

FCC/IC - TEST REPORT

Report Number : **4842025220300A** Date of Issue: 2025.03.28

Model : T1-M

Product Type : Wi-Fi and Bluetooth Module

Applicant : Hangzhou Tuya Information Technology Co., Ltd

Address : Room 301, Building 1, Huace Center, Xihu District, 310000
Hangzhou City, Zhejiang Province, PEOPLE'S REPUBLIC OF
CHINA

Manufacturer : Hangzhou Tuya Information Technology Co., Ltd.

Address : Room 301, Building 1, Huace Center, Xihu District, 310000
Hangzhou City, Zhejiang Province, PEOPLE'S REPUBLIC OF
CHINA

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including
Appendices : 83

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2 Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd.
Floor 1-4, Building B, No.37, Tuanjie Road(Middle), Xishan Economic and Technological Development Zone, Wuxi, Jiangsu. China

Test Firm FCC Registration Number: 571980

Designation number: CN1405

IC Company Number: 33393

CAB identifier: CN0184

Telephone: +86 510 8820 3737
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3 Description of the Equipment under Test

Description of the Equipment Under Test

Product: Wi-Fi and Bluetooth Module

PMN / HVIN / Model no.: T1-M

FCC ID: 2ANDL-T1-M

Rating: 3.0-3.6V DC
Normal: 3.3V DC

RF Transmission Frequency: Wi-Fi:2412-2462MHz
Bluetooth LE:2402~2480MHz

No. of Operated Channel: 2.4GHz WIFI: 11 for 802.11b/g/n(HT20)
2.4GHz BLE: 40

Modulation: Direct Sequence Spread Spectrum (DSSS) for 802.11b
Orthogonal Frequency Division Multiplexing (OFDM) for
802.11g/n; 2.4GHz BLE: GFSK

Channel list:

802.11b/g/n(HT20)			
Ch	Fre(MHz)	Ch	Fre(MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Bluetooth Low Energy							
Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)	Ch	Fre(MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Antenna Type: Onboard PCB antenna



Report Number:4842025220300A

Antenna Gain: -0.66dBi

Description of the EUT: The Equipment Under Test (EUT) is a Wi-Fi and Bluetooth module which support 2.4GHz Wi-Fi and BLE 4.2(support 1Mbps data rate). We tested it and listed the worst data in this report.

Test sample no.: WUX-889391-2 (RF radiated); WUX-889391-1 (RF conducted)

The sample's mentioned in this report is/are submitted/ supplied/ manufactured by client. The laboratory therefore assumes no responsibility for accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 and ANSI C63.10 (2020).

5 Summary of Test Results

Technical Requirements						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	13-17	Site 1	☒	☐	☐
§15.247 (b) (3)	Conducted peak output power	18	Site 1	☒	☐	☐
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Dwell Time - Average Time of Occupancy	---	---	☐	☐	☒
§15.247(a)(2)	6dB bandwidth	19-24	Site 1	☒	☐	☐
§15.247(e)	Power spectral density	25-30	Site 1	☒	☐	☐
§15.247(e)	Spurious RF conducted emissions	31-49	Site 1	☒	☐	☐
§15.247(d)	Band edge	50-56	Site 1	☒	☐	☐
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	57-80	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a PCB antenna, which gain is -0.66dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ANDL-T1-M, complies with Section 15.207,15.209,15.231,15.247 of the FCC Part 15, Subpart C Rules.

This report is only for the 2.4GHz Wi-Fi test report, for the 2.4GHz BLE test report please refer to 4842025220300B.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: February 10, 2025

Testing Start Date: February 12, 2025

Testing End Date: February 28, 2025

-TÜV SÜD Certification and Testing (China) Co., Ltd.

Reviewed by:



Bo Dai
Review Engineer

Prepared by:



Yiquan Wang
Project Engineer

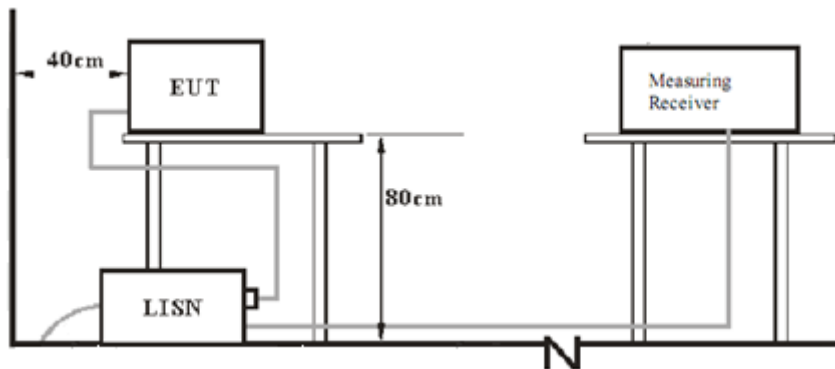
Tested by:



Xia Zhihua
Test Engineer

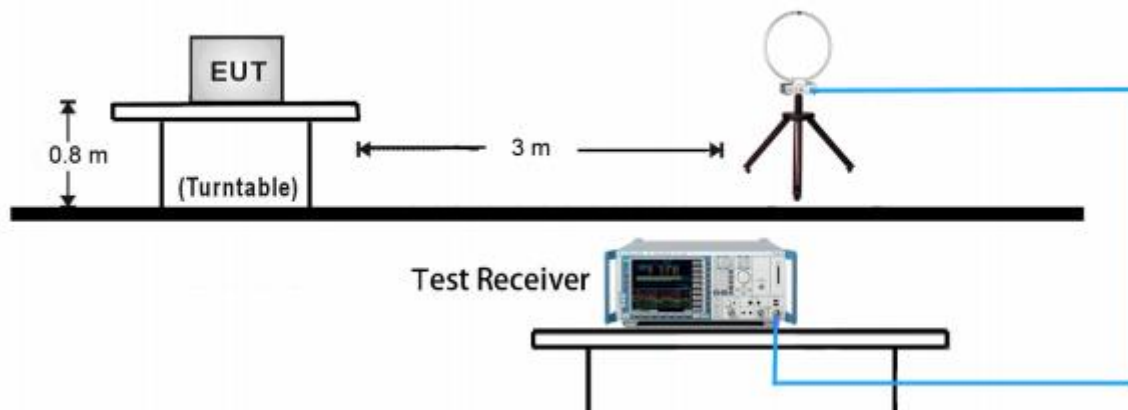
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

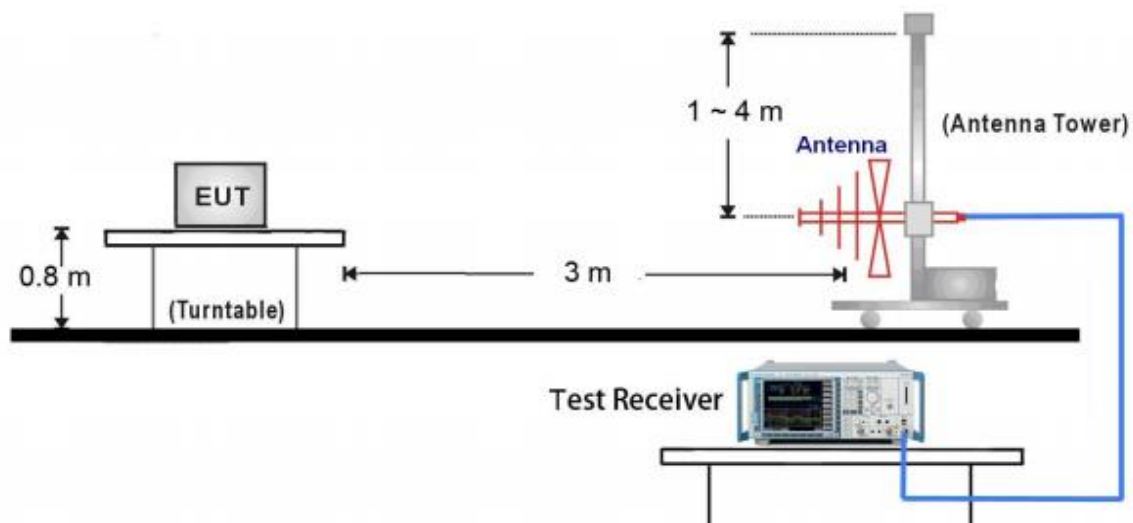


7.2 Radiated test setups

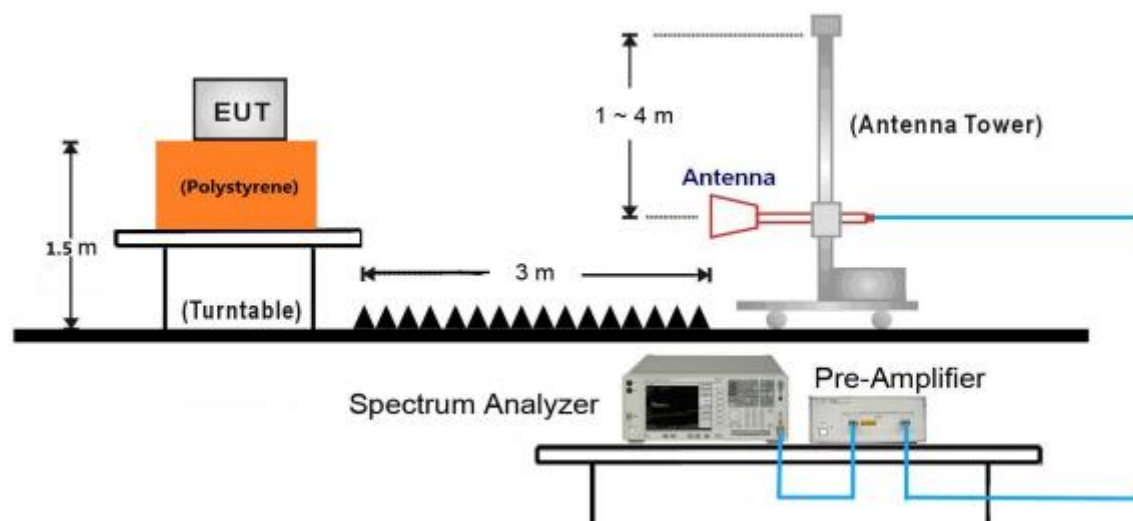
9kHz ~ 30MHz Test Setup:



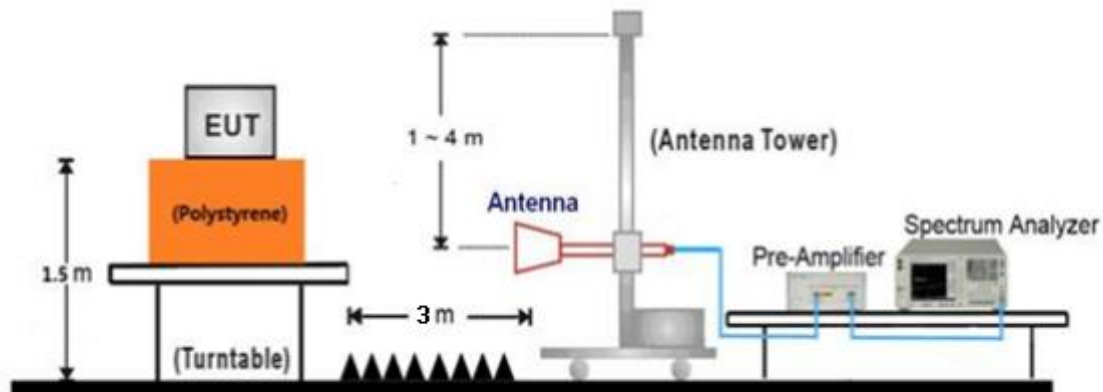
30MHz ~ 1GHz Test Setup:



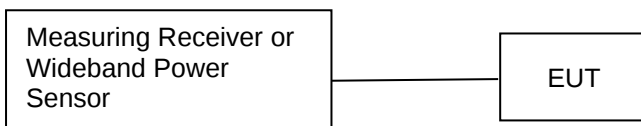
1GHz ~ 18GHz Test Setup:



18GHz ~ 25GHz Test Setup:



7.3 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	HONOR	NDR-WFH	ET247
Notebook	HONOR	VLT-W50	ET137

Test software: Wifi Test tool v1.7.4

Test Mode Applicability and Tested Channel Detail:

Mode	Tested Channel	Data Rate (Mbps)	Modulation	Index Value (Power level setting)
802.11b	1	1	CCK	Auto
	6	1	CCK	Auto
	11	1	CCK	Auto
802.11g	1	6	OFDM	Auto
	6	6	OFDM	Auto
	11	6	OFDM	Auto
802.11n HT20	1	MCS0	OFDM	90
	6	MCS0	OFDM	90
	11	MCS0	OFDM	90

