Annex 1: Measurement diagrams 23-1-0086302T016a-A1

Number of pages:	31	**Date of Report:**	2025-Feb-14
Testing company:	cetecom advanced GmbH Untertuerkheimer Str. 6-10 66117 Saarbruecken GERMANY	**Applicant:**	indurad GmbH
Product: **Model:**	**2D Scanning Radar** **iSDR-H-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		

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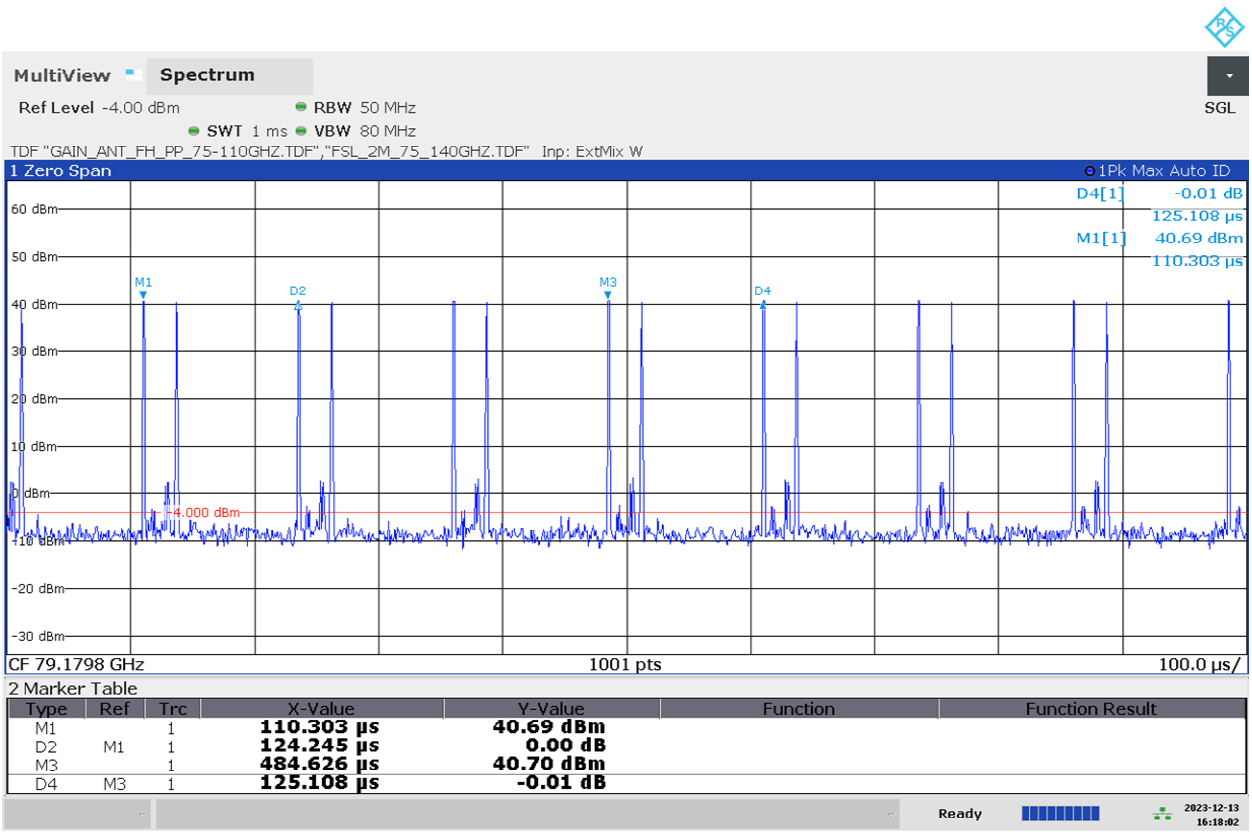
1 Measurement diagrams

1.1 EUT Cycle Time (iSDR-H_DN190):

D500_EUT_Cycle_Time_125µs_iSDR-H_DN190_WR

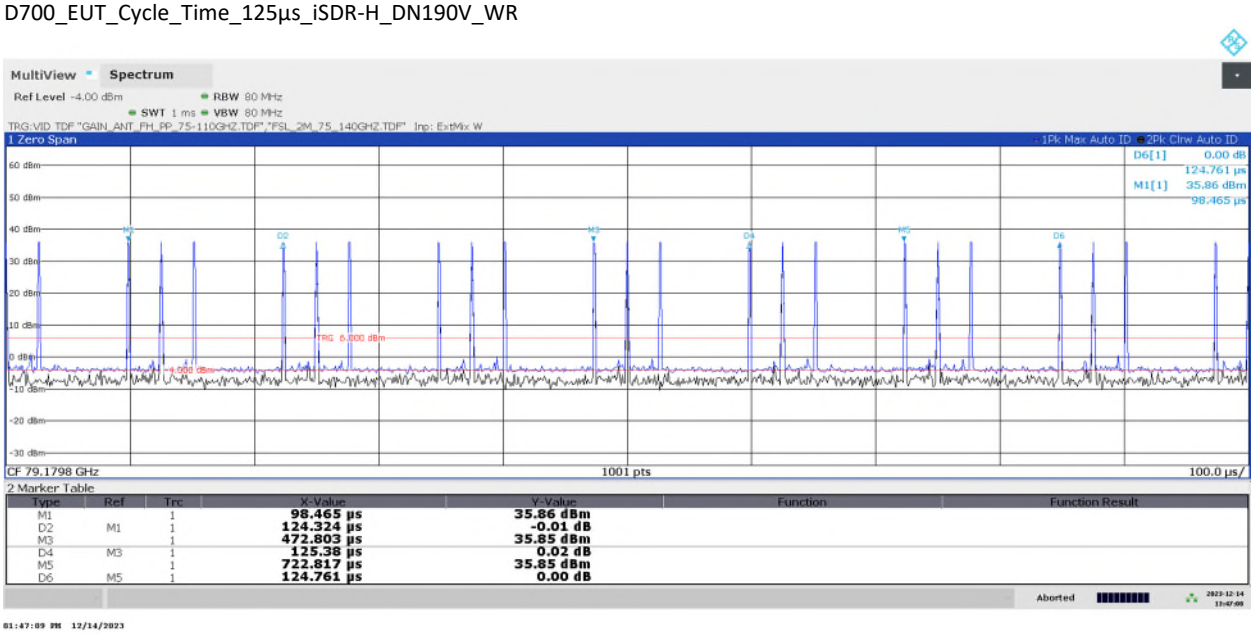


04:18:03 PM 12/13/2023

Note: EUT Cycle Time: 125µs, EUT: DN190, Declared by Customer is 125µs (verified), Only for information, not for assessment.

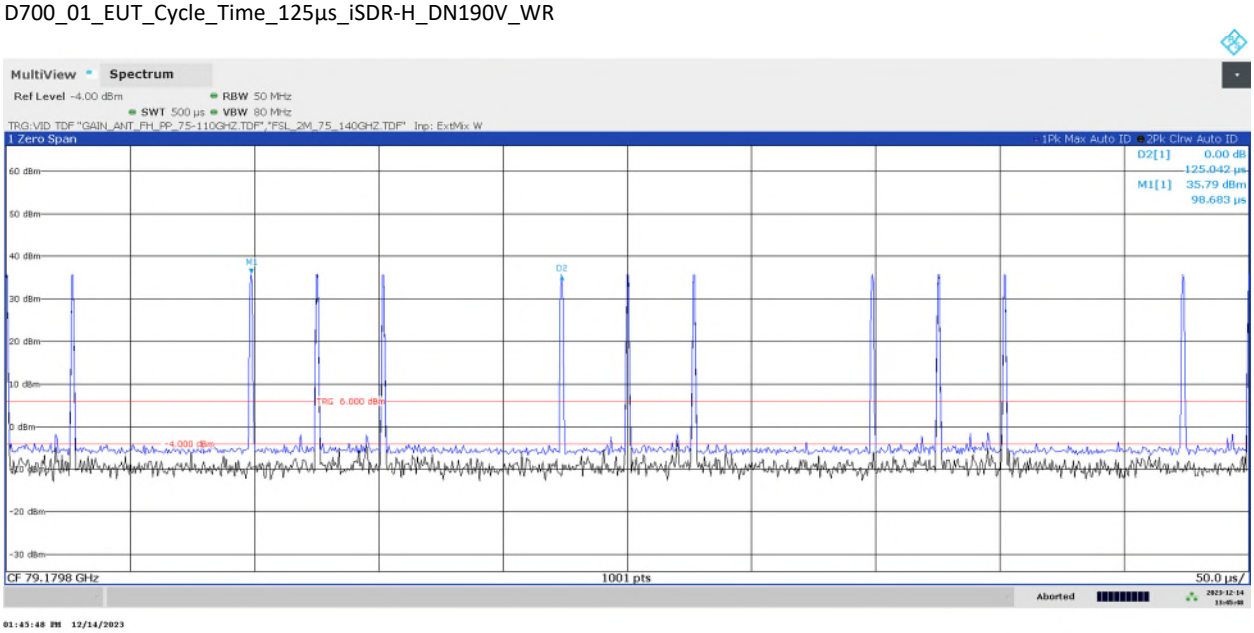
1.2 EUT Cycle Time (iSDR-H_DN190V):

D700_EUT_Cycle_Time_125µs_iSDR-H_DN190V_WR



Note: EUT Cycle Time: 125µs, EUT: DN190V, Declared by Customer is 125µs (verified), Only for information, not for assessment.

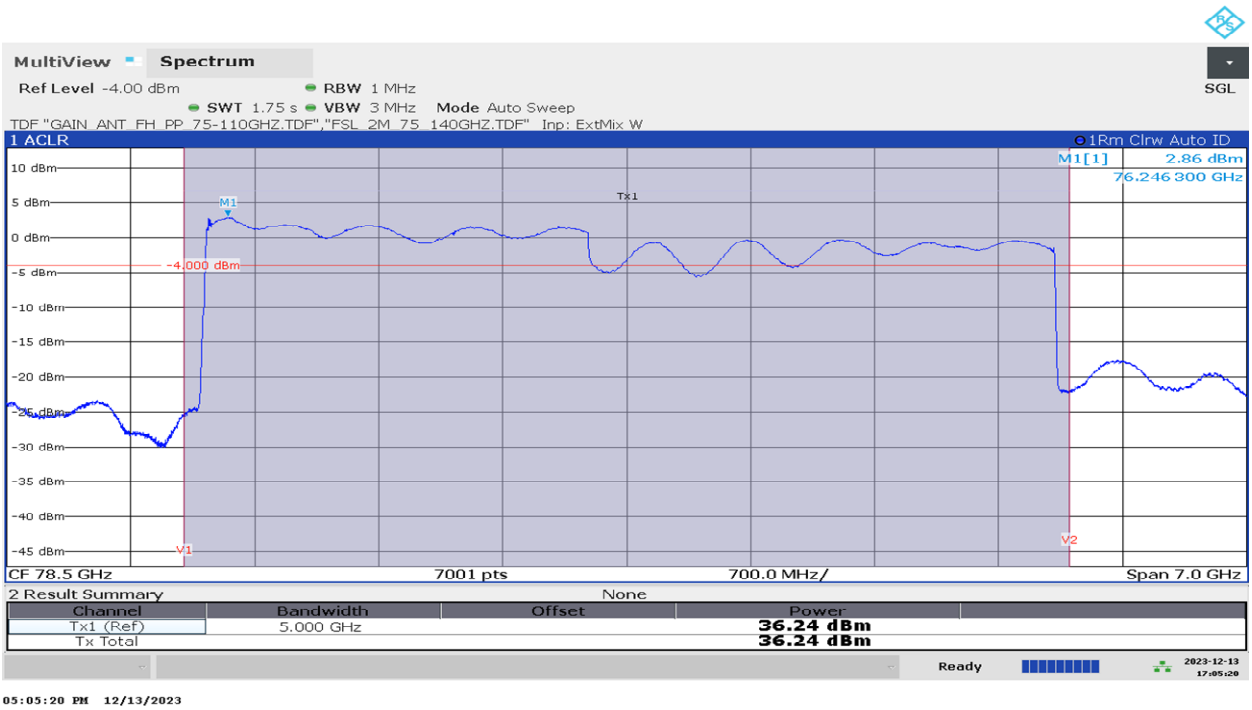
D700_01_EUT_Cycle_Time_125µs_iSDR-H_DN190V_WR



Note: EUT Cycle Time: 125µs, EUT: DN190V, Declared by Customer is 125µs (verified), Only for information, not for assessment.

1.3 Mean / Channel Power (iSDR-H_DN190):

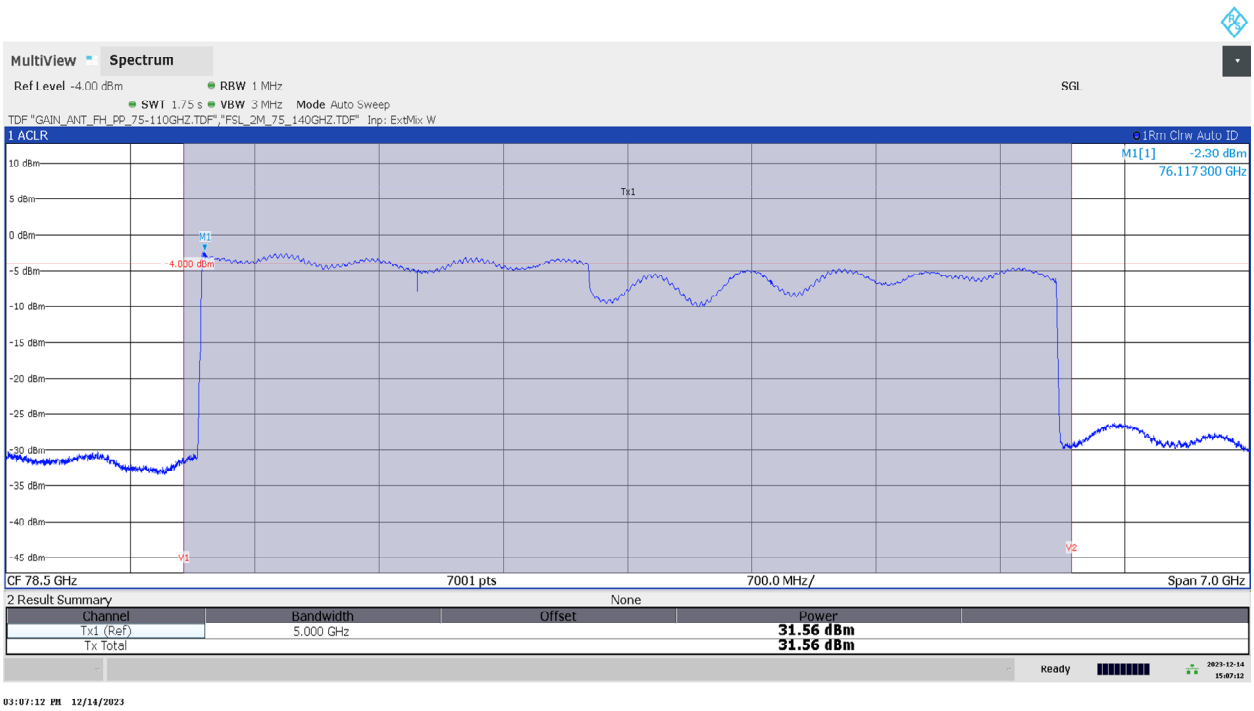
D509_Channel_Power_RMS_36.24dBm



Note: Total Channel Power is 36.24dBm, Limit line: 50dBm, Result: Passed.

