11.11 Spurious emissions radiated below 30 MHz

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace mode:	Max Hold
Measured modulation	☒ DSSS b – mode ☒ OFDM g – mode ☐ OFDM n HT20 – mode ☐ OFDM n HT40 – mode
Test setup:	See sub clause 6.2 – B
Measurement uncertainty	See sub clause 8

Limits:

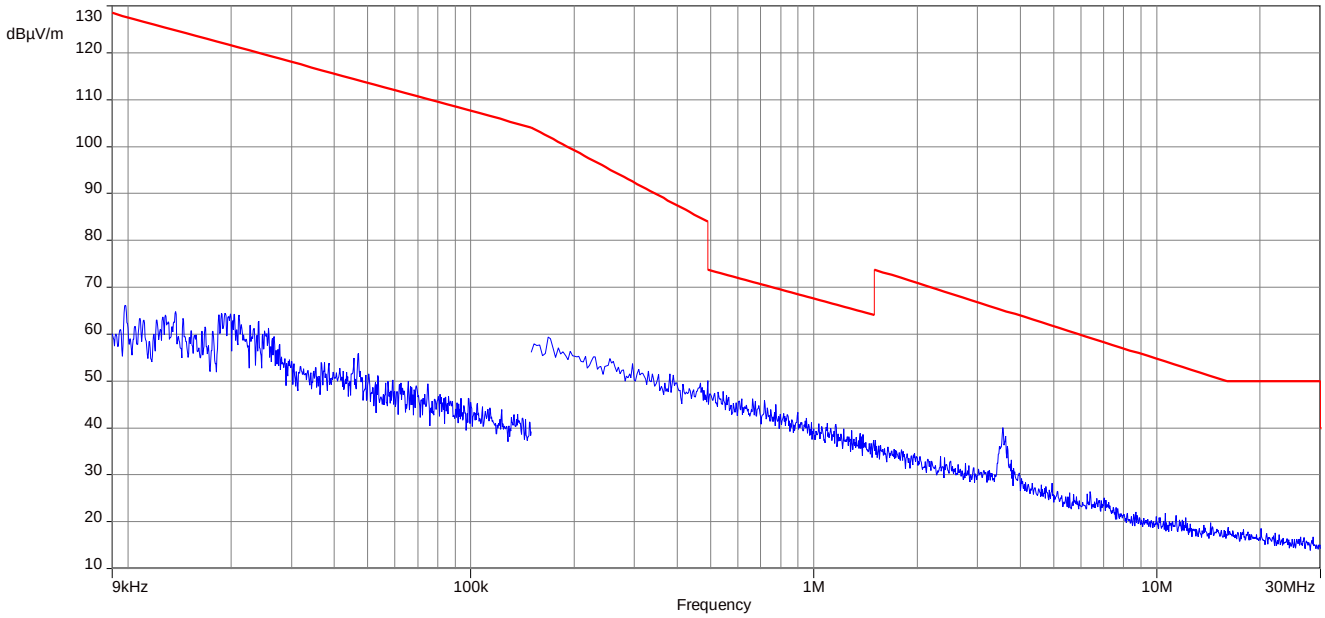
FCC		IC
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Results:

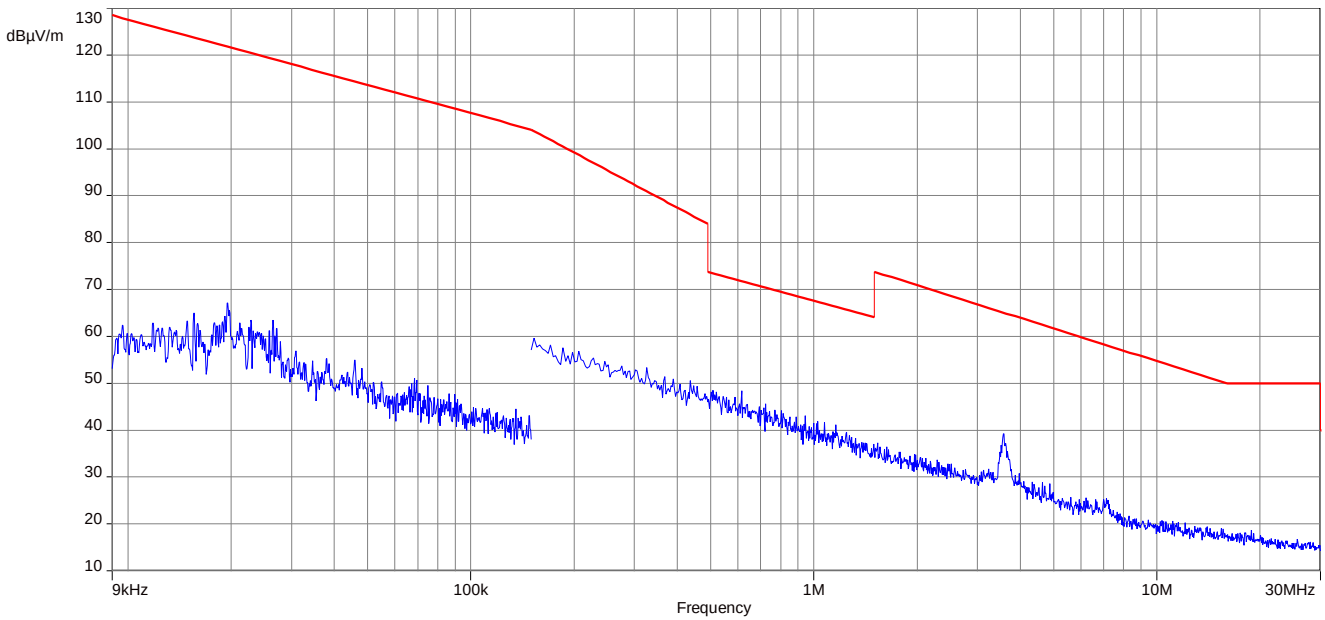
TX Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
All detected peaks are more than 20 dB below the limit.		

Plots: DSSS – ANT0

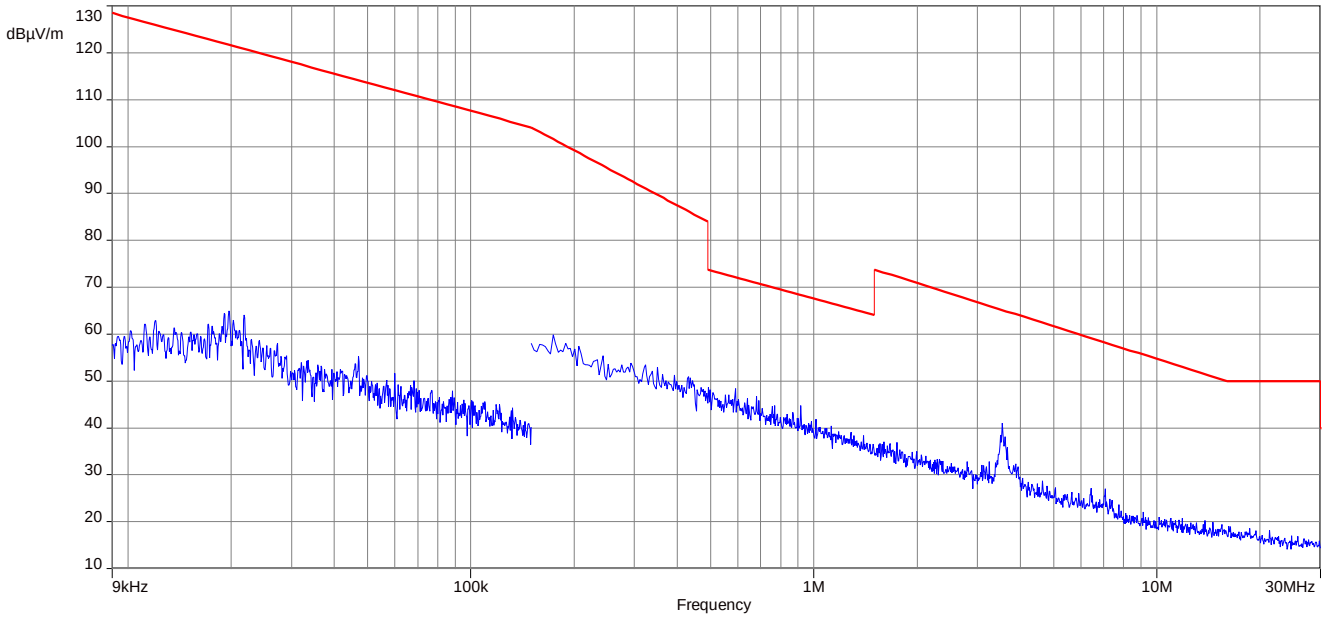
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel

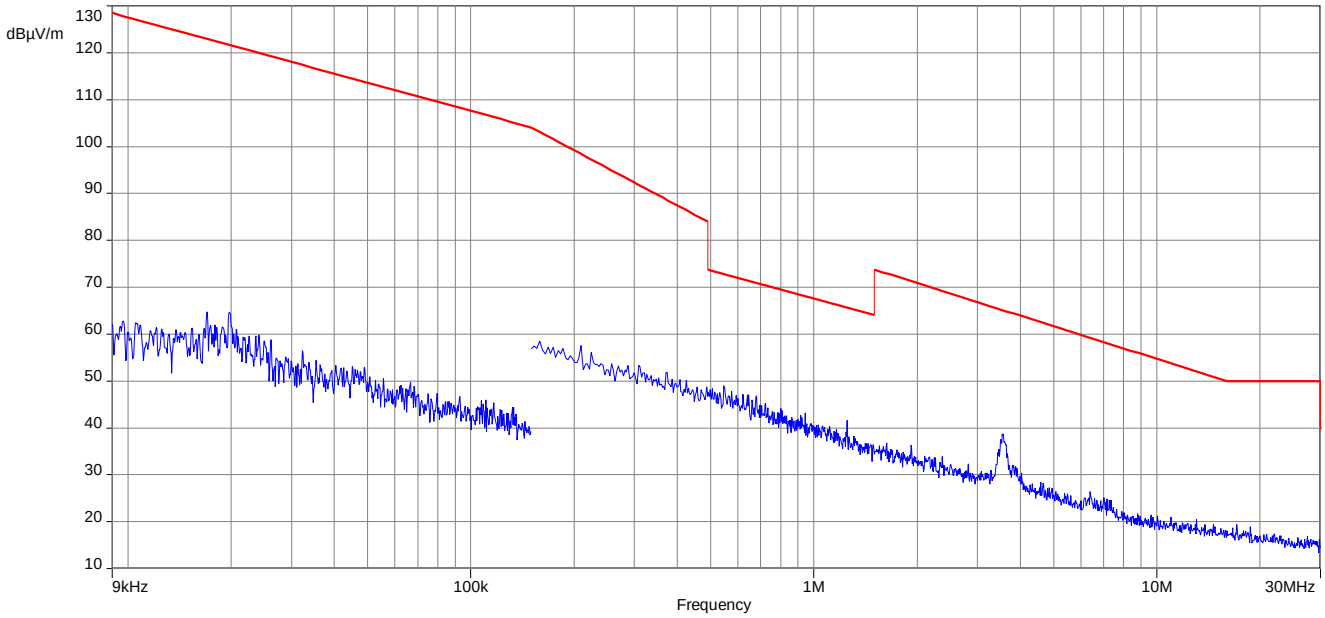


Plot 3: 9 kHz to 30 MHz, high channel

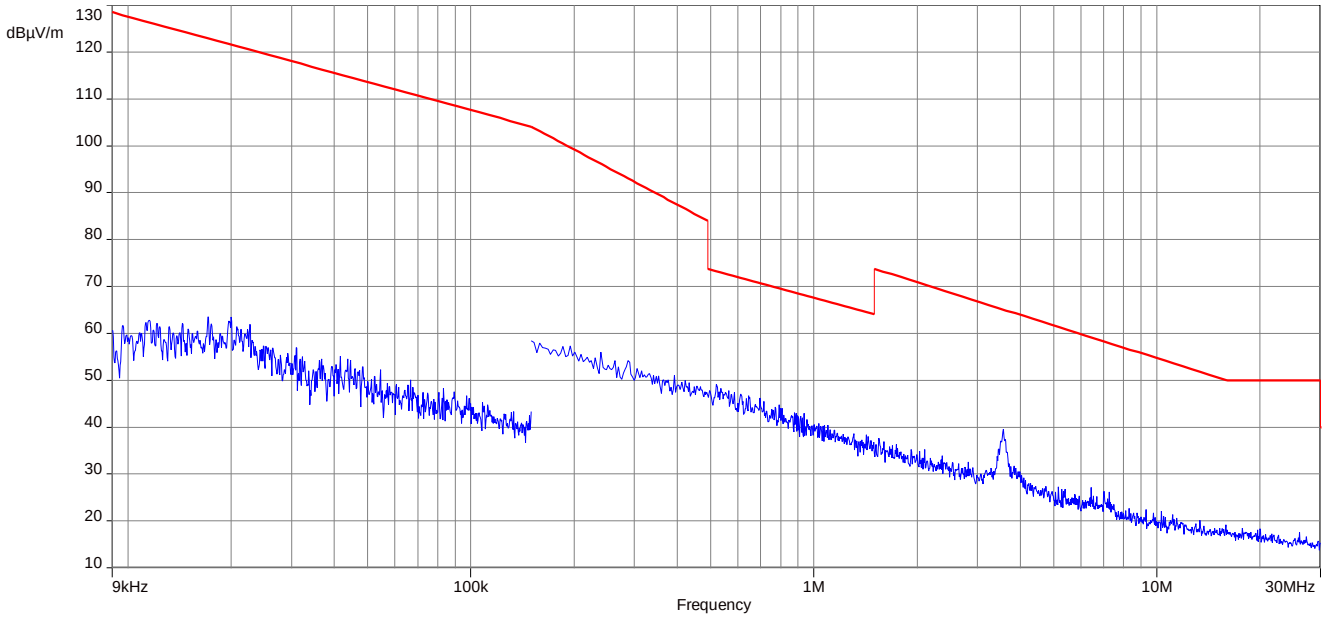


Plots: OFDM (20 MHz bandwidth) – ANT0

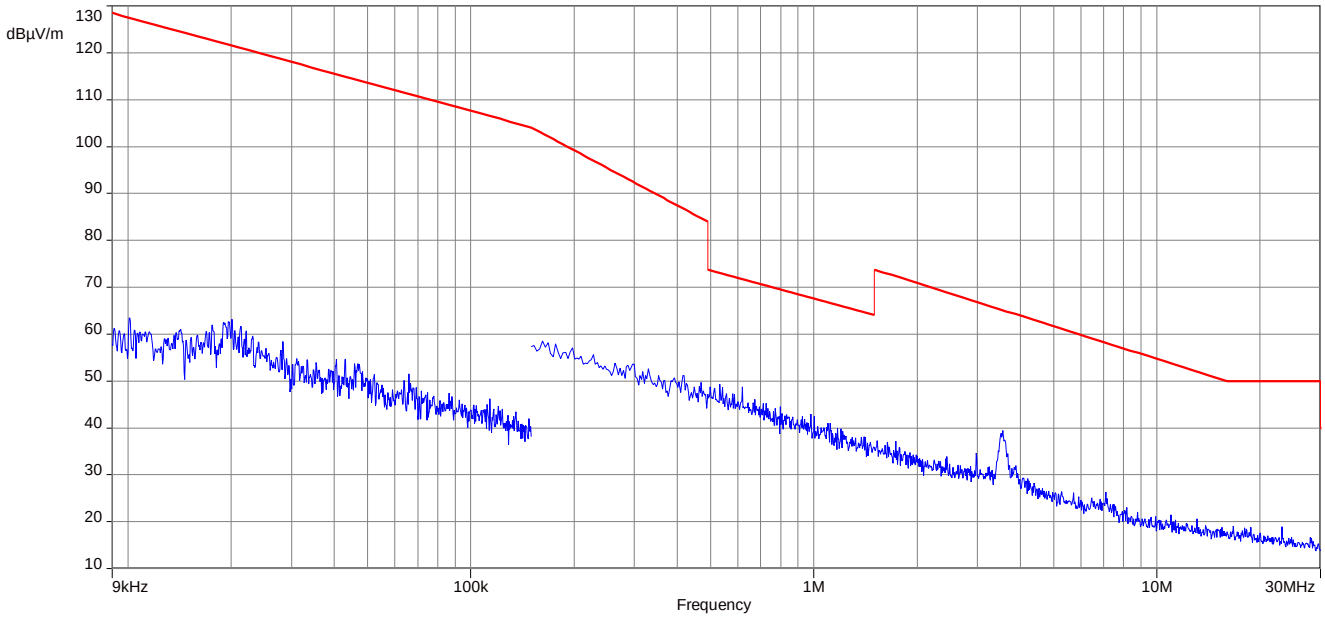
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel

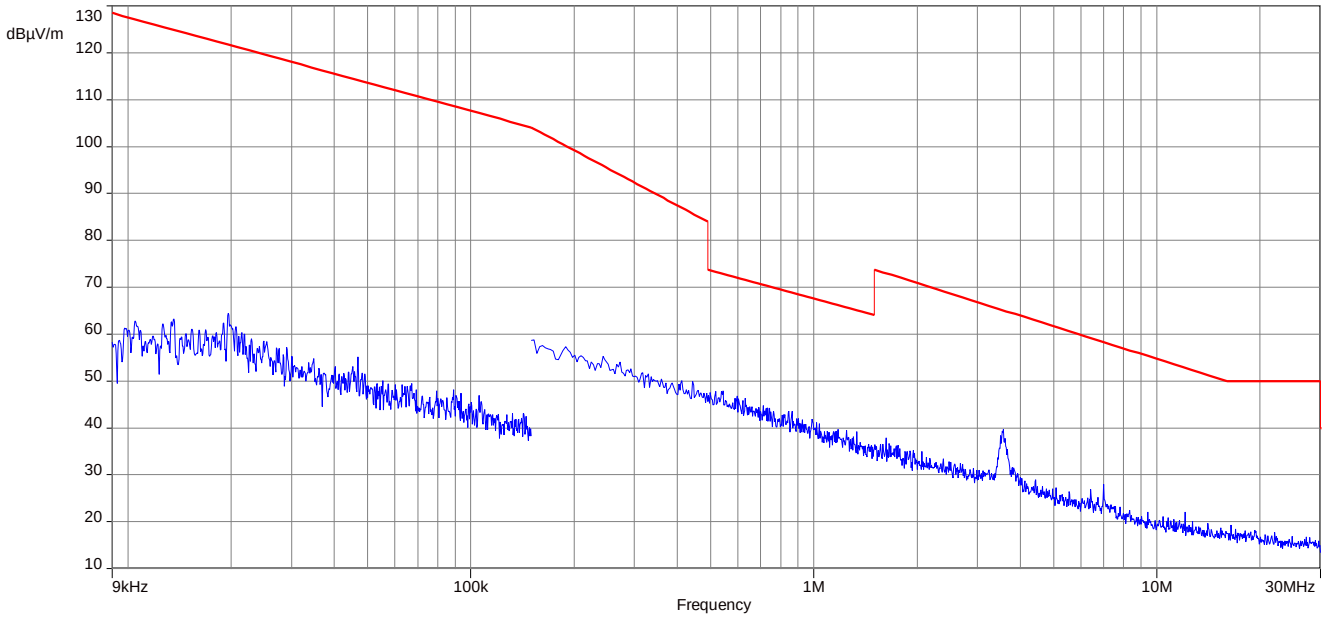


Plot 3: 9 kHz to 30 MHz, high channel

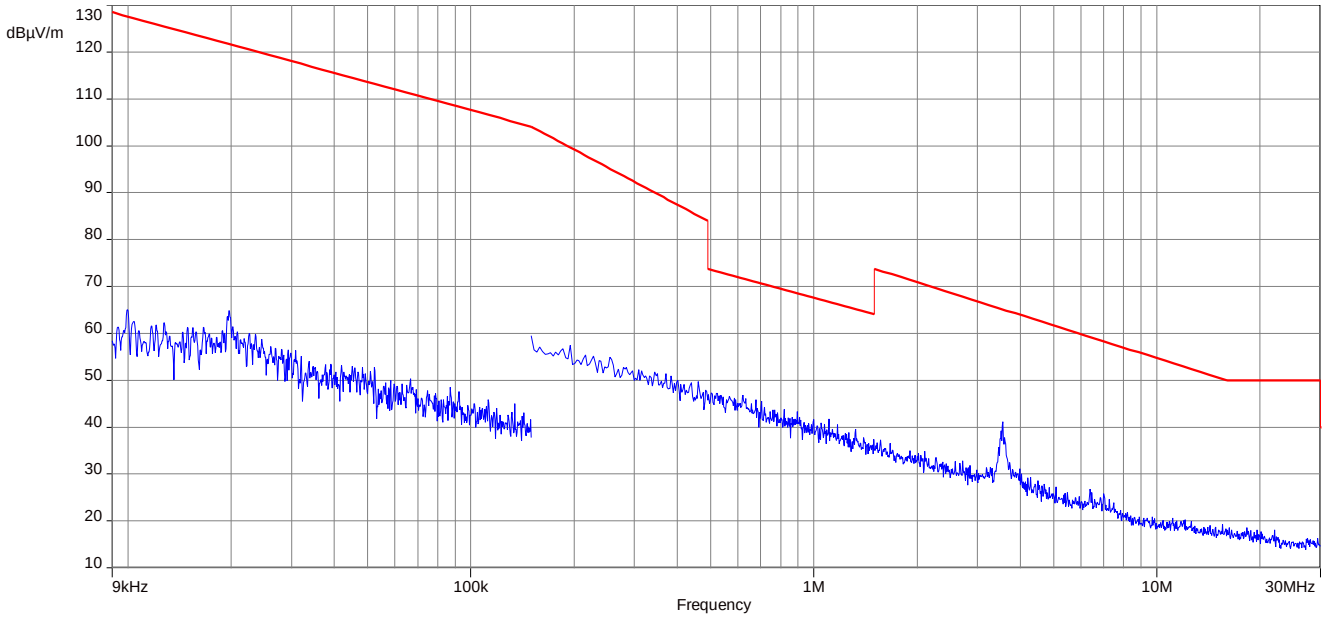


Plots: DSSS – ANT1 – TE2118309-X Rev E

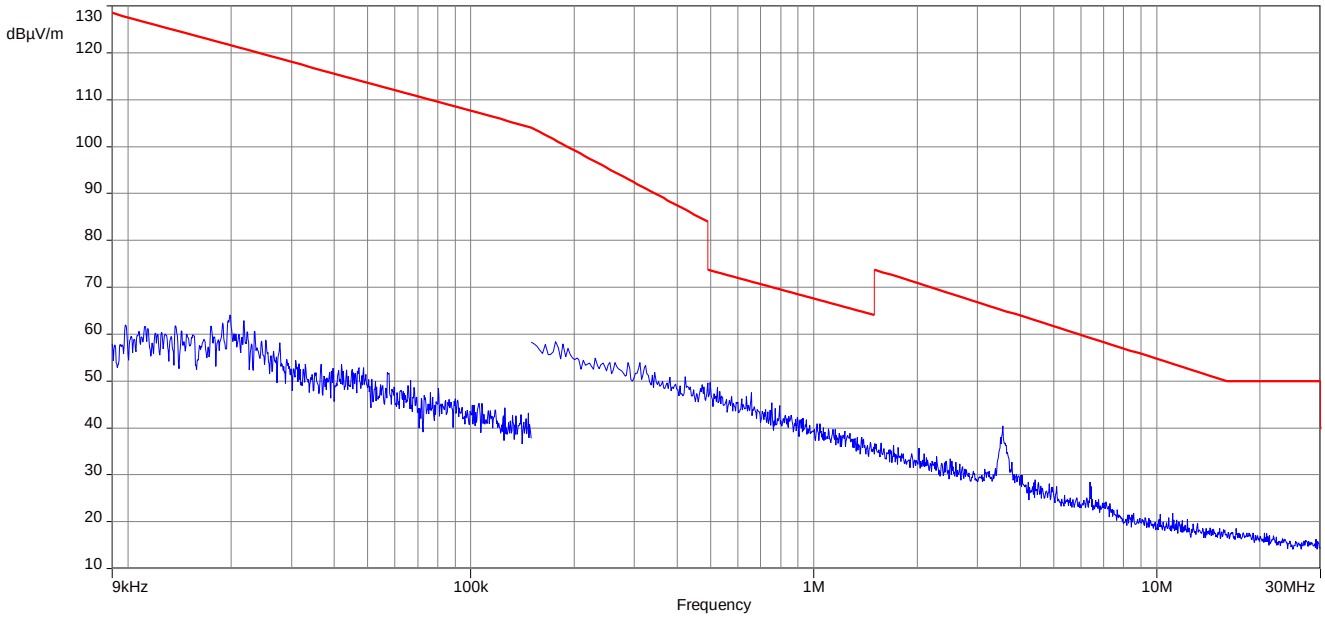
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel

