



FCC - TEST REPORT

Report Number : **4842024420600A** Date of Issue: 2025.04.07

Model : THP23-ZB-X, THP23-ZB-P, THP23-ZB-X-Vx, THP23-ZB-Vx,
THP23-M-X, THP23-M-Vx ("x" represents 1, 2, 3.....)

Product Type : Smart M Gateway

Applicant : Zhejiang Lingzhu Technology Co., Ltd.

Address : Room 302, No 1 Building Huace Center, Xihu District 310000,
Hangzhou City, Zhejiang Province, PEOPLE'S REPUBLIC OF
CHINA

Manufacturer : Zhejiang Lingzhu Technology Co., Ltd.

Address : Room 302, No 1 Building Huace Center, Xihu District 310000,
Hangzhou City, Zhejiang Province, PEOPLE'S REPUBLIC OF
CHINA

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

Total pages including
Appendices : 111



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2 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2025.04.07



3 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

Telephone: +86 510 8820 3737
Fax: +86 510 8820 3636

4 Description of the Equipment under Test

Product: Smart M Gateway

PMN / HVIN / Model no.: THP23-ZB-X, THP23-ZB-P, THP23-ZB-X-Vx, THP23-ZB-Vx, THP23-M-X, THP23-M-Vx ("x" represents 1, 2, 3.....)

FCC ID: 2BEWXTHP23

Rating: Gateway Input: DC 5V, 2A (Type C Port); DC 48V, 0.35A (PoE Port)
Adapter Input: 100-240V~, 50/60Hz, 0.4A (for model KA12H-0502000US);
100-240V~, 50/60Hz, 0.3A (for model TPA-10D050200UU01)
Adppter Output: DC 5.0V, 2.0A, 10W

RF Transmission Frequency: 2.4G Wi-Fi: 802.11b/g/n-HT20: 2412~2462 MHz

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

Modulation: Direct Sequence Spread Spectrum (DSSS) for 802.11b
Orthogonal Frequency Division Multiplexing (OFDM) for 802.11g/n(HT20)

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		

Hardware Version: V1.3.0

Software Version: V1.0.4

Antenna Type: Built-in antenna

Antenna Gain: 2.78dBi

Description of the EUT: The Equipment Under Test (EUT) is a Smart M Gateway which support 2.4GHz & 5GHz Wi-Fi, Low Energy Bluetooth (1Mbps data rate) and Zigbee function. We tested it and listed the worst data in this report. The gateway can normally be powered by two different models of adapters: KA12H-0502000US and TPA-10D050200UU01. Additionally, the gateway can also be powered via its PoE (Power over Ethernet) port. According to the client's declaration, all models of the gateway have the same wireless parameters and electrical structures. In this report, only model THP23-ZB-X was chosen to perform test.

Test sample no.: WUX-0877560-006

Remark

This report is only for 2.4G Wi-Fi

Title: DTS Test Report
Revision: 02
Effective date: 2024-08-01

ID-Number: EMC_WUX_F_25.34E
Author: Ming GU

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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



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.



5 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).

6 Summary of Test Results

Technical Requirements						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	13-19	Site 1	☒	☐	☐
§15.247 (b) (3)	Conducted peak output power	20-21	Site 1	☒	☐	☐
§15.247(a)(1)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Dwell Time	---	---	☐	☐	☒
§15.247(a)(2)	6dB bandwidth and 99% Occupied Bandwidth	22-30	Site 1	☒	☐	☐
§15.247(e)	Power spectral density	31-35	Site 1	☒	☐	☐
§15.247(d)	Spurious RF conducted emissions	36-49	Site 1	☒	☐	☐
§15.247(d)	Band edge	50-55	Site 1	☒	☐	☐
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	56-106	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a Built-in antenna, which gain is 2.78dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.



7 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2BEWXTHP23, complies with Section 15.207,15.209,15.231,15.247 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 7 were

■ - Performed

□ - **Not** Performed

The Equipment under Test

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

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

Sample Received Date: 2025.01.02

Testing Start Date: 2025.01.06

Testing End Date: 2025.02.27

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

Reviewed by:

Zhilan Xue
Project Manager

Prepared by:

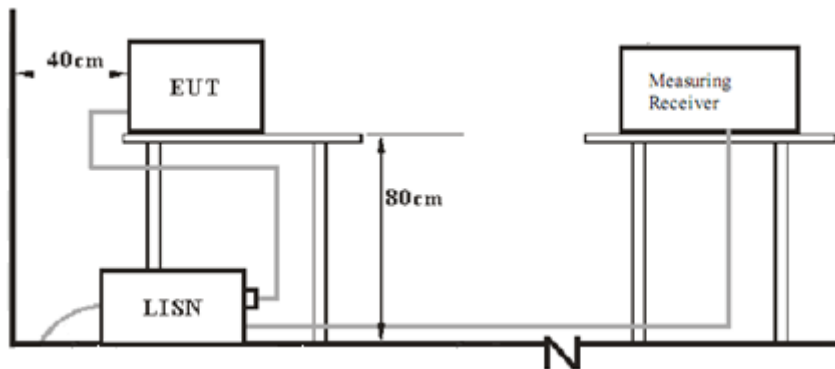
Xin Feng
Project Engineer

Tested by:

Xu Zheng
Test Engineer

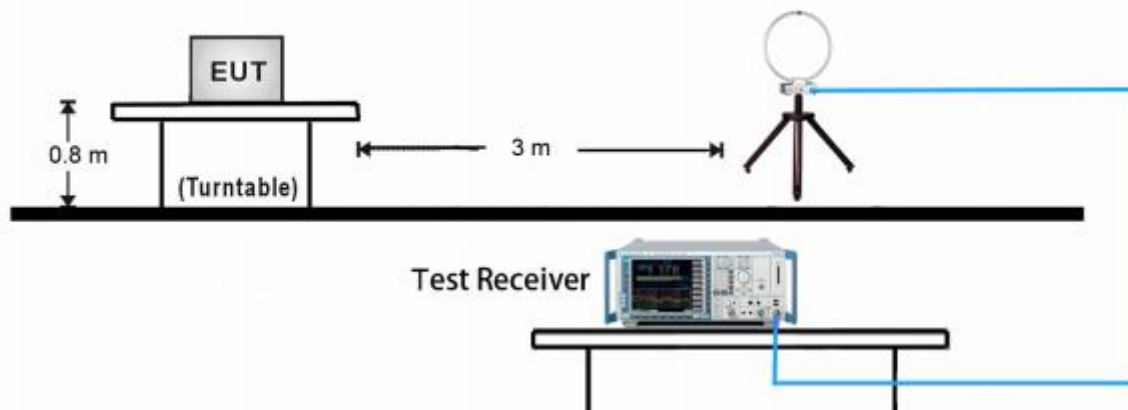
8 Test Setups

7.1 AC Power Line Conducted Emission test setups

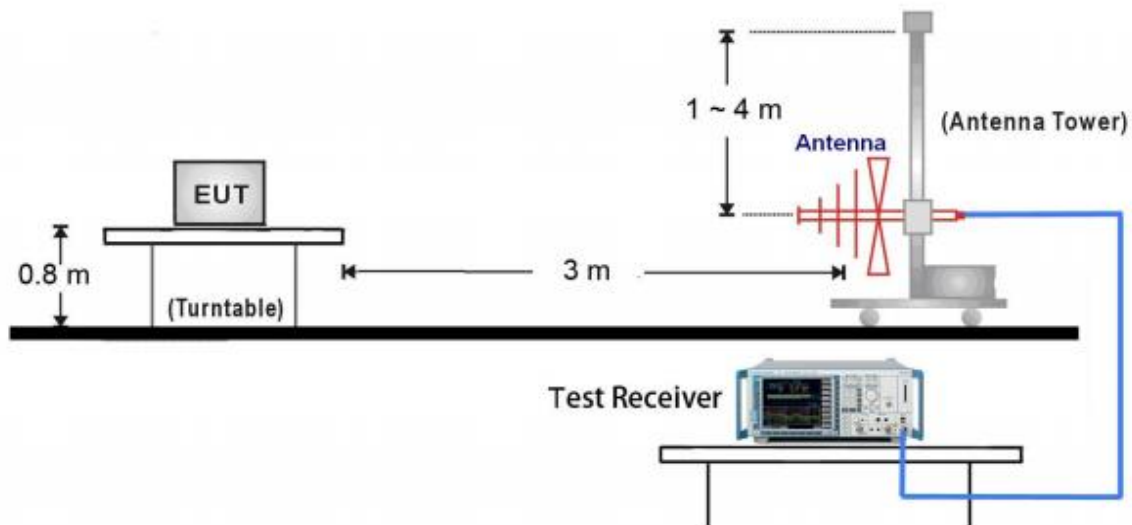


7.2 Radiated test setups

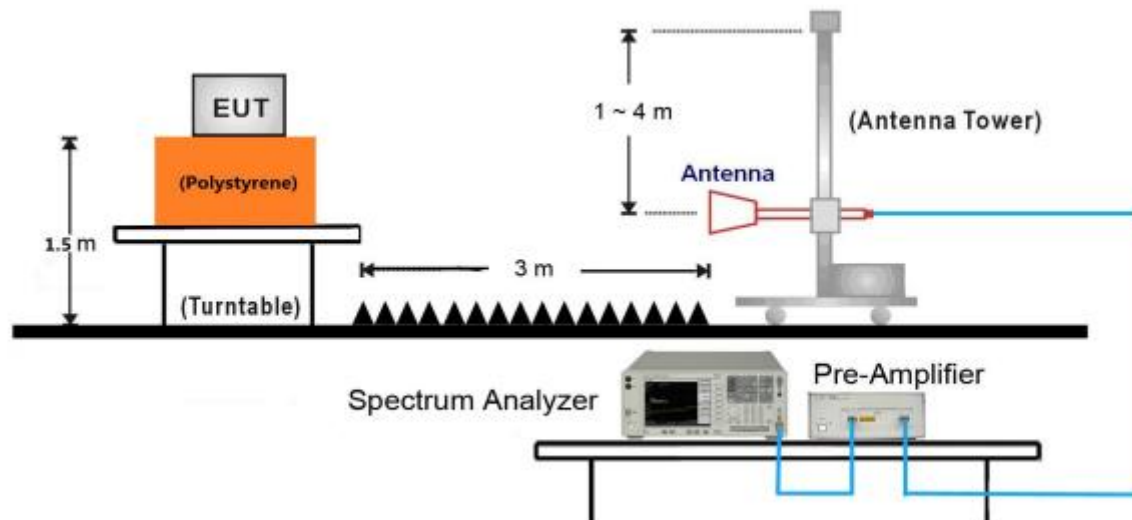
9kHz ~ 30MHz Test Setup:



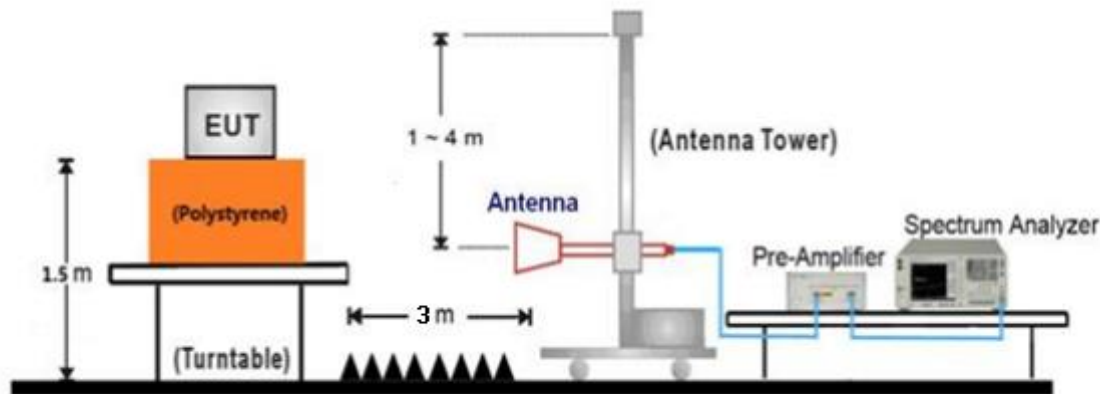
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:

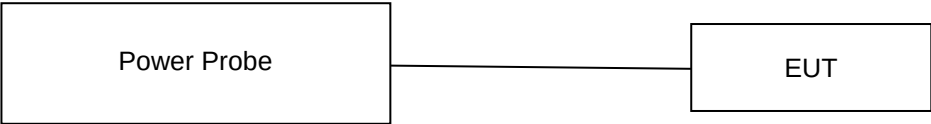


18GHz ~ 25GHz Test Setup:



7.3 Conducted RF test setups

For Conducted peak output power



For other test items



9 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Huawei	VLT-W50	2018AP1231

Test software: sscom5.13.1

Test Mode Applicability and Tested Channel Detail:

Mode	Tested Channel	Data Rate	Modulation	Power level setting (Index Value)
802.11b	1	1 Mbps	DSSS	16
	6			16
	11			16
802.11g	1	6 Mbps	OFDM	12
	6			12
	11			12
802.11n HT20	1	MCS0 (6.5Mbps)	OFDM	12
	6			12
	11			12

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.

10 Technical Requirement

10.1 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

According to §15.207, conducted emissions limit as below:

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

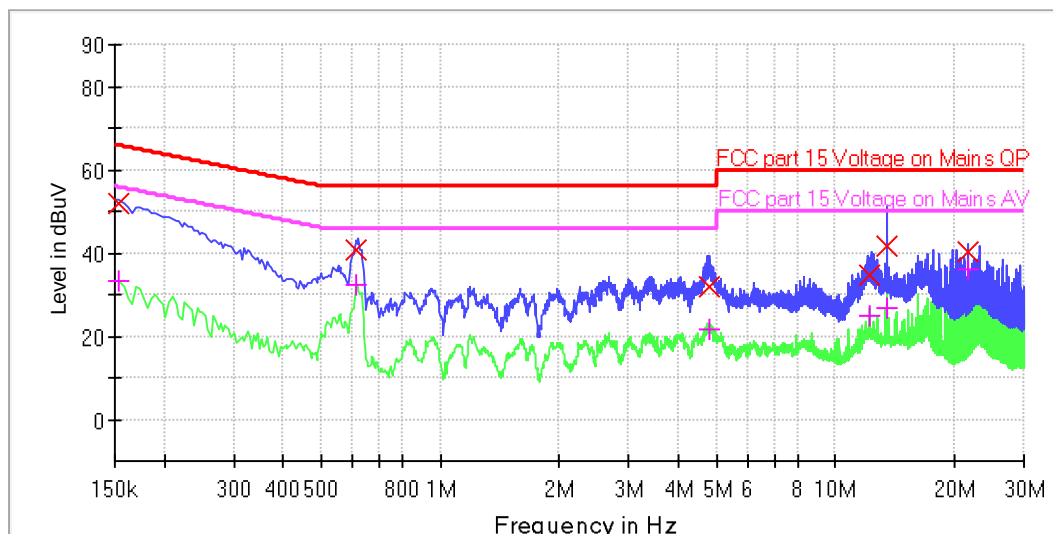
EUT Information

EUT: Smart M Gateway
Model: THP23-ZB-X
Client: Zhejiang Lingzhu Technology Co., Ltd
Operating Conditions: Power on, 2.4G Wi-Fi transmitting, 802.11G 2462MHz
Operator Name: Xu Zheng
Input: AC 120V 60Hz
Test Standard: FCC Part 15.207(a)
Comment: Phase L, Adapter Model: TPA-10D050200UU01
Sample No.: WUX-0877560-006