1.4 Mean / Channel Power (iSDR-H_DN190V):

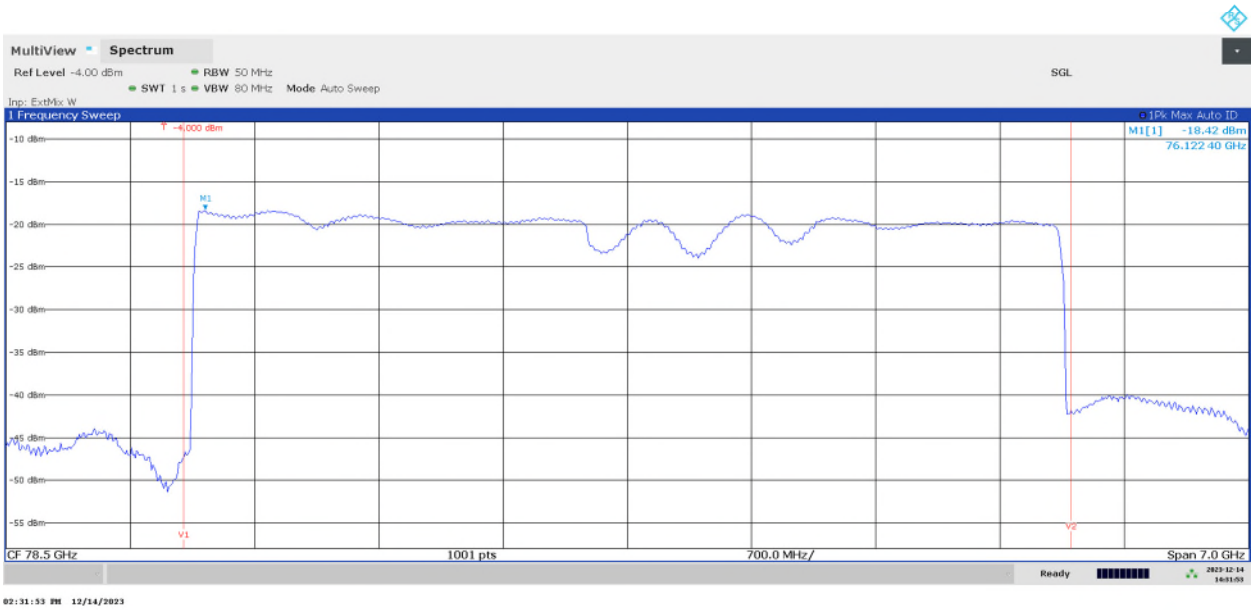
D712_Channel_Power_RMS_31.56dBm



Note: Total Channel Power is 31.56dBm, Limit line: 50dBm, Result: Passed.

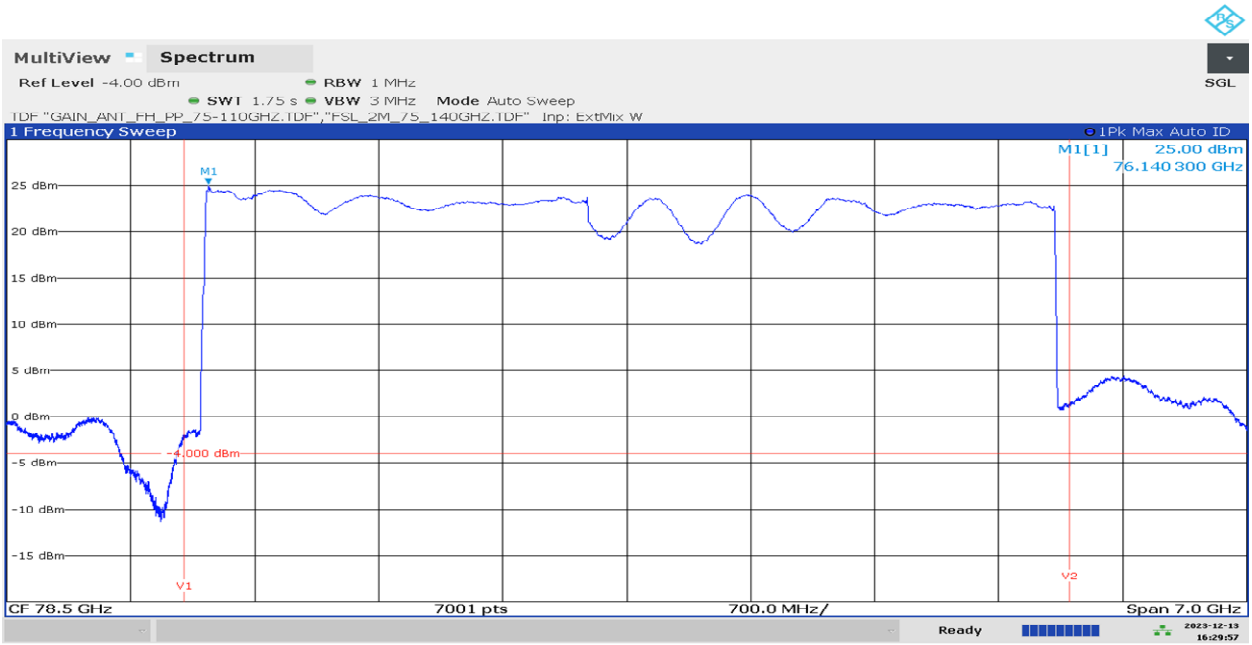
1.5 **Peak Power** (iSDR-H_DN190):

D705_01_Peak_EIRP_to_verify_ref_level_FSW



Note: FSW Ref Level has been verified.

D501_Check_Desensitization_RBW_1MHz_25dBm_iSDR-H_**DN190**



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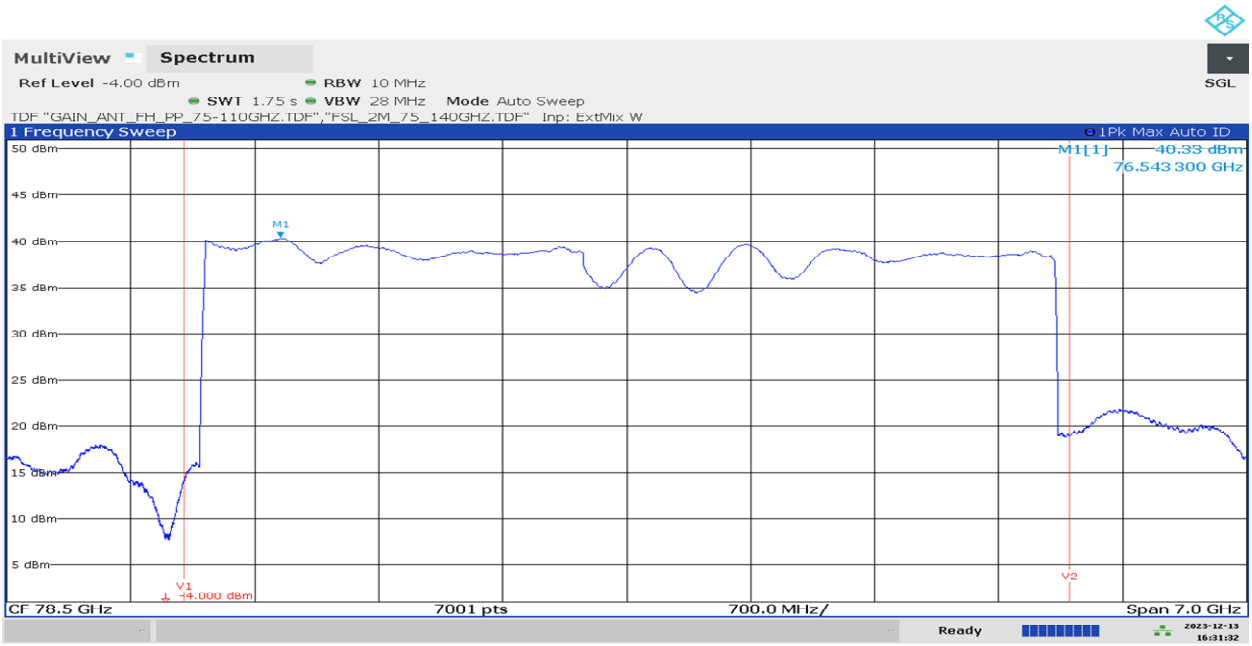
Note: Different RBW has been used to avoid desesitization factor, RBW=1MHz, only for information.

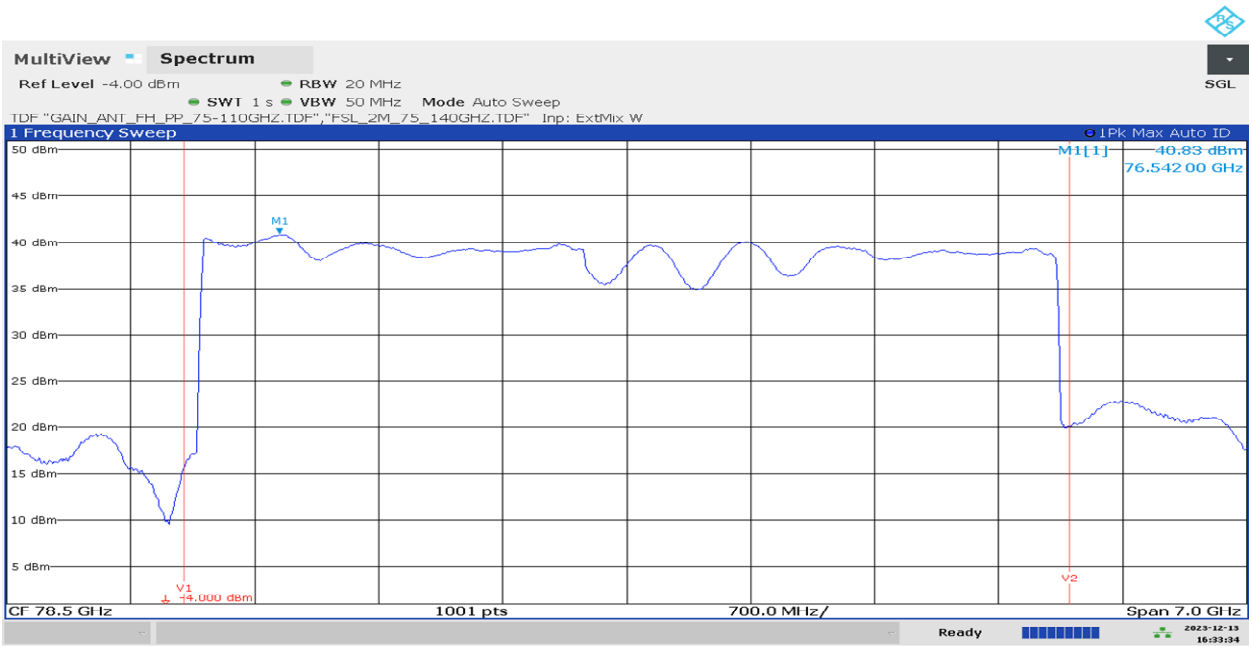
D502_Check_Desensitization_RBW_10MHz_40.33dBm_iSDR-H_**DN190**



04:31:32 PM 12/13/2023

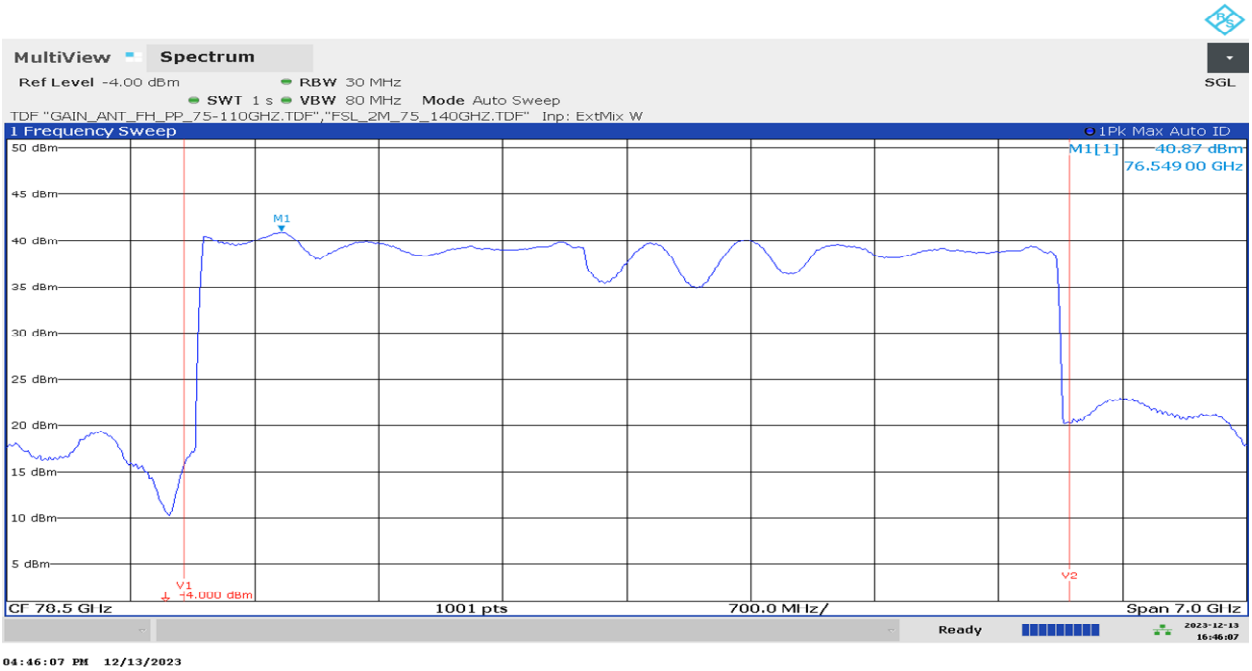
Note: Different RBW has been used to avoid desesitization factor, RBW=10MHz, only for information.

D503_Check_Desensitization_RBW_20MHz_40.83dBm_iSDR-H_**DN190**



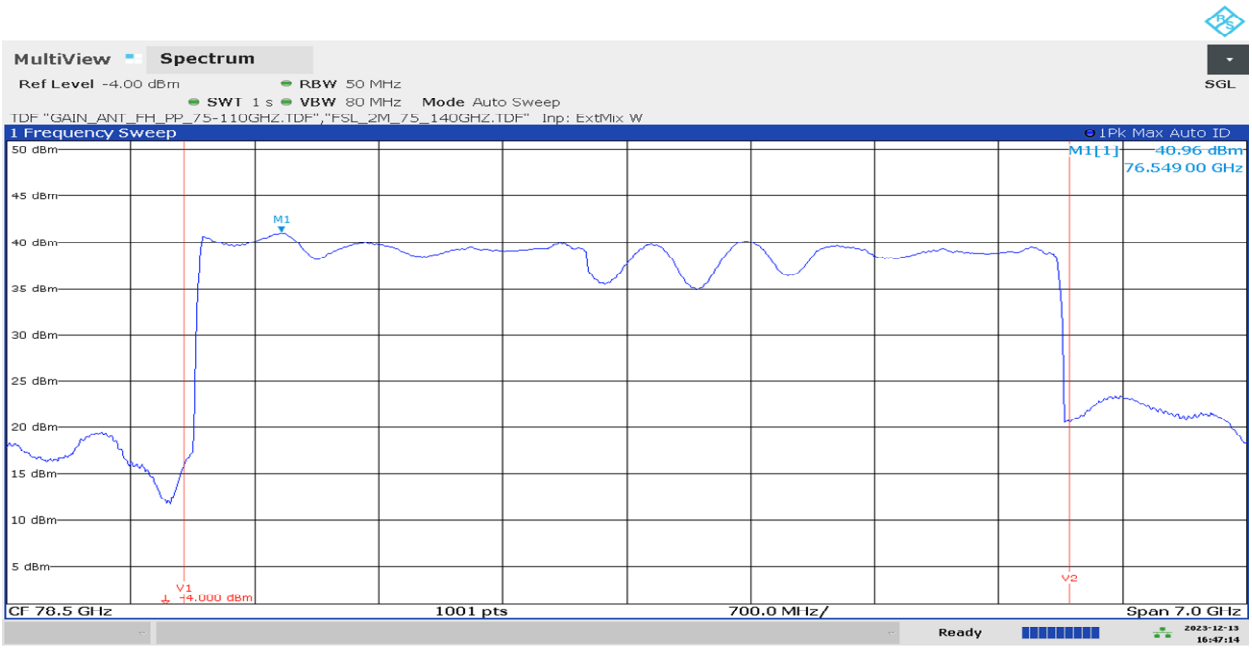
Note: Different RBW has been used to avoid desesitization factor, RBW=20MHz, only for information.

