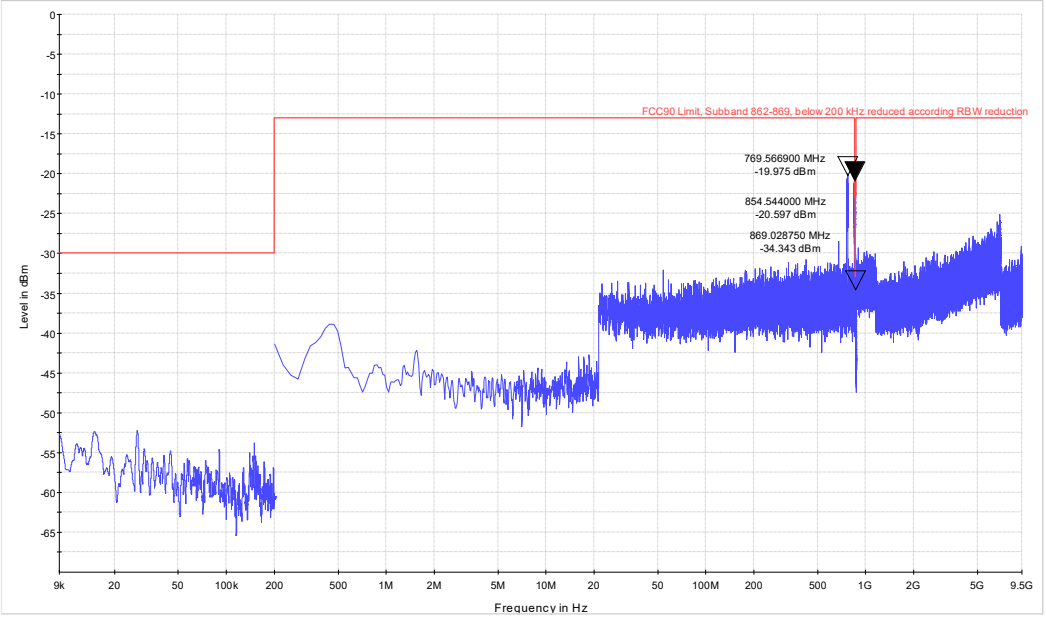
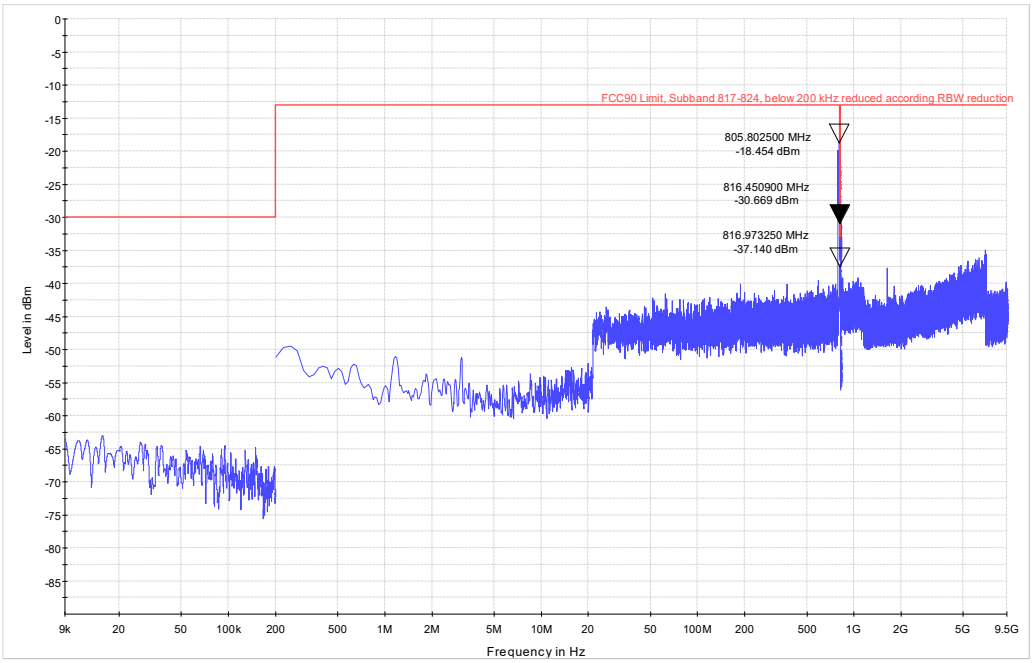
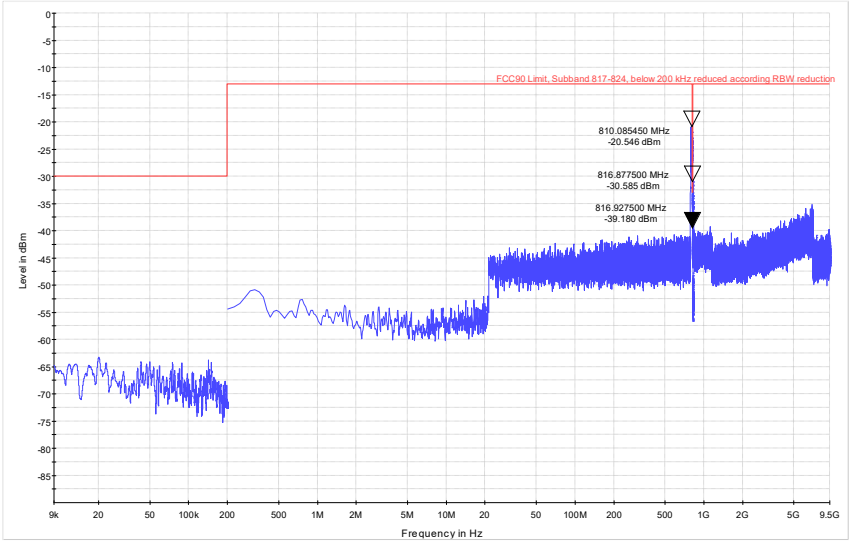
Frequency Band = Band 862 – 869 MHz, Test Frequency = high, Direction = RF downlink, Signal Type = CW
(S01_AA01)



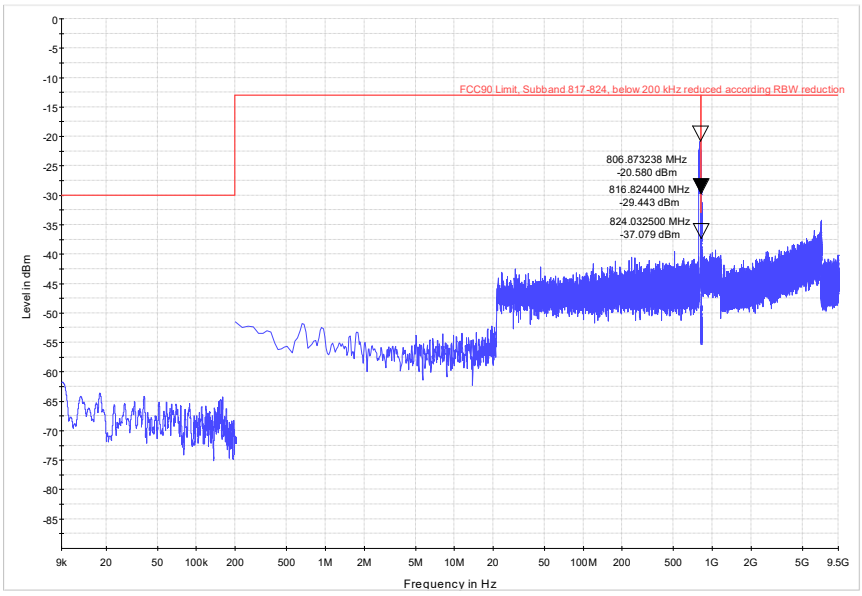
Frequency Band = Band 817 – 824 MHz, Test Frequency = low, Direction = RF uplink, Signal Type = CW
(S01_AA01)



Frequency Band = Band 817 – 824 MHz, Test Frequency = mid, Direction = RF uplink, Signal Type = CW
(S01_AA01)



Frequency Band = Band 817 – 824 MHz, Test Frequency = high, Direction = RF uplink, Signal Type = CW
(S01_AA01)



4.3.5 TEST EQUIPMENT USED

- R&S TS8997

4.4 OUT-OF-BAND EMISSION LIMITS

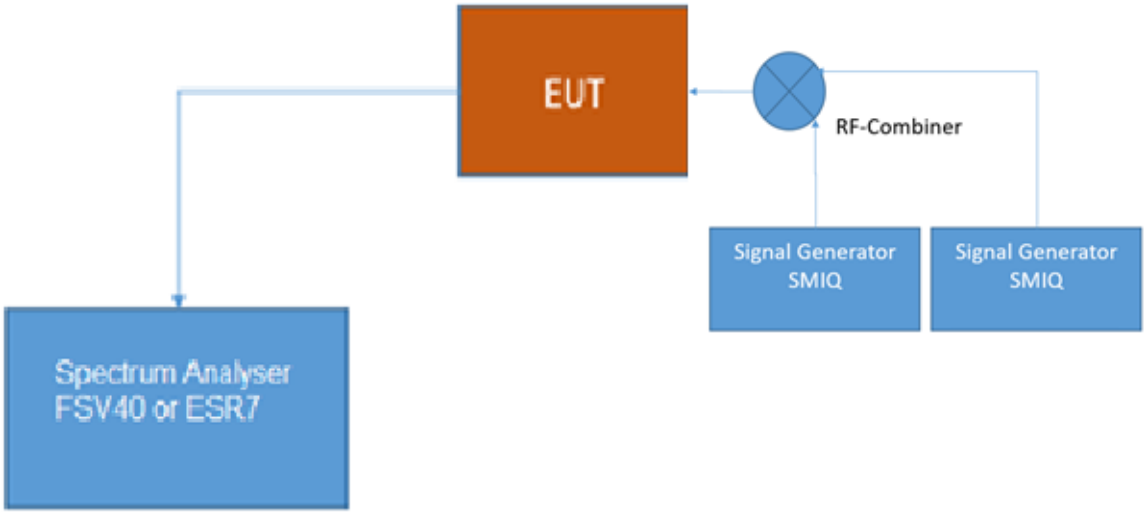
Standard FCC Part 90; §90.213, §90.691

The test was performed according to:
ANSI C63.26, KDB 935210 D05 v01r03: 3.6

4.4.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the out-of-band emission limit for industrial signal boosters. The limits itself come from the applicable rule part for each operating band.

The EUT was connected to the test setup according to the following diagram:



The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyser settings can be directly found in the measurement diagrams.

4.4.2 TEST REQUIREMENTS / LIMITS

Part 90, Subpart I/R

Band 758 MHz – 768 MHz

§90.219 – Use of signal boosters

(e)(3) Spurious emissions from a signal booster must not exceed −13 dBm within any 100 kHz measurement bandwidth.

(d)(6)(i) In general, the ERP of intermodulation products should not exceed −30 dBm in 10 kHz measurement bandwidth.

Part 90, Subpart I/S

Band 862 MHz – 869 MHz

§90.691 - Emission mask requirements for EA-based systems.

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

4.4.3 TEST PROTOCOL

Band 758 MHz – 768 MHz, Downlink, Number of input signals = 2							
Emission Designator with Channel Bandwidth [MHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 5	0.3 dB < AGC	762.1640	767.1640	-57.5	-28.7	-13.0	15.7
CW at 5	3 dB > AGC	762.1640	767.1640	-54.2	-28.8	-13.0	15.8

Band 769 MHz – 775 MHz, Downlink, Number **of input signals = 2**							
Emission Designator with Channel Bandwidth [kHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 6.25	0.3 dB < AGC	771.8625	771.8688	-58.3	-24.8	-13.0	11.8
CW at 6.25	3 dB > AGC	771.8625	771.8688	-55.1	-24.1	-13.0	11.1
CW at 12.5	0.3 dB < AGC	771.8625	771.8750	-58.3	-26.0	-13.0	13.0
CW at 12.5	3 dB > AGC	771.8625	771.8750	-55.1	-25.6	-13.0	12.6
CW at 25	0.3 dB < AGC	771.8563	771.8813	-58.3	-24.5	-13.0	11.5
CW at 25	3 dB > AGC	771.8563	771.8813	-55.1	-24.0	-13.0	11.0

Band 851 MHz – 854 MHz, Downlink, Number of input signals = 2							
Emission Designator with Channel Bandwidth [kHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 12.5	0.3 dB < AGC	852.9000	852.9125	-57.1	-24.4	-13.0	11.4
CW at 12.5	3 dB > AGC	852.9000	852.9125	-53.8	-22.6	-13.0	11.4

Band 854 MHz – 862 MHz, Downlink, Number of input signals = 2							
Emission Designator with Channel Bandwidth [kHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 12.5	0.3 dB < AGC	856.8000	856.8125	-58.5	-24.3	-13.0	11.3
CW at 12.5	3 dB > AGC	856.8000	856.8125	-55.2	-23.1	-13.0	10.1

Band 862 MHz – 869 MHz, Downlink, Number of input signals = 2							
Emission Designator with Channel Bandwidth [kHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 25	0.3 dB < AGC	863.1875	863.2125	-57.3	-23.3	-13.0	10.3
CW at 25	3 dB > AGC	863.1875	863.2125	-54.0	-22.9	-13.0	10.3

Band 788 MHz – 798 MHz, Uplink, Number of input signals = 2							
Emission Designator with Channel Bandwidth [MHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 5	0.3 dB < AGC	788.6040	793.6040	-64.3	-31.0	-13.0	18.0
CW at 5	3 dB > AGC	788.6040	793.6040	-61.1	-30.1	-13.0	17.1

Band 799 MHz – 805 MHz, Uplink, Number of input signals = 2							
Emission Designator with Channel Bandwidth [kHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 6.25	0.3 dB < AGC	799.5875	799.5938	-63.5	-25.1	-13.0	12.1
CW at 6.25	3 dB > AGC	799.5875	799.5938	-60.3	-25.2	-13.0	12.2
CW at 12.5	0.3 dB < AGC	799.5875	799.6000	-63.5	-25.7	-13.0	12.7
CW at 12.5	3 dB > AGC	799.5875	799.6000	-60.3	-25.3	-13.0	12.3
CW at 25	0.3 dB < AGC	799.5813	799.6063	-63.5	-26.1	-13.0	13.1
CW at 25	3 dB > AGC	799.5813	799.6063	-60.3	-25.3	-13.0	12.3

Band 806 MHz – 809 MHz, Uplink, Number of input signals = 2							
Emission Designator with Channel Bandwidth [kHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 12.5	0.3 dB < AGC	806.7875	806.8000	-64.9	-24.8	-13.0	11.8
CW at 12.5	3 dB > AGC	806.7875	806.8000	-61.6	-24.6	-13.0	11.6

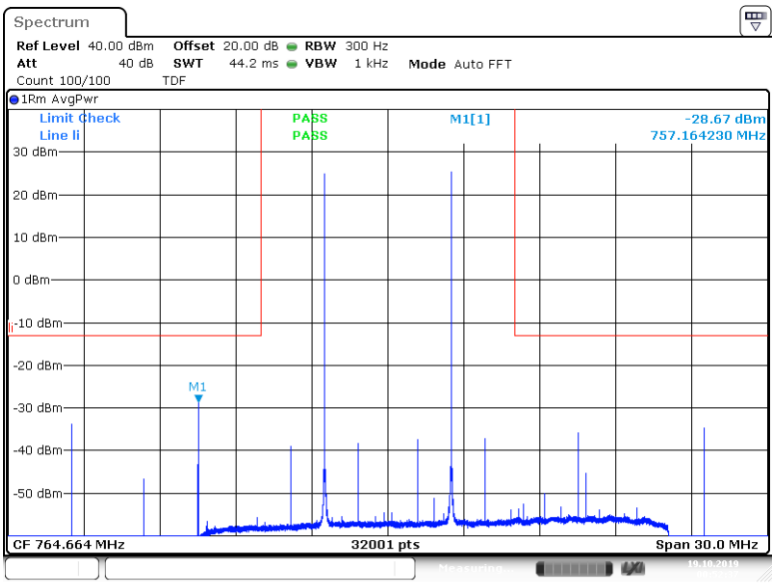
Band 809 MHz – 817 MHz, Uplink, Number of input signals = 2							
Emission Designator with Channel Bandwidth [kHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 12.5	0.3 dB < AGC	816.8250	816.8375	-64.1	-25.8	-13.0	12.8
CW at 12.5	3 dB > AGC	816.8250	816.8375	-60.8	-25.7	-13.0	12.7

Band 817 MHz – 824 MHz, Uplink, Number of input signals = 2							
Emission Designator with Channel Bandwidth [kHz]	**Input Power**	**Signal Frequency f1 [MHz]**	**Signal Frequency f2 [MHz]**	**Input Power [dBm]**	**Maximum Out-of-band Power [dBm]**	**Limit Out-of-band Power [dBm]**	**Margin to Limit [dB]**
CW at 25	0.3 dB < AGC	820.2375	820.2625	-65.3	-26.6	-13.0	13.6
CW at 25	3 dB > AGC	820.2375	820.2625	-62.1	-26.3	-13.0	13.3

Remark: Please see next sub-clause for the measurement plot.