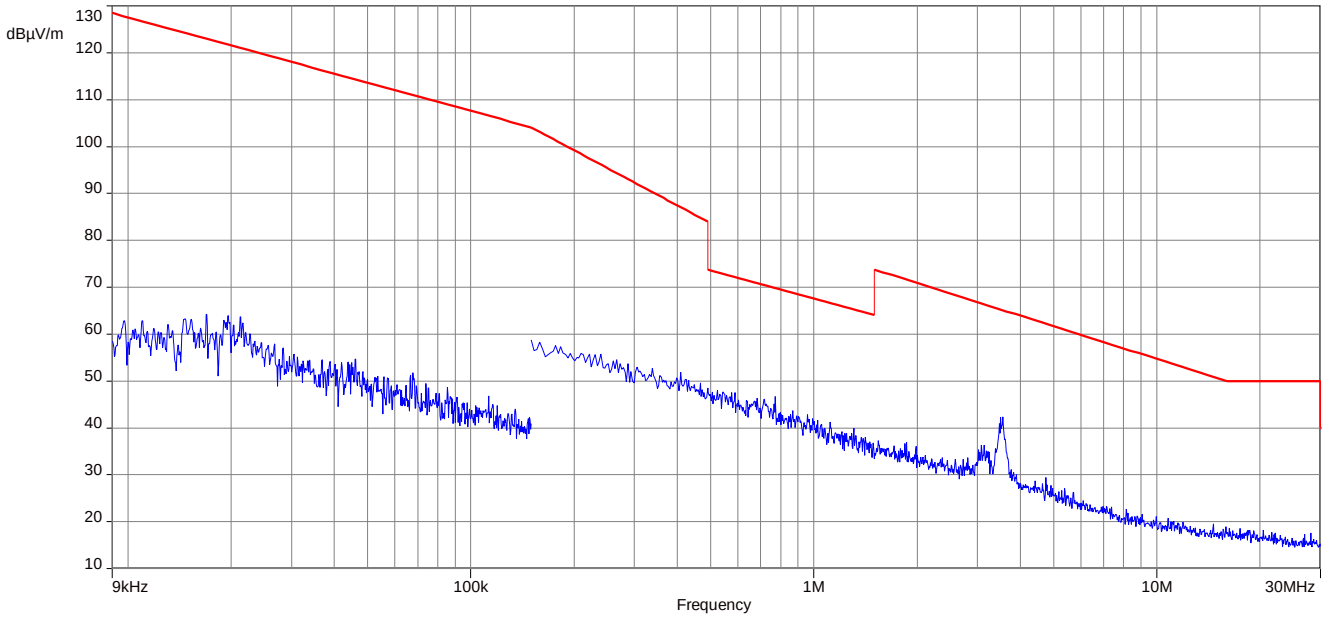


Plot 3: 9 kHz to 30 MHz, high channel

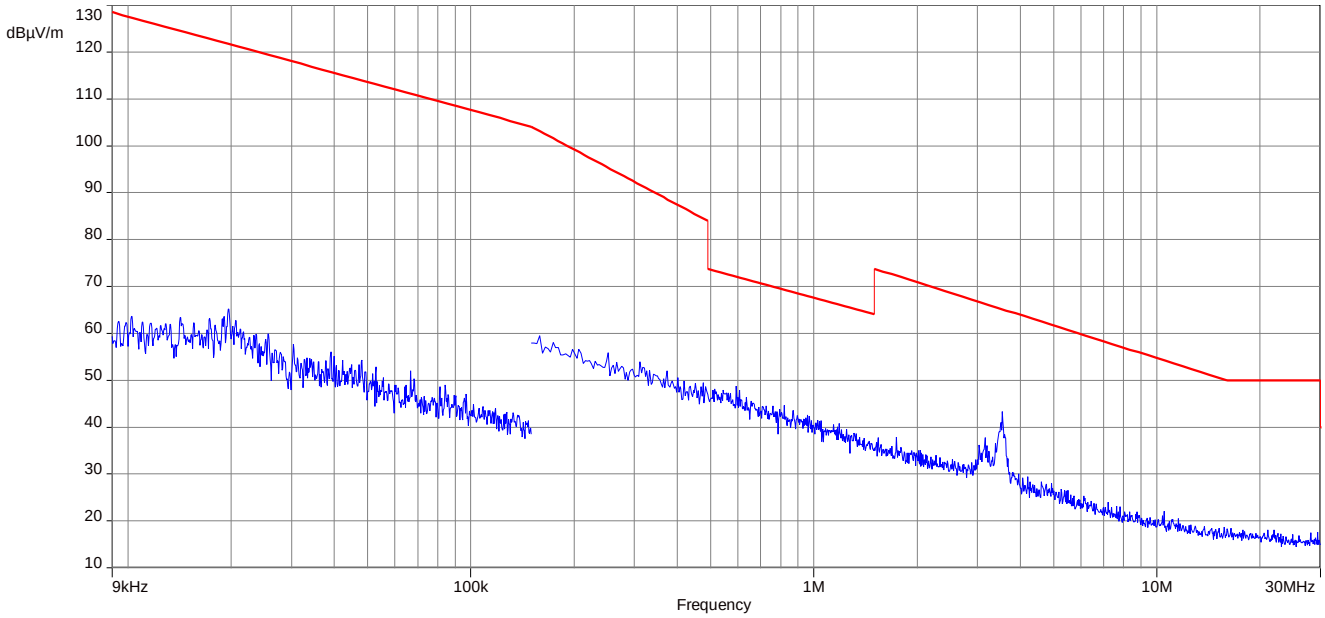


Plots: OFDM (20 MHz bandwidth) – ANT1 – TE2118309-X Rev E

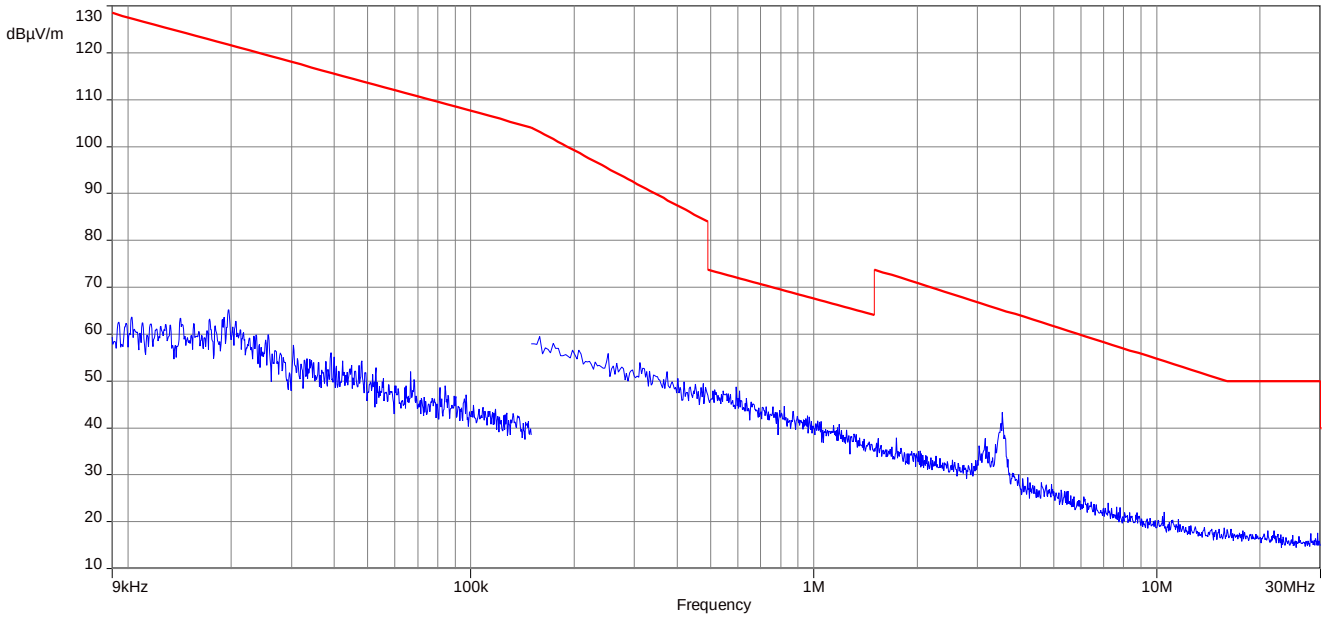
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel

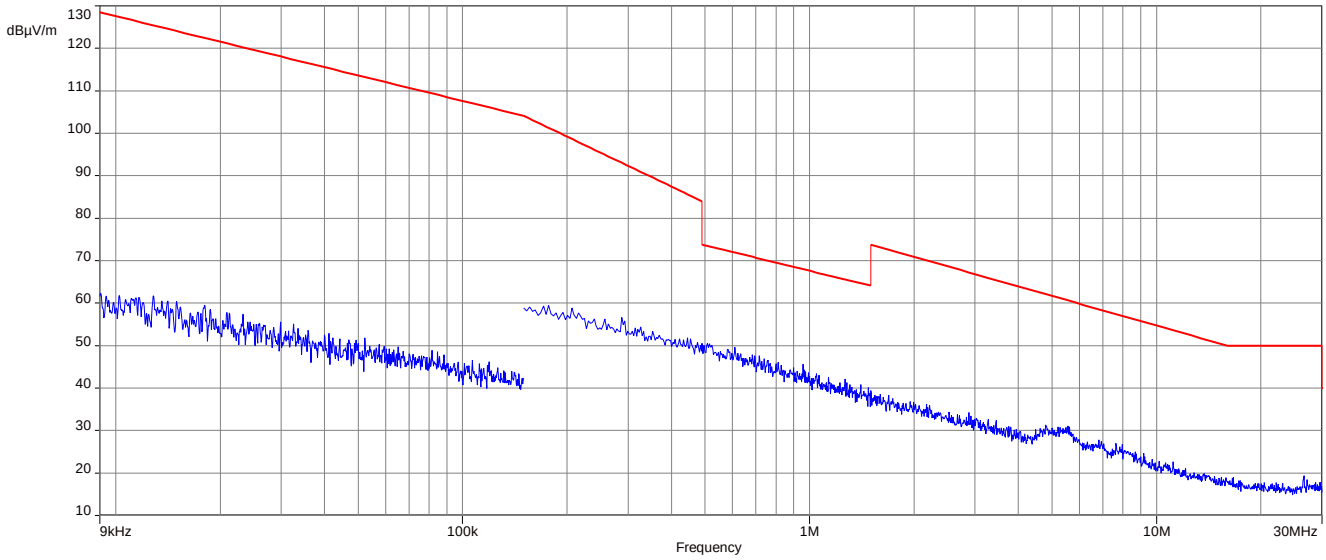


Plot 3: 9 kHz to 30 MHz, high channel

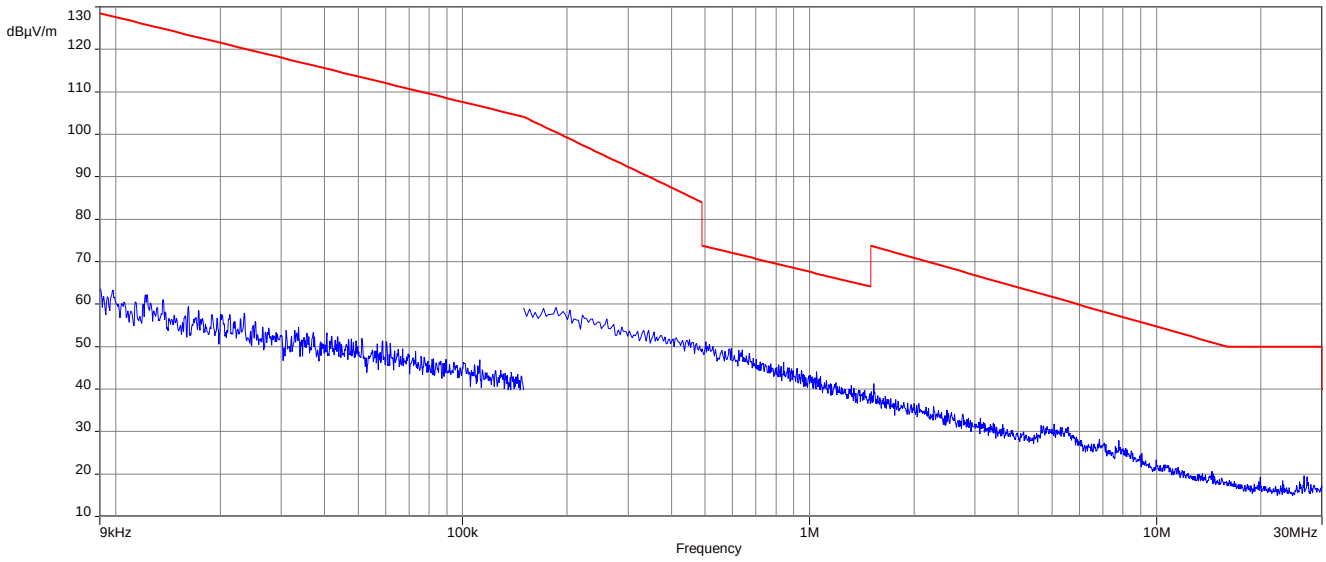


Plots: DSSS – ANT1 – N12-3071-R0A

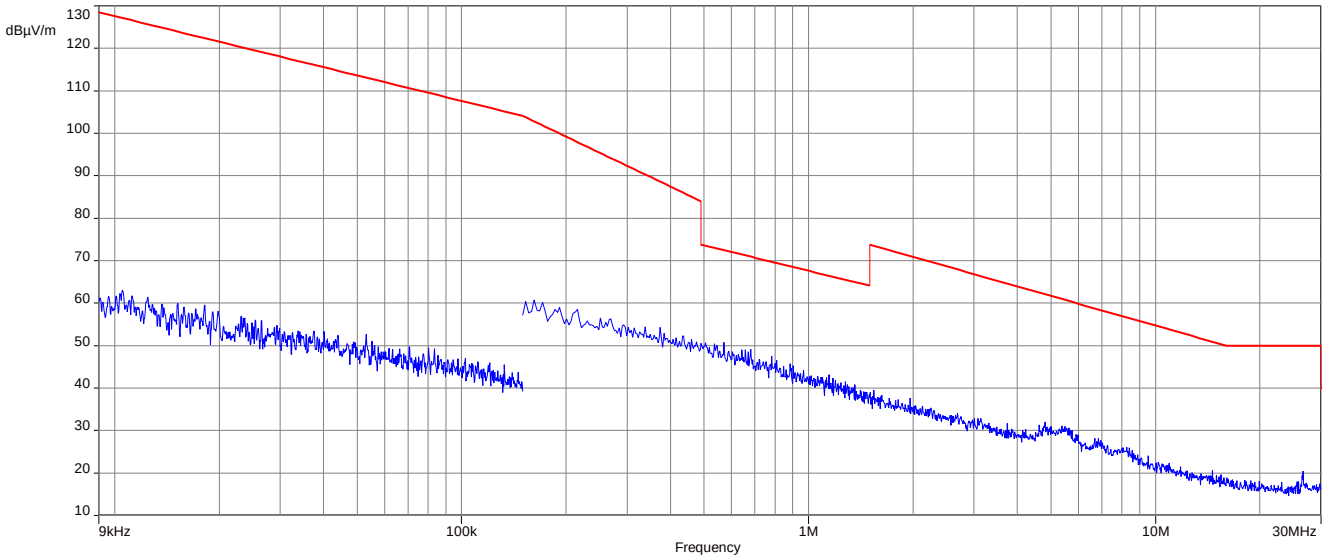
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel

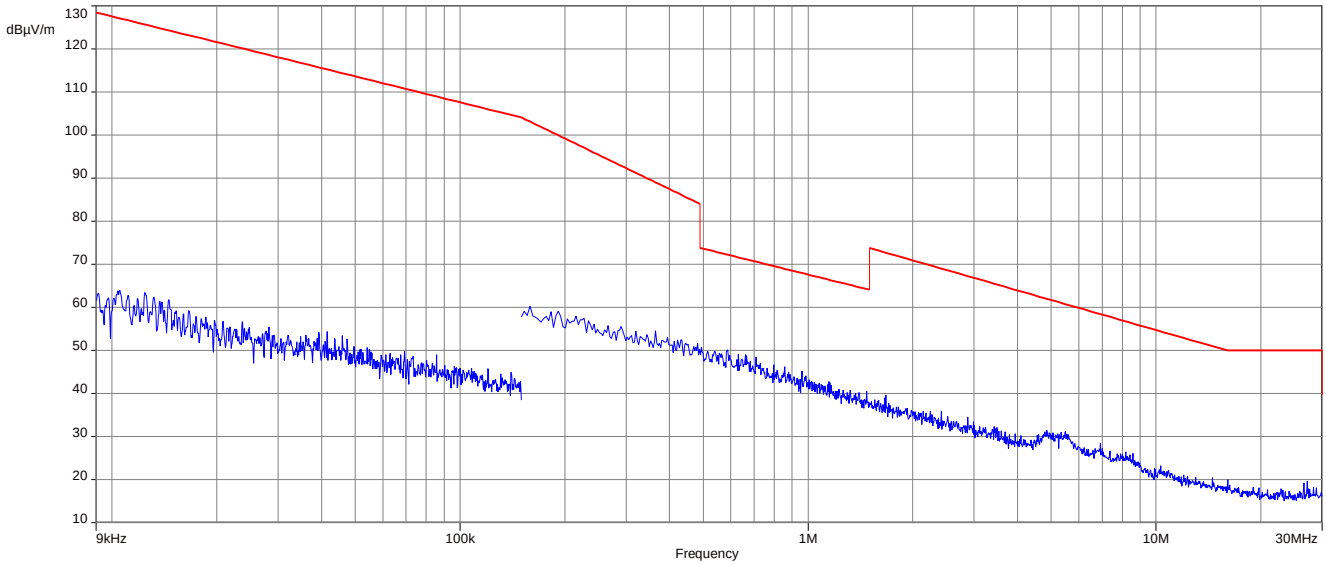


Plot 3: 9 kHz to 30 MHz, high channel

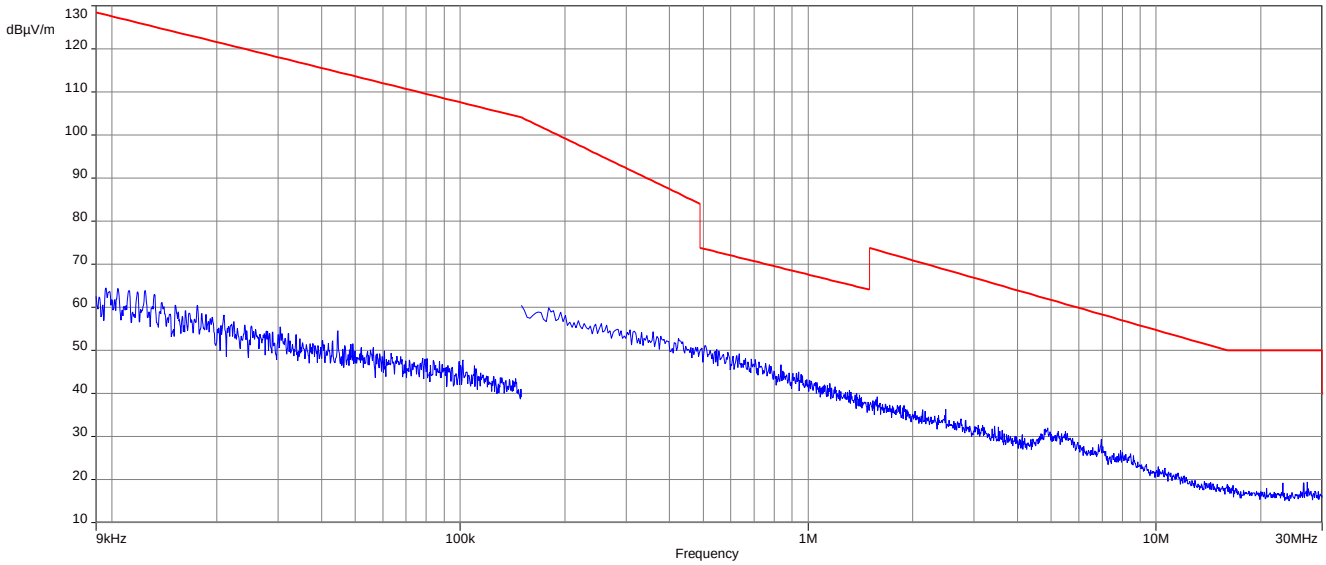


Plots: OFDM (20 MHz bandwidth) – ANT1 – N12-3071-R0A

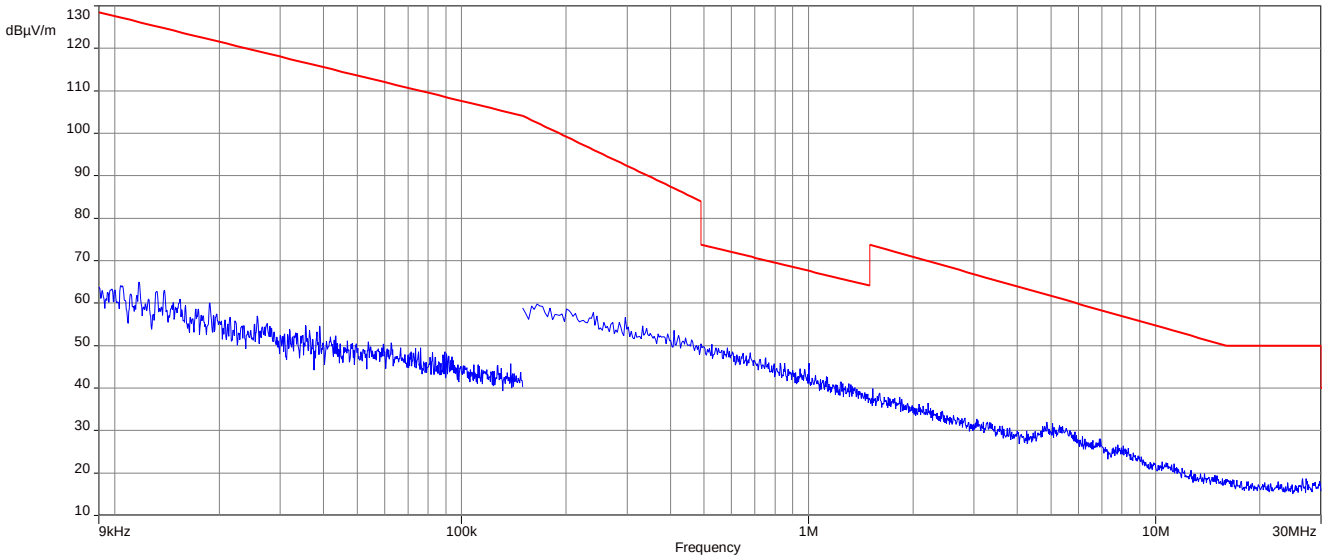
Plot 1: 9 kHz to 30 MHz, low channel



Plot 2: 9 kHz to 30 MHz, mid channel



Plot 3: 9 kHz to 30 MHz, high channel



11.12 Spurious emissions radiated 30 MHz to 1 GHz

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Resolution bandwidth:	120 kHz
Video bandwidth:	3 x RBW
Span:	30 MHz to 1 GHz
Trace mode:	Max Hold
Measured modulation	☒ DSSS b – mode ☒ OFDM g – mode ☐ OFDM n HT20 – mode ☐ OFDM n HT40 – mode ☒ RX / Idle – mode
Test setup:	See sub clause 6.1 – A
Measurement uncertainty	See sub clause 8

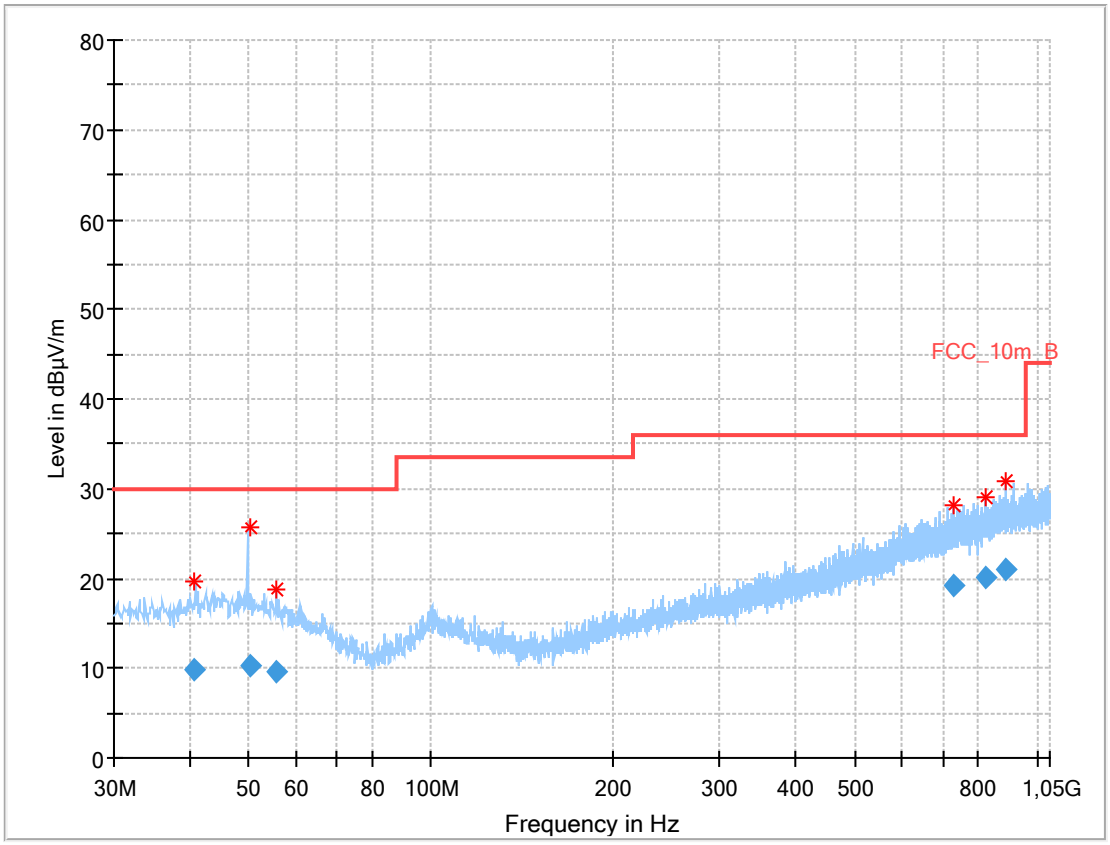
The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

Limits:

FCC	IC	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10

Plot: DSSS - ANT0

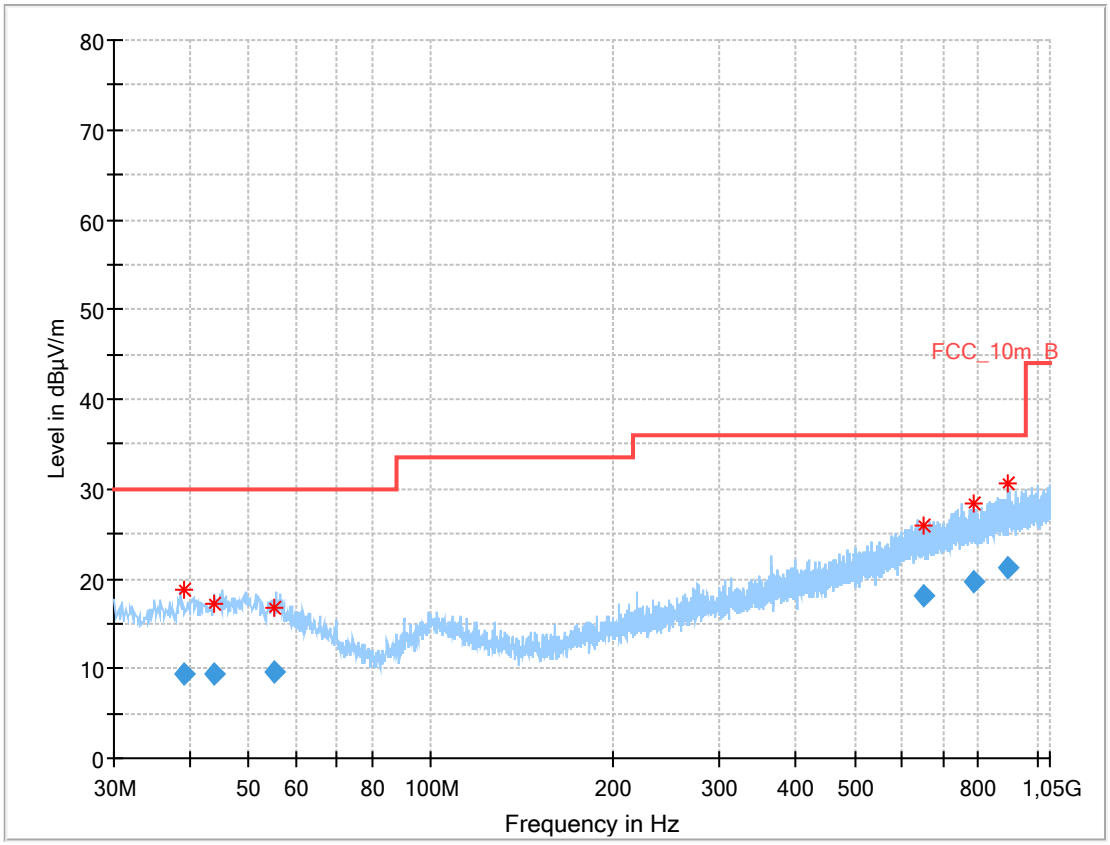
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.581900	9.88	30.00	20.12	1000.0	120.000	98.0	H	-8.0	13.3
50.245500	10.27	30.00	19.73	1000.0	120.000	170.0	V	280.0	13.7
55.401300	9.50	30.00	20.50	1000.0	120.000	170.0	V	190.0	13.0
726.118050	19.25	36.00	16.75	1000.0	120.000	170.0	V	10.0	22.2
821.736450	20.16	36.00	15.84	1000.0	120.000	100.0	V	-8.0	23.1
889.794450	21.07	36.00	14.93	1000.0	120.000	101.0	H	-8.0	24.1