D504_Check_Desensitization_RBW_30MHz_40.87dBm_iSDR-H_**DN190**



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

D505_Check_Desensitization_RBW_50MHz_40.96dBm_iSDR-H_**DN190**



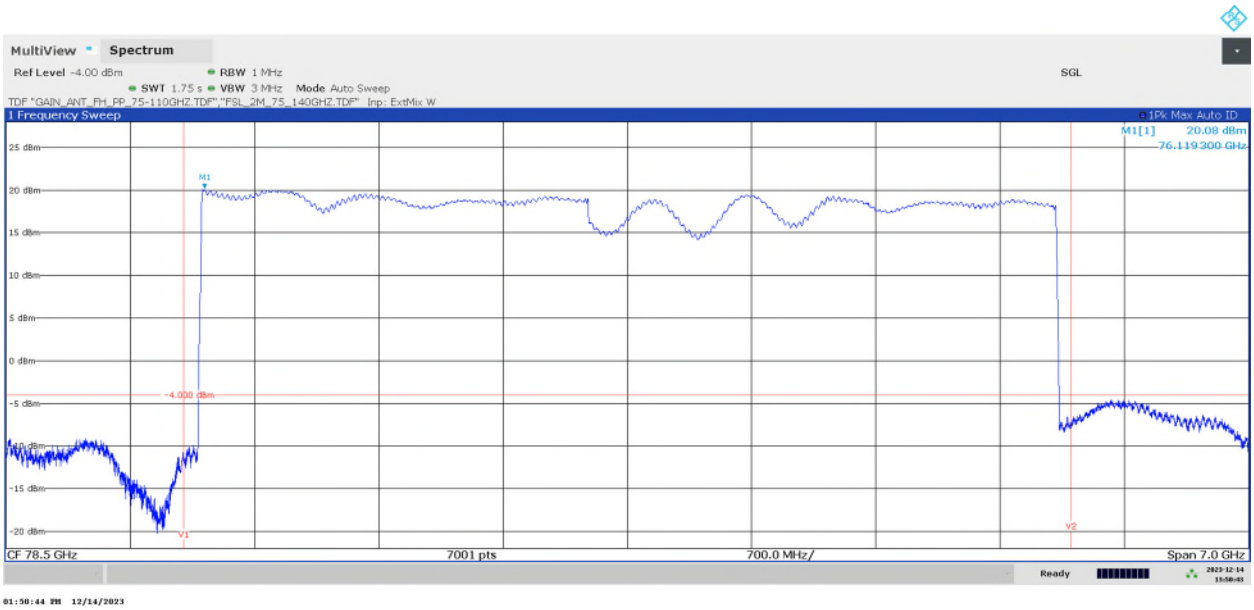
Note: Different RBW has been used to avoid desesitization factor, RBW=50MHz.

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

EUT Maximum Peak EIRP = 40.96dBm, Limit Line: 55dBm, Result: Passed.

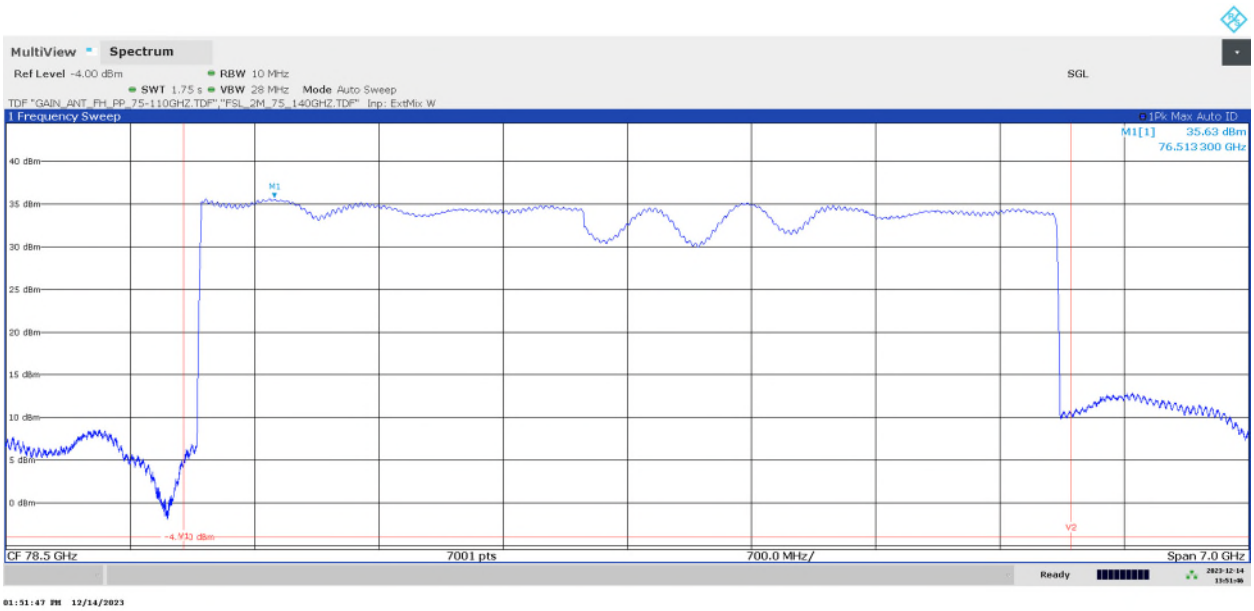
1.6 **Peak Power** (iSDR-H_DN190V):

D701_Check_Desensitization_RBW_1MHz_20.08dBm_iSDR-H_**DN190V**



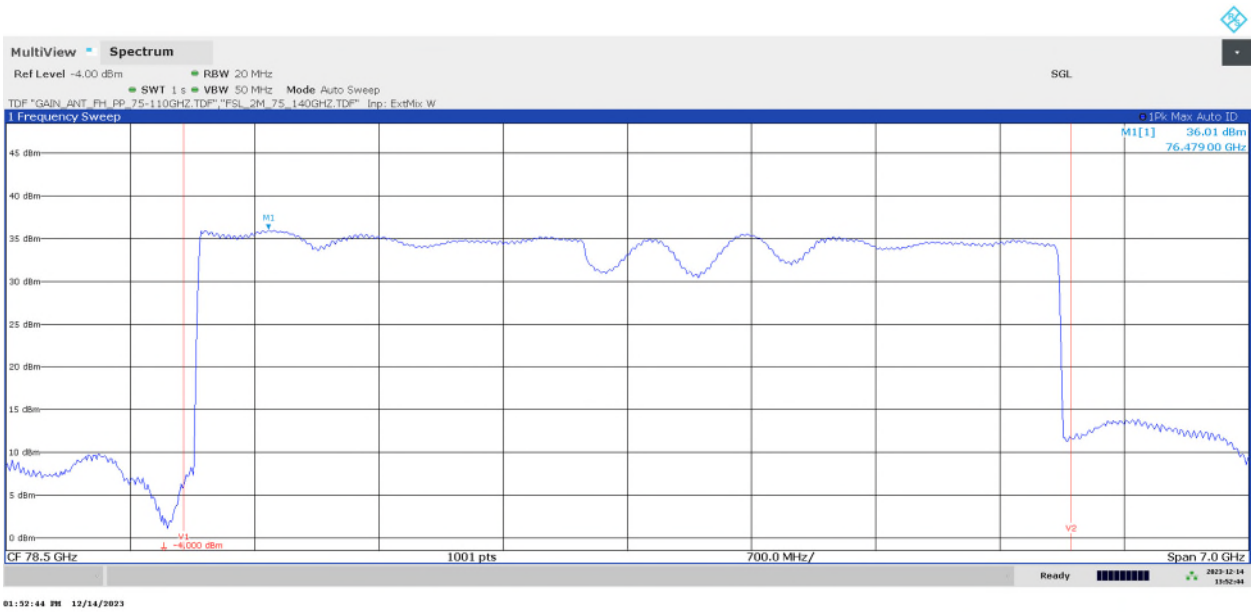
Note: Different RBW has been used to avoid desesitization factor, RBW=1MHz, only for information.

D702_Check_Desensitization_RBW_10MHz_35.63dBm_**DN190V**



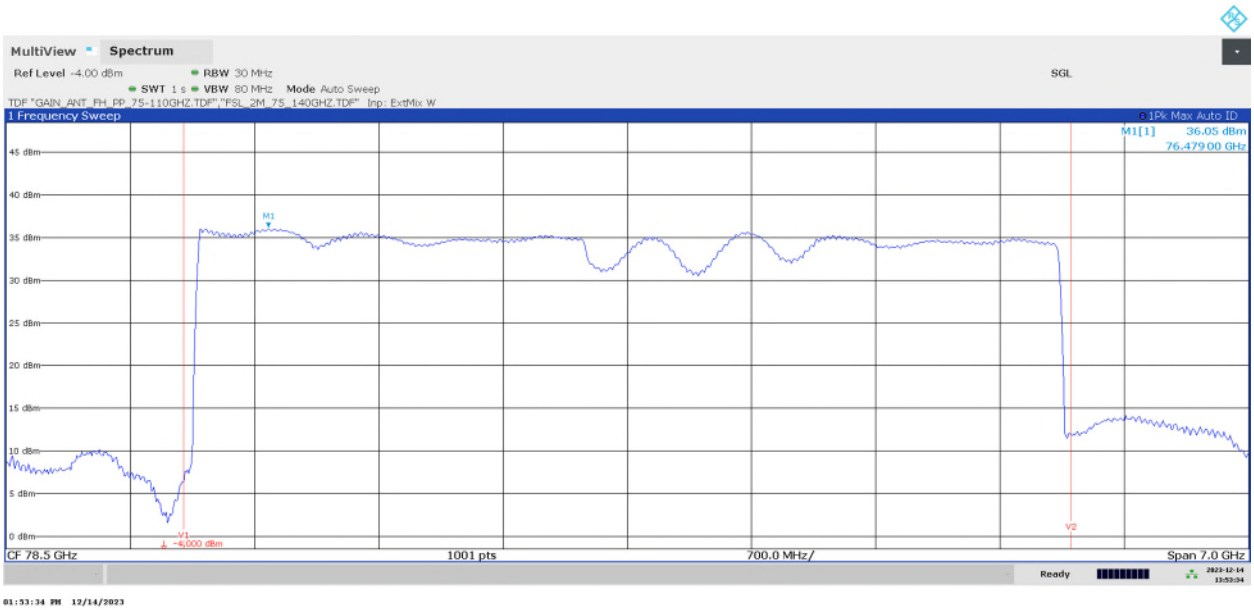
Note: Different RBW has been used to avoid desesitization factor, RBW=10MHz, only for information.

D703_Check_Desensitization_RBW_20MHz_36.01dBm_**DN190V**



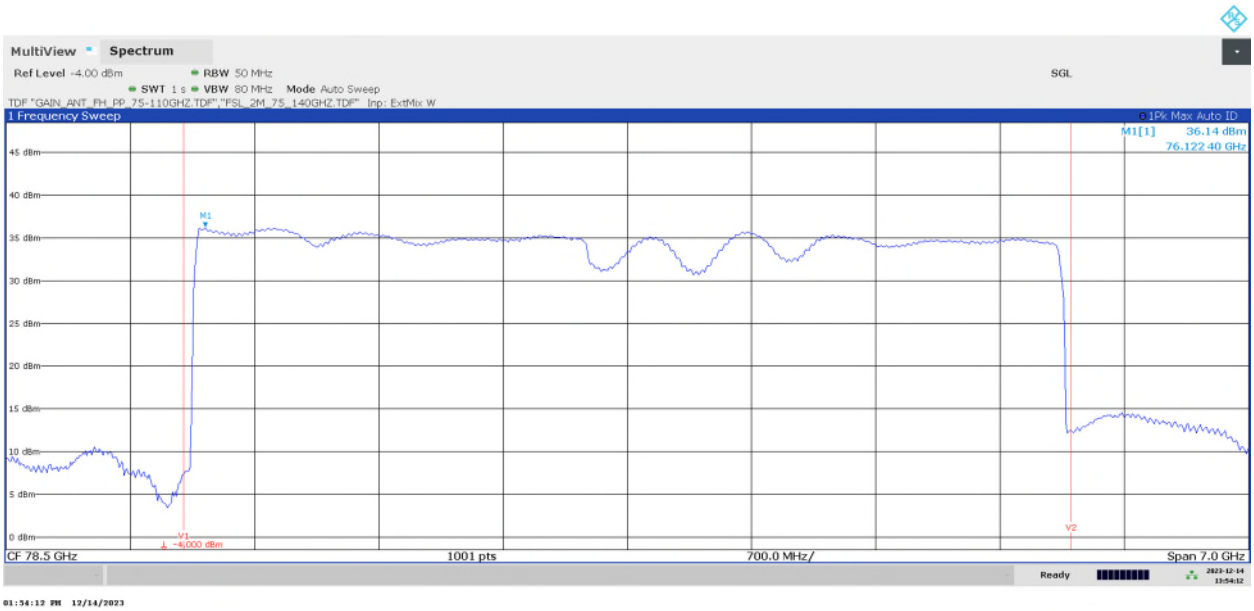
Note: Different RBW has been used to avoid desesitization factor, RBW=20MHz, only for information.

D704_Check_Desensitization_RBW_30MHz_36.05dBm_**DN190V**



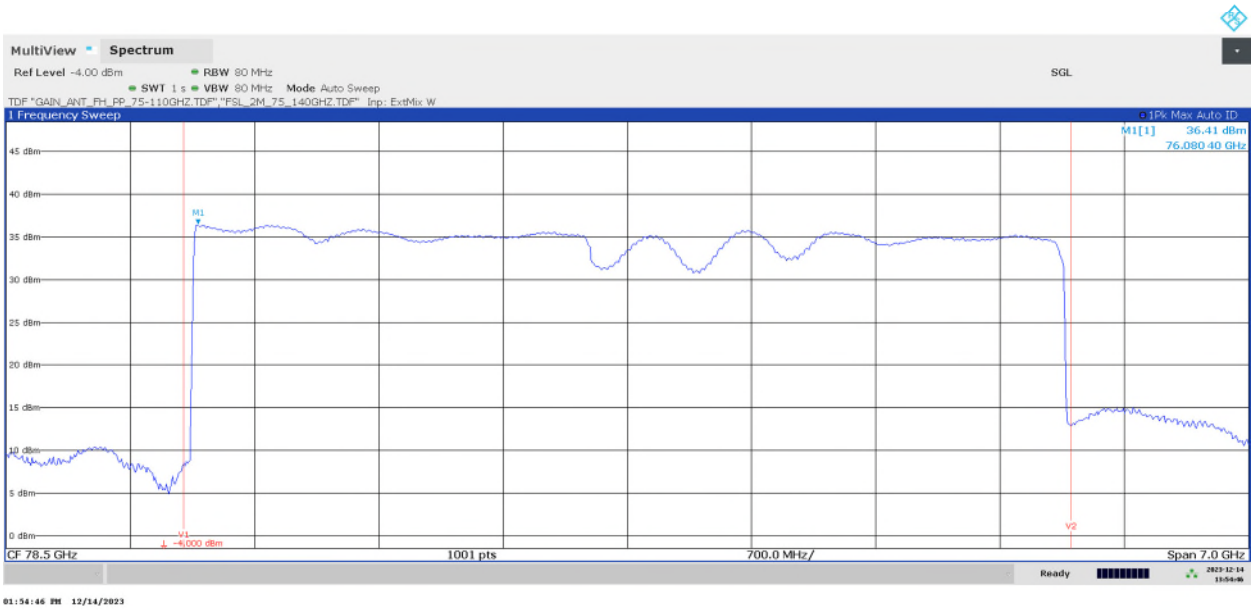
Note: Different RBW has been used to avoid desesitization factor, RBW=30MHz, only for information.