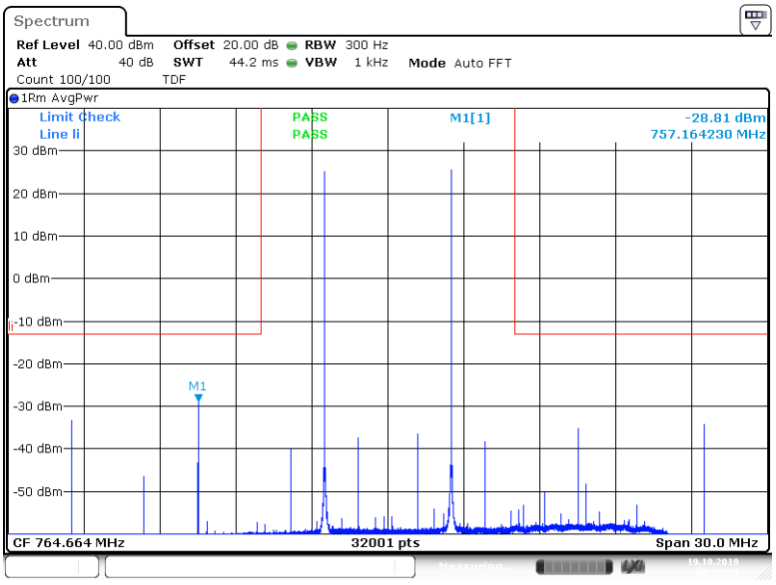
4.4.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Frequency band = 758 MHz – 768 MHz, Channel bandwidth = 5 MHz, Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC, Emission designator = 5M00G7D



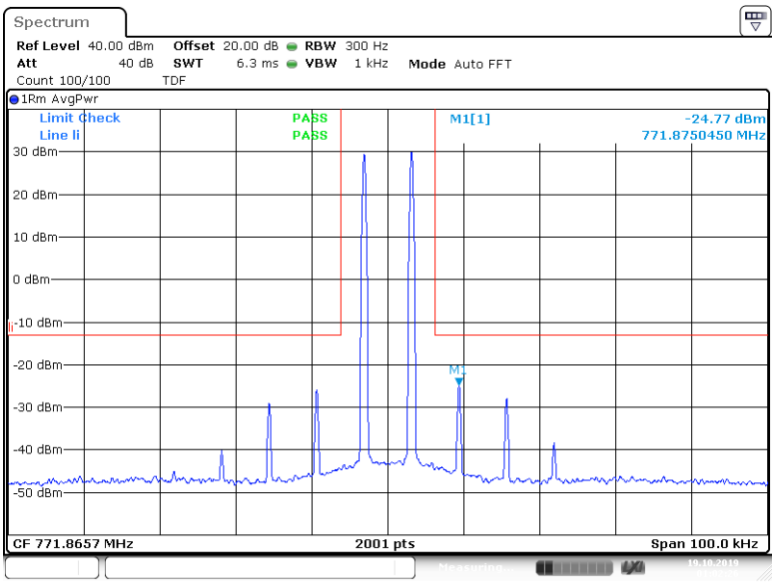
out of band emi;CW;2 carrier -0.3 dB;764.66400M;30.000M; CB5
.00M

Frequency band = 758 MHz – 768 MHz, Channel bandwidth = 5 MHz, Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC, Emission designator = 5M00G7D



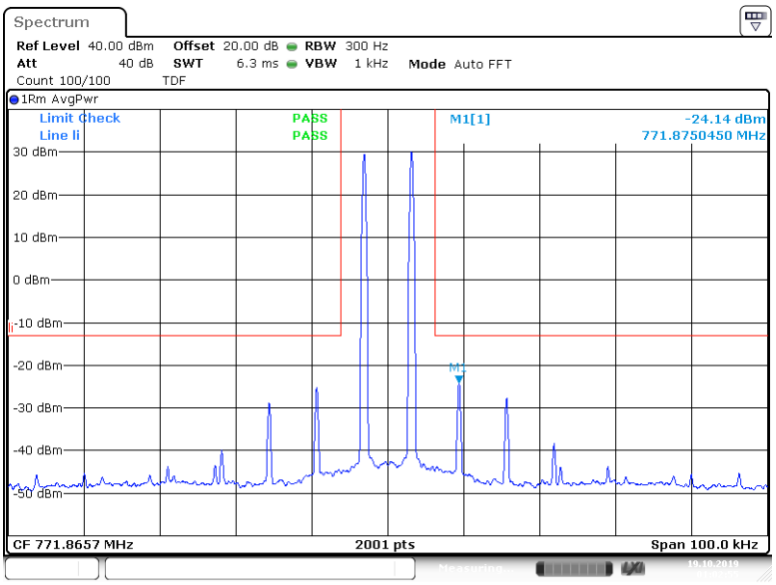
out of band emi;CW;2 carrier +3 dB;764.66400M;30.000M; CB5.0
0M

Frequency band = 769 MHz – 775 MHz, Channel bandwidth = 6.25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designator = 4K00F3E



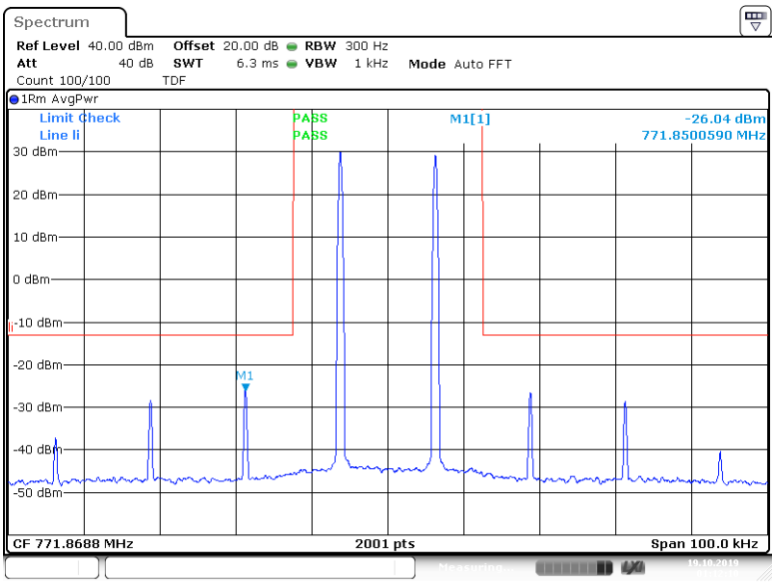
out of band emi;CW;2 carrier -0.3 dB;771.86570M;100.000k; CB
6.25k

Frequency band = 769 MHz – 775 MHz, Channel bandwidth = 6.25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designator = 4K00F3E



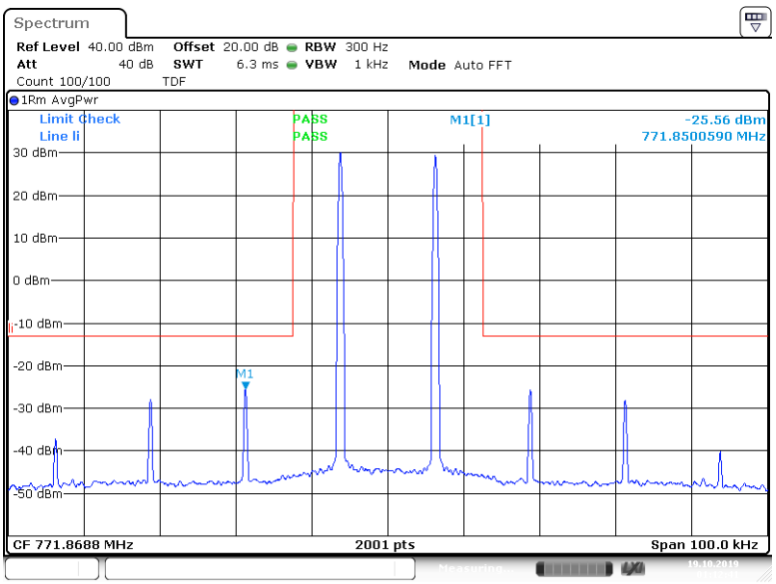
out of band emi;CW;2 carrier +3 dB;771.86570M;100.000k; CB6.
25k

Frequency band = 769 MHz – 775 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designators = 11K3F3E, 8K10F1D and 9K80D7W



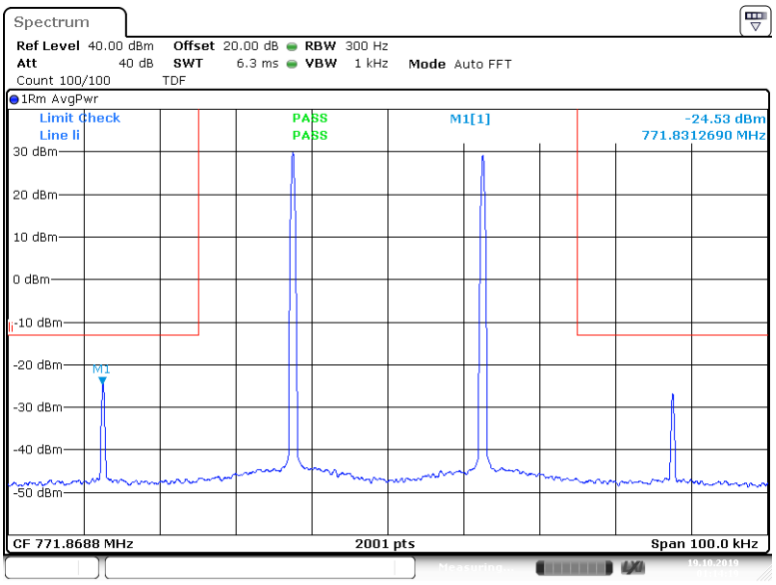
out of band emi;CW;2 carrier -0.3 dB;771.86880M;100.000k; CB
12.50k

Frequency band = 769 MHz – 775 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designators = 11K3F3E, 8K10F1D and 9K80D7W



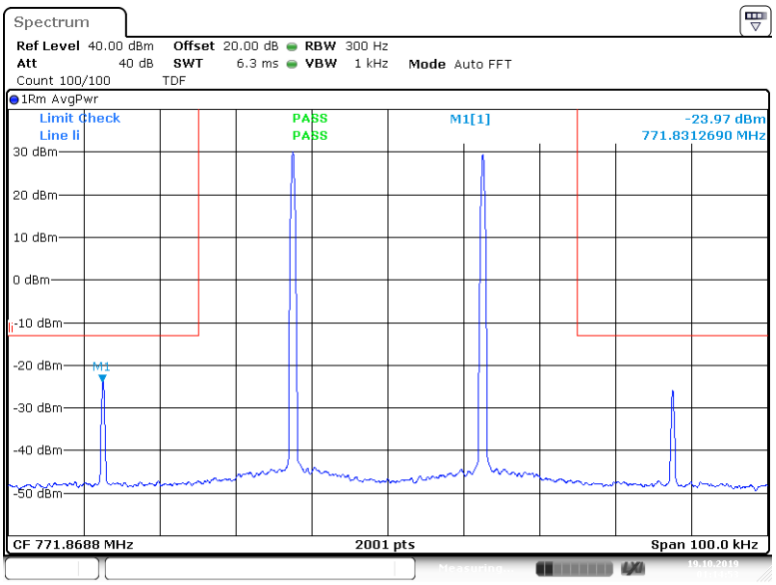
out of band emi;CW;2 carrier +3 dB;771.86880M;100.000k; CB12
.50k

Frequency band = 769 MHz – 775 MHz, Channel bandwidth = 25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designator = 16K0F3E



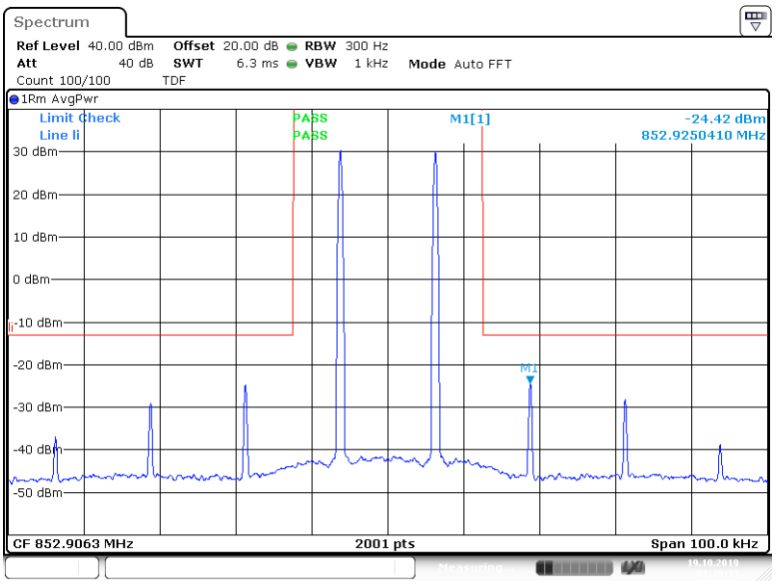
out of band emi;CW;2 carrier -0.3 dB;771.86880M;100.000k; CB
25.00k

Frequency band = 769 MHz – 775 MHz, Channel bandwidth = 25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designator = 16K0F3E



