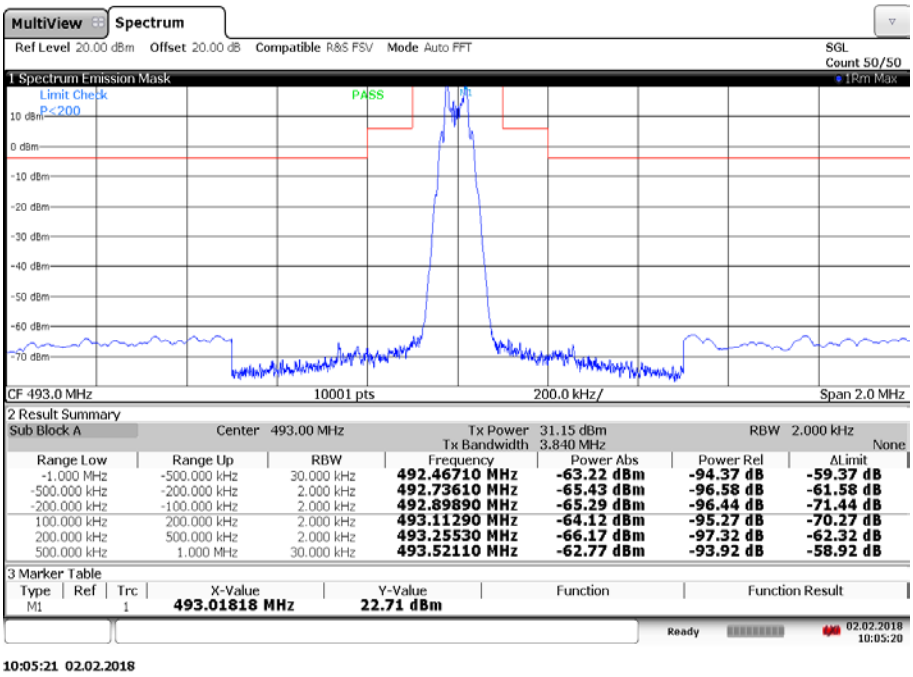
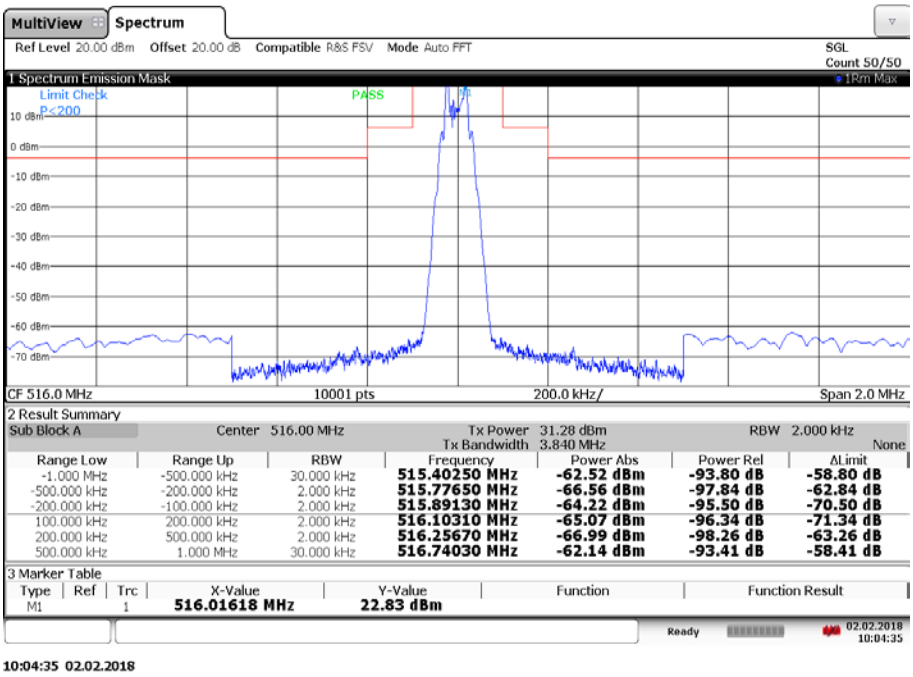
Plot 2: middle channel, spectrum mask