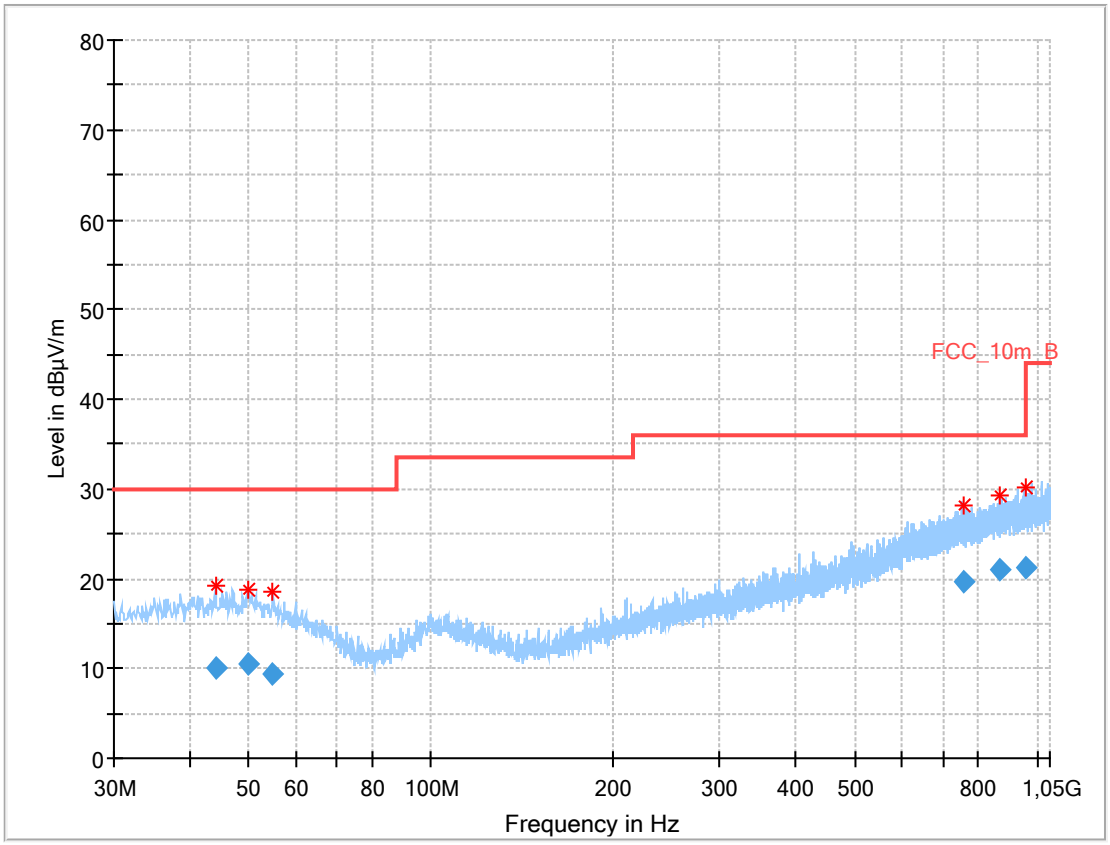
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
39.094050	9.29	30.00	20.71	1000.0	120.000	101.0	V	100.0	13.1
43.914600	9.37	30.00	20.63	1000.0	120.000	170.0	H	82.0	13.5
55.075950	9.51	30.00	20.49	1000.0	120.000	98.0	V	190.0	13.1
648.659850	18.17	36.00	17.83	1000.0	120.000	170.0	V	10.0	21.1
786.051450	19.67	36.00	16.33	1000.0	120.000	170.0	H	82.0	22.7
896.423250	21.18	36.00	14.82	1000.0	120.000	101.0	V	190.0	24.1

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

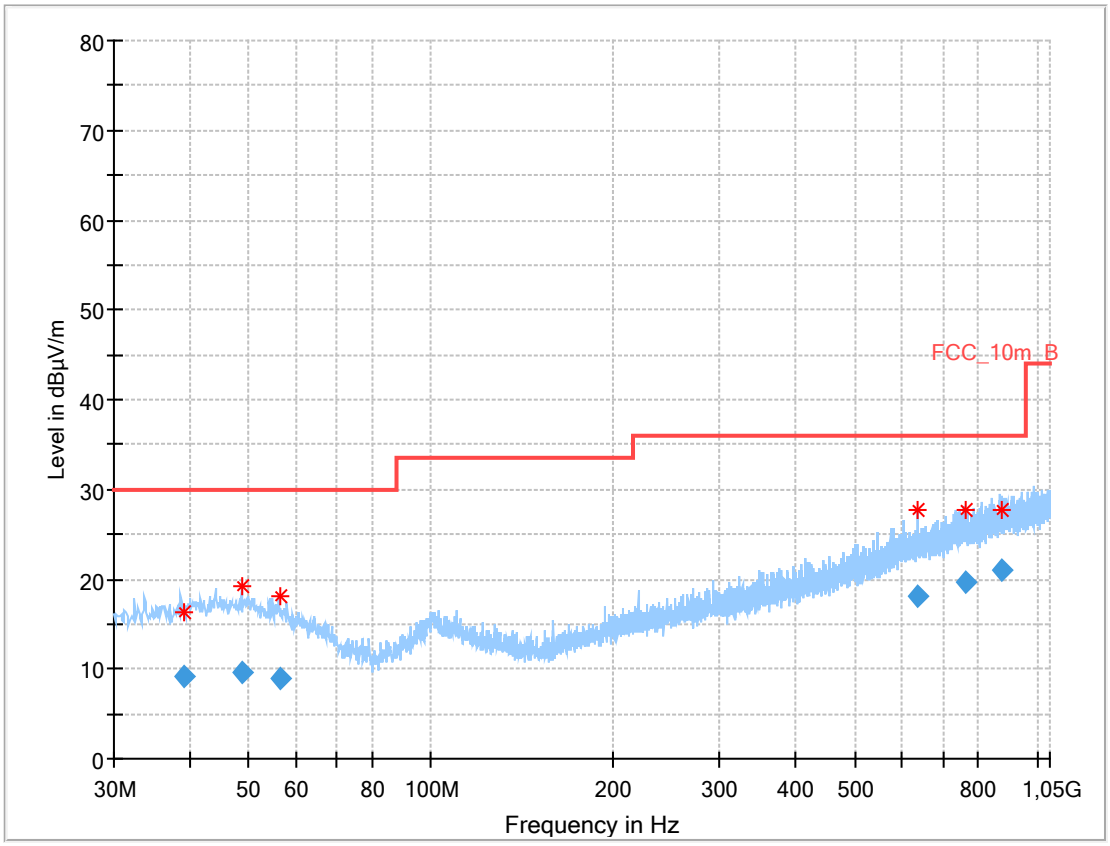


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
44.355450	9.99	30.00	20.01	1000.0	120.000	98.0	V	280.0	13.6
49.940250	10.57	30.00	19.43	1000.0	120.000	170.0	V	262.0	13.7
54.642600	9.31	30.00	20.69	1000.0	120.000	170.0	H	171.0	13.1
754.444200	19.69	36.00	16.31	1000.0	120.000	101.0	V	100.0	22.7
866.727450	21.08	36.00	14.92	1000.0	120.000	170.0	V	190.0	23.8
958.524000	21.28	36.00	14.72	1000.0	120.000	100.0	H	81.0	24.4

Plot: OFDM (20 MHz bandwidth / g-mode) – ANT0

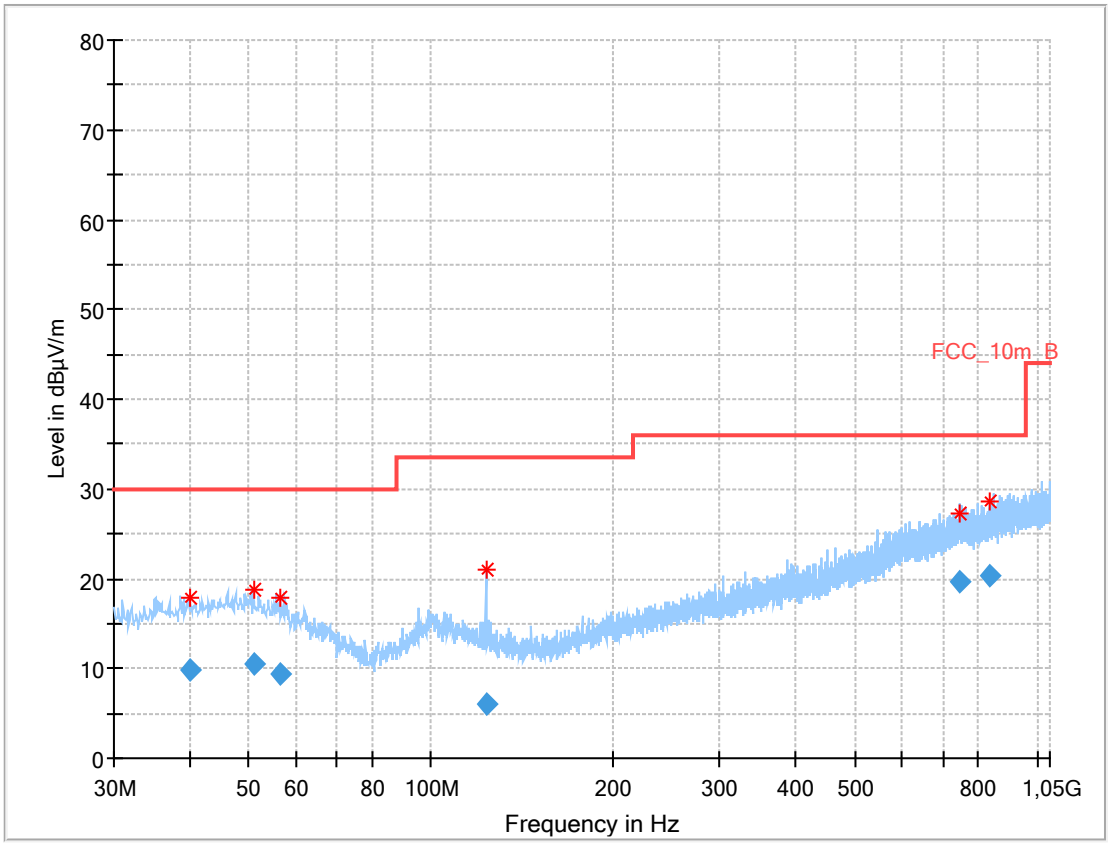
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
39.138150	9.23	30.00	20.77	1000.0	120.000	170.0	H	-8.0	13.1
48.702600	9.66	30.00	20.34	1000.0	120.000	101.0	V	280.0	13.7
56.646750	9.04	30.00	20.96	1000.0	120.000	100.0	H	-8.0	12.7
637.173450	18.05	36.00	17.95	1000.0	120.000	170.0	V	280.0	21.0
761.355000	19.66	36.00	16.34	1000.0	120.000	170.0	H	190.0	22.7
877.638750	21.07	36.00	14.93	1000.0	120.000	101.0	V	-10.0	23.9

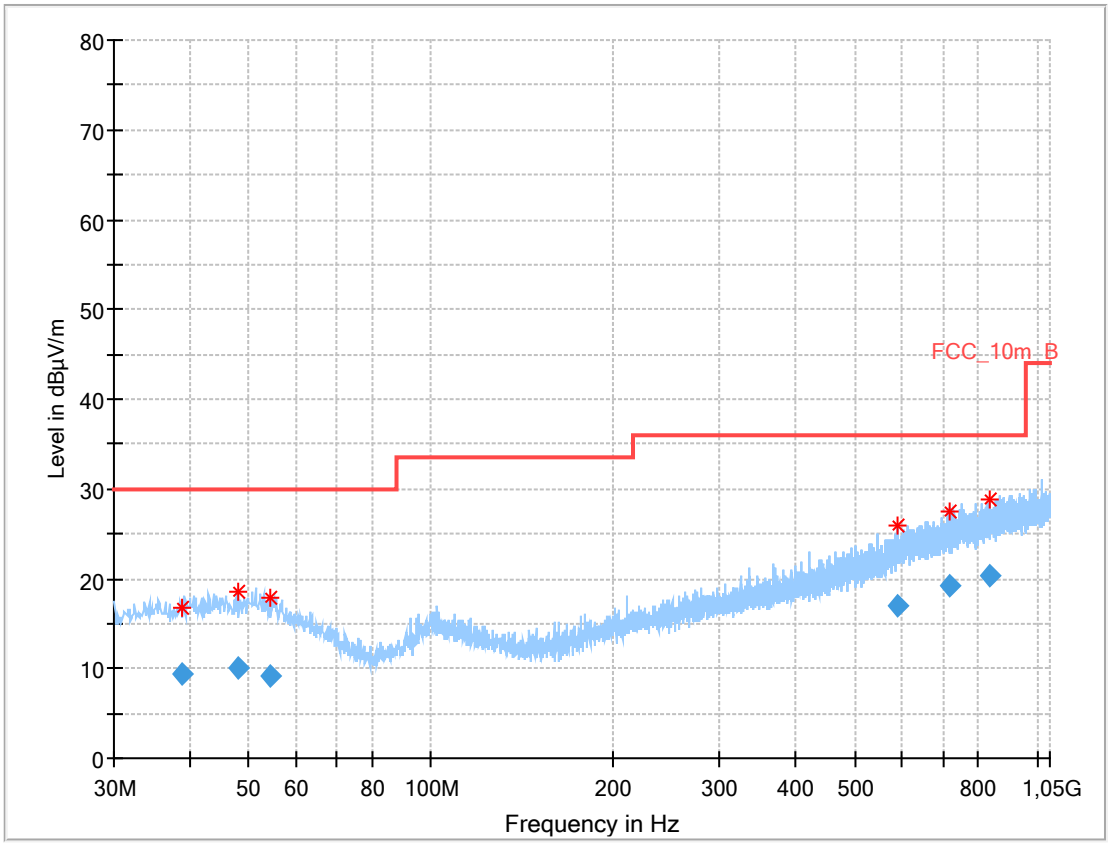
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.156050	9.83	30.00	20.17	1000.0	120.000	170.0	H	10.0	13.2
51.087600	10.46	30.00	19.54	1000.0	120.000	101.0	V	-8.0	13.6
56.334450	9.34	30.00	20.66	1000.0	120.000	98.0	V	-8.0	12.8
123.560700	6.07	33.50	27.43	1000.0	120.000	100.0	V	80.0	10.0
747.784950	19.72	36.00	16.28	1000.0	120.000	170.0	H	80.0	22.7
837.979800	20.43	36.00	15.57	1000.0	120.000	170.0	V	10.0	23.3

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

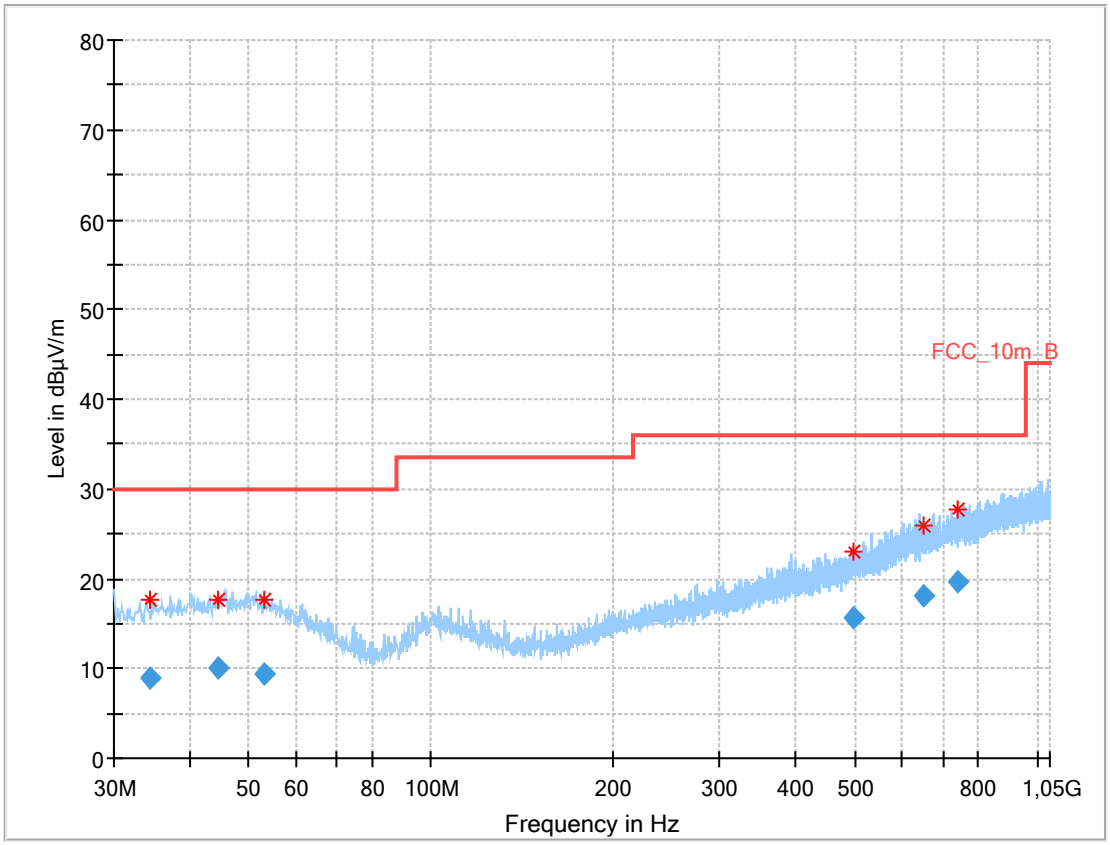


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.791200	9.29	30.00	20.71	1000.0	120.000	100.0	V	263.0	13.1
48.034350	9.95	30.00	20.05	1000.0	120.000	101.0	V	10.0	13.7
54.333600	9.25	30.00	20.75	1000.0	120.000	100.0	V	170.0	13.2
587.080050	16.97	36.00	19.03	1000.0	120.000	100.0	H	-10.0	20.4
720.112800	19.16	36.00	16.84	1000.0	120.000	101.0	V	100.0	22.0
834.929400	20.38	36.00	15.62	1000.0	120.000	98.0	H	80.0	23.3

Plot: DSSS – ANT1 – TE2118309-X Rev E

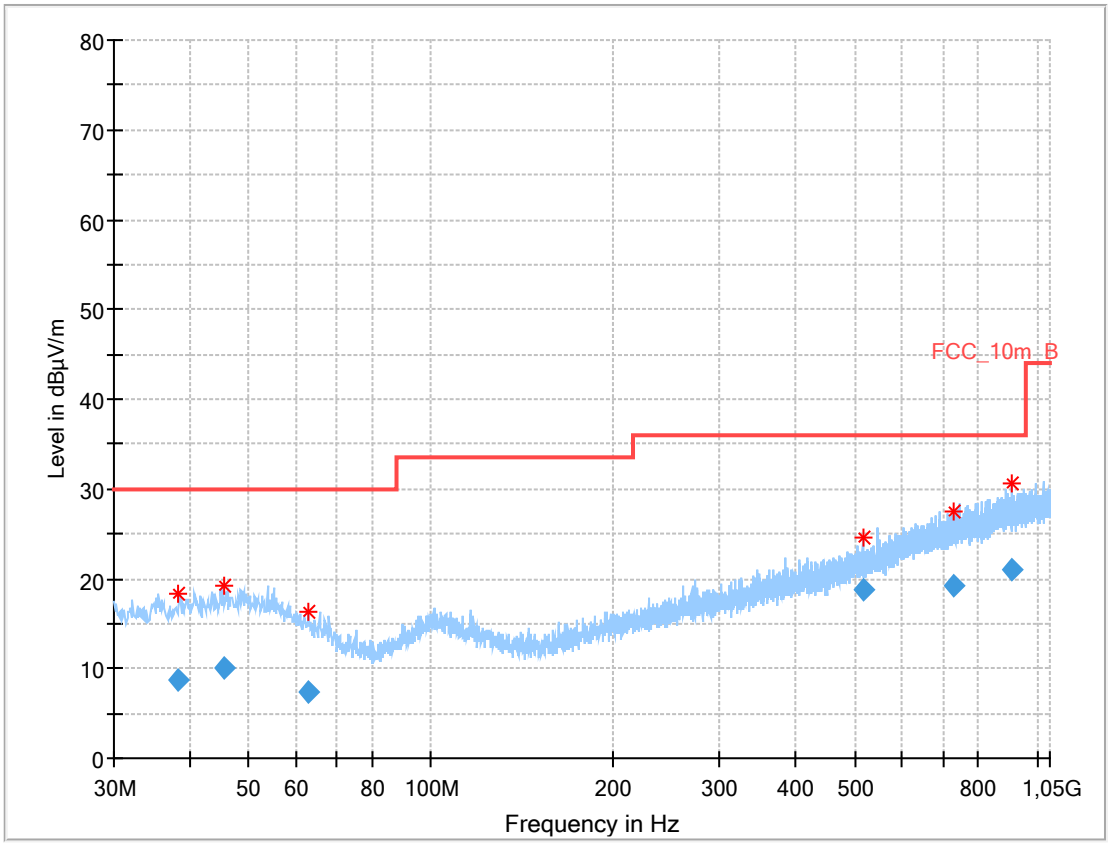
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
34.351500	8.95	30.00	21.05	1000.0	120.000	179.0	V	321.0	12.6
44.709450	9.98	30.00	20.02	1000.0	120.000	178.0	H	103.0	13.6
52.941000	9.33	30.00	20.67	1000.0	120.000	98.0	V	328.0	13.4
499.168800	15.68	36.00	20.32	1000.0	120.000	178.0	V	231.0	18.7
647.721900	18.19	36.00	17.81	1000.0	120.000	100.0	V	155.0	21.1
740.015700	19.60	36.00	16.40	1000.0	120.000	98.0	H	292.0	22.5

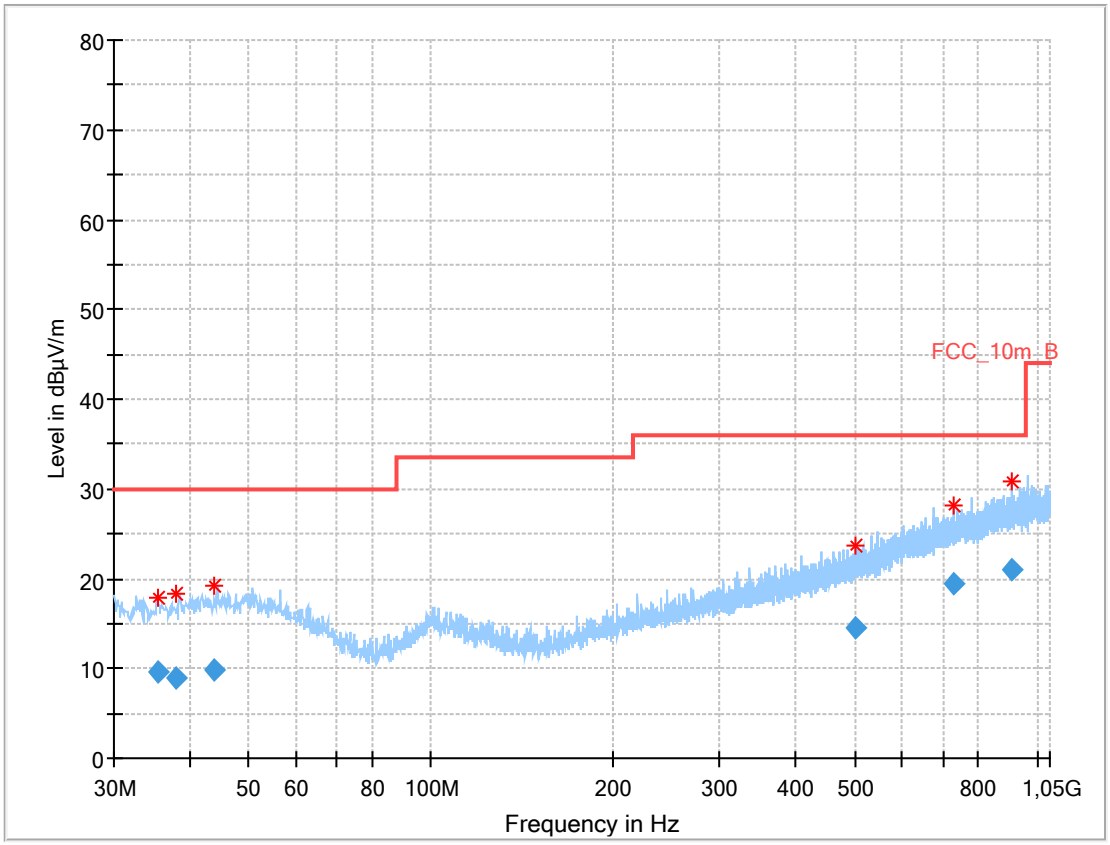
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.156100	8.63	30.00	21.37	1000.0	120.000	178.0	H	197.0	13.0
45.493950	10.15	30.00	19.85	1000.0	120.000	185.0	H	313.0	13.6
62.959050	7.41	30.00	22.59	1000.0	120.000	101.0	H	350.0	11.2
515.419500	18.76	36.00	17.24	1000.0	120.000	101.0	H	197.0	18.9
727.330500	19.30	36.00	16.70	1000.0	120.000	98.0	H	40.0	22.2
912.044100	21.08	36.00	14.92	1000.0	120.000	185.0	H	40.0	24.2

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

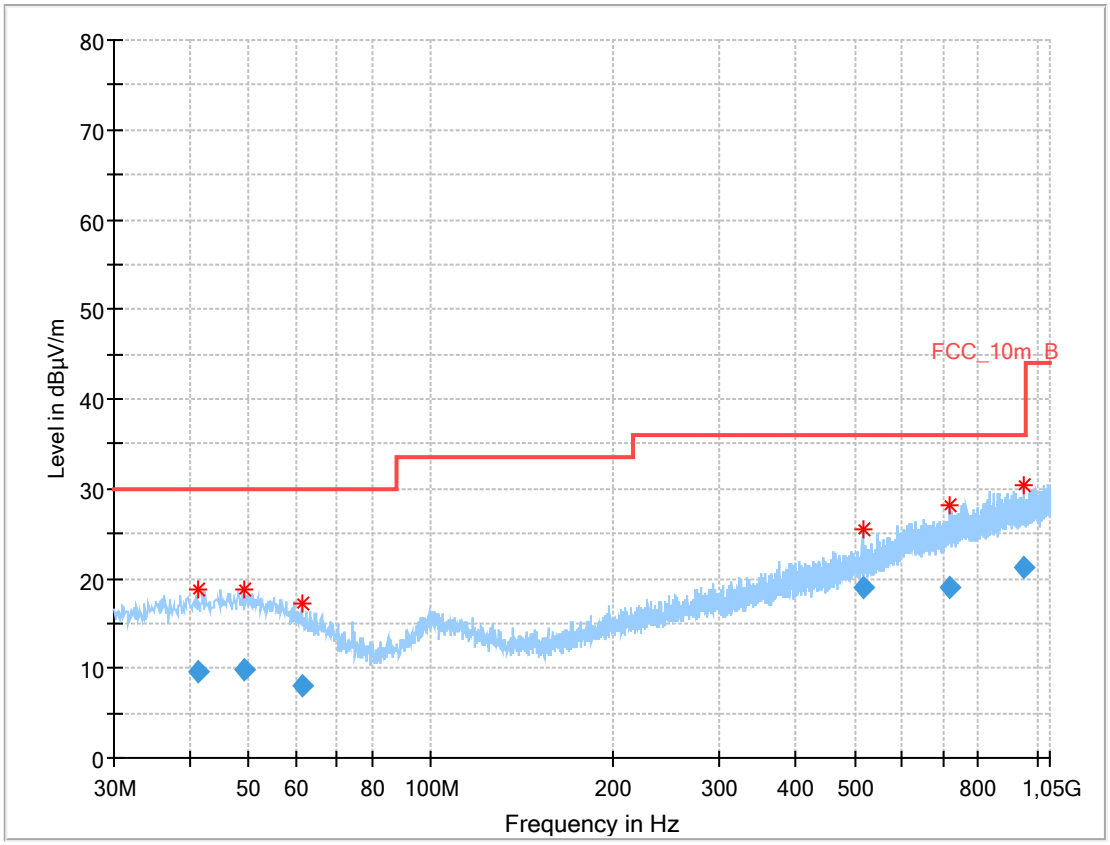


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.413200	9.66	30.00	20.34	1000.0	120.000	101.0	V	353.0	12.7
37.951050	8.88	30.00	21.12	1000.0	120.000	178.0	V	49.0	13.0
44.048850	9.77	30.00	20.23	1000.0	120.000	101.0	V	192.0	13.6
503.499300	14.61	36.00	21.39	1000.0	120.000	185.0	H	96.0	18.8
728.891850	19.39	36.00	16.61	1000.0	120.000	185.0	H	320.0	22.2
911.132550	21.09	36.00	14.91	1000.0	120.000	98.0	H	299.0	24.2

