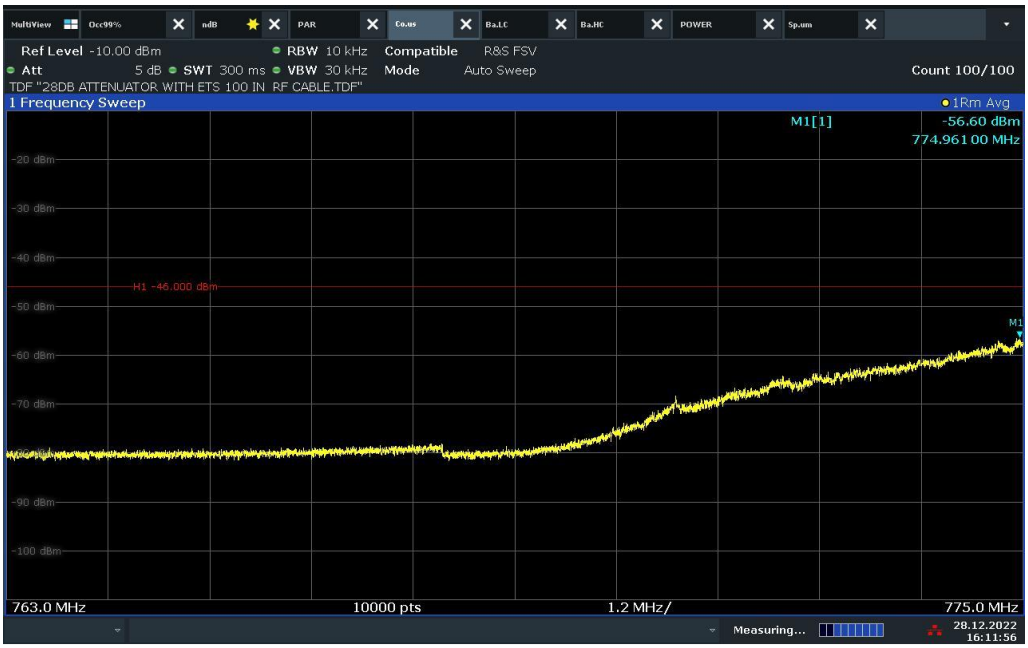
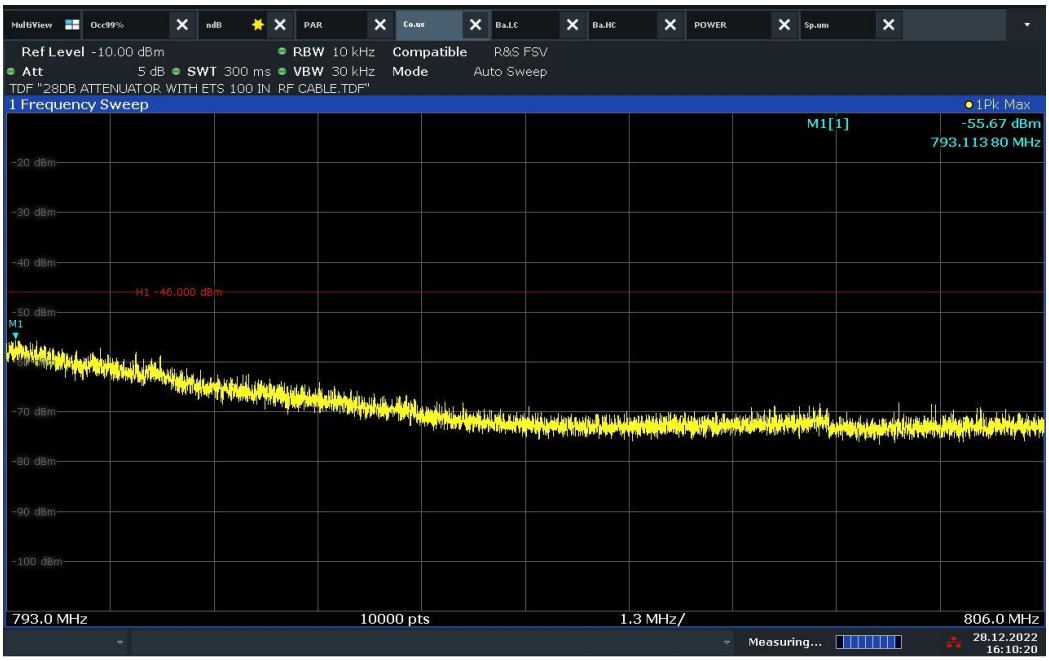
LTE Band 13 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions (763-775 MHz)



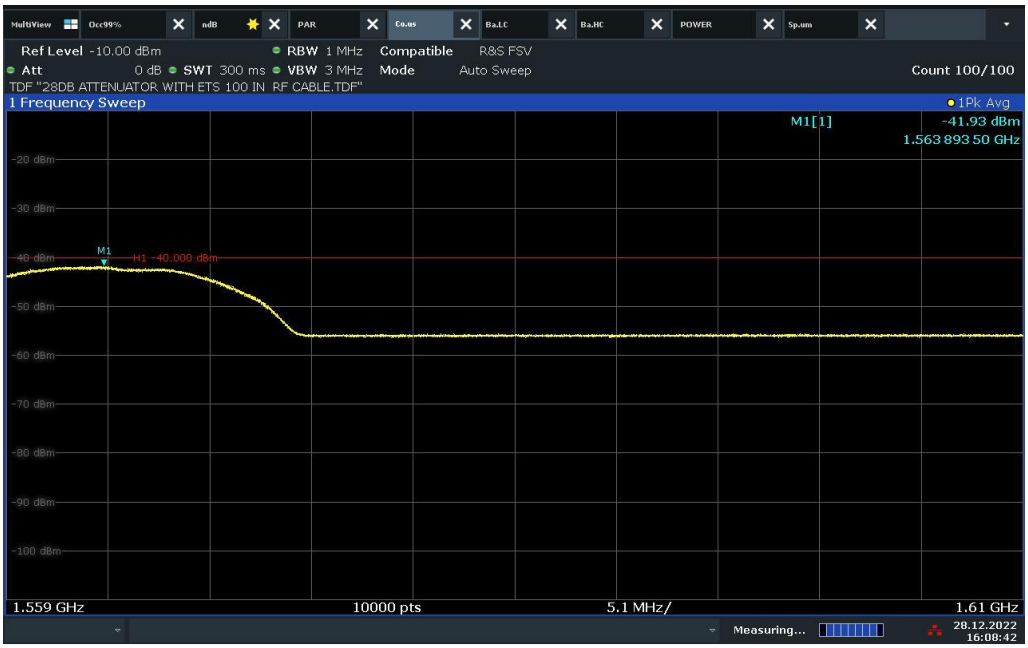
16:11:57 28.12.2022

LTE Band 13 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions (793-806 MHz)



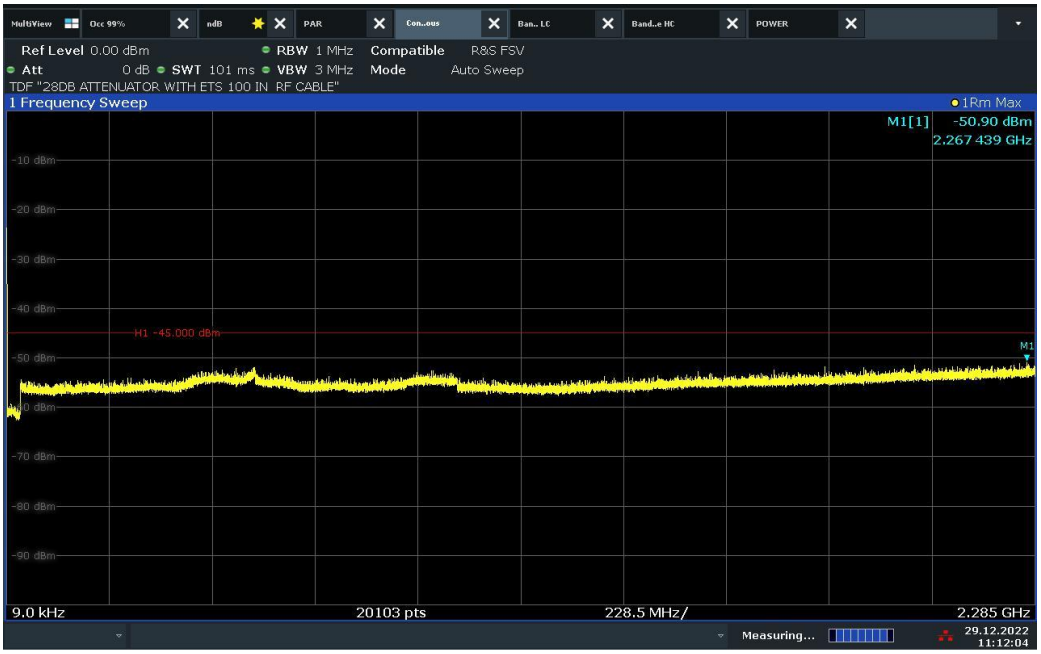
16:10:21 28.12.2022

LTE Band 13 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions (1559-1610 MHz)



16:08:43 28.12.2022

LTE Band 30 Downlink 5MHz Bandwidth Middle Channel Conducted Spurious Emissions (9k - 2285 MHz)

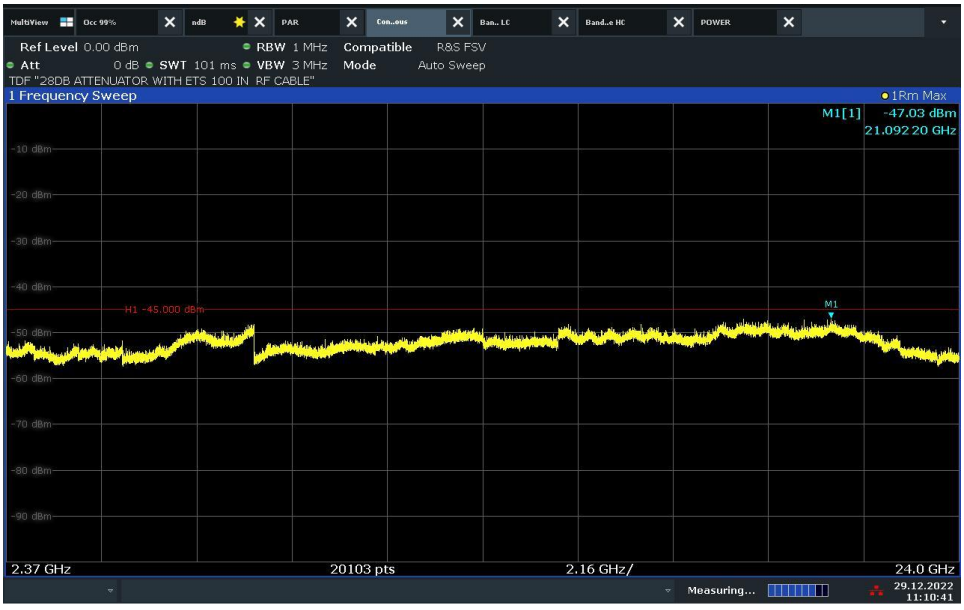


11:12:05 29.12.2022

LTE Band 30 Downlink 5MHz Bandwidth Middle Channel Conducted Spurious Emissions (2200 - 2395 MHz)

14:01:34 29.12.2022

LTE Band 30 Downlink 5MHz Bandwidth Middle Channel Conducted Spurious Emissions (2370 - 24 GHz)