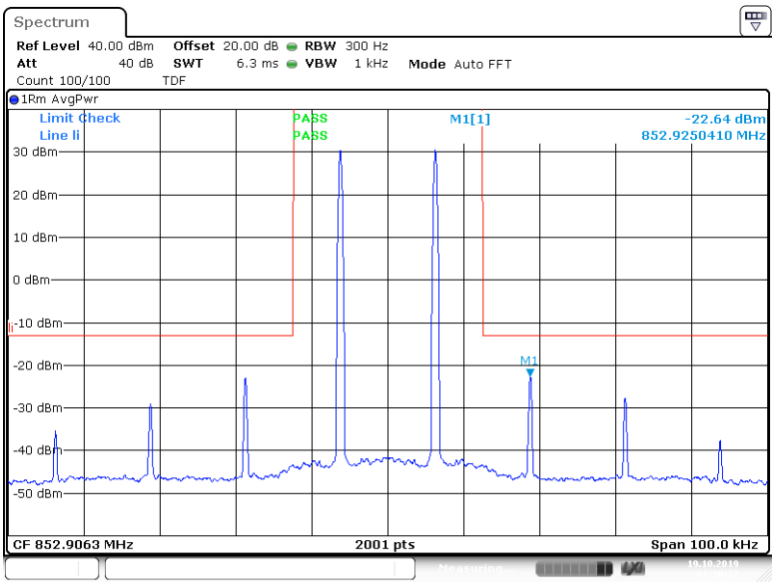
out of band emi;CW;2 carrier +3 dB;771.86880M;100.000k; CB25
.00k

Frequency band = 851 MHz – 854 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D and 9K80D7W



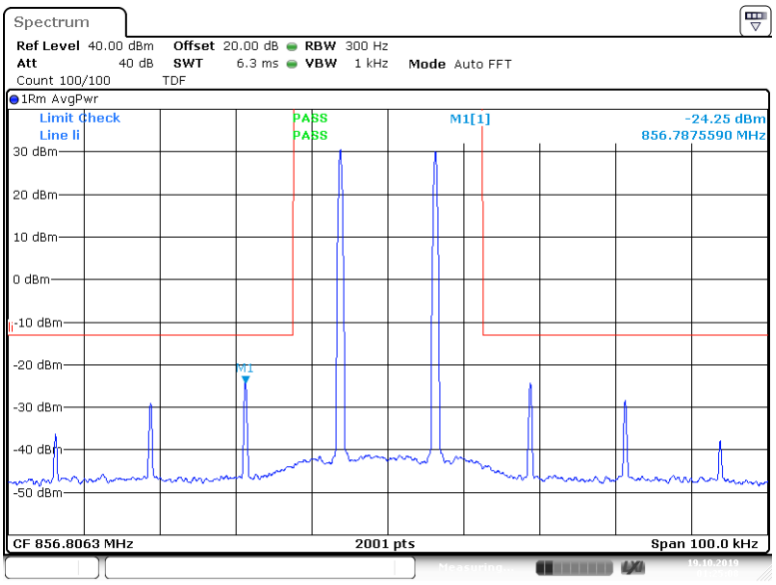
out of band emi;CW;2 carrier -0.3 dB;852.90630M;100.000k; CB
12.50k

Frequency band = 851 MHz – 854 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D and 9K80D7W



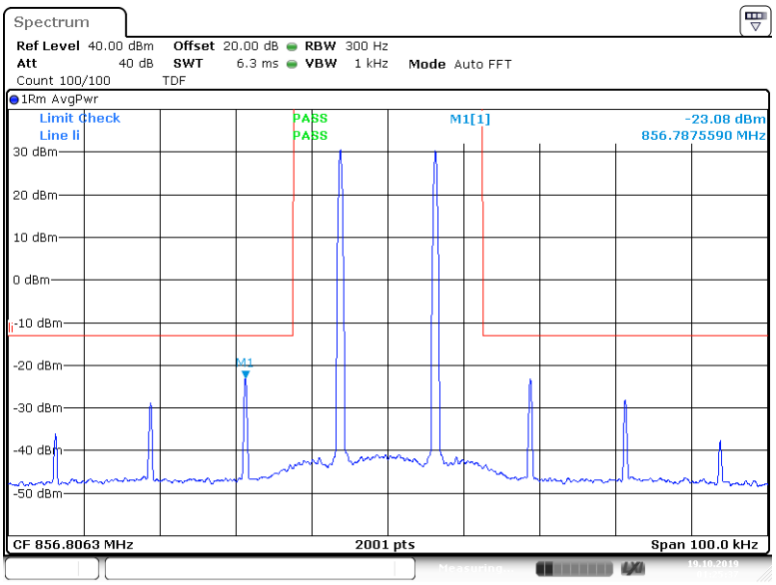
out of band emi;CW;2 carrier +3 dB;852.90630M;100.000k; CB12
.50k

Frequency band = 854 MHz – 862 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D and 9K80D7W



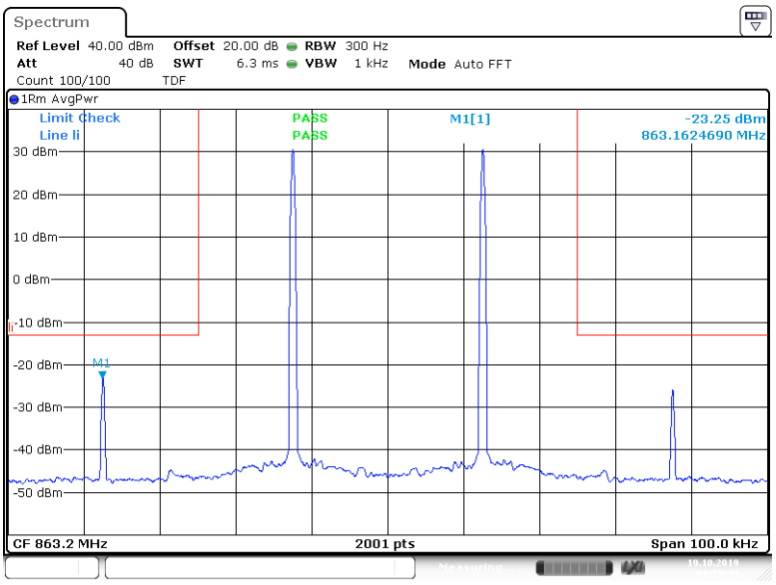
out of band emi;CW;2 carrier -0.3 dB;856.80630M;100.000k; CB
12.50k

Frequency band = 854 MHz – 862 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D and 9K80D7W



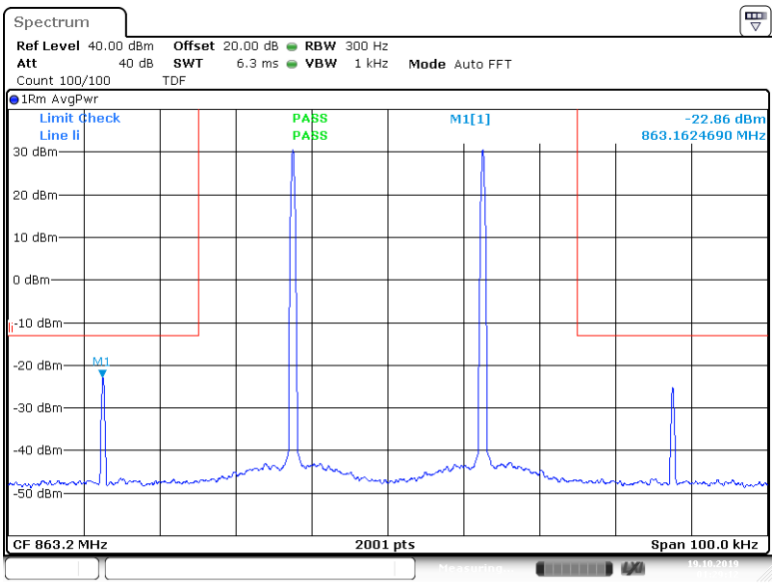
out of band emi;CW;2 carrier +3 dB;856.80630M;100.000k; CB12
.50k

Frequency band = 862 MHz – 869 MHz, Channel bandwidth = 25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D, 9K80D7W and 16K0F3E



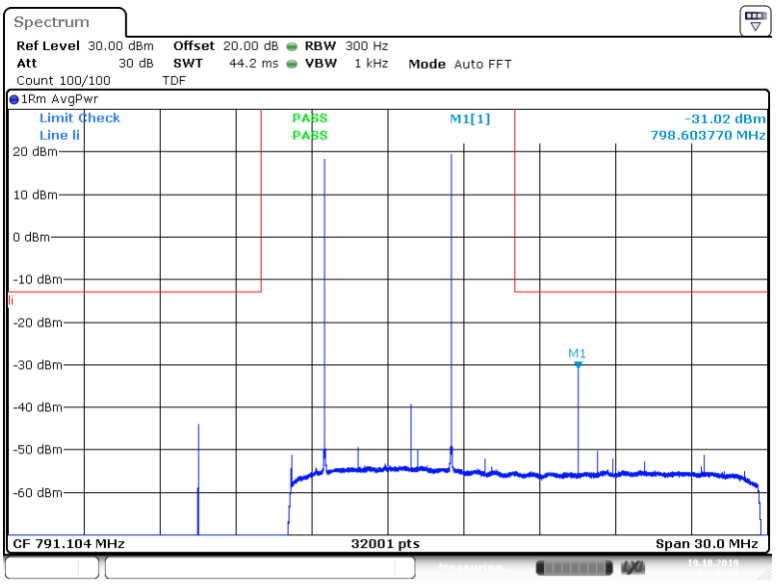
out of band emi;CW;2 carrier -0.3 dB;863.20000M;100.000k; CB
25.00k

Frequency band = 862 MHz – 869 MHz, Channel bandwidth = 25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D, 9K80D7W and 16K0F3E



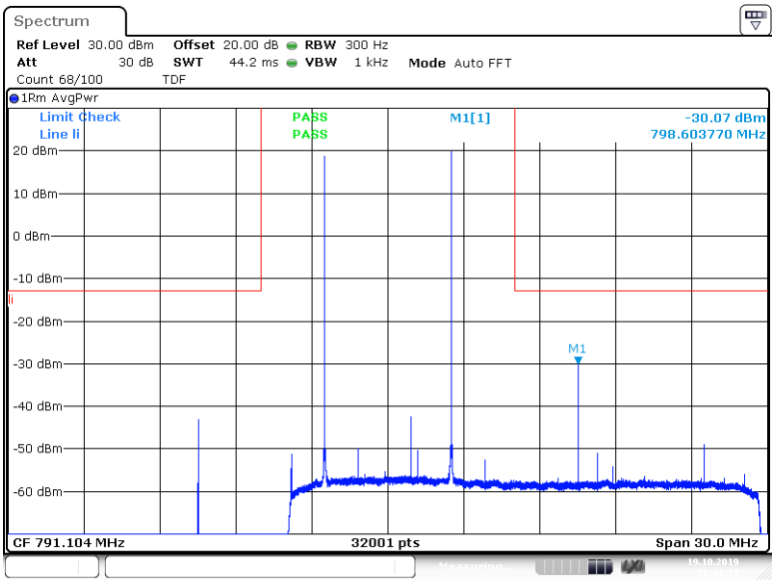
out of band emi;CW;2 carrier +3 dB;863.20000M;100.000k; CB25
.00k

Frequency band = 788 MHz – 798 MHz, Channel bandwidth = 5 MHz, Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC, Emission designator = 5M00G7D



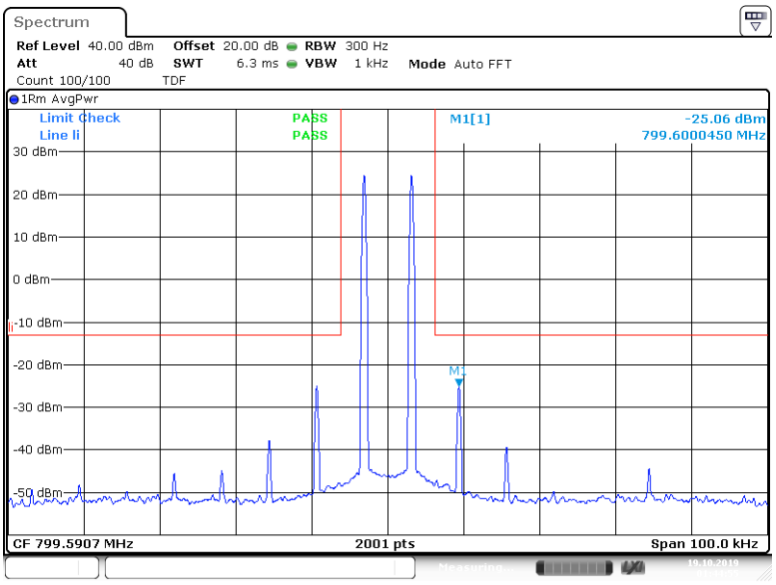
out of band emi;CW;2 carrier -0.3 dB;791.10400M;30.000M; CB5
.00M

Frequency band = 788 MHz – 798 MHz, Channel bandwidth = 5 MHz, Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC, Emission designator = 5M00G7D



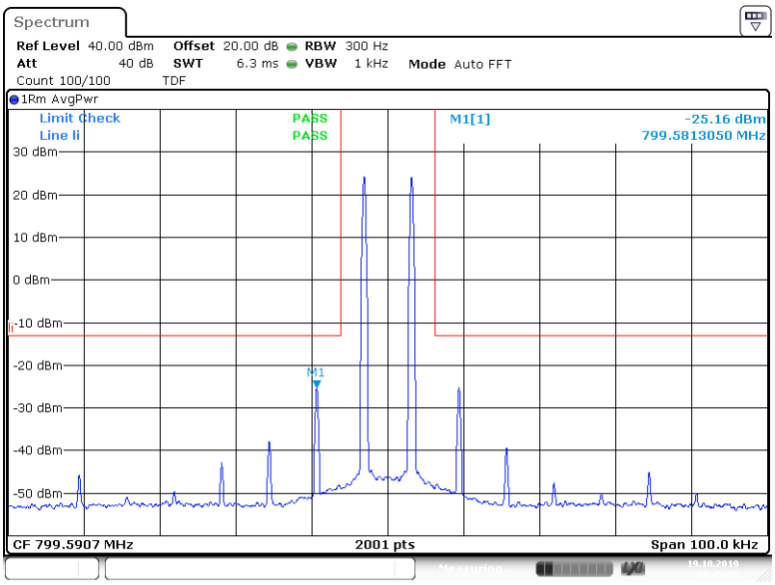
out of band emi;CW;2 carrier +3 dB;791.10400M;30.000M; CB5.0
0M

Frequency band = 799 MHz – 805 MHz, Channel bandwidth = 6.25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designator = 4K00F3E



