

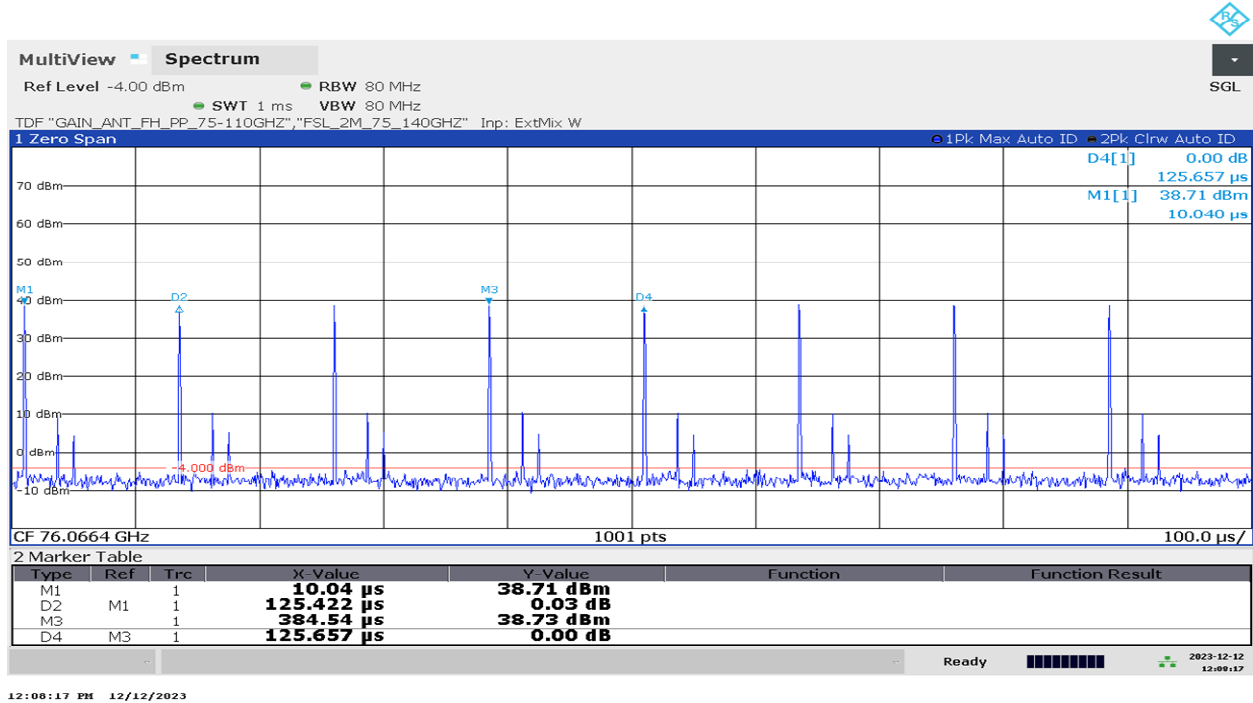
Annex 1: Measurement diagrams 23-1-0086302T012a-A1

Number of pages:	29	Date of Report:	2025-Feb-20
Testing company:	cetecom advanced GmbH Untertuerkheimer Str. 6-10 66117 Saarbruecken GERMANY	Applicant:	indurad GmbH
Product:	2D Scanning Radar		
Model:	iSDR-M-G5		
FCC ID:	2AJRSISDRG5		
Testing has been carried out in accordance with:	FCC Regulations Title 47 CFR, Chapter I, Subchapter D, Part 95 Subpart M The 76-81 GHz Band Radar Service § 95.3367 76-81 GHz Band Radar Service radiated power limits § 95.3379 76-81 GHz Band Radar Service unwanted emissions limits		

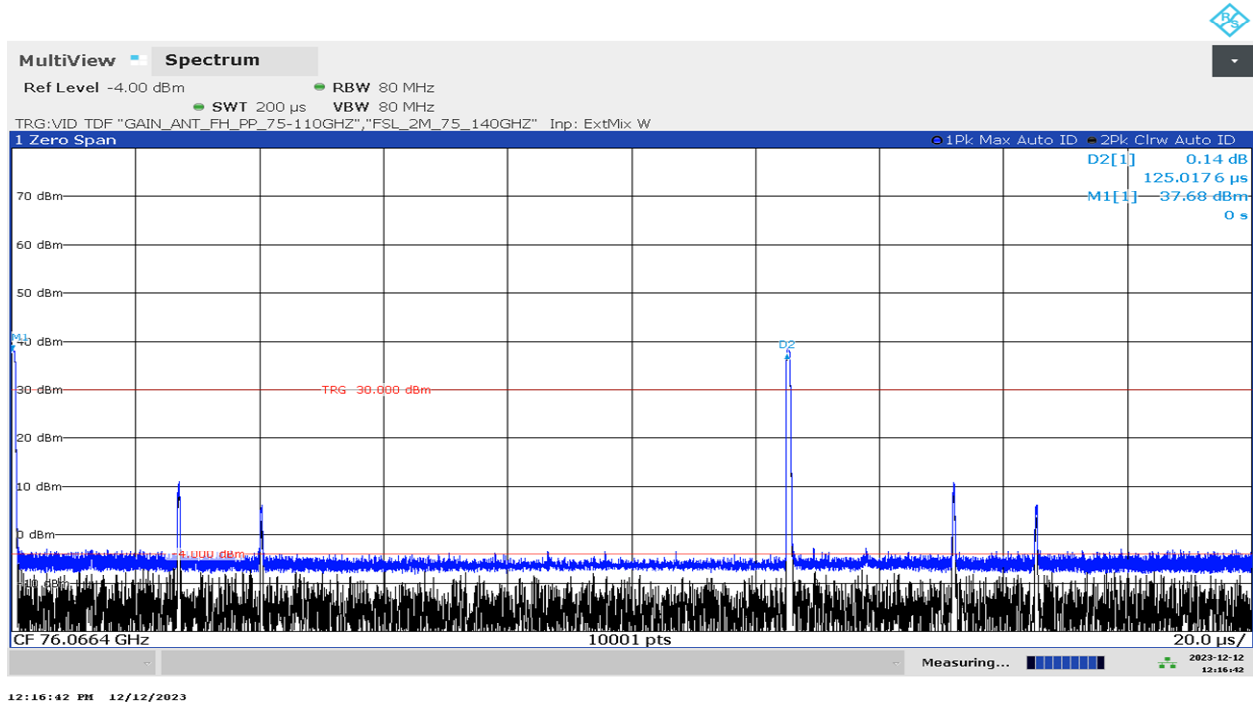
1 Measurement diagrams

1.1 EUT Cycle Time (iSDR-M_DN135):

D100_EUT_Cycle_Time_125µs_Ant_V_iSDR-M_DN135_WR



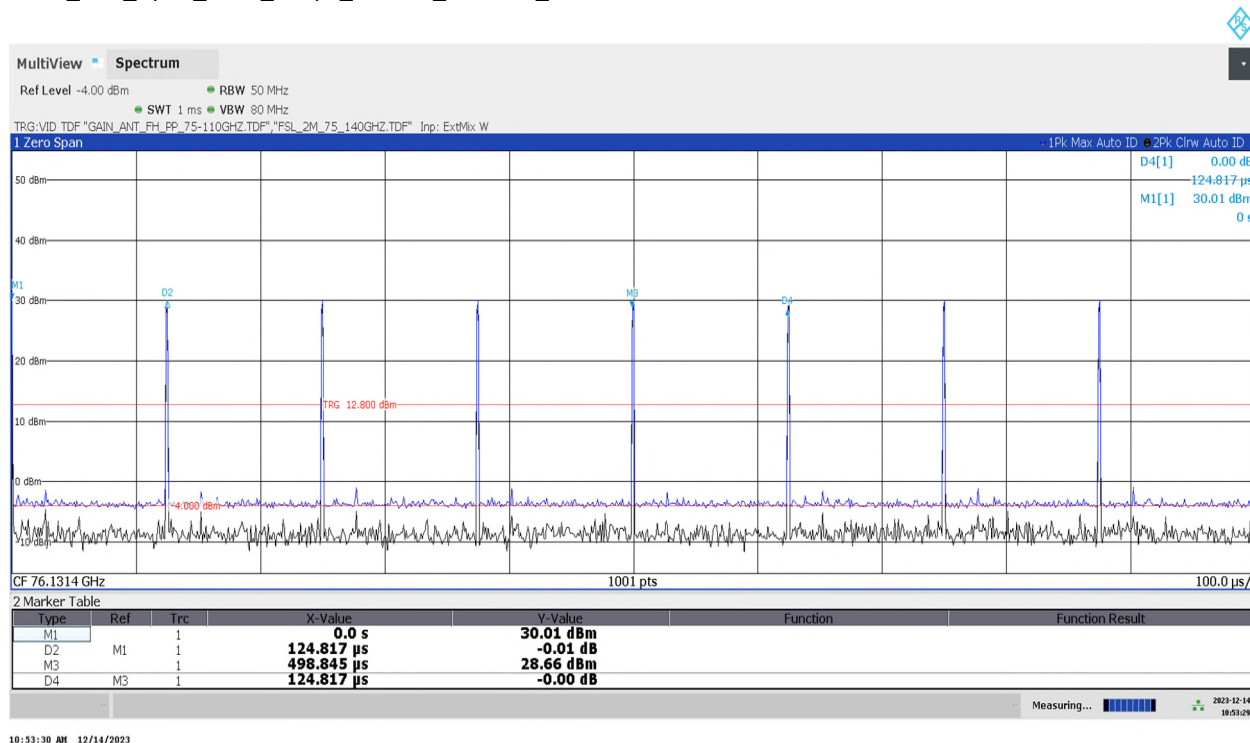
D101_EUT_Cycle_Time_125µs_Ant_V_iSDR-M_DN135_WR



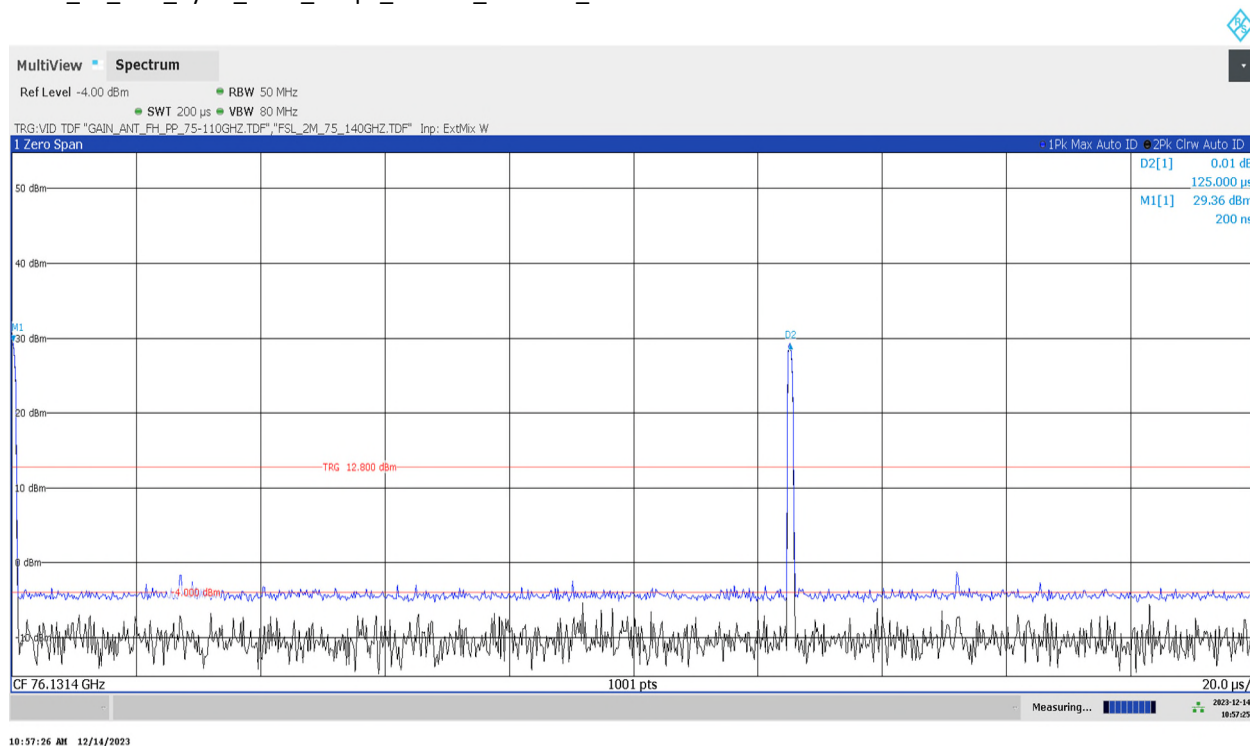
Note: EUT Cycle Time: 125µs, EUT: DN135, Declared by Customer is 125µs (verified), Only for information, not for assessment.

1.2 EUT Cycle Time (iSDR-M_DN135V):

D600_EUT_Cycle_Time_125µs_iSDR-M_DN135V_WR



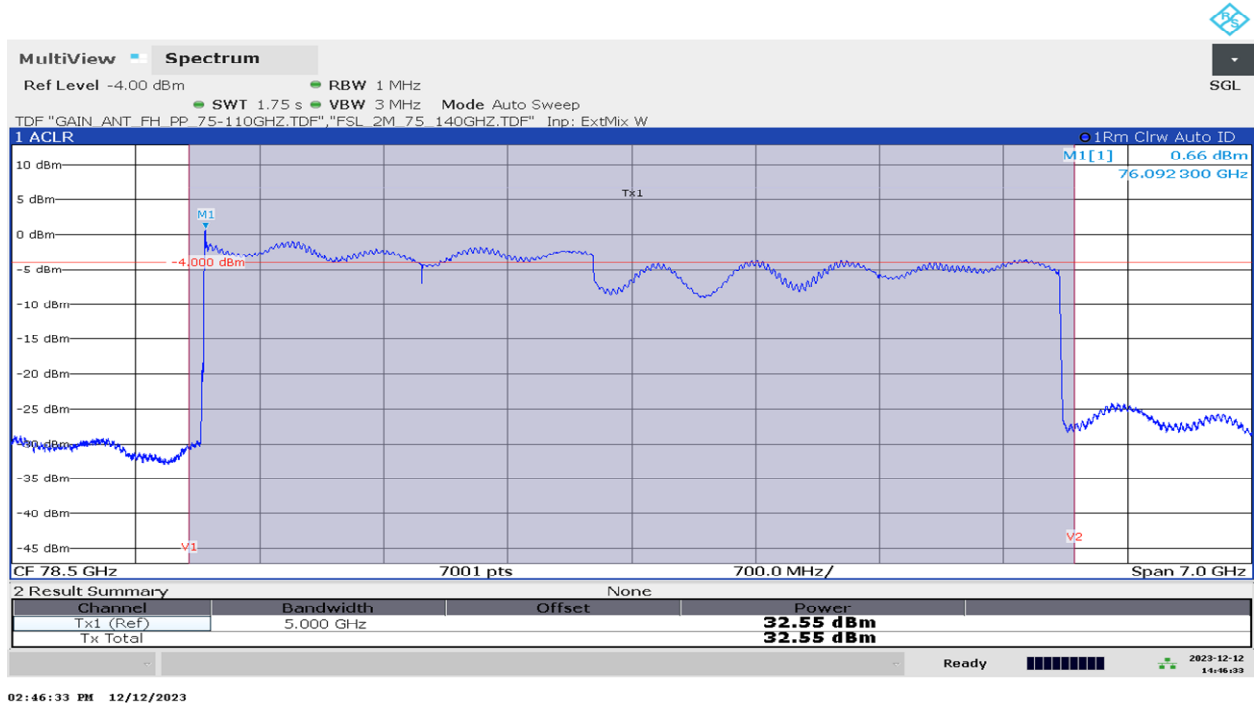
D600_01_EUT_Cycle_Time_125µs_iSDR-M_DN135V_WR



Note: EUT Cycle Time: 125µs, EUT: DN135V, Declared by Customer is 125µs (verified), Only for information, not for assessment.