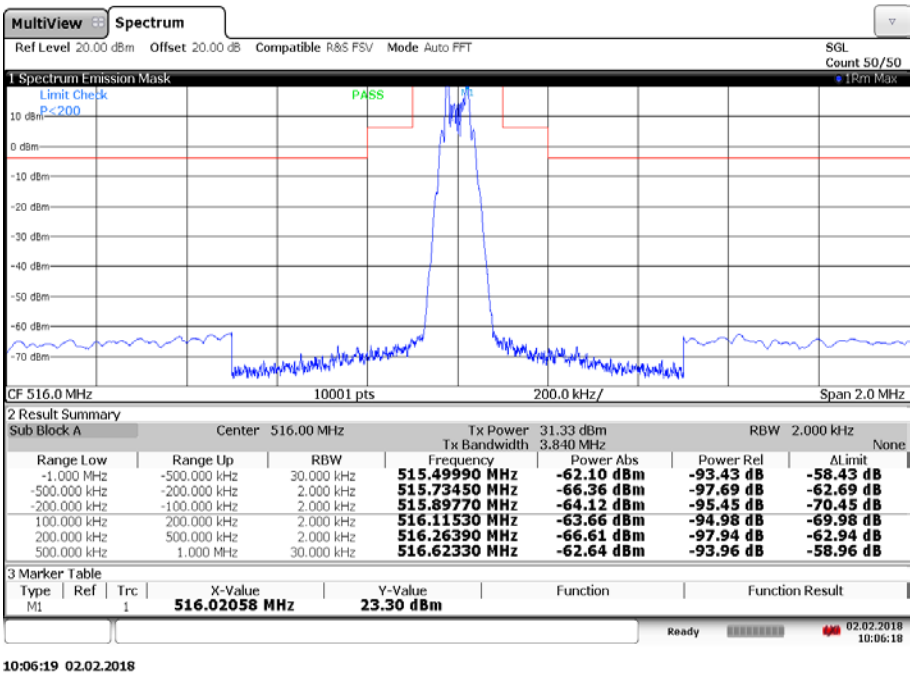


Plot 3: highest channel, spectrum mask



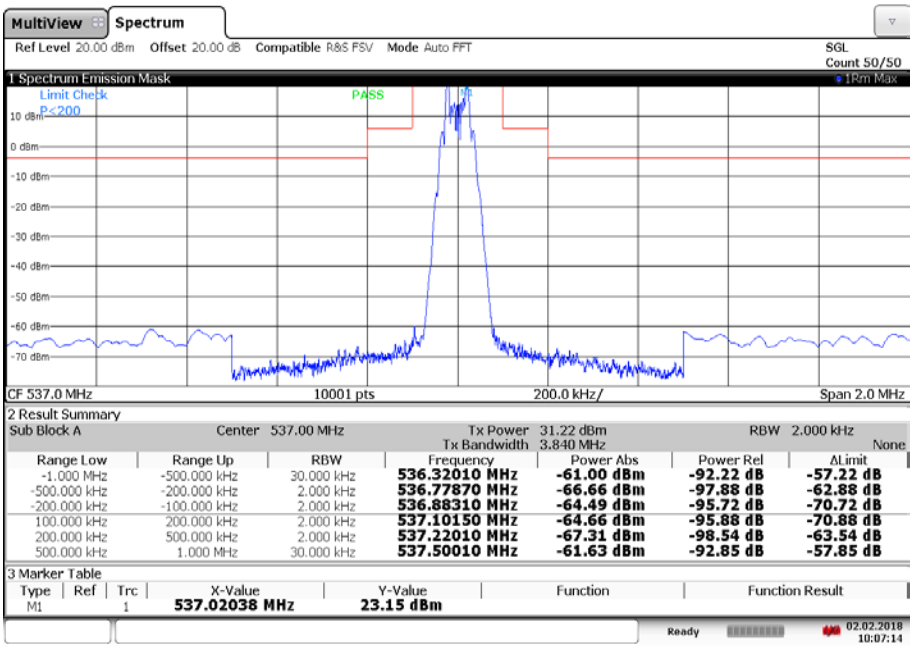
Plots: conducted, range A

Plot 1: lowest channel, spectrum mask



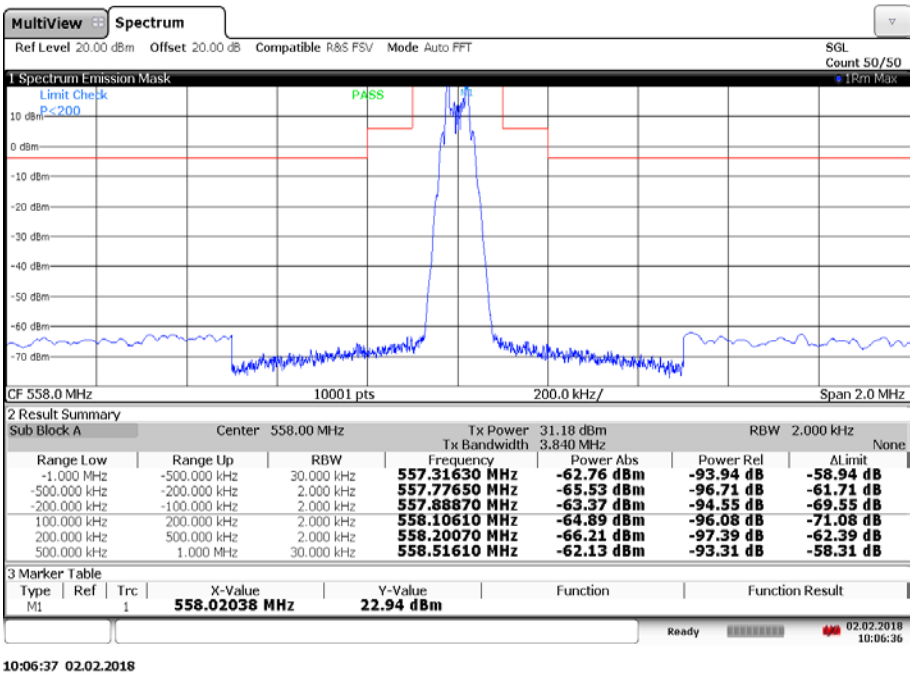
10:06:19 02.02.2018

Plot 2: middle channel, spectrum mask



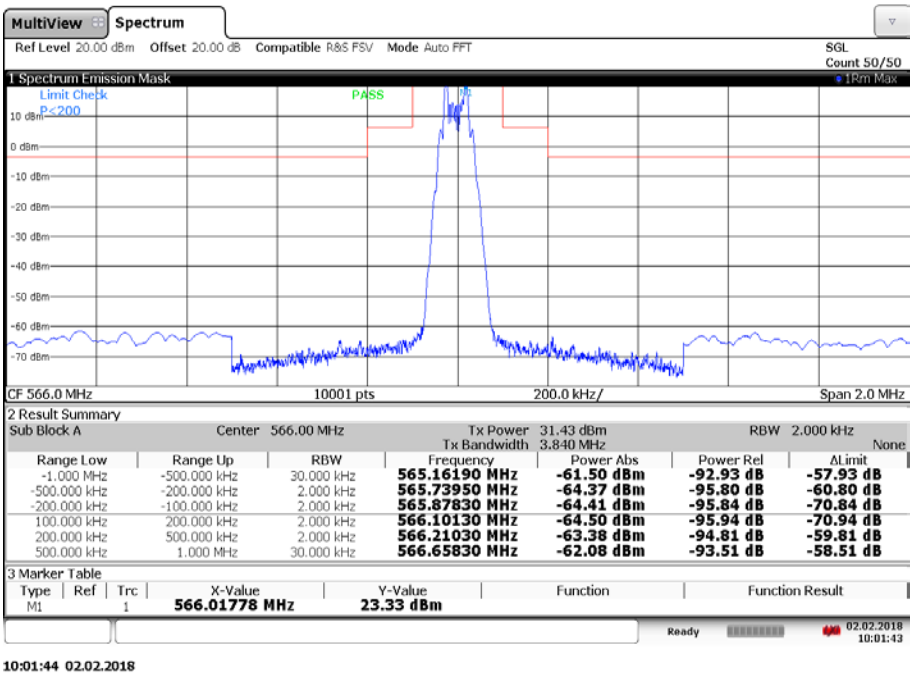
10:07:15 02.02.2018

Plot 3: highest channel, spectrum mask

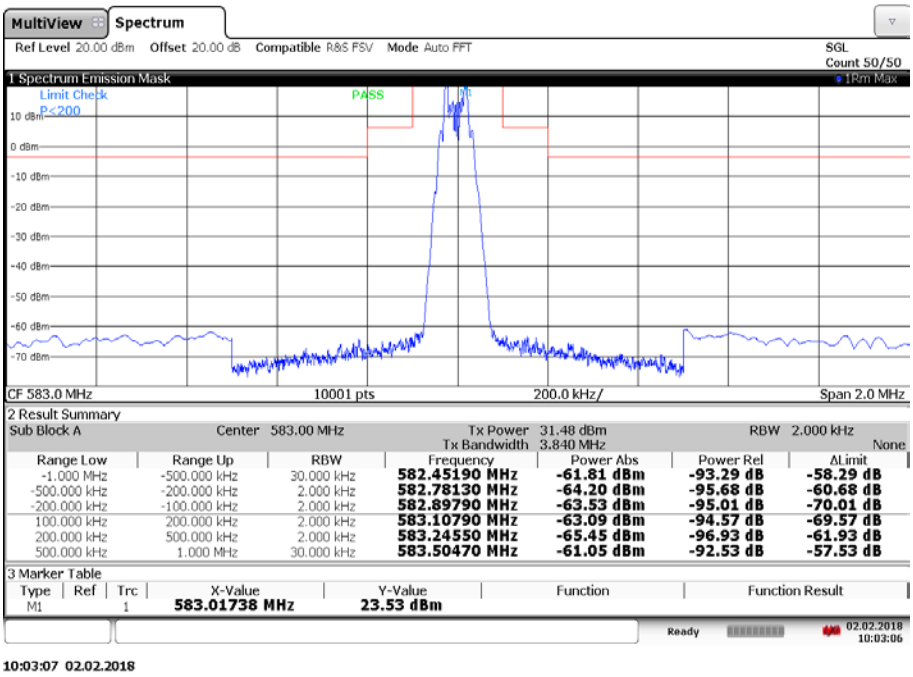


Plots: conducted, range G

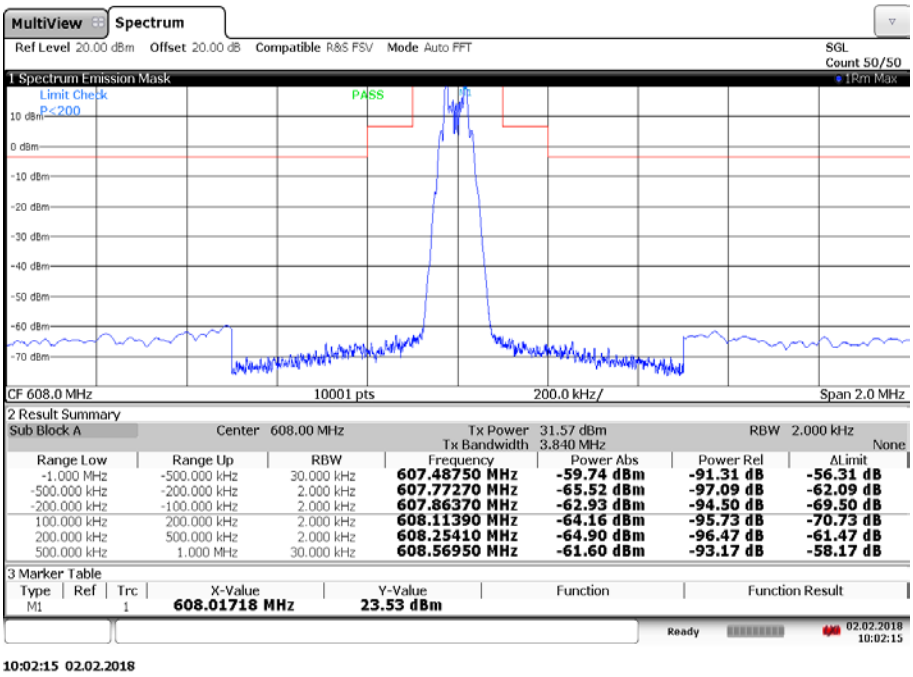
Plot 1: lowest channel, spectrum mask



Plot 2: middle channel, spectrum mask



Plot 3: highest channel, spectrum mask



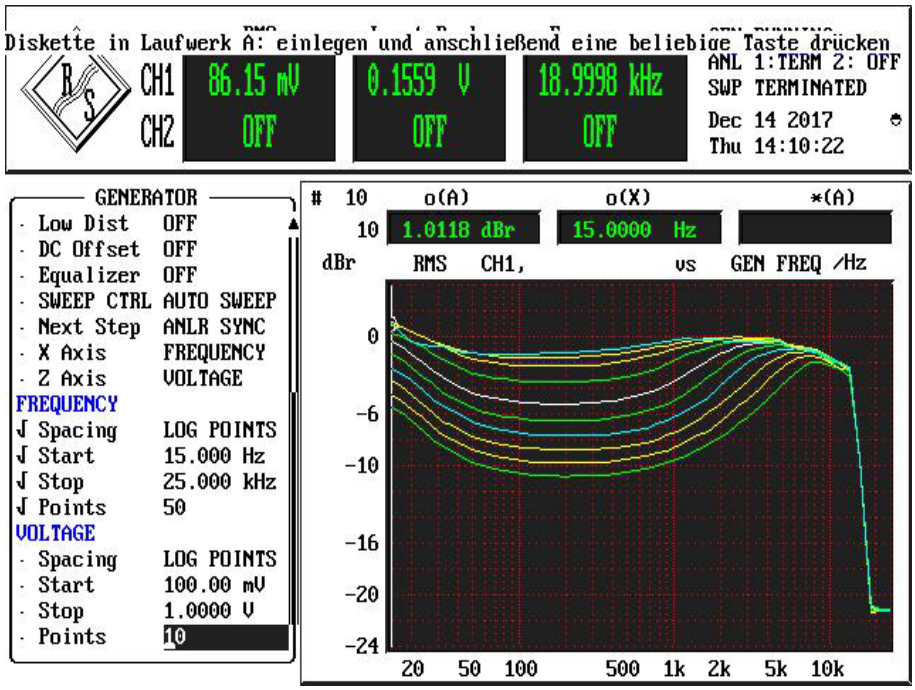
11.5 Modulation characteristics

Method of measurement:

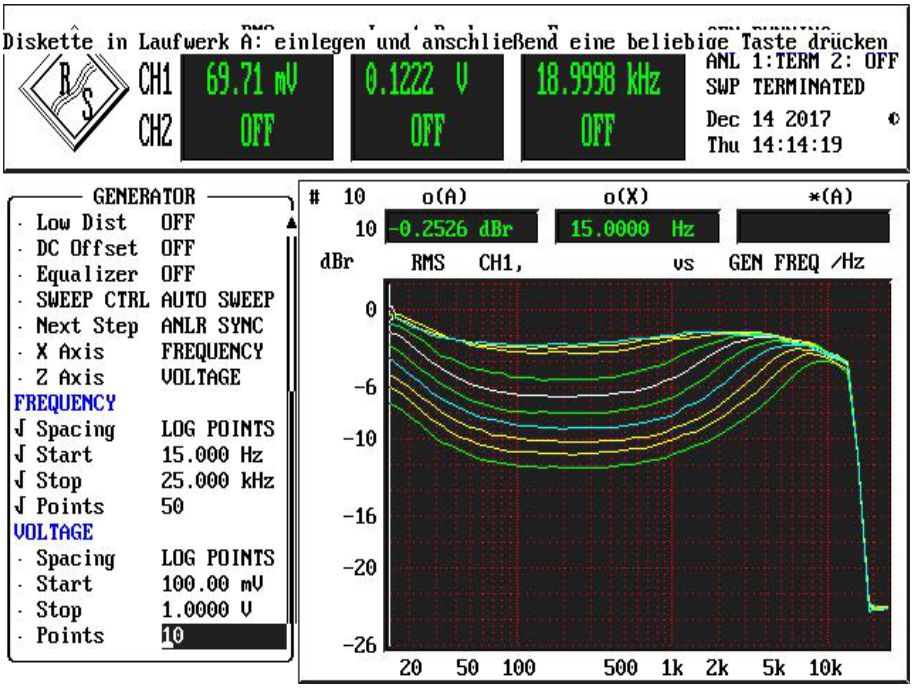
The audio frequency response was measured in accordance with EIA/TIA 603. The plots shows 10 curves with different modulation levels, the test frequency is varied from 15 Hz to 20 kHz.

Plots: Range A1

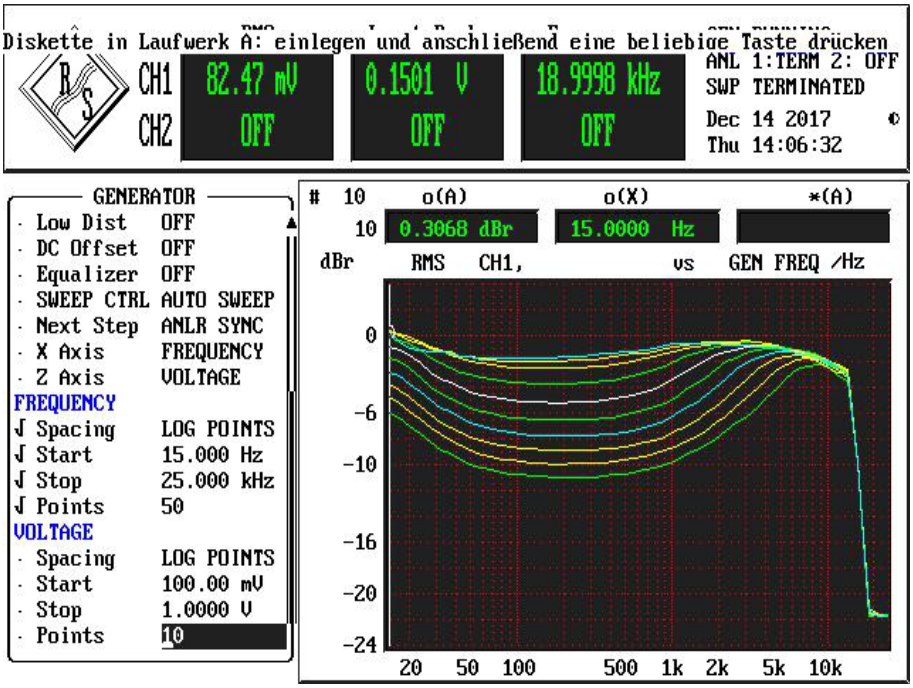
Plot 1: low channel, 10 curves with voltage and frequency variation



Plot 2: middle channel, 10 curves with voltage and frequency variation

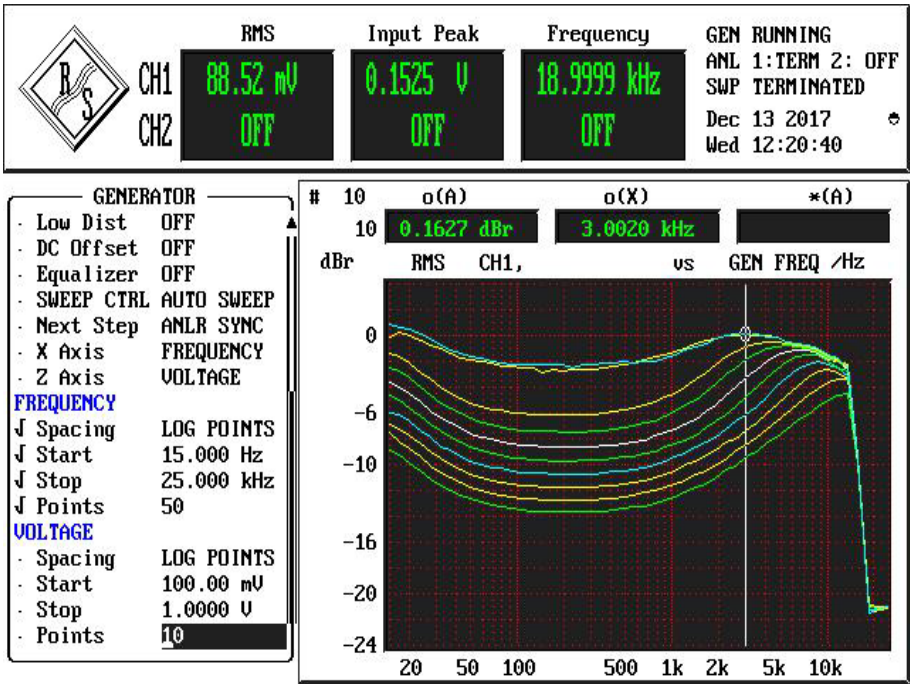


Plot 3: high channel, 10 curves with voltage and frequency variation

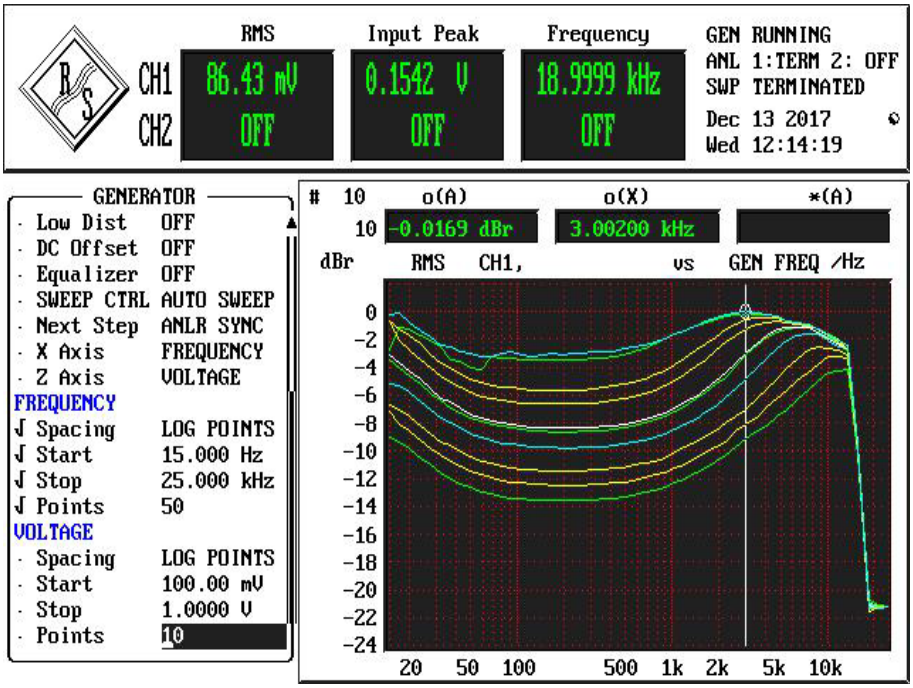


Plots: Range A

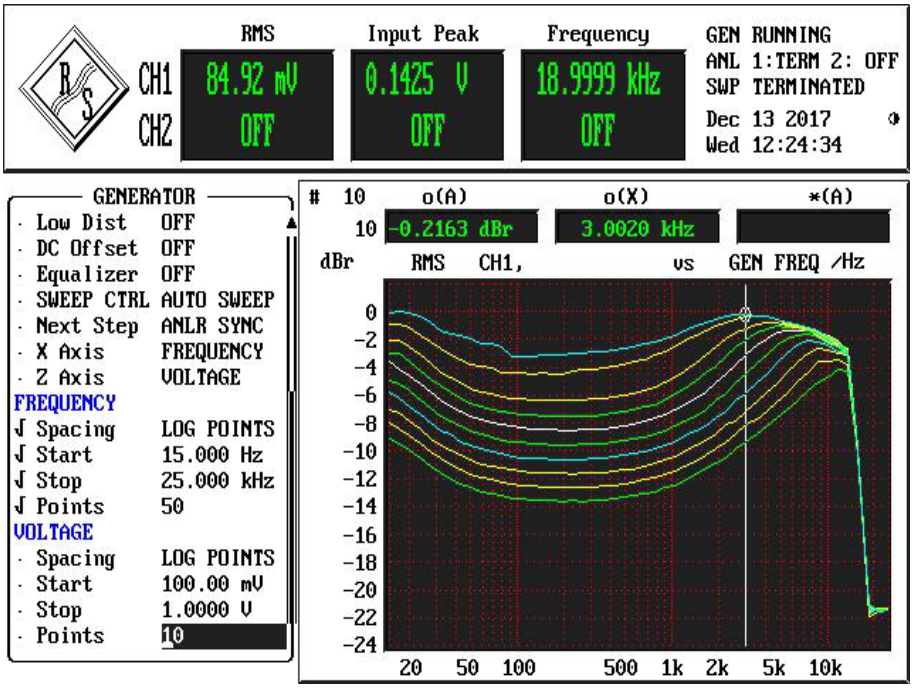
Plot 1: low channel, 10 curves with voltage and frequency variation