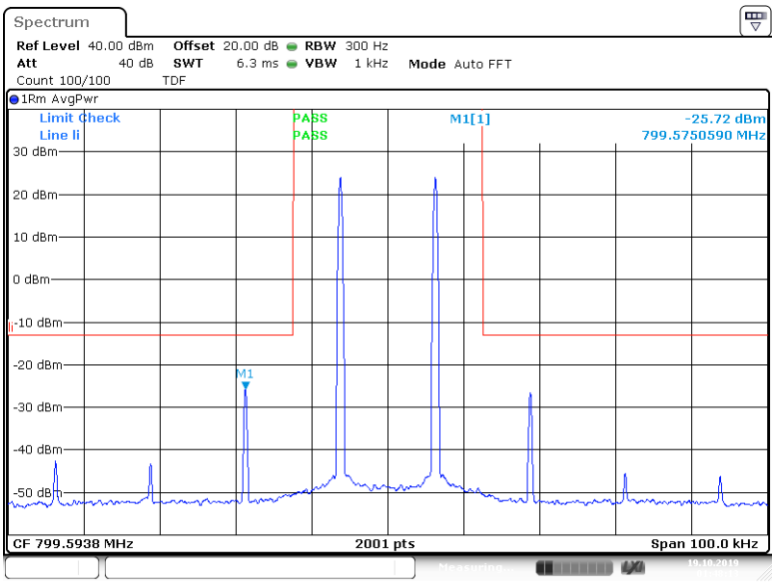
out of band emi;CW;2 carrier -0.3 dB;799.59070M;100.000k; CB
6.25k

Frequency band = 799 MHz – 805 MHz, Channel bandwidth = 6.25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designator = 4K00F3E



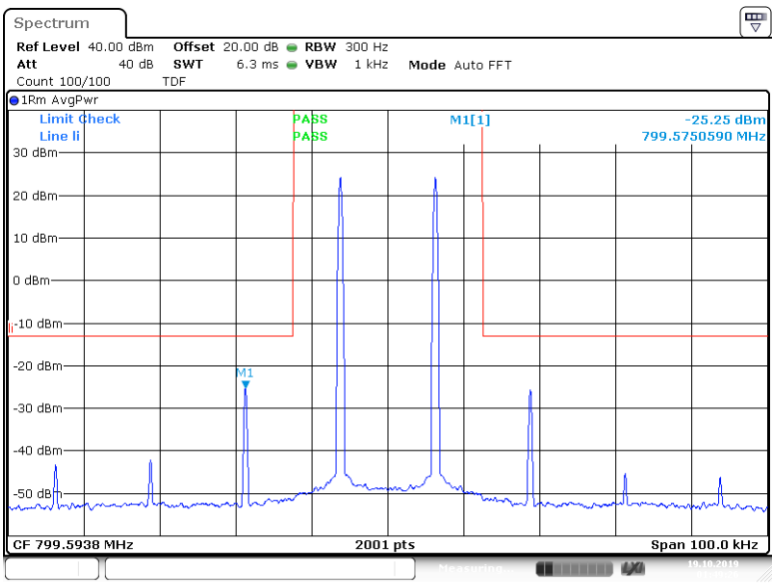
out of band emi;CW;2 carrier +3 dB;799.59070M;100.000k; CB6.
25k

Frequency band = 799 MHz – 805 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designators = 11K3F3E, 8K10F1D and 9K80D7W



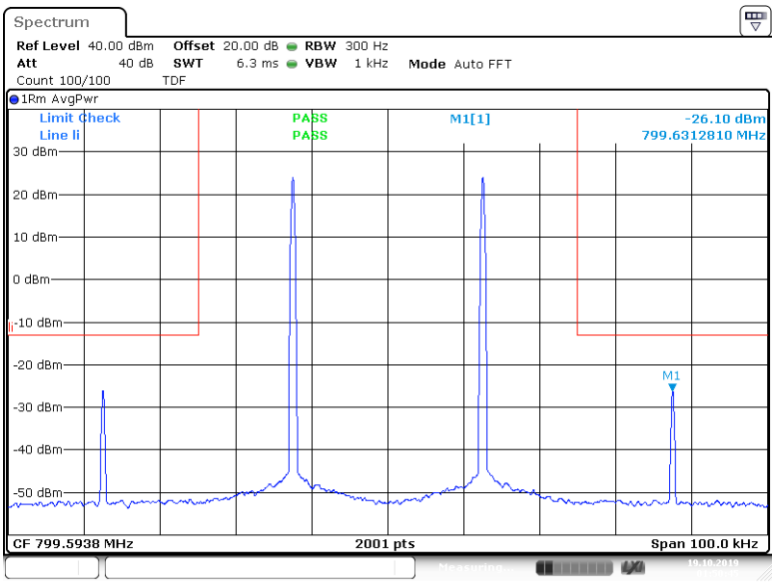
out of band emi;CW;2 carrier -0.3 dB;799.59380M;100.000k; CB
12.50k

Frequency band = 799 MHz – 805 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designators = 11K3F3E, 8K10F1D and 9K80D7W



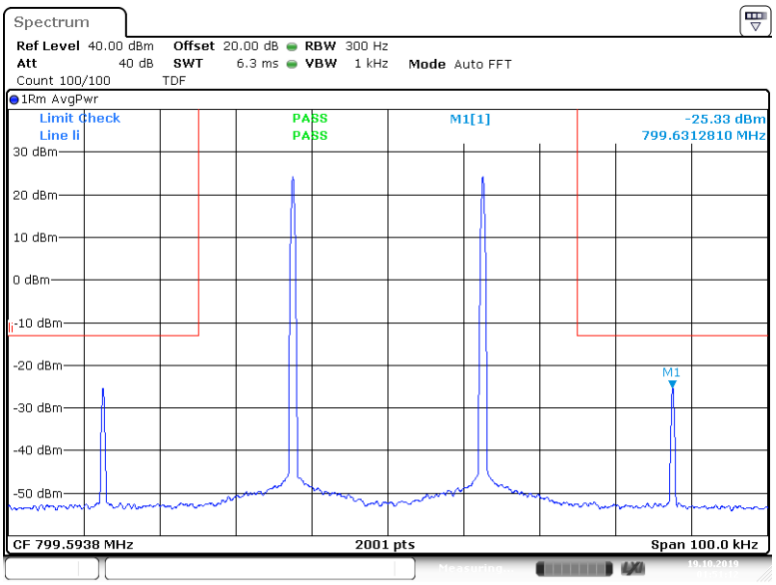
out of band emi;CW;2 carrier +3 dB;799.59380M;100.000k; CB12
.50k

Frequency band = 799 MHz – 805 MHz, Channel bandwidth = 25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designator = 16K0F3E



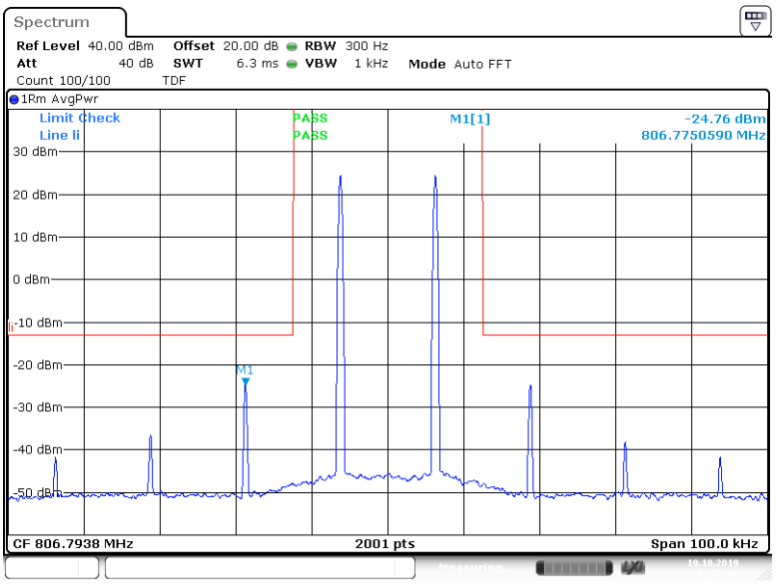
out of band emi;CW;2 carrier -0.3 dB;799.59380M;100.000k; CB
25.00k

Frequency band = 799 MHz – 805 MHz, Channel bandwidth = 25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designator = 16K0F3E



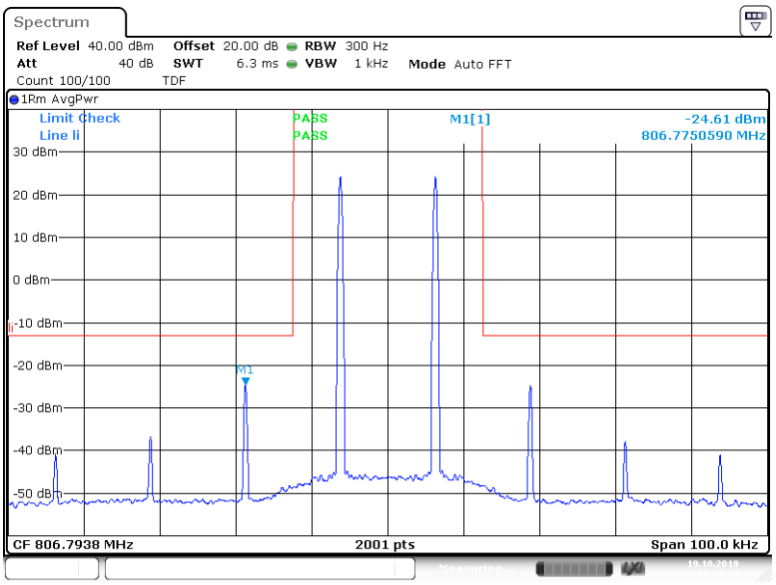
out of band emi;CW;2 carrier +3 dB;799.59380M;100.000k; CB25
.00k

Frequency band = 806 MHz – 809 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D and 9K80D7W



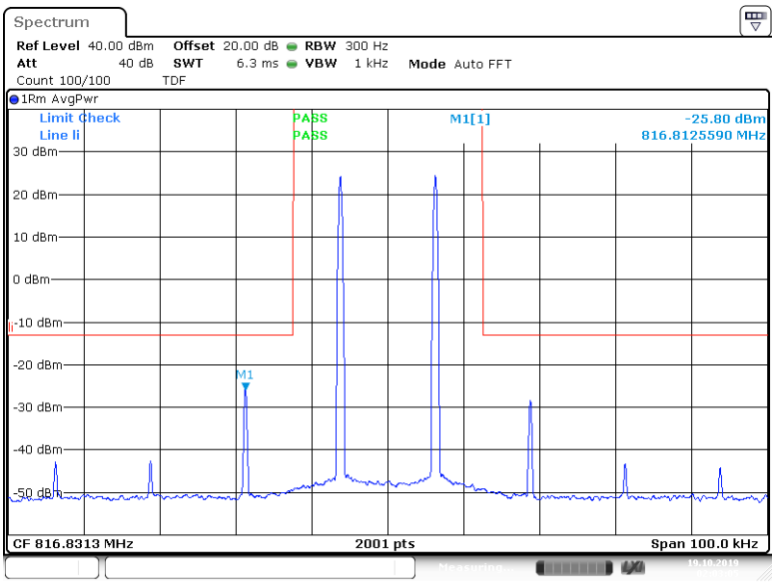
out of band emi;CW;2 carrier -0.3 dB;806.79380M;100.000k; CB
12.50k

Frequency band = 806 MHz – 809 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D and 9K80D7W



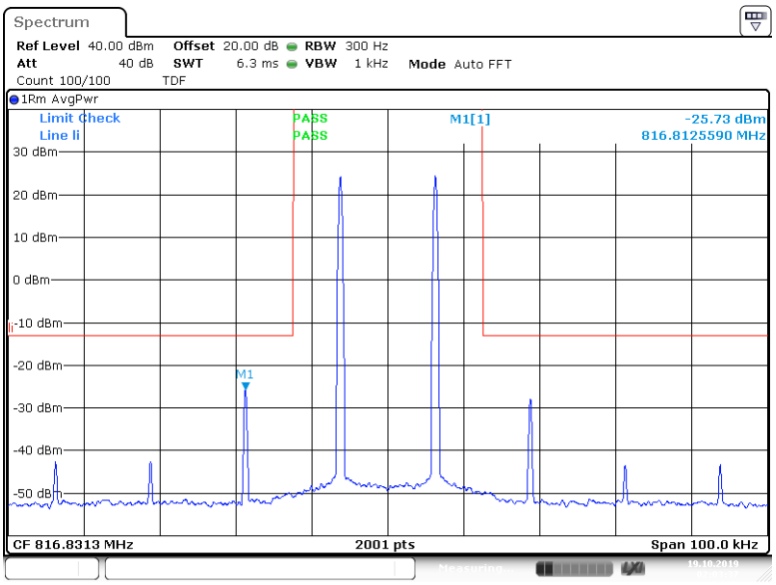
out of band emi;CW;2 carrier +3 dB;806.79380M;100.000k; CB12
.50k

Frequency band = 809 MHz – 817 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D and 9K80D7W



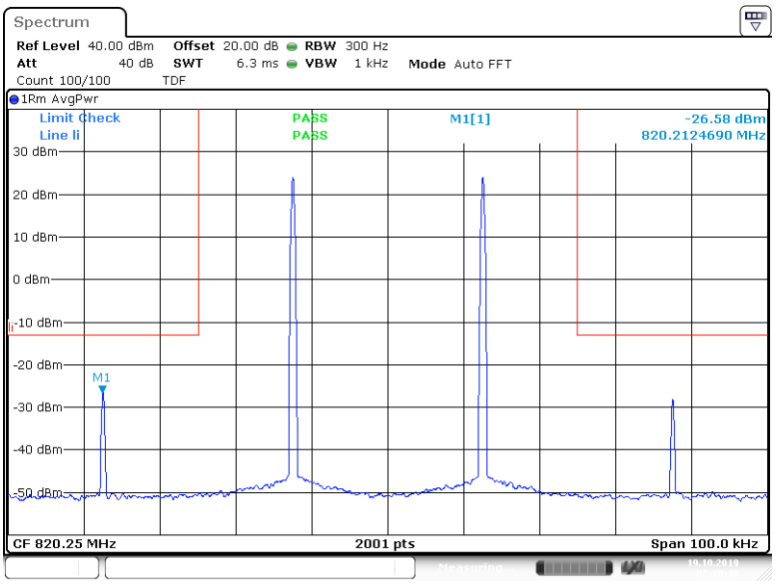
out of band emi;CW;2 carrier -0.3 dB;816.83130M;100.000k; CB
12.50k

Frequency band = 809 MHz – 817 MHz, Channel bandwidth = 12.5 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D and 9K80D7W



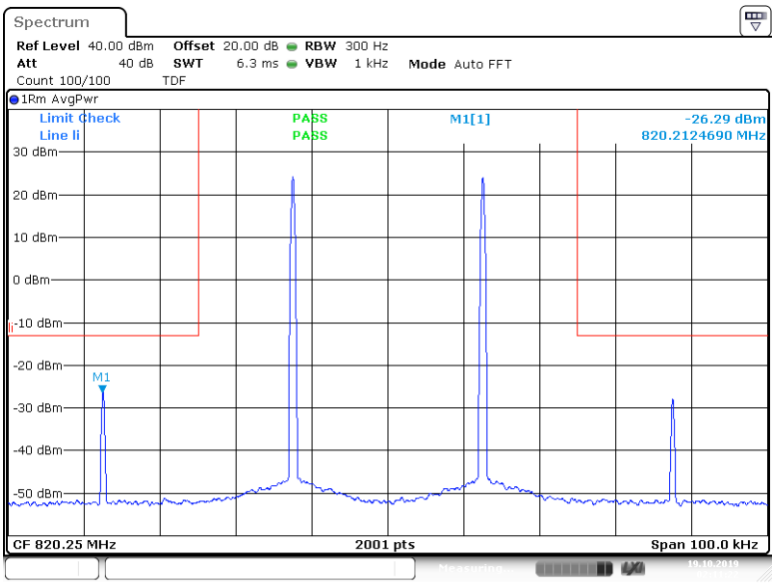
out of band emi;CW;2 carrier +3 dB;816.83130M;100.000k; CB12
.50k

Frequency band = 817 MHz – 824 MHz, Channel bandwidth = 25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 0.3 dB < AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D, 9K80D7W and 16K0F3E



out of band emi;CW;2 carrier -0.3 dB;820.25000M;100.000k; CB
25.00k

Frequency band = 817 MHz – 824 MHz, Channel bandwidth = 25 kHz,
Number of signals = 2, Direction = RF downlink, Input power = = 3 dB > AGC,
Emission designators = 4K00F3E, 11K3F3E, 8K10F1D, 9K80D7W and 16K0F3E



out of band emi;CW;2 carrier +3 dB;820.25000M;100.000k; CB25
.00k

4.4.5 TEST EQUIPMENT USED

- FCC cond. Test Lab, BV Nbg

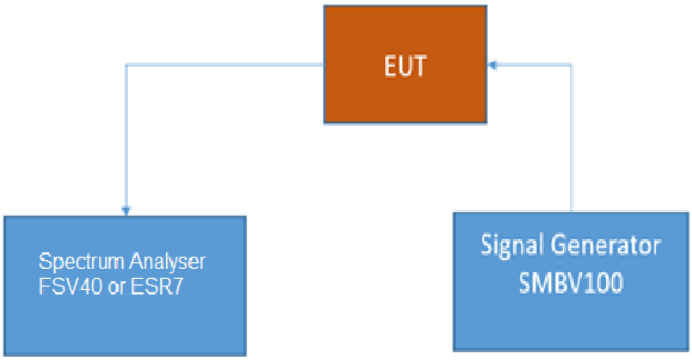
4.5 OUT-OF-BAND REJECTION

Standard FCC Part 90

The test was performed according to:
ANSI C63.26

4.5.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the out-of-band rejection test case for industrial signal boosters.
The EUT was connected to the test setup according to the following diagram:



The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyser settings can be directly found in the measurement diagrams.