1.3 Mean / Channel Power (iSDR-M_DN135):

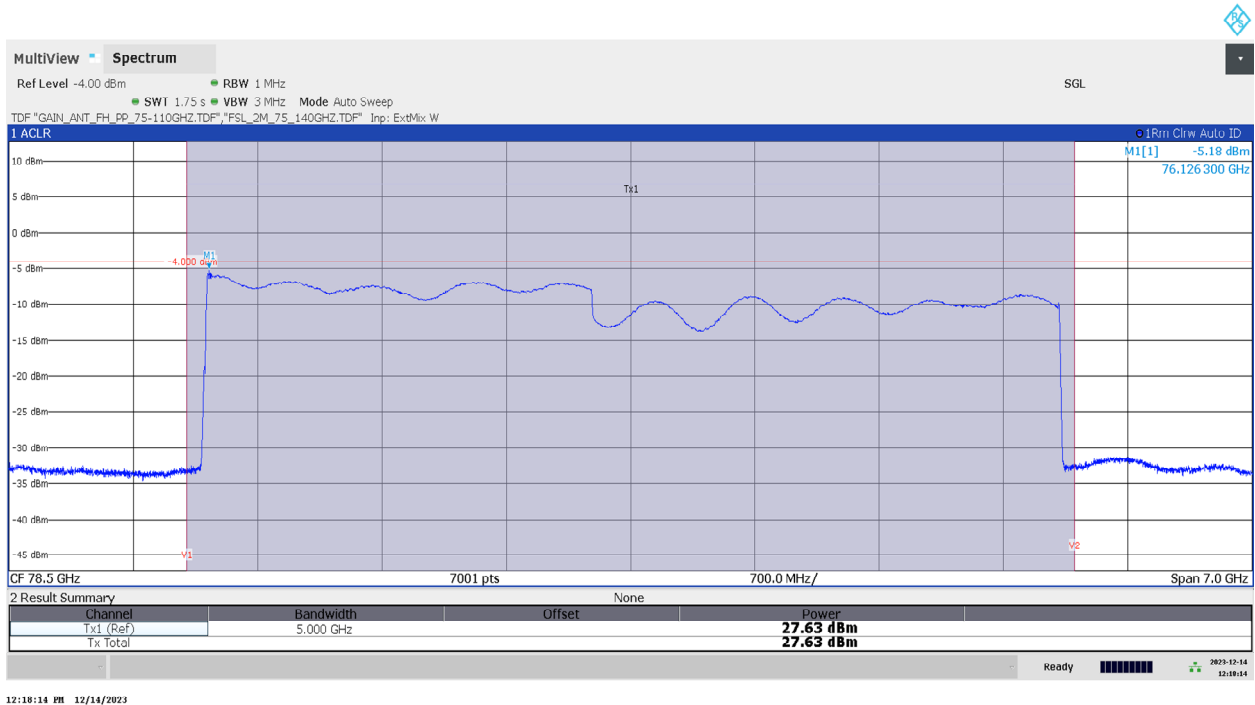
D112_Channel_Power_RMS_32.55dBm



Note: Total Channel Power is 32.55dBm, Limit line: 50dBm, Result: Passed.

1.4 Mean / Channel Power (iSDR-M_DN135V):

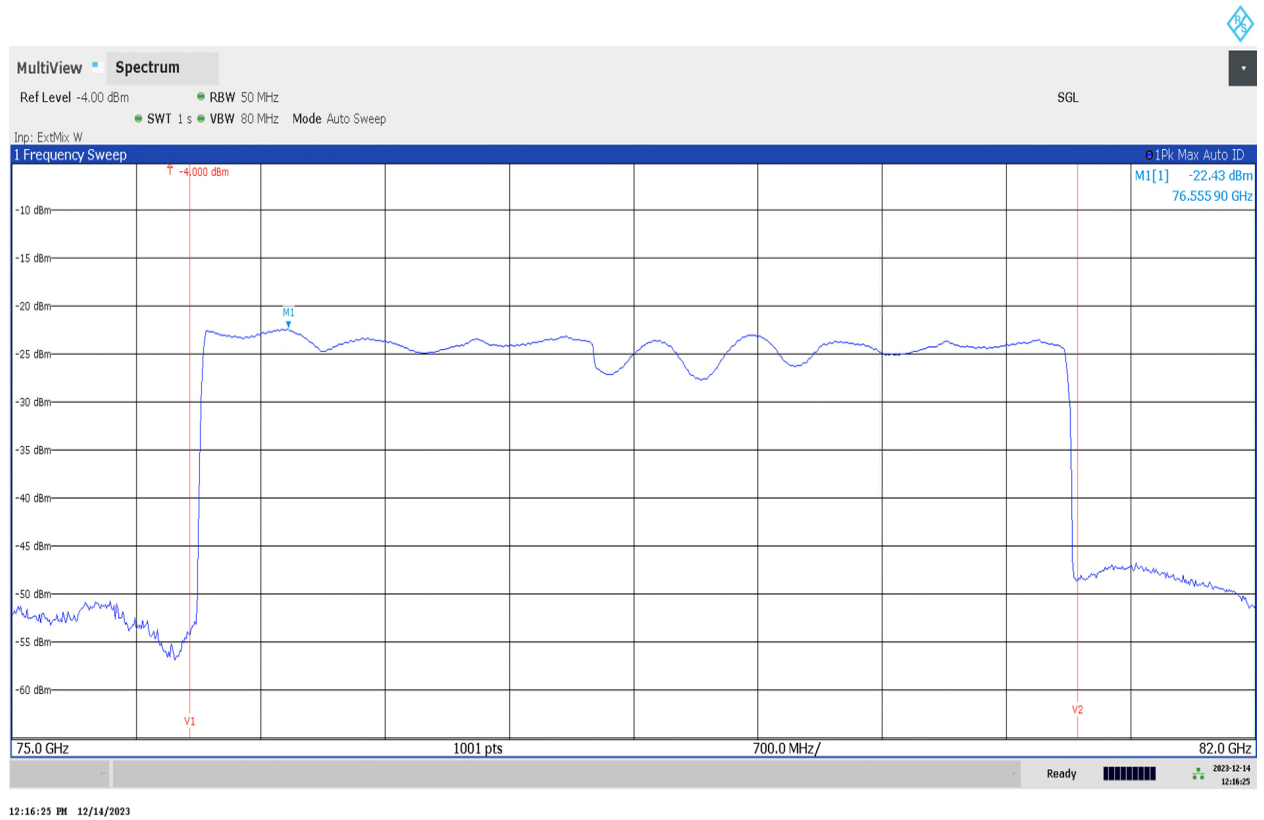
D612_Channel_Power_RMS_27.63dBm



Note: Total Channel Power is 27.63dBm, Limit line: 50dBm, Result: Passed.

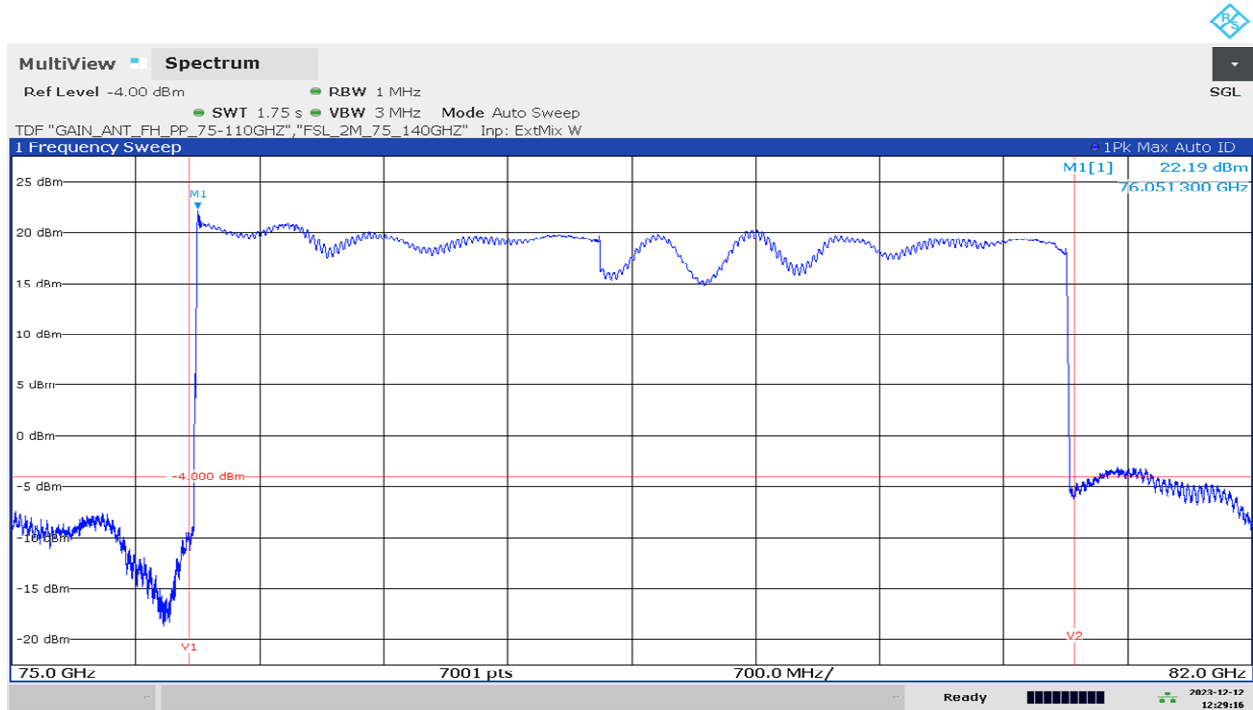
1.5 Peak Power (iSDR-M_DN135):

D605_01_Peak_EIRP_to_verify_ref_level_FSW



Note: FSW Ref Level has been verified. Only for information not for assessment.

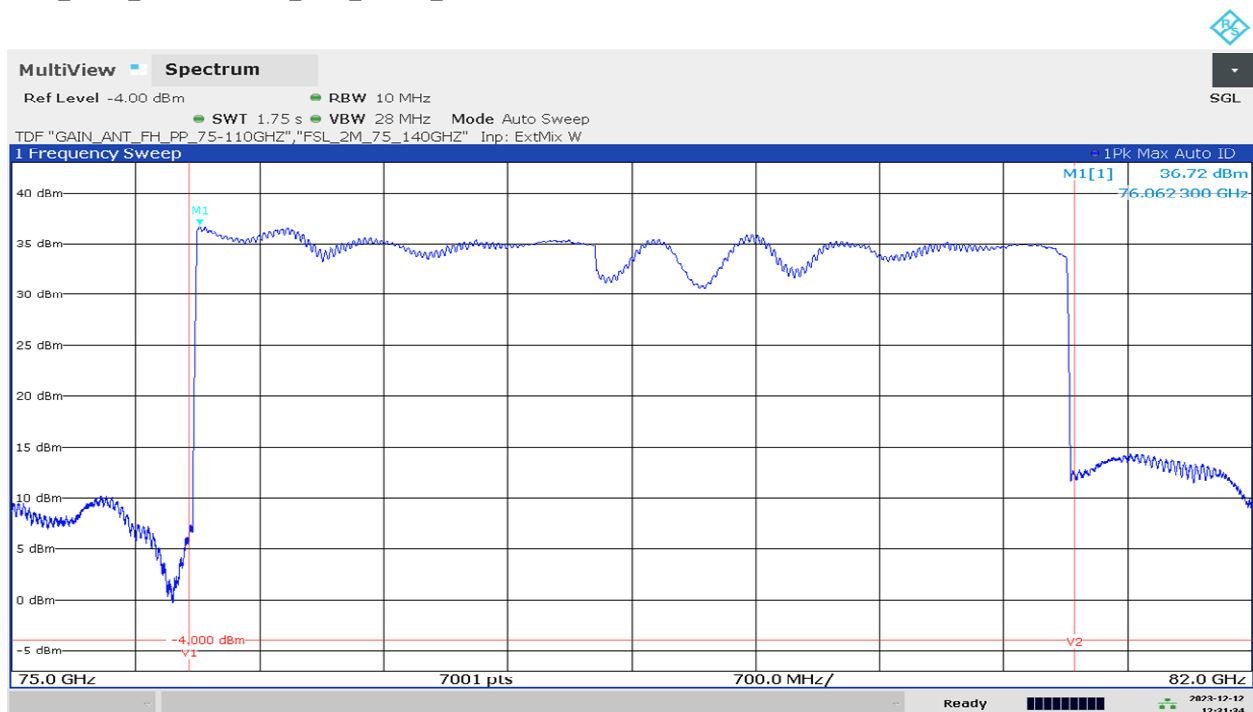
D102_Check_Desensitization_RBW_1MHz_22.19dBm



12:29:16 PM 12/12/2023

Note: Different RBW has been used to avoid desensitization factor, RBW=1MHz, only for information.

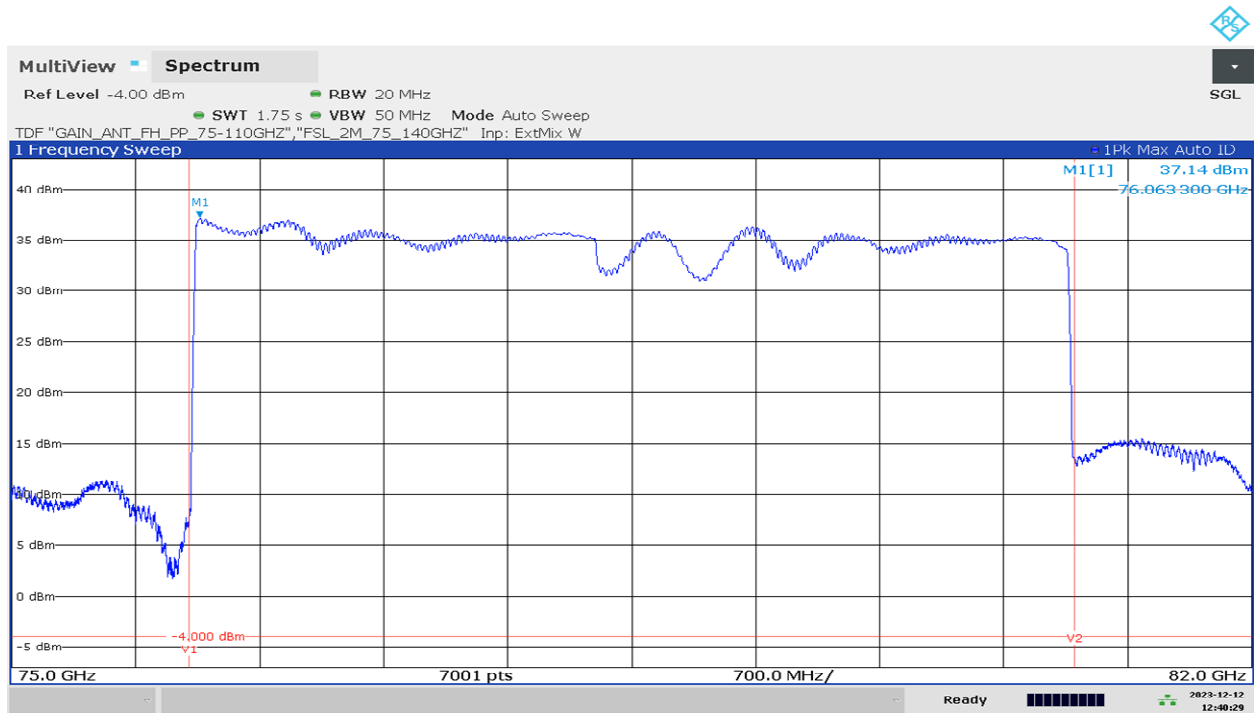
D104_Check_Desensitization_RBW_10MHz_36.72dBm



12:31:34 PM 12/12/2023

Note: Different RBW has been used to avoid desensitization factor, RBW=10MHz, only for information.

