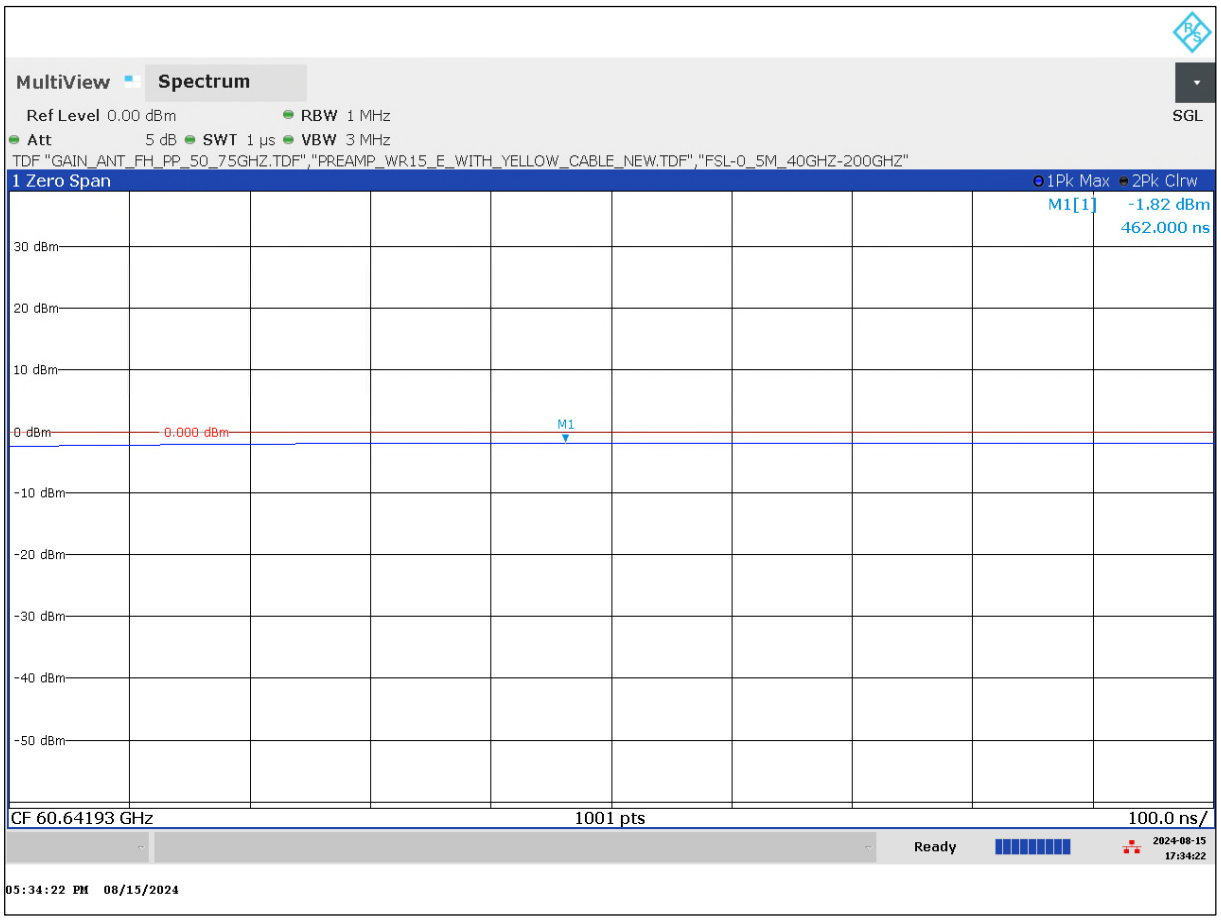
Annex 202: Measurement diagrams 23-1-0012601T007_TR1-A202-R01

Number of pages:	51	**Date of Report:**	2025-Jun-13
Testing company:	cetecom advanced GmbH Untertuerkheimer Str. 6-10 66117 Saarbruecken GERMANY	**Applicant:**	Rosenberger Hochfrequenztechnik GmbH & Co. KG
Product: **Model:**	**RoProxCon Hybrid Transmitter** **MI1C804-901-01**		
FCC ID:	2BG4VRPCH	**IC:** **PMN:** **HVIN:**	33058-RPCH RoProxCon Hybrid MI1C804-901-01
Testing has been carried out in accordance with:	**FCC - Title 47 CFR Part 15,** Subpart C, §15.255 FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 15 - Radio frequency devices **RSS - 210 Issue 11** Annex J Spectrum Management and Telecommunications Radio Standards Specification - Licence-Exempt Radio Apparatus: Category I Equipment		

1 Measurement diagrams

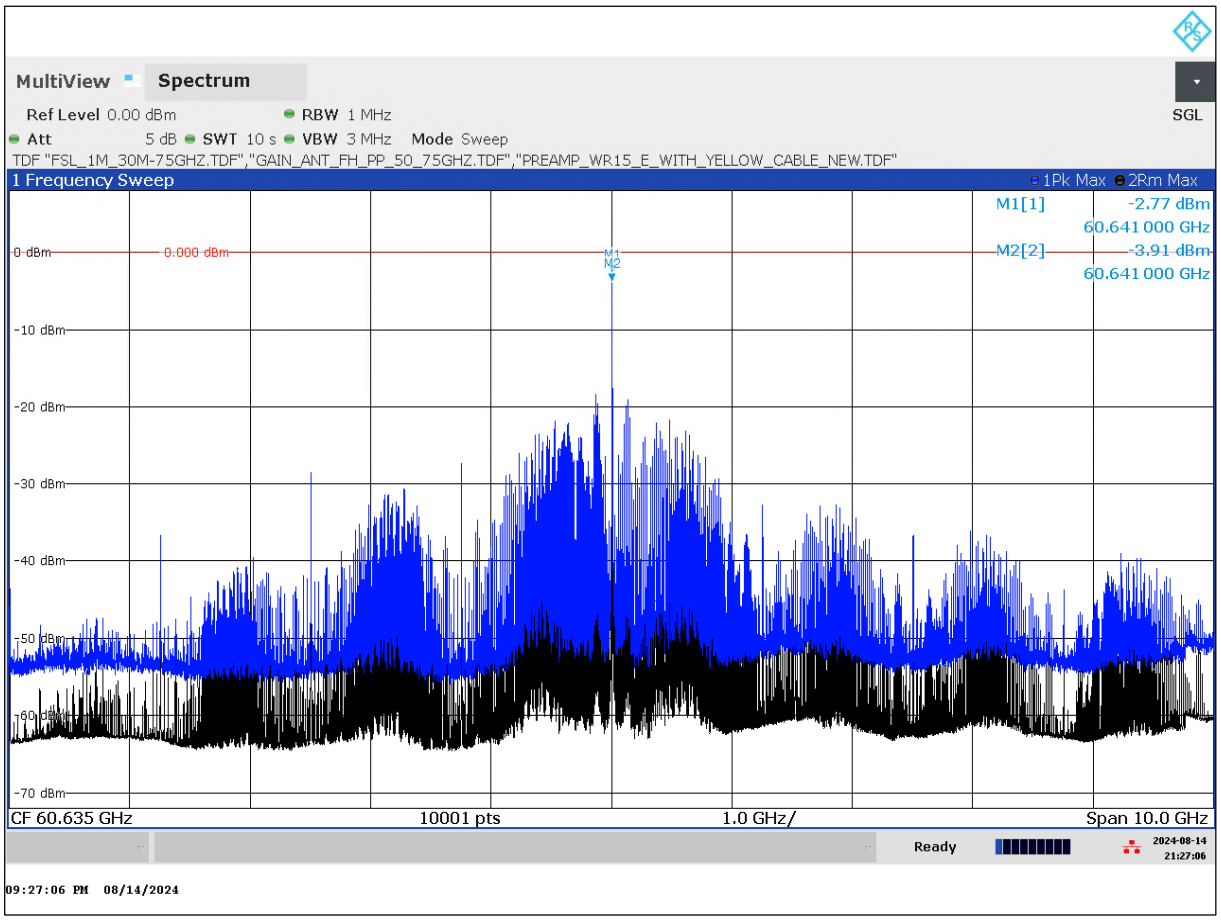
1.1 Cycle-Time of transmitter

TID103_23-1-0012601T007_EUT_cycle_time_verification_with_1µs



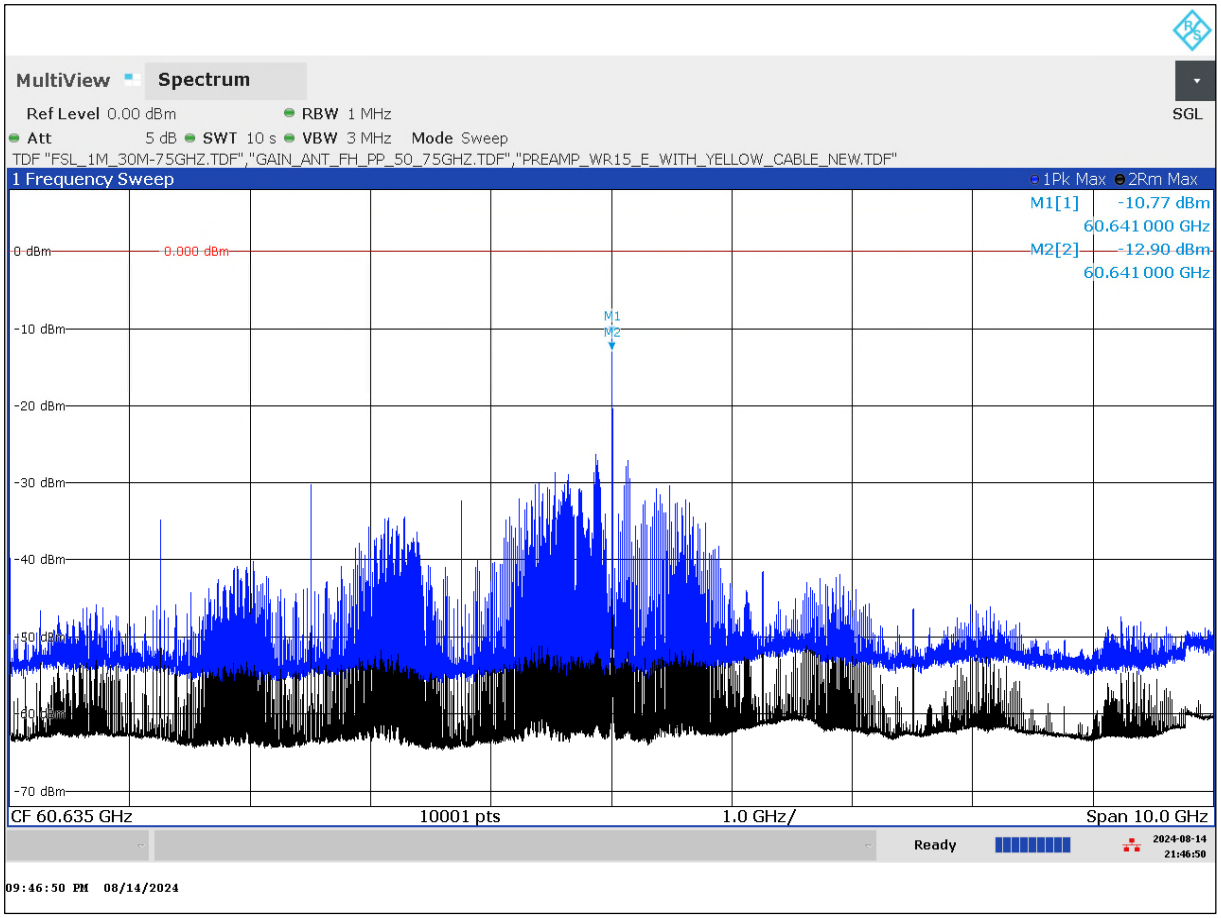
1.2 Measurement: Peak EIRP

TID030_23-1-0012601T007_PEAK_EIRP_Ant_V_RBW_1MHz



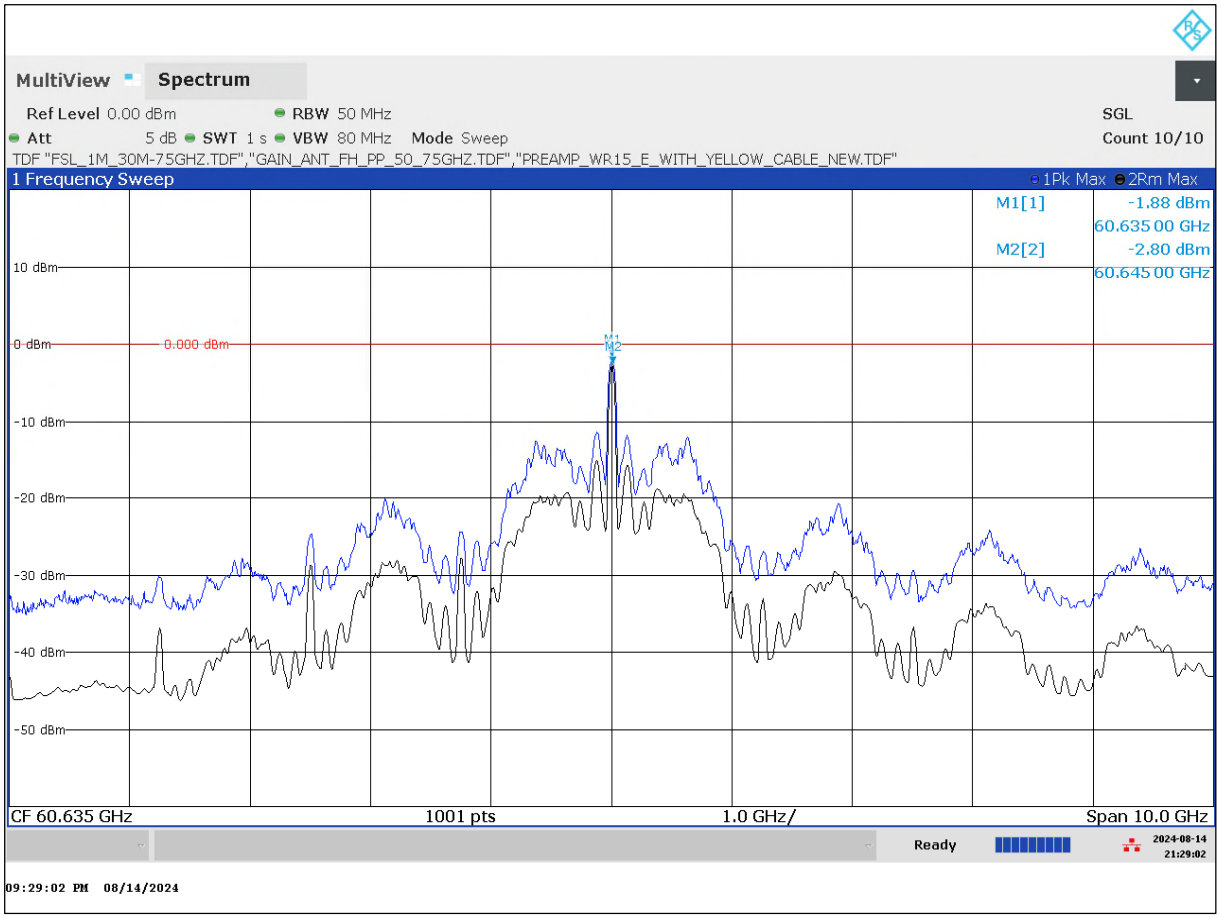
Peak EIRP with RBW=1MHz, value = -2.77dBm

TID031_23-1-0012601T007_PEAK_EIRP_Ant_H_RBW_1MHz



Peak EIRP with RBW=1MHz, value = - 10.77dBm (not worst-case polarisation)

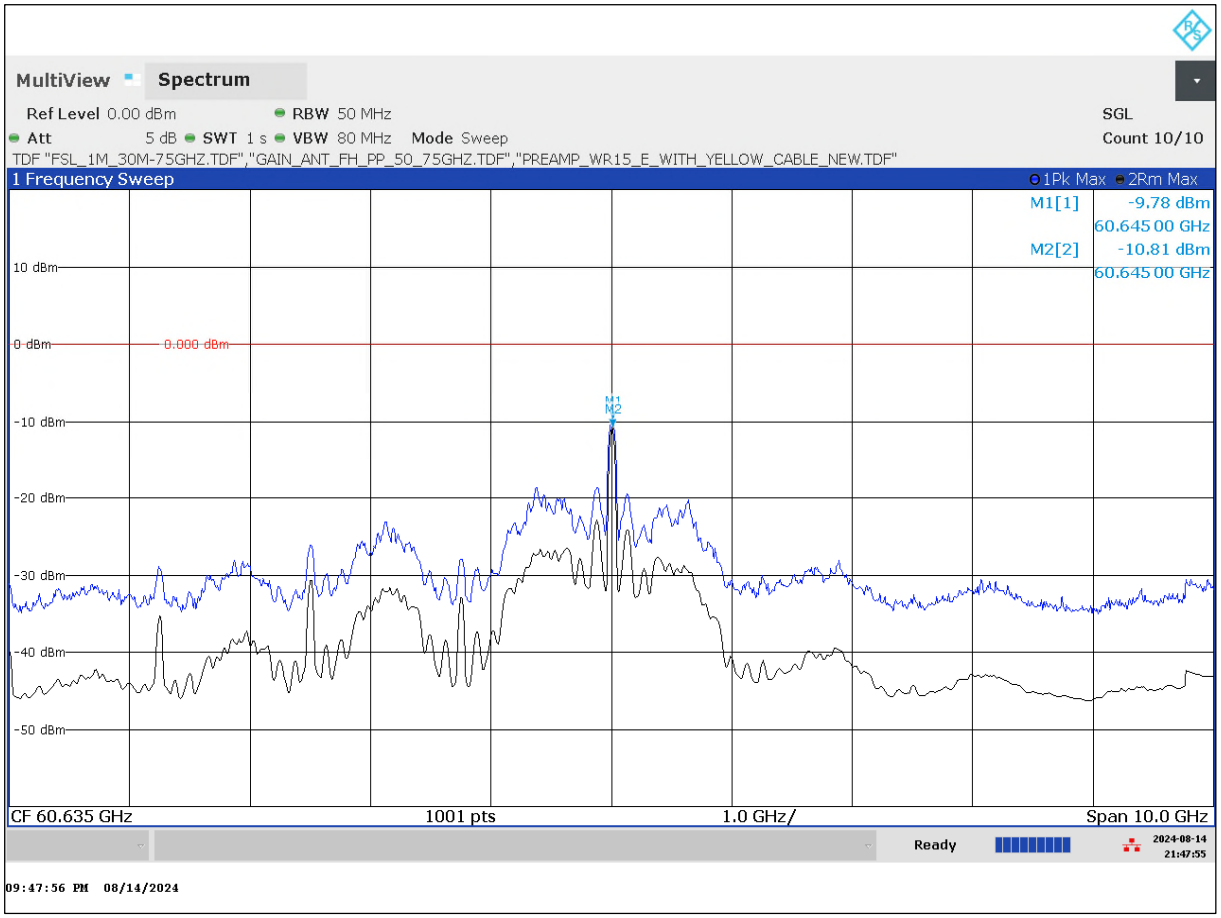
TID032_23-1-0012601T007_PEAK_EIRP_Ant_V_RBW_50MHz



Peak EIRP with RBW=50MHz, value = -1.88dBm

Chosen measurement BW (50MHz) bigger then EBW (=1.281MHz) of the main signal component.