4.5.2 TEST REQUIREMENTS / LIMITS

§90.219 – Use of signal boosters

(d)(7) Signal booster passbands are limited to the service band or bands for which the operator is authorized. In general, signal boosters should utilize the minimum passband that is sufficient to accomplish the purpose. Except for distributed antenna systems (DAS) installed in buildings, the passband of a Class B booster should not encompass both commercial services (such as ESMR and Cellular Radiotelephone) and part 90 Land Mobile and Public Safety Services.

For this test case exists no applicable limit

4.5.3 TEST PROTOCOL

Band 758 MHz – 768 MHz, downlink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -20 dB Frequency [MHz]**	**Upper Highest Power -20 dB Frequency [MHz]**	**20 dB Bandwidth [MHz]**
764.6640	29.96	757.0106	775.9737	18.9631

Band 769 MHz – 775 MHz, downlink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -20 dB Frequency [MHz]**	**Upper Highest Power -20 dB Frequency [MHz]**	**20 dB Bandwidth [MHz]**
771.8650	29.76	757.0095	775.9716	18.9621

Band 851 MHz – 854 MHz, downlink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -20 dB Frequency [MHz]**	**Upper Highest Power -20 dB Frequency [MHz]**	**20 dB Bandwidth [MHz]**
852.9035	29.76	850.5147	869.4878	18.9731

Band 854 MHz – 862 MHz, downlink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -20 dB Frequency [MHz]**	**Upper Highest Power -20 dB Frequency [MHz]**	**20 dB Bandwidth [MHz]**
856.8011	31.17	850.5207	869.4774	18.9566

Band 862 MHz – 869 MHz, downlink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -20 dB Frequency [MHz]**	**Upper Highest Power -20 dB Frequency [MHz]**	**20 dB Bandwidth [MHz]**
863.1955	31.13	850.5915	869.4091	18.8176

Remark: Please see next sub-clause for the measurement plot.

Band 788 MHz – 798 MHz, uplink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -13 dB Frequency [MHz]**	**Upper Highest Power -2.9 dB Frequency [MHz]**	**2.9 dB Bandwidth [MHz]**
791.1040	24.95	787.7255	805.4238	17.6982

Band 799 MHz – 805 MHz, uplink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -17 dB Frequency [MHz]**	**Upper Highest Power -3.4 dB Frequency [MHz]**	**3.4 dB Bandwidth [MHz]**
799.5909	24.74	787.6764	805.4227	17.7462

Band 806 MHz – 809 MHz, uplink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -12 dB Frequency [MHz]**	**Upper Highest Power -4.0 dB Frequency [MHz]**	**4.0 dB Bandwidth [MHz]**
806.7947	24.64	805.5312	824.2458	18.7146

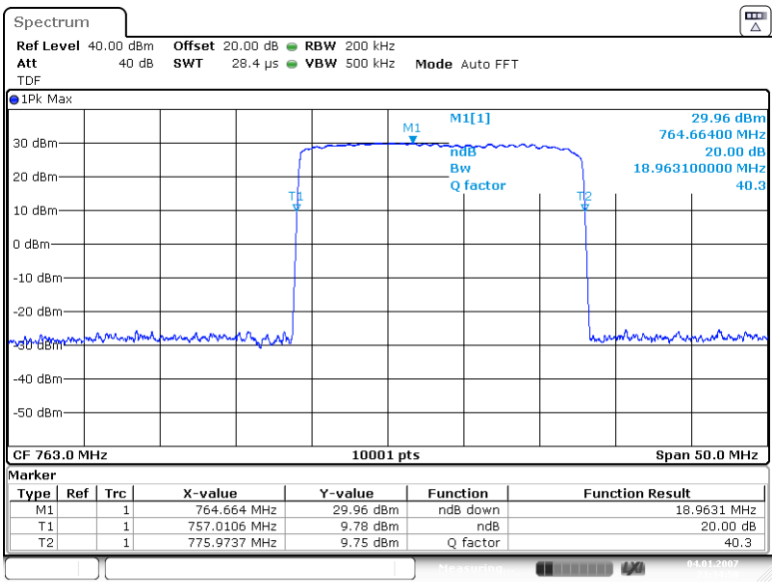
Band 809 MHz – 817 MHz, uplink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -12 dB Frequency [MHz]**	**Upper Highest Power -3.2 dB Frequency [MHz]**	**3.2 dB Bandwidth [MHz]**
816.8350	25.56	805.5317	824.2464	18.7146

Band 817 MHz – 824 MHz, uplink				
Highest Power Frequency [MHz]	**Output Power [dBm]**	**Lower Highest Power -16 dB Frequency [MHz]**	**Upper Highest Power -4.8 dB Frequency [MHz]**	**4.8 dB Bandwidth [MHz]**
820.2515	24.06	805.5740	824.2306	18.6566

Remark:Please see next sub-clause for the measurement plot.

4.5.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

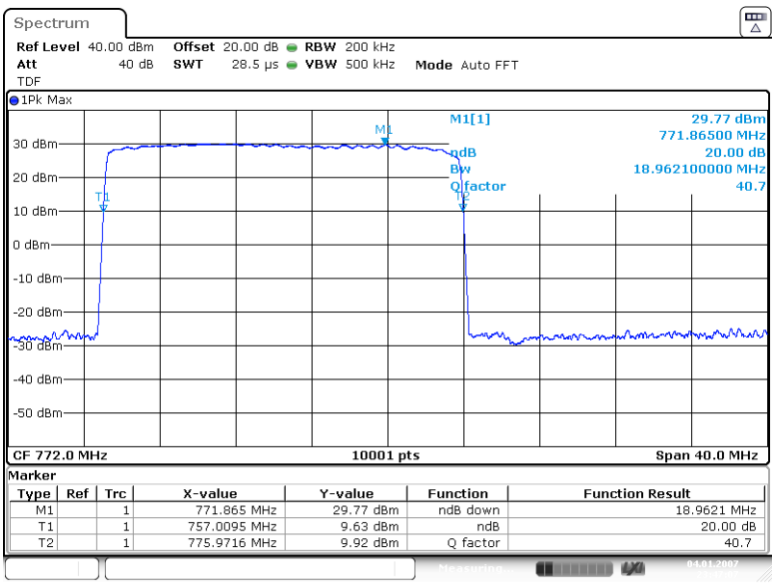
Frequency Band = Band 758 MHz – 768 MHz, Direction = RF downlink



Out of band rejection 763.00000M

_20dB

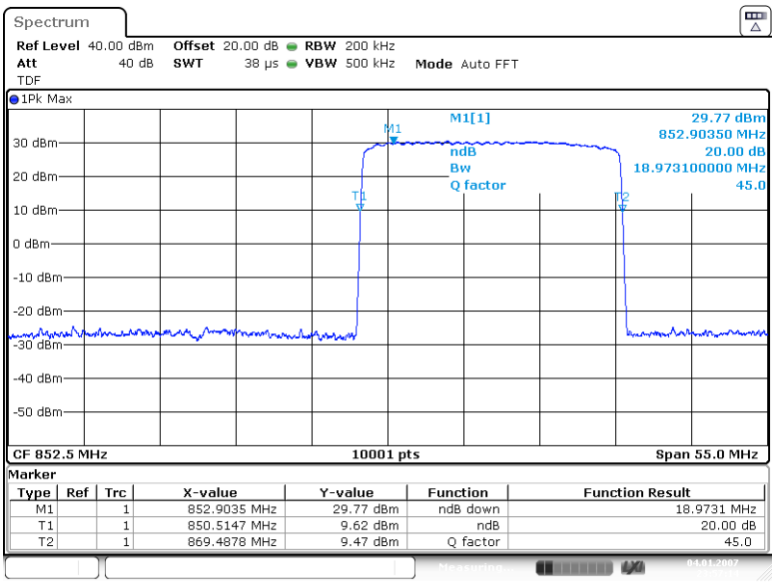
Frequency Band = Band 769 MHz – 775 MHz, Direction = RF downlink



Out of band rejection 772.00000M

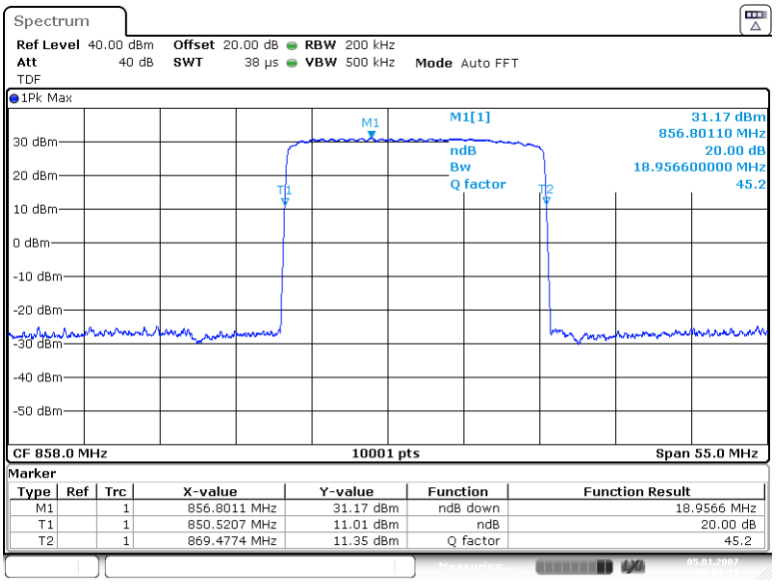
_20dB

Frequency Band = Band 851 MHz – 854 MHz, Direction = RF downlink



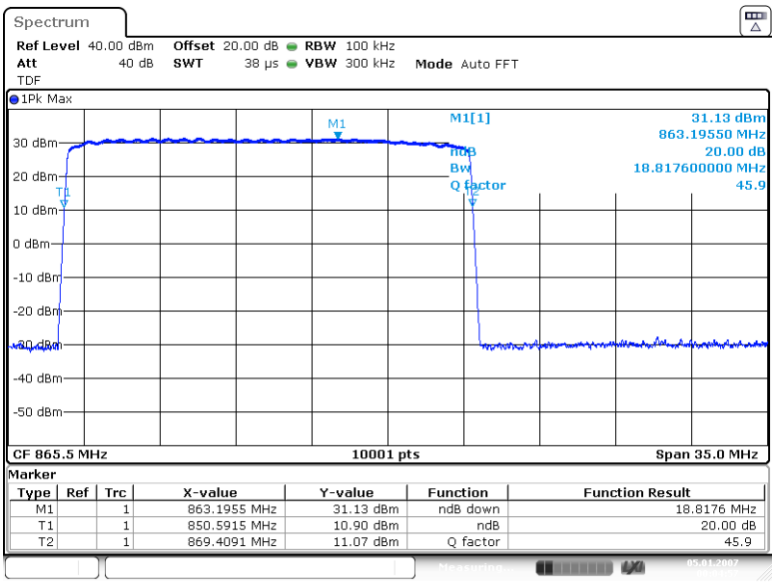
Out of band rejection 852.50000M
_20dB

Frequency Band = Band 854 MHz – 862 MHz, Direction = RF downlink



Out of band rejection 858.00000M
_20dB

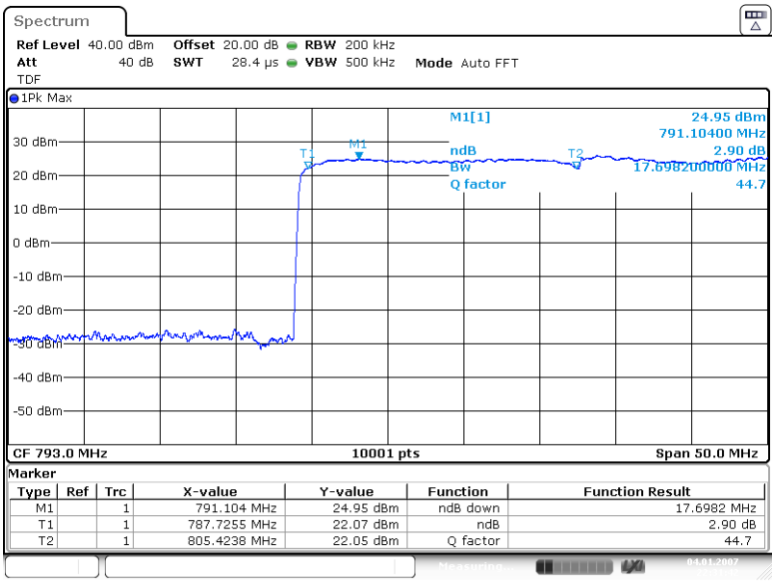
Frequency Band = Band 862 MHz – 869 MHz, Direction = RF downlink



