

Annex 1: Measurement diagrams to
TEST REPORT
No.: 20-1-0087101T03a-C2

According to:
47 CFR Part 95
RSS-Gen Issue 5
RSS-251 Issue 2

for

Hella GmbH & Co. KGaA

RS5.4
Advanced Driver Assistance System

FCC ID: NBG01RS54A
ISED ID: 2694A-RS54A



Laboratory Accreditation
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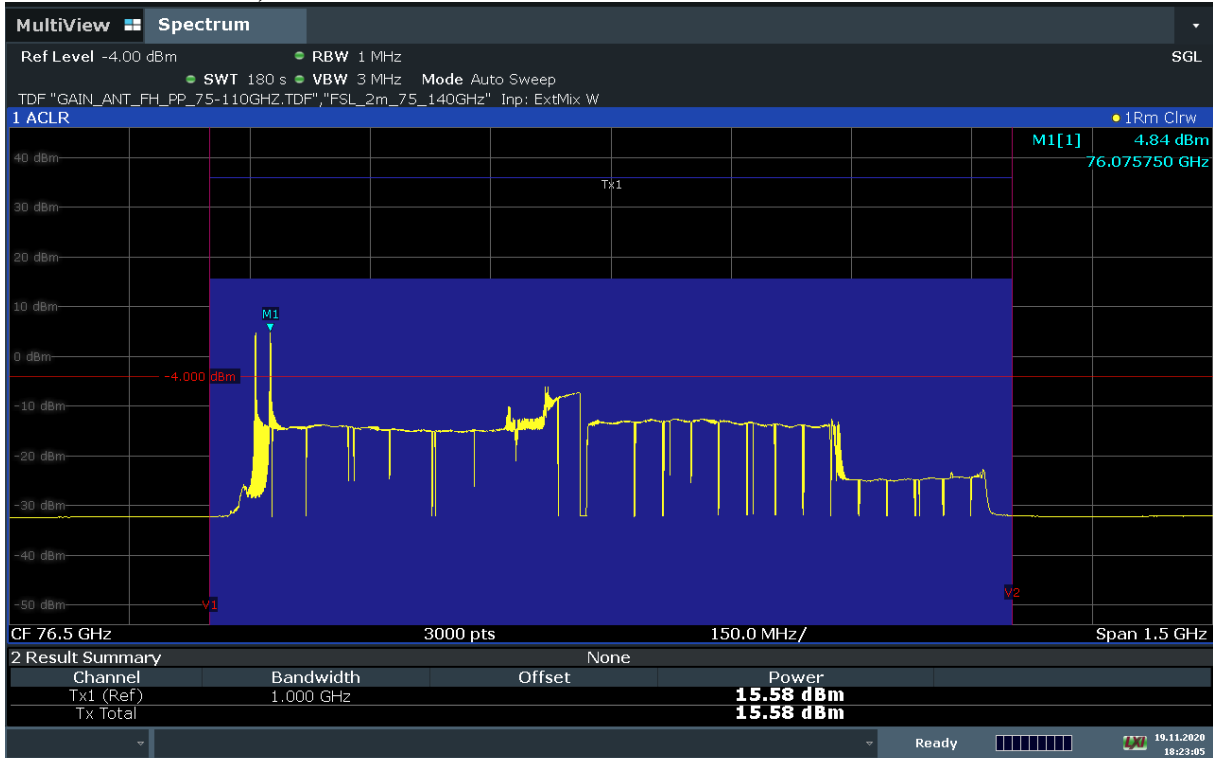
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1. The maximum peak power EIRP / peak EIRP spectral density. The maximum power EIRP/ average EIRP.