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

**Limit and Margin**

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.154000	51.7	33.3	1000.0	9.000	10.6	14.1	65.8	22.5	55.8
0.614000	40.8	32.3	1000.0	9.000	10.5	15.2	56.0	13.7	46.0
4.798000	32.1	21.6	1000.0	9.000	10.6	23.9	56.0	24.4	46.0
12.198000	34.6	24.8	1000.0	9.000	10.9	25.4	60.0	25.2	50.0
13.562000	41.9	26.8	1000.0	9.000	10.9	18.1	60.0	23.2	50.0
21.662000	40.1	36.1	1000.0	9.000	11.1	19.9	60.0	14.0	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

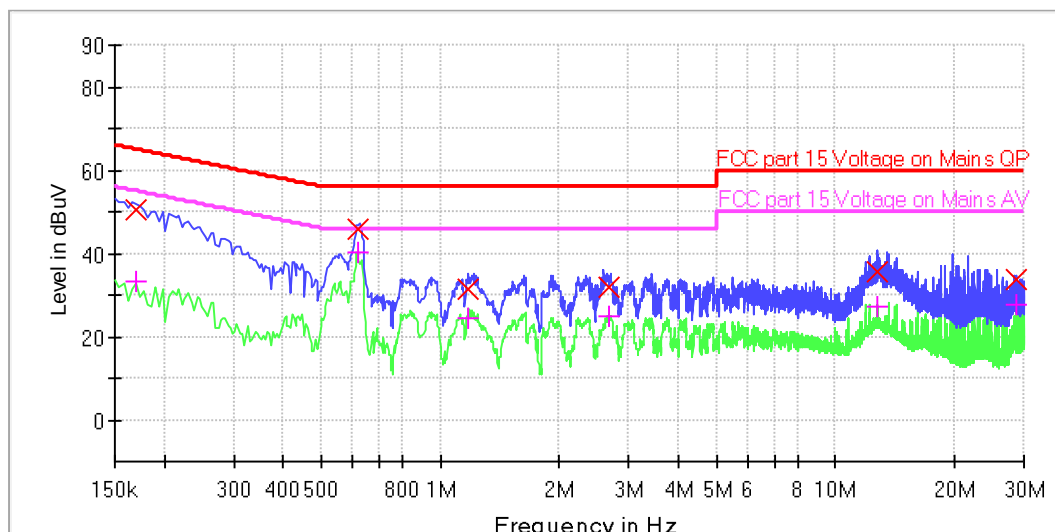
EUT Information

EUT: Smart M Gateway
Model: THP23-ZB-X
Client: Zhejiang Lingzhu Technology Co., Ltd
Operating Conditions: Power on, 2.4G Wi-Fi transmitting, 802.11G 2462MHz
Operator Name: Xu Zheng
Input: AC 120V 60Hz
Test Standard: FCC Part 15.207(a)
Comment: Phase N, Adapter Model: TPA-10D050200UU01
Sample No.: WUX-0877560-006

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



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.170000	50.5	33.1	1000.0	9.000	10.6	14.4	65.0	21.8	55.0
0.618000	46.0	40.1	1000.0	9.000	10.5	10.0	56.0	6.0	46.0
1.178000	31.3	24.3	1000.0	9.000	10.5	24.7	56.0	21.7	46.0
2.670000	31.7	24.7	1000.0	9.000	10.6	24.3	56.0	21.3	46.0
12.746000	35.5	27.1	1000.0	9.000	10.9	24.6	60.0	22.9	50.0
28.562000	33.5	27.8	1000.0	9.000	11.4	26.5	60.0	22.2	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

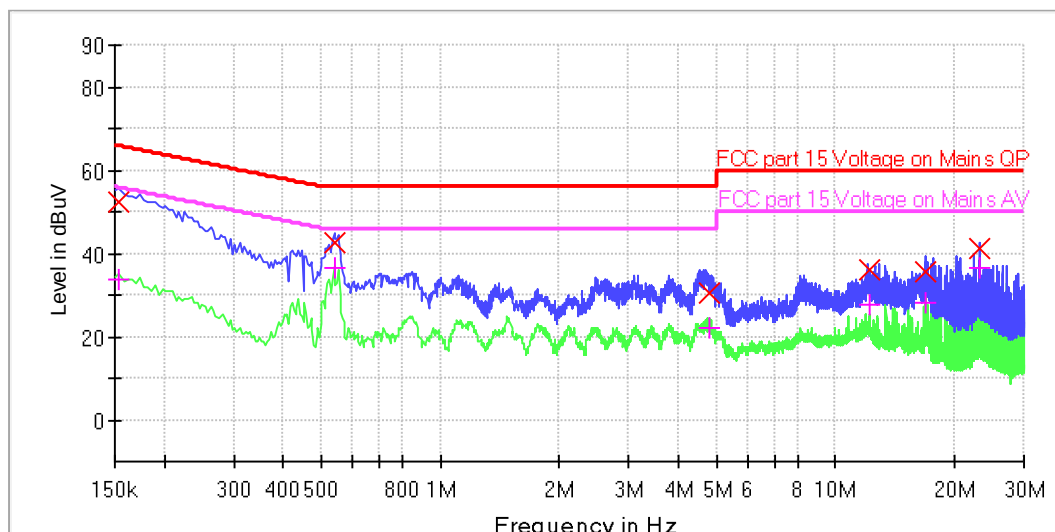
EUT Information

EUT: Smart M Gateway
Model: THP23-ZB-X
Client: Zhejiang Lingzhu Technology Co., Ltd
Operating Conditions: Power on, 2.4G Wi-Fi transmitting, 802.11G 2462MHz
Operator Name: Xu Zheng
Input: AC 120V 60Hz
Test Standard: FCC Part 15.207(a)
Comment: Phase L, Adapter Model: KA12H-0502000US
Sample No.: WUX-0877560-006

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



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.154000	52.5	33.7	1000.0	9.000	10.6	13.3	65.8	22.1	55.8
0.538000	42.7	36.7	1000.0	9.000	10.5	13.3	56.0	9.3	46.0
4.810000	30.7	22.3	1000.0	9.000	10.6	25.3	56.0	23.7	46.0
12.138000	35.9	27.8	1000.0	9.000	10.9	24.1	60.0	22.2	50.0
16.898000	35.4	28.1	1000.0	9.000	11.0	24.6	60.0	21.9	50.0
23.130000	41.1	36.5	1000.0	9.000	11.2	19.0	60.0	13.5	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

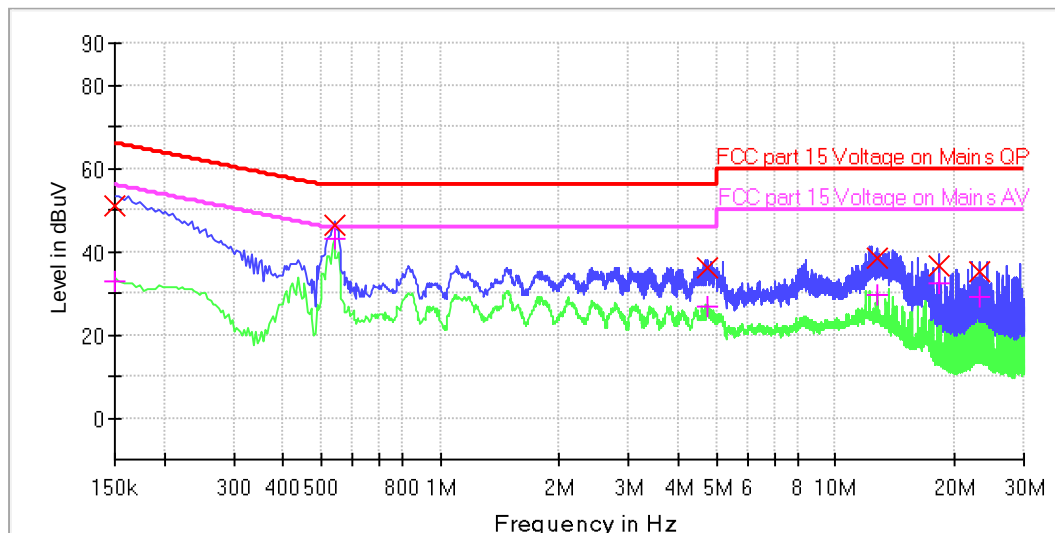
EUT Information

EUT: Smart M Gateway
Model: THP23-ZB-X
Client: Zhejiang Lingzhu Technology Co., Ltd
Operating Conditions: Power on, 2.4G Wi-Fi transmitting, 802.11G 2462MHz
Operator Name: Xu Zheng
Input: AC 120V 60Hz
Test Standard: FCC Part 15.207(a)
Comment: Phase N, Adapter Model: KA12H-0502000US
Sample No.: WUX-0877560-006

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



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.150000	51.1	32.8	1000.0	9.000	10.6	15.0	66.0	23.2	56.0
0.538000	46.1	43.0	1000.0	9.000	10.5	9.9	56.0	3.0	46.0
4.730000	35.9	26.9	1000.0	9.000	10.6	20.1	56.0	19.1	46.0
12.746000	38.5	29.6	1000.0	9.000	10.9	21.5	60.0	20.4	50.0
18.242000	36.5	32.1	1000.0	9.000	11.0	23.5	60.0	17.9	50.0
23.066000	35.1	28.9	1000.0	9.000	11.2	24.9	60.0	21.1	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

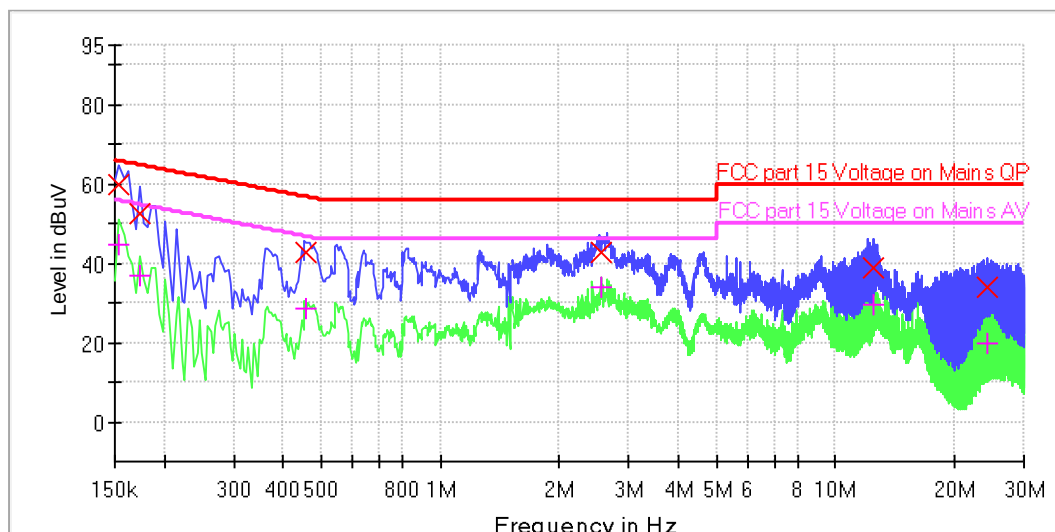
EUT Information

EUT: Smart M Gateway
Model: THP23-ZB-X
Client: Zhejiang Lingzhu Technology Co., Ltd
Operating Conditions: Power on, 2.4G Wi-Fi transmitting, 802.11G 2462MHz
Operator Name: Xu Zheng
Input: AC 120V 60Hz (for a network switch that provides PoE power supply)
Test Standard: FCC Part 15.207(a)
Comment: Phase L
Sample No.: WUX-0877560-006

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



Limit and Margin

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.154000	59.7	44.5	1000.0	9.000	10.1	6.1	65.8	11.3	55.8
0.174000	52.5	37.1	1000.0	9.000	10.1	12.2	64.8	17.7	54.8
0.458000	43.0	28.7	1000.0	9.000	10.1	13.8	56.7	18.0	46.7
2.546000	42.8	34.0	1000.0	9.000	10.2	13.2	56.0	12.0	46.0
12.466000	38.6	29.8	1000.0	9.000	10.5	21.4	60.0	20.2	50.0
24.242000	34.1	19.8	1000.0	9.000	10.7	25.9	60.0	30.2	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

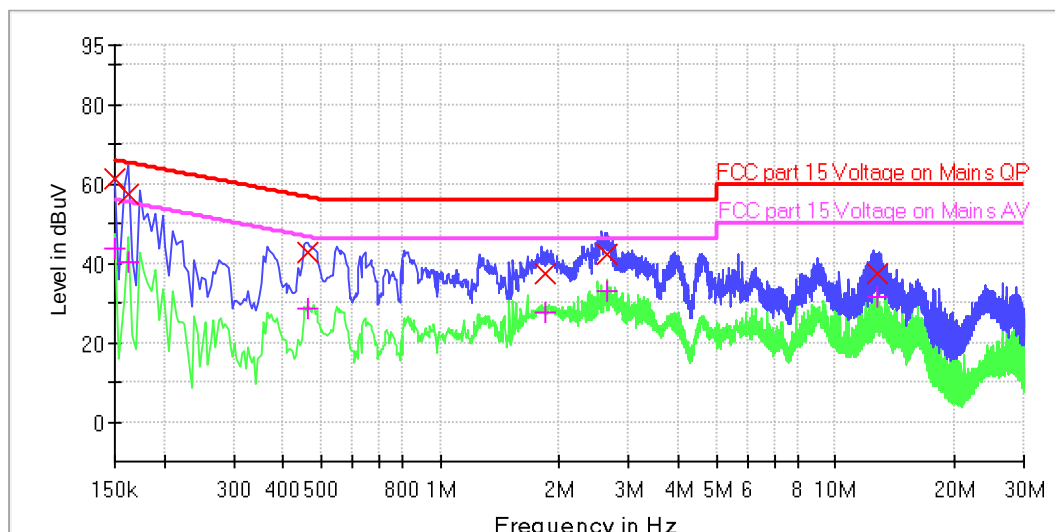
EUT Information

EUT: Smart M Gateway
Model: THP23-ZB-X
Client: Zhejiang Lingzhu Technology Co., Ltd
Operating Conditions: Power on, 2.4G Wi-Fi transmitting, 802.11G 2462MHz
Operator Name: Xu Zheng
Input: AC 120V 60Hz (for a network switch that provides PoE power supply)
Test Standard: FCC Part 15.207(a)
Comment: Phase N
Sample No.: WUX-0877560-006

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



Limit and Margin

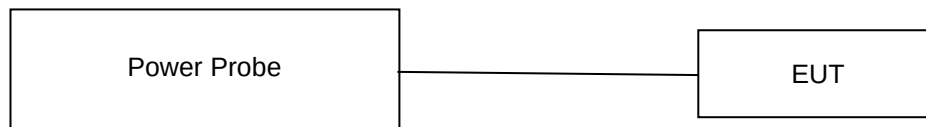
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBuV)	Margin - CAV (dB)	Limit - CAV (dBuV)
0.150000	61.1	43.8	1000.0	9.000	10.1	4.9	66.0	12.2	56.0
0.162000	57.2	40.2	1000.0	9.000	10.1	8.1	65.4	15.2	55.4
0.462000	42.7	28.3	1000.0	9.000	10.1	13.9	56.7	18.3	46.7
1.838000	37.3	27.7	1000.0	9.000	10.2	18.7	56.0	18.3	46.0
2.646000	42.3	33.0	1000.0	9.000	10.2	13.7	56.0	13.1	46.0
12.750000	37.5	31.6	1000.0	9.000	10.5	22.6	60.0	18.4	50.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + LISN Factor (dB) + 10dB Attenuator

10.2 Conducted peak output power

Test Method

- 1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
- 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
- 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- 4) Measure the peak power of the transmitter. This measurement is a peak over both the ON and OFF periods of the transmitter.



