

12.10 Spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at the lowest; the middle and the highest channel. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector	Peak
Sweep time	Auto
Resolution bandwidth	100 kHz
Video bandwidth	500 kHz
Span	9 kHz to 25 GHz
Trace mode	Max Hold
Test setup	See chapter 6.5 – A
Measurement uncertainty	See chapter 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	

Results: DSSS / b – mode

TX spurious emissions conducted					
channel		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
1		0.83	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
6		0.22	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
11		0.81	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant

Results: OFDM / g – mode

TX spurious emissions conducted					
channel		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
1		-3.16	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
2		-1.32	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
3		-0.34	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
6		-0.34	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
9		-1.68	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
10		-3.13	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
11		-4.50	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant

Results: OFDM / n HT20 – mode

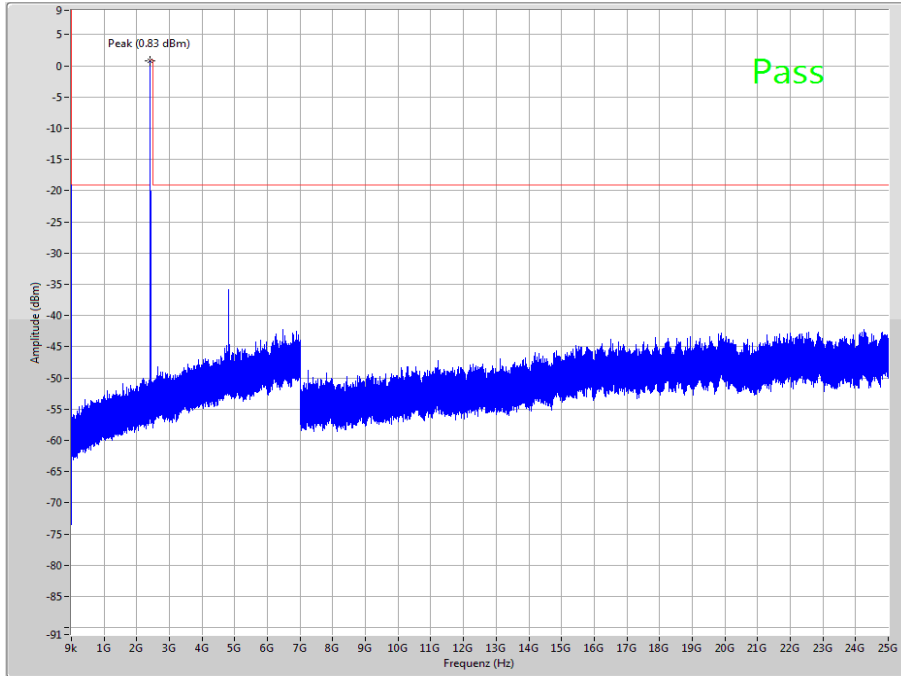
TX spurious emissions conducted					
channel		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
1		-4.25	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
2		-1.84	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
3		-1.37	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
6		-0.34	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
9		-3.41	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
10		-2.66	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
11		-5.52	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant

Results: OFDM / n HT40 – mode

TX spurious emissions conducted					
channel		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
3		-9.69	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
4		-11.05	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
5		-7.55	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
6		-6.93	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
7		-7.00	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
8		-8.16	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant
9		-9.64	30 dBm		Operating frequency
All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		compliant

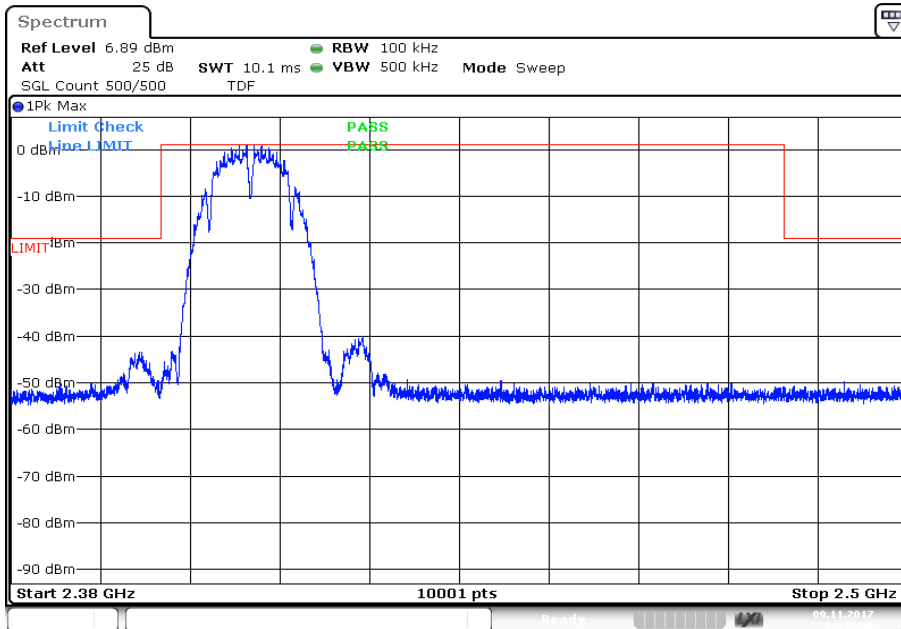
Plots: DSSS / b – mode

Plot 1: channel 1, up to 25 GHz



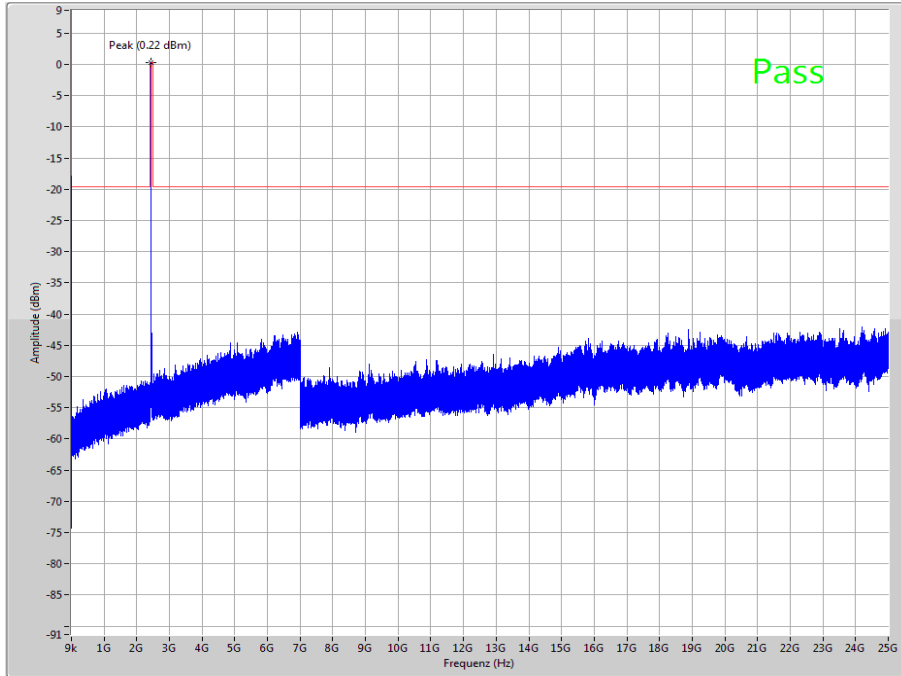
The peak at the beginning of the plot is the LO from the SA.

Plot 2: channel 1, zoomed carrier



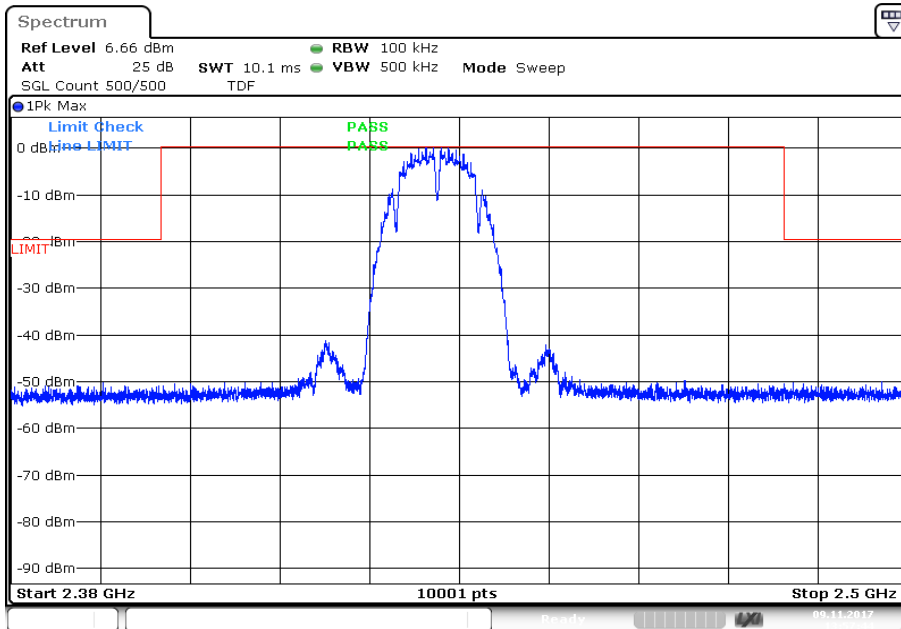
Date: 9. NOV. 2017 13:49:38

Plot 3: channel 6, up to 25 GHz

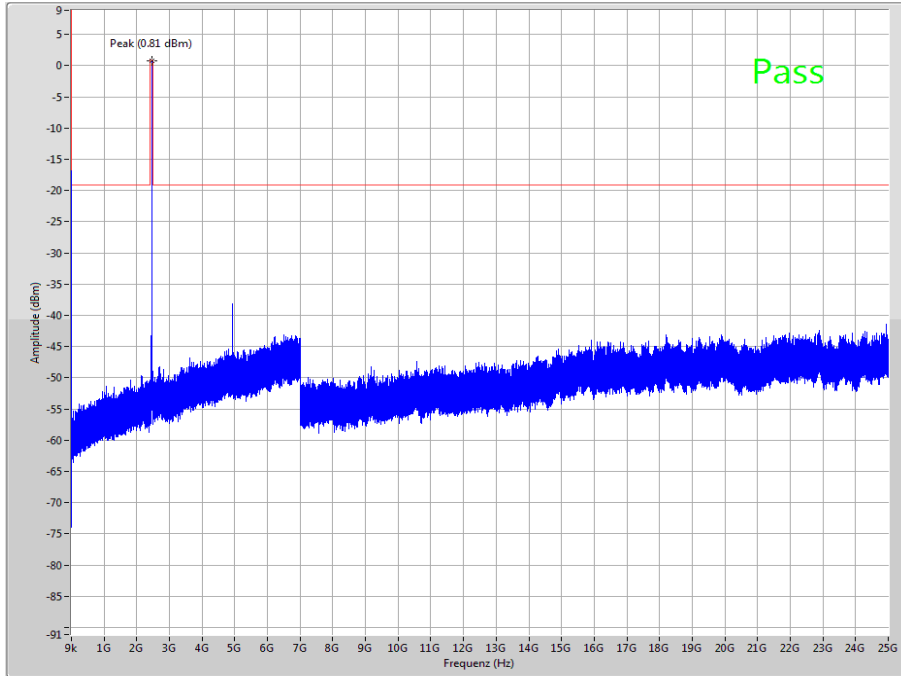


The peak at the beginning of the plot is the LO from the SA.

Plot 4: channel 6, zoomed carrier

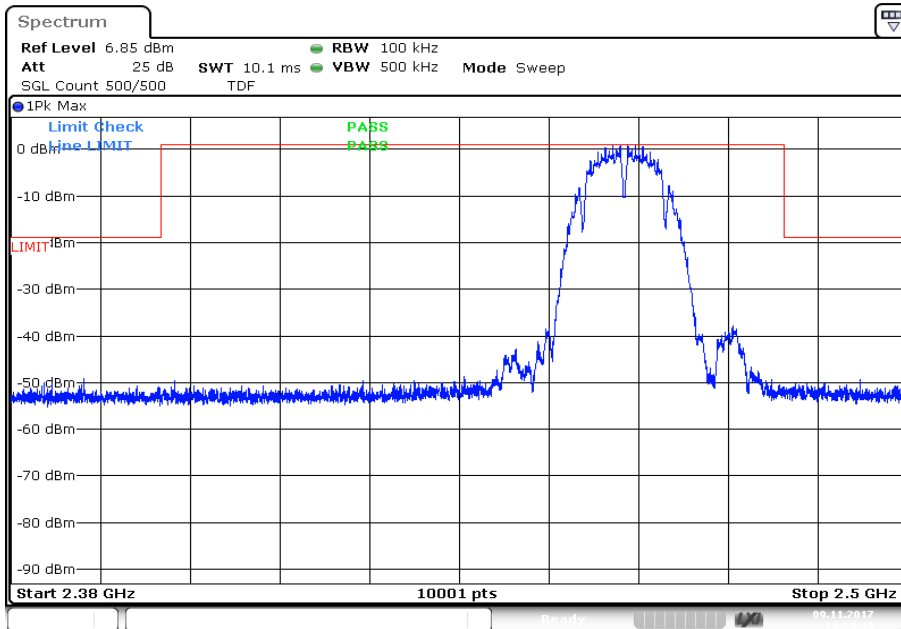


Plot 5: channel 11, up to 25 GHz



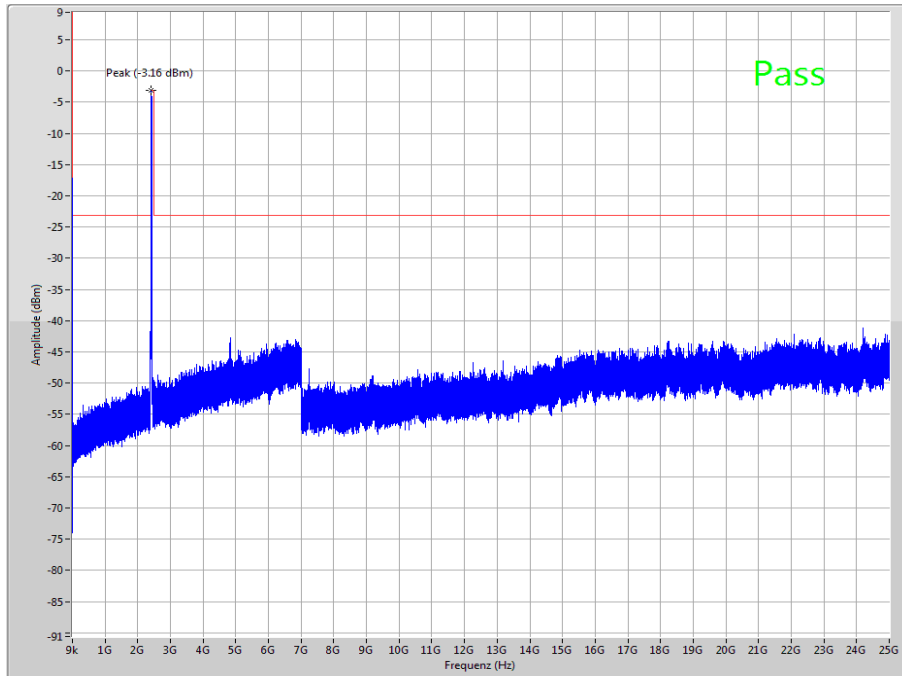
The peak at the beginning of the plot is the LO from the SA.

Plot 6: channel 11, zoomed carrier



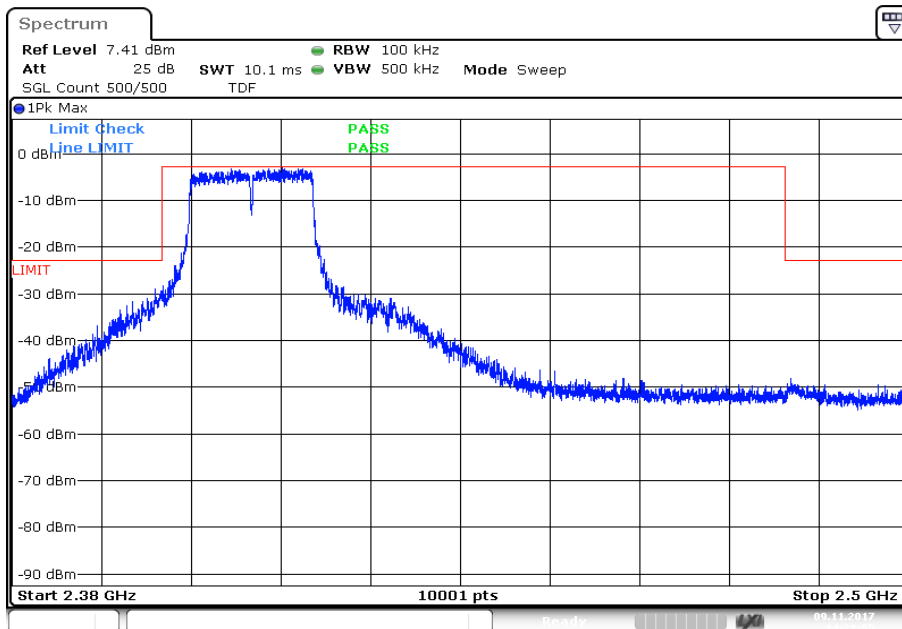
Plots: OFDM / g – mode

Plot 1: channel 1, up to 25 GHz



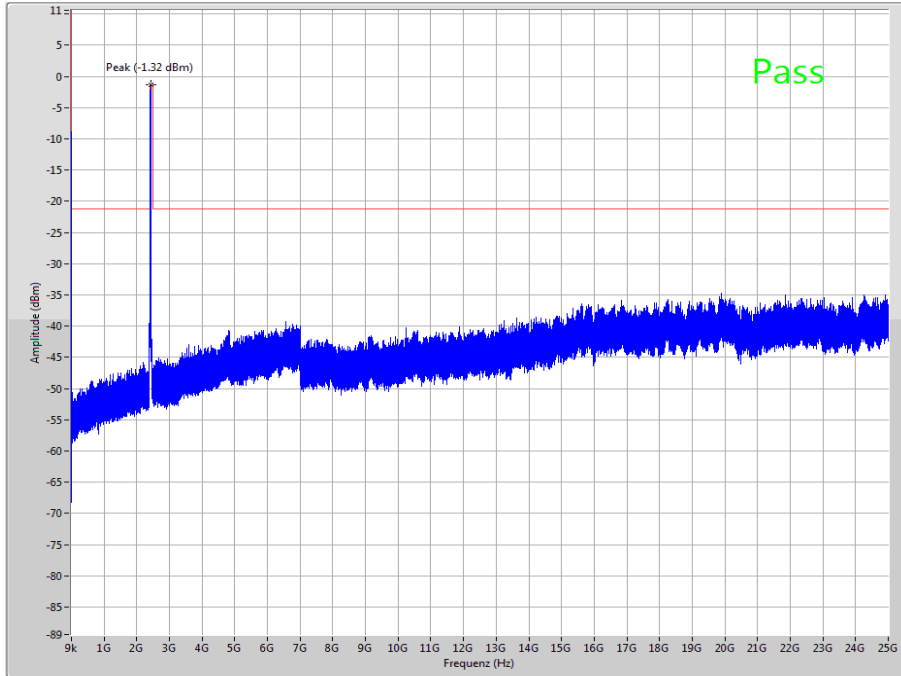
The peak at the beginning of the plot is the LO from the SA.

Plot 2: channel 1, zoomed carrier



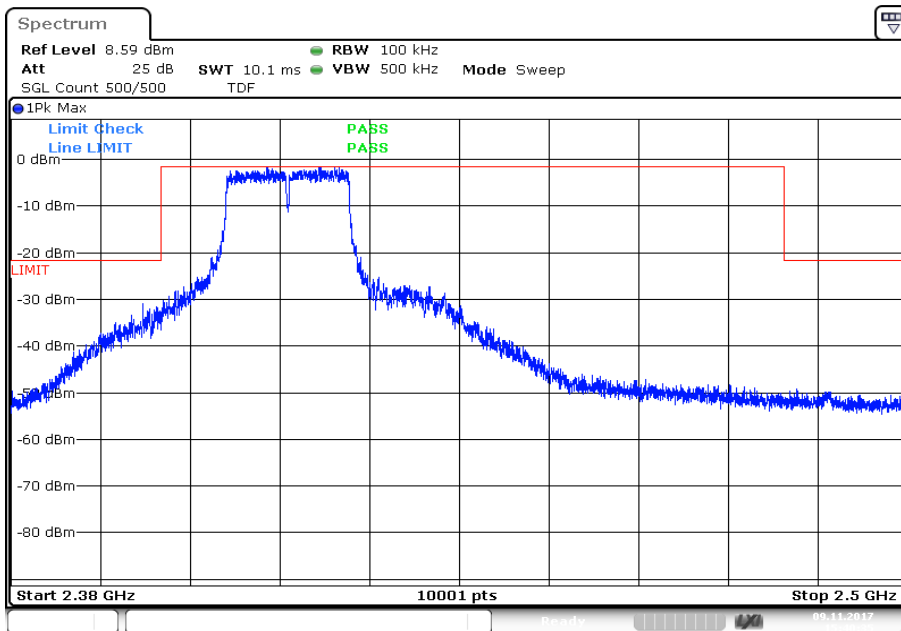
Date: 9. NOV. 2017 14:28:55

Plot 3: channel 2, up to 25 GHz



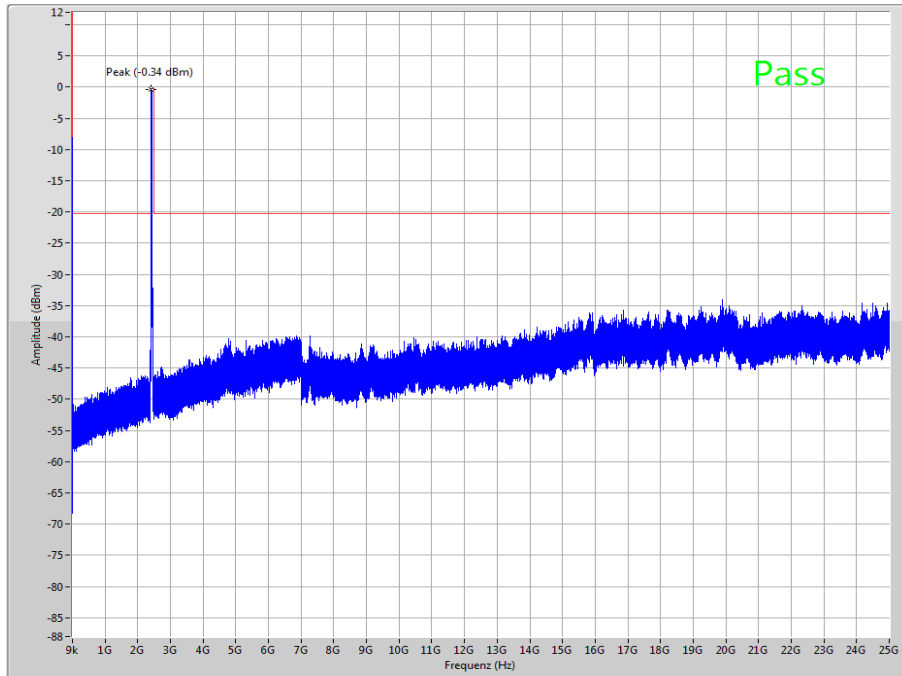
The peak at the beginning of the plot is the LO from the SA.

Plot 4: channel 2, zoomed carrier



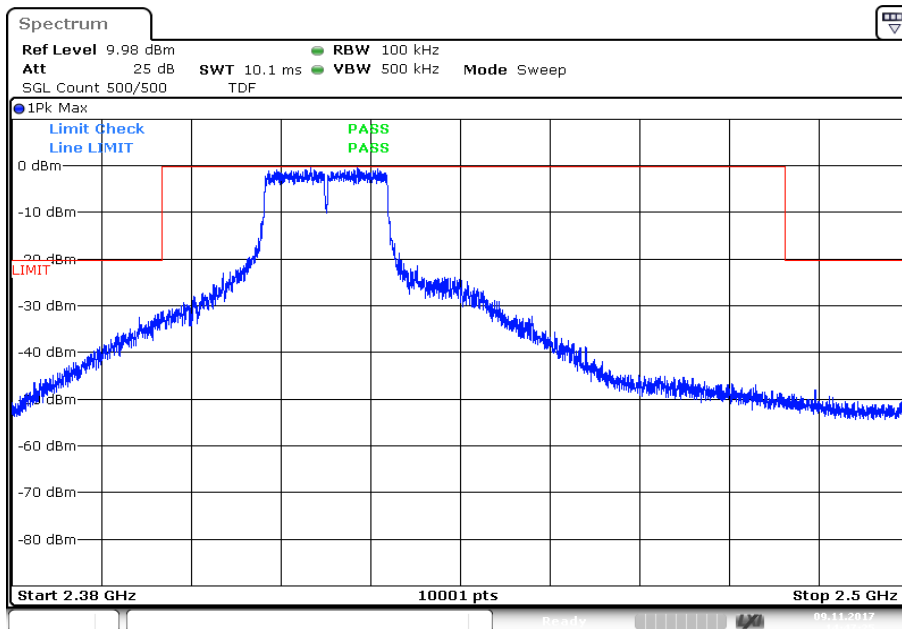
Date: 9. NOV. 2017 15:40:35

Plot 5: channel 3, up to 25 GHz

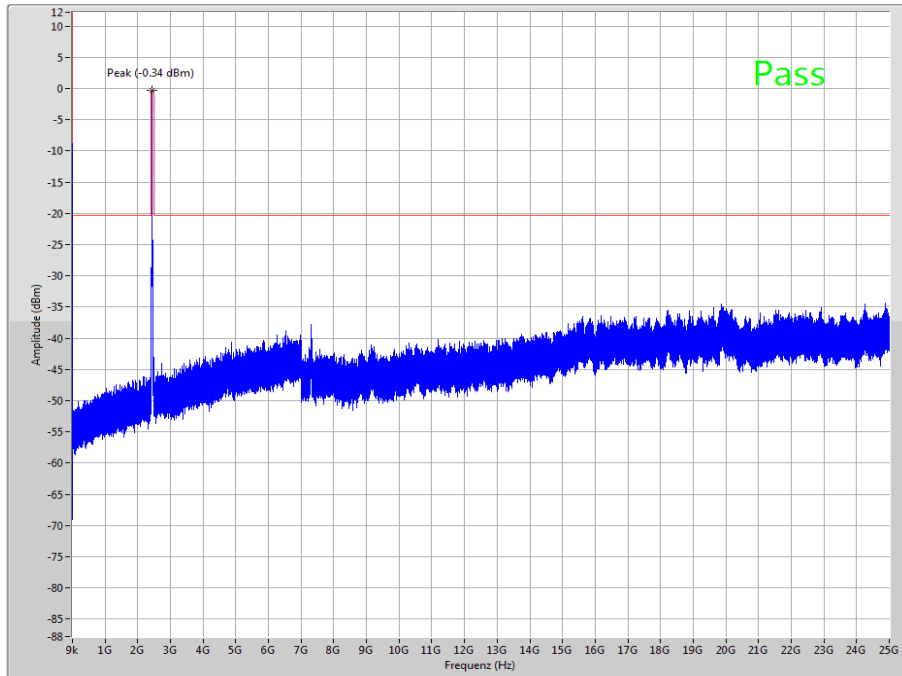


The peak at the beginning of the plot is the LO from the SA.