Plot: OFDM (20 MHz bandwidth / g-mode) – ANT1 – TE2118309-X Rev E

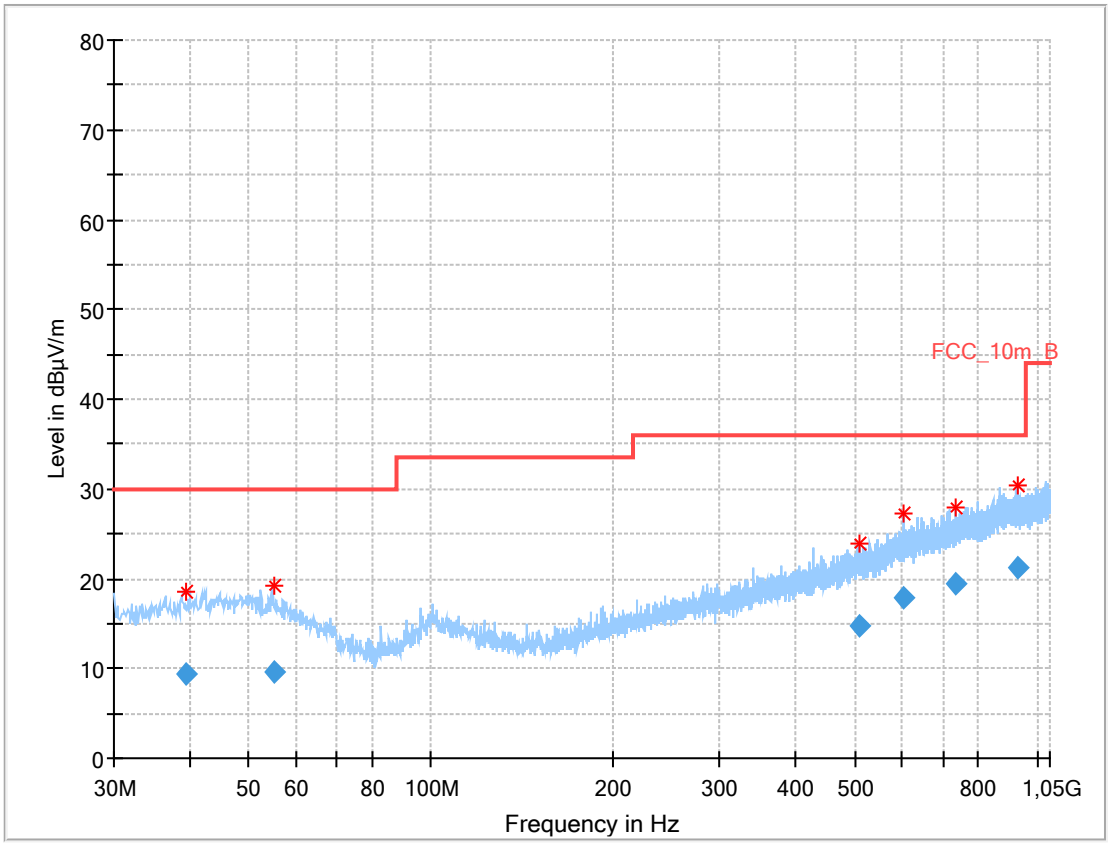
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.431350	9.67	30.00	20.33	1000.0	120.000	101.0	V	33.0	13.3
49.041600	9.82	30.00	20.18	1000.0	120.000	185.0	V	328.0	13.7
61.562100	8.10	30.00	21.90	1000.0	120.000	98.0	H	120.0	11.5
515.387100	18.97	36.00	17.03	1000.0	120.000	101.0	H	53.0	18.9
716.529600	19.00	36.00	17.00	1000.0	120.000	185.0	V	215.0	21.9
951.668700	21.26	36.00	14.74	1000.0	120.000	101.0	V	3.0	24.4

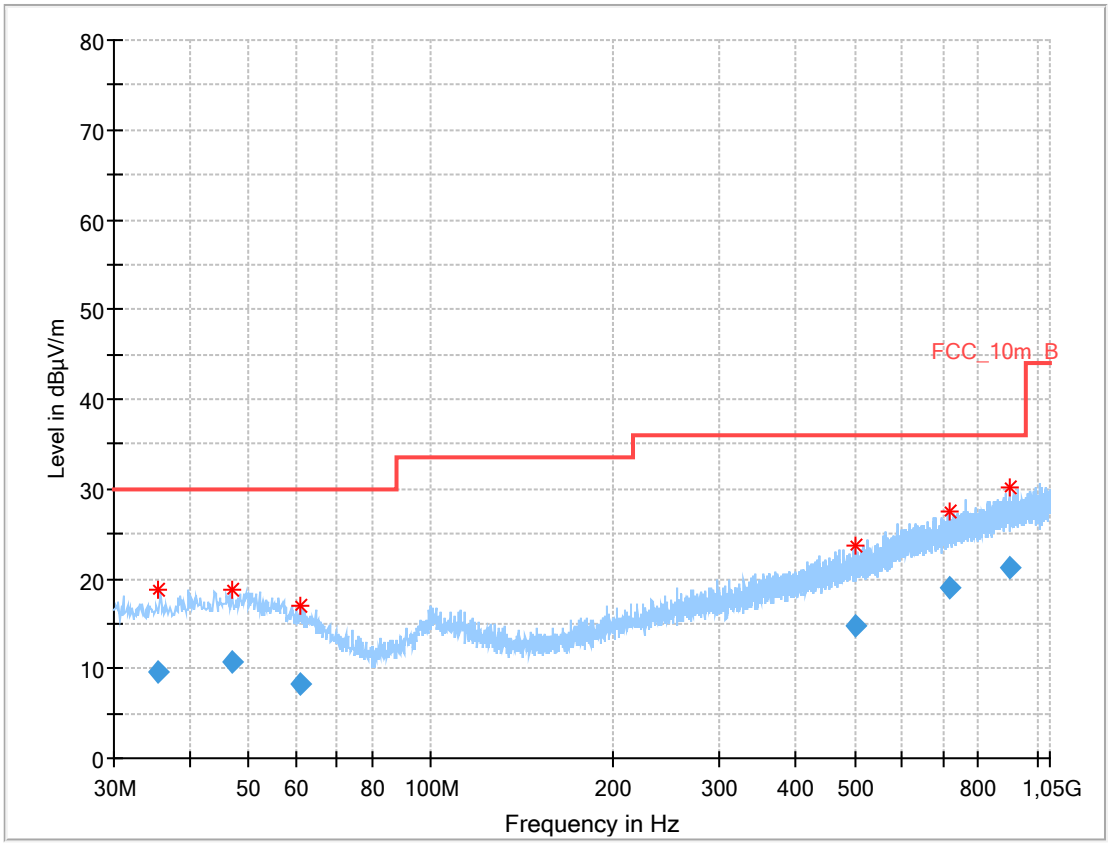
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
39.483300	9.42	30.00	20.58	1000.0	120.000	98.0	H	306.0	13.2
55.338750	9.52	30.00	20.48	1000.0	120.000	185.0	V	106.0	13.0
510.267600	14.74	36.00	21.26	1000.0	120.000	101.0	H	188.0	18.8
603.826200	17.88	36.00	18.12	1000.0	120.000	98.0	H	152.0	20.8
734.396700	19.42	36.00	16.58	1000.0	120.000	98.0	V	135.0	22.4
929.062800	21.13	36.00	14.87	1000.0	120.000	185.0	V	246.0	24.3

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

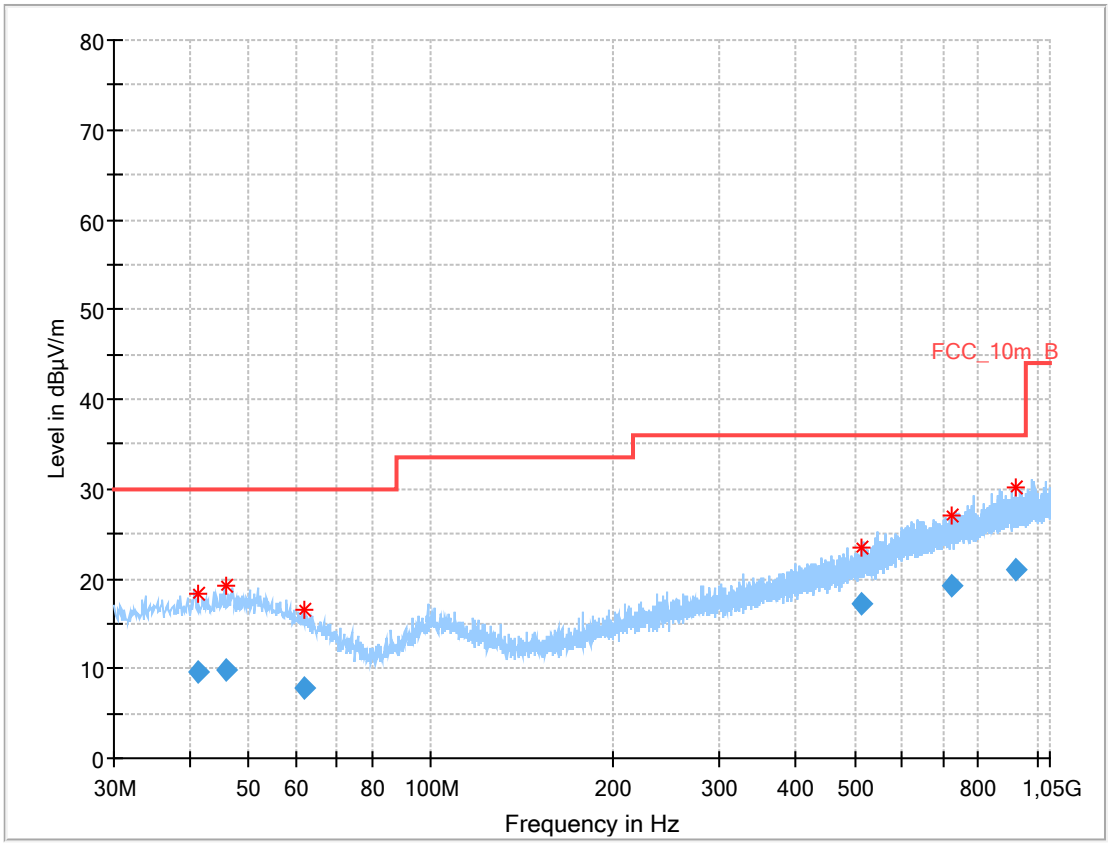


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35.586000	9.57	30.00	20.43	1000.0	120.000	178.0	V	29.0	12.7
46.984650	10.80	30.00	19.20	1000.0	120.000	185.0	V	29.0	13.7
60.997800	8.21	30.00	21.79	1000.0	120.000	98.0	H	321.0	11.6
501.307500	14.73	36.00	21.27	1000.0	120.000	185.0	H	208.0	18.7
715.869600	19.07	36.00	16.93	1000.0	120.000	98.0	V	90.0	21.9
903.692550	21.19	36.00	14.81	1000.0	120.000	98.0	V	321.0	24.2

Plot: DSSS – ANT1 – N12-3071-R0A

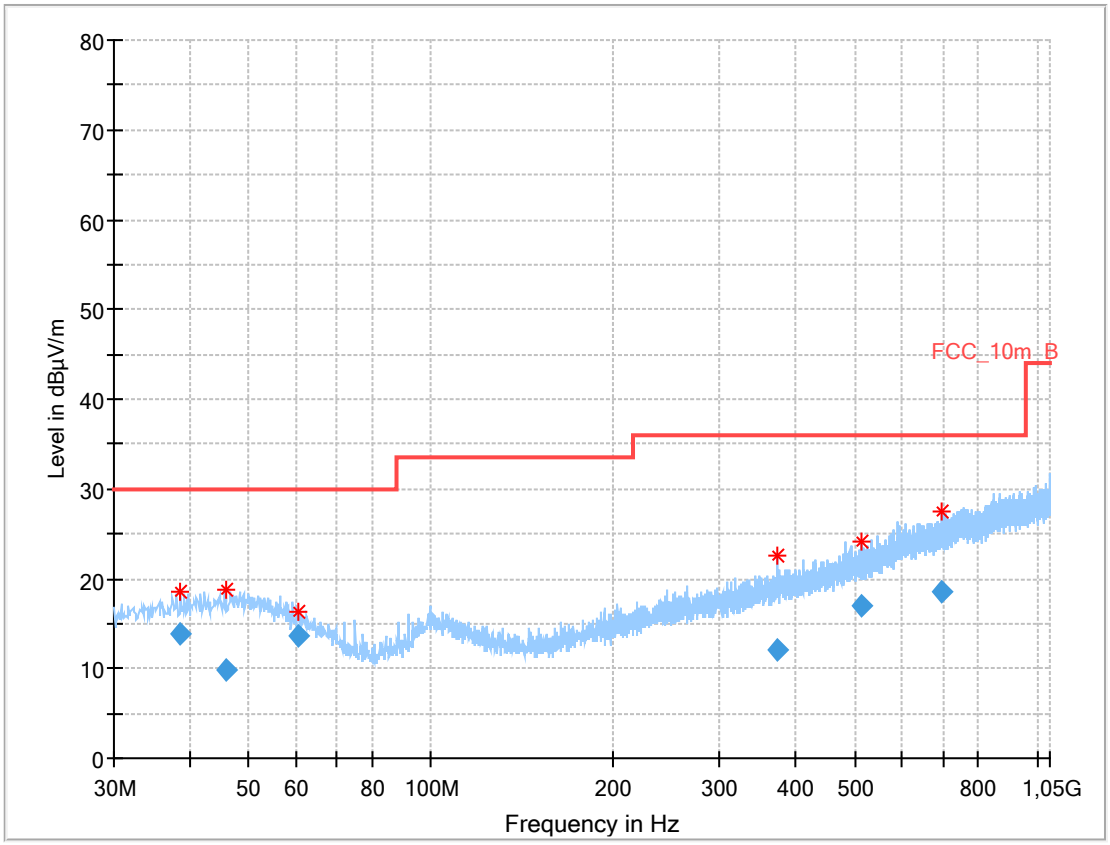
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.263500	9.68	30.00	20.32	1000.0	120.000	178.0	V	73.0	13.3
46.082700	9.78	30.00	20.22	1000.0	120.000	101.0	H	143.0	13.7
61.806750	7.80	30.00	22.20	1000.0	120.000	185.0	H	113.0	11.5
512.018700	17.13	36.00	18.87	1000.0	120.000	98.0	V	259.0	18.9
725.733150	19.18	36.00	16.82	1000.0	120.000	185.0	H	342.0	22.2
921.732750	21.09	36.00	14.91	1000.0	120.000	101.0	V	73.0	24.3

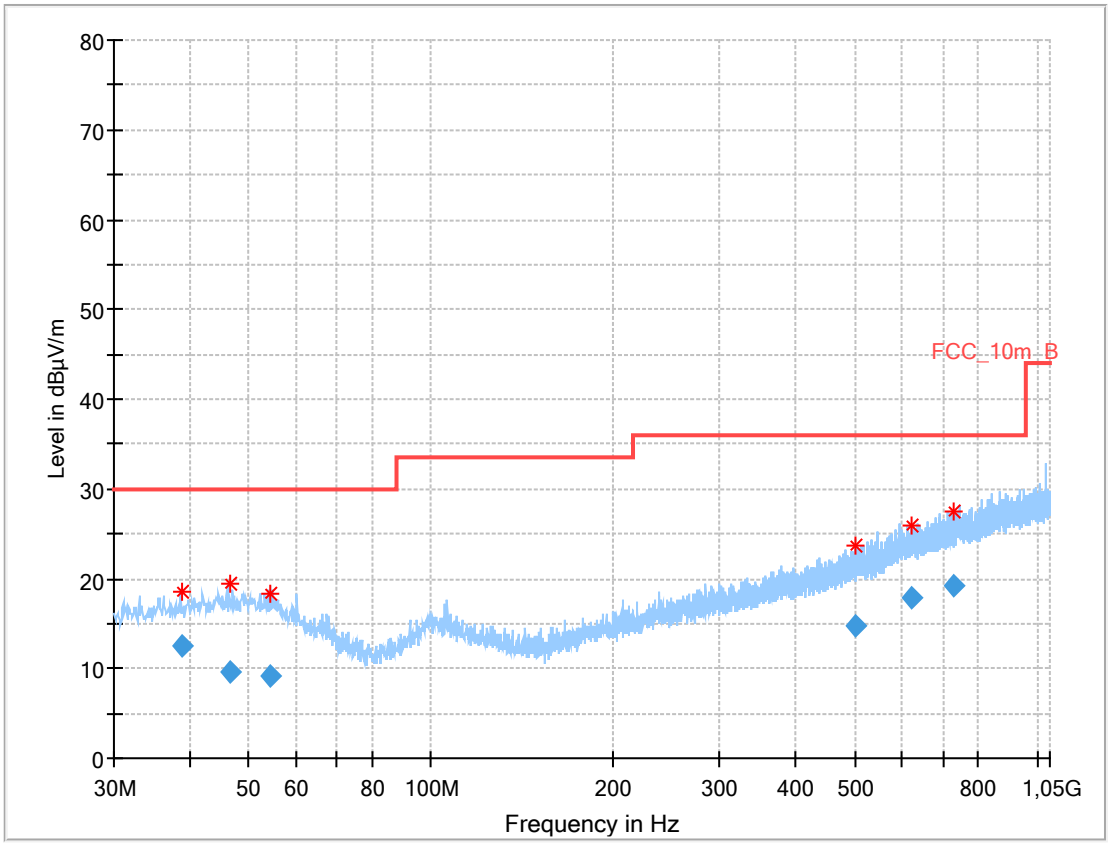
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.691450	13.77	30.00	16.23	1000.0	120.000	100.0	V	160.0	13.1
45.787800	9.85	30.00	20.15	1000.0	120.000	101.0	H	11.0	13.6
60.507000	13.68	30.00	16.32	1000.0	120.000	101.0	V	192.0	11.7
373.557600	12.15	36.00	23.85	1000.0	120.000	101.0	V	215.0	16.4
511.974600	16.91	36.00	19.09	1000.0	120.000	185.0	H	130.0	18.9
695.120250	18.49	36.00	17.51	1000.0	120.000	185.0	V	0.0	21.5

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

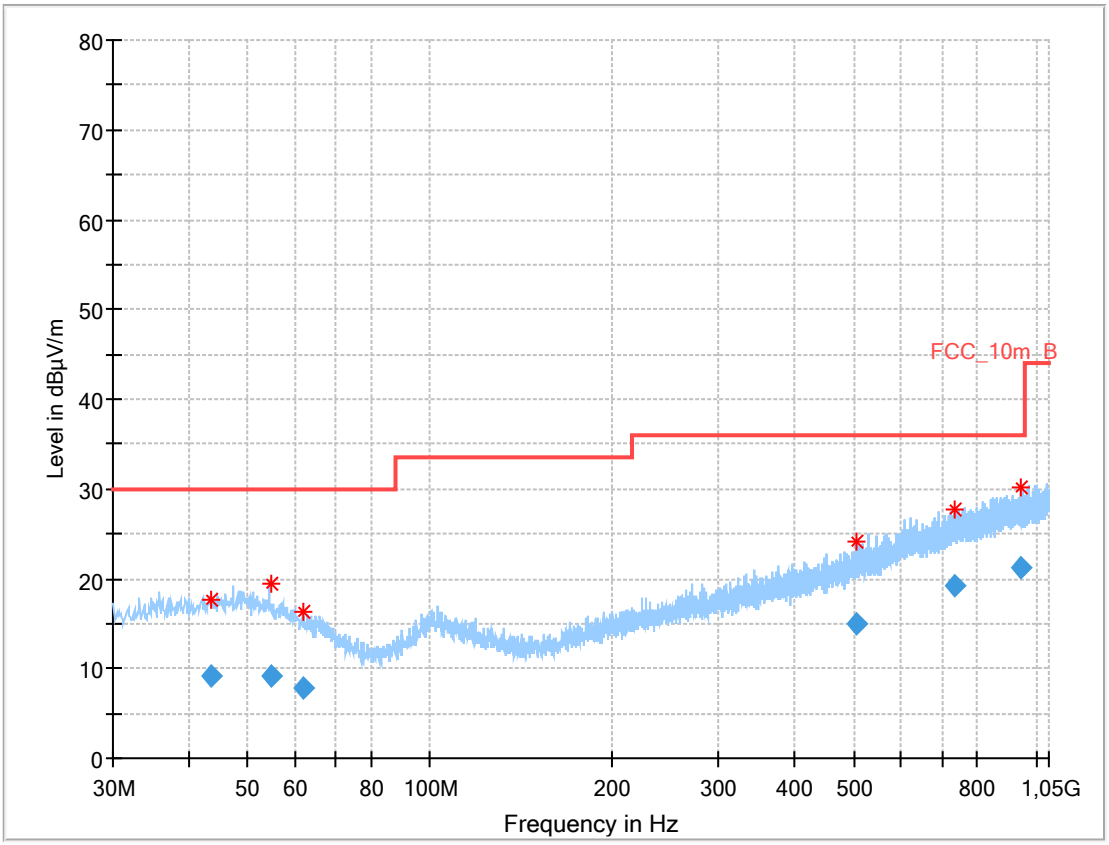


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.742450	12.49	30.00	17.51	1000.0	120.000	101.0	V	173.0	13.1
46.517250	9.69	30.00	20.31	1000.0	120.000	101.0	V	92.0	13.7
54.274050	9.13	30.00	20.87	1000.0	120.000	101.0	H	221.0	13.2
501.301800	14.67	36.00	21.33	1000.0	120.000	185.0	H	352.0	18.7
623.113800	17.86	36.00	18.14	1000.0	120.000	98.0	H	221.0	20.9
727.599750	19.14	36.00	16.86	1000.0	120.000	98.0	V	241.0	22.2

Plot: OFDM (20 MHz bandwidth / g-mode) – ANT1 – N12-3071-R0A

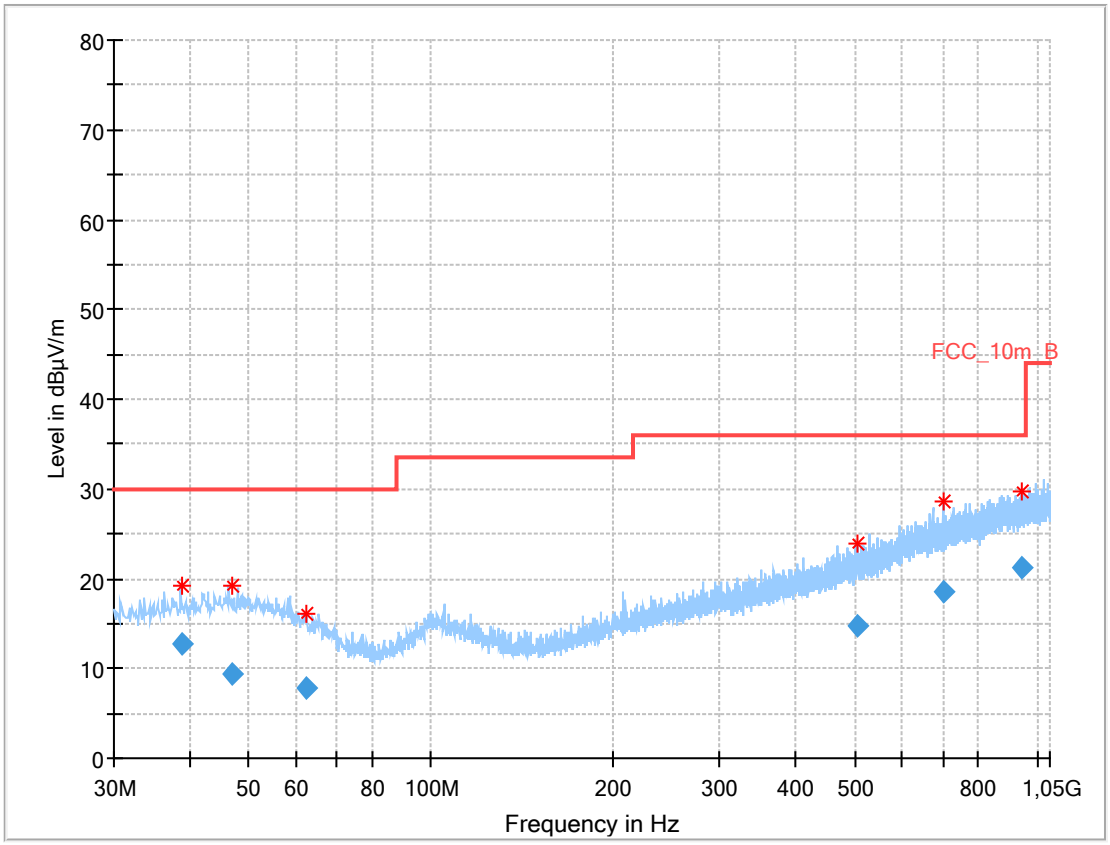
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, low channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
43.682850	9.27	30.00	20.73	1000.0	120.000	101.0	H	0.0	13.5
54.576600	9.18	30.00	20.82	1000.0	120.000	101.0	V	102.0	13.1
61.850250	7.82	30.00	22.18	1000.0	120.000	101.0	V	0.0	11.4
506.320800	14.92	36.00	21.08	1000.0	120.000	185.0	V	309.0	18.8
731.524800	19.23	36.00	16.77	1000.0	120.000	98.0	H	170.0	22.3
945.578100	21.14	36.00	14.86	1000.0	120.000	185.0	V	73.0	24.3