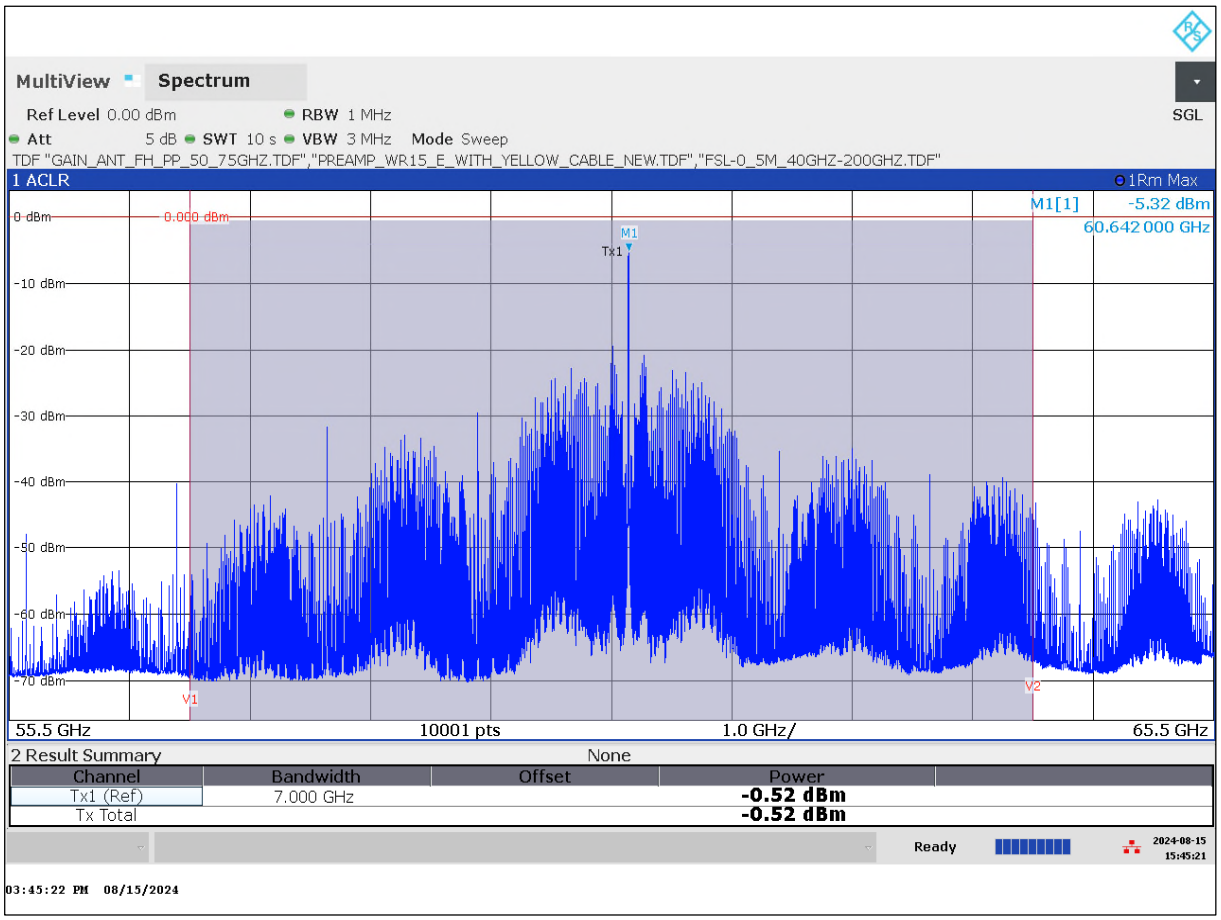
TID033_23-1-0012601T007_PEAK_EIRP_Ant_H_RBW_50MHz



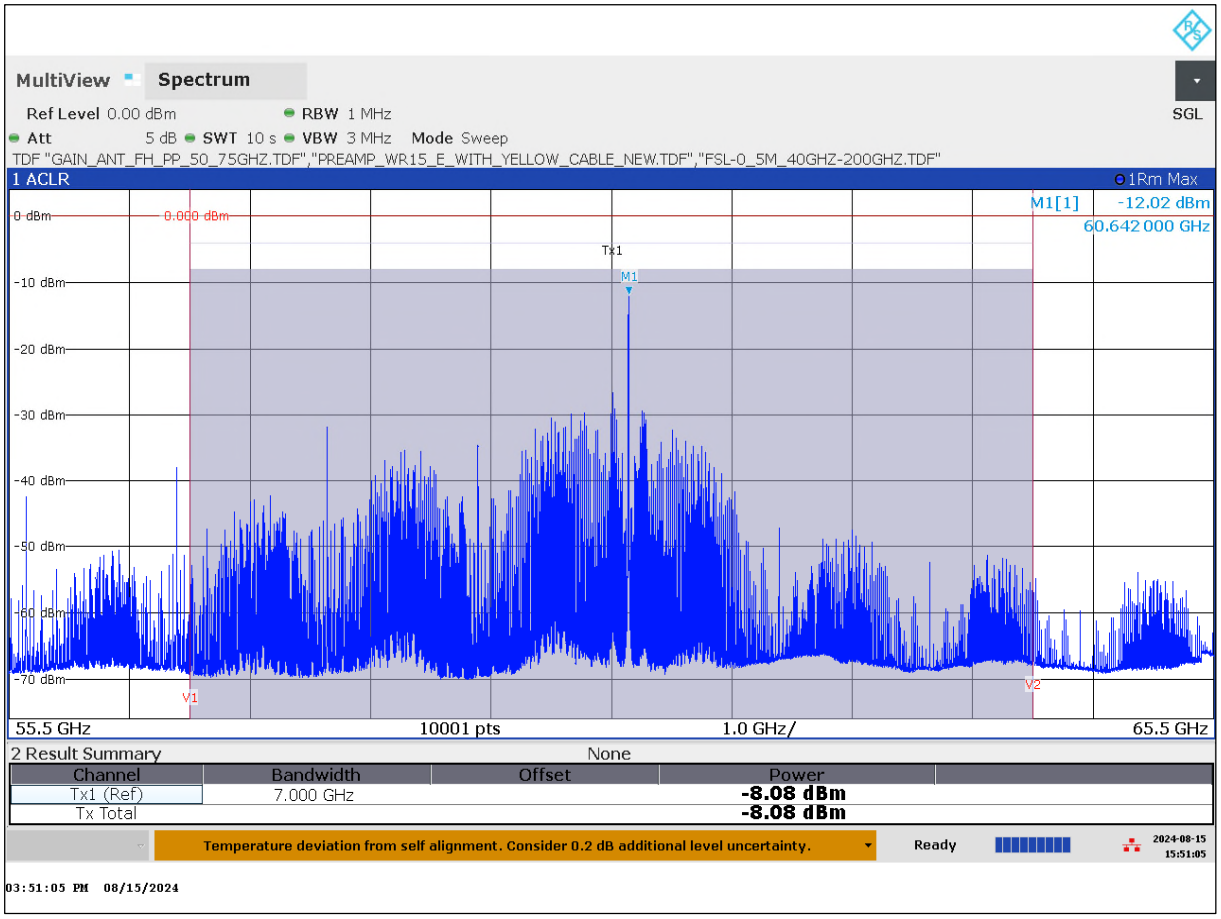
Peak EIRP with RBW=50MHz, value = -9.78dBm (not worst-case polarisation)

1.3 Measurement: Average EIRP

TID041_23-1-0012601T007_Channel_Power_Ant_V_span_10GHz



TID043_23-1-0012601T007_Channel_Power_Ant_V_span_10GHz

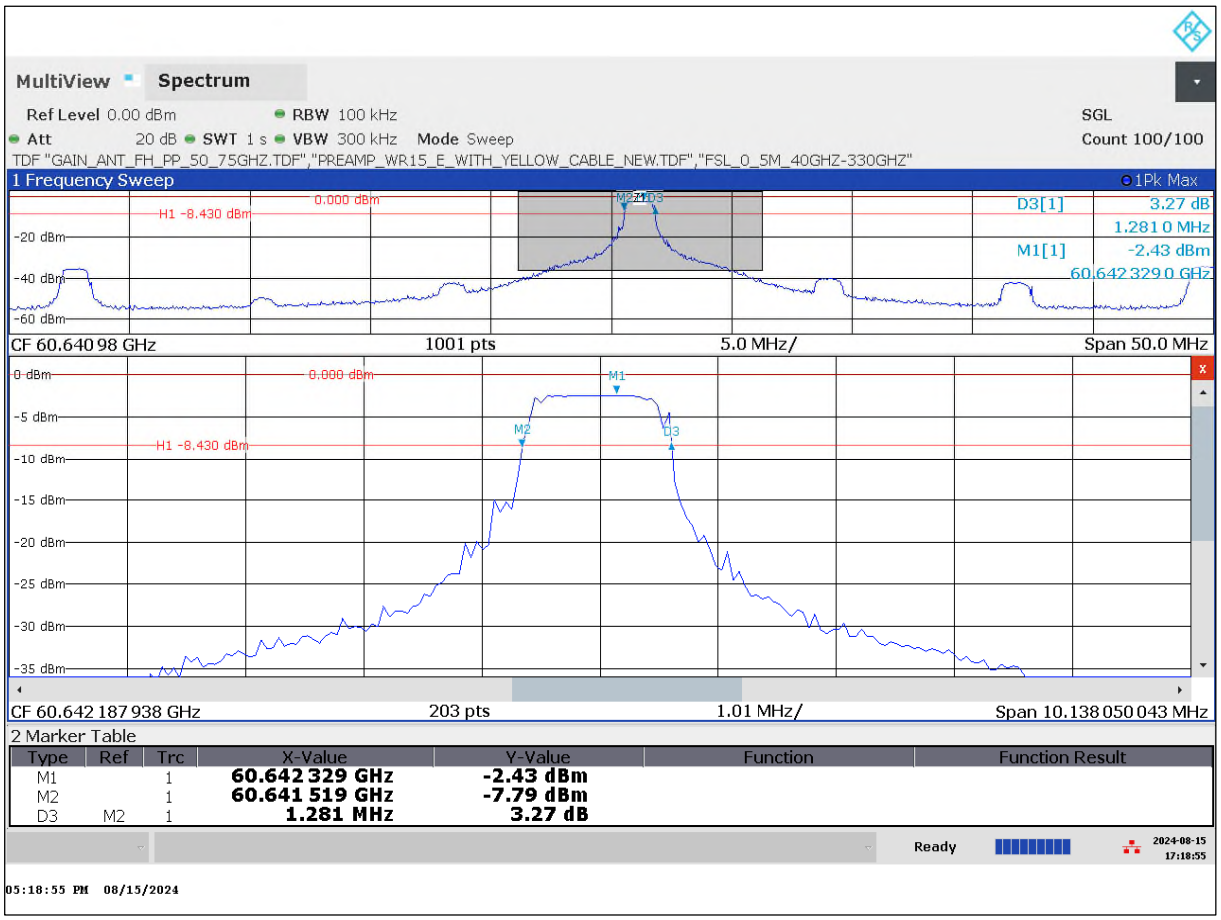


1.4 Measurement: 20dB emission bandwidth

See testcase nominal and extreme test conditions under annex 201.

1.5 Measurement: 6dB emission bandwidth

TID034_01_23-1-0012601T007_6dB_EBW_Ant_V_RBW_100kHz_2nd_run



6 dB bandwidth: 1.281MHz

1.6 Measurement: 99% occupied bandwidth

See testcase nominal and extreme test conditions under annex 201.

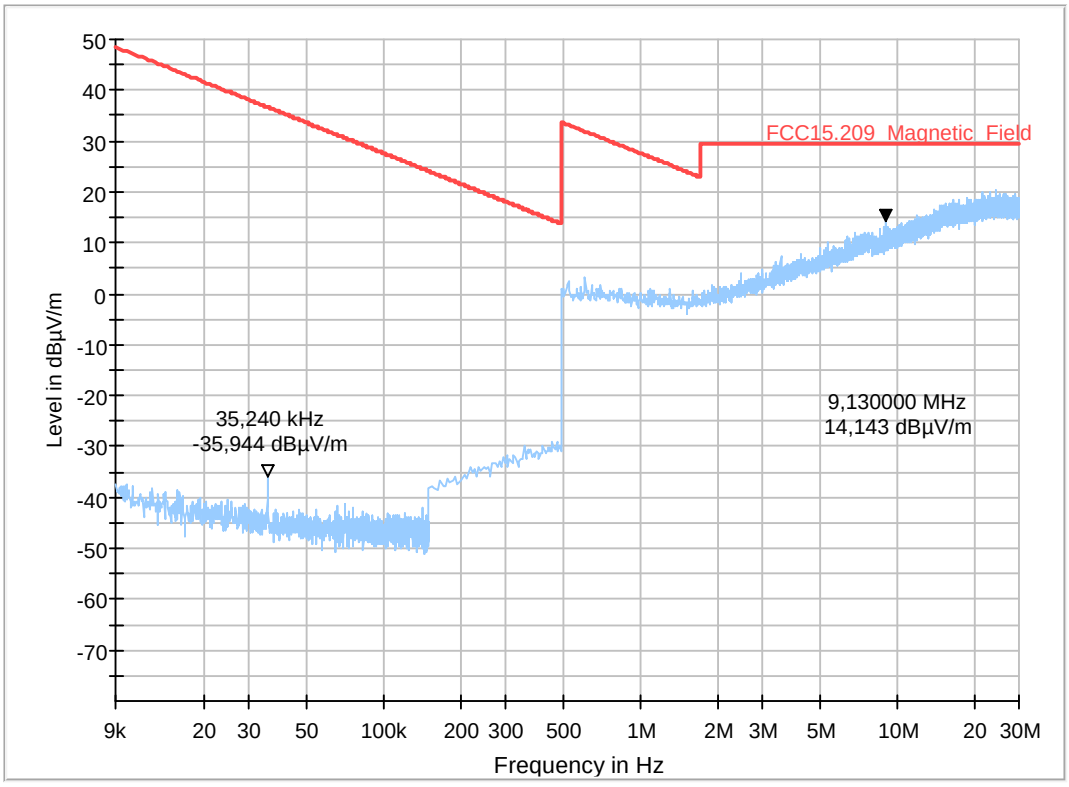
1.7 Radiated spurious emissions (9kHz < f < 30MHz)

TID017a_23-1-0012601T007_9kHz - 30 MHz_EUT_front_rear_left_right

Common Information

Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.60.20
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 5
Operator:	AHo
Operating Mode:	TX-on
Power during tests:	24 V DC
EUT Setup:	front, rear, left, right
Verdict:	Passed
EUT Sample No:	S05_C01

Full Spectrum

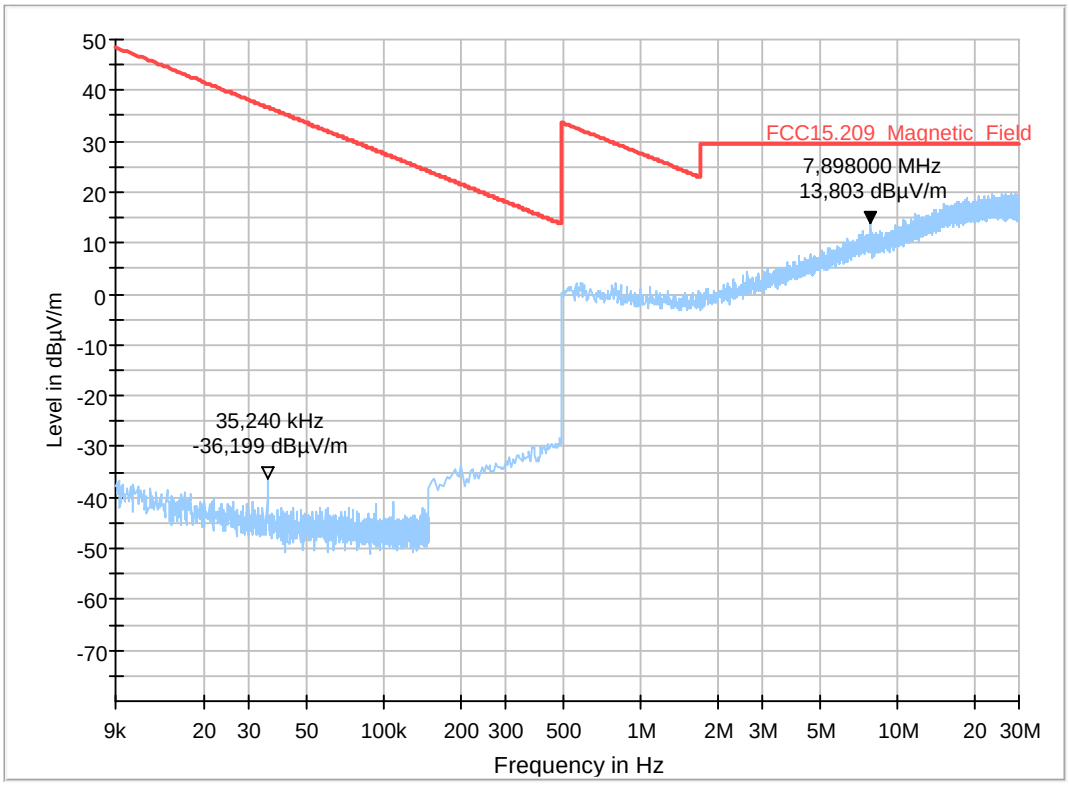


TID017b_23-1-0012601T007_9kHz - 30 MHz_EUT_top_bottom_left_right

Common Information

Test description:	Magnetic Field Strength Measurement related to 30/300 m distance
Test Site Location:	Ref.-Nr. 441 Semi Anechoic Chamber (SAC1) with 3 m measurement distance
Version of Testsoftware:	EMC32 V10.60.20
Distance correction:	used accord. table, pls. see test report
Technical Data:	Please see page 2 for detailed data of measurement setup
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation
Used filter:	bypass
Test Standard:	FCC 15.205 § 15.209; RSS-Gen: Issue 5
Operator:	AHo
Operating Mode:	TX-on
Power during tests:	24 V DC
EUT Setup:	top, bottom
Verdict:	Passed
EUT Sample No:	S05_C01

Full Spectrum

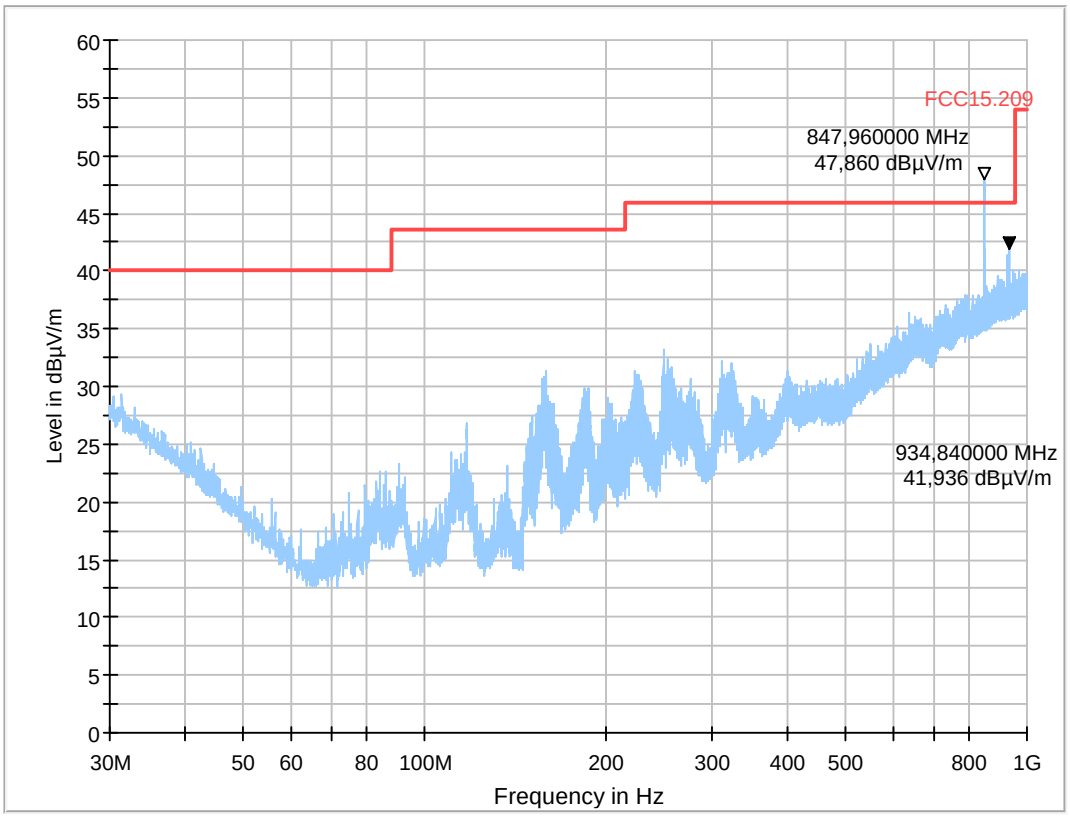


1.8 Radiated spurious emissions (30MHz< f < 1GHz)

TID018a_23-1-0012601T007_30 MHz - 1 GHz_EUT_front_rear_left_right

Common Information

Test Description:	Radiated field strength emission in 3m distance
Test Site:	cetecom advanced GmbH Essen
Test Standard:	FCC 15.205&15.209 & RSS Gen. Issue 5
Antenna polarisation:	horizontal/vertical
EUT:	front, rear, right, left
Operator Name:	AHo
Operating Mode:	TX
Power supply:	24 V DC
EUT Sample No:	S05_C01
Verdict:	Passed

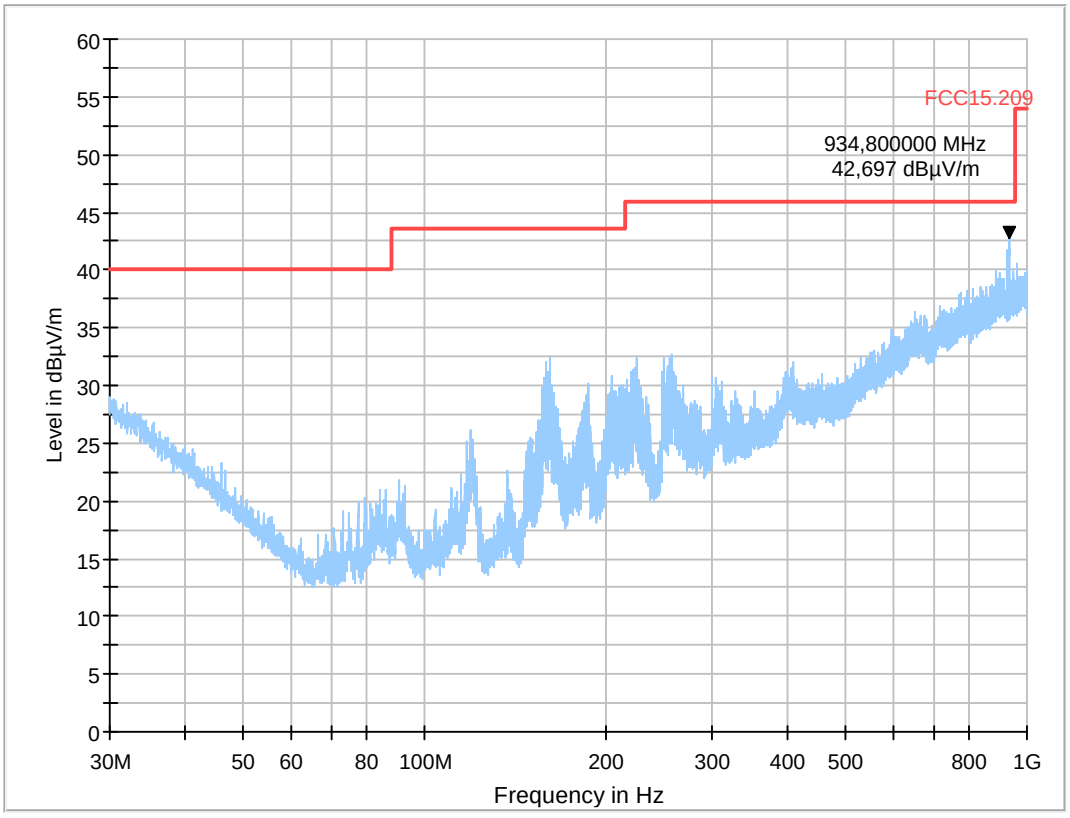


External interferer LTE Band 20 in diagram at 847.96MHz
External interferer LTE Band 1 in diagram at 934.84MHz