Plot 6: channel 3, zoomed carrier

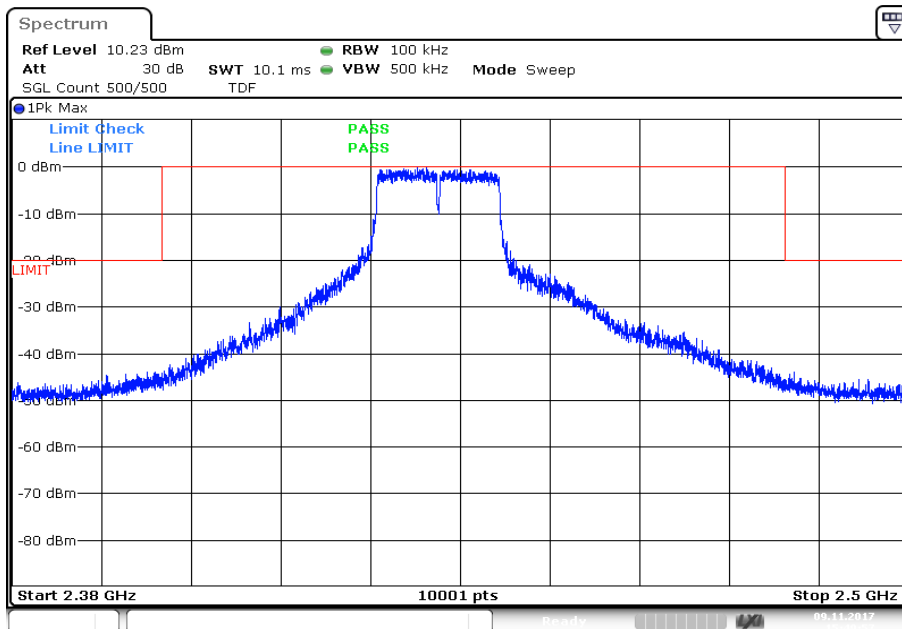


Plot 7: channel 6, up to 25 GHz



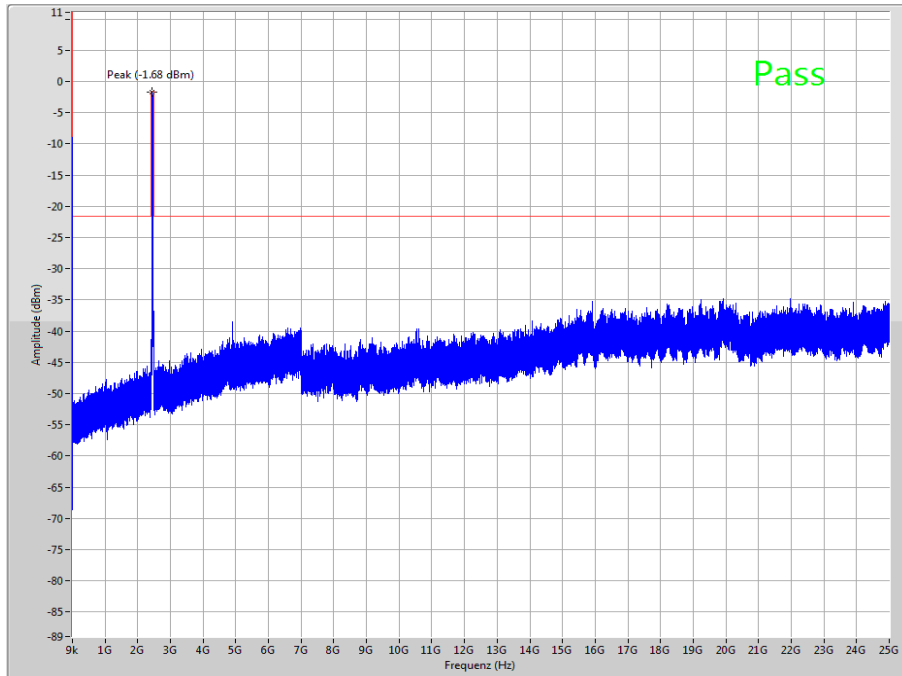
The peak at the beginning of the plot is the LO from the SA.

Plot 8: channel 6, zoomed carrier



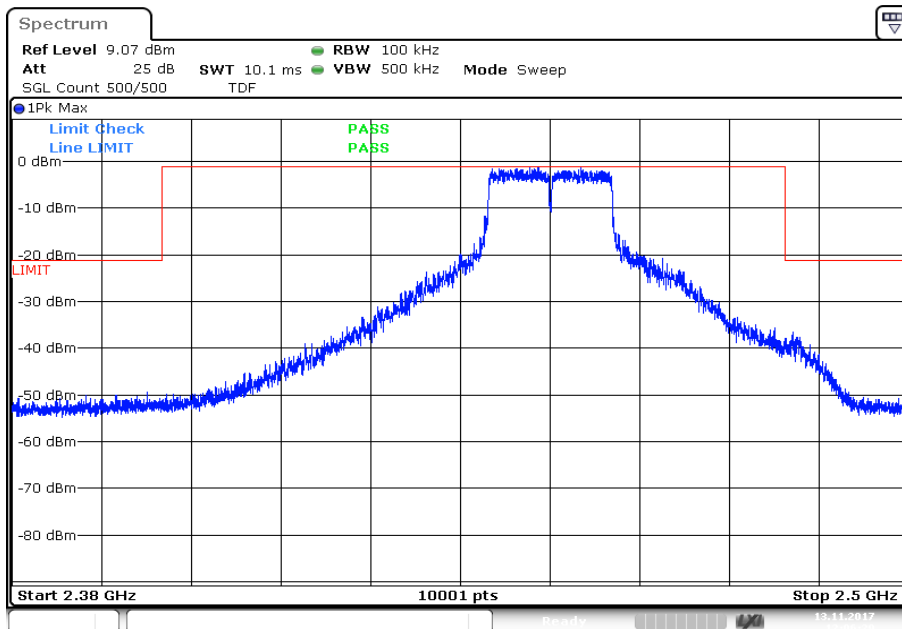
Date: 9. NOV. 2017 15:49:57

Plot 9: channel 9, up to 25 GHz

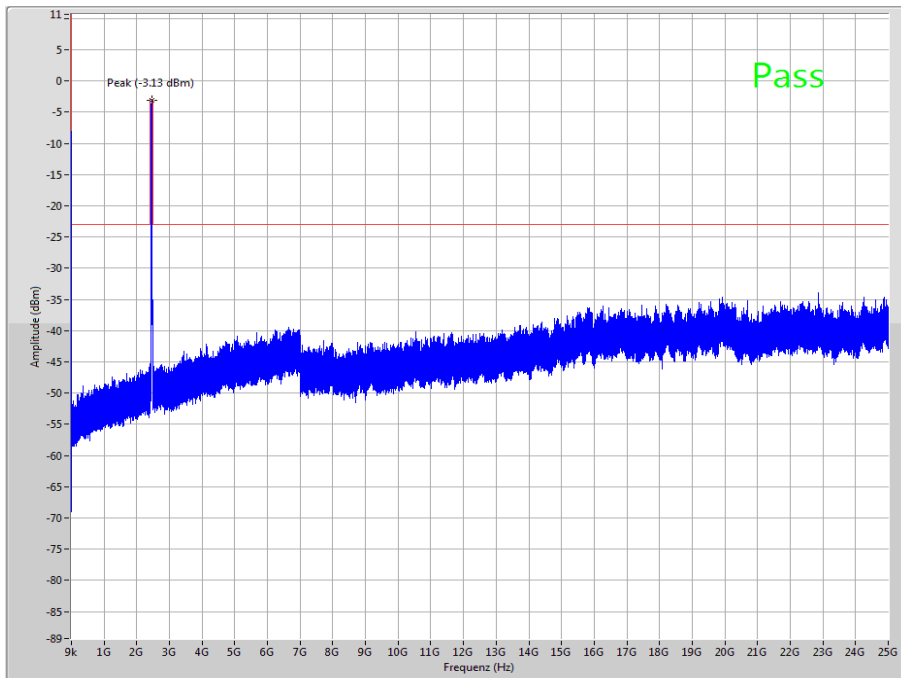


The peak at the beginning of the plot is the LO from the SA.

Plot 10: channel 9, zoomed carrier

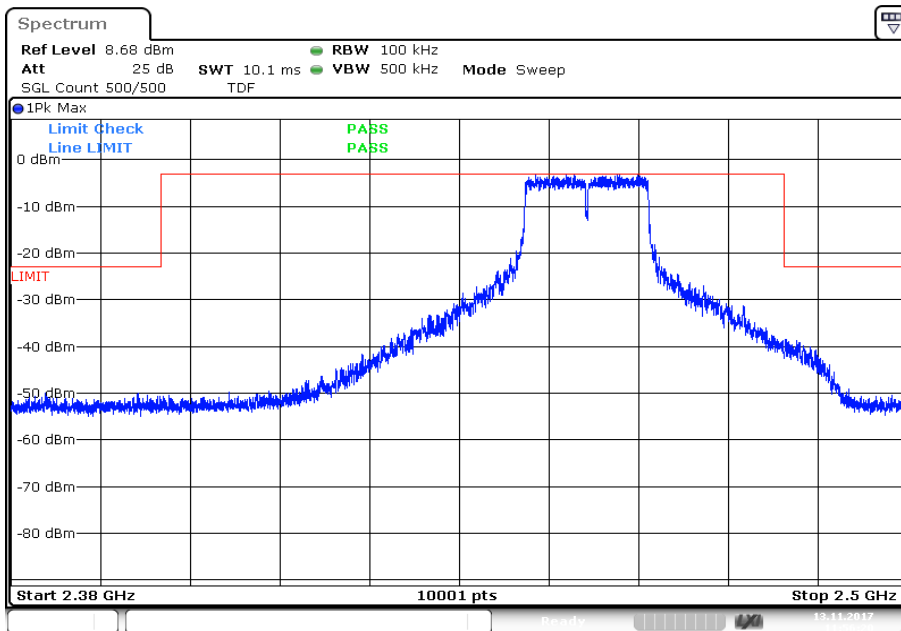


Plot 11: channel 10, up to 25 GHz

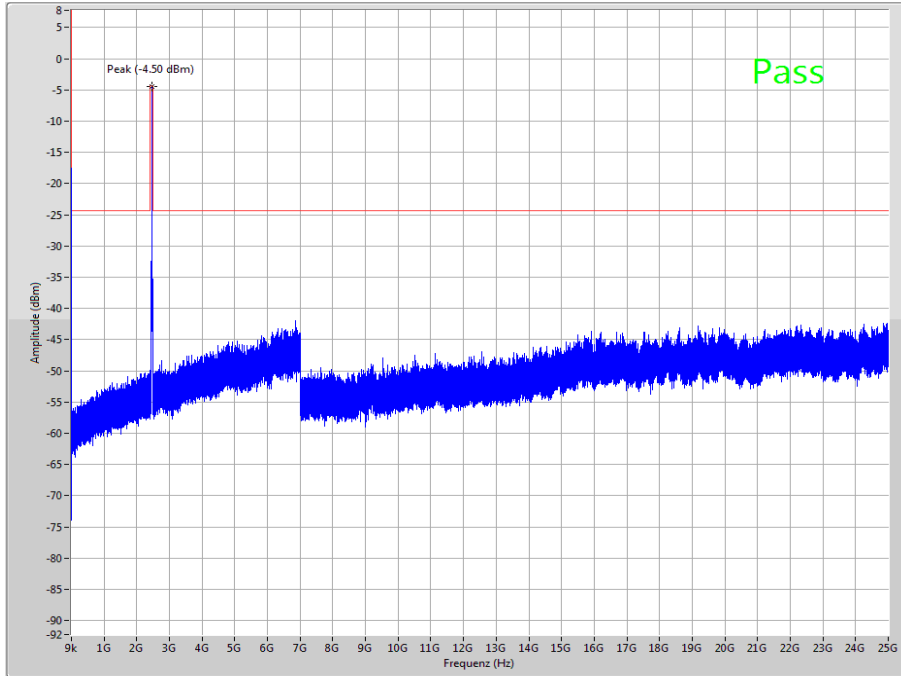


The peak at the beginning of the plot is the LO from the SA.

Plot 12: channel 10, zoomed carrier

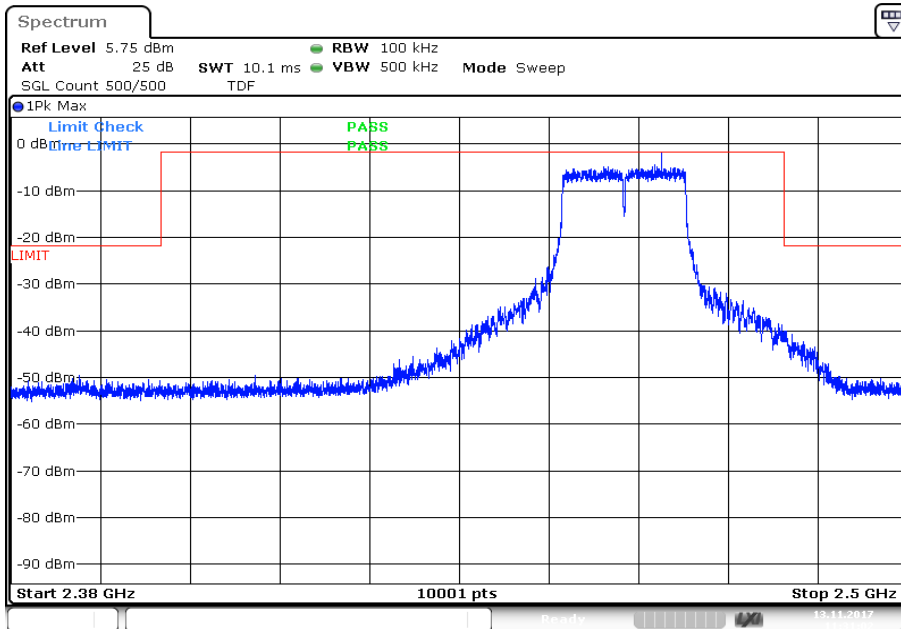


Plot 13: channel 11, up to 25 GHz



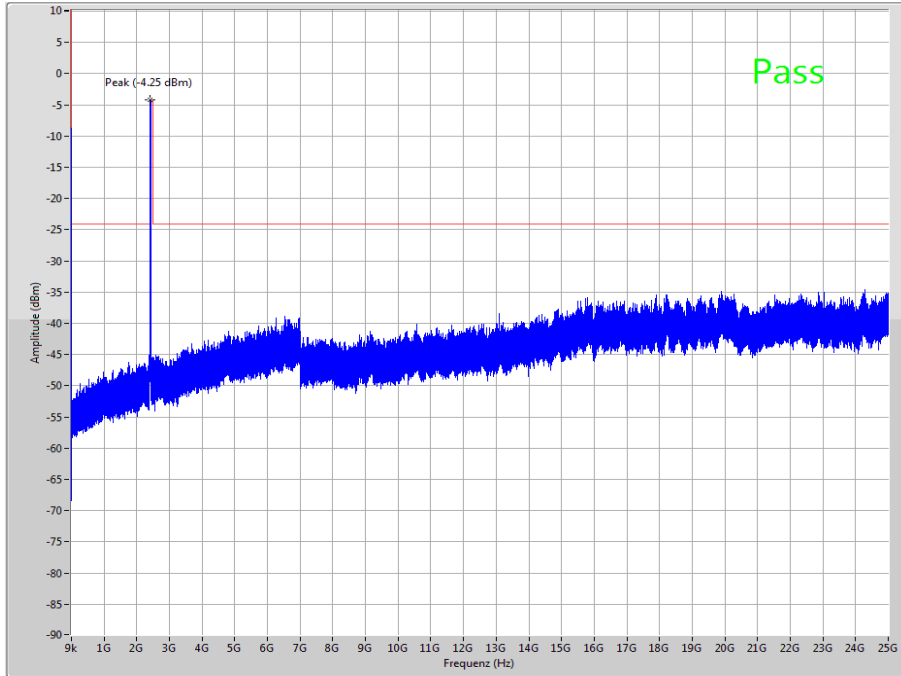
The peak at the beginning of the plot is the LO from the SA.

Plot 14: channel 11, zoomed carrier



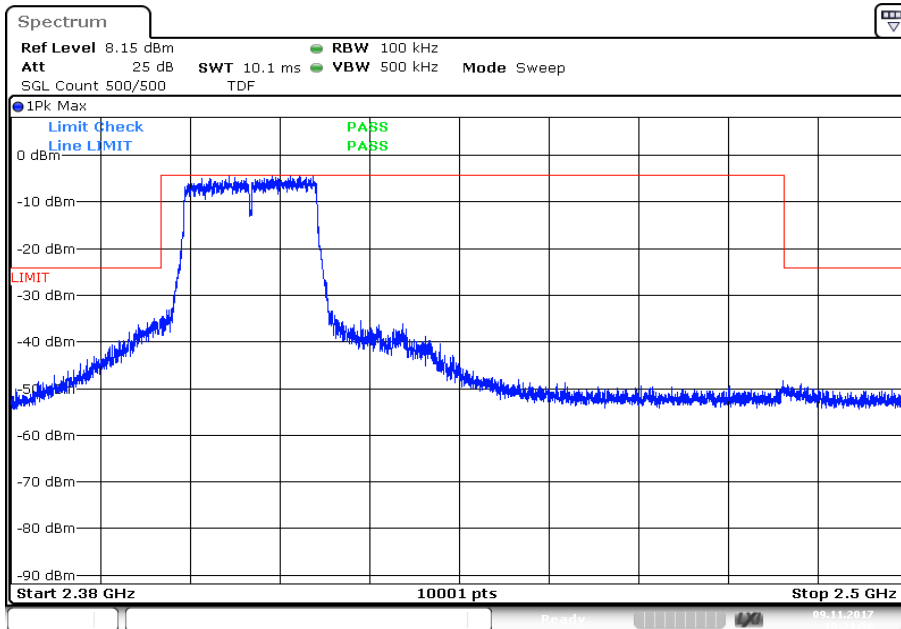
Plots: OFDM / n HT 20 – mode

Plot 1: channel 1, up to 25 GHz



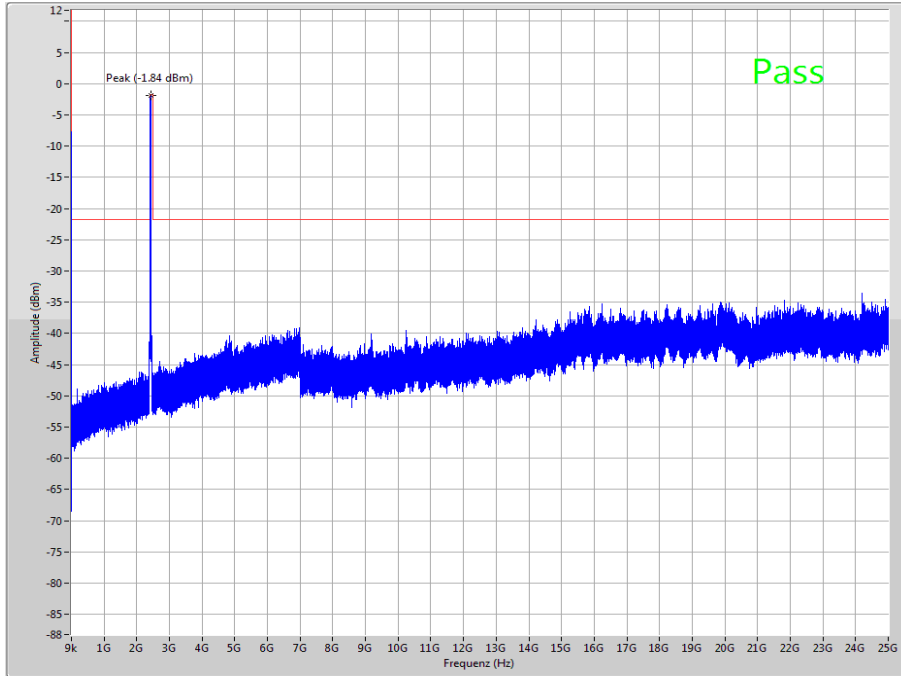
The peak at the beginning of the plot is the LO from the SA.

Plot 2: channel 1, zoomed carrier



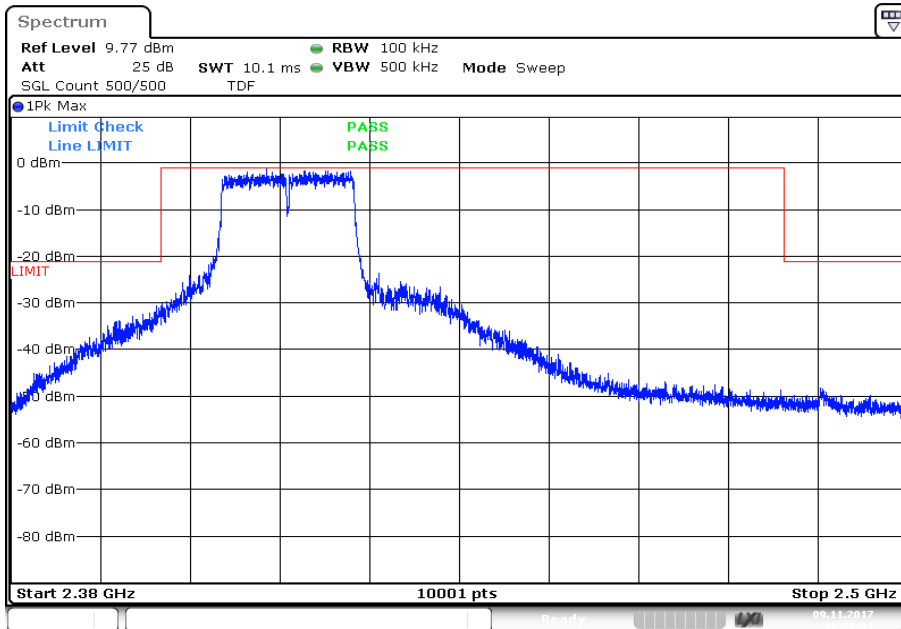
Date: 9. NOV. 2017 15:21:56

Plot 3: channel 2, up to 25 GHz



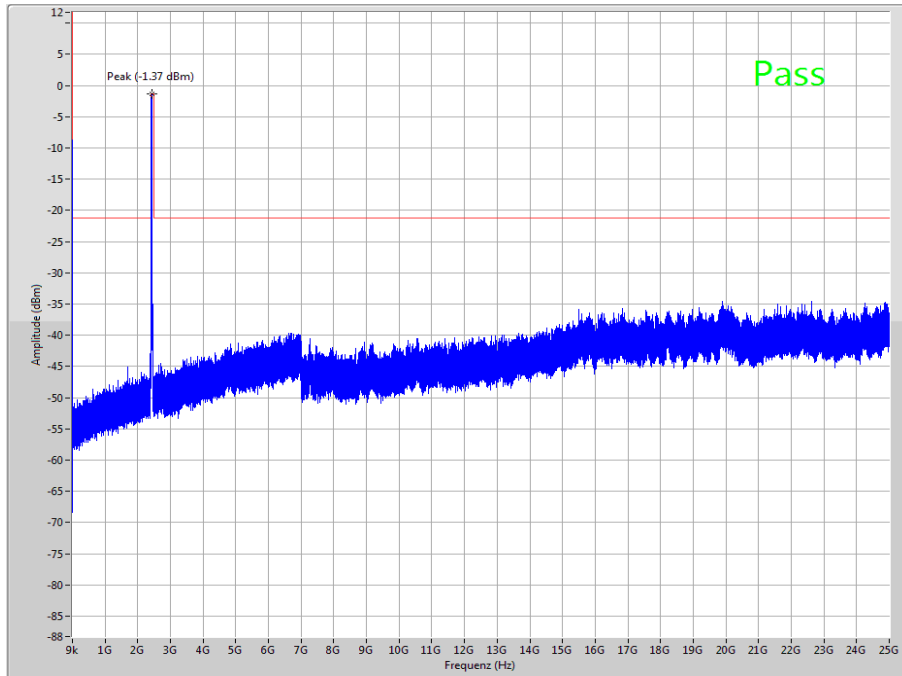
The peak at the beginning of the plot is the LO from the SA.

Plot 4: channel 2, zoomed carrier



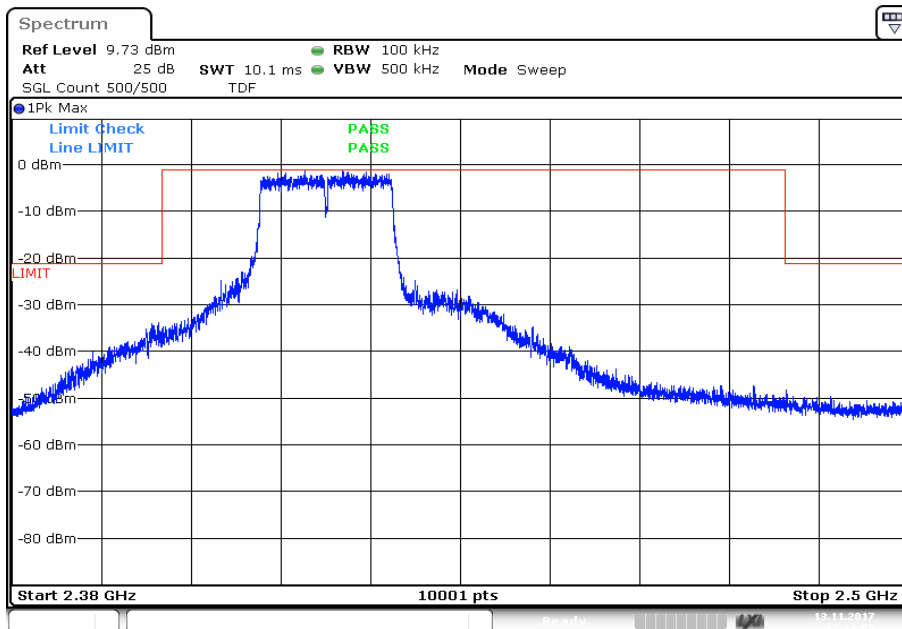
Date: 9. NOV. 2017 16:00:41

Plot 5: channel 3, up to 25 GHz

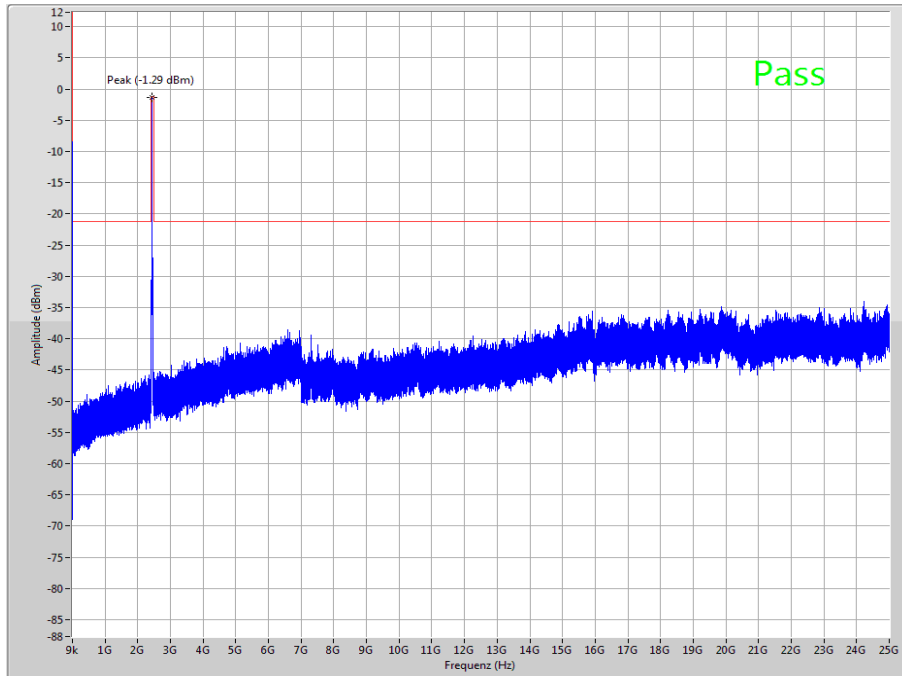


The peak at the beginning of the plot is the LO from the SA.