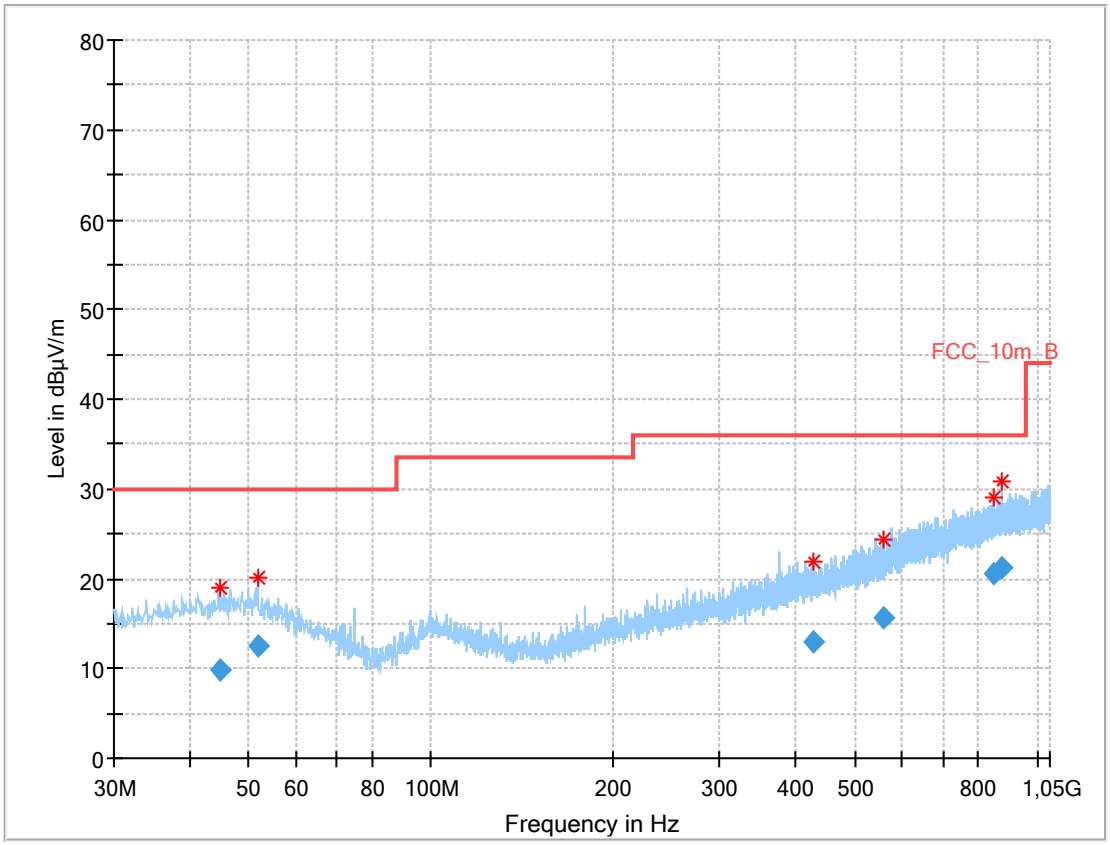
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, mid channel



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.739900	12.65	30.00	17.35	1000.0	120.000	100.0	V	151.0	13.1
46.847400	9.49	30.00	20.51	1000.0	120.000	101.0	H	151.0	13.7
62.113050	7.75	30.00	22.25	1000.0	120.000	98.0	V	0.0	11.4
506.506800	14.77	36.00	21.23	1000.0	120.000	101.0	H	46.0	18.8
698.783250	18.50	36.00	17.50	1000.0	120.000	98.0	V	273.0	21.5
941.440500	21.16	36.00	14.84	1000.0	120.000	101.0	H	254.0	24.3

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

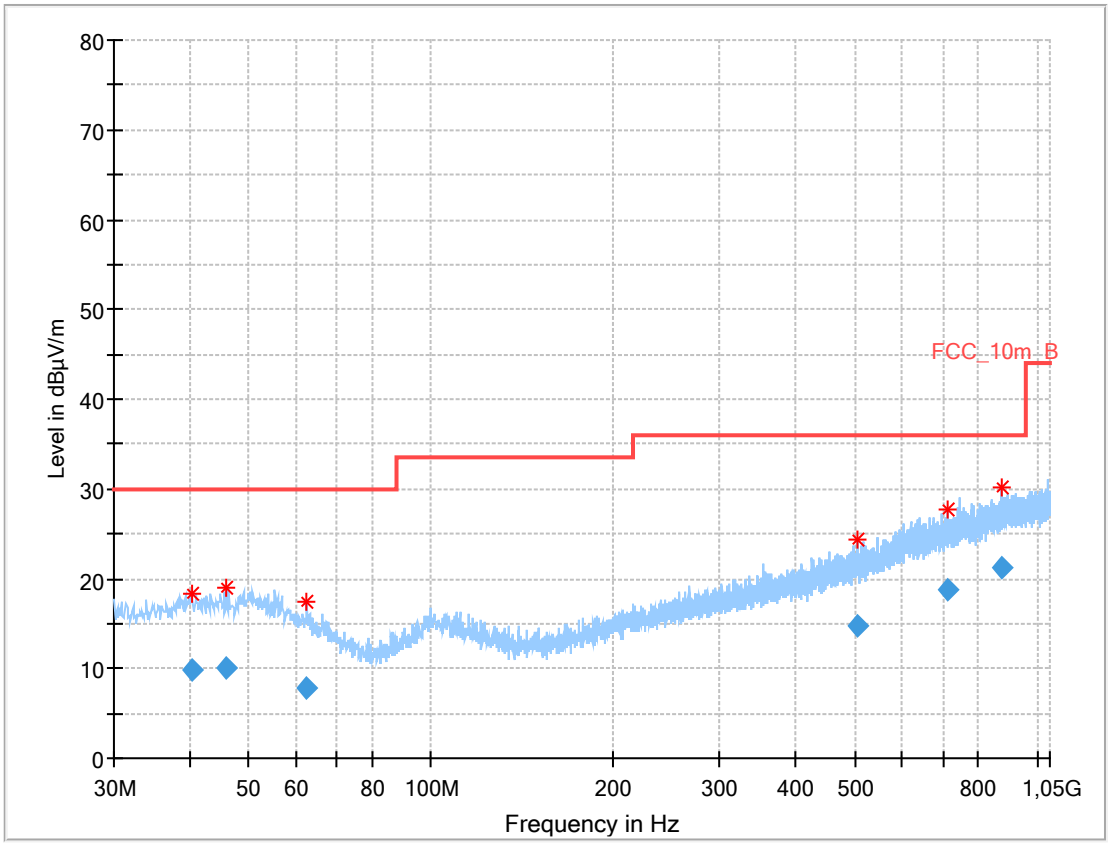


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
45.030450	9.86	30.00	20.14	1000.0	120.000	101.0	H	10.0	13.6
51.910350	12.56	30.00	17.44	1000.0	120.000	98.0	H	280.0	13.5
428.412900	12.99	36.00	23.01	1000.0	120.000	170.0	V	82.0	17.3
556.760250	15.75	36.00	20.25	1000.0	120.000	170.0	V	10.0	19.5
850.986300	20.56	36.00	15.44	1000.0	120.000	101.0	H	190.0	23.5
875.072550	21.13	36.00	14.87	1000.0	120.000	170.0	H	280.0	23.9

Plot: RX / Idle mode

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



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.380150	9.88	30.00	20.12	1000.0	120.000	101.0	H	178.0	13.2
45.994200	10.02	30.00	19.98	1000.0	120.000	100.0	H	238.0	13.7
62.373900	7.93	30.00	22.07	1000.0	120.000	185.0	V	184.0	11.3
505.154850	14.74	36.00	21.26	1000.0	120.000	185.0	H	178.0	18.8
710.661600	18.87	36.00	17.13	1000.0	120.000	98.0	V	224.0	21.8
873.825000	21.14	36.00	14.86	1000.0	120.000	185.0	H	0.0	23.8

11.13 Spurious emissions radiated above 1 GHz

Description:

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

Measurement:

Measurement parameter	
Detector:	Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	3 x RBW
Span:	1 GHz to 26 GHz
Trace mode:	Max Hold
Measured modulation	☒ DSSS b – mode ☒ OFDM g – mode ☐ OFDM n HT20 – mode ☐ OFDM n HT40 – mode ☒ RX / Idle – mode
Test setup:	See sub clause 6.2 – A
Measurement uncertainty	See sub clause 8

Limits:

FCC	IC	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance (m)
Above 960	54.0	3

Results: DSSS – ANT0

TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.			4924	Peak	53.7
							AVG	47.9
	Peak			Peak			Peak	
	AVG			AVG			AVG	

Results: OFDM (20 MHz bandwidth) – ANT0

TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.		
	Peak			Peak			Peak	
	AVG			AVG			AVG	

Results: RX / idle – mode – ANT0

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

Results: DSSS – ANT1 – TE2118309-X Rev E

TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.			1229.4	Peak	42.6
							AVG	32.9
	Peak			Peak		4924	Peak	61.0
	AVG			AVG			AVG	52.2

Results: OFDM (20 MHz bandwidth) – ANT1 – TE2118309-X Rev E

TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.		
	Peak			Peak			Peak	
	AVG			AVG			AVG	

Results: RX / idle – mode – ANT1 – TE2118309-X Rev E

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

Results: DSSS – ANT1 – N12-3071-R0A

TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.		
	Peak			Peak			Peak	
	AVG			AVG			AVG	

Results: OFDM (20 MHz bandwidth) – ANT1 – N12-3071-R0A

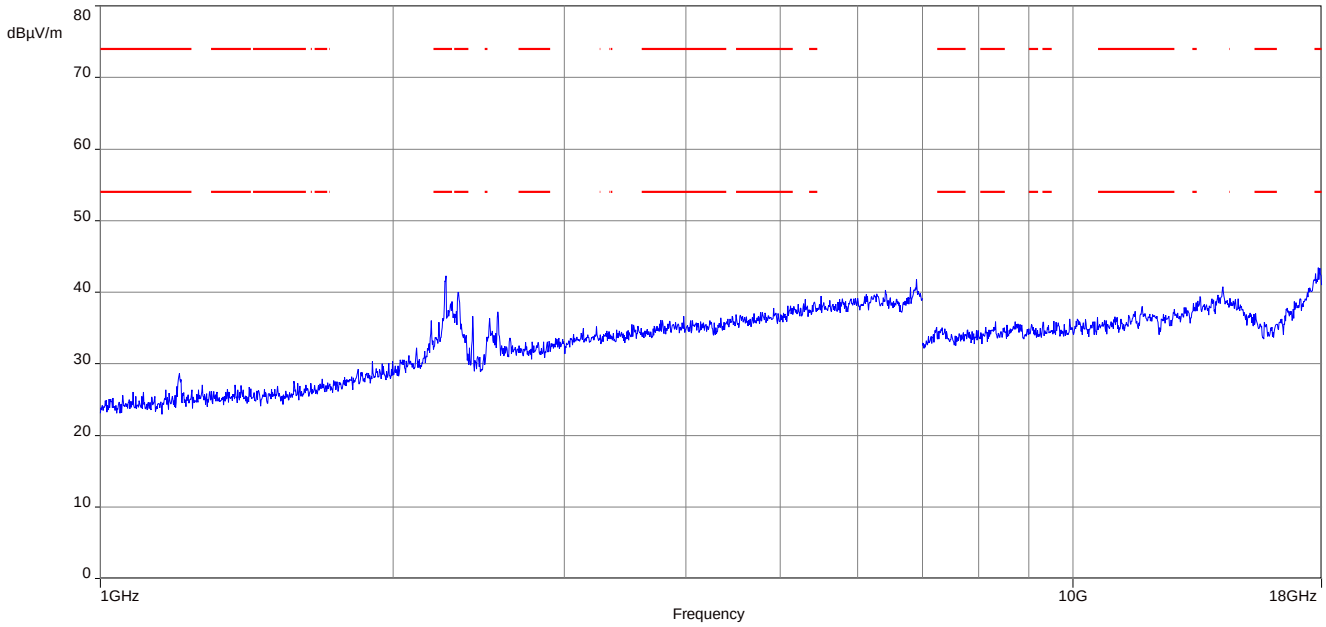
TX Spurious Emissions Radiated [dBµV/m]								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.		
	Peak			Peak			Peak	
	AVG			AVG			AVG	

Results: RX / idle – mode – ANT1 – N12-3071-R0A

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

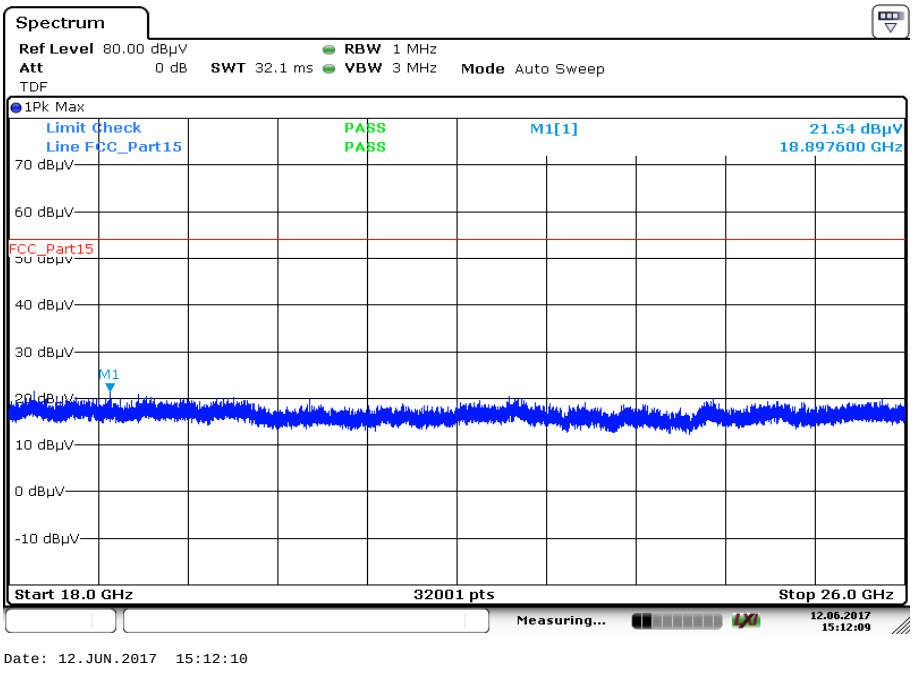
Plots: DSSS – ANT0

Plot 1: Lowest channel, 1 GHz to 18 GHz, vertical & horizontal polarization

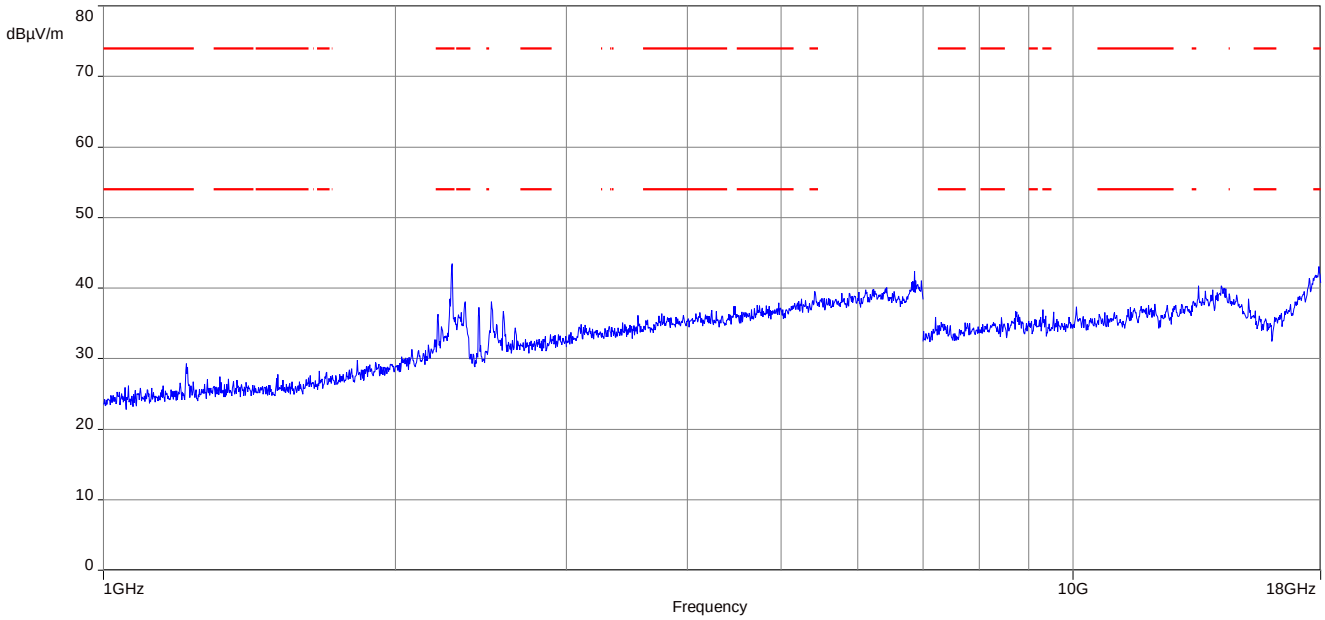


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

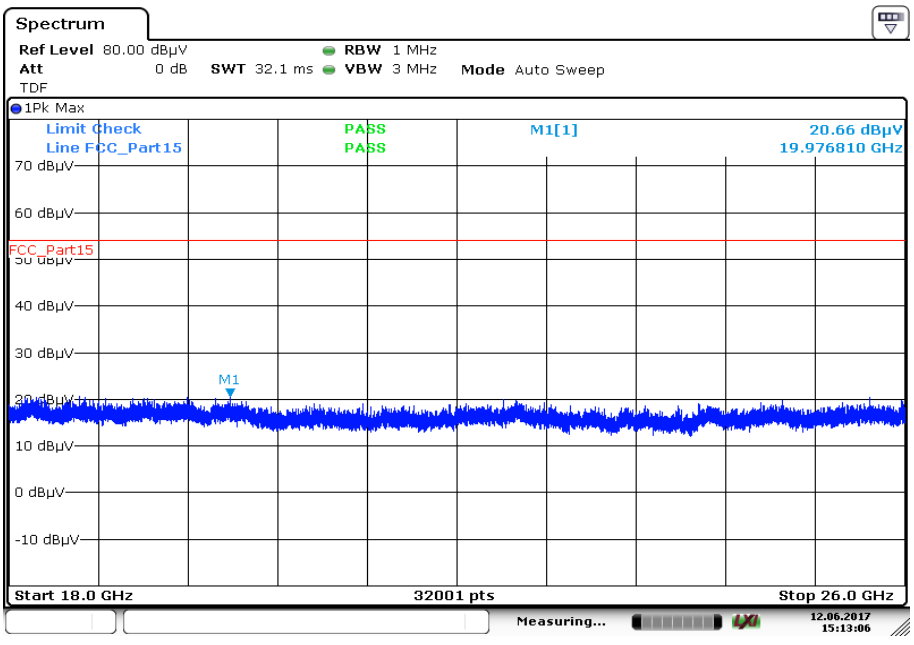


Plot 3: Middle channel, 1 GHz to 18 GHz, vertical & horizontal polarization

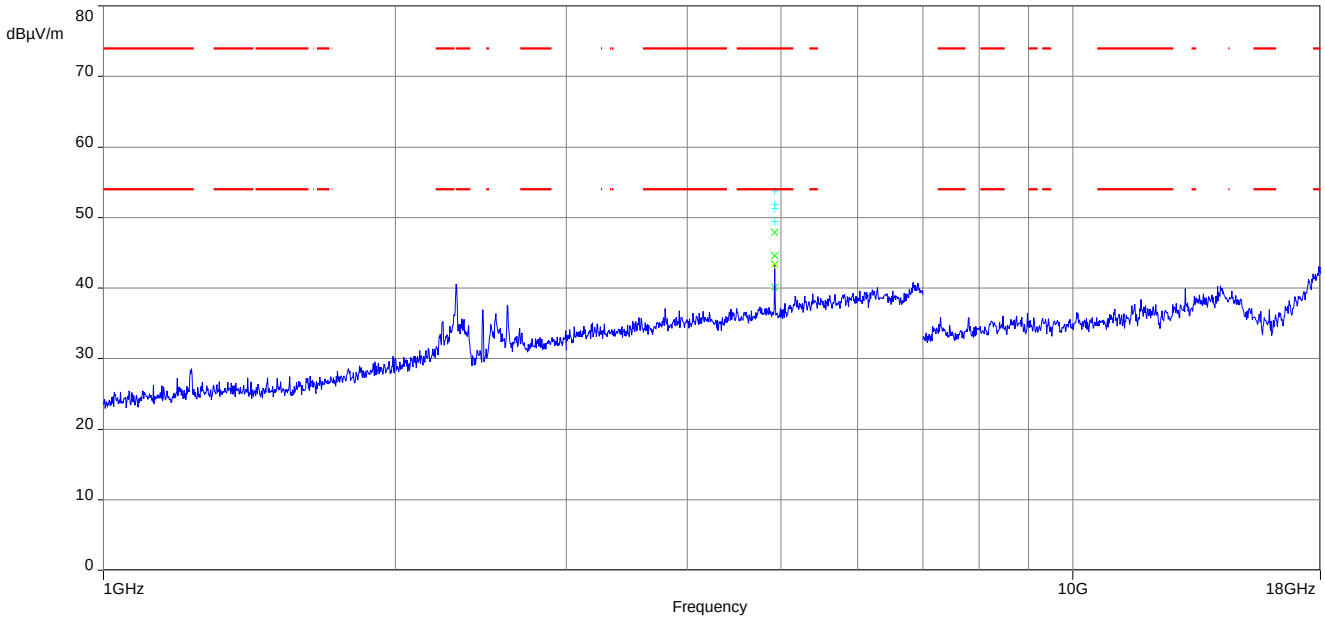


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

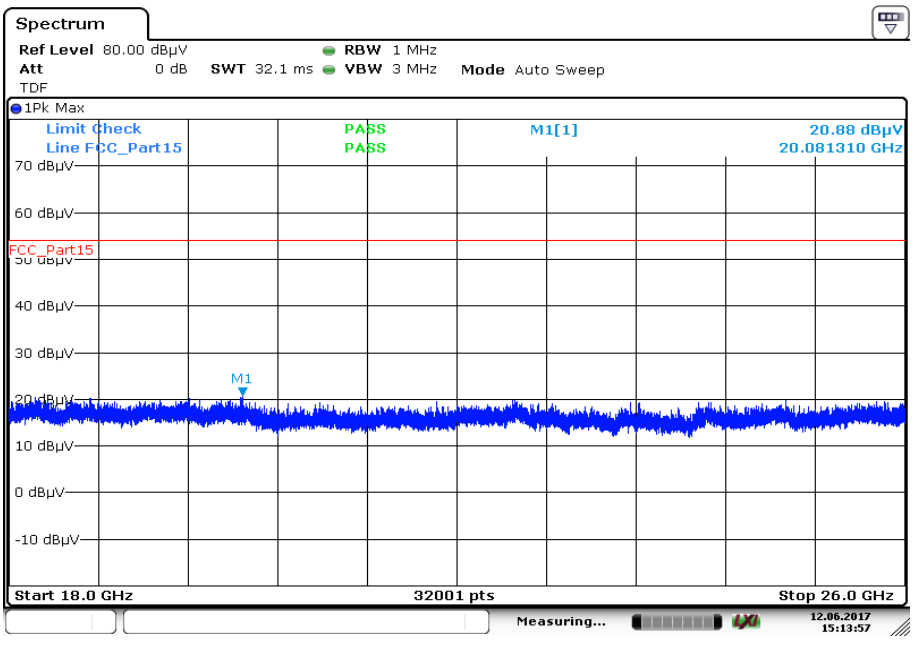


Plot 5: Highest channel, 1 GHz to 18 GHz, vertical & horizontal polarization



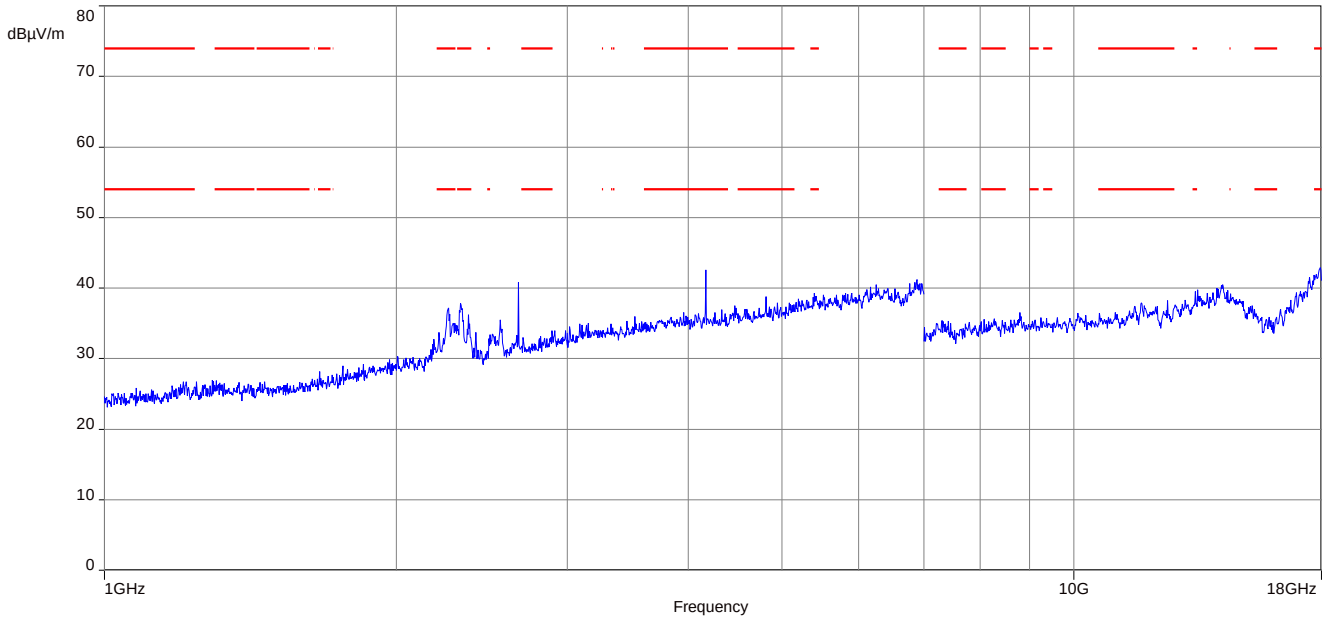
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