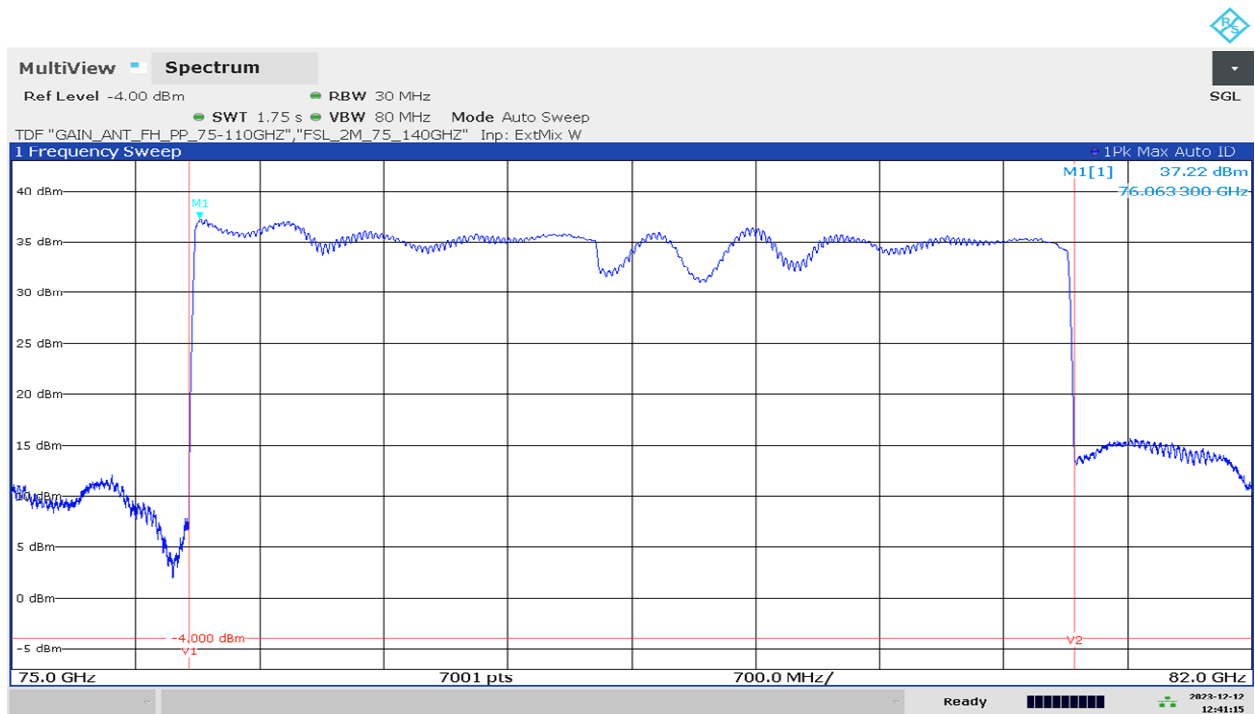
D105_Check_Desensitization_RBW_20MHz_37.14dBm



12:40:30 PM 12/12/2023

Note: Different RBW has been used to avoid desensitization factor, RBW=20MHz, only for information.

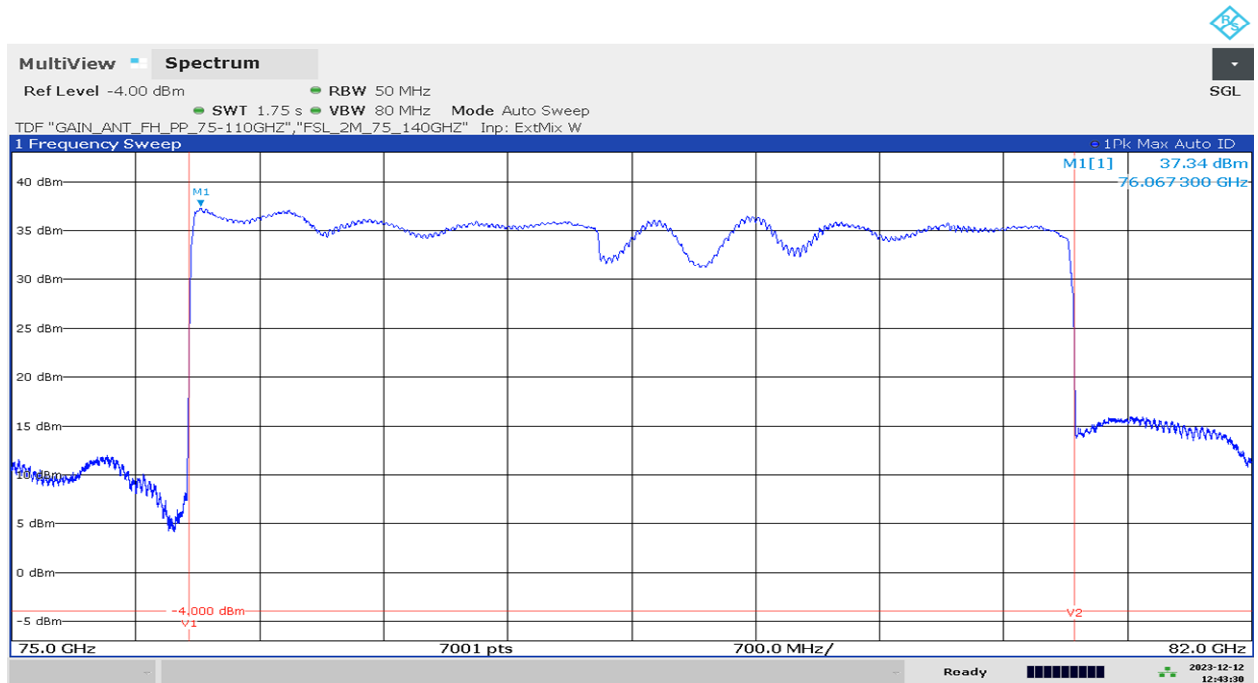
D106_Check_Desensitization_RBW_30MHz_37.22dBm



12:41:15 PM 12/12/2023

Note: Different RBW has been used to avoid desensitization factor, RBW=30MHz, only for information.

D107_Check_Desensitization_RBW_50MHz_37.34dBm



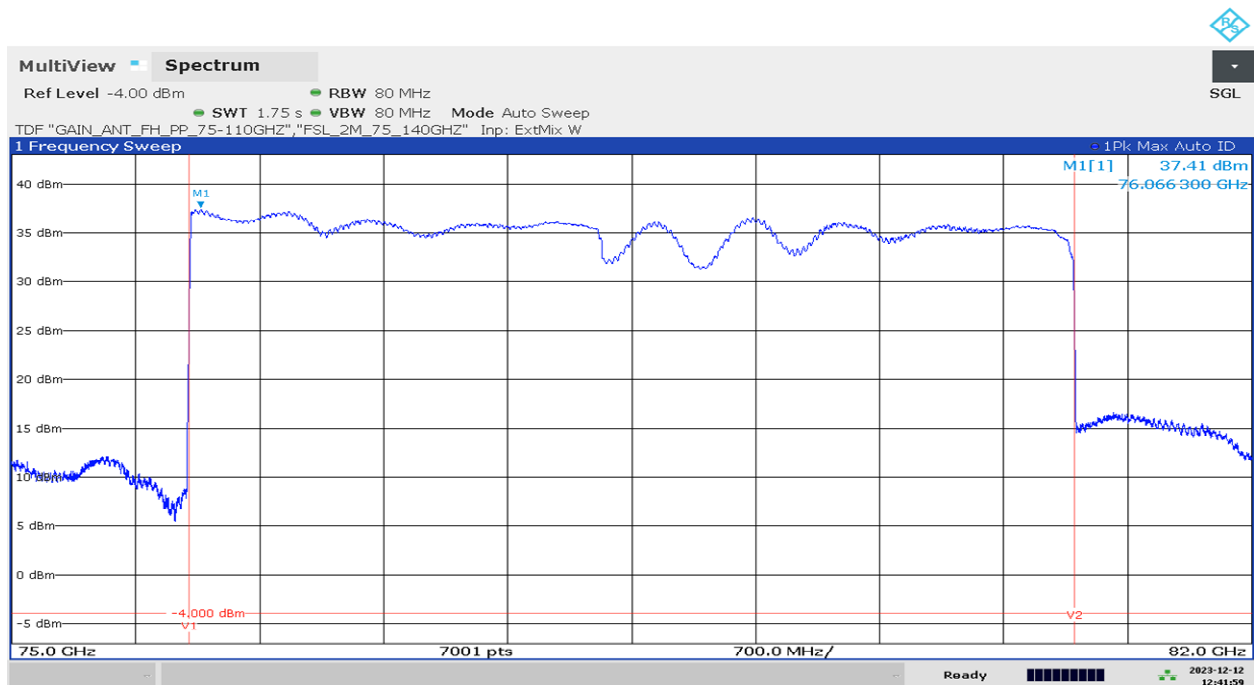
12:43:30 PM 12/12/2023

Note: Different RBW has been used to avoid desensitization factor.

RBW 50MHz has been chosen to perform EUT maximum Peak EIRP to avoid desensitization factor.

EUT Maximum Peak EIRP = 37.34dBm, Limit Line: 55dBm, Result: Passed.

D108_Check_Desensitization_RBW_80MHz_37.41dBm

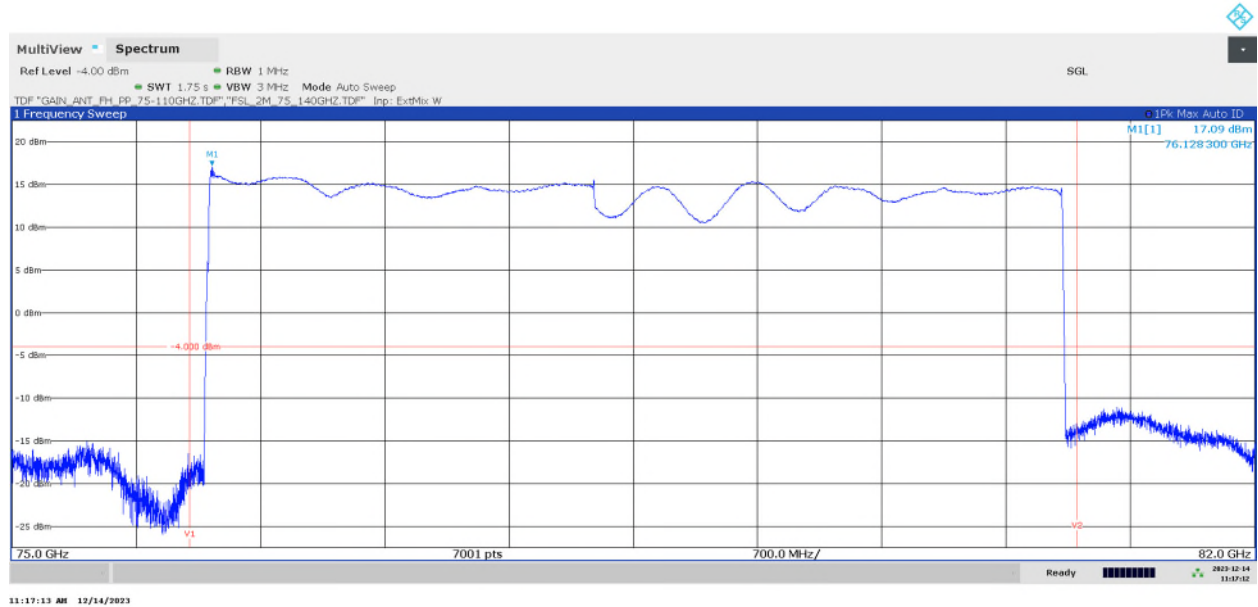


12:41:59 PM 12/12/2023

Note: Different RBW has been used to avoid desensitization factor, RBW=80MHz, only for information.

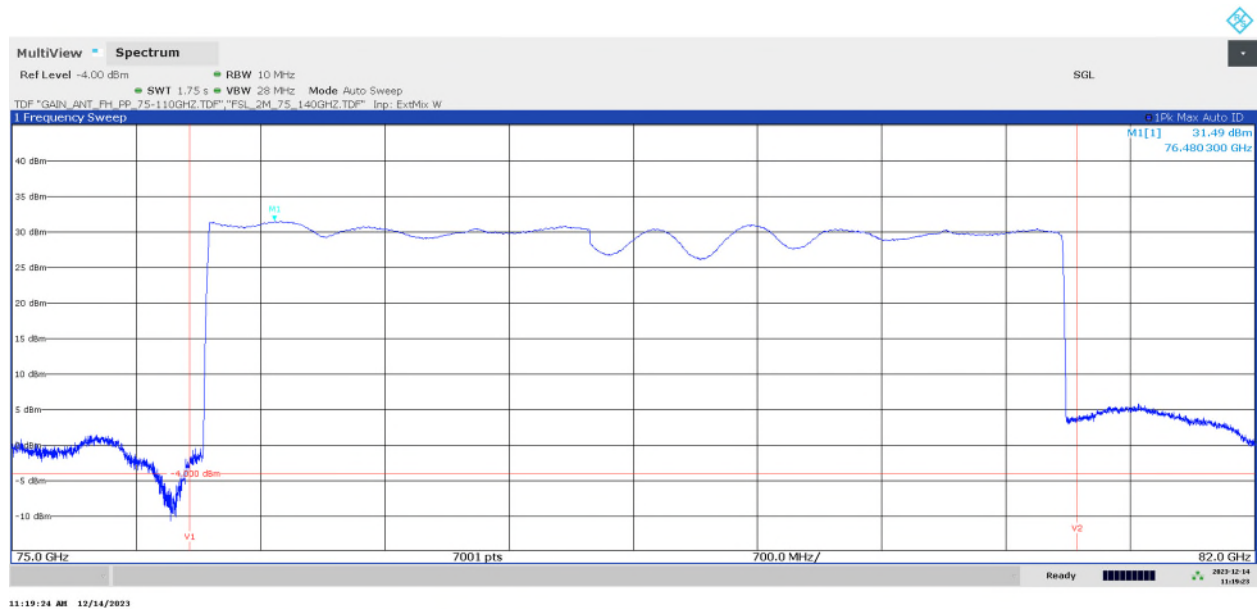
1.6 Peak Power (iSDR-M_DN135V):

D601_Check_Desensitization_RBW_1MHz_17.09dBm



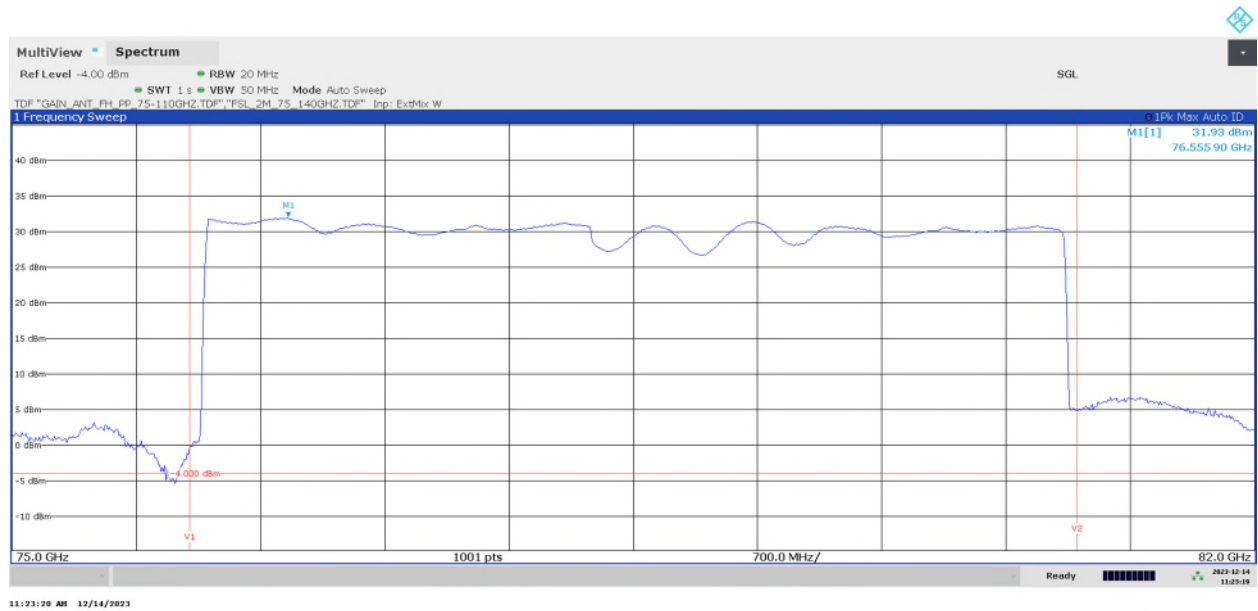
Note: Different RBW has been used to avoid desensitization factor, RBW=1MHz, only for information.