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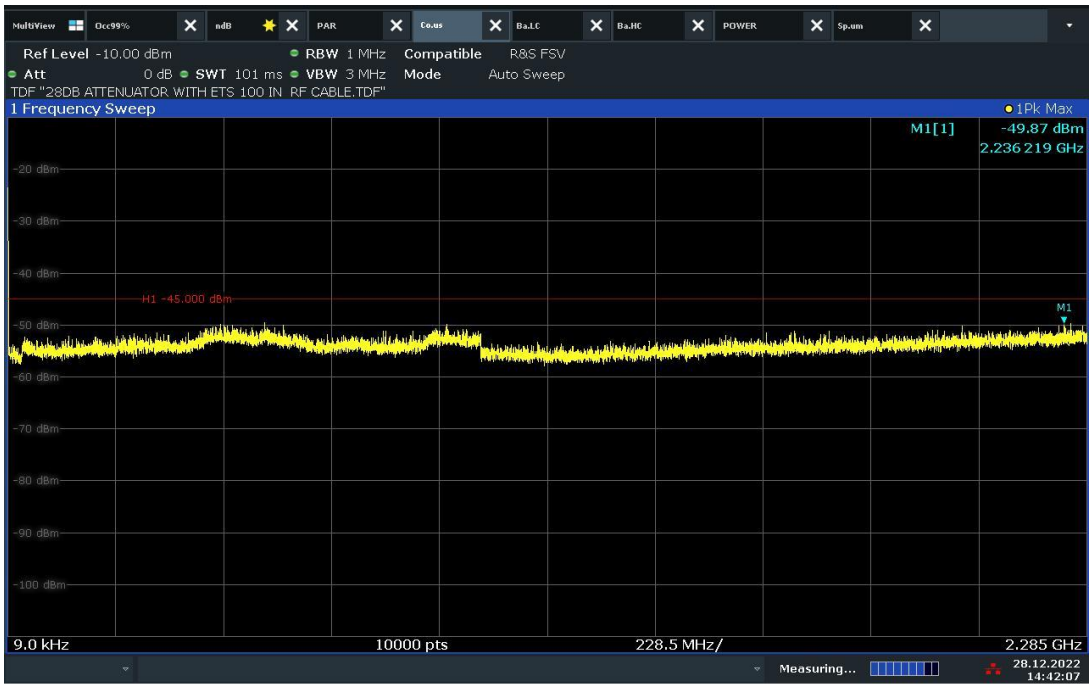
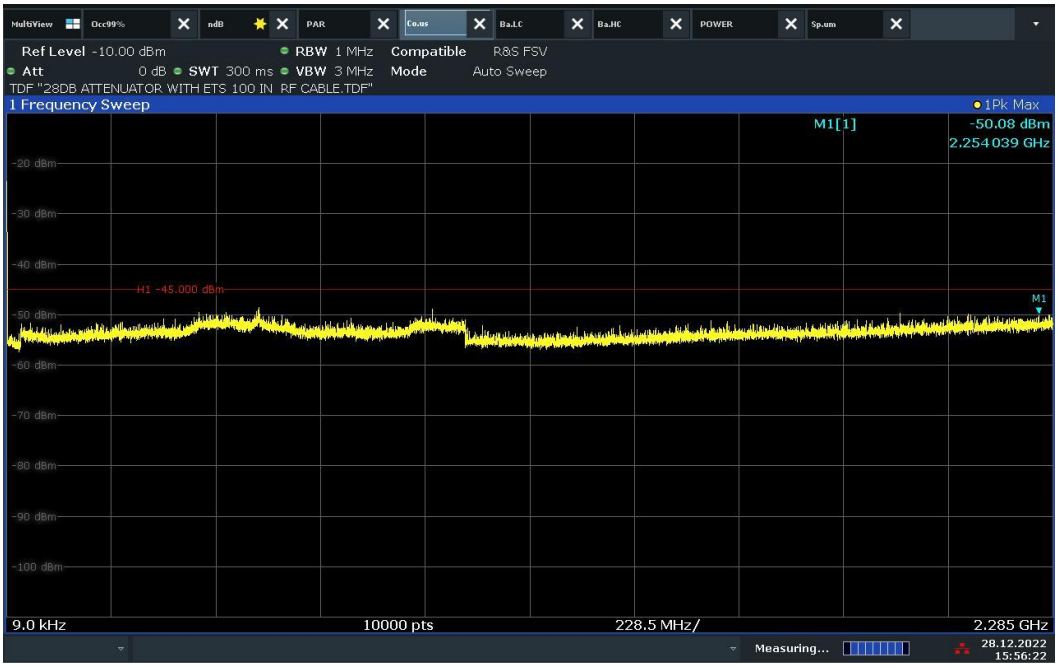
LTE Band 30 Downlink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions (9k - 2285 MHz)



14:42:07 28.12.2022

LTE Band 30 Downlink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions (2200 - 2395 MHz)

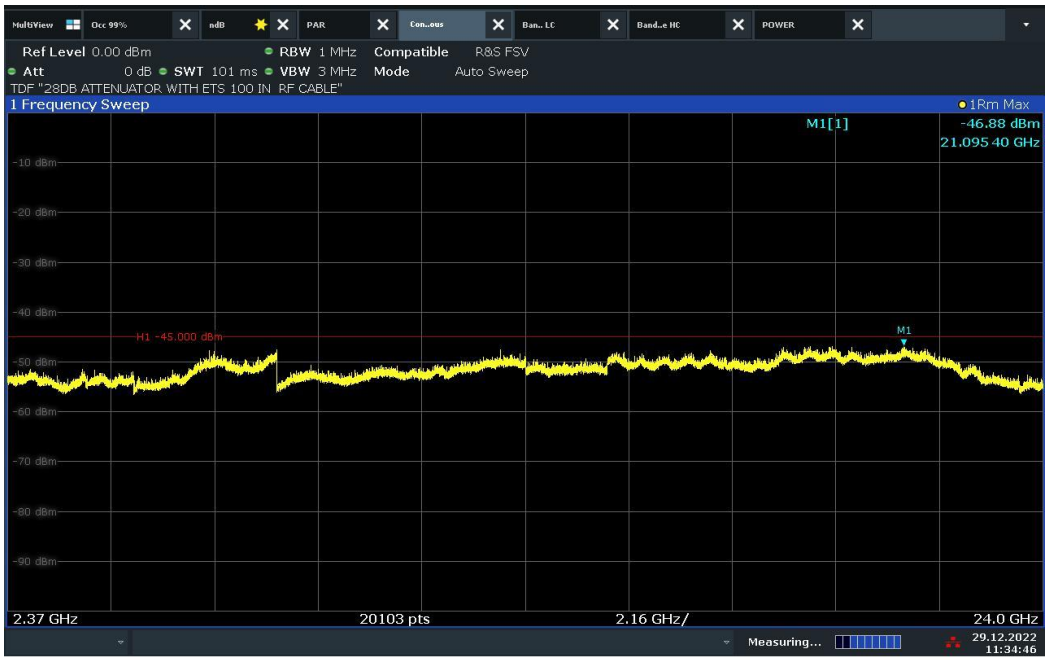
13:58:40 29.12.2022

LTE Band 30 Downlink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions (2370 - 24 GHz)
 16:41:58 28.12.2022
LTE Band 30 Uplink 5MHz Bandwidth Middle Channel Conducted Spurious Emissions (9k - 2285 MHz)
 15:56:23 28.12.2022

LTE Band 30 Uplink 5MHz Bandwidth Middle Channel Conducted Spurious Emissions (2200 - 2395 MHz)

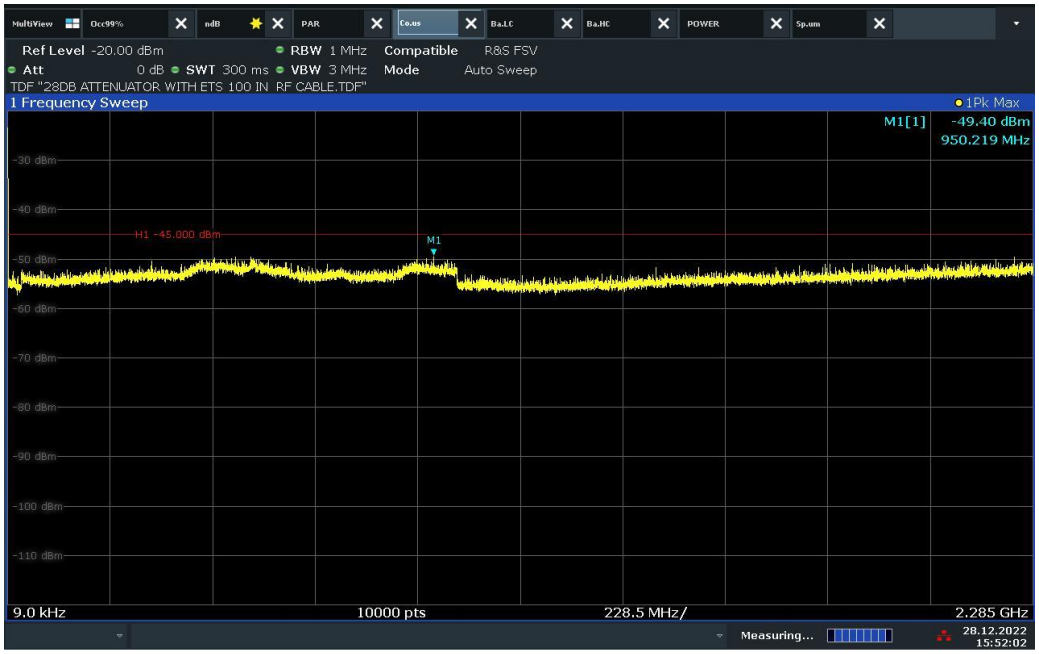
13:20:56 29.12.2022

LTE Band 30 Uplink 5MHz Bandwidth Middle Channel Conducted Spurious Emissions (2370 - 24 GHz)



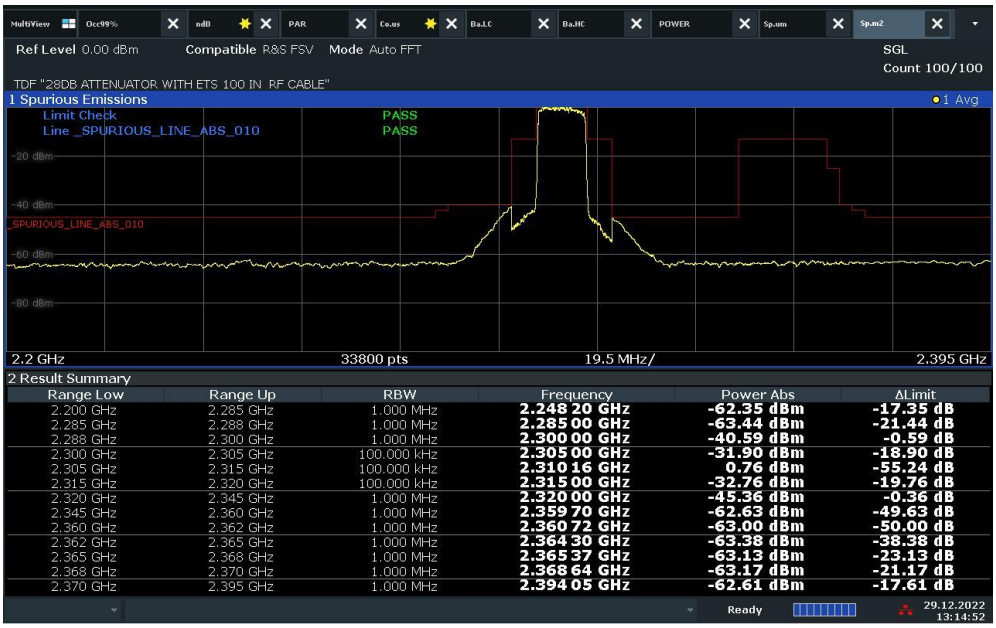
11:34:46 29.12.2022

LTE Band 30 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions (9k - 2285 MHz)



15:52:02 28.12.2022

LTE Band 30 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions (2200 - 2395 MHz)



2 Result Summary

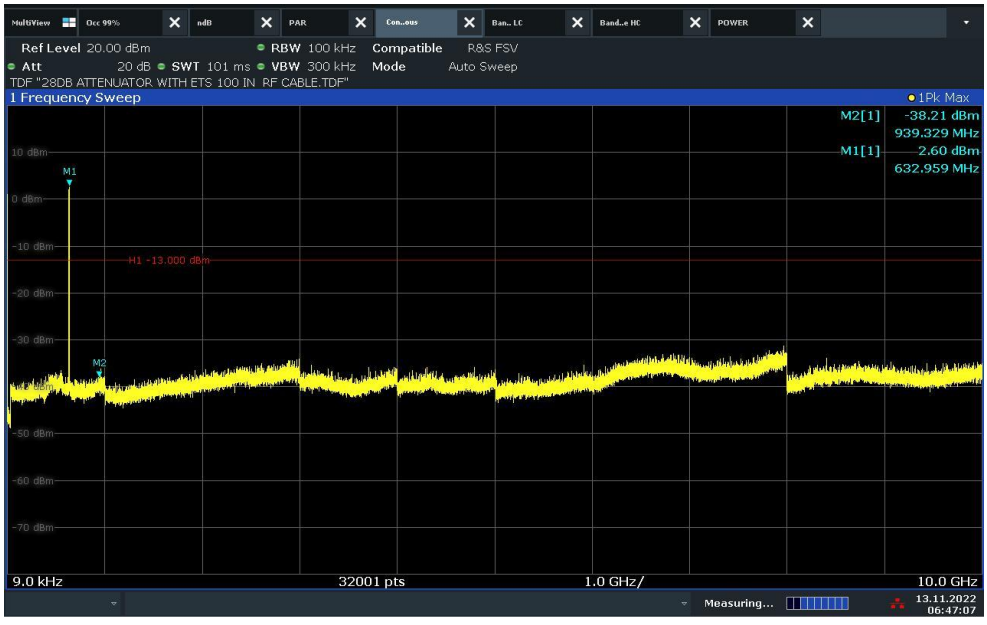
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.200 GHz	2.285 GHz	1.000 MHz	2.248 20 GHz	-62.35 dBm	-17.35 dB
2.285 GHz	2.288 GHz	1.000 MHz	2.285 00 GHz	-63.44 dBm	-21.44 dB
2.288 GHz	2.300 GHz	1.000 MHz	2.300 00 GHz	-40.59 dBm	-0.59 dB
2.300 GHz	2.305 GHz	100.000 kHz	2.305 00 GHz	-31.90 dBm	-18.90 dB
2.305 GHz	2.315 GHz	100.000 kHz	2.310 16 GHz	0.76 dBm	-55.24 dB
2.315 GHz	2.320 GHz	100.000 kHz	2.315 00 GHz	-32.76 dBm	-19.76 dB
2.320 GHz	2.345 GHz	1.000 MHz	2.320 00 GHz	-45.36 dBm	-0.36 dB
2.345 GHz	2.360 GHz	1.000 MHz	2.359 70 GHz	-62.63 dBm	-49.63 dB
2.360 GHz	2.362 GHz	1.000 MHz	2.360 72 GHz	-63.00 dBm	-50.00 dB
2.362 GHz	2.365 GHz	1.000 MHz	2.364 30 GHz	-63.38 dBm	-38.38 dB
2.365 GHz	2.368 GHz	1.000 MHz	2.365 37 GHz	-63.13 dBm	-23.13 dB
2.368 GHz	2.370 GHz	1.000 MHz	2.368 64 GHz	-63.17 dBm	-21.17 dB
2.370 GHz	2.395 GHz	1.000 MHz	2.394 05 GHz	-62.61 dBm	-17.61 dB

13:14:53 29.12.2022

LTE Band 30 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions (2370 - 24 GHz)