Plot 2: middle channel, 10 curves with voltage and frequency variation

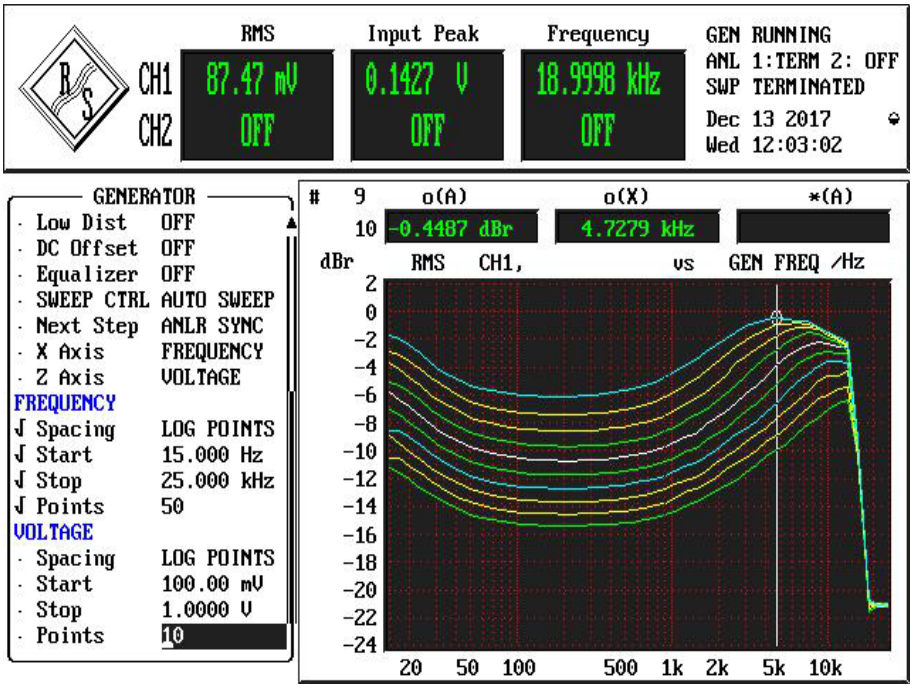


Plot 3: high channel, 10 curves with voltage and frequency variation

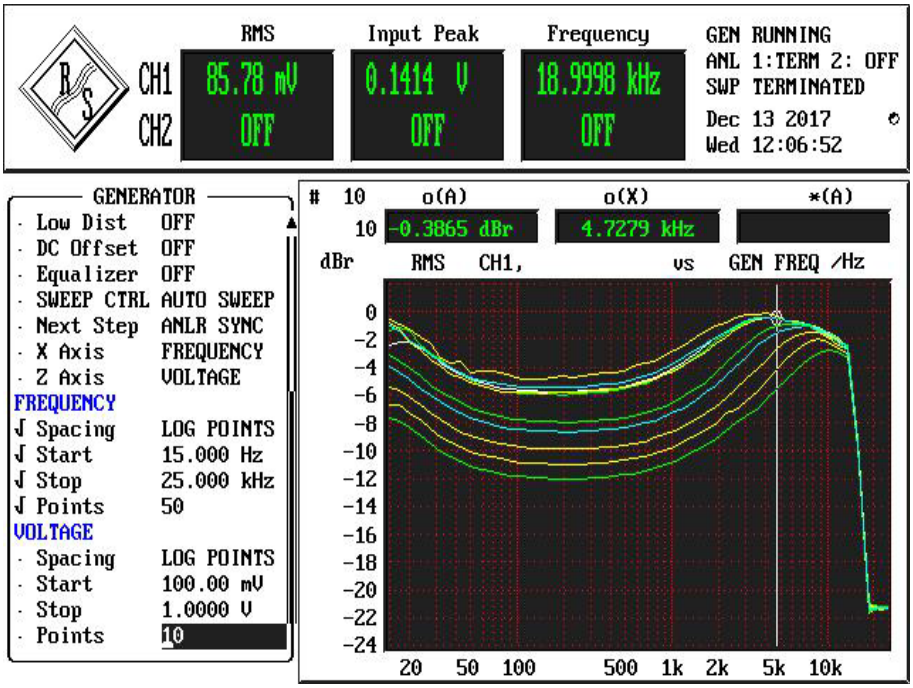


Plots: Range G

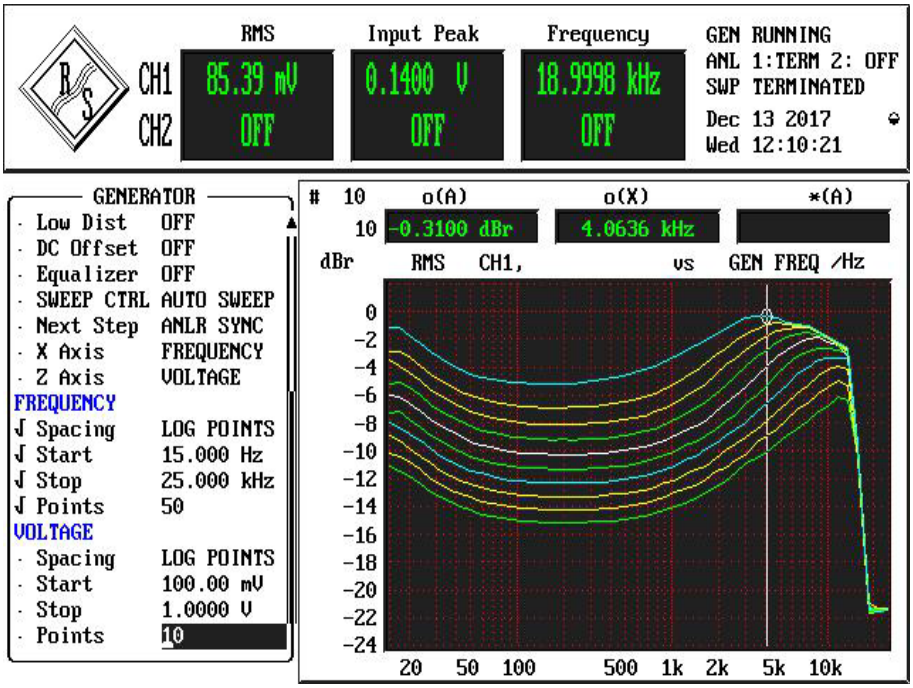
Plot 1: low channel, 10 curves with voltage and frequency variation



Plot 2: middle channel, 10 curves with voltage and frequency variation



Plot 3: high channel, 10 curves with voltage and frequency variation



11.6 Necessary bandwidth (BN) for analogue systems

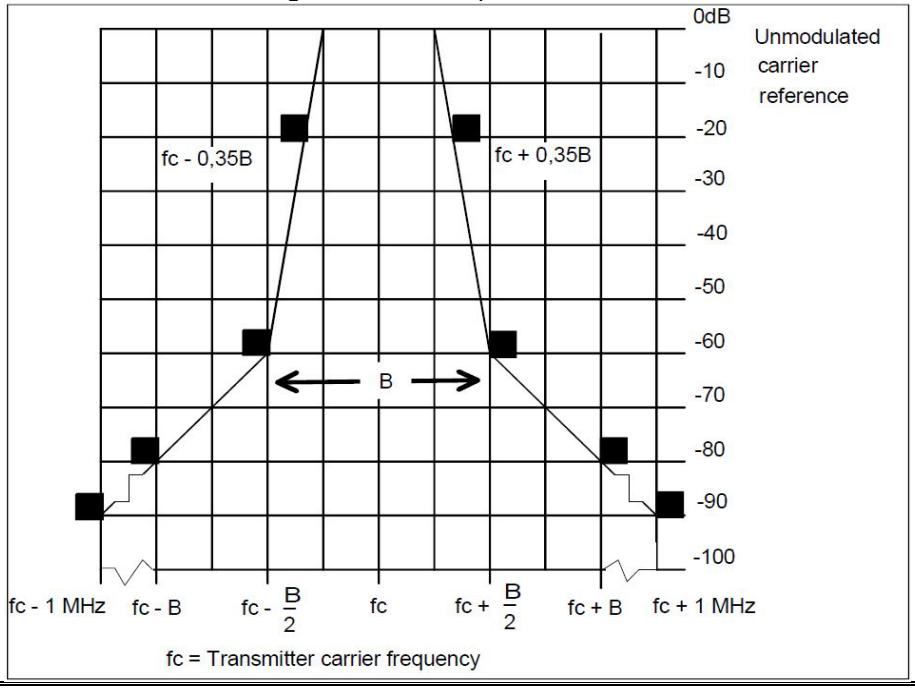
Measurement:

Measurement parameter	
Detector:	Peak / Average (-90 dBc point only)
Sweep time:	Auto
Resolution bandwidth:	1 kHz
Video bandwidth:	1 kHz
Span:	fc - 1 MHz to fc + 1 MHz (2 MHz)
Trace mode:	Max hold/view
EUT:	CW and MC
Test setup:	See sub clause 6.3 - C
Measurement uncertainty:	See sub clause 8

Limits: according to ETSI EN 300 422-1 v1.4.2 (2011-08)

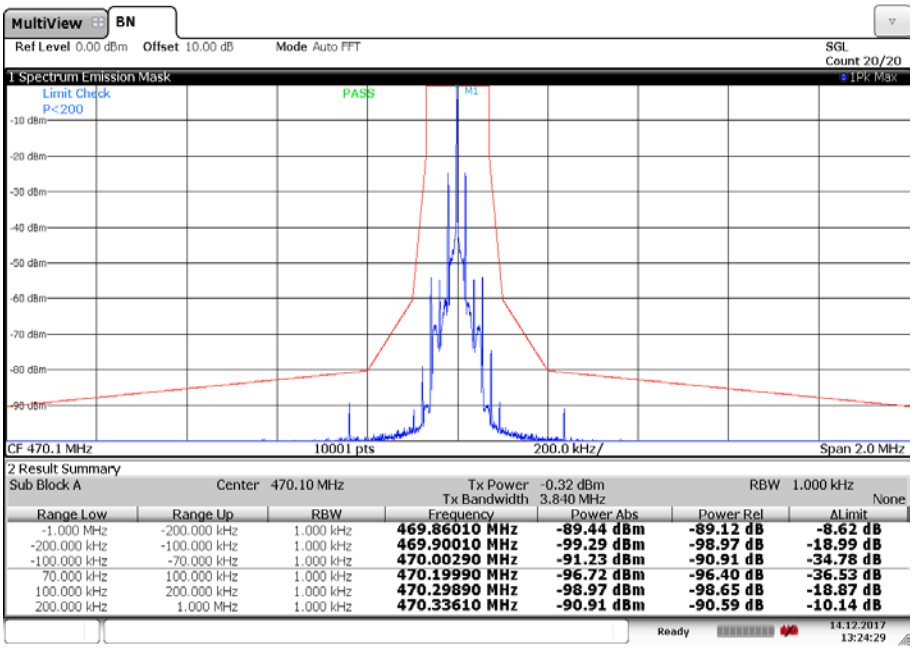
FCC & IC

Signal within the spectrum mask:



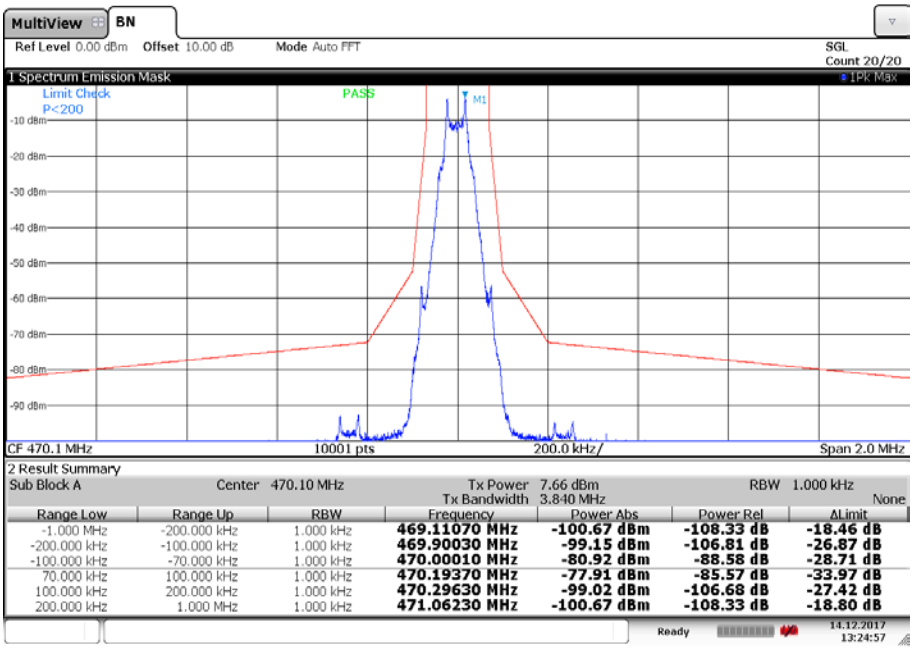
Plots: Range A1, lowest channel

Plot 1: Unmodulated carrier reference (with pilot-tone)



13:24:30 14.12.2017

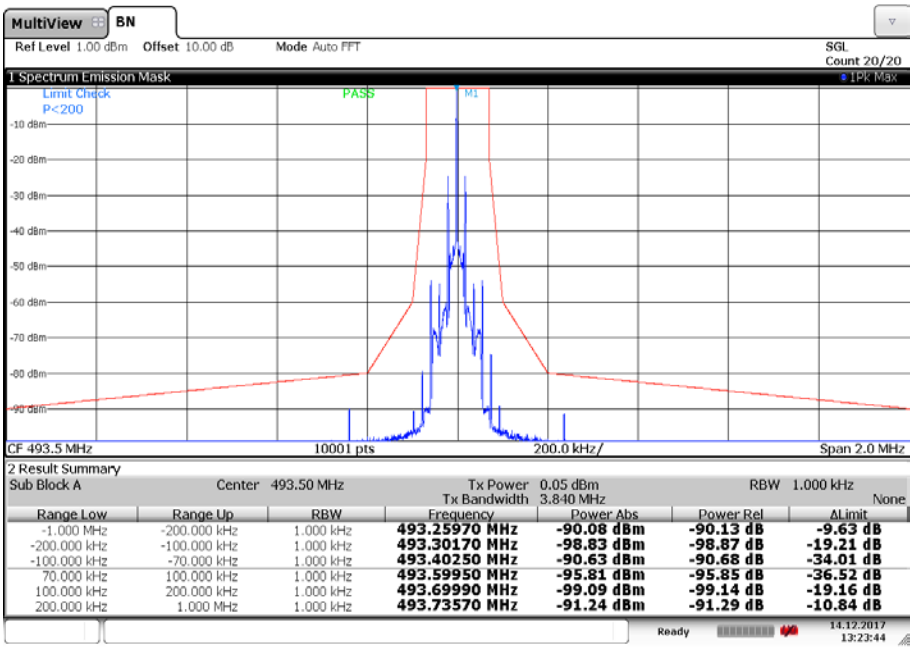
Plot 2: Modulated carrier with the weighted noise source



13:24:58 14.12.2017

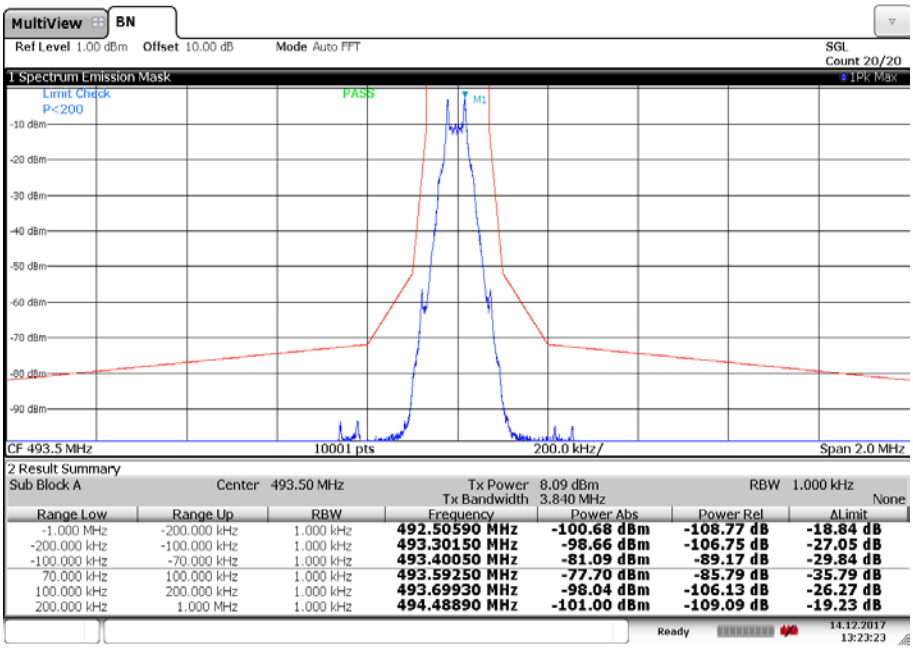
Plots: Range A1, middle channel

Plot 1: Unmodulated carrier reference (with pilot-tone)



13:23:44 14.12.2017

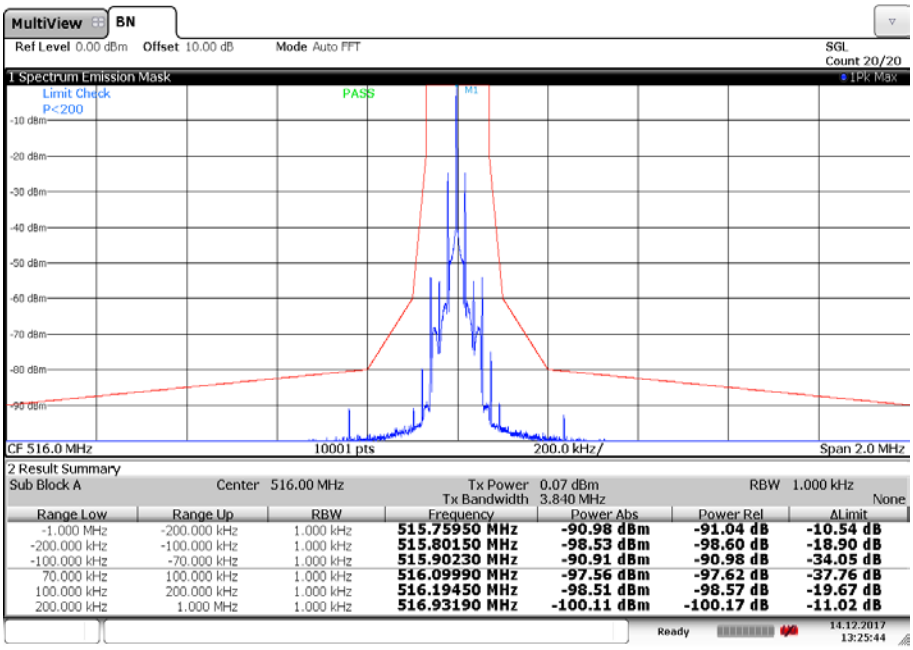
Plot 2: Modulated carrier with the weighted noise source



13:23:24 14.12.2017

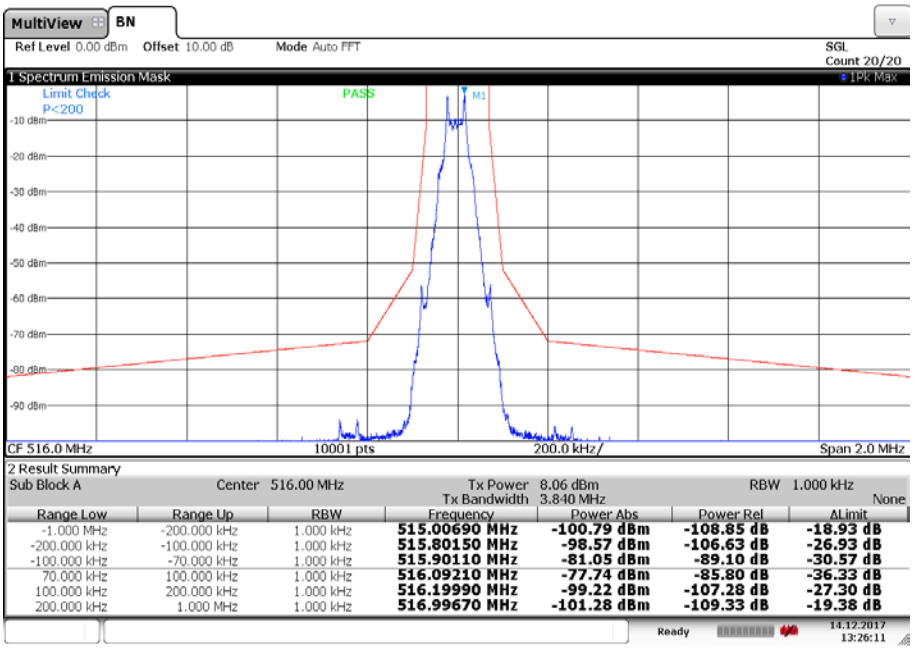
Plots: Range A1, highest channel

Plot 1: Unmodulated carrier reference (with pilot-tone)



13:25:45 14.12.2017

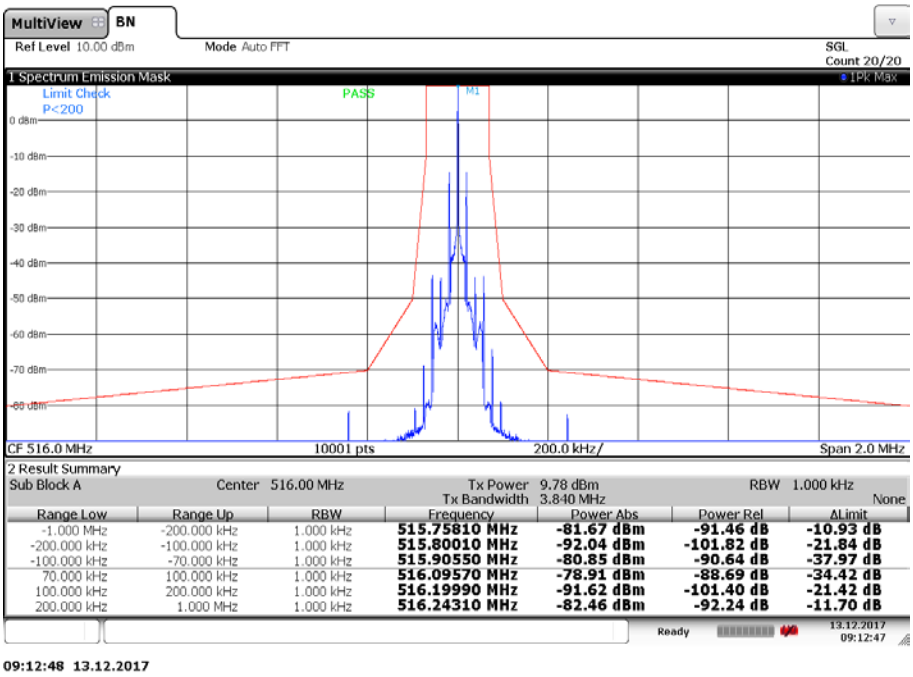
Plot 2: Modulated carrier with the weighted noise source



13:26:11 14.12.2017

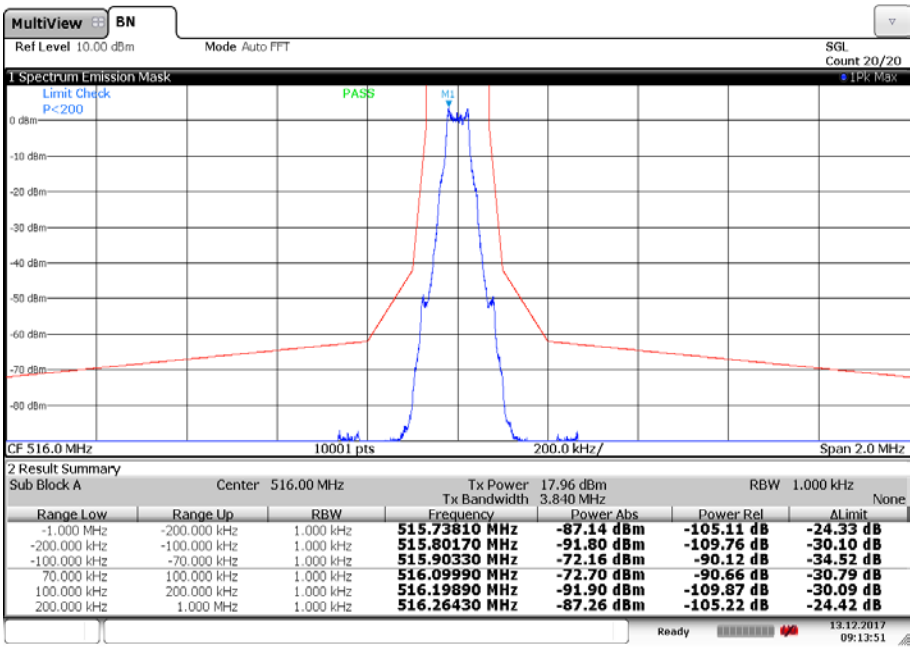
Plots: Range A, lowest channel

Plot 1: Unmodulated carrier reference (with pilot-tone)