D602_Check_Desensitization_RBW_10MHz_31.49dBm

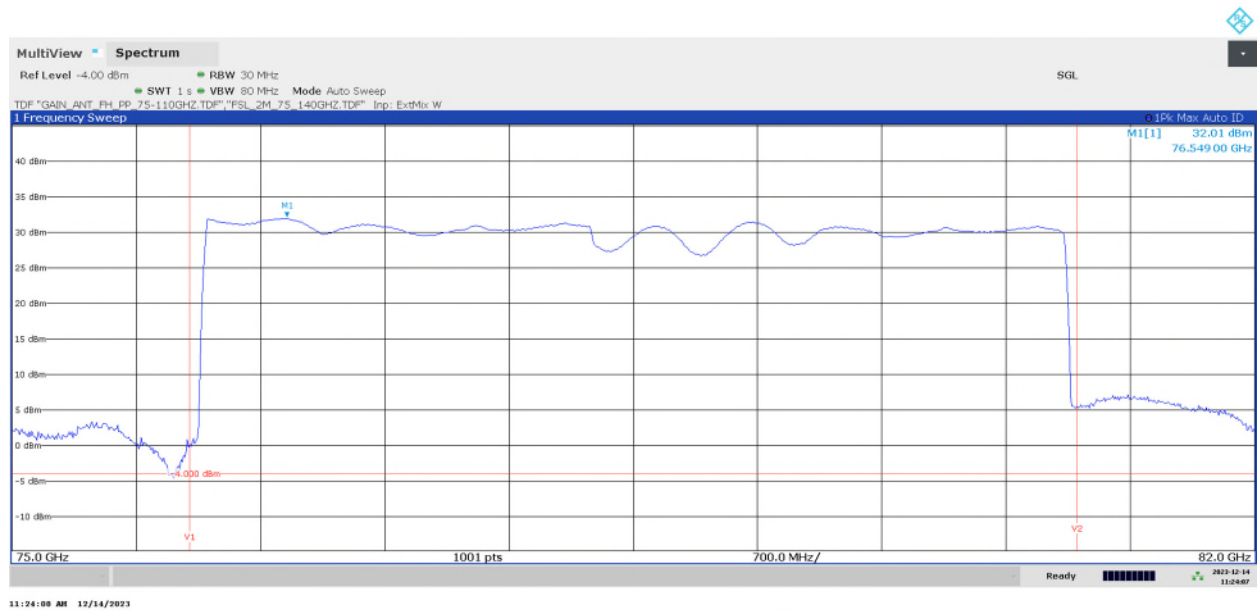


Note: Different RBW has been used to avoid desensitization factor, RBW=10MHz, only for information.

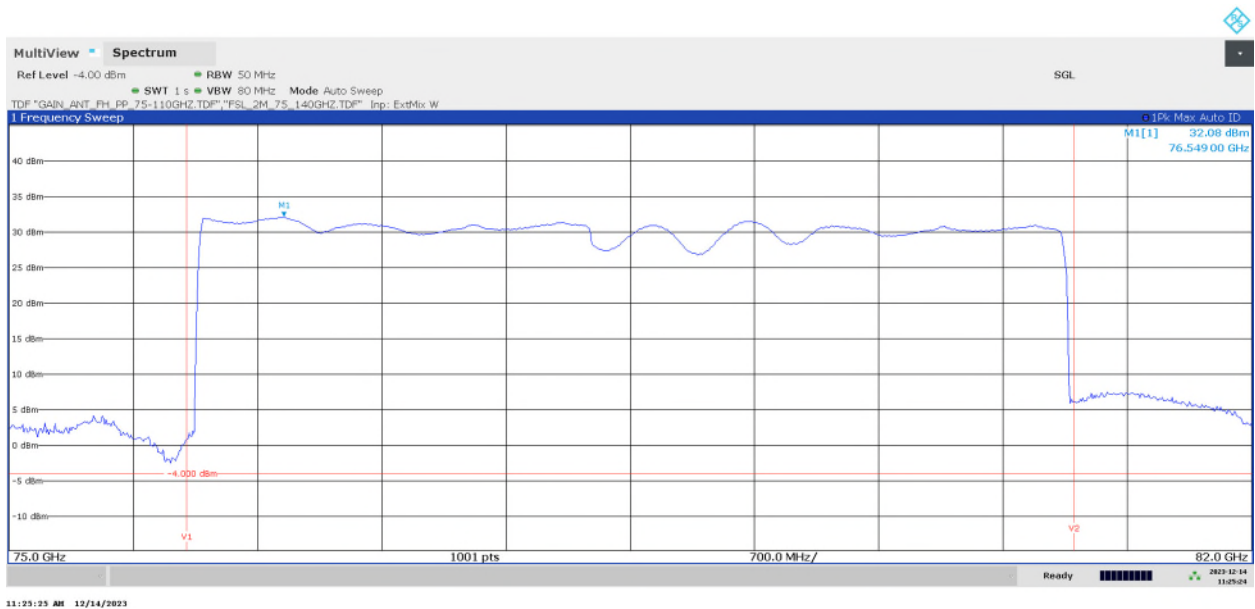
D603_Check_Desensitization_RBW_20MHz_31.93dBm



D604_Check_Desensitization_RBW_30MHz_32.01dBm



D605_Check_Desensitization_RBW_50MHz_32.08dBm

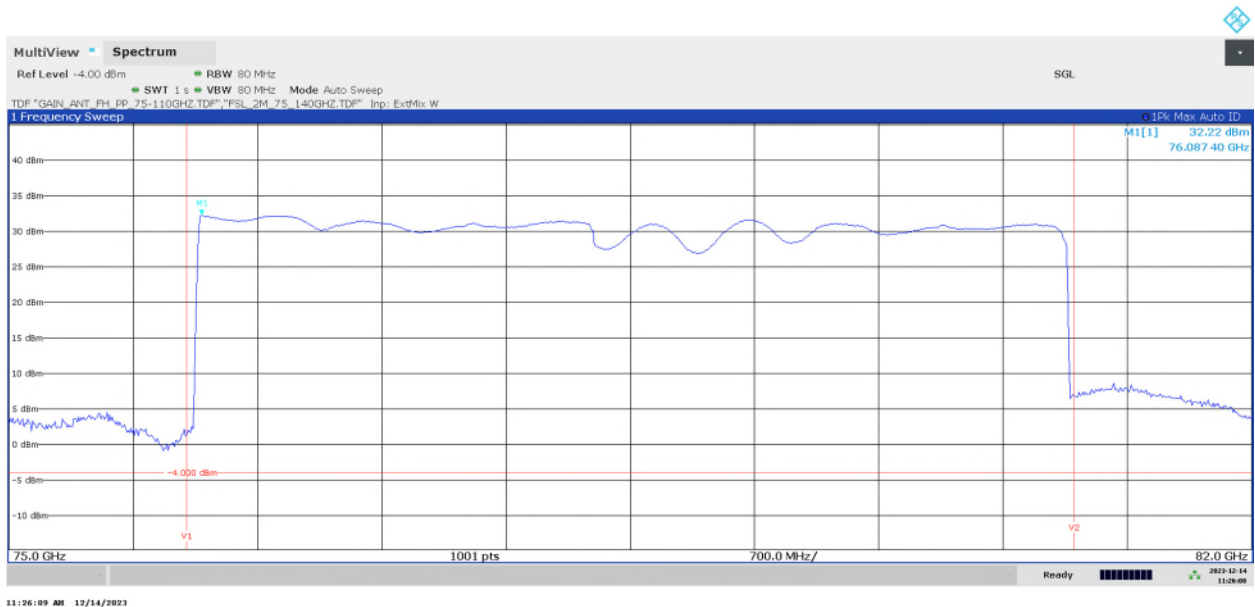


Note: Different RBW has been used to avoid desensitization factor.

RBW 50MHz has been chosen to perform EUT maximum Peak EIRP to avoid desensitization factor.

EUT Maximum Peak EIRP = 32.08dBm, Limit Line: 55dBm, Result: Passed.

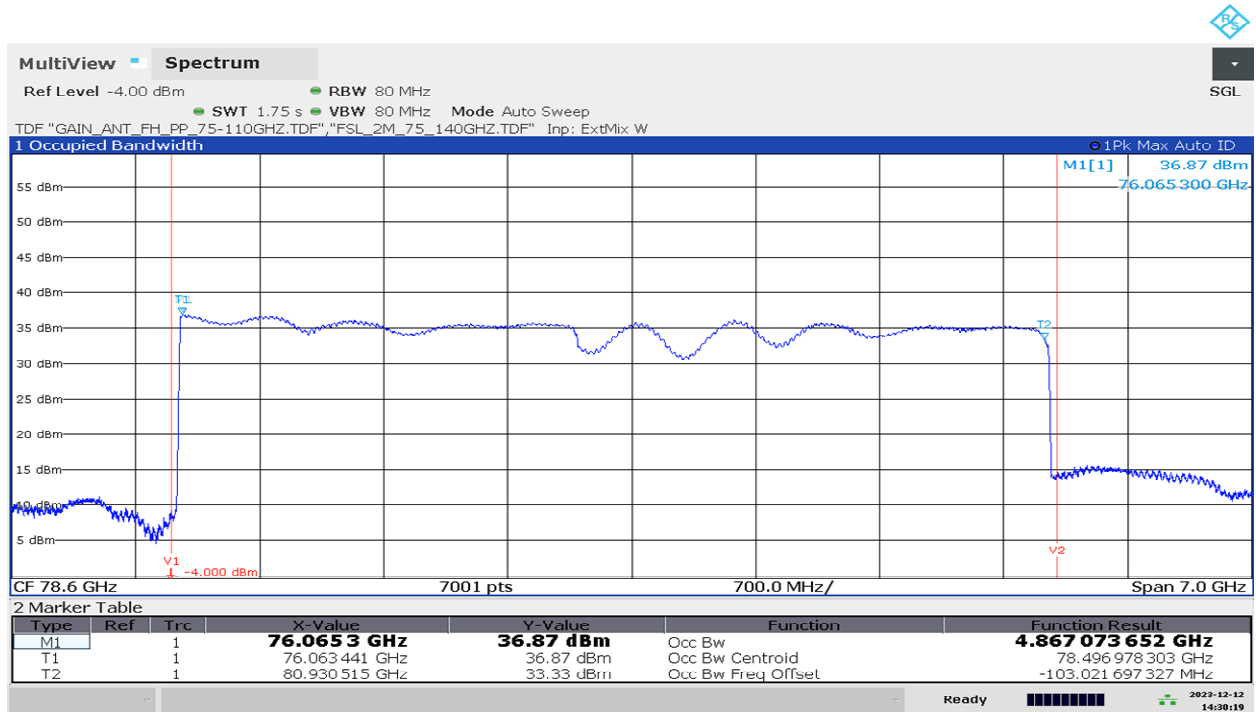
D606_Check_Desensitization_RBW_80MHz_32.22dBm



Note: Different RBW has been used to avoid desensitization factor, RBW=80MHz, only for information.

1.7 Operating Frequency Range (iSDR-M_DN135):

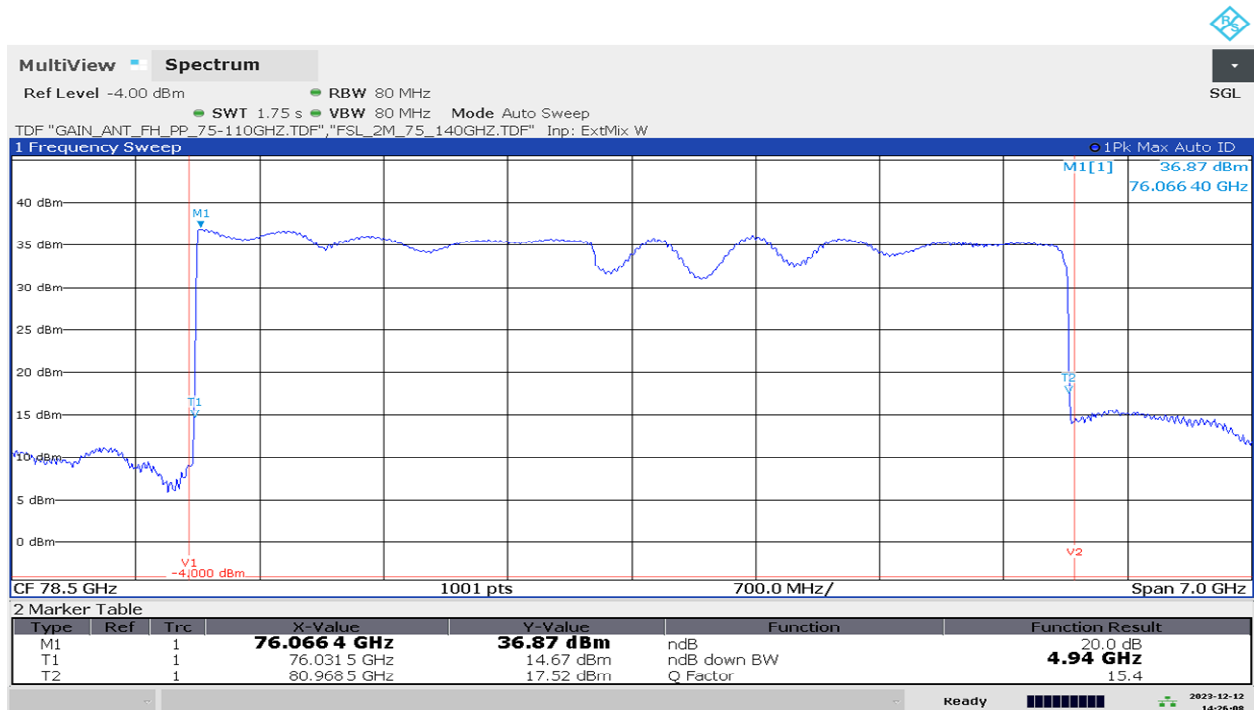
D110_99%OBW_4.87GHz_RBW_80MHz



02:30:19 PM 12/12/2023

Note: fL/T1=76.0634GHz, fH/T2=80.9305GHz, Limit Line: 76G – 81GHz, Result: Passed.

D111_20dB_OBW_4.94GHz_RBW_80MHz

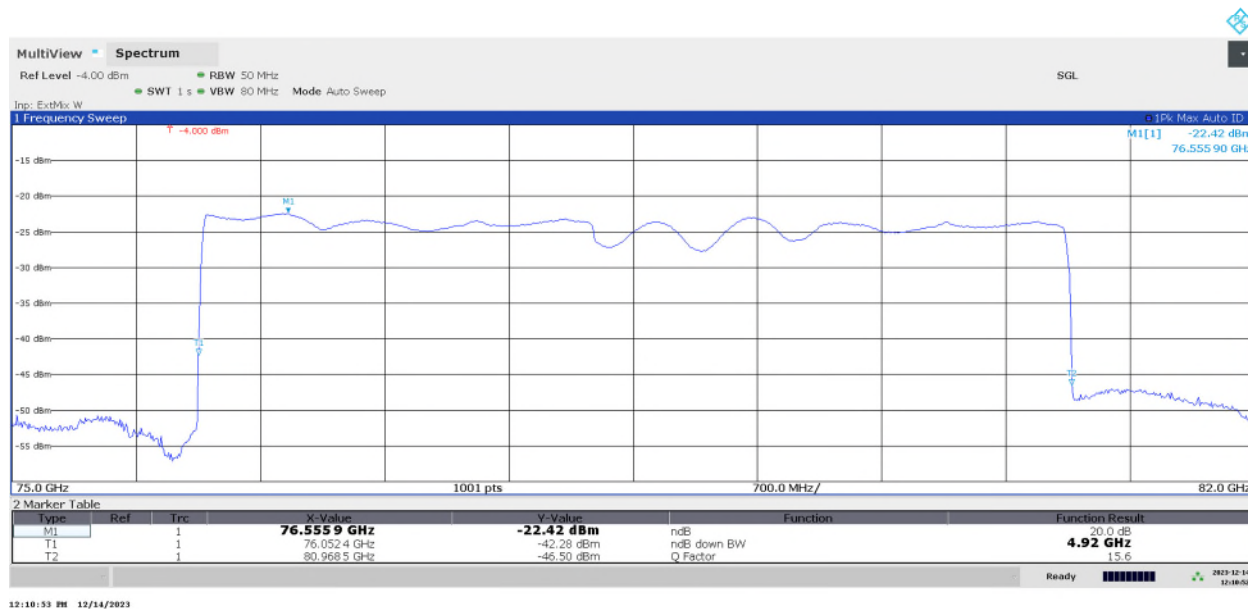


02:26:08 PM 12/12/2023

Note: fL/T1=76.0315GHz, fH/T2=80.9685GHz, Limit Line: 76G – 81GHz, only for information.