Plot 6: channel 3, zoomed carrier

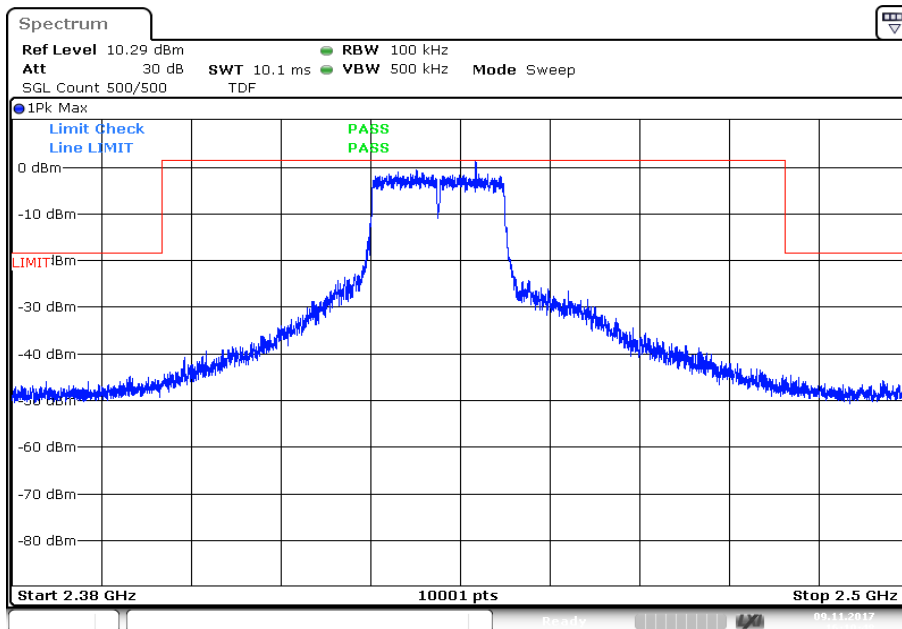


Plot 7: channel 6, up to 25 GHz

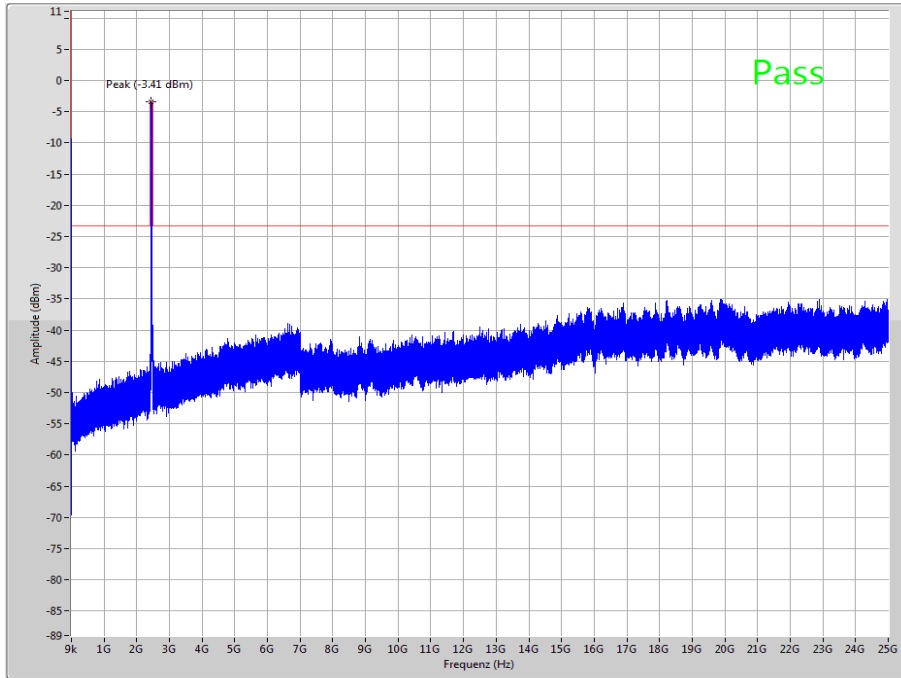


The peak at the beginning of the plot is the LO from the SA.

Plot 8: channel 6, zoomed carrier

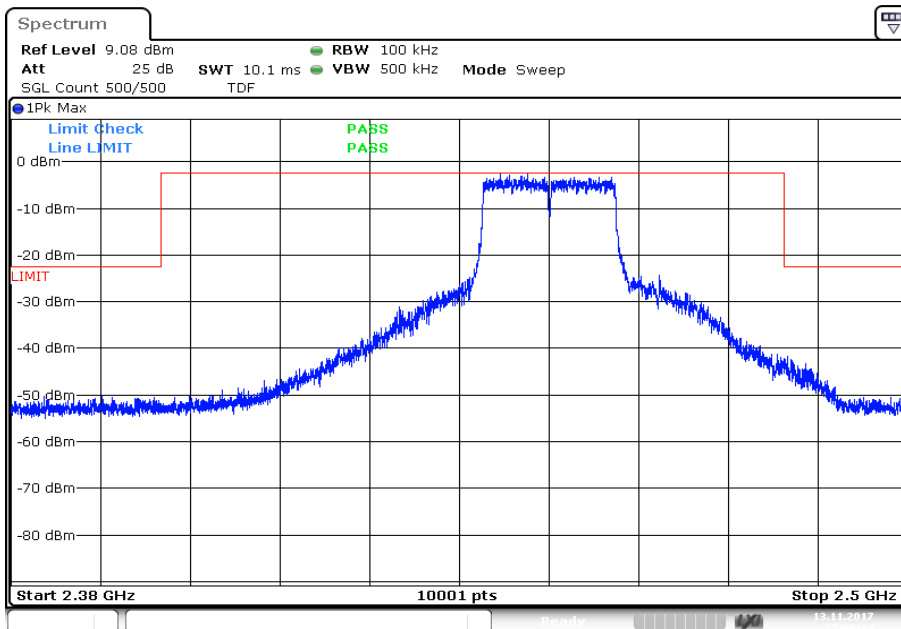


Plot 9: channel 9, up to 25 GHz



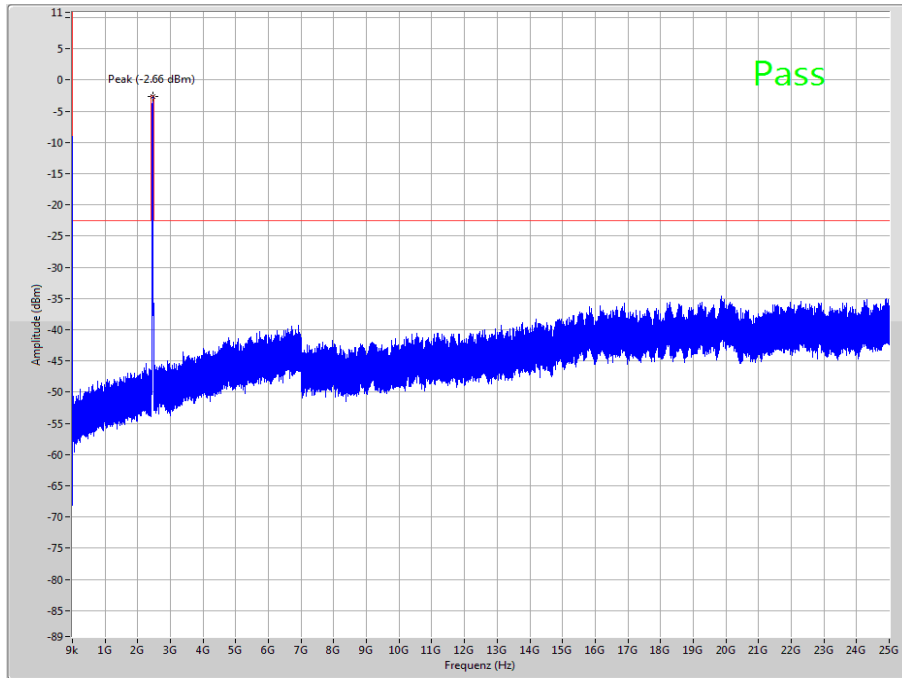
The peak at the beginning of the plot is the LO from the SA.

Plot 10: channel 9, zoomed carrier



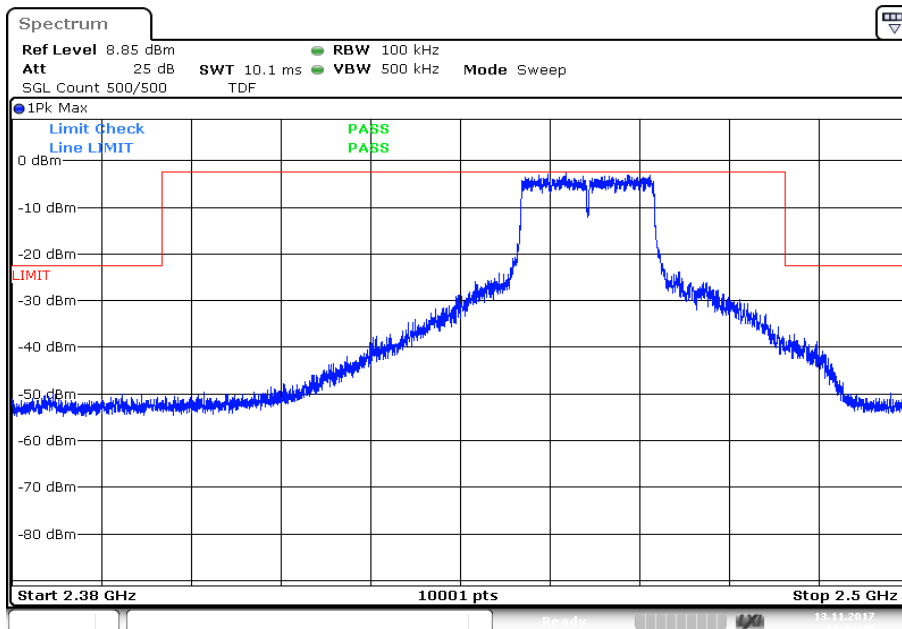
Date: 13.NOV.2017 15:09:15

Plot 11: channel 10, up to 25 GHz



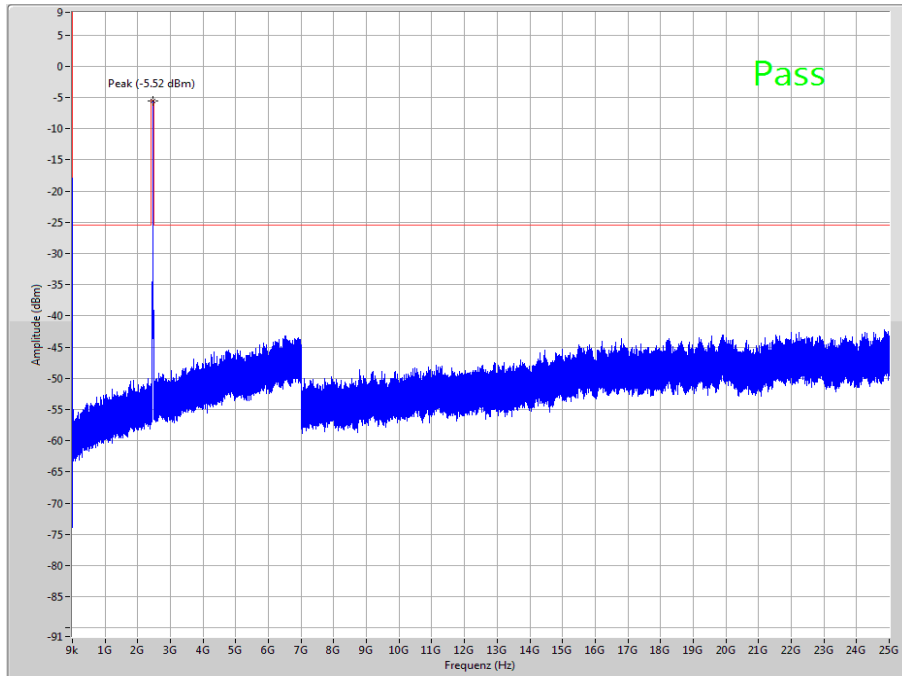
The peak at the beginning of the plot is the LO from the SA.

Plot 12: channel 10, zoomed carrier



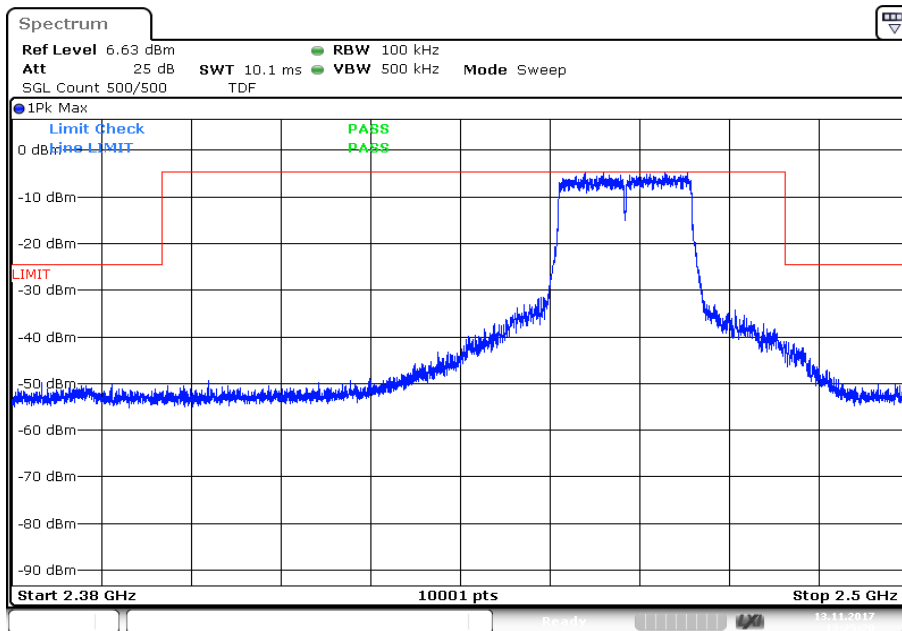
Date: 13.NOV.2017 13:44:47

Plot 13: channel 11, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

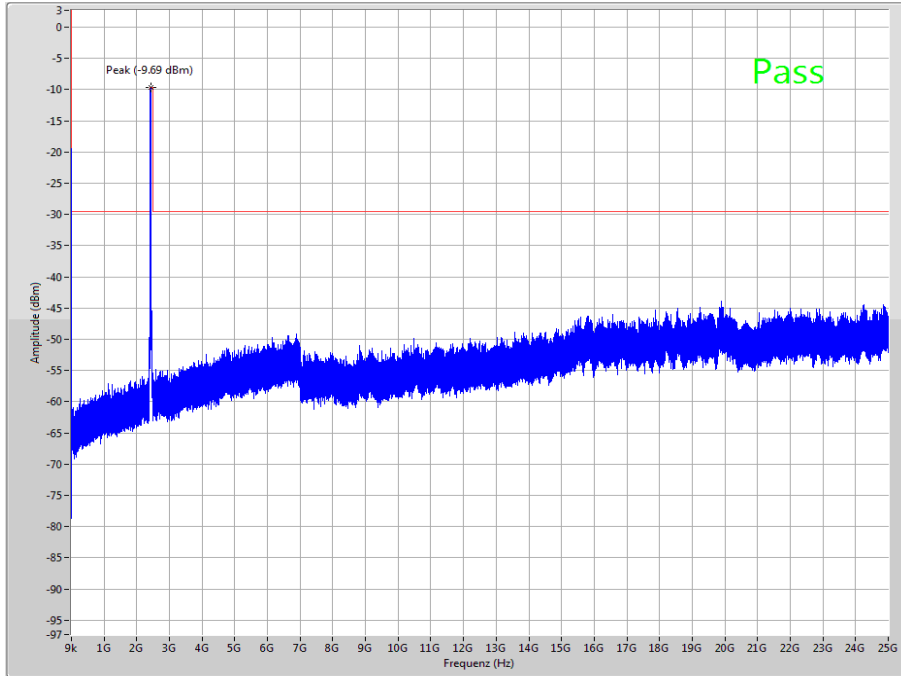
Plot 14: channel 11, zoomed carrier



Date: 13.NOV.2017 13:25:21

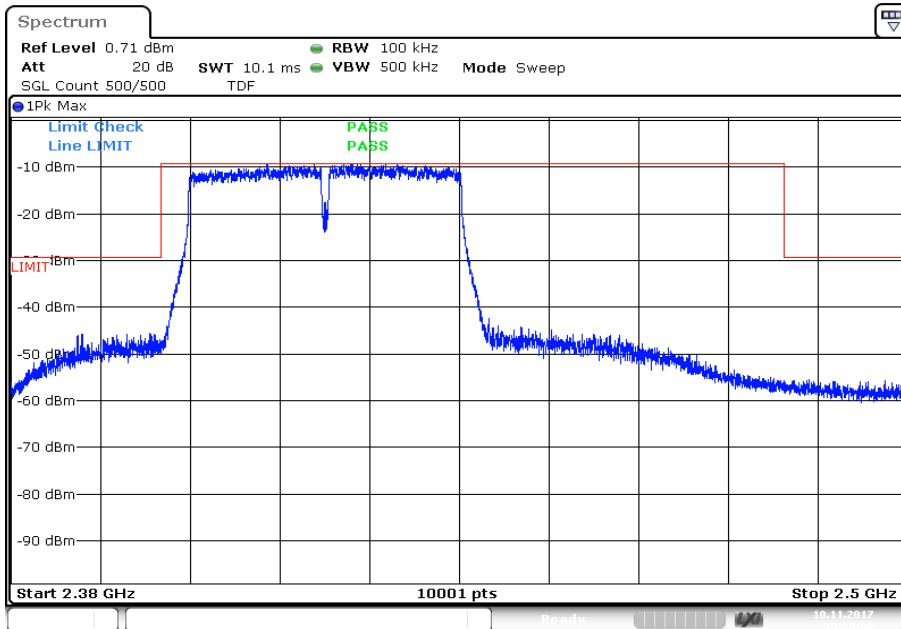
Plots: OFDM / n HT 40 – mode

Plot 1: channel 3, up to 25 GHz

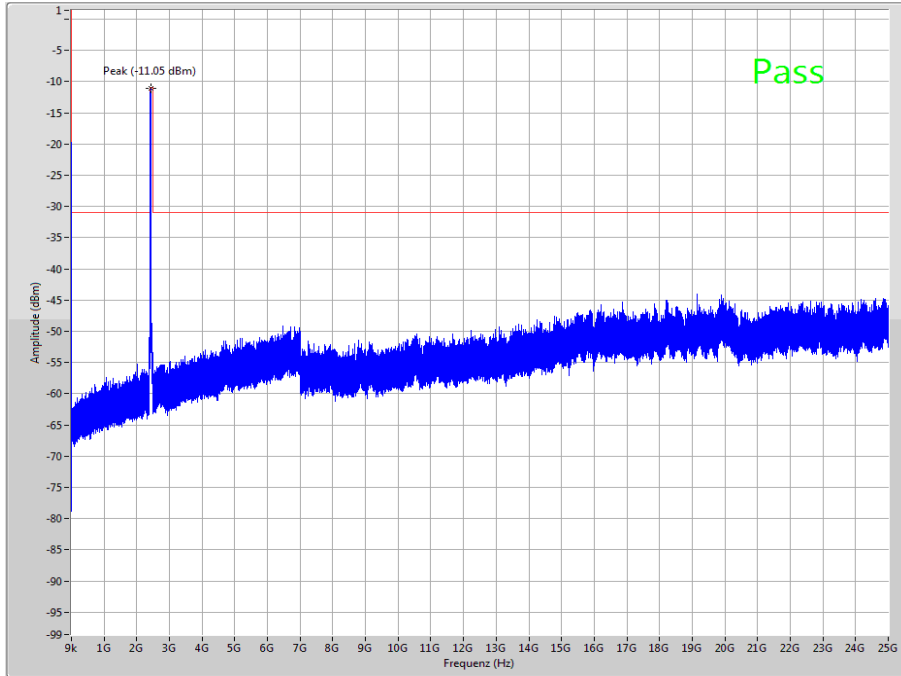


The peak at the beginning of the plot is the LO from the SA.

Plot 2: channel 3, zoomed carrier

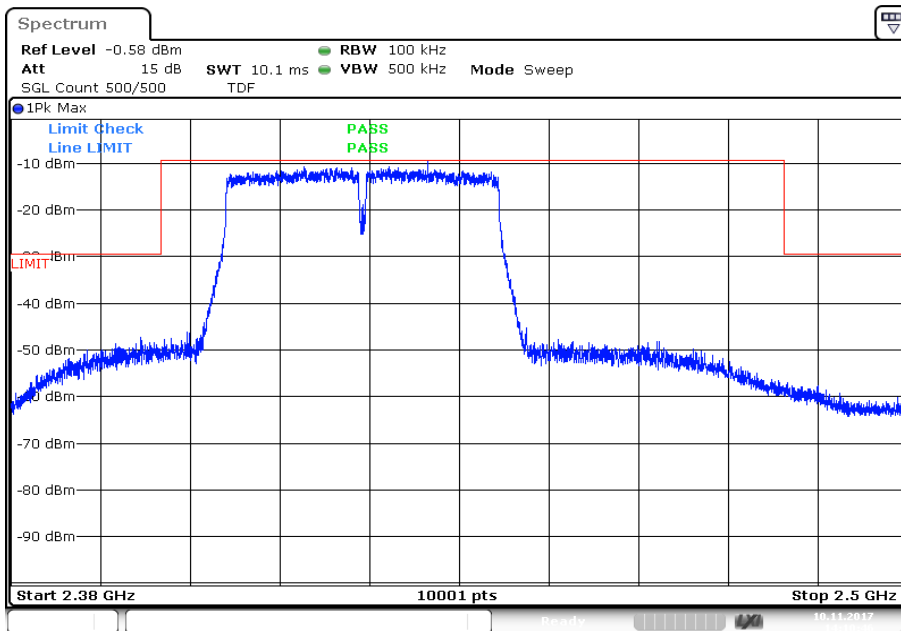


Plot 3: channel 4, up to 25 GHz



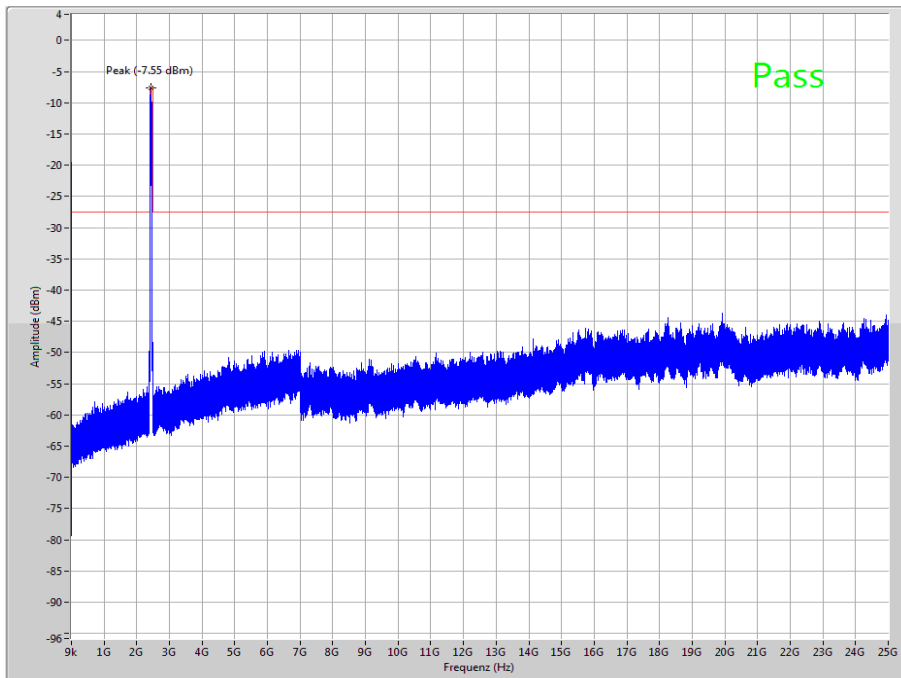
The peak at the beginning of the plot is the LO from the SA.