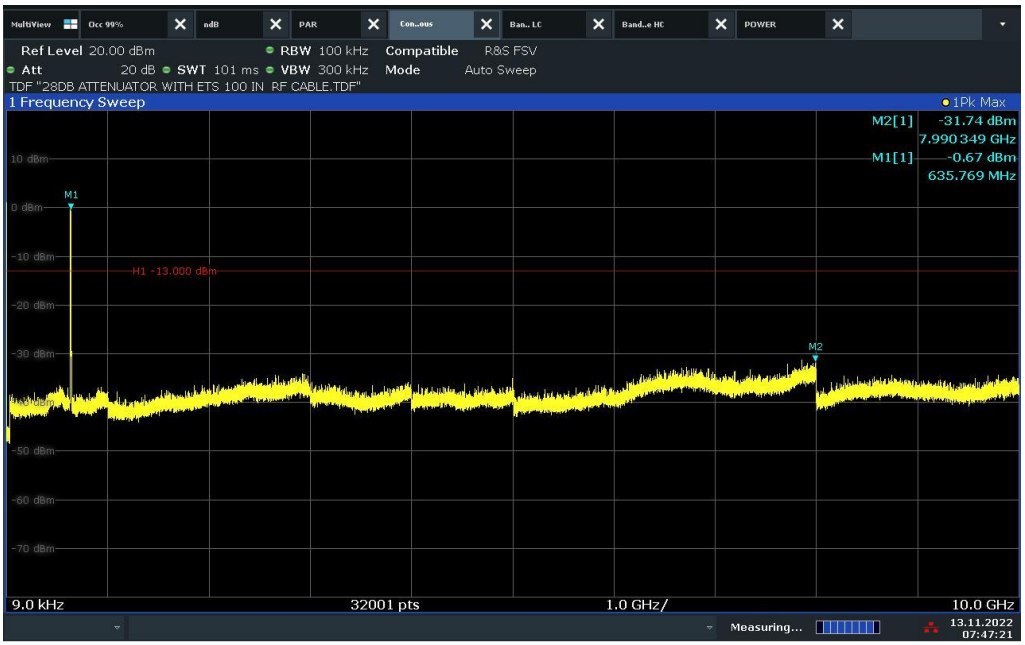
14:16:16 29.12.2022

LTE Band 71 Downlink 5MHz Bandwidth Middle Channel Conducted Spurious Emissions



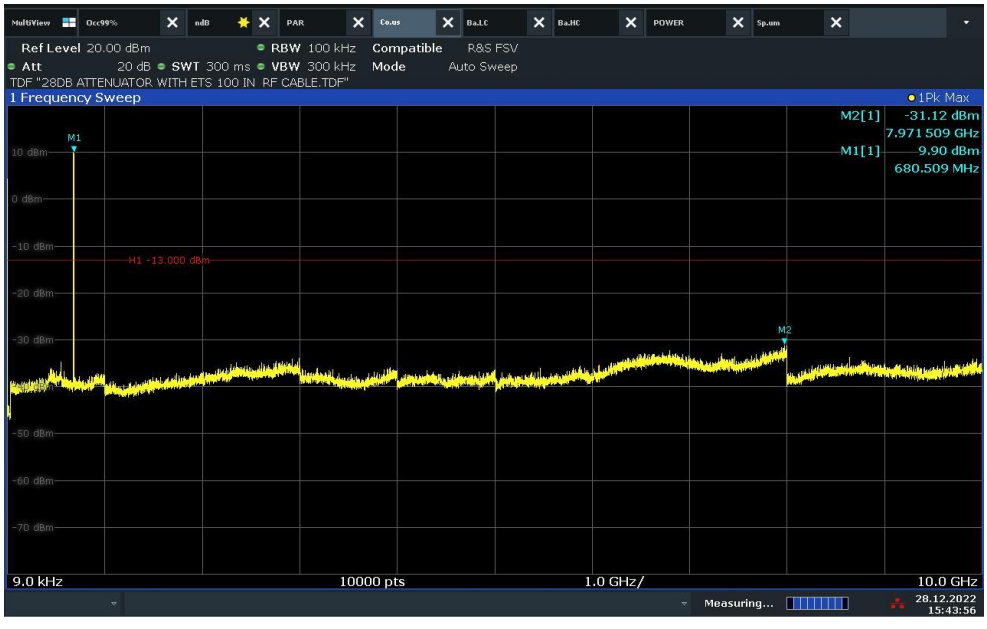
06:47:08 13.11.2022

LTE Band 71 Downlink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions

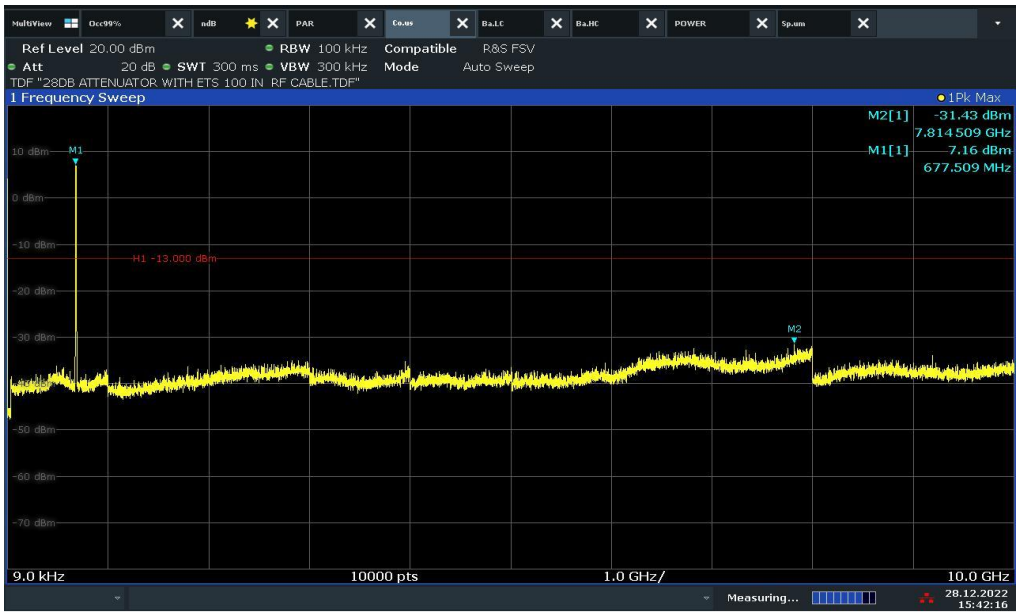
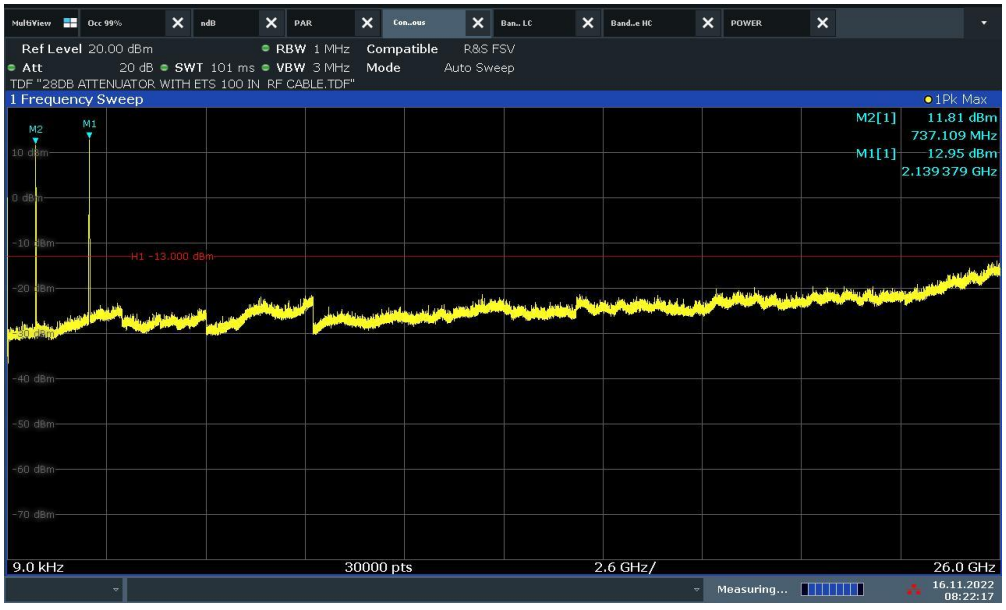


07:47:22 13.11.2022

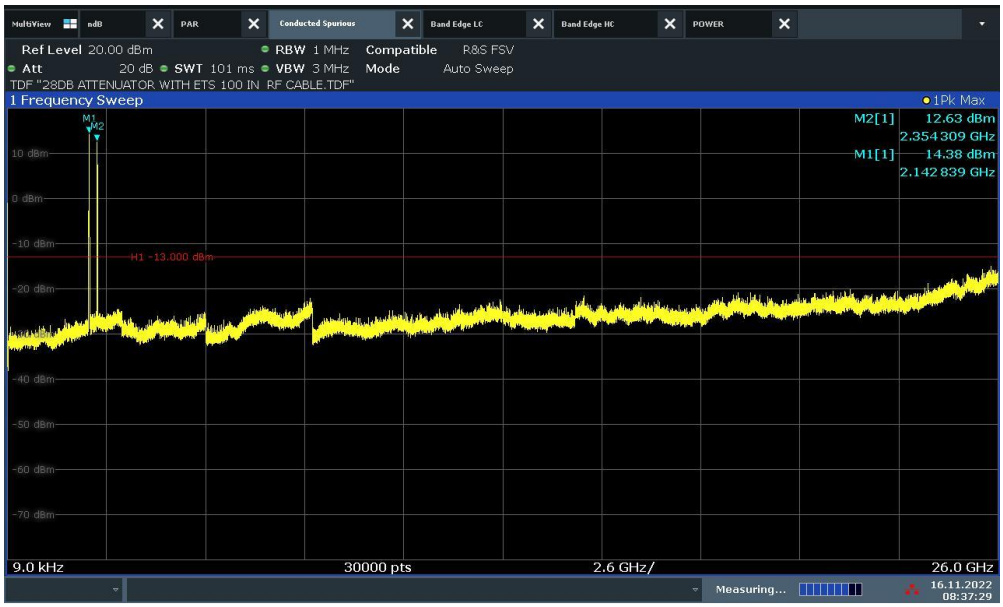
LTE Band 71 Uplink 5MHz Bandwidth Middle Channel Conducted Spurious Emissions



15:43:57 28.12.2022

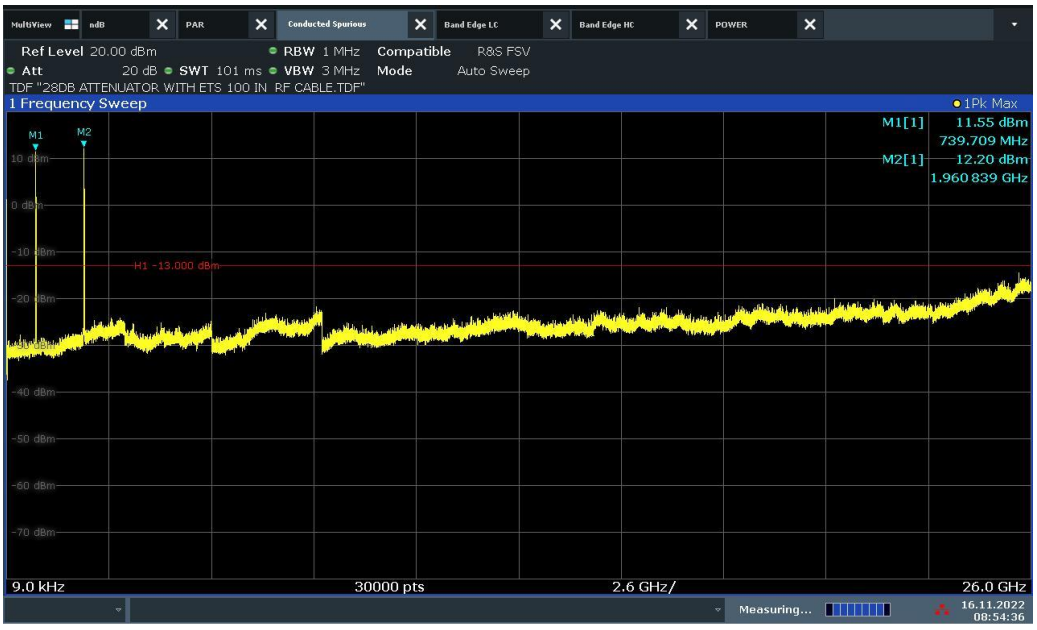
LTE Band 71 Uplink 10MHz Bandwidth Middle Channel Conducted Spurious Emissions
 15:42:17 28.12.2022
2 Bands per antenna port Conducted Spurious Emissions CU with Antenna Port A Downlink: LTE Band 4 20MHz BW High Ch & LTE Band 12 10MHz BW High Ch
 08:22:17 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port A Downlink: LTE Band 4 20MHz BW High Ch & LTE Band 30 10MHz BW Mid Ch



08:37:30 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port A Downlink: LTE Band 25 20MHz BW Mid Ch & LTE Band 12 10MHz BW High Ch