D705_Check_Desensitization_RBW_50MHz_36.14dBm_**DN190V**



Note: Different RBW has been used to avoid desesitization factor, RBW=50MHz.
RBW 50MHz has been chosen to perform EUT maximum Peak EIRP to avoid desensitization factor.
EUT Maximum Peak EIRP = 36.14dBm, Limit Line: 55dBm, Result: Passed.

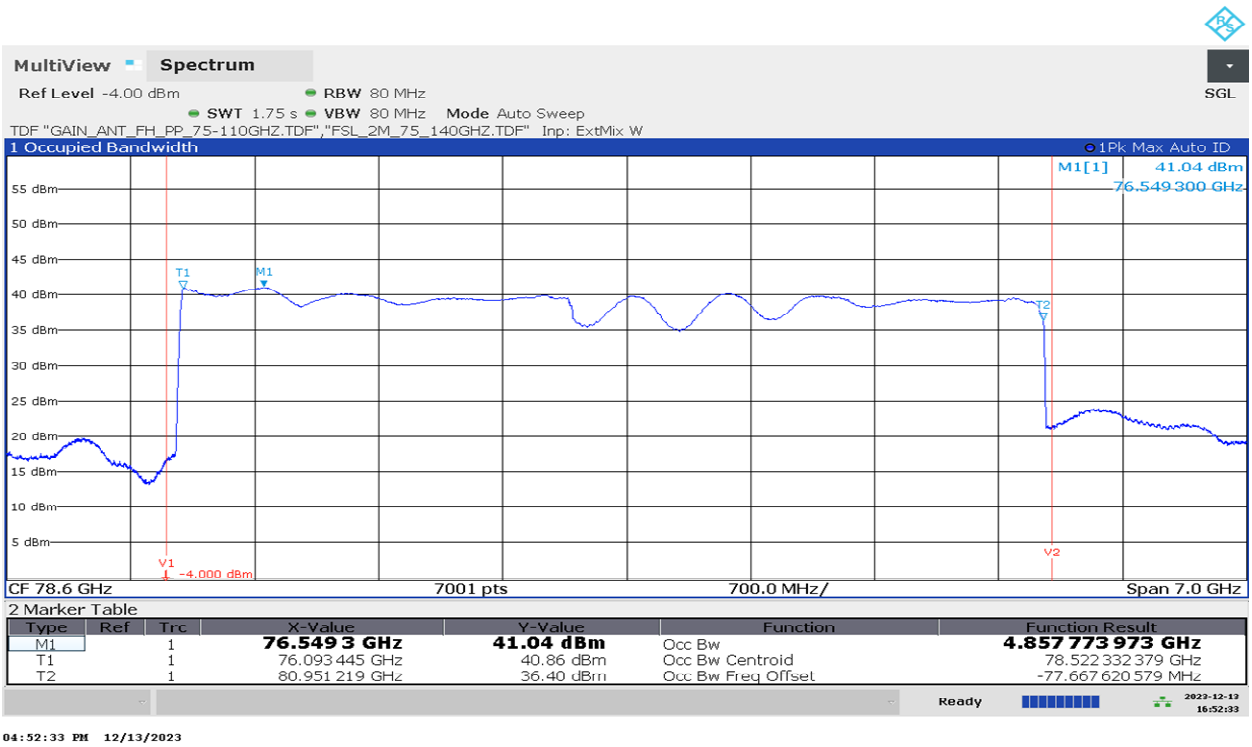
D706_Check_Desensitization_RBW_80MHz_36.41dBm_**DN190V**



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

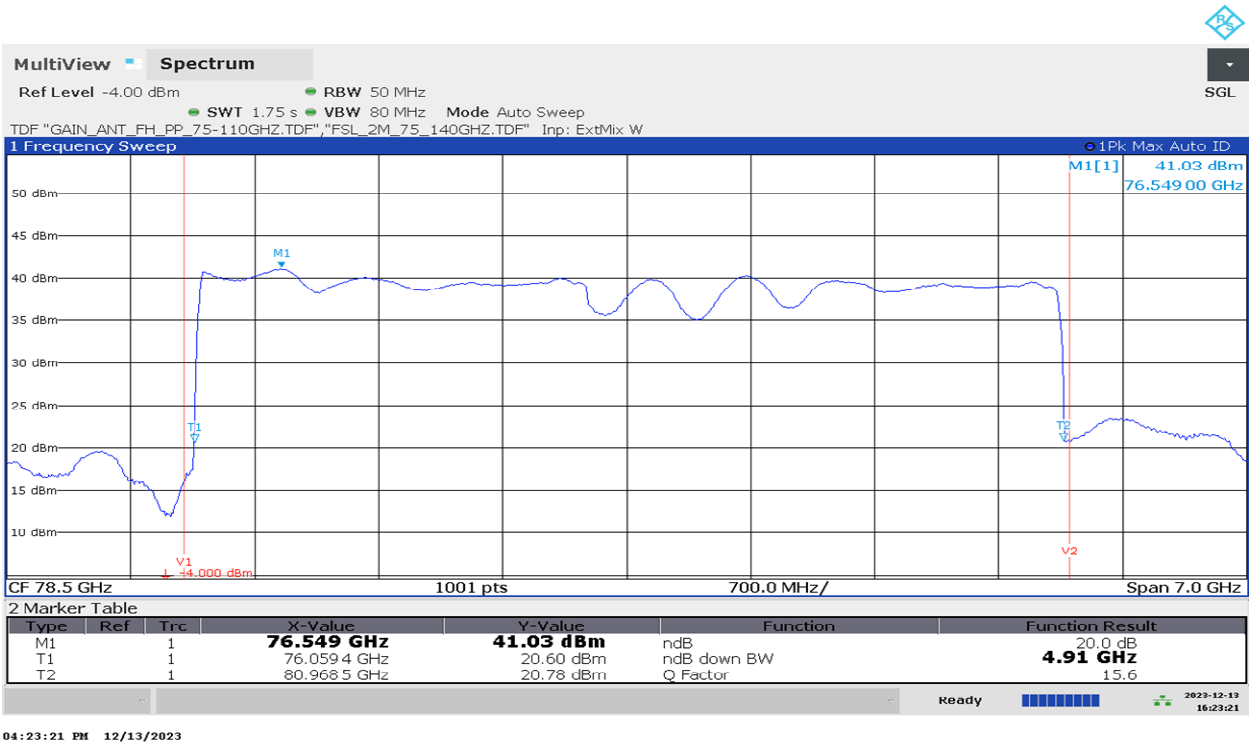
1.7 Operating Frequency Range (iSDR-H_DN190):

D507_99%OBW_4.86GHz_RBW_80MHz



Note: fL/T1=76.093445GHz, fH/T2=80.951219GHz, Limit Line: 76G – 81GHz, Result: Passed.

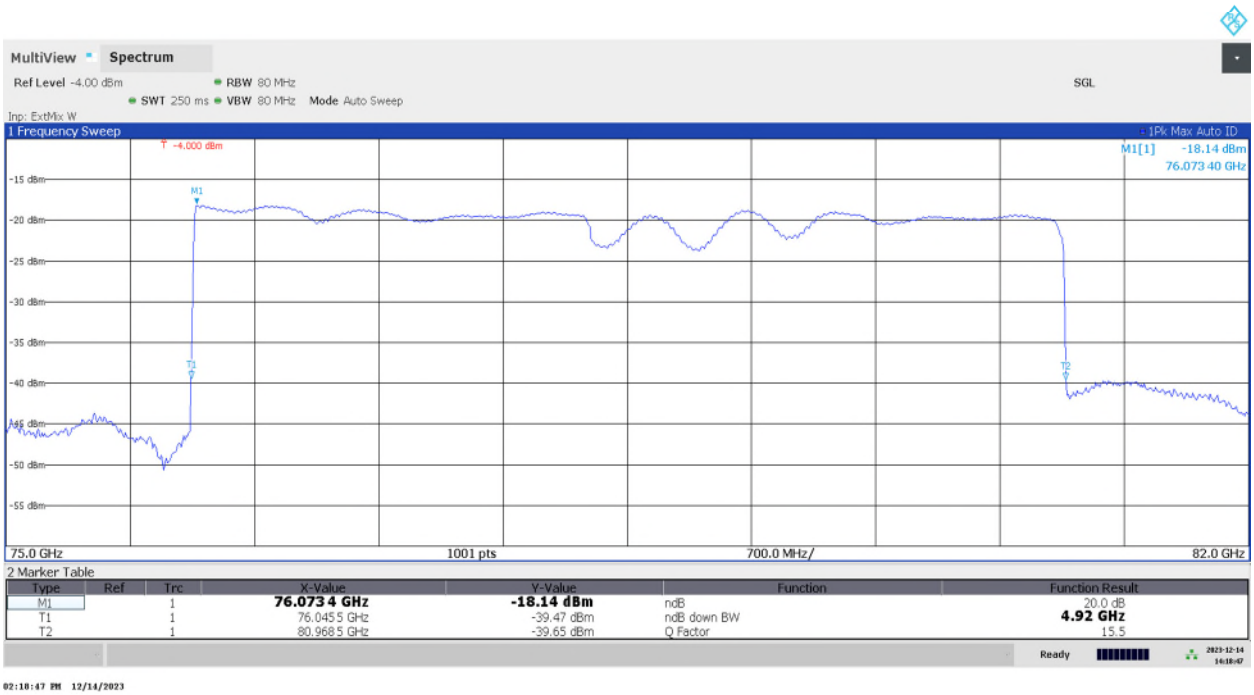
D511_20dB_OBW_4.91GHz_RBW_50MHz



Note: fL/T1=76.0594GHz, fH/T2=80.9685GHz, Limit Line: 76G – 81GHz, only for information.

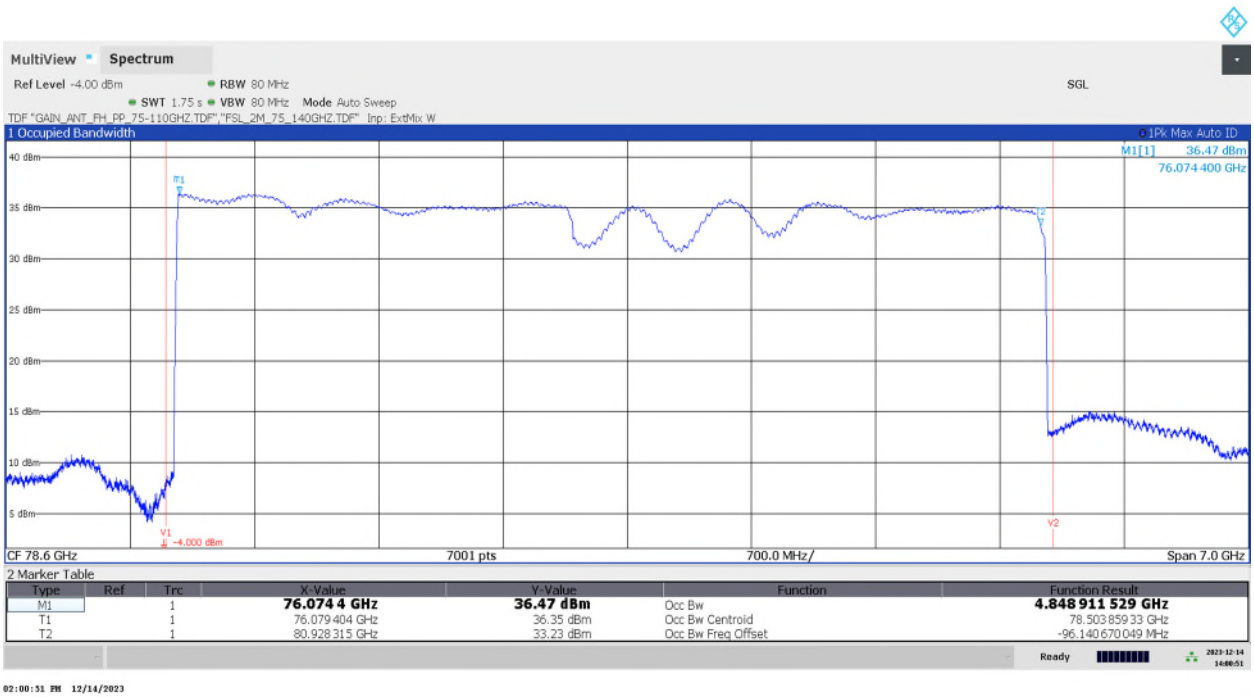
1.8 Operating Frequency Range (iSDR-H_DN190V):

D711_02_20dB_OBW_4.92GHz_RBW_80MHz_to_verify_ref_level_FSW



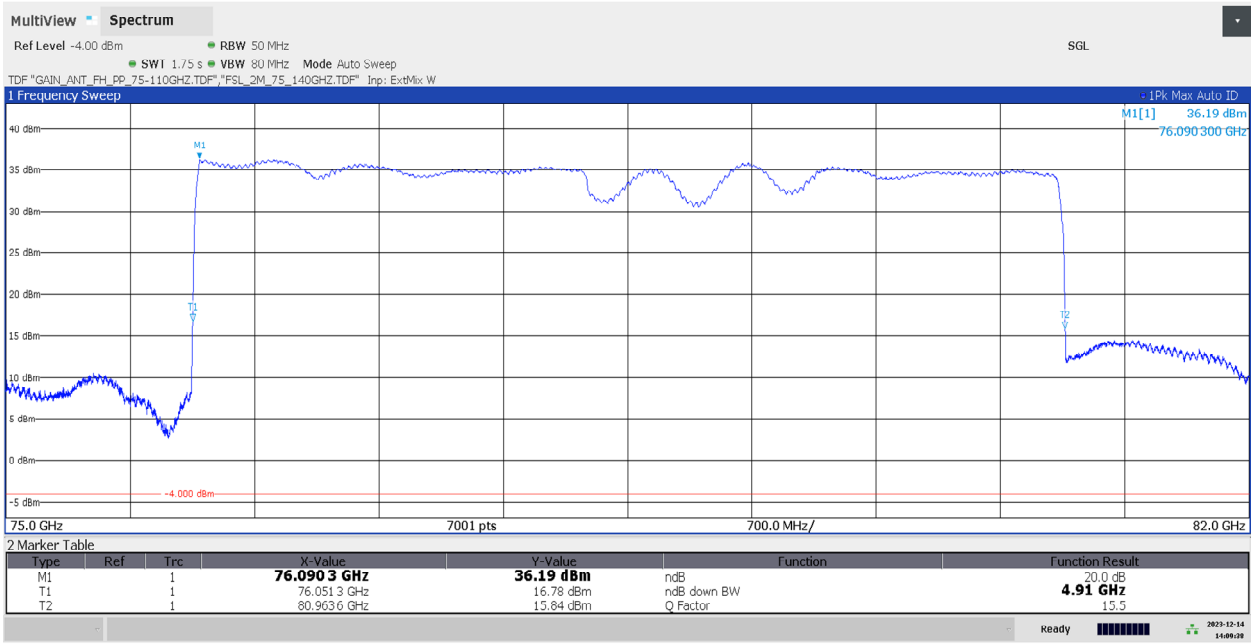
Note: FSW ref level verified, only for information not for assessment.