1.1. RMS Detector, T_{nom}/V_{nom}



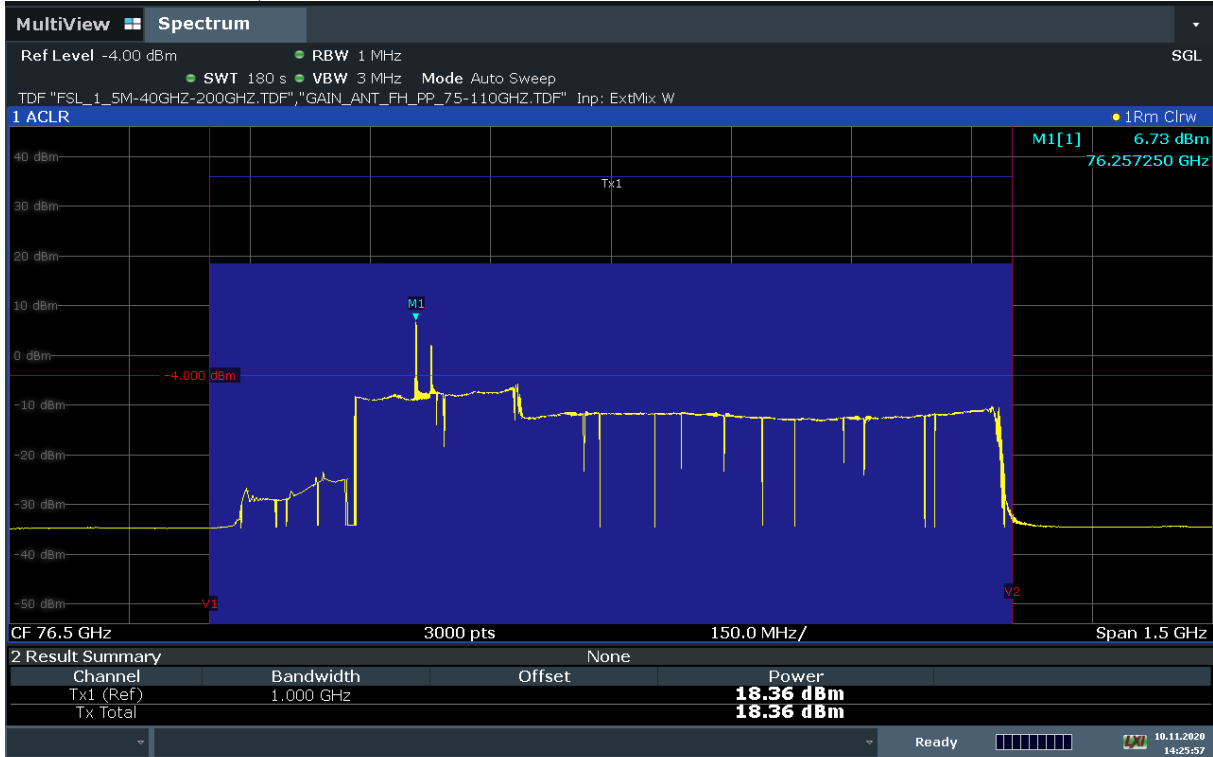
18:23:06 19.11.2020

1.2. Peak Detector, T_{nom}/V_{nom}



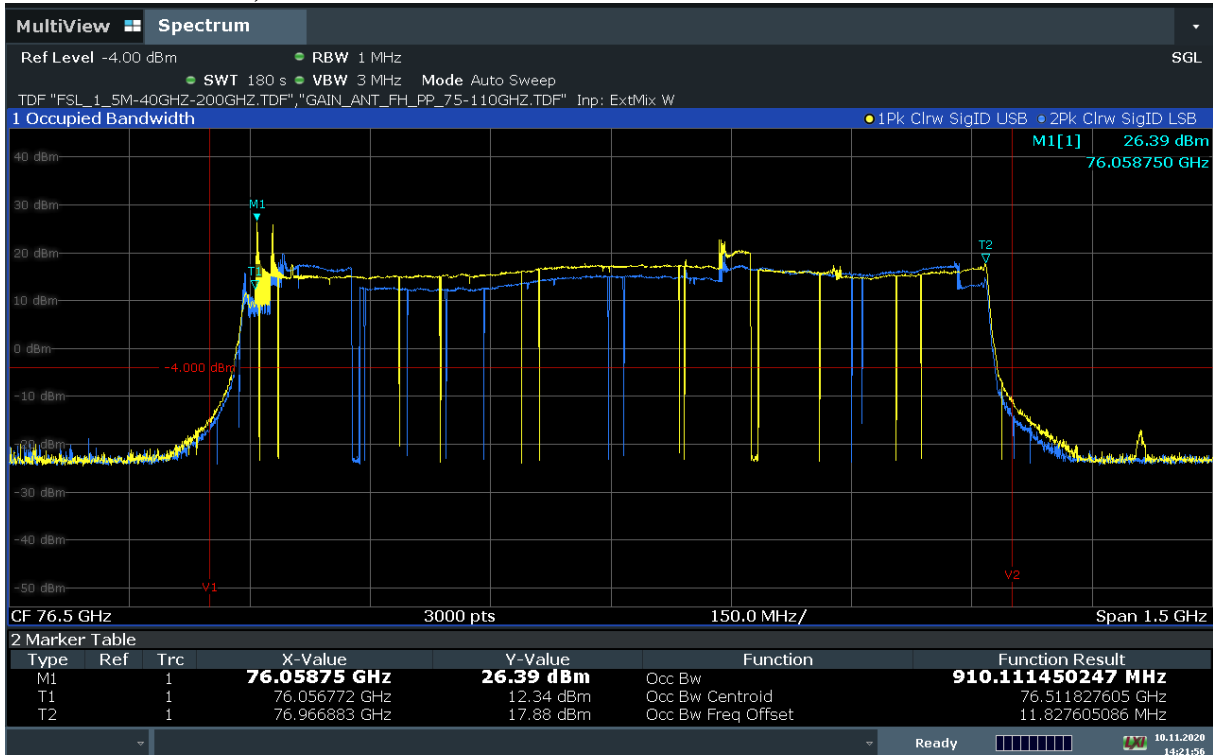
12:27:44 10.11.2020

1.3. RMS Detector, T_{min}/V_{min}



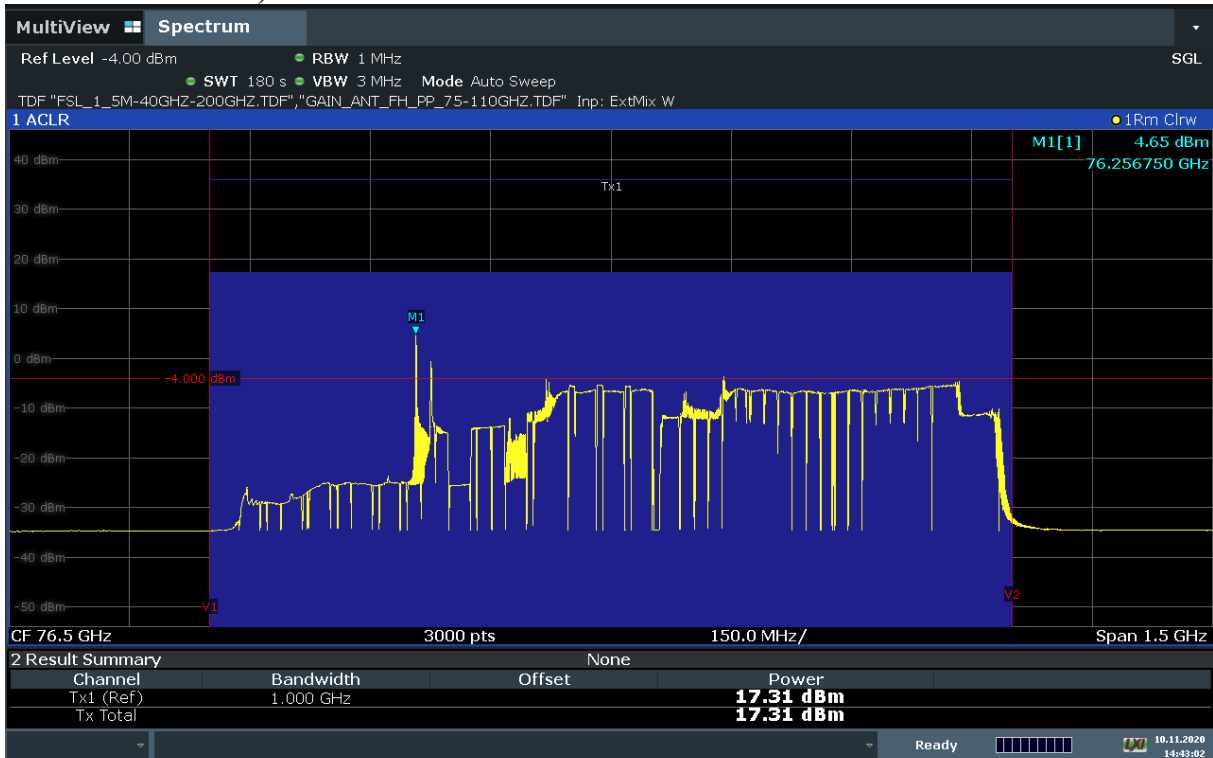
14:25:57 10.11.2020

1.4. Peak Detector, T_{min}/V_{min}



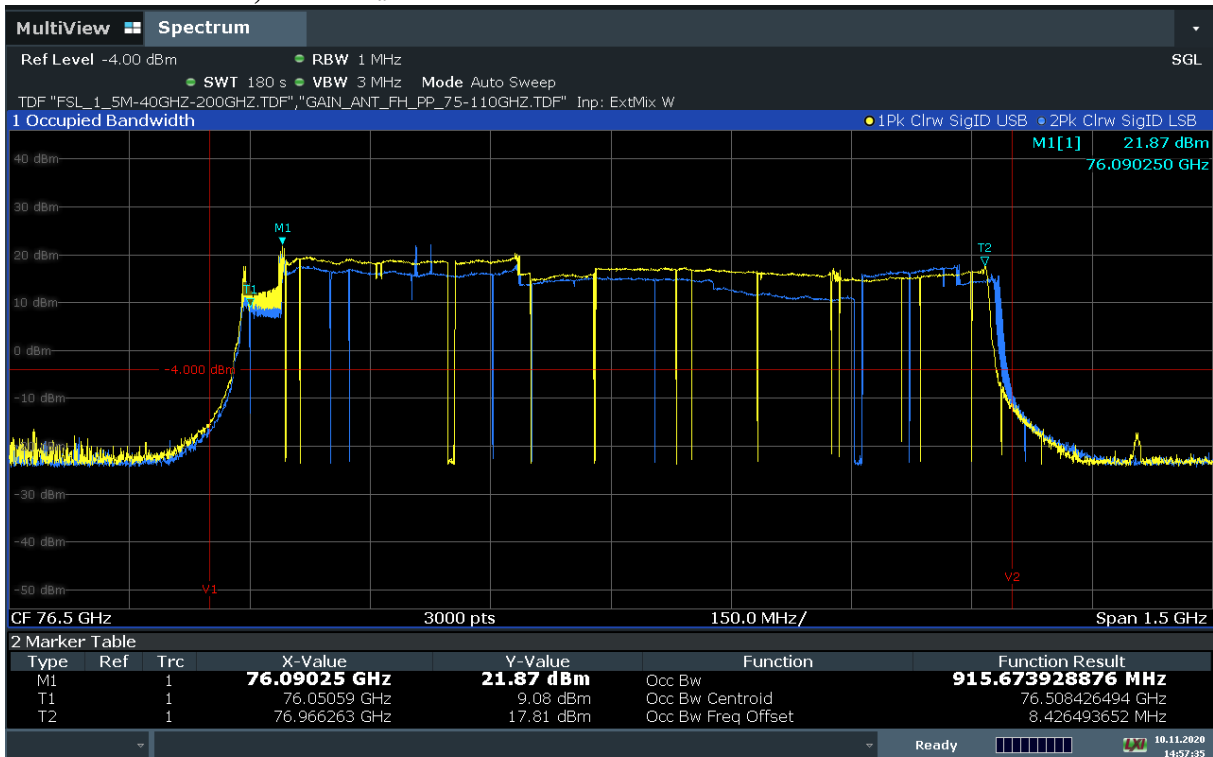
14:21:57 10.11.2020

1.5. RMS Detector, T_{min}/V_{max}



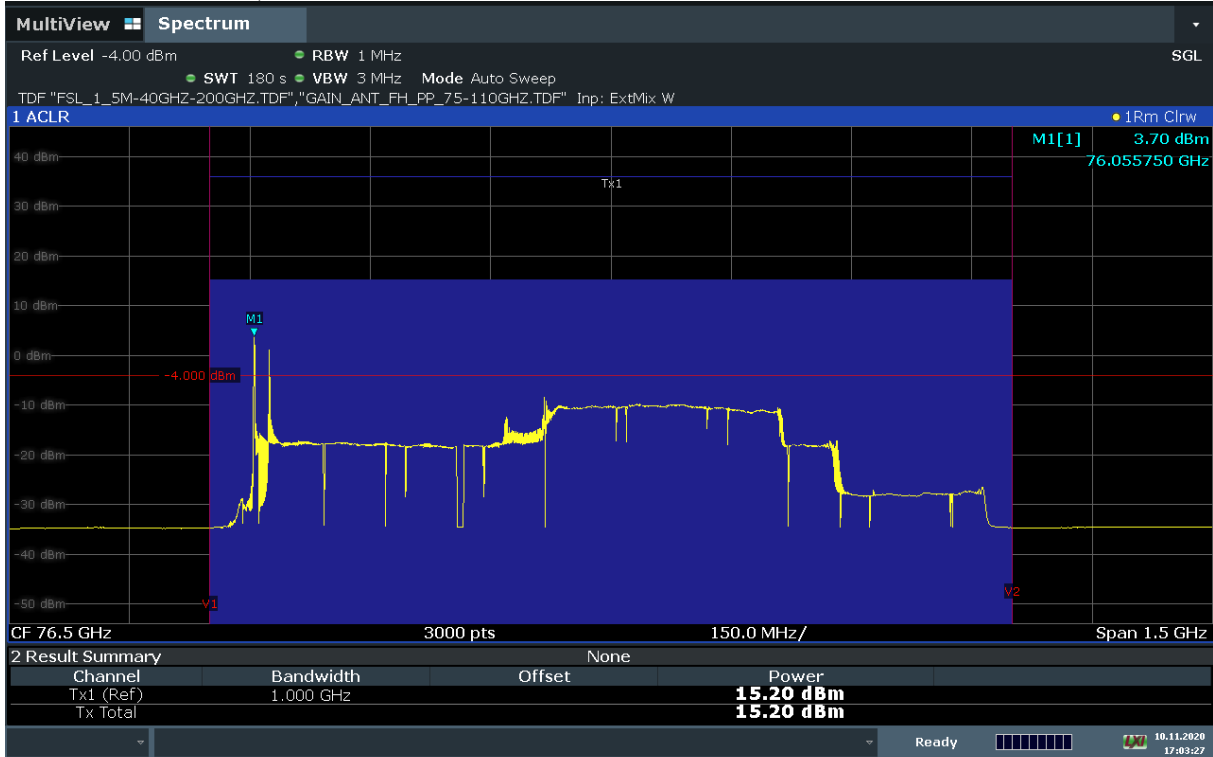
14:43:03 10.11.2020

1.6. Peak Detector, T_{min}/V_{max}



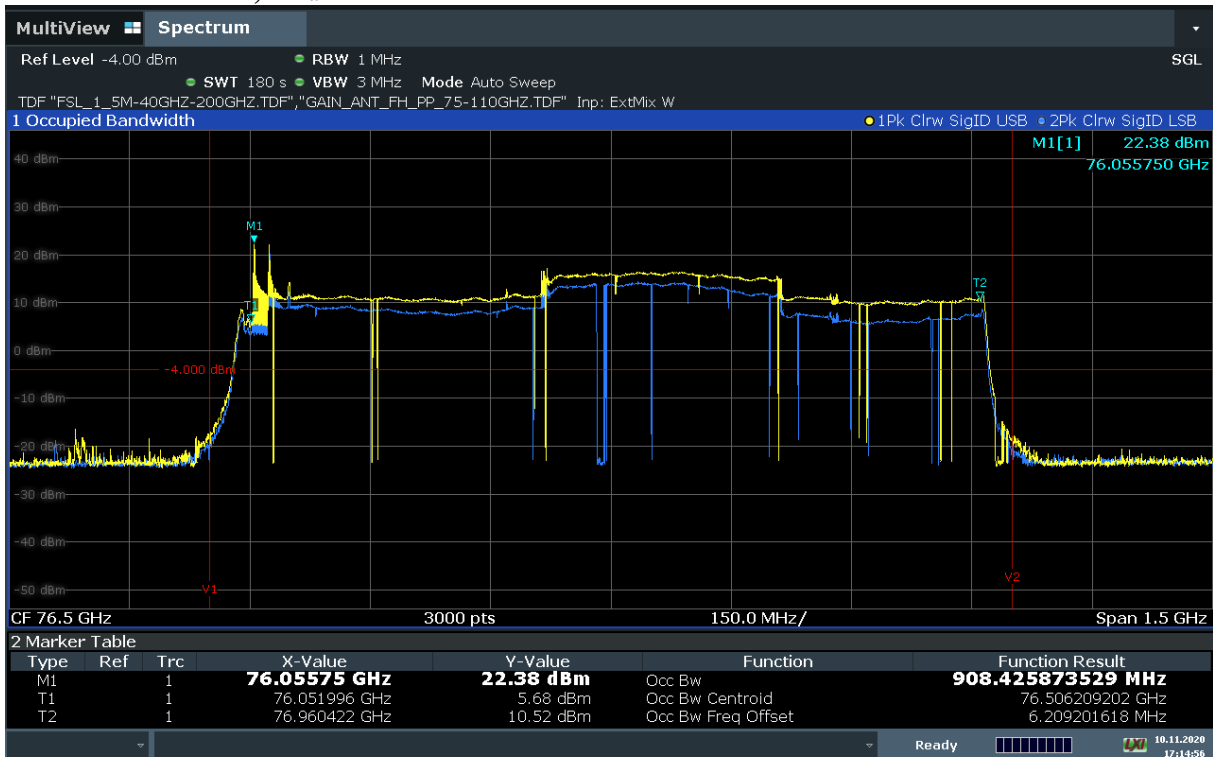
14:57:36 10.11.2020

1.7. RMS Detector, T_{max}/V_{min}



17:03:28 10.11.2020

1.8. Peak Detector, T_{max}/V_{min}



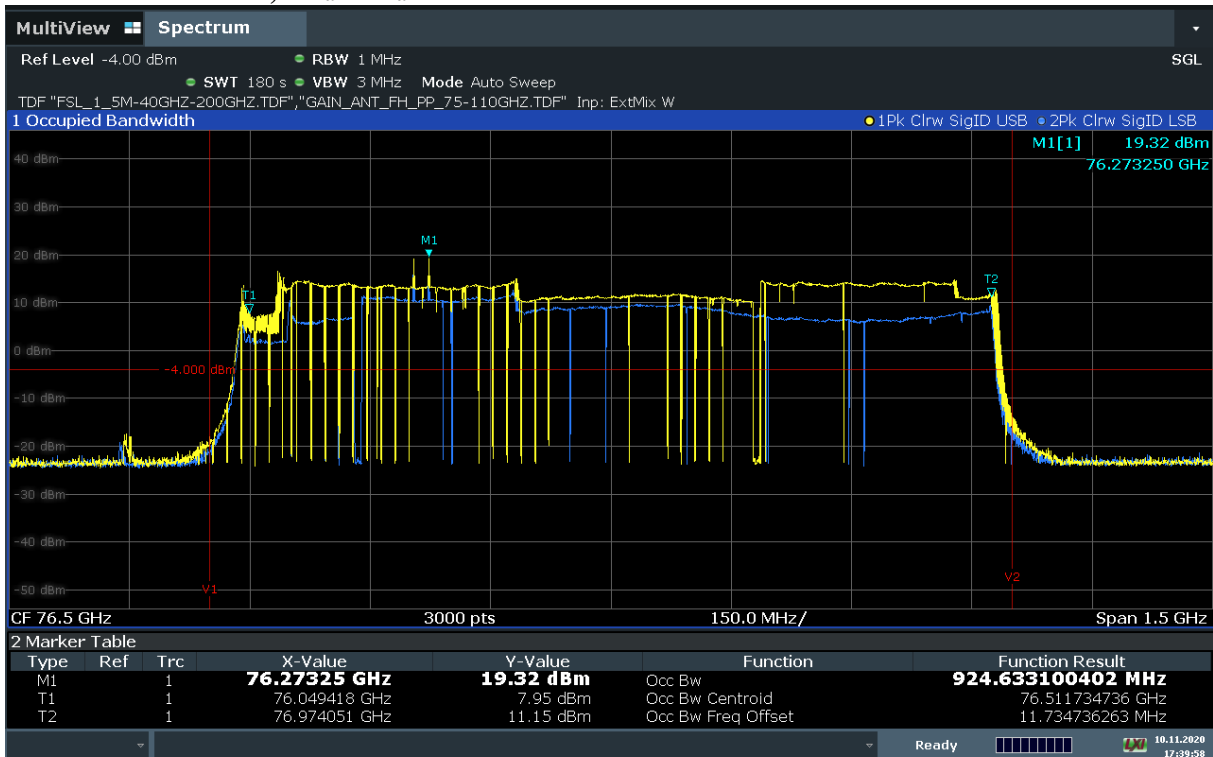
17:14:56 10.11.2020

1.9. RMS Detector, T_{max}/V_{max}



17:30:24 10.11.2020

1.10. Peak Detector, T_{max}/V_{max}



17:39:59 10.11.2020

2. Modulation characteristics

2.1. Peak Detector, T_{nom}/V_{nom}

See diagram 1.2

2.2. Peak Detector, T_{min}/V_{min}

See diagram 1.4

2.3. Peak Detector, T_{min}/V_{max}

See diagram 1.6

2.4. Peak Detector, T_{max}/V_{min}

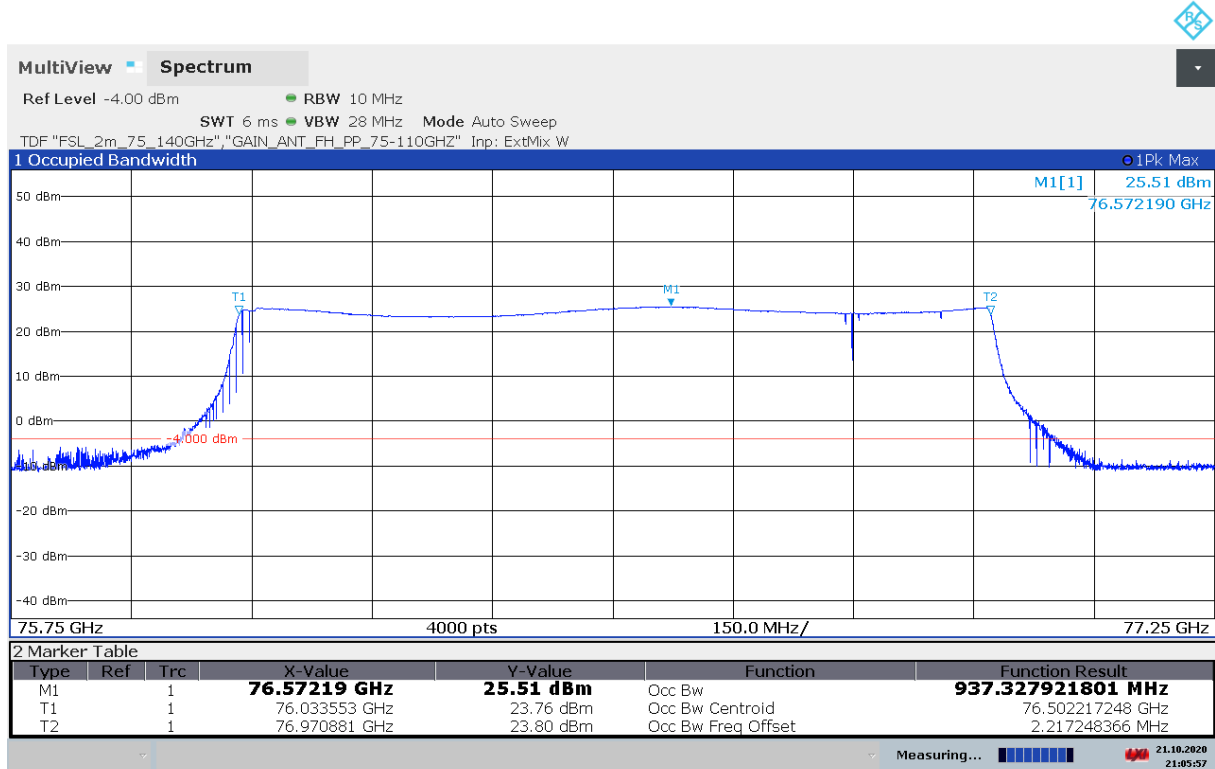
See diagram 1.8

2.5. Peak Detector, T_{max}/V_{max}

See diagram 1.10

3. Occupied bandwidth

3.1. Peak Detector, T_{nom}/V_{nom} , RBW 10 MHz (only required for 99% RSS Gen Occupied BW)



21:05:57 21.10.2020

3.2. Peak Detector, T_{nom}/V_{nom}

See diagram 1.2

3.3. Peak Detector, T_{min}/V_{min}

See diagram 1.4

3.4. Peak Detector, T_{min}/V_{max}

See diagram 1.6

3.5. Peak Detector, T_{max}/V_{min}

See diagram 1.8

3.6. Peak Detector, T_{max}/V_{max}

See diagram 1.10

4. Field strength of emissions (band edge)

4.1. RMS Detector, low edge, 73.5 GHz – 76 GHz

No emissions below 76 GHz. See diagrams 5.9-5.12.

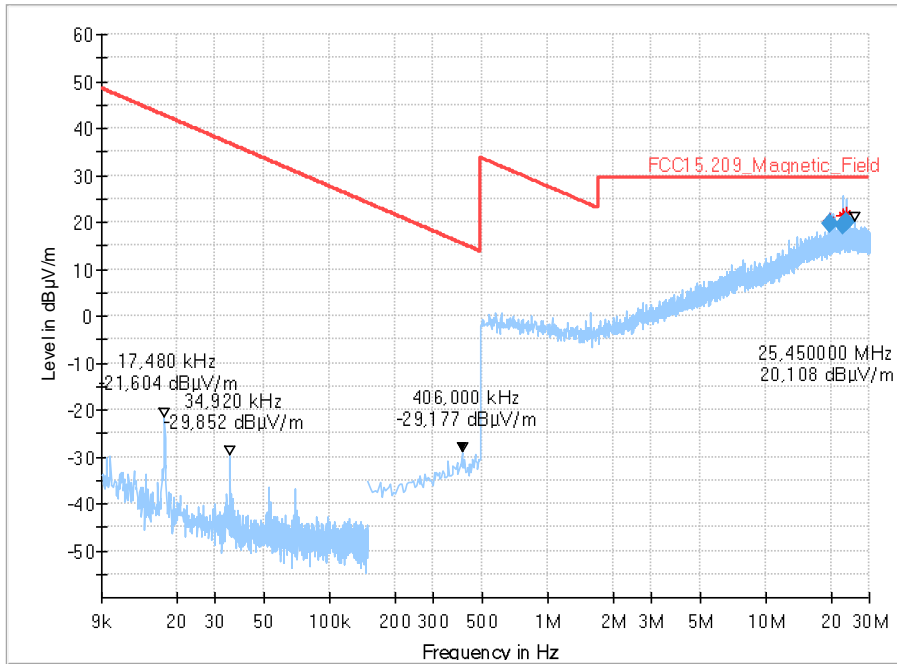
4.2. RMS Detector, high edge, 77 GHz – 78 GHz

No emissions above 77 GHz. See diagram 5.13.