TID018b_23-1-0012601T007_30 MHz - 1 GHz_EUT_top_bottom_left_right

Common Information

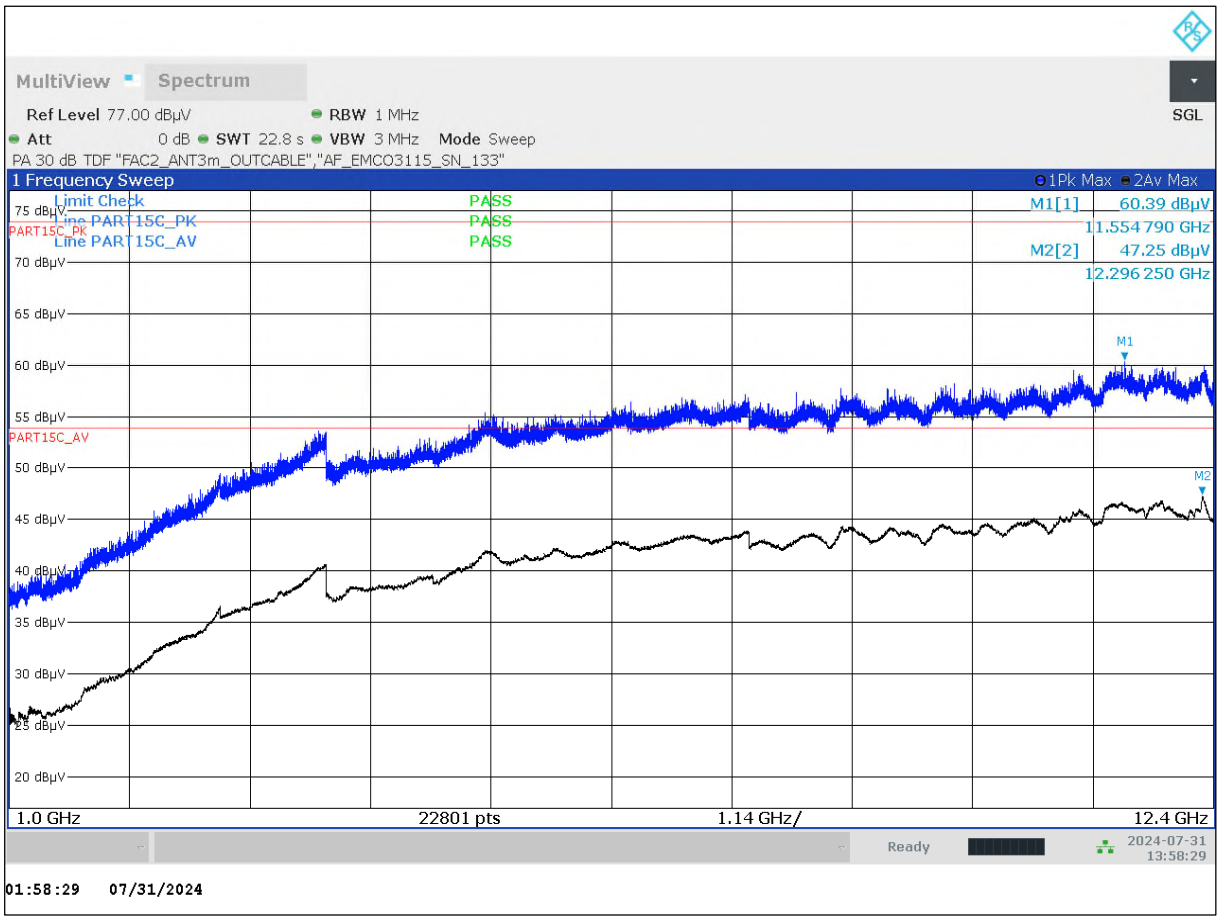
Test Description:	Radiated field strength emission in 3m distance
Test Site:	cetecom advanced GmbH Essen
Test Standard:	FCC 15.205&15.209 & RSS Gen. Issue 5
Antenna polarisation:	horizontal/vertical
EUT:	top, bottom, right, left
Operator Name:	AHo
Operating Mode:	TX
Power supply:	24 V DC
EUT Sample No:	S05_C01
Verdict:	Passed



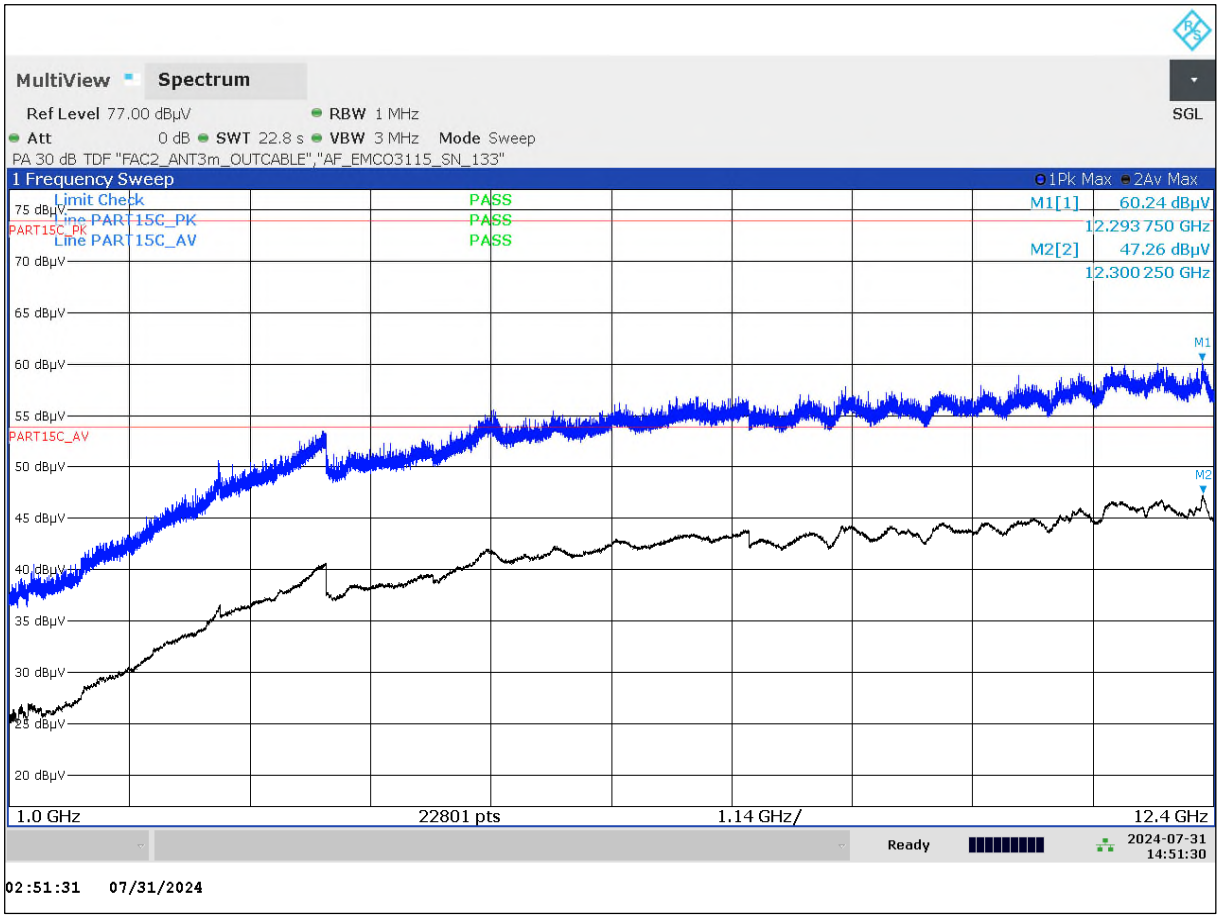
External interferer LTE Band 1 in diagram at 934.84MHz

1.9 Radiated spurious emissions (1GHz < f < 12.4GHz)

TID026a__RSE_ChNom_S05_1-12.4GHz__AntH

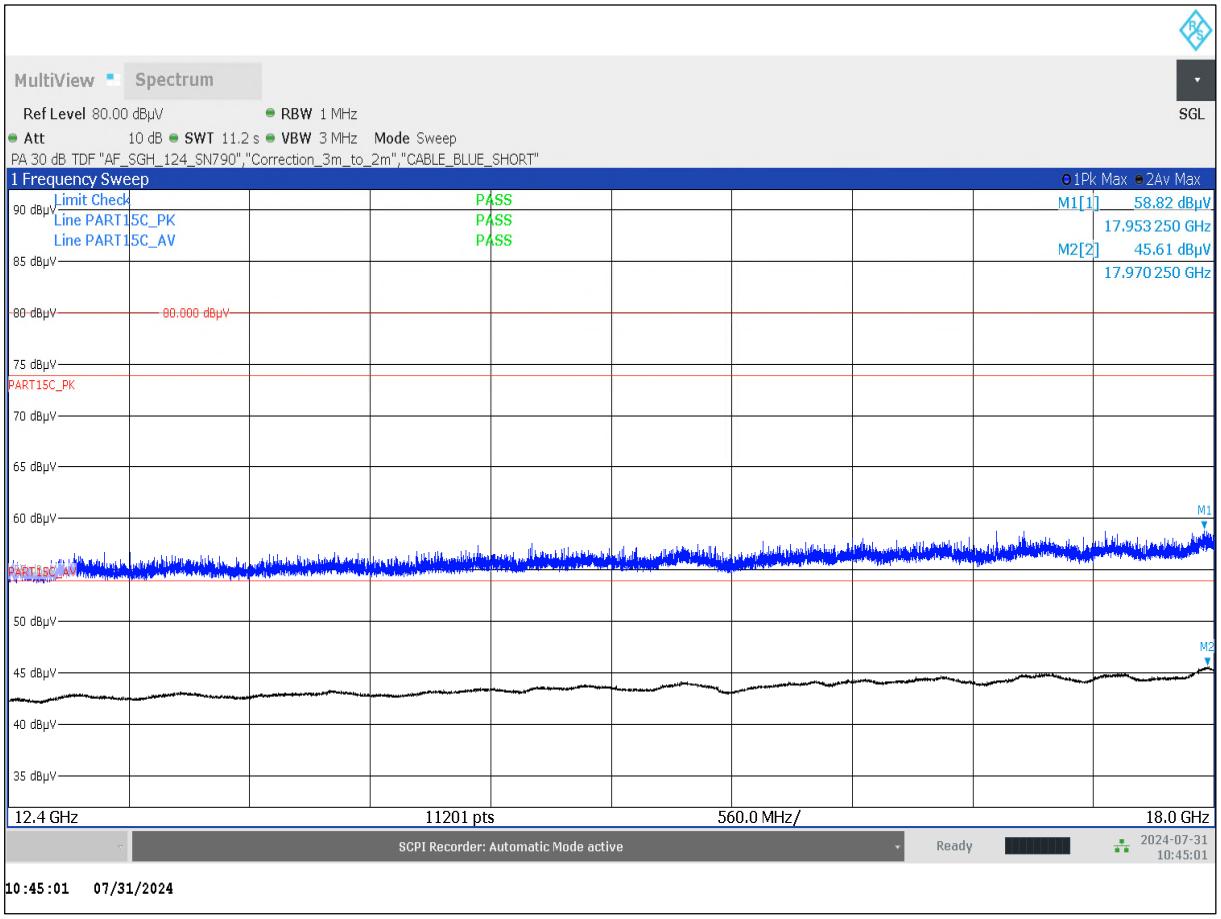


TID026b__RSE_ChNom_S05_1-12.4GHz__AntV

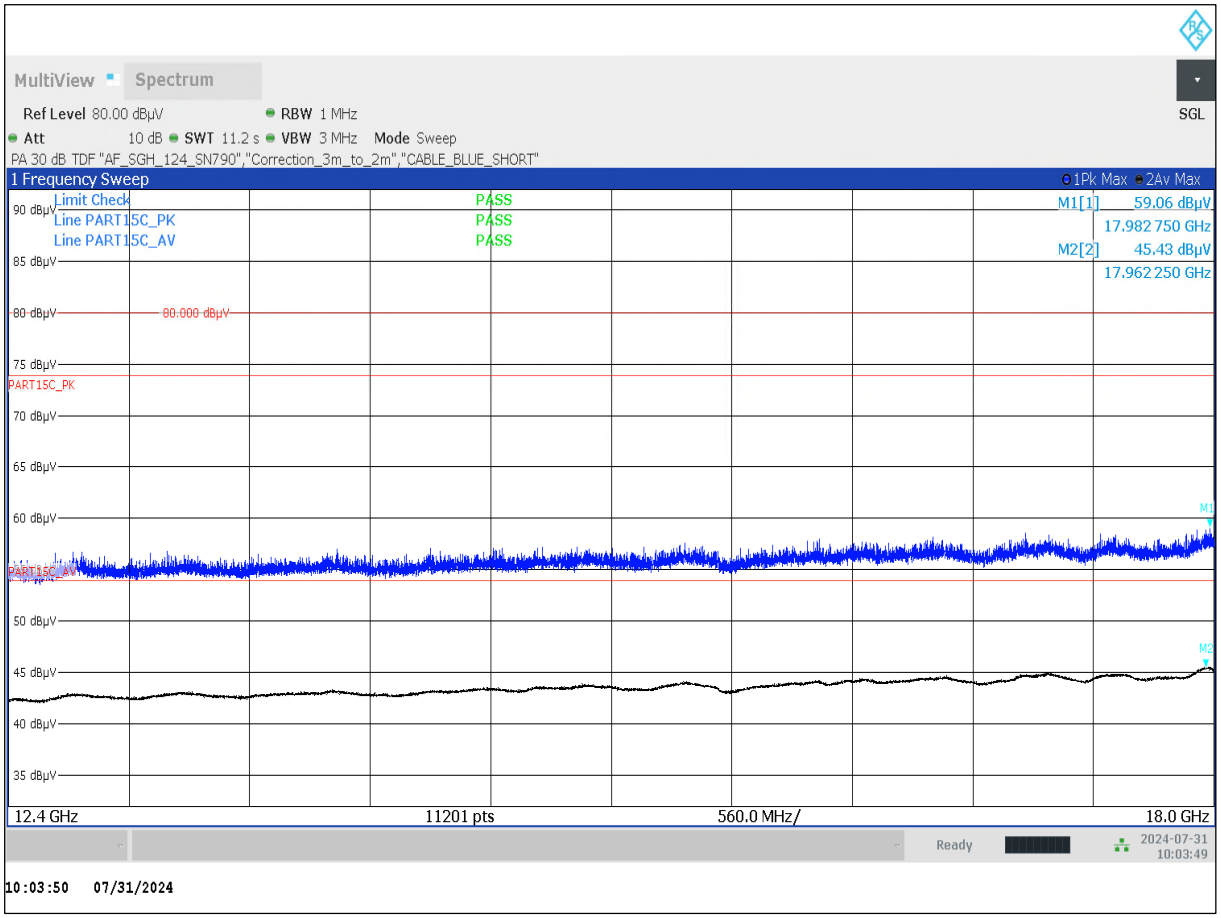


1.10 Radiated spurious emissions (12.4GHz < f < 18GHz)

TID023a__RSE_ChNom_S05_12.4-18GHz__AntH

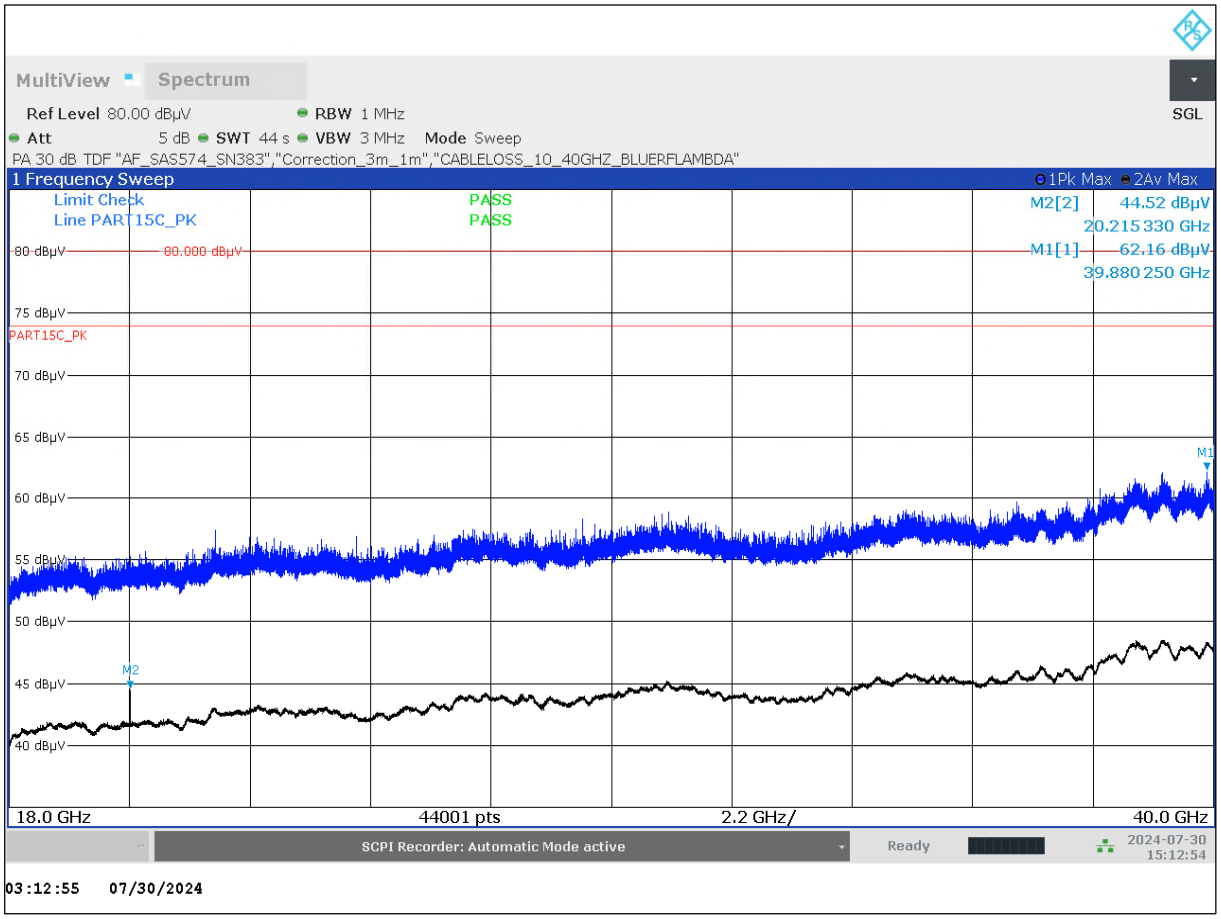


TID023b__RSE_ChNom_S04_12.4-18GHz__AntV



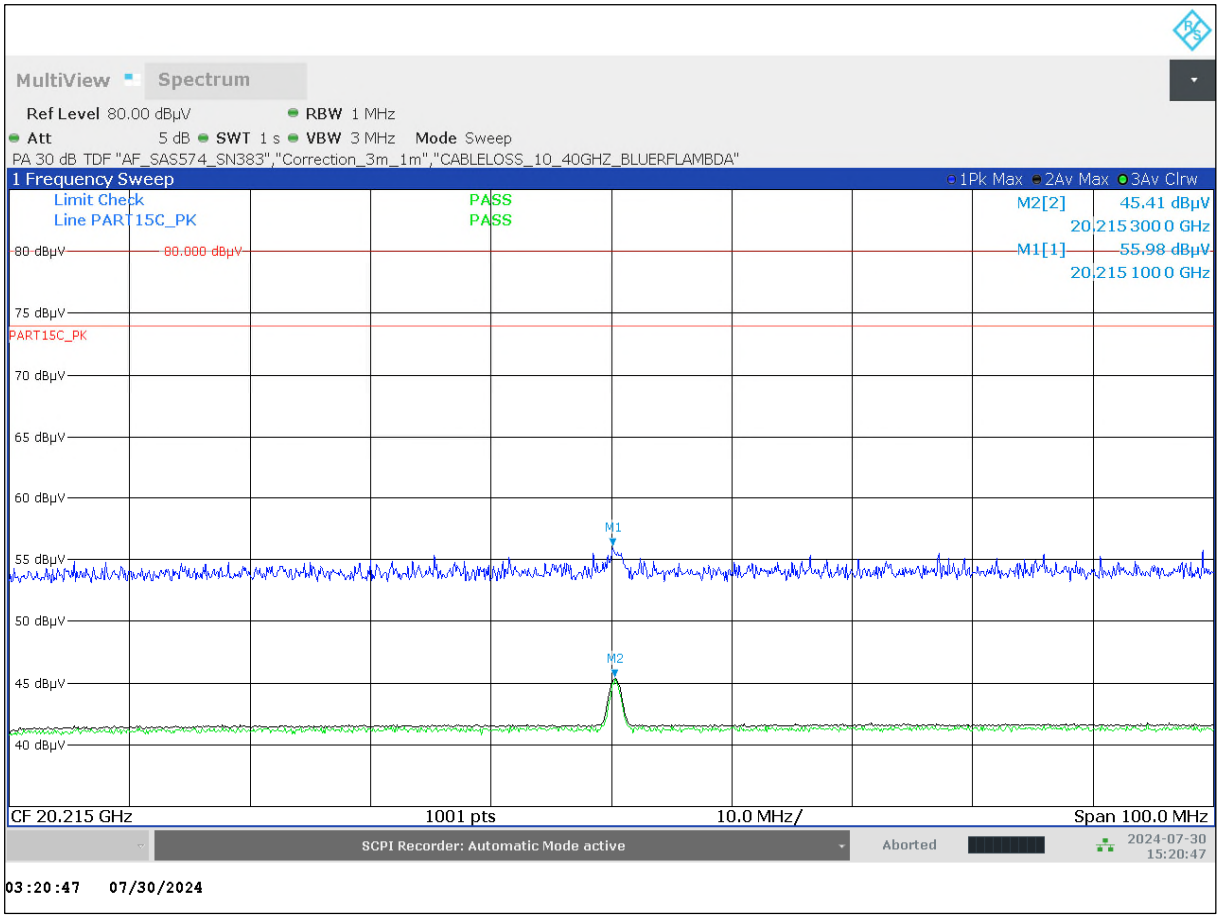
1.11 Radiated spurious emissions (18GHz < f < 40GHz)

