



中认信通

CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)

JAPAN MIC

TEST REPORT

Applicant: SUZHOU ZWO CO., LTD.

Address: Building 2, Peninsula Life Plaza, Moon bay road 6 SuZhou Industrial Park, JiangSu, China

Product Name: Smart telescope

Model Number: Seestar S50

Standard(s): Radio Law of Japan item 19 of Article 2 Paragraph 1

The above equipment has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: CR230737963-07C

Date Of Issue: 2023/8/8

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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	CR230737963-07C	Original Report	2023/8/8

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Name:	Smart telescope
Trade Name:	Seestar
EUT Model:	Seestar S50
Frequency Range:	802.11b/g/n ht20: 2412-2472 MHz 802.11n ht40: 2422-2462 MHz
Nominal RF Output Power (Conducted):	802.11 b: 6.4mW/MHz; 802.11 g: 4.1mW/MHz; 802.11n ht20: 1.4mW/MHz; 802.11n ht40: 1.7mW/MHz
Number of TX Chain(s):	1
Number of RX Chain(s):	1
Antenna Gain (dBi)▲:	3.07
Modulation Type:	802.11b: DSSS-DBPSK, DQPSK, CCK 802.11g/n: OFDM-BPSK, QPSK, 16QAM, 64QAM
Emission Type:	G1D, D1D
Rated Input Voltage:	3.7V from Battery
Serial Number:	2703-5
EUT Received Date:	2023/7/5
EUT Received Status:	Good

Operation Frequency Detail: For 802.11b/g/n ht20:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442	/	/
The test frequencies were performed the test as below:			
Test Channel		Frequency (MHz)	
Lowest		2412	
Middle		2442	
Highest		2472	

For 802.11n ht40:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	8	2447
4	2427	9	2452
5	2432	10	2457
6	2437	11	2462
7	2442	/	/
The test frequencies were performed the test as below:			
Test Channel		Frequency (MHz)	
Lowest		2422	
Middle		2442	
Highest		2462	

Accessory Information:

Accessory Description	Manufacturer	Model	Parameters
/	/	/	/

1.2 Description of Test Configuration

1.2.1 EUT Operation Condition:

EUT Operation Mode:	The system was configured for testing in Engineering Mode, which was provided by the manufacturer.		
Equipment Modifications:	No		
EUT Exercise Software:	MobaXterm-Personal-22.0.exe		
The software was provided by manufacturer. The maximum power was configured as below, that was provided by the manufacturer▲:			
Test Modes	Power Level Setting		
	Lowest	Middle	Highest
802.11b	14	14	14
802.11g	14	14	14
802.11n ht20	10	10	10
802.11n ht40	12	12	12
The extreme voltage test conditions which were declared by the manufacturer and the normal conditions are as below:			
NV, Normal Voltage (Vdc): 3.7			
LV, Low Voltage (Vdc): 3.2			
HV, High Voltage (Vdc): 4.2			

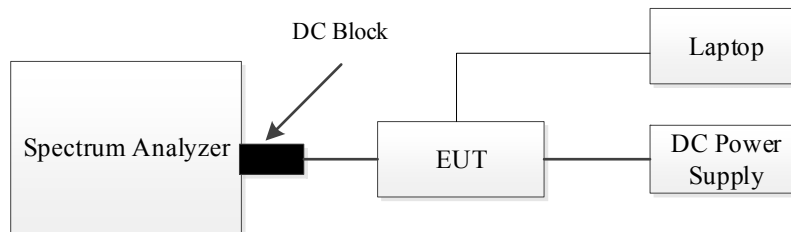
1.2.2 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Lenovo	Laptop	T460S	60PDTEK8

1.2.3 Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	No	No	1	EUT	Laptop
Power Cable	No	No	1.5	EUT	DC Power Supply

1.2.4 Block Diagram of Test Setup



1.3 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Frequency Error	$\pm 0,5$ ppm
Occupied bandwidth and spreading bandwidth	± 5 %
RF output power, conducted	± 0.61 dB
Unwanted Emissions (TX&RX), conducted	± 2.47 dB
Temperature	± 1 °C
Humidity	± 5 %
DC and low frequency voltages	± 0.4 %
Duty Cycle	1 %

2. SUMMARY OF TEST RESULTS

MIC Notice No.88 Appendix No.43 Article 2, Paragraph 1, Item 19 Rules Section	Description of Test	Result
3	Frequency Error	Compliant
4	Occupied Bandwidth	Compliant
5	Transmitter Spurious Emission and Unwanted Emission Intensity	Compliant
6	Antenna Output Power and Output Power Tolerance	Compliant
7	Receiver Spurious Emission and Unwanted Emission Intensity	Compliant
8	Carrier sense capability (1)	Compliant
9	Carrier sense capability (2)	Not Applicable*
10	Transmission Antenna Gain	Not Applicable**
11	Transmission Radiation Angle Width	Not Applicable**
12	Interference Prevention Function	Compliant
13	Frequency Hopping Dwell Time	Not Applicable***
Note 1	Construction Protection Confirmation	Compliant

Note:

Not Applicable:* Only required for outdoor use radio control of model airplanes.

*Not Applicable**:* This item not applicable for the EIRP less than the limit.

*Not Applicable***:* Testing is only required for FHSS system devices.

3. REQUIREMENTS AND TEST PROCEDURES

3.1 Frequency Error

3.1.1 Limit

Within ± 50 ppm.

3.1.2 Test Procedure

Set the EUT to the measurement frequency without modulation.

Setting of SA is following as: Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode:

Positive peak / Trace mode: MAX Hold.

Record the peak spot frequency.

If the EUT can't set at un-modulation mode, measure the 10dBc center frequency.

3.2 Occupied Bandwidth and Spreading Bandwidth

3.2.1 Limit

- Occupied bandwidth: ≤ 26 MHz
- Occupied bandwidth: ≥ 26 MHz and ≤ 40 MHz
- Spreading bandwidth (DSSS): ≥ 0.5 MHz
- Spreading Factor (DSSS): ≥ 5

3.2.2 Test Procedure

1. Setting of SA is following as: RB: 300 kHz/VB: 300 kHz / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold
2. EUT have transmitted the maximum modulation signal and fixed channelize. SA set to 99% of occupied bandwidth to measure occupied bandwidth.
3. SA set to 90% of occupied bandwidth to measure spreading bandwidth.
4. Calculate spreading factor = spreading bandwidth / 1.375

3.3 Transmitter Spurious Emission Strength and Unwanted Emission Intensity

3.3.1 Limit

- $30\text{MHz} \leq f < 2387\text{ MHz}: \leq 2.5\mu\text{W/ MHz}$
- $2387\text{ MHz} \leq f \leq 2400\text{ MHz}: \leq 25\mu\text{W/ MHz};$
- $2483.5\text{ MHz} < f \leq 2496.5\text{ MHz}: \leq 25\mu\text{W/ MHz}$
- $2496.5\text{ MHz} < f \leq 12500\text{MHz}: \leq 2.5\mu\text{W/ MHz}$

3.3.2 Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be in continuously transmitting mode.

❖ Spectrum Analyzer Conditions

- Setting of SA start 30MHz and stop frequency 1000MHz, RB:100kHz/VB:100kHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $0.25\mu\text{W}/100\text{kHz}$.
- Setting of SA start 1000MHz and stop frequency 2387MHz, RB:1MHz/VB:1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $2.5\mu\text{W}/\text{MHz}$.
- Setting of SA start 2387MHz and stop frequency 2400MHz, RB:1MHz/VB:1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $25\mu\text{W}/\text{MHz}$.
- Setting of SA start 2483.5MHz and stop frequency 2496.5MHz, RB:1MHz/VB:1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $25\mu\text{W}/\text{MHz}$.
- Setting of SA start 2496.5MHz and stop frequency 12500MHz, RB:1MHz/VB:1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $2.5\mu\text{W}/\text{MHz}$.

If above test over the limit, the below test procedure should be used:

Step 1:

Center the frequency which was want to investigate, search the peak frequency.

Step 2:

Center frequency: Searched Frequency

Span: 0Hz

RBW: 1MHz(Above 1GHz), VBW: Same as RBW.

Sweep time: Auto(Minimum time to ensure measurement accuracy. *In case of burst wave, one burst shall be included per data point) Data points: 400 points or more. Sweep mode: Single Sweep.

Detection Mode: Sample

3.4 Antenna Output Power and Antenna Power Tolerance

3.4.1 Limit

- ≤ 10 mW/MHz (OFDM/DSSS for bandwidth ≤ 26 MHz)
- ≤ 5 mW/MHz (OFDM for bandwidth ≤ 40 MHz)

The Output Power Tolerance must be within +20%, -80%.

E.i.r.p:

- ≤ 12.14 dBm/MHz (OFDM/DSSS for bandwidth ≤ 26 MHz)
- ≤ 9.13 dBm/MHz (OFDM for bandwidth ≤ 40 MHz)

Note: E.I.R.P will not be applied to the transmission antenna which has a gain of 2.14dBi or less.

3.4.2 Test Procedure

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test.
- RBW: 1 MHz.
- VBW: 1 MHz.
- Span: Wide enough to cover the complete power envelope of the signal of the UUT.
- Detector: Peak.
- Trace Mode: Max Hold.

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyser:

- Centre Frequency: Equal to the frequency recorded in step 2.
- Span: 3 MHz.
- RBW: 1 MHz.
- VBW: 1 MHz.
- Detector: Average (see note).
- Trace Mode: Max Hold.

When the trace is complete, capture the trace, for example using the "View" option on the spectrum analyser. For Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as D.

D shall be recorded in the test report.

The maximum PD, which is e.i.r.p. PSD (spectral density power) or power, is calculated from the above measured value D, and the applicable antenna assembly gain "G" in dBi, according to the formula below. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used.

$$PD = D + G$$

3.5 Receiver Spurious Emission and Unwanted Emission Intensity

3.5.1 Limit

- $\leq 4 \text{ nW}$ ($30 \text{ MHz} \leq f \leq 1000 \text{ MHz}$)
- $\leq 20 \text{ nW}$ ($1 \text{ GHz} \leq f \leq 12.5 \text{ GHz}$)

3.5.2 Test Procedure

- ❖ Conditions of Application Equipment (EUT)
 - The modulation state shall be “continuous receiving mode”.
- ❖ Spectrum Analyzer Conditions
 - Start Frequency: Start Frequency of frequency range to measure (30MHz to 1GHz)
 - Stop Frequency: Stop Frequency of frequency range to measure (1GHz to 12.5GHz)
 - Span: AUTO (Measurement Range)
 - RBW: 100 kHz, VBW: 100 kHz for Frequency $< 1 \text{ GHz}$
 - RBW: 1MHz, VBW: 1MHz for Frequency $> 1 \text{ GHz}$
 - Sweep time: AUTO or more
 - Sweep mode: Auto Sweep
 - Detection: Positive Peak
 - Reference Level: Enough level for maximum dynamic range

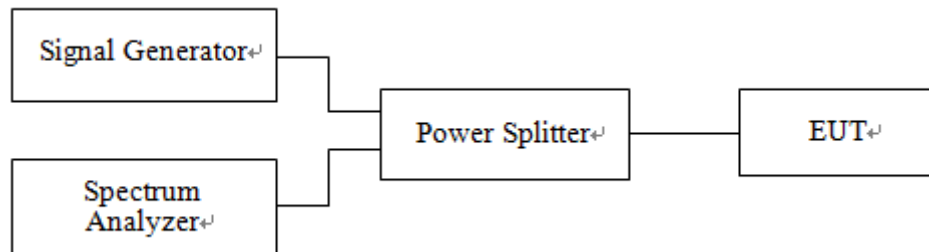
3.6 Carrier Sense Capability

3.6.1 Limit

EUT stop RF transmission signal after carrier inject to EUT

3.6.2 Test Procedure

❖ Measurement System Diagram



❖ Conditions of Application Equipment (EUT)

- The EUT state shall be “normal mode link with wireless router”.

❖ Test Procedure

1. SG adjusted the frequency as same as the EUT transmitted signal and emitted the absence of modulation from SG and power level is $(-22.79 + G - 20 \cdot \log(f) \text{ dBm})$ (G is the antenna gain, f is the test frequency).
2. turn off the RF signal of the SG.
3. EUT have transmitted the maximum modulation signal and fixed channelize.
4. Setting of SA :RBW/VBW=1MHz/1MHz, Span=50MHz, Sweep time=auto, Sweep mode=continuous, Detect mode=positive peak
5. SG RF signal on.
6. EUT shall be stop the transmitted any signal and SG RF signal off, the EUT will be continuous transmitted signal.

3.6.3 Measurement Result

Result: Compliant.

3.7 Interference Prevention Function

3.7.1 Requirement

The EUT shall have the interference prevention capability to transmit or to receive the identification automatically, so that sender and receiver shall exclude other equipment.

3.7.2 Test Procedure

Measurement System Diagram:



In the case that the EUT has the function of automatically transmitting the identification code:

1. Transmit the predetermined identification codes from EUT
2. Check the transmitted identification codes with the demodulator.

In the case of receiving the identification codes:

1. Transmit the predetermined identification codes from the counterpart.
2. Check if communication is normal
3. Transmit the signal other than predetermined ID codes from the counterpart.
4. Check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

3.7.3 Measurement Result

Test Result: Good

3.8 Note 1 - Construction Protection Confirmation

3.8.1 Limit

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

3.8.2 Confirmation Method

The RF Part (include antenna) covered by EUT case with metal screws, it can't be opened easily. Please refer the EUT photo.

4. TEST DATA AND RESULTS

4.1 Test Environmental Conditions & Test Equipment List and Details

Test Date:		2023/7/25~2023/7/26			
Tester:		LingLing Li			
Environmental Conditions:					
Temperature: (℃)	25.5~25.8	Relative Humidity: (%)	58~60	ATM Pressure: (kPa)	100.1~100.2

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date	Calibration Agency	Calibration Method ^{Note}
R&S	Spectrum Analyzer	FSU26	100147	2023/03/31	2024/03/30	CCIC	C
zhuoxiang	Coaxial Cable	SMA-178	211001	Each time	N/A	/	/
Agilent	ESG Series Signal Generator	E4422B	MY4100035	2022/10/24	2023/10/23	CCIC	C
Weinschel	Power splitter	1515	RA915	Each time	N/A	/	/
ZHAOXIN	DC Power Supply	RXN-6010D	21R6010D0912386	N/A	N/A	/	/
UNI-T	Multimeter	UT39A+	C210582554	2022/09/29	2023/09/28	BACL	C

* Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Note:

- A. Calibration conducted by the National Institute of Information and Communications Technology (NICT) (hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1).
- B. Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992).
- C. Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
- D. Calibration conducted by using measuring instruments and other equipment which shall have been given any of calibration, etc. listed above from a) to c)

4.2 Frequency Error

Test Result: Compliant

Test Mode: Transmitting

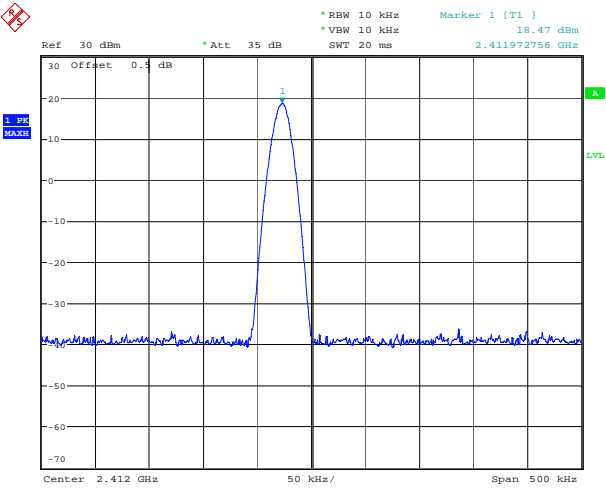
Test Condition	Mode	Channel	Fc (MHz)	Measured Frequency (MHz)	Result (ppm)	Limit (ppm)
NV	Single Carrier	Low	2412	2411.9728	-11.28	± 50
			2422	2421.9736	-10.90	
		Middle	2442	2441.9728	-11.14	
		High	2462	2461.9728	-11.05	
			2472	2471.9720	-11.33	
LV	Single Carrier	Low	2412	2411.9733	-11.07	± 50
			2422	2421.9748	-10.40	
		Middle	2442	2441.9731	-11.02	
		High	2462	2461.9738	-10.64	
			2472	2471.9729	-10.96	
HV	Single Carrier	Low	2412	2411.9720	-11.61	± 50
			2422	2421.9719	-11.60	
		Middle	2442	2441.9722	-11.38	
		High	2462	2461.9725	-11.17	
			2472	2471.9712	-11.65	

Note:

$$\text{Result} = (\text{Measured Frequency} - \text{Test Frequency}) / \text{Test Frequency} * 10^6$$

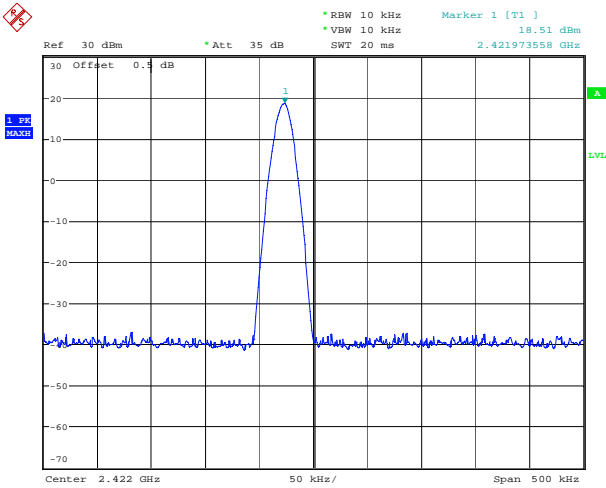
Please refer to the plots for normal voltage test:

2412MHz



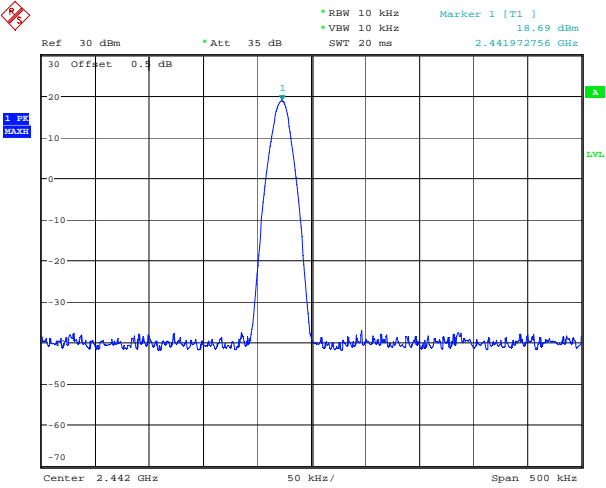
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2422MHz