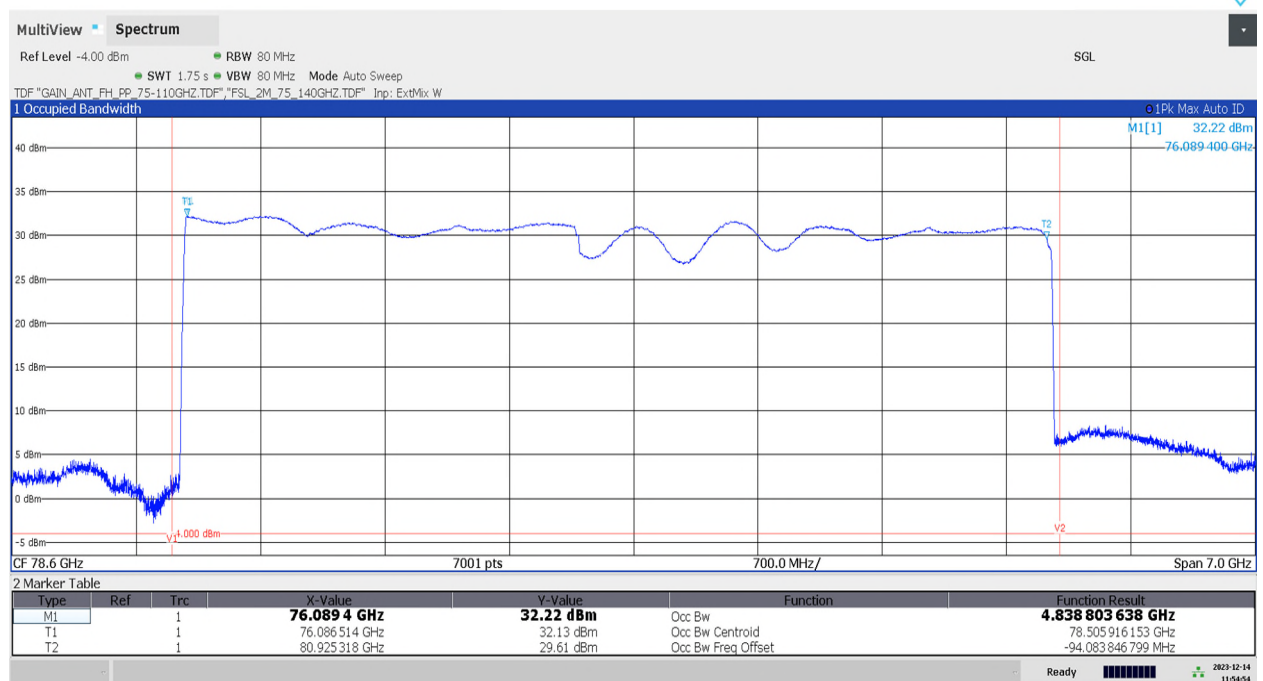
1.8 Operating Frequency Range (iSDR-M_DN135V):

D610_02_20dB_OBW_to_verify_ref_level



Note: FSW ref level verified, only for information not for assessment.

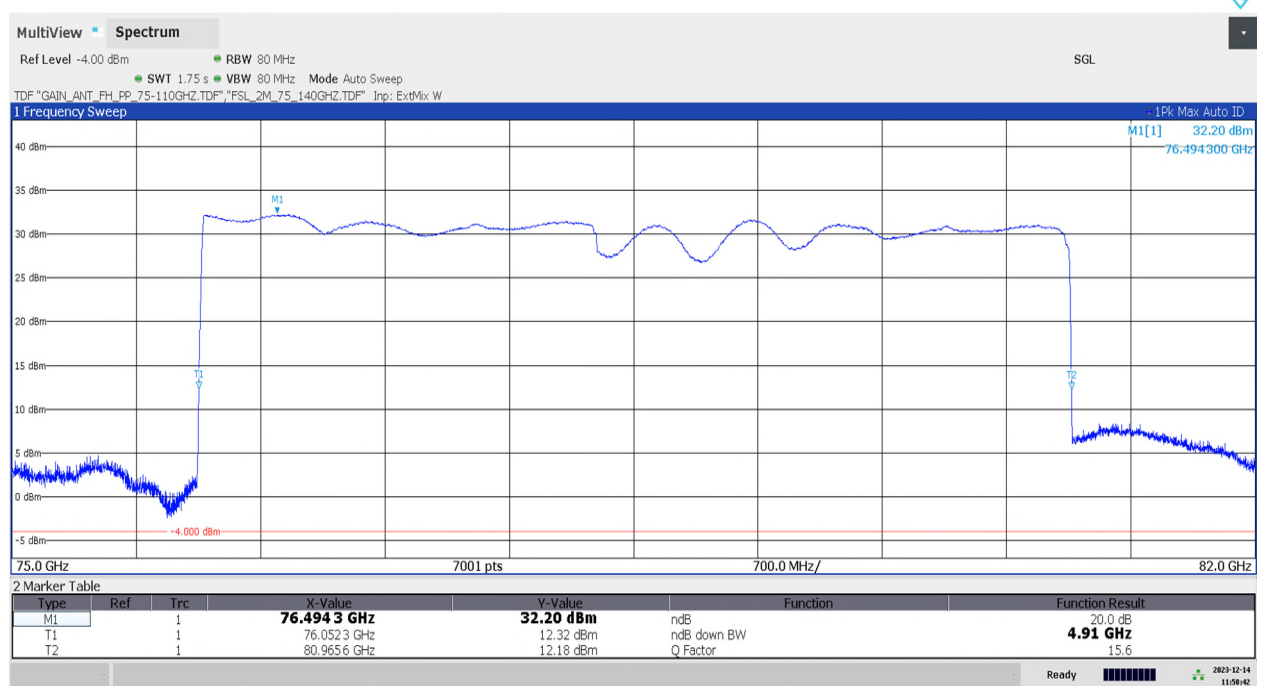
D609_99%OBW_4.84GHz_RBW_80MHz



11:54:55 AM 12/14/2023

Note: fL/T1=76.0865GHz, fH/T2=80.9253GHz, Limit Line: 76G – 81GHz, Result: Passed.

D611_20dB_OBW_4.91GHz_RBW_80MHz



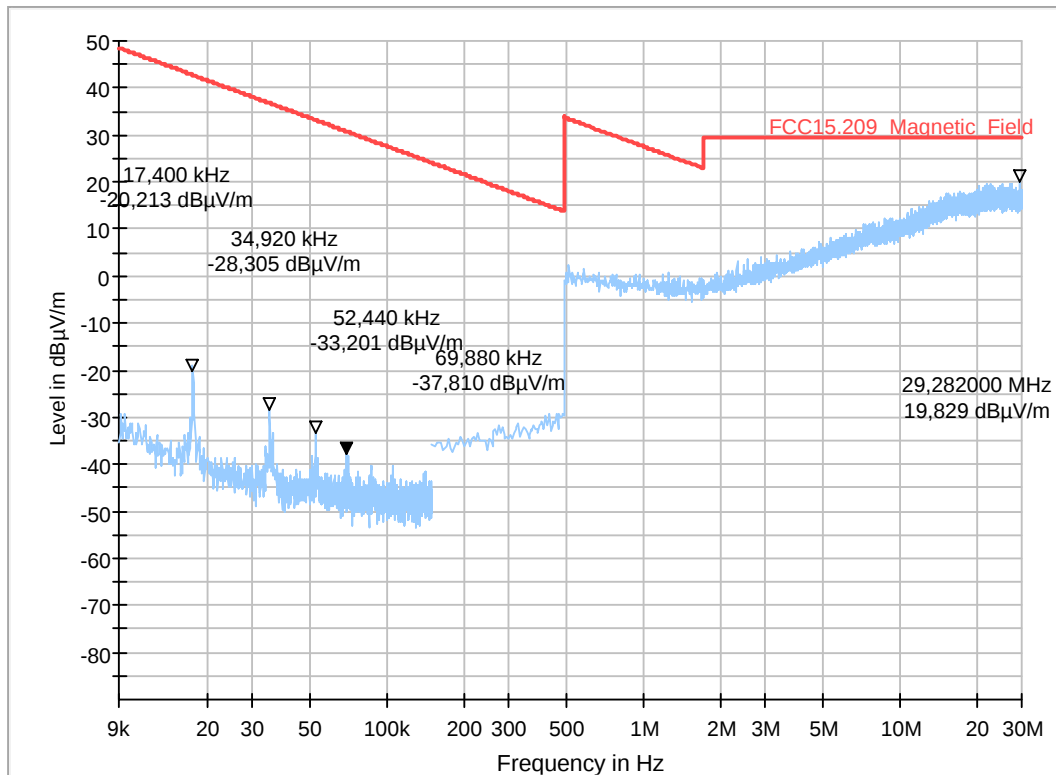
11:58:42 AM 12/14/2023

Note: fL/T1=76.0523GHz, fH/T2=80.9656GHz, Limit Line: 76G – 81GHz, only for information

1.9 Unwanted emissions in the out-of-band and spurious domain (9k – 250GHz)

D113_MgFeld_9k_30M

Full Spectrum

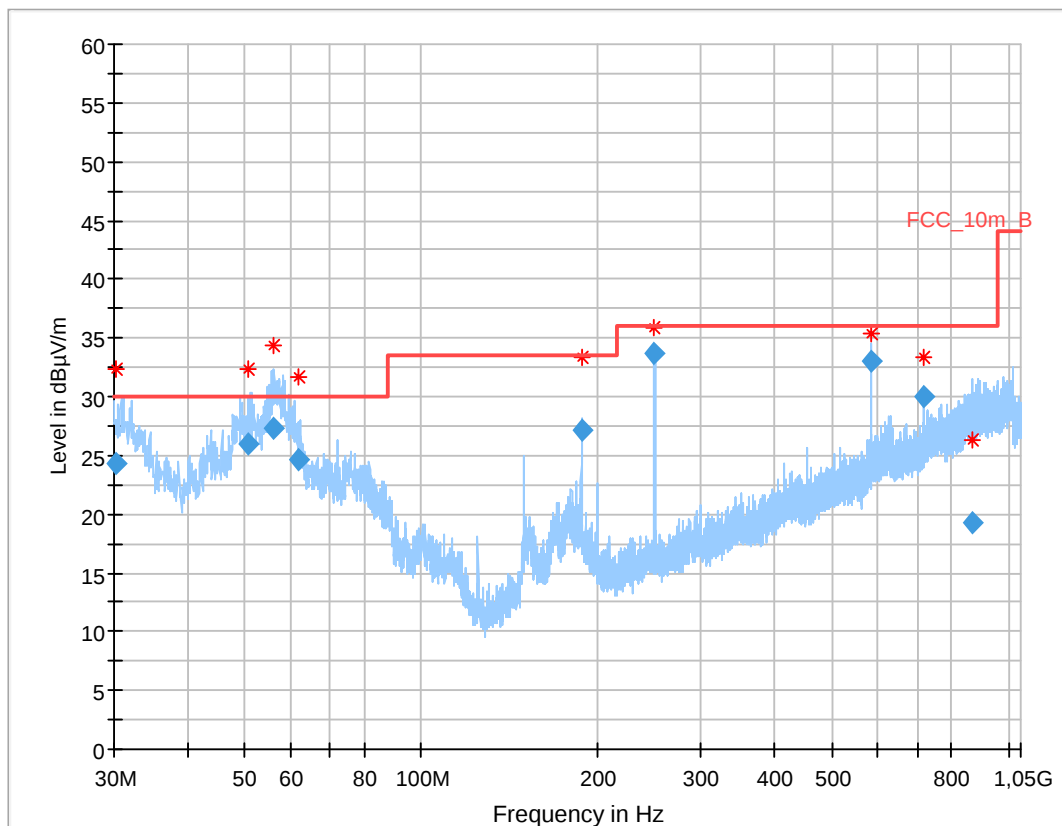


Note: No critical frequency found, Result: Passed.

6513_01_04_L_DC

Common Information

EUT:	radar iSDR-M
Serial number:	
Test description:	FCC <1GHz
Operating condition:	RF active
Operator name:	LAN
Comment:	DC 24V



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.315	24.34	30.0	5.7	1000	120.0	111.0	V	58	13
50.899	25.99	30.0	4.0	1000	120.0	200.0	V	45	15
56.145	27.35	30.0	2.7	1000	120.0	125.0	V	0	16
61.939	24.62	30.0	5.4	1000	120.0	200.0	V	344	13
187.531	27.10	33.5	6.4	1000	120.0	116.0	V	130	12
249.996	33.67	36.0	2.3	1000	120.0	103.0	V	353	14
585.919	33.05	36.0	3.0	1000	120.0	275.0	V	45	21
716.126	30.00	36.0	6.0	1000	120.0	229.0	V	116	22
870.868	19.25	36.0	16.8	1000	120.0	182.0	V	225	25

Hardware Setup: EMI radiated\VULP_10_m - [EMI radiated]

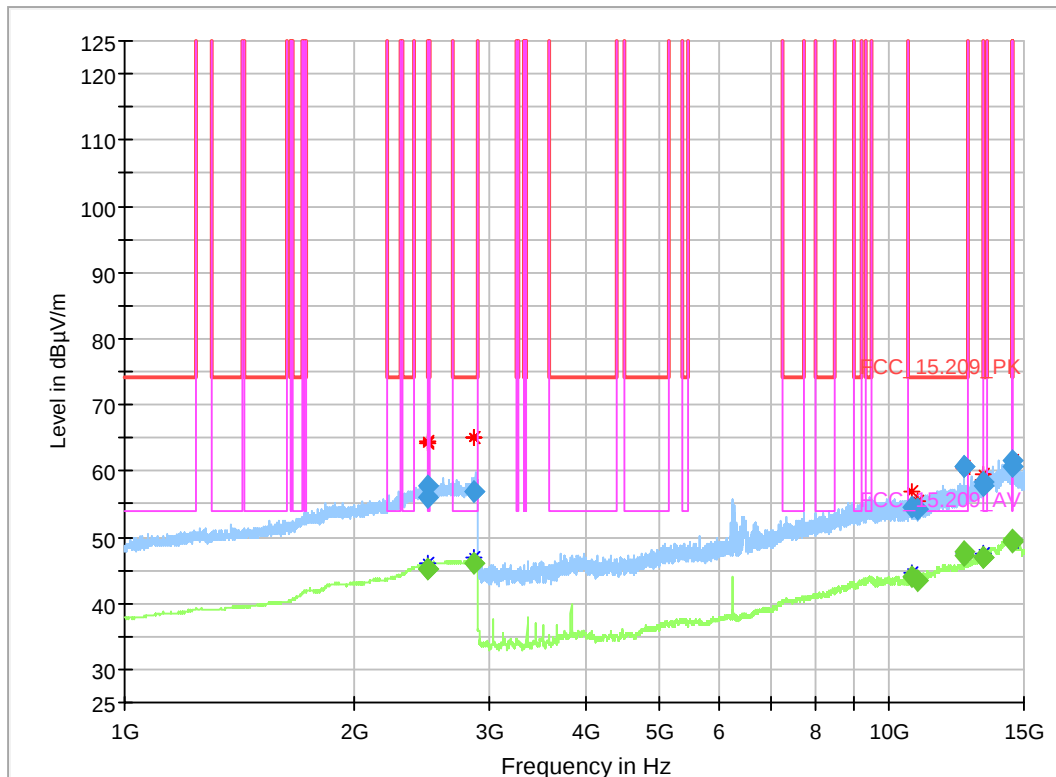
Subrange 1

Frequency Range:	30 MHz - 2 GHz
Receiver:	ESR 3 [ESR 3] @ GPIB0 (ADR 20), SN 1316.3003K03/102587, FW 3.66
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 FW --- Correction Table (vertical): VULP_9163_SN1029_10m Correction Table (horizontal): VULP_9163_SN1029_10m Correction Table (vertical): Cable_EN_1GHz Correction Table (horizontal): Cable_EN_1GHz
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