TID016a__RSE_ChNom_S04_18-40GHz__AntH



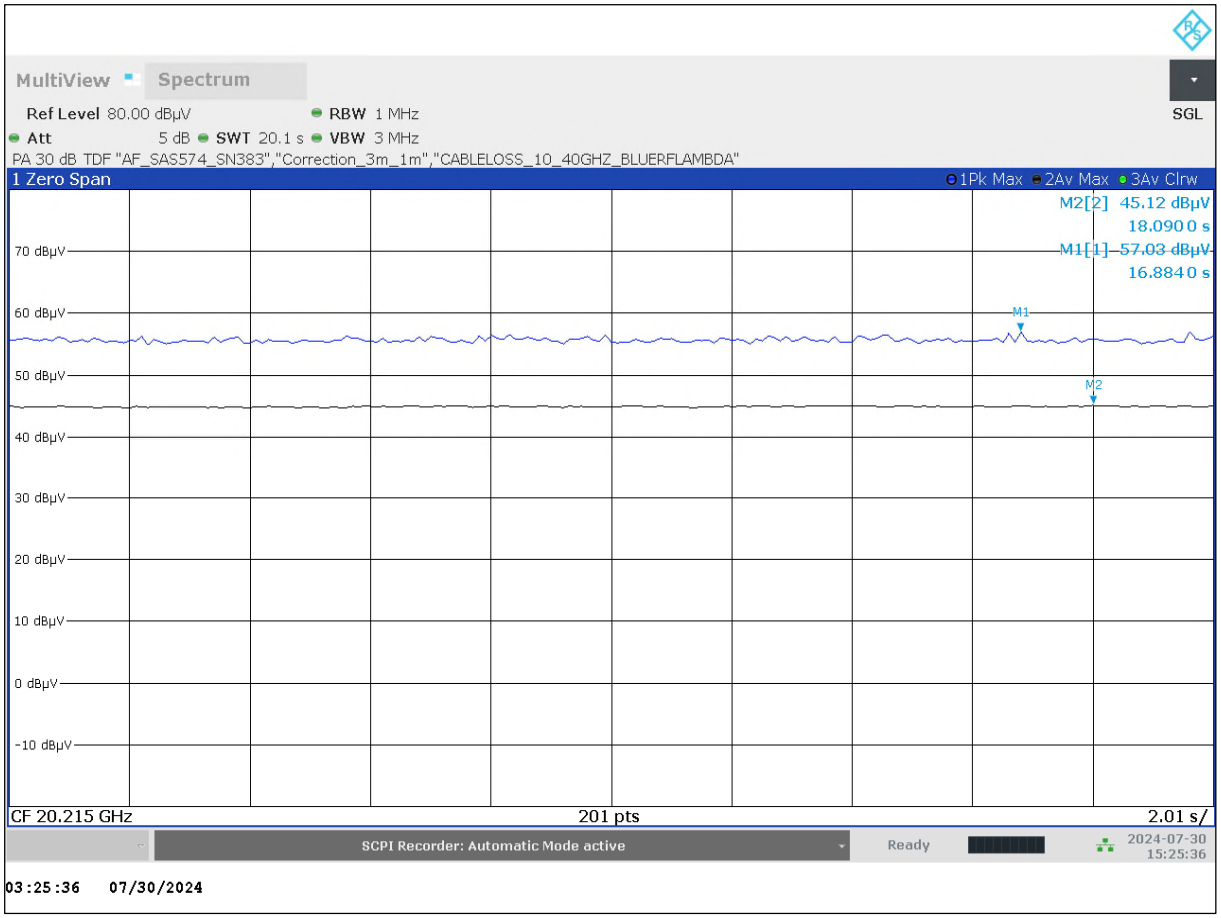
Critical frequency: 20.215GHz

TID016a_01_f1_critical_20.215GHz_A348deg_E112deg__AntH



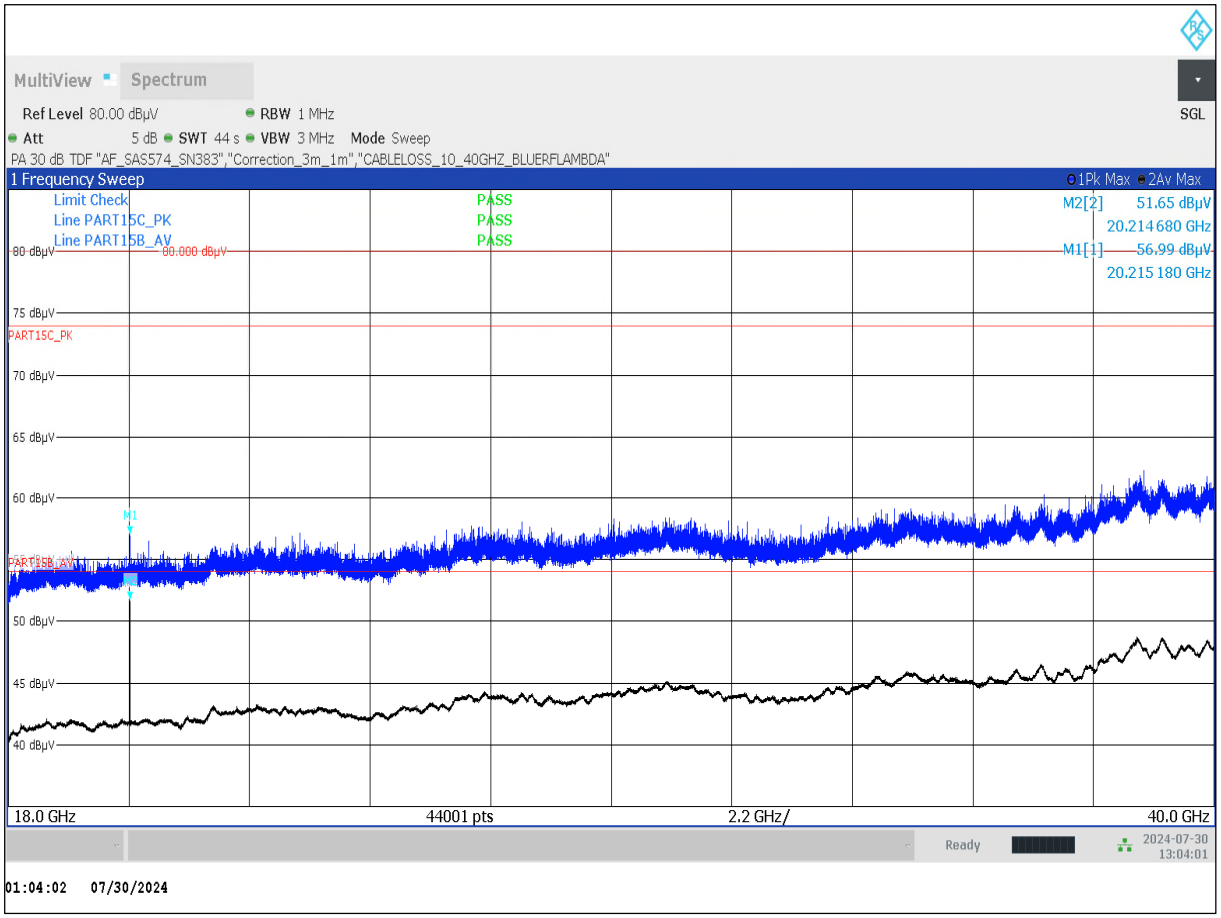
Maximization of emission

TID016a_02_f1_critical_ZeroSpan_20.215GHz_A348deg_E112deg__AntH



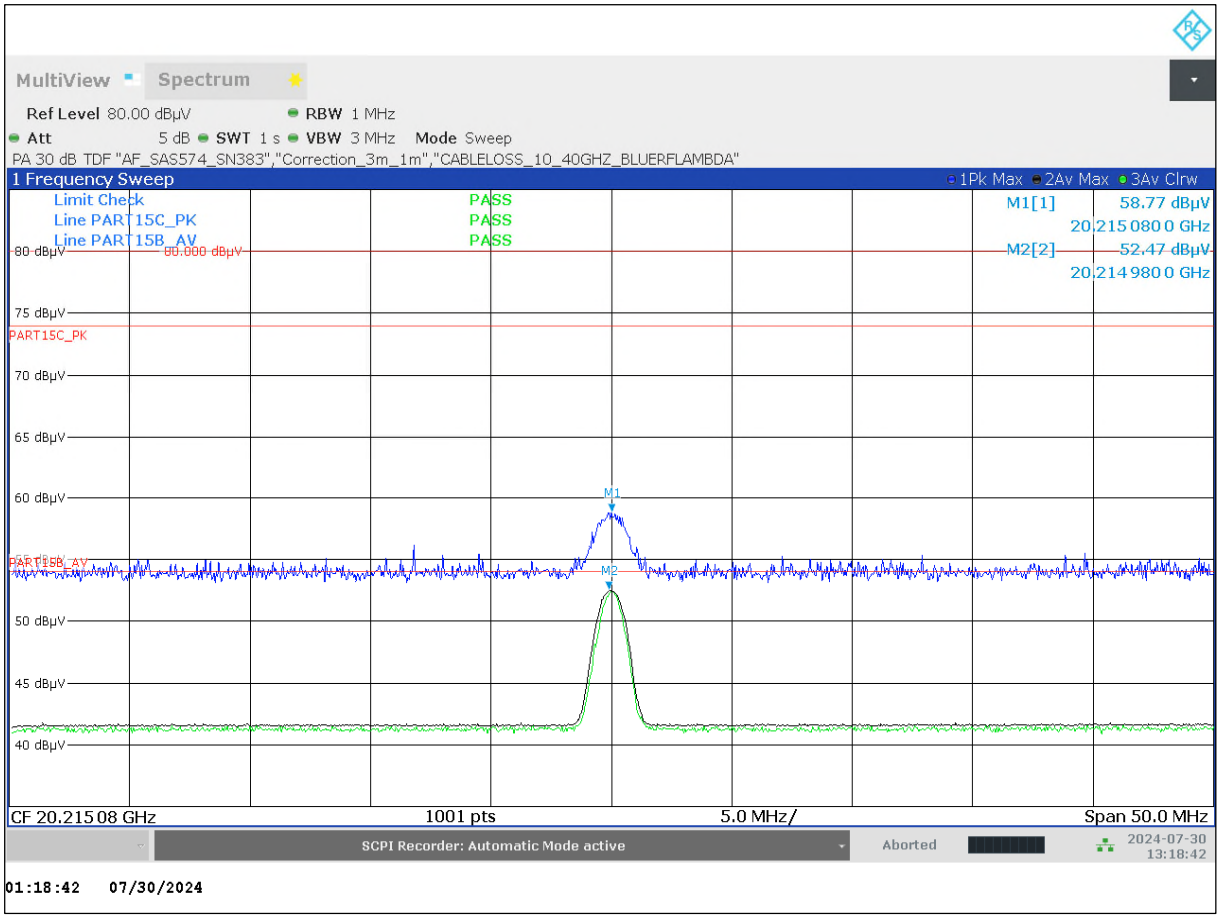
Final result with 100ms time per bin: AV – 45.12dBuV/m, PK – 57.03dBuV/m

TID016b__RSE_ChNom_S04_18-40GHz__AntV



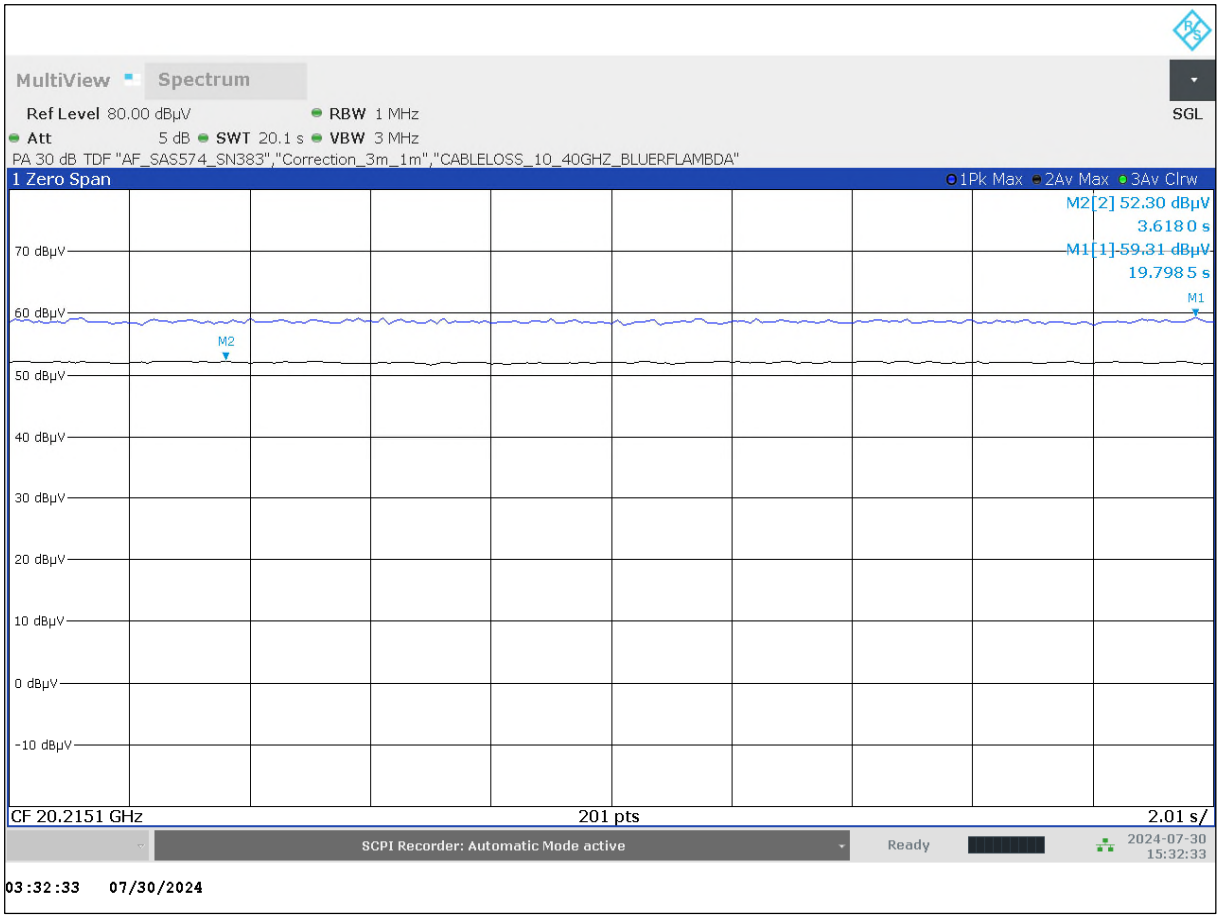
Critical emission: 20.215GHz

TID016b_01_f1_critical_20.215GHz_A1deg_E89deg__AntV



Maximization of emission

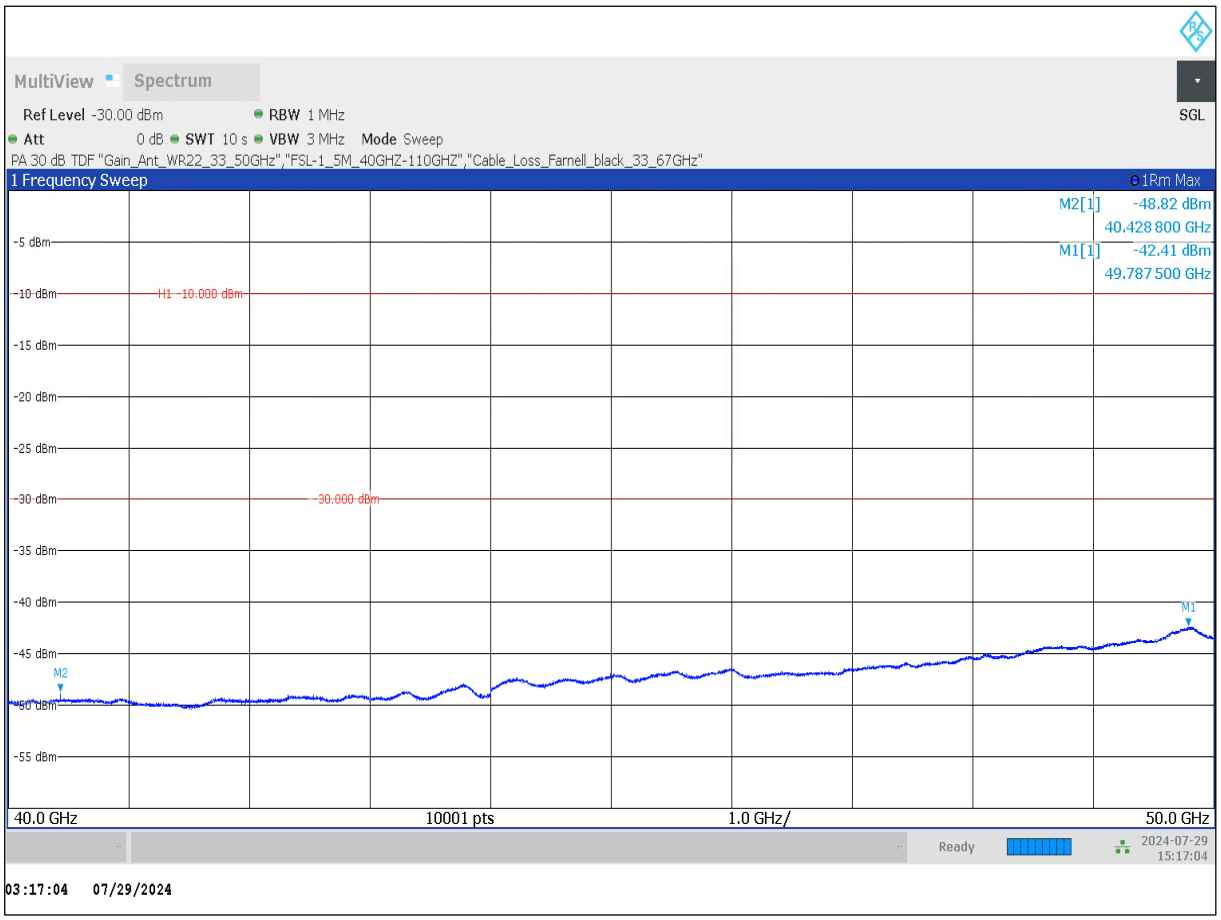
TID016b_03_f1_critical_ZeroSpan_20.215GHz_A1deg_E89deg__AntV