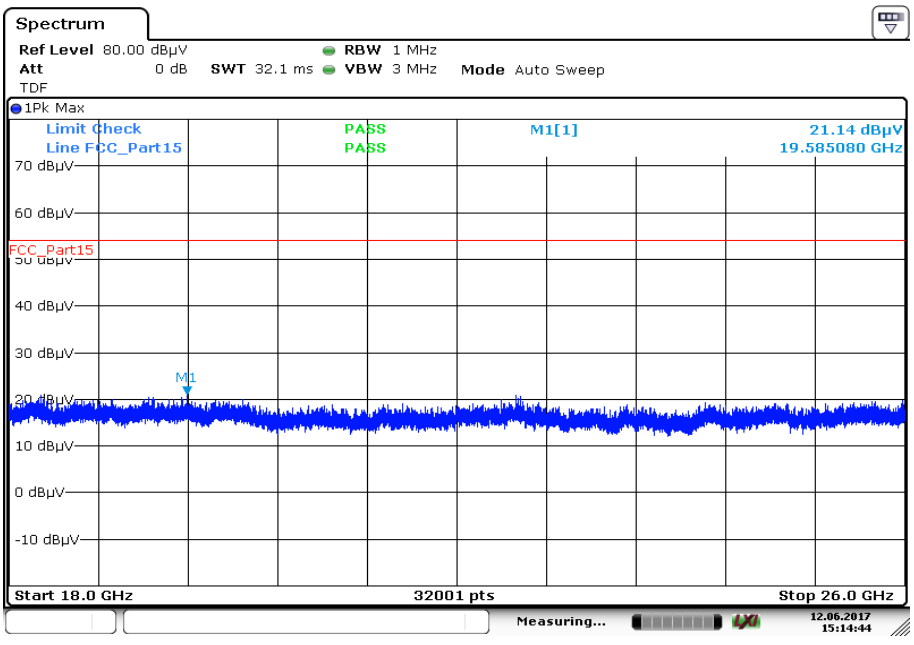
Plots: OFDM (20 MHz bandwidth) – ANT0

Plot 1: Lowest channel, 1 GHz to 18 GHz, vertical & horizontal polarization

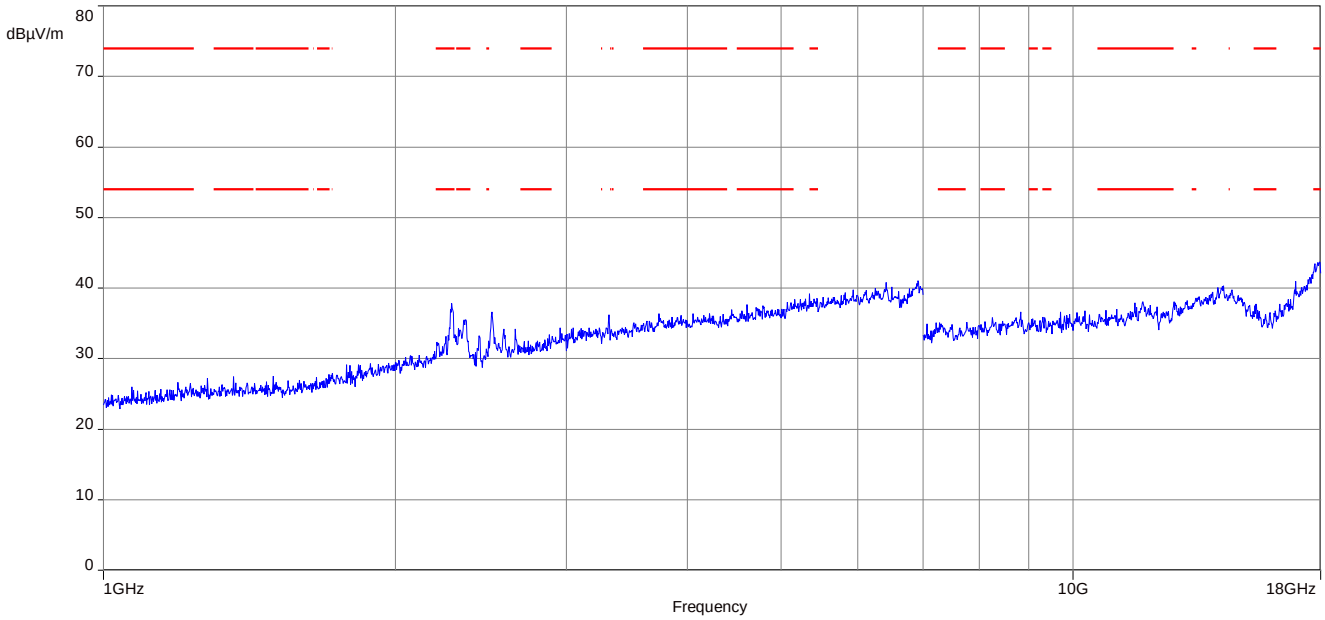


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization

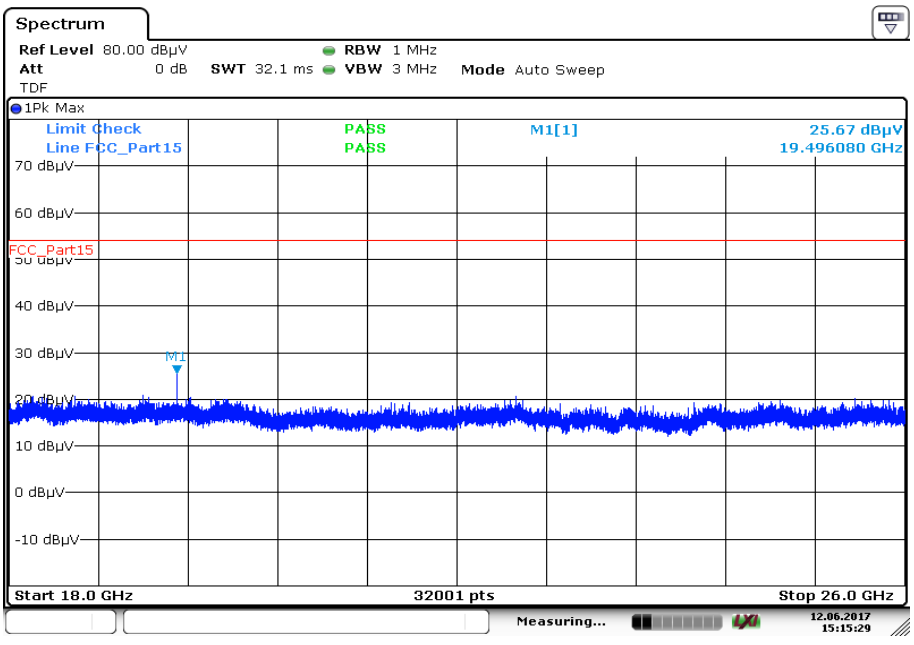


Plot 3: Middle channel, 1 GHz to 18 GHz, vertical & horizontal polarization

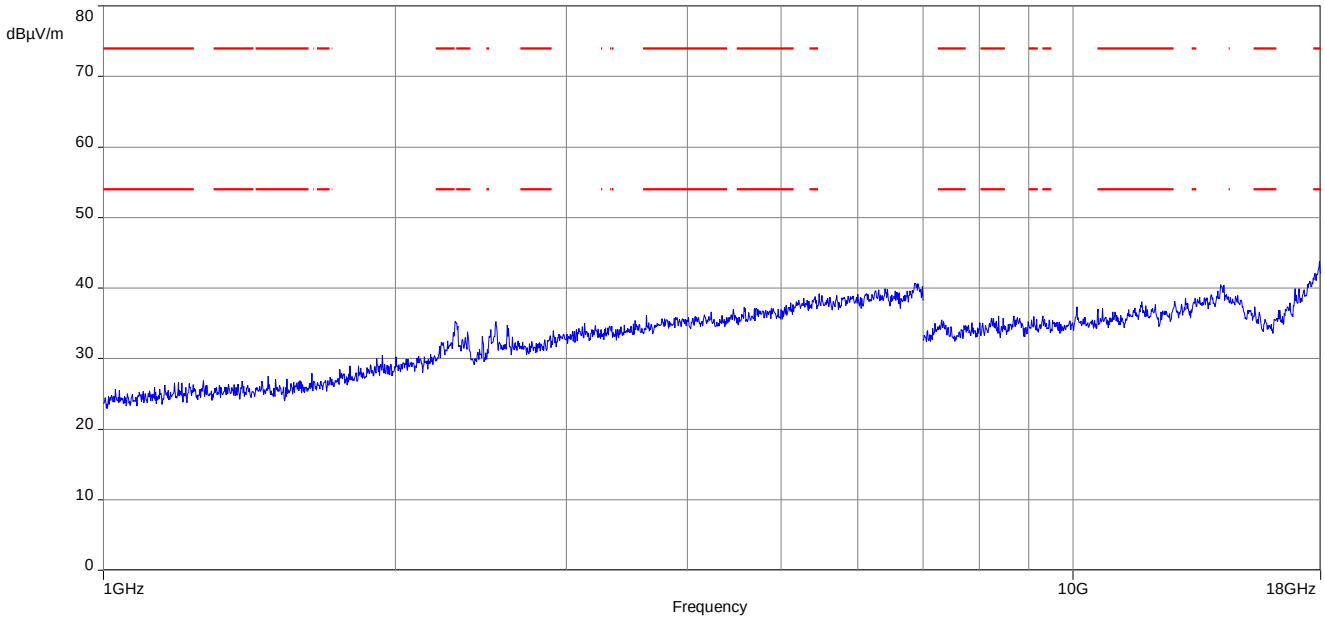


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

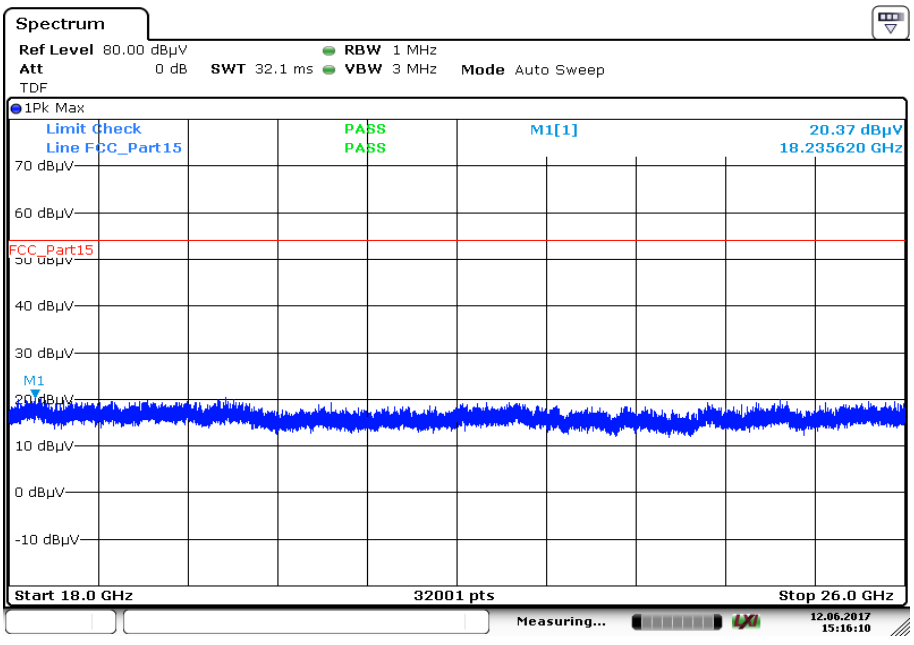


Plot 5: Highest channel, 1 GHz to 18 GHz, vertical & horizontal polarization



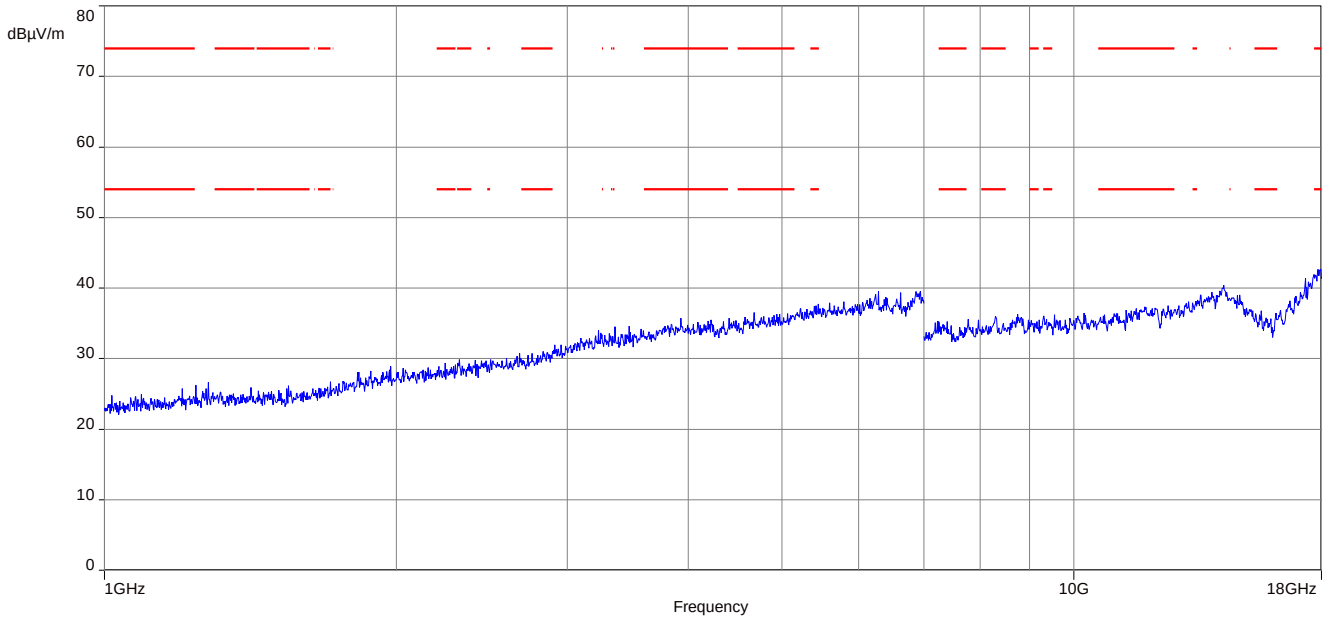
The carrier signal is notched with a 2.4 GHz band rejection filter.

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

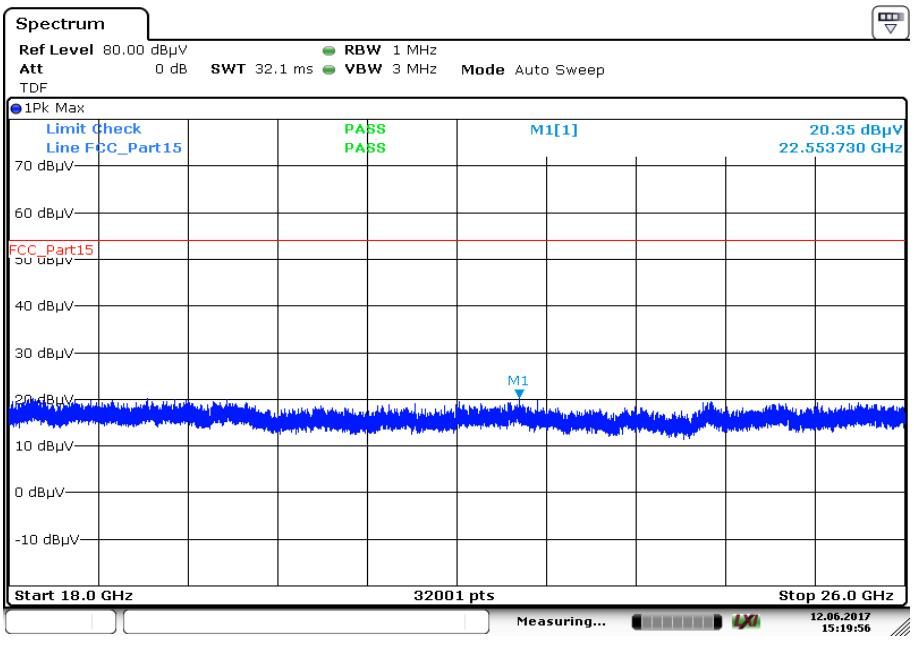


Plots: RX / idle mode – ANT0

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

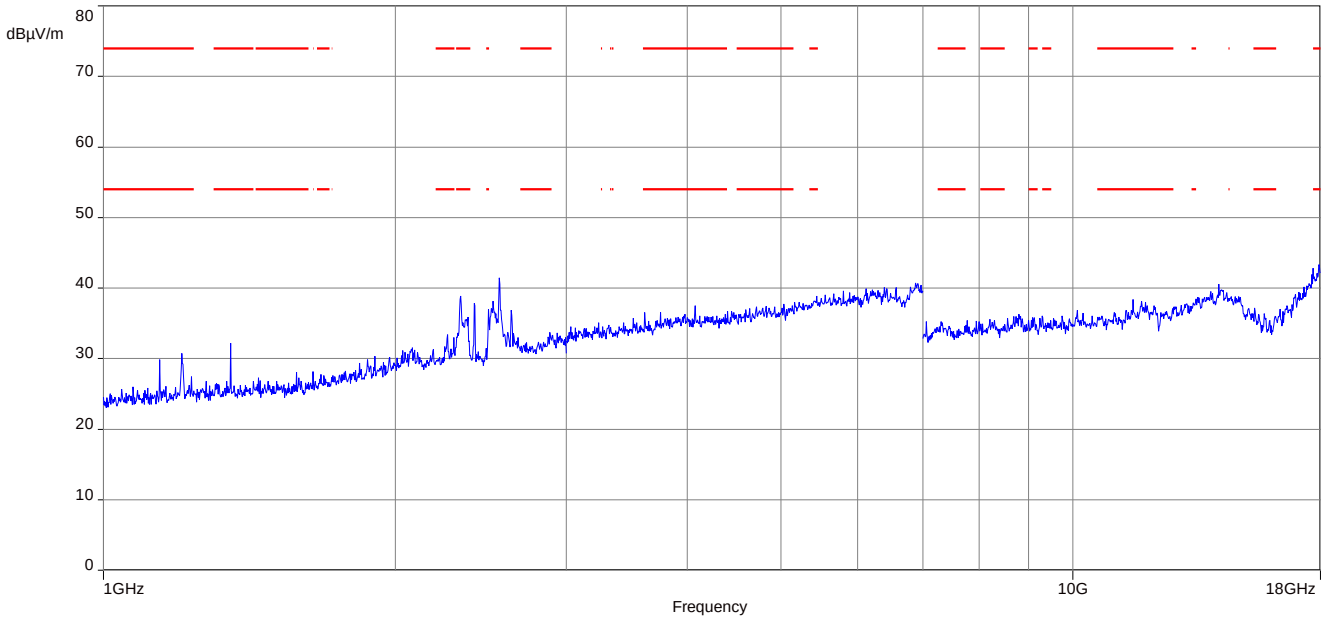


Plot 2: 18 GHz to 26 GHz, vertical & horizontal polarization



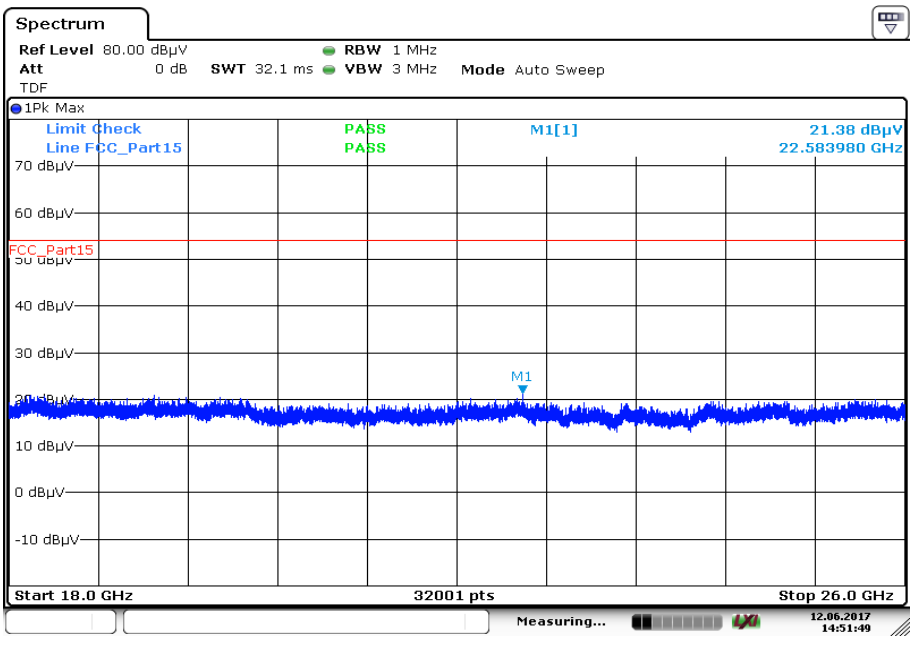
Plots: DSSS – ANT1 – TE2118309-X Rev E

Plot 1: Lowest channel, 1 GHz to 18 GHz, vertical & horizontal polarization

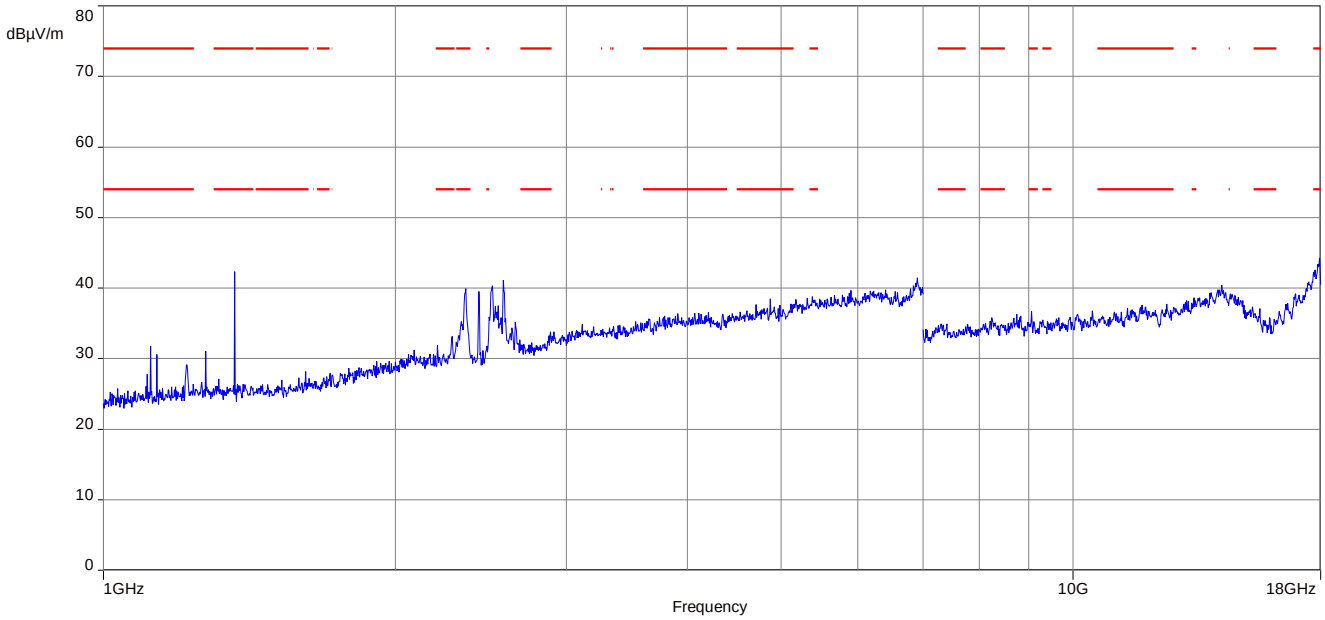


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization, peak & average

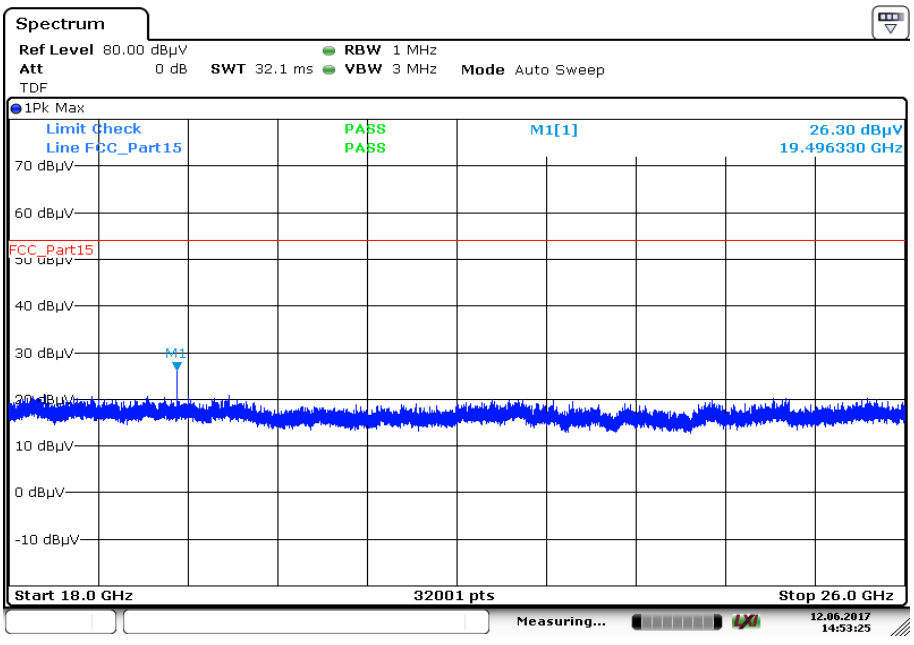


Plot 3: Middle channel, 1 GHz to 18 GHz, vertical & horizontal polarization



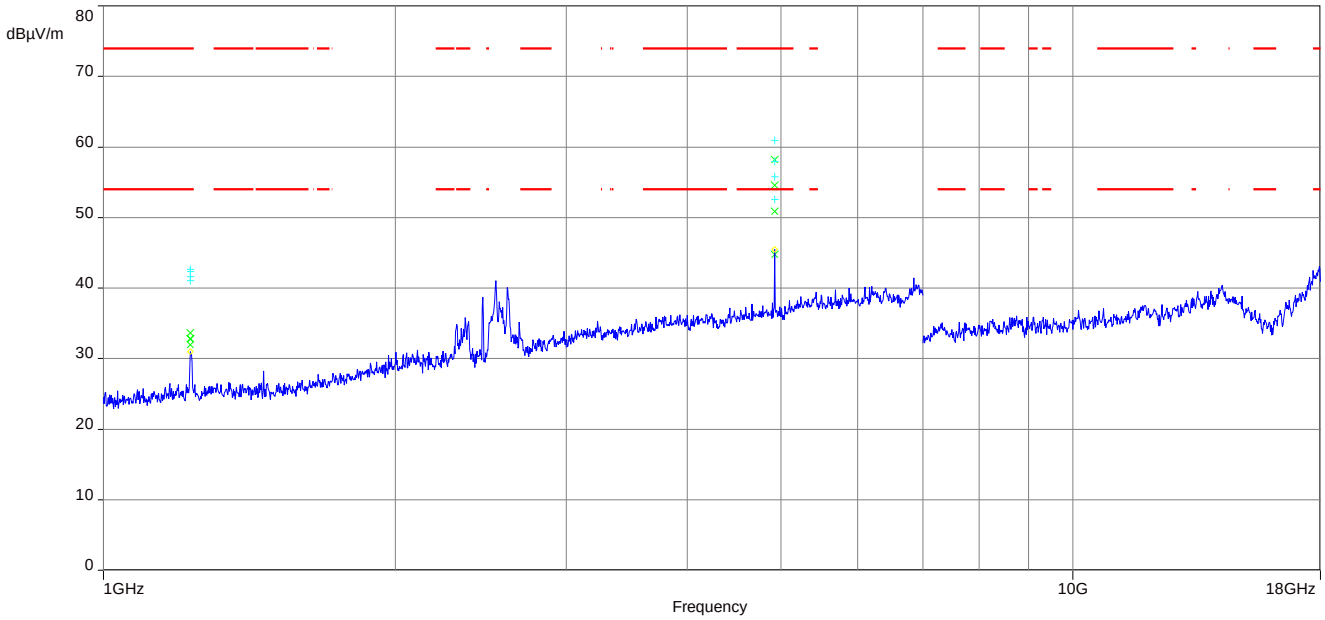
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