09:12:48 13.12.2017

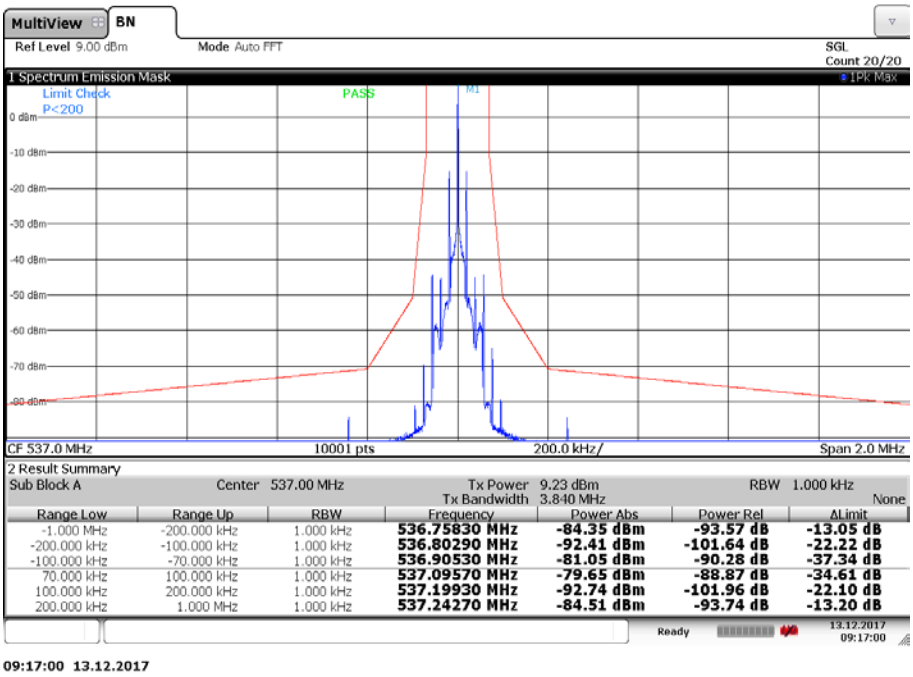
Plot 2: Modulated carrier with the weighted noise source



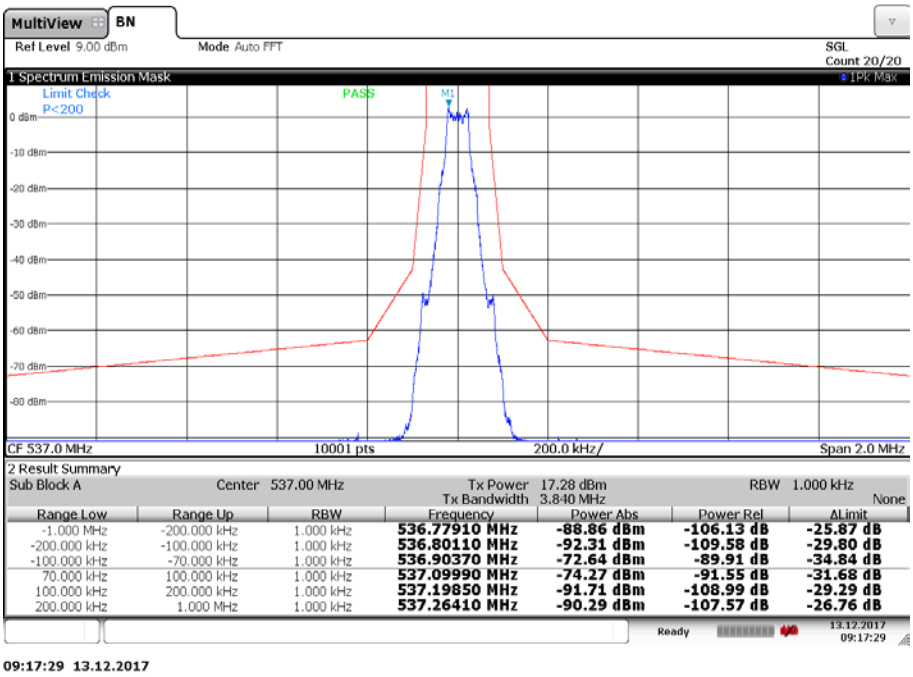
09:13:51 13.12.2017

Plots: Range A, middle channel

Plot 1: Unmodulated carrier reference (with pilot-tone)

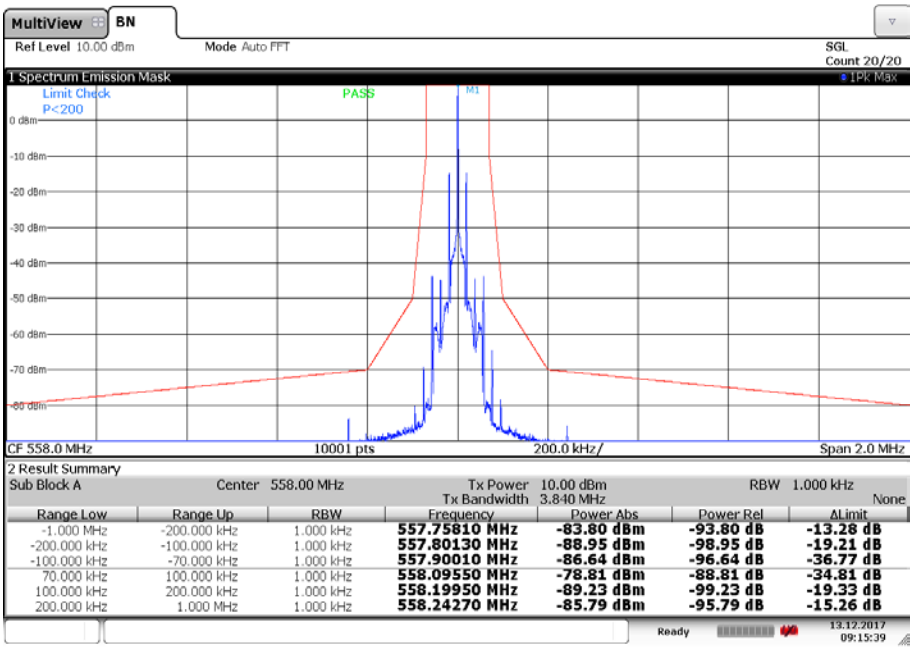


Plot 2: Modulated carrier with the weighted noise source



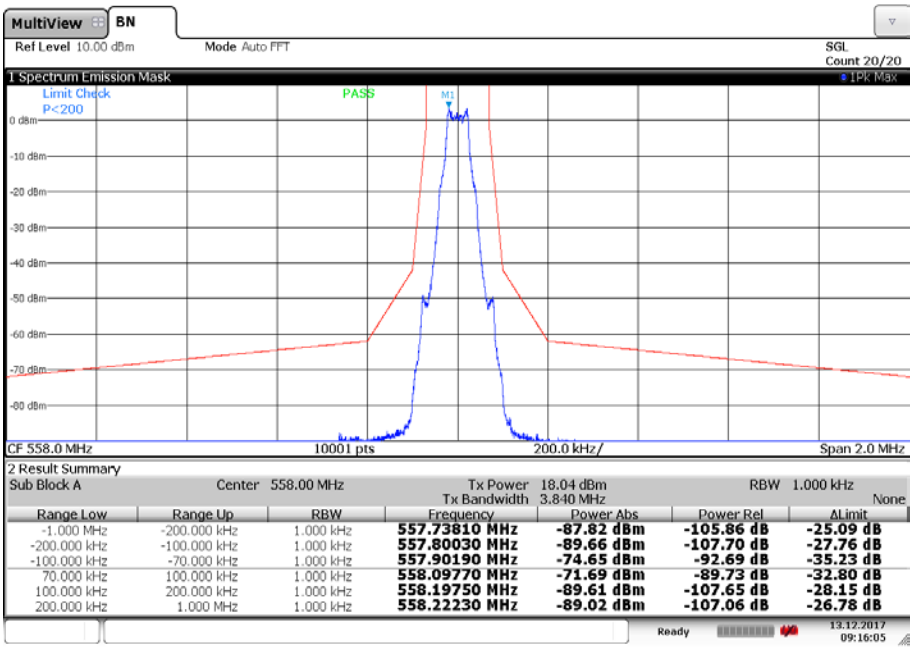
Plots: Range A, highest channel

Plot 1: Unmodulated carrier reference (with pilot-tone)



09:15:40 13.12.2017

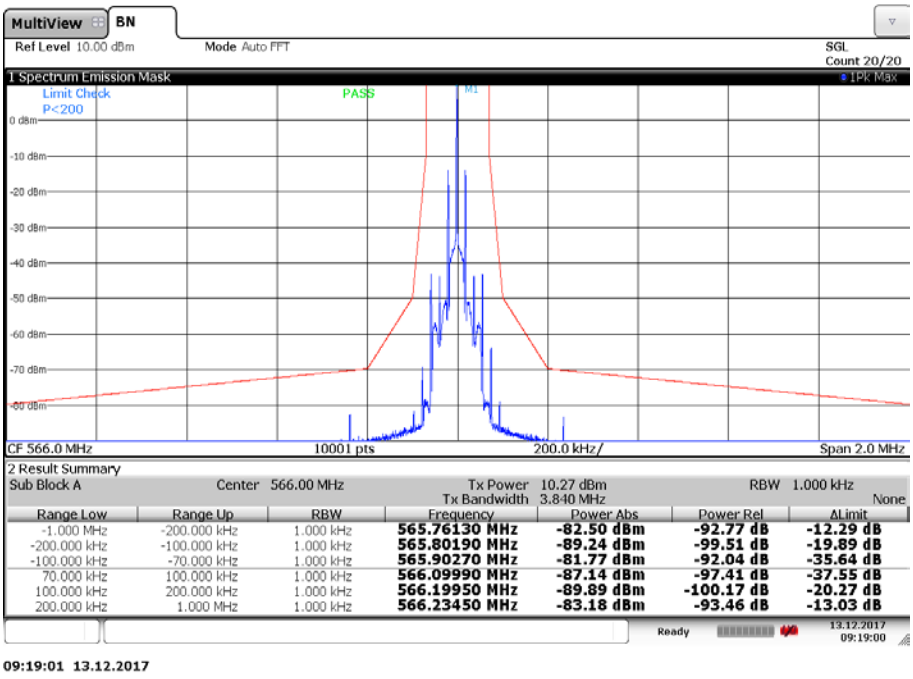
Plot 2: Modulated carrier with the weighted noise source



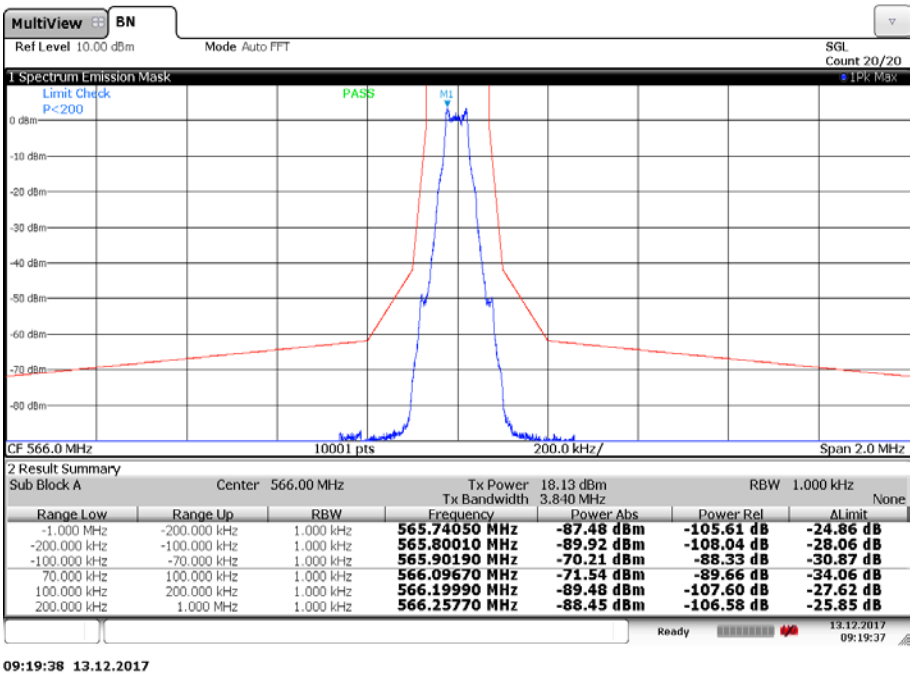
09:16:05 13.12.2017

Plots: Range G, lowest channel

Plot 1: Unmodulated carrier reference (with pilot-tone)