Final result with 100ms time per bin: AV – 52.30dBuV/m, PK – 59.31dBuV/m

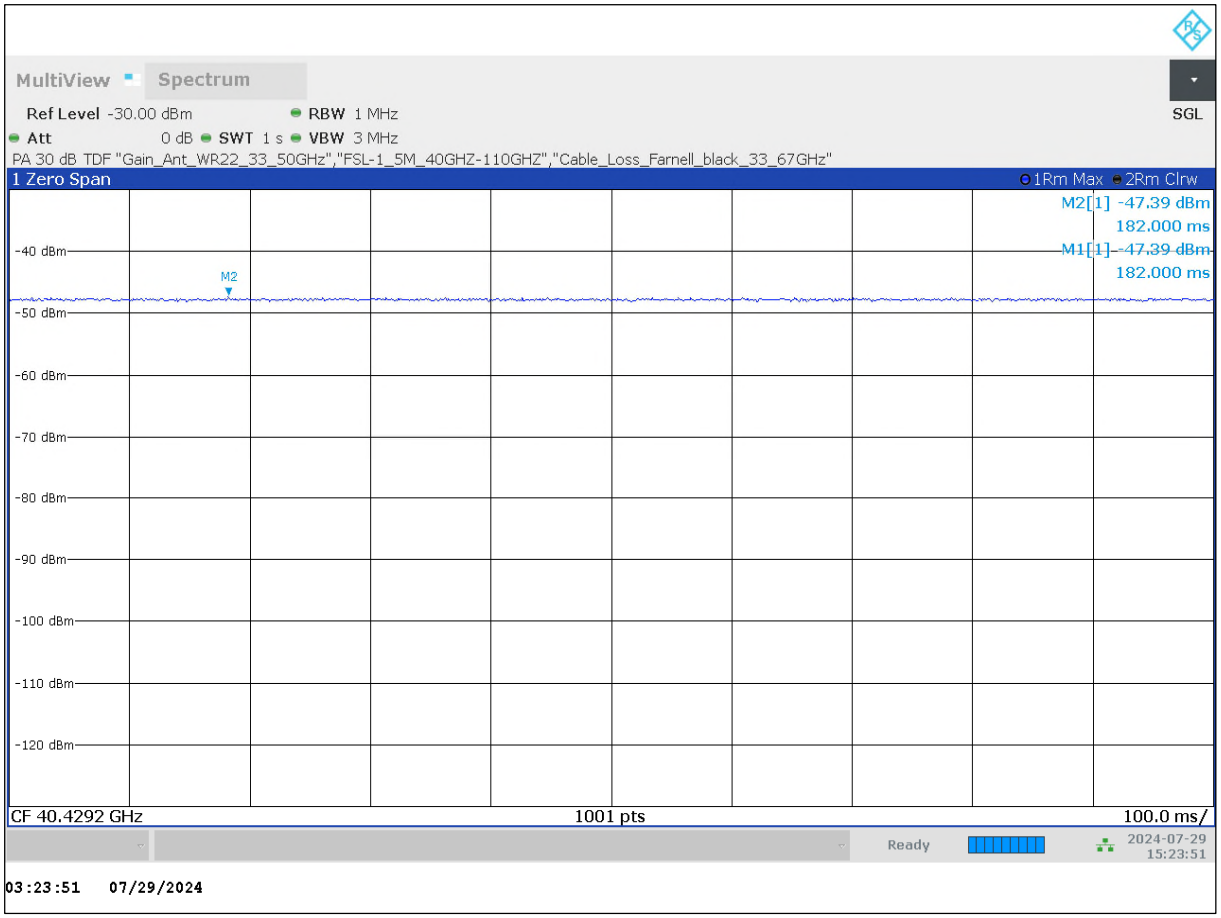
1.12 Radiated spurious emissions (40GHz < f < 50GHz)

TID014a_01_RSE_ChNom_S04_40-50GHz__AntH



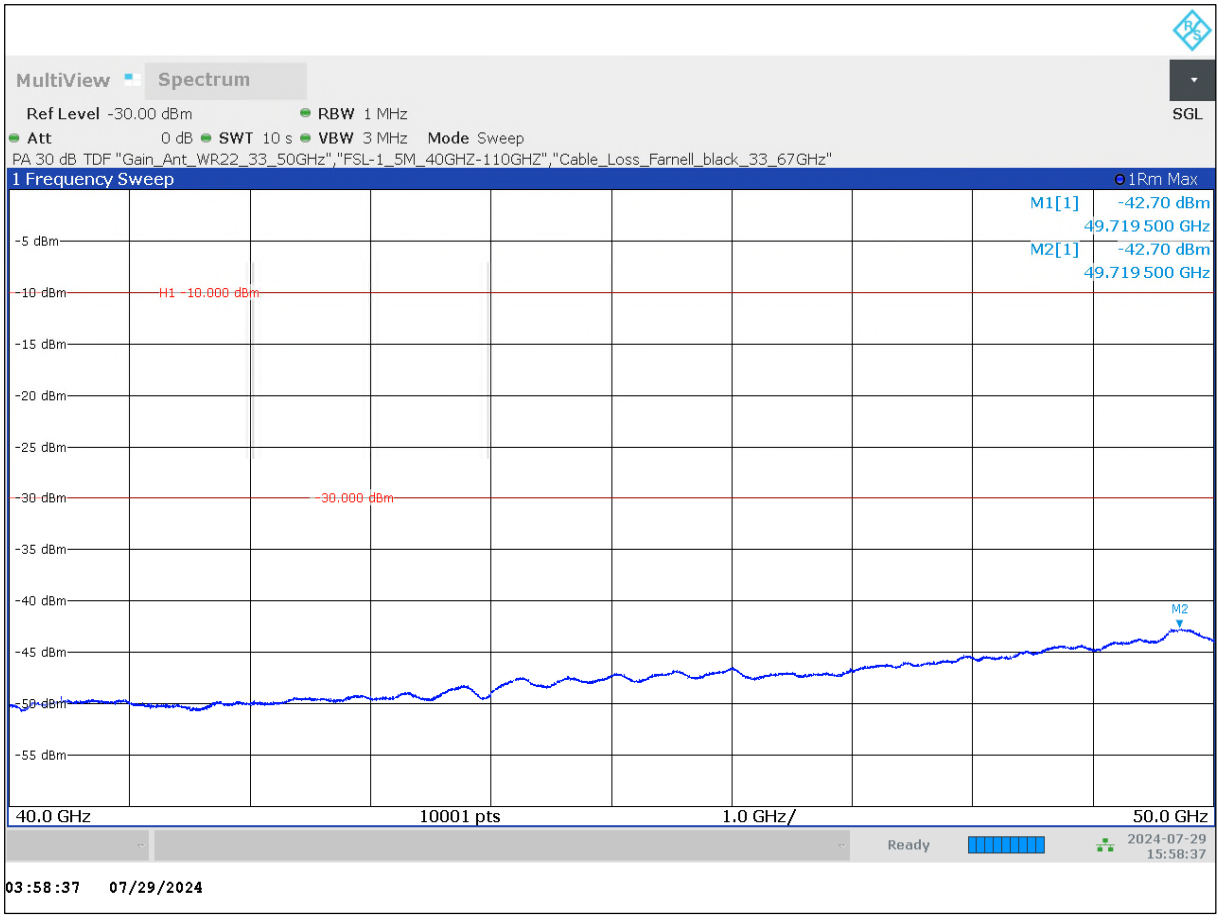
Frequency for investigation: 40.428GHz

TID014a_02_f1_krit_40.429GHz_A5deg_E80deg__AntH



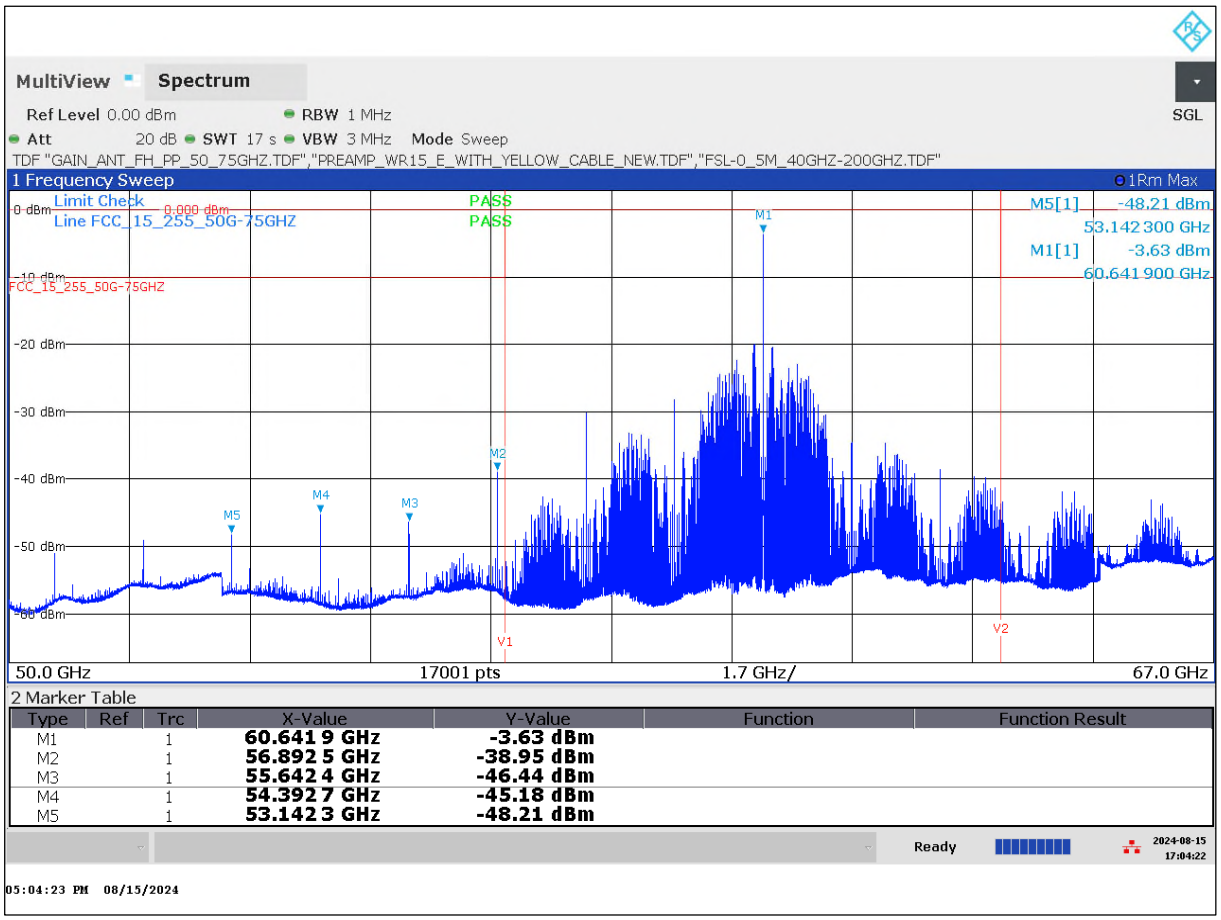
Final measurement: -47.39dBm

TID014b_01__RSE_ChNom_S04_40-50GHz__AntV

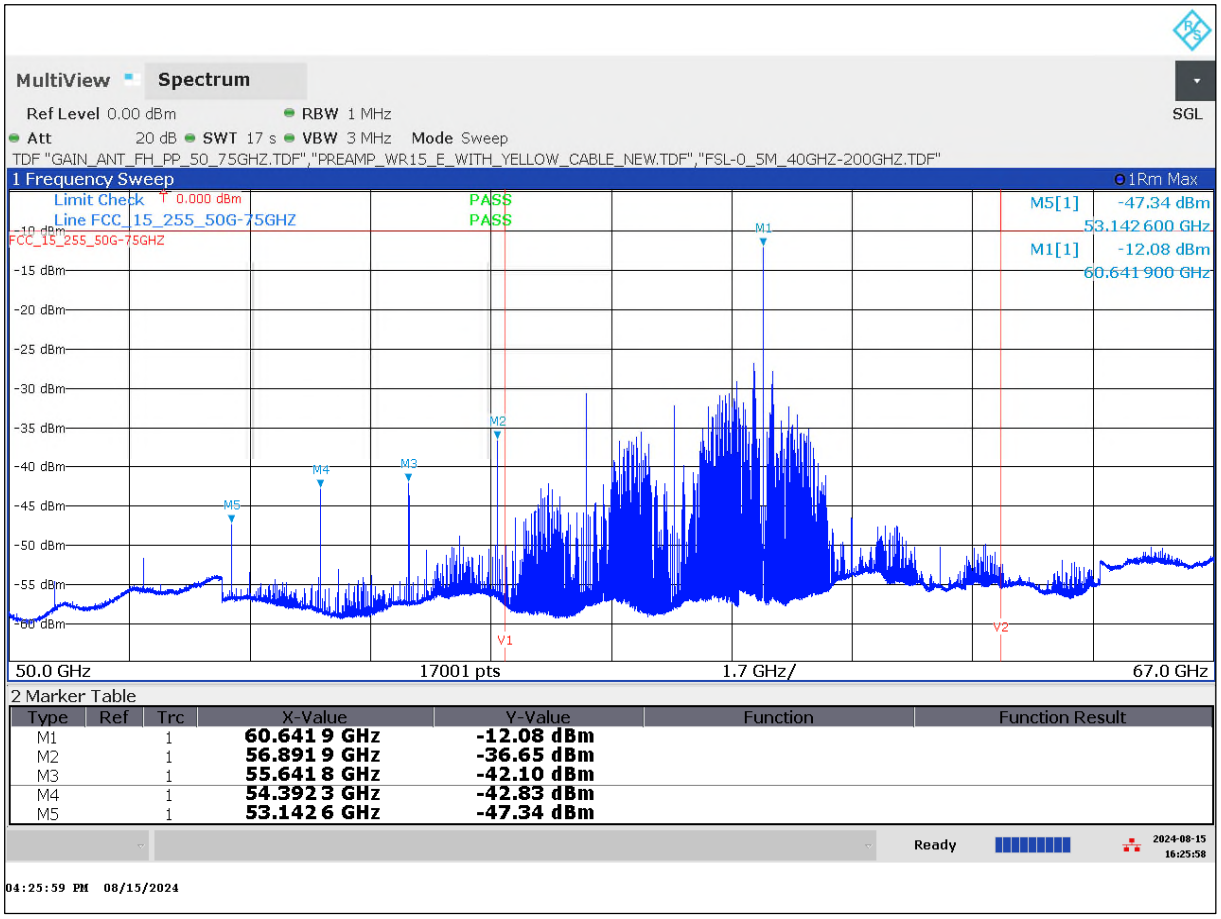


1.13 Radiated spurious emissions (50GHz < f < 75GHz)

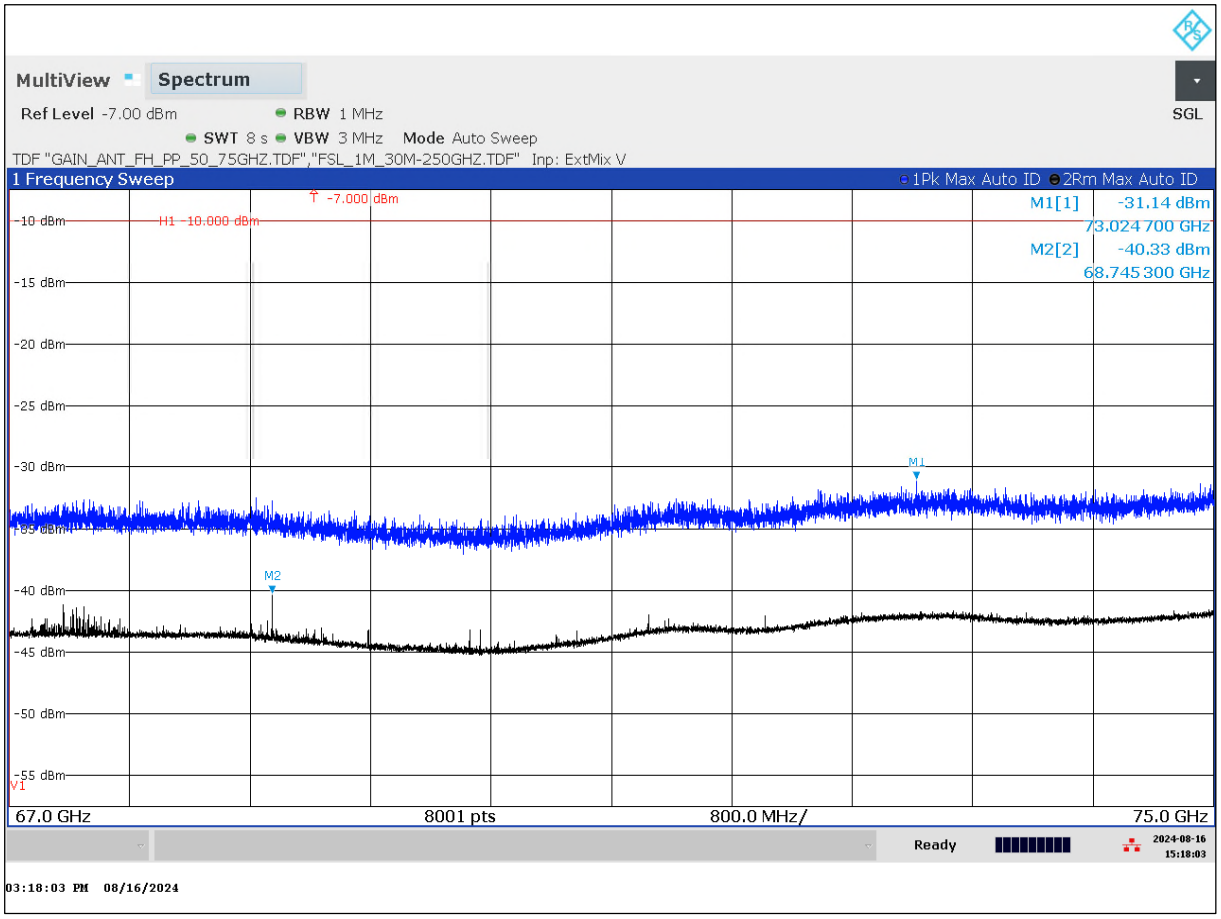
TID044_02_23-1-0012601T007_RSE_OOB_50G-67GHz_Ant_V_RMS



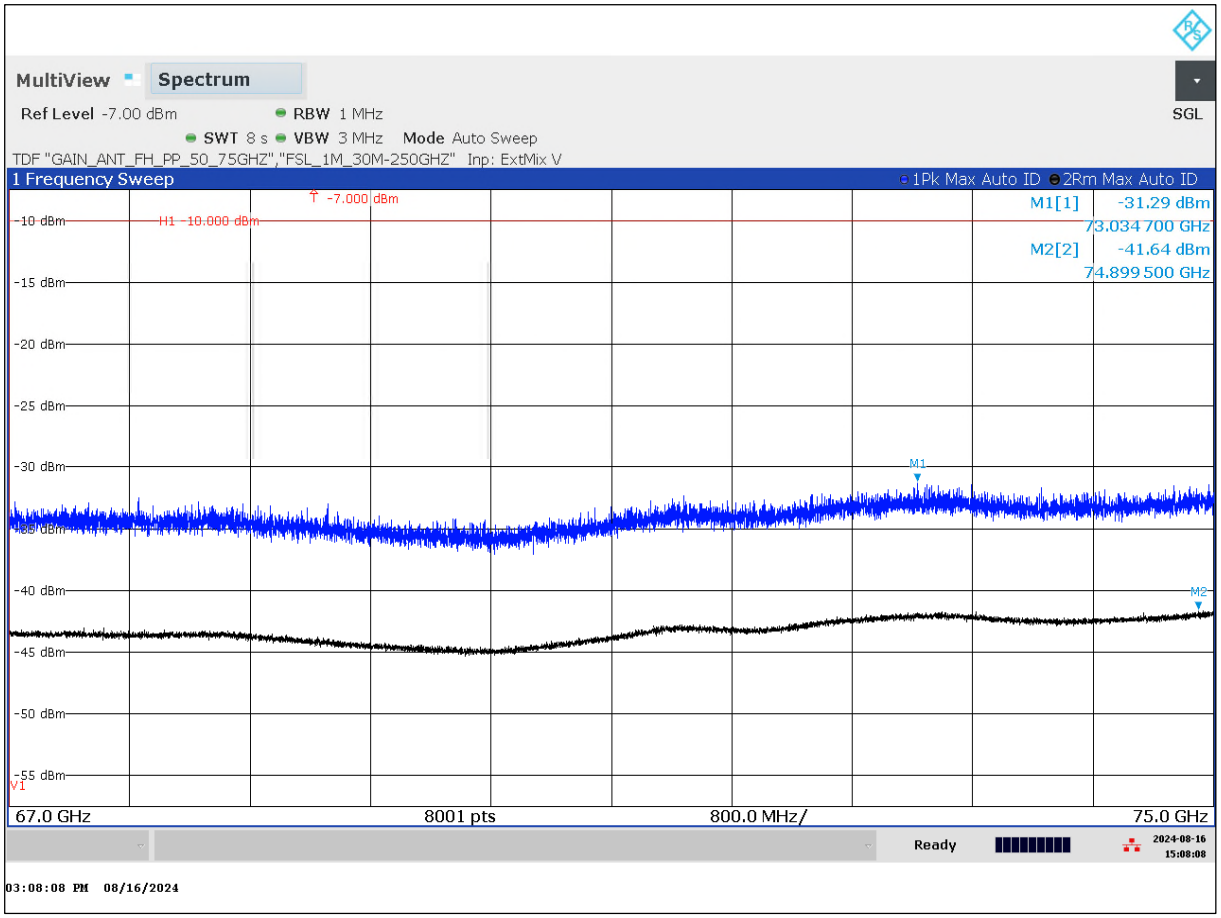
TID045_02_23-1-0012601T007_RSE_OOB_50G-67GHz_Ant_H_RMS