5. Field strength of emissions (radiated spurious emissions)

5.1. 9 kHz – 30 MHz, EUT standing

Full Spectrum

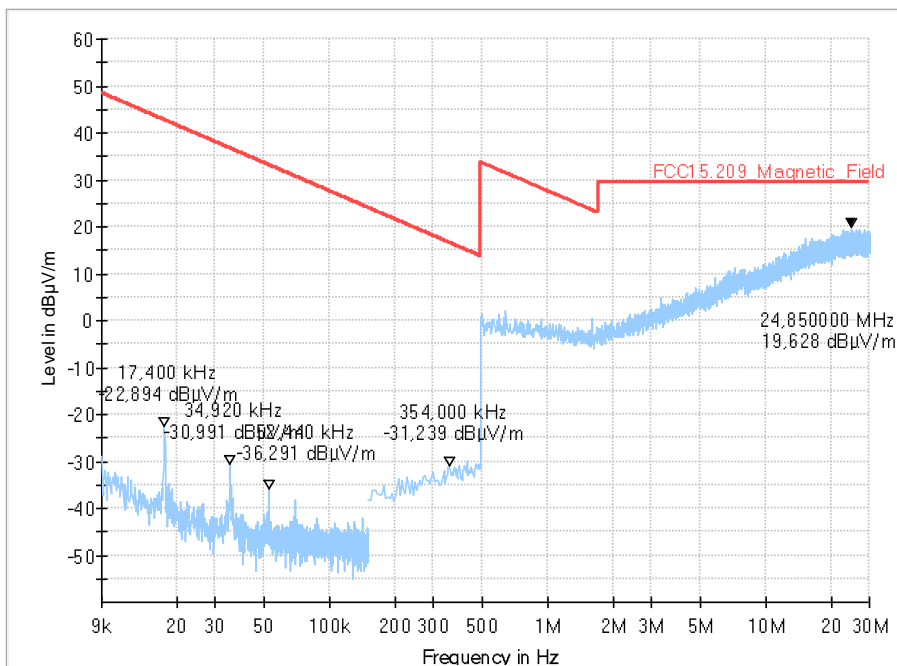


Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth (h)	Pol	Azimuth (h)	Corr. (dB/m)	Comment
19.842000	19.79	29.54	9.75	1000.0	9.000	H	137.0	0.9	16:22:53 - 22.10.2020
22.674000	19.47	29.54	10.07	1000.0	9.000	H	142.0	1.5	16:31:15 - 22.10.2020
23.426000	19.86	29.54	9.68	1000.0	9.000	H	230.0	1.6	16:27:18 - 22.10.2020

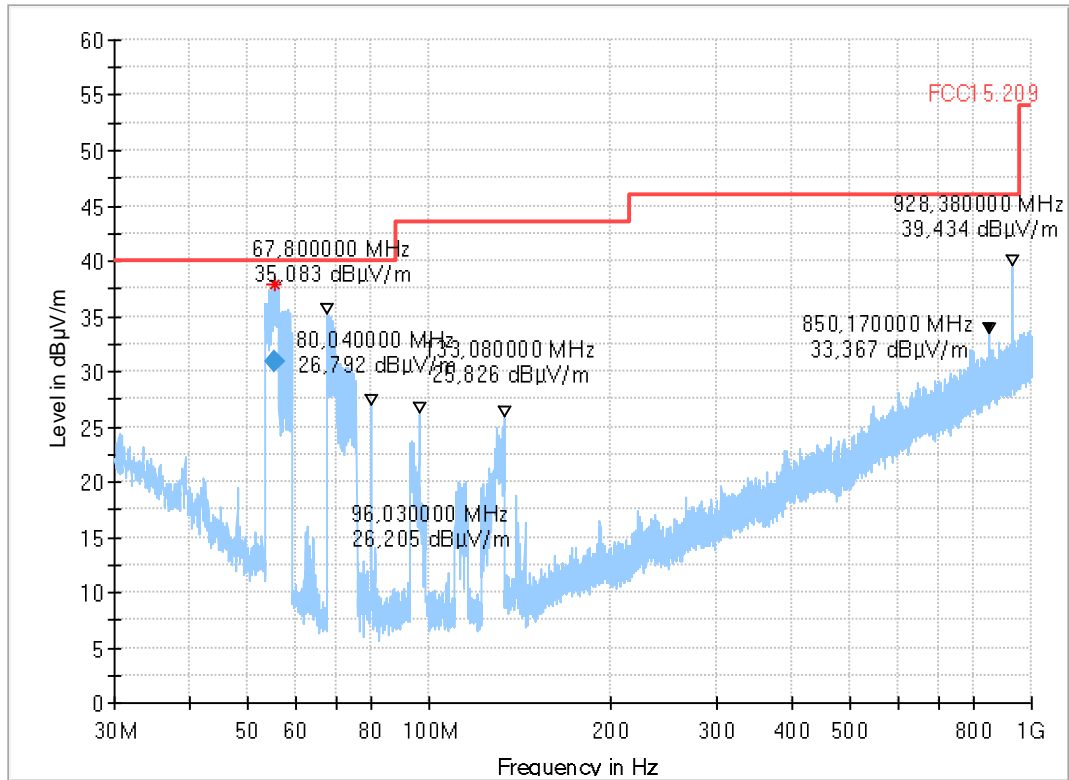
5.2. 9 kHz – 30 MHz, EUT lying

Full Spectrum



5.3. 30 MHz – 1 GHz, EUT standing

Full Spectrum



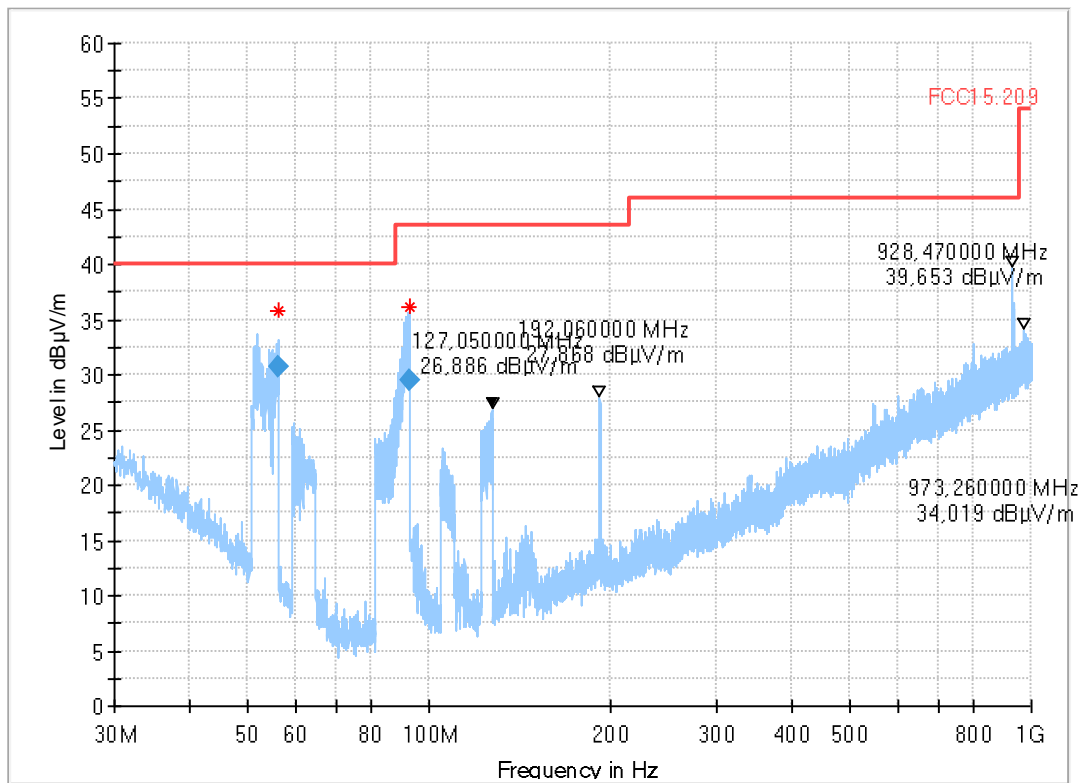
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth (Hz)	Height	Pol	Azimuth	Corr. (dB/m)
55.296000	30.84	40.00	9.16	1000.0	120.000	121.0	V	266.0	11.0

Remark: The emission at 928 MHz is external, thus irrelevant to the limit.

5.4. 30 MHz – 1 GHz, EUT lying

Full Spectrum

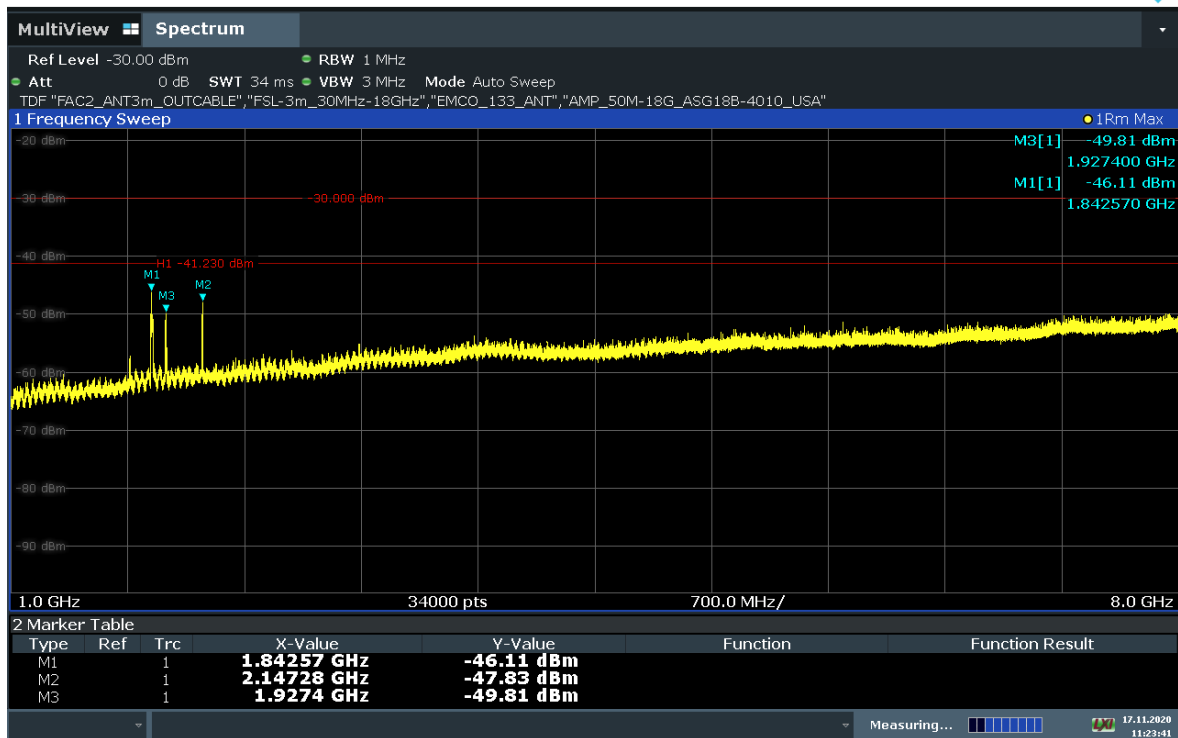


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB/m)
56.218000	30.69	40.00	9.31	1000.0	120.000	117.0	V	219.0	10.6
92.554000	29.40	43.50	14.10	1000.0	120.000	119.0	V	271.0	8.3

Remark: The emission at 928 MHz is external, thus irrelevant to the limit.

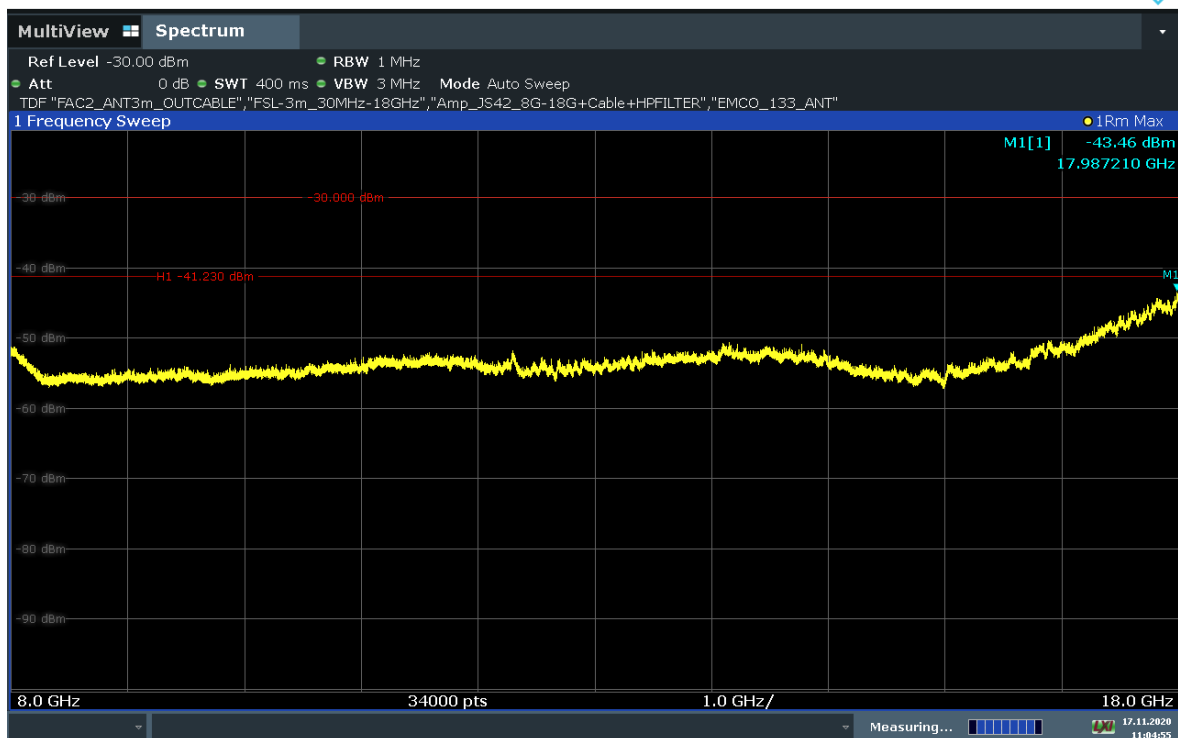
5.5. 1 GHz – 8 GHz, ANT HOR + VER, sweep time: auto



11:23:42 17.11.2020

Remark: The emissions at marker M1/M2/M3 are external, thus irrelevant to the limit. The limit is -41.23 dBm.

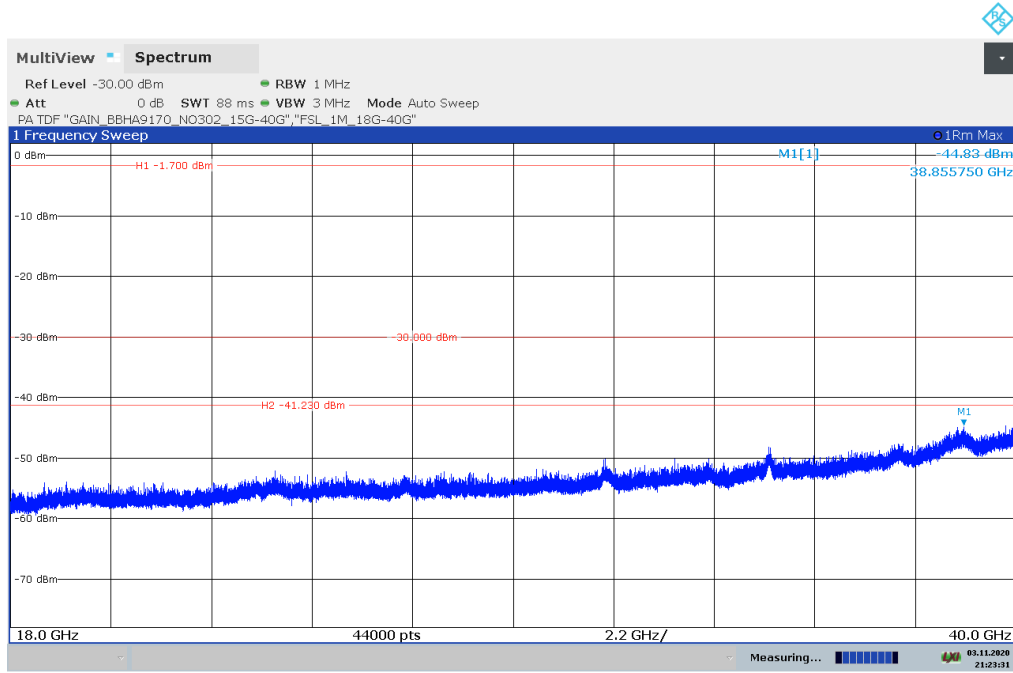
5.6. 8 GHz – 18 GHz, ANT HOR + VER, sweep time: 400 ms



11:04:56 17.11.2020

Remark: The limit is -41.23 dBm.

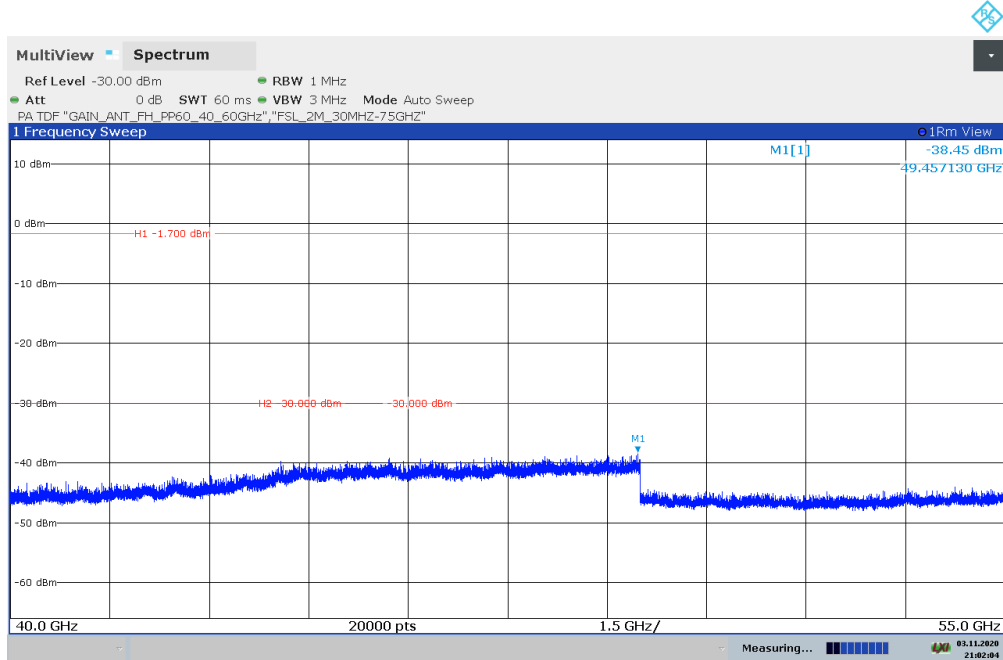
5.7. 18 GHz – 40 GHz, ANT HOR + VER, sweep time: auto



21:23:31 03.11.2020

Remark: Limit is -41.23 dBm.