Plot 4: channel 4, zoomed carrier



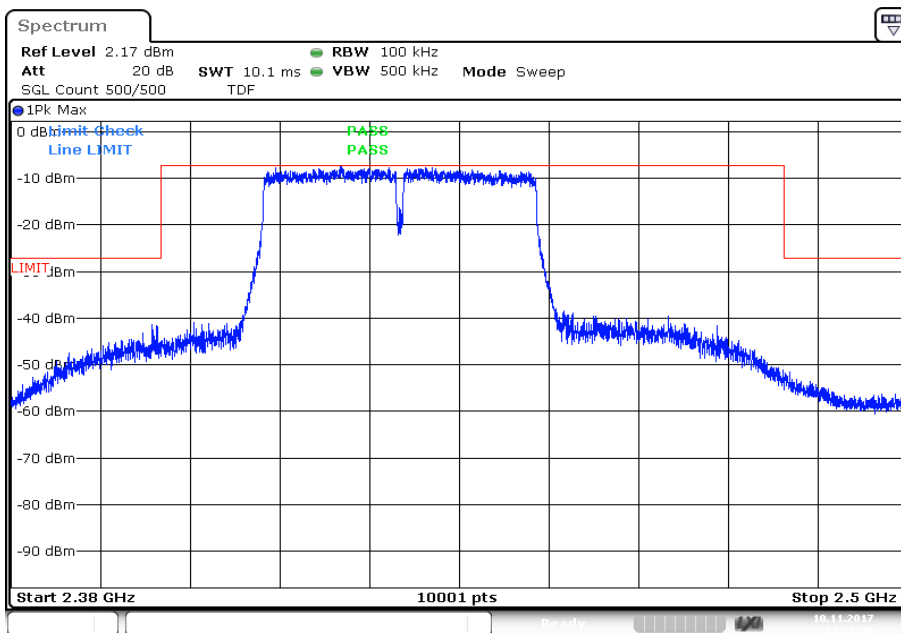
Date: 10.NOV.2017 14:10:46

Plot 5: channel 5, up to 25 GHz



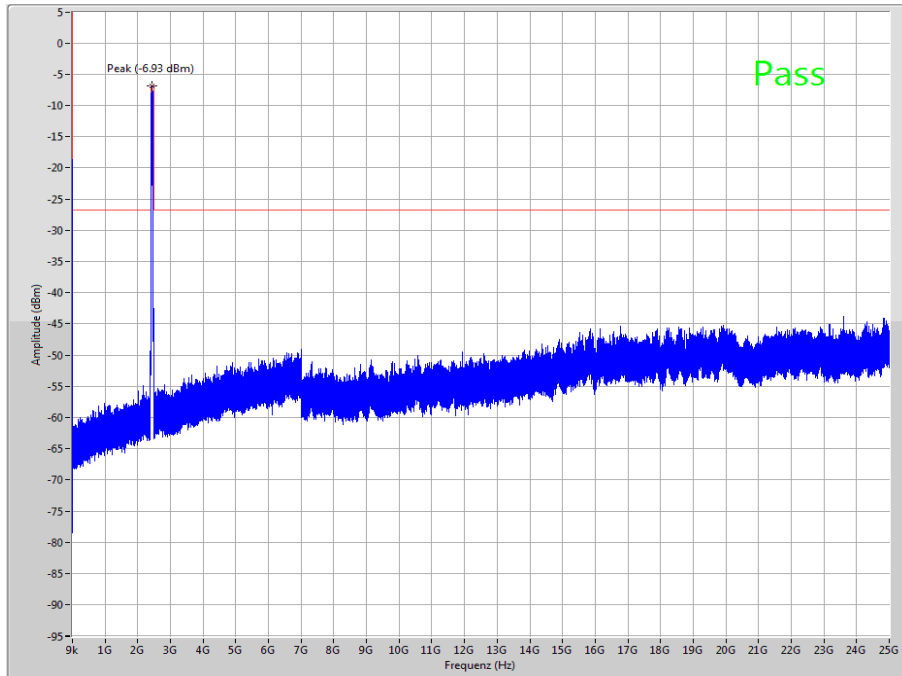
The peak at the beginning of the plot is the LO from the SA.

Plot 6: channel 5, zoomed carrier



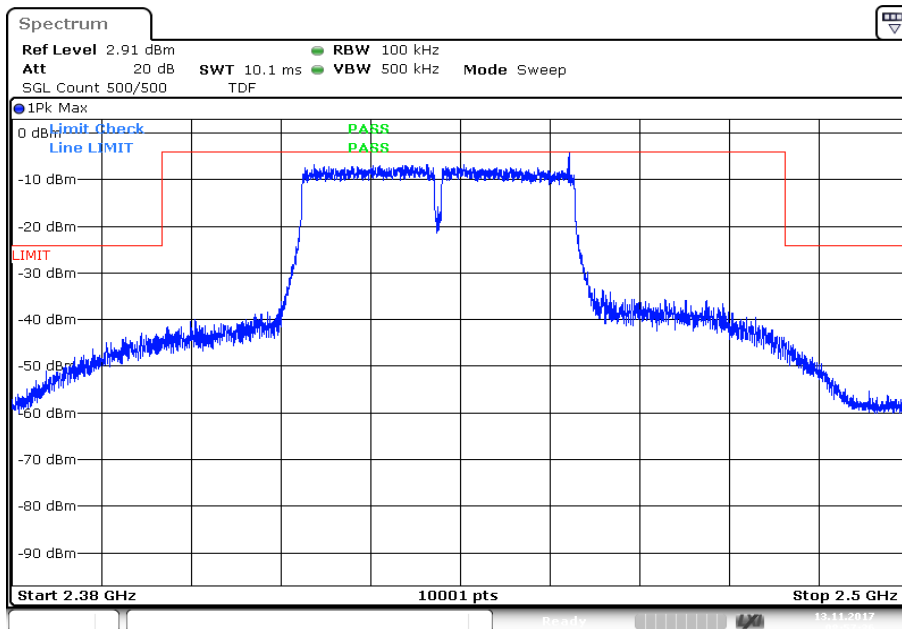
Date: 10.NOV.2017 14:25:46

Plot 7: channel 6, up to 25 GHz



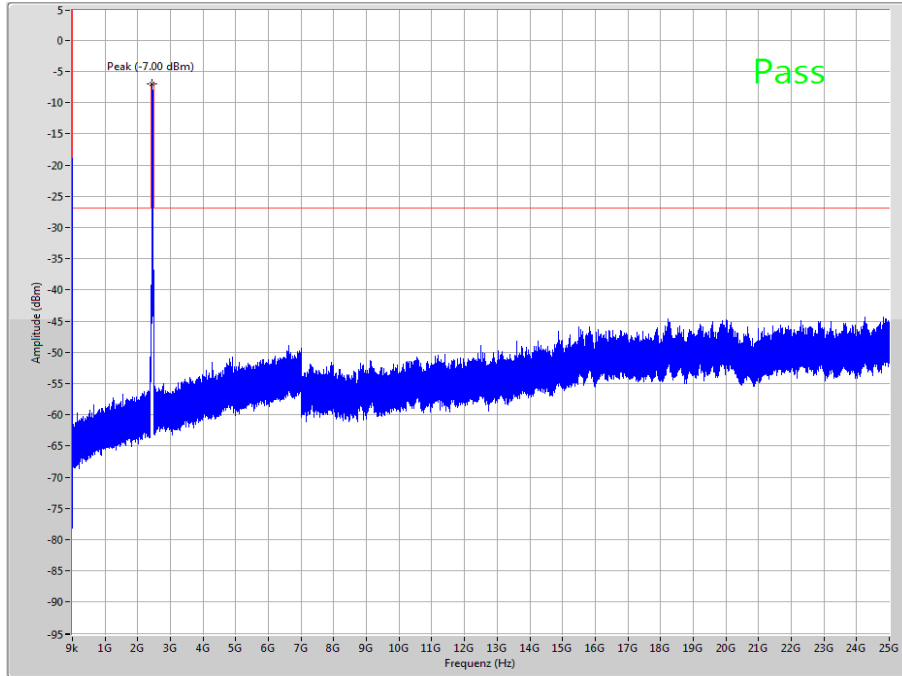
The peak at the beginning of the plot is the LO from the SA.

Plot 8: channel 6, zoomed carrier



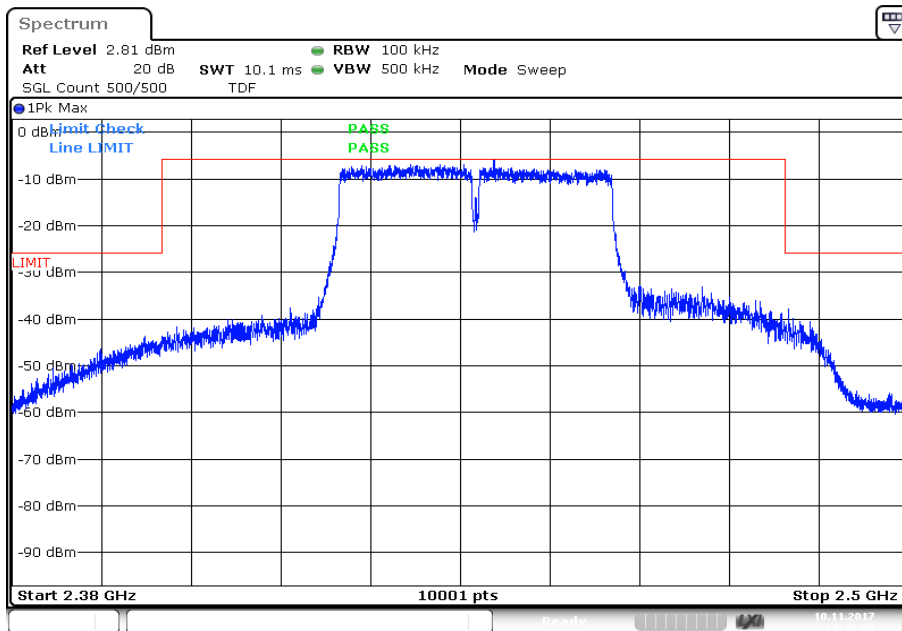
Date: 13.NOV.2017 08:57:36

Plot 9: channel 7, up to 25 GHz



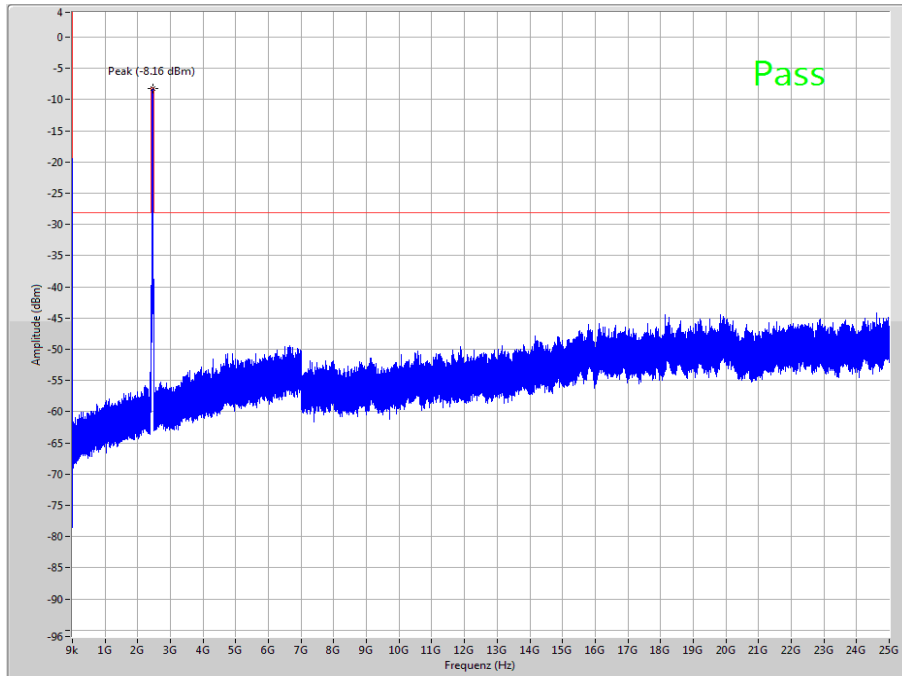
The peak at the beginning of the plot is the LO from the SA.

Plot 10: channel 7, zoomed carrier



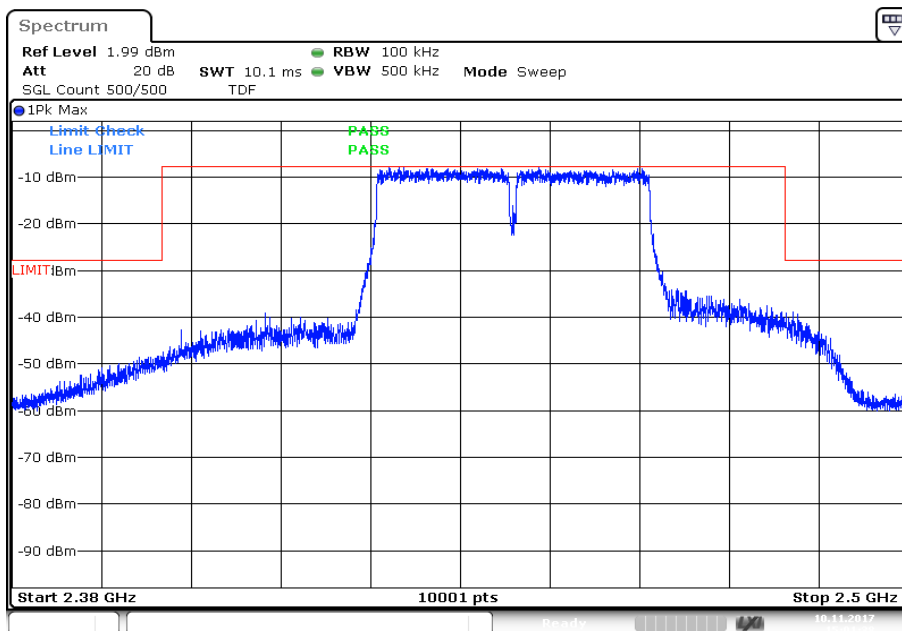
Date: 10.NOV.2017 14:48:05

Plot 11: channel 8, up to 25 GHz



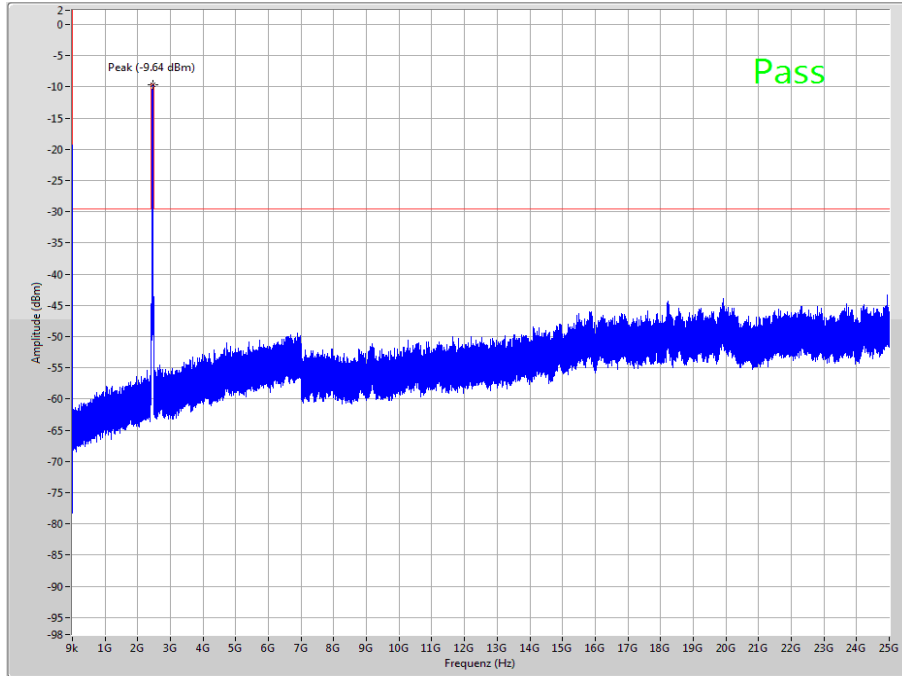
The peak at the beginning of the plot is the LO from the SA.

Plot 12: channel 8, zoomed carrier



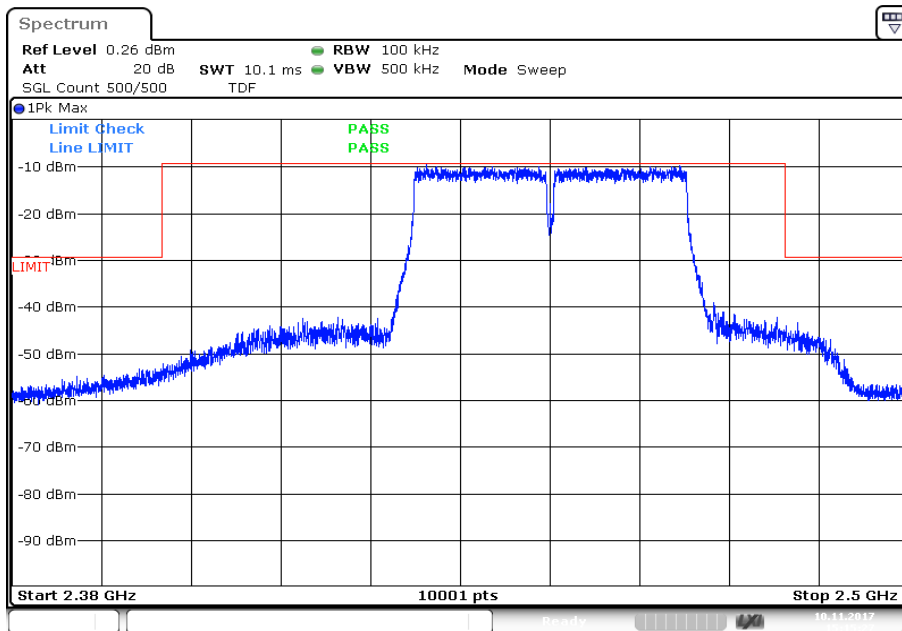
Date: 10.NOV.2017 15:01:38

Plot 13: channel 9, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

Plot 14: channel 9, zoomed carrier



Date: 10.NOV.2017 15:15:27

12.11 Spurious emissions radiated below 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. 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	<input checked="" type="checkbox"/> DSSS b – mode <input checked="" type="checkbox"/> OFDM g – mode <input type="checkbox"/> OFDM n HT20 – mode <input checked="" type="checkbox"/> OFDM n HT40 – mode
Test setup	See chapter 6.2 – A
Measurement uncertainty	See chapter 8

Limits:

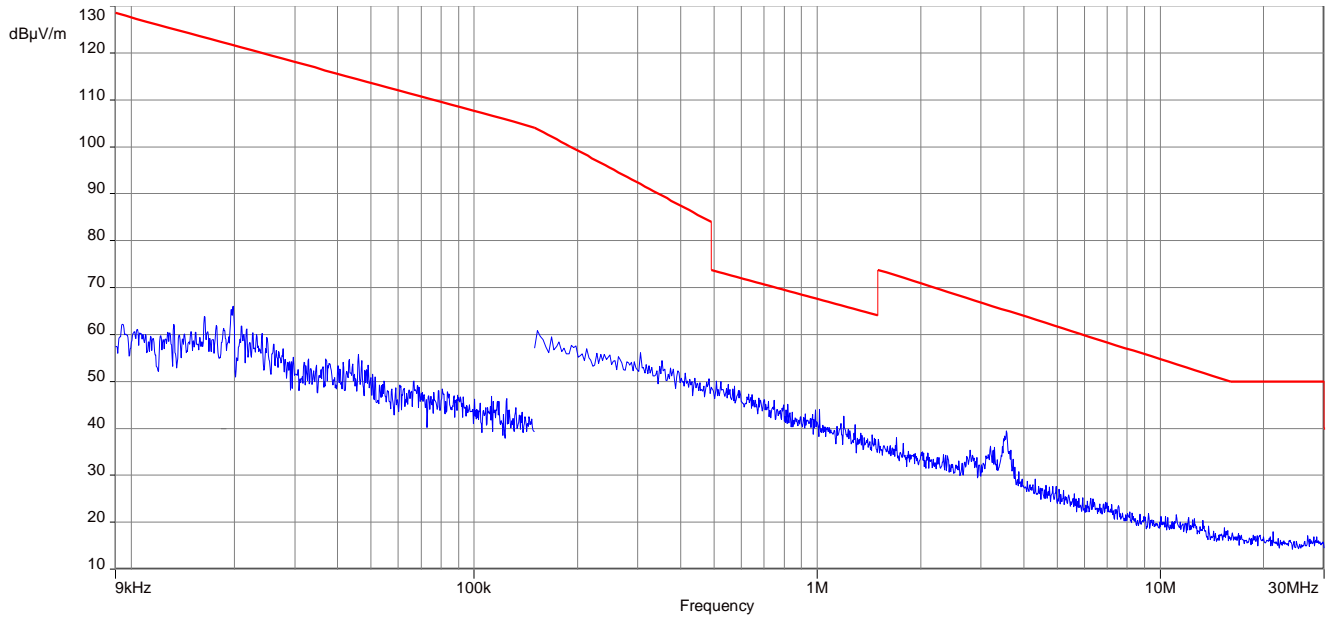
FCC		IC
Frequency / MHz	Field Strength / (dBµV / m)	Measurement distance / m
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Results:

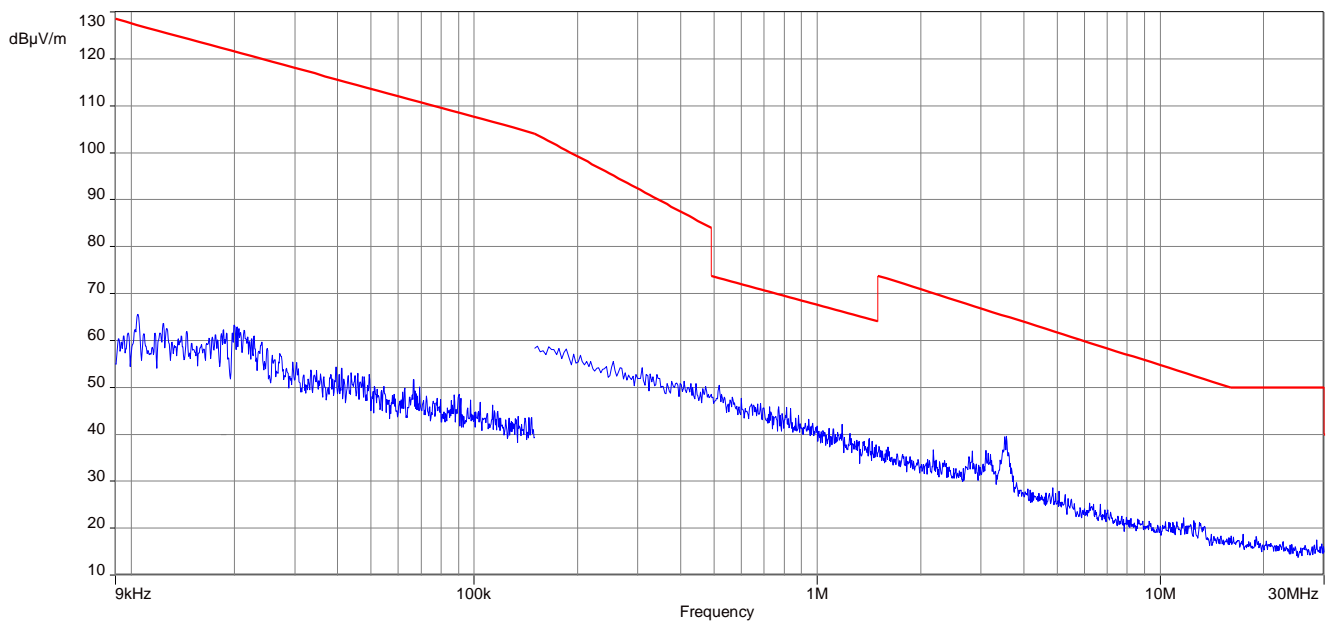
TX spurious emissions radiated < 30 MHz / (dBµV / m) @ 3 m		
Frequency / MHz	Detector	Level / (dBµV / m)
All detected peaks are more than 20 dB below the limit.		