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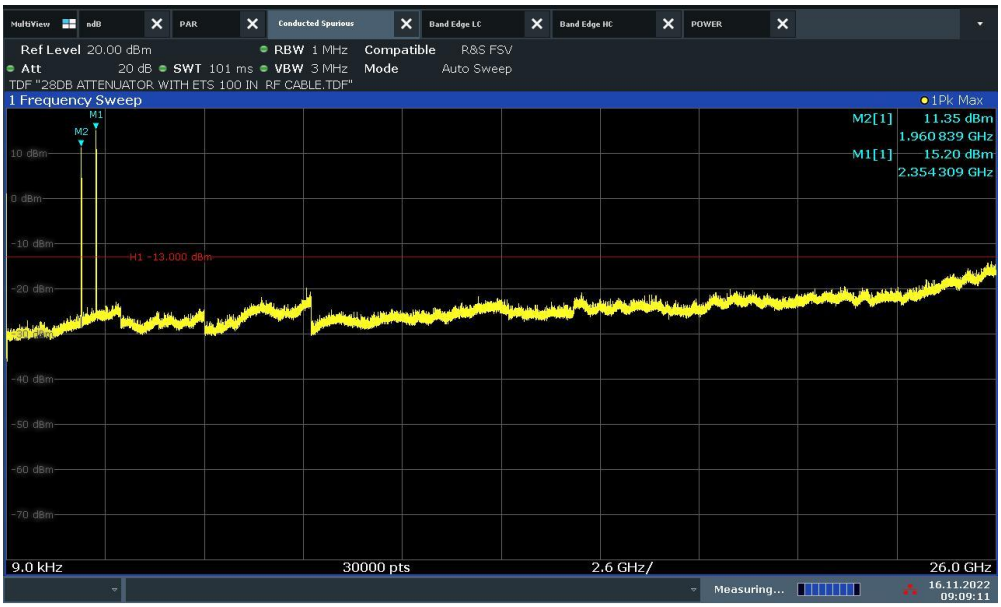
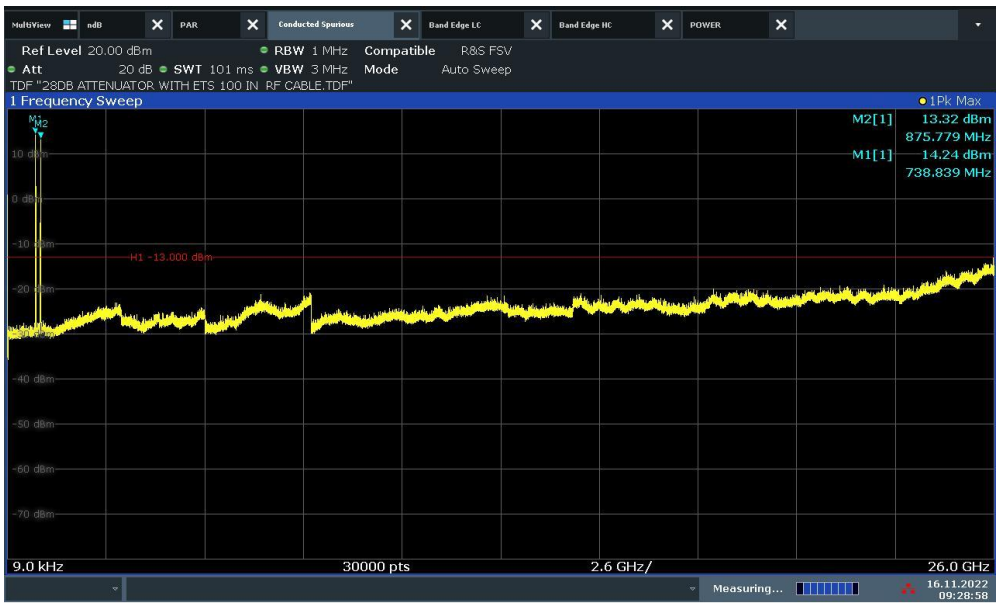
2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port A Downlink: LTE Band 25 20MHz BW Mid Ch & LTE Band 30 10MHz BW Mid Ch



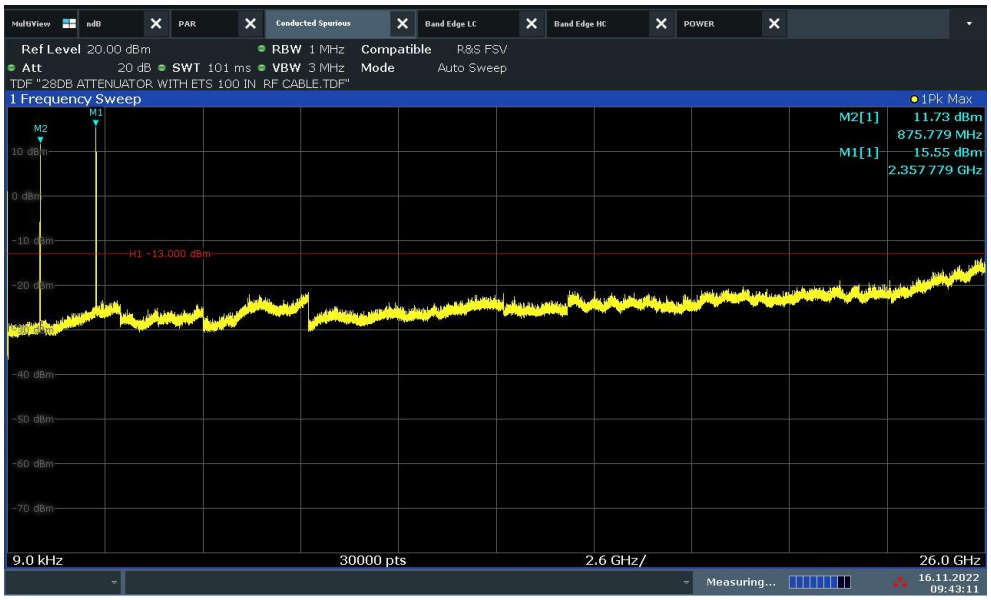
09:09:12 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port A Downlink: WCDMA Band 5 15MHz BW Low Ch & LTE Band 12 10MHz BW High Ch



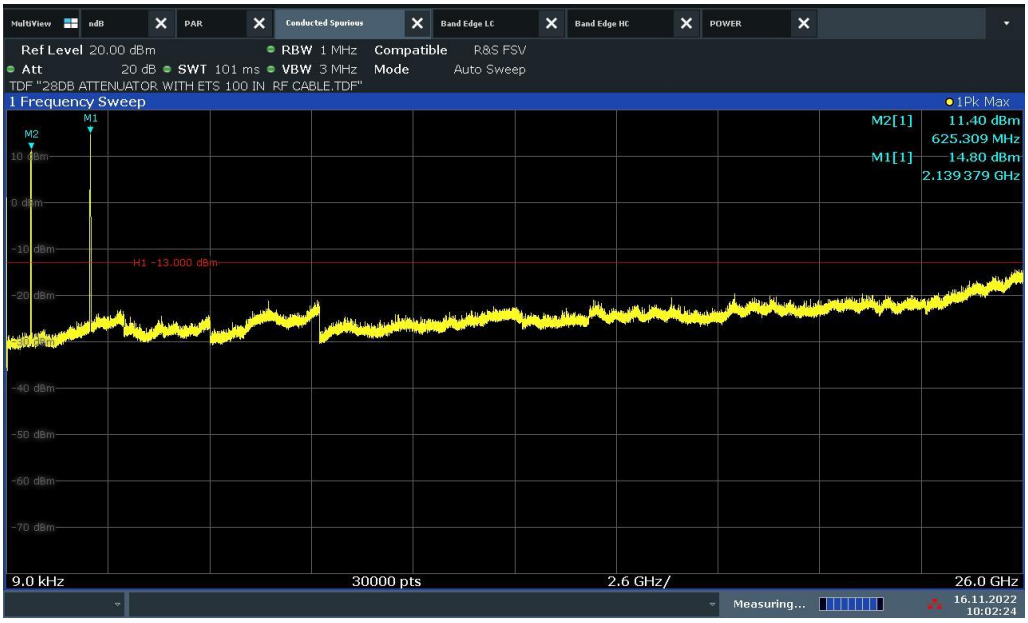
09:28:59 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port A Downlink: WCDMA Band 5 15MHz BW Low Ch & LTE Band 30 10MHz BW Mid Ch



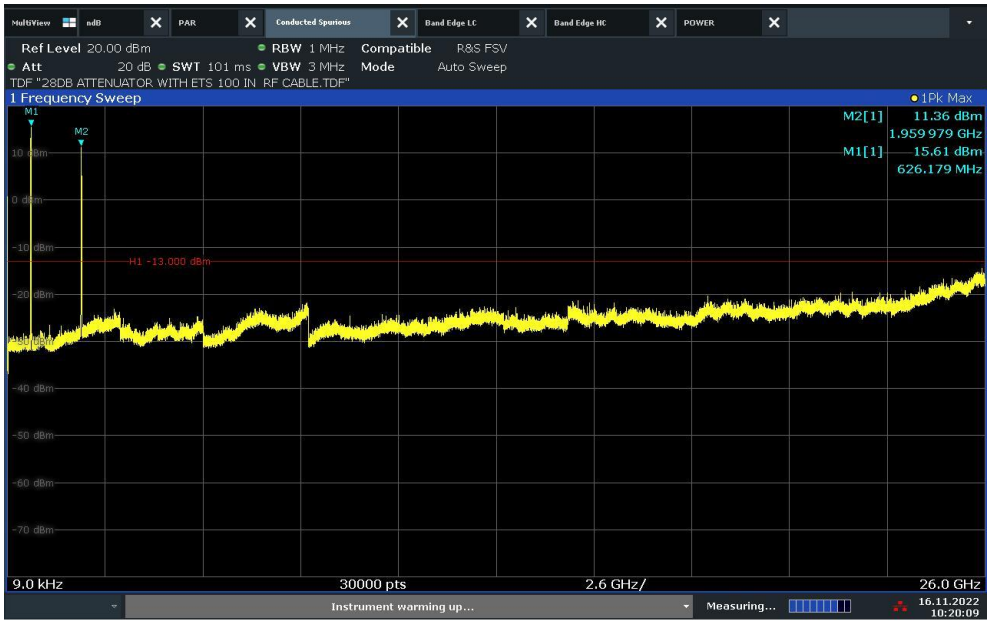
09:43:12 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port B Downlink: LTE Band 4 20MHz BW High Ch & LTE Band 71 20MHz BW Low Ch



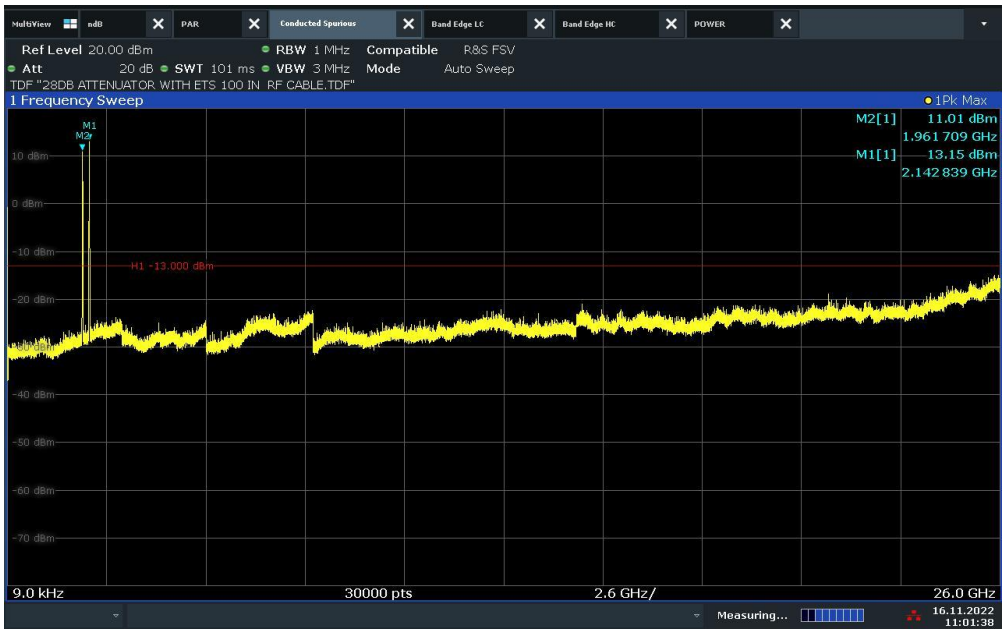
10:02:25 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port B Downlink: LTE Band 25 20MHz BW Mid Ch & LTE Band 71 20MHz BW Low Ch



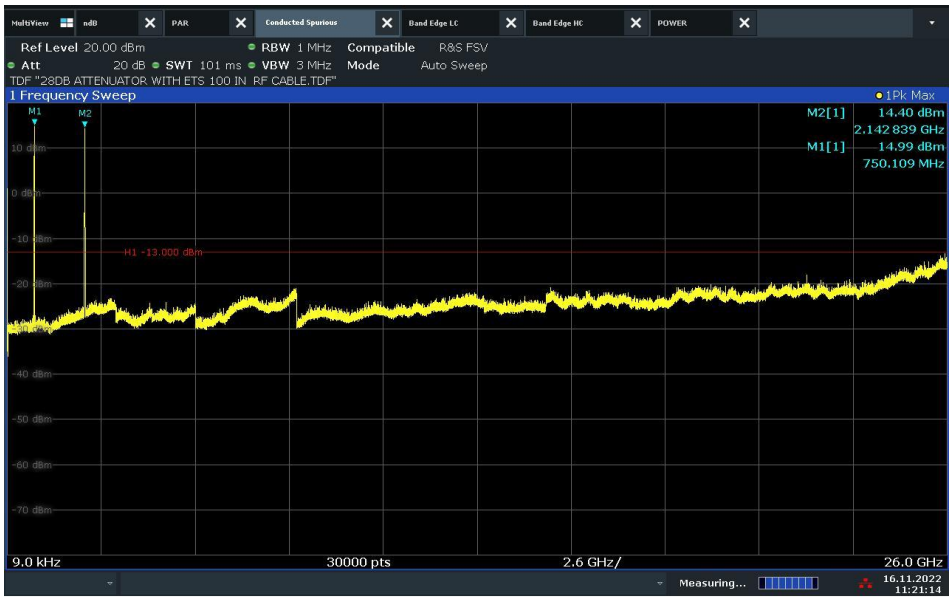
10:20:10 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port B Downlink: LTE Band 4 20MHz BW High Ch & LTE Band 25 20MHz BW Mid Ch