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Conducted Emission

150k-30MHz Conducted Emission Test

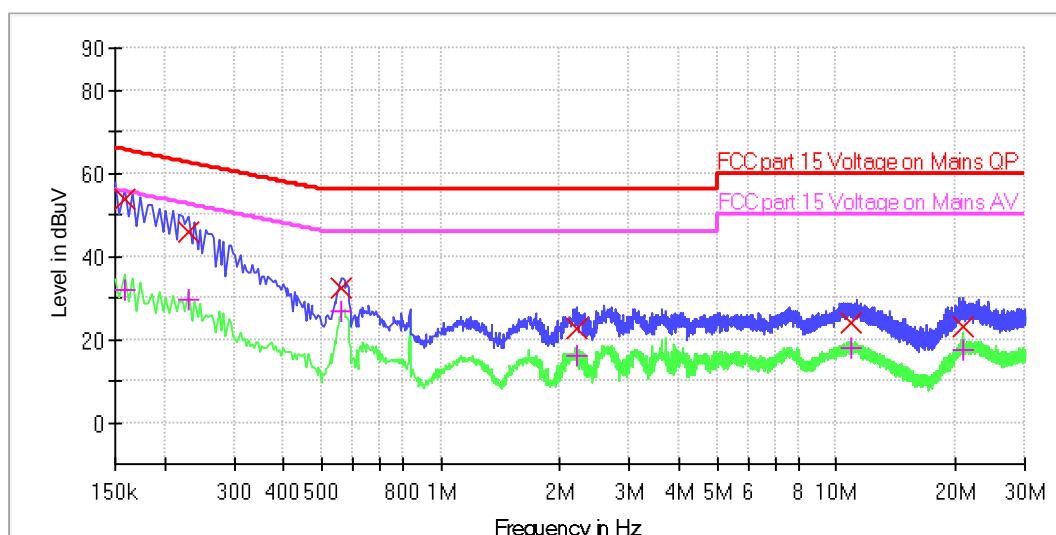
EUT Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2412MHz at b mode
Operator name:	Zhihua Xia
Input:	AC 120V/60Hz
Sample No:	WUX-889391-1
Test standard:	FCC Part 15.209(a)
Comment:	Phase L
Comment:	T21.2°C, H51.7%, P100.1kPa

Scan Setup: Mains Voltage LISN 2 Lines 150kHz-30MHz Pre Fcc [EMI conducted]

Hardware Setup:	Mains Voltage LISN 2 Lines 150kHz-30MHz_Fcc
Receiver:	[ESW 8]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4 kHz	PK+ ; AVG	9 kHz	0.01 s	0 dB



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwi dth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.158000	53.7	31.7	1000.0	9.000	10.6	11.9	65.6	23.8	55.6
0.230000	45.8	29.6	1000.0	9.000	10.5	16.7	62.4	22.9	52.4
0.562000	32.4	26.9	1000.0	9.000	10.5	23.6	56.0	19.1	46.0
2.206000	22.4	15.9	1000.0	9.000	10.6	33.6	56.0	30.1	46.0
10.910000	24.0	18.0	1000.0	9.000	10.9	36.0	60.0	32.0	50.0
20.898000	23.1	17.3	1000.0	9.000	11.1	37.0	60.0	32.7	50.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator



150k-30MHz Conducted Emission Test

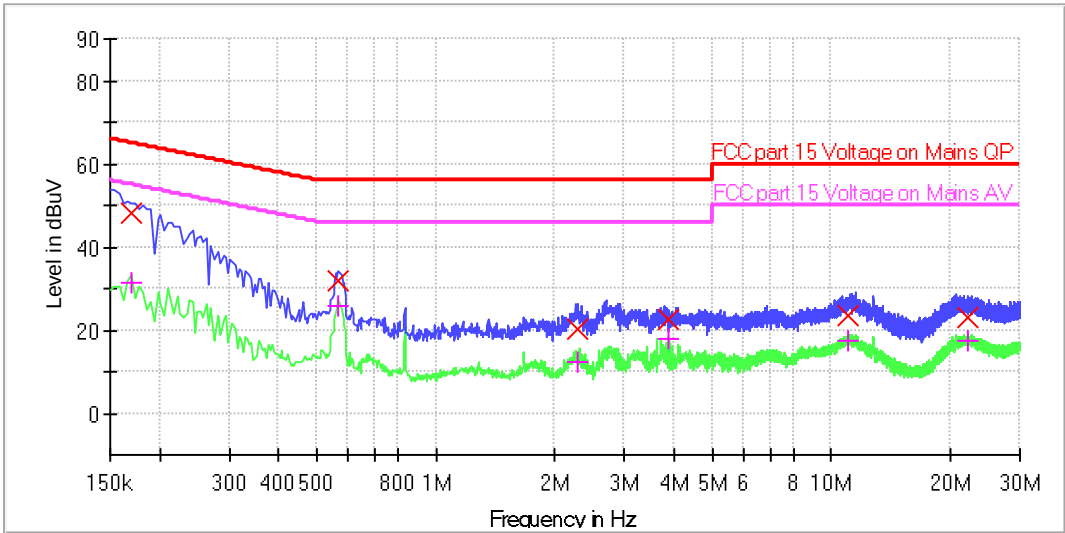
EUT Information

EUT:	Wi-Fi and Bluetooth Module
Model:	T1-M
Client:	Hanzghou Tuya Information Technology Co., Ltd
Operating conditions:	Power on and TX_2412MHz at b mode
Operator name:	Zhihua Xia
Input:	AC 120V/60Hz
Sample No:	WUX-889391-1
Test standard:	FCC Part 15.209(a)
Comment:	Phase N
Comment:	T21.2°C, H51.7%, P100.1kPa

Scan Setup: Mains Voltage LISN 2 Lines 150kHz-30MHz Pre Fcc [EMI conducted]

Hardware Setup:	Mains Voltage LISN 2 Lines 150kHz-30MHz_Fcc
Receiver:	[ESW 8]
Level Unit:	dBuV

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4 kHz	PK+ ; AVG	9 kHz	0.01 s	0 dB



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwi dth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.170000	48.0	31.4	1000.0	9.000	10.6	17.0	65.0	23.6	55.0
0.566000	32.1	25.7	1000.0	9.000	10.5	23.9	56.0	20.3	46.0
2.278000	20.1	12.5	1000.0	9.000	10.6	36.0	56.0	33.5	46.0
3.894000	22.5	18.1	1000.0	9.000	10.6	33.5	56.0	27.9	46.0
11.034000	23.5	17.5	1000.0	9.000	10.9	36.5	60.0	32.5	50.0
22.030000	22.9	17.4	1000.0	9.000	11.1	37.1	60.0	32.6	50.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
RBW > the 6 dB bandwidth of the emission being measured, VBW $\geq$ 3RBW, Span $\geq$ 3RBW
Sweep = auto, Detector function = peak, Trace = max hold.
2. Add a correction factor to the display.
3. Use a power meter to measure the conducted peak output power.

Limits

According to §15.247 (b) (1) , conducted peak output power limit as below:

Conducted peak output power

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤ 1	≤ 30

e.i.r.p

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤ 4	≤ 36

Test result as below table

Mode	Frequency MHz	Conducted Peak Output Power(dBm) §15.247 (b) (3)	Result
802.11b	2412MHz	15.90	Pass
	2437MHz	15.22	Pass
	2462MHz	15.74	Pass

Mode	Frequency MHz	Conducted Peak Output Power(dBm) §15.247 (b) (3)	Result
802.11g	2412MHz	11.60	Pass
	2437MHz	12.19	Pass
	2462MHz	13.11	Pass

Mode	Frequency MHz	Conducted Peak Output Power(dBm) §15.247 (b) (3)	Result
802.11n (HT20)	2412MHz	13.47	Pass
	2437MHz	12.61	Pass
	2462MHz	14.10	Pass

9.3 6dB bandwidth

Test Method

- 1. Use the following spectrum analyzer settings:
RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
- 3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