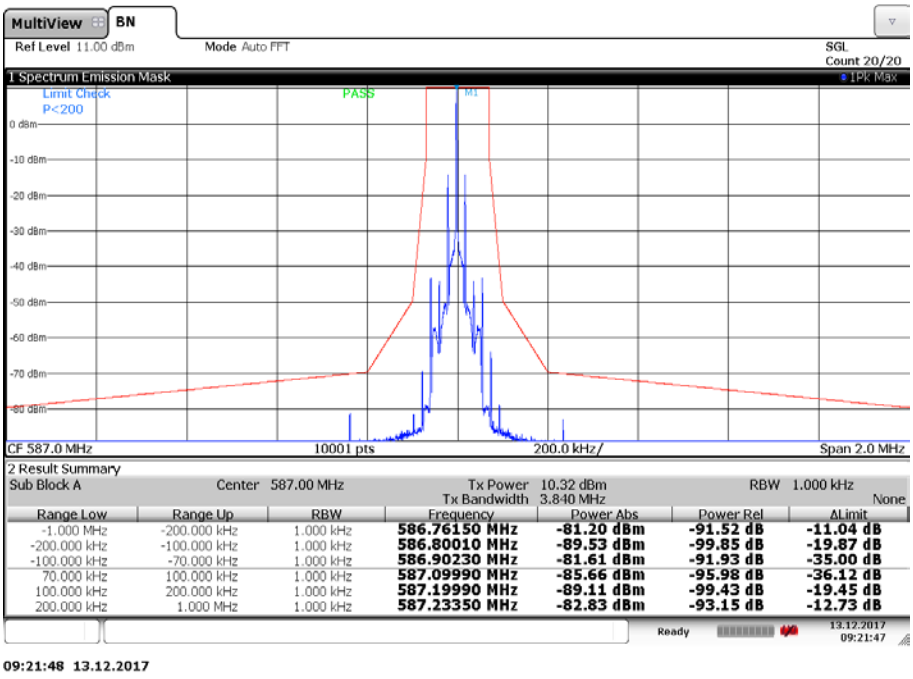


Plot 2: Modulated carrier with the weighted noise source

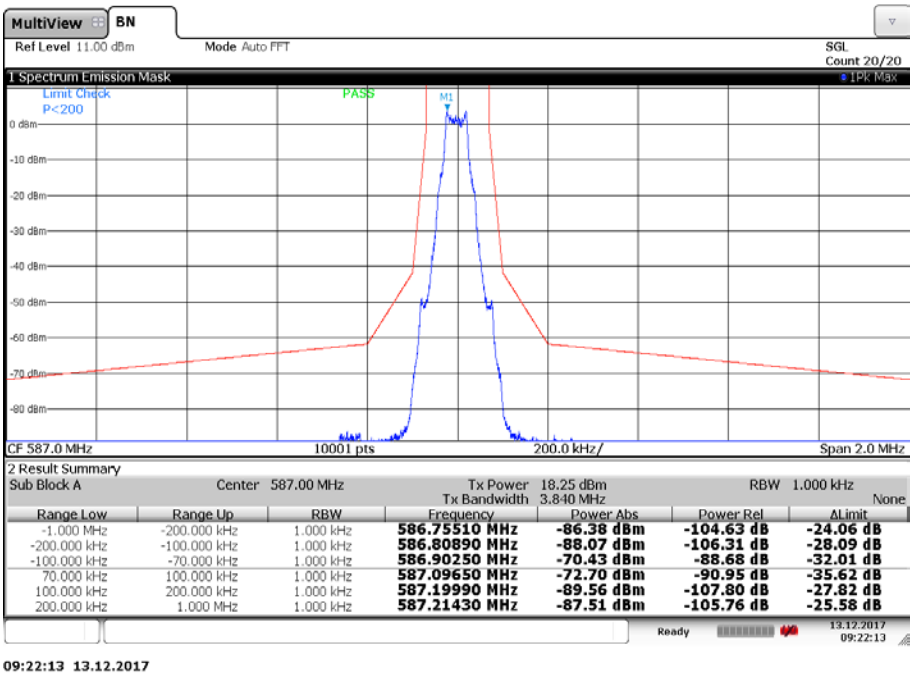


Plots: Range G, middle channel

Plot 1: Unmodulated carrier reference (with pilot-tone)

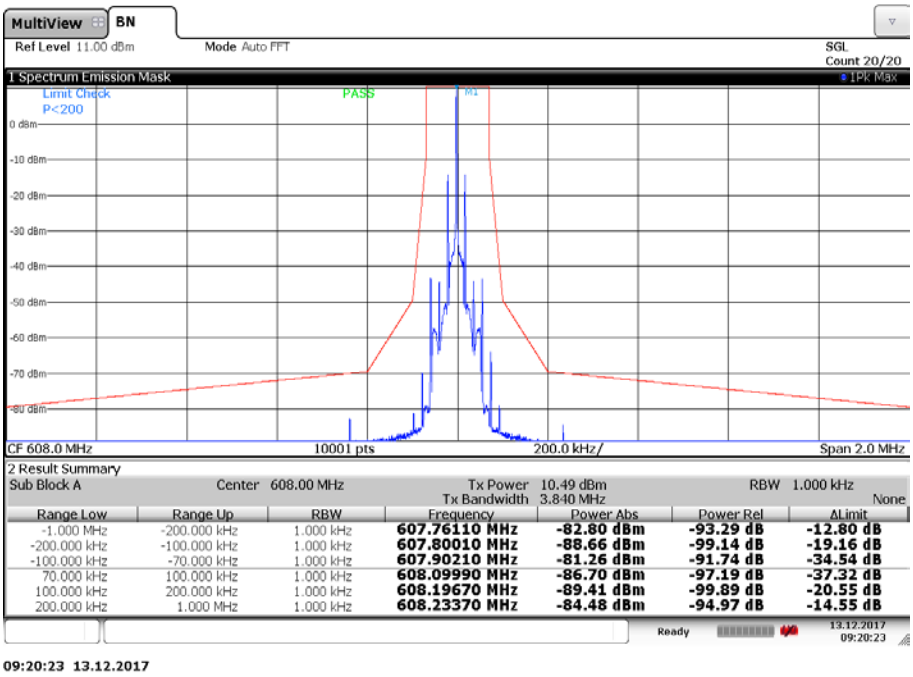


Plot 2: Modulated carrier with the weighted noise source



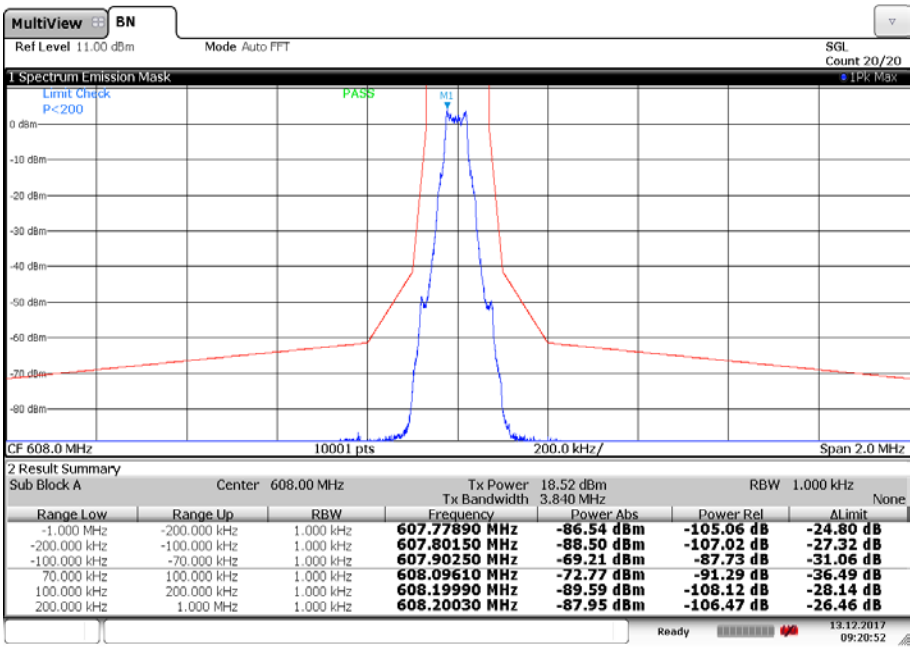
Plots: Range G, highest channel

Plot 1: Unmodulated carrier reference (with pilot-tone)



09:20:23 13.12.2017

Plot 2: Modulated carrier with the weighted noise source



09:20:52 13.12.2017

11.7 Frequency modulation

Measurement:

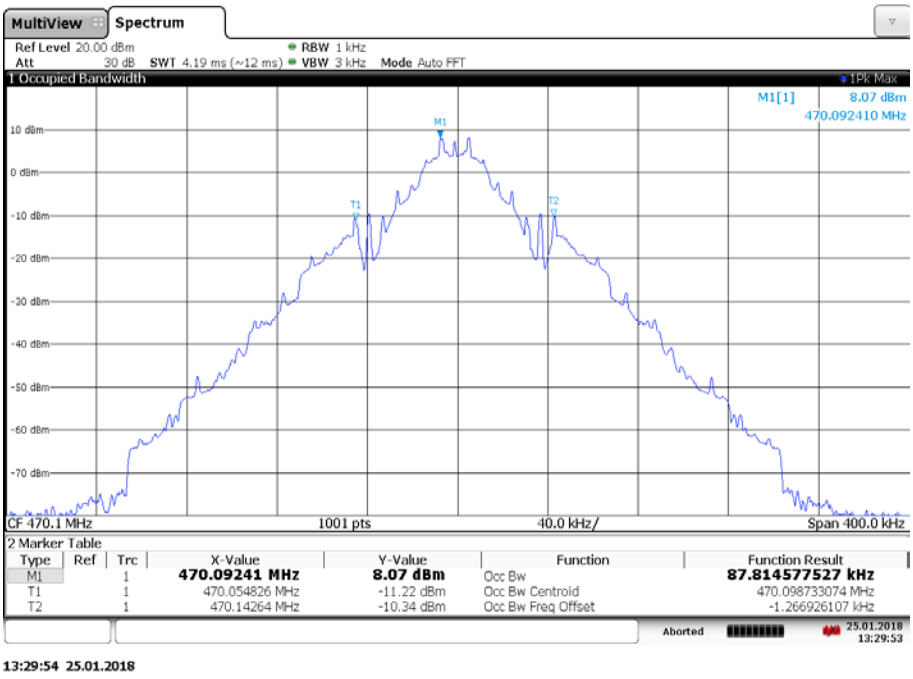
Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 % to 5 % of the occupied bandwidth
Video bandwidth:	3 x resolution bandwidth
Span:	2 x emission bandwidth
Trace mode:	Max. hold
Analyzer function:	99% power occupied bandwidth function
EUT:	Modulated signal with frequency varied between 50 Hz and 15 kHz
Test setup:	See sub clause 6.3 - B
Measurement uncertainty:	See sub clause 8

Limits:

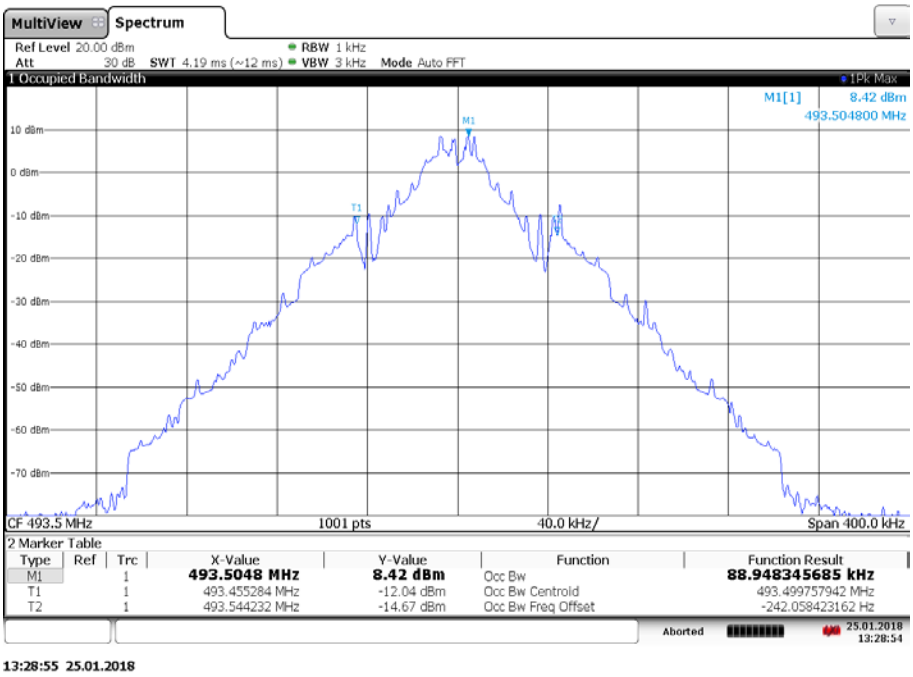
FCC & IC
Frequency deviation up to a maximum of ± 75 kHz

Plots: Range A1

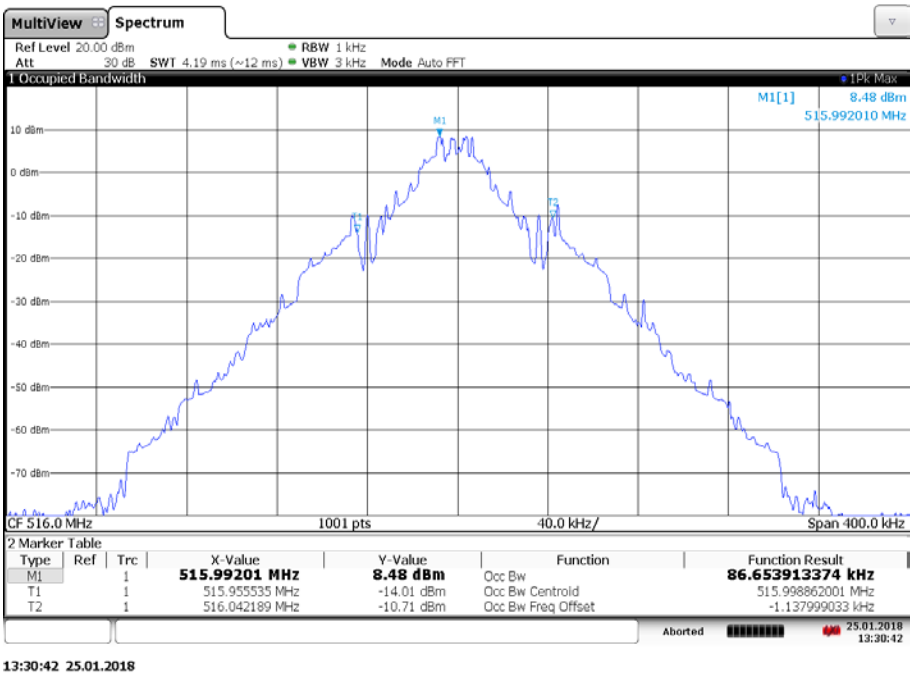
Plot 1: lowest channel, max hold with frequency variation from 50 Hz to 15 kHz