Power Probe conducted test setup

Limits

According to §15.247 (b) (3), conducted peak output power limit as below:

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

Test result as below table

802.11b Test Result

Data transmission Rate	Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)		
		Result	limit	Verdict
1Mbps	2412MHz	19.12	≤30	Pass
	2437MHz	18.62	≤30	Pass
	2462MHz	19.40	≤30	Pass

802.11g Test Result

Data transmission Rate	Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)		
		Result	limit	Verdict
6Mbps	2412MHz	22.33	≤30	Pass
	2437MHz	22.67	≤30	Pass
	2462MHz	23.02	≤30	Pass



802.11n20 Test Result

Data transmission Rate	Frequency (MHz)	Conducted Peak Output Power (dBm) §15.247 (b) (3)		
		Result	limit	Verdict
MCS0 (6.5Mbps)	2412MHz	22.15	≤30	Pass
	2437MHz	22.69	≤30	Pass
	2462MHz	22.84	≤30	Pass

10.3 6dB bandwidth and 99% Occupied Bandwidth

Test Method

1. Set RBW = shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.
2. Set the VBW $\geq [3 \times \text{RBW}]$.
3. Detector = peak.
RBW=100KHz, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Trace mode = max-hold.
5. Sweep = No faster than coupled (auto) time.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-6 dB down amplitude”. If a marker is below this “-6 dB down amplitude” value, then it shall be as close as possible to this value.

Test Method for 99 % Bandwidth

1. Use the following spectrum analyzer settings:
RBW=1% to 5% of the actual occupied, VBW $\geq$ 3RBW, Sweep = auto,
Detector function = peak, Trace = max hold
2. Use the occupied bandwidth measurement capability of test receiver.
3. Allow the trace to stabilize, record the occupied bandwidth value.

Limit

6dB bandwidth Limit [kHz]

99% bandwidth Limit [kHz]

 ≥ 500

--

Test result

802.11b Test Result

Data transmission rate	Frequency MHz	6dB bandwidth (MHz)		Result	99% occupied bandwidth MHz
		result	limit	verdict	
1Mbps	2412	10.119	≥ 0.5	Pass	14.018
	2437	10.170	≥ 0.5	Pass	14.099
	2462	10.116	≥ 0.5	Pass	13.988

802.11g Test Result

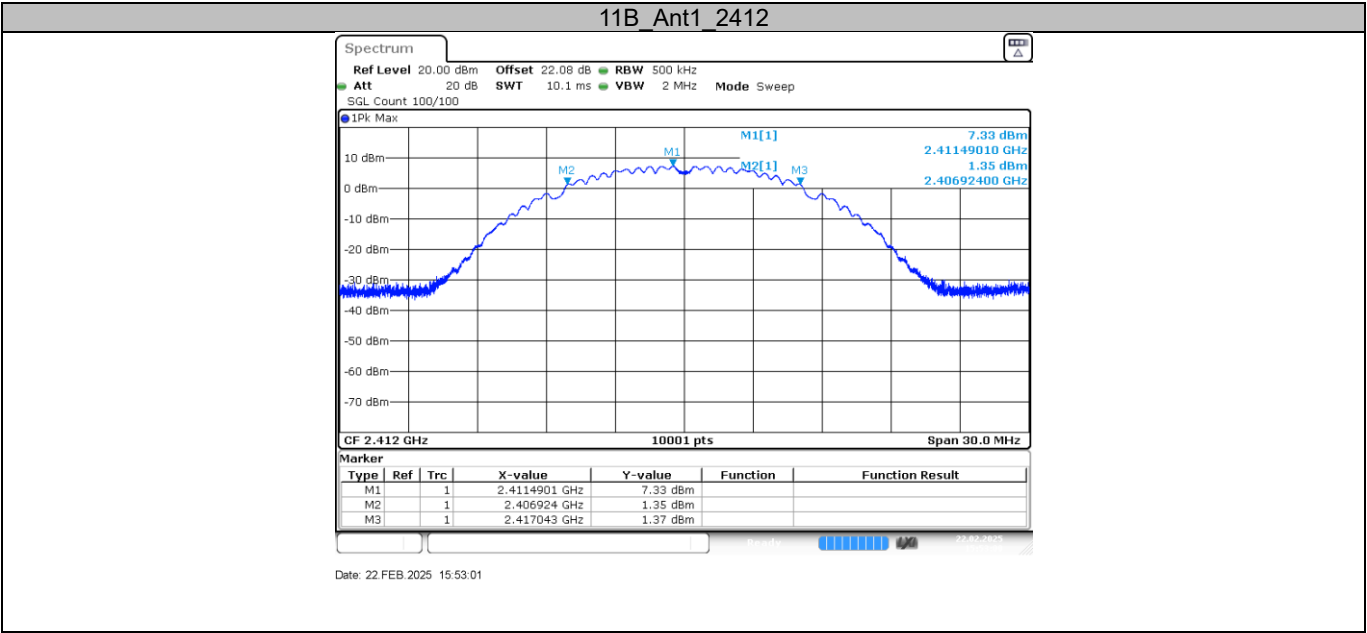
Data transmission rate	Frequency MHz	6dB bandwidth (MHz)		Result	99% occupied bandwidth MHz
		result	limit	verdict	
6Mbps	2412	16.326	≥ 0.5	Pass	16.510
	2437	16.257	≥ 0.5	Pass	16.519
	2462	16.311	≥ 0.5	Pass	16.507



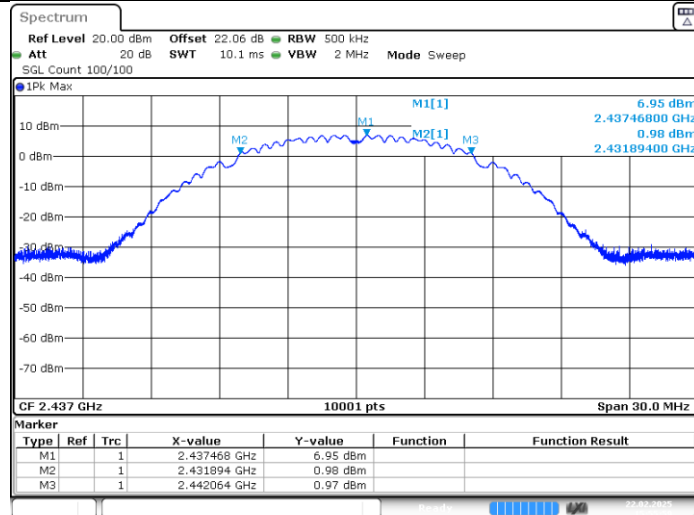
802.11n20 Test Result

Data transmission rate	Frequency MHz	6dB bandwidth (MHz)		Result	99% occupied bandwidth MHz
		result	limit	verdict	
MCS0 (6.5Mbps)	2412	17.502	≥0.5	Pass	17.653
	2437	17.502	≥0.5	Pass	17.653
	2462	17.529	≥0.5	Pass	17.656