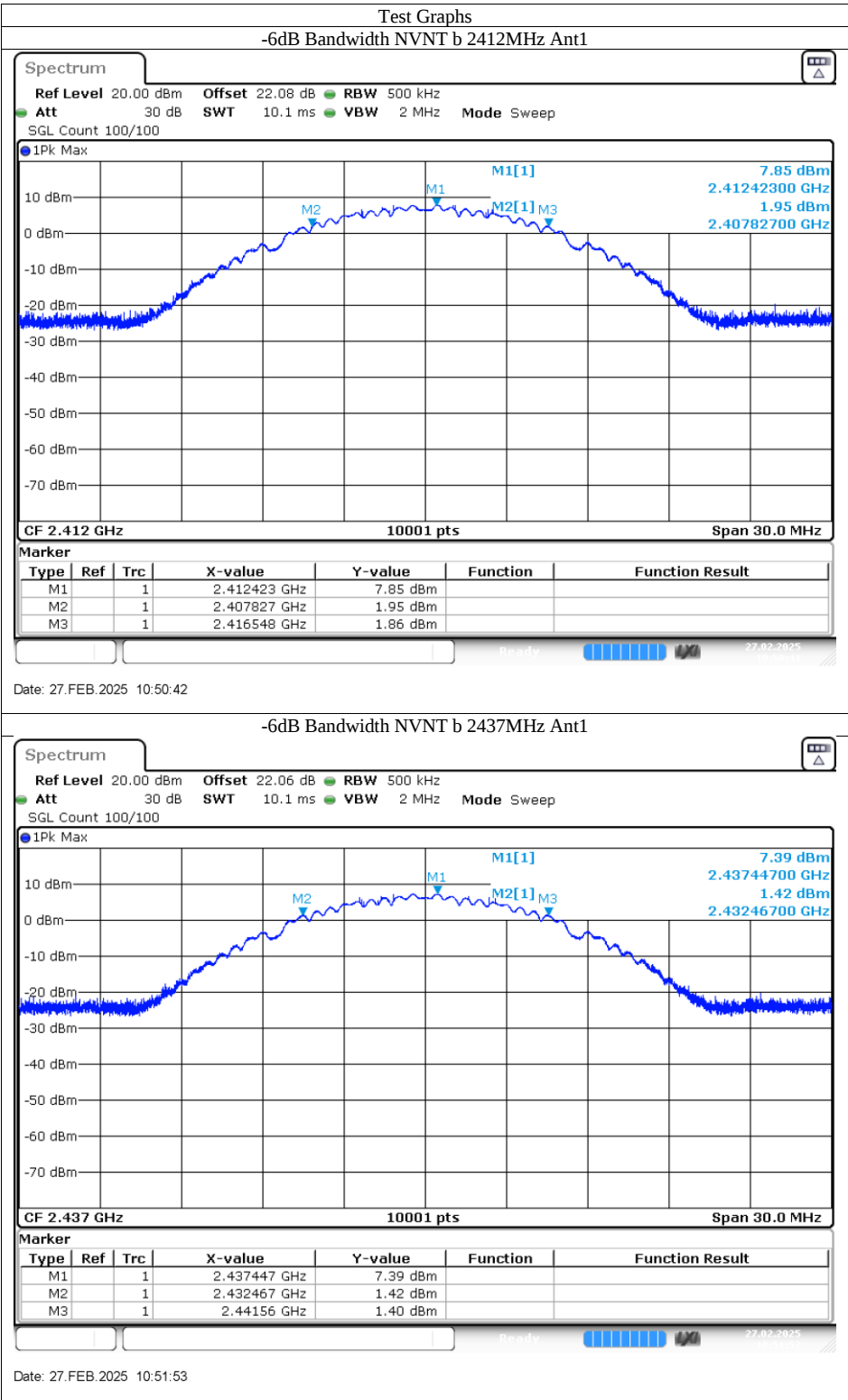
≥500

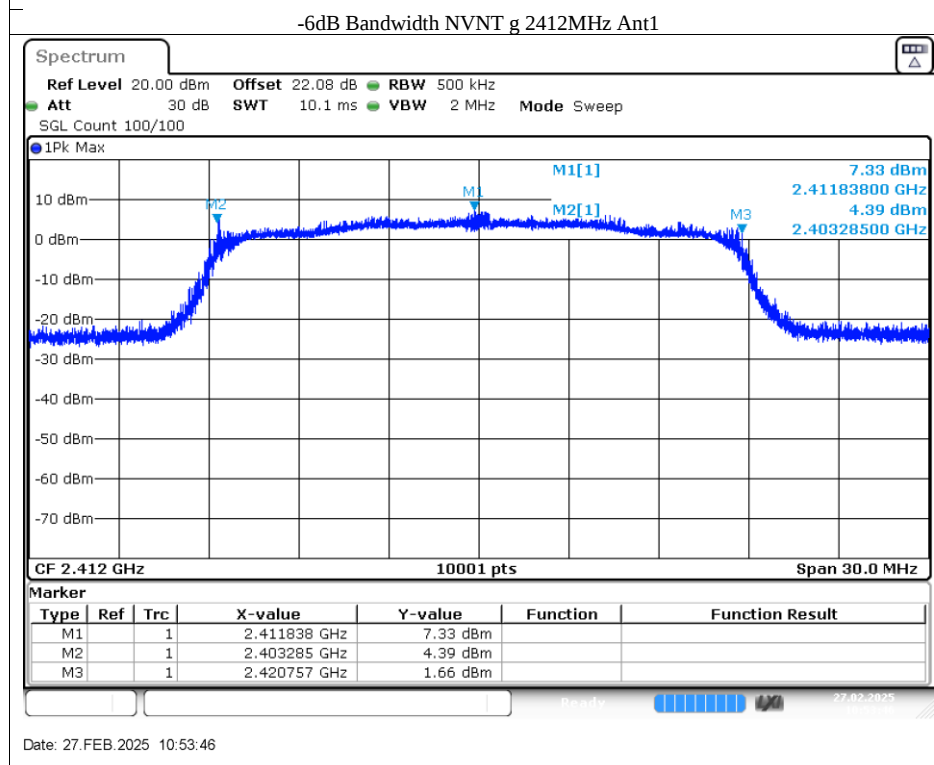
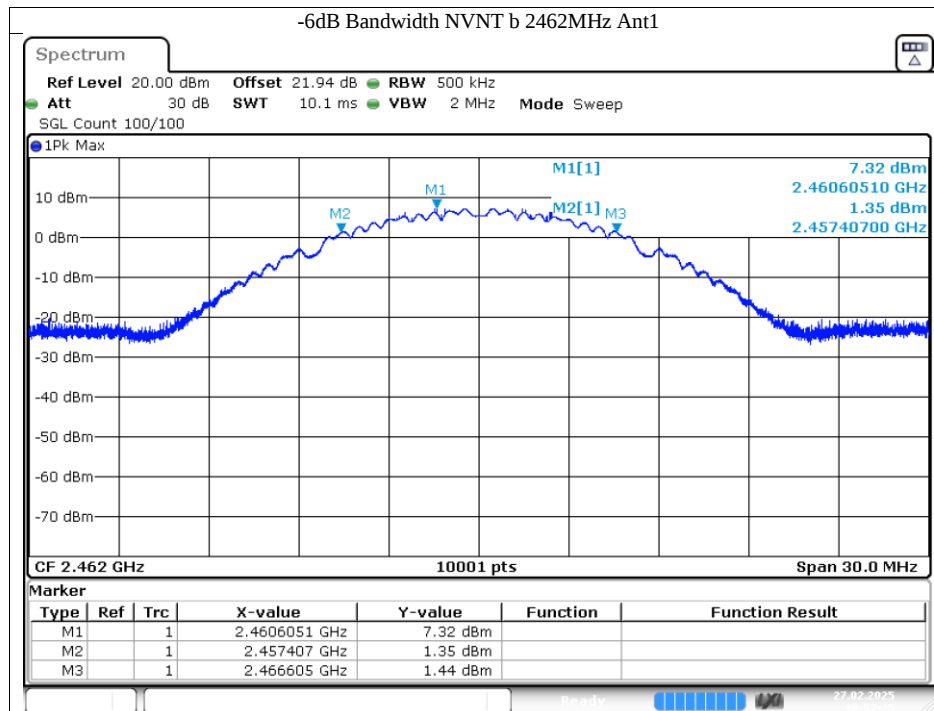
Test result

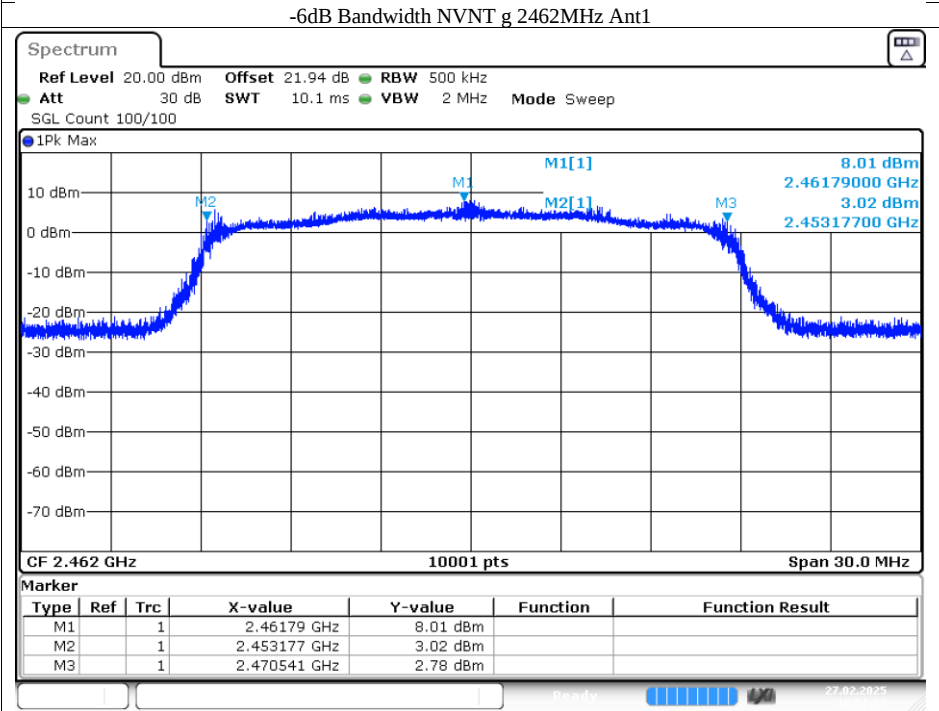
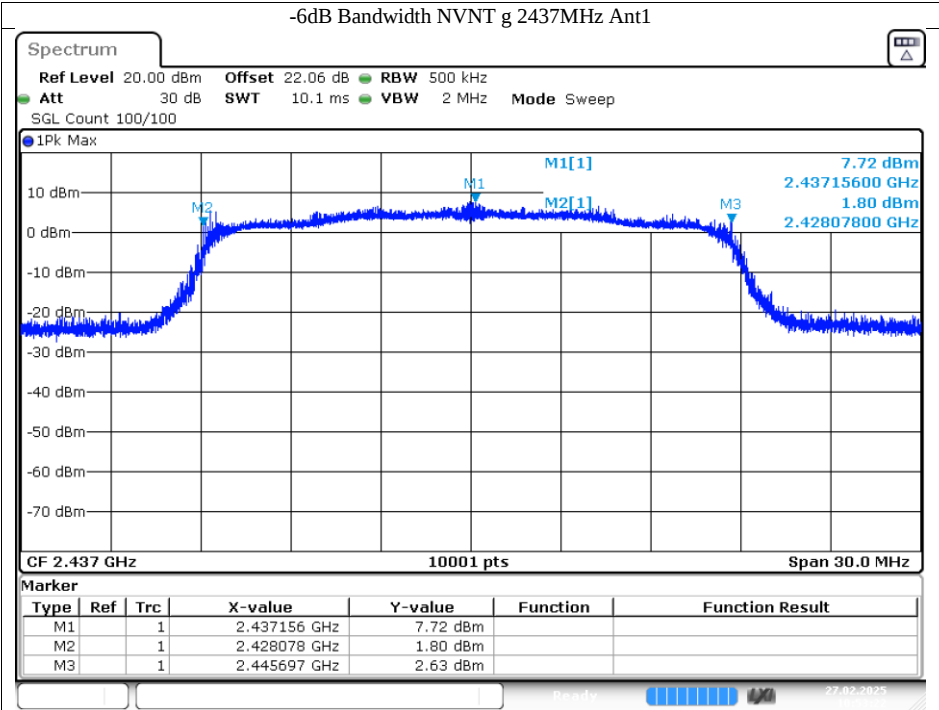
Test Mode	Frequency MHz	6dB bandwidth (MHz)		Result	99% occupied bandwidth MHz
		result	limit	verdict	
802.11b	2412	8.721	≥0.5	Pass	14.153
	2437	9.093	≥0.5	Pass	14.165
	2462	9.198	≥0.5	Pass	14.156
802.11g	2412	17.472	≥0.5	Pass	17.275
	2437	17.619	≥0.5	Pass	17.323
	2462	17.364	≥0.5	Pass	17.368
802.11n(HT20)	2412	16.068	≥0.5	Pass	17.884
	2437	16.239	≥0.5	Pass	17.836
	2462	16.245	≥0.5	Pass	17.893

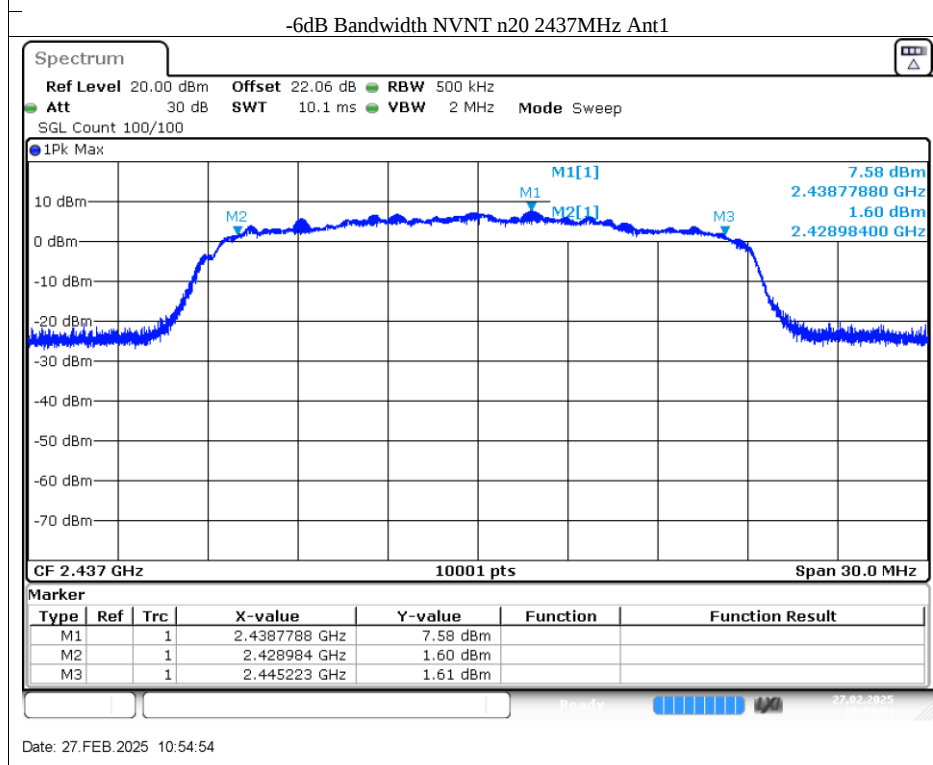
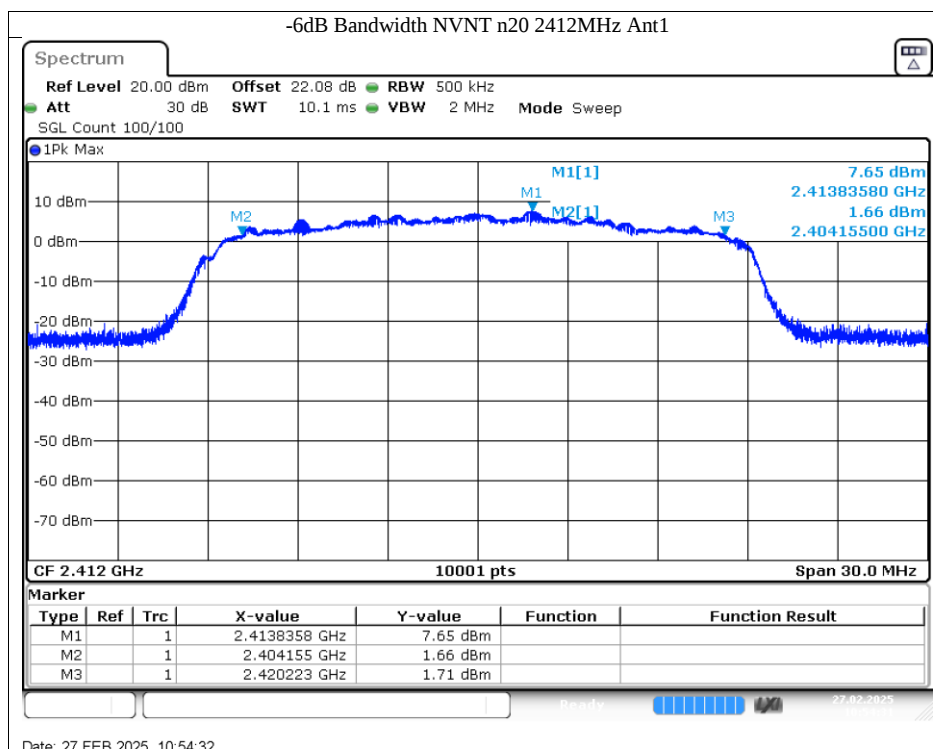