Plot 2: middle channel, max hold with frequency variation from 50 Hz to 15 kHz



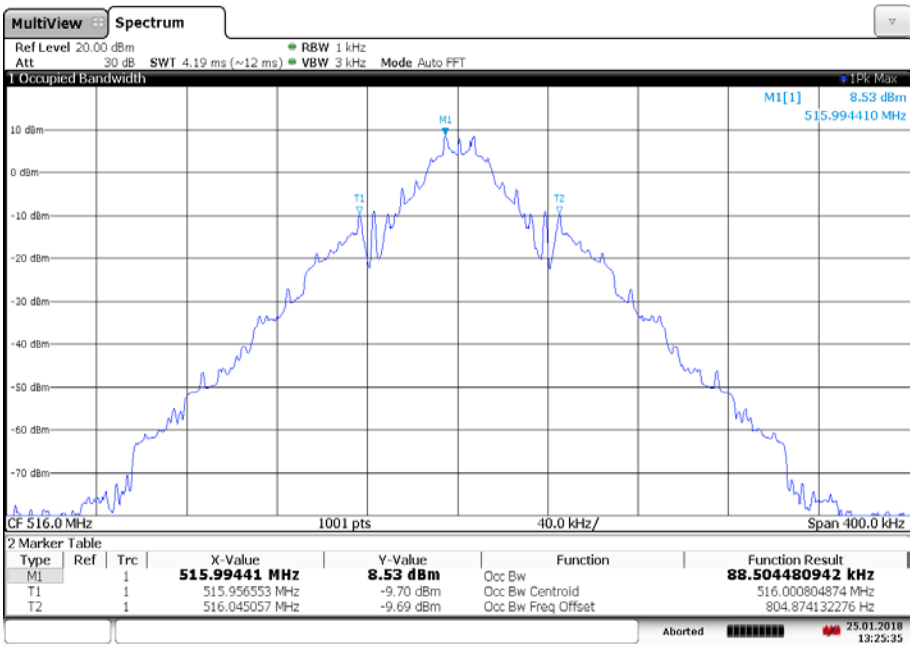
Plot 3: highest channel, max hold with frequency variation from 50 Hz to 15 kHz



13:30:42 25.01.2018

Plots: Range A

Plot 1: lowest channel, max hold with frequency variation from 50 Hz to 15 kHz

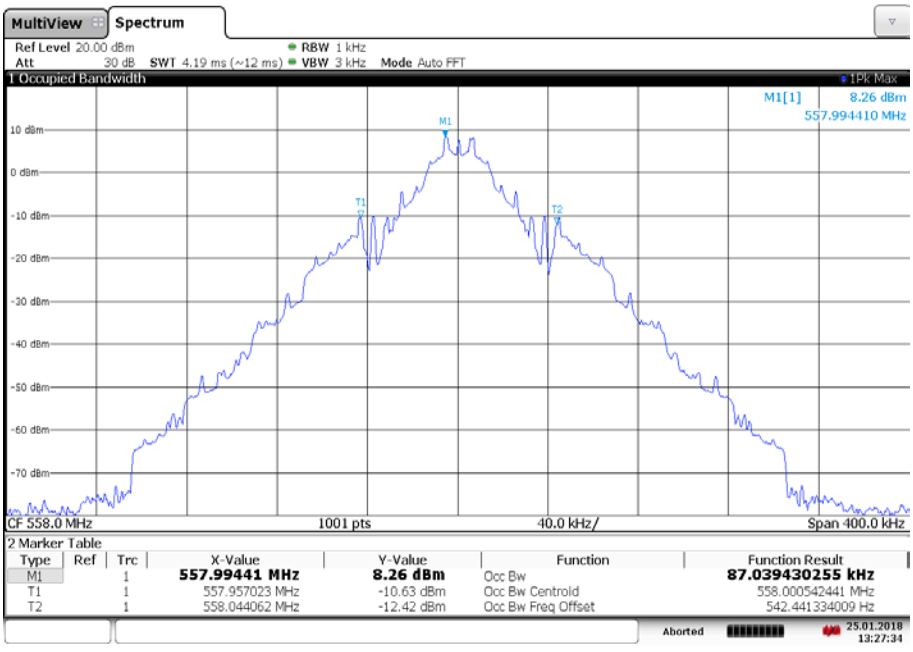


13:25:35 25.01.2018

Plot 2: middle channel, max hold with frequency variation from 50 Hz to 15 kHz

13:26:44 25.01.2018

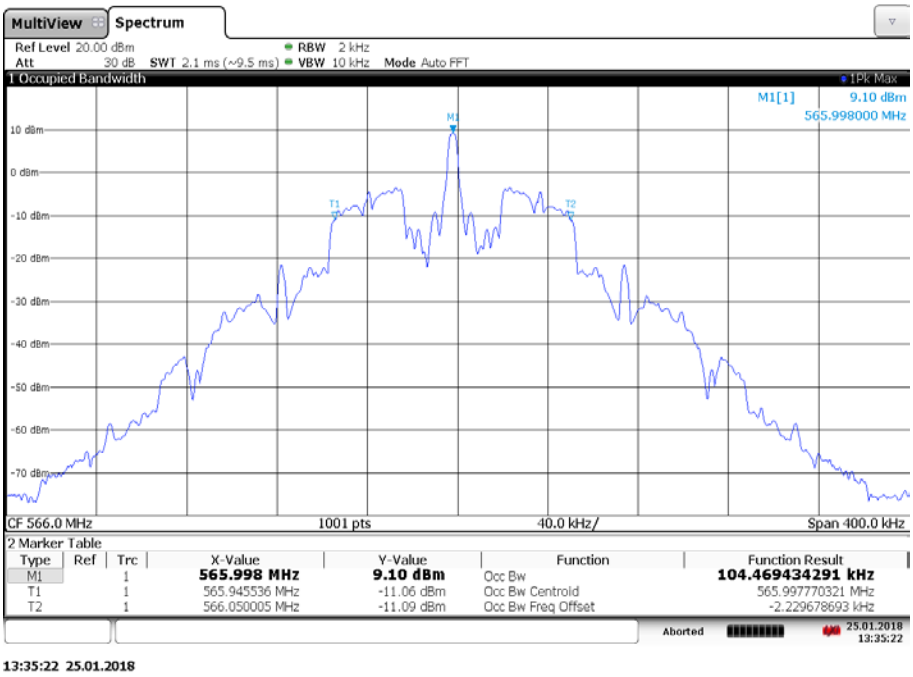
Plot 3: highest channel, max hold with frequency variation from 50 Hz to 15 kHz



13:27:35 25.01.2018

Plots: Range G

Plot 1: lowest channel, max hold with frequency variation from 50 Hz to 15 kHz



13:35:22 25.01.2018

Plot 2: middle channel, max hold with frequency variation from 50 Hz to 15 kHz

13:34:26 25.01.2018

Plot 3: highest channel, max hold with frequency variation from 50 Hz to 15 kHz

11.8 Spurious emissions conducted below 30 MHz (AC conducted)

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are re-measured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace mode:	Max Hold
Test setup:	See sub clause 6.2 – A
Measurement uncertainty:	See sub clause 8

Limits:

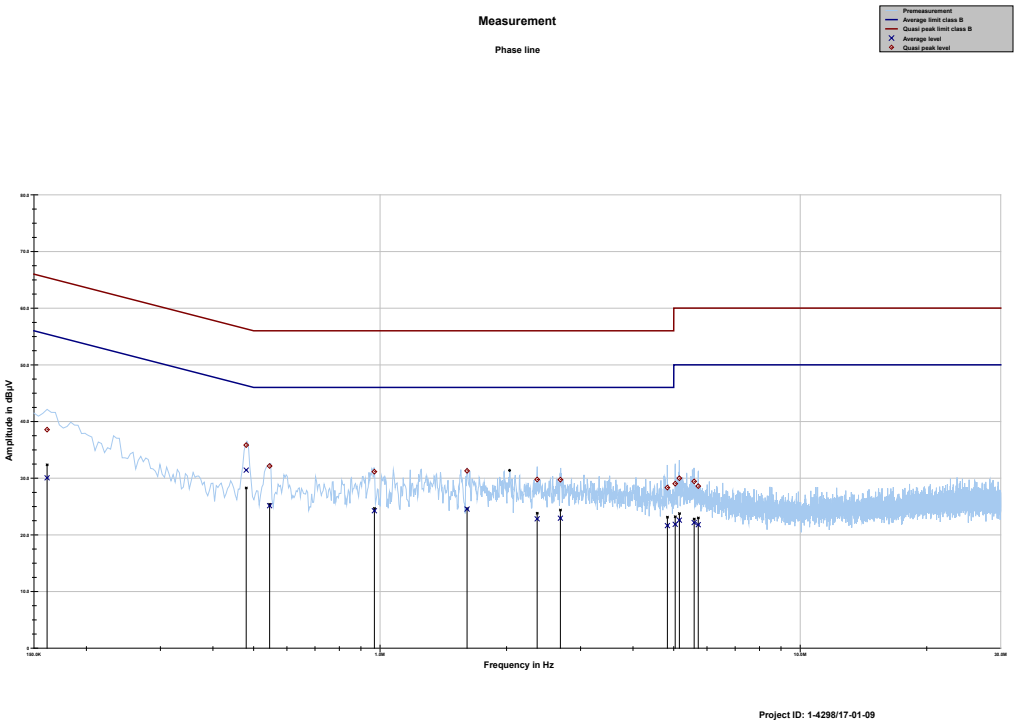
FCC & IC		
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

Results:

TX Spurious Emissions Conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
See table below the plots!		

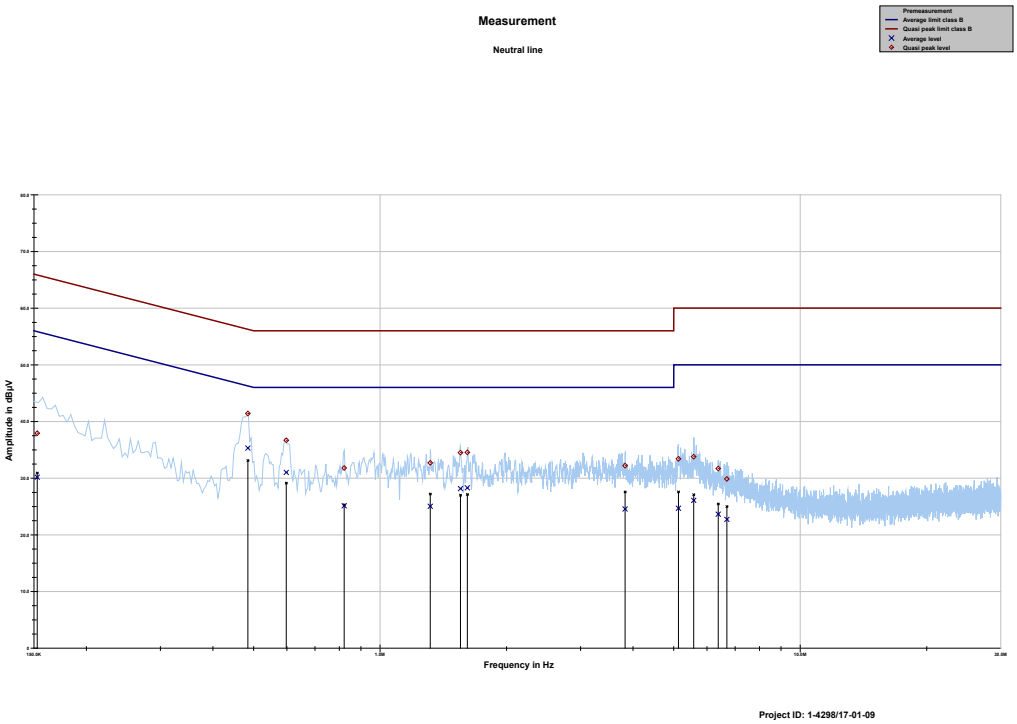
Plots: Frequency range A1, middle channel

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
0.161234	38.55	26.85	65.400	30.05	25.63	55.679
0.480123	35.82	20.51	56.337	31.42	15.15	46.568
0.545748	32.13	23.87	56.000	25.13	20.87	46.000
0.969176	31.14	24.86	56.000	24.25	21.75	46.000
1.610666	31.29	24.71	56.000	24.55	21.45	46.000
2.365649	29.76	26.24	56.000	22.82	23.18	46.000
2.685930	29.73	26.27	56.000	22.93	23.07	46.000
4.828645	28.34	27.66	56.000	21.62	24.38	46.000
5.038565	29.02	30.98	60.000	21.86	28.14	50.000
5.157777	29.99	30.01	60.000	22.59	27.41	50.000
5.591171	29.43	30.57	60.000	22.15	27.85	50.000
5.718963	28.60	31.40	60.000	21.79	28.21	50.000