D709_99%OBW_4.85GHz_RBW_80MHz



Note: fL/T1=76.079404GHz, fH/T2=80.928315GHz, Limit Line: 76G – 81GHz, Result: Passed.

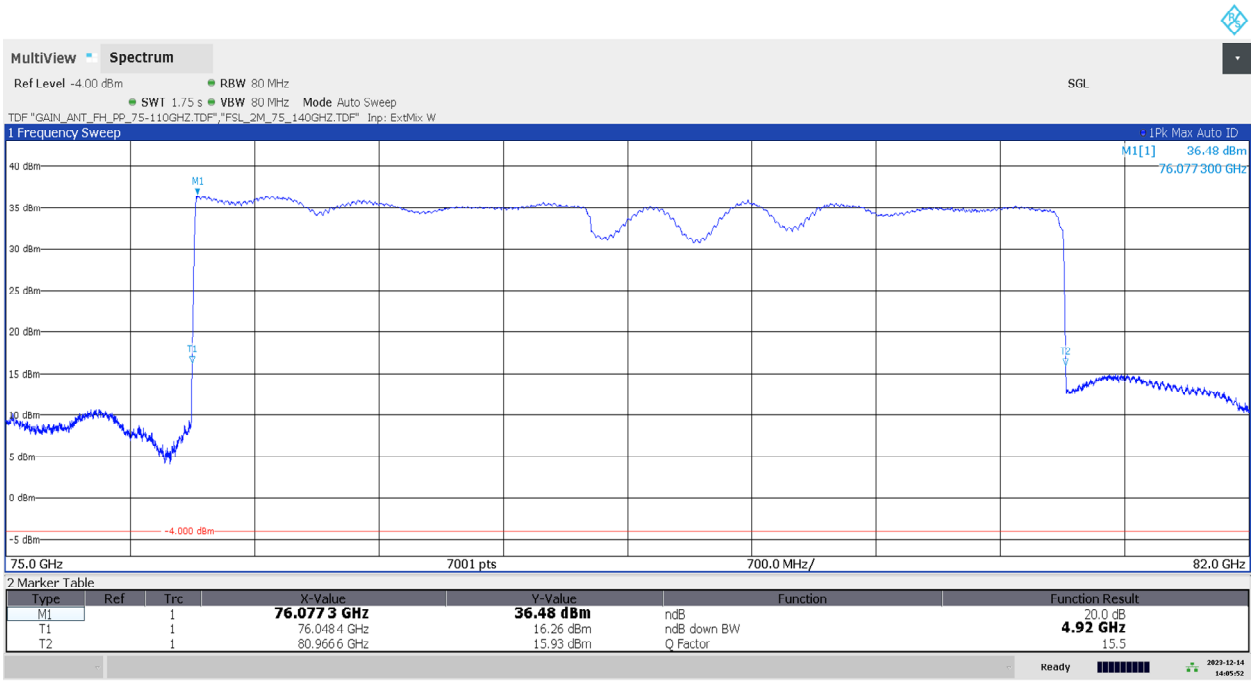
D710_20dB_OBW_4.91GHz_RBW_50MHz



02:09:38 PM 12/14/2023

Note: fL/T1=76.0513GHz, fH/T2=80.9636GHz, Limit Line: 76G – 81GHz, only for information.

D711_20dB_OBW_4.92GHz_RBW_80MHz



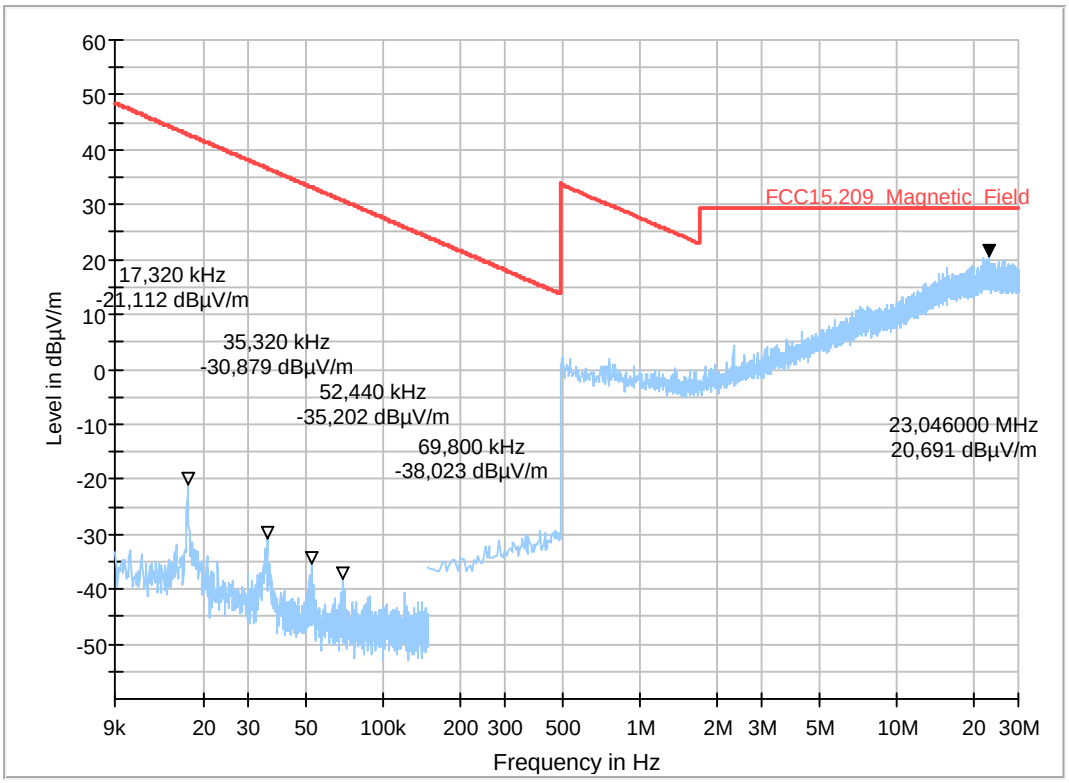
02:05:52 PM 12/14/2023

Note: fL/T1=76.0484GHz, fH/T2=80.9666GHz, Limit Line: 76G – 81GHz, only for information.

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

D513_MgFeld_9k_30M

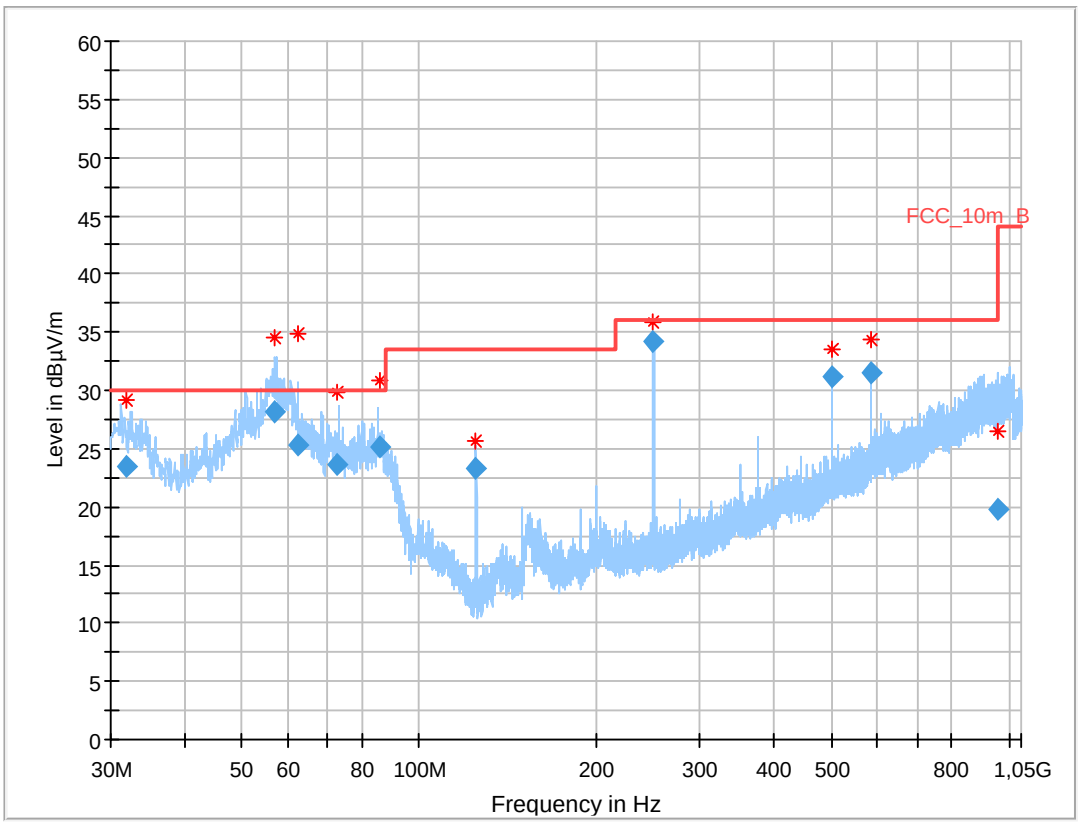
Full Spectrum



6513_01_04_L_EC_SB

Common Information

EUT:	radar iSDR-H
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)
31.800	23.53	30.0	6.5	1000	120.0	106.0	V	-3	13
56.707	28.14	30.0	1.9	1000	120.0	255.0	V	-3	16
62.485	25.35	30.0	4.7	1000	120.0	389.0	V	64	13
72.488	23.69	30.0	6.3	1000	120.0	287.0	V	135	10
85.558	25.07	30.0	4.9	1000	120.0	136.0	V	119	10
124.998	23.33	33.5	10.2	1000	120.0	151.0	V	348	10
249.987	34.18	36.0	1.8	1000	120.0	103.0	V	164	14
499.992	31.13	36.0	4.9	1000	120.0	191.0	H	70	20
585.941	31.57	36.0	4.4	1000	120.0	315.0	V	-43	21
956.516	19.71	36.0	16.3	1000	120.0	200.0	H	45	25

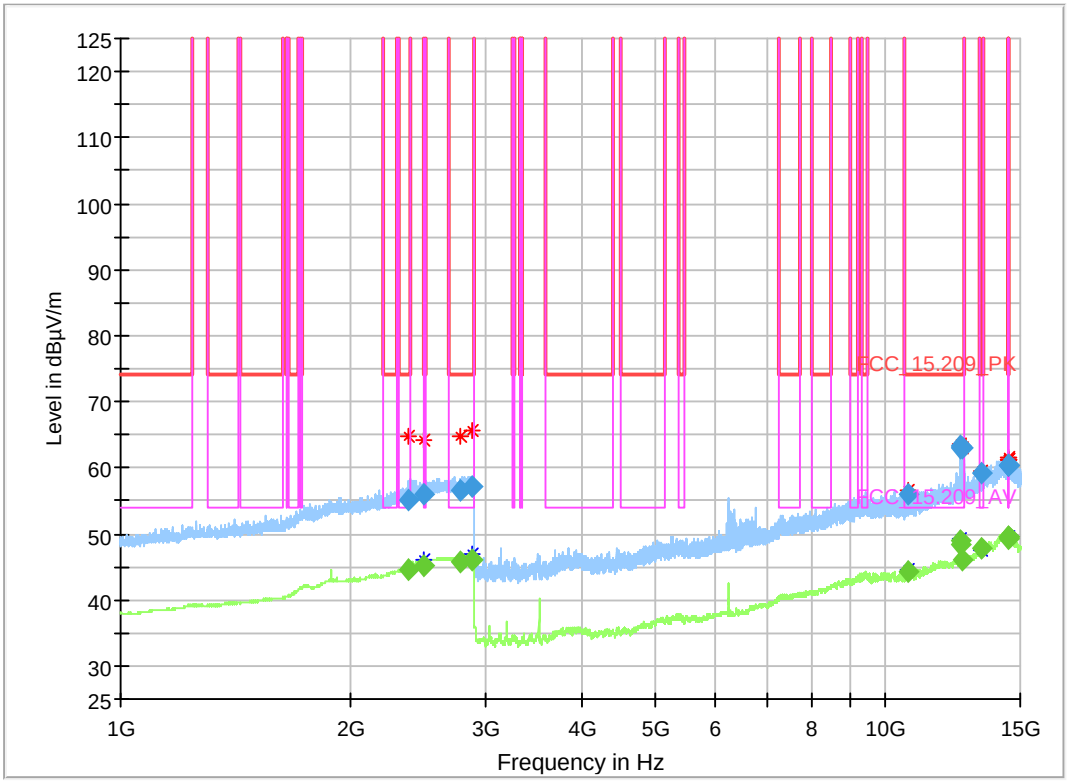
Hardware Setup: EMI radiated\VULP_10_m - [EMI radiated]

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

D515_1G_15GHz



Final_Result_PK+

Frequency (MHz)	Bandwidth (kHz)	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)	Preamp (dB)	Trd Corr. (dB/	Raw Rec (dBµV)	Comment
2373.460000	1000.000	30.0	0.0	33.4	0.0	28.6	21.8	12:52:00 PM - 08-Jan-24
2488.710000	1000.000	142.0	0.0	33.7	0.0	28.7	22.3	12:53:25 PM - 08-Jan-24
2785.493333	1000.000	53.0	0.0	34.7	0.0	29.3	21.8	12:49:25 PM - 08-Jan-24
2875.463250	1000.000	105.0	0.0	34.9	0.0	29.5	22.3	12:50:38 PM - 08-Jan-24
10722.975000	1000.000	326.0	0.0	7.8	0.0	38.1	48.1	1:21:21 PM - 08-Jan-24
12500.172917	1000.000	98.0	0.0	10.2	0.0	38.3	53.1	1:12:57 PM - 08-Jan-24
12500.775417	1000.000	97.0	0.0	10.2	0.0	38.3	52.9	1:14:18 PM - 08-Jan-24

12619.788750	1000.000	99.0	0.0	10.6	0.0	38.5	52.6	1:15:39 PM - 08-Jan-24
13379.653333	1000.000	259.0	0.0	12.0	0.0	40.1	47.3	1:17:22 PM - 08-Jan-24
14473.134167	1000.000	322.0	0.0	12.6	0.0	41.4	47.9	1:24:08 PM - 08-Jan-24
14484.809167	1000.000	329.0	0.0	12.6	0.0	41.3	47.9	1:22:44 PM - 08-Jan-24
14496.724167	1000.000	-20.0	0.0	12.6	0.0	41.3	47.8	1:19:21 PM - 08-Jan-24