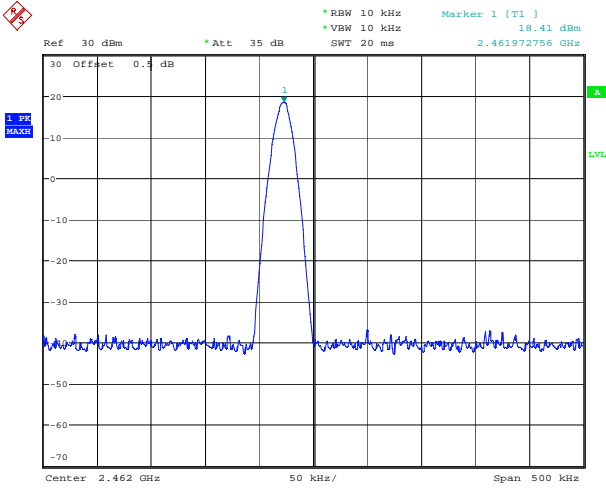
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2442MHz



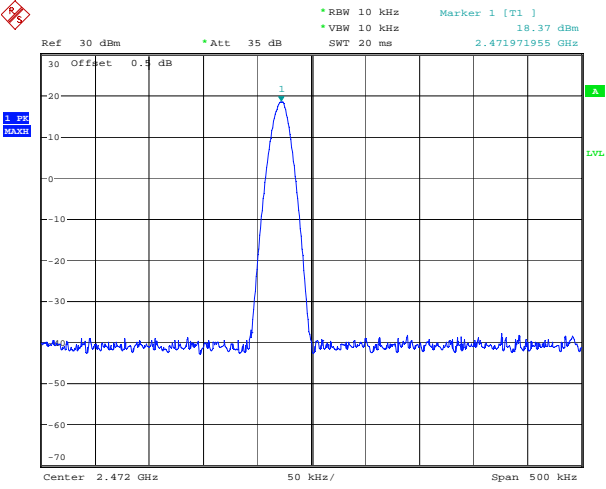
Date: 25.JUL.2023 17:33:15

2462MHz



Date: 25.JUL.2023 17:34:30

2472MHz



Date: 25.JUL.2023 17:34:55

4.3 Occupied Bandwidth and Spreading Bandwidth

Test Result: Compliant

Test Mode: Transmitting

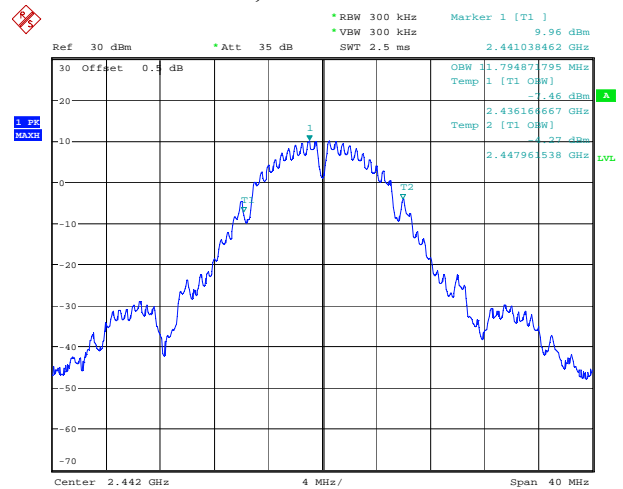
Test Condition	Occupied bandwidth (MHz)				
	Mode	Low Channel	Middle Channel	High Channel	Limit
NV	802.11 b	11.667	11.795	11.859	≤ 26
	802.11 g	16.538	16.538	16.603	≤ 26
	802.11 n20	17.628	17.692	17.692	≤ 26
	802.11 n40	35.897	35.897	35.897	26~40
LV	802.11 b	11.827	12.645	12.719	≤ 26
	802.11 g	17.198	17.178	17.253	≤ 26
	802.11 n20	18.248	18.082	17.762	≤ 26
	802.11 n40	36.317	36.217	36.697	26~40
HV	802.11 b	10.897	11.215	10.899	≤ 26
	802.11 g	16.318	16.498	16.423	≤ 26
	802.11 n20	17.068	17.442	17.432	≤ 26
	802.11 n40	34.947	35.327	35.097	26~40

Spreading bandwidth and Spreading Factor for 802.11b(DSSS)

Test Condition	Test Items	Low Channel	Middle Channel	High Channel	Limit
NV	Spreading bandwidth (MHz)	7.692	7.692	7.756	≥ 0.5
	Spreading Factor	5.59	5.59	5.64	≥ 5
LV	Spreading bandwidth (MHz)	8.642	7.892	8.216	≥ 0.5
	Spreading Factor	6.29	5.74	5.98	≥ 5
HV	Spreading bandwidth (MHz)	7.332	7.142	6.936	≥ 0.5
	Spreading Factor	5.33	5.19	5.04	≥ 5

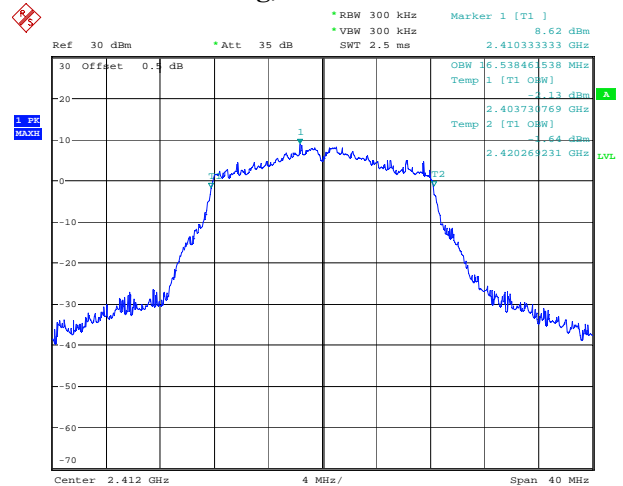
Please refer to the below plots for normal voltage test:

802.11b, Middle Channel



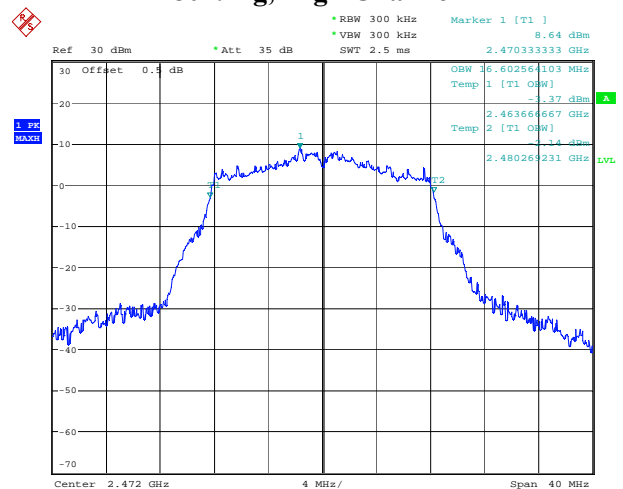
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802.11g, Low Channel



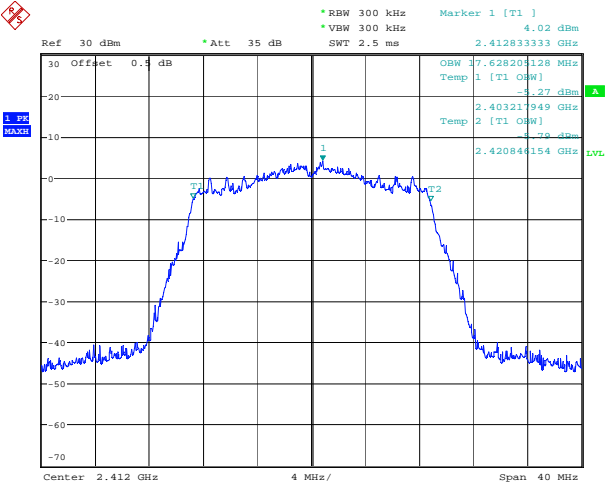
Date: 25.JUL.2023 17:10:45

802.11g, High Channel

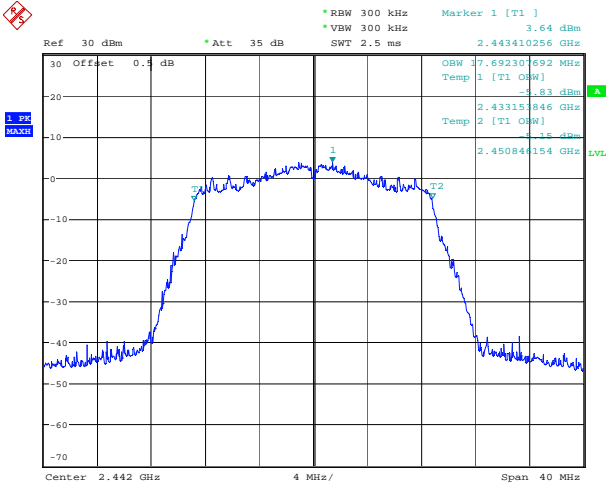


Date: 25.JUL.2023 17:10:09

802.11n ht20, Low Channel

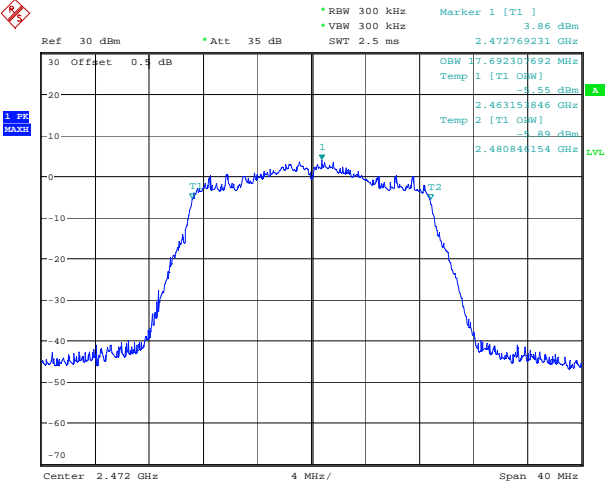


802.11n ht20, Middle Channel



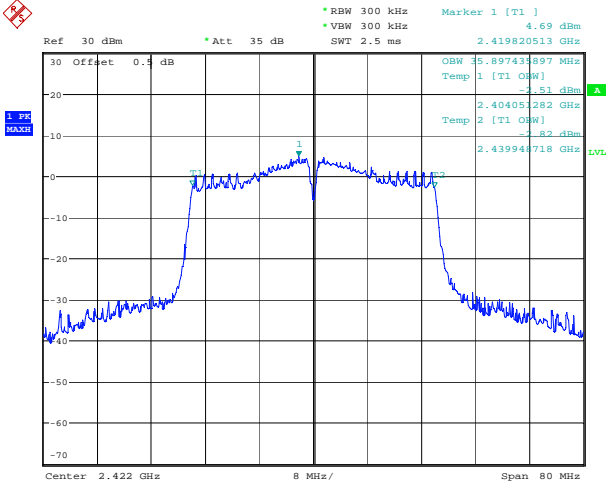
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802.11n ht20, High Channel



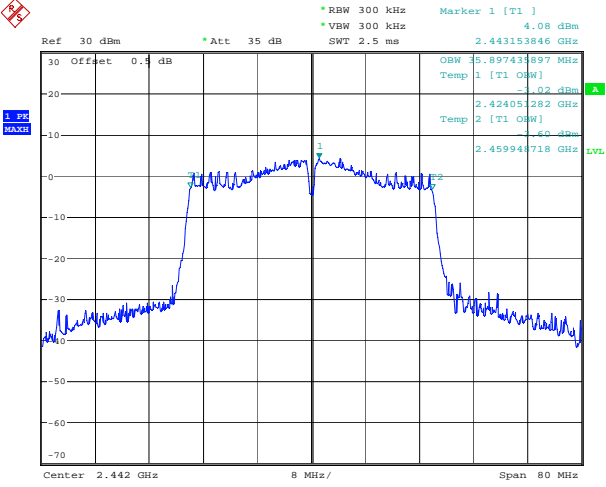
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802.11n ht40, Low Channel



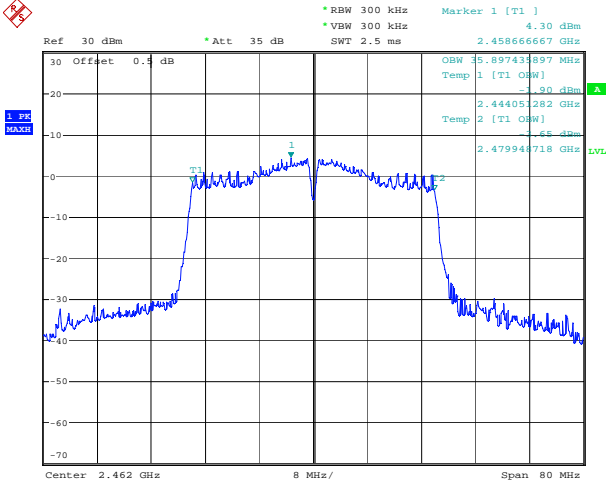
Date: 25.JUL.2023 17:13:32

802.11n ht40, Middle Channel



Date: 25.JUL.2023 17:14:40

802.11n ht40, High Channel

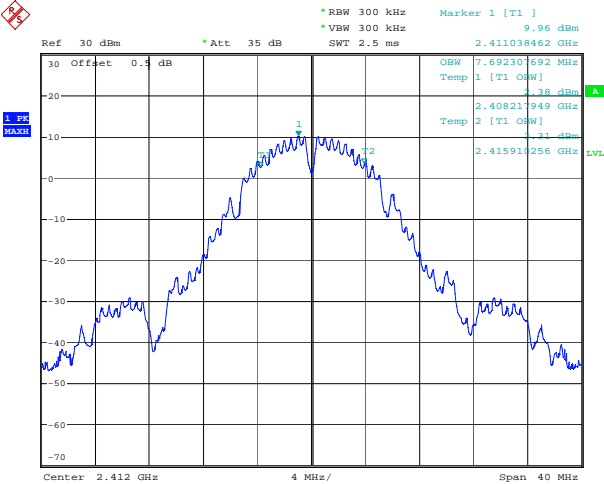


Date: 25.JUL.2023 17:15:18

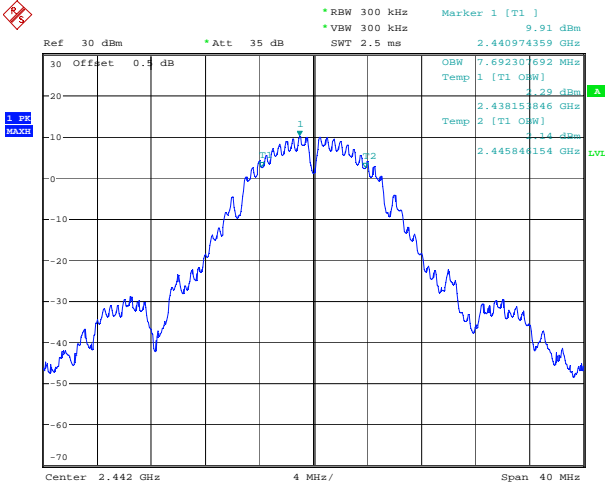
Date: 25.JUL.2023 17:15:59

Spreading bandwidth:

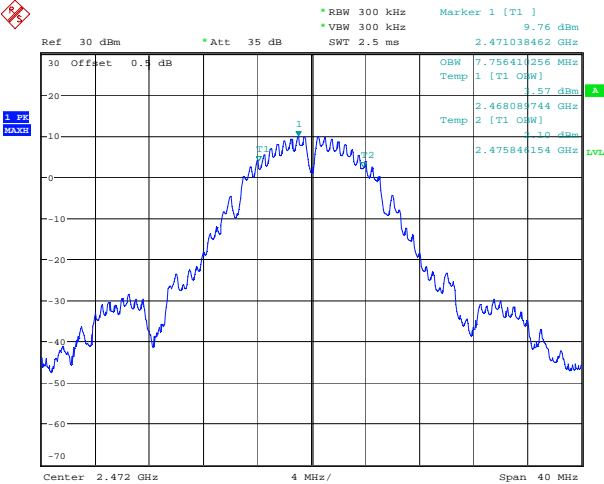
802.11b, Low Channel



802.11b, Middle Channel



802.11b, High Channel



4.4 Transmitter Spurious Emission Strength and Unwanted Emission Intensity

Test Result: Compliant

Test Mode: Transmitting

Test Condition	Mode	Test Band (RBW)	Result (dBm/RBW)			Limit (dBm/RBW)	Limit (μW/RBW)
			Low Channel	Middle Channel	High Channel		
NV	802.11 b	Band I (100kHz)	-41.71	-40.75	-41.03	-36	0.25
		Band II (1MHz)	-42.81	-44.11	-44.63	-26	2.5
		Band III (1MHz)	-26.98	-42.45	-41.75	-16	25
		Band IV (1MHz)	-42.07	-41.89	-27.48	-16	25
		Band V (1MHz)	-31.60	-31.28	-31.93	-26	2.5
	802.11 g	Band I (100kHz)	-51.81	-50.21	-51.73	-36	0.25
		Band II (1MHz)	-32.72	-43.62	-44.74	-26	2.5
		Band III (1MHz)	-18.57	-38.65	-41.74	-16	25
		Band IV (1MHz)	-42.06	-40.29	-16.13	-16	25
		Band V (1MHz)	-31.86	-31.43	-31.24	-26	2.5
	802.11 n20	Band I (100kHz)	-54.94	-55.46	-54.97	-36	0.25
		Band II (1MHz)	-43.22	-43.21	-44.37	-26	2.5
		Band III (1MHz)	-24.11	-42.69	-42.39	-16	25
		Band IV (1MHz)	-43.16	-42.41	-19.91	-16	25
		Band V (1MHz)	-31.43	-31.27	-31.56	-26	2.5
	802.11 n40	Band I (100kHz)	-54.24	-52.62	-52.93	-36	0.25
		Band II (1MHz)	-28.78	-37.26	-43.50	-26	2.5
		Band III (1MHz)	-21.13	-29.20	-37.55	-16	25
		Band IV (1MHz)	-36.44	-29.61	-18.06	-16	25
		Band V (1MHz)	-31.77	-31.25	-27.02	-26	2.5