Plots: DSSS

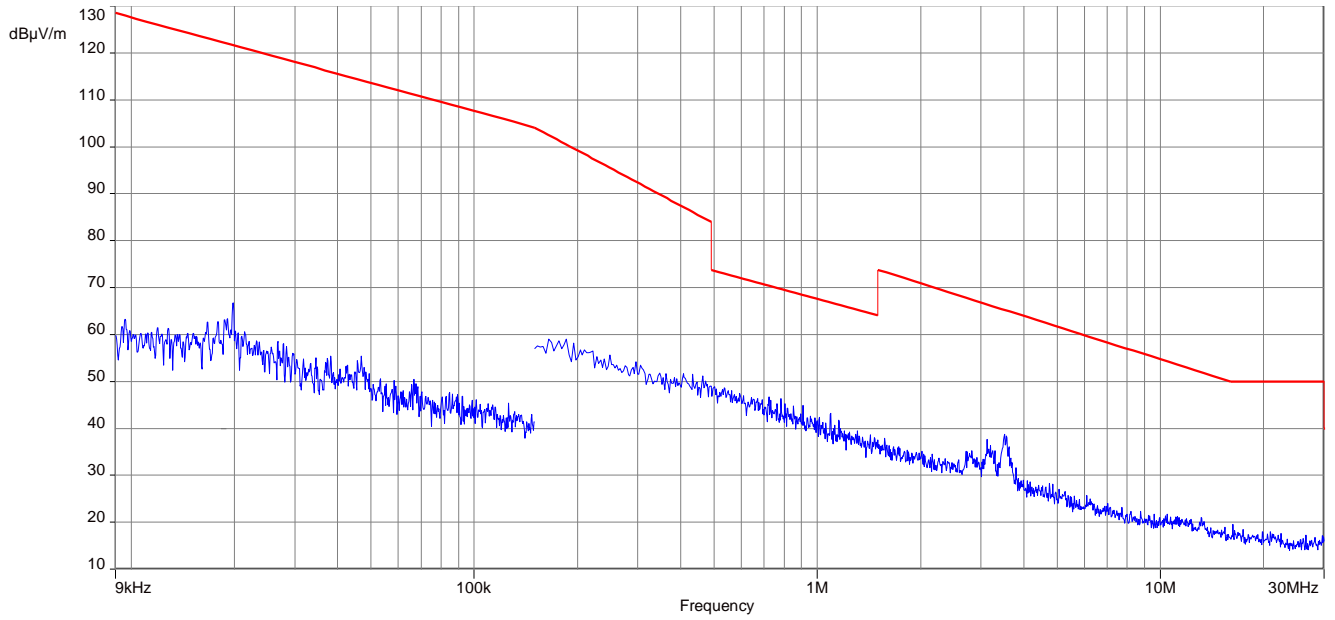
Plot 1: 9 kHz to 30 MHz, lowest channel



Plot 2: 9 kHz to 30 MHz, middle channel

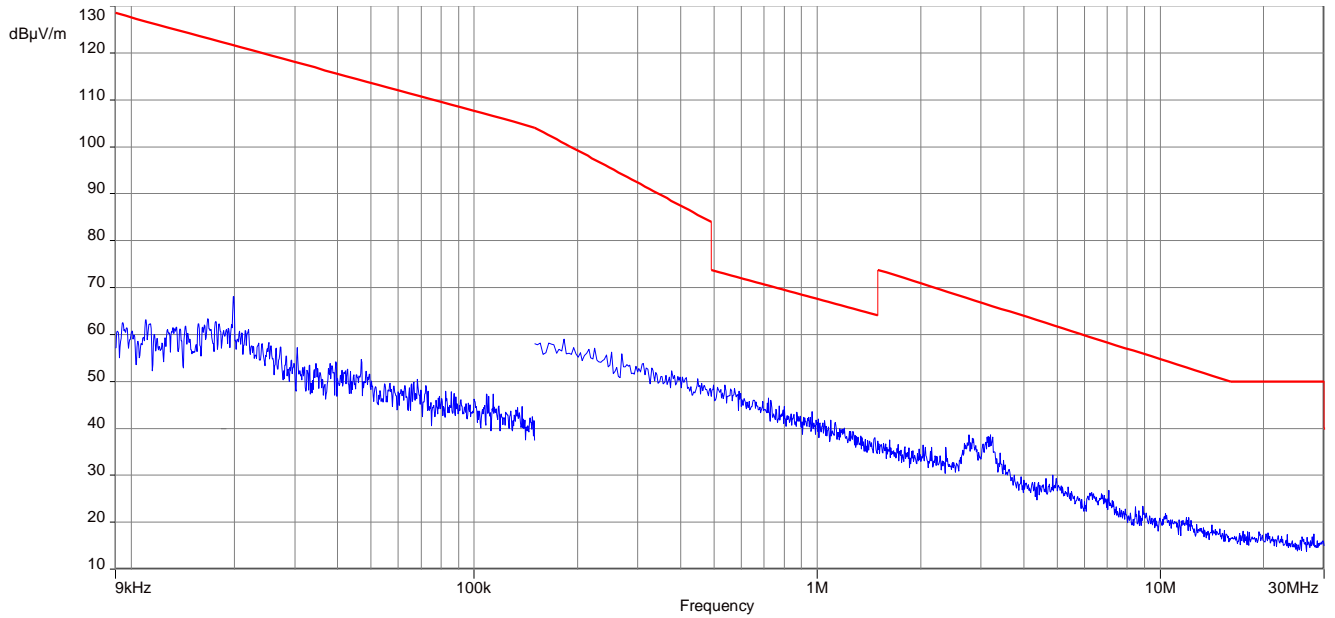


Plot 3: 9 kHz to 30 MHz, highest channel

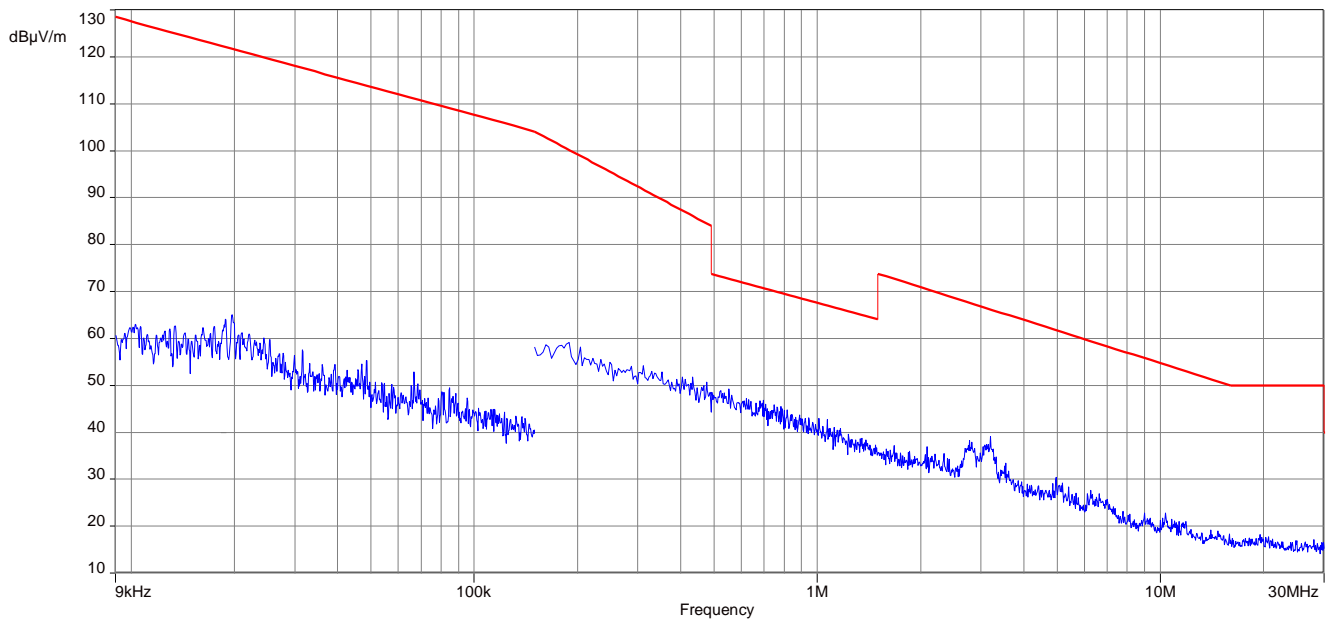


Plots: OFDM (20 MHz nominal channel bandwidth)

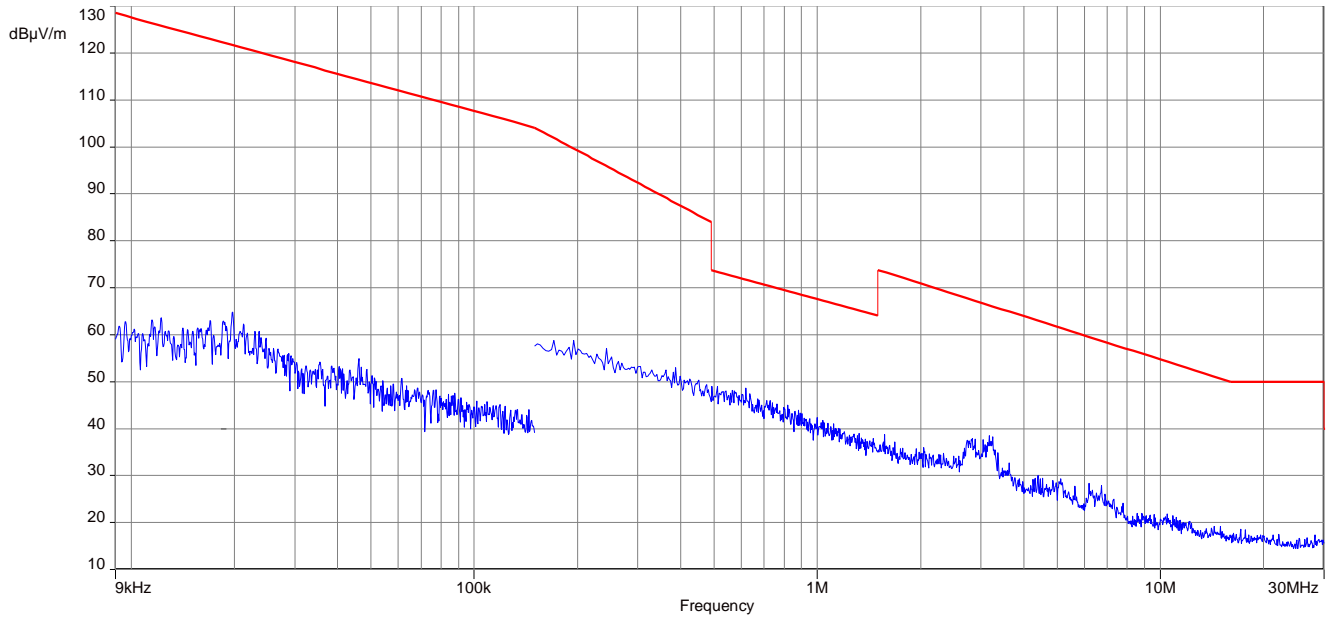
Plot 1: 9 kHz to 30 MHz, lowest channel



Plot 2: 9 kHz to 30 MHz, middle channel

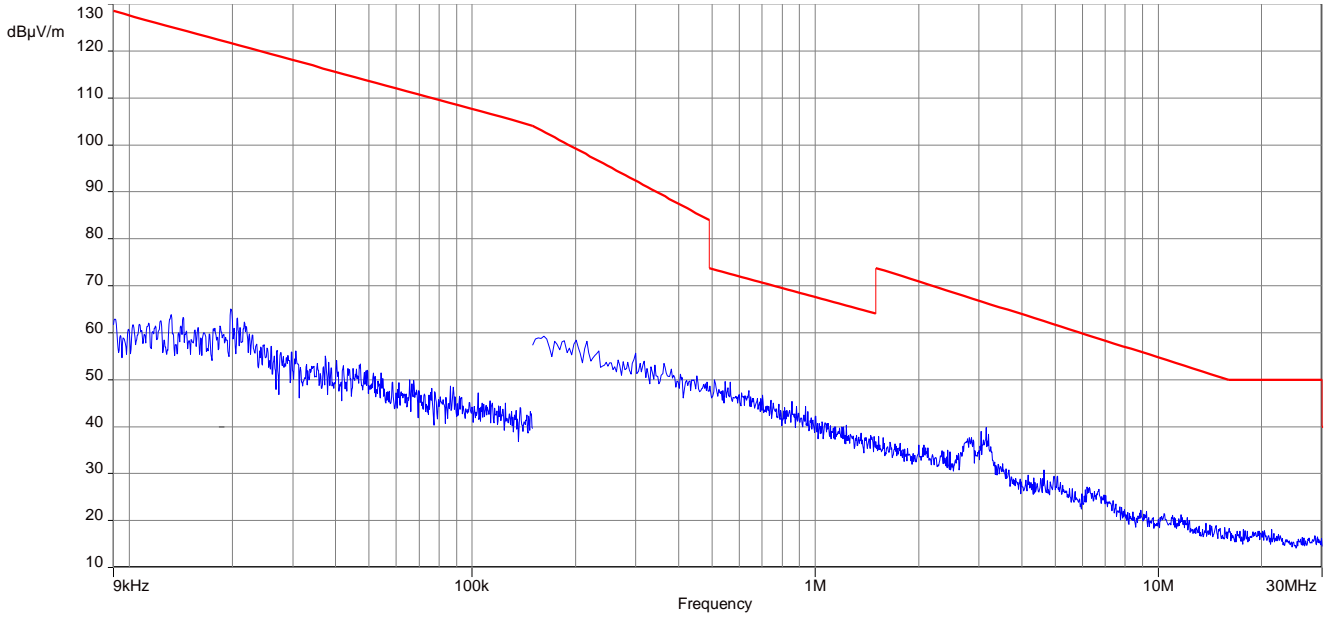


Plot 3: 9 kHz to 30 MHz, highest channel

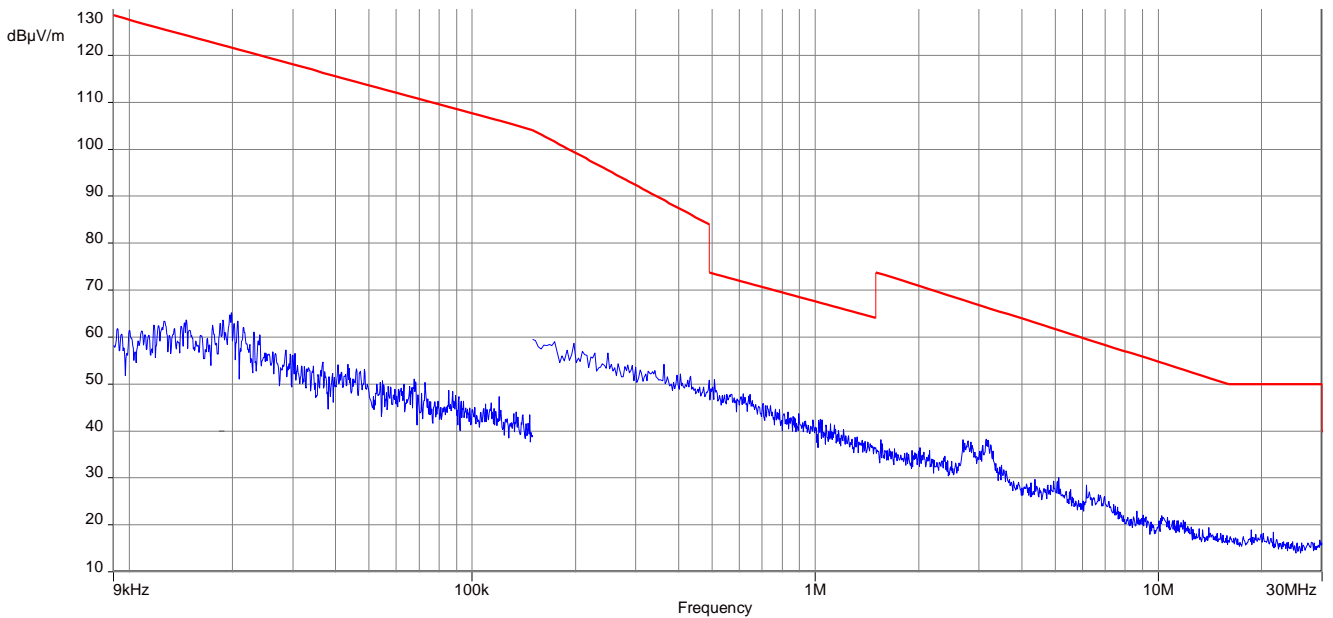


Plots: OFDM (40 MHz nominal channel bandwidth)

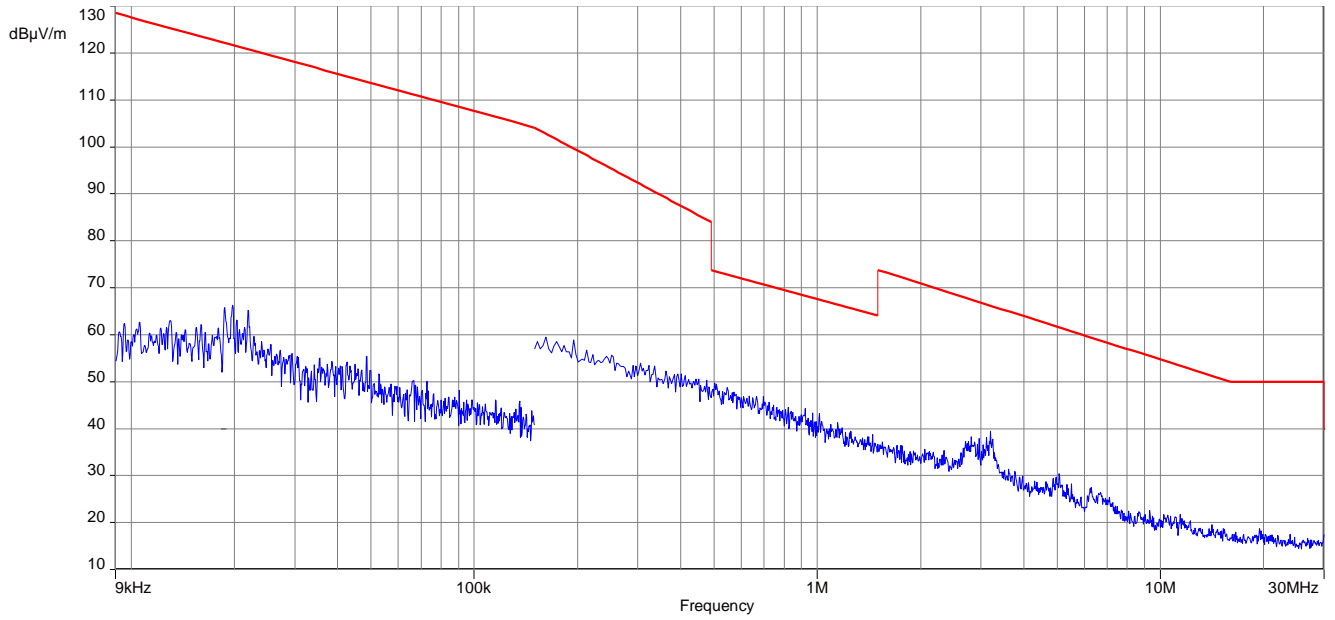
Plot 1: 9 kHz to 30 MHz, lowest channel



Plot 2: 9 kHz to 30 MHz, middle channel



Plot 3: 9 kHz to 30 MHz, highest channel



12.12 Spurious emissions radiated 30 MHz to 1 GHz

Description:

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

Measurement:

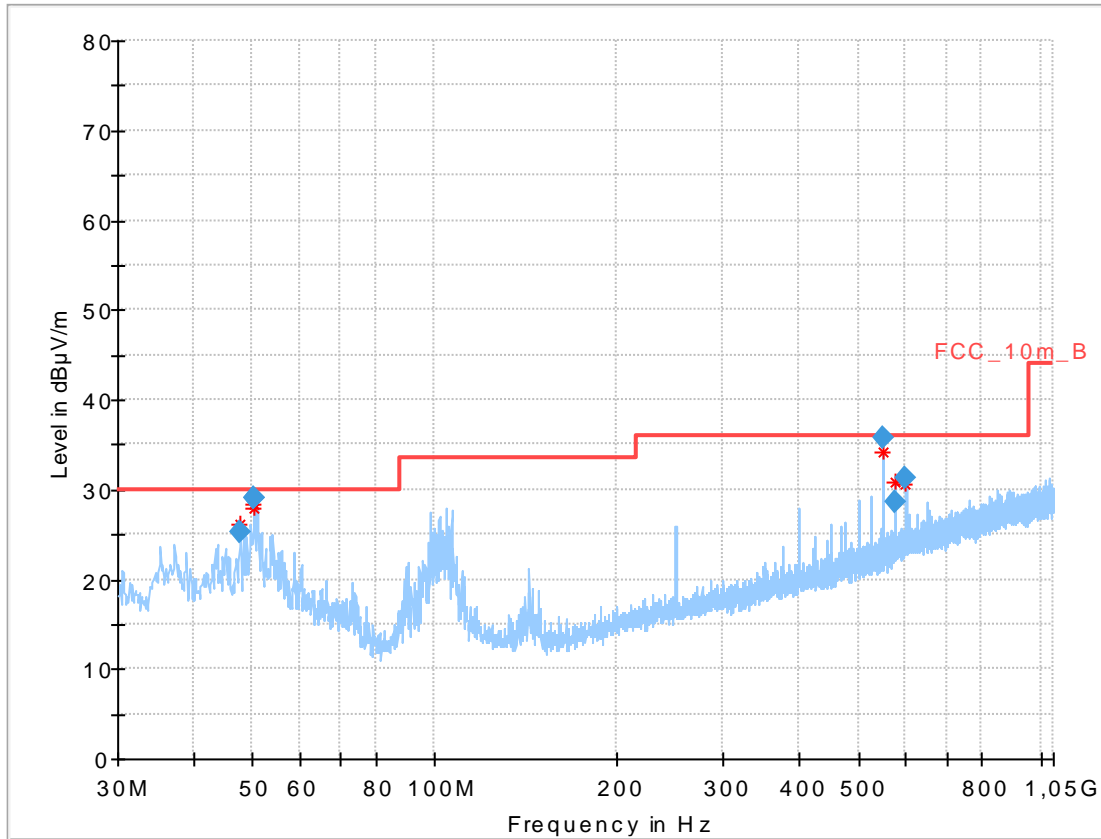
Measurement parameter	
Detector	Peak / Quasi Peak
Sweep time	Auto
Resolution bandwidth	120 kHz
Video bandwidth	3 x RBW
Span	30 MHz to 1 GHz
Trace mode	Max Hold
Measured modulation	<input checked="" type="checkbox"/> DSSS b – mode <input checked="" type="checkbox"/> OFDM g – mode <input type="checkbox"/> OFDM n HT20 – mode <input checked="" type="checkbox"/> OFDM n HT40 – mode <input checked="" type="checkbox"/> RX / Idle – mode
Test setup	See chapter 6.1 – A
Measurement uncertainty	See chapter 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 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 / m	
30 – 88	30.0	10	
88 – 216	33.5	10	
216 – 960	36.0	10	

Plot: DSSS

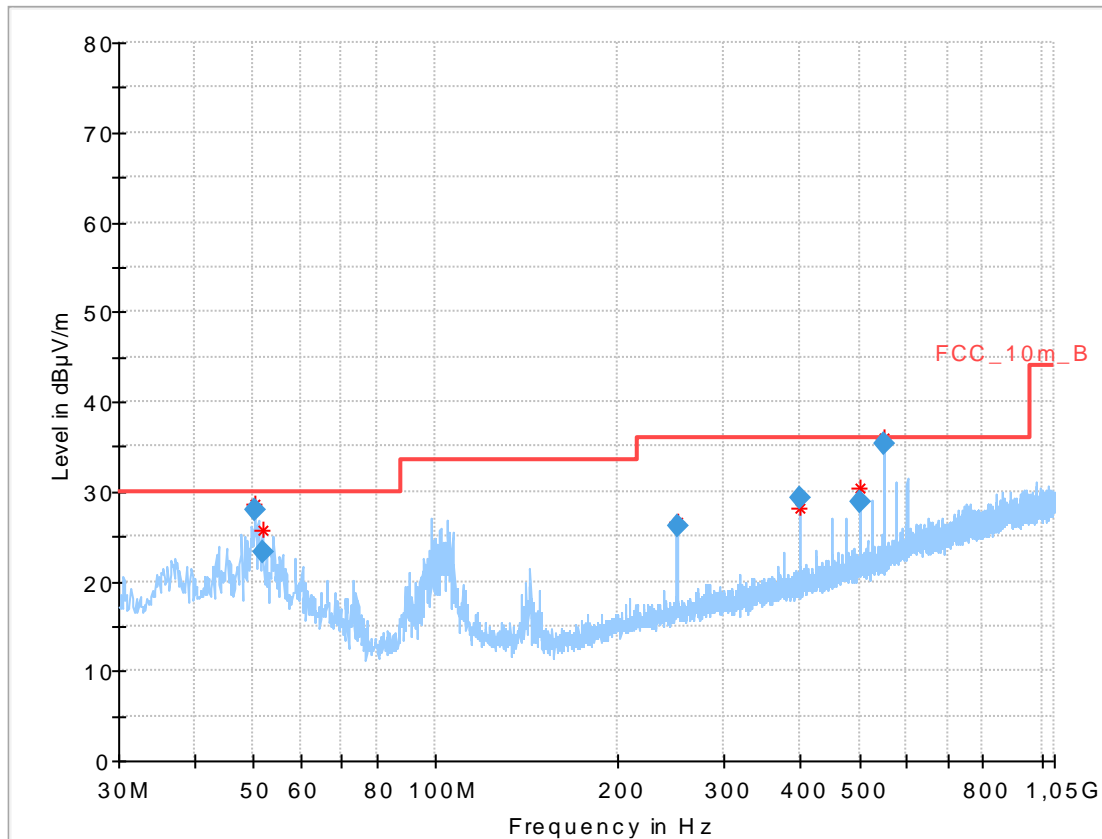
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, lowest channel



Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
47.795	25.30	30.0	4.70	1000	120	98.0	V	359.0	13.7
50.438	28.99	30.0	1.01	1000	120	98.0	V	341.0	13.7
50.454	28.96	30.0	1.04	1000	120	98.0	V	358.0	13.7
549.995	35.68	36.0	0.32	1000	120	101.0	H	91.0	19.3
574.998	28.67	36.0	7.33	1000	120	101.0	H	298.0	20.0
599.993	31.22	36.0	4.78	1000	120	101.0	H	106.0	20.7

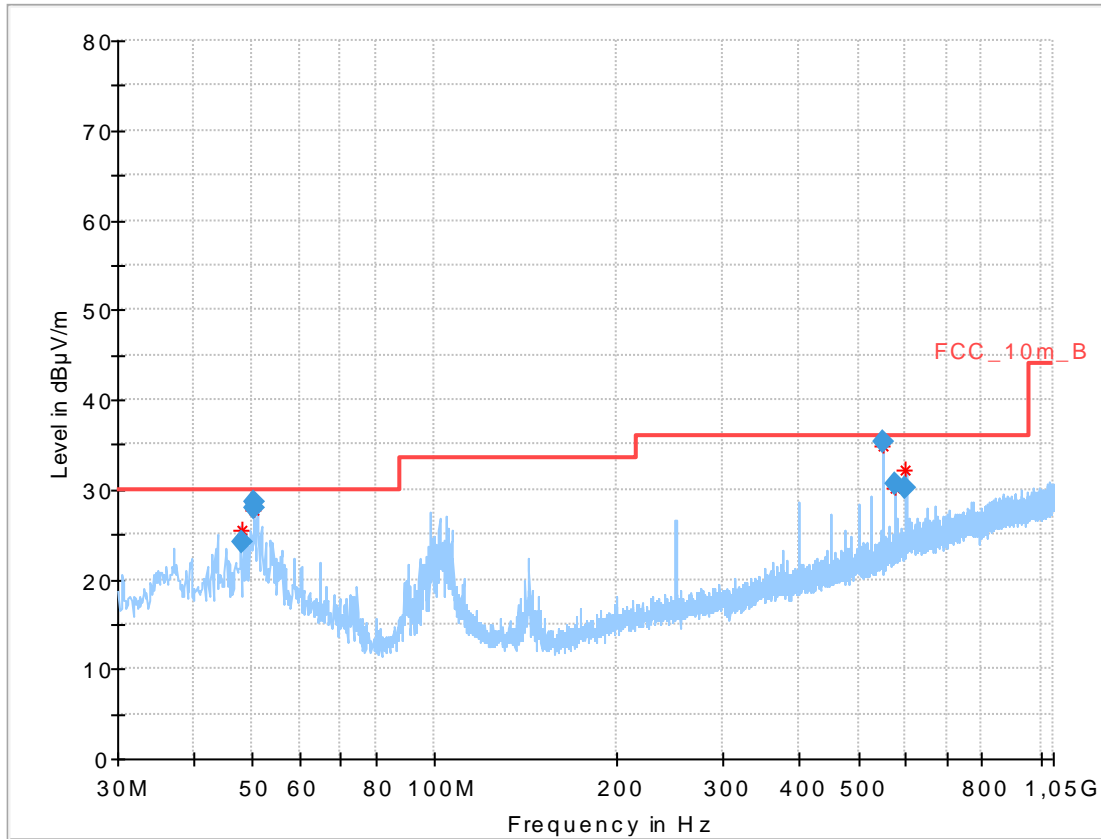
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, middle channel



Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
50.435	27.95	30.0	2.05	1000	120	170.0	V	338.0	13.7
51.771	23.31	30.0	6.69	1000	120	101.0	V	319.0	13.5
250.003	26.19	36.0	9.81	1000	120	98.0	V	2.0	13.4
400.008	29.24	36.0	6.76	1000	120	170.0	H	92.0	16.9
500.003	28.73	36.0	7.27	1000	120	101.0	H	102.0	18.7
550.008	35.39	36.0	0.61	1000	120	101.0	H	97.0	19.3