TID046_23-1-0012601T007_RSE_OOB_67G-75GHz_Ant_V

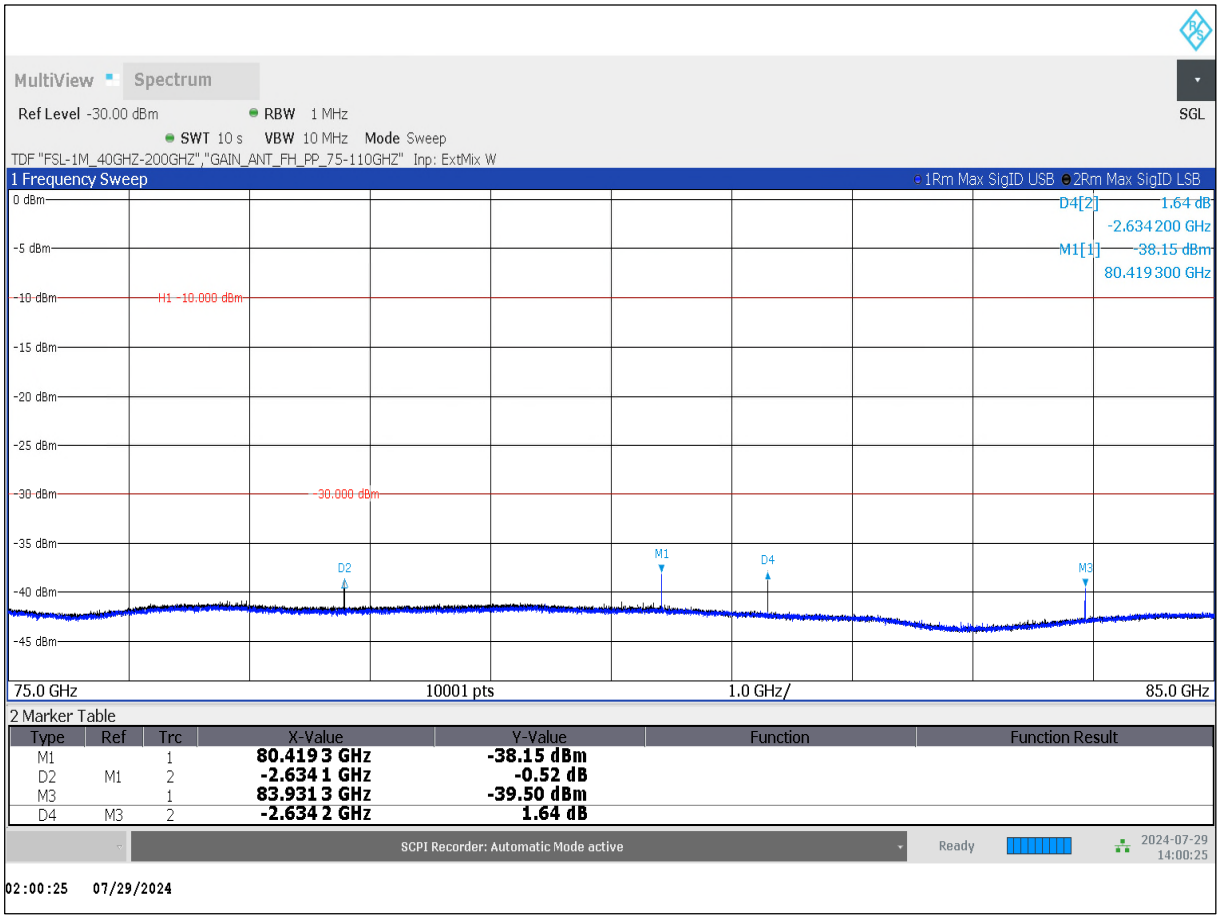


TID047_23-1-0012601T007_RSE_OOB_67G-75GHz_Ant_H



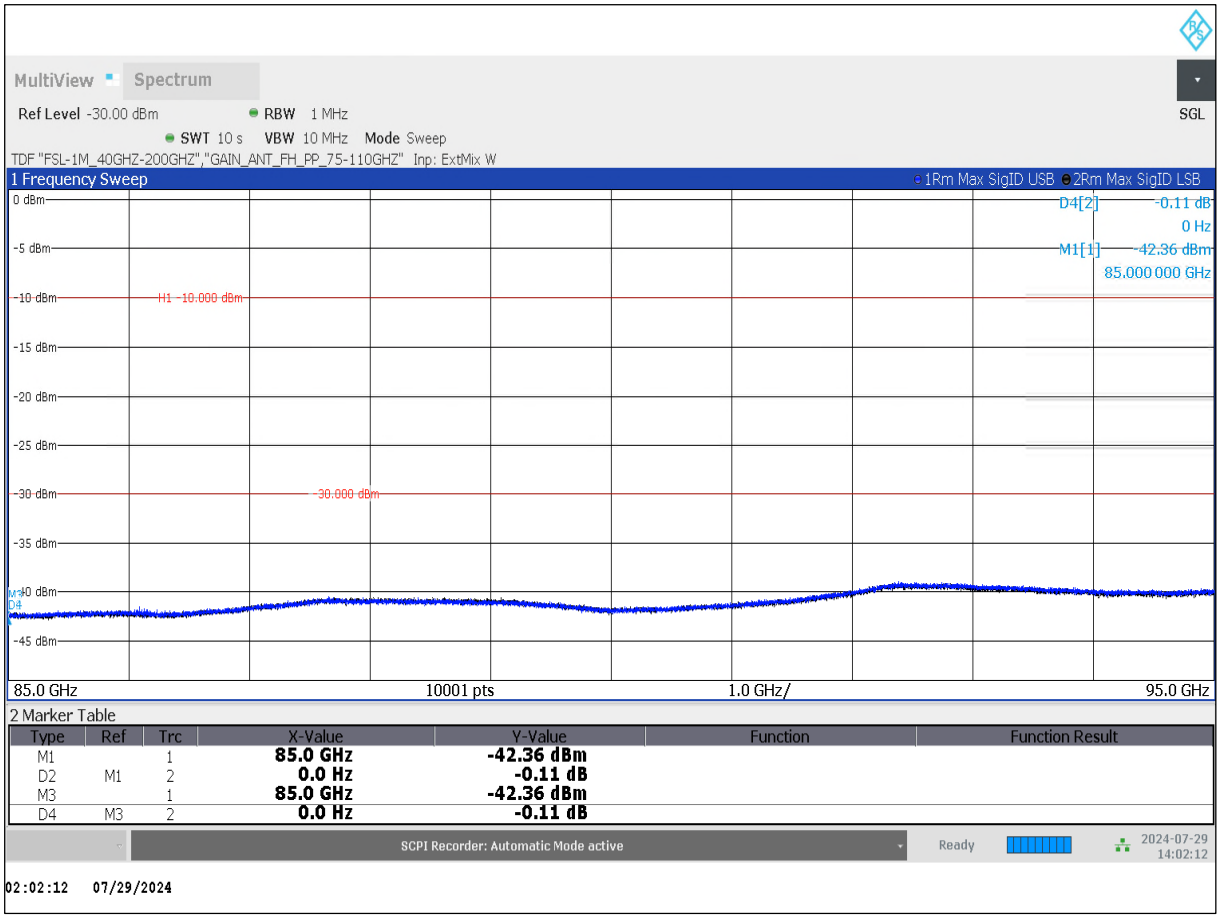
1.14 Radiated spurious emissions (75GHz < f < 110GHz)

TID013a__01_RSE_ChNom_S04_75-85GHz__AntH

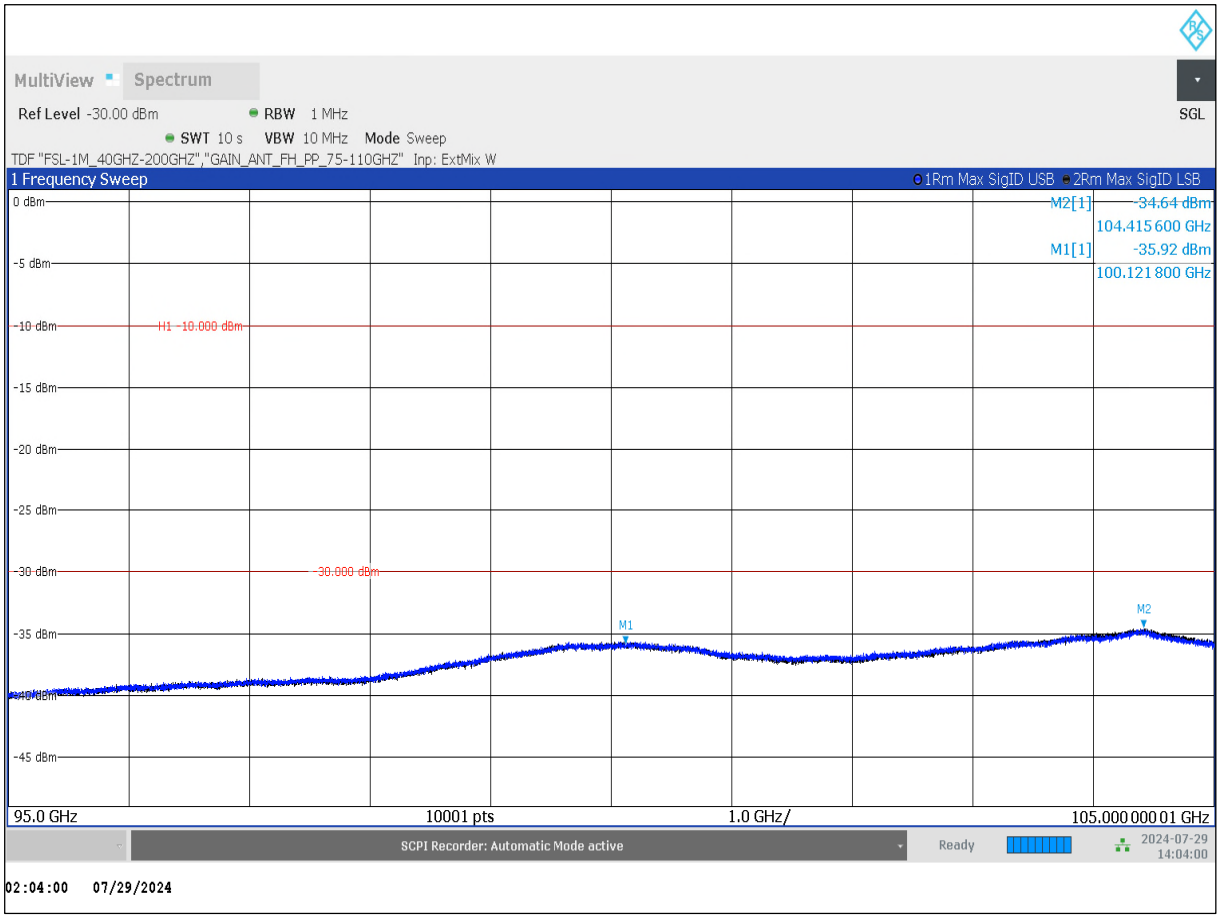


Examination for ghost/image signals on vertical antenna measurement diagrams performed

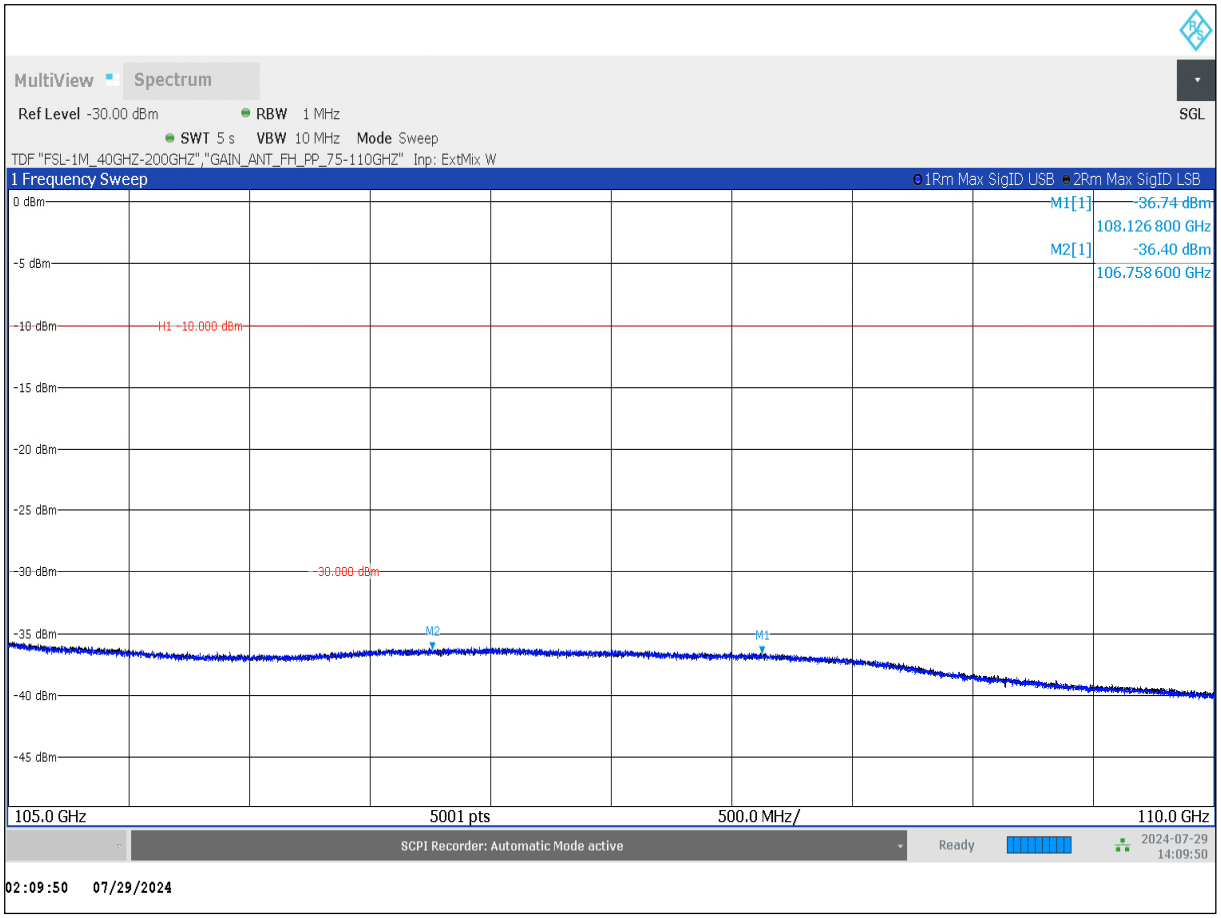
TID013a__02_RSE_ChNom_S04_85-95GHz__AntH



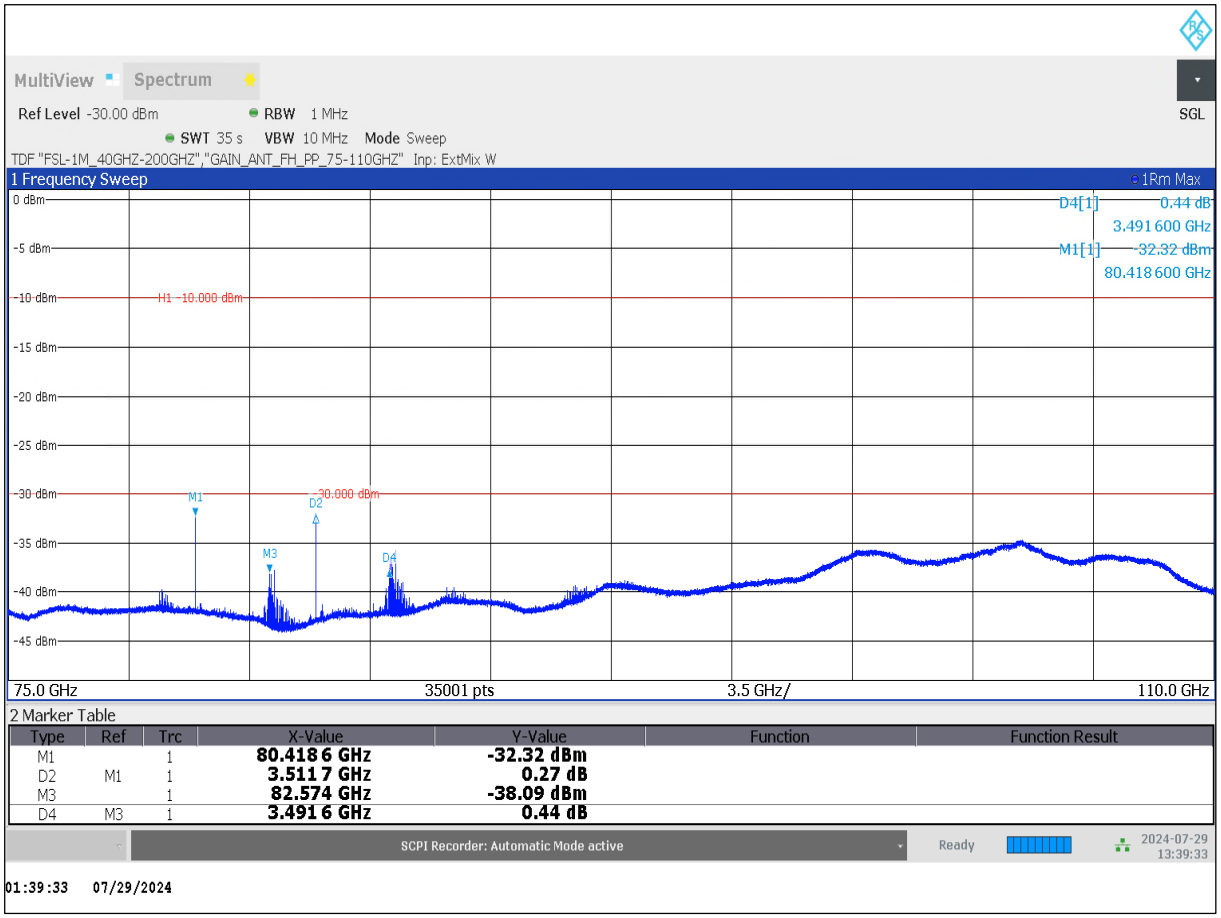
TID013a__03_RSE_ChNom_S04_95-105GHz__AntH



TID013a__04_RSE_ChNom_S04_105-110GHz__AntH

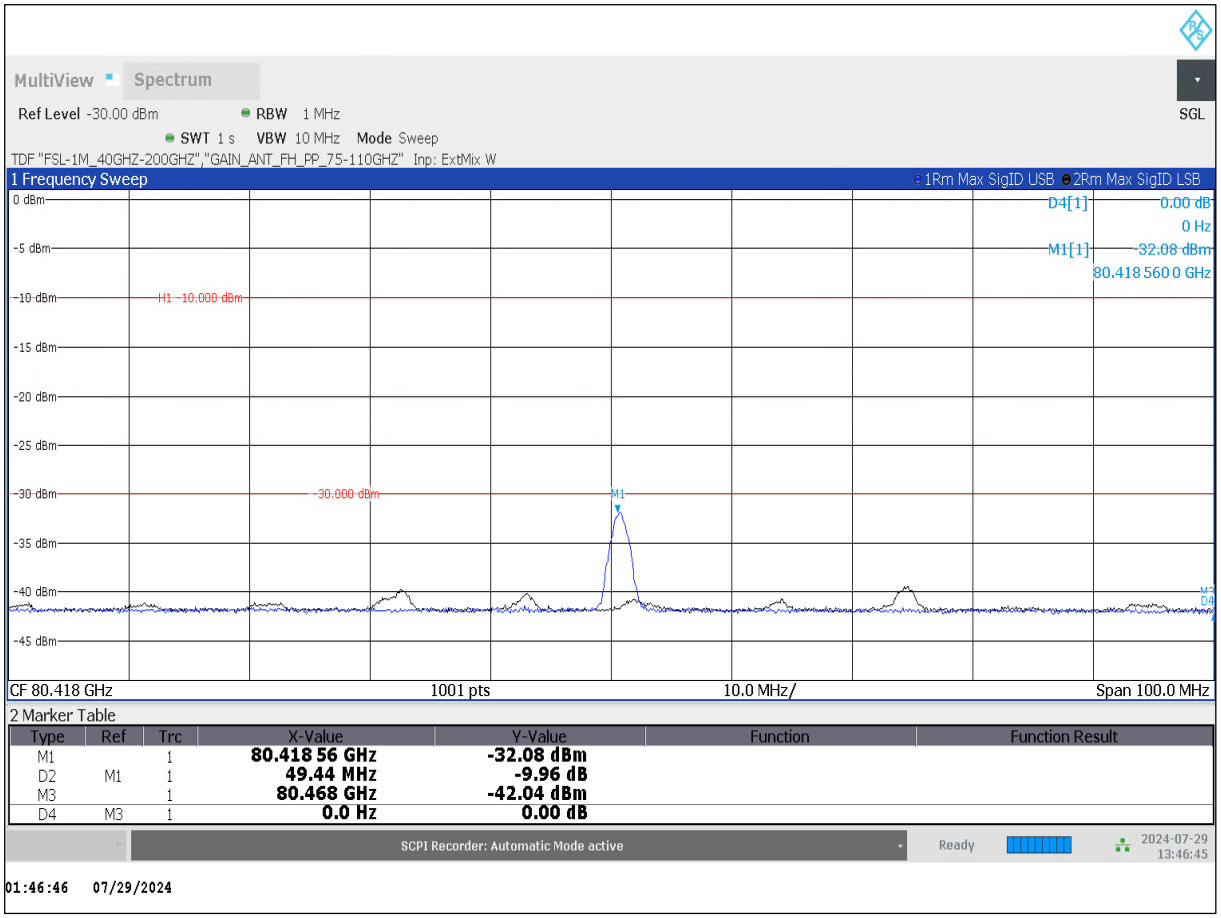


TID013b__RSE_ChNom_S04_75-110GHz__AntV



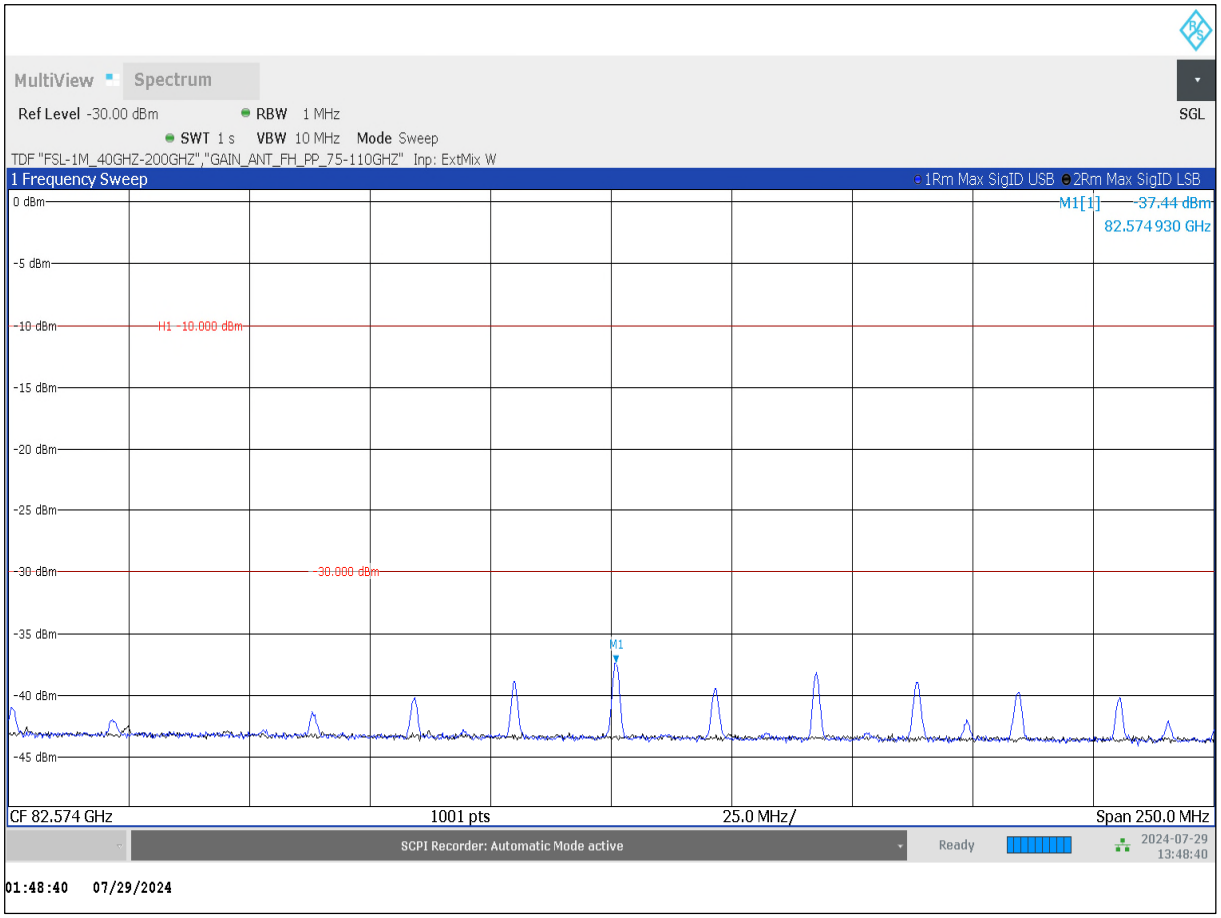
Proof/Check for ghost signals on following pages: all ghost signals