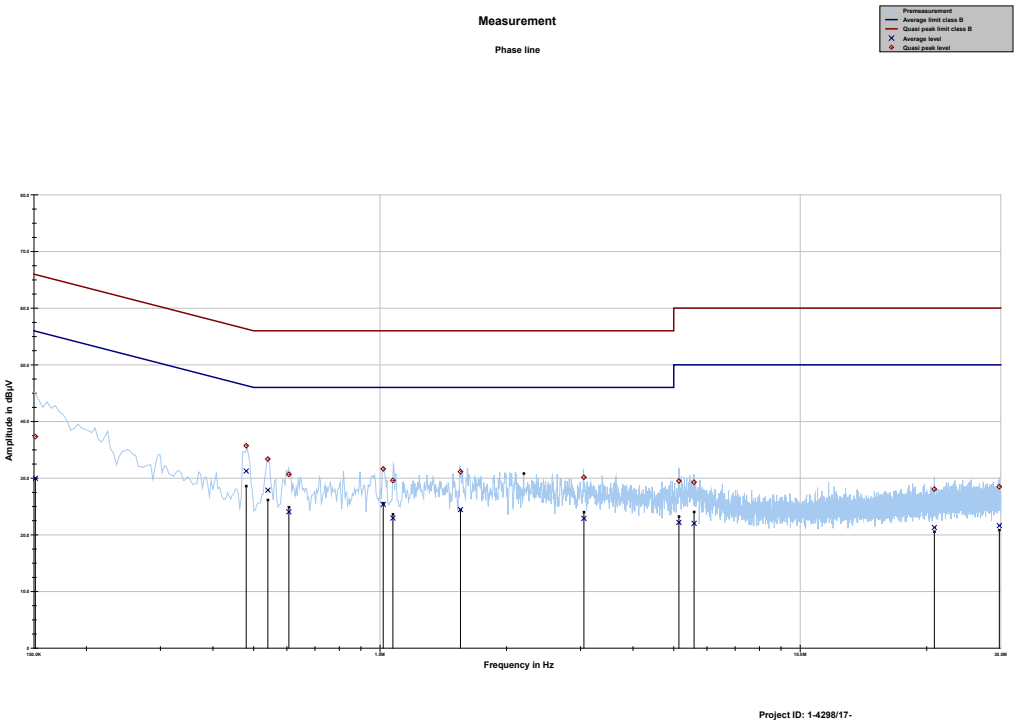
Plot 2: 150 kHz to 30 MHz, neutral line



Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.152754	37.94	27.91	65.849	30.17	25.75	55.921
0.484615	41.41	14.85	56.260	35.31	11.13	46.440
0.597917	36.69	19.31	56.000	31.01	14.99	46.000
0.821520	31.80	24.20	56.000	25.11	20.89	46.000
1.316192	32.70	23.30	56.000	25.03	20.97	46.000
1.553623	34.51	21.49	56.000	28.16	17.84	46.000
1.613509	34.56	21.44	56.000	28.30	17.70	46.000
3.830201	32.20	23.80	56.000	24.56	21.44	46.000
5.130570	33.41	26.59	60.000	24.70	25.30	50.000
5.576509	33.79	26.21	60.000	26.09	23.91	50.000
6.380078	31.69	28.31	60.000	23.64	26.36	50.000
6.688928	29.85	30.15	60.000	22.71	27.29	50.000

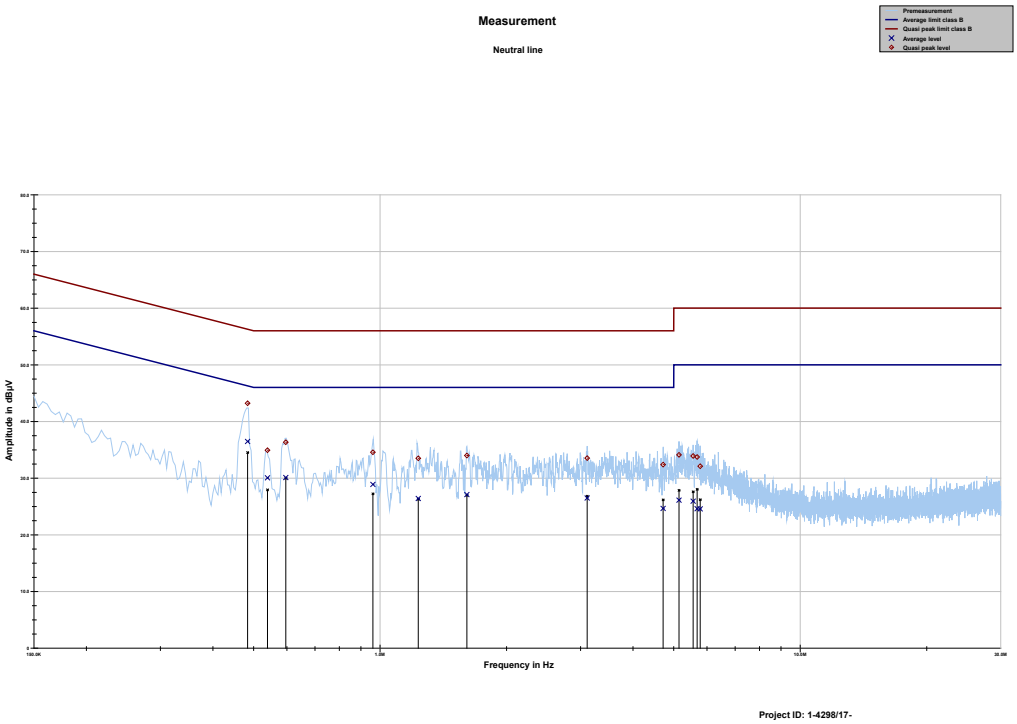
Plots: Frequency range A, middle channel

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
0.151199	37.34	28.59	65.934	29.98	25.98	55.966
0.480044	35.71	20.62	56.338	31.25	15.32	46.570
0.540557	33.37	22.63	56.000	27.87	18.13	46.000
0.606611	30.67	25.33	56.000	24.04	21.96	46.000
1.017125	31.63	24.37	56.000	25.36	20.64	46.000
1.072563	29.60	26.40	56.000	22.95	23.05	46.000
1.553438	31.14	24.86	56.000	24.45	21.55	46.000
3.056567	30.15	25.85	56.000	22.89	23.11	46.000
5.143105	29.50	30.50	60.000	22.17	27.83	50.000
5.588244	29.28	30.72	60.000	22.02	27.98	50.000
20.854536	28.08	31.92	60.000	21.28	28.72	50.000
29.782612	28.48	31.52	60.000	21.63	28.37	50.000

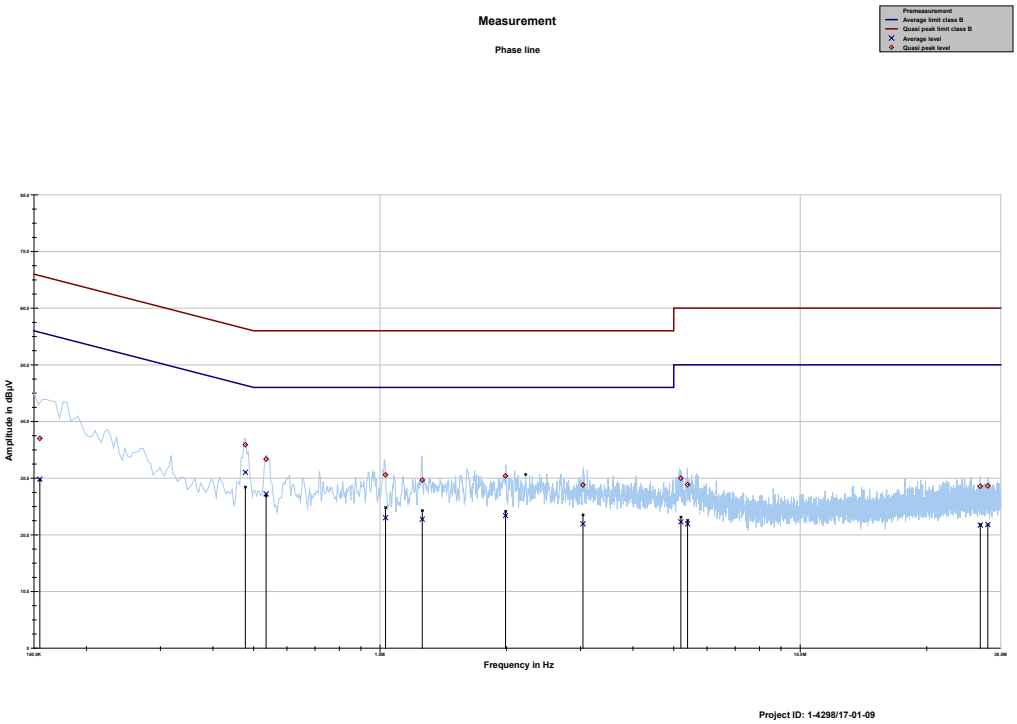
Plot 2: 150 kHz to 30 MHz, neutral line



Frequency	Quasi peak level	Margin quasi peak	Limit QP	Average level	Margin average	Limit AV
MHz	dBµV	dB	dBµV	dBµV	dB	dBµV
0.483713	43.22	13.06	56.275	36.47	9.99	46.465
0.539492	34.93	21.07	56.000	30.06	15.94	46.000
0.596451	36.34	19.66	56.000	30.11	15.89	46.000
0.961310	34.57	21.43	56.000	28.90	17.10	46.000
1.232952	33.50	22.50	56.000	26.42	19.58	46.000
1.609112	33.99	22.01	56.000	27.10	18.90	46.000
3.110794	33.54	22.46	56.000	26.49	19.51	46.000
4.717039	32.38	23.62	56.000	24.66	21.34	46.000
5.147087	34.10	25.90	60.000	26.11	23.89	50.000
5.559572	33.91	26.09	60.000	25.94	24.06	50.000
5.682928	33.74	26.26	60.000	24.60	25.40	50.000
5.779926	32.10	27.90	60.000	24.57	25.43	50.000

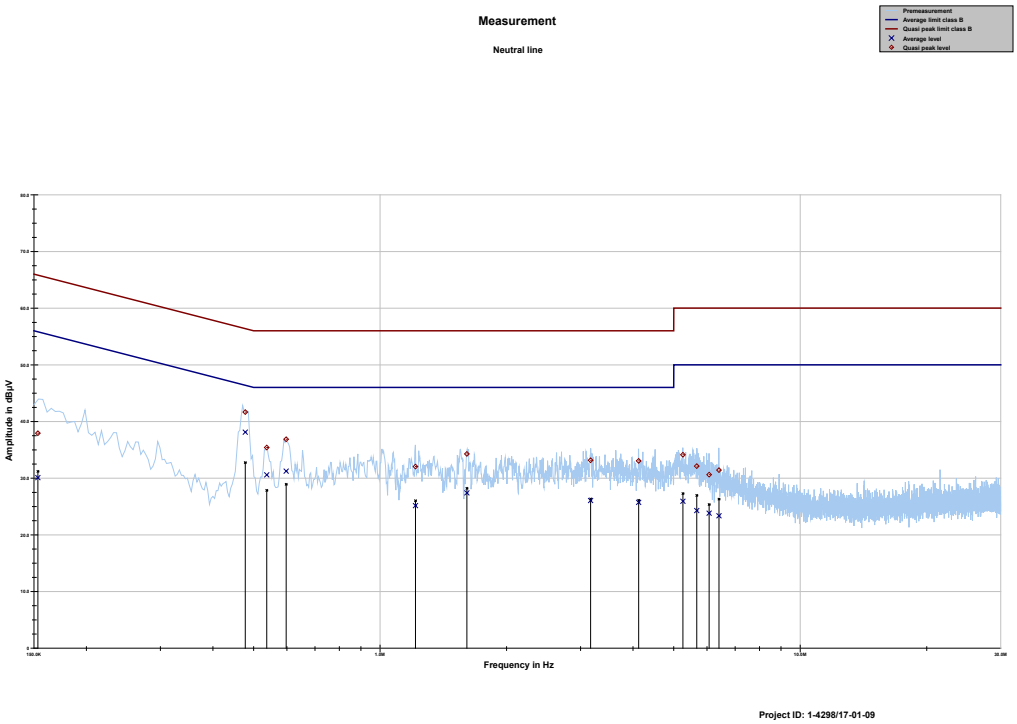
Plots: Frequency range G, middle channel

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
0.154932	37.02	28.71	65.731	29.83	26.03	55.859
0.477789	35.89	20.48	56.377	31.02	15.62	46.635
0.535439	33.36	22.64	56.000	27.24	18.76	46.000
1.030258	30.57	25.43	56.000	23.02	22.98	46.000
1.260320	29.66	26.34	56.000	22.75	23.25	46.000
1.988690	30.40	25.60	56.000	23.39	22.61	46.000
3.039829	28.81	27.19	56.000	21.95	24.05	46.000
5.199250	29.99	30.01	60.000	22.29	27.71	50.000
5.392471	28.86	31.14	60.000	21.94	28.06	50.000
26.830633	28.58	31.42	60.000	21.71	28.29	50.000
27.953001	28.64	31.36	60.000	21.82	28.18	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
0.153274	37.93	27.89	65.821	30.09	25.82	55.906
0.477691	41.66	14.72	56.379	38.11	8.53	46.637
0.537323	35.41	20.59	56.000	30.59	15.41	46.000
0.597589	36.86	19.14	56.000	31.24	14.76	46.000
1.214125	32.05	23.95	56.000	25.15	20.85	46.000
1.609098	34.28	21.72	56.000	27.40	18.60	46.000
3.170466	33.15	22.85	56.000	26.05	19.95	46.000
4.124920	33.04	22.96	56.000	25.73	20.27	46.000
5.257729	34.12	25.88	60.000	25.91	24.09	50.000
5.671508	32.12	27.88	60.000	24.27	25.73	50.000
6.069394	30.61	29.39	60.000	23.82	26.18	50.000
6.405009	31.41	28.59	60.000	23.36	26.64	50.000

12 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/N_0	Carrier to noise-density ratio, expressed in dB-Hz

Annex B Document history

Version	Applied changes	Date of release
-/-	Initial release	2018-03-21

Annex C Accreditation Certificate

first page	last page
	

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