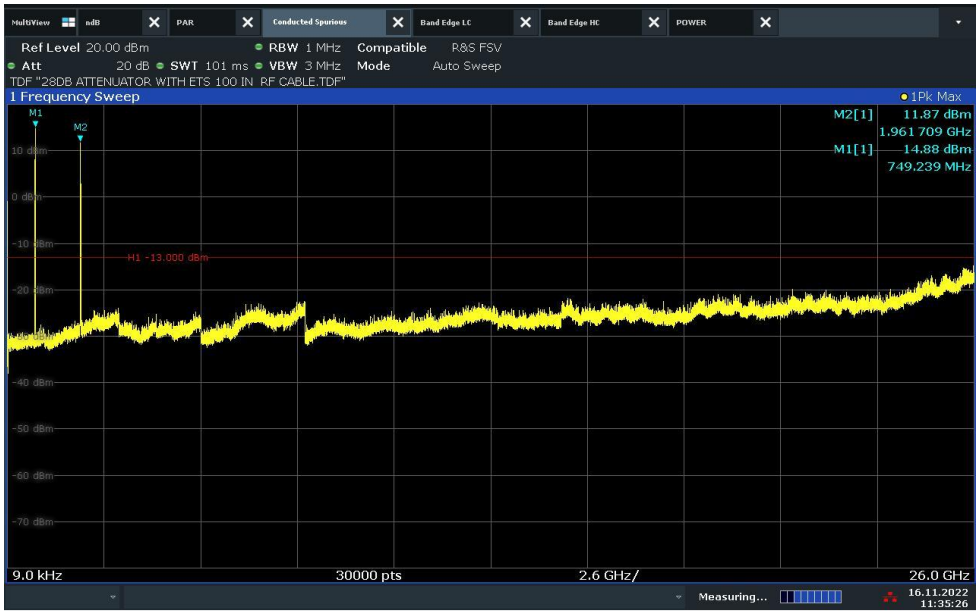
11:01:39 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port C Downlink: LTE Band 4 20MHz BW High Ch & LTE Band 13 10MHz BW Mid Ch



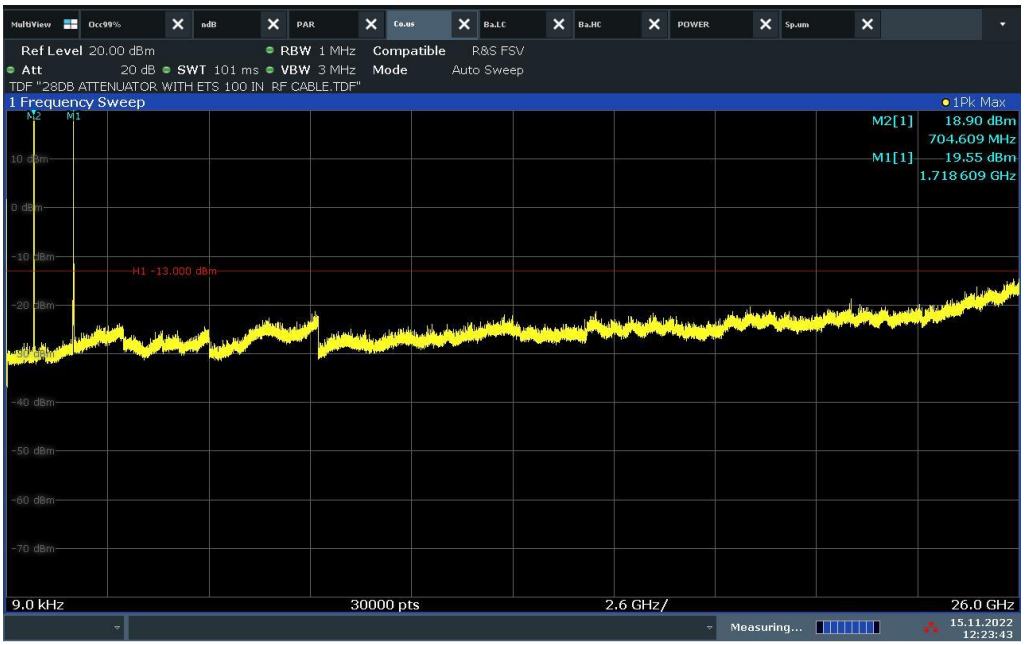
11:21:14 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
CU with Antenna Port C Downlink: LTE Band 25 20MHz BW Mid Ch & LTE Band 13 10MHz BW Mid Ch



11:35:27 16.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port A Uplink: LTE Band 4 15MHz BW Low Ch & LTE Band 12 10MHz BW Low Ch



12:23:44 15.11.2022

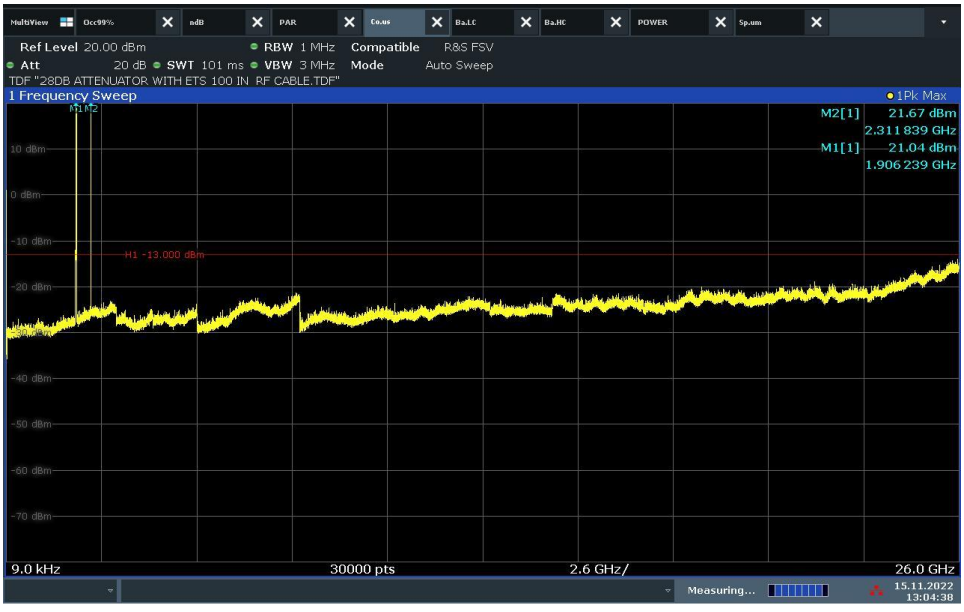
2 Bands per antenna port Conducted Spurious Emissions
Antenna Port A Uplink: LTE Band 4 15MHz BW Low Ch & LTE Band 30 5MHz BW High Ch

12:33:01 15.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port A Uplink: LTE Band 25 20MHz BW High Ch & LTE Band 12 10MHz BW Low Ch

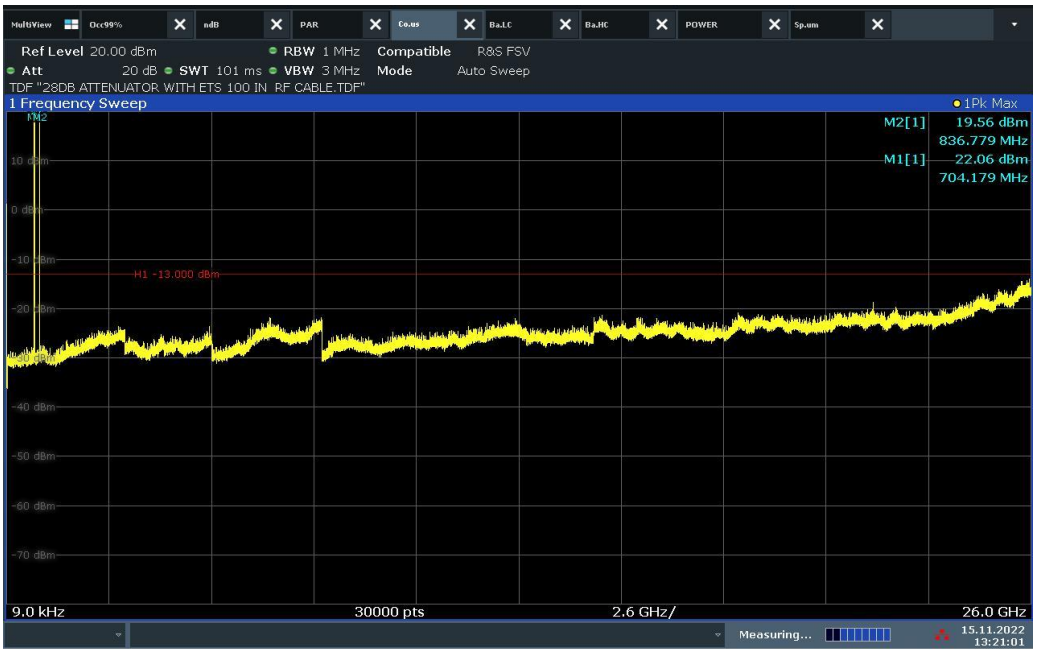
12:48:20 15.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port A Uplink: LTE Band 25 20MHz BW High Ch & LTE Band 30 5MHz BW High Ch



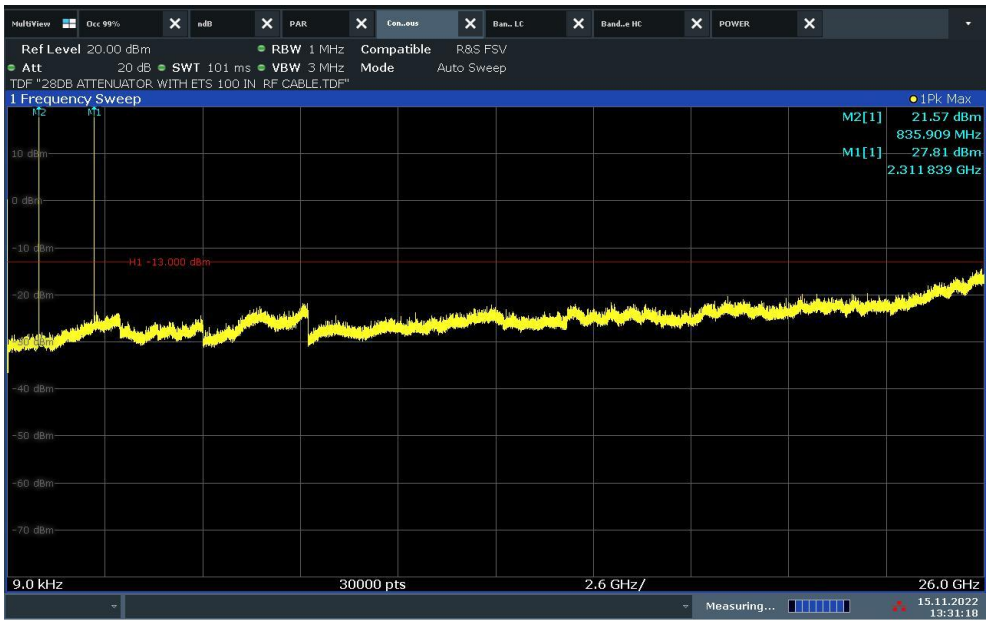
13:04:38 15.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port A Uplink: WCDMA Band 5 5MHz BW Mid Ch & LTE Band 12 10MHz BW Low Ch



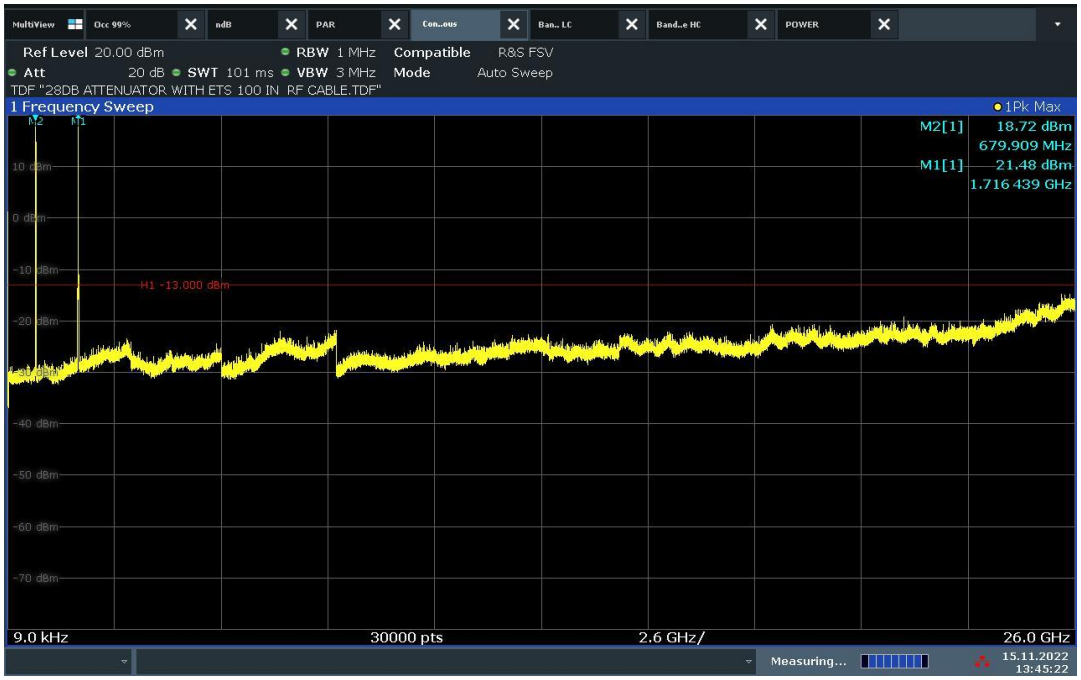
13:21:02 15.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port A Uplink: WCDMA Band 5 5MHz BW Mid Ch & LTE Band 30 5MHz BW High Ch