6dB Bandwidth

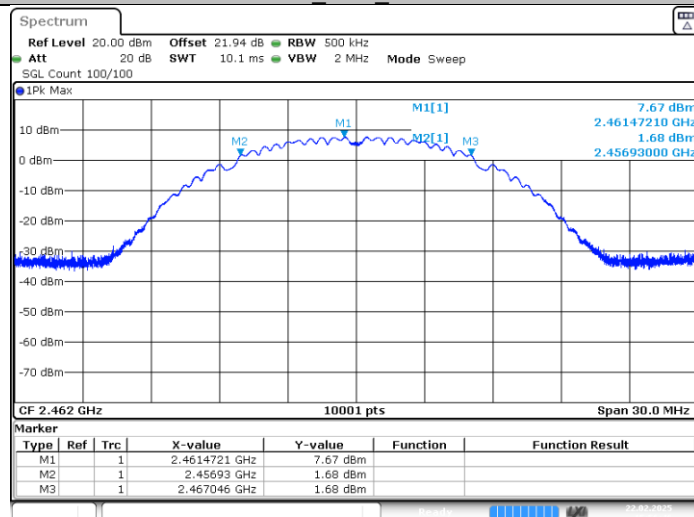


11B_Ant1_2437



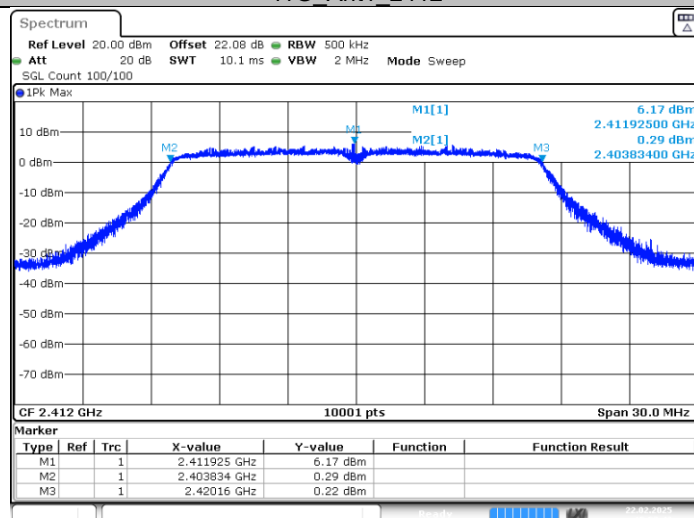
Date: 22 FEB 2025 15:55:59

11B_Ant1_2462



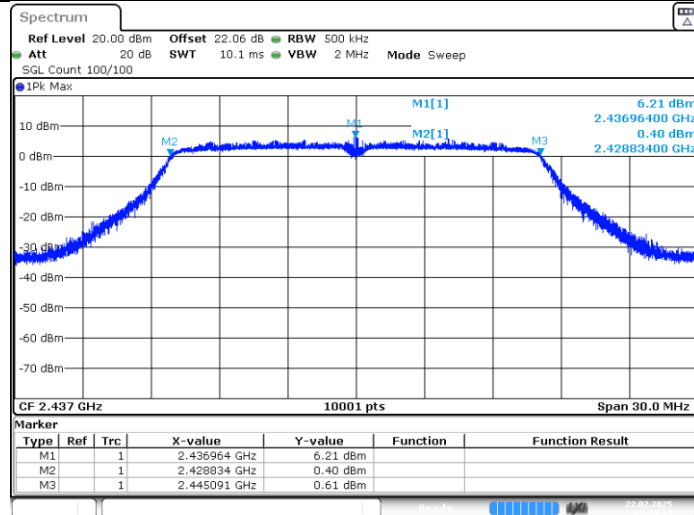
Date: 22 FEB 2025 15:56:47

11G_Ant1_2412



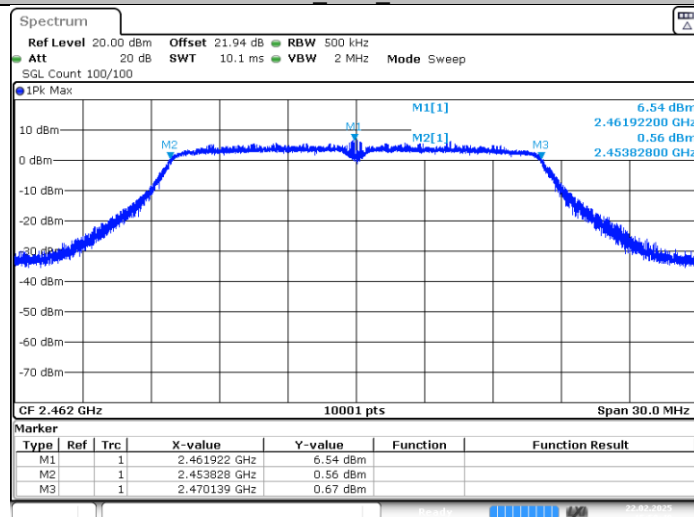
Date: 22 FEB 2025 15:57:44

11G_Ant1_2437



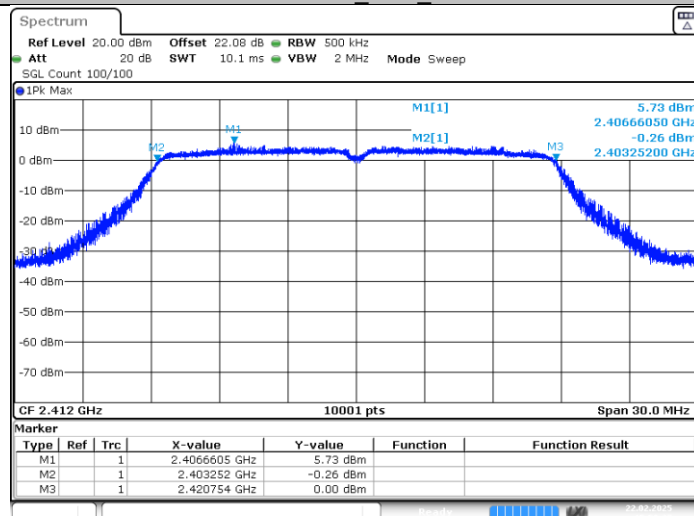
Date: 22 FEB 2025 15:58:14

11G_Ant1_2462



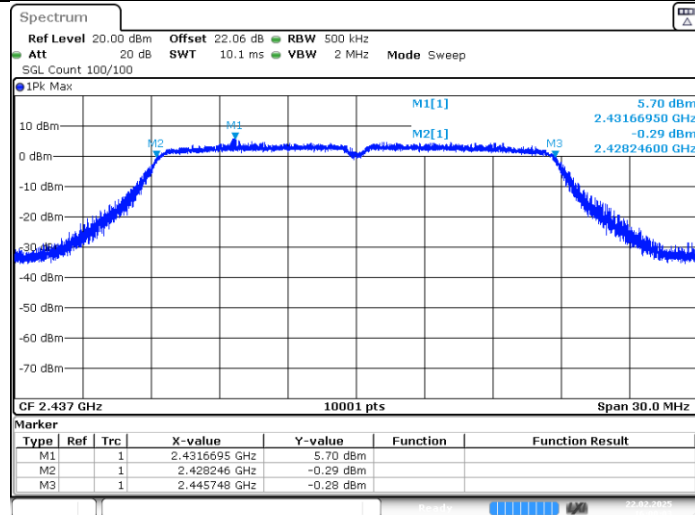
Date: 22 FEB 2025 15:58:39

11N20SISO_Ant1_2412



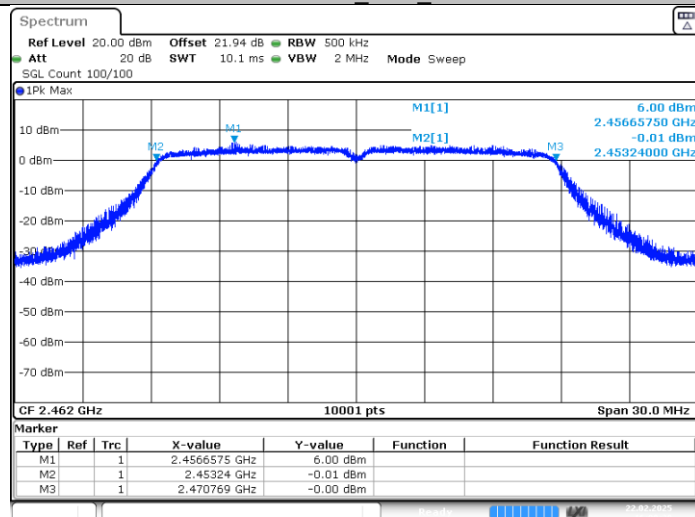
Date: 22 FEB 2025 15:59:28

11N20SISO_Ant1_2437



Date: 22 FEB 2025 16:00:03

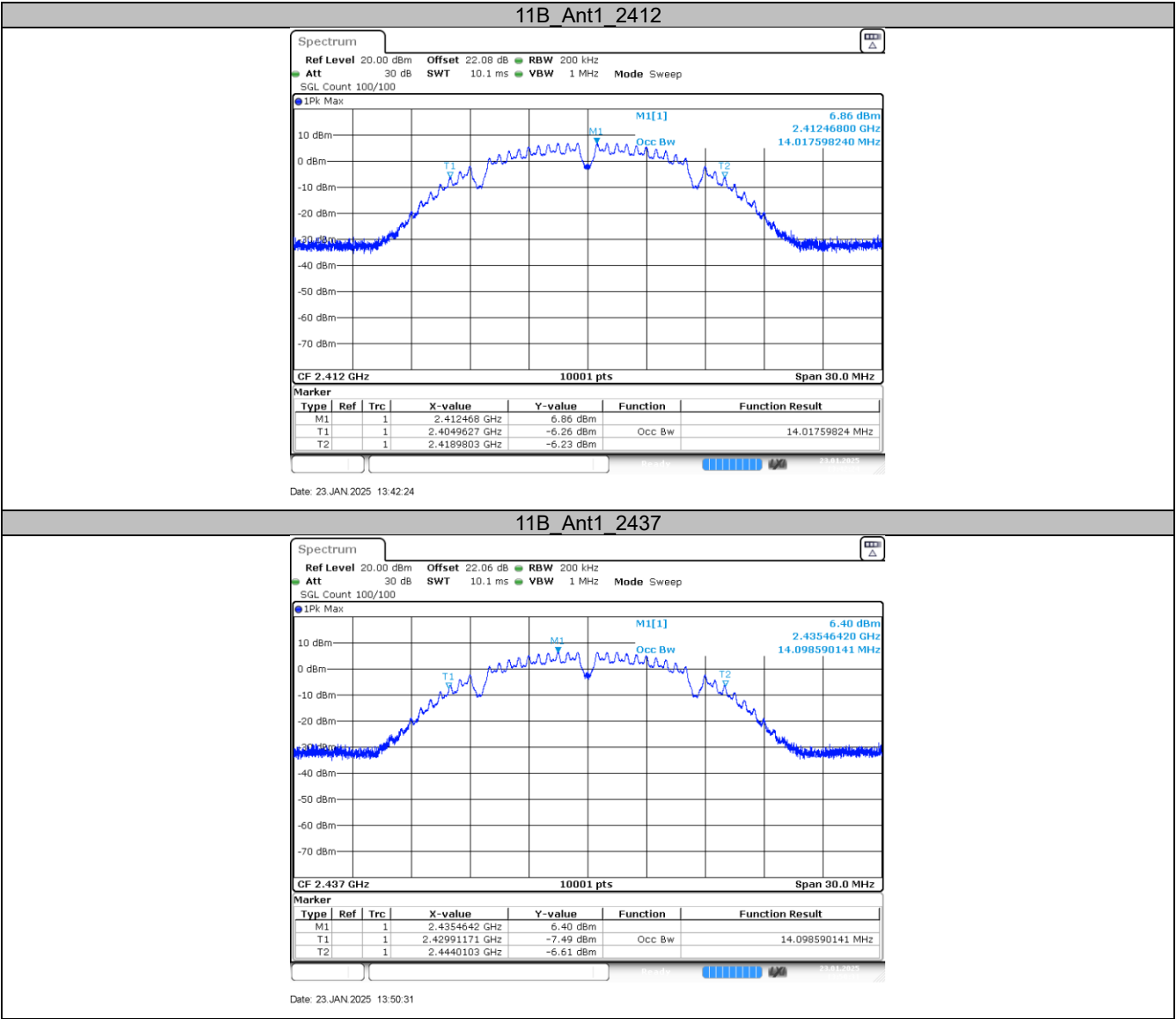
11N20SISO_Ant1_2462



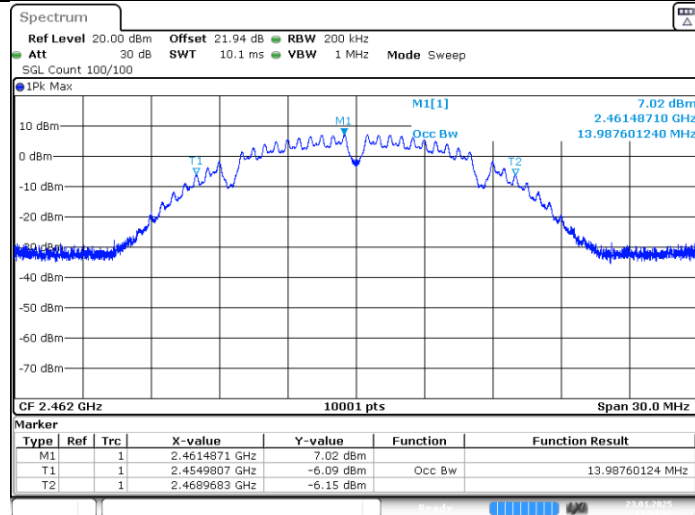
Date: 22 FEB 2025 16:00:28



99% Bandwidth

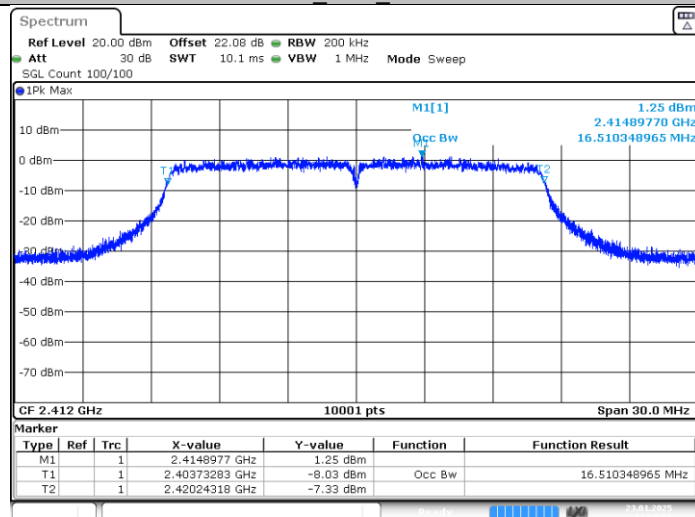


11B_Ant1_2462



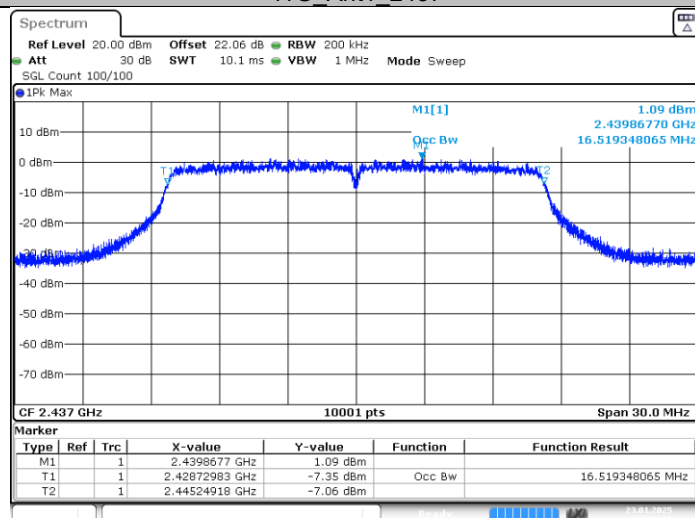
Date: 23. JAN. 2025 13:54:32

11G_Ant1_2412



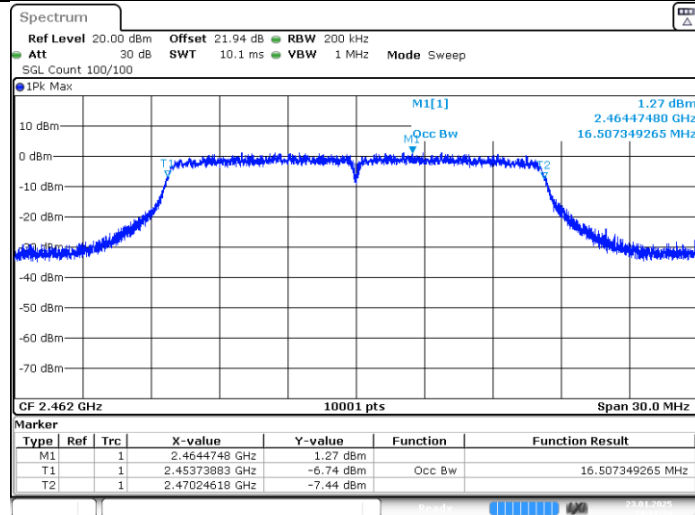
Date: 23. JAN. 2025 13:59:55

11G_Ant1_2437



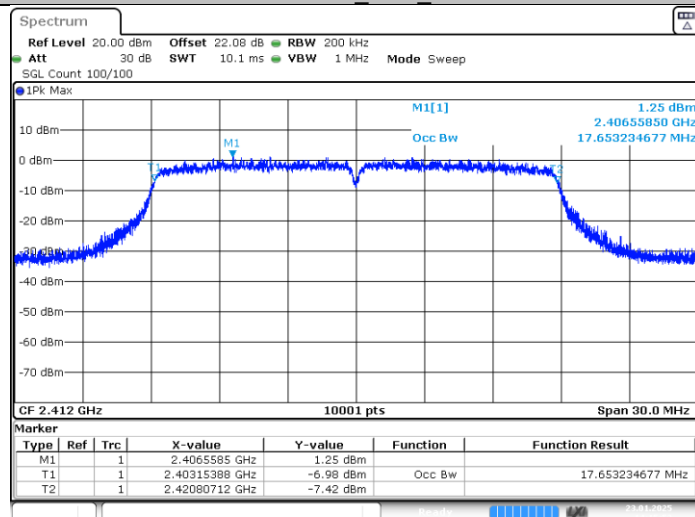
Date: 23. JAN. 2025 14:06:21

11G_Ant1_2462



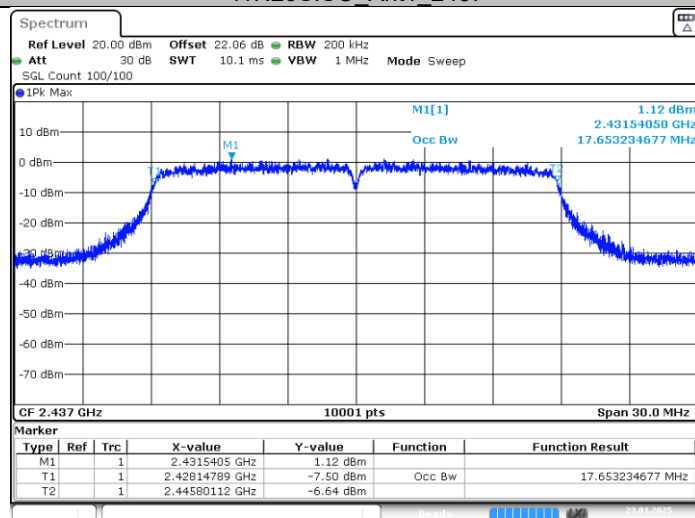
Date: 23 JAN 2025 14:11:24

11N20SISO_Ant1_2412

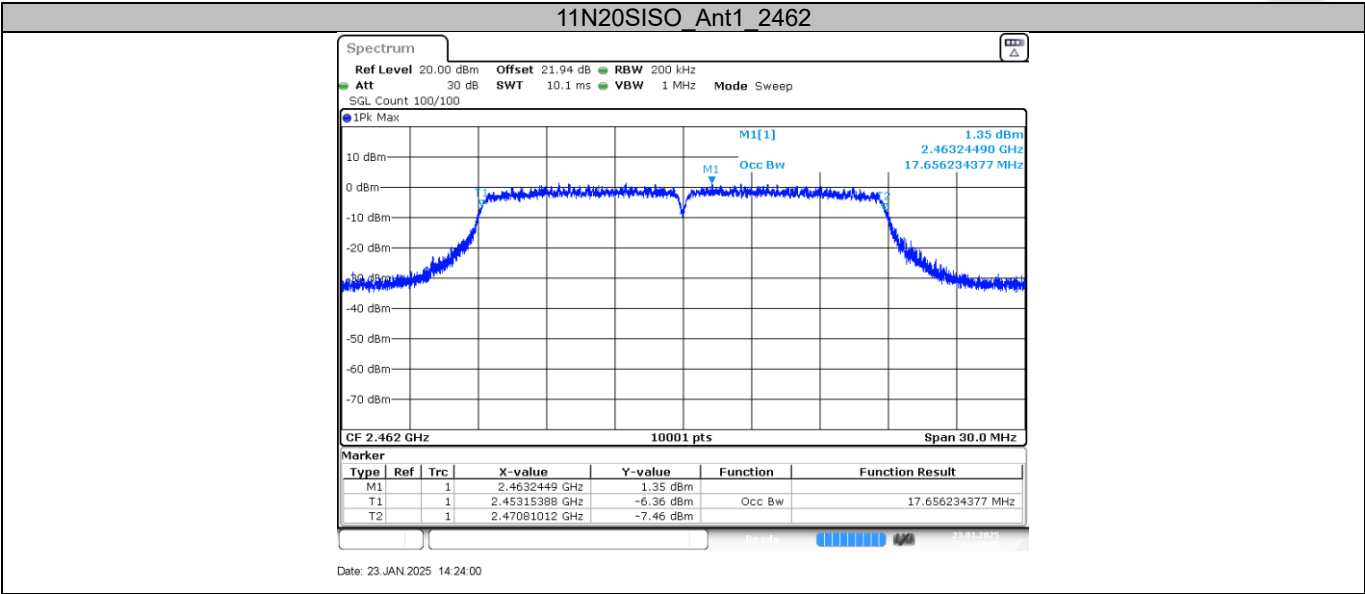


Date: 23 JAN 2025 14:15:54

11N20SISO_Ant1_2437



Date: 23 JAN 2025 14:21:01



10.4 Power spectral density

Test Method

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

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
4. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW $\geq$ 3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
5. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
6. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3kHz]

≤ 8

Test result

802.11b Test Result

Data transmission rate	Frequency (MHz)	Power spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Result
1Mbps	Low channel 2412MHz	-6.89	8	Pass
	Middle channel 2437MHz	-7.39	8	Pass
	High channel 2462MHz	-7.12	8	Pass