Out of band rejection 865.50000M

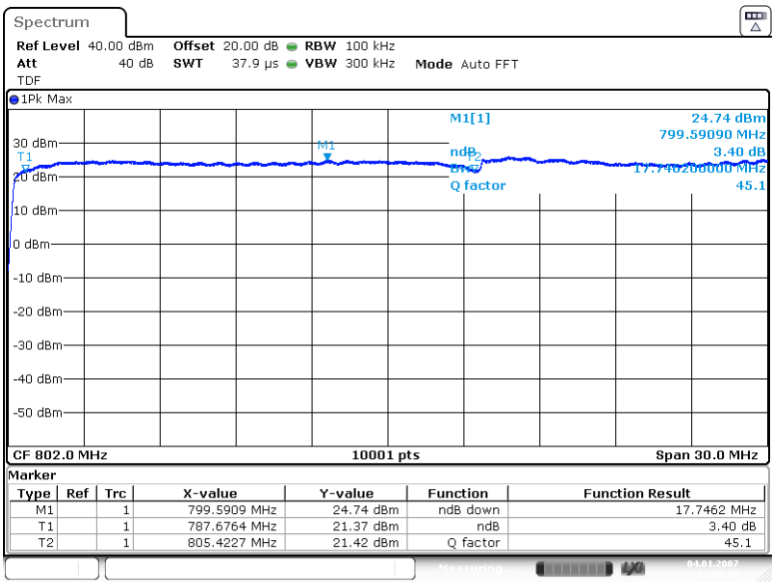
_20dB

Frequency Band = Band 788 MHz – 798 MHz, Direction = RF uplink



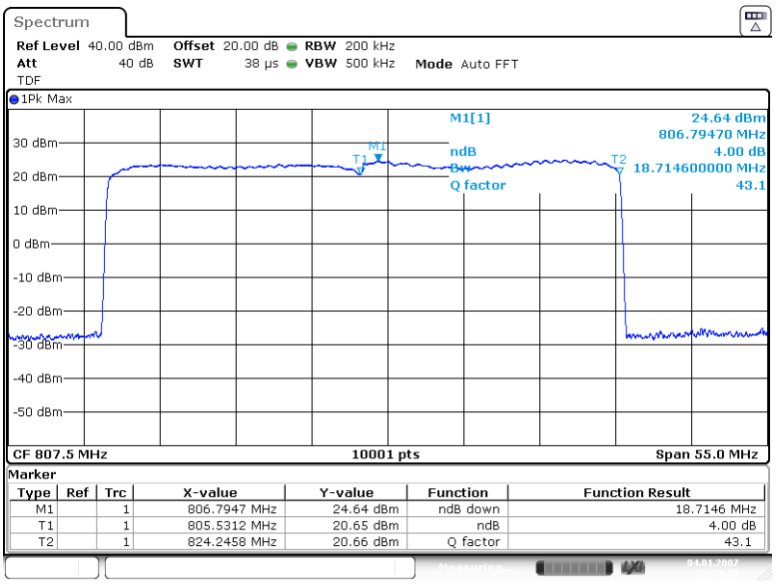
Out of band rejection 793.00000M
_20dB

Frequency Band = Band 799 MHz – 805 MHz, Direction = RF uplink



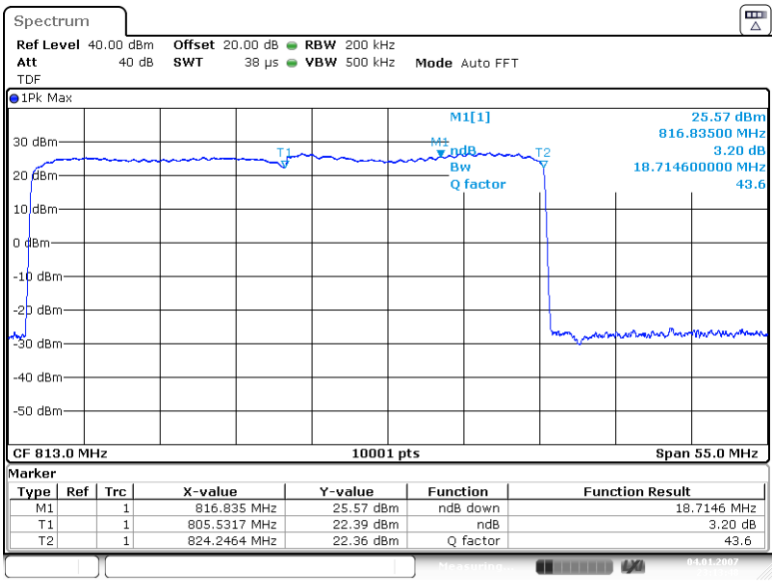
Out of band rejection 802.00000M
_20dB

Frequency Band = Band 806 MHz – 809 MHz, Direction = RF uplink



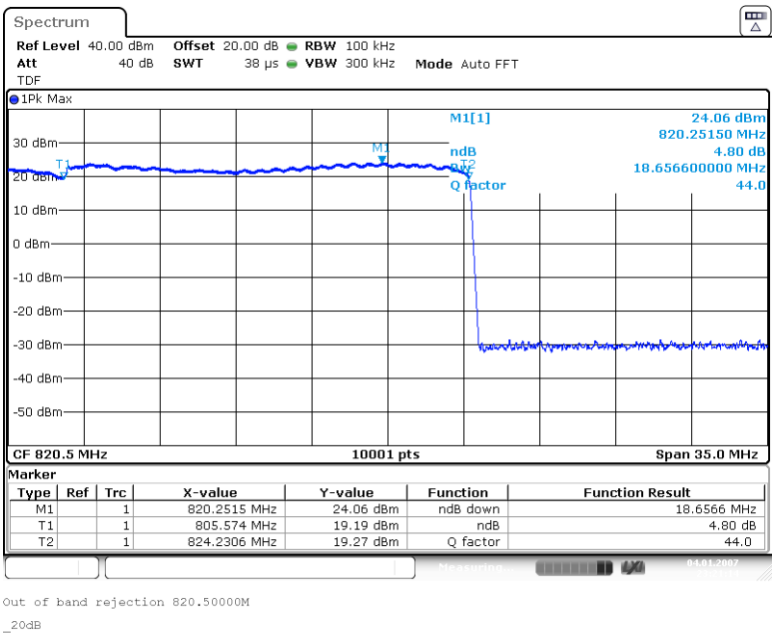
Out of band rejection 807.50000M
_20dB

Frequency Band = Band 809 MHz – 817 MHz, Direction = RF uplink



Out of band rejection 813.00000M
_20dB

Frequency Band = Band 817 MHz – 824 MHz, Direction = RF uplink



4.5.5 TEST EQUIPMENT USED

- FCC cond. Test Lab, BV Nbg

4.6 NOISE FIGURE

Standard FCC Part 90, §90.219,

The test was performed according to:
ANSI C63.26

4.6.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to noise limit for industrial signal boosters. The limits itself come from the applicable rule part for each operating band.

The EUT was connected to the test setup according to the following diagram:

FCC Part 22/24/27/90 Industrial signal booster – Test Setup; Noise

The attenuation of the measuring and stimulus path are known for each measured frequency and are considered.

The Spectrum Analyser settings can be directly found in the measurement diagrams.

4.6.2 TEST REQUIREMENTS / LIMITS

Part 90, Subpart I

§90.219 – Use of signal boosters

(e)(2) The noise figure of a signal booster must not exceed 9 dB in either direction.

Remarks of the test laboratory:

With thermal noise of -174 dBm/Hz at 300 K and measurement bandwidth of 1 MHz the noise value is -114 dBm. Adding the gain of 88 dB (89 dB, dependent from the frequency range), as well as 9 dB for noise figure, the limit for the border line is -16 dBm respectively -15 dBm.

According the used KDB 932210 05 paragraph 4.6 during the measurements the repeater's AGC is switched off.

4.6.3 TEST PROTOCOL

Band 758 MHz – 775 MHz, downlink	
Test step	**Noise level below theoretical noise level plus 9 dB noise figure?**
Passband	Yes

Band 851 MHz – 869 MHz, downlink	
Test step	**Noise level below theoretical noise level plus 9 dB noise figure?**
Passband	Yes

Band 788 MHz – 805 MHz, uplink	
Test step	**Noise level below theoretical noise level plus 9 dB noise figure?**
Passband	Yes

Band 806 MHz – 824 MHz, uplink	
Test step	**Noise level below theoretical noise level plus 9 dB noise figure?**
Passband	Yes

Remarks:

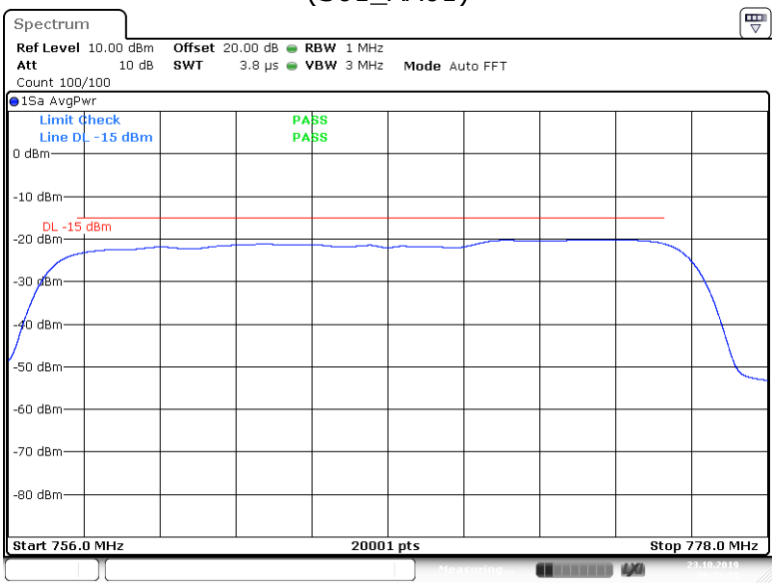
To stimulate noise production in the uplink bands, in the according band as CW signal (the first CW signal per band) is applied within the passband. The according CW signal is spared out of the data line limit.

To prove that in the spared out part is no hidden noise in this first CW signal per band the measurements are done in the according bands with a second CW signal with another frequency than the first CW.

In the cases of stimulating the noise production the 50 Ohms termination shown in the test description setup diagram is substituted by a signal generator for producing CWs.

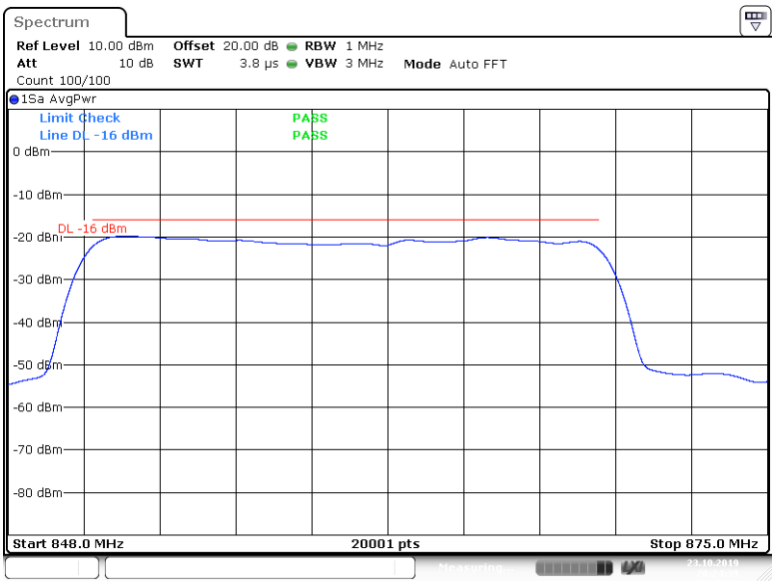
4.6.4 MEASUREMENT PLOT

Frequency Band = Band 758 MHz to 775 MHz, Direction = RF downlink, Test Step = passband (S01_AA01)



758 MHz to 775 MHz, AGC switched off

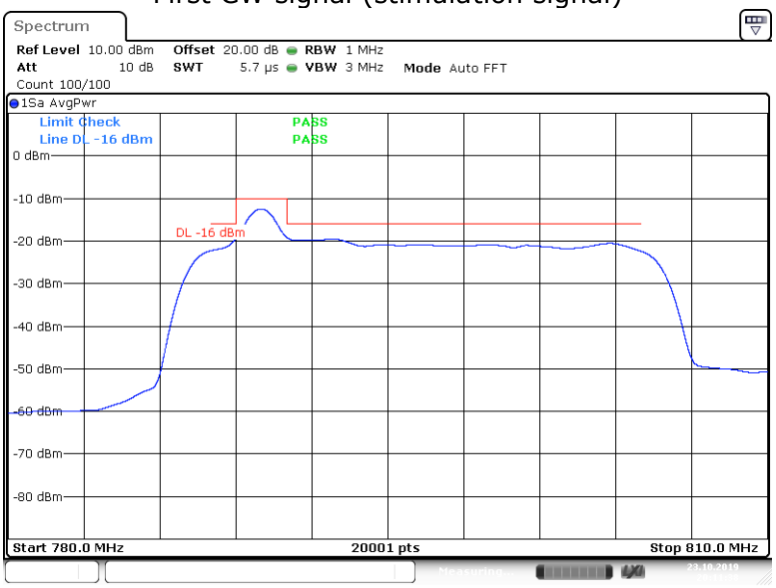
Frequency Band = Band 851 MHz to 869 MHz, Direction = RF downlink, Test Step = passband (S01_AA01)



851 MHz to 869 MHz, AGC switched off

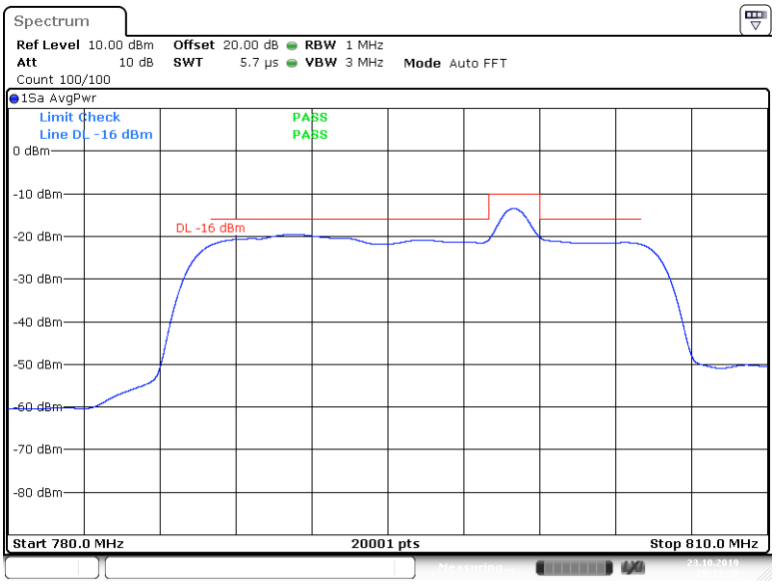
Frequency Band = Band 788 MHz to 805 MHz, Direction = RF uplink, Test Step = passband (S01_AA01)

First CW signal (stimulation signal)