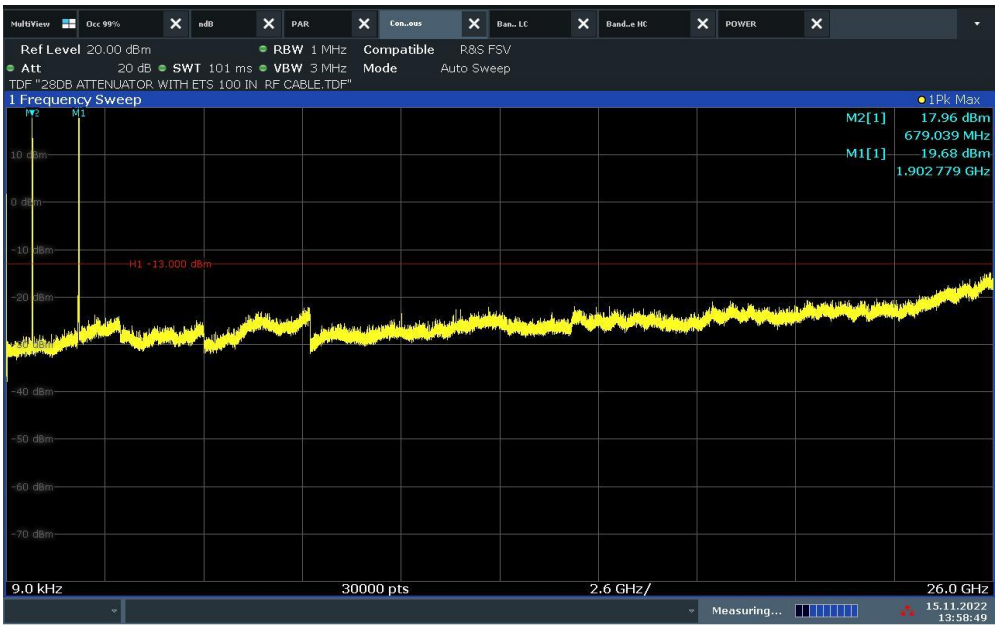
13:31:18 15.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port B Uplink: LTE Band 4 15MHz BW Low Ch & LTE Band 71 10MHz BW Mid Ch



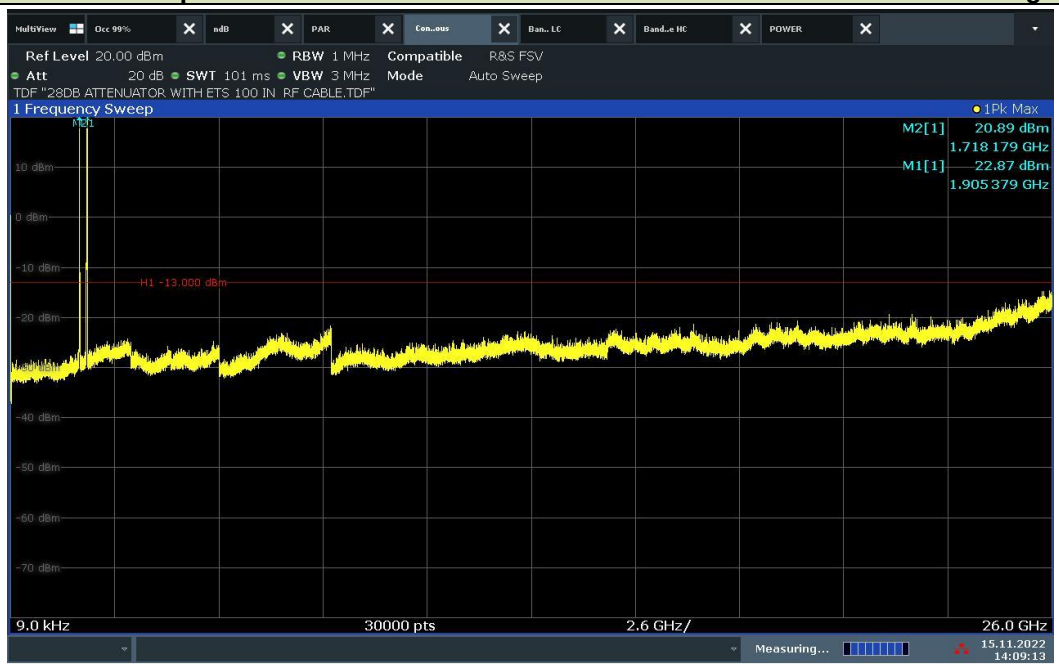
13:45:23 15.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port B Uplink: LTE Band 25 20MHz BW High Ch & LTE Band 71 10MHz BW Mid Ch



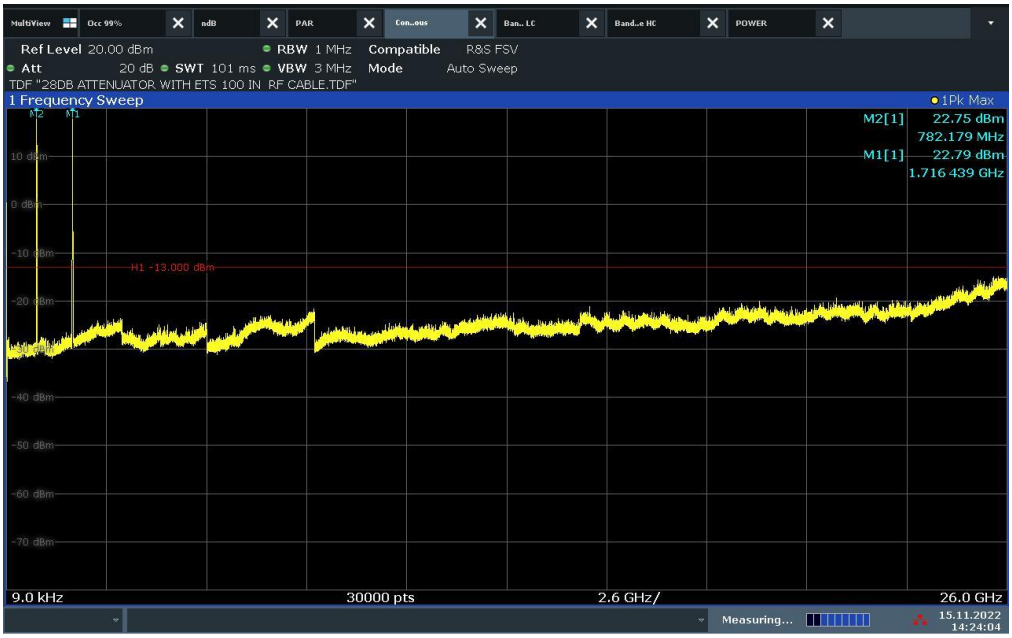
13:58:50 15.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port B Uplink: LTE Band 4 15MHz BW Low Ch & LTE Band 25 20MHz BW High Ch



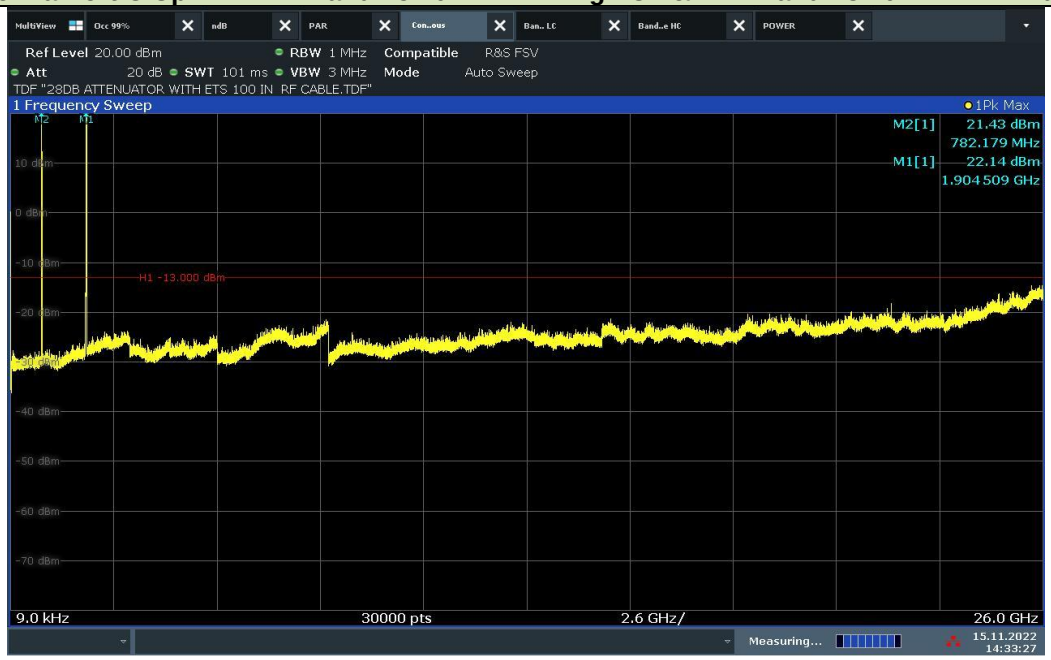
14:09:13 15.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port C Uplink: LTE Band 4 15MHz BW Low Ch & LTE Band 13 10MHz BW Mid Ch



14:24:05 15.11.2022

2 Bands per antenna port Conducted Spurious Emissions
Antenna Port C Uplink: LTE Band 25 20MHz BW High Ch & LTE Band 13 10MHz BW Mid Ch



14:33:27 15.11.2022

2.7 Noise Limit

2.7.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(A)
FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(I)
KDB935210 D04, Clause 7.7

2.7.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(A) Noise Limits.:

The transmitted noise power in dBm/MHz of frequency selective consumer boosters outside the licensee's spectrum blocks at their uplink and downlink ports shall not exceed the following limits:
(1) -103 dBm/MHz - RSSI
(i) Where RSSI is the downlink composite signal power received in dBm for frequencies in the band of operation outside the licensee's spectrum block as measured after spectrum block filtering is applied and is referenced to the booster's donor port for each band of operation. RSSI is expressed in negative dB units relative to 1 mW.
(ii) Boosters with MSCL less than 40 dB, shall reduce the Noise output in (A) by 40 dB - MSCL, where MSCL is the minimum coupling loss in dB between the wireless device and booster's server port. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.

(2)(i) Maximum downlink noise power shall not exceed -102.5 dBm/MHz + 20 Log10(Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz.
(ii) Compliance with Noise limits will use instrumentation calibrated in terms of RMS equivalent voltage, and with booster input ports terminated or without input signals applied within the band of measurement.

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(I) Transmit Power Off Mode.
When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in ''Transmit Power OFF Mode.'' In this mode of operation, the uplink and downlink noise power shall not exceed -70 dBm/MHz and uplink gain shall not exceed the lesser of 23 dB or MSCL.

2.7.3 Equipment Under Test and Modification State

Serial No: 370920000139 (NU)and 371929000156 (CU) / Test Configuration A and B

2.7.4 Date of Test/Initial of test personnel who performed the test

August 19 and October 15, 2019/XYZ

2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Mira Mesa facility.

Ambient Temperature	24.5 - 26.7°C
Relative Humidity	45.0 - 49.6%
ATM Pressure	98.9 - 99.0kPa

2.7.7 Additional Observations

- This is conducted Test. Test procedure is per Section 7.7 of KDB935210 (D04 Provider Specific Booster Measurements v02r03). Appropriate offset (line losses) applied.
- The EUT operated in Test Mode with the gain set to the maximum gain and a minimum bandwidth setting (5MHz).
- For Maximum Noise (frequency Dependent) testing, setup the EUT according to Figure 6 of Section 7.7 of KDB935210.
- Maximum Noise (frequency Dependent) evaluations are conducted at CU antenna ports. Operational downlink band for WCDMA Band 5 and LTE Band 4, 12, 13, 25, 30, 71 were tested.
- For Maximum Noise (RSSI Dependent and Transmit Power off mode) and Noise Response Time tests, setup the EUT according to Figure 7 or 8 of Section 7.7 of KDB935210 as appropriate.
- Maximum Noise (RSSI Dependent and Transmit Power off mode) and Noise Response Time evaluations are conducted at CU and NU antenna ports. Operational uplink and downlink bands for WCDMA Band 5 and LTE Band 4, 12, 13, 25, 30, 71 were tested.
- Signal generator was configured to transmit: 4.1 MHz AWGN.