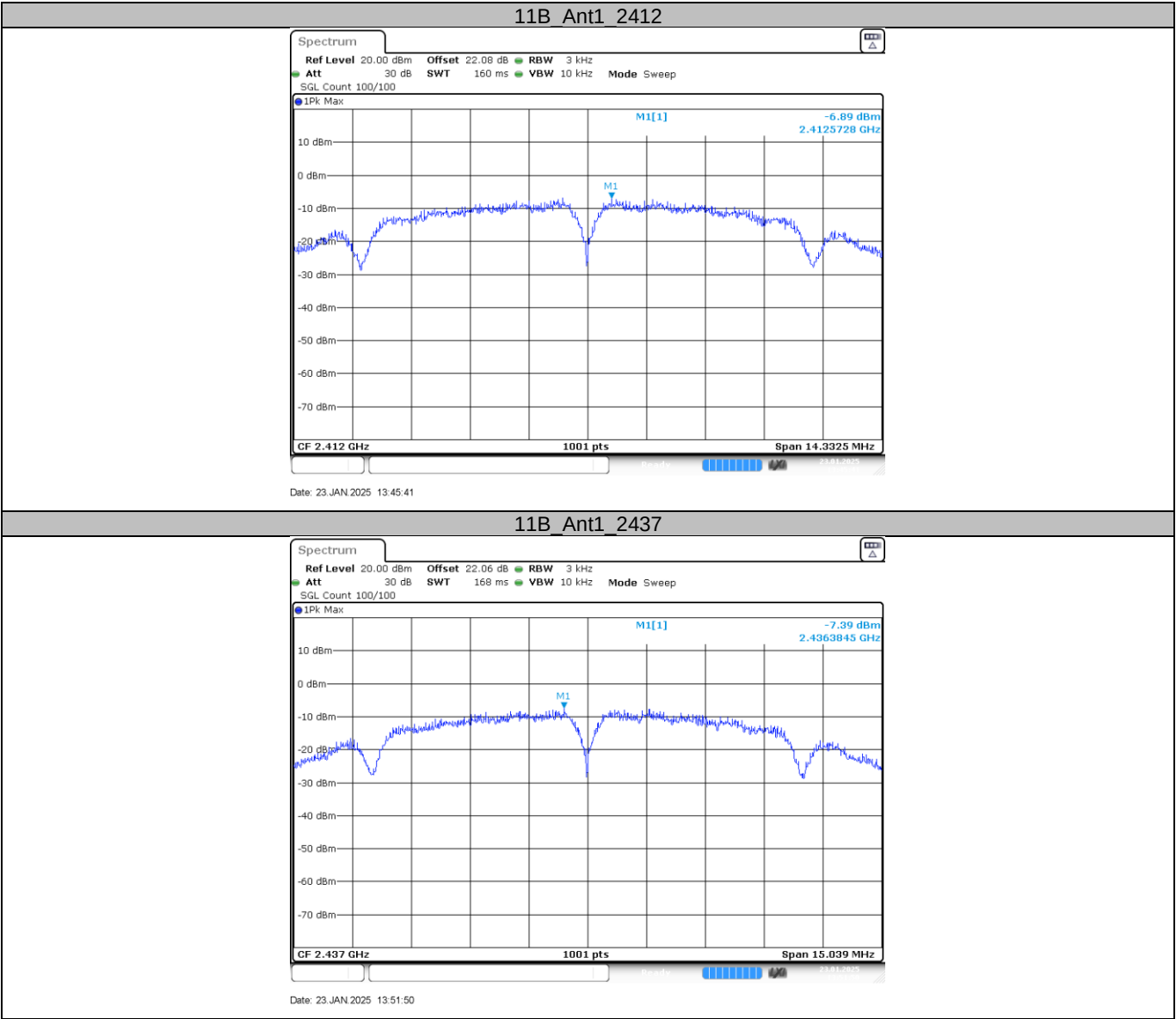
802.11g Test Result

Data transmission rate	Frequency (MHz)	Power spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Result
6Mbps	Low channel 2412MHz	-14.25	8	Pass
	Middle channel 2437MHz	-14.22	8	Pass
	High channel 2462MHz	-13.91	8	Pass

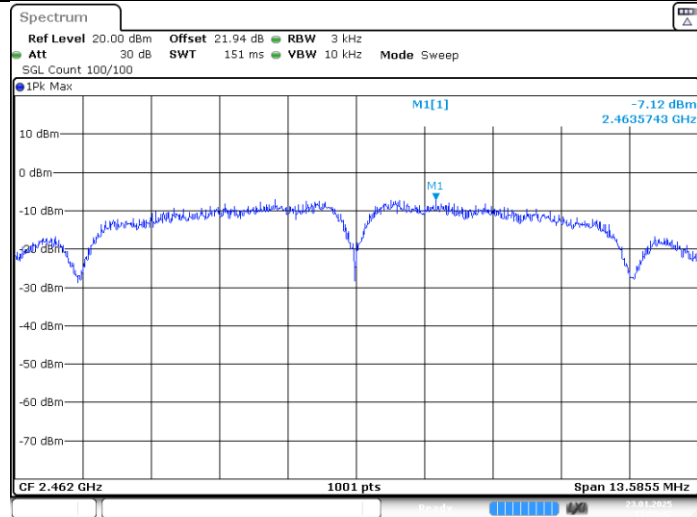


802.11n20 Test Result

Data transmission rate	Frequency (MHz)	Power spectral density (dBm/3kHz)	Limit (dBm/3kHz)	Result
MCS0 (6.5Mbps)	Low channel 2412MHz	-13.55	8	Pass
	Middle channel 2437MHz	-13.65	8	Pass
	High channel 2462MHz	-13.28	8	Pass

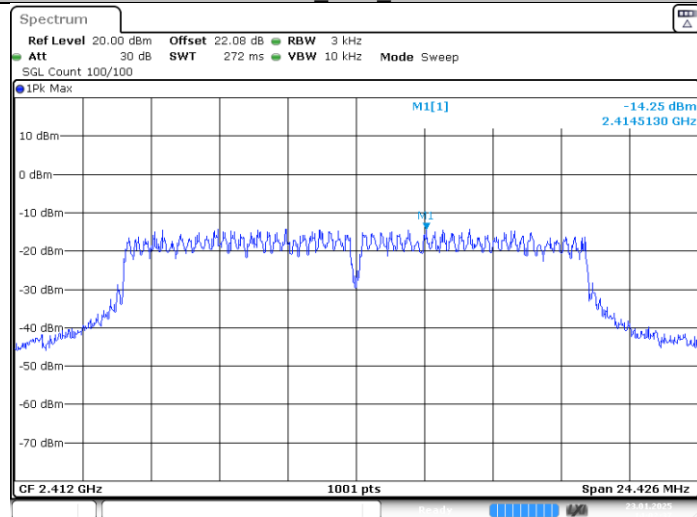


11B_Ant1_2462



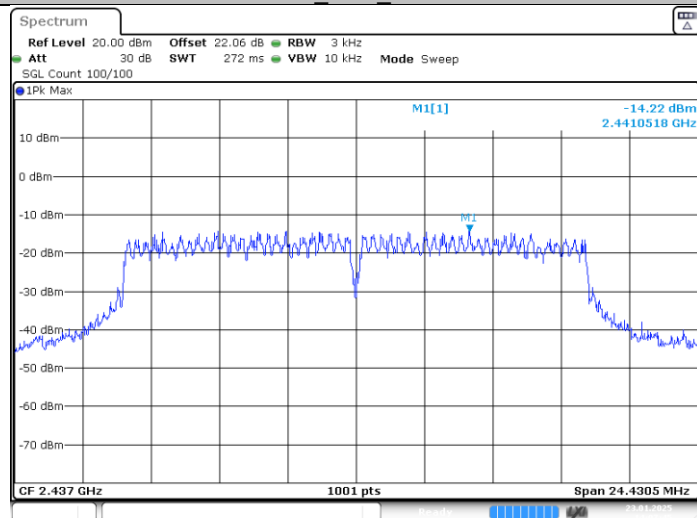
Date: 23. JAN. 2025 13:55:42

11G_Ant1_2412



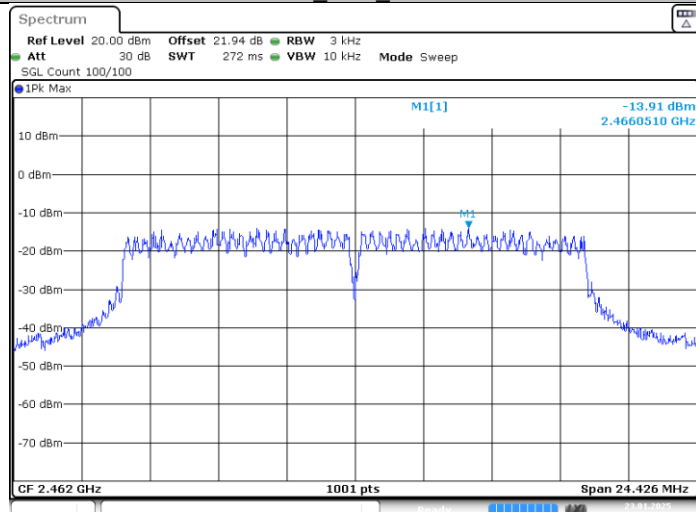
Date: 23. JAN. 2025 14:02:37

11G_Ant1_2437



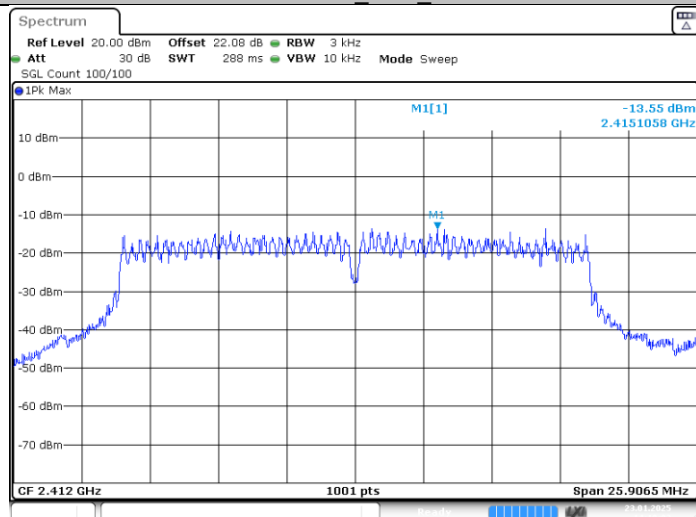
Date: 23. JAN. 2025 14:07:45

11G_Ant1_2462



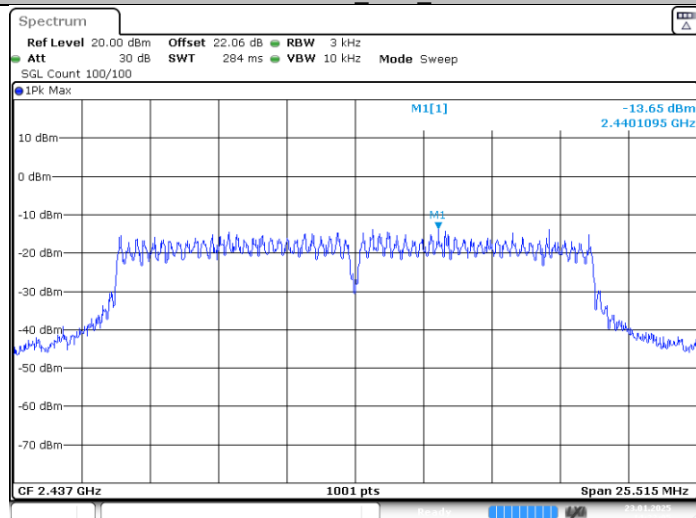
Date: 23. JAN. 2025 14:12:30

11N20SISO_Ant1_2412

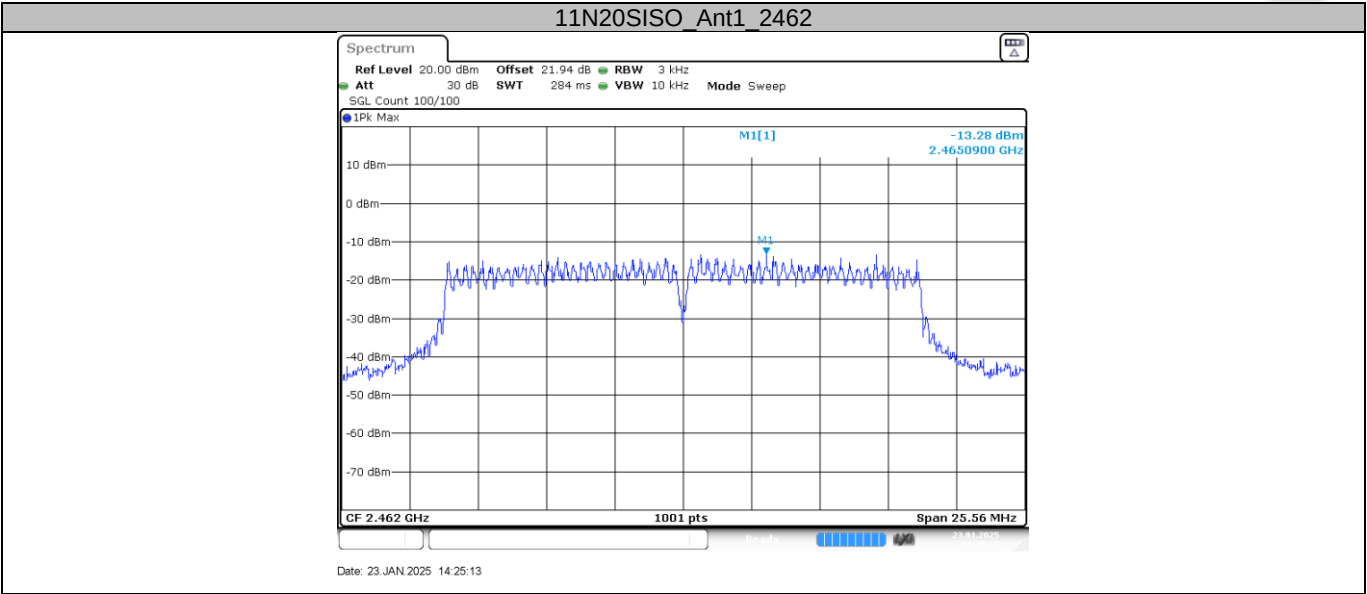


Date: 23. JAN. 2025 14:18:03

11N20SISO_Ant1_2437



Date: 23. JAN. 2025 14:22:05





10.5 Spurious RF conducted emissions

Test Method

- 1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
- 3. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 4. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
- 5. The level displayed must comply with the limit specified in this Section. Submit these plots.
- 6. Repeat above procedures until all frequencies measured were complete.