5.8. 40 GHz – 55 GHz, ANT HOR + VER, sweep time: auto

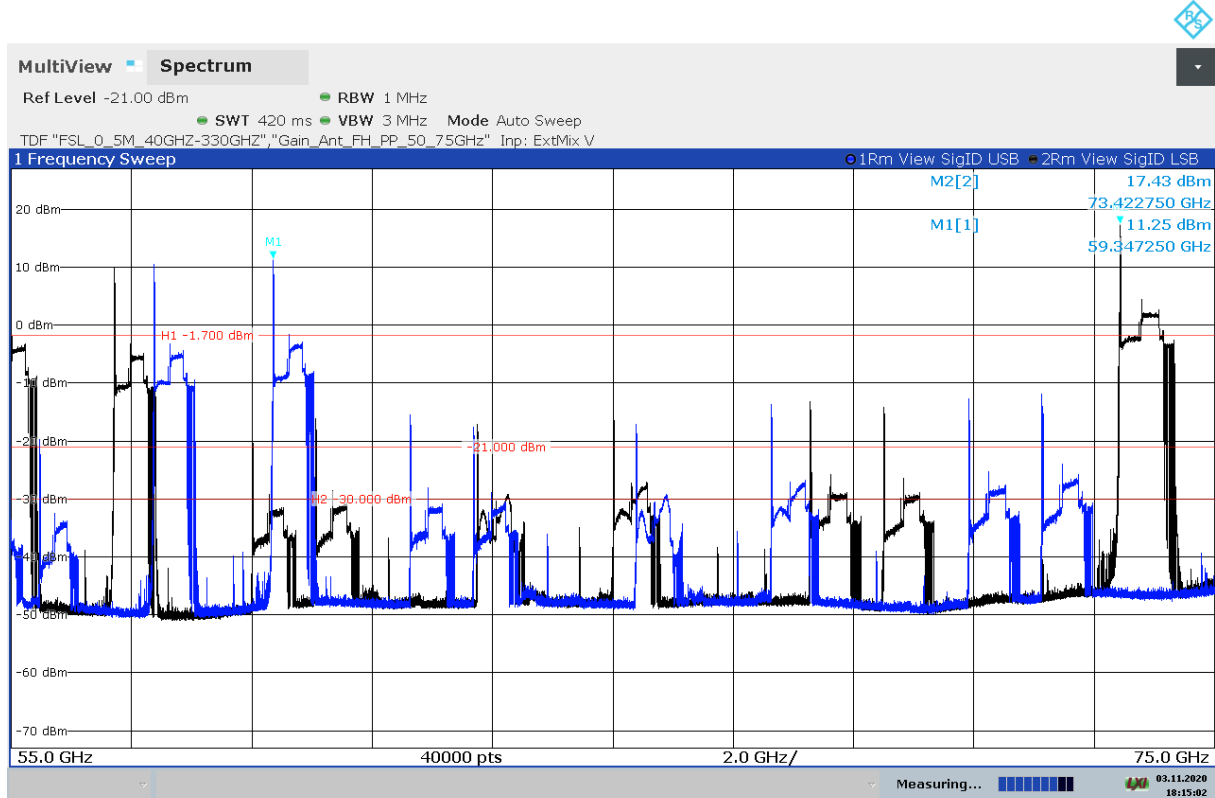


21:02:04 03.11.2020

Remark: Limits are -1.7 dBm (FCC) and -30 dBm (ISED).

Remark: The emissions above 55 GHz are measured with help of an external mixer. Due to its intrinsic characteristic, it produces image signals while receives signal with decent amount of power. In order to identify the image signals, the signal ID function is activated. The emission is only real, when the traces USB and LSB completely overlap, otherwise it is an image signal.

5.9. 55 GHz – 75 GHz, ANT HOR + VER, SigID USB + LSB, sweep time: 420 ms

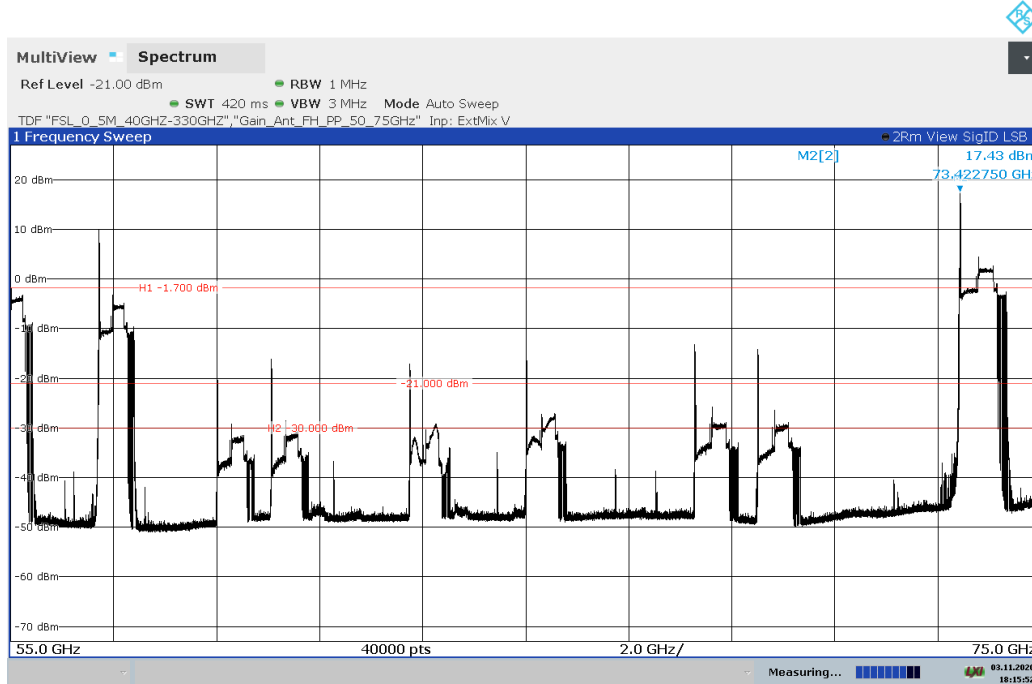


18:15:02 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED)*.

*) The limit for ISED is 0 dBm within 73.5 GHz – 76 GHz, if the occupied bandwidth resides entirely in the 76-77 GHz band.

5.10. 55 GHz – 75 GHz, ANT HOR + VER, SigID LSB, sweep time: 420 ms

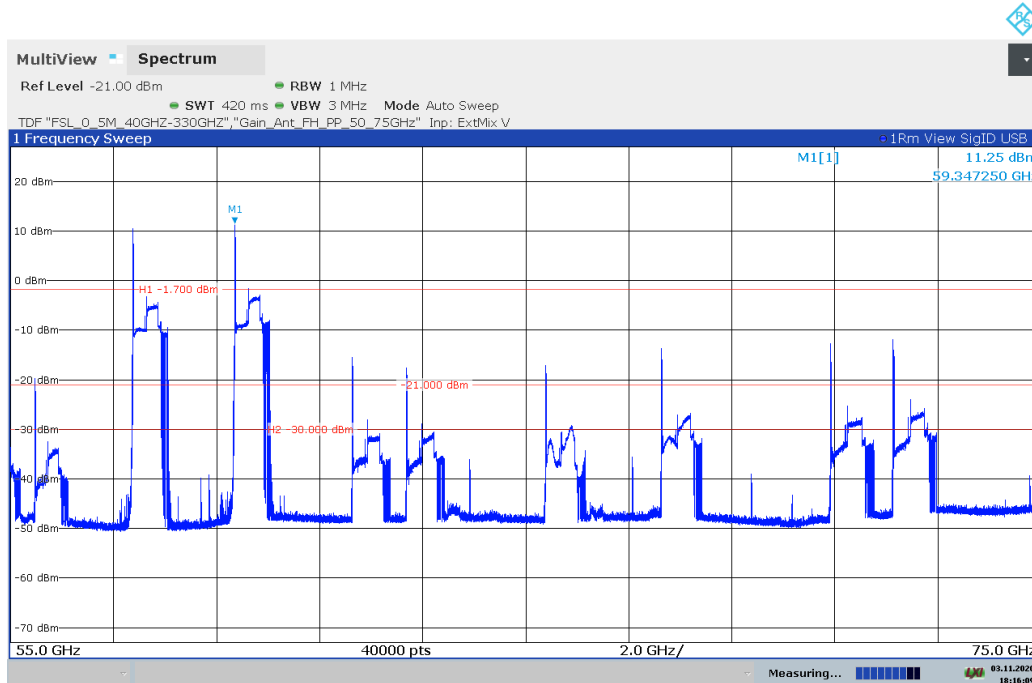


18:15:52 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED)*.

*) The limit for ISED is 0 dBm within 73.5 GHz – 76 GHz, if the occupied bandwidth resides entirely in the 76-77 GHz band.

5.11. 55 GHz – 75 GHz, ANT HOR + VER, SigID USB, sweep time: 420 ms

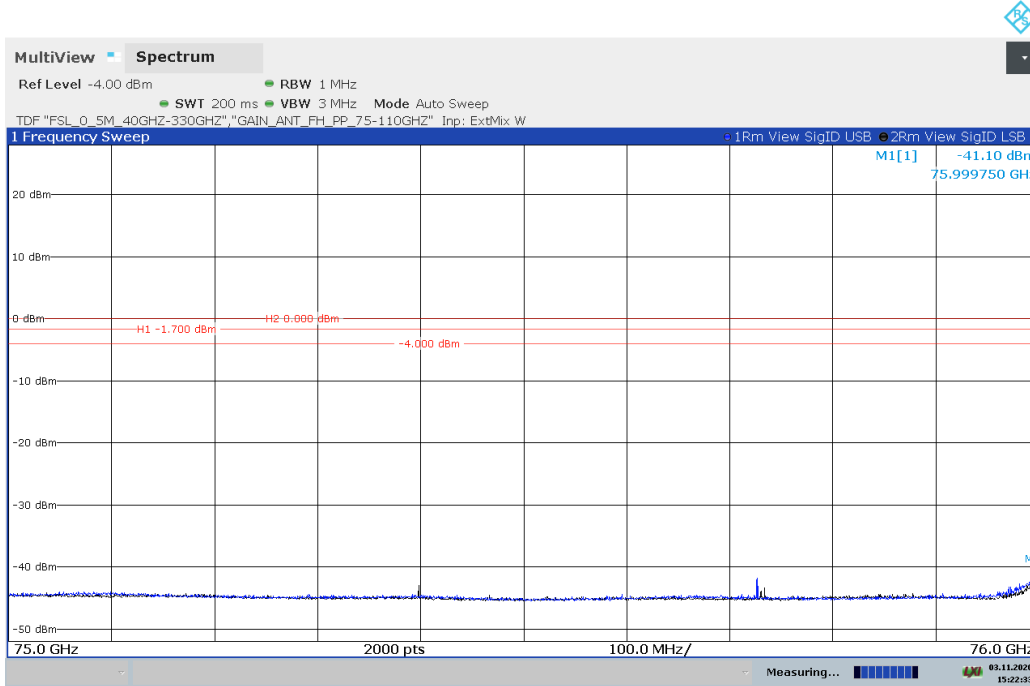


18:16:09 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED)*.

*) The limit for ISED is 0 dBm within 73.5 GHz – 76 GHz, if the occupied bandwidth resides entirely in the 76-77 GHz band.

5.12. 75 GHz – 76 GHz, ANT HOR + VER, sweep time: 200 ms

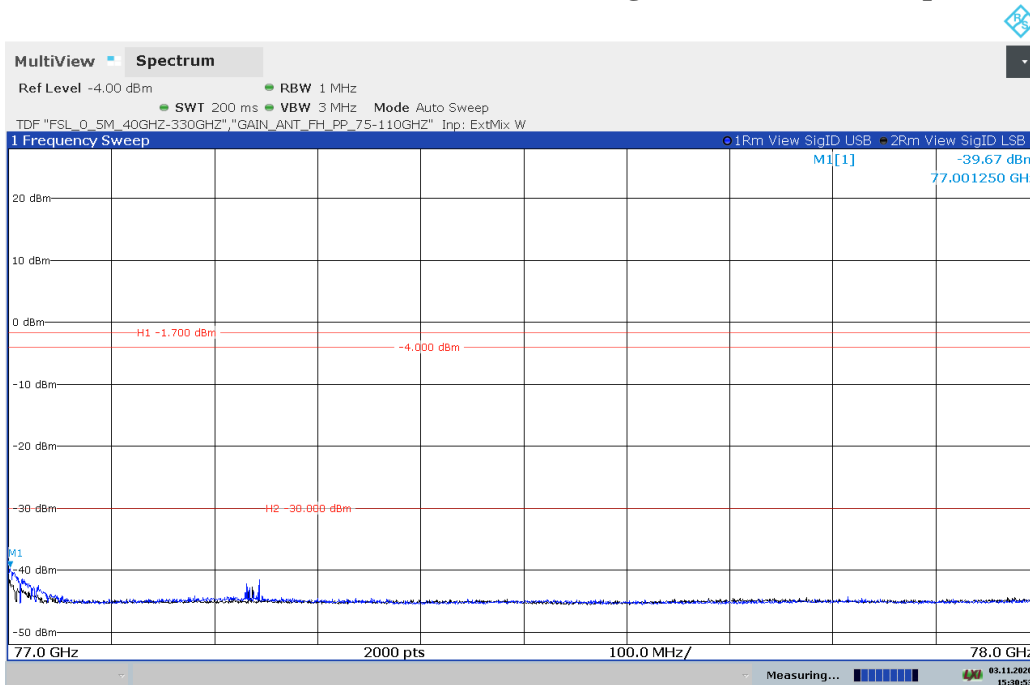


15:22:33 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and 0 dBm (ISED)*.

*) The limit for ISED is 0 dBm within 73.5 GHz – 76 GHz, if the occupied bandwidth resides entirely in the 76-77 GHz band.