TID013b_01_f1_krit_80.418GHz_GhostSignal__AntV



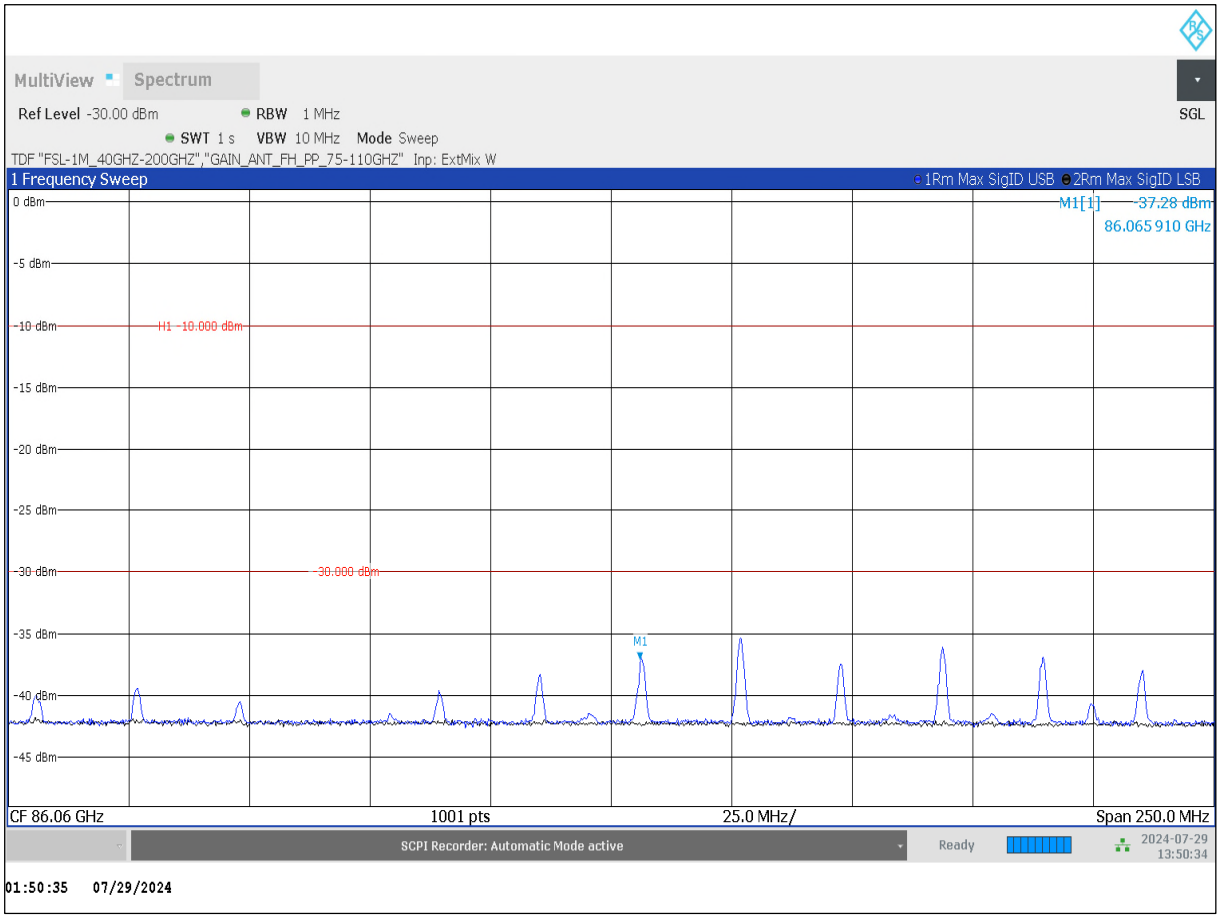
80.418 GHz – Ghost signal

TID013b_02_f2_krit_82.574GHz_GhostSignal__AntV



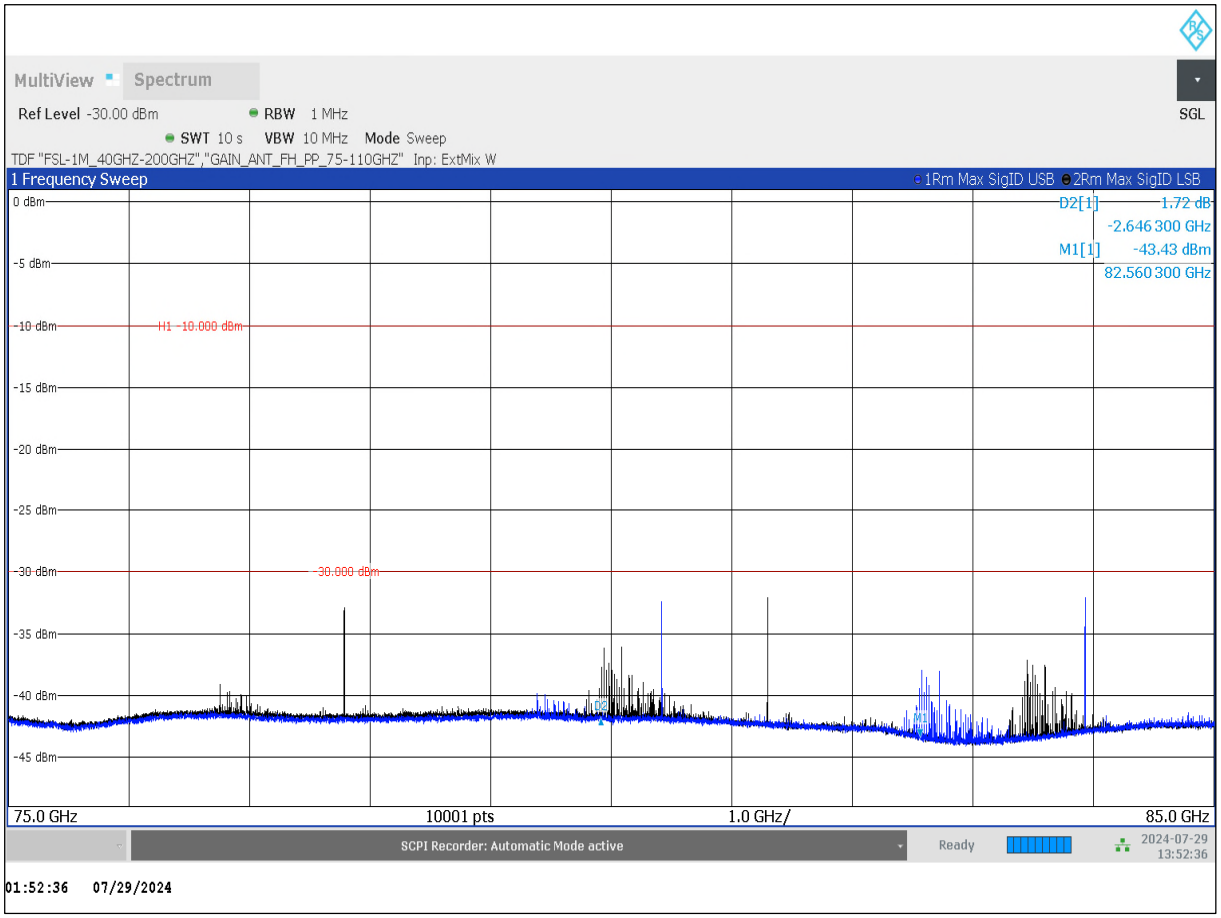
82.57 GHz – Ghost signal

TID013b_03_f3_krit_86.065GHz_GhostSignal__AntV



86.06 GHz – Ghost signal

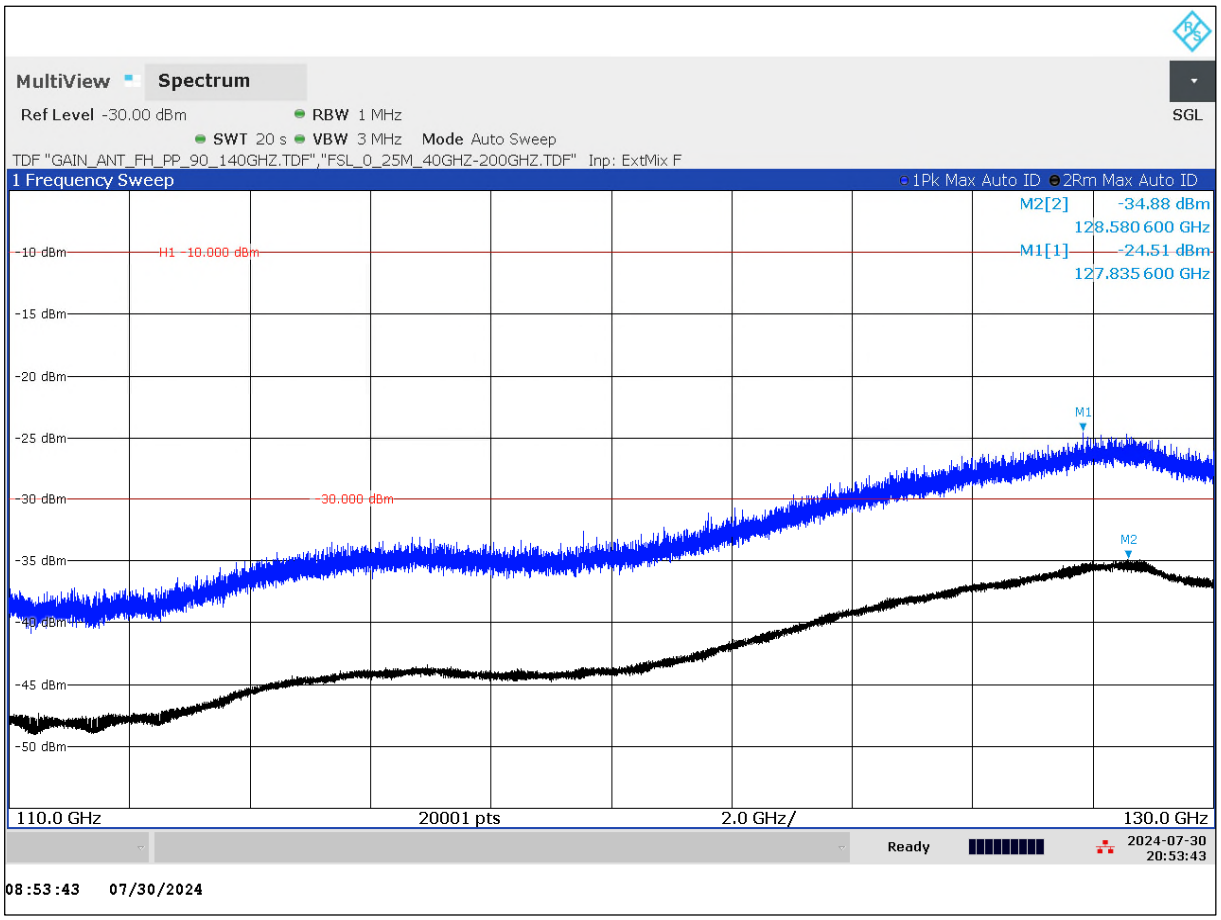
TID013b_04_RSE_Overview_S04_75-85GHz__AntV



82.56 GHz – Ghost signal

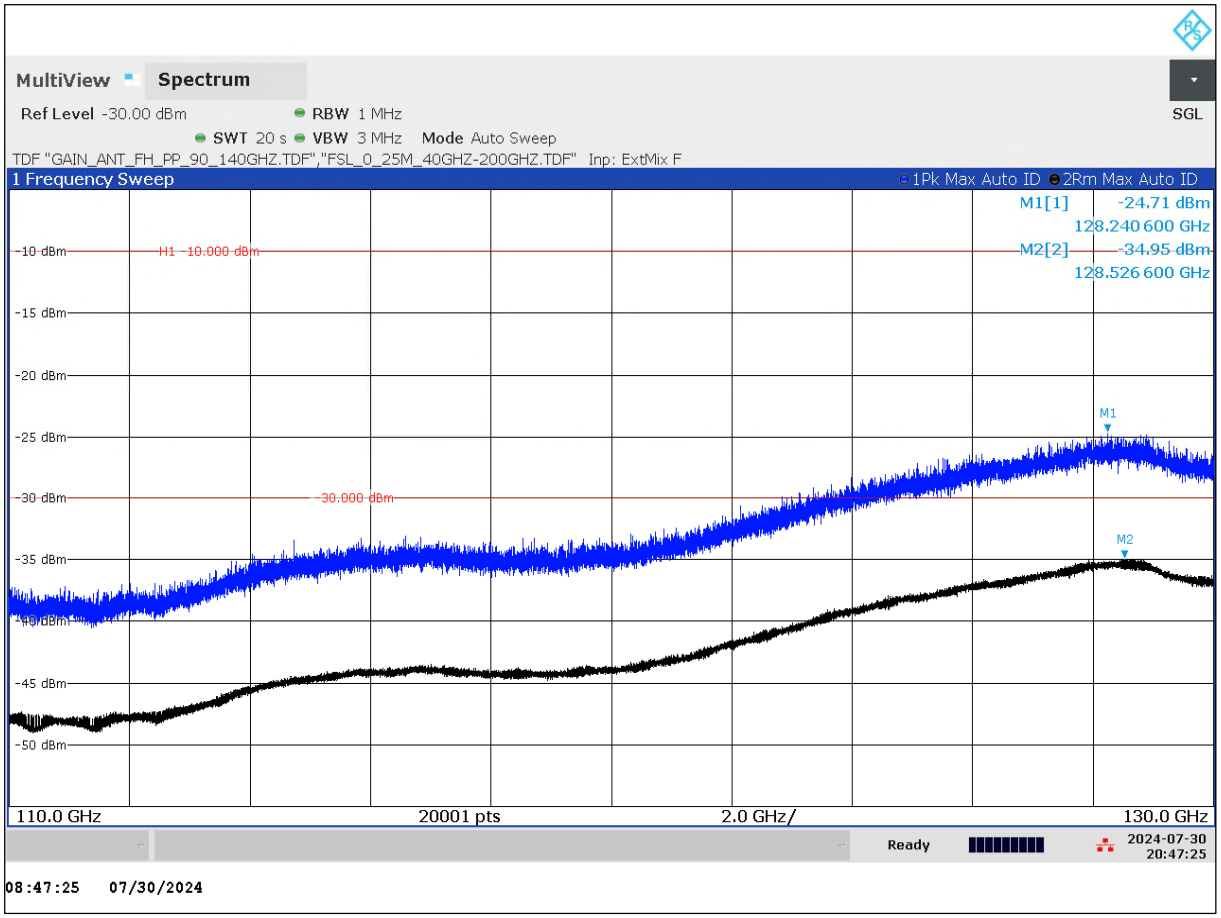
1.15 Radiated spurious emissions (110GHz < f < 140GHz)

TID019a_110 GHz - 130 GHz_Ant_H_FCC



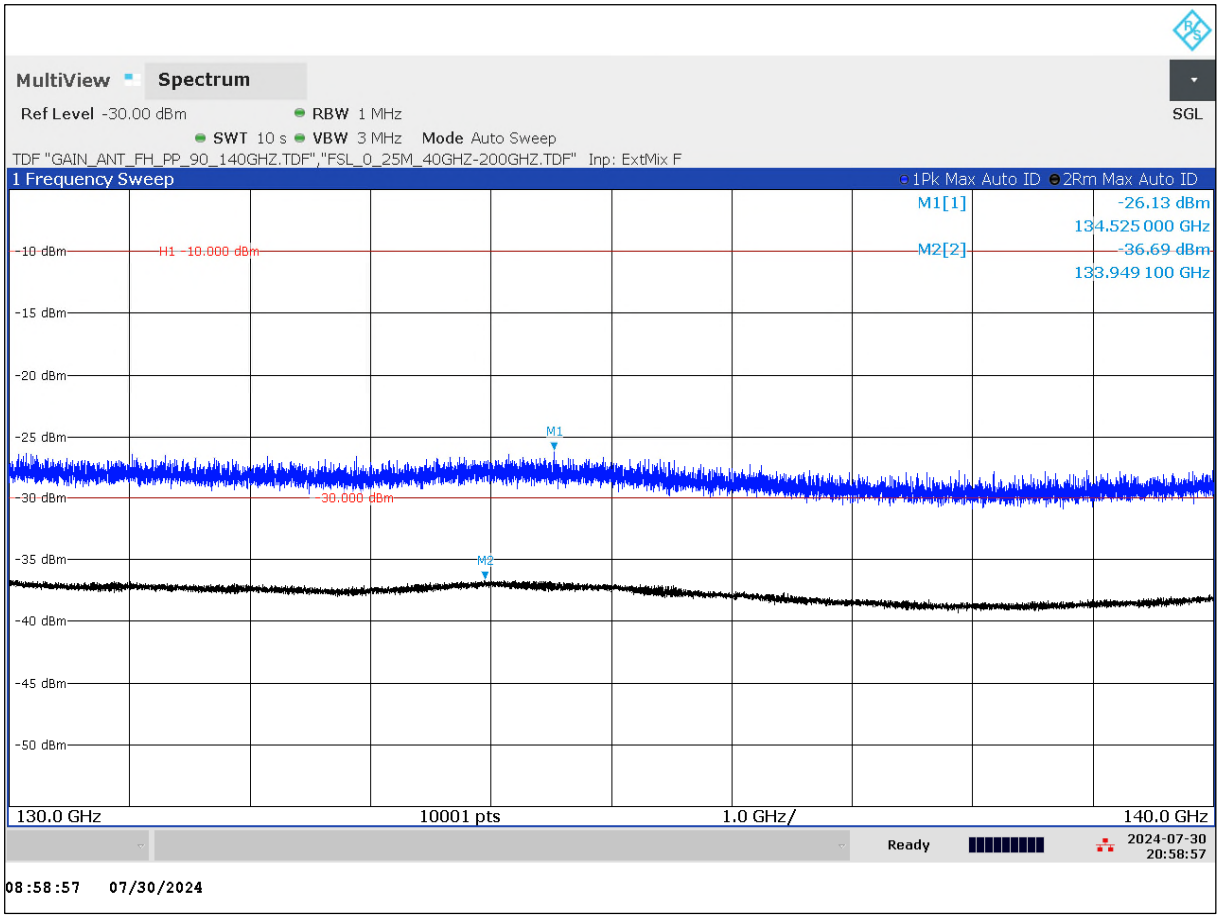
PK trace activated for monitoring purpose.