Final_Result_RMS

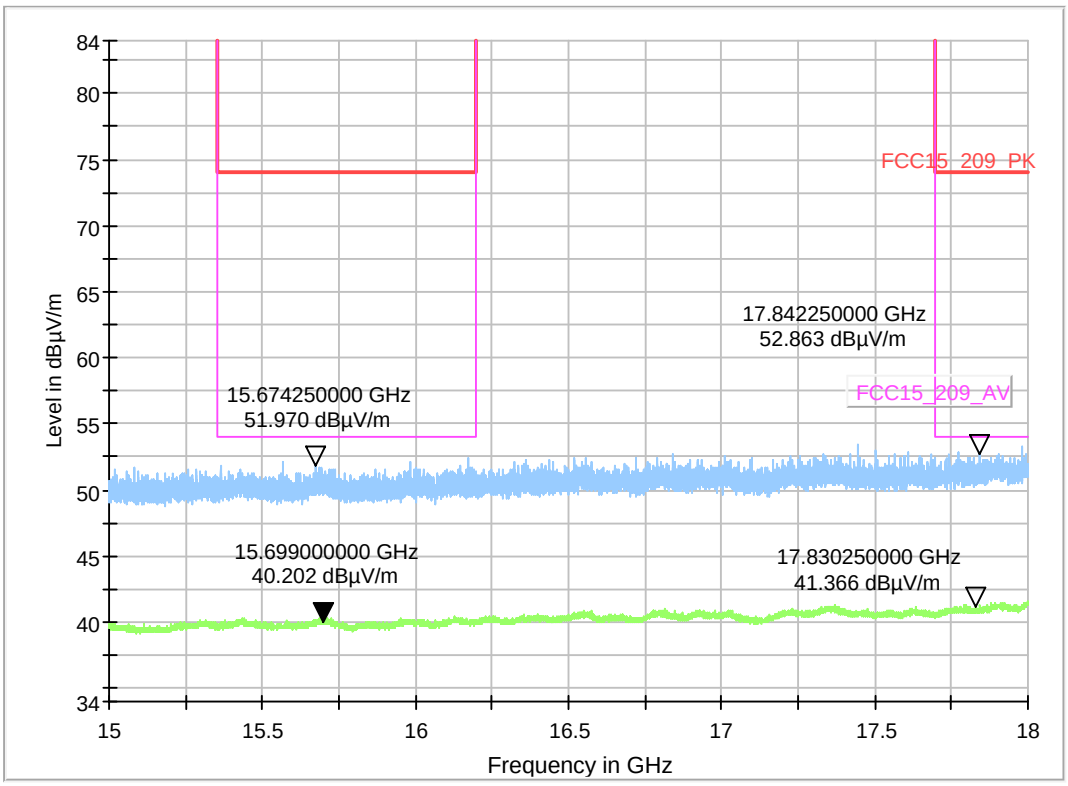
Frequency (MHz)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2373.460000	44.54	54.00	9.46	1000.000	155.0	V	30.0	0.0	33.4
2488.710000	45.16	54.00	8.84	1000.000	155.0	V	142.0	0.0	33.7
2785.493333	45.80	54.00	8.20	1000.000	155.0	H	53.0	0.0	34.7
2875.463250	46.04	54.00	7.96	1000.000	155.0	H	105.0	0.0	34.9
10722.975000	44.32	54.00	9.68	1000.000	155.0	V	326.0	0.0	7.8
12500.172917	49.07	54.00	4.93	1000.000	155.0	H	98.0	0.0	10.2
12500.775417	48.47	54.00	5.53	1000.000	155.0	H	97.0	0.0	10.2
12619.788750	46.08	54.00	7.92	1000.000	155.0	H	99.0	0.0	10.6
13379.653333	47.73	54.00	6.27	1000.000	155.0	H	259.0	0.0	12.0
14473.134167	49.33	54.00	4.67	1000.000	155.0	V	322.0	0.0	12.6
14484.809167	49.43	54.00	4.57	1000.000	155.0	V	329.0	0.0	12.6
14496.724167	49.43	54.00	4.57	1000.000	155.0	V	-20.0	0.0	12.6

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

Frequency (MHz)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBµV)	Comment
2373.460000	0.0	28.6	11.1	12:52:00 PM - 08-Jan-24
2488.710000	0.0	28.7	11.4	12:53:26 PM - 08-Jan-24
2785.493333	0.0	29.3	11.1	12:49:25 PM - 08-Jan-24
2875.463250	0.0	29.5	11.2	12:50:38 PM - 08-Jan-24
10722.975000	0.0	38.1	36.5	1:21:21 PM - 08-Jan-24
12500.172917	0.0	38.3	38.9	1:12:57 PM - 08-Jan-24
12500.775417	0.0	38.3	38.3	1:14:18 PM - 08-Jan-24
12619.788750	0.0	38.5	35.5	1:15:39 PM - 08-Jan-24
13379.653333	0.0	40.1	35.7	1:17:23 PM - 08-Jan-24
14473.134167	0.0	41.4	36.7	1:24:09 PM - 08-Jan-24
14484.809167	0.0	41.3	36.8	1:22:44 PM - 08-Jan-24
14496.724167	0.0	41.3	36.9	1:19:22 PM - 08-Jan-24

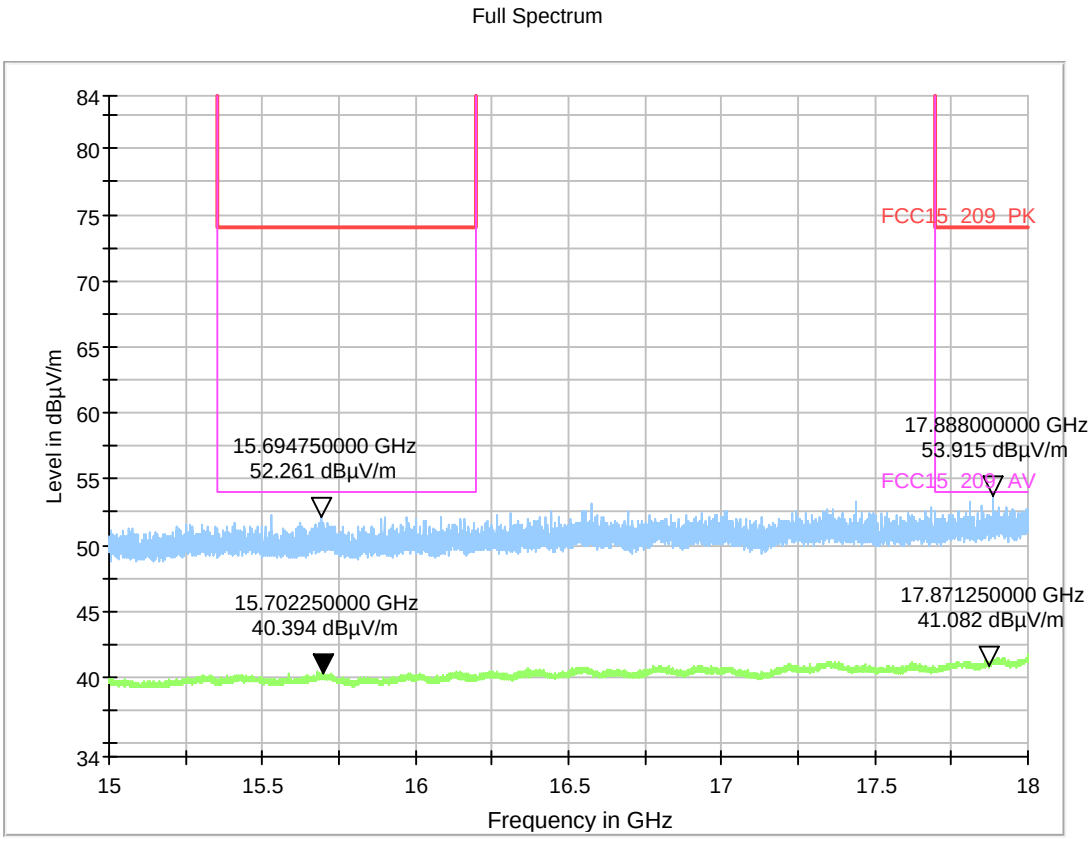
D516_15G_18GHz_Ant_V

Full Spectrum



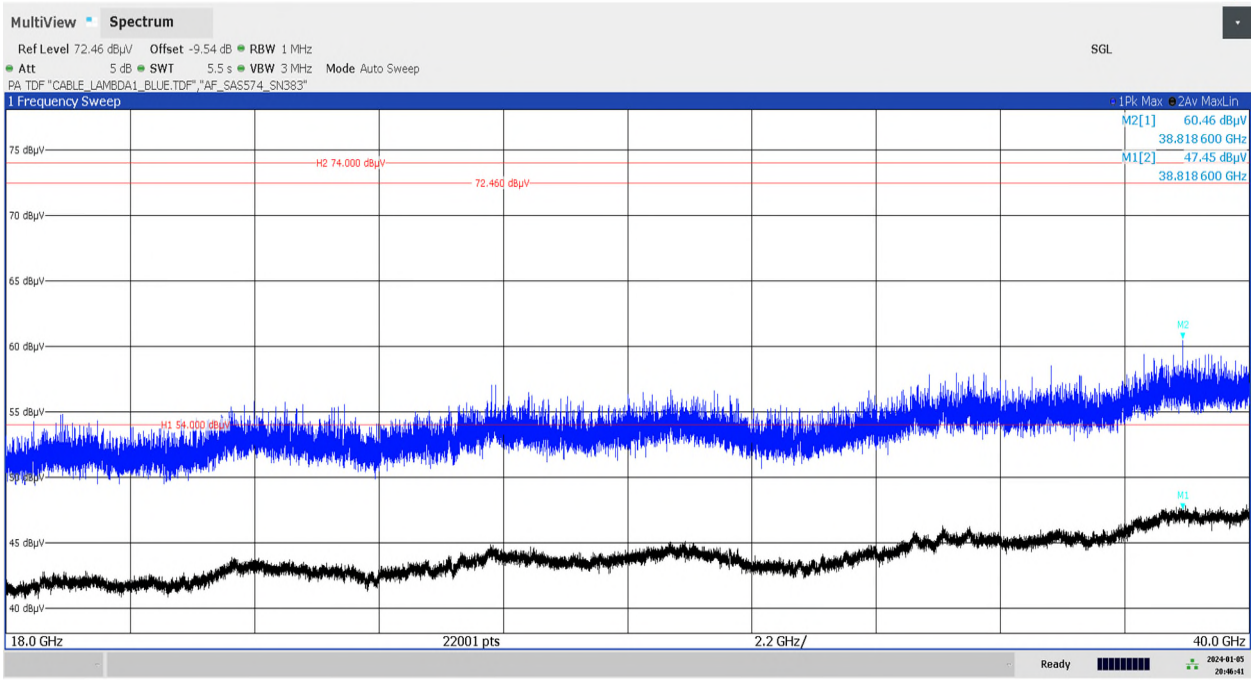
Note: No Critical Emission found. Result: Passed.

D516_01_15G_18GHz_Ant_H



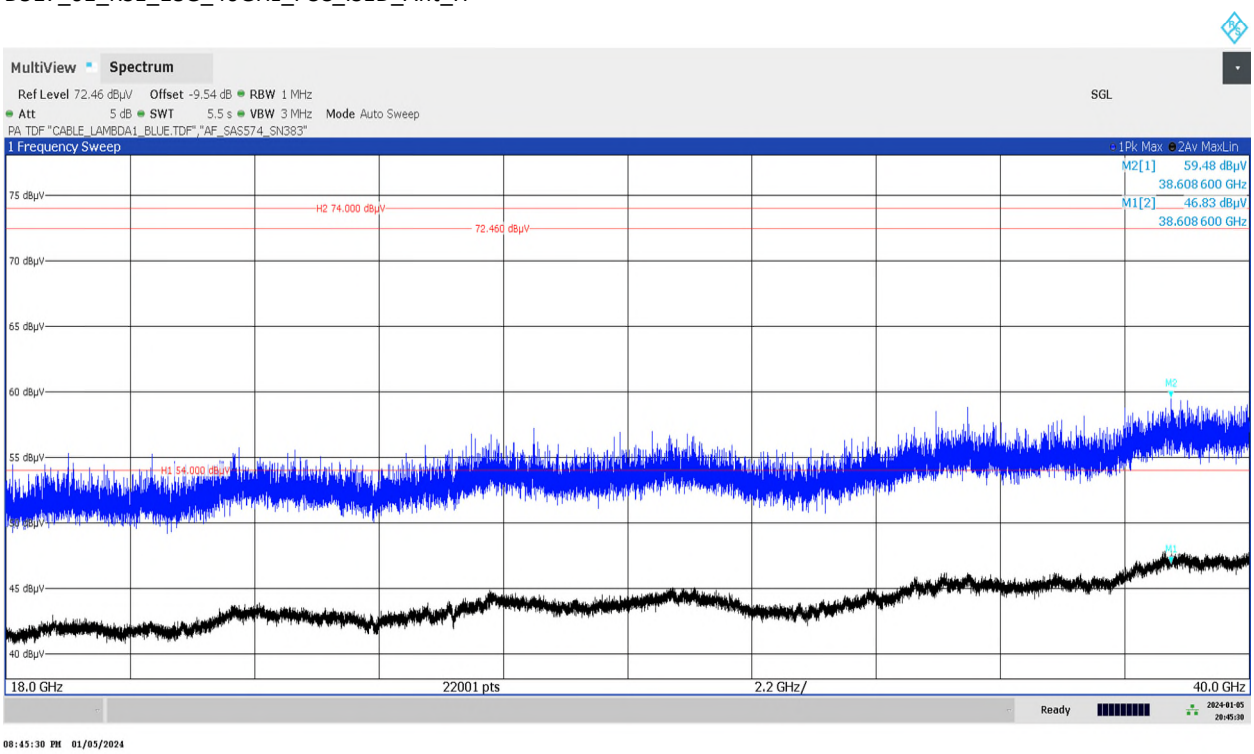
Note: No Critical Emission found. Result: Passed.

D517_RSE_18G_40GHz_FCC_ISED_Ant_V



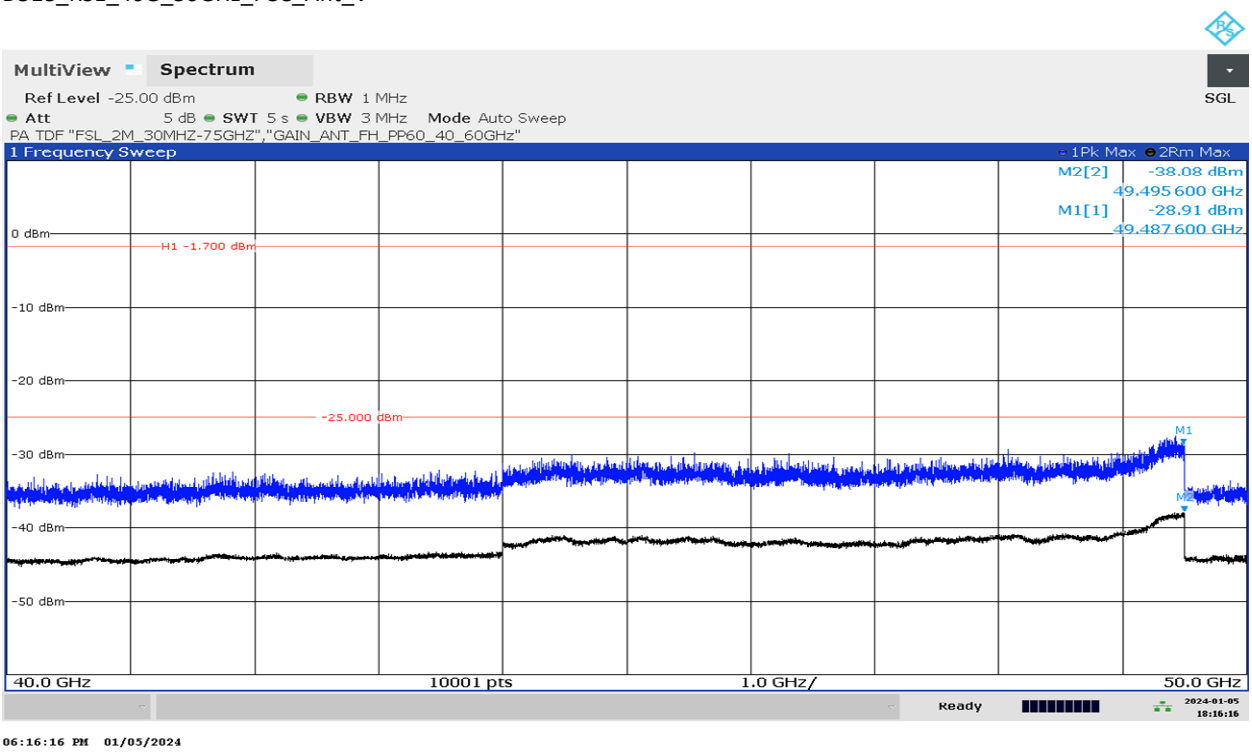
Note: No critical emission found, Limit Line: Avg=54dBµV, Peak= 74 dBµV , Result: Passed.