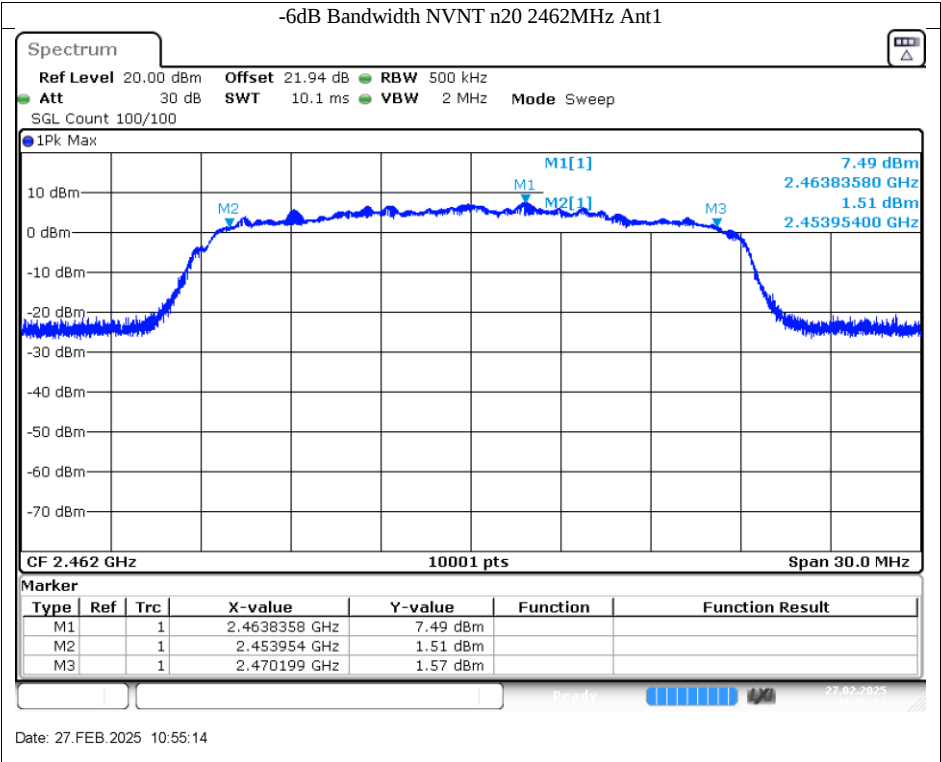
6dB Bandwidth











9.4 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency.
RBW=3kHz,VBW≥3RBW,Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3kHz]

≤8

Test result

802.11 b

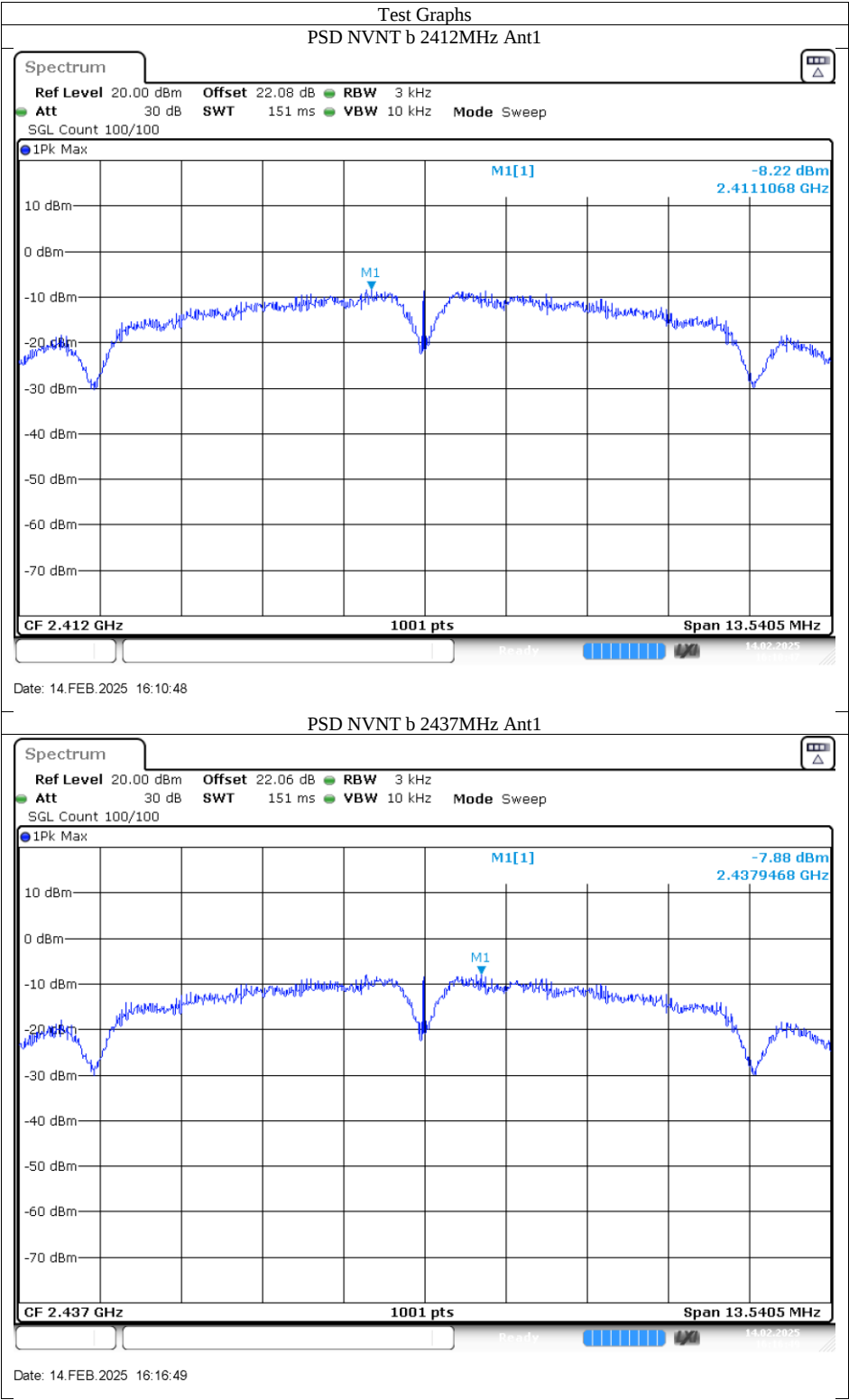
Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2412MHz	-8.22	Pass
Middle channel 2437MHz	-7.88	Pass
High channel 2462MHz	-7.7	Pass

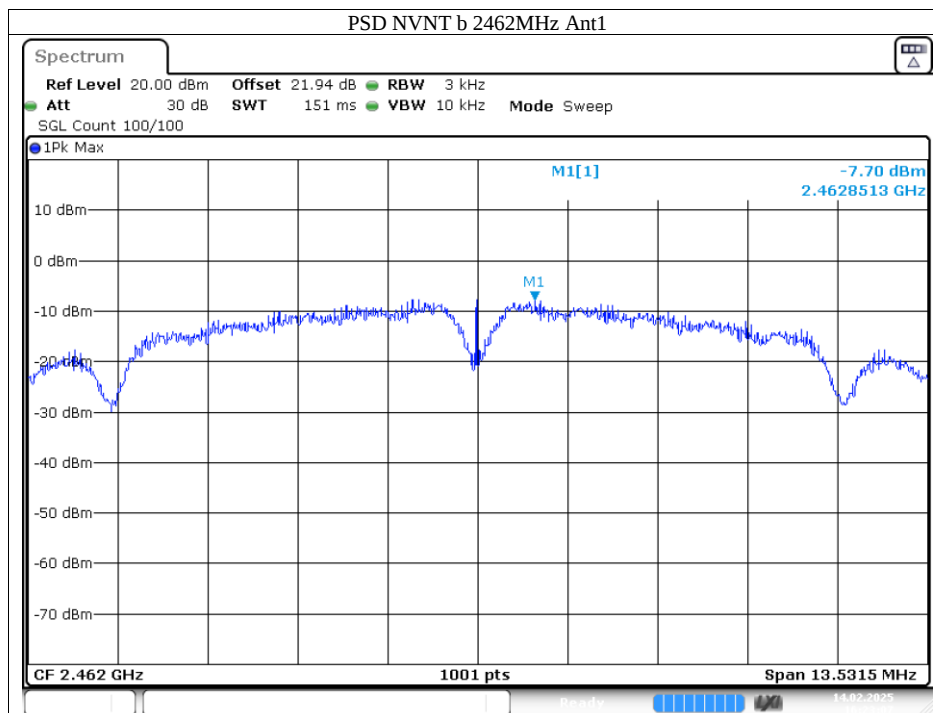
802.11 g

Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2412MHz	-13.15	Pass
Middle channel 2437MHz	-11.95	Pass
High channel 2462MHz	-12.05	Pass

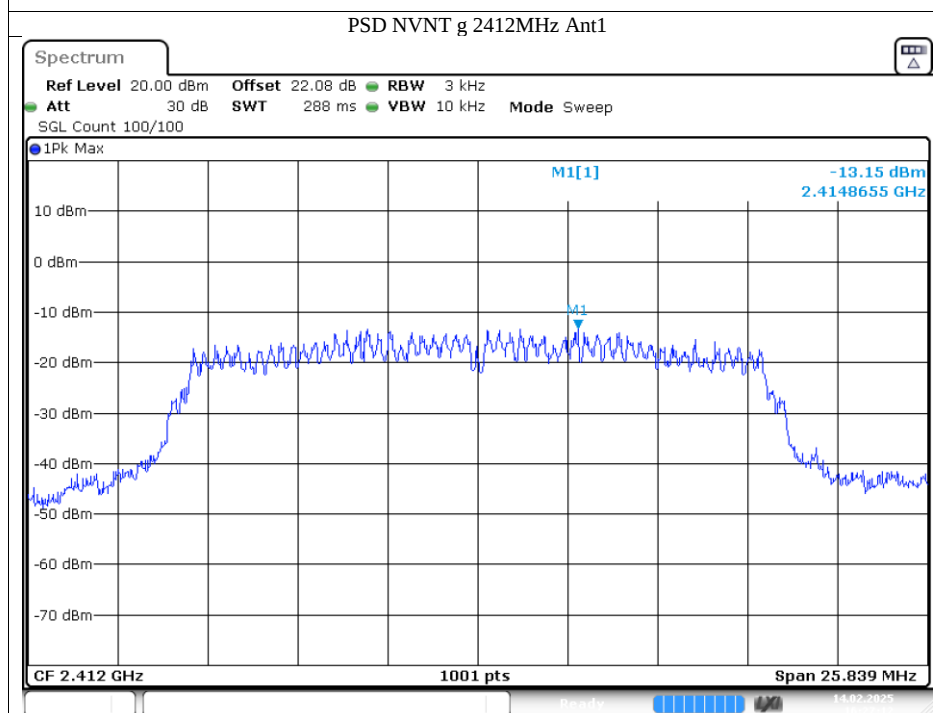
802.11 n (HT20)

Frequency MHz	Power spectral density dBm/3kHz	Result
Low channel 2412MHz	-10.64	Pass
Middle channel 2437MHz	-10.33	Pass
High channel 2462MHz	-10.13	Pass