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

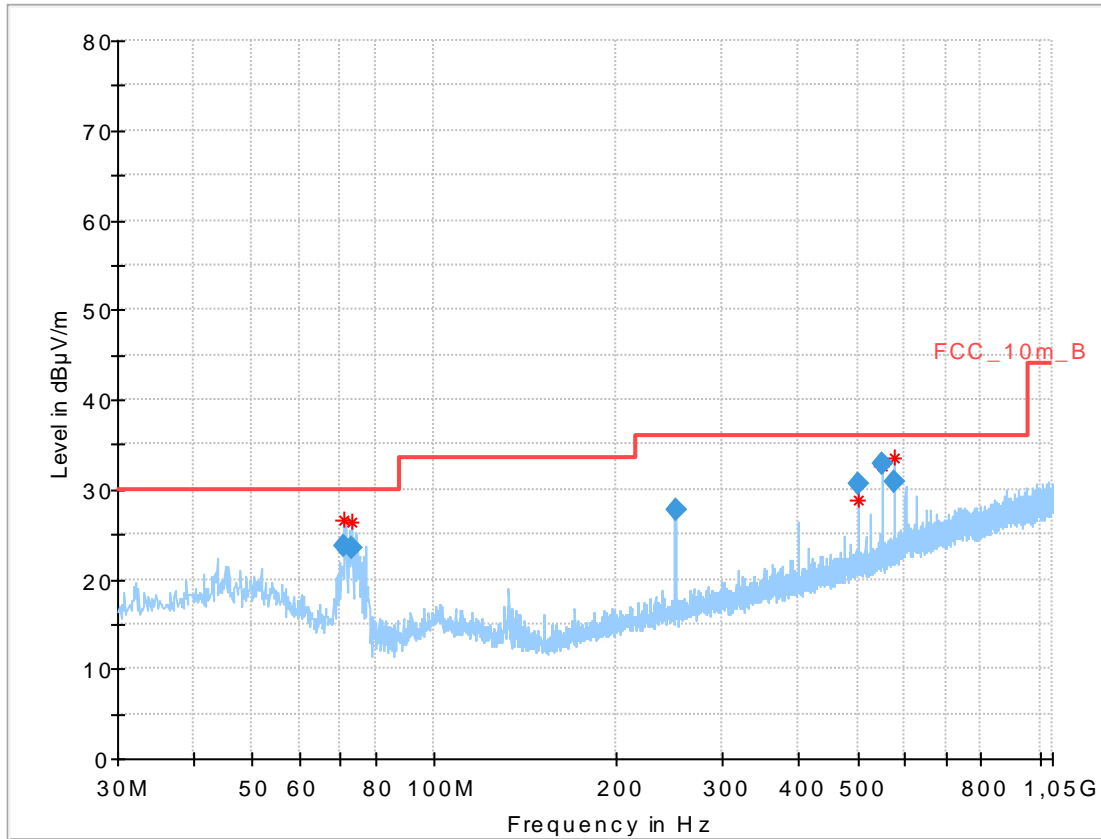


Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
48.267	24.24	30.0	5.76	1000	120	98.0	V	0.0	13.7
50.431	28.03	30.0	1.97	1000	120	98.0	V	71.0	13.7
50.441	28.71	30.0	1.29	1000	120	98.0	V	324.0	13.7
549.992	35.33	36.0	0.67	1000	120	100.0	H	93.0	19.3
574.989	30.51	36.0	5.49	1000	120	170.0	H	78.0	20.0
599.994	30.25	36.0	5.75	1000	120	101.0	H	113.0	20.7

Plot: OFDM (20 MHz nominal channel bandwidth)

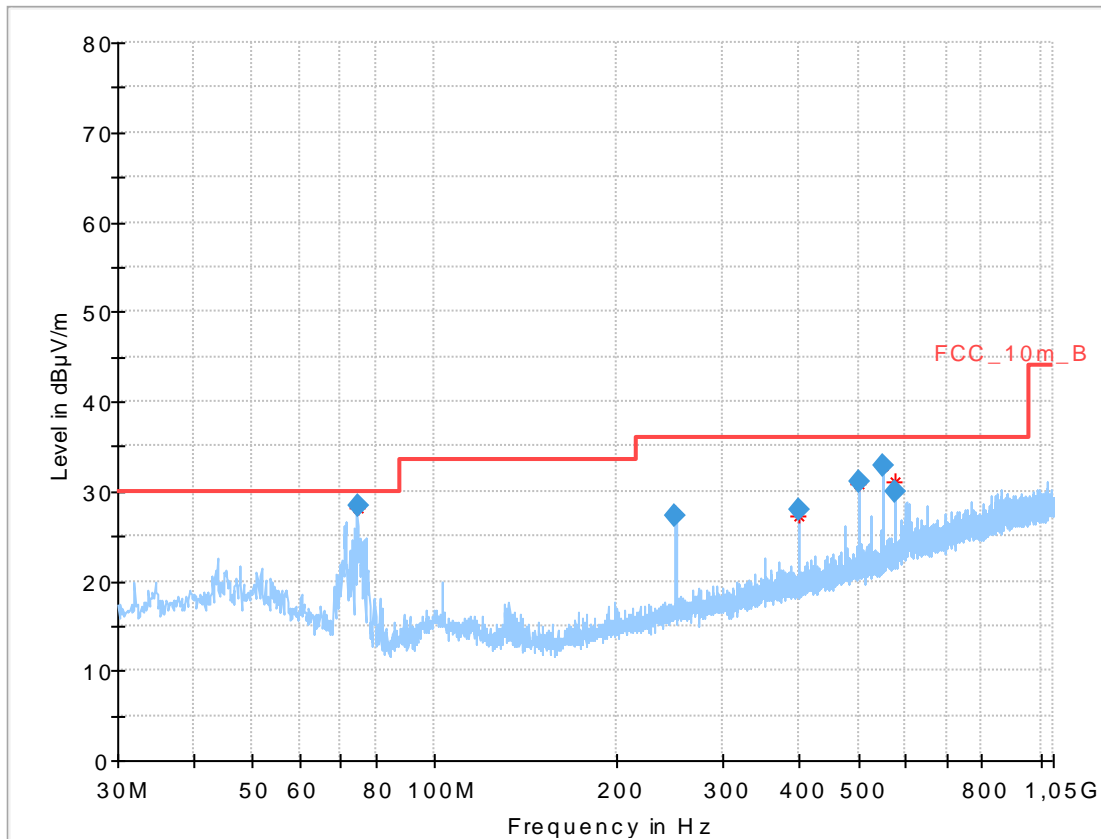
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, lowest channel



Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
71.140	23.68	30.0	6.32	1000	120	101.0	V	146.0	9.5
73.174	23.36	30.0	6.64	1000	120	101.0	V	290.0	9.2
250.002	27.72	36.0	8.28	1000	120	170.0	V	117.0	13.4
499.982	30.71	36.0	5.29	1000	120	170.0	H	87.0	18.7
550.000	32.93	36.0	3.07	1000	120	101.0	H	81.0	19.3
574.981	30.91	36.0	5.09	1000	120	101.0	H	304.0	20.0

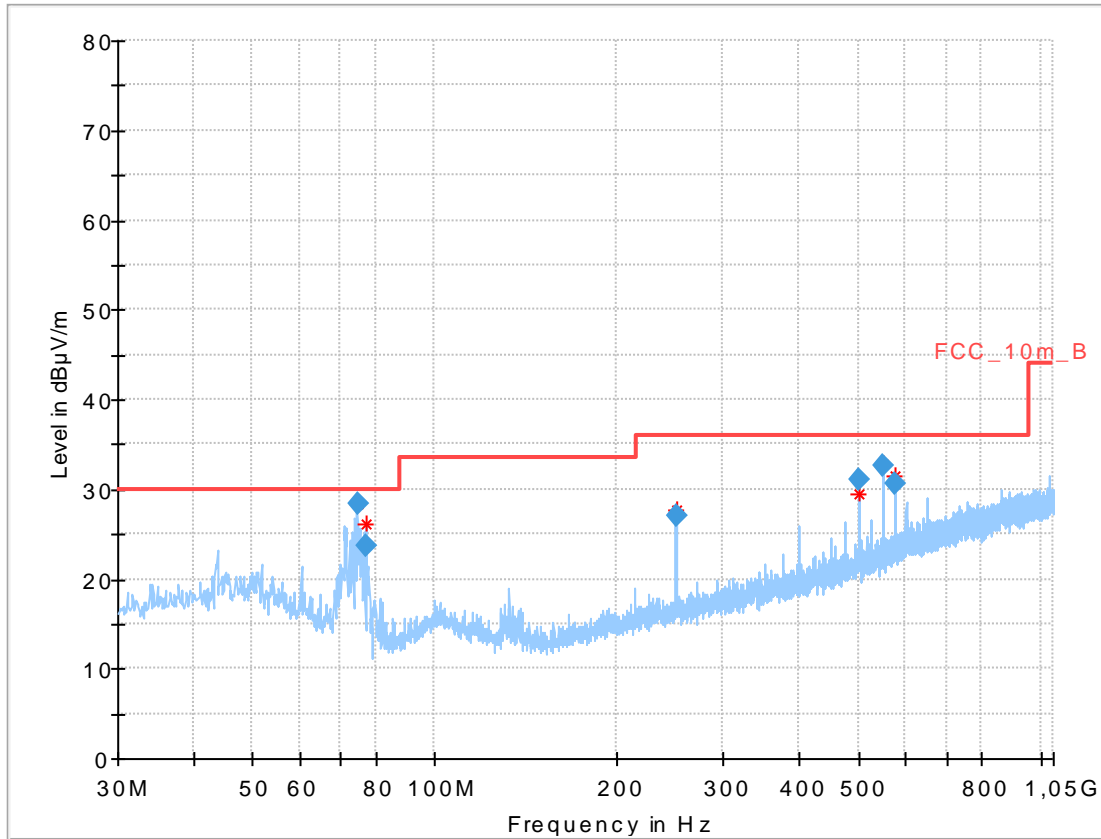
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, middle channel



Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
74.559	28.41	30.0	1.59	1000	120	101.0	V	271.0	9.0
249.987	27.27	36.0	8.73	1000	120	170.0	V	110.0	13.4
399.995	27.89	36.0	8.11	1000	120	170.0	H	87.0	16.9
499.998	31.07	36.0	4.93	1000	120	170.0	H	99.0	18.7
550.005	32.79	36.0	3.21	1000	120	101.0	H	55.0	19.3
574.998	29.90	36.0	6.10	1000	120	100.0	H	285.0	20.0

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

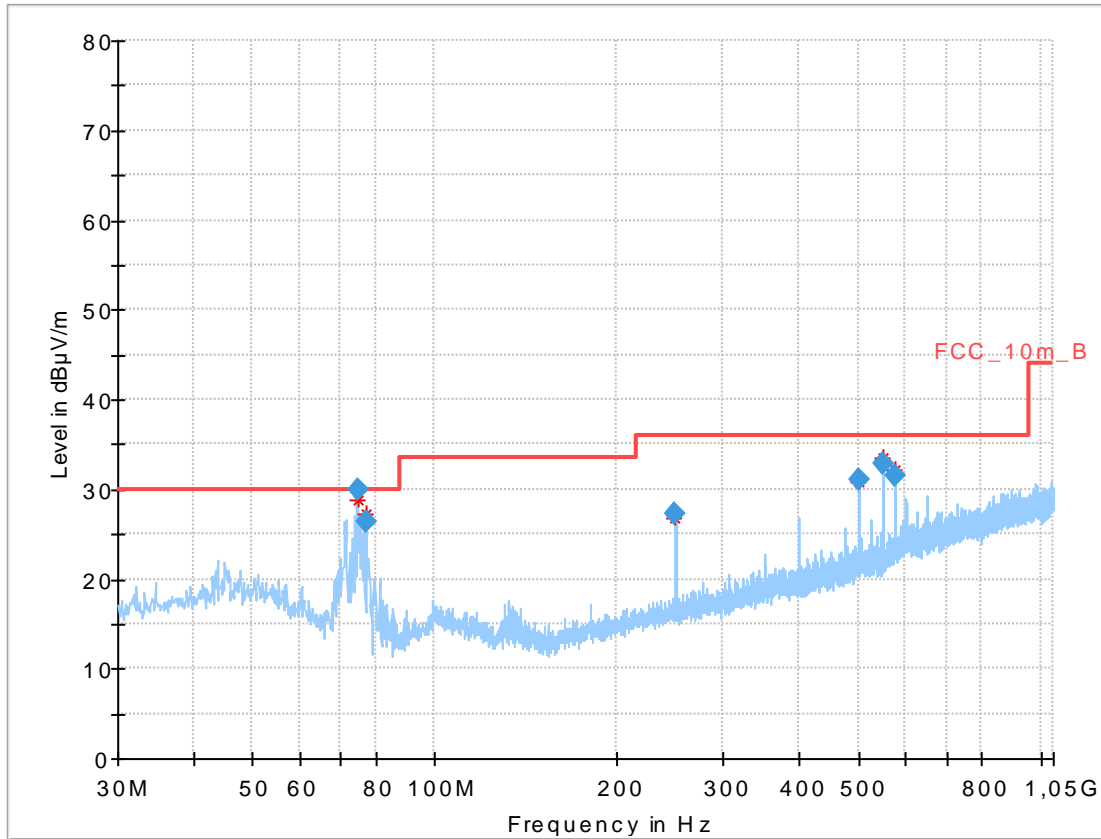


Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
74.567	28.27	30.0	1.73	1000	120	101.0	V	264.0	8.9
77.195	23.73	30.0	6.27	1000	120	101.0	V	281.0	8.5
250.004	27.03	36.0	8.97	1000	120	170.0	V	110.0	13.4
499.993	31.11	36.0	4.89	1000	120	170.0	H	94.0	18.7
550.008	32.73	36.0	3.27	1000	120	101.0	H	56.0	19.3
574.993	30.67	36.0	5.33	1000	120	101.0	H	301.0	20.0

Plot: OFDM (40 MHz nominal channel bandwidth)

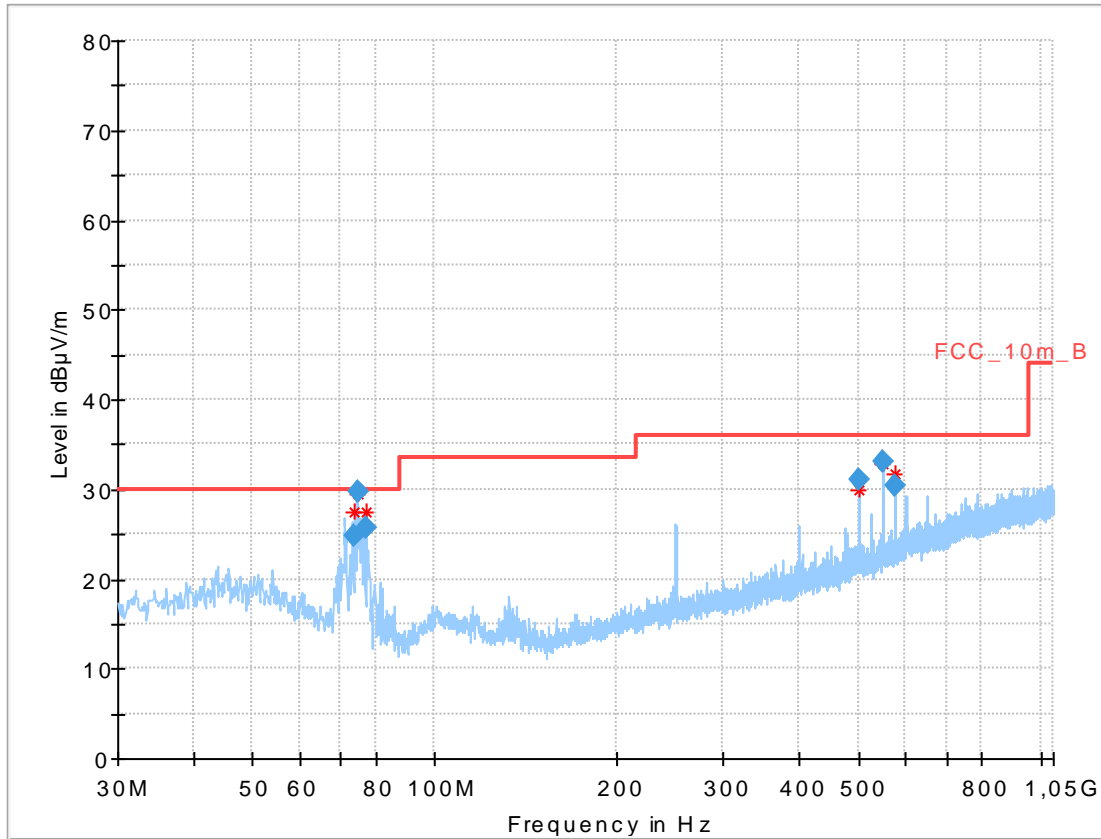
Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization, lowest channel



Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
74.571	29.85	30.0	0.15	1000	120	101.0	V	-10.0	8.9
77.202	26.31	30.0	3.69	1000	120	101.0	V	271.0	8.5
249.992	27.36	36.0	8.64	1000	120	170.0	H	247.0	13.4
500.003	31.09	36.0	4.91	1000	120	170.0	H	92.0	18.7
550.004	32.78	36.0	3.22	1000	120	101.0	H	77.0	19.3
574.978	31.40	36.0	4.60	1000	120	170.0	H	294.0	20.0

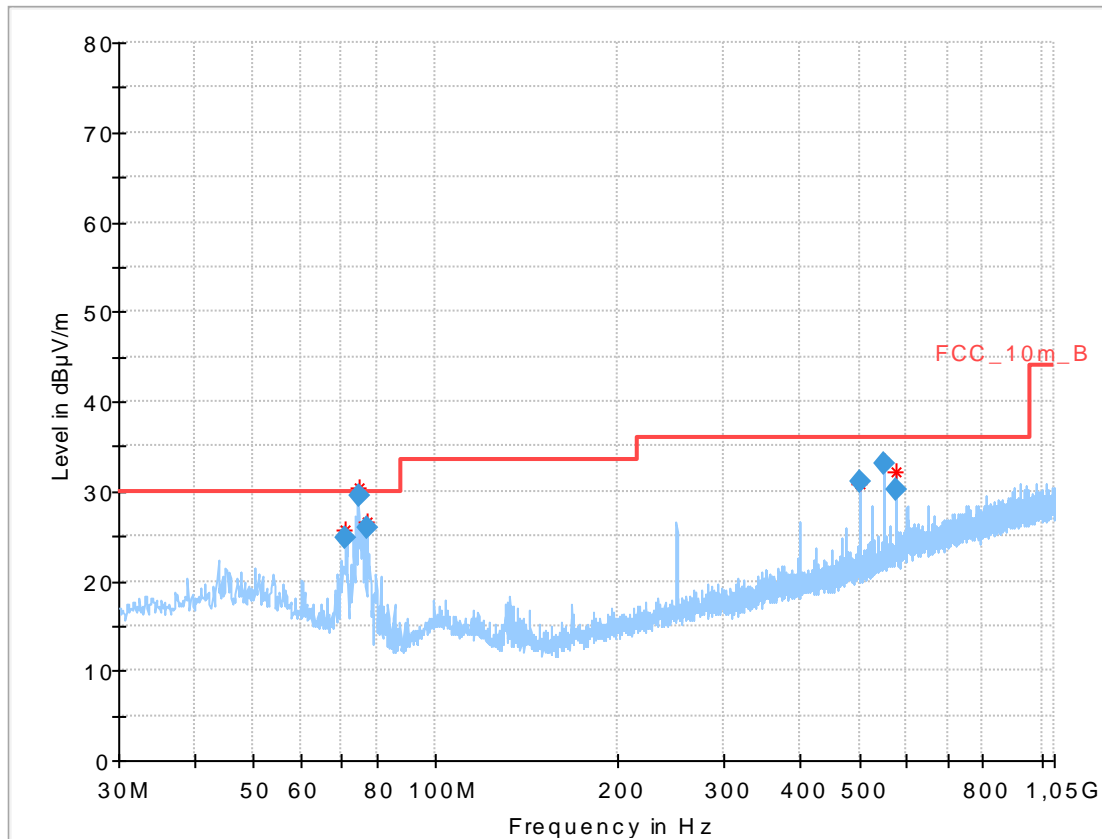
Plot 2: 30 MHz to 1 GHz, vertical & horizontal polarization, middle channel



Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
73.928	24.80	30.0	5.20	1000	120	101.0	V	323.0	9.1
74.583	29.67	30.0	0.33	1000	120	170.0	V	303.0	8.9
77.183	25.79	30.0	4.21	1000	120	101.0	V	265.0	8.5
499.993	31.15	36.0	4.85	1000	120	170.0	H	91.0	18.7
549.998	33.00	36.0	3.00	1000	120	101.0	H	74.0	19.3
574.993	30.46	36.0	5.54	1000	120	101.0	H	291.0	20.0

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

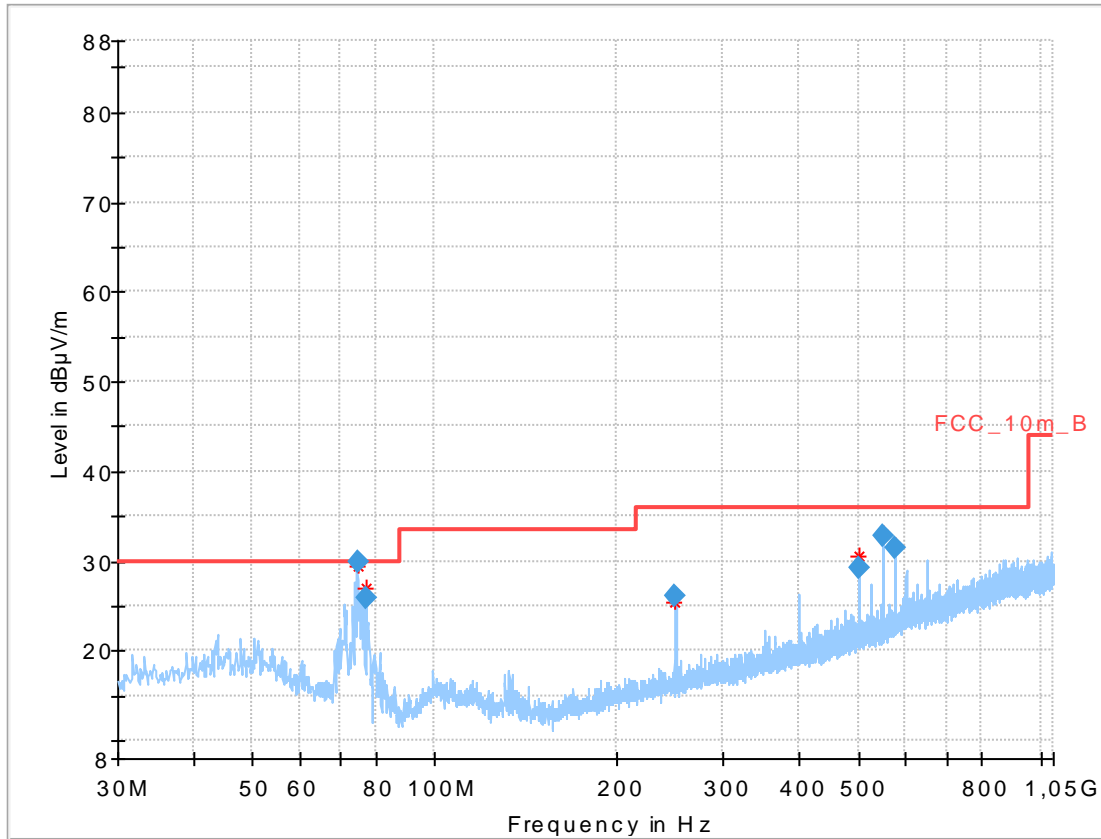


Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
71.165	24.75	30.0	5.25	1000	120	170.0	V	340.0	9.5
74.563	29.45	30.0	0.55	1000	120	101.0	V	282.0	8.9
77.196	25.99	30.0	4.01	1000	120	101.0	V	-10.0	8.5
499.995	31.09	36.0	4.91	1000	120	170.0	H	89.0	18.7
549.996	33.16	36.0	2.84	1000	120	101.0	H	67.0	19.3
574.999	30.20	36.0	5.80	1000	120	101.0	H	287.0	20.0

Plot: RX / Idle mode

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



Final results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
74.565	29.80	30.0	0.20	1000	120	170.0	V	226.0	8.9
77.198	25.91	30.0	4.09	1000	120	100.0	V	294.0	8.5
249.995	26.02	36.0	9.98	1000	120	98.0	V	143.0	13.4
499.987	29.24	36.0	6.76	1000	120	101.0	H	98.0	18.7
550.009	32.84	36.0	3.16	1000	120	101.0	H	67.0	19.3
574.991	31.44	36.0	4.56	1000	120	101.0	H	292.0	20.0

12.13 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	<input checked="" type="checkbox"/> DSSS b – mode <input checked="" type="checkbox"/> OFDM g – mode <input type="checkbox"/> OFDM n HT20 – mode <input checked="" type="checkbox"/> OFDM n HT40 – mode <input checked="" type="checkbox"/> RX / Idle – mode
Test setup	See chapter 6.2 – B See chapter 6.3 – A
Measurement uncertainty	See chapter 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 / (dB μ V / m)	Measurement distance / m
Above 960	54.0 (AVG)	3
	74.0 (peak)	

Results: DSSS

TX spurious emissions radiated / dBµV/m @ 3 m								
lowest channel			middle channel			highest channel		
f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m
4824	Peak	57.7	4878	Peak	56.1	4924	Peak	57.3
	AVG	53.9		AVG	51.8		AVG	53.9
7236	Peak	53.5	-/-	Peak	-/-	7386	Peak	50.7
	AVG	47.9		AVG	-/-		AVG	42.8
12060	Peak	53.7	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	47.8		AVG	-/-		AVG	-/-
For emissions above 18 GHz, please look at the plots.			For emissions above 18 GHz, please look at the plots.			For emissions above 18 GHz, please look at the plots.		

Results: OFDM (20 MHz nominal channel bandwidth)

TX spurious emissions radiated / dBµV/m @ 3 m								
lowest channel			middle channel			highest channel		
f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m
4824	Peak	57.1	4878	Peak	60.2	4924	Peak	58.5
	AVG	46.1		AVG	50.1		AVG	48.0
12060	Peak	63.9	12185	Peak	65.6	-/-	Peak	-/-
	AVG	50.3		AVG	53.2		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
For emissions above 18 GHz, please look at the plots.			For emissions above 18 GHz, please look at the plots.			For emissions above 18 GHz, please look at the plots.		