2.7.8 Test Results

Maximum Noise (Frequency Dependent)				
Band	**Frequency Range (MHz)**	**Max Noise (dBm/MHz)**	**Limit* (dBm/MHz)**	**Margin (dB)**
WCDMA Band 5 Downlink (Port A)	869 - 894	-66.06	-43.60	22.46
LTE Band 4 Downlink (Port A)	2110 - 2155	-68.18	-35.92	32.26
LTE Band 12 Downlink (Port A)	729 - 746	-68.0	-45.14	22.86
LTE Band 13 Downlink (Port C)	746 - 756	-62.57	-44.98	17.59
LTE Band 25 Downlink (Port A)	1930 - 1995	-68.56	-36.65	31.91
LTE Band 30 Downlink (Port A)	2350 - 2360	-61.59	-35.06	26.53
LTE Band 71 Downlink (Port B)	617 - 652	-67.26	-46.45	20.81

*: -102.5 dBm/MHz + 20 Log_{10}(Frequency), where Frequency is the uplink mid-band frequency of the supported spectrum bands in MHz. (Downlink only)

Maximum Noise (RSSI Dependent and Transmit Power off mode)					
Band	**Frequency (MHz)**	**Signal Generator Output Level (dBm)**	**Max Noise (dBm/MHz)**	**Limit (dBm/MHz)**	**Margin (dB)**
WCDMA Band 5 Downlink	869 - 894	-70.7	-76.81	-37.3	39.51
		-60.7	-76.69	-47.3	29.39
		-50.7	-76.96	-57.3	19.66
		-40.7**	-81.46	-67.3	14.16
		-30.7	-81.10	-70.0	11.10
		-20.7	-80.89	-70.0	10.89
WCDMA Band 5 Uplink	824 - 849	-74.7	-78.26	-33.3	44.96
		-64.7	-77.47	-43.3	34.17
		-54.7	-77.81	-53.3	24.51
		-44.7**	-81.36	-63.3	18.06
		-34.7	-81.15	-70.0	11.15
		-24.7	-81.45	-70.0	11.45
LTE Band 4 Downlink	2110 - 2155	-70.4	-71.14	-37.6	33.54
		-60.4	-71.80	-47.6	24.20
		-50.4	-72.43	-57.6	14.83
		-40.4**	-71.84	-67.6	4.24
		-30.4	-72.0	-70.0	2.0
		-20.4	-71.84	-70.0	1.84
LTE Band 4 Uplink	1710 - 1755	-77.0	-78.77	-31.0	47.77
		-67.0	-78.62	-41.0	37.62
		-57.0	-78.36	-51.0	27.36
		-47.0**	-83.62	-61.0	22.62
		-37.0	-81.97	-70.0	11.97
		-27.0	-82.09	-70.0	12.09
LTE Band 12 Downlink	729 - 746	-70.9	-74.53	-37.1	37.43
		-60.9	-79.44	-47.1	32.34
		-50.9	-81.89	-57.1	24.79
		-40.9**	-81.48	-67.1	14.38
		-30.9	-82.10	-70.0	12.10
		-20.9	-81.59	-70.0	11.59
	699 - 716	-74.5	-77.26	-33.5	43.76

LTE Band 12 Uplink		-64.5	-76.75	-43.5	33.25
		-54.5	-78.29	-53.5	24.79
		-44.5**	-79.89	-63.5	16.39
		-34.5	-79.63	-70.0	9.63
		-24.5	-80.67	-70.0	10.67
LTE Band 13 Downlink	746 - 756	-70.6	-76.95	-37.4	39.55
		-60.6	-75.13	-47.4	27.73
		-50.6	-76.29	-57.4	18.89
		-40.6	-75.12	-67.4	7.72
		-30.6	-75.51	-70.0	5.51
		-20.6	-75.57	-70.0	5.57
LTE Band 13 Uplink	777 - 787	-74.6	-72.75	-33.4	39.35
		-64.6	-73.24	-43.4	29.84
		-54.6	-72.85	-53.4	19.45
		-44.6**	-78.75	-63.4	15.35
		-34.6	-82.05	-70.0	12.05
		-24.6	-83.79	-70.0	13.79
LTE Band 25 Downlink	2110 - 2155	-72.3	-72.90	-35.7	37.20
		-62.3	-72.28	-45.7	26.58
		-52.3	-72.14	-55.7	16.44
		-42.3**	-72.04	-65.7	6.34
		-32.3	-80.21	-70.0	10.21
		-22.3	-80.72	-70.0	10.72
LTE Band 25 Uplink	1710 - 1755	-79.2	-78.19	-28.8	49.39
		-69.2	-77.72	-38.8	38.92
		-59.2	-78.87	-48.8	30.07
		-49.2**	-83.90	-58.8	25.10
		-39.2	-82.23	-68.8	13.43
		-29.2	-82.32	-70.0	12.32
LTE Band 30 Downlink	2350 - 2360	-79.2	-67.56	-28.8	38.76
		-69.2	-61.87	-38.8	23.07
		-59.2	-61.85	-48.8	13.05
		-49.2**	-61.11	-58.8	2.31
		-39.2	-73.67	-68.8	4.87

		-29.2	73.06	-70.0	-143.06
LTE Band 30 Uplink	2305 - 2315	-75.8	-63.76	-32.2	31.56
		-65.8	-63.83	-42.2	21.63
		-55.8	-63.59	-52.2	11.39
		-45.8**	-73.72	-62.2	11.52
		-35.8	-73.62	-70.0	3.62
		-25.8	-73.99	-70.0	3.99
LTE Band 71 Downlink	617 - 652	-70.8	-69.61	-37.2	32.41
		-60.8	-70.02	-47.2	22.82
		-50.8	-76.93	-57.2	19.73
		-40.8**	-79.59	-67.2	12.39
		-30.8	-79.73	-70.0	9.73
		-20.8	-79.07	-70.0	9.07
LTE Band 71 Uplink	663 - 698	-74.5	-73.75	-33.5	40.25
		-64.5	-73.74	-43.5	30.24
		-54.5	-73.92	-53.5	20.42
		-44.5**	-74.36	-63.5	10.86
		-34.5	-74.25	-70.0	4.25
		-24.5	-74.71	-70.0	4.71

**: Transmit Power off mode

Noise Response Time				
Band	**Frequency (MHz)**	**Noise Response Time (Sec)**	**Limit (Sec)**	**Margin (Sec)**
WCDMA Band 5 Downlink	869 - 894	0.425	3	2.575
WCDMA Band 5 Uplink	824 - 849	0.410	3	2.590
LTE Band 4 Downlink	2110 - 2155	0.440	3	2.560
LTE Band 4 Uplink	1710 - 1755	0.640	3	2.360
LTE Band 5 Downlink	869 - 894	0.462	3	2.538
LTE Band 5 Uplink	824 - 849	0.412	3	2.588
LTE Band 12 Downlink	729 - 746	0.405	3	2.595
LTE Band 12 Uplink	699 - 716	0.435	3	2.565

LTE Band 13 Downlink	746 - 756	N/A*	-	-
LTE Band 13 Uplink	777 - 787	0.425	3	2.575
LTE Band 25 Downlink	1930 - 1995	0.440	3	2.560
LTE Band 25 Uplink	1850 - 1915	0.410	3	2.590
LTE Band 30 Downlink	2350 - 2360	0.033	3	2.967
LTE Band 30 Uplink	2305 - 2315	0.410	3	2.590
LTE Band 71 Downlink	617 - 652	0.455	3	2.545
LTE Band 71 Uplink	663 - 698	0.425	3	2.575

N/A*: Not Applicable. Maximum Noise always complies with Noise Limit requirement. There is no noise limit change during testing.

2.8 Uplink Inactivity

2.8.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(J)
KDB935210 D04, Clause 7.8

2.8.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(J) Uplink Inactivity:

Uplink Inactivity. When a consumer booster is not serving an active device connection after 5 seconds the uplink noise power shall not exceed -70 dBm/MHz.

2.8.3 Equipment Under Test and Modification State

Serial No: 370920000139 (NU)and 371929000156 (CU) / Test Configuration A and B

2.8.4 Date of Test/Initial of test personnel who performed the test

August 08, 13 and October 15, 16, 2019/XYZ

2.8.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Mira Mesa facility.

Ambient Temperature	24.5 - 25.8°C
Relative Humidity	45.0 - 53.3%
ATM Pressure	98.9 - 99.0kPa

2.8.7 Additional Observations

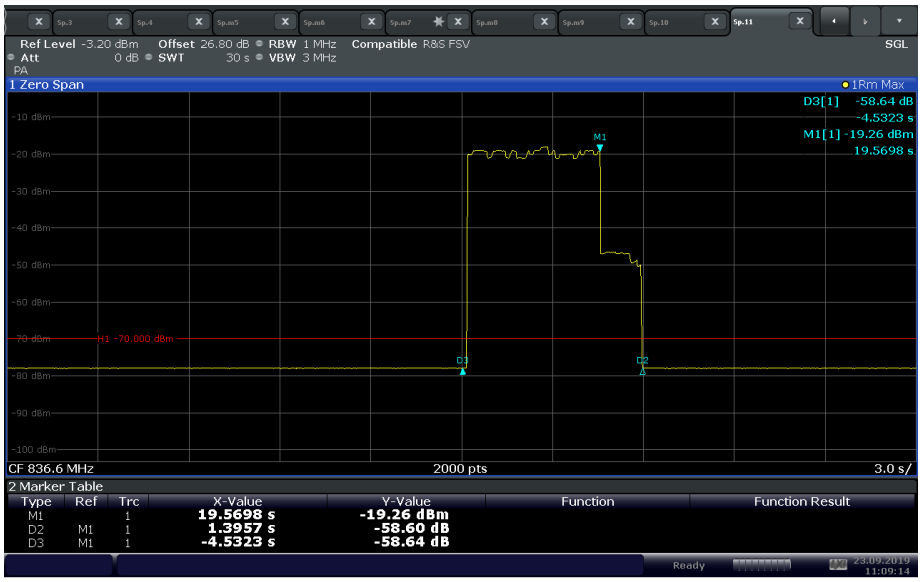
- This is conducted Test.
- Test procedure is per Section 7.8 of KDB935210 (D04 Provider Specific Booster Measurements v02r03). Appropriate offset (line losses) applied.
- The EUT operated in Normal Mode with a minimum bandwidth setting (5MHz).
- Setup the EUT according to Figure 1 of Section 6.3.2 of KDB935210.
- Evaluations are conducted at NU antenna ports.
- Operational uplink bands for WCDMA Band 5 and LTE Band 4, 12, 13, 25, 30, 71 were tested.
- Signal: 5MHz WCDMA or LTE.

2.8.8 Test Results

Uplink Inactivity				
Band	**Frequency (MHz)**	**UL Inactive Time (Sec)**	**Limit (Sec)**	**Margin (Sec)**
WCDMA Band 5 Port A	836.6	1.40	5.0	3.60
LTE Band 4 Port A	1732.5	1.44	5.0	3.56
LTE Band 4 Port B	1732.5	1.47	5.0	3.53
LTE Band 4 Port C	1732.5	1.59	5.0	3.41
LTE Band 12 Port A	707.5	1.67	5.0	3.33
LTE Band 12 Port B	707.5	1.46	5.0	5.54
LTE Band 13 Port C	782	1.38	5.0	3.62
LTE Band 25 Port A	1882.5	1.53	5.0	3.47
LTE Band 25 Port B	1882.5	1.44	5.0	3.56
LTE Band 25 Port C	1882.5	1.77	5.0	3.23
LTE Band 25 Port D	1882.5	1.38	5.0	3.62
LTE Band 30 Port A	2310	1.61	5.0	3.39
LTE Band 71 Port A	680.5	1.61	5.0	3.39
WCDMA Band 5 Port A	836.6	1.40	5.0	3.60
LTE Band 4 Port A	1732.5	1.44	5.0	3.56