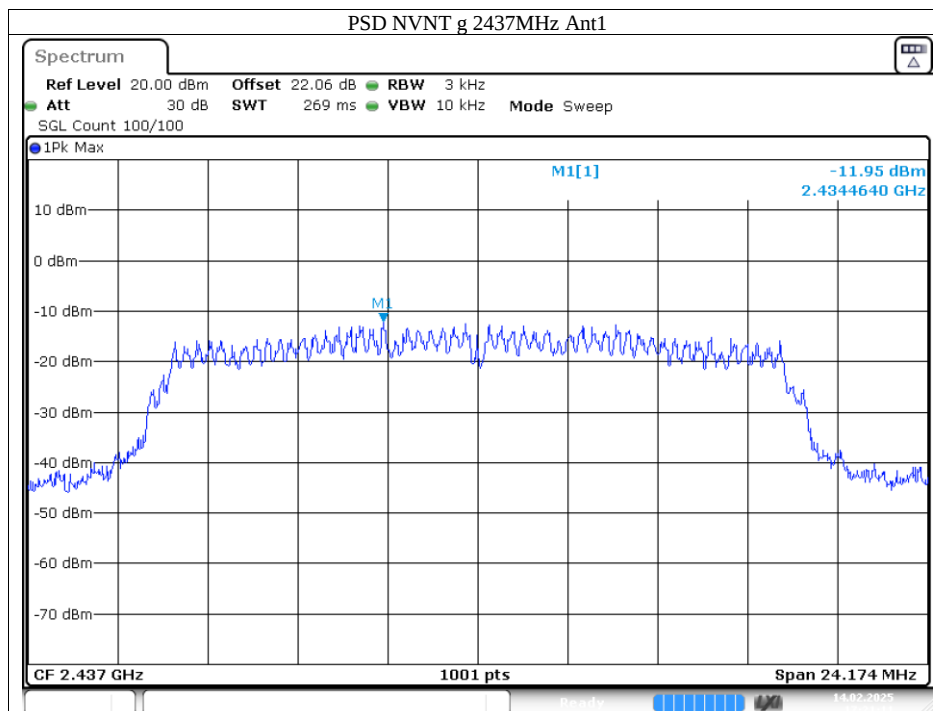




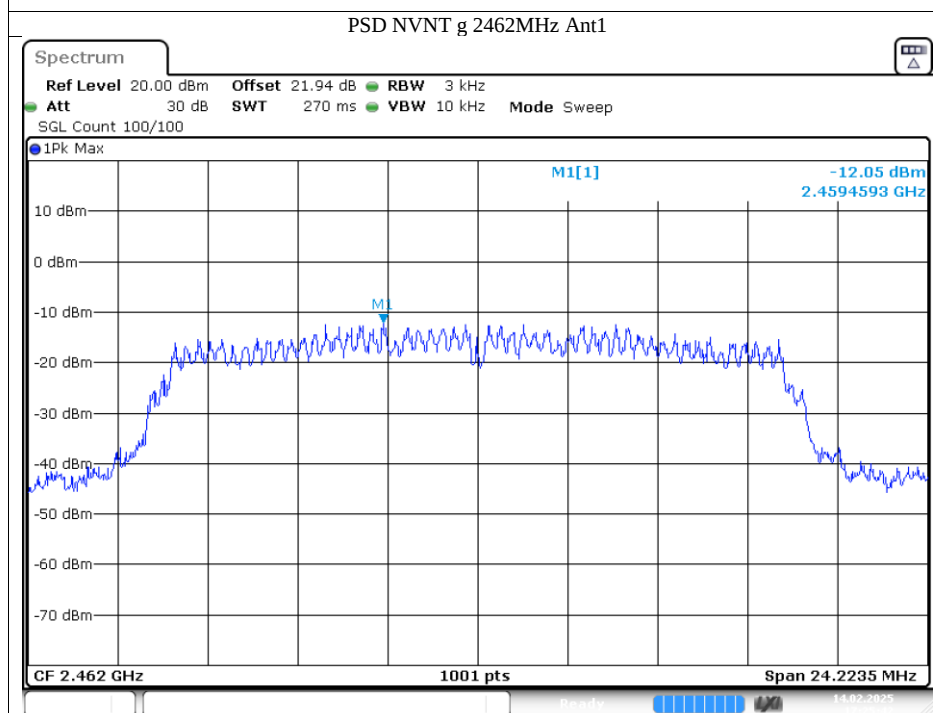
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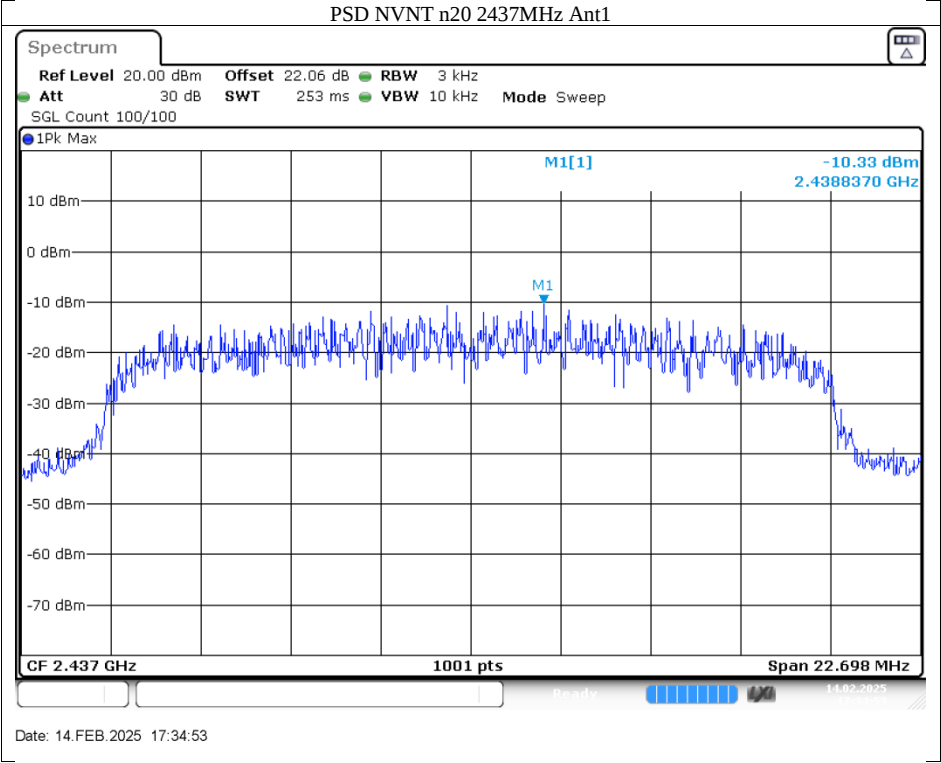
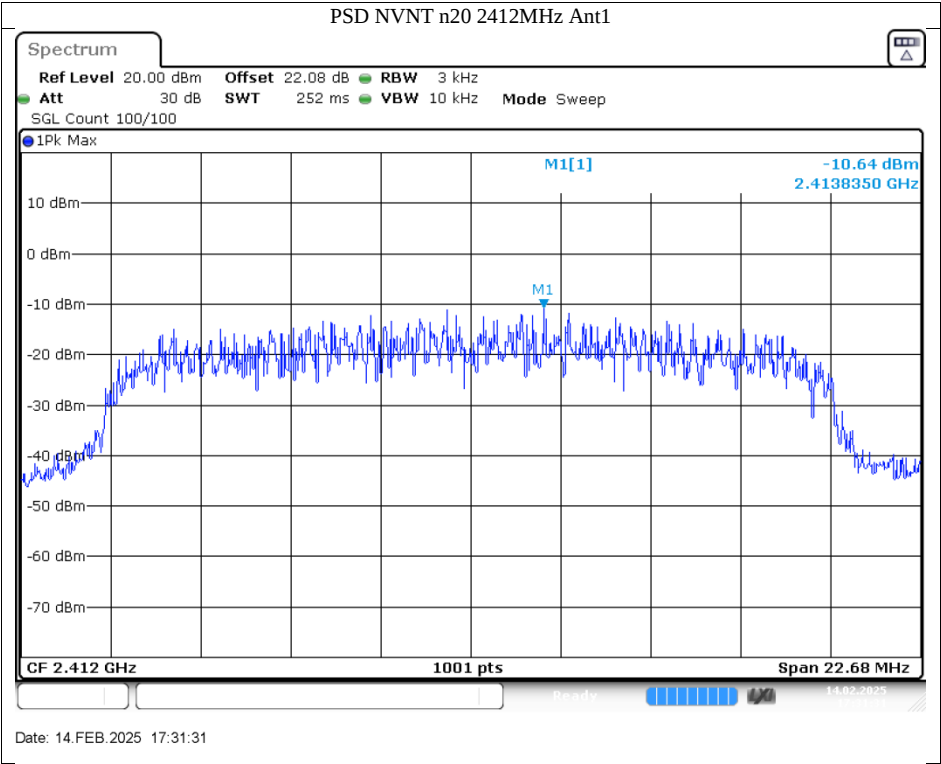
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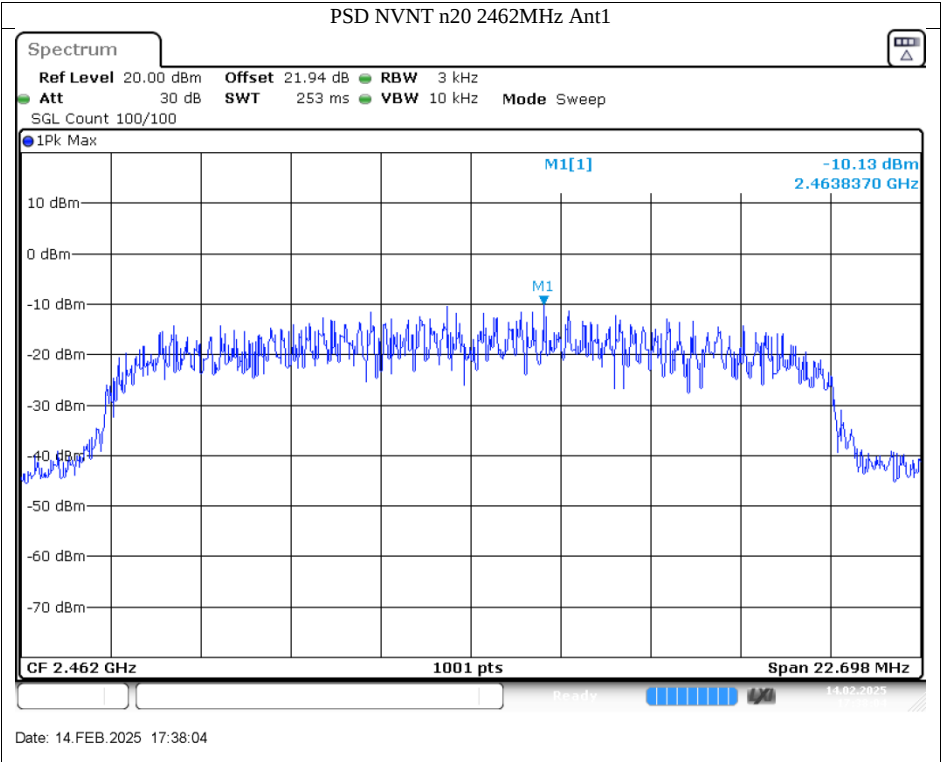


Date: 14.FEB.2025 17:21:12



Date: 14.FEB.2025 17:25:43







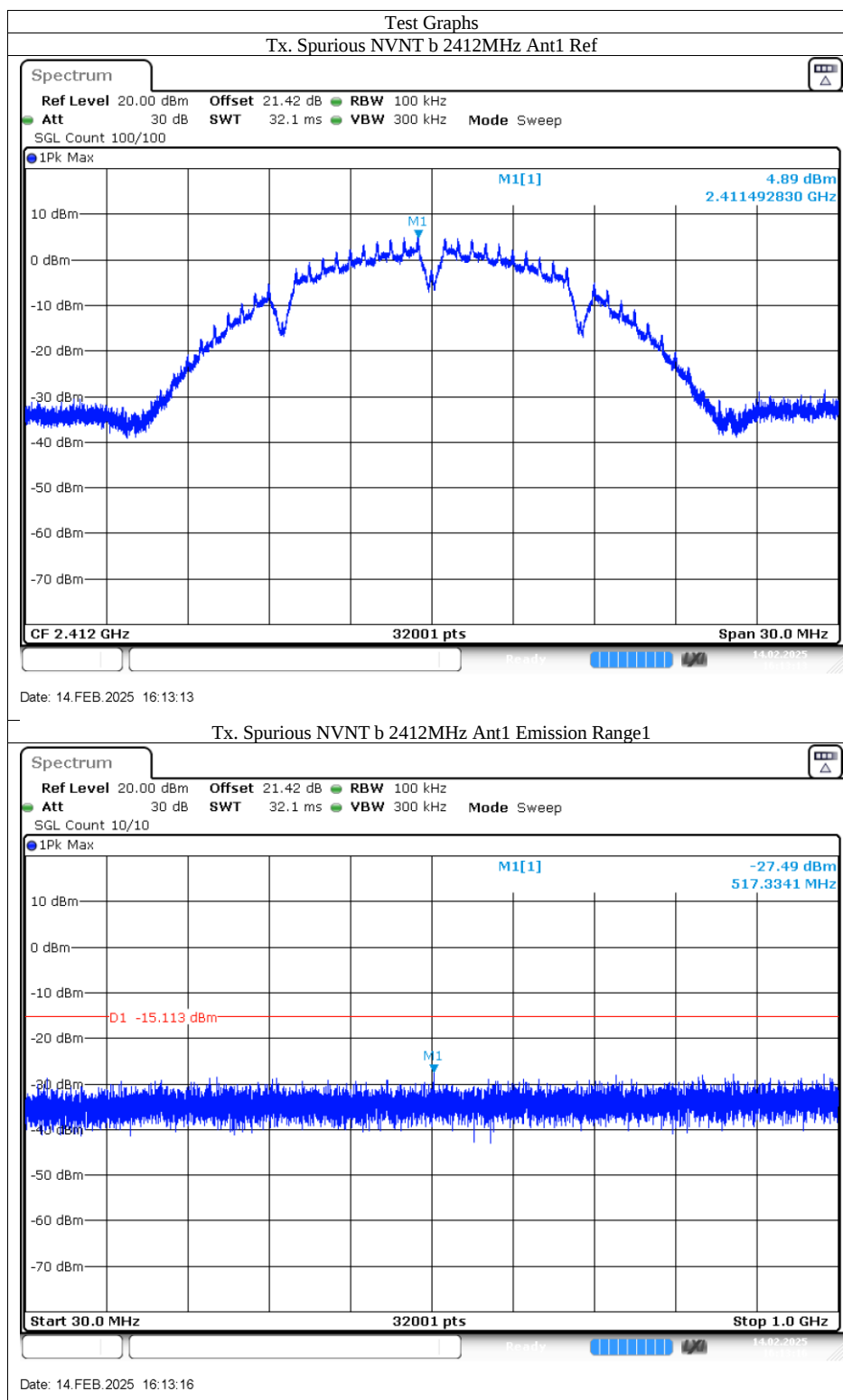
9.5 Spurious RF conducted emissions

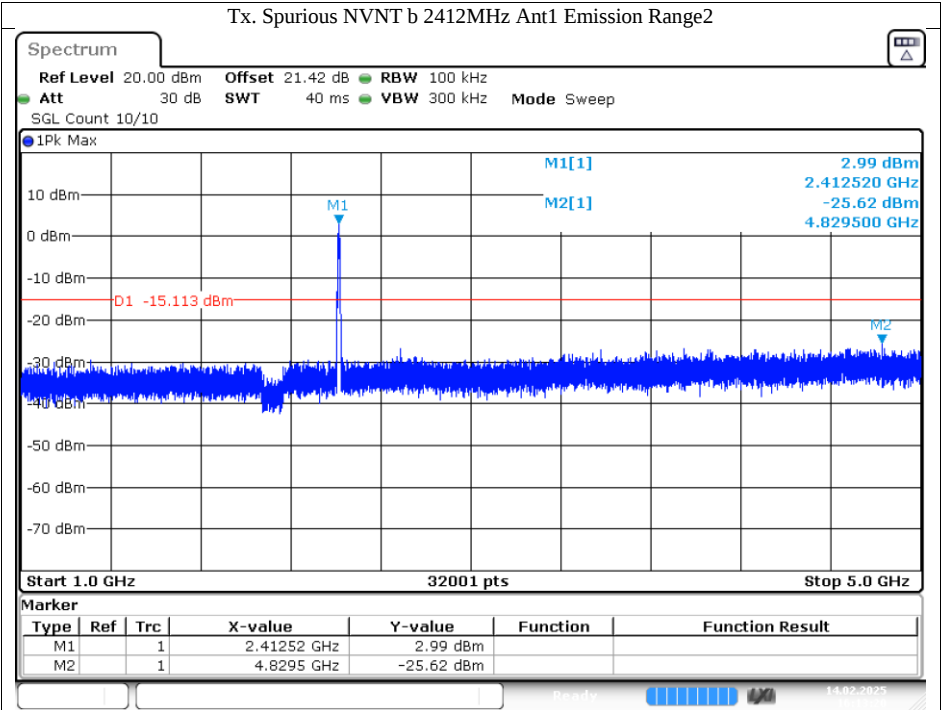
Test Method

- 1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
 - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
- 2. Use the maximum PSD level to establish the reference level.
 - a. Set the center frequency and span to encompass frequency range to be measured.
 - b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
- 3. Repeat above procedures until other frequencies measured were completed.