Software version: EMC32 V10.59.0

D115_1G_15GHz

Full Spectrum



Final_Result_PK+

Frequency (MHz)	Bandwidth (kHz)	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)	Preamplifier (dB)	Trd Corr. (dB/)	Raw Rec (dBμV)	Comment
2491.250000	1000.000	142.0	0.0	33.7	0.0	28.7	22.4	10:54:07 AM - 10-Jan-24
2494.916667	1000.000	353.0	0.0	33.8	0.0	28.7	24.1	10:56:43 AM - 10-Jan-24
2854.641917	1000.000	62.0	0.0	34.8	0.0	29.4	22.0	10:52:52 AM - 10-Jan-24
2856.076750	1000.000	219.0	0.0	34.8	0.0	29.4	22.2	10:55:21 AM - 10-Jan-24
10713.483333	1000.000	130.0	0.0	7.8	0.0	38.1	46.8	11:24:10 AM - 10-Jan-24
10907.539583	1000.000	281.0	0.0	7.6	0.0	38.2	46.7	11:16:24 AM - 10-Jan-24
12499.956250	1000.000	-3.0	0.0	10.2	0.0	38.3	50.6	11:19:49 AM - 10-Jan-24
12500.016250	1000.000	0.0	0.0	10.2	0.0	38.3	50.4	11:21:10 AM - 10-Jan-24

13290.20125 0	1000.000	-3.0	0.0	11.8	0.0	39.8	46.6	11:22:36 AM - 10- Jan-24
13293.31458 3	1000.000	142.0	0.0	11.8	0.0	39.9	45.9	11:25:32 AM - 10- Jan-24
14490.67500 0	1000.000	195.0	0.0	12.6	0.0	41.3	48.8	11:27:05 AM - 10- Jan-24
14498.50791 7	1000.000	292.0	0.0	12.5	0.0	41.3	48.2	11:17:49 AM - 10- Jan-24

Final_Result_RMS

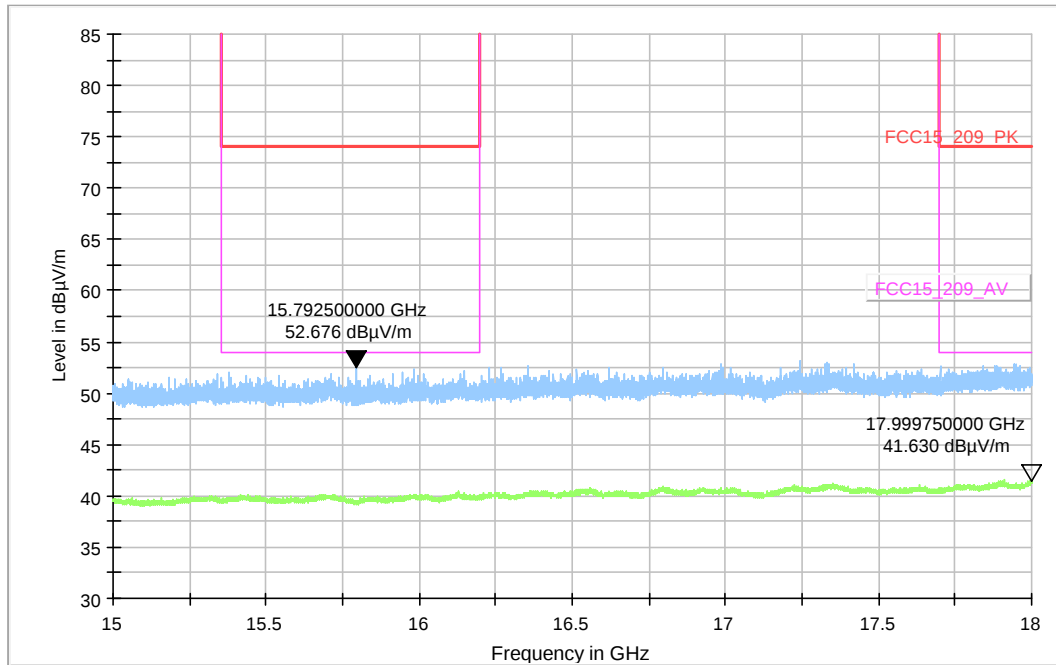
Frequency (MHz)	RMS (dBμV/m)	Limit (dBμV /m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azim uth (deg)	Elevati on (deg)	Corr. (dB/m)
2491.250000	45.11	54.00	8.89	1000.000	155.0	V	142.0	0.0	33.7
2494.916667	45.23	54.00	8.77	1000.000	155.0	V	353.0	0.0	33.8
2854.641917	45.93	54.00	8.07	1000.000	155.0	V	62.0	0.0	34.8
2856.076750	45.95	54.00	8.05	1000.000	155.0	V	219.0	0.0	34.8
10713.48333 3	43.93	54.00	10.07	1000.000	155.0	V	130.0	0.0	7.8
10907.53958 3	43.49	54.00	10.51	1000.000	155.0	H	281.0	0.0	7.6
12499.95625 0	47.34	54.00	6.66	1000.000	155.0	V	-3.0	0.0	10.2
12500.01625 0	47.70	54.00	6.30	1000.000	155.0	V	0.0	0.0	10.2
13290.20125 0	47.05	54.00	6.95	1000.000	155.0	V	-3.0	0.0	11.8
13293.31458 3	46.99	54.00	7.01	1000.000	155.0	V	142.0	0.0	11.8
14490.67500 0	49.43	54.00	4.57	1000.000	155.0	V	195.0	0.0	12.6
14498.50791 7	49.28	54.00	4.72	1000.000	155.0	H	292.0	0.0	12.5

(continuation of the "Final_Result_RMS" table from column 12 ...)

Frequency (MHz)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)	Comment
2491.250000	0.0	28.7	11.4	10:54:07 AM - 10-Jan-24
2494.916667	0.0	28.7	11.5	10:56:43 AM - 10-Jan-24
2854.641917	0.0	29.4	11.2	10:52:53 AM - 10-Jan-24
2856.076750	0.0	29.4	11.2	10:55:21 AM - 10-Jan-24
10713.48333 3	0.0	38.1	36.1	11:24:10 AM - 10-Jan-24
10907.53958 3	0.0	38.2	35.9	11:16:25 AM - 10-Jan-24
12499.95625 0	0.0	38.3	37.1	11:19:49 AM - 10-Jan-24
12500.01625 0	0.0	38.3	37.5	11:21:10 AM - 10-Jan-24
13290.20125 0	0.0	39.8	35.3	11:22:37 AM - 10-Jan-24
13293.31458 3	0.0	39.9	35.2	11:25:32 AM - 10-Jan-24
14490.67500 0	0.0	41.3	36.8	11:27:06 AM - 10-Jan-24
14498.50791 7	0.0	41.3	36.7	11:17:50 AM - 10-Jan-24

D116_15G_18GHz_Ant_V

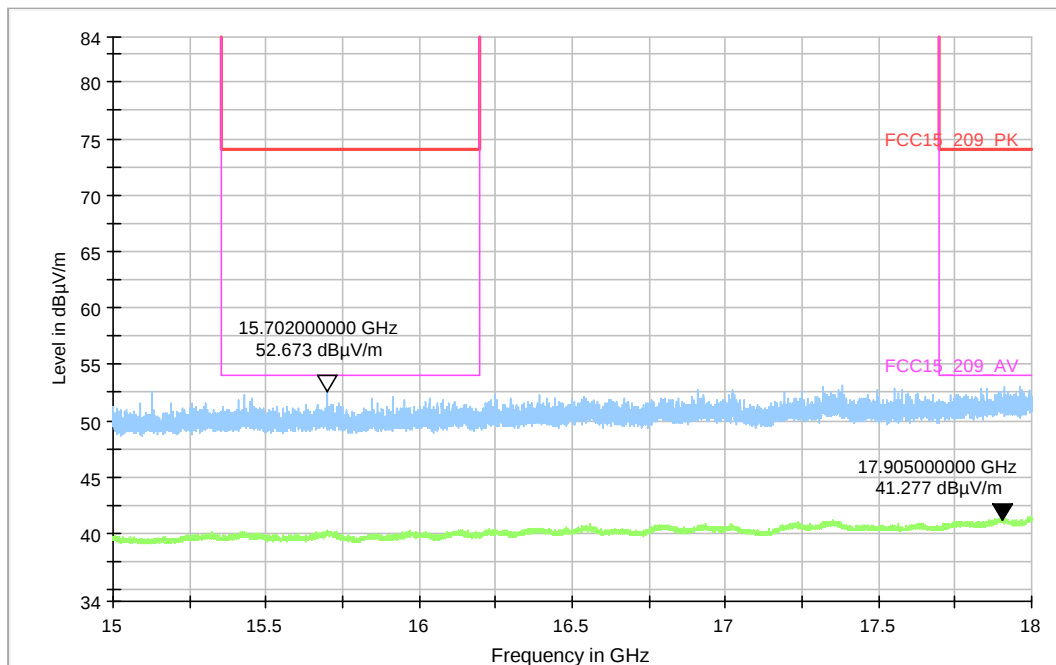
Full Spectrum



Note: No Critical Emission found, Result: Passed.

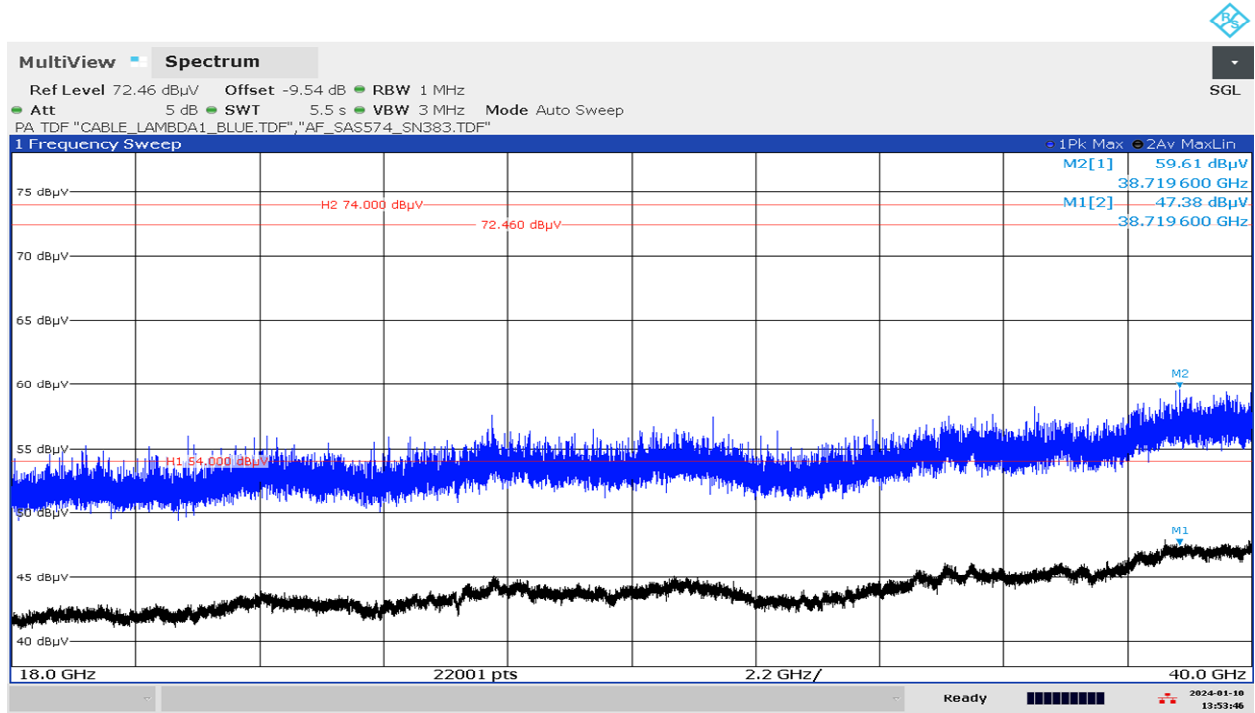
D116_01_15G_18GHz_Ant_H

Full Spectrum



Note: No Critical Emission found, Result: Passed.

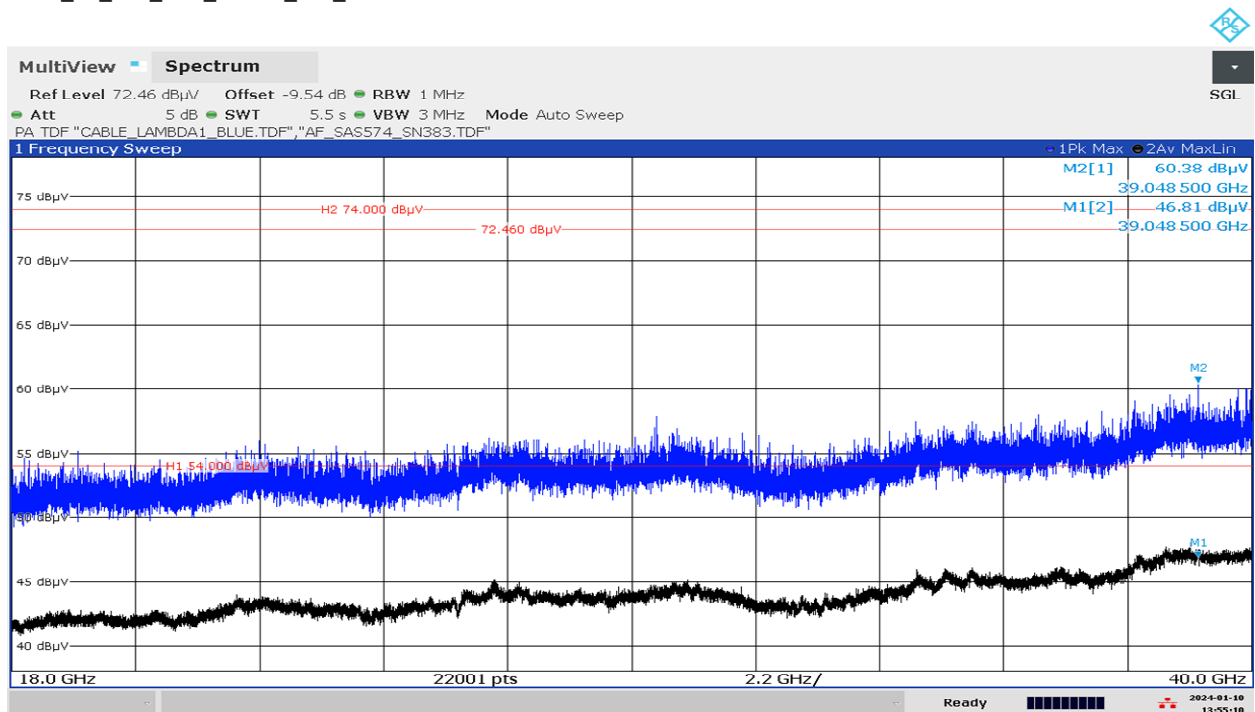
D117_RSE_18G_40GHz_Ant_V



01:53:46 PM 01/10/2024

Note: No critical emission found, Limit Line: Avg=54dBμV, Peak= 74 dBμV , Result: Passed.