D517_01_RSE_18G_40GHz_FCC_ISED_Ant_H



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

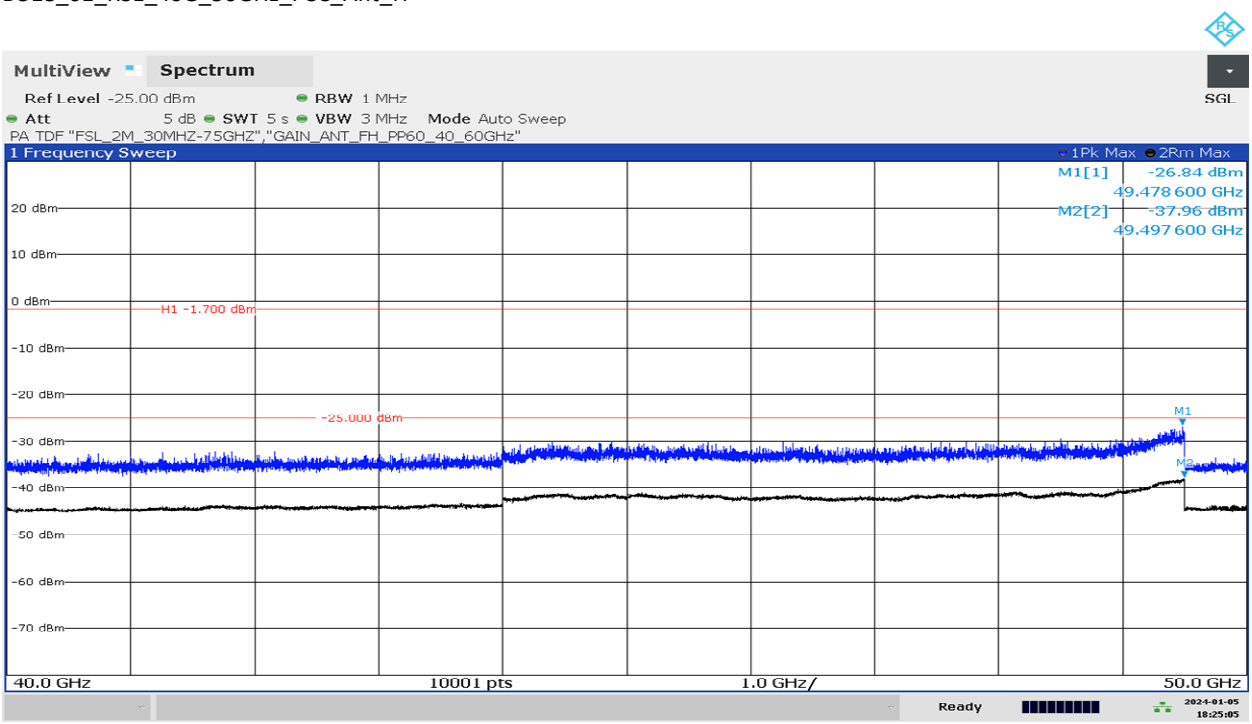
D518_RSE_40G_50GHz_FCC_Ant_V



06:16:16 PM 01/05/2024

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

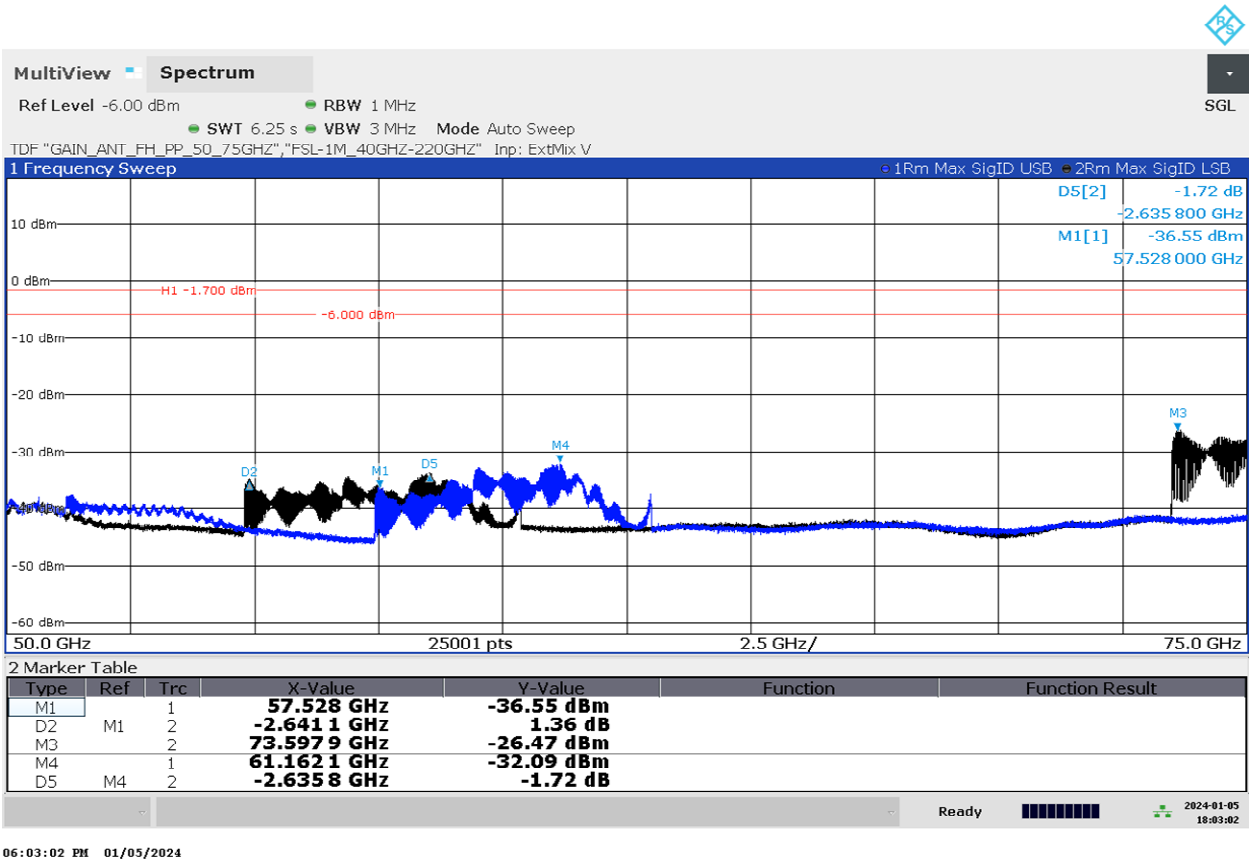
D518_01_RSE_40G_50GHz_FCC_Ant_H



06:25:05 PM 01/05/2024

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

D519_RSE_50G_75GHz_signal_id_FCC



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.

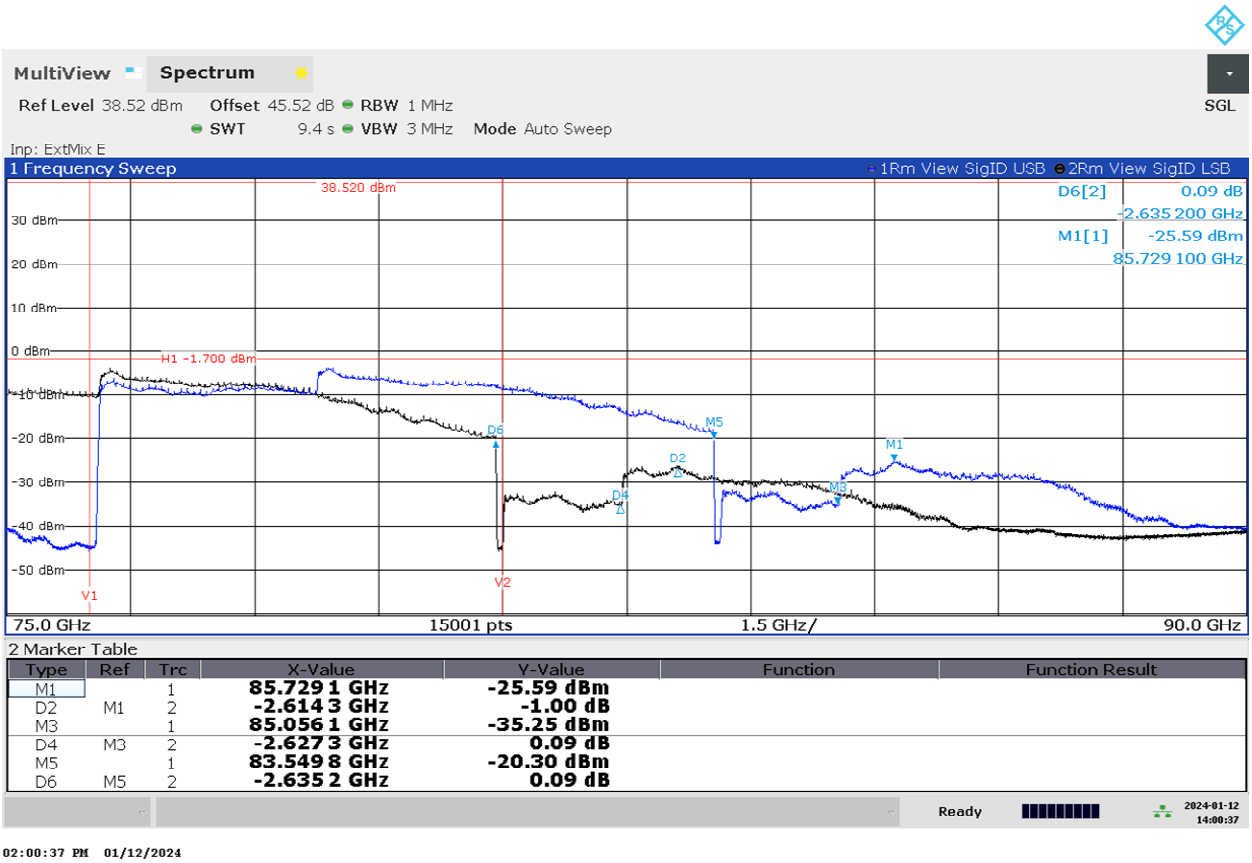
D520_02_RSE_75G_90GHz_auto_id_new_setup_SB_FCC

01:59:38 PM 01/12/2024

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

RADAR is active.in 76G – 81GHz.

D520_01_RSE_75G_90GHz_signal_id_new_setup_SB_FCC



02:00:37 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.

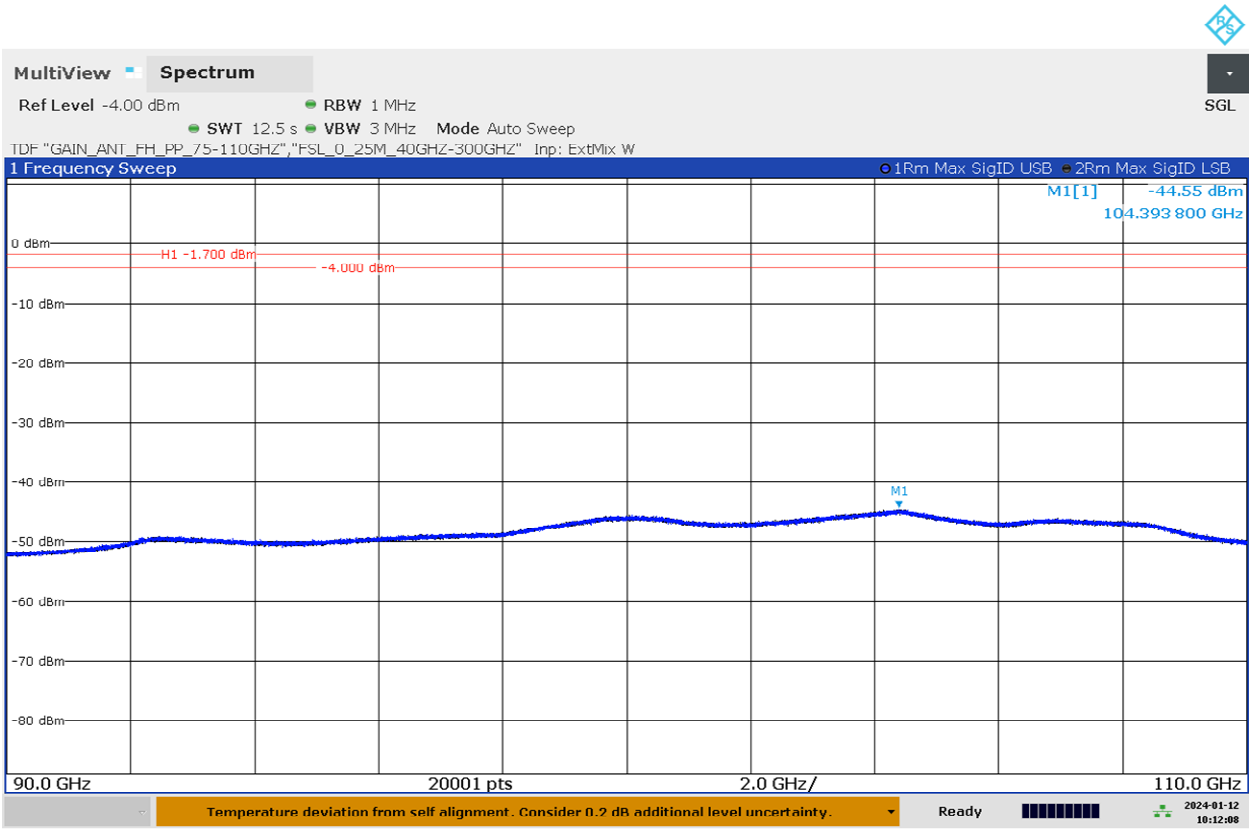
Real signal: Which are overlapping.

Image/Ghost signal: Which are not overlapping

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

Result: Only for information.