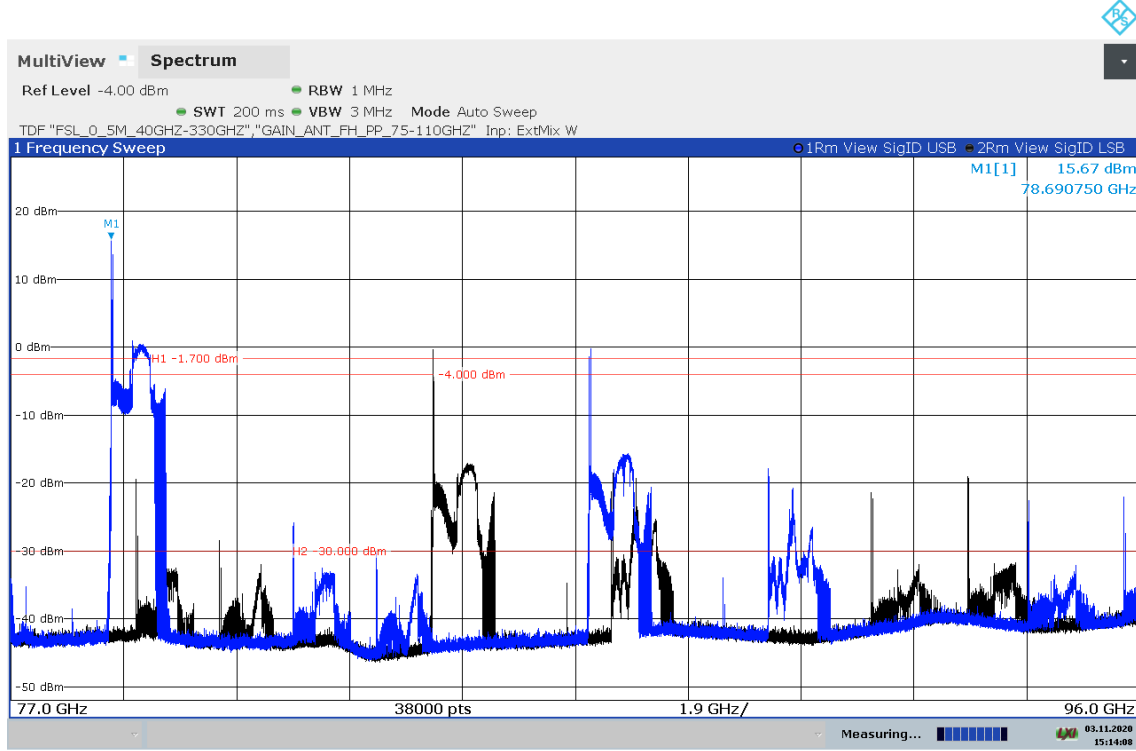
5.13. 77 GHz – 78 GHz, ANT HOR + VER, SigID USB + LSB, sweep time: 200 ms



15:30:53 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

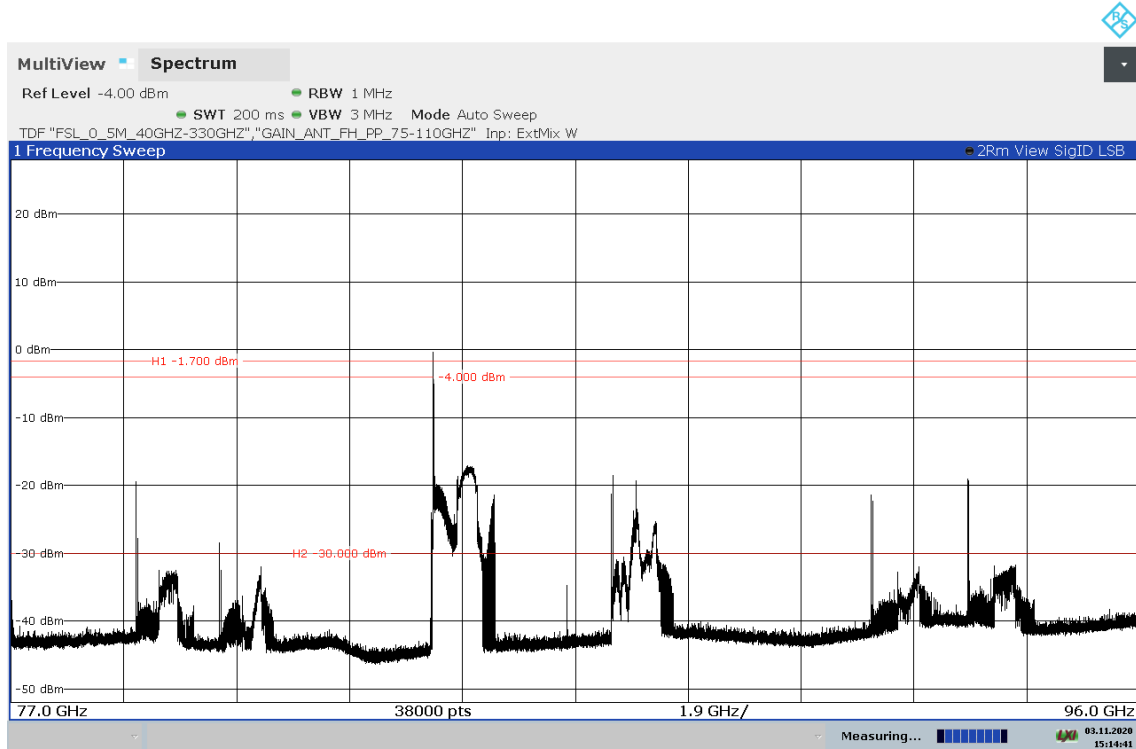
5.14. 77 GHz – 96 GHz, ANT HOR + VER, SigID USB+LSB, sweep time: 200 ms



15:14:08 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

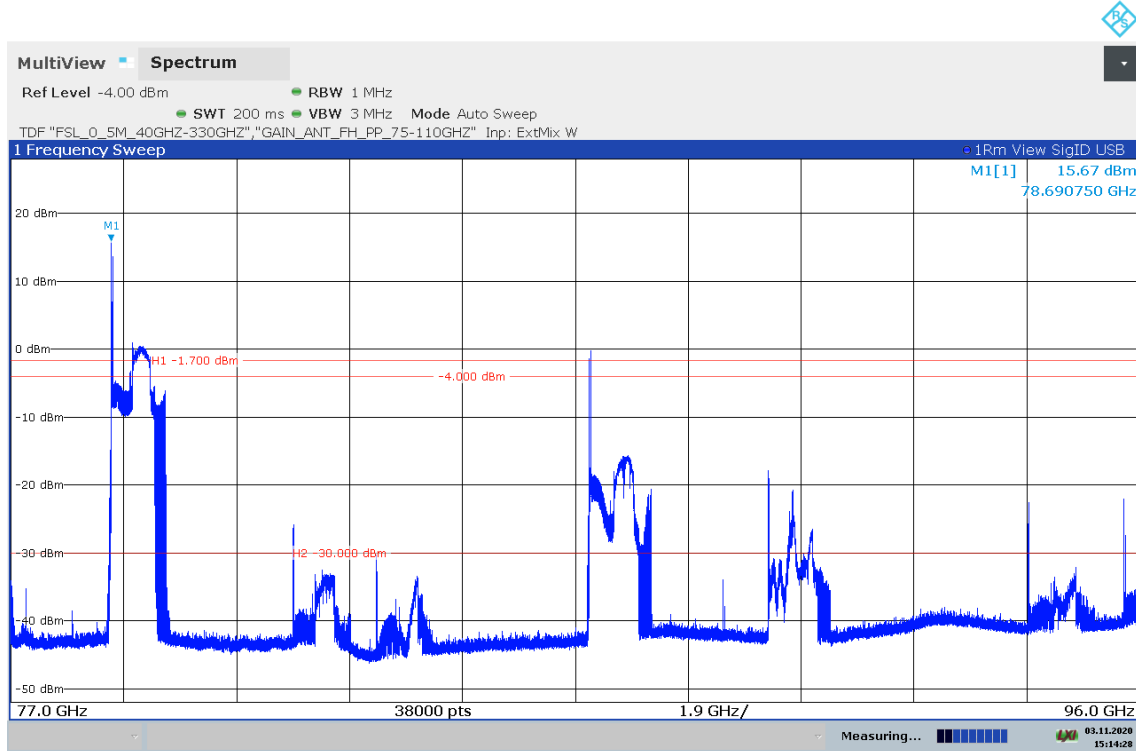
5.15. 77 GHz – 96 GHz, ANT HOR + VER, SigID LSB, sweep time: 200 ms



15:14:41 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

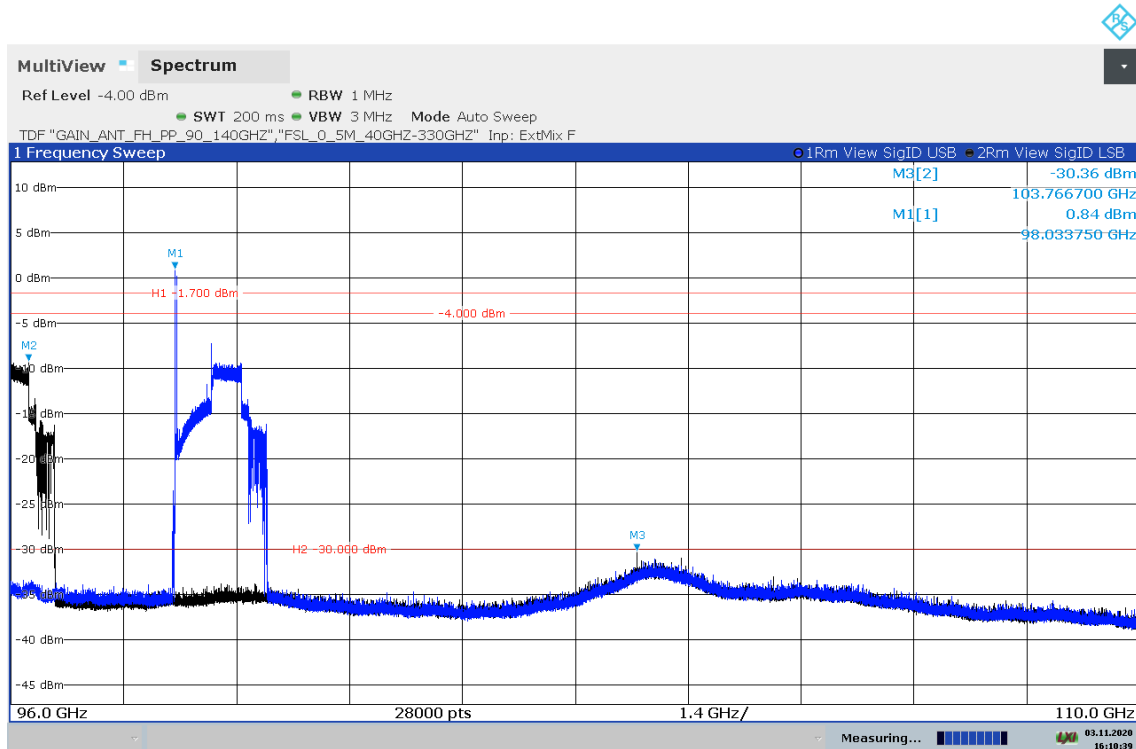
5.16. 77 GHz – 96 GHz, ANT HOR + VER, SigID USB, sweep time: 200 ms



15:14:28 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

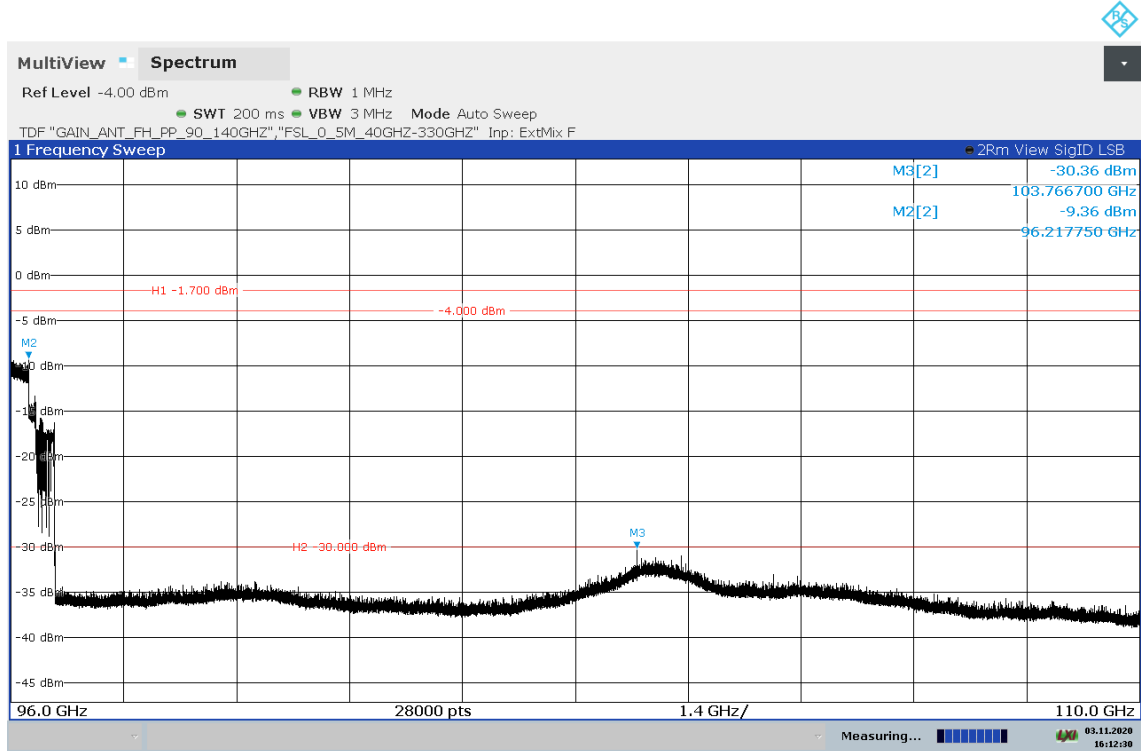
5.17. 96 GHz – 110 GHz, ANT HOR + VER, SigID USB + LSB, sweep time: 200 ms



16:10:39 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

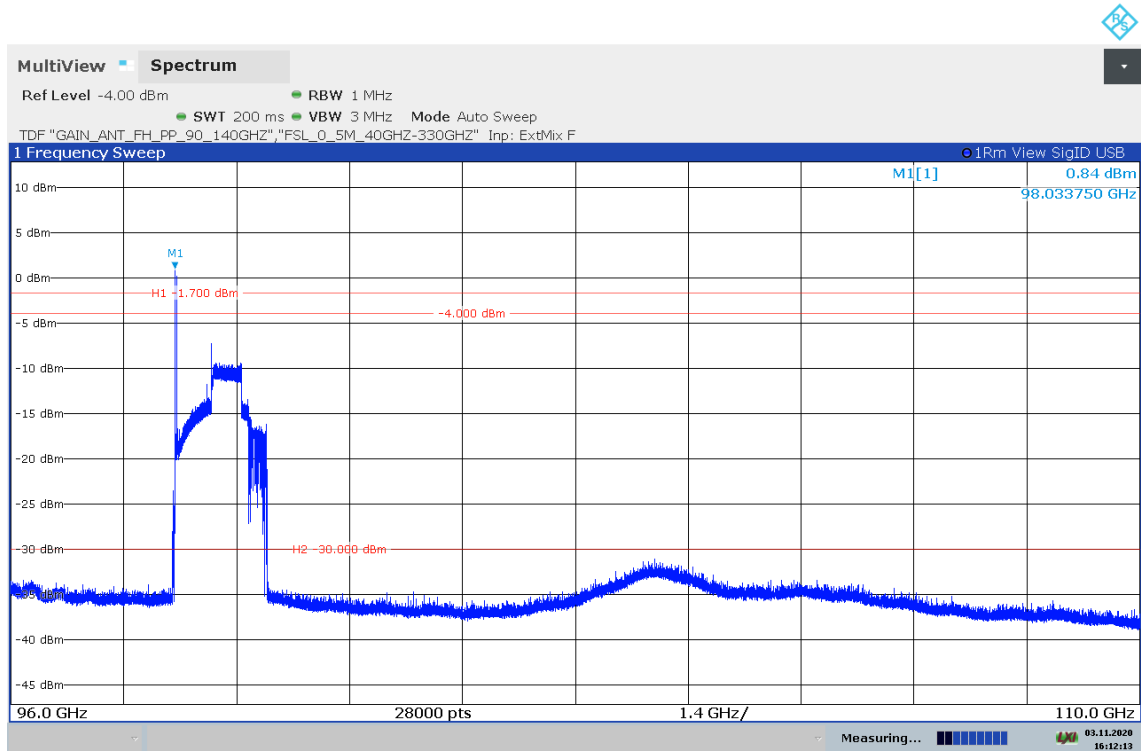
5.18. 96 GHz – 110 GHz, ANT HOR + VER, SigID LSB, sweep time: 200 ms



16:12:30 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

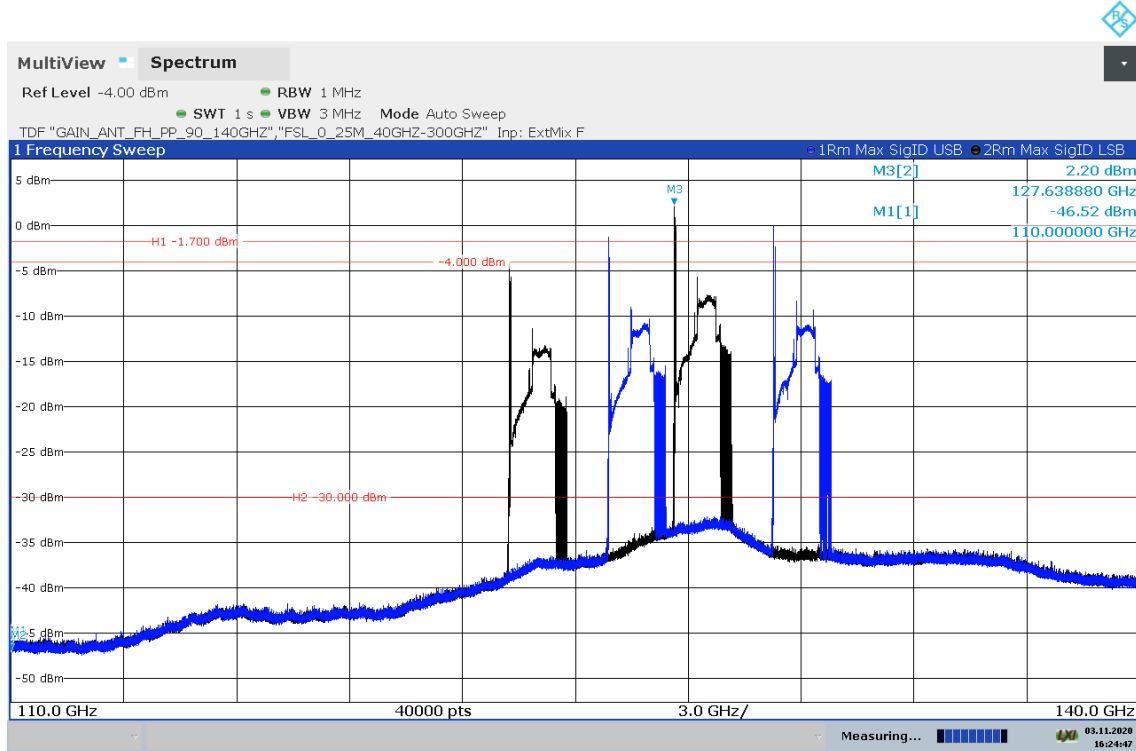
5.19. 96 GHz – 110 GHz, ANT HOR + VER, SigID USB, sweep time: 200 ms