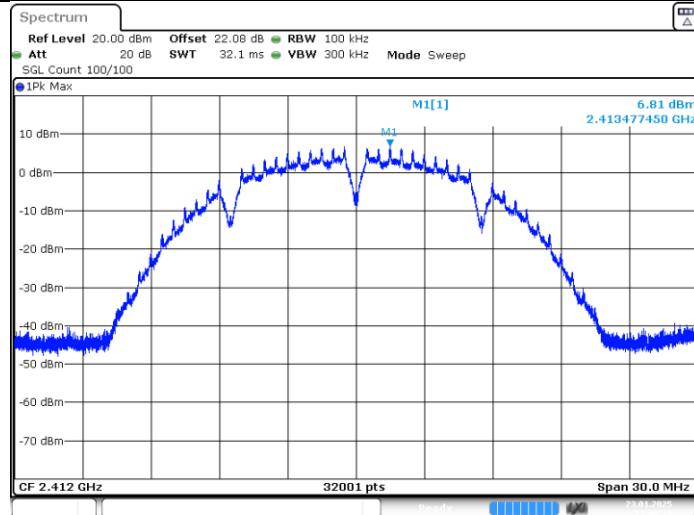
Limit

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

Spurious RF conducted emissions

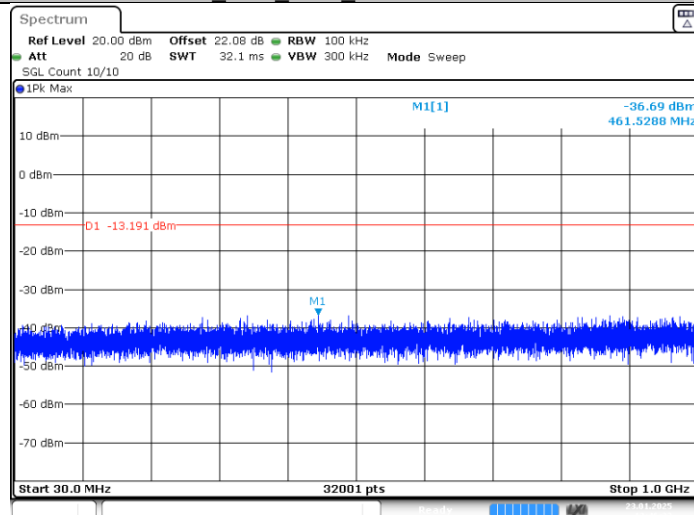
Test Mode	Test Frequency (MHz)	Freq. Range (MHZ)	Result (dBm)	Limit (dBm)	Verdict
11B	2412	Reference	6.81	---	PASS
		30~1000	-36.69	<=-13.19	PASS
		1000~26500	-32.44	<=-13.19	PASS
	2437	Reference	6.17	---	PASS
		30~1000	-36.82	<=-13.83	PASS
		1000~26500	-31.80	<=-13.83	PASS
	2462	Reference	6.71	---	PASS
		30~1000	-36.47	<=-13.29	PASS
		1000~26500	-32.45	<=-13.29	PASS
11G	2412	Reference	0.08	---	PASS
		30~1000	-36.41	<=-19.92	PASS
		1000~26500	-32.45	<=-19.92	PASS
	2437	Reference	0.08	---	PASS
		30~1000	-36.18	<=-19.92	PASS
		1000~26500	-32.59	<=-19.92	PASS
	2462	Reference	0.38	---	PASS
		30~1000	-36.62	<=-19.62	PASS
		1000~26500	-32.92	<=-19.62	PASS
11N20	2412	Reference	0.17	---	PASS
		30~1000	-36.61	<=-19.83	PASS
		1000~26500	-32.70	<=-19.83	PASS
	2437	Reference	0.02	---	PASS
		30~1000	-37.00	<=-19.98	PASS
		1000~26500	-32.21	<=-19.98	PASS
	2462	Reference	0.40	---	PASS
		30~1000	-36.82	<=-19.60	PASS
		1000~26500	-32.16	<=-19.60	PASS

11B_Ant1_2412_Reference Point



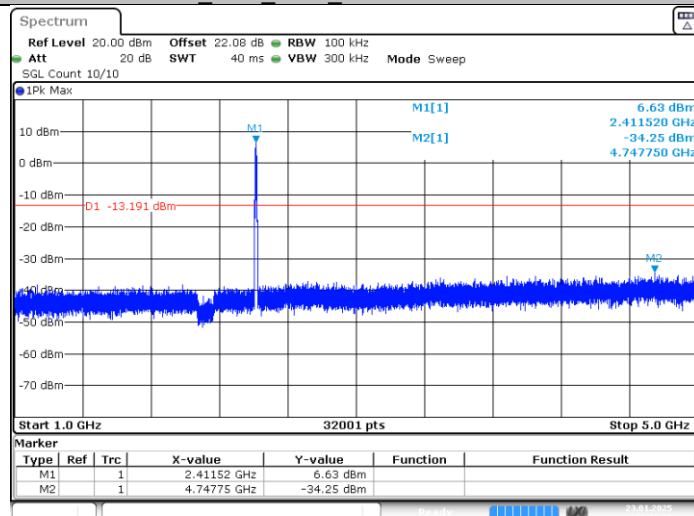
Date: 23. JAN. 2025 13:46:29

11B_Ant1_2412_30MHz-1000MHz



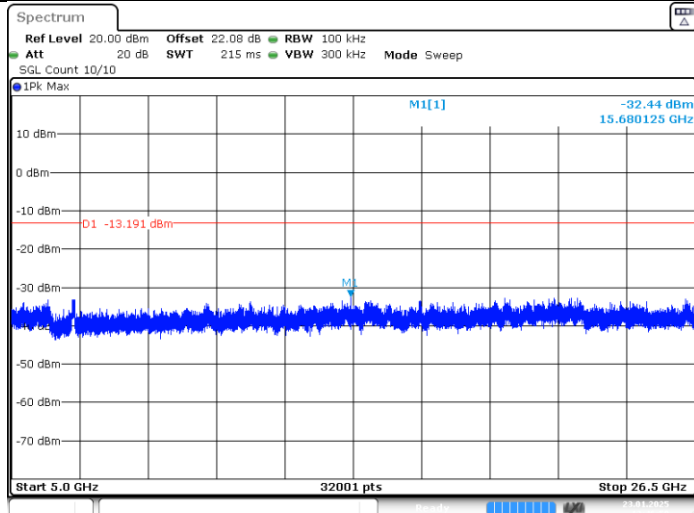
Date: 23. JAN. 2025 13:46:33

11B_Ant1_2412_1000MHz-5000MHz



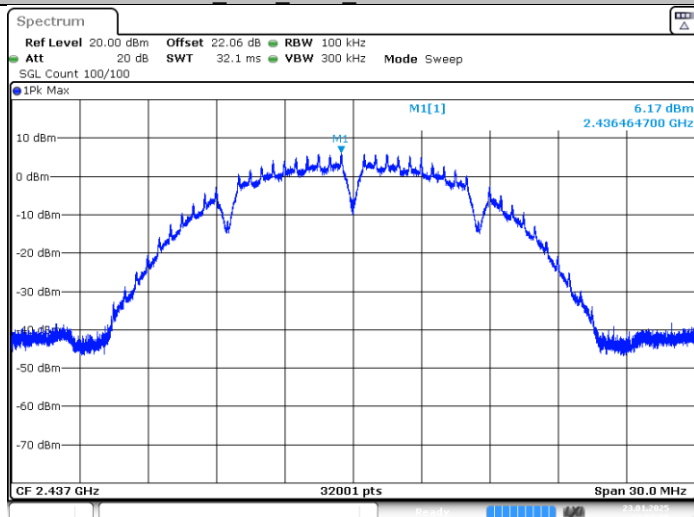
Date: 23. JAN. 2025 13:46:38

11B_Ant1_2412_5000MHz-26500MHz



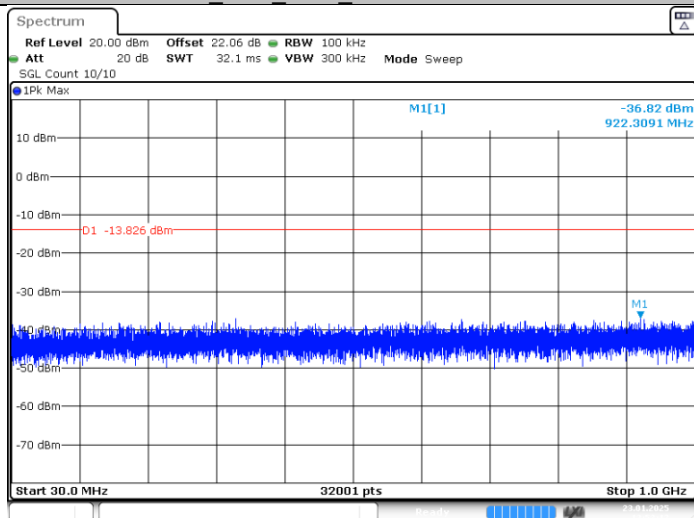
Date: 23. JAN. 2025 13:46:51

11B_Ant1_2437_Reference Point

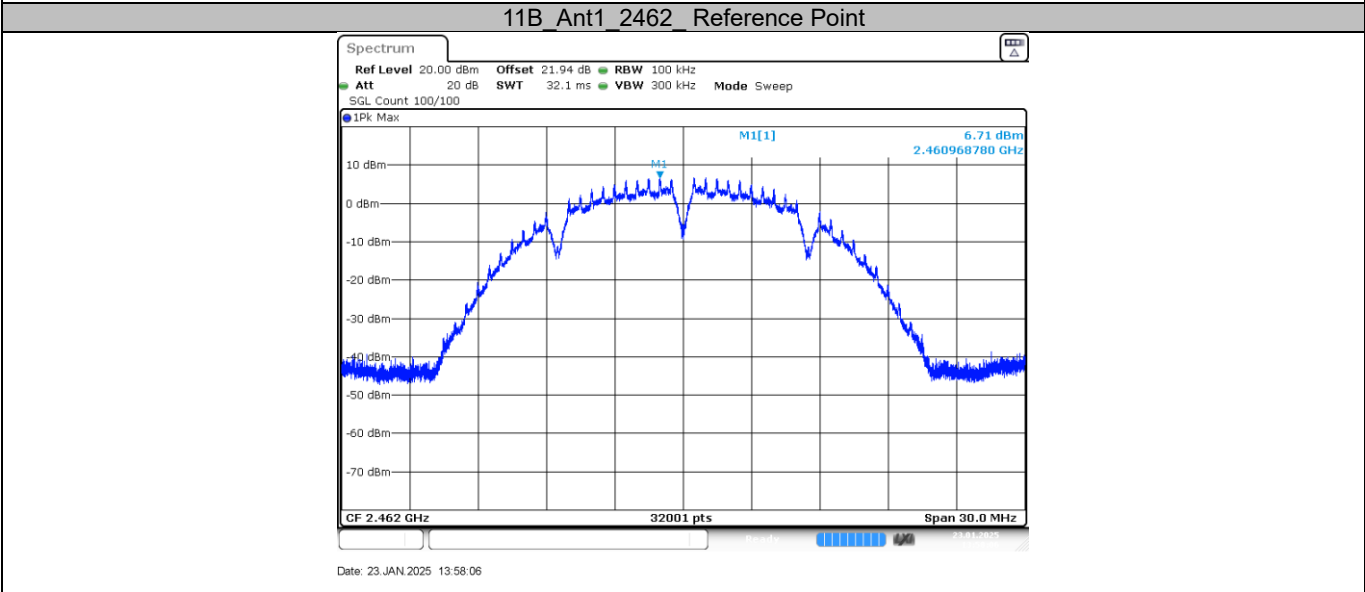
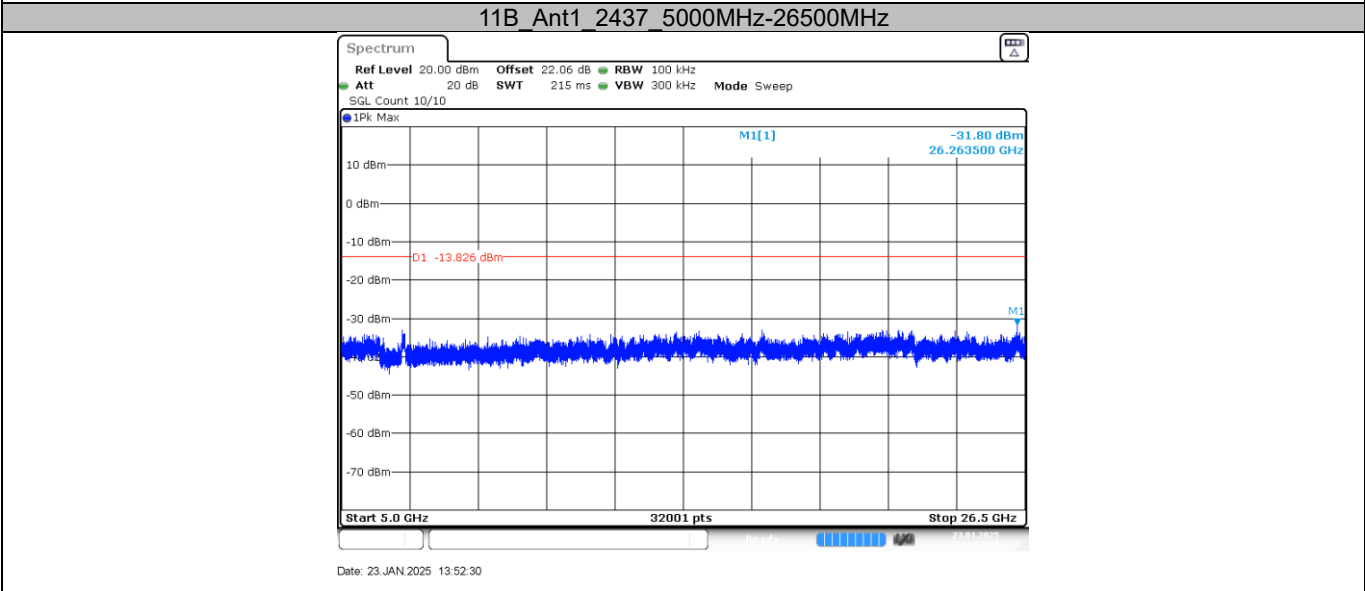
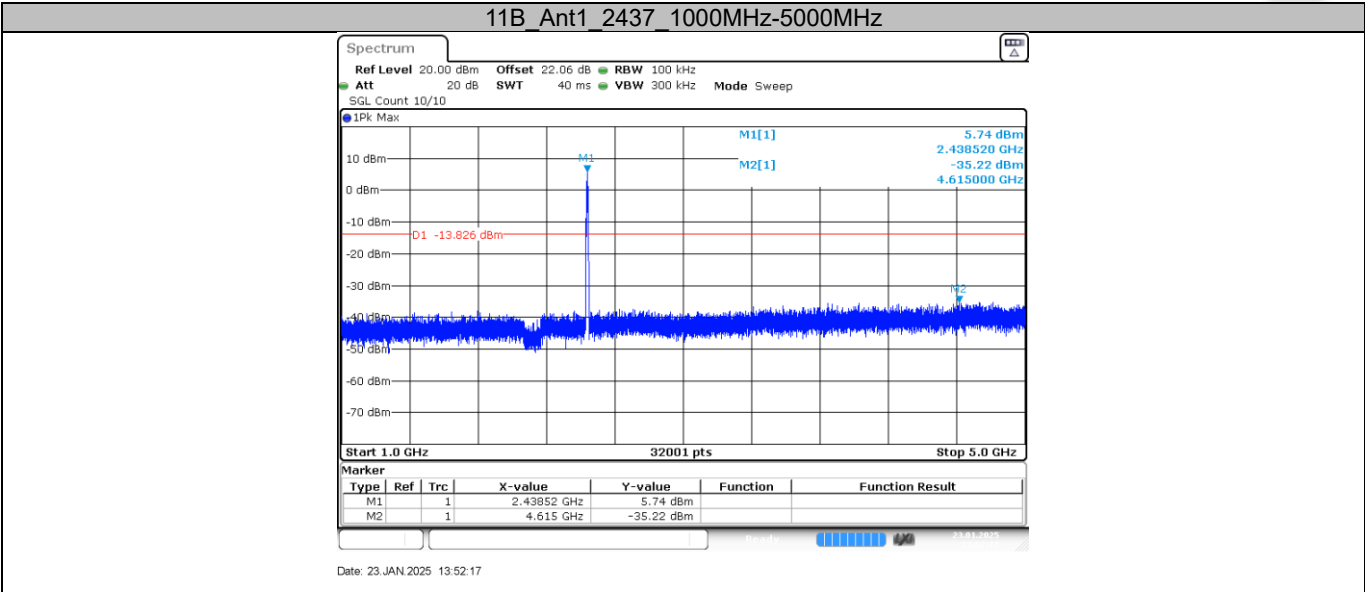