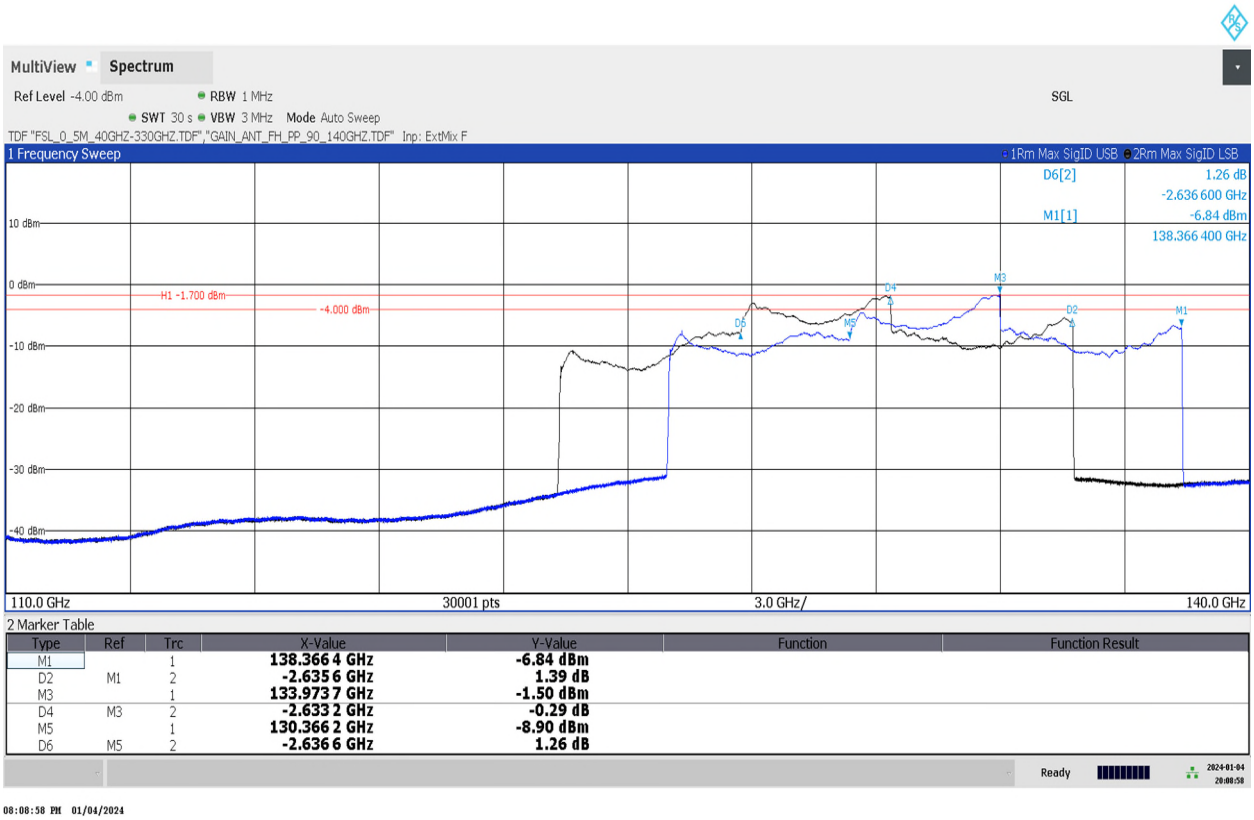
D522_RSE_90G_110GHz_signal_id_with_HP_Filter_FCC



10:12:08 AM 01/12/2024

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

D525_RSE_110G_140GHz_signal_id_FCC



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.

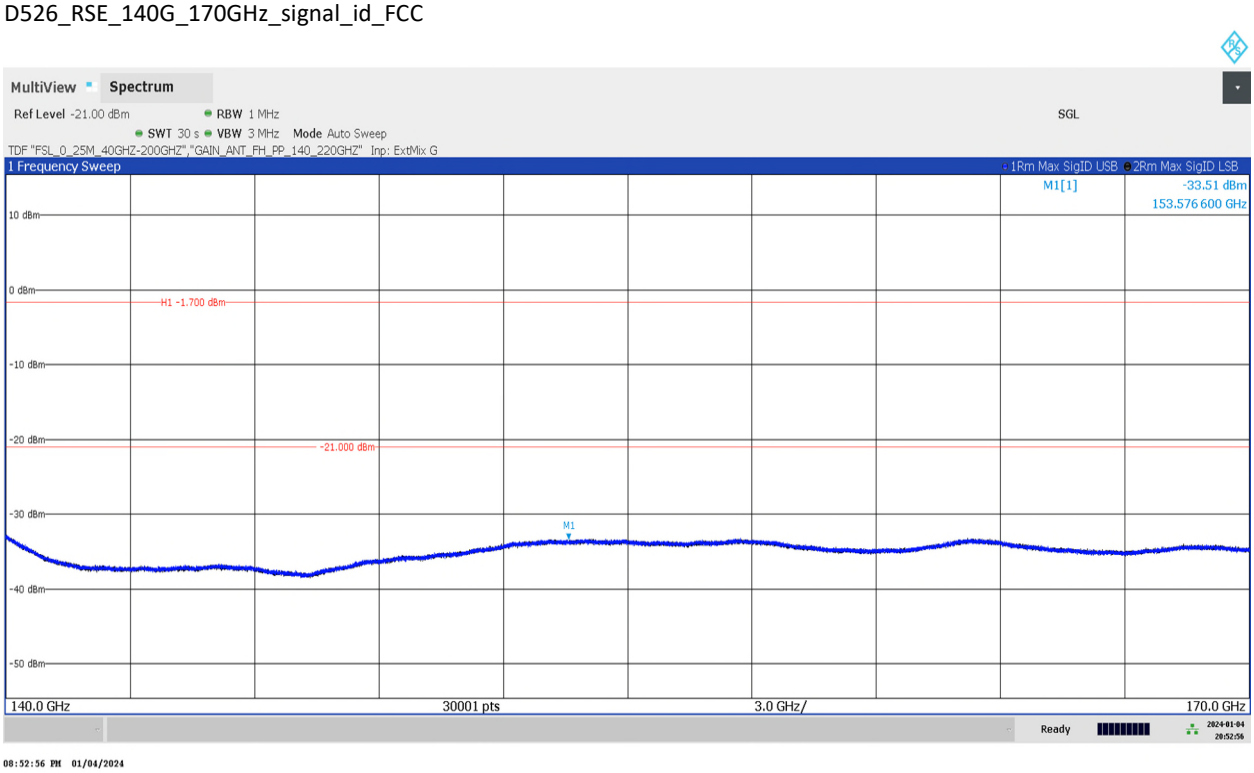
Real signal: Which are overlapping.

Image/Ghost signal: Which are not overlapping

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

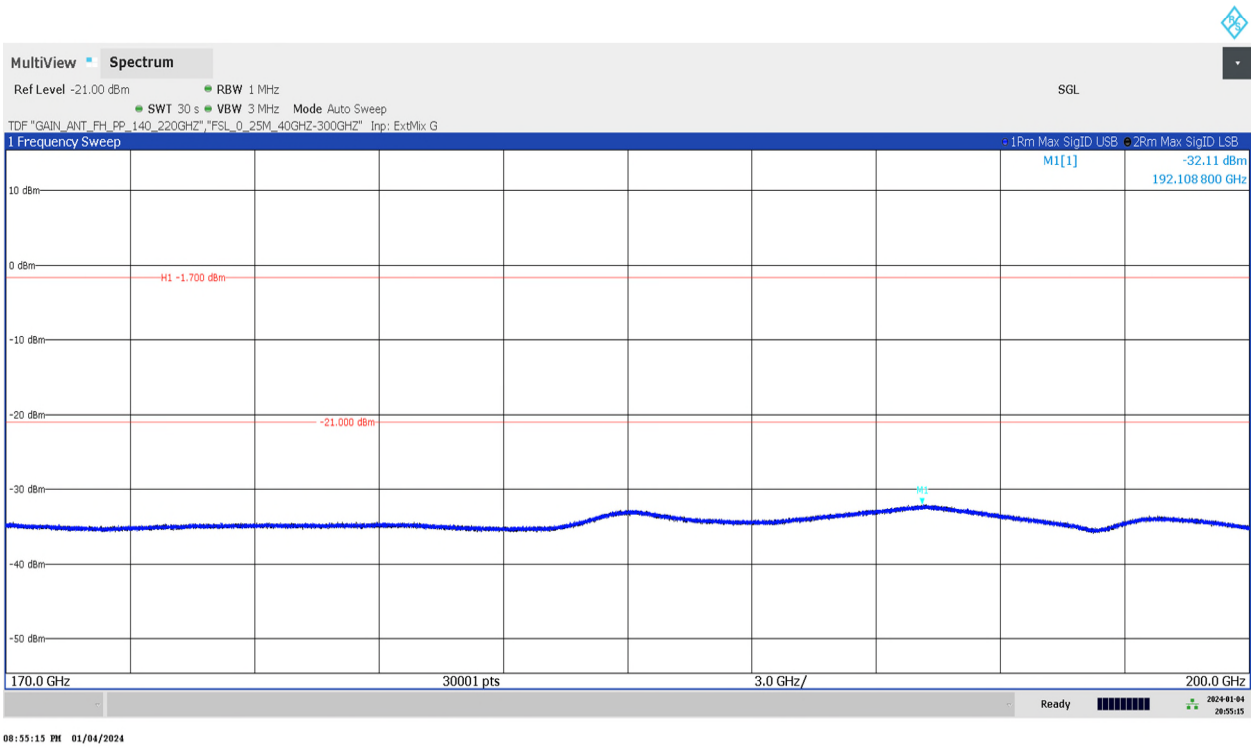
Limit Line: -1.7dBm, Result: Passed.

D526_RSE_140G_170GHz_signal_id_FCC



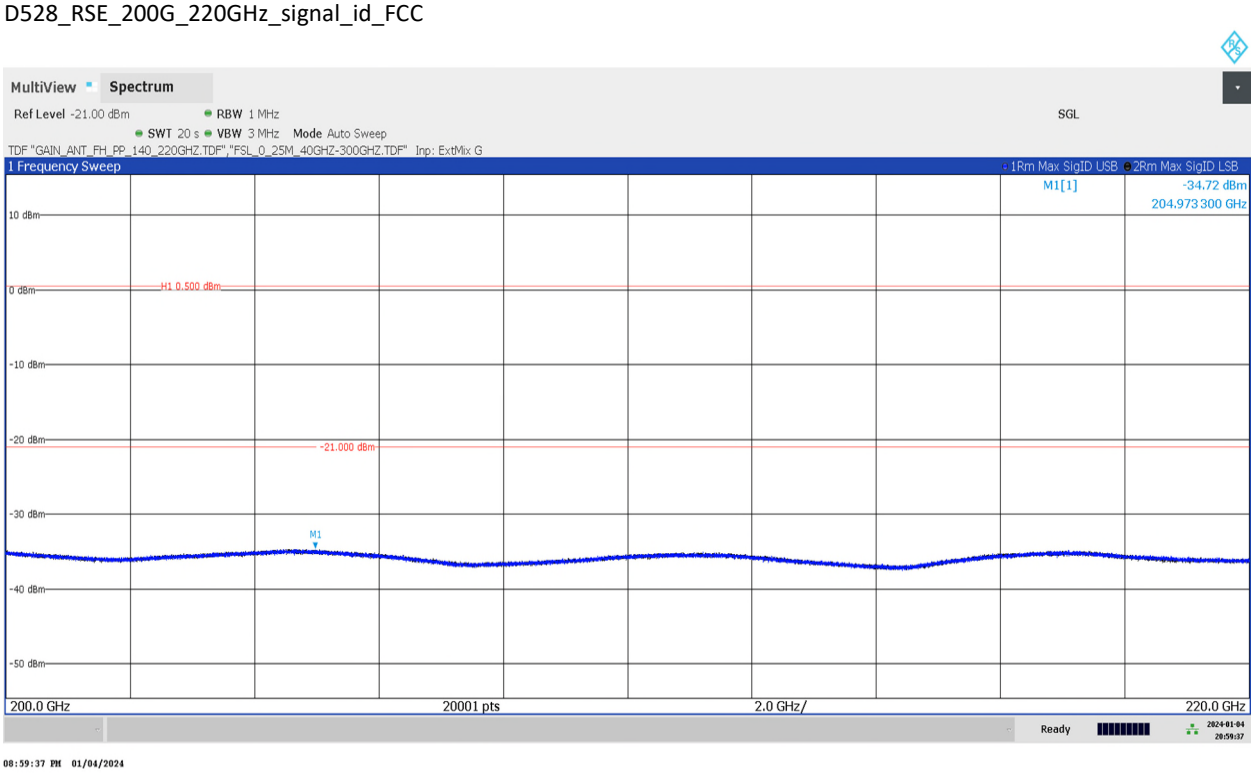
Note: No critical frequency found, Limit Line: -1.7dBm, Result: Passed.

D527_RSE_170G_200GHz_signal_id_FCC



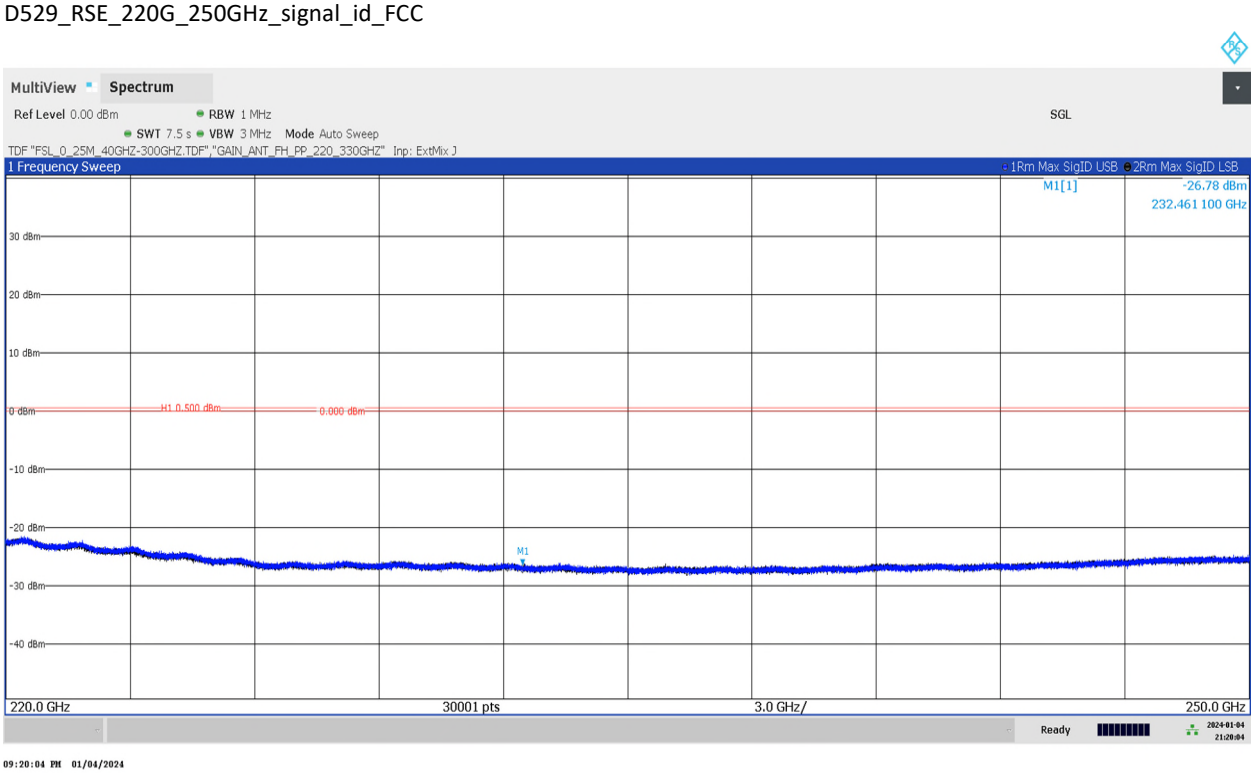
Note: No critical frequency found, Limit Line: -1.7dBm, Result: Passed.

D528_RSE_200G_220GHz_signal_id_FCC



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

D529_RSE_220G_250GHz_signal_id_FCC



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

End Of Annex 1