16:12:13 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

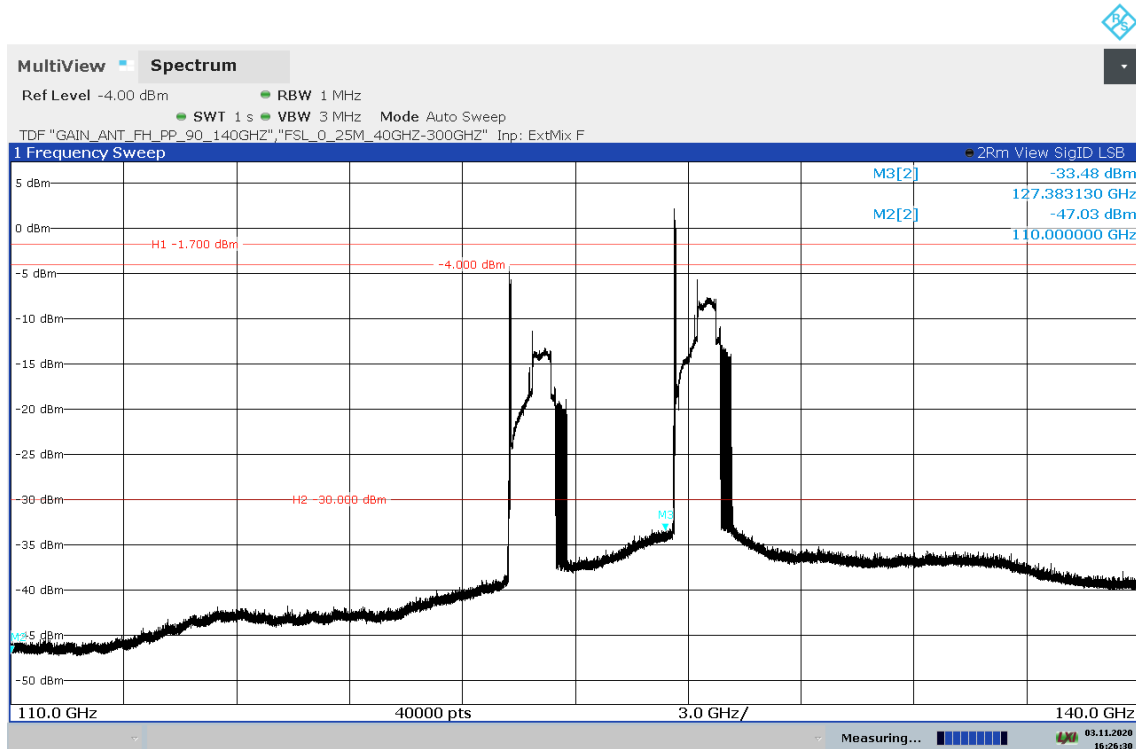
5.20. 110 GHz – 140 GHz, ANT HOR + VER, SigID USB + LSB, sweep time: 1 s



16:24:47 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

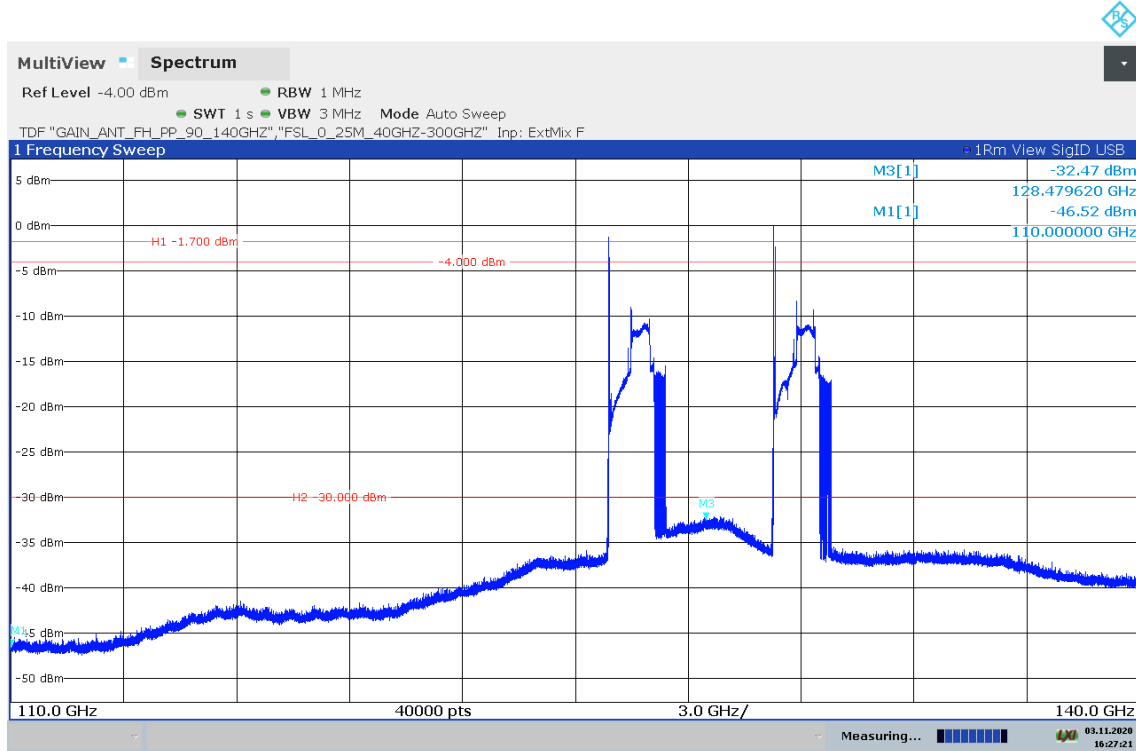
5.21. 110 GHz – 140 GHz, ANT HOR + VER, SigID LSB, sweep time: 1 s



16:26:30 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

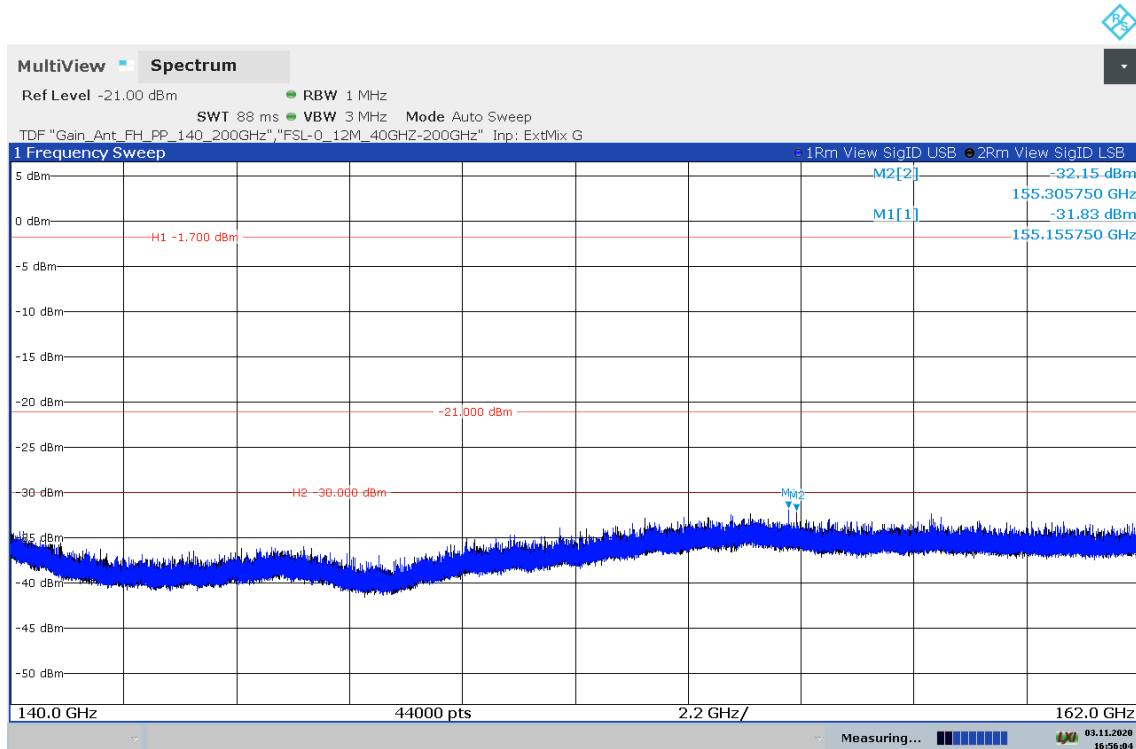
5.22. 110 GHz – 140 GHz, ANT HOR + VER, SigID USB, sweep time: 1 s



16:27:21 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

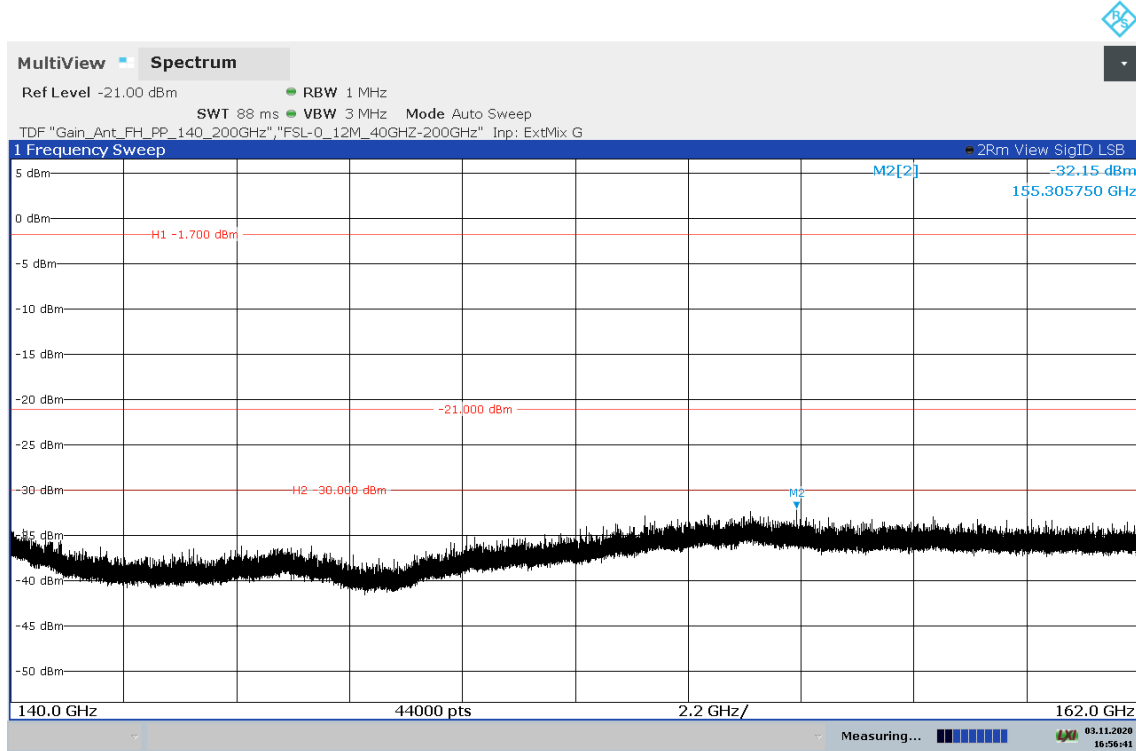
5.23. 140 GHz – 162 GHz, ANT HOR + VER, SigID USB + LSB, sweep time: auto



16:56:04 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

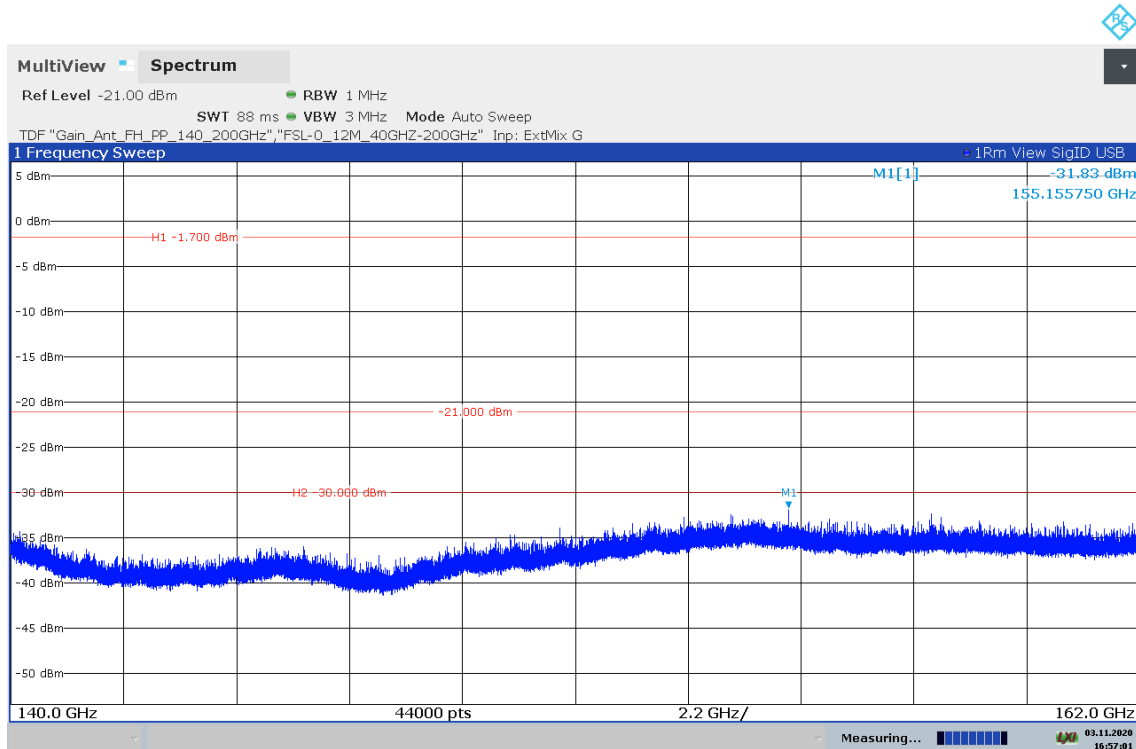
5.24. 140 GHz – 162 GHz, ANT HOR + VER, SigID LSB, sweep time: auto



16:56:41 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

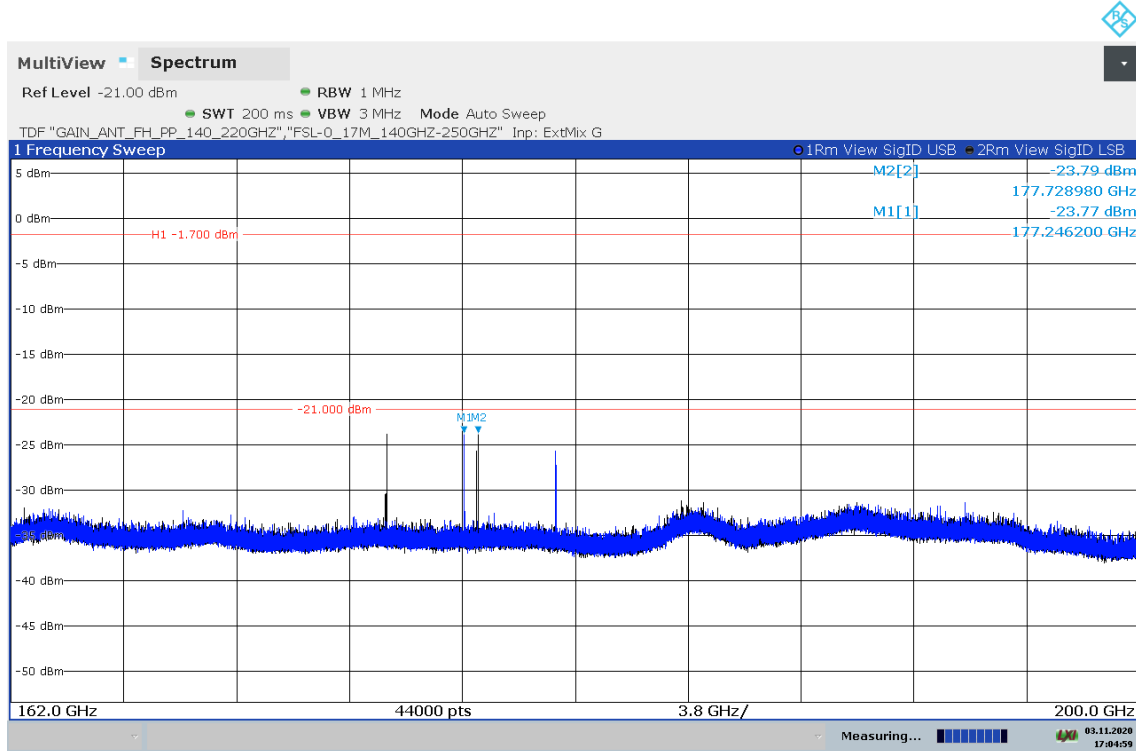
5.25. 140 GHz – 162 GHz, ANT HOR + VER, SigID USB, sweep time: auto



16:57:01 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC) and -30 dBm (ISED).