Results: OFDM (40 MHz nominal channel bandwidth)

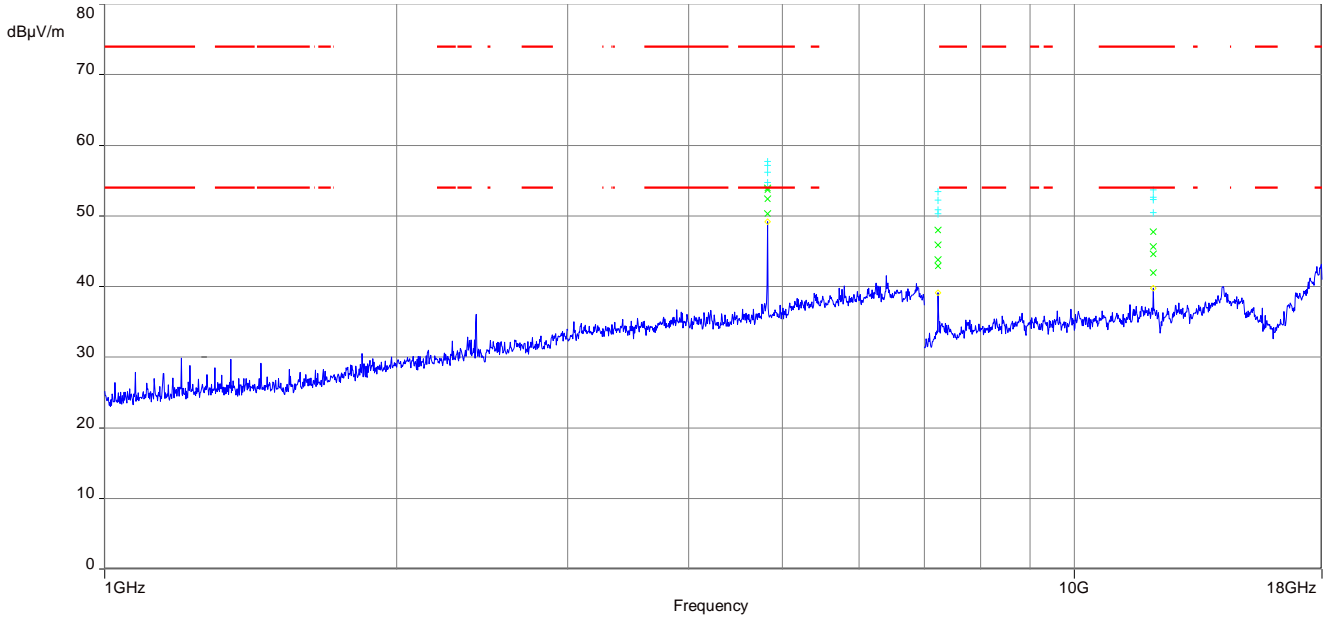
TX spurious emissions radiated / dBµV/m @ 3 m								
lowest channel			middle channel			highest channel		
f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m	f / MHz	Detector	Level / dBµV/m
All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.			All detected emissions are more than 20 dB below the limit.		
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
-/-	Peak	-/-	-/-	Peak	-/-	-/-	Peak	-/-
	AVG	-/-		AVG	-/-		AVG	-/-
For emissions above 18 GHz, please look at the plots.			For emissions above 18 GHz, please look at the plots.			For emissions above 18 GHz, please look at the plots.		

Results: RX / idle – mode

TX spurious emissions radiated / dBµV/m @ 3 m		
f / MHz	Detector	Level / dBµV/m
All detected emissions are more than 20 dB below the limit.		
-/-	Peak	-/-
	AVG	-/-
For emissions above 18 GHz, please look at the plots.		

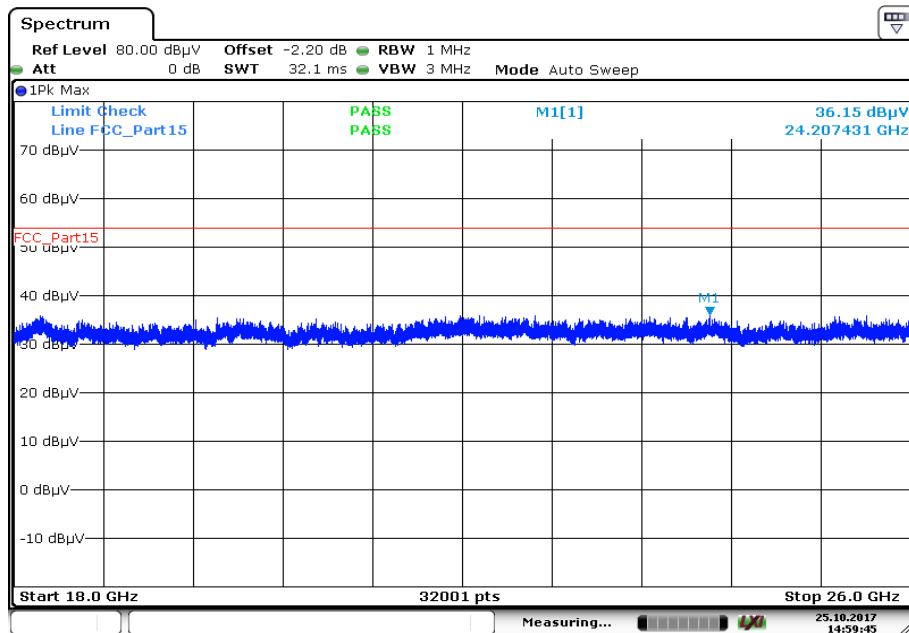
Plots: DSSS

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



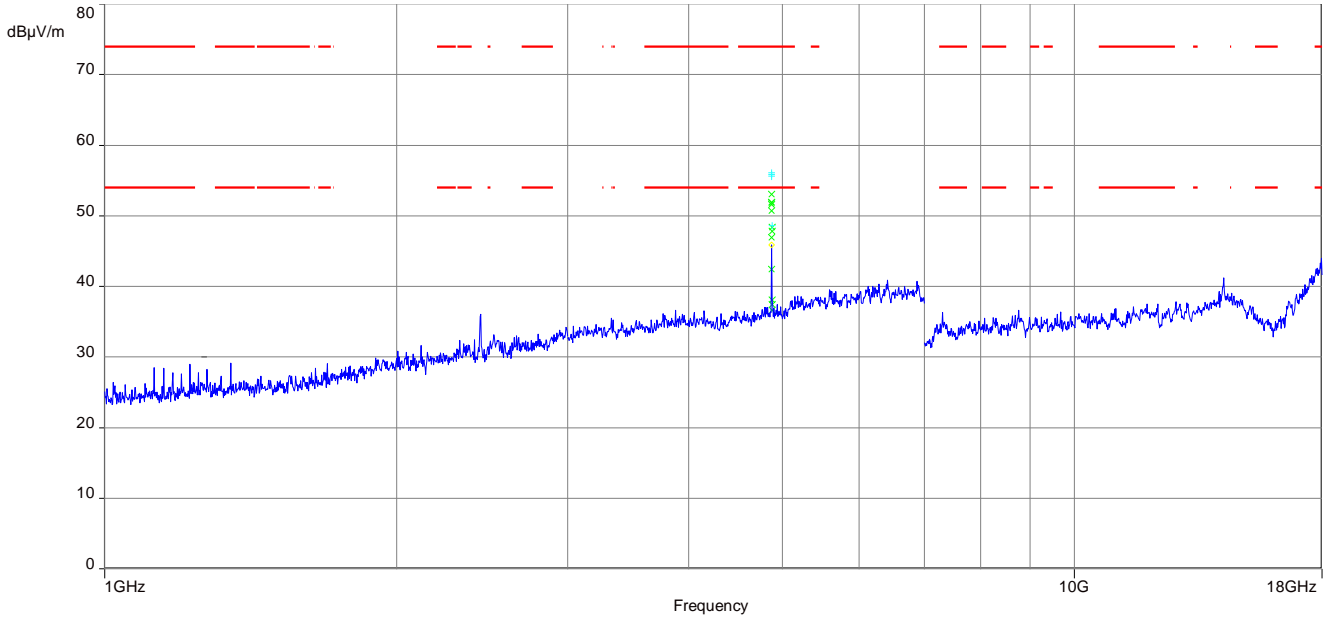
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



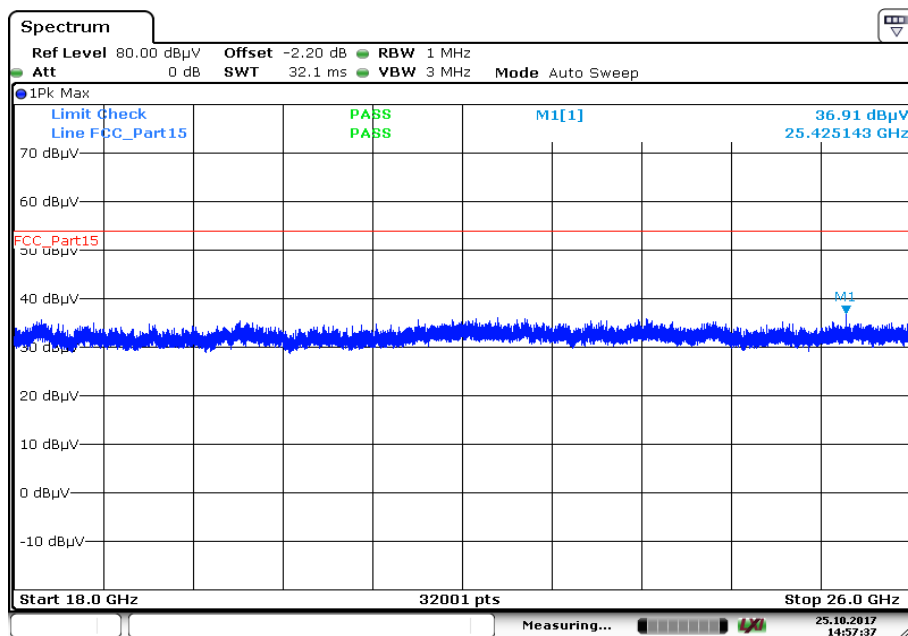
Date: 25.OCT.2017 14:59:45

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



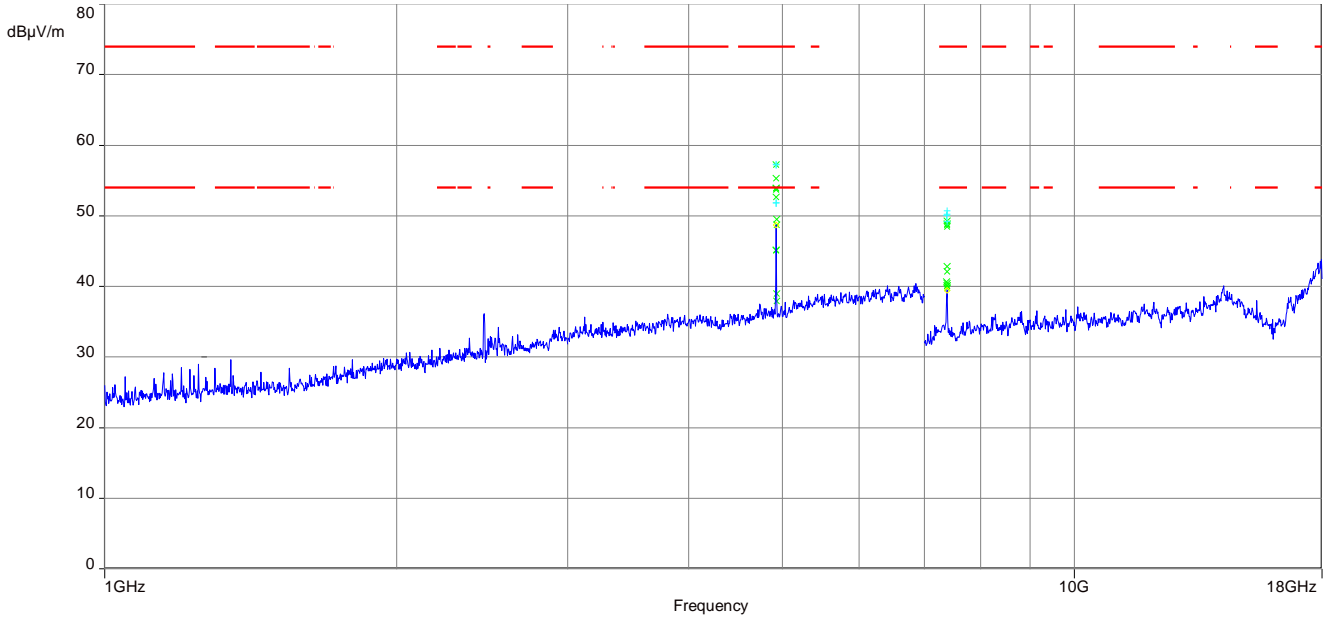
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



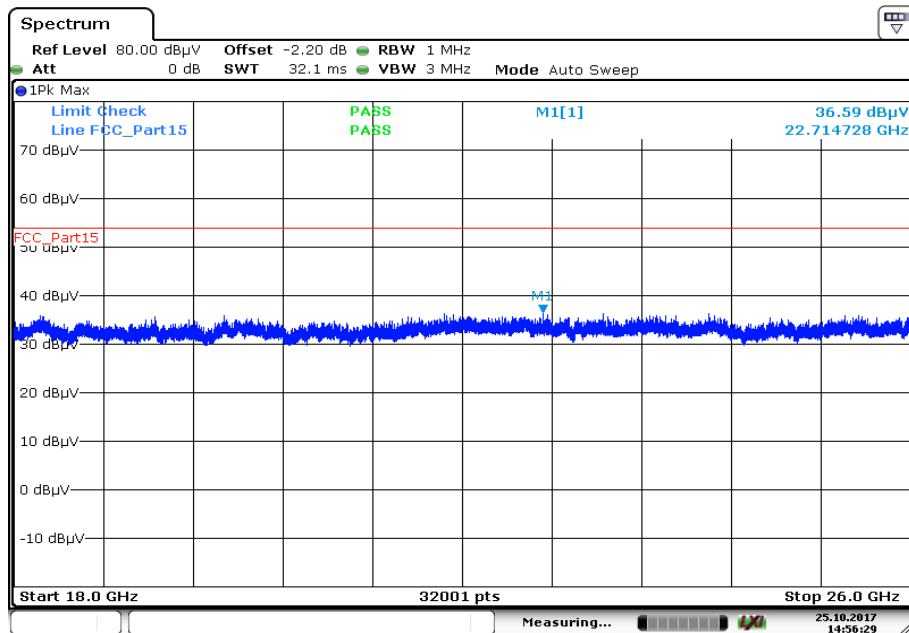
Date: 25.OCT.2017 14:57:37

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.

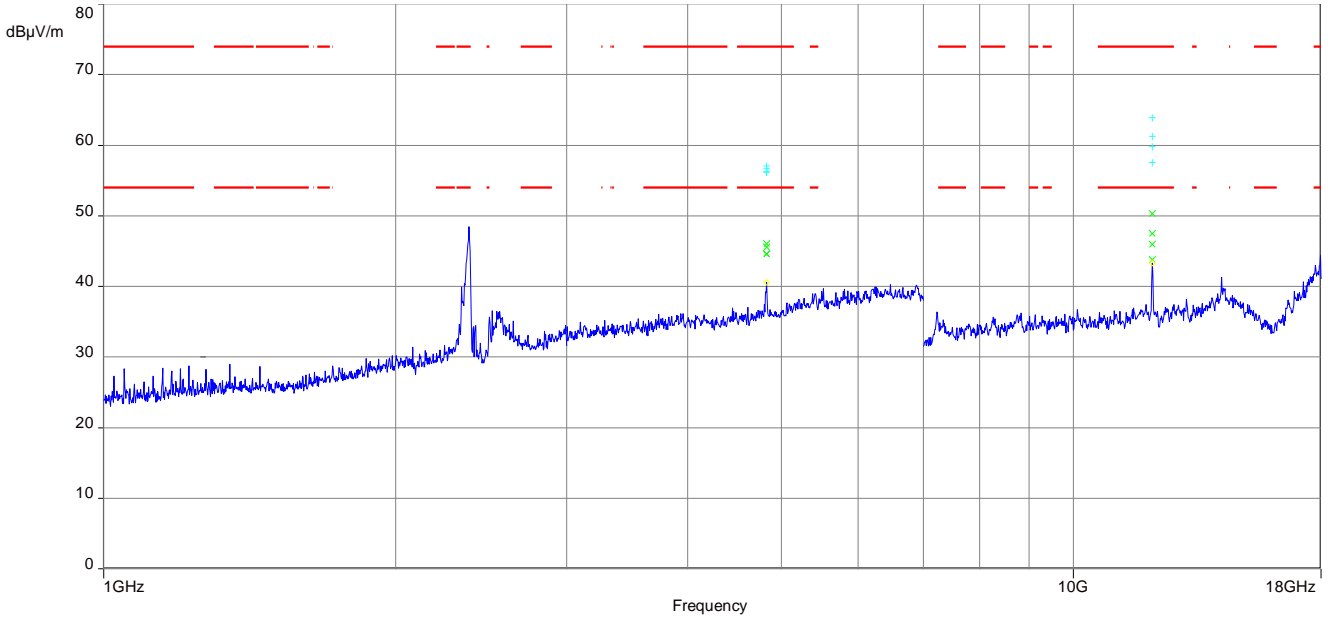
Plot 9: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.OCT.2017 14:56:30

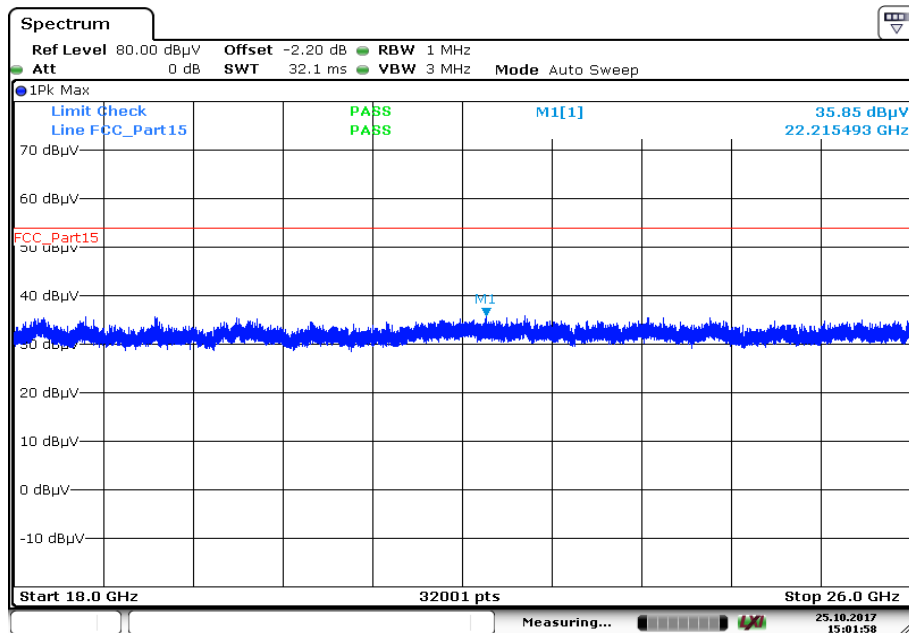
Plots: OFDM (20 MHz bandwidth)

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



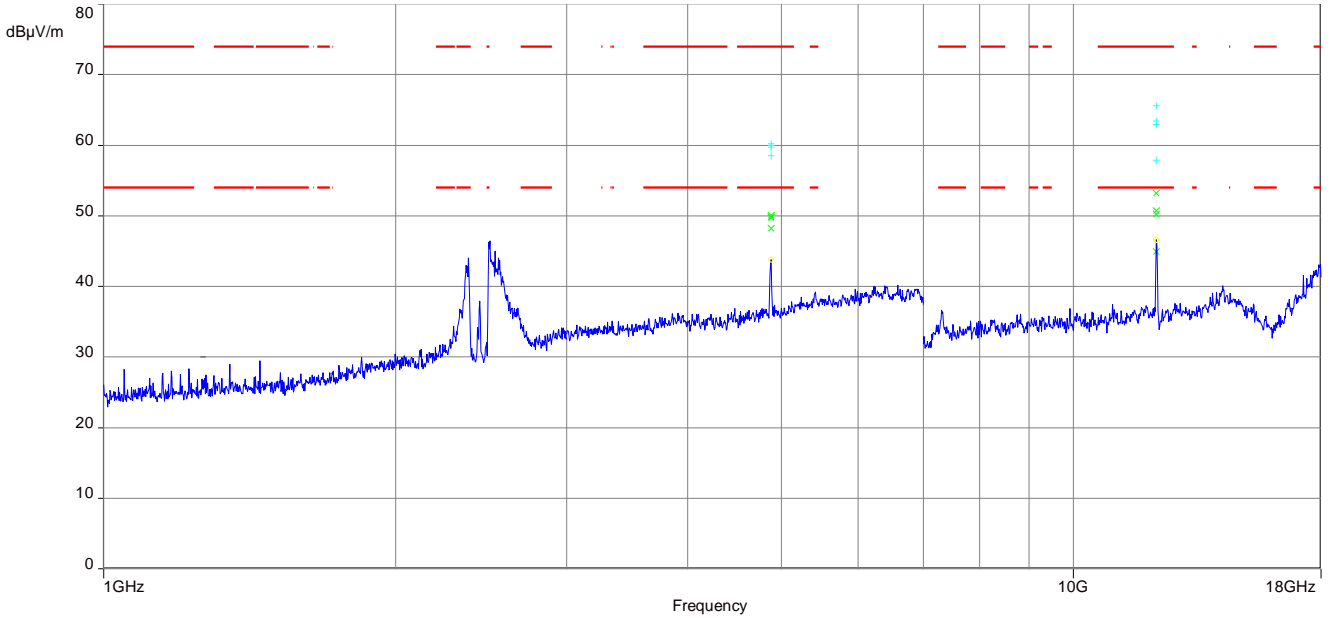
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



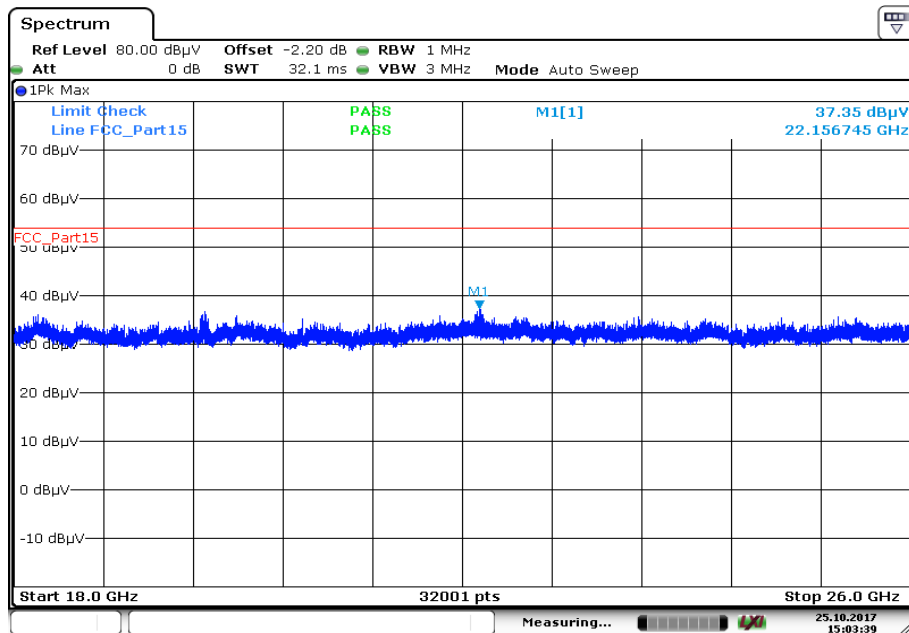
Date: 25.OCT.2017 15:01:58

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



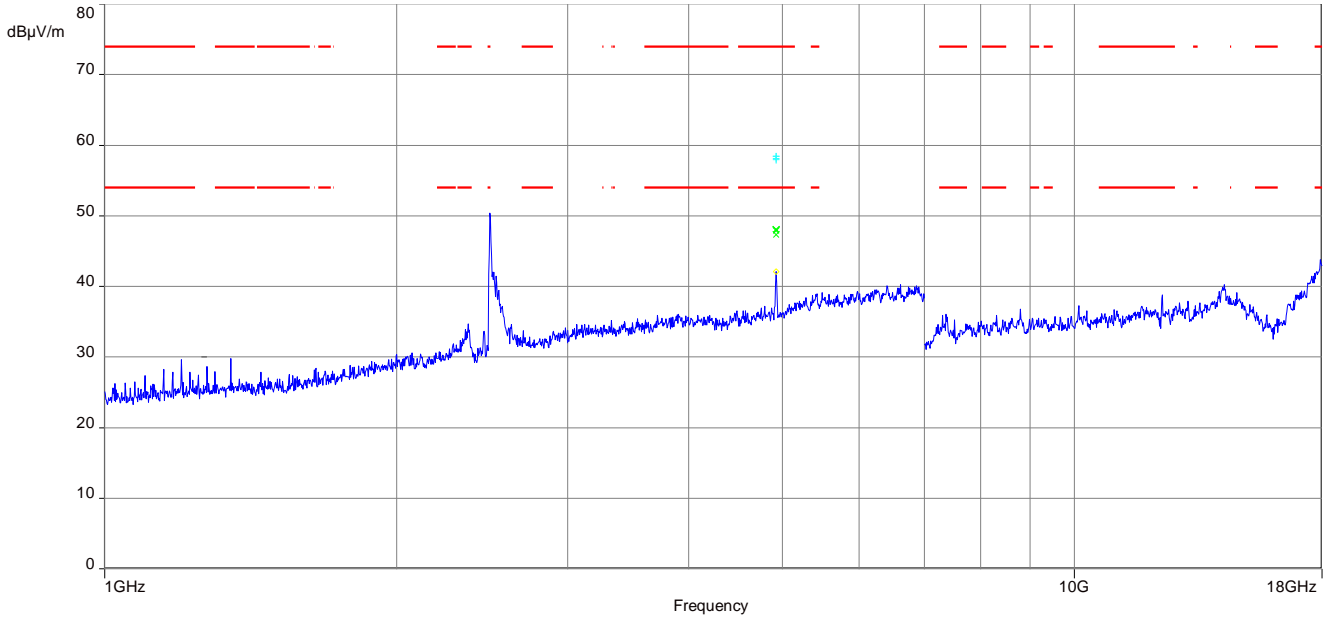
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



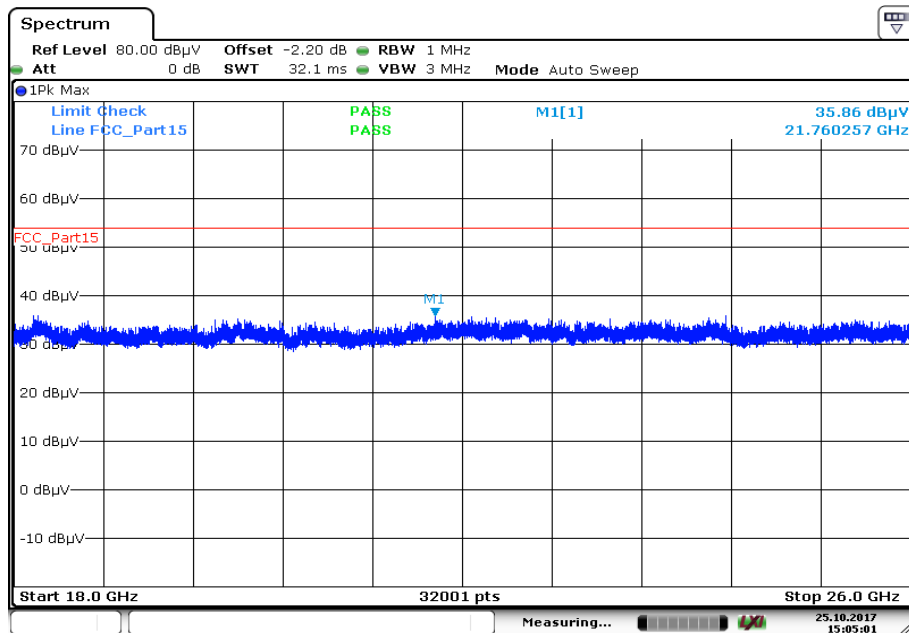
Date: 25.OCT.2017 15:03:40

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.