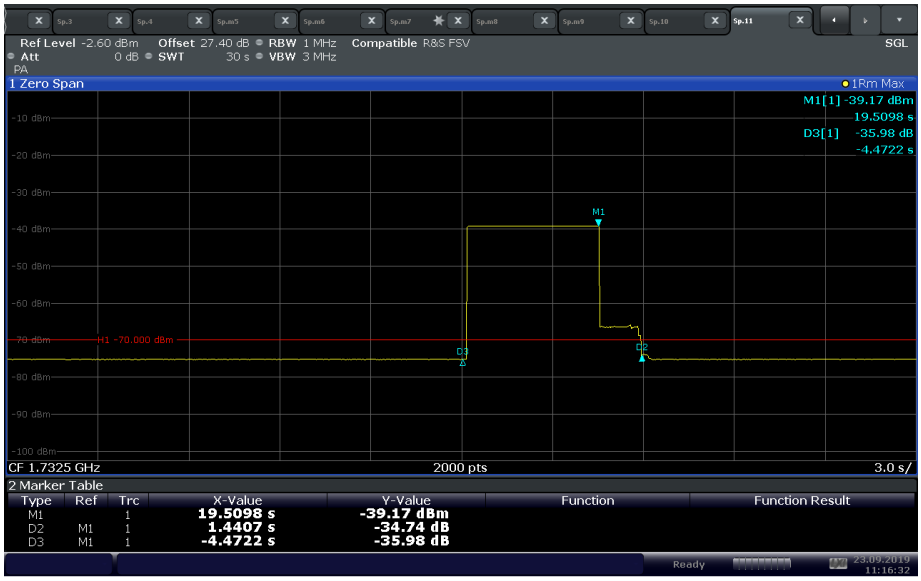
2.8.9 Sample test Plots

WCDMA Band 5 Uplink 5MHz Bandwidth Mid Channel on NU Port A



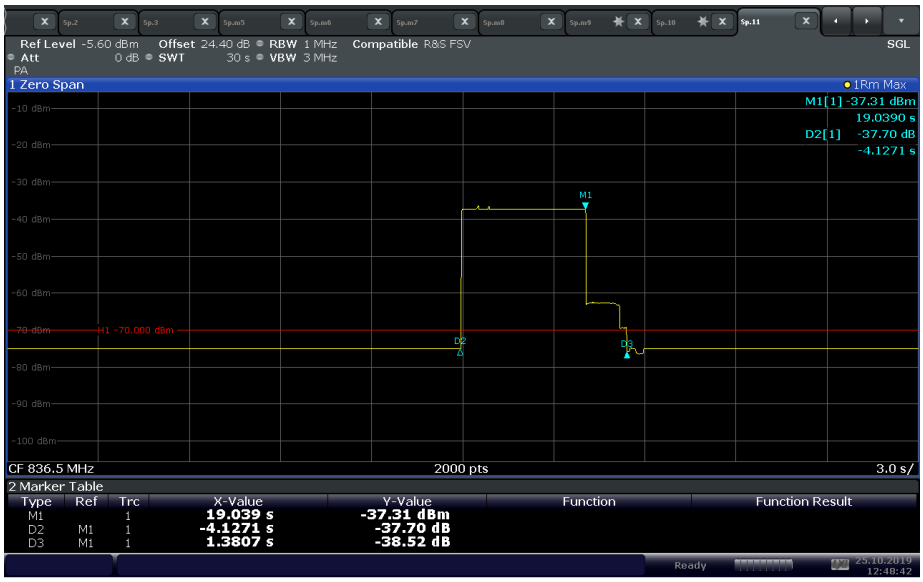
11:09:14 23.09.2019

LTE Band 4 Uplink 5MHz Bandwidth Mid Channel on NU Port A



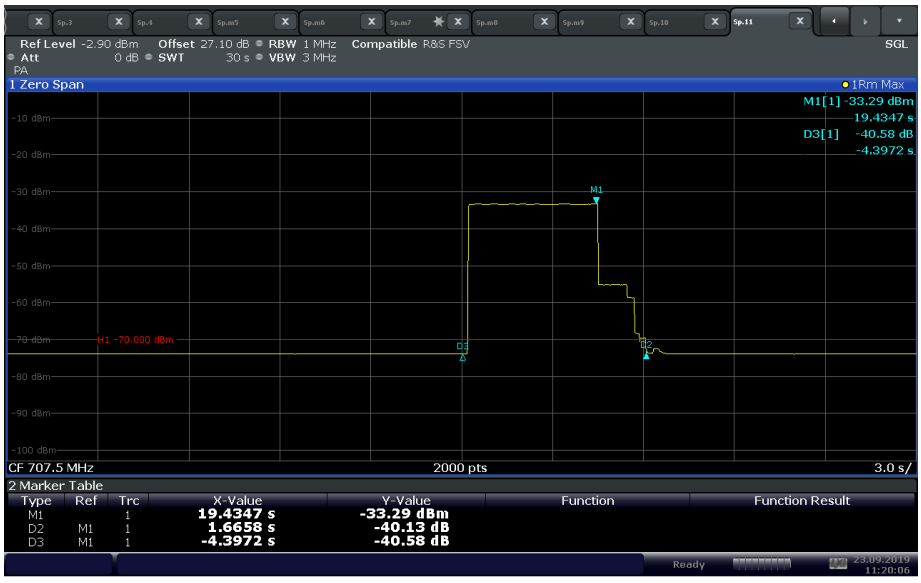
11:16:32 23.09.2019

LTE Band 5 Uplink 5MHz Bandwidth Mid Channel on NU Port D



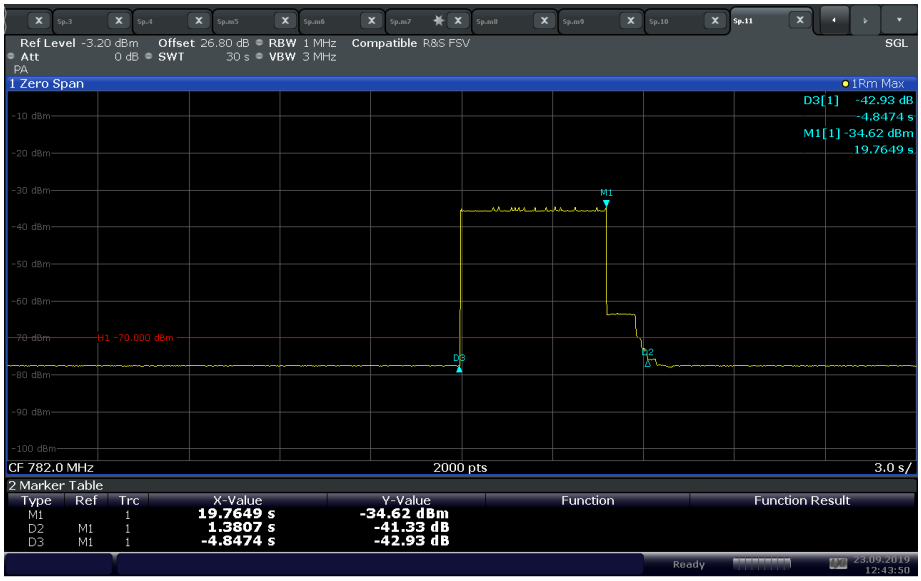
12:48:43 25.10.2019

LTE Band 12 Uplink 5MHz Bandwidth Mid Channel on NU Port A



11:20:06 23.09.2019

LTE Band 13 Uplink 5MHz Bandwidth Mid Channel on NU Port C



12:43:50 23.09.2019

LTE Band 25 Uplink 5MHz Bandwidth Mid Channel on NU Port A

11:25:32 23.09.2019

LTE Band 30 Uplink 5MHz Bandwidth Mid Channel on NU Port A

11:35:22 23.09.2019

LTE Band 71 Uplink 5MHz Bandwidth Mid Channel on NU Port B

11:46:08 23.09.2019

2.9 Variable Booster Gain

2.9.1 Specification Reference

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(C)(1)
FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(I)
KDB935210 D04, Clause 7.9

2.9.2 Standard Applicable

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(C)(1) Booster Gain Limits:
The gain of the frequency selective consumer booster shall meet the limits below.

1) The uplink and downlink gain in dB of a frequency selective consumer booster referenced to its input and output ports shall not exceed BSCL - 28dB - (40 dB - MSCL).
(i) Where BSCL is the coupling loss between the booster's donor port and the base station's input port, and MSCL is the minimum coupling loss in dB between the wireless device and the booster's server port. MSCL must be calculated or measured for each band of operation and provided in compliance test reports.
(ii) In order of preference, BSCL is determined as follows: determine path loss between the base station and the booster; such measurement shall be based on measuring the received forward pilot/control channel power at the booster and reading the pilot/control channel transmit power from the base station as defined in the system information messages sent by the base station; estimate BSCL by assuming that the base station is transmitting at a level of +25 dBm per channel (assume a small, lightly loaded cell) and measuring the total received signal power level within the channel in dBm (RPCH) received at the booster input port. BSCL is then calculated as 25– RPCH; or assume that the BSCL is 70dB without performing any measurement.

FCC 47 CFR Part 20. Clause 20.21(e)(9)(i)(I) Transmit Power Off Mode.
When the consumer booster cannot otherwise meet the noise and gain limits defined herein it must operate in ''Transmit Power OFF Mode.'' In this mode of operation, the uplink and downlink noise power shall not exceed -70 dBm/MHz and uplink gain shall not exceed the lesser of 23 dB or MSCL.

2.9.3 Equipment Under Test and Modification State

Serial No: 110222000051 and 481222000175 / Test Configuration A and B

2.9.4 Date of Test/Initial of test personnel who performed the test

August 08, 13 and October 15, 16, 2019/XYZ

2.9.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Mira Mesa facility.

Ambient Temperature	24.5 - 25.8°C
Relative Humidity	45.0 - 53.3%
ATM Pressure	98.9 - 99.0kPa

2.9.7 Additional Observations

- This is conducted Test.
- Test procedure is per Section 7.9 of KDB935210 (D04 Provider Specific Booster Measurements v02r03). Appropriate offset (line losses) applied.
- The EUT operated in Normal Mode
- Setup the EUT according to Figure 1 of Section 6.3.2 of KDB935210.
- Evaluations are conducted at worst case CU and NU antenna ports according to Maximum Booster Gain test result.
- Variable Gain: Operational uplink and downlink bands for WCDMA B5, LTE B4, B12, B13, B25, B30 and B71 were tested.
- Uplink Gain Timing: Operational uplink bands for WCDMA B5, LTE B4, B12, B13, B25, B30 and B71 were tested.
- Signal: 5MHz WCDMA or LTE.
- MSCL: Lp = 20logf + 20logd - 27.5

  Where: Lp = Basic free space path loss,
  f = frequency in MHz,
  d = separation distance in meters (2m)
  lowest MSCL value was utilized.
- BSCL: The coupling loss (in dB) between the donor port (NU) of the Consumer Booster and the input port of the Base Station

2.9.8 Test Results

WCDMA B5 Downlink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-106.5	131.5	-1.13	97.90	98.50	0.60
-96.5	121.5	-1.51	87.52	88.50	0.98
-86.5	111.5	-0.8	78.23	78.50	0.27
-76.5	101.5	-1.5	67.53	68.50	0.97
-66.5	91.5	-1.41	57.62	58.50	0.88
-56.5	81.5	-1.35	47.68	48.50	0.82

WCDMA B5 Uplink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-107.3	142.3	19.39	72.56	99.30	26.74
-97.3	132.3	19.65	72.82	89.30	16.48
-87.3	112.3	19.26	72.43	79.30	6.87
-77.3	102.3	15.27	68.44	69.30	0.86
-67.3	92.3	5.82	58.99	59.30	0.31
-57.3	82.3	-4.46	48.71	49.30	0.59

LTE B12 Downlink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-107.39	132.39	4.48	86.38	99.39	13.01
-97.39	122.39	1.27	73.17	89.39	16.22
-87.39	112.39	8.21	70.11	79.39	9.28
-77.39	102.39	8.27	60.17	69.39	9.22
-67.39	92.39	8.42	50.32	59.39	9.07
-57.39	82.39	8.3	40.2	49.39	9.19

LTE B12 Uplink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-107.4	132.4	19.96	75.95	99.40	23.45
-97.4	122.4	19.59	75.58	89.40	13.82
-87.4	112.4	18.2	74.19	79.40	5.21
-77.4	102.4	8.48	64.47	69.40	4.93
-37.4	92.4	-1.7	54.29	59.40	5.11
-57.4	82.4	-10.38	45.61	49.40	3.79

LTE B12 Uplink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-107.4	132.4	19.96	75.95	99.40	23.45
-97.4	122.4	19.59	75.58	89.40	13.82
-87.4	112.4	18.2	74.19	79.40	5.21
-77.4	102.4	8.48	64.47	69.40	4.93
-37.4	92.4	-1.7	54.29	59.40	5.11
-57.4	82.4	-10.38	45.61	49.40	3.79

LTE B13 Uplink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-107.36	132.36	14.63	70.66	99.36	28.70
-97.36	122.36	13.48	69.51	89.36	19.85
-87.36	112.36	3.41	59.44	79.36	19.92
-77.36	102.36	-7.92	48.11	69.36	21.25
-67.36	92.36	-15.40	40.63	59.36	18.73
-57.36	82.36	-20.8	35.23	49.36	14.13

LTE B25 Downlink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-101.60	126.60	8.09	83.63	93.60	9.97
-91.60	116.60	8.58	74.12	83.60	9.48
-81.60	106.60	8.78	64.32	73.60	9.28
-71.60	96.60	9.25	54.79	63.60	8.81
-61.60	86.60	8.89	44.43	53.60	9.17
-51.60	76.60	8.58	34.12	43.60	9.48

LTE B25 Uplink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-108.60	133.60	19.17	78.41	100.60	22.19
-98.60	123.60	19.21	78.45	90.60	12.15
-88.60	113.60	19.0	78.24	80.60	2.36
-78.60	103.60	9.11	68.35	70.60	2.25
-68.60	93.60	-1.07	58.17	60.60	2.43
-58.60	83.60	-10.68	48.56	50.60	2.04

LTE B30 Downlink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-101.28	126.28	7.51	83.23	93.28	10.05
-91.28	116.28	8.79	74.51	83.28	8.77
-81.28	106.28	8.54	64.26	73.28	9.02
-71.28	96.28	8.65	54.37	63.28	8.91
-61.28	86.28	8.88	44.60	53.28	8.68
-51.28	76.28	8.91	34.63	43.28	8.65

LTE B30 Uplink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-108.28	133.28	16.06	74.29	100.28	25.99
-98.28	123.28	16.28	74.51	90.28	15.77
-88.28	113.28	16.36	74.59	80.28	5.69
-78.28	103.28	8.69	66.92	70.28	3.36
-68.28	93.28	-1.08	57.15	60.28	3.13
-58.28	83.28	-10.57	47.66	50.28	2.62

LTE B71 Downlink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-100.29	125.29	5.55	80.22	92.29	12.07
-90.29	115.29	8.07	72.74	82.29	9.55
-80.29	105.29	7.95	62.62	72.29	9.67
-70.29	95.29	7.76	52.43	62.29	9.86
-60.29	85.29	8.29	42.96	52.29	9.33
-50.29	75.29	7.99	32.66	42.29	9.63

LTE B71 Uplink Gain vs RPCH and BSCL - Middle Channel					
RPCH Power (dBm)	**BSCL (dB)**	**Measured Power (dBm)**	**Gain (dB)**	**Limit (dB)**	**Margin (dB)**
-107.29	132.29	20.09	76.12	99.29	23.17
-97.29	122.29	19.71	75.74	89.29	13.55
-87.29	112.29	18.56	74.59	79.29	4.70
-77.29	102.29	8.83	64.86	69.29	4.43
-67.29	92.29	-1.82	54.21	59.29	5.08
-57.29	82.29	-11.57	44.46	49.29	4.83

LTE B71 Uplink Gain vs RPCH and BSCL - Middle Channel				
Band	**Frequency (MHz)**	**UL Gain Timing (Sec)**	**Limit (Sec)**	**Margin (Sec)**
WCDMA Band 5 Uplink	836.6	0.87	3	2.13
LTE Band 4 Uplink	1732.5	1.01	3	1.99
LTE Band 5 Uplink	1732.5	0.82	3	2.08
LTE Band 12 Uplink	707.5	1.12	3	1.88
LTE Band 13 Uplink	782	0.95	3	2.05
LTE Band 25 Uplink	1882.5	1.07	3	2.93
LTE Band 30 Uplink	2310	0.74	3	2.26
LTE Band 71 Uplink	680.5	0.93	3	2.07