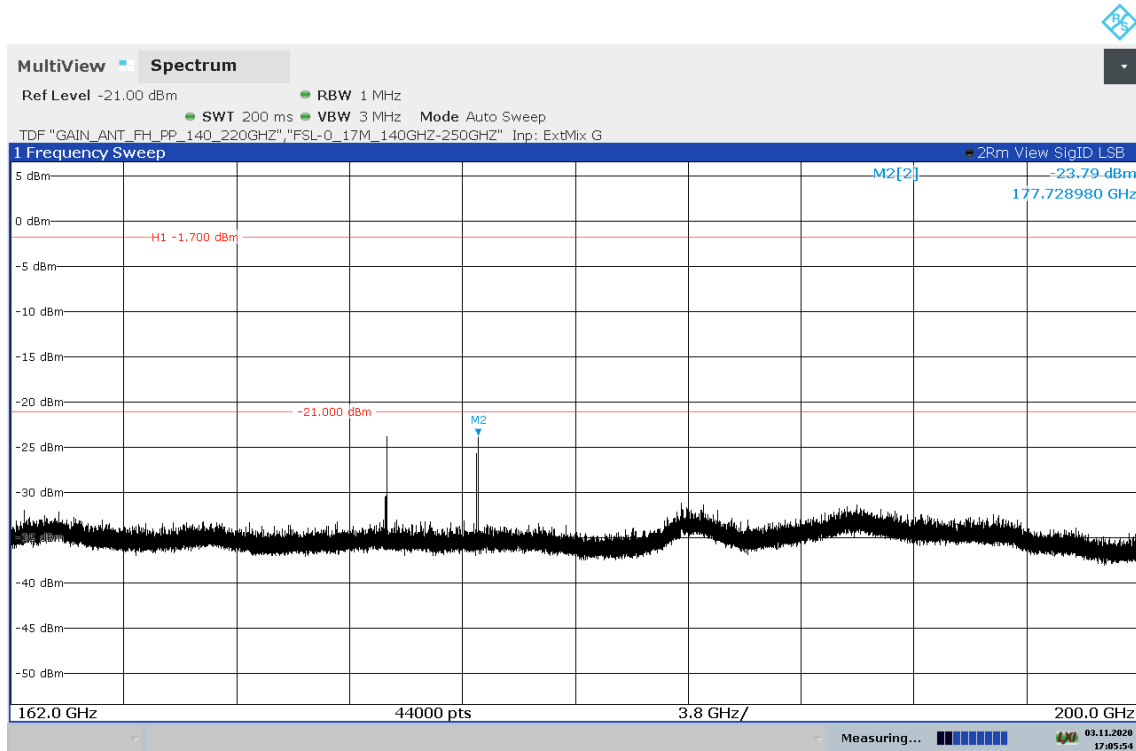
5.26. 162 GHz – 200 GHz, ANT HOR + VER, SigID USB + LSB, sweep time: 200 ms



17:04:59 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC).

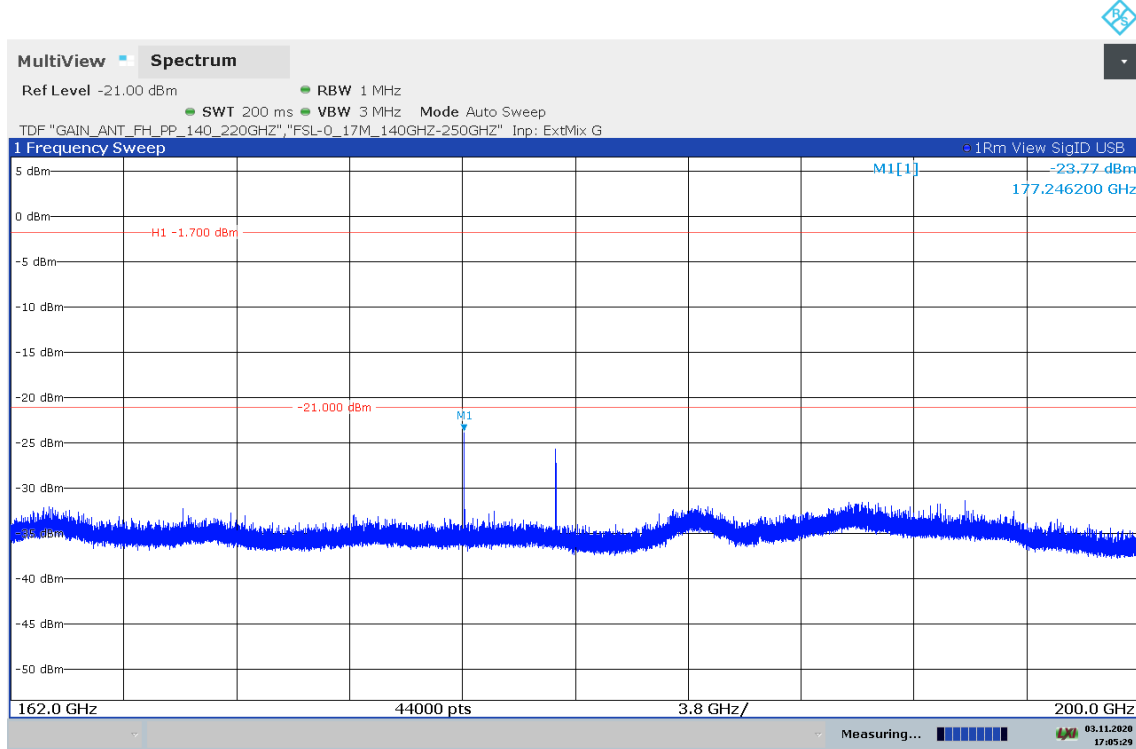
5.27. 162 GHz – 200 GHz, ANT HOR + VER, SigID LSB, sweep time: 200 ms



17:05:54 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC).

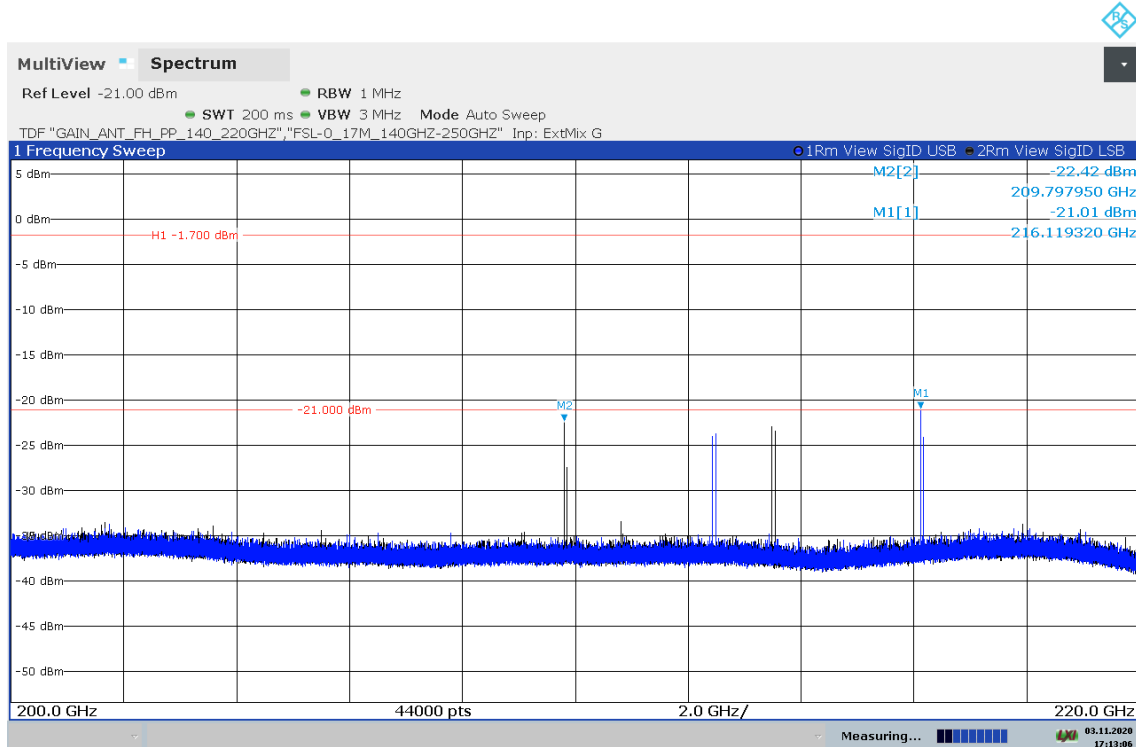
5.28. 162 GHz – 200 GHz, ANT HOR + VER, SigID USB, sweep time: 200 ms



17:05:29 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are -1.7 dBm (FCC).

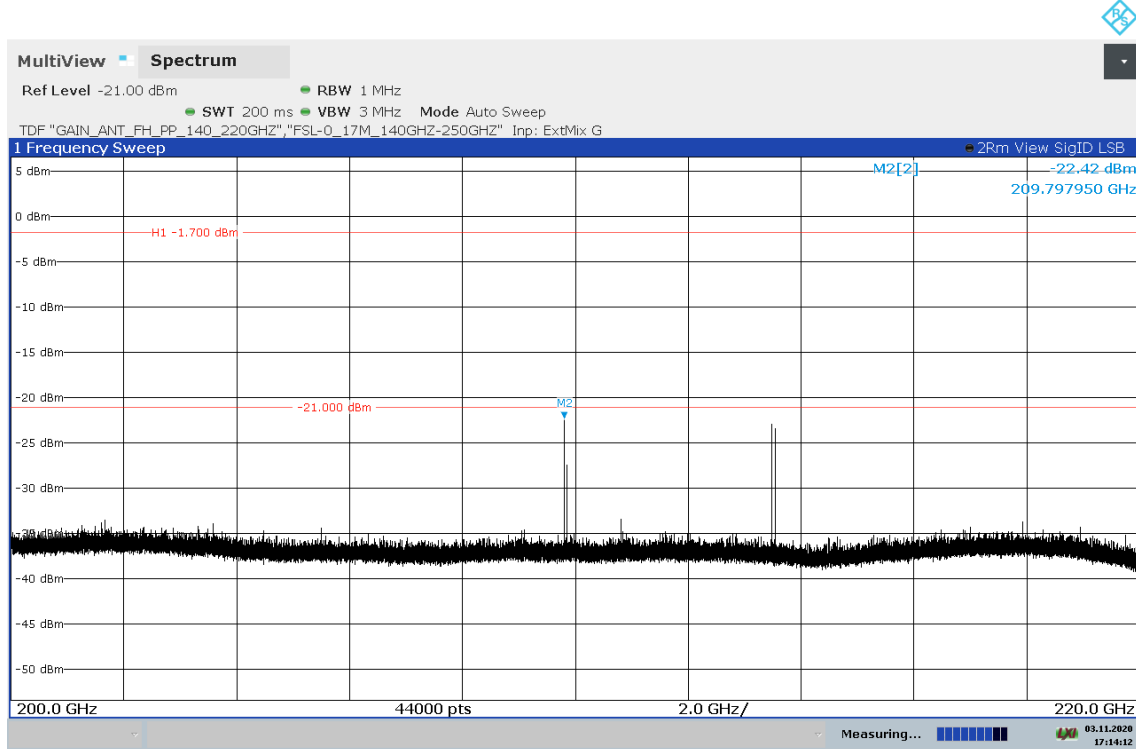
5.29. 200 GHz – 220 GHz, ANT HOR + VER, SigID USB + LSB, sweep time: 200 ms



17:13:06 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are 0.5 dBm (FCC).

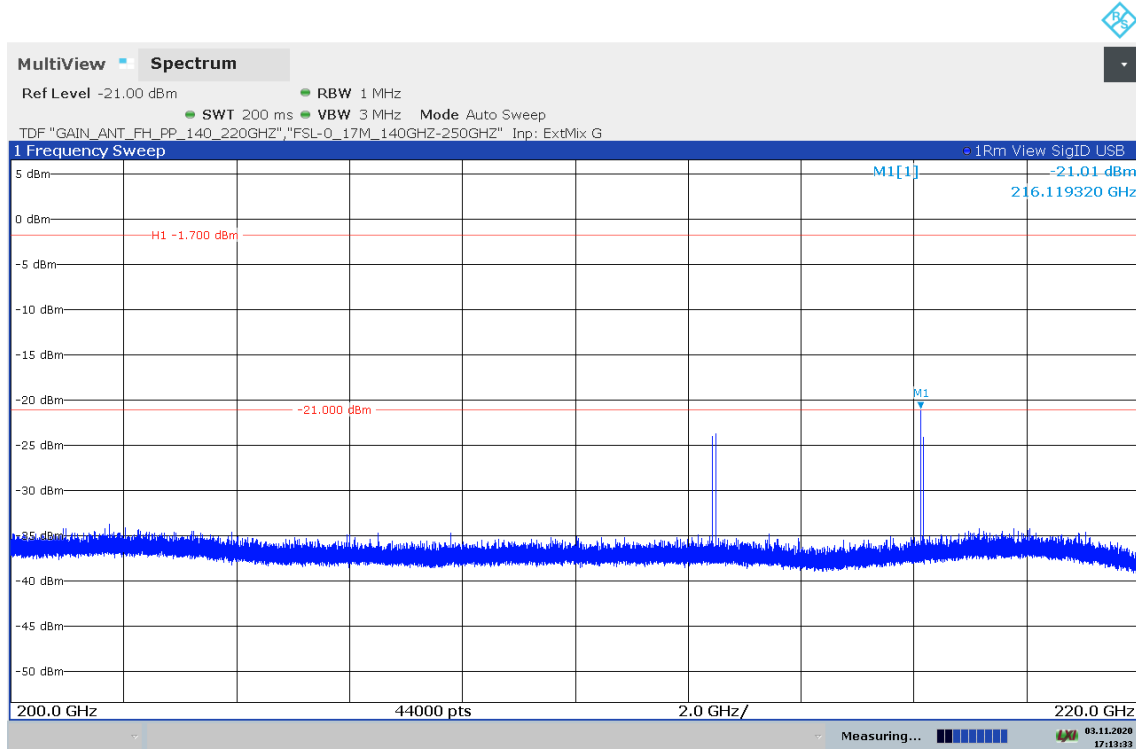
5.30. 200 GHz – 220 GHz, ANT HOR + VER, SigID LSB, sweep time: 200 ms



17:14:12 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are 0.5 dBm (FCC).