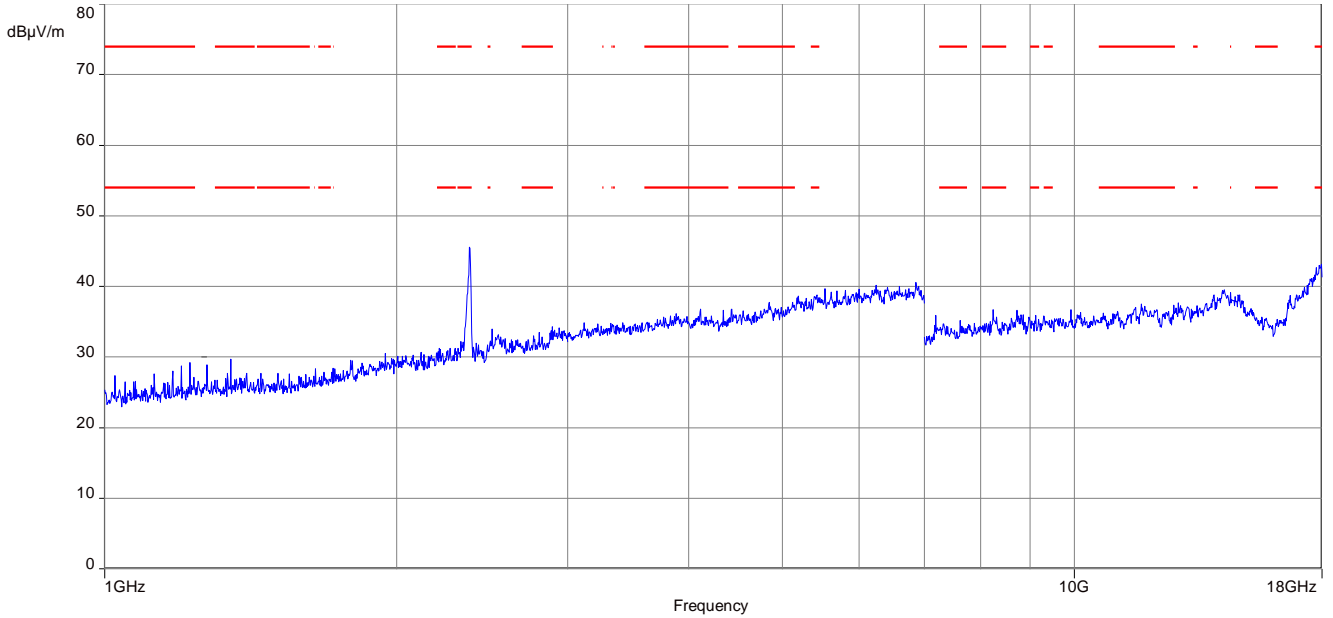
Plot 6: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 25.OCT.2017 15:05:01

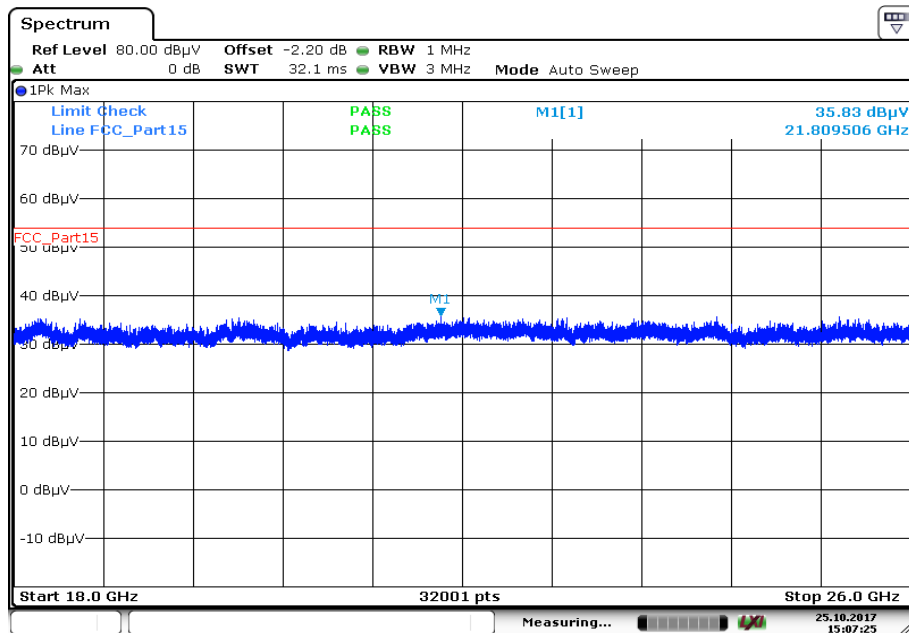
Plots: OFDM (40 MHz bandwidth)

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



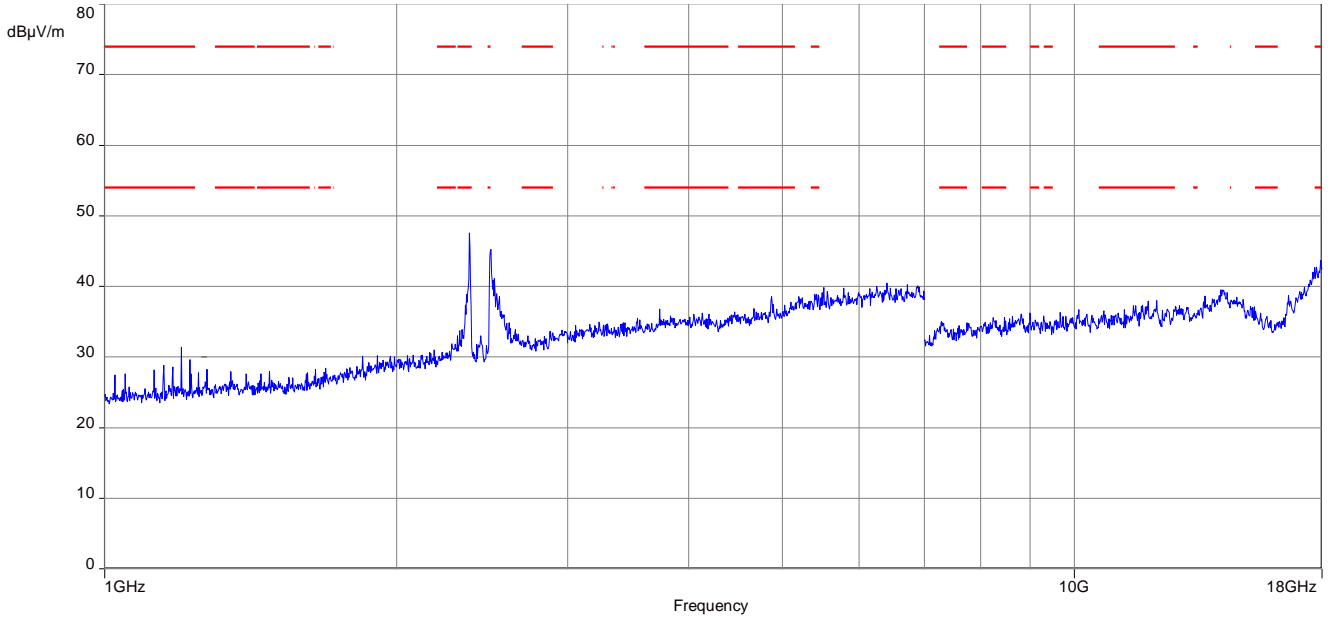
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



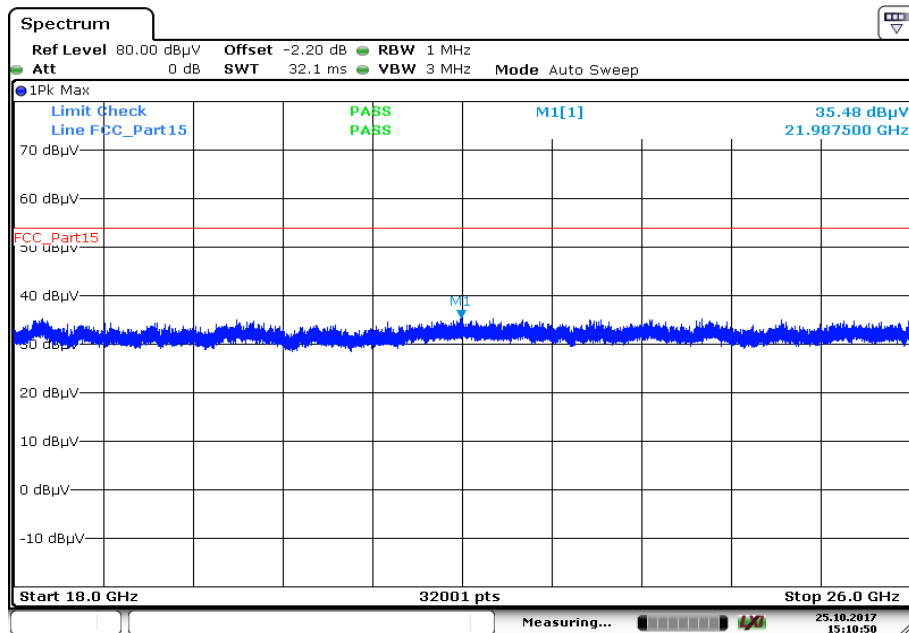
Date: 25.OCT.2017 15:07:26

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



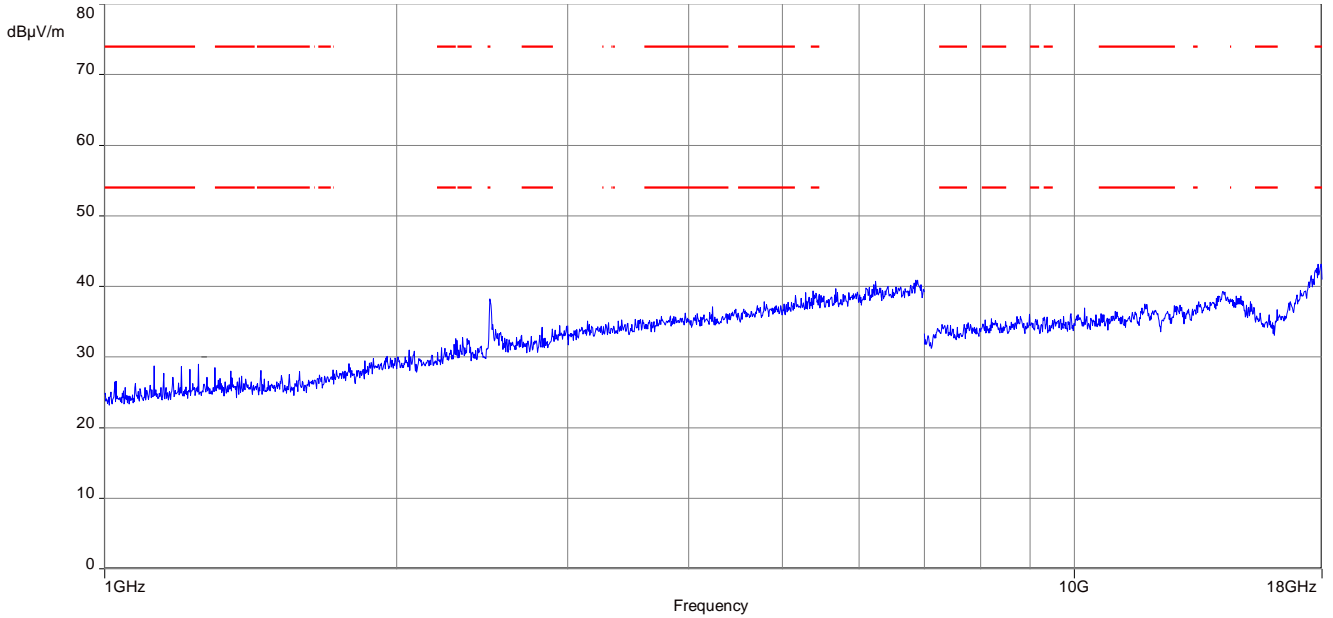
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



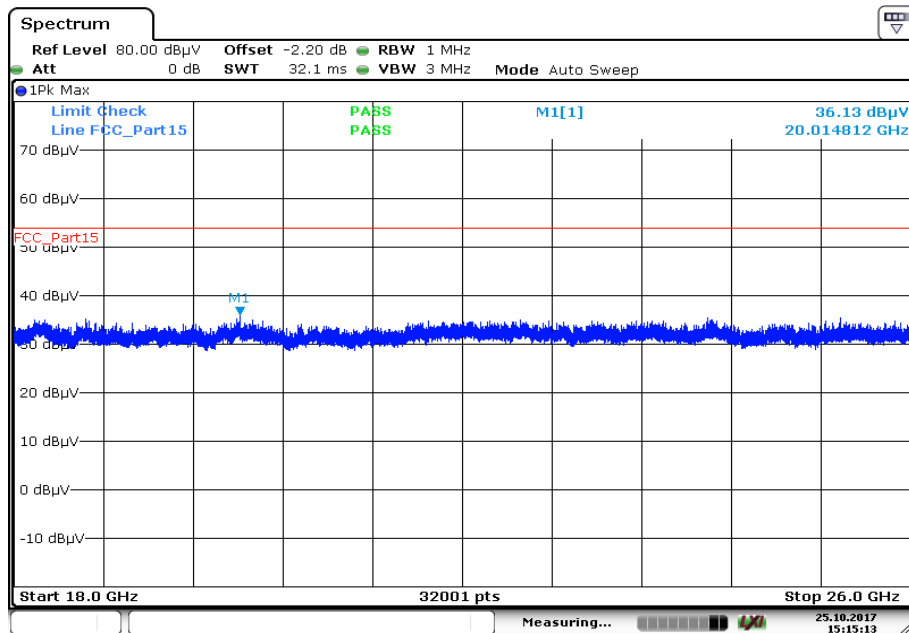
Date: 25.OCT.2017 15:10:50

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.

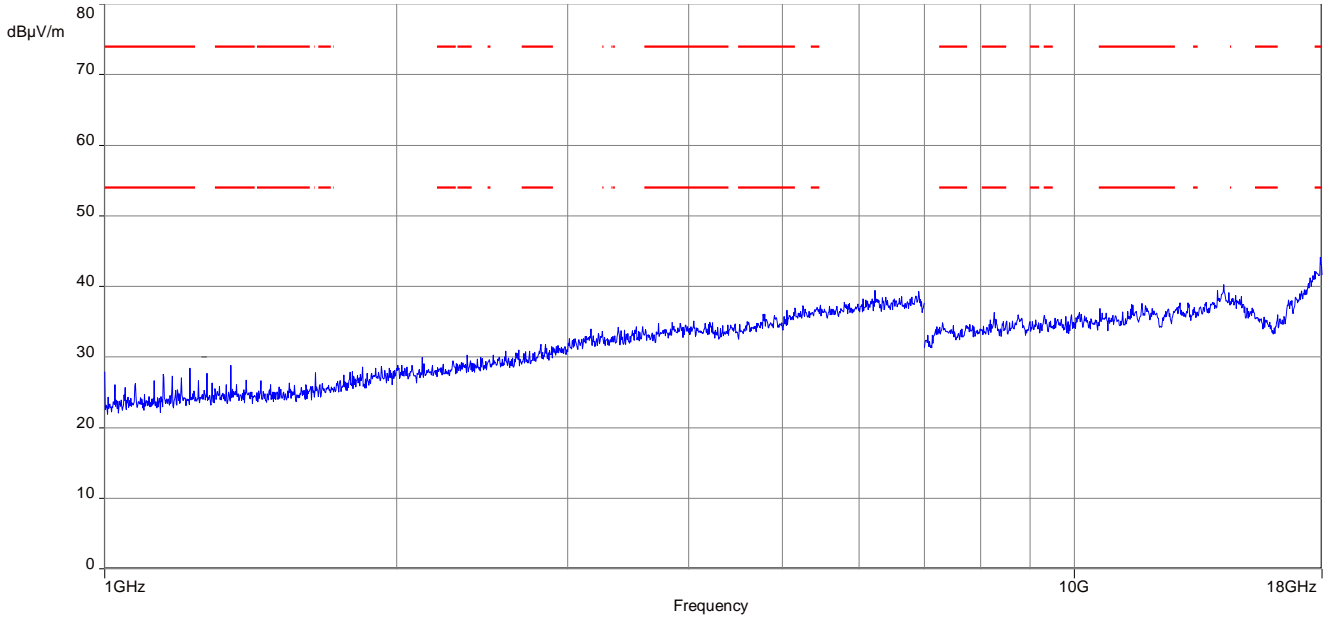
Plot 6: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



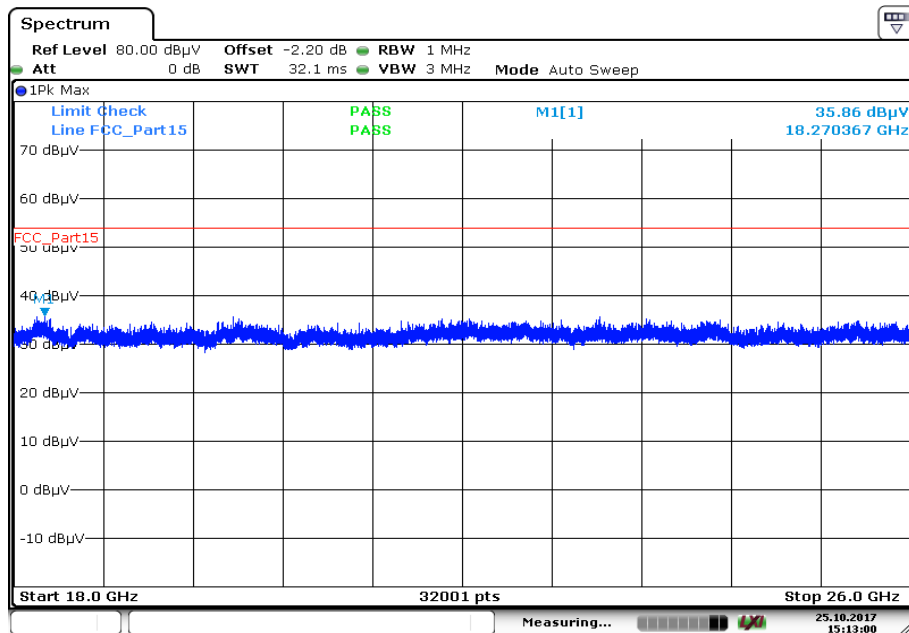
Date: 25.OCT.2017 15:15:14

Plots: RX / idle mode

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



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



Date: 25.OCT.2017 15:13:00

12.14 Spurious emissions conducted below 30 MHz (AC conducted)

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. 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 chapter 6.4 – A
Measurement uncertainty	See chapter 8

Limits:

FCC		IC
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

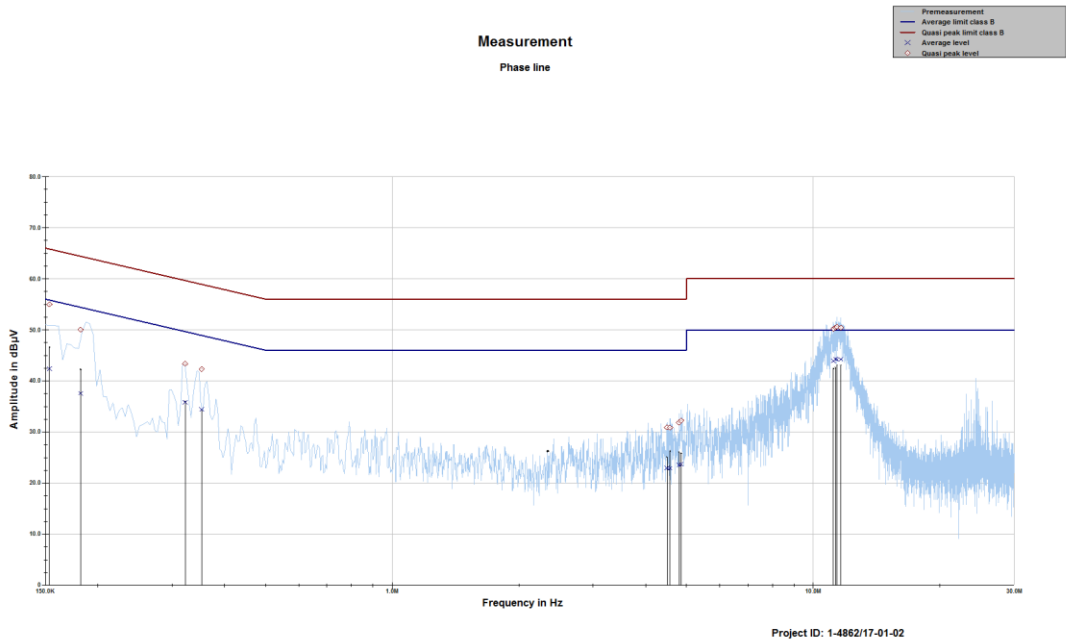
*Decreases with the logarithm of the frequency

Results:

TX spurious emissions conducted < 30 MHz / (dB μ V / m) @ 3m		
f / MHz	Detector	Level / dB μ V/m
See table below the plots.		

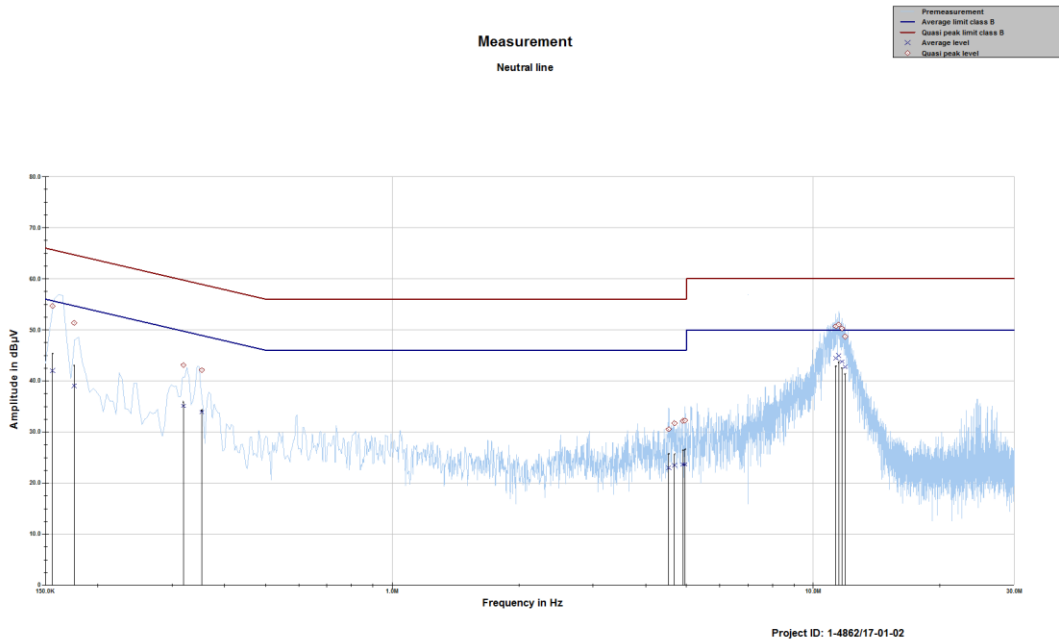
Plots:

Plot 1: 150 kHz to 30 MHz, phase line



Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.153376	54.97	10.84	65.815	42.36	13.54	55.904
0.181905	50.05	14.35	64.398	37.58	17.51	55.088
0.322196	43.37	16.28	59.650	35.82	15.26	51.080
0.352576	42.31	16.59	58.902	34.40	15.81	50.212
4.494698	30.88	25.12	56.000	22.95	23.05	46.000
4.568475	30.85	25.15	56.000	22.89	23.11	46.000
4.798964	31.84	24.16	56.000	23.53	22.47	46.000
4.856707	32.24	23.76	56.000	23.71	22.29	46.000
11.167822	50.19	9.81	60.000	43.93	6.07	50.000
11.296825	50.44	9.56	60.000	44.27	5.73	50.000
11.382623	50.58	9.42	60.000	44.23	5.77	50.000
11.624701	50.42	9.58	60.000	44.25	5.75	50.000

Plot 2: 150 kHz to 30 MHz, neutral line



Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.155946	54.67	11.01	65.677	41.98	13.85	55.830
0.175635	51.36	13.33	64.690	39.06	16.21	55.268
0.319242	43.11	16.62	59.726	35.11	16.06	51.165
0.353017	42.13	16.76	58.891	33.91	16.29	50.200
4.535622	30.55	25.45	56.000	22.98	23.02	46.000
4.679789	31.72	24.28	56.000	23.47	22.53	46.000
4.905424	32.17	23.83	56.000	23.64	22.36	46.000
4.956942	32.25	23.75	56.000	23.66	22.34	46.000
11.314486	50.69	9.31	60.000	44.46	5.54	50.000
11.491331	51.03	8.97	60.000	44.95	5.05	50.000
11.696401	50.29	9.71	60.000	43.77	6.23	50.000
11.902902	48.70	11.30	60.000	42.75	7.25	50.000

13 Observations

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

Annex A Glossary

EUT	Equipment under test
DUT	Device under test
UUT	Unit under test
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

Annex B Document history

Version	Applied changes	Date of release
-/-	Initial release	2017-11-29

Annex C Accreditation Certificate

first page	last page
 <p>Deutsche Akkreditierungsstelle GmbH</p> <p>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</p> <p>Akkreditierung </p> <p>Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium CTC advanced GmbH Untertürkheimer Straße 6-10, 66117 Saarbrücken</p> <p>die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:</p> <p>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)</p> <p>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.</p> <p>Registrierungsnummer der Urkunde: D-PL-12076-01-01</p> <p>Frankfurt, 25.11.2016</p> <p> Im Auftrag Dipl.-Ing. (FH) Ralf Egner Abteilungsleiter</p> <p><small>Siehe Hinweise auf der Rückseite</small></p>	<p>Deutsche Akkreditierungsstelle GmbH</p> <p>Standort Berlin Spittelmarkt 10 10117 Berlin</p> <p>Standort Frankfurt am Main Europa-Allee 52 60327 Frankfurt am Main</p> <p>Standort Braunschweig Bundesallee 100 38116 Braunschweig</p> <p>Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkKS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes durch die uneinseitig genannte Konformitätsbewertungsstelle in unveränderter Form.</p> <p>Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAkKS bestätigten Akkreditierungsbereich hinausgehen.</p> <p>Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abt. L 218 vom 9. Juli 2008, S. 30). Die DAkKS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.</p> <p>Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden: EA: www.european-accreditation.org ILAC: www.ilac.org IAF: www.iaf.nu</p>

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

<http://www.dakks.de/as/ast/d/D-PL-12076-01-03.pdf>