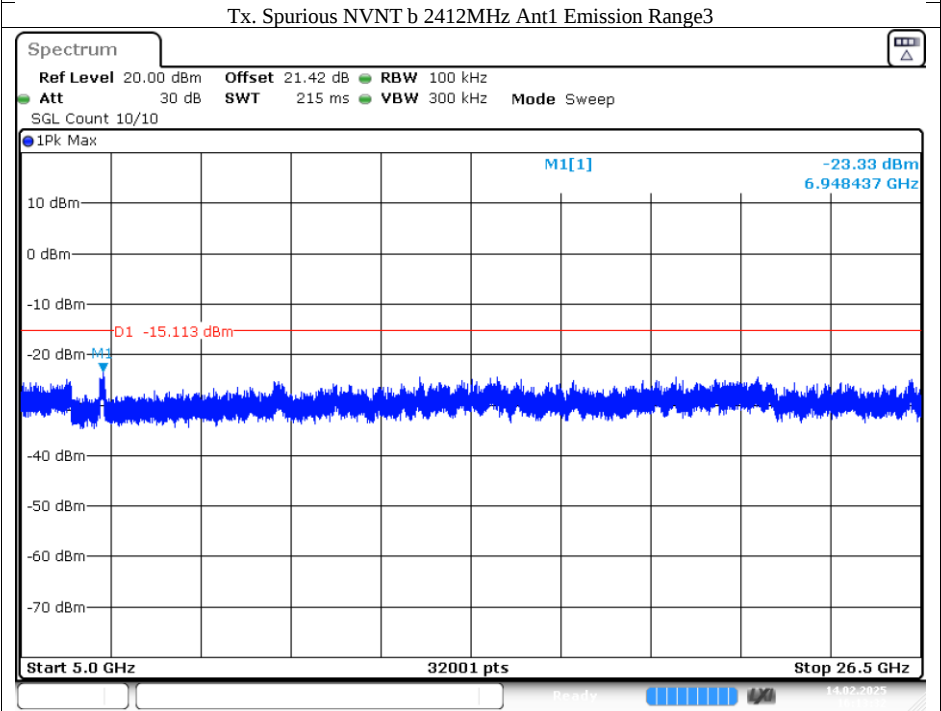
Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