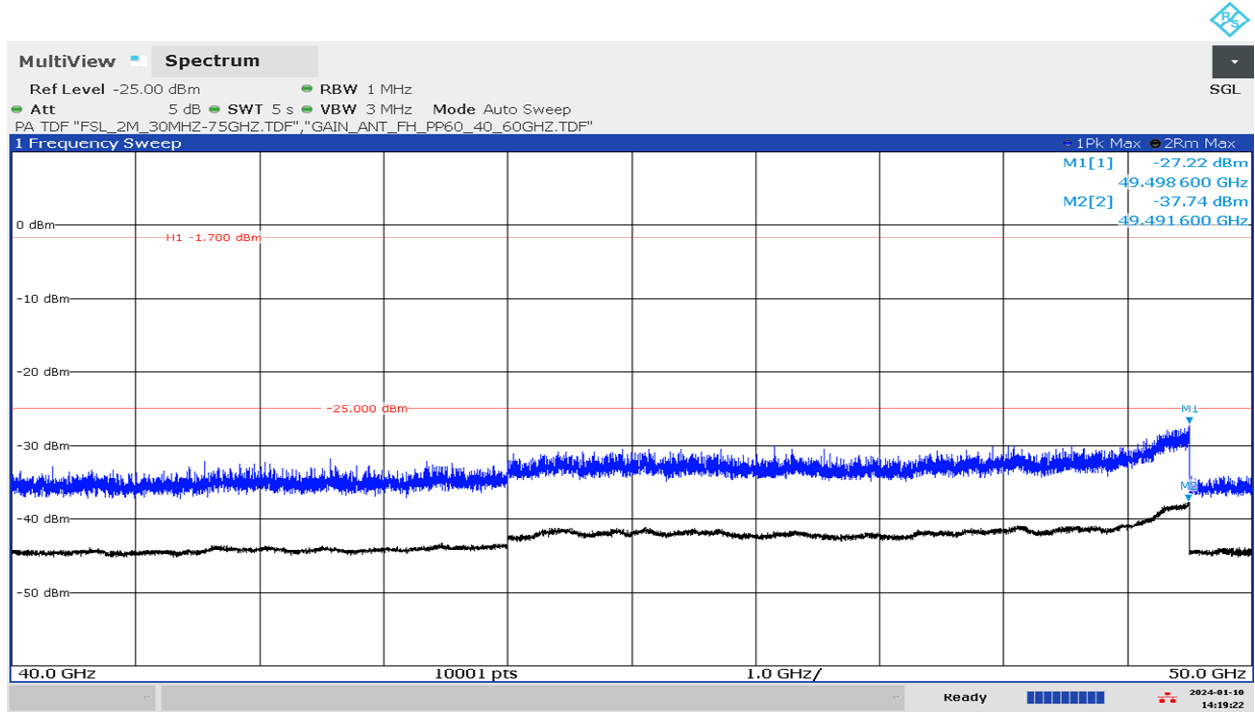
D117_01_RSE_18G_40GHz_Ant_H



01:55:10 PM 01/10/2024

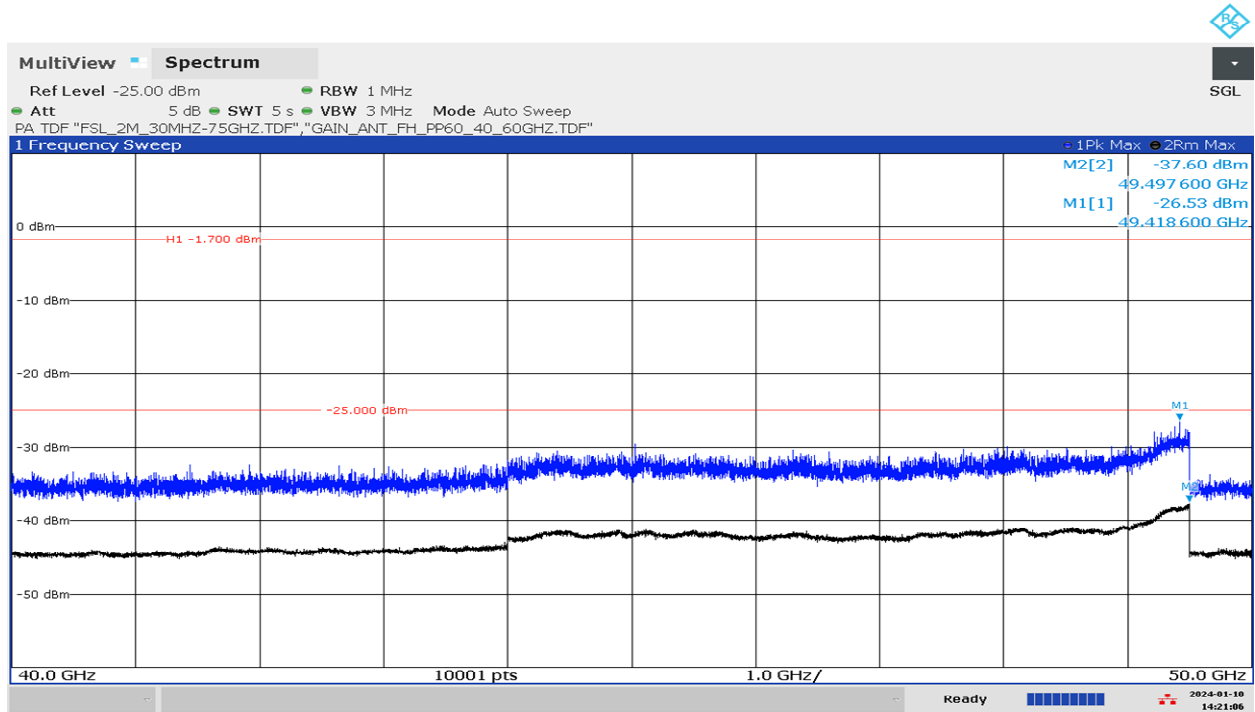
Note: No critical emission found, Limit Line: Avg=54dBμV, Peak= 74 dBμV , Result: Passed.

D118_RSE_40G_50GHz_FCC_Ant_V



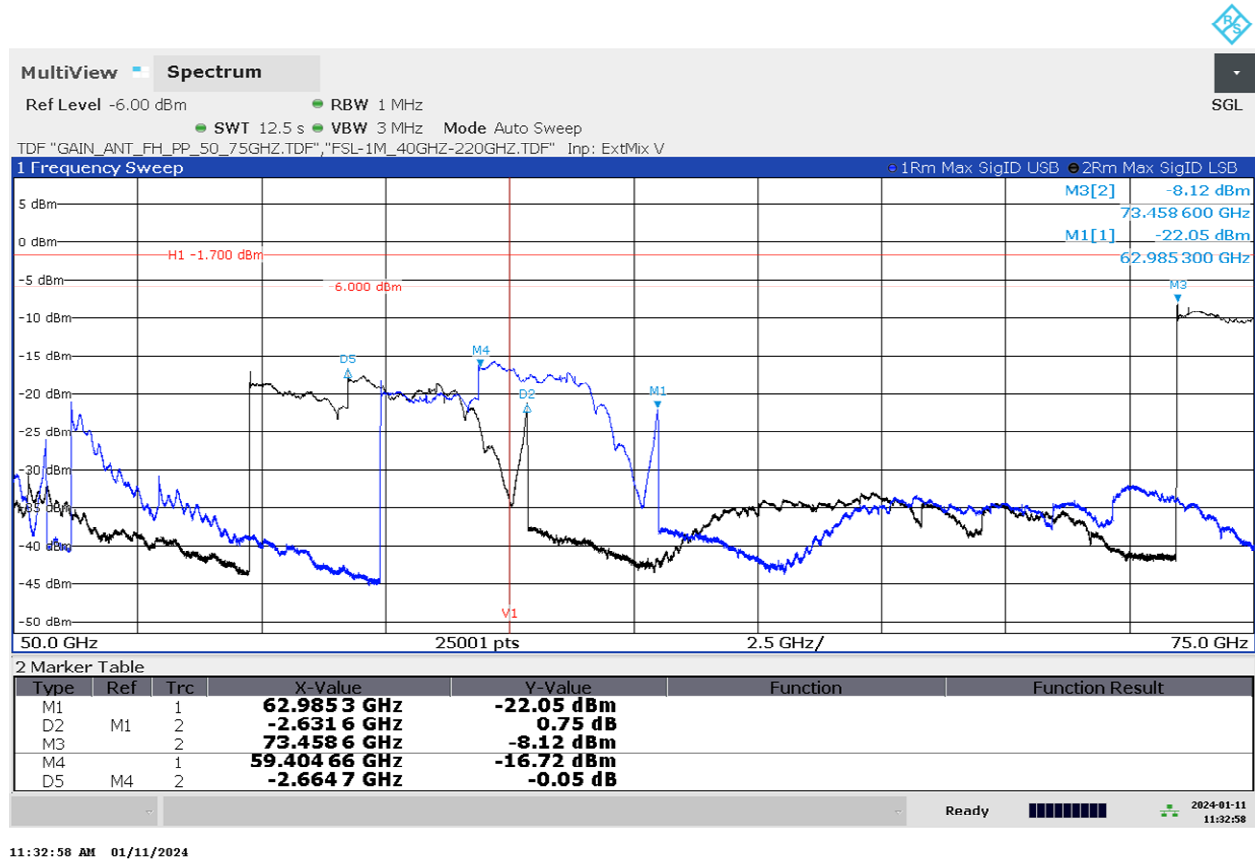
Note: No critical Emission found, Limit Line: -1.7dBm, Result: Passed. Peak detector is only for information.

D118_01_RSE_40G_50GHz_FCC_Ant_H



Note: No critical Emission found, Limit Line: -1.7dBm, Result: Passed. Peak detector is only for information.

D119_RSE_50G_75GHz_FCC_signal_id



11:32:58 AM 01/11/2024

Note:

Mixer Products have been used. Signal ID function activated.

No Critical Emission found, all are image/ghost signals not related to assessment.

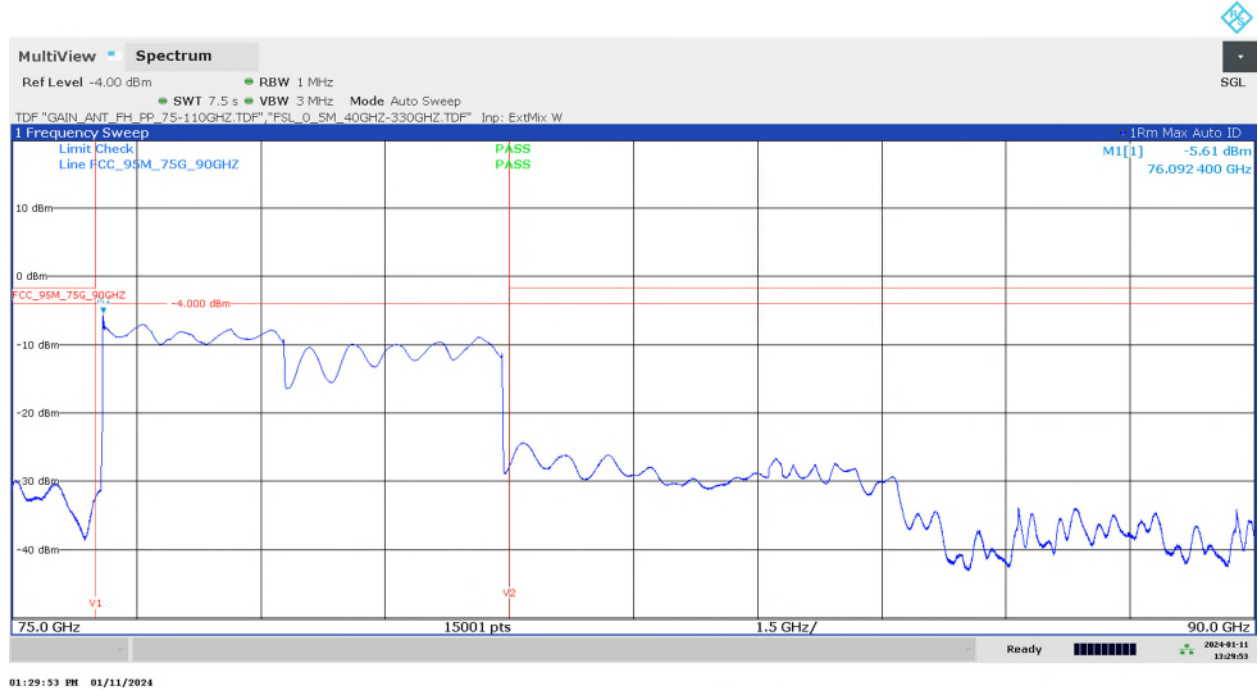
Real signal: Which are overlapping.

Image/Ghost signal: Which are not overlapping

Every image/ghost signal has been verified separately during measurements.

Limit: -1.7dBm, Result: Passed.

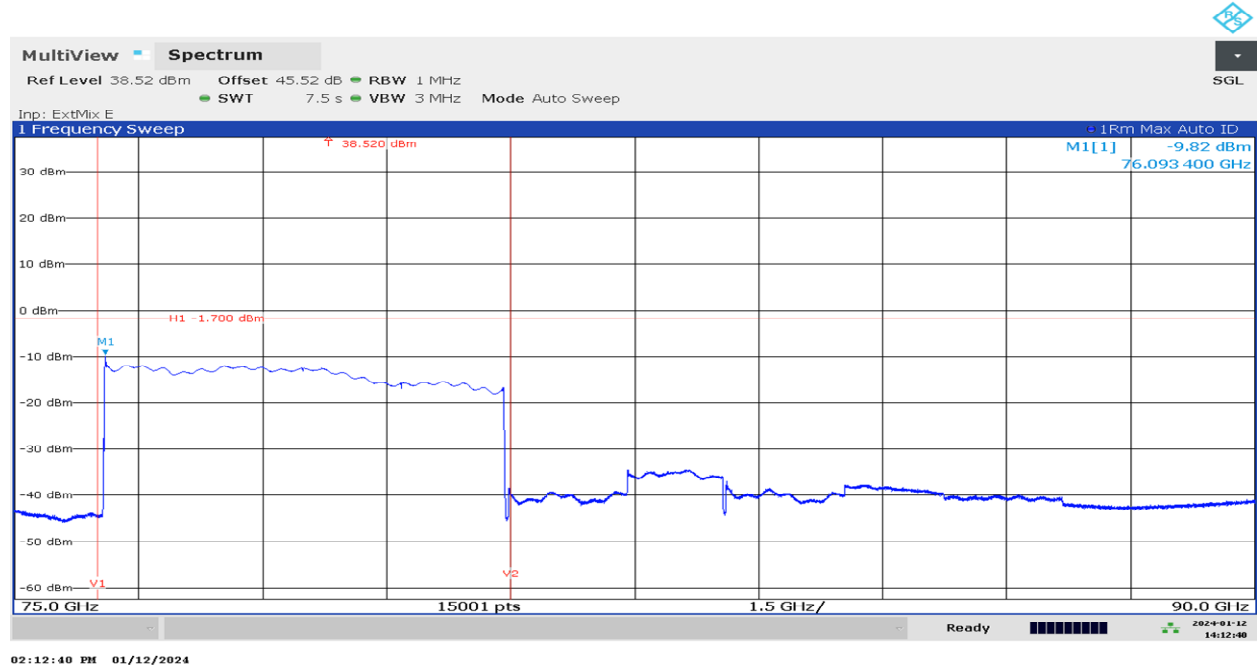
D120_RSE_75G_90GHz_FCC_auto_id



Note: No critical frequency found, Limit Line: -1.7dBm, Frequency Range: 75G- 76GHz and 81G – 90GHz, Result: Passed.

RADAR is active.in 76G – 81GHz.