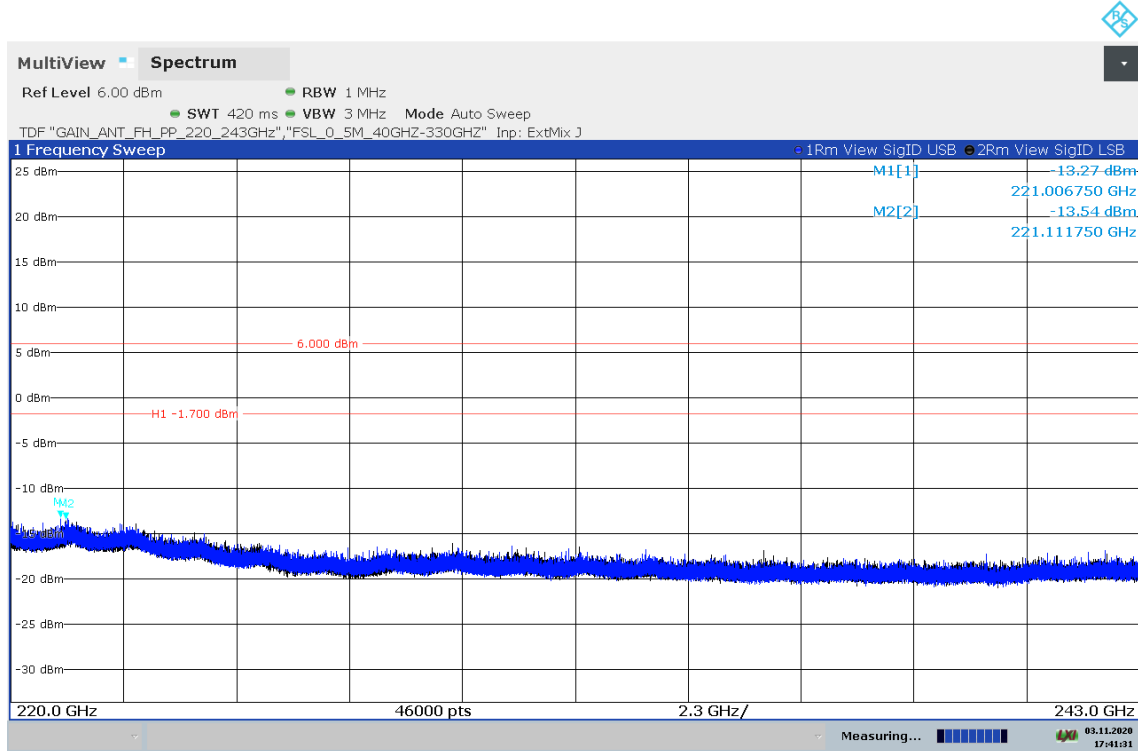
5.31. 200 GHz – 220 GHz, ANT HOR + VER, SigID USB, sweep time: 200 ms



17:13:33 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are 0.5 dBm (FCC).

5.32. 220 GHz – 243 GHz, ANT HOR + VER, SigID USB + LSB, sweep time: auto

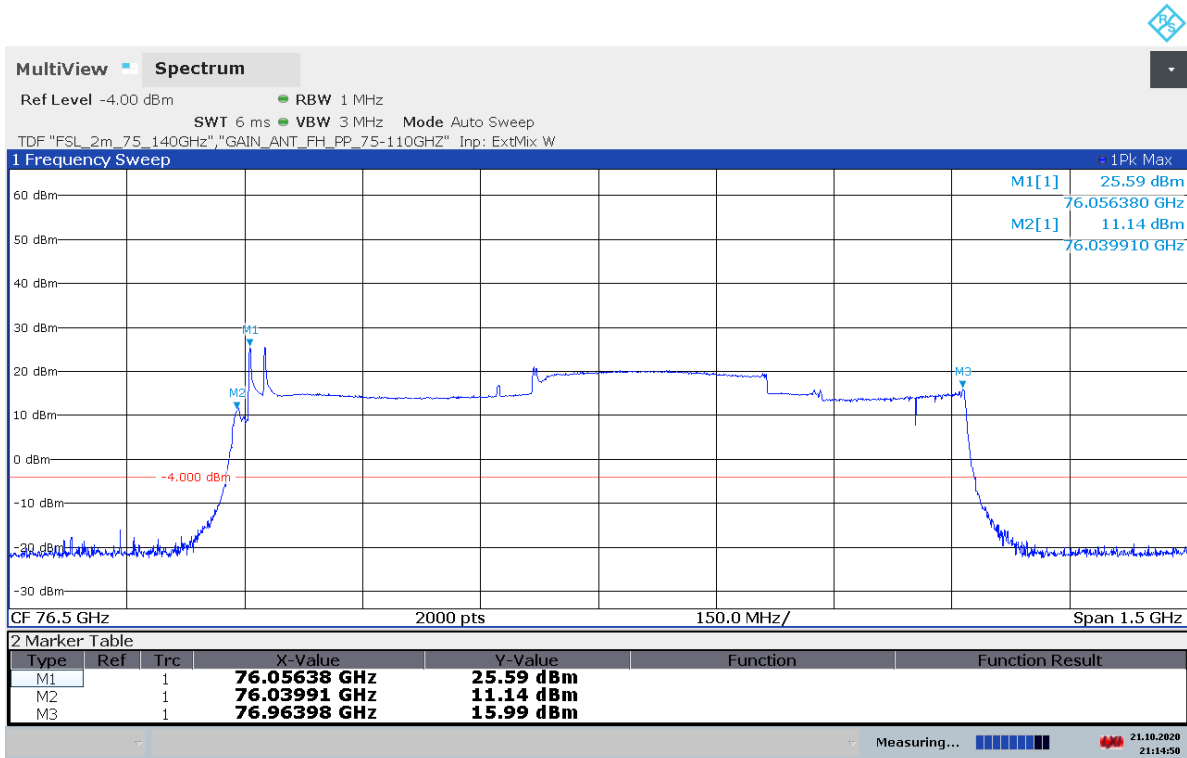


17:41:31 03.11.2020

Remark: Signal ID function is activated in order to identify image signals. No real signal is observed. The limits are 0.5 dBm (FCC).

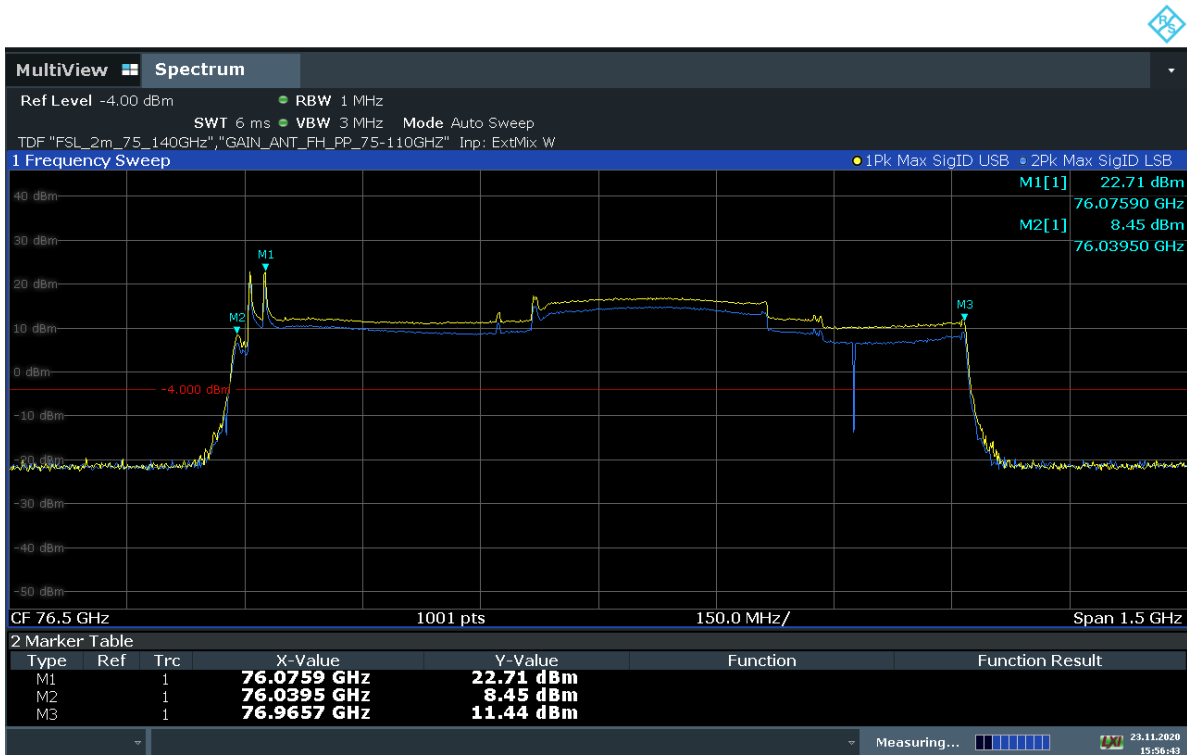
6. Frequency stability

6.1. T_{nom}/V_{nom}



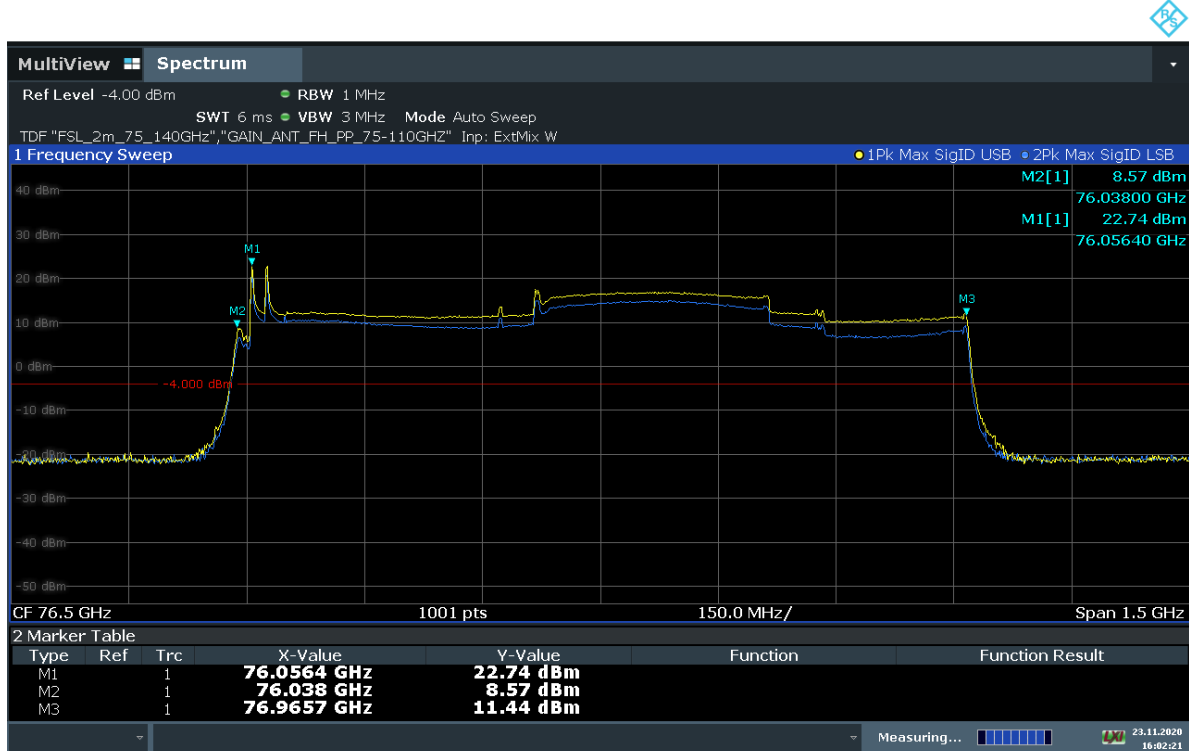
21:14:50 21.10.2020

6.2. T_{nom}/V_{max}



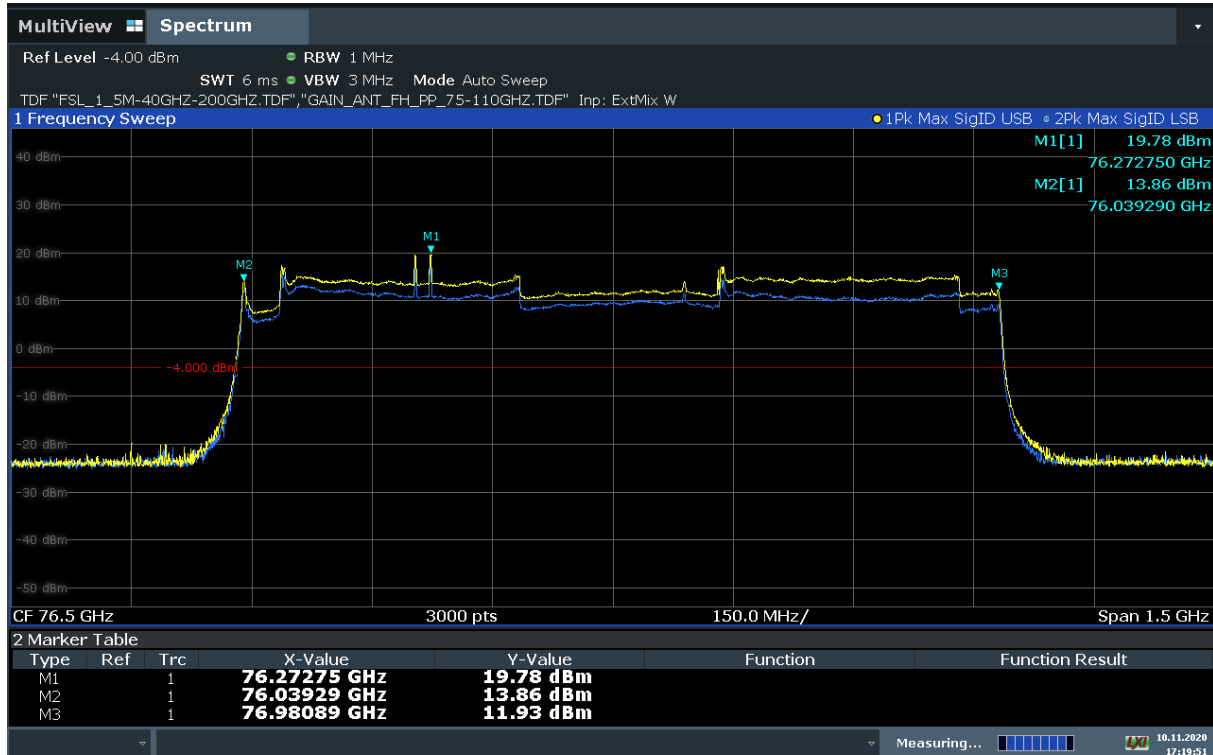
15:56:44 23.11.2020

6.3. T_{nom}/V_{min}



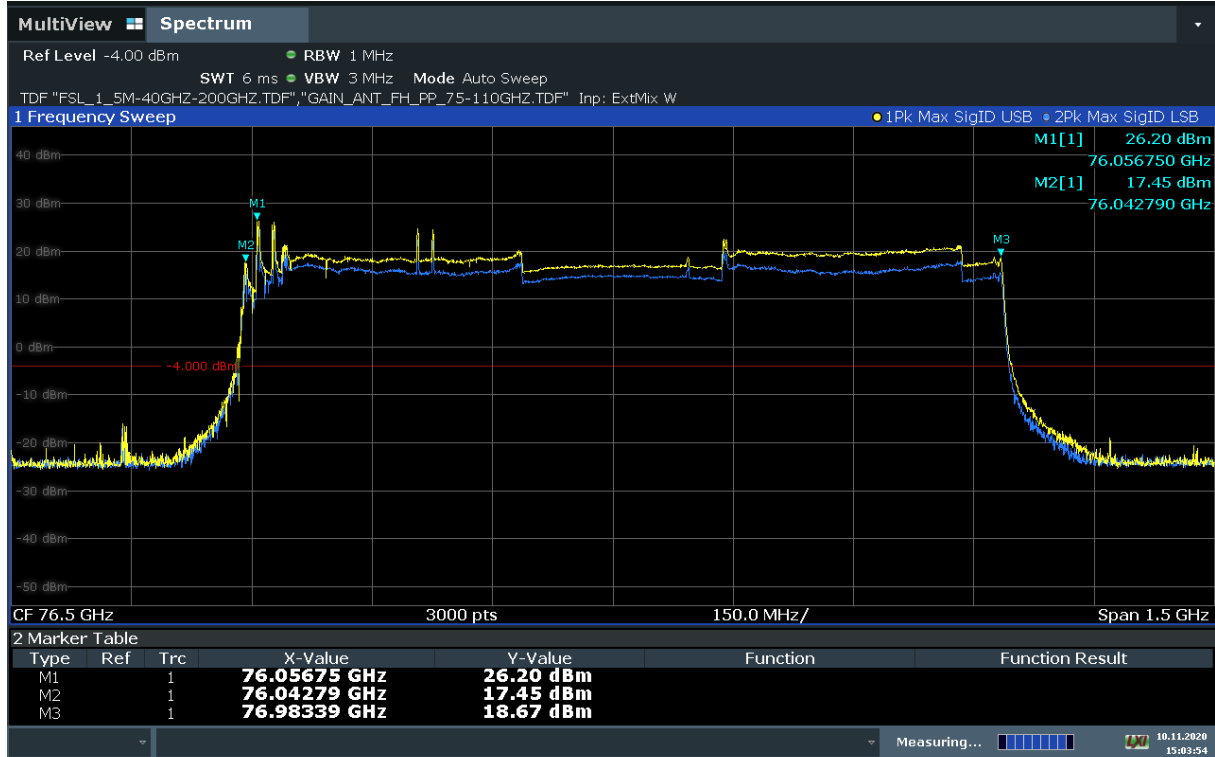
16:02:22 23.11.2020

6.4. T_{max}/V_{nom}



17:19:51 10.11.2020

6.5. T_{min}/V_{nom}



15:03:55 10.11.2020

End of the Annex