Date: 23. JAN. 2025 13:52:08

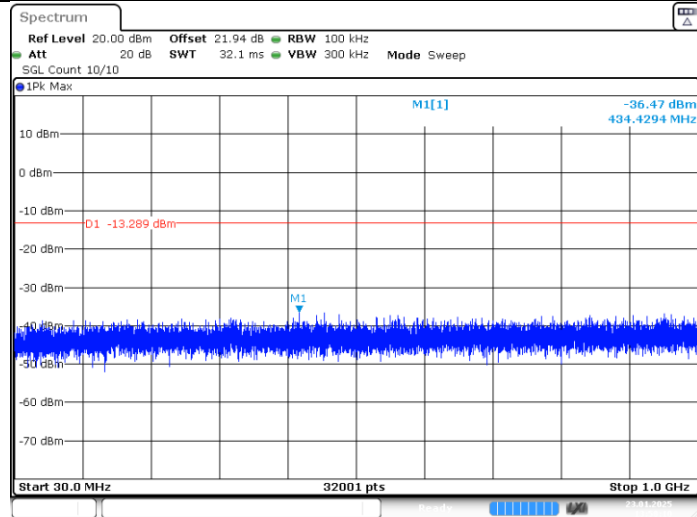
11B_Ant1_2437_30MHz-1000MHz



Date: 23. JAN. 2025 13:52:12

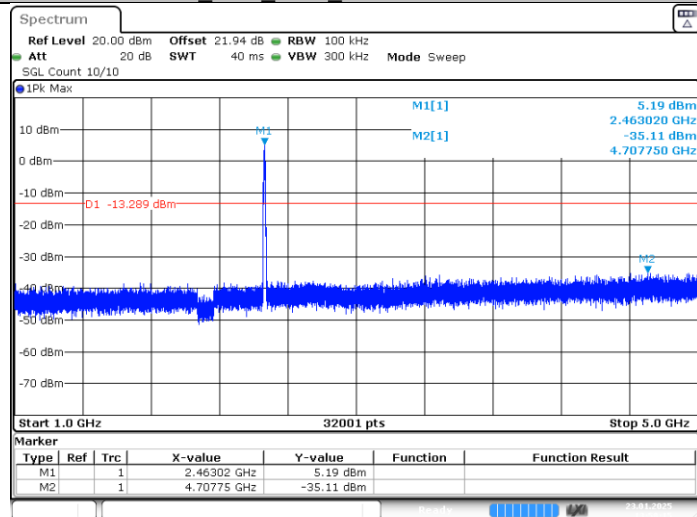


11B_Ant1_2462_30MHz-1000MHz



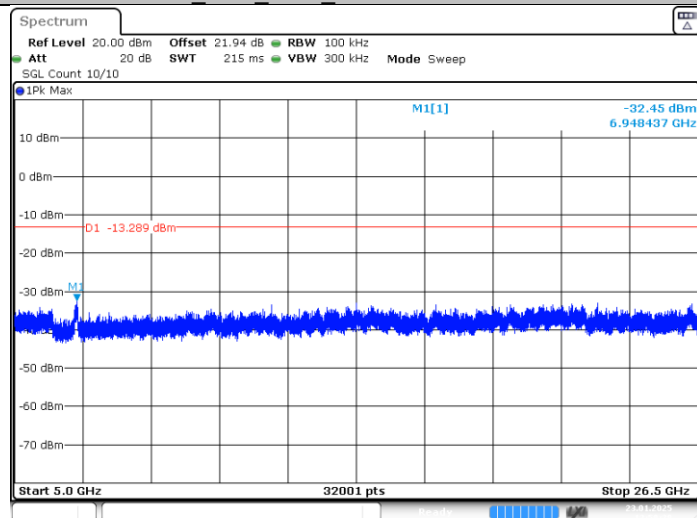
Date: 23. JAN. 2025 13:58:10

11B_Ant1_2462_1000MHz-5000MHz



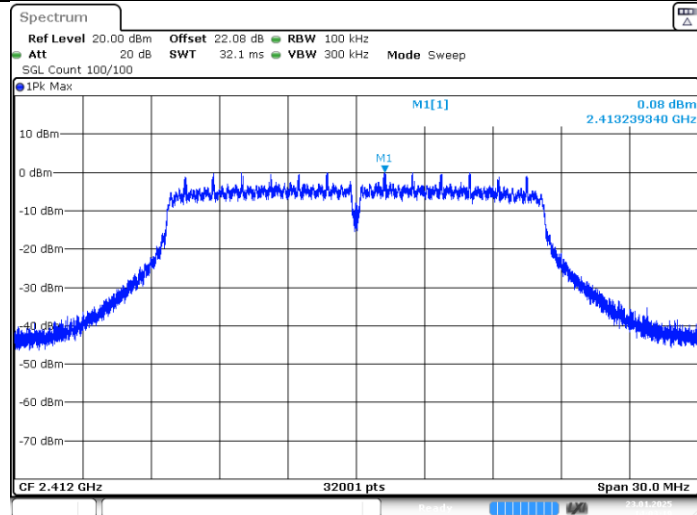
Date: 23. JAN. 2025 13:58:15

11B_Ant1_2462_5000MHz-26500MHz



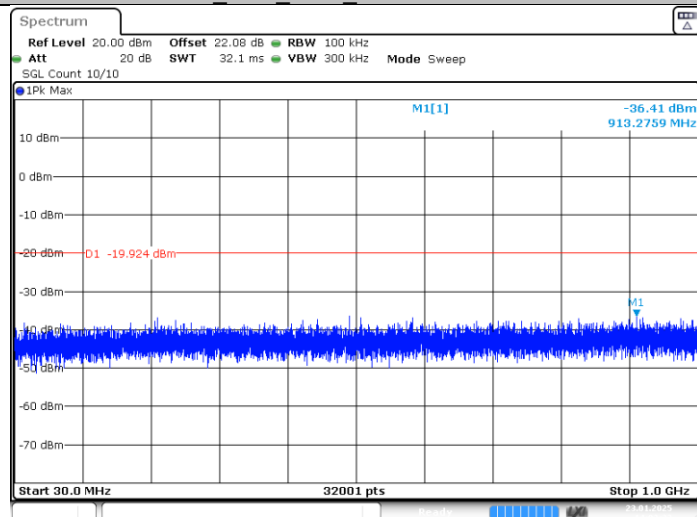
Date: 23. JAN. 2025 13:58:28

11G_Ant1_2412_Reference Point



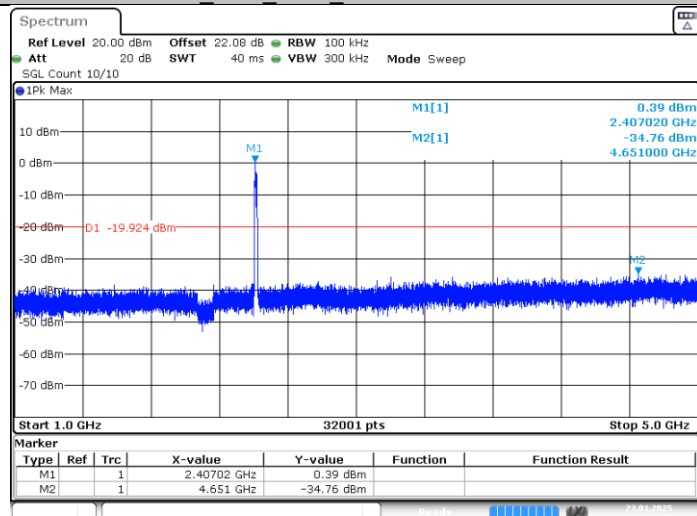
Date: 23. JAN. 2025 14:03:19

11G_Ant1_2412_30MHz-1000MHz



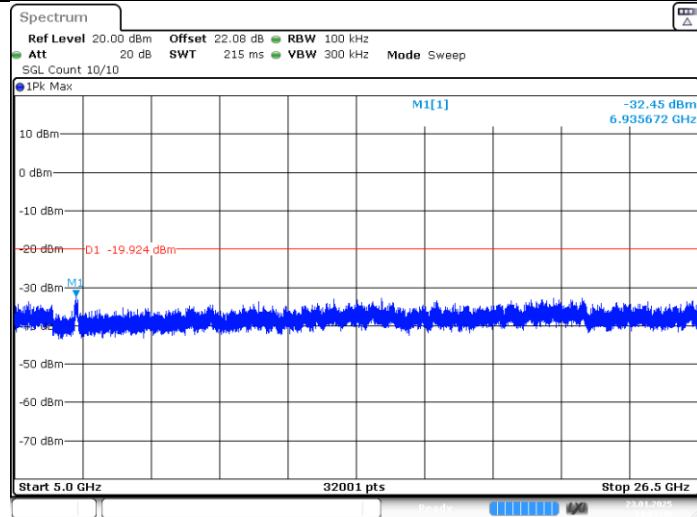
Date: 23. JAN. 2025 14:03:23

11G_Ant1_2412_1000MHz-5000MHz



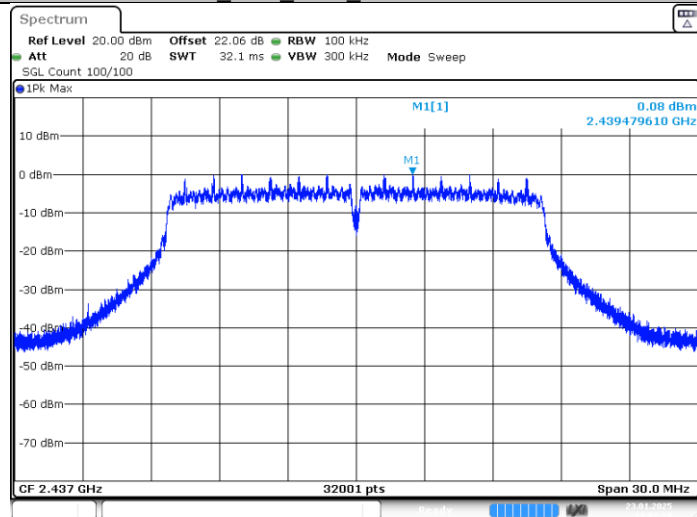
Date: 23. JAN. 2025 14:03:28

11G_Ant1_2412_5000MHz-26500MHz



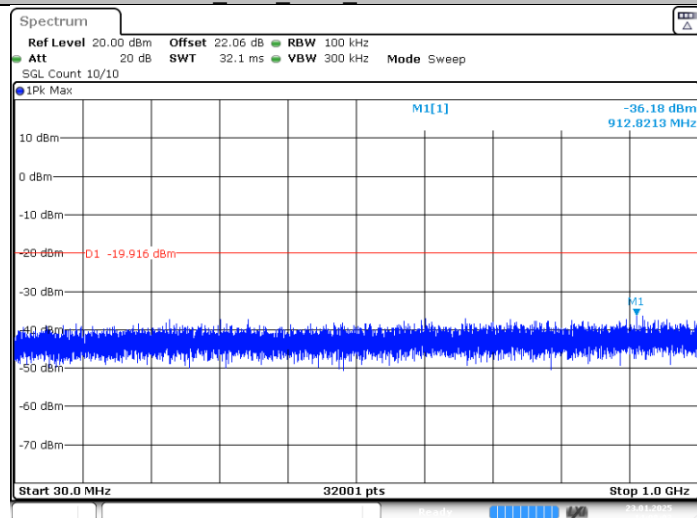
Date: 23. JAN. 2025 14:03:41

11G_Ant1_2437_Reference Point



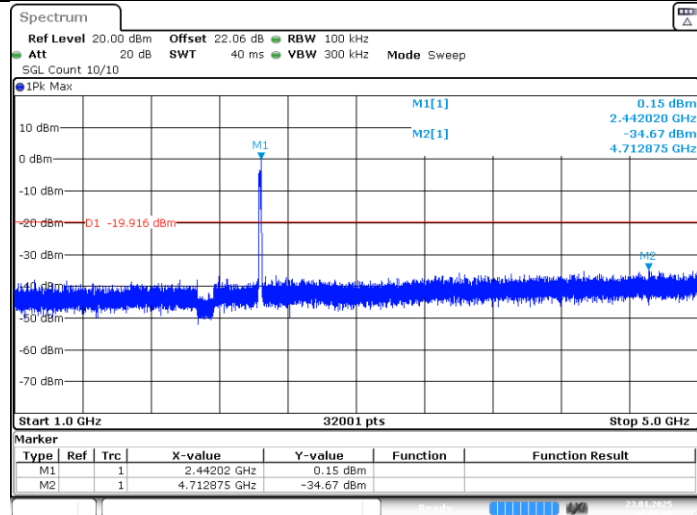
Date: 23. JAN. 2025 14:07:59

11G_Ant1_2437_30MHz-1000MHz