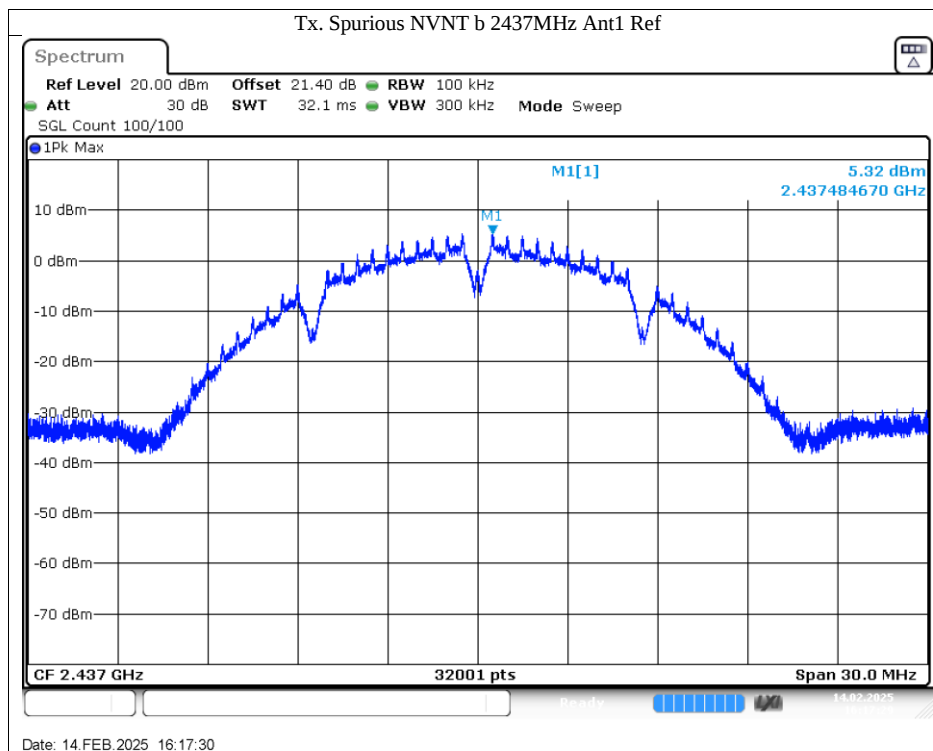
Spurious RF conducted emissions



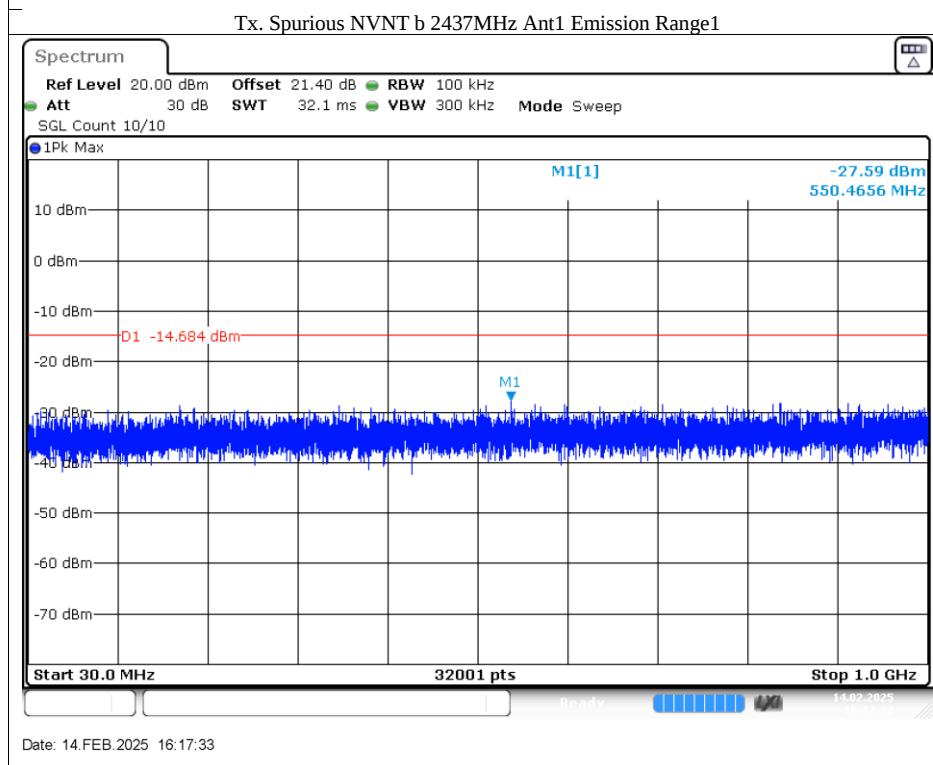
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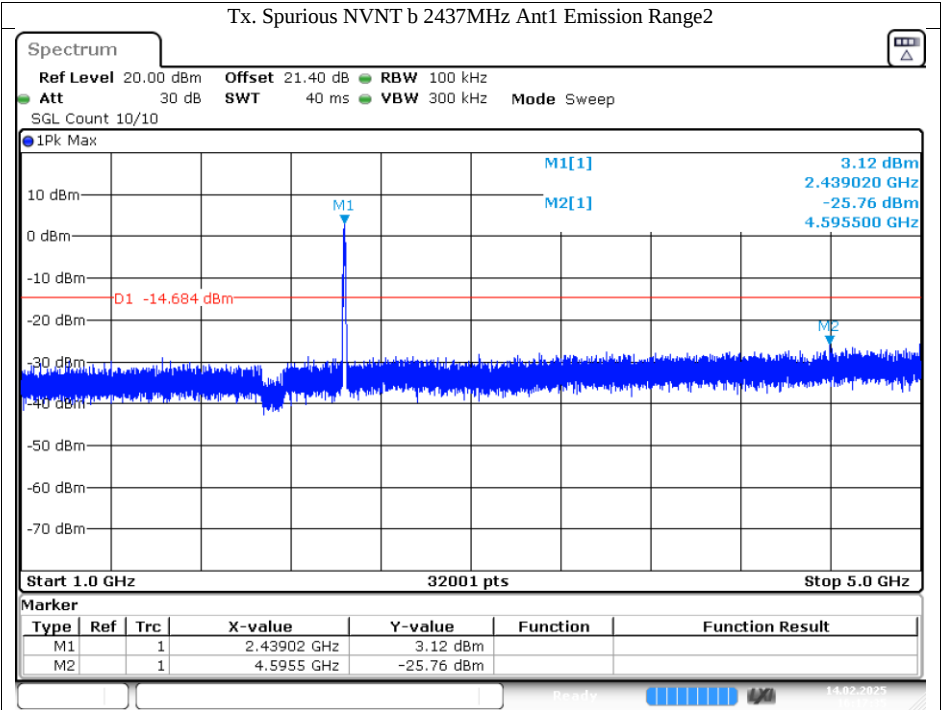
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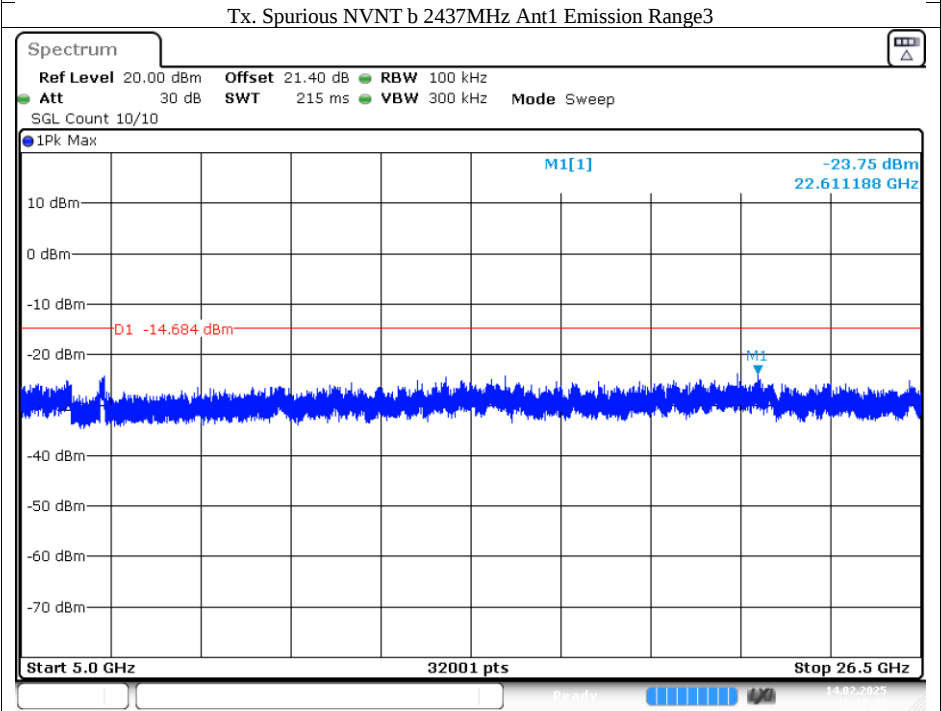
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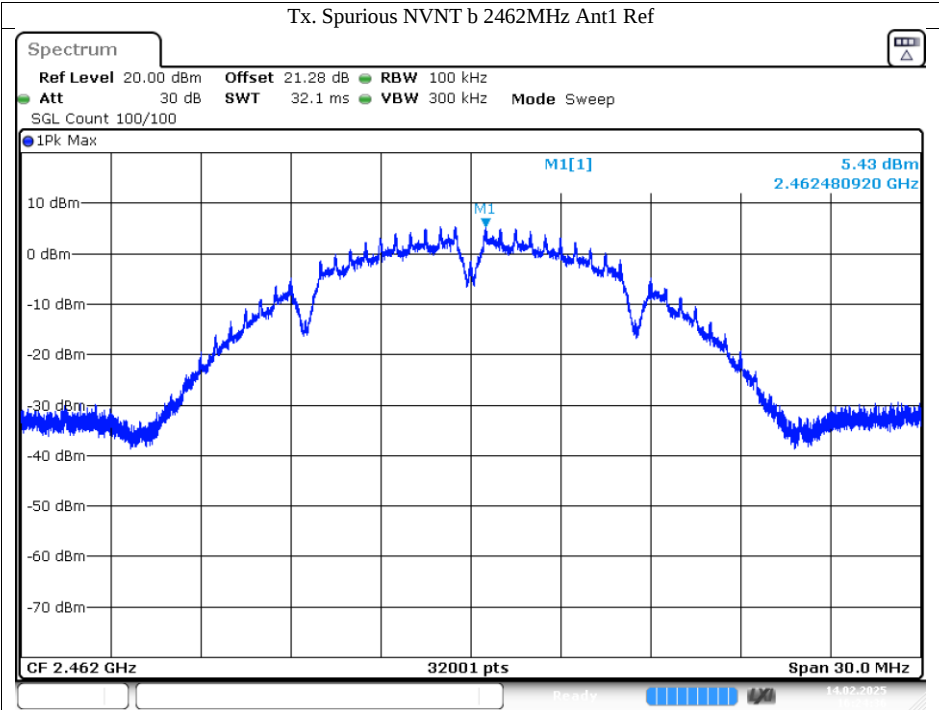
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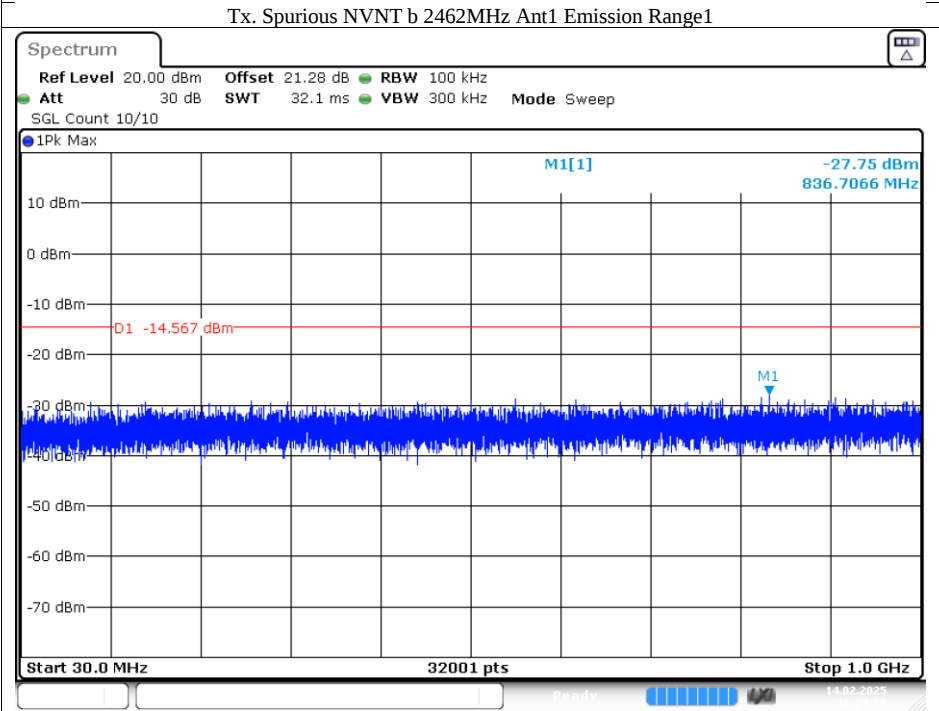
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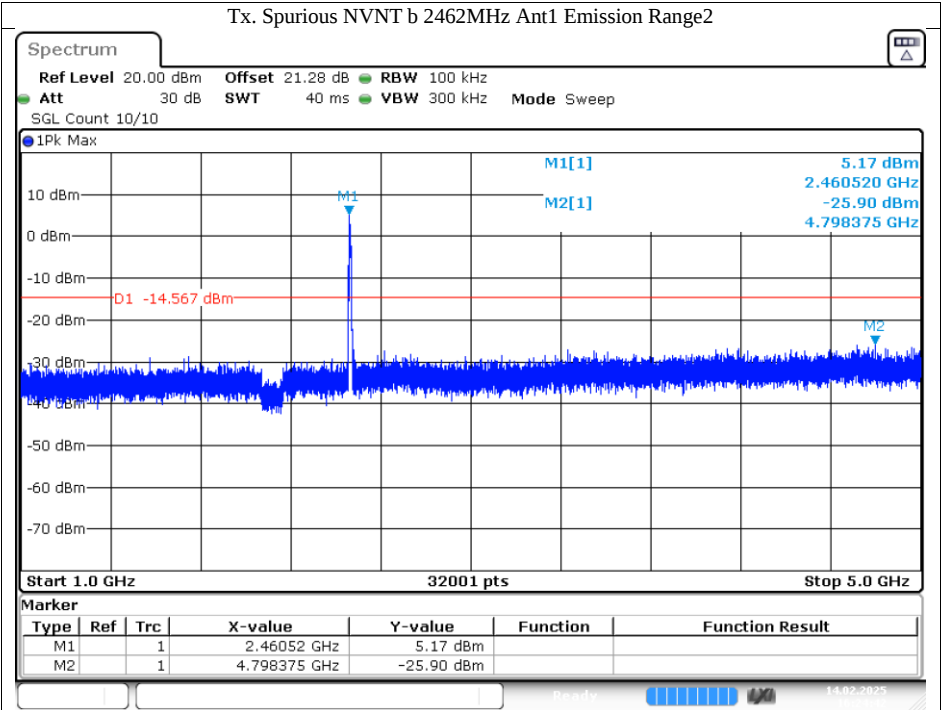
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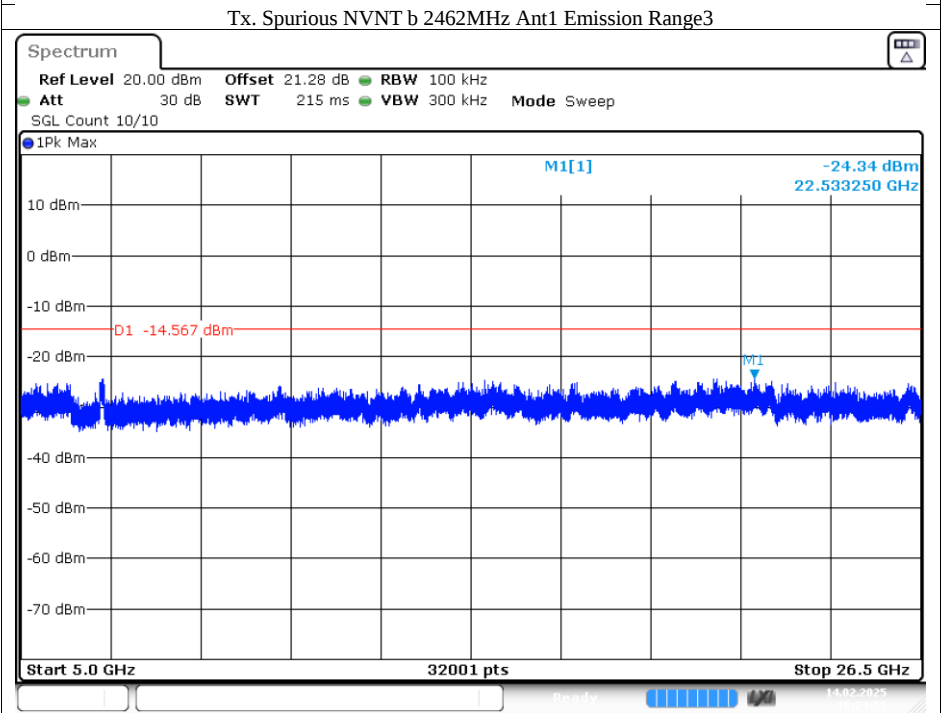
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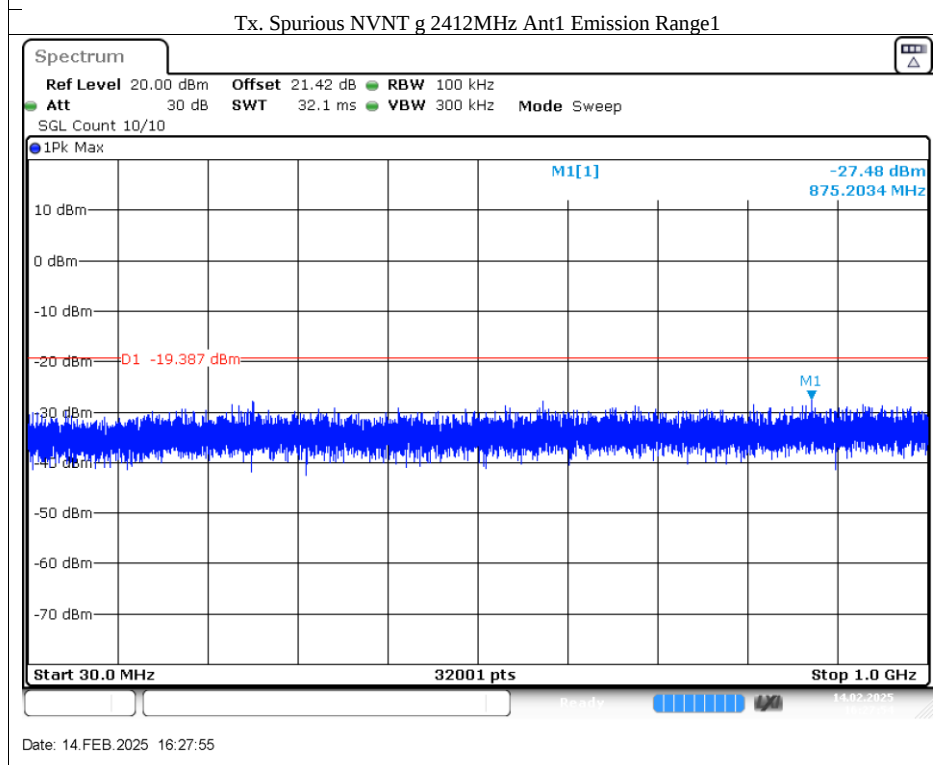
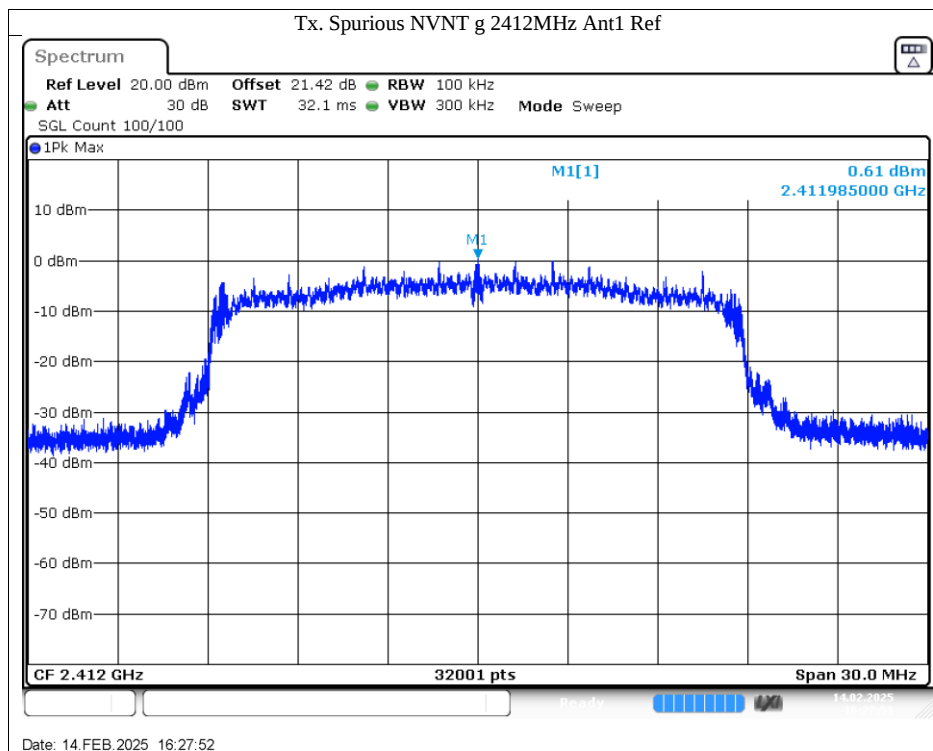
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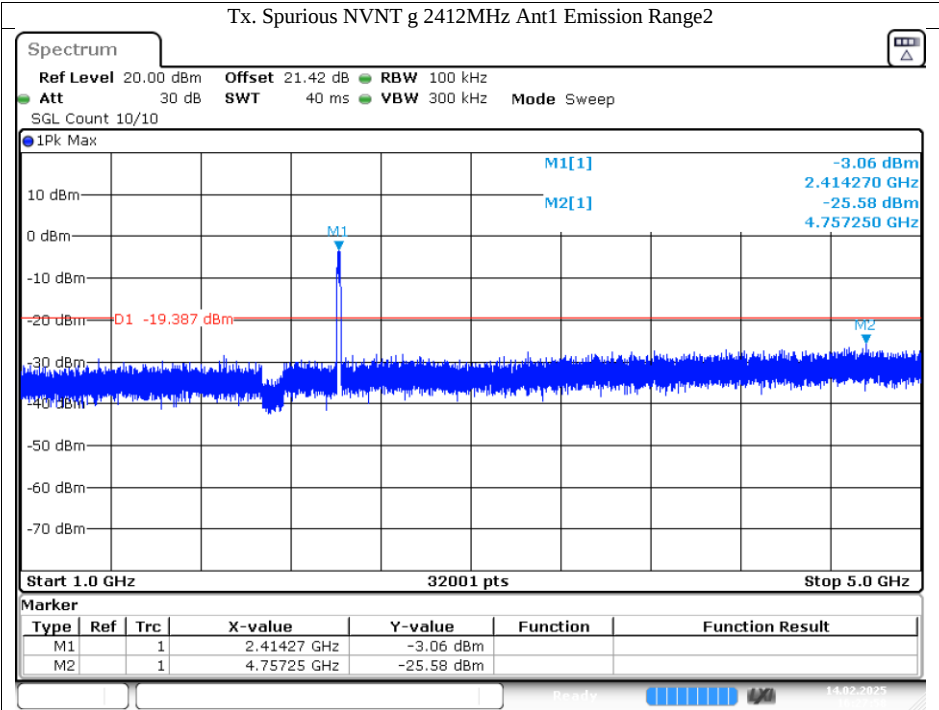