788 MHz to 805 MHz, AGC switched off

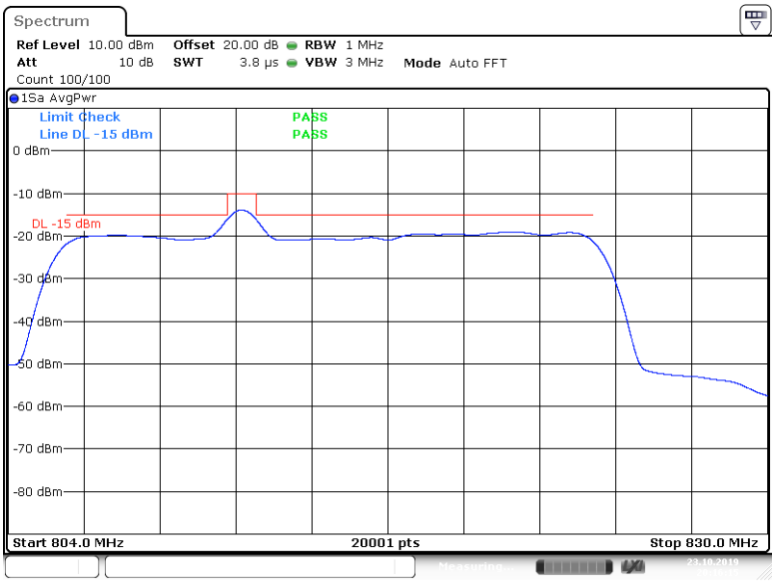
Second CW signal (stimulation signal)



788 MHz to 805 MHz, AGC switched off

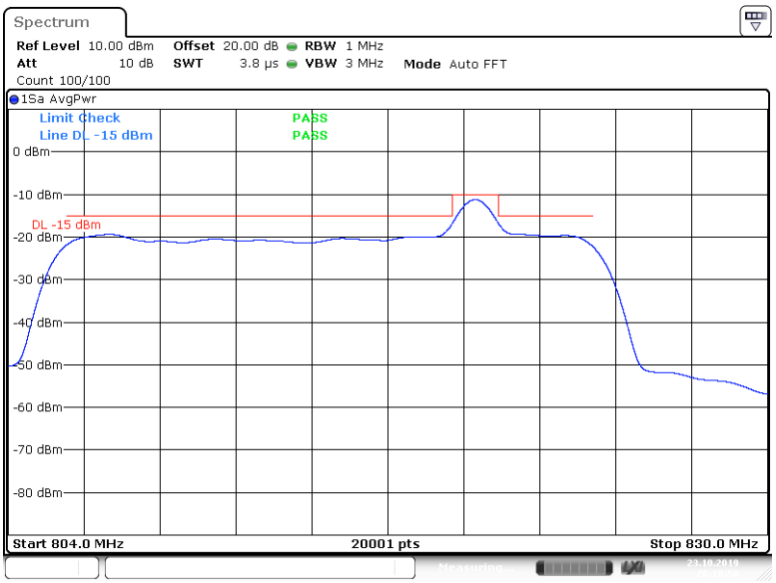
Frequency Band = Band 806 MHz to 824 MHz, Direction = RF uplink, Test Step = passband (S01_AA01)

First CW signal (stimulation signal)



806 MHz to 824 MHz, AGC switched off

Second CW signal (stimulation signal)



806 MHz to 824 MHz, AGC switched off

4.6.5 TEST EQUIPMENT USED

- FCC cond. Test Lab, BV Nbg

4.7 FIELD STRENGTH OF SPURIOUS RADIATION

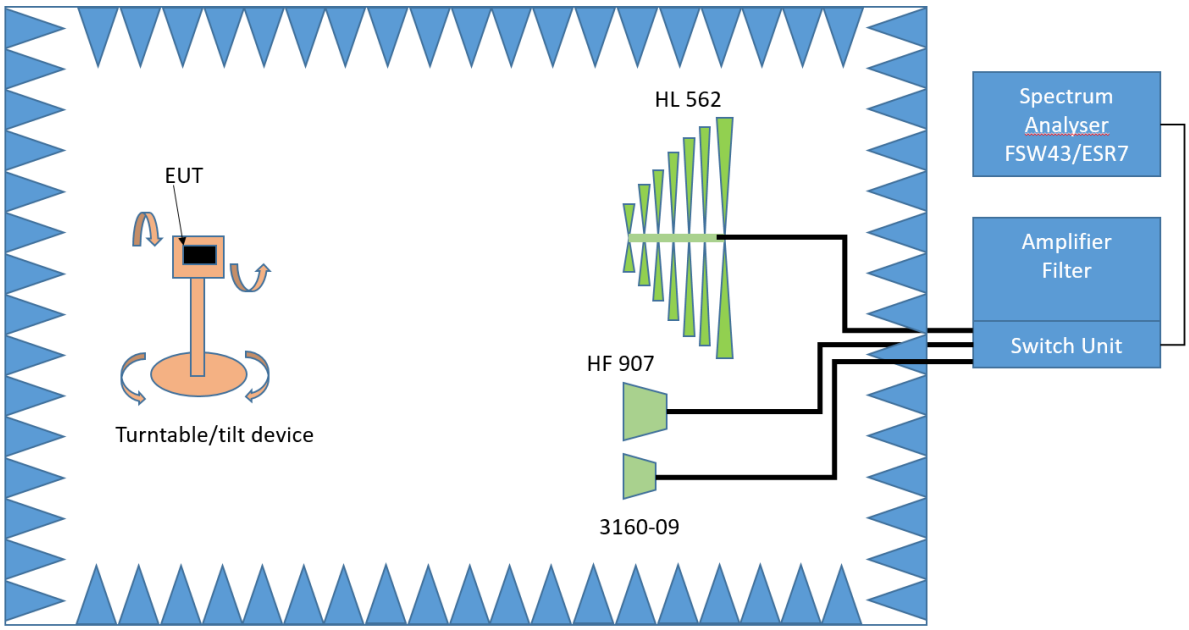
Standard FCC Part 90, §90.219

The test was performed according to:
ANSI C63.26

4.7.1 TEST DESCRIPTION

This test case is intended to demonstrate compliance to the applicable radiated spurious emission measurements per § 2.1053

The EUT was connected to the test setup according to the following diagram:



FCC Part 22/24/27/90; Industrial Signal Booster – Test Setup; Field Strength of Spurious Radiation

The test set-up was made in accordance to the general provisions of ANSI C63.4 in a typical installation configuration. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m² in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.
The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered from a DC power source.

1. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan
This is a preliminary test to identify the highest amplitudes relative to the limit.
Settings for step 1:
- Antenna distance: 3 m
- Detector: Peak-Maxhold / Quasipeak (FFT-based)

- Frequency range: 30 – 1000 MHz
- Frequency steps: 30 kHz
- IF–Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 ms
- Turntable angle range: –180° to 90°
- Turntable step size: 90°
- Height variation range: 1 – 3 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: Adjustment measurement
In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.
For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by ± 45° around this value. During this action, the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position, the antenna height will also slowly vary by ± 100 cm around the antenna height determined. During this action, the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.
- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: ± 45 ° around the determined value
- Height variation range: ± 100 cm around the determined value
- Antenna Polarisation: max. value determined in step 1

Step 3: Final measurement with QP detector
With the settings determined in step 3, the final measurement will be performed:
EMI receiver settings for step 4:
- Detector: Quasi-Peak (< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

3. Measurement above 1 GHz
The following modifications apply to the measurement procedure for the frequency range above 1 GHz:
Step 1:
The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.
All steps were performed with one height (1.5 m) of the receiving antenna only.
The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90 °.
The turn table step size (azimuth angle) for the preliminary measurement is 45 °.
Step 2:

Due to the fact, that in this frequency range the test is performed in a fully anechoic room, the height scan of the receiving antenna instep 2 is omitted. Instead of this, a maximum search with a step size ± 45° for the elevation axis is performed.
The turn table azimuth will slowly vary by ± 22.5°.
The elevation angle will slowly vary by ± 45°
EMI receiver settings (for all steps):
- Detector: Peak, Average
- IF Bandwidth = 1 MHz

Step 3:
Spectrum analyser settings for step 3:
- Detector: Peak / Average
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 1 MHz
- Measuring time: 1 s

4.7.2 TEST REQUIREMENTS / LIMITS

FCC Part 2.1053; Measurement required: Field strength of spurious radiation:

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate.

Part 90, Subpart I/S
Band 14 (758 MHz – 768 MHz)

§90.543 – Emission limitations

(e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

Part 90, Subpart I/R
Band 26/27 (862 MHz – 869 MHz)

§90.691

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at

least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

4.7.3 TEST PROTOCOL

Band 758 – 768 MHz, downlink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

Band 788 – 798 MHz, uplink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

Band 769 – 775 MHz, downlink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

Band 799 – 805 MHz, uplink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

Band 851 – 854 MHz, downlink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

Band 806 – 809 MHz, uplink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

Band 854 – 862 MHz, downlink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

Band 809 – 817 MHz, uplink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

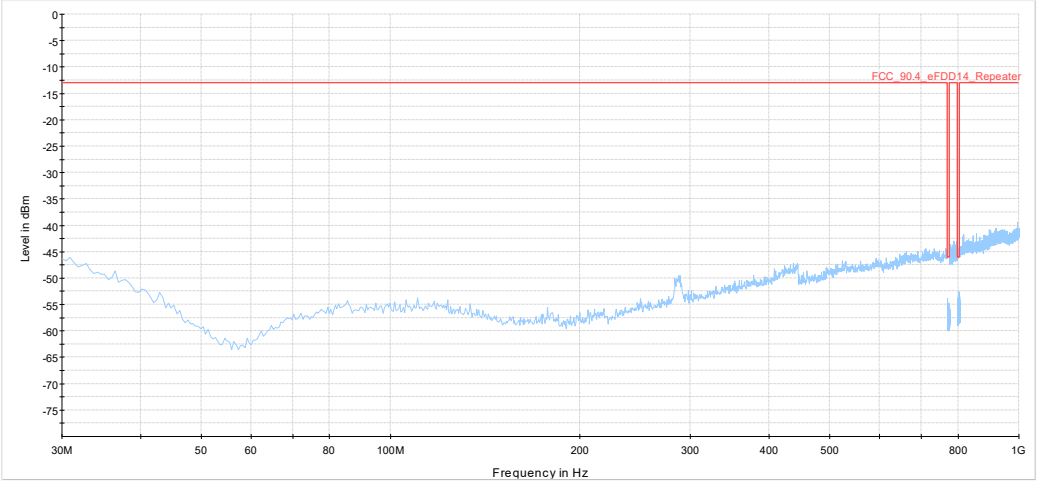
Band 862 – 869 MHz, downlink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

Band 817 – 824 MHz, uplink						
Spurious Freq. [MHz]	**Spurious Level [dBm]**	**Pin [dBm]**	**Detector**	**RBW [kHz]**	**Limit [dBm]**	**Margin to Limit [dB]**
-	-	-4.3	RMS	100	-13.0	- - -
-	-	-4.3	RMS	100	-13.0	- - -

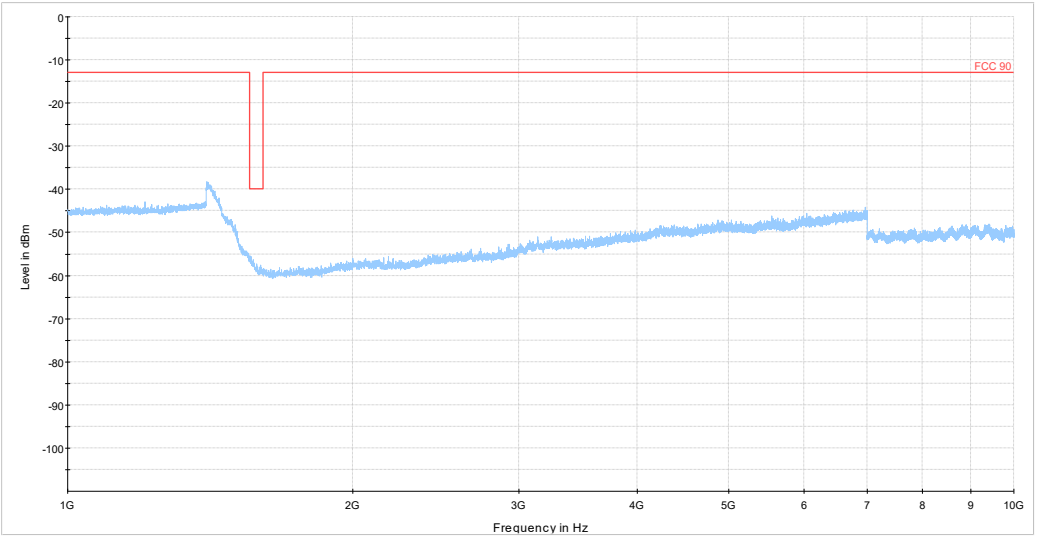
Remark: Please see next sub-clause for the measurement plot.
The three required test frequencies (low, mid, high) were injected simultaneously into the EUT.

4.7.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Frequency Band = Band 758 – 768 MHz, Direction = RF downlink
(S01_AA01)

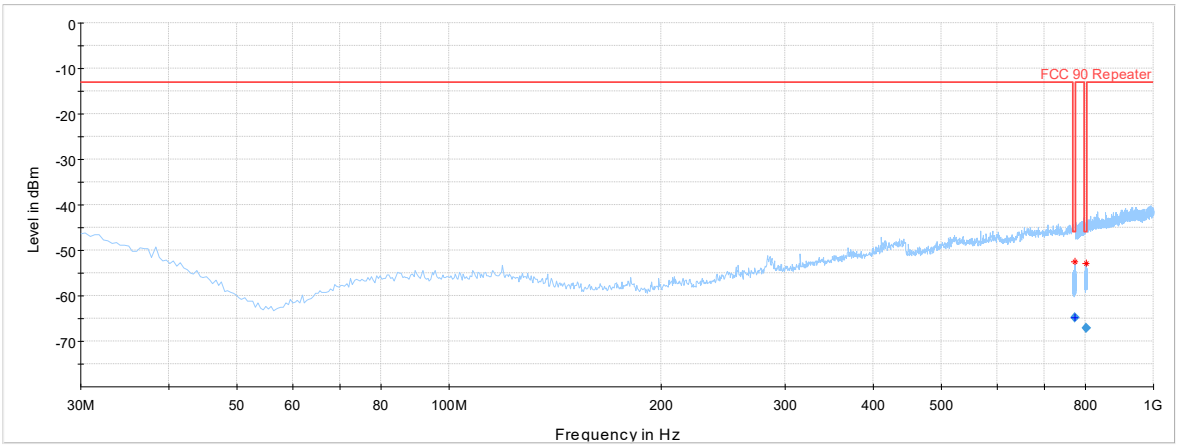


30 MHz - 1 GHz

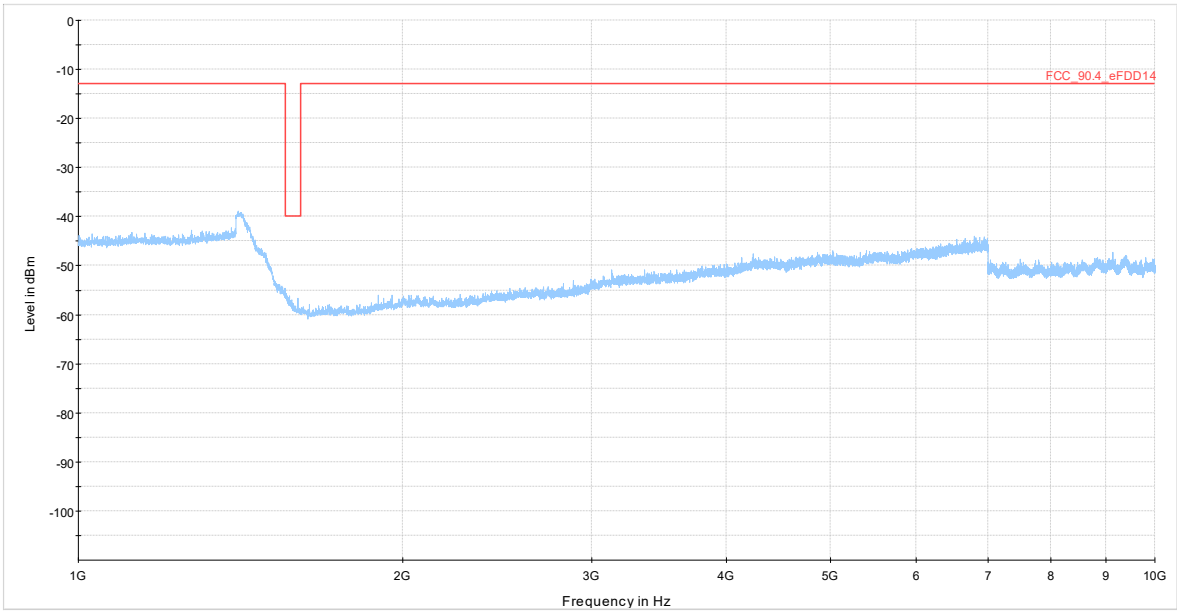


1 GHz - 10 GHz

Frequency Band = Band 788 – 798 MHz, Direction = RF uplink
(S01_AA01)