Test Condition	Mode	Test Band (RBW)	Result (dBm/RBW)			Limit (dBm/RBW)	Limit (μW/RBW)
			Low Channel	Middle Channel	High Channel		
LV	802.11 b	Band I (100kHz)	-41.50	-40.21	-40.73	-36	0.25
		Band II (1MHz)	-42.16	-43.75	-44.02	-26	2.5
		Band III (1MHz)	-26.81	-41.50	-41.52	-16	25
		Band IV (1MHz)	-41.41	-41.13	-27.24	-16	25
		Band V (1MHz)	-31.01	-30.99	-31.04	-26	2.5
	802.11 g	Band I (100kHz)	-51.64	-50.04	-51.21	-36	0.25
		Band II (1MHz)	-31.73	-43.45	-44.18	-26	2.5
		Band III (1MHz)	-18.23	-38.60	-40.99	-16	25
		Band IV (1MHz)	-41.35	-40.29	-16.10	-16	25
		Band V (1MHz)	-30.95	-30.92	-30.56	-26	2.5
	802.11 n20	Band I (100kHz)	-54.24	-54.91	-54.91	-36	0.25
		Band II (1MHz)	-43.19	-42.34	-44.21	-26	2.5
		Band III (1MHz)	-23.25	-41.96	-41.57	-16	25
		Band IV (1MHz)	-42.52	-41.70	-19.28	-16	25
		Band V (1MHz)	-30.54	-30.50	-31.49	-26	2.5
	802.11 n40	Band I (100kHz)	-53.94	-52.21	-52.73	-36	0.25
		Band II (1MHz)	-28.40	-37.03	-43.27	-26	2.5
		Band III (1MHz)	-20.89	-28.49	-37.37	-16	25
		Band IV (1MHz)	-36.11	-29.39	-17.07	-16	25
		Band V (1MHz)	-30.98	-30.27	-26.55	-26	2.5

Test Condition	Mode	Test Band (RBW)	Result (dBm/RBW)			Limit (dBm/RBW)	Limit (μW/RBW)
			Low Channel	Middle Channel	High Channel		
HV	802.11 b	Band I (100kHz)	-42.55	-41.39	-41.64	-36	0.25
		Band II (1MHz)	-43.02	-44.72	-44.91	-26	2.5
		Band III (1MHz)	-27.82	-42.96	-42.51	-16	25
		Band IV (1MHz)	-42.67	-42.80	-28.08	-16	25
		Band V (1MHz)	-31.93	-32.05	-32.53	-26	2.5
	802.11 g	Band I (100kHz)	-52.51	-50.78	-51.83	-36	0.25
		Band II (1MHz)	-32.74	-44.12	-44.94	-26	2.5
		Band III (1MHz)	-19.25	-38.89	-42.06	-16	25
		Band IV (1MHz)	-42.72	-40.94	-17.01	-16	25
		Band V (1MHz)	-32.69	-31.75	-32.03	-26	2.5
	802.11 n20	Band I (100kHz)	-55.21	-55.63	-55.60	-36	0.25
		Band II (1MHz)	-43.40	-43.68	-44.80	-26	2.5
		Band III (1MHz)	-24.15	-43.11	-42.73	-16	25
		Band IV (1MHz)	-43.89	-42.91	-19.99	-16	25
		Band V (1MHz)	-32.10	-31.38	-31.76	-26	2.5
	802.11 n40	Band I (100kHz)	-54.42	-52.66	-53.49	-36	0.25
		Band II (1MHz)	-29.01	-37.87	-44.27	-26	2.5
		Band III (1MHz)	-21.40	-29.44	-38.03	-16	25
		Band IV (1MHz)	-37.39	-29.84	-18.82	-16	25
		Band V (1MHz)	-31.91	-31.90	-27.16	-26	2.5

Note:

Band I: 30MHz~1000MHz

Band II: 1000MHz~2387MHz

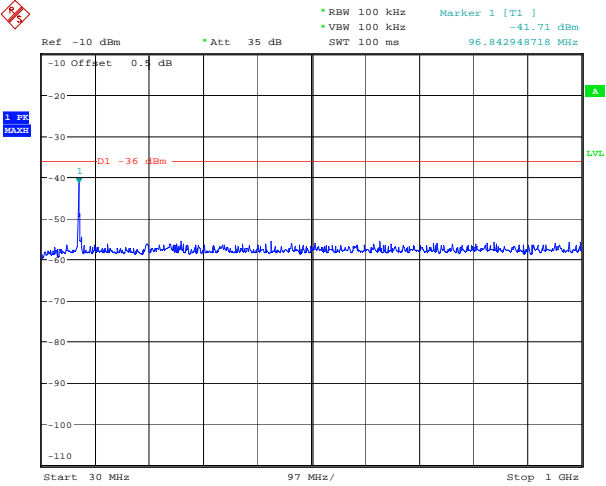
Band III: 2387MHz~2400MHz

Band IV: 2483.5MHz~2496.5MHz

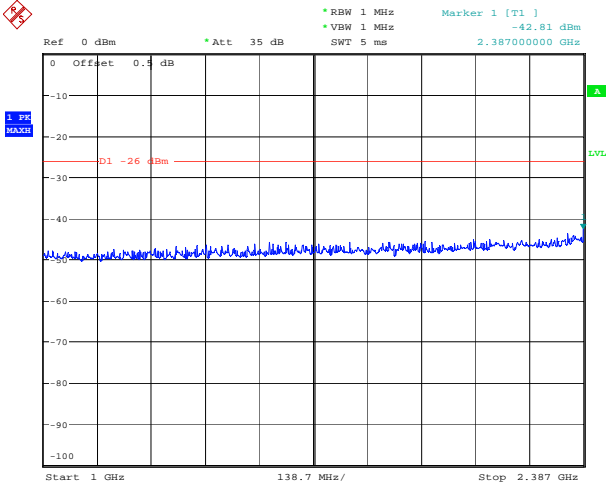
Band V: 2496.5MHz~12500MHz

Please refer to the below plots for normal voltage test.

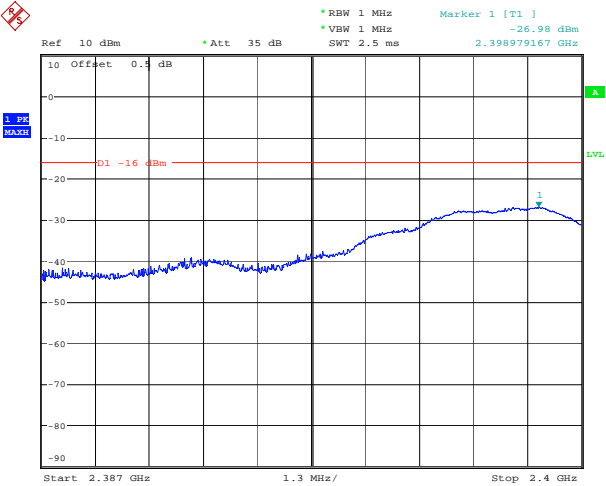
802.11b Low Channel



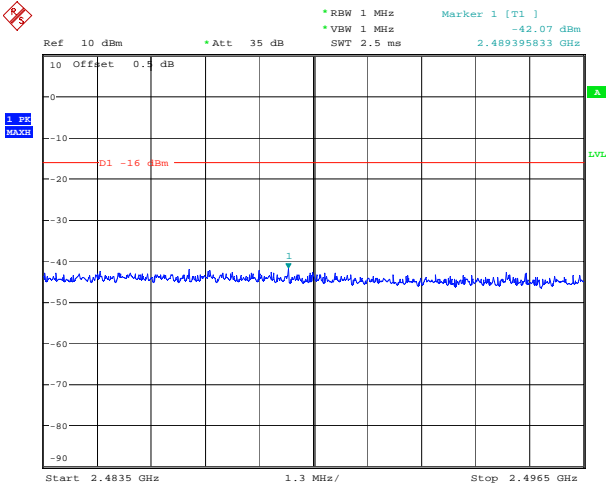
Date: 25.JUL.2023 15:50:44



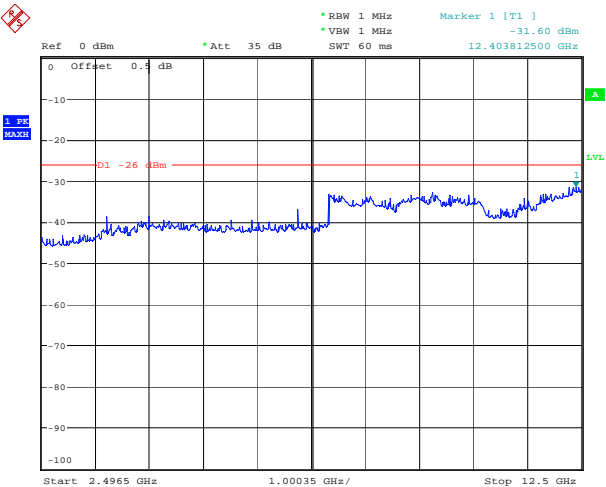
Date: 25.JUL.2023 15:50:55



Date: 25.JUL.2023 15:51:07



Date: 25.JUL.2023 15:51:21



Date: 25.JUL.2023 15:51:33

Ref -10 dBm *Att 35 dB

RBW 100 kHz Marker 1 [T1] -40.75 dBm
 VBW 100 kHz SWT 100 ms 127.932692308 MHz

Offset 0.5 dB

D1 -36 dBm

Start 30 MHz 97 MHz/ Stop 1 GHz

* RBW 1 MHz Marker 1 [T1]
 * VBW 1 MHz -44.11 dBm
 SWF 5 ms 2.333653846 GHz

Ref 0 dBm * Att. 35 dB

0 Offset 0.5 dB

-10
 -20
 -30
 -40
 -50
 -60
 -70
 -80
 -90
 -100

D1 -26 dBm

1. PR
 MAXH

Start 1 GHz 138.7 MHz/ Stop 2.387 GHz

Ref 10 dBm *Att. 35 dB

*RBW 1 MHz Marker 1 [T1] -42.45 dBm
 *VBW 1 MHz
 SWT 2.5 ms 2.391958333 GHz

10 Offset 0.5 dB

0

-10

-20

-30

-40

-50

-60

-70

-80

-90

D1 -16 dBm

1

Start 2.387 GHz 1.3 MHz/ Stop 2.4 GHz

Ref 10 dBm *Att 35 dB

RBW 1 MHz Marker 1 {T1 }
 VBW 1 MHz -41.89 dBm
 SWT 2.5 ms 2.489062500 GHz

10 Offset 0.5 dB

D1 -16 dBm

1.3 MHz

Start 2.4835 GHz Stop 2.4965 GHz

1 PR
MAX

Ref 0 dBm *Att 35 dB

*RBW 1 MHz Marker 1 [T1] -31.28 dBm
*VBW 1 MHz
SWT 60 ms 12.371750000 GHz

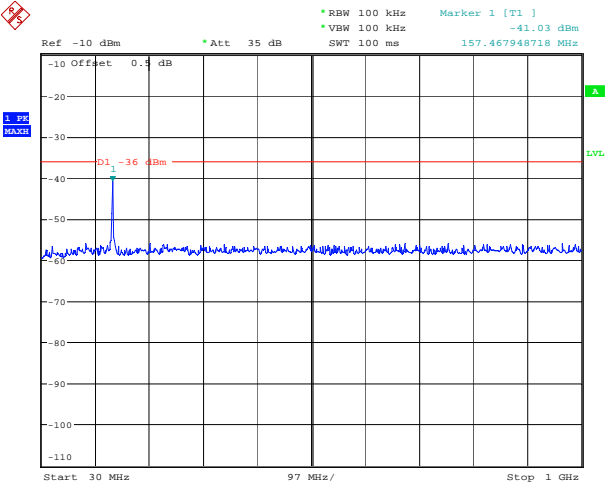
0 Offset 0.5 dB

D1 -26 dBm

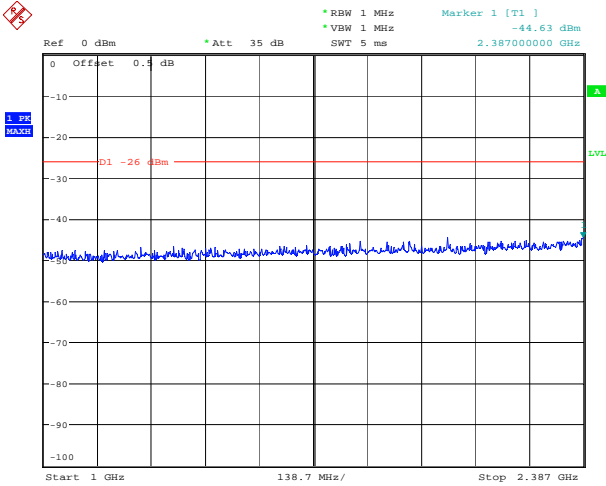
Start 2.4965 GHz 1.00035 GHz/ Stop 12.5 GHz

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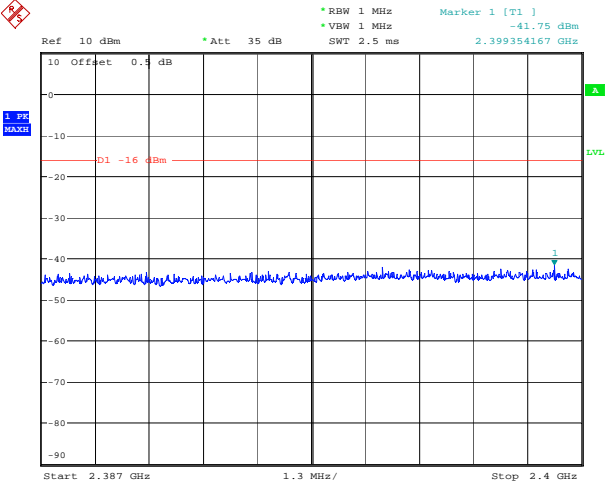
802.11b High Channel



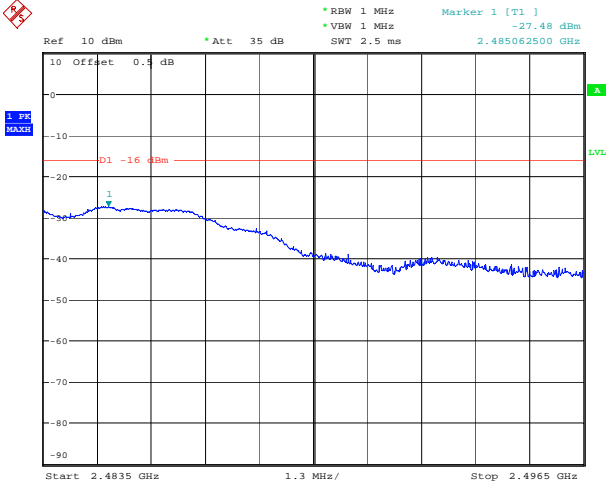
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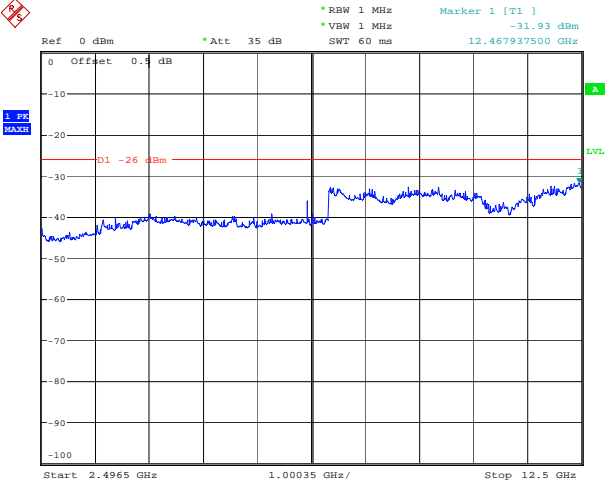
Date: 25.JUL.2023 16:44:05



Date: 25.JUL.2023 16:44:20

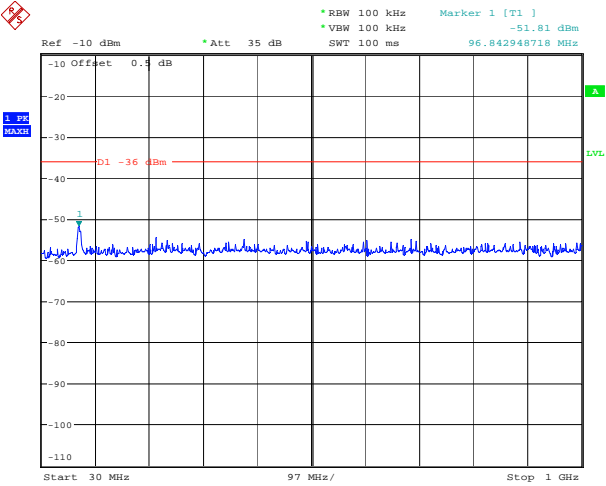


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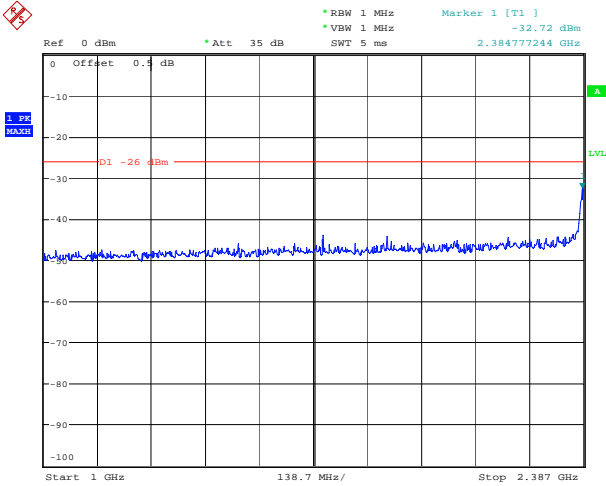


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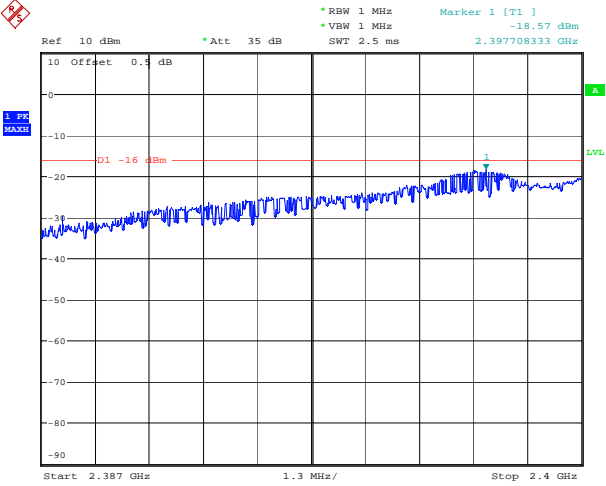
802.11g Low Channel