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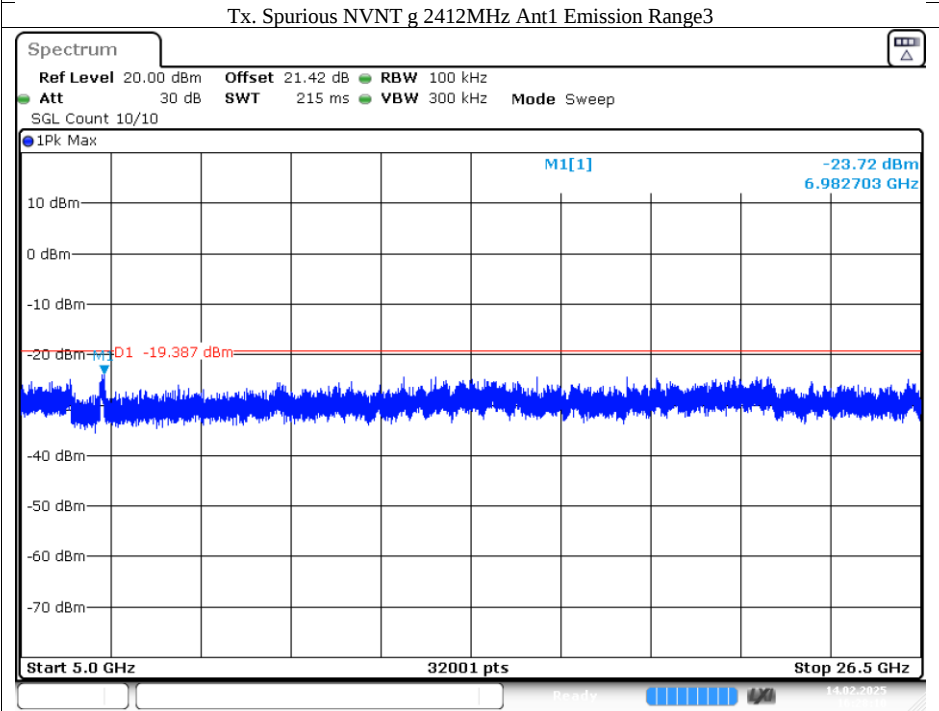


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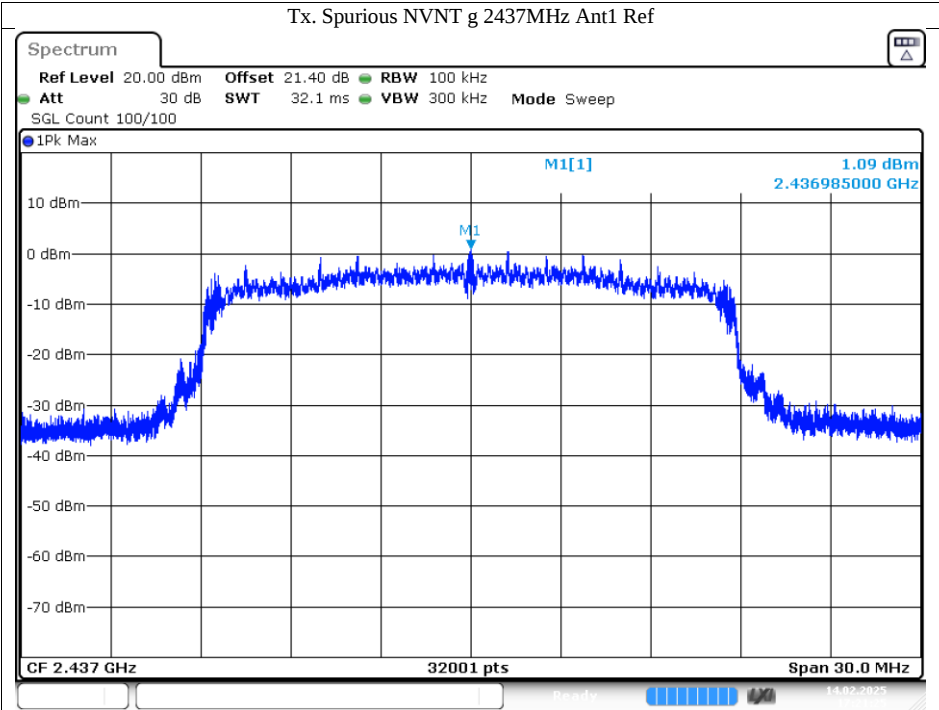




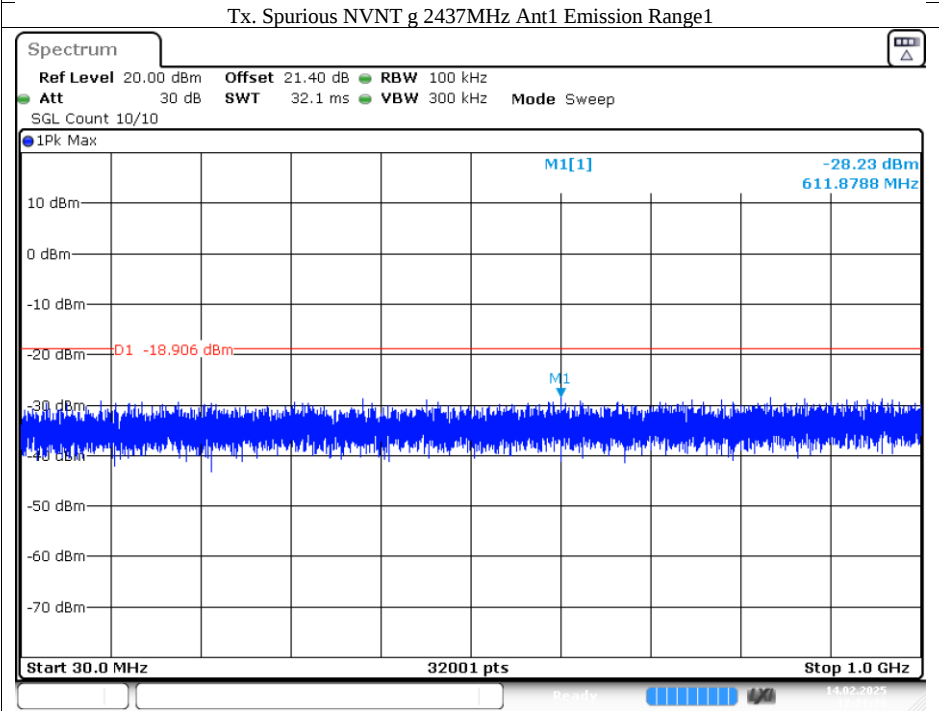
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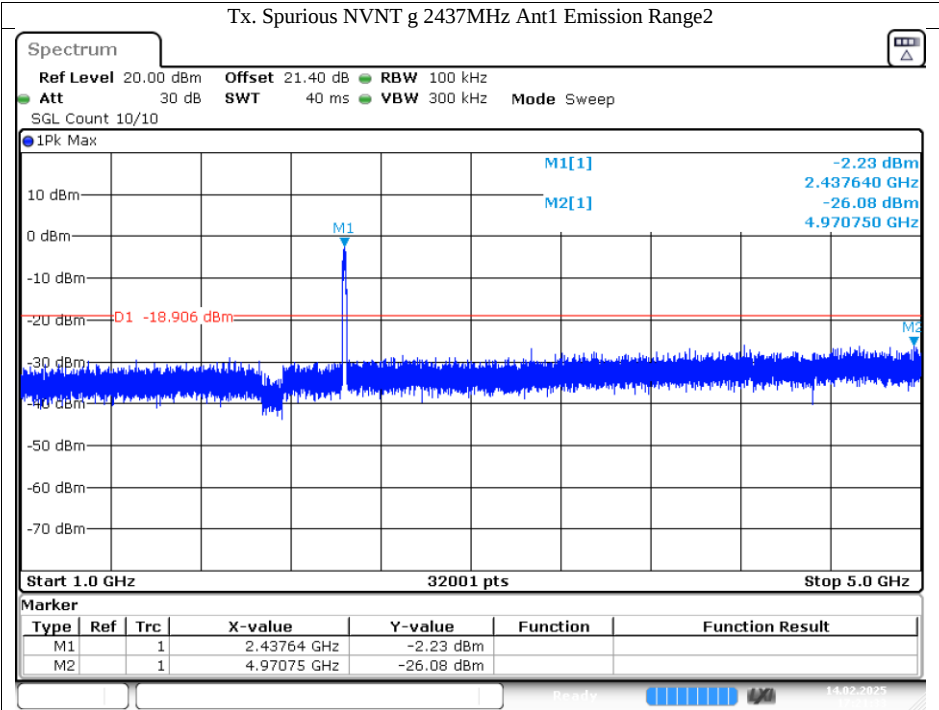
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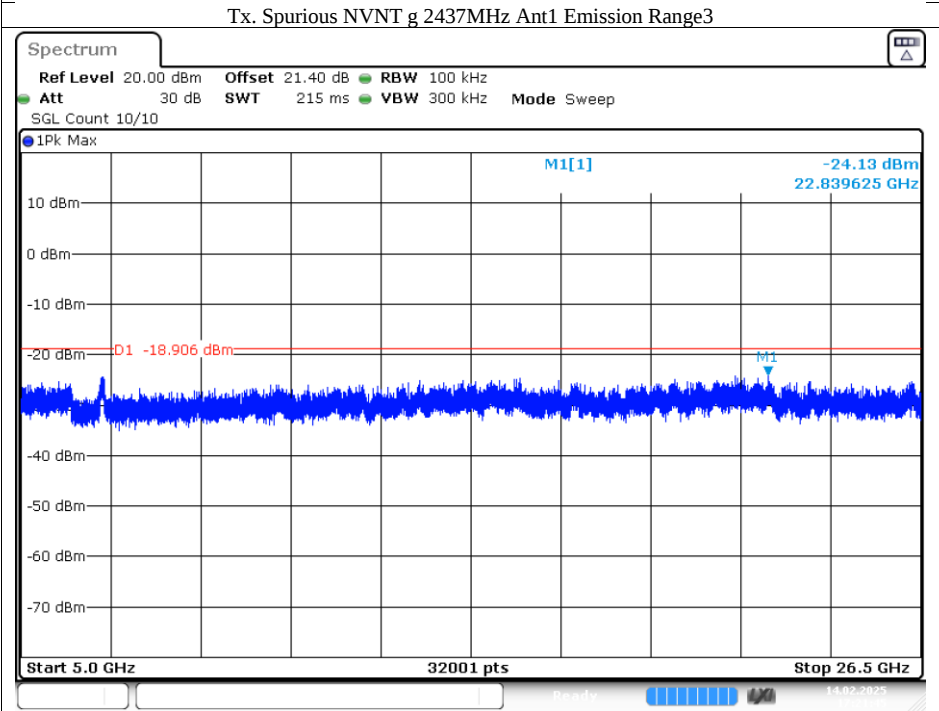
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Date: 14.FEB.2025 17:21:45