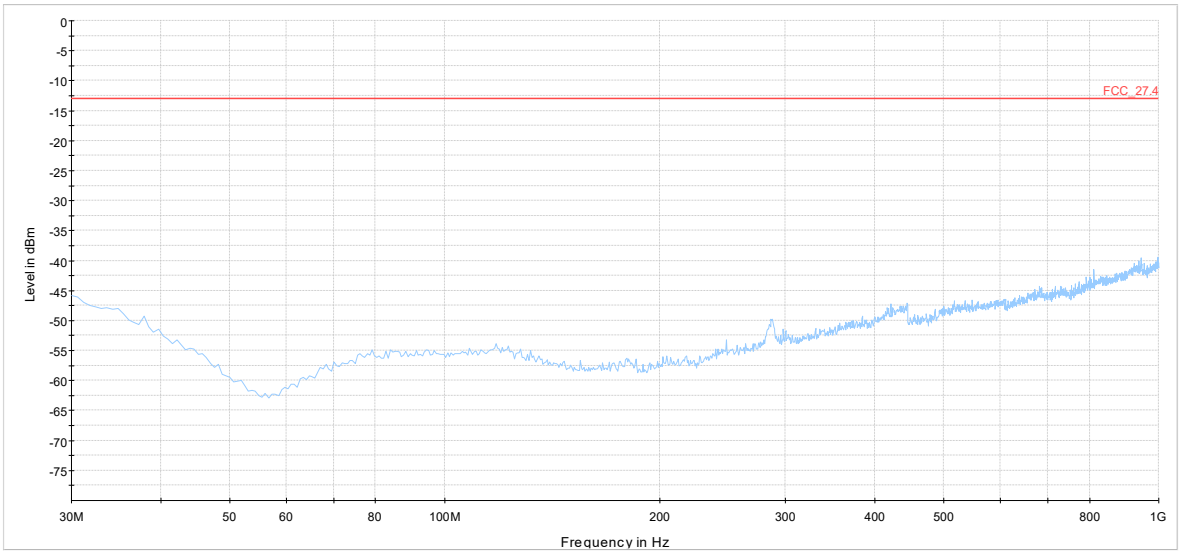


30 MHz - 1 GHz

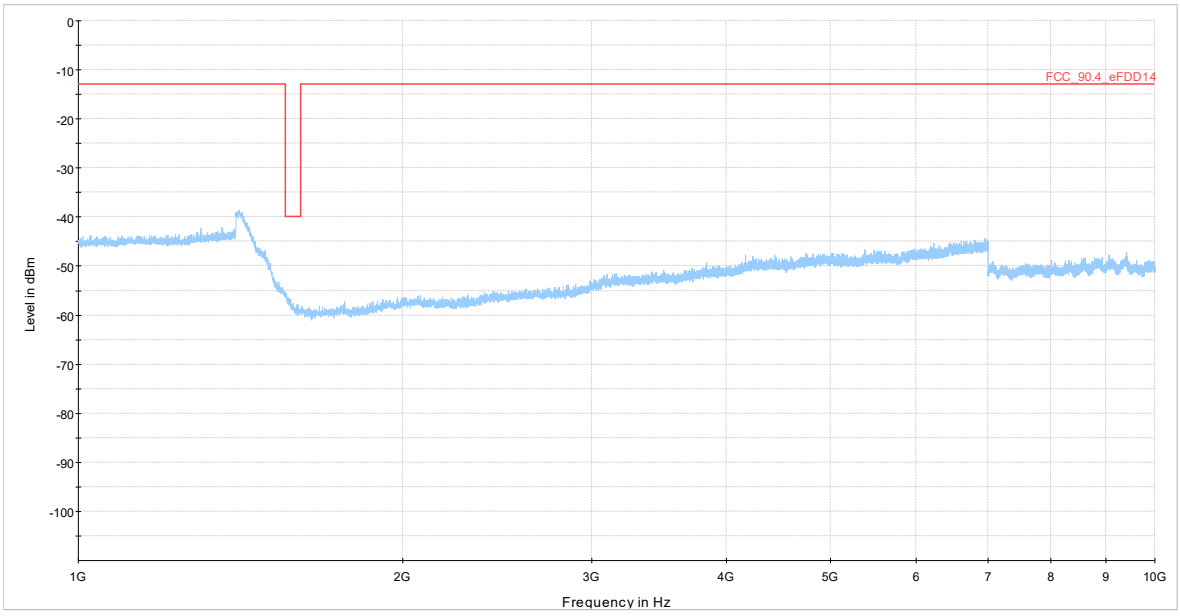


1 GHz - 10 GHz

Frequency Band = Band 769 – 775 MHz, Direction = RF downlink
(S01_AA01)

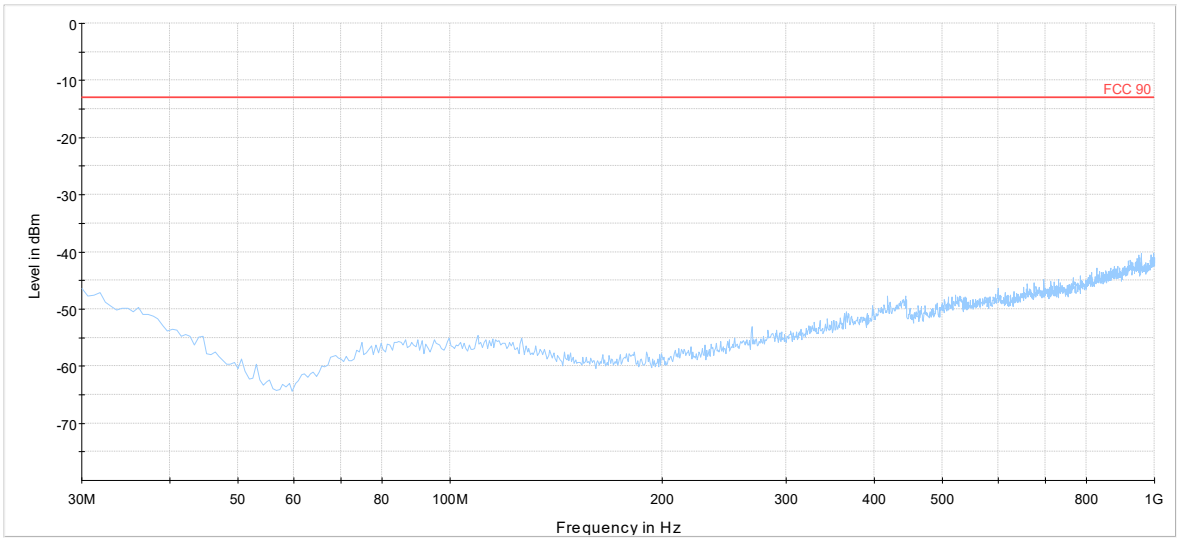


30 MHz - 1 GHz

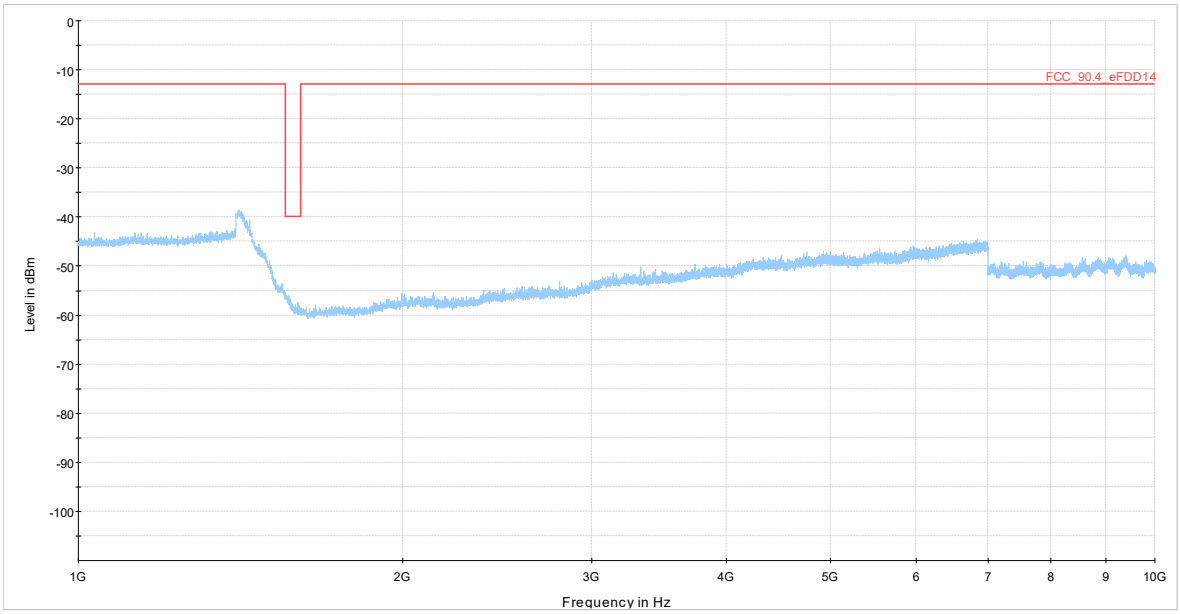


1 GHz - 10 GHz

Frequency Band = Band 799 – 805 MHz, Direction = RF uplink
(S01_AA01)

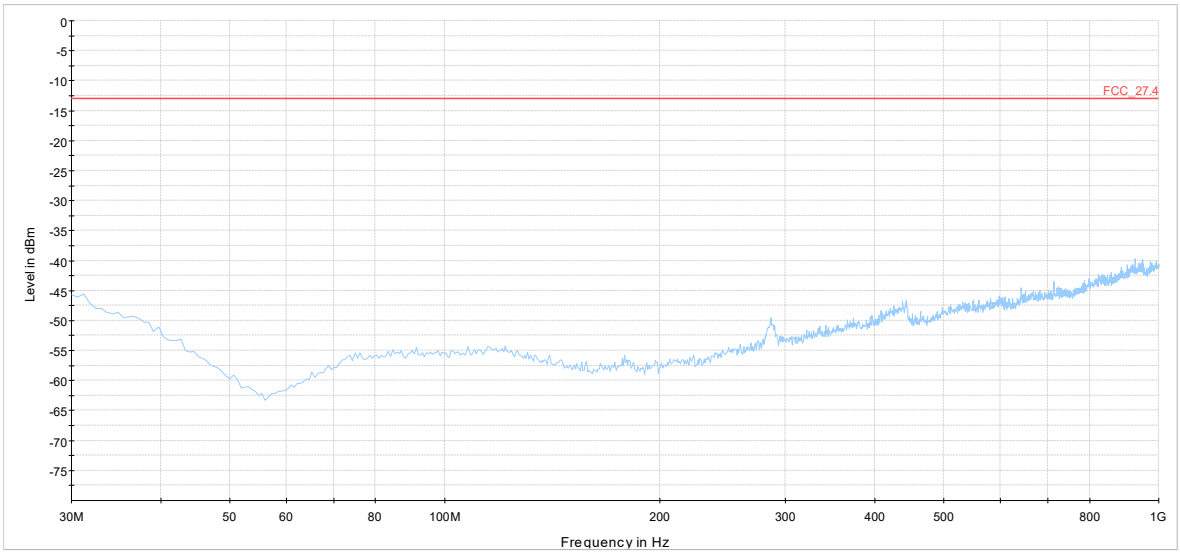


30 MHz - 1 GHz

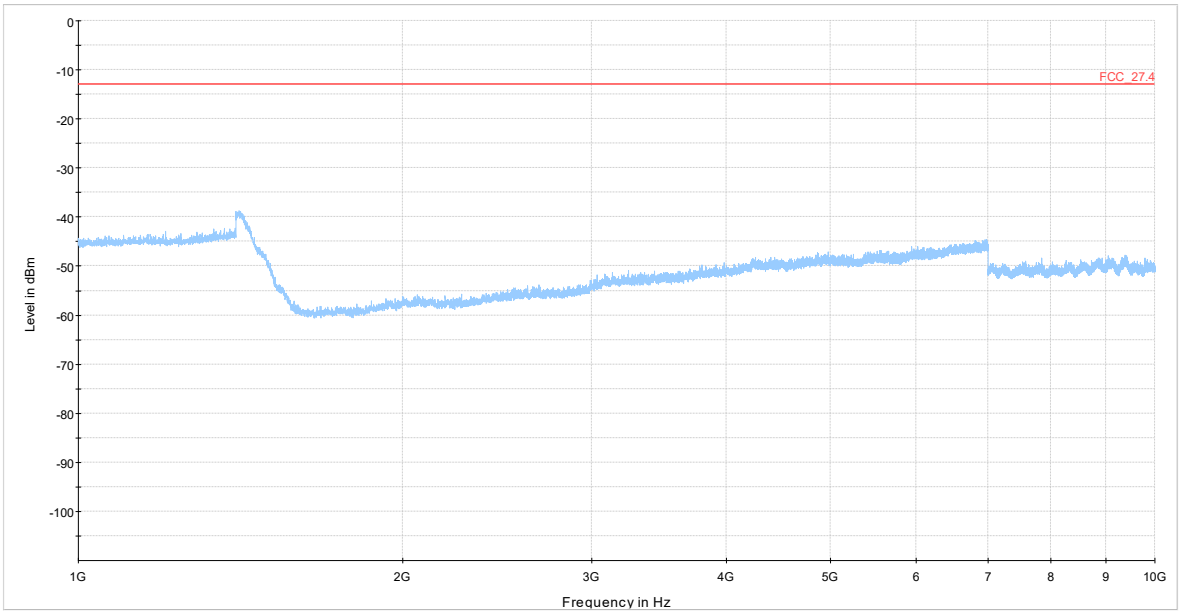


1 GHz - 10 GHz

Frequency Band = Band 851 – 854 MHz, Direction = RF downlink
(S01_AA01)



30 MHz - 1 GHz



1 GHz - 10 GHz