FCC Test Report

Report No.: AGC12845231102FR01

FCC ID	:	2A2LL-P1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	FJD Trion P1 LiDAR Scanner
BRAND NAME	:	FJ Dynamics
MODEL NAME	:	P1
APPLICANT	:	FJ Dynamics Co., Ltd
DATE OF ISSUE	:	Dec. 27, 2023
STANDARD(S)	:	FCC Part 15 Subpart C §15.247
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Dec. 27, 2023	Valid	Initial Release

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1. General Information

Applicant	FJ Dynamics Co., Ltd
Address	1709, WeiXing Building 61 GaoXin South 9th Rd Nanshan District, Shenzhen China
Manufacturer	FJ Dynamics Co., Ltd
Address