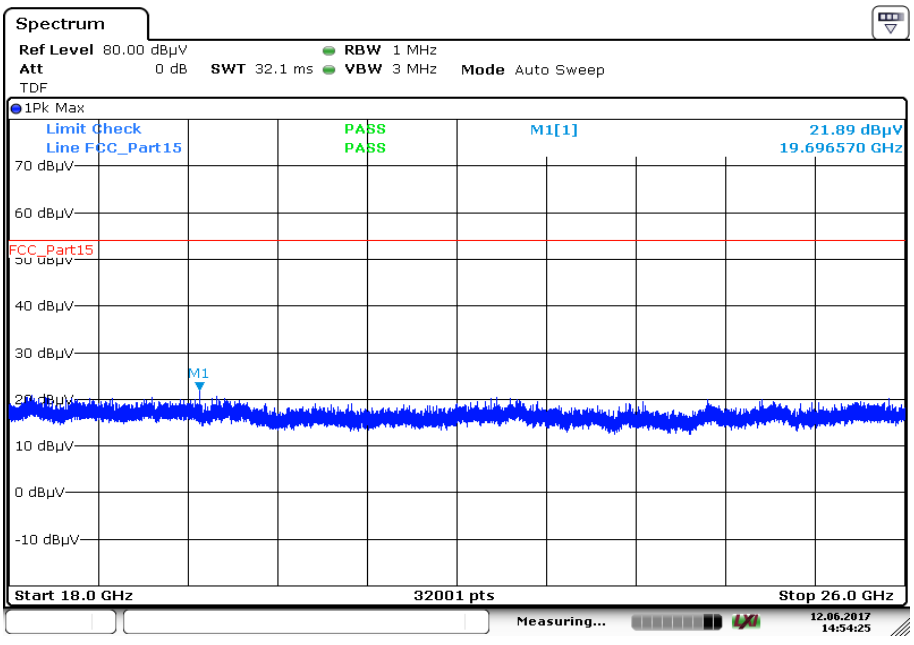
Date: 12.JUN.2017 14:53:26

Plot 5: Highest channel, 1 GHz to 18 GHz, vertical & horizontal polarization



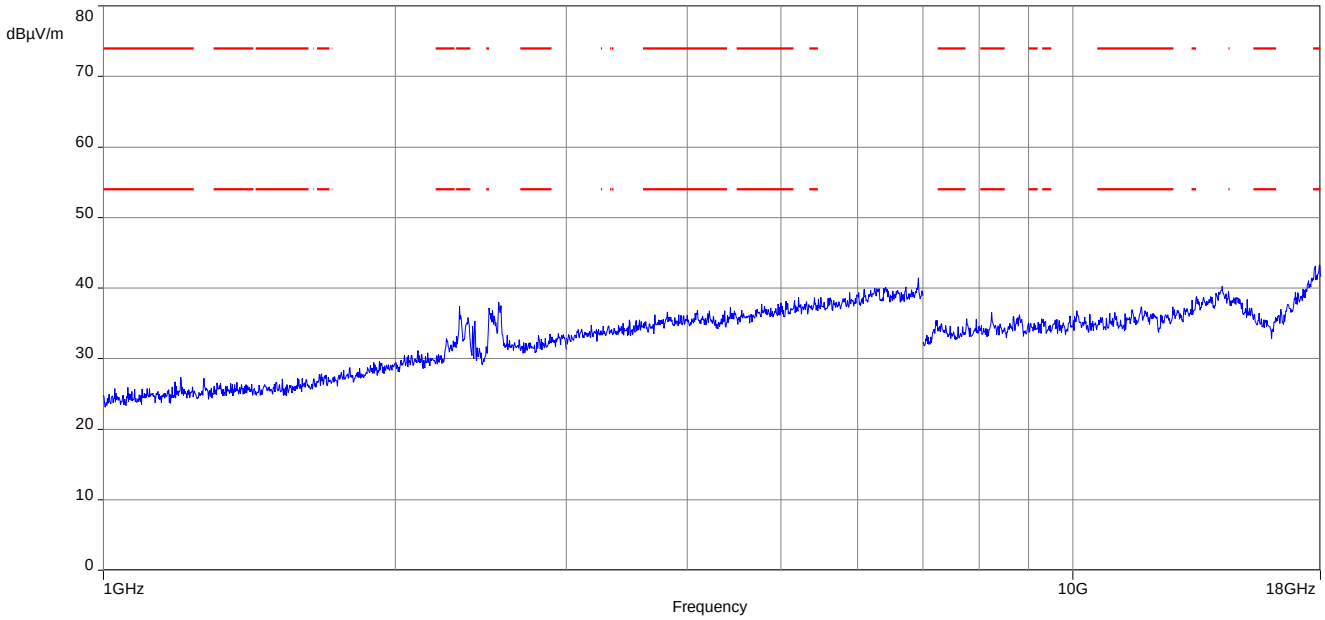
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



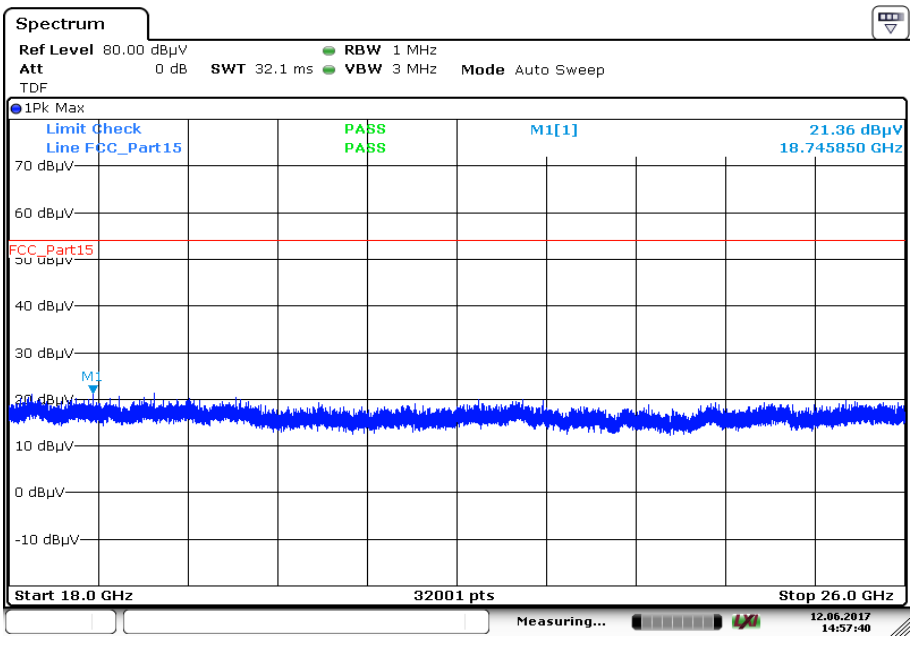
Plots: OFDM (20 MHz bandwidth) – ANT1 – TE2118309-X Rev E

Plot 1: Lowest channel, 1 GHz to 18 GHz, vertical & horizontal polarization



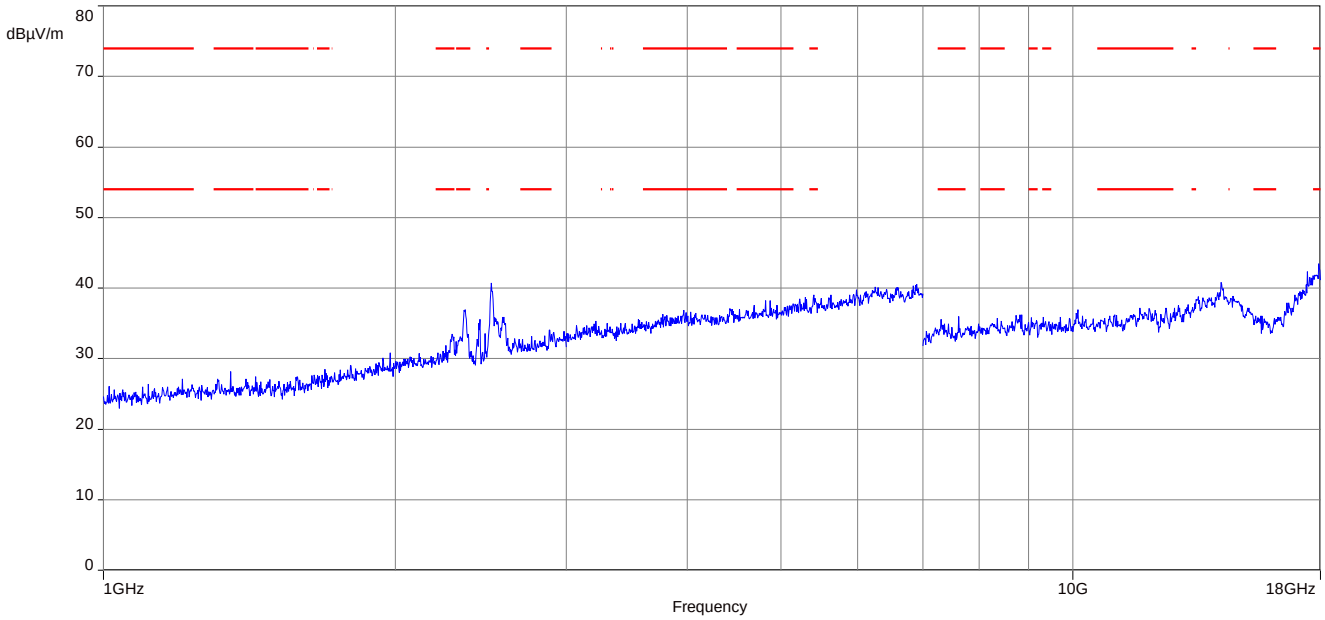
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



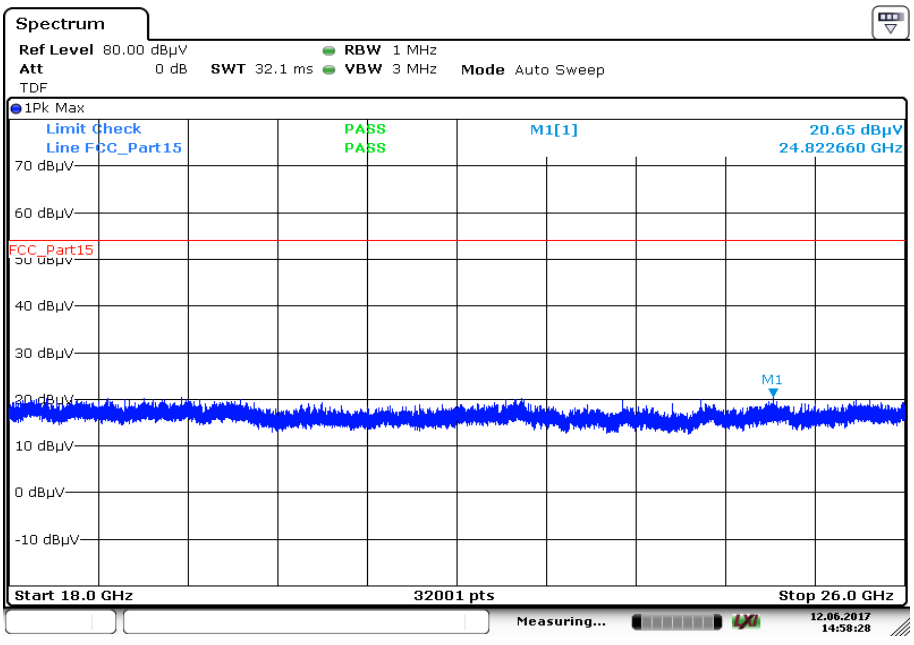
Date: 12.JUN.2017 14:57:40

Plot 3: Middle channel, 1 GHz to 18 GHz, vertical & horizontal polarization

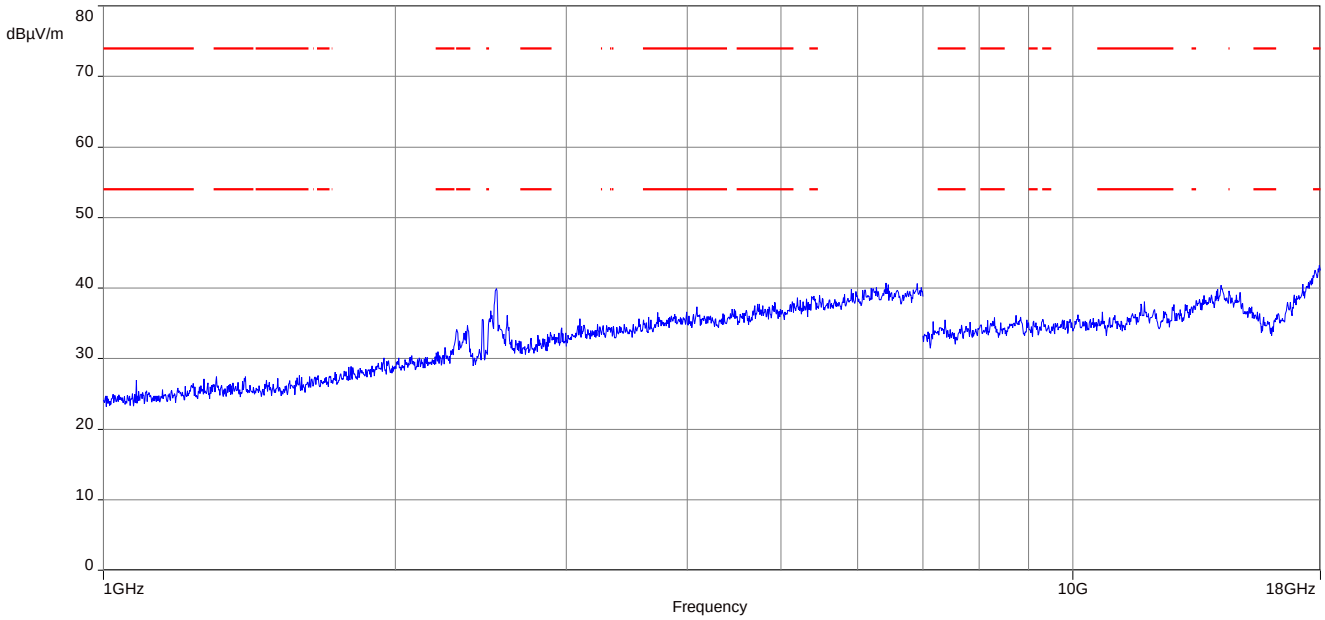


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

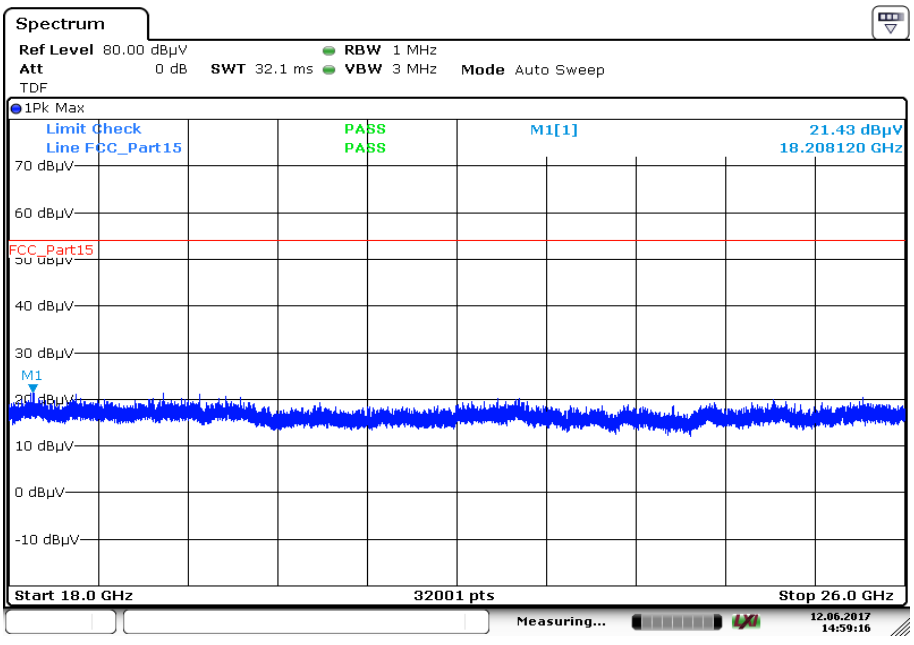


Plot 5: Highest channel, 1 GHz to 18 GHz, vertical & horizontal polarization



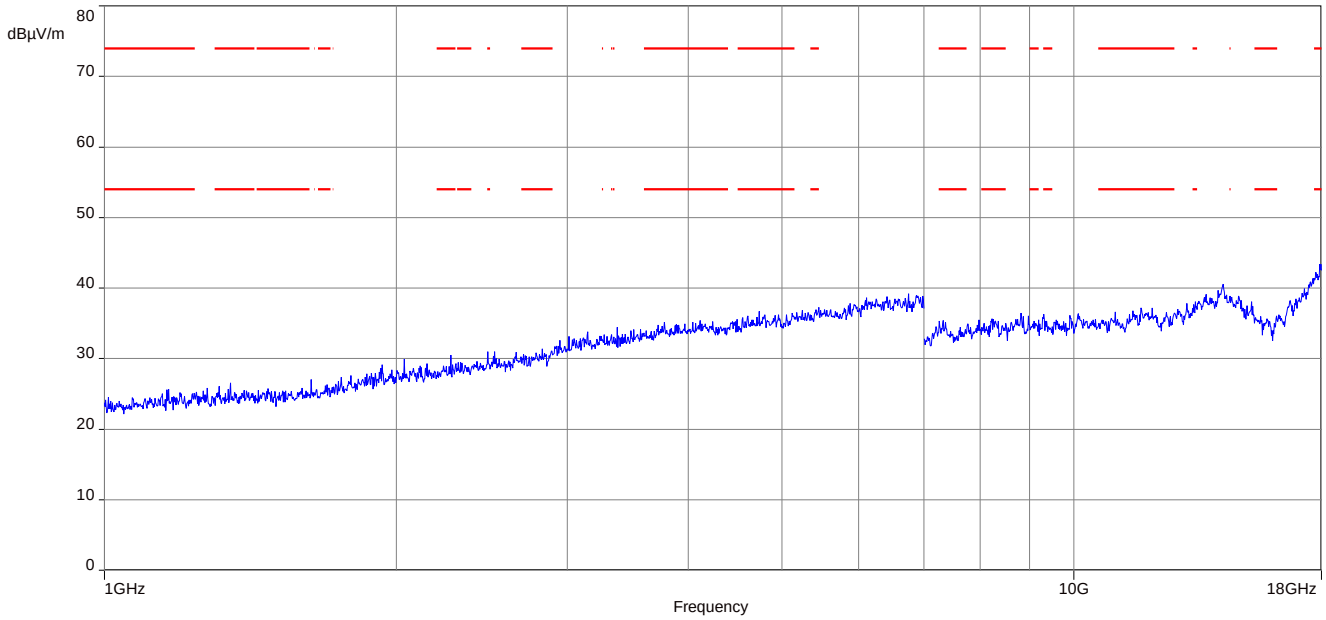
The carrier signal is notched with a 2.4 GHz band rejection filter.

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

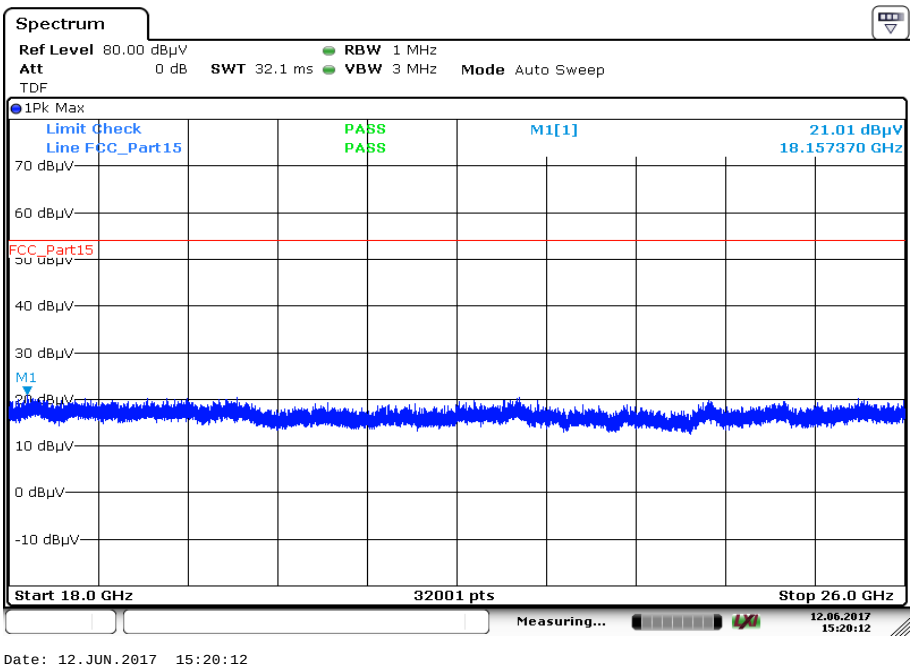


Plots: RX / idle mode – ANT1 – TE2118309-X Rev E

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

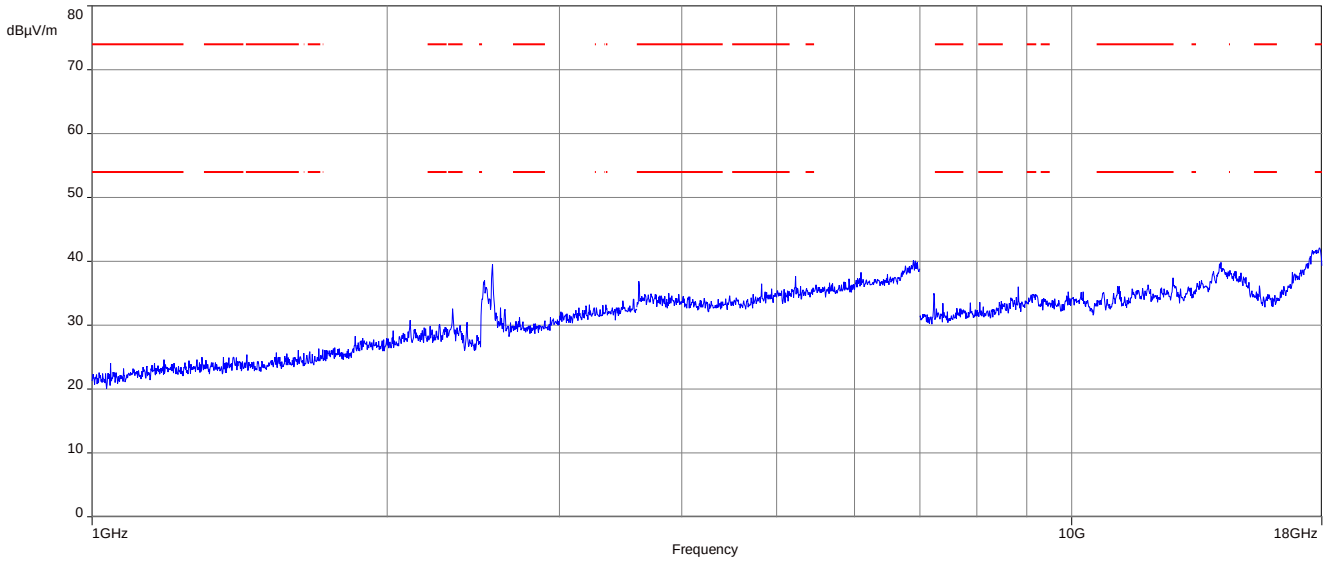


Plot 2: 18 GHz to 26 GHz, vertical & horizontal polarization



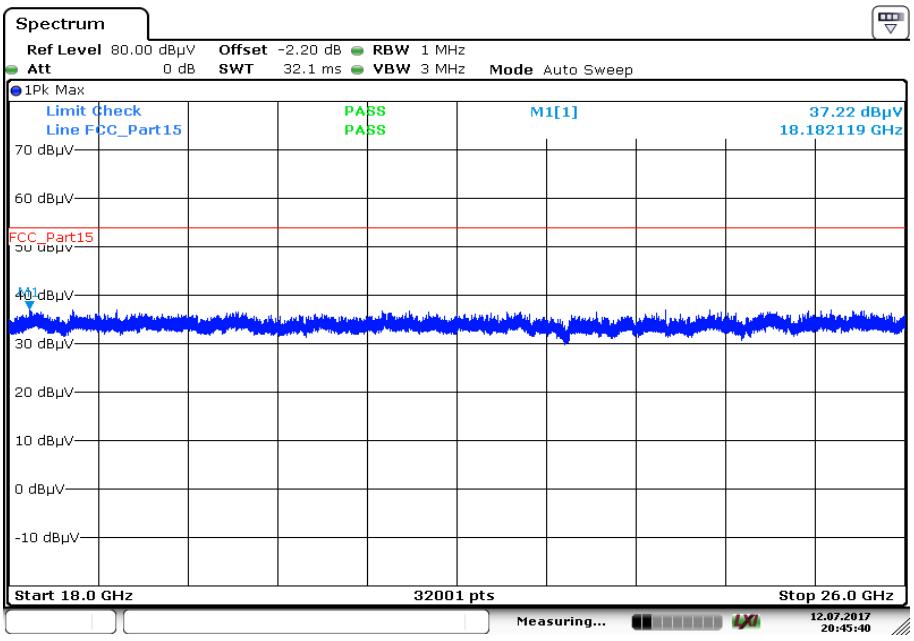
Plots: DSSS – ANT1 – N12-3071-R0A

Plot 1: Lowest channel, 1 GHz to 18 GHz, vertical & horizontal polarization



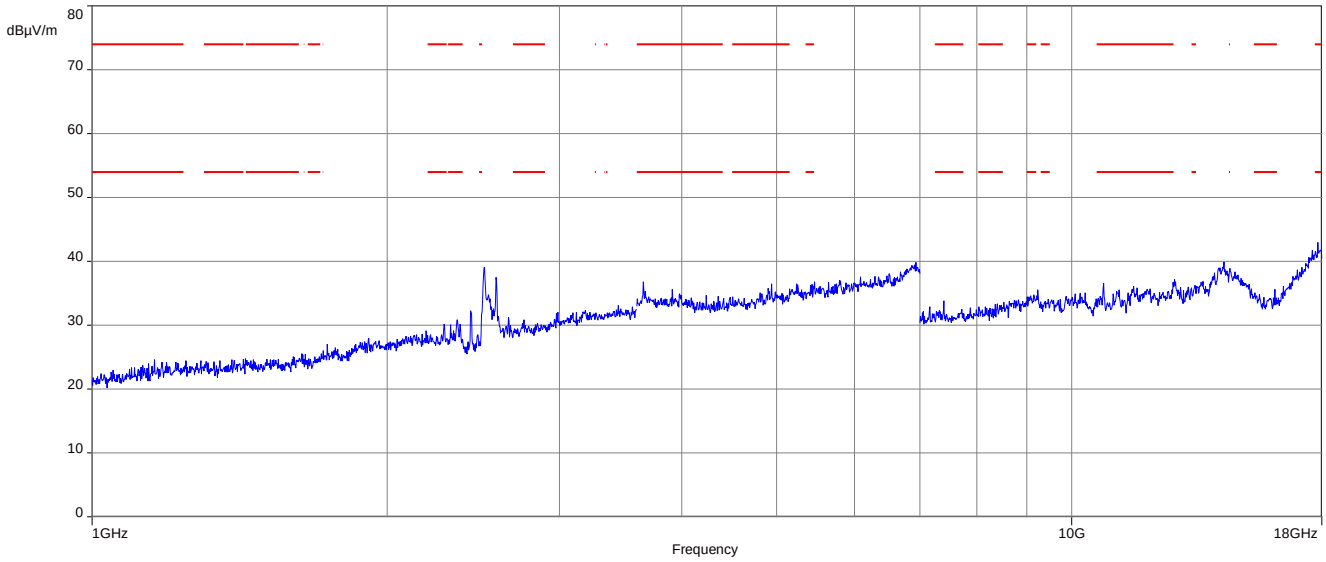
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization, peak & average