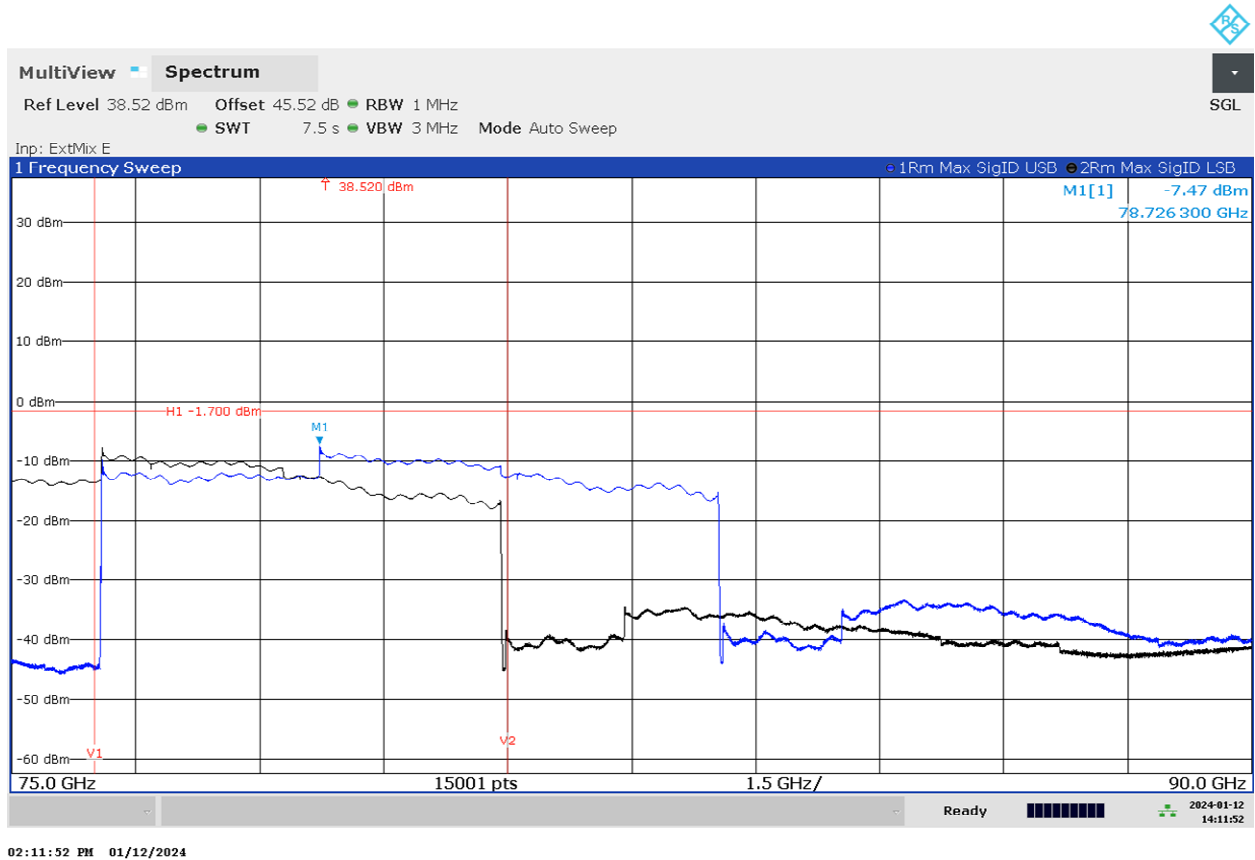
D120_02_RSE_75G_90GHz_FCC_auto_id_new_setup_SB



Note: 2nd run with another setup (antenna + mixer_SB)

No critical Emission found, Only for information.

D120_01_RSE_75G_90GHz_FCC_signal_id_new_setup_SB



02:11:52 PM 01/12/2024

Note-1: Signal ID function activated, only ghost signal are identified, no critical emission found.

Note-2: Mixer Products have been used. Signal ID function activated.

No Critical Emission found, all are image/ghost signals not related to assessment.

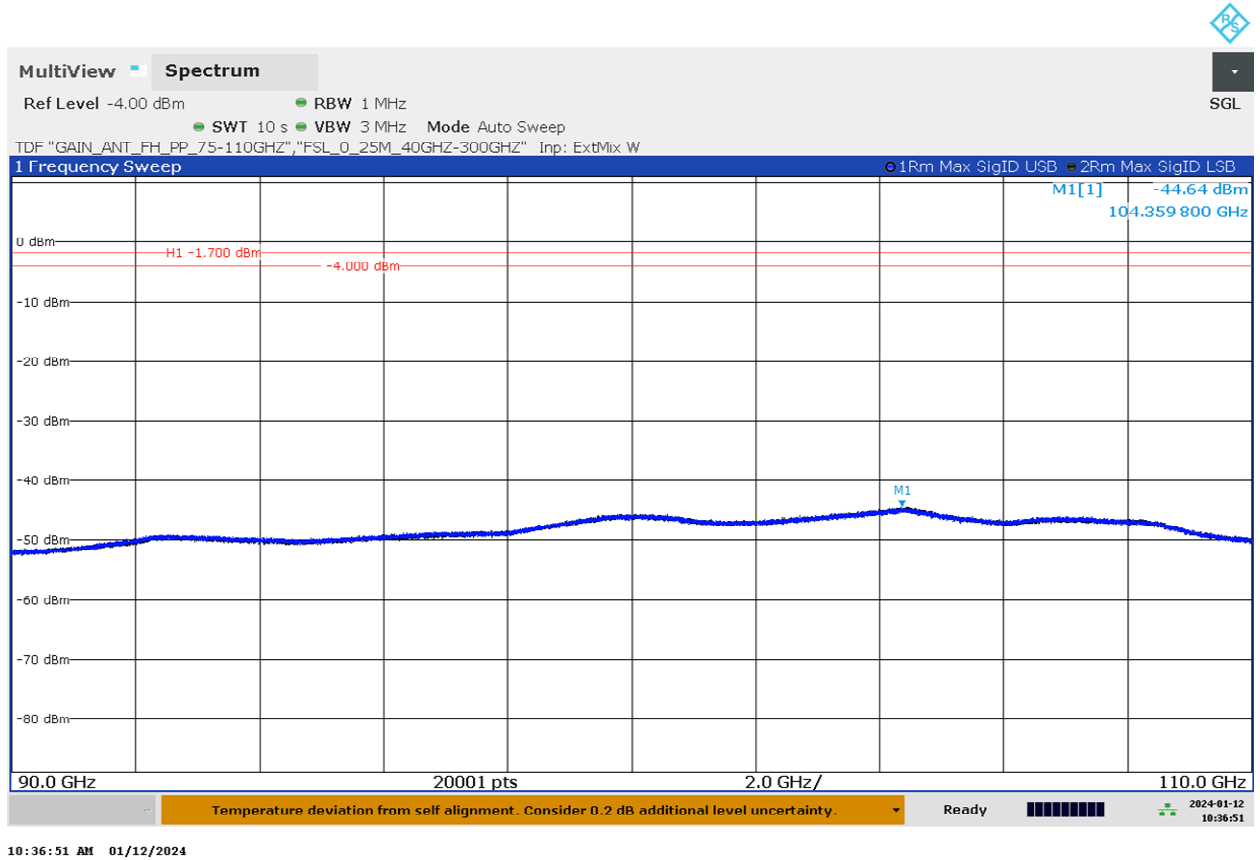
Real signal: Which are overlapping (76G – 81GHz).

Image/Ghost signal: Which are not overlapping

Every image/ghost signal has been verified separately during measurements.

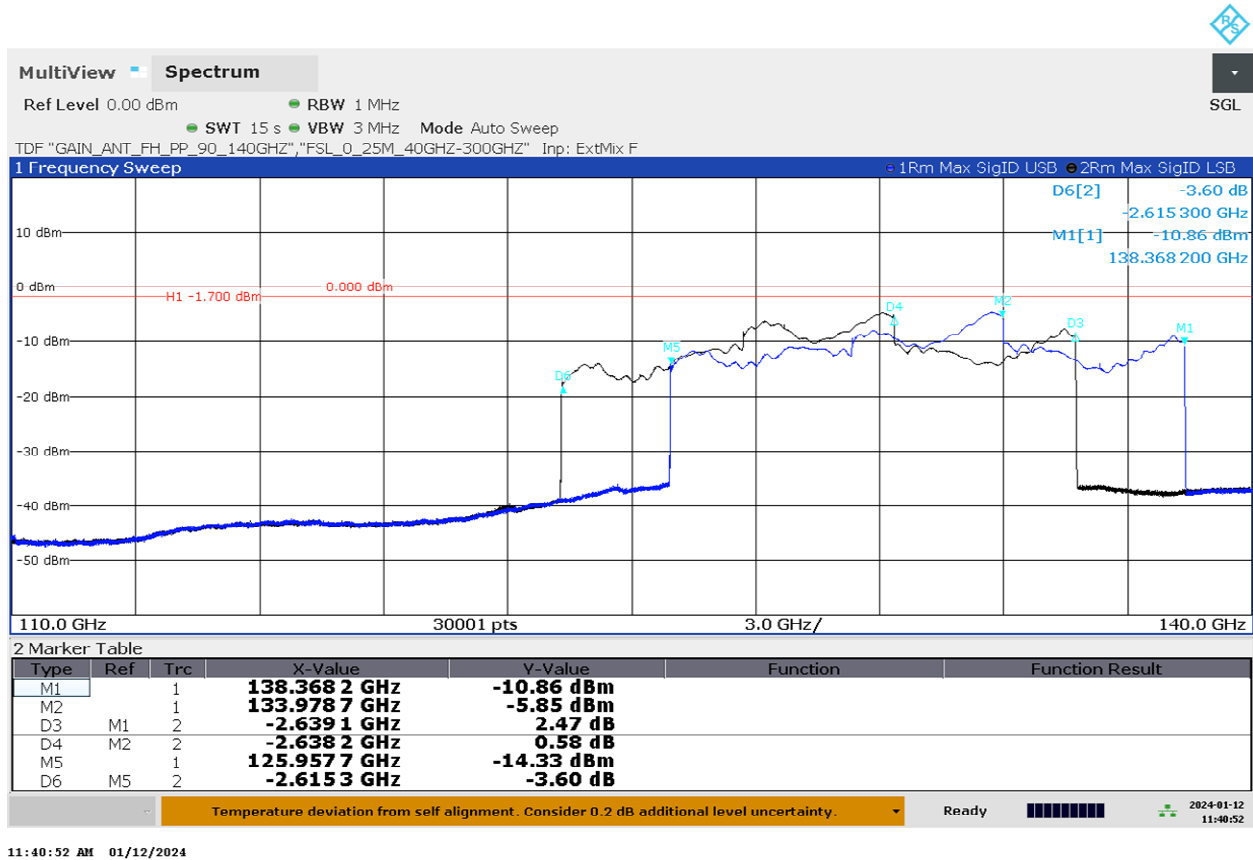
Result: Only for information.

D121_01_RSE_90G_110GHz_FCC



Note: No critical Emission found, Limit Line: -1.7dBm, Result: Passed.

D121_02_RSE_110G_140GHz_FCC



11:40:52 AM 01/12/2024

Note:

Mixer Products have been used. Signal ID function activated. Only Ghost Signals are identified, no critical emission found.

No Critical Emission found, all are image/ghost signals not related to assessment.

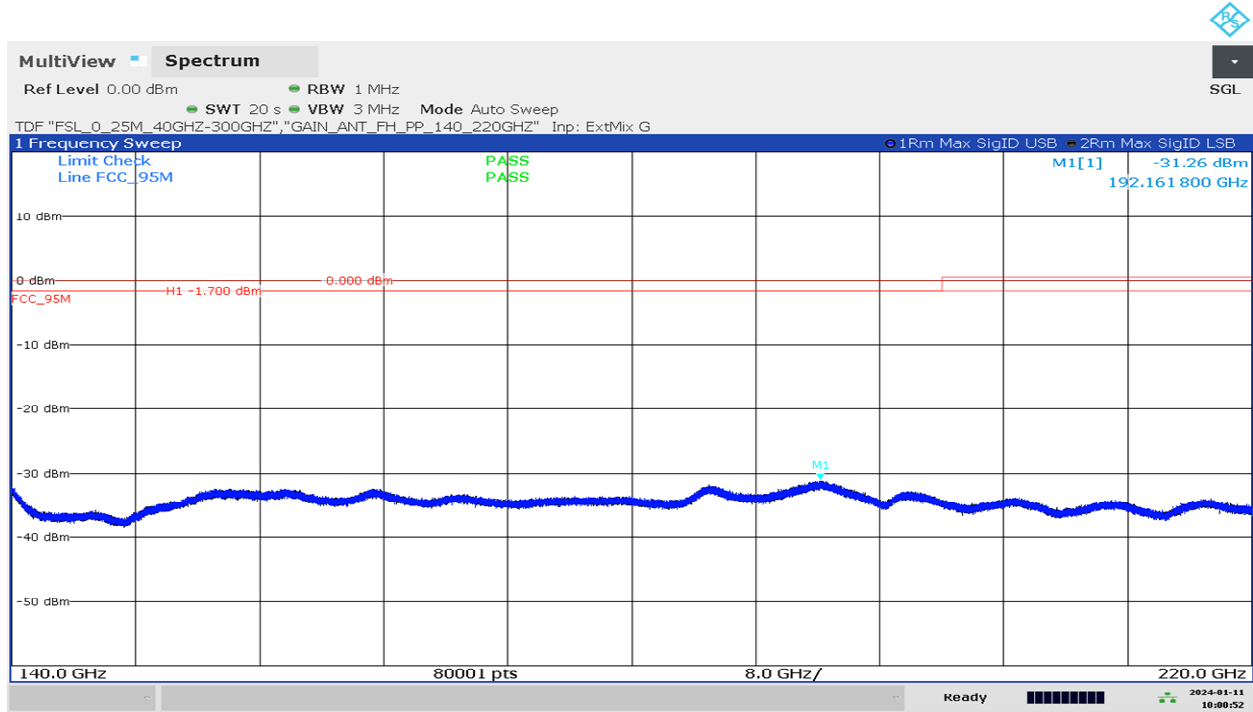
Real signal: Which are overlapping.

Image/Ghost signal: Which are not overlapping

Every image/ghost signal has been verified separately during measurements.

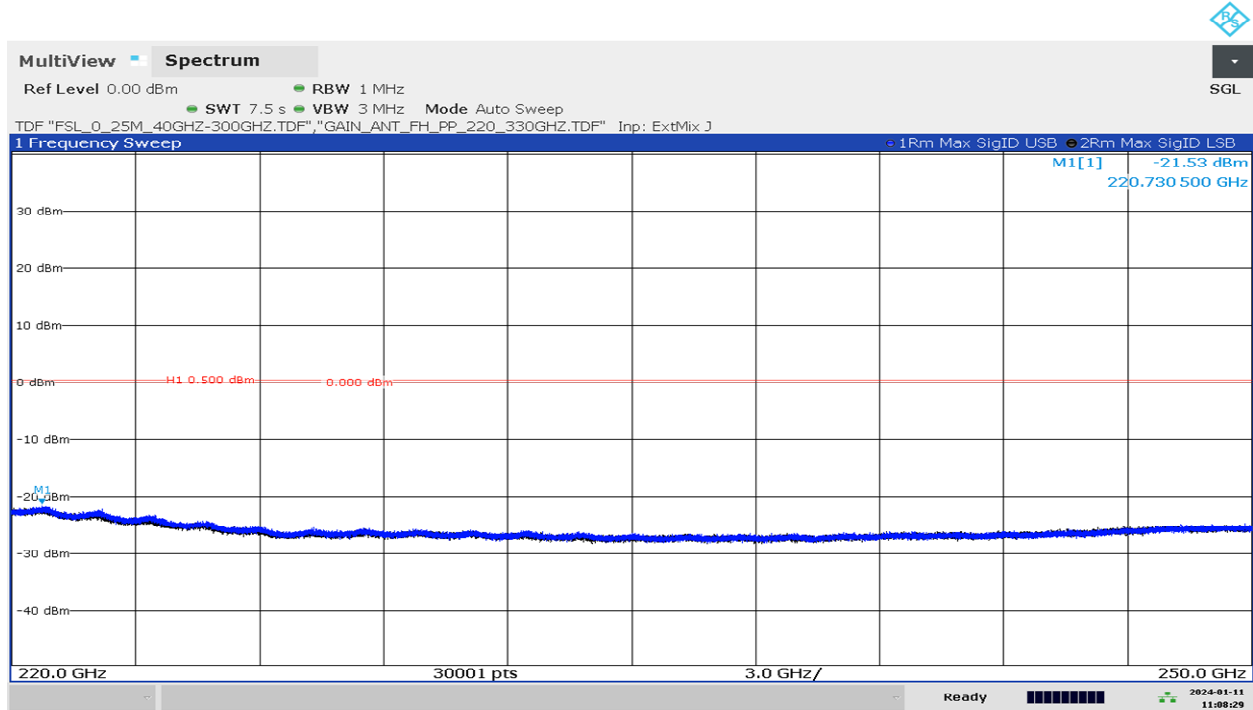
Limit Line: -1.7dBm, Result: Passed.

D122_RSE_140G_220GHz_FCC



Note: No critical frequency found, Limit Line: -1.7dBm (140G – 200GHz) and +0.5dBm (200G – 220GHz), Result: Passed.

D123_RSE_220G_250GHz_FCC



Note: No critical frequency found, Limit Line: +0.5dBm, Result: Passed.

End Of Annex 1