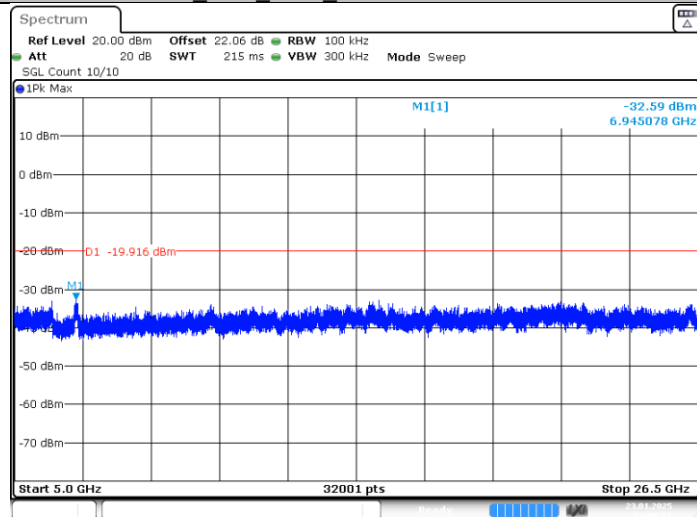
Date: 23. JAN. 2025 14:08:03

11G_Ant1_2437_1000MHz-5000MHz



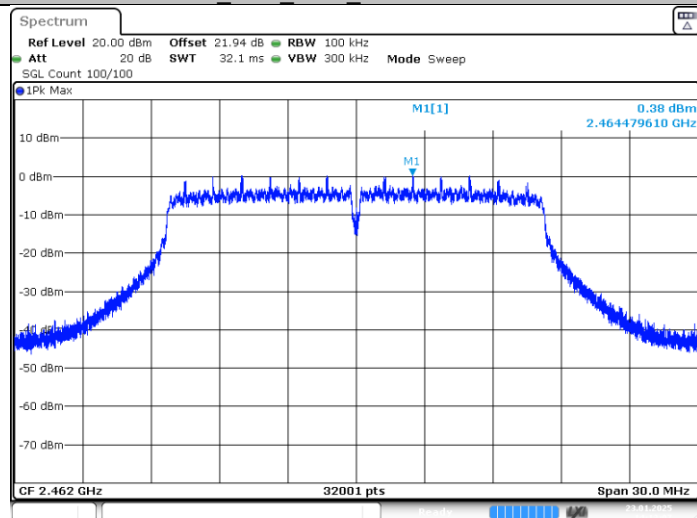
Date: 23. JAN. 2025 14:08:08

11G_Ant1_2437_5000MHz-26500MHz



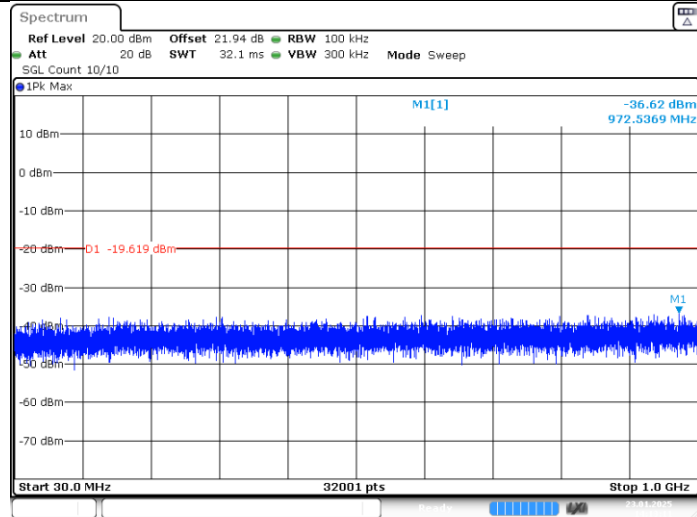
Date: 23. JAN. 2025 14:08:21

11G_Ant1_2462_Reference Point



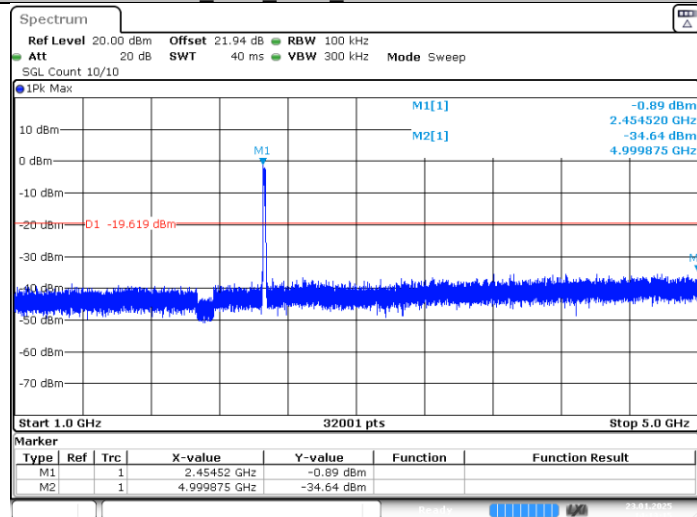
Date: 23. JAN. 2025 14:13:07

11G_Ant1_2462_30MHz-1000MHz



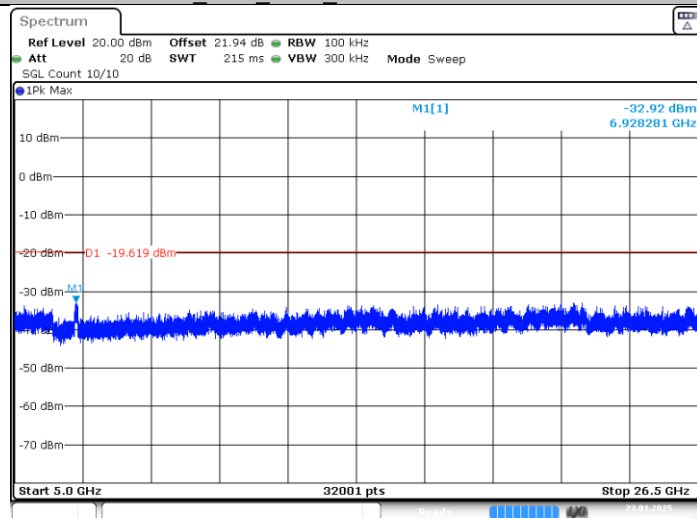
Date: 23. JAN. 2025 14:13:11

11G_Ant1_2462_1000MHz-5000MHz

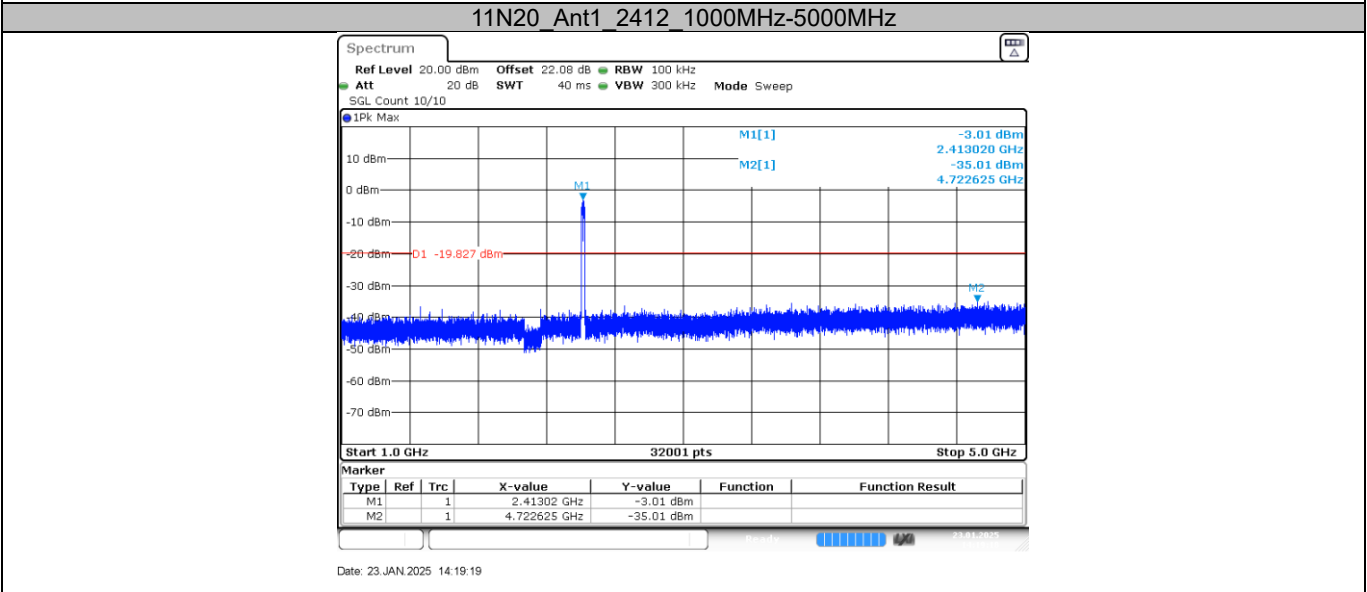
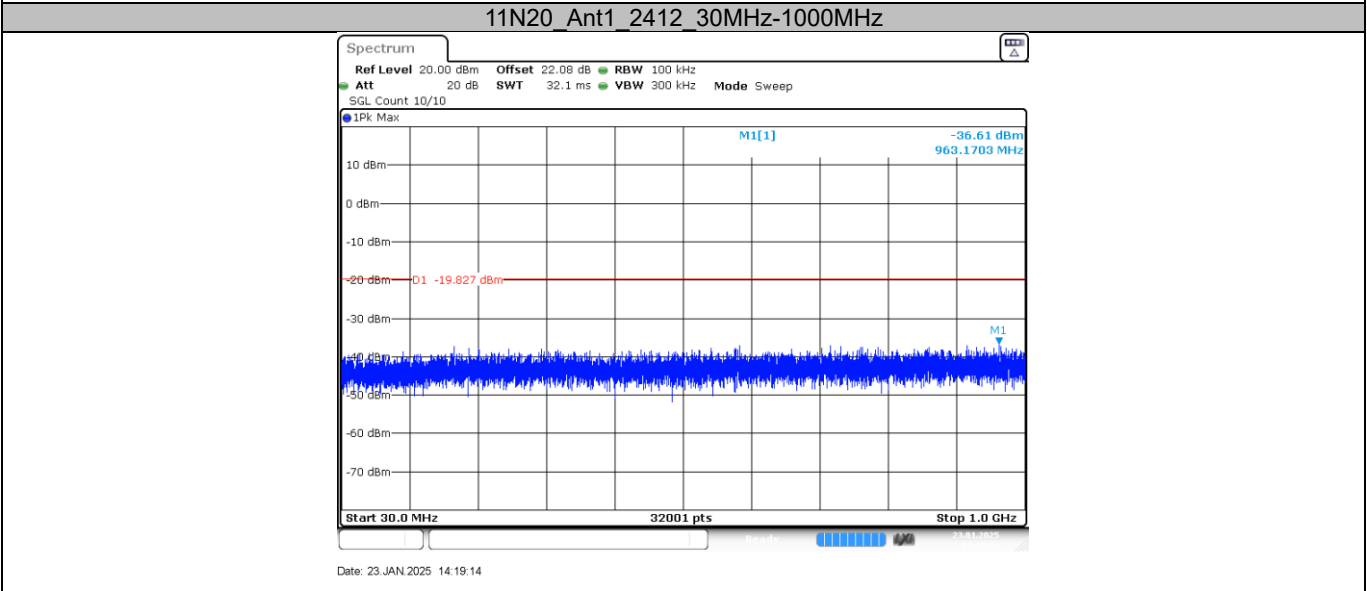
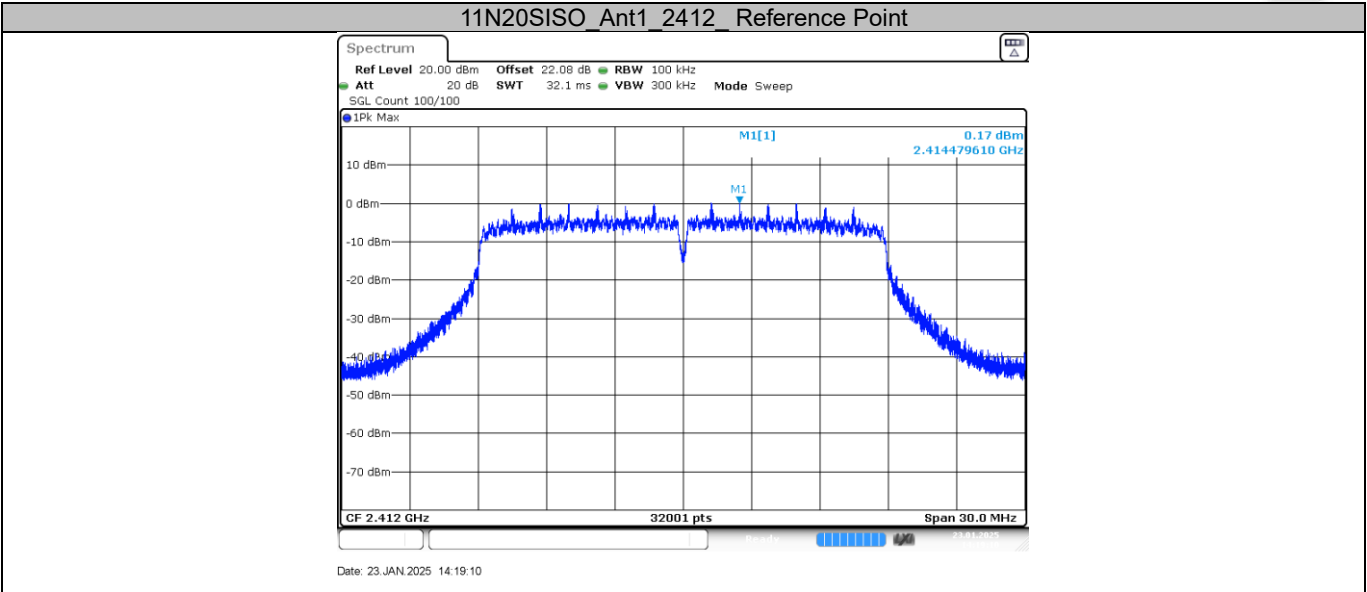


Date: 23. JAN. 2025 14:13:16

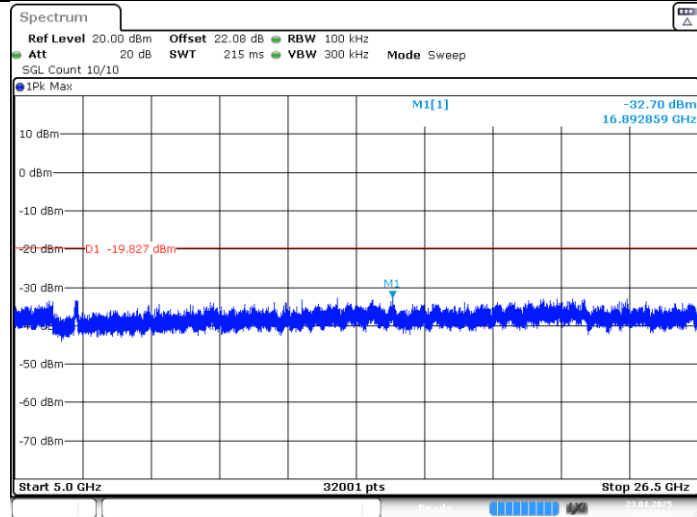
11G_Ant1_2462_5000MHz-26500MHz



Date: 23. JAN. 2025 14:13:29

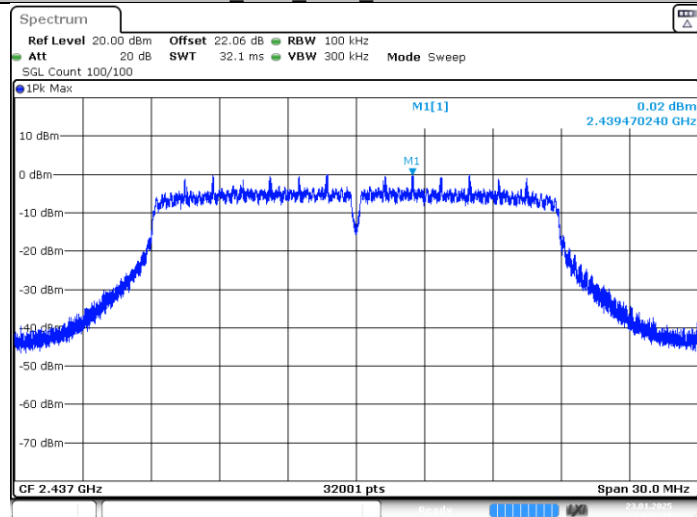


11N20_Ant1_2412_5000MHz-26500MHz



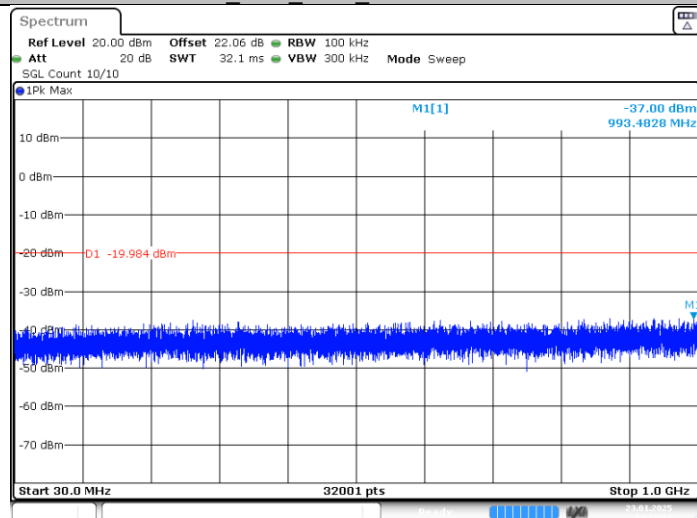
Date: 23. JAN. 2025 14:19:32

11N20_Ant1_2437_Reference Point



Date: 23. JAN. 2025 14:22:19

11N20_Ant1_2437_30MHz-1000MHz



Date: 23. JAN. 2025 14:22:23