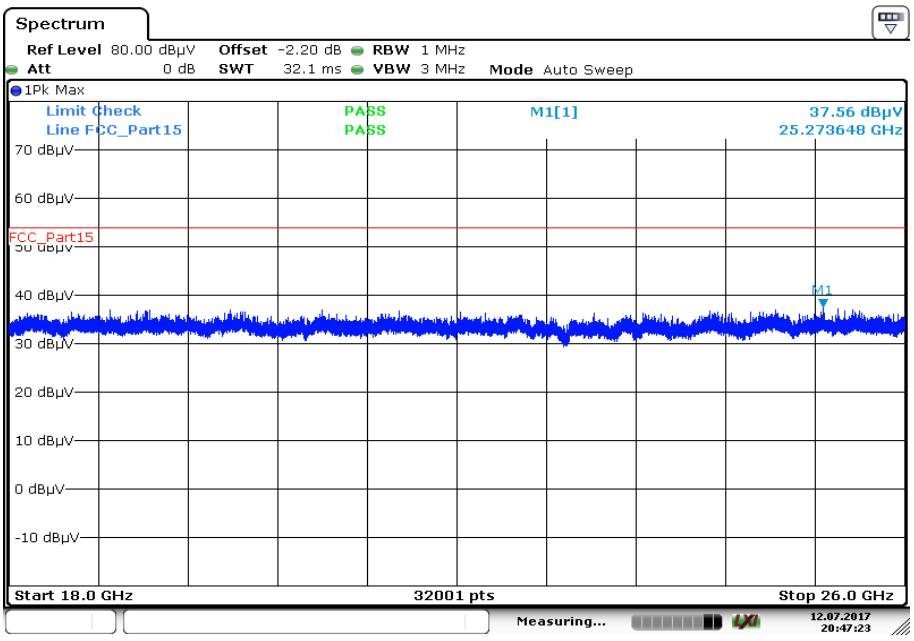
Date: 12.JUL.2017 20:45:41

Plot 3: Middle channel, 1 GHz to 18 GHz, vertical & horizontal polarization



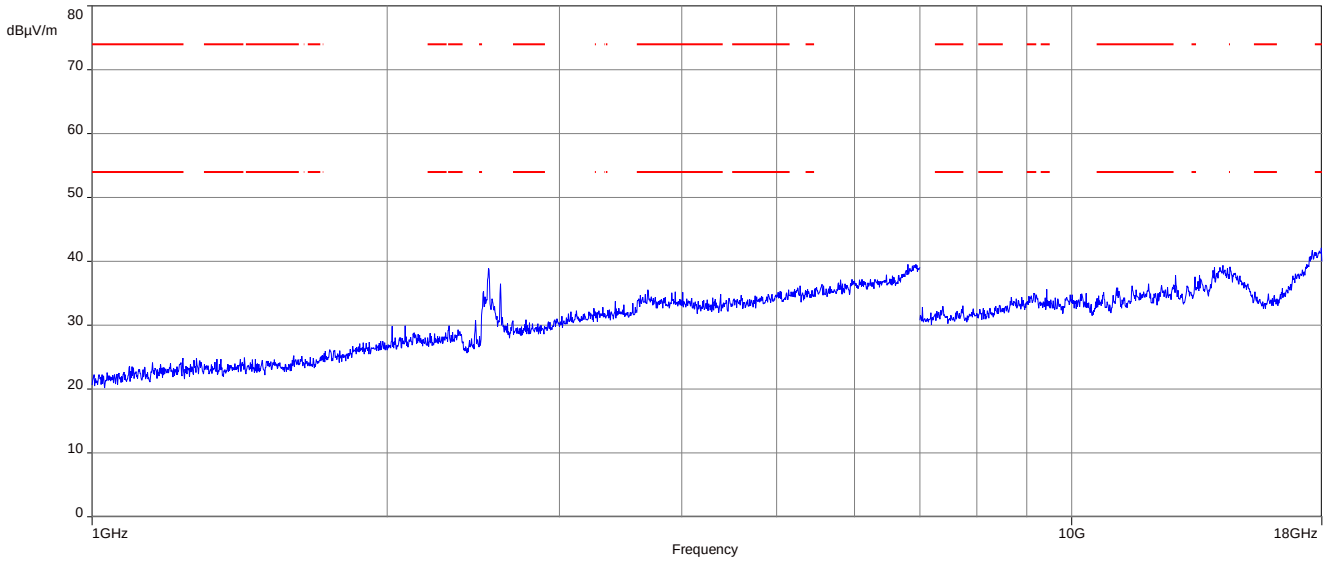
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



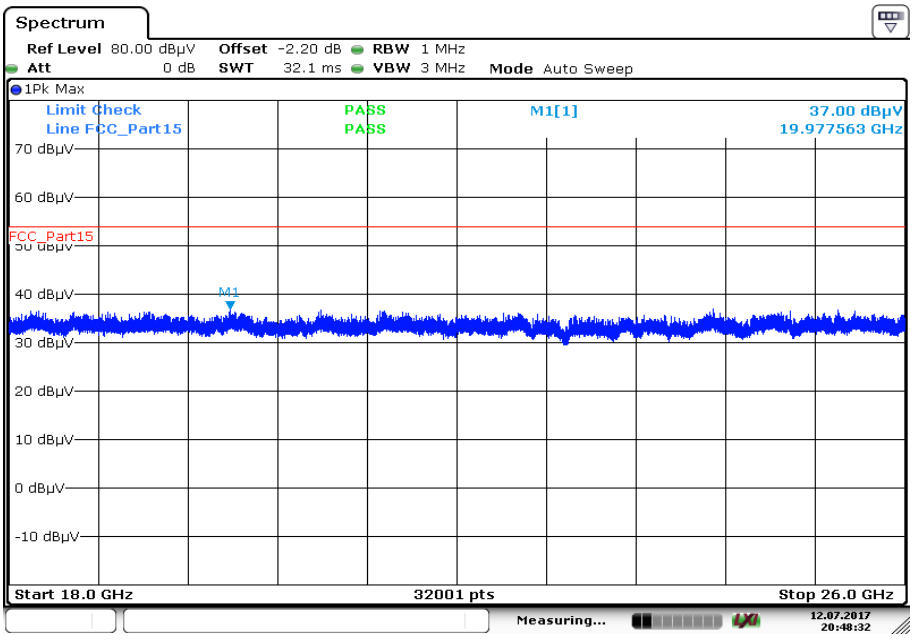
Date: 12.JUL.2017 20:47:23

Plot 5: Highest channel, 1 GHz to 18 GHz, vertical & horizontal polarization



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

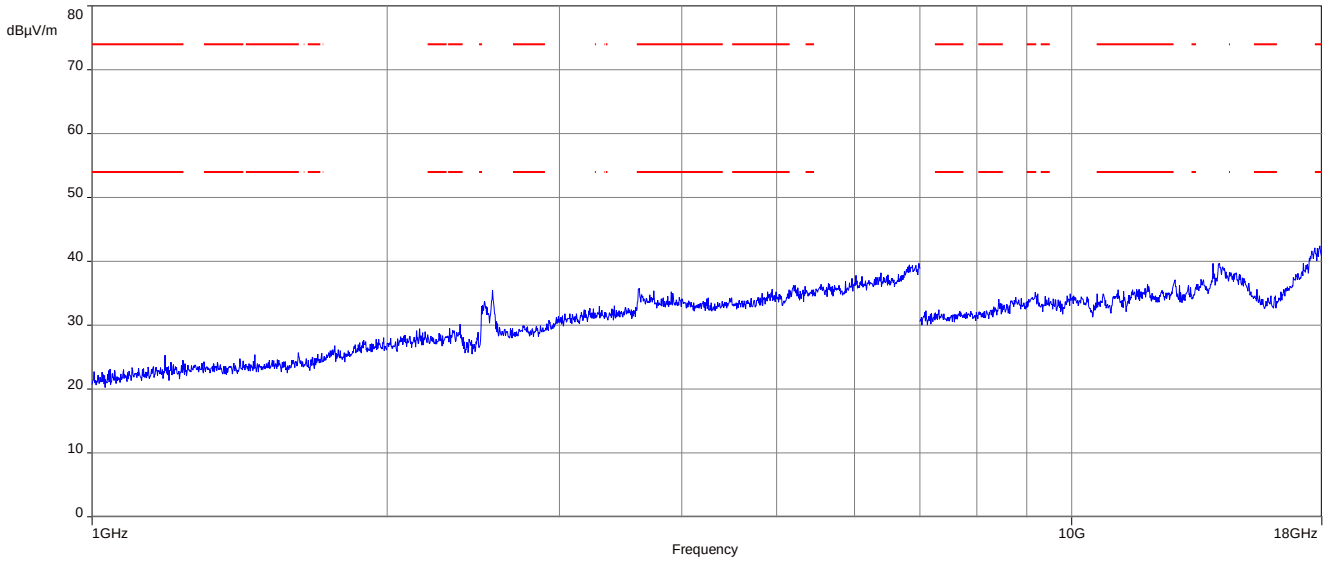
Plot 6: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 12.JUL.2017 20:48:32

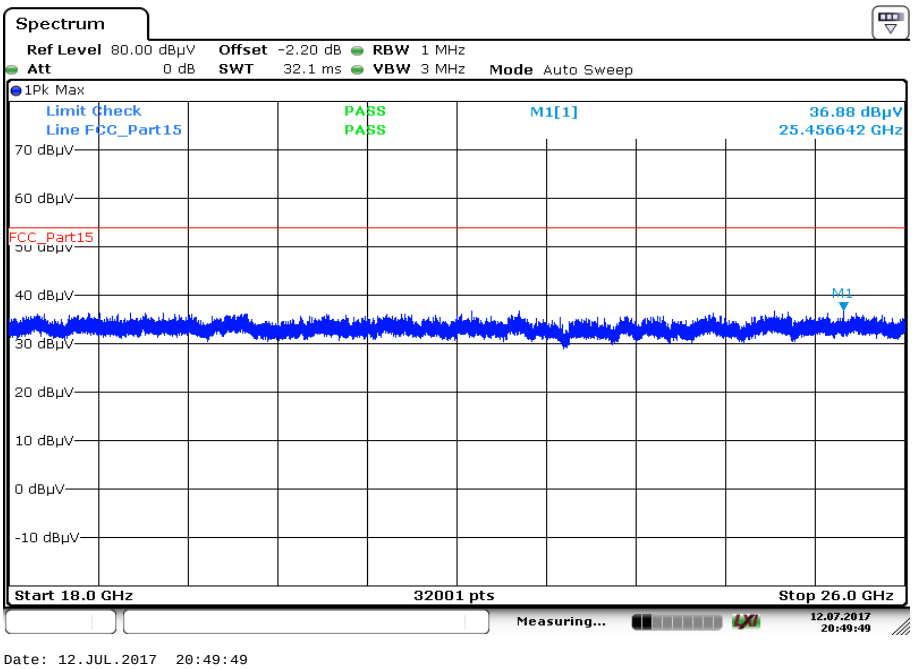
Plots: OFDM (20 MHz bandwidth) – ANT1 – N12-3071-R0A

Plot 1: Lowest channel, 1 GHz to 18 GHz, vertical & horizontal polarization



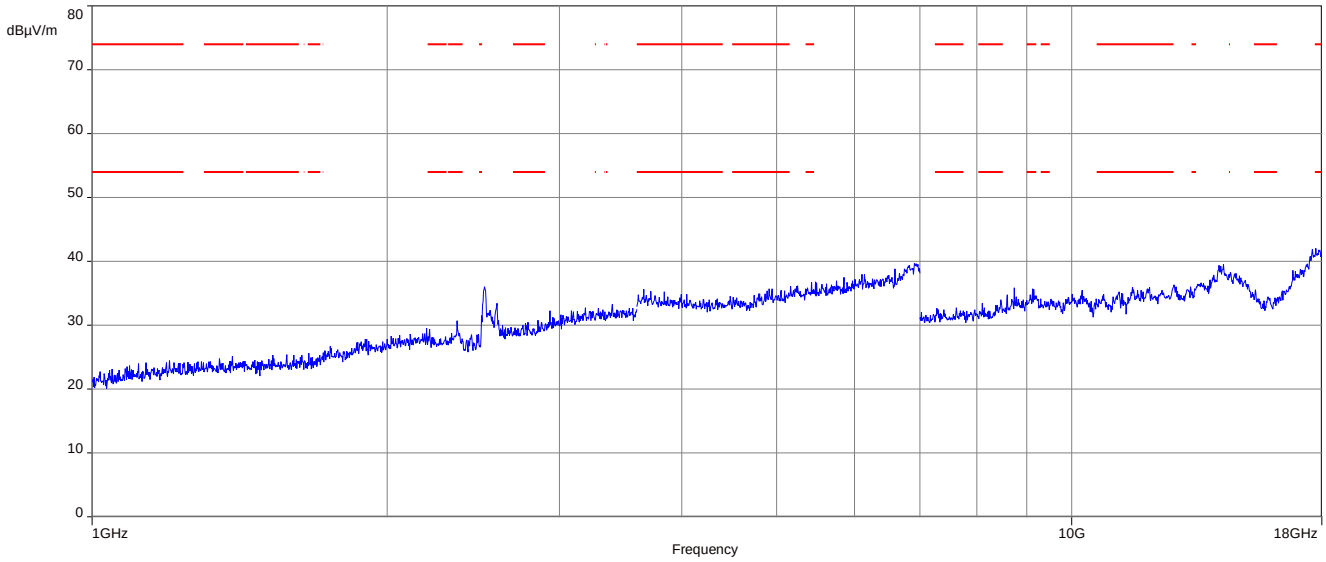
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 2: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



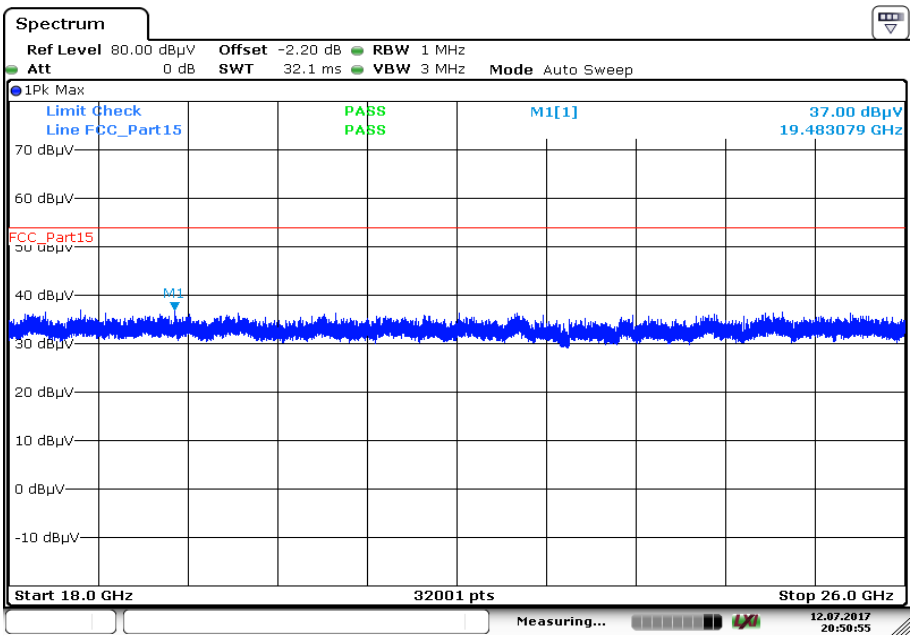
Date: 12.JUL.2017 20:49:49

Plot 3: Middle channel, 1 GHz to 18 GHz, vertical & horizontal polarization



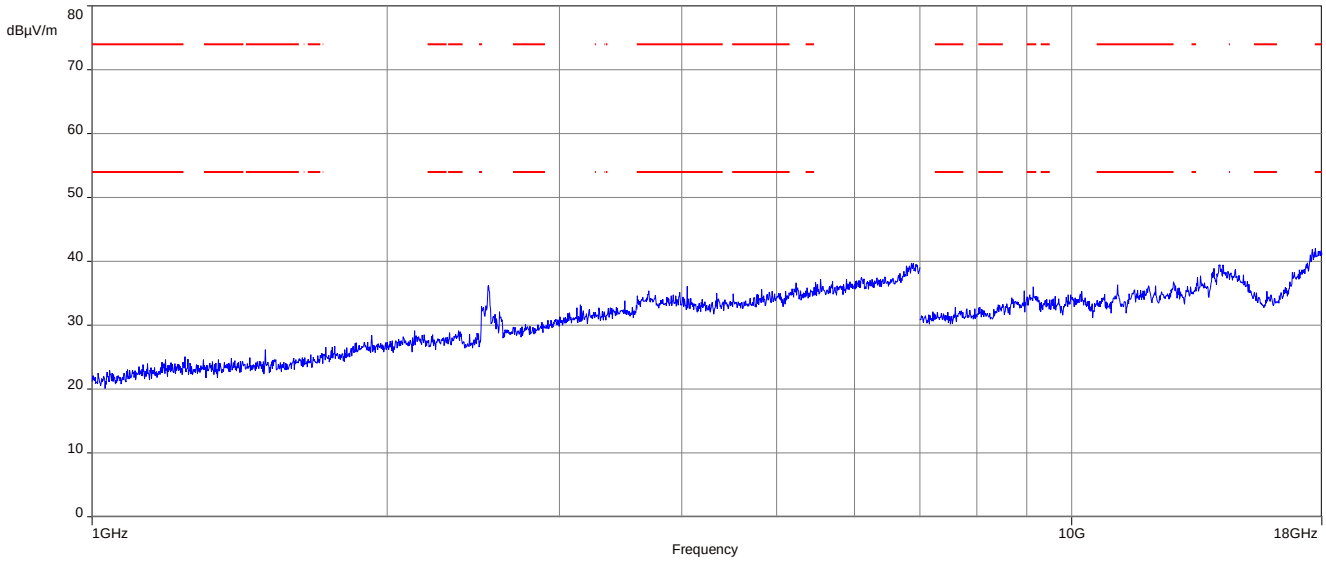
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



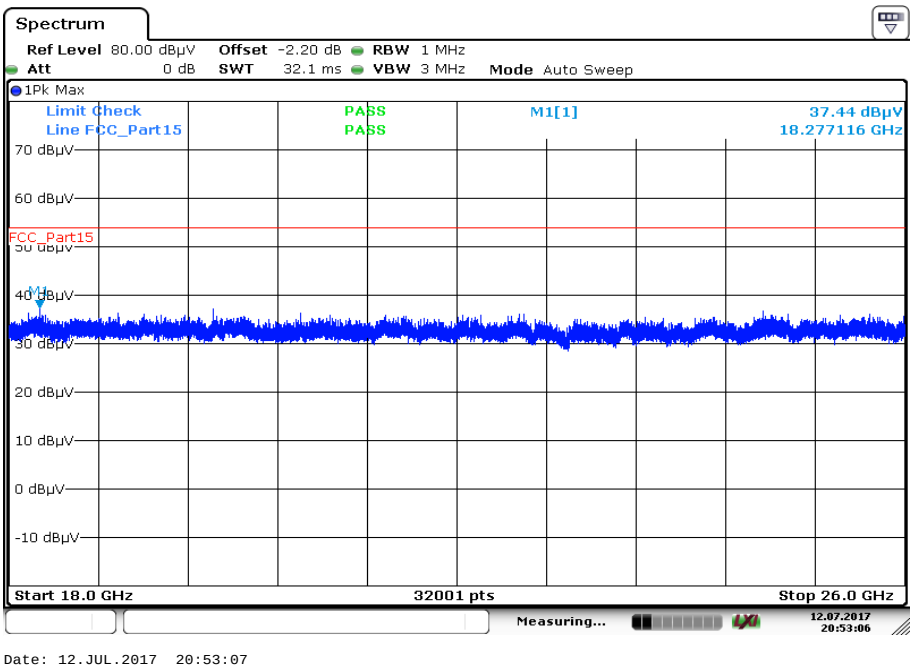
Date: 12.JUL.2017 20:50:55

Plot 5: Highest channel, 1 GHz to 18 GHz, vertical & horizontal polarization



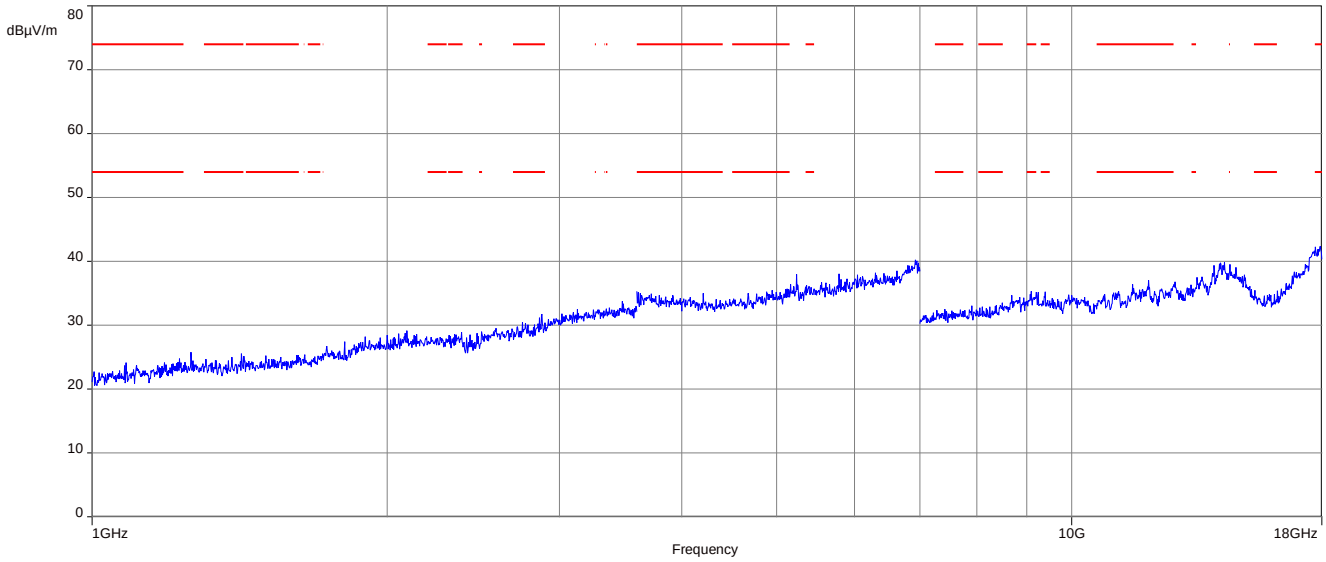
The carrier signal is notched with a 2.4 GHz band rejection filter.

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

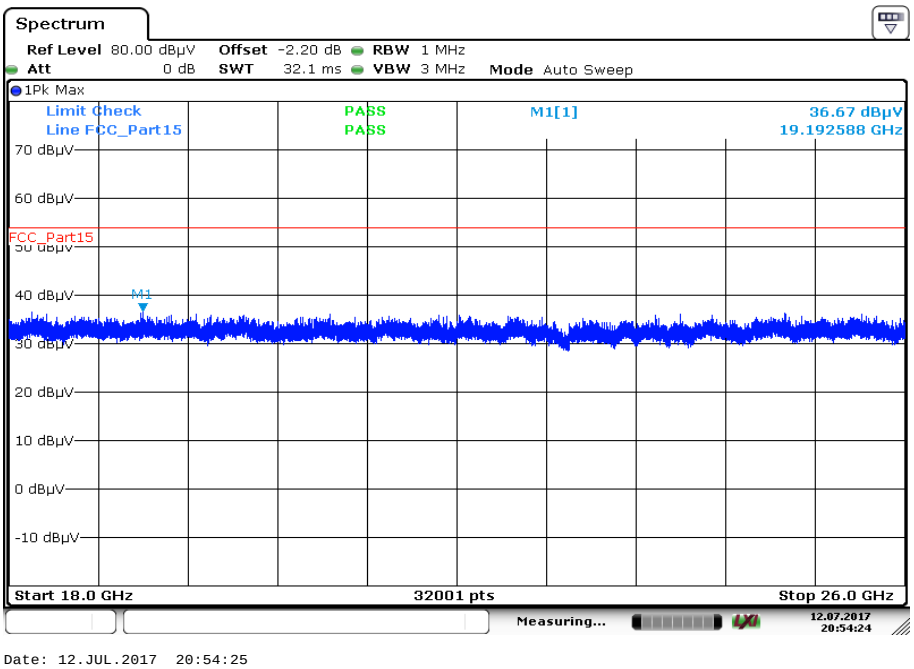


Plots: RX / idle mode – ANT1 – N12-3071-R0A

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



Plot 2: 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 12.JUL.2017 20:54:25

11.14 Spurious emissions conducted below 30 MHz (AC conducted)

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. 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
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video 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 6.5 – A
Measurement uncertainty:	See sub clause 8

Limits:

FCC		IC
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

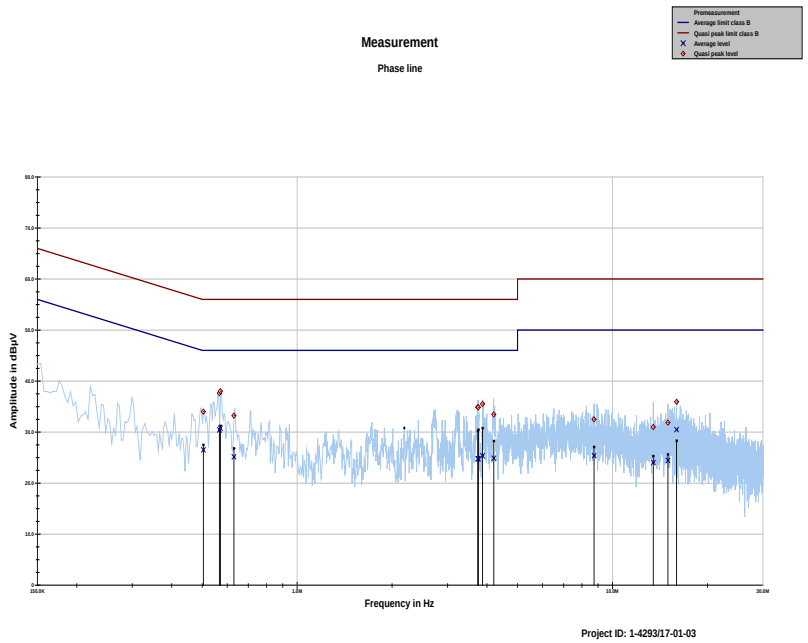
*Decreases with the logarithm of the frequency

Results:

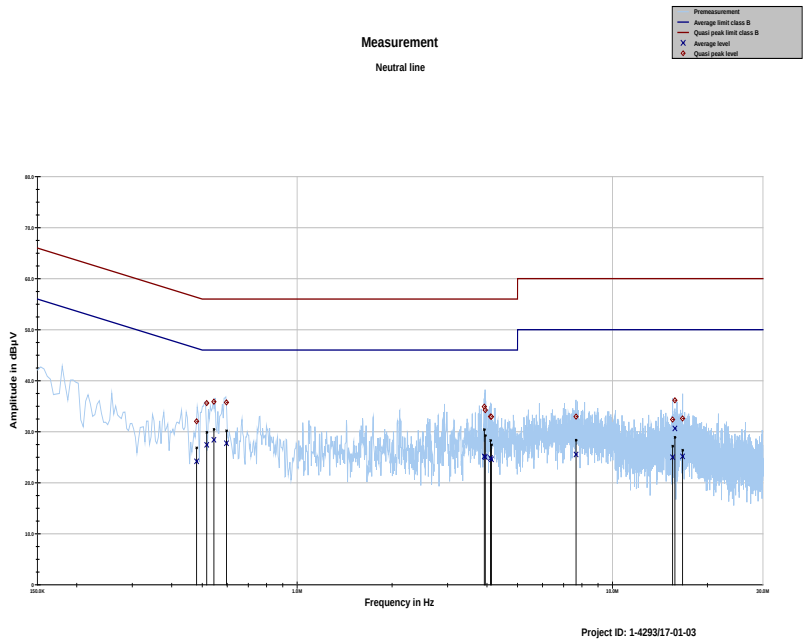
TX Spurious Emissions Conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
All detected peaks are more than 20 dB below the limit.		

Plots:

Plot 1: 150 kHz to 30 MHz, phase line



Plot 2: 150 kHz to 30 MHz, neutral line



Annex A Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
ETSI	European Telecommunications Standard Institute
EN	European Standard
FCC	Federal Communication 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	2017-07-07
A	second antenna for ANT1 added - N12-3071-R0A	2017-07-24
B	Editorial changes	2017-07-28
C	PMN and HVIN added	2017-08-09

Annex C Accreditation Certificate

first page	last page

DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

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

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CTC advanced GmbH
Untertürkheimer Straße 6-10, 66117 Saarbrücken

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

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

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 25.11.2016 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig bis 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 63 Seiten.

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

Frankfurt, 25.11.2016

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

Siehe Hinweise auf der Rückseite

Deutsche Akkreditierungsstelle GmbH

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10117 Berlin

Standort Frankfurt am Main
Europa-Allee 52
60327 Frankfurt am Main

Standort Braunschweig
Bundesallee 100
38116 Braunschweig

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ILAC: www.ilac.org
IAF: www.iaf.nu

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http://www.dakks.de/as/ast/d/D-PL-12076-01-01.pdf

http://www.dakks.de/as/ast/d/D-PL-12076-01-02.pdf