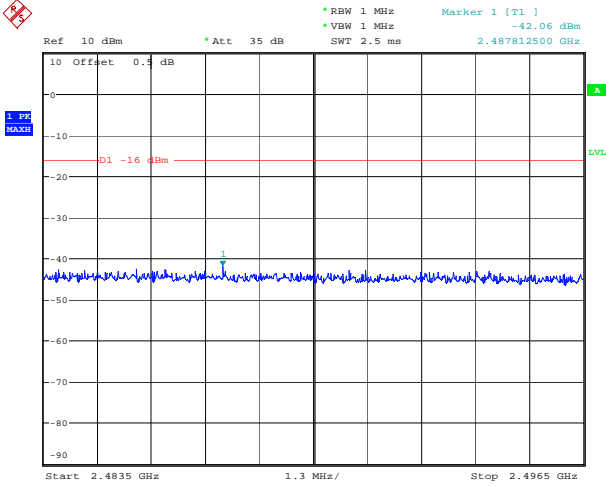
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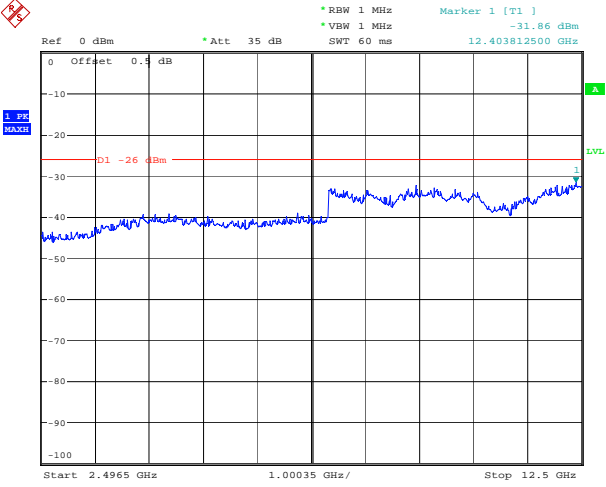
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Date: 25.JUL.2023 16:08:38

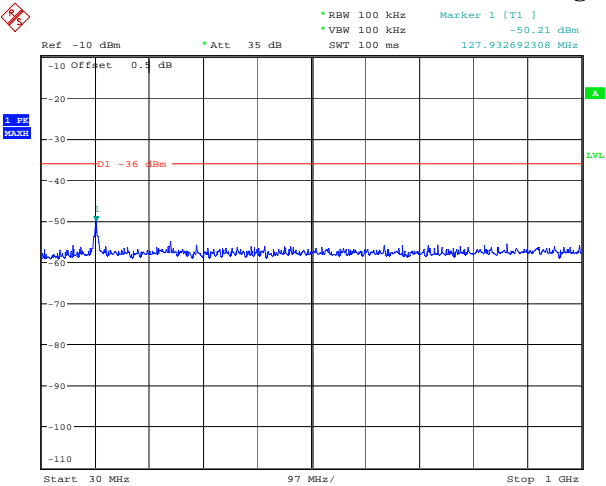


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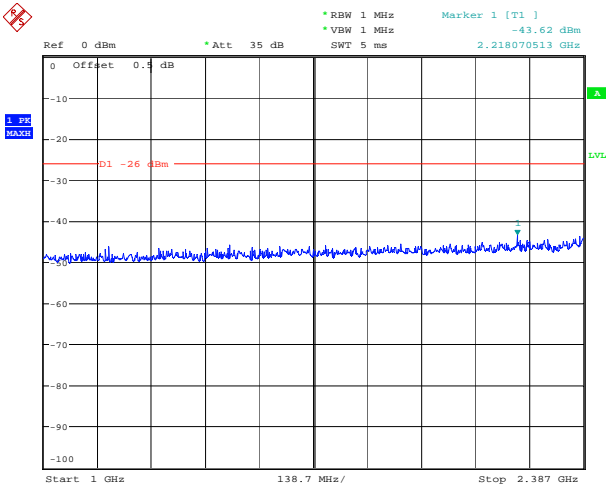


Date: 25.JUL.2023 16:09:04

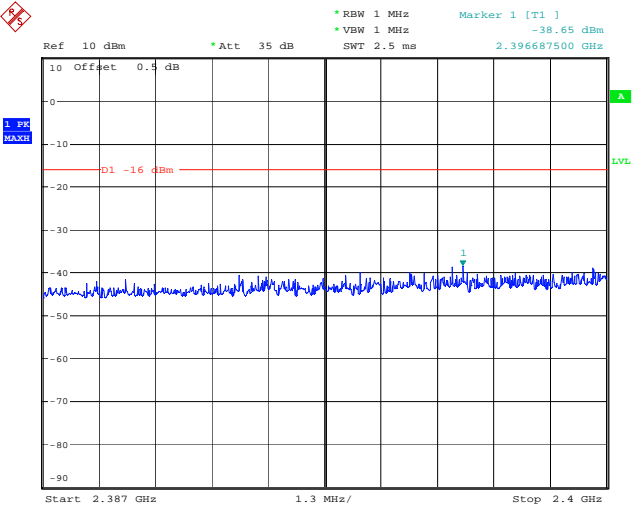
802.11g Middle Channel



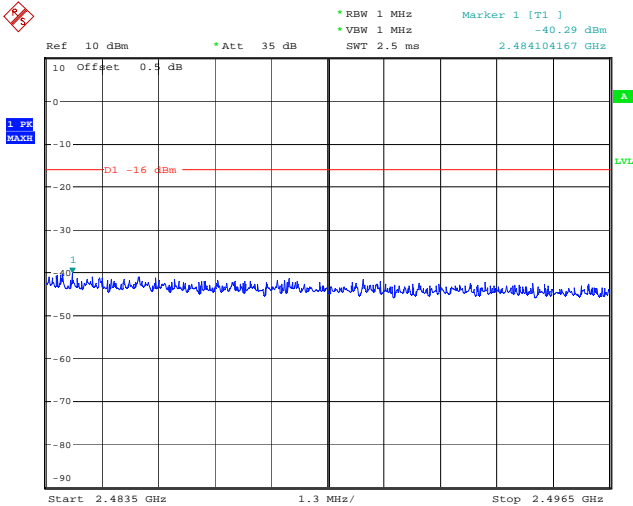
Date: 25.JUL.2023 16:45:19



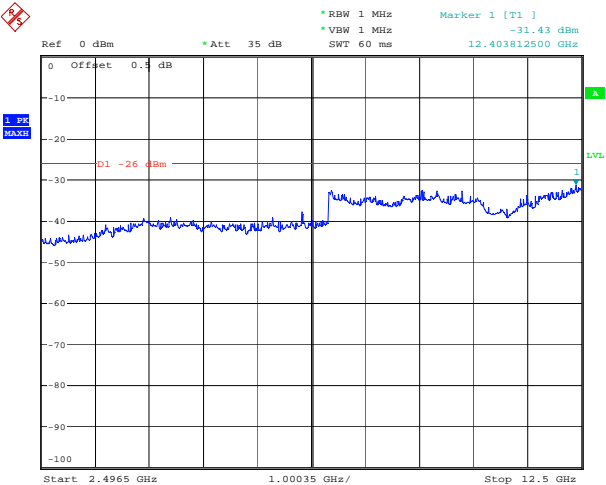
Date: 25.JUL.2023 16:45:34



Date: 25.JUL.2023 16:45:49



Date: 25.JUL.2023 16:46:00



Date: 25.JUL.2023 16:46:12

RBW 100 kHz
 VBW 100 kHz
 SWT 100 ms

Marker 1 [T1]
 -51.73 dBm
 157.467948718 MHz

Ref -10 dBm
 *Att. 35 dB

-10 Offset 0.5 dB

D1 -36 dBm

1

Start 30 MHz
 97 MHz/
 Stop 1 GHz

* RBW 1 MHz
 * VSW 1 MHz
 * Att. 35 dB
 * Offset 0 dB
 * Marker 1 { T1 }
 * -44.74 dBm
 * SWF 5 ms
 * 2.133605769 GHz

0 Offset 0.5 dB
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -80
 -90
 -100

D1 -26 dBm
 T1
 -44.74 dBm

Start 1 GHz
 138.7 MHz/
 Stop 2.387 GHz

The screenshot displays a spectrum analyzer interface. At the top, a red 'X' icon is visible. The main display area shows a blue noise floor at approximately -41.74 dBm. A red horizontal line is drawn across the plot at -16 dBm, labeled 'D1 -16 dBm'. A green marker is placed on the noise floor at 2.395187500 GHz, labeled '3'. The x-axis represents frequency, ranging from 2.387 GHz to 2.4 GHz. The y-axis represents power, ranging from -90 dBm to 10 dBm. The top status bar shows 'Ref 10 dBm', '*Att. 35 dB', '*RBW 1 MHz', '*VBW 1 MHz', 'SWT 2.5 ms', and 'Marker 1 [T1] -41.74 dBm'. The bottom status bar shows 'Start 2.387 GHz', '1.3 MHz/', and 'Stop 2.4 GHz'.

Ref 10 dBm *Att 35 dB

*RBW 1 MHz Marker 1 {T1 } -16.13 dBm
 *VBW 1 MHz
 SWT 2.5 ms 2.485020833 GHz

10 Offset 0.5 dB

0
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -80
 -90

1 PR
 HANSH

1
 -16 dBm

Start 2.4835 GHz 1.3 MHz/ Stop 2.4965 GHz

* RBW 1 MHz
 * VSW 1 MHz
 SWF 60 ms
 Marker 1 [T1]
 -31.24 dBm
 12.483968750 GHz

Ref 0 dBm
 * Att. 35 dB

0 Offset 0.5 dB
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -80
 -90
 -100

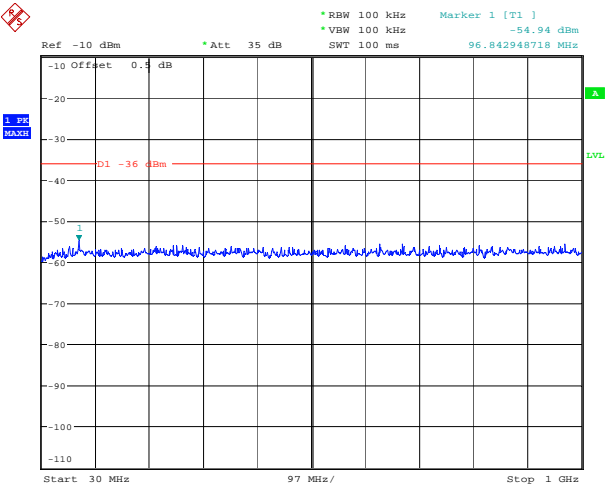
D1 -26 dBm
 LVL

1 PP
 MAXI

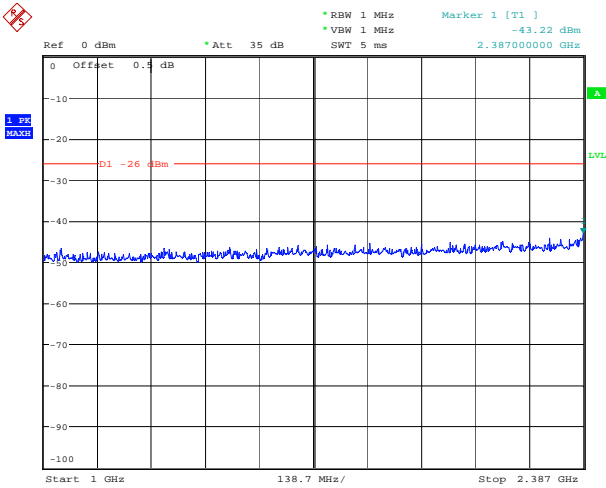
Start 2.4965 GHz
 1.00035 GHz/
 Stop 12.5 GHz

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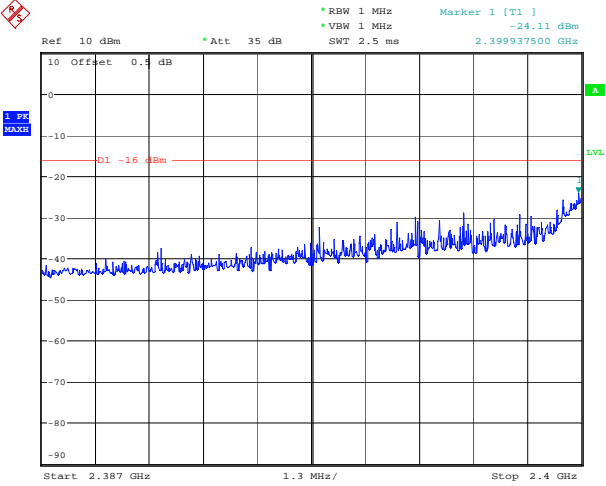
802.11n ht20 Low Channel



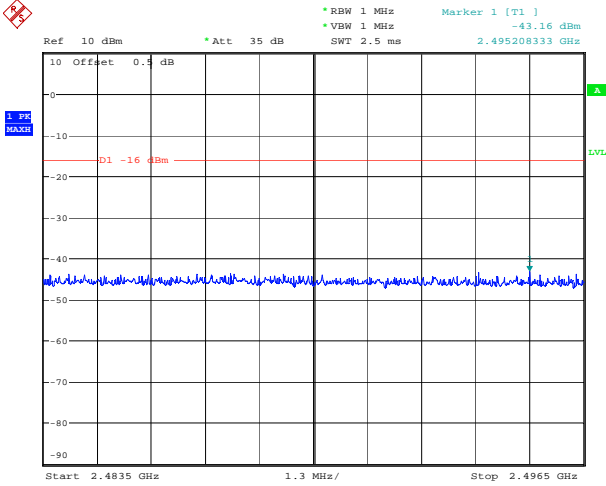
Date: 25.JUL.2023 16:59:30



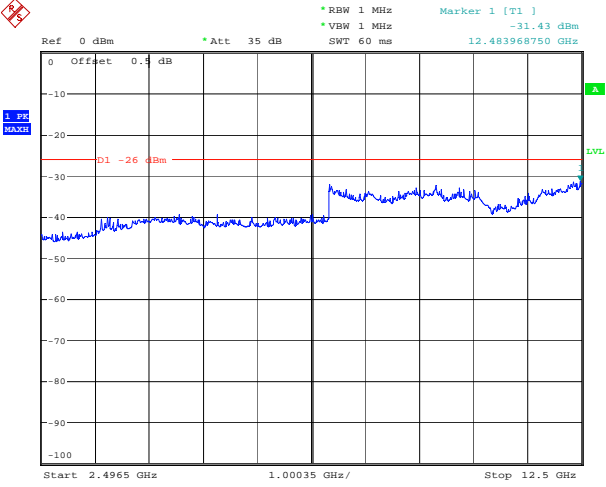
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Date: 25.JUL.2023 17:00:02

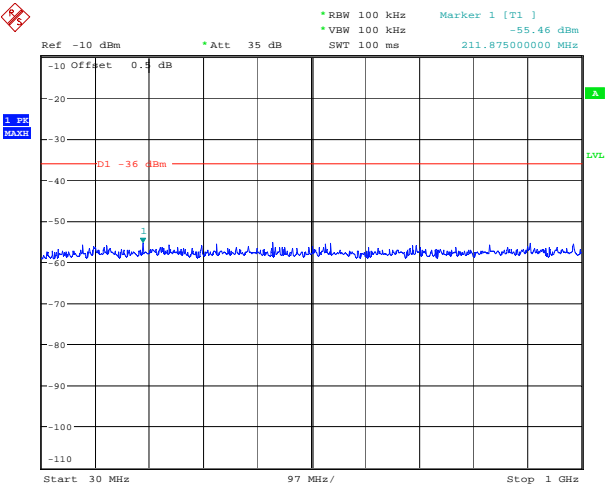


Date: 25.JUL.2023 17:00:14

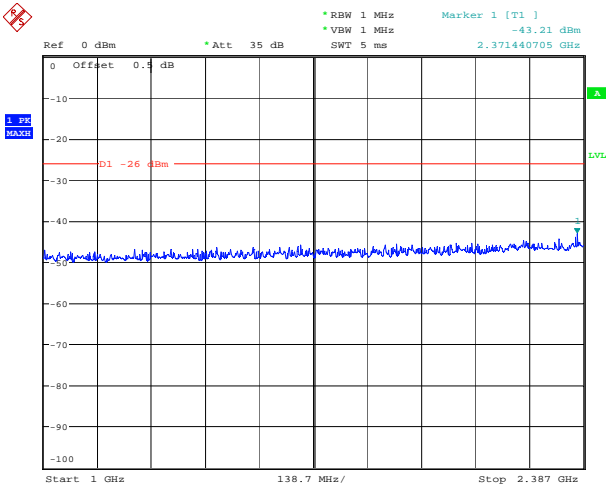


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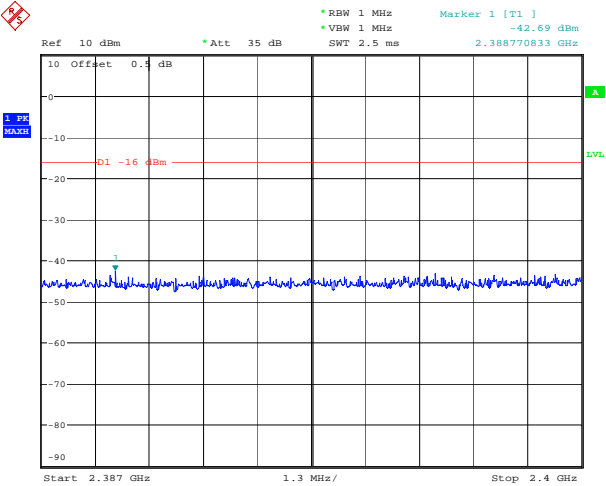
802.11n ht20 Middle Channel



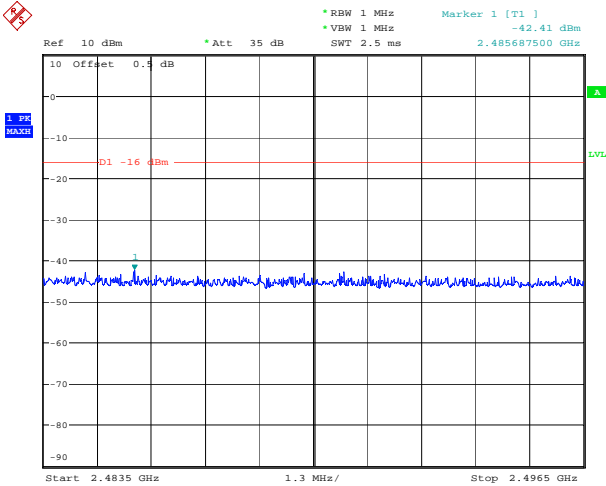
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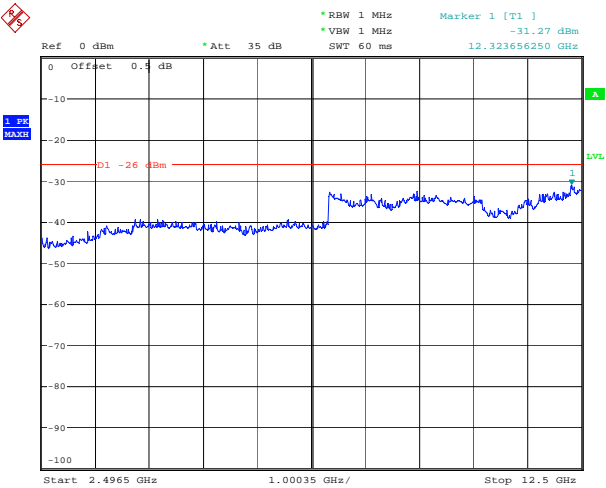
Date: 25.JUL.2023 16:58:26



Date: 25.JUL.2023 16:58:38

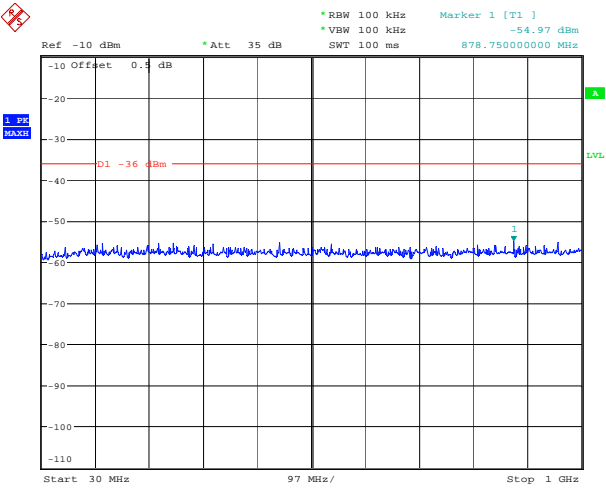


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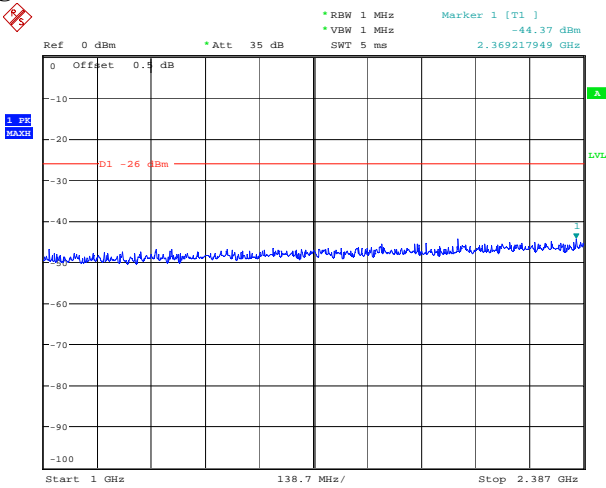


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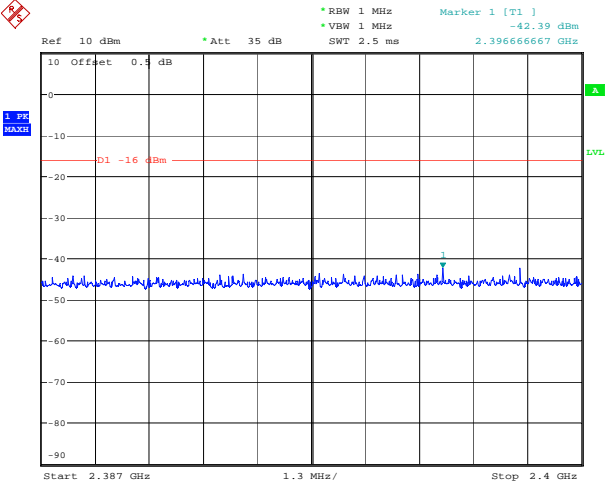
802.11n ht20 High Channel



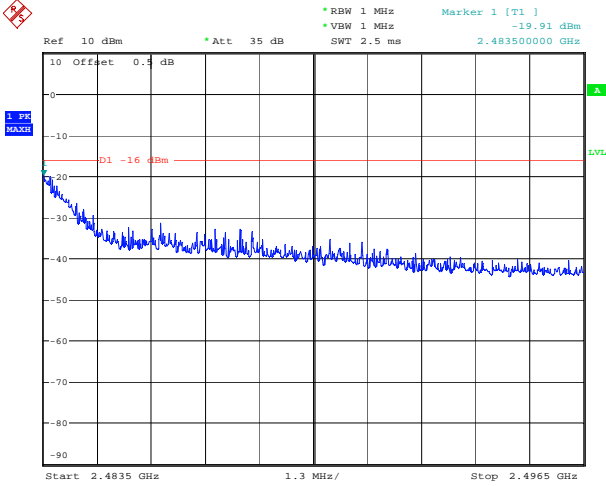
Date: 25.JUL.2023 16:56:44



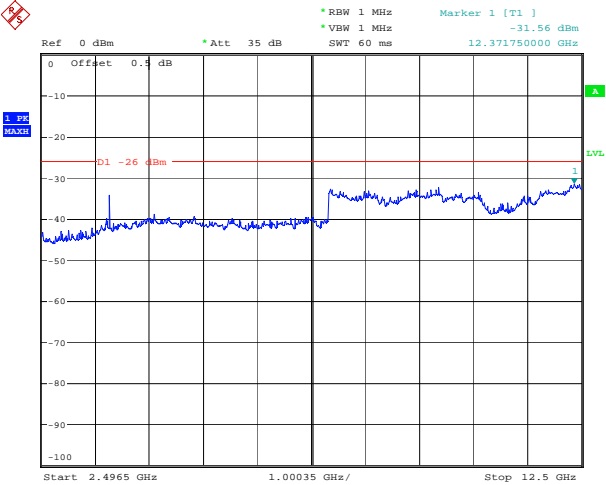
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Date: 25.JUL.2023 16:57:07

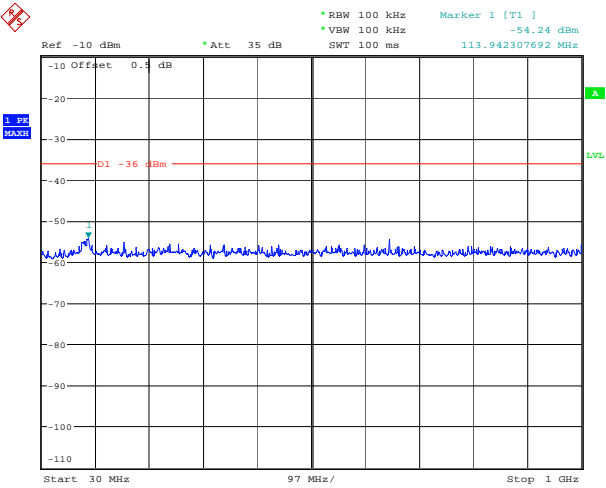


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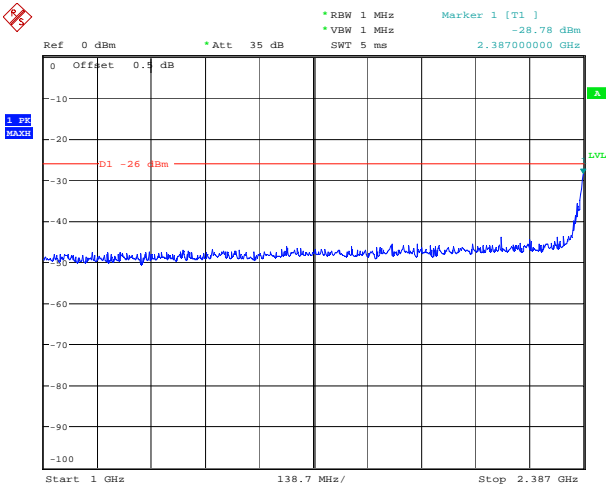


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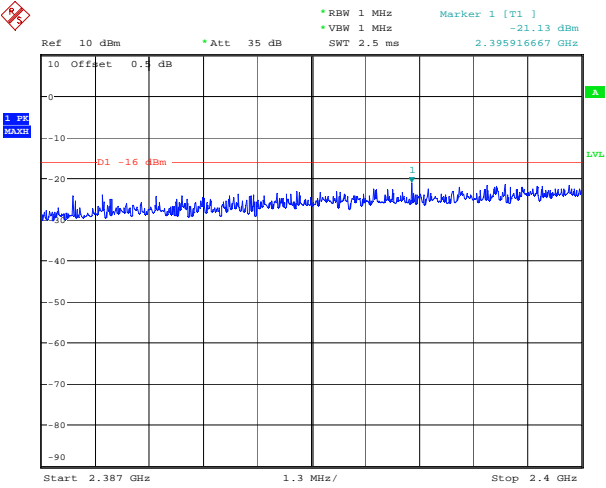
802.11n ht40 Low Channel



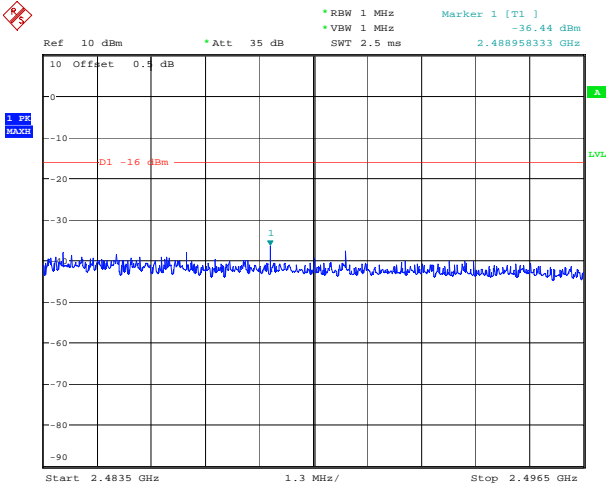
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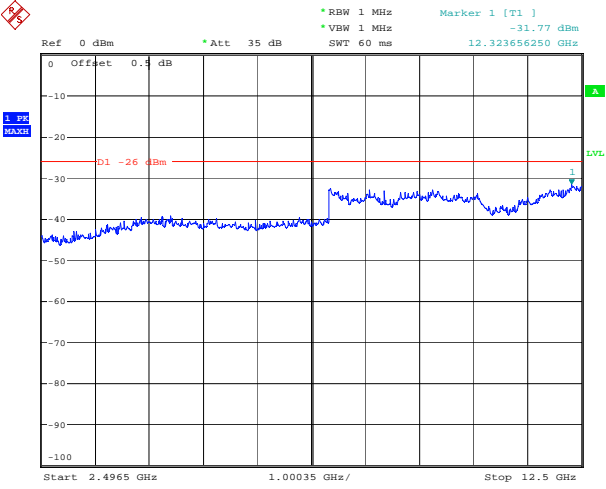
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Date: 25.JUL.2023 16:24:29

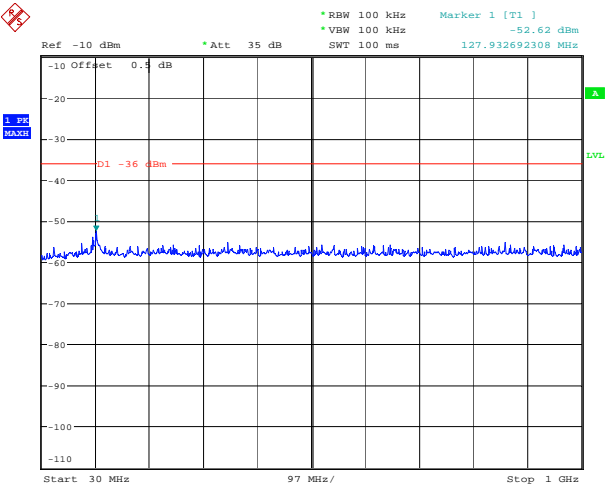


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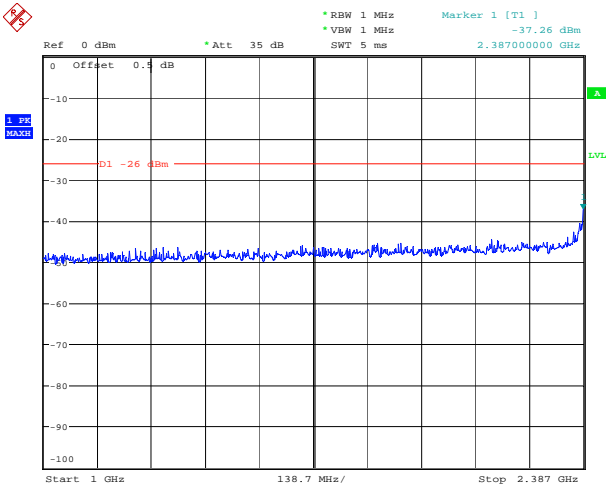


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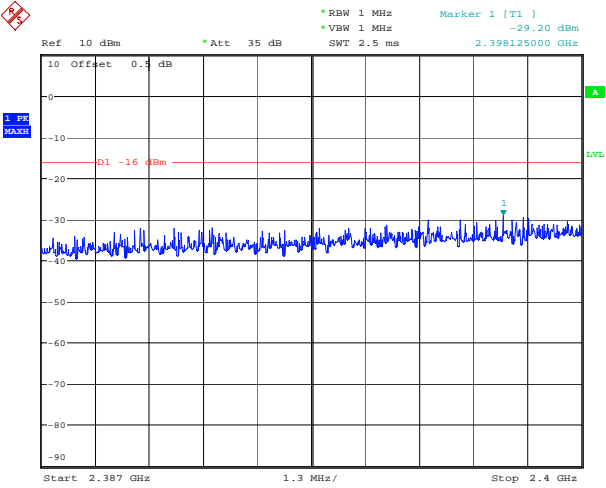
802.11n ht40 Middle Channel



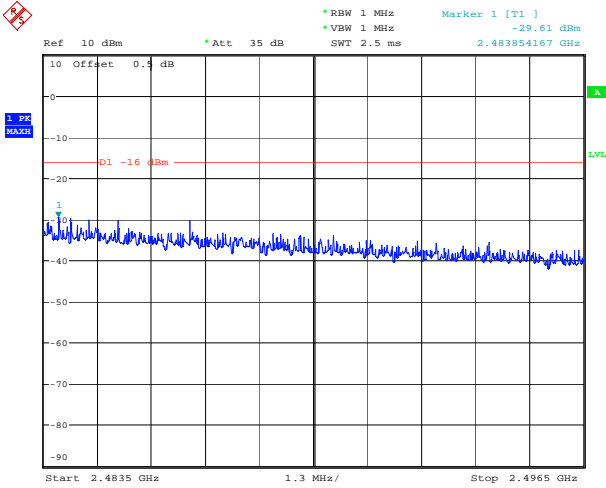
Date: 25.JUL.2023 17:01:53



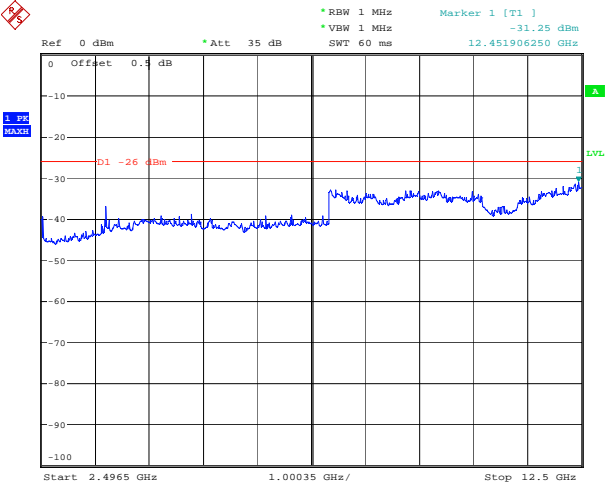
Date: 25.JUL.2023 17:02:05



Date: 25.JUL.2023 17:02:23



Date: 25.JUL.2023 17:02:37



Date: 25.JUL.2023 17:02:49

1 PR
MAX

Ref -10 dBm Att 35 dB

RBW 100 kHz VBW 100 kHz SWT 100 ms Marker 1 [T1] -52.93 dBm 148.141025641 MHz

D1 -36 dBm

Start 30 MHz 97 MHz/ Stop 1 GHz

The screenshot shows a Spectrum Analyzer interface with the following details:

- Top Bar:**
 - RBW 1 MHz
 - VBW 1 MHz
 - Marker 1 [T1]
 - Att -43.50 dBm
- Control Panel:**
 - Ref 0 dBm
 - *Att 35 dB
 - SWT 5 ms
 - 2.387000000 GHz
- Display Area:**
 - A grid with major lines every 10 dB and minor lines every 2 dB.
 - A blue trace representing the signal spectrum, showing a noisy baseline around -43.50 dBm.
 - A red horizontal line at -26 dBm, labeled "D1 -26 dBm".
 - A green horizontal line at the top right, labeled "LVL".
 - A green label "A" is visible on the right edge of the grid.
- Bottom Bar:**
 - Start 1 GHz
 - 138.7 MHz/
 - Stop 2.387 GHz

RBW 1 MHz Marker 1 [T1] -37.55 dBm
VBW 1 MHz
SWT 2.5 ms 2.399770813 GHz

Ref 10 dBm *Att. 35 dB

10 Offset 0.5 dB

0

-10

-20

-30

-40

-50

-60

-70

-80

-90

D1 -16 dBm

3

Start 2.387 GHz 1.3 MHz / Stop 2.4 GHz

*RBW 1 MHz
 *VBW 1 MHz
 SWT 2.5 ms
 Marker 1 (T1)
 -18.06 dBm
 2.483812500 GHz

Ref 10 dBm
 *Att. 35 dB

10 Offset 0.5 dB
 0
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -80
 -90

1 PR
 MAXH

D1 -16 dBm
 LVL

Start 2.4835 GHz
 1.3 MHz/
 Stop 2.4965 GHz

* RBW 1 MHz
 * VBW 1 MHz
 * Att. 35 dB
 SWF 60 ms
 Marker 1 [T1]
 -27.02 dBm
 2.496500000 GHz

Ref 0 dBm
 Offset 0.5 dB

D1 -26 dBm

1 PR
 MAXI

Start 2.4965 GHz
 1.00035 GHz/
 Stop 12.5 GHz

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4.5 Antenna Output Power and Antenna Power Tolerance

Test Result: Compliant

Test Mode: Transmitting

Duty Cycle and Declared Power:

Mode	Ton (ms)	Ton+Toff (ms)	Duty cycle (%)
802.11 b	100.000	100.000	100.00
802.11 g	1.418	1.506	94.16
802.11 n20	1.330	1.418	93.79
802.11 n40	0.668	0.702	95.16

Mode	Antenna gain (dBi)	Declared power (mW/MHz)
802.11 b	3.07	6.40
802.11 g		4.10
802.11 n20		1.40
802.11 n40		1.70

Output power

Test Condition	Mode	Channel	Conducted power (dBm/MHz)	Antenna output power (mW/MHz)		Antenna output tolerance (%)		EIRP (dBm/MHz)	
				Result	Limit	Result	Limit	Result	Limit
NV	802.11 b	Low	7.93	6.209	≤ 10	-2.98	-80~+20	11.00	≤ 12.14
		Middle	8.05	6.383	≤ 10	-0.27		11.12	≤ 12.14
		High	7.68	5.861	≤ 10	-8.42		10.75	≤ 12.14
	802.11 g	Low	5.73	3.973	≤ 10	-3.10	-80~+20	9.06	≤ 12.14
		Middle	5.80	4.038	≤ 10	-1.51		9.13	≤ 12.14
		High	5.74	3.982	≤ 10	-2.88		9.07	≤ 12.14
	802.11ac vht20	Low	0.97	1.333	≤ 10	-4.79	-80~+20	4.32	≤ 12.14
		Middle	0.97	1.333	≤ 10	-4.79		4.32	≤ 12.14
		High	0.88	1.306	≤ 10	-6.71		4.23	≤ 12.14
	802.11ac vht40	Low	1.98	1.658	≤ 5	-2.47	-80~+20	5.27	≤ 9.13
		Middle	1.77	1.580	≤ 5	-7.06		5.06	≤ 9.13
		High	1.87	1.616	≤ 5	-4.94		5.15	≤ 9.13
LV	802.11 b	Low	7.81	6.039	≤ 10	-5.64	-80~+20	10.88	≤ 12.14
		Middle	7.95	6.237	≤ 10	-2.55		11.02	≤ 12.14
		High	7.52	5.649	≤ 10	-11.73		10.59	≤ 12.14
	802.11 g	Low	5.59	3.847	≤ 10	-6.17	-80~+20	8.92	≤ 12.14
		Middle	5.80	4.038	≤ 10	-1.51		9.13	≤ 12.14
		High	5.64	3.892	≤ 10	-5.07		8.97	≤ 12.14
	802.11ac vht20	Low	0.95	1.327	≤ 10	-5.21	-80~+20	4.30	≤ 12.14
		Middle	0.85	1.297	≤ 10	-7.36		4.20	≤ 12.14
		High	0.86	1.300	≤ 10	-7.14		4.21	≤ 12.14
	802.11ac vht40	Low	1.92	1.635	≤ 5	-3.82	-80~+20	5.21	≤ 9.13
		Middle	1.67	1.544	≤ 5	-9.18		4.96	≤ 9.13
		High	1.75	1.572	≤ 5	-7.53		5.03	≤ 9.13
HV	802.11 b	Low	7.93	6.209	≤ 10	-2.98	-80~+20	11.00	≤ 12.14
		Middle	7.87	6.124	≤ 10	-4.31		10.94	≤ 12.14
		High	7.52	5.649	≤ 10	-11.73		10.59	≤ 12.14
	802.11 g	Low	5.59	3.847	≤ 10	-6.17	-80~+20	8.92	≤ 12.14
		Middle	5.66	3.910	≤ 10	-4.63		8.99	≤ 12.14
		High	5.74	3.982	≤ 10	-2.88		9.07	≤ 12.14
	802.11ac vht20	Low	0.81	1.285	≤ 10	-8.21	-80~+20	4.16	≤ 12.14
		Middle	0.81	1.285	≤ 10	-8.21		4.16	≤ 12.14
		High	0.80	1.282	≤ 10	-8.43		4.15	≤ 12.14
	802.11ac vht40	Low	1.86	1.613	≤ 5	-5.12	-80~+20	5.15	≤ 9.13
		Middle	1.75	1.572	≤ 5	-7.53		5.03	≤ 9.13
		High	1.77	1.580	≤ 5	-7.06		5.06	≤ 9.13

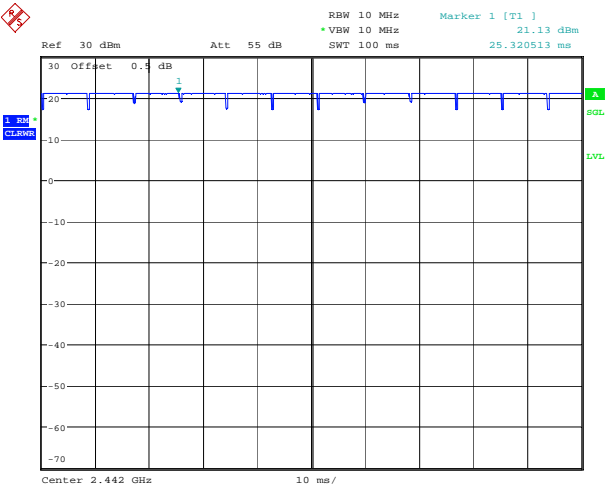
Note:

Antenna Output Power = Conducted power (mW/MHz) / Duty Cycle;

Antenna Output Power Tolerance = (Antenna Output power - Declared Power)/Declared Power*100%

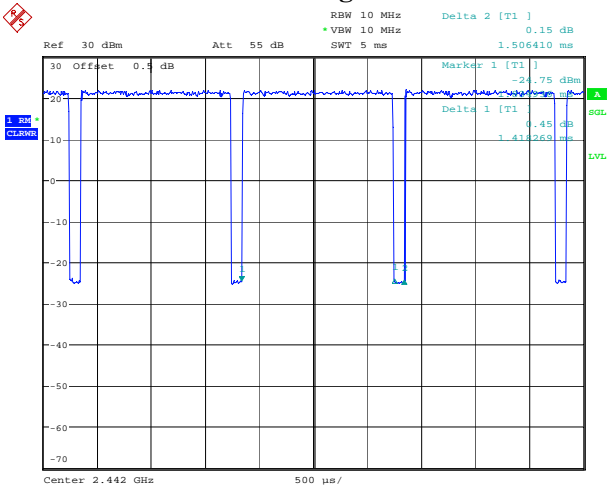
Duty Cycle:

802.11b



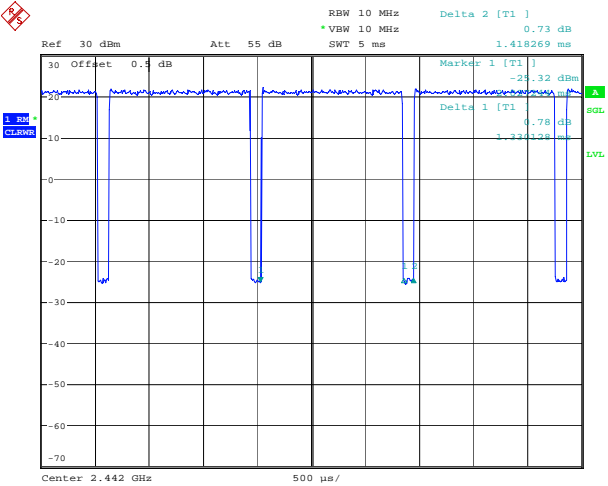
Date: 25.JUL.2023 17:43:12

802.11g



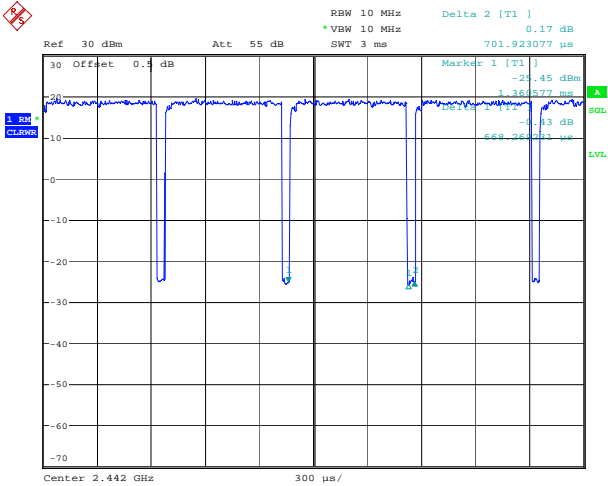
Date: 25.JUL.2023 17:44:36

802.11n20



Date: 25.JUL.2023 17:45:18

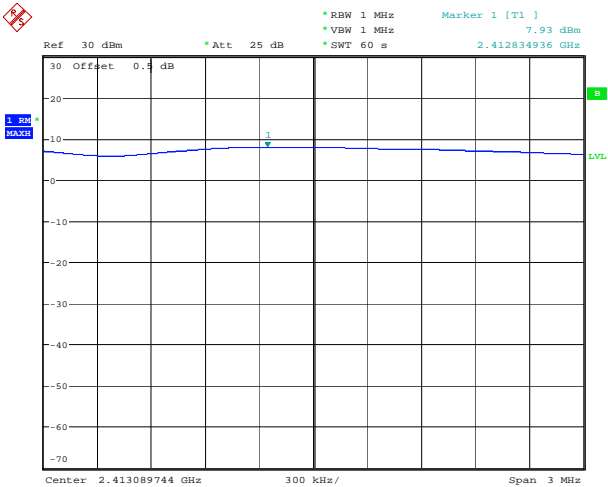
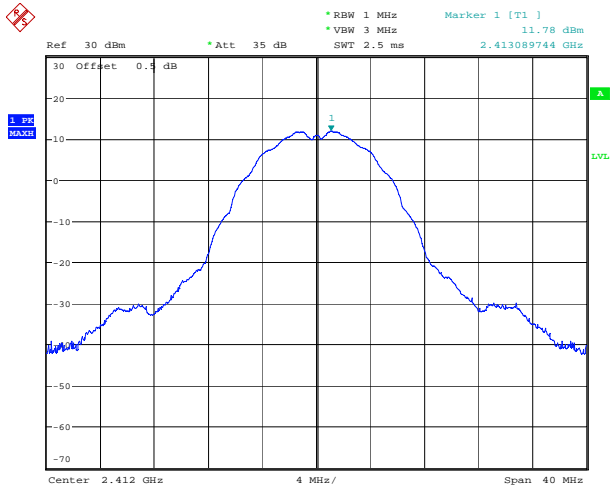
802.11n40



Date: 25.JUL.2023 17:46:07

Antenna Power:

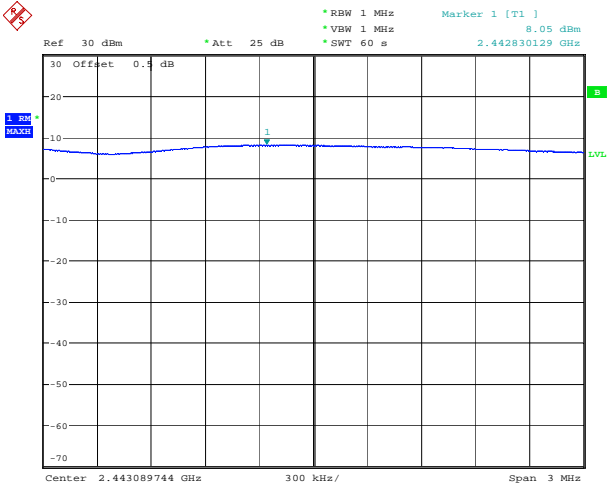
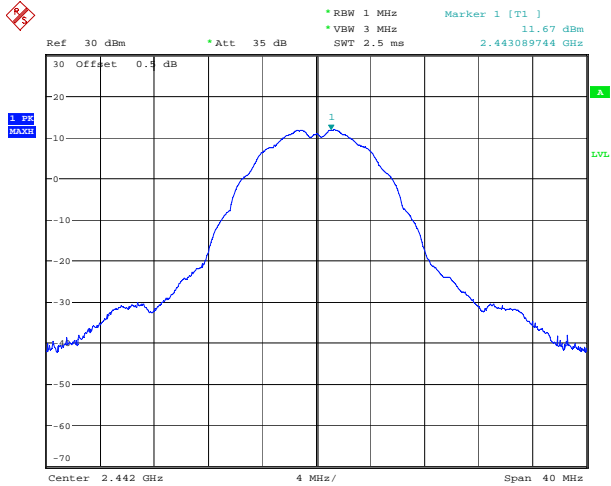
802.11b, Low Channel



Date: 26.JUL.2023 14:30:15

Date: 26.JUL.2023 14:32:33

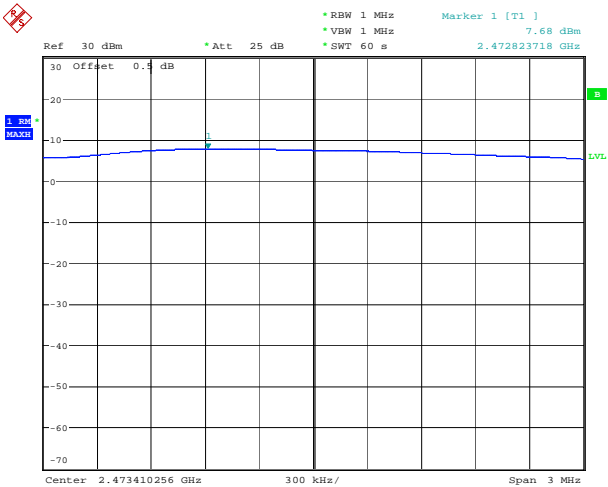
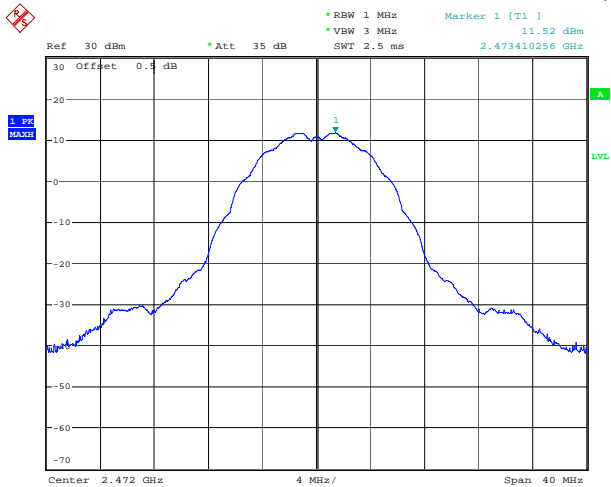
802.11b, Middle Channel



Date: 26.JUL.2023 14:25:52

Date: 26.JUL.2023 14:29:18

802.11b, High Channel



Date: 26.JUL.2023 14:33:18

Date: 26.JUL.2023 14:36:02

RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 14.35 dBm
 SWT 2.5 ms 2.413217949 GHz

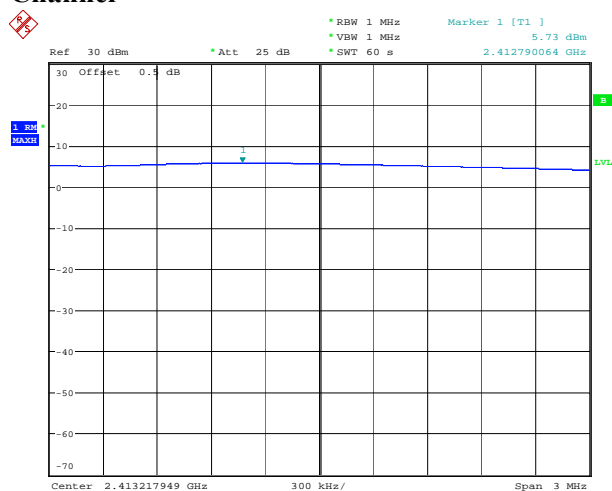
Ref 30 dBm *Att 35 dB

30 Offset 0.5 dB

1 PR MAX

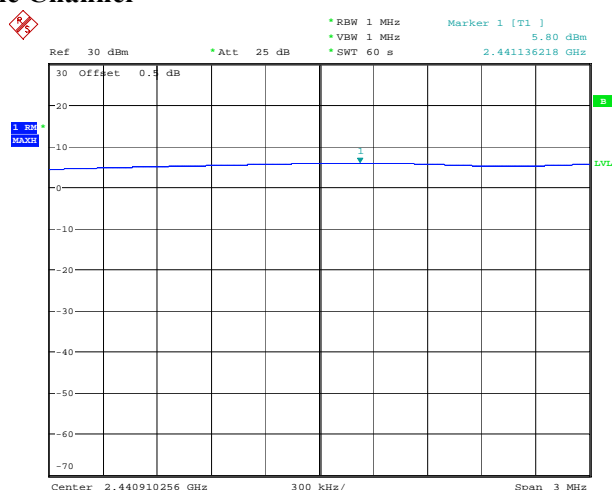
Center 2.412 GHz 4 MHz/ Span 40 MHz

Date: 26.JUL.2023 11:05:35



Date: 26.JUL.2023 11:08:06

Date: 26.JUL.2023 11:09:12



Date: 26.JUL.2023 11:13:03

Ref 30 dBm *Att 35 dB

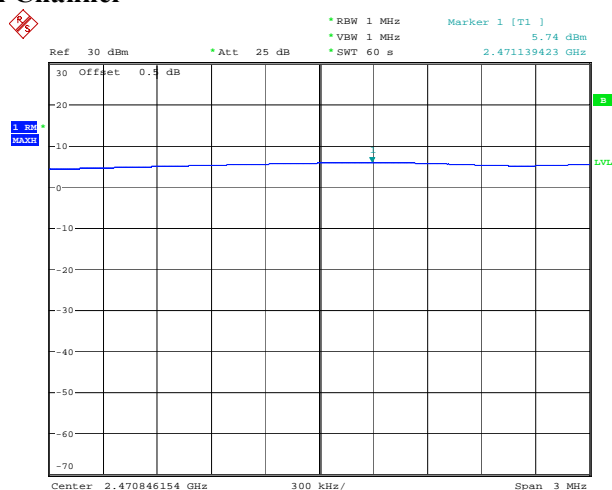
*RBW 1 MHz Marker 1 [T1] 14.40 dBm
 *VBW 3 MHz
 SWT 2.5 ms 2.470846154 GHz

30 Offset 0.5 dB

1 PR
 MAX

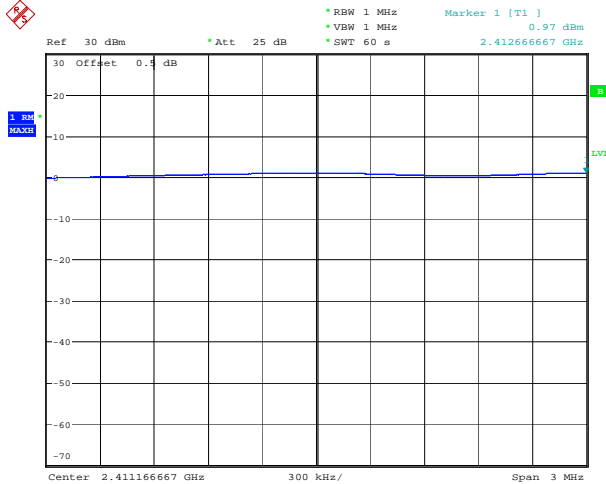
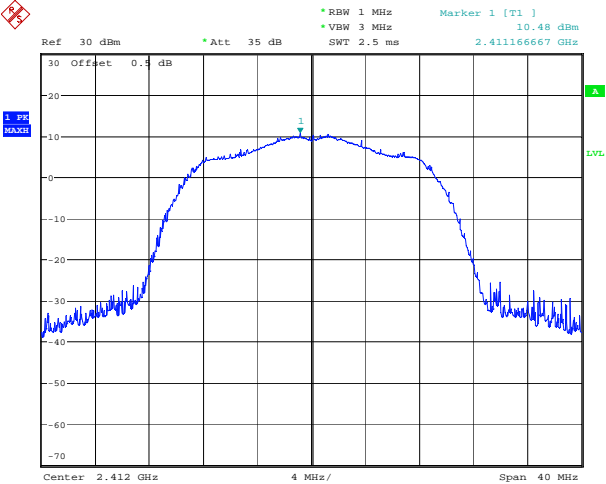
Center 2.472 GHz 4 MHz/
 Span 40 MHz

Date: 26.JUL.2023 11:13:57



Date: 26.JUL.2023 11:16:38

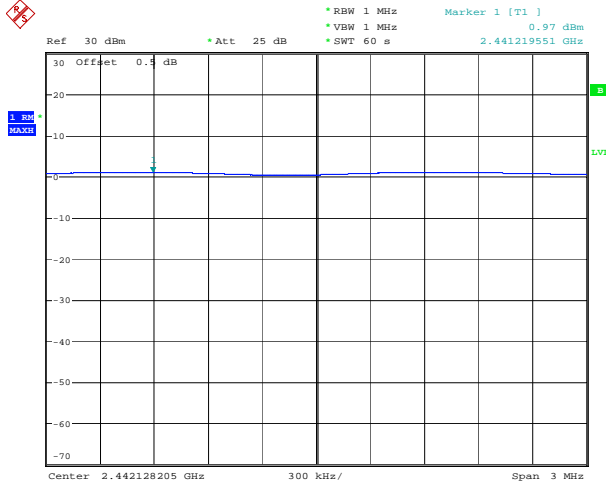
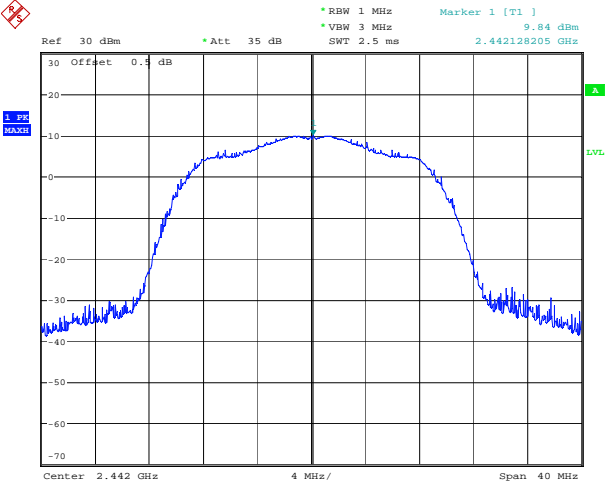
802.11n ht20, Low Channel



Date: 26.JUL.2023 11:31:05

Date: 26.JUL.2023 11:36:12

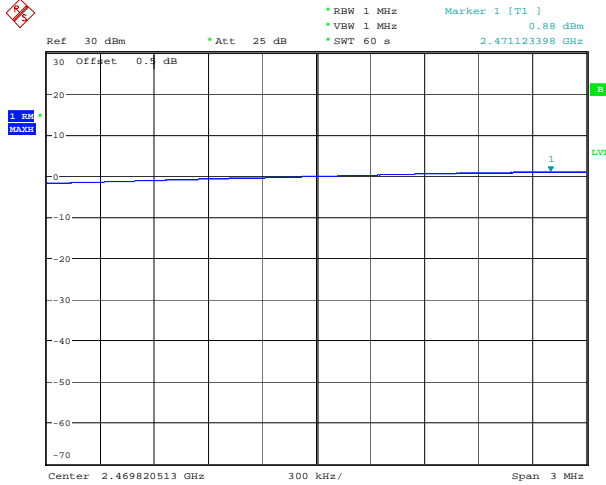
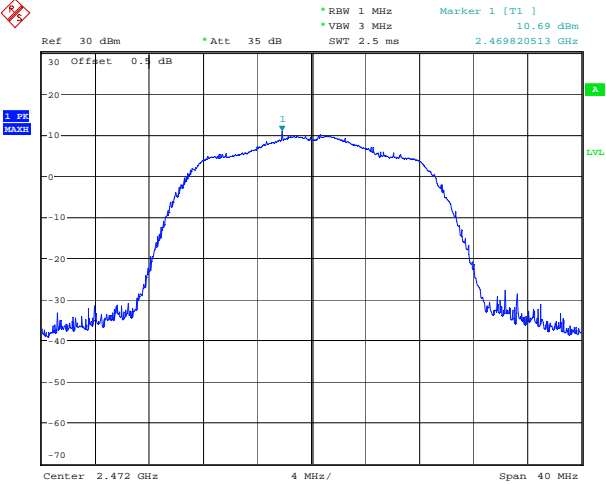
802.11n ht20, Middle Channel



Date: 26.JUL.2023 11:38:48

Date: 26.JUL.2023 11:41:16

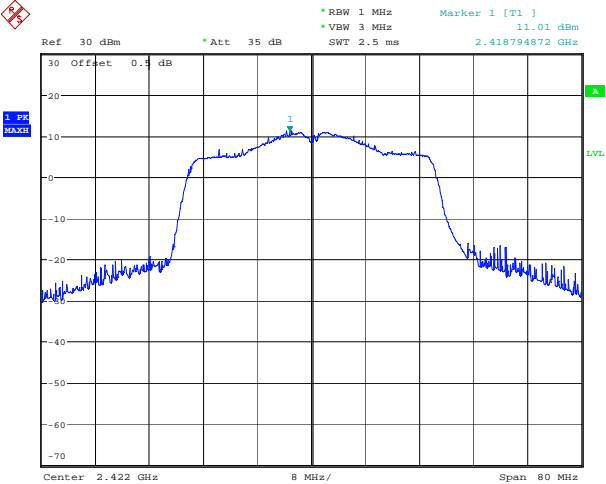
802.11n ht20, High Channel



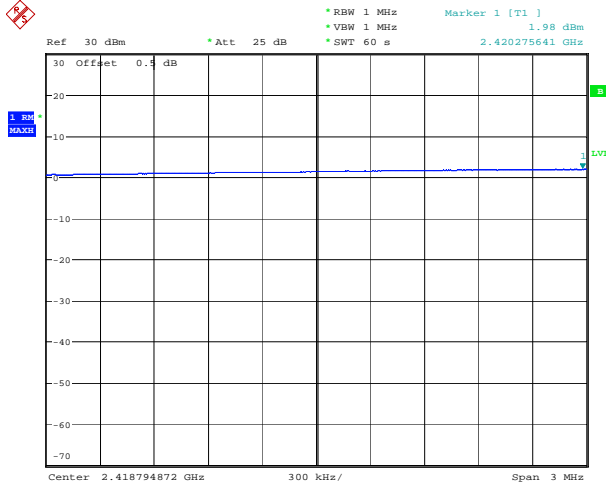
Date: 26.JUL.2023 11:42:57

Date: 26.JUL.2023 11:45:41

802.11n ht40, Low Channel

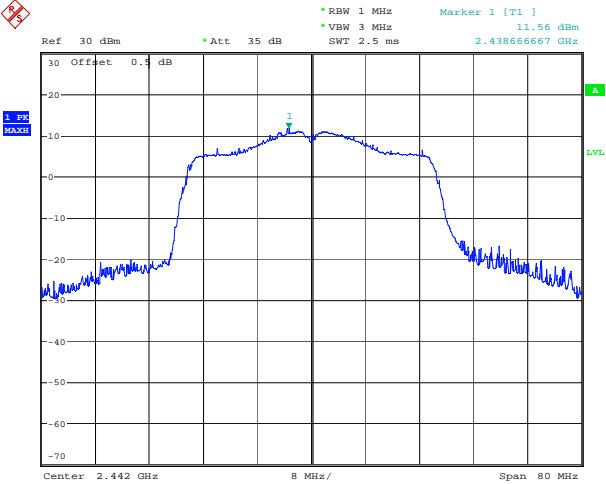


Date: 26.JUL.2023 11:47:31

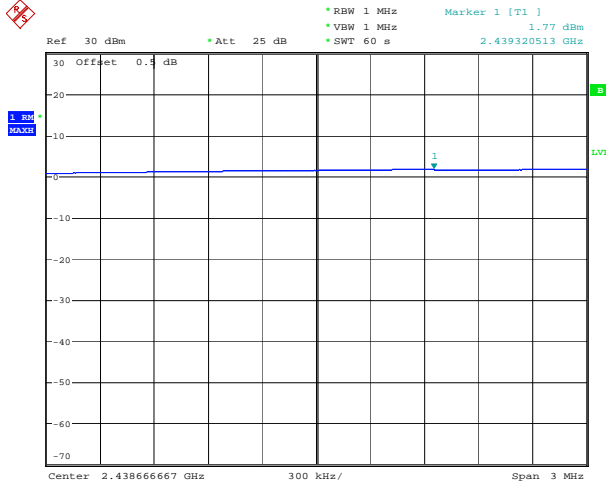


Date: 26.JUL.2023 11:50:10

802.11n ht40, Middle Channel

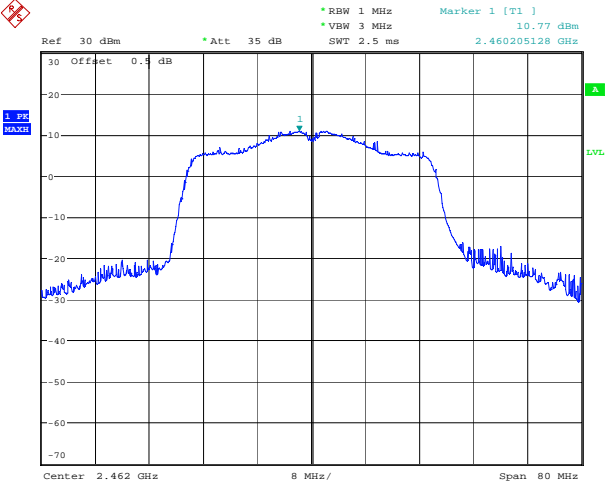


Date: 26.JUL.2023 11:52:36

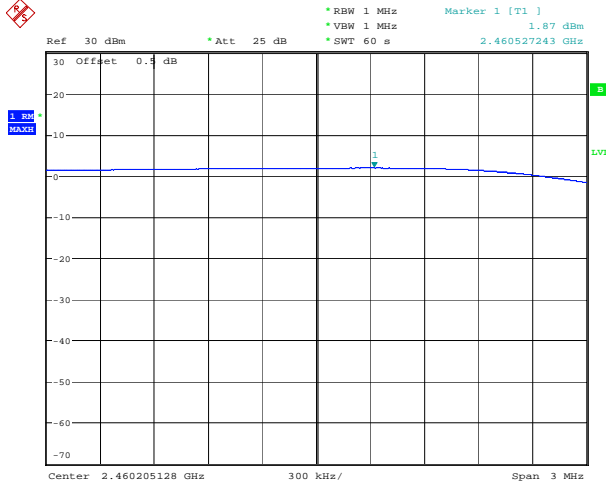


Date: 26.JUL.2023 11:55:13

802.11n ht40, High Channel



Date: 26.JUL.2023 11:57:38



Date: 26.JUL.2023 12:00:49

4.6 Receiver Spurious Emission and Unwanted Emission Intensity

Test Result: Compliant, please see the below tables and plots

Test Mode: Receiving

Test Condition	Mode	Test Band (RBW)	Result (dBm)			Limit (dBm)	Limit (nW)
			Low Channel	Middle Channel	High Channel		
NV	802.11 b	Band I (100kHz)	-69.20	-70.44	-70.01	-54	4
		Band II (1MHz)	-56.55	-55.70	-56.72	-47	20
	802.11 g	Band I (100kHz)	-70.52	-70.19	-70.05	-54	4
		Band II (1MHz)	-56.12	-56.41	-56.48	-47	20
	802.11 n20	Band I (100kHz)	-70.05	-69.45	-70.00	-54	4
		Band II (1MHz)	-56.63	-56.01	-56.59	-47	20
	802.11 n40	Band I (100kHz)	-70.66	-70.22	-70.59	-54	4
		Band II (1MHz)	-56.20	-57.06	-55.87	-47	20
LV	802.11 b	Band I (100kHz)	-69.09	-69.63	-69.60	-54	4
		Band II (1MHz)	-55.76	-55.10	-56.50	-47	20
	802.11 g	Band I (100kHz)	-70.45	-69.56	-70.04	-54	4
		Band II (1MHz)	-55.97	-56.29	-55.90	-47	20
	802.11 n20	Band I (100kHz)	-69.72	-69.31	-69.76	-54	4
		Band II (1MHz)	-56.04	-55.52	-55.68	-47	20
	802.11 n40	Band I (100kHz)	-70.05	-69.99	-69.81	-54	4
		Band II (1MHz)	-56.19	-56.74	-55.77	-47	20
HV	802.11 b	Band I (100kHz)	-69.91	-70.94	-70.46	-54	4
		Band II (1MHz)	-56.75	-55.90	-57.21	-47	20
	802.11 g	Band I (100kHz)	-71.31	-71.12	-70.67	-54	4
		Band II (1MHz)	-56.92	-56.83	-56.66	-47	20
	802.11 n20	Band I (100kHz)	-70.53	-69.87	-70.93	-54	4
		Band II (1MHz)	-57.29	-56.90	-56.65	-47	20
	802.11 n40	Band I (100kHz)	-70.80	-70.98	-70.61	-54	4
		Band II (1MHz)	-56.69	-57.80	-56.18	-47	20

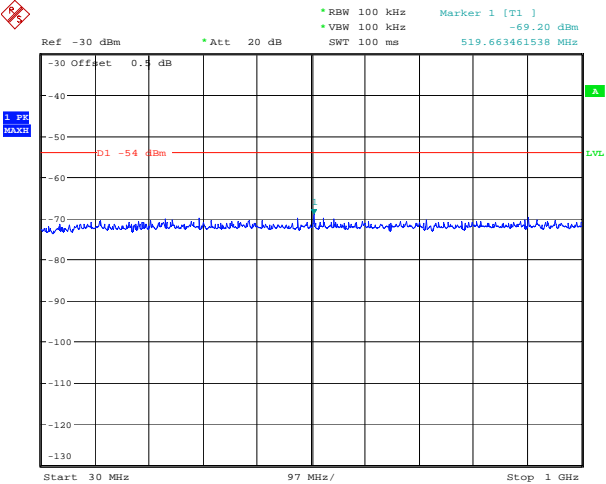
Note:

Band I: 30MHz ~ 1000MHz

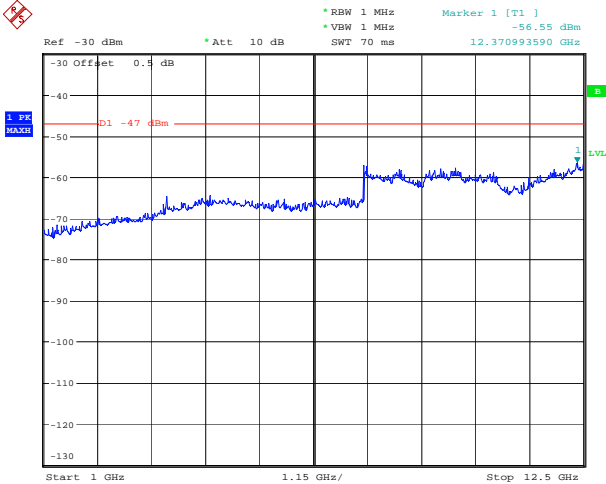
Band II: 1000MHz ~ 12500MHz

Please refer to the below plots for normal voltage test.

802.11b, Low Channel

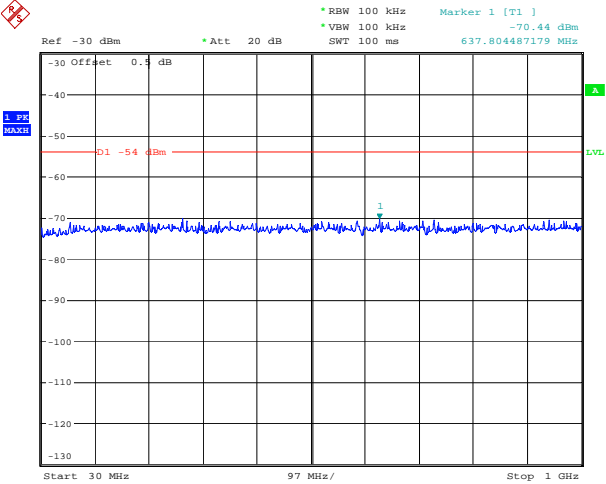


Date: 26.JUL.2023 09:24:11

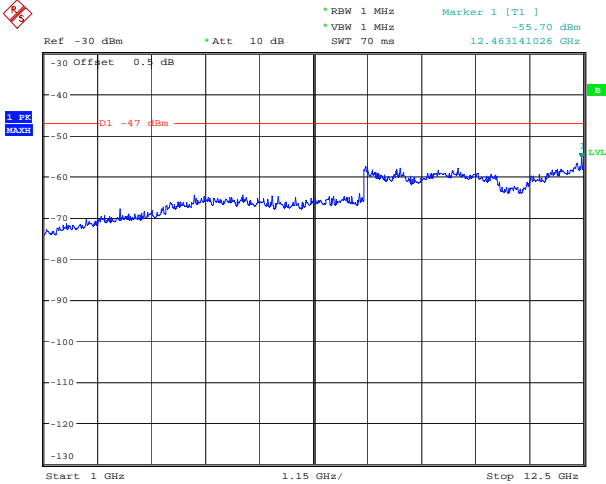


Date: 26.JUL.2023 09:27:45

802.11b, Middle Channel

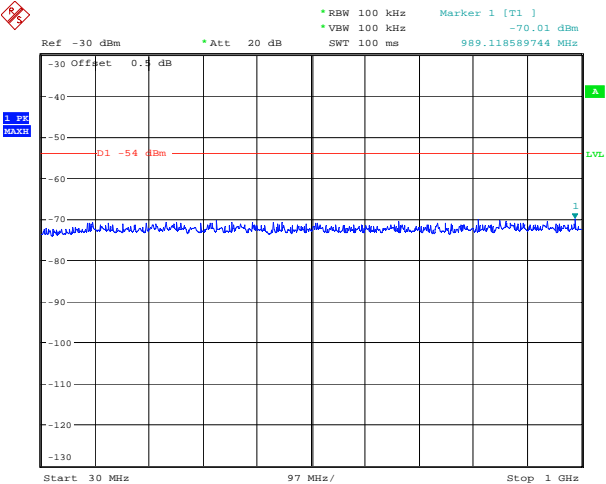


Date: 26.JUL.2023 09:29:13

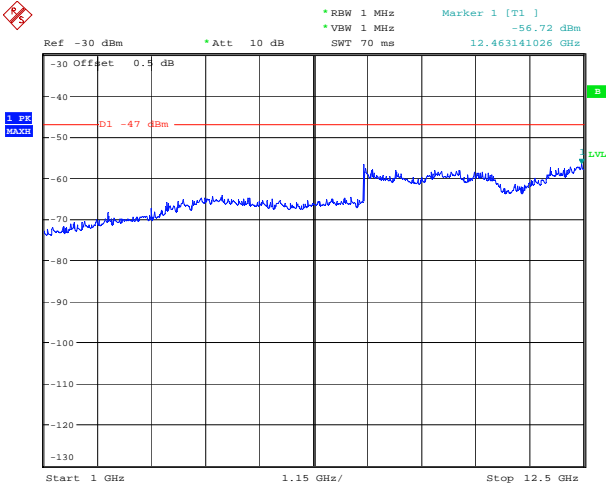


Date: 26.JUL.2023 09:28:51

802.11b, High Channel

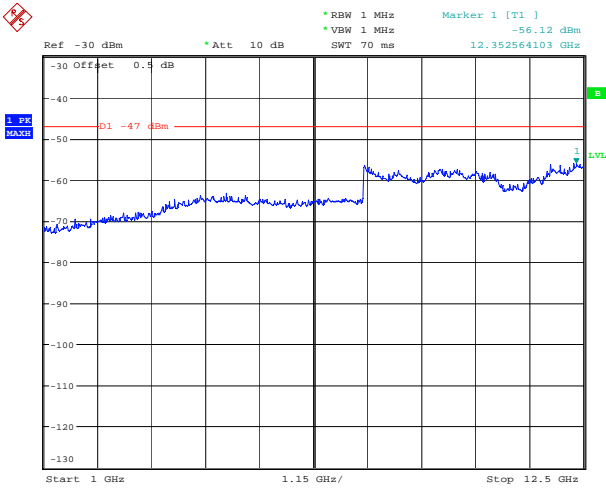
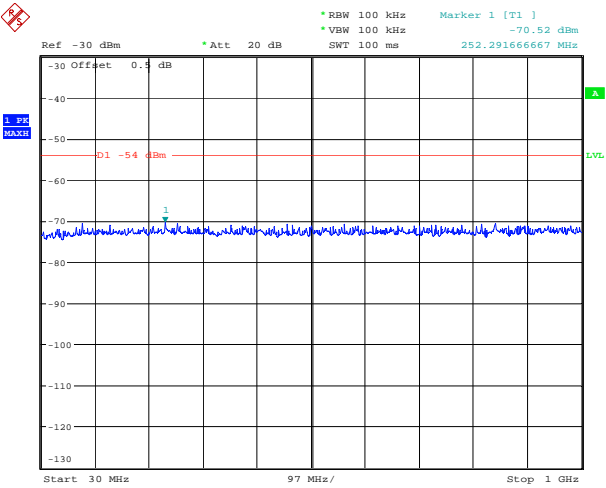


Date: 26.JUL.2023 09:29:54

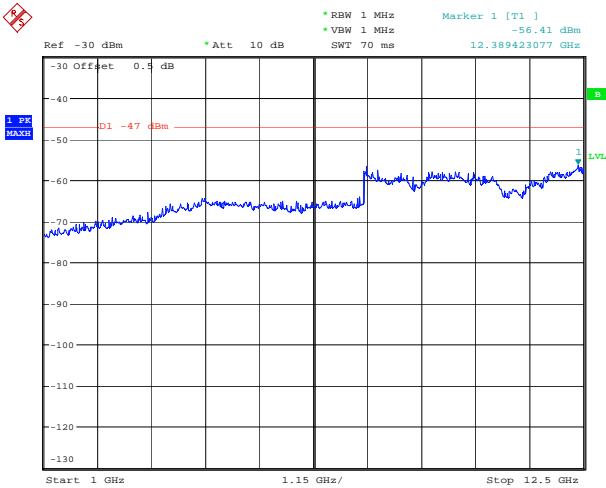
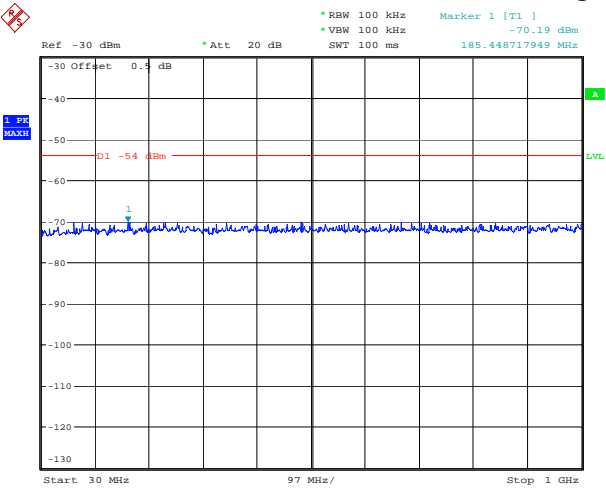


Date: 26.JUL.2023 09:30:17

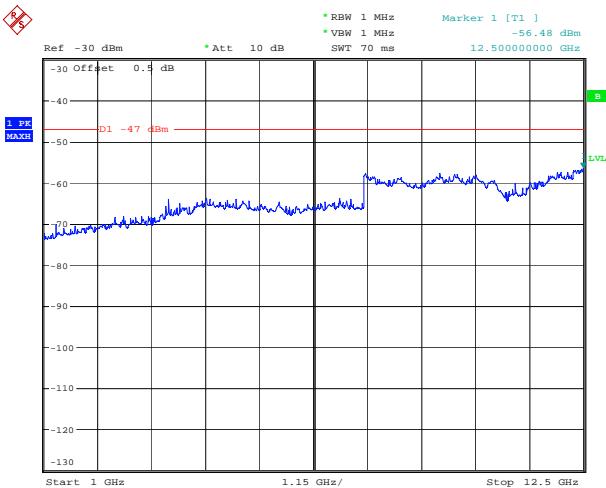
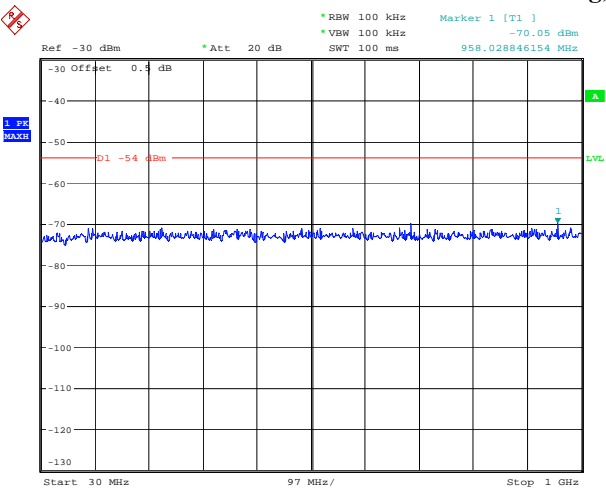
802.11g, Low Channel



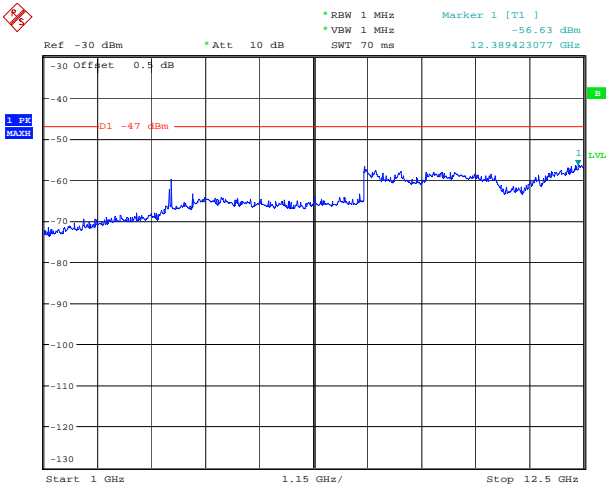
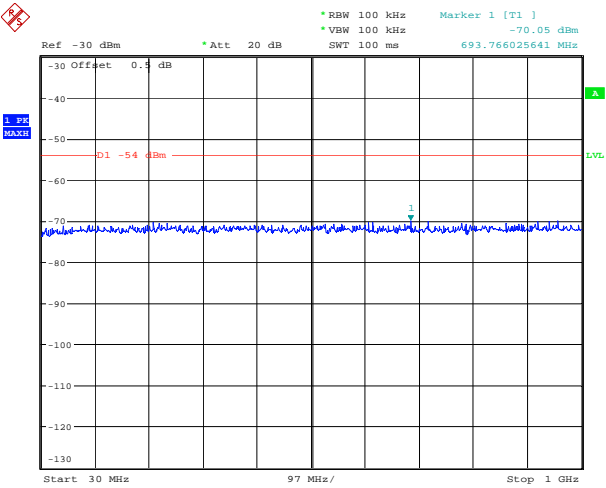
802.11g, Middle Channel



802.11g, High Channel



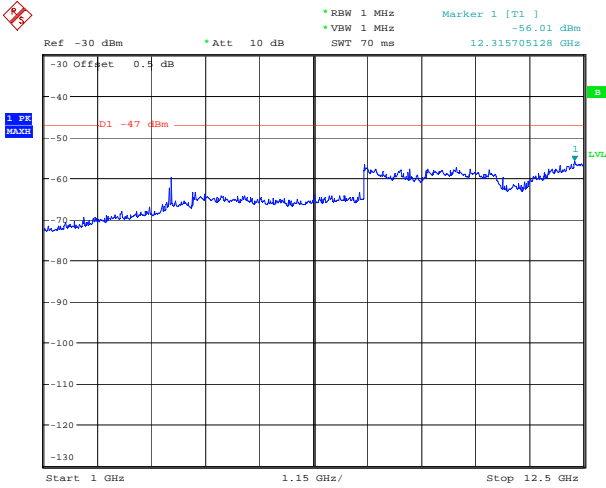
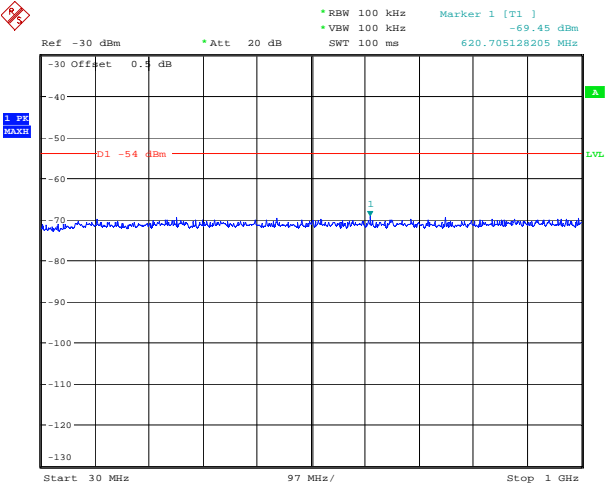
802.11n ht20, Low Channel



Date: 26.JUL.2023 09:34:12

Date: 26.JUL.2023 09:38:00

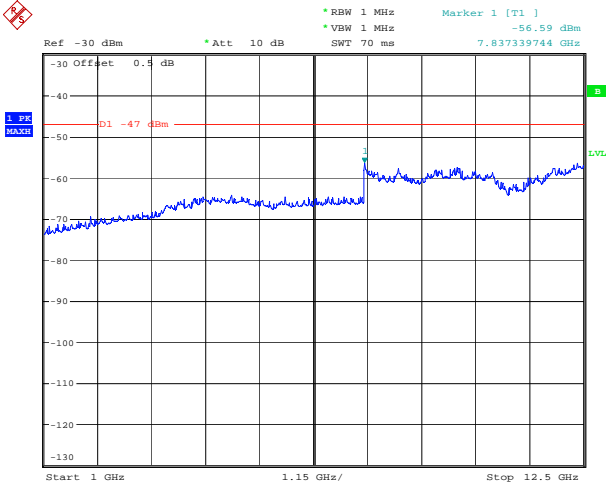
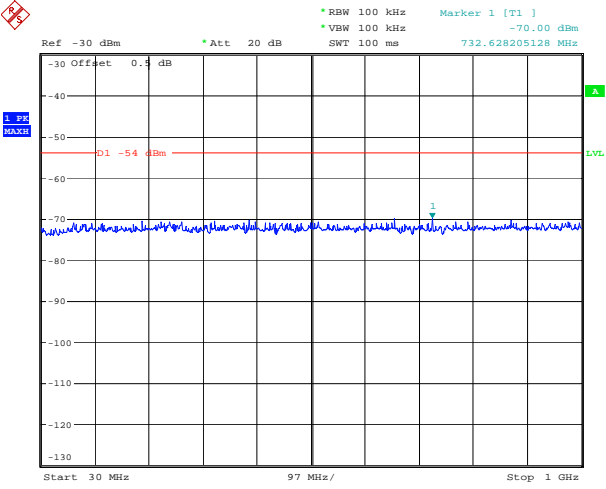
802.11n ht20, Middle Channel



Date: 26.JUL.2023 09:37:10

Date: 26.JUL.2023 09:38:26

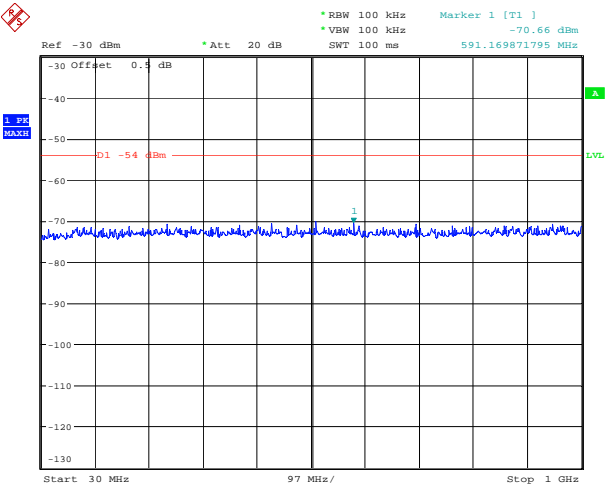
802.11n ht20, High Channel



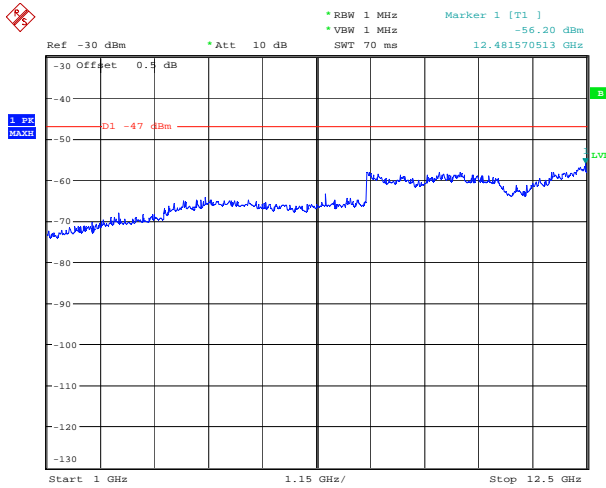
Date: 26.JUL.2023 09:39:57

Date: 26.JUL.2023 09:43:59

802.11n ht40, Low Channel

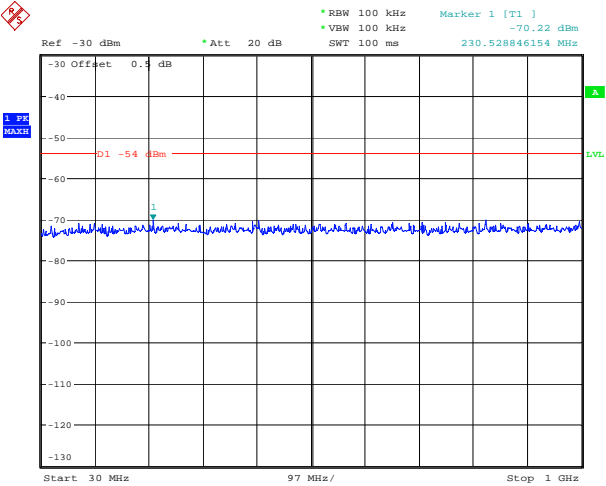


Date: 26.JUL.2023 09:56:01

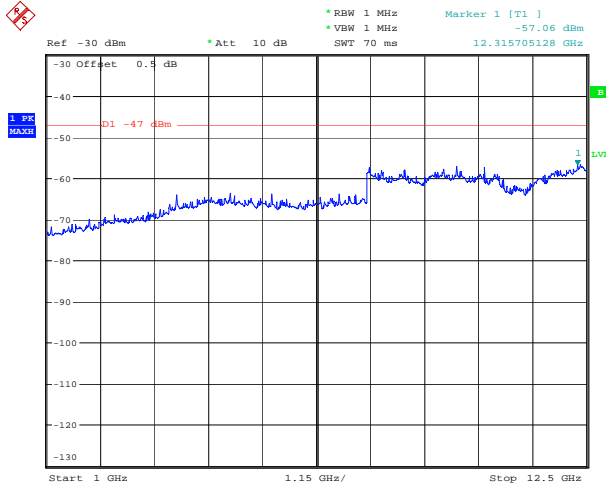


Date: 26.JUL.2023 09:55:53

802.11n ht40, Middle Channel

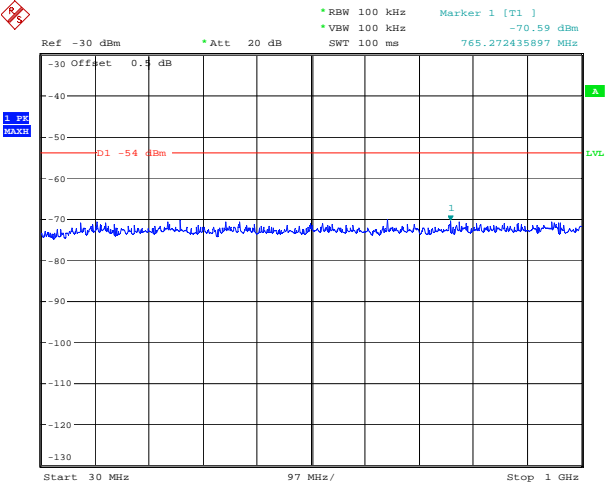


Date: 26.JUL.2023 09:40:33

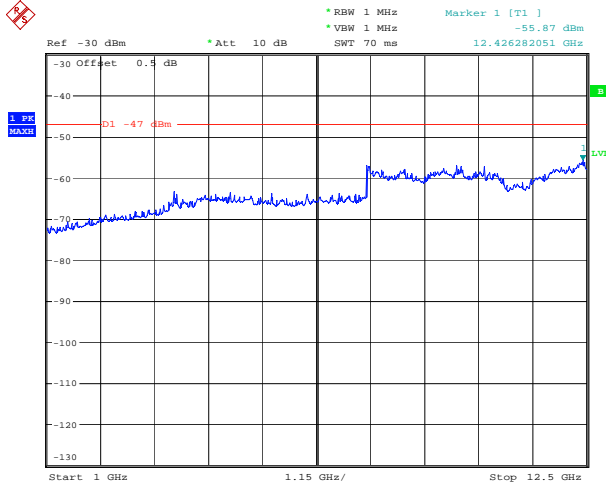


Date: 26.JUL.2023 09:40:57

802.11n ht40, High Channel



Date: 26.JUL.2023 09:41:34



Date: 26.JUL.2023 09:41:15

***** END OF REPORT *****