TID019b_110 GHz - 130 GHz_Ant_V_FCC



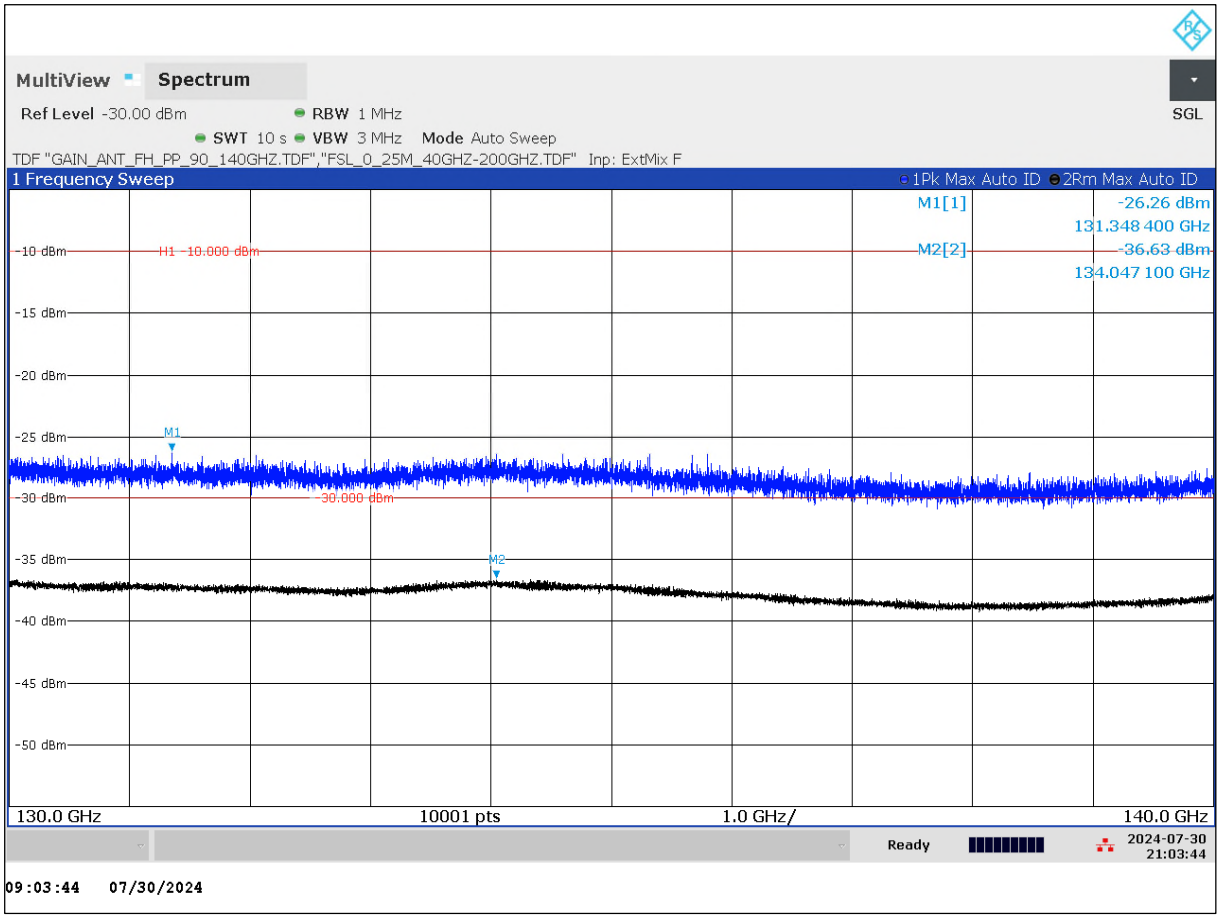
PK trace activated for monitoring purpose.

TID020a_130 GHz - 140 GHz_Ant_H_FCC



PK trace activated for monitoring purpose.

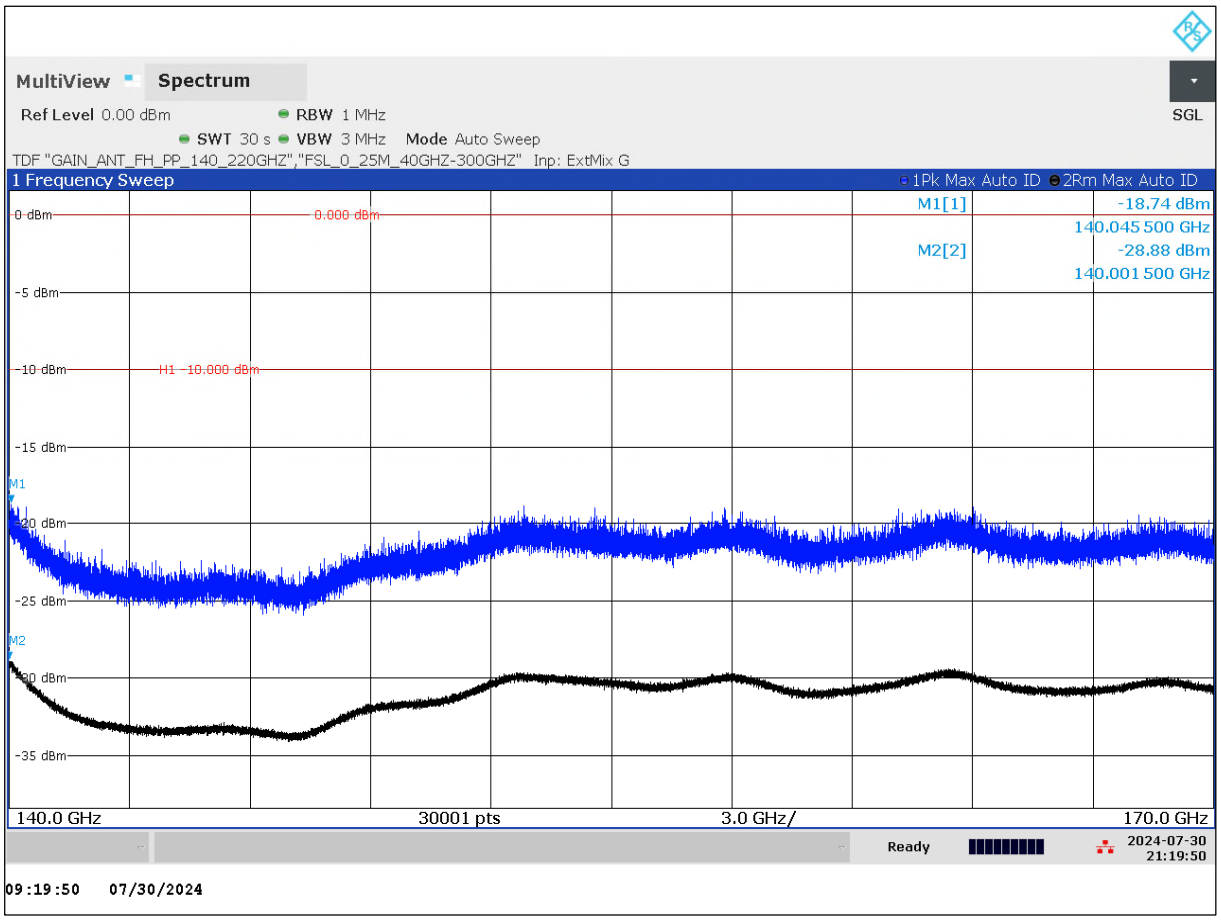
TID020b_130 GHz - 140 GHz_Ant_V_FCC



PK trace activated for monitoring purpose.

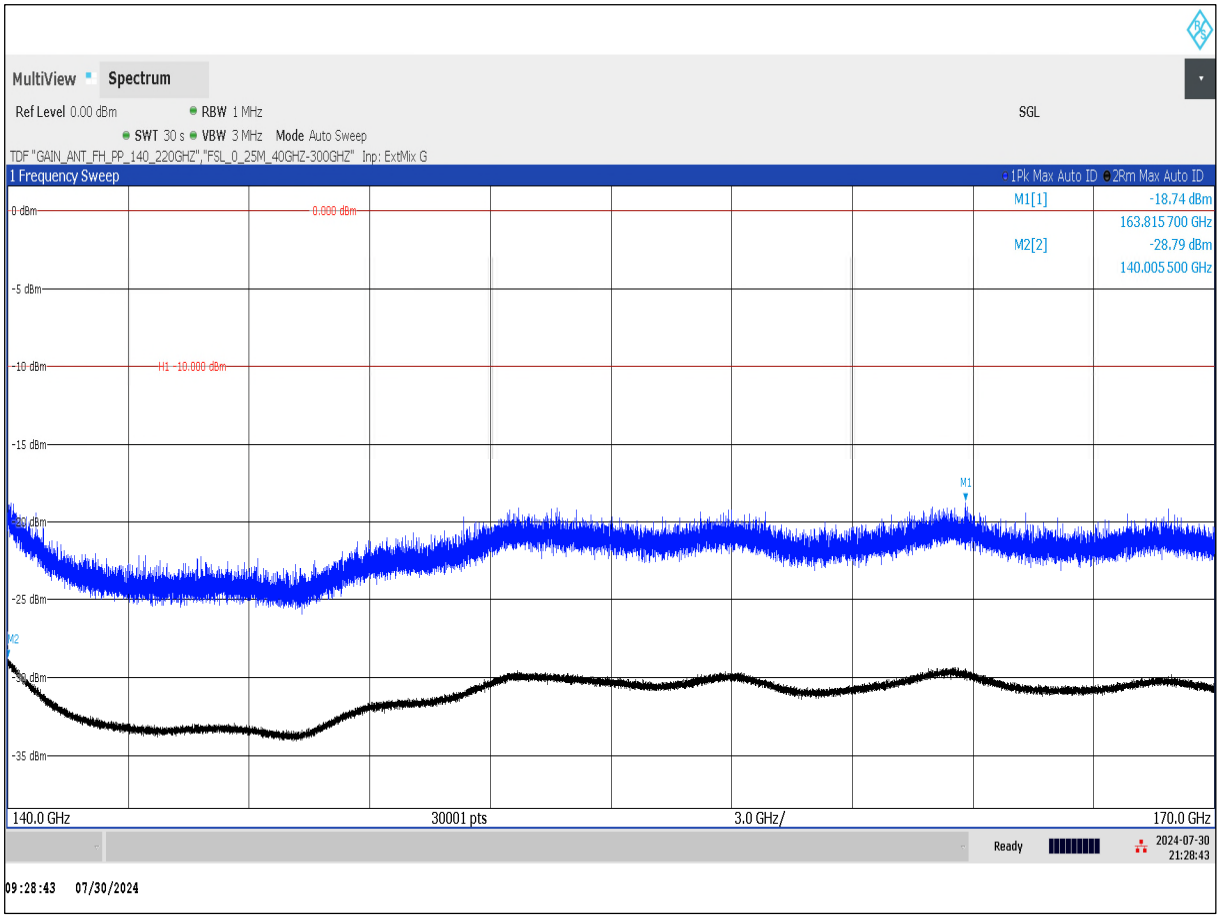
1.16 Radiated spurious emissions (140GHz < f < 200GHz)

TID021a_140 GHz - 170 GHz_Ant_H_FCC



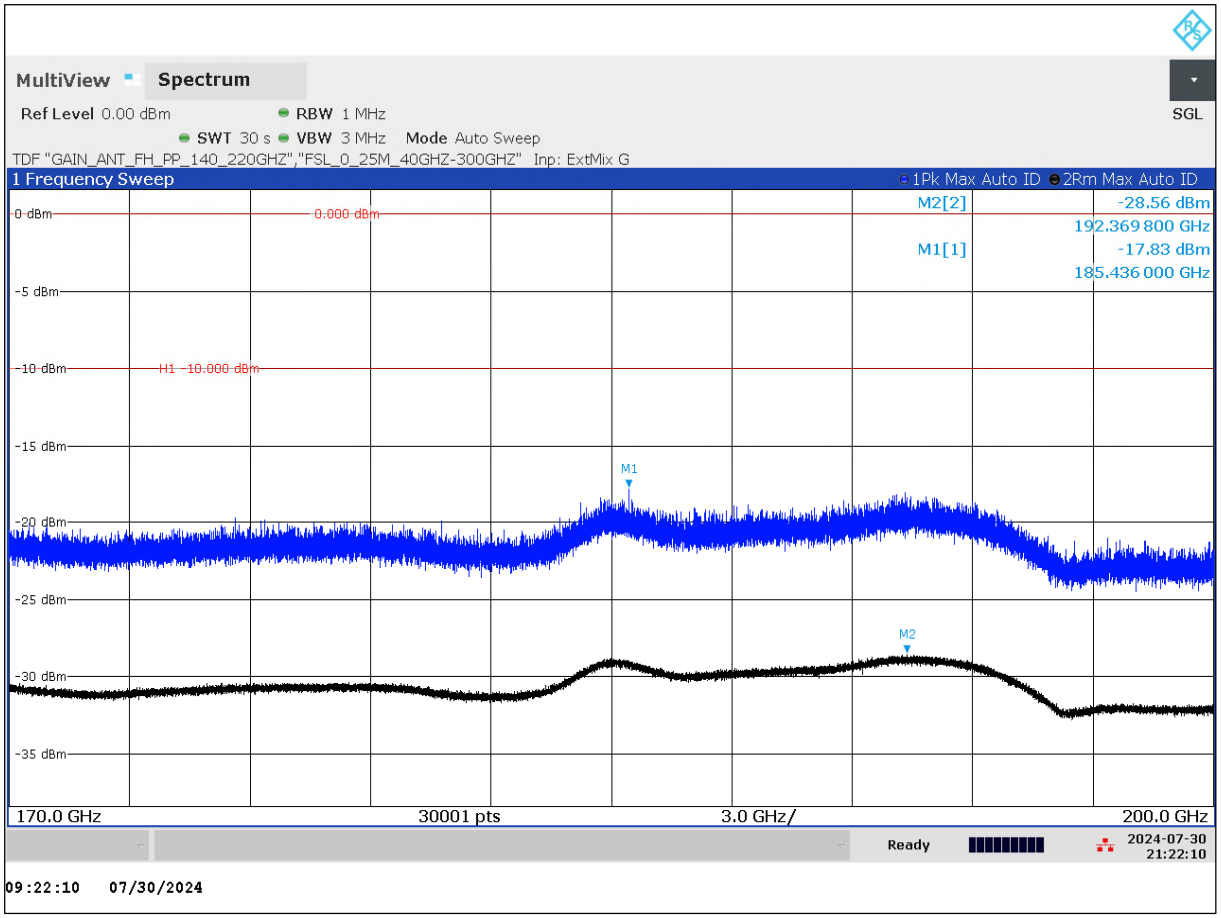
PK trace activated for monitoring purpose.

TID021b_140 GHz - 170 GHz_Ant_V_FCC



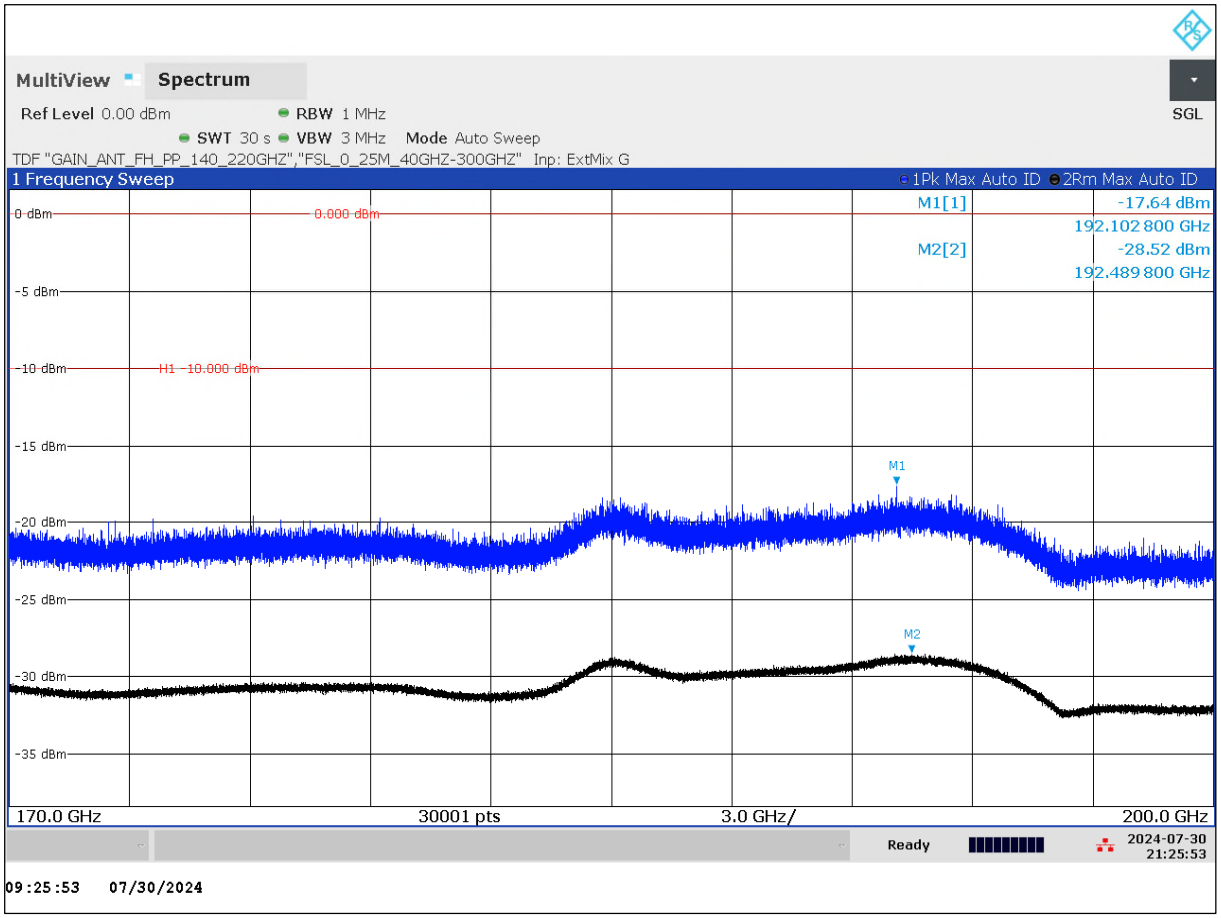
PK trace activated for monitoring purpose.

TID022a_170 GHz - 200 GHz_Ant_H_FCC



PK trace activated for monitoring purpose.

TID022b_170 GHz - 200 GHz_Ant_V_FCC



PK trace activated for monitoring purpose.

1.17 Conducted emissions on AC-mains

Tests have been performed with DC-power supply (nominal voltage) and a standard LISN used for coupling.

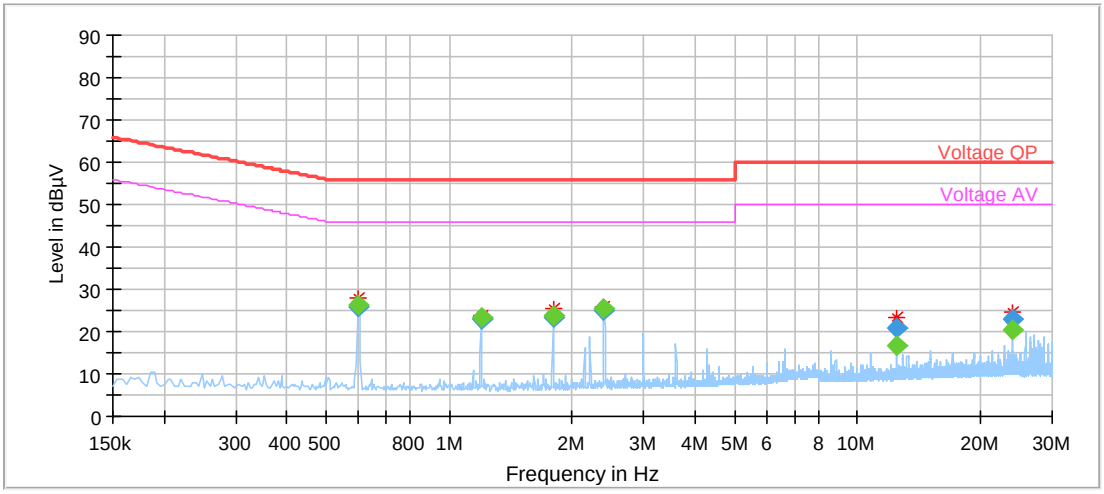
Diagram 1.01

Common Information

Test Description:	Conducted Voltage Measurement
Test Site Location:	Conducted Emission, cetecom advanced GmbH Essen
Test Software:	R&S EMC32 v9.15
Test Standard:	FCC 15.207
Operating Mode:	Radar TX-on continuously
Measured on line:	+/-
Diagram details:	Shows the peak values as a sum of measured ports in maxhold mode
Environmental Conditions:	Humidity: 62%rH; Temperature: 21.7°C
Operator:	Lor
Comments:	DC powered
EUT Setup:	1 (S05 used)
Verdict:	Passed

EUT Information

PMT number:	23-1-00126S05_C01



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.601719	---	26.26	46.00	19.74	1000.0	9.000	L1	GND	0.1
0.601719	25.70	---	56.00	30.30	1000.0	9.000	L1	GND	0.1
1.198281	---	23.28	46.00	22.72	1000.0	9.000	N	GND	0.3
1.198281	23.00	---	56.00	33.00	1000.0	9.000	N	GND	0.3
1.800938	---	23.79	46.00	22.21	1000.0	9.000	N	GND	0.3
1.800938	23.37	---	56.00	32.63	1000.0	9.000	N	GND	0.3
2.397500	---	25.43	46.00	20.57	1000.0	9.000	N	GND	0.3
2.397500	24.93	---	56.00	31.07	1000.0	9.000	N	GND	0.3
12.448281	20.77	---	60.00	39.23	1000.0	9.000	L1	GND	0.7
12.448281	---	16.68	50.00	33.32	1000.0	9.000	L1	GND	0.7
24.000156	22.87	---	60.00	37.13	1000.0	9.000	L1	GND	1.1
24.000156	---	20.53	50.00	29.47	1000.0	9.000	L1	GND	1.1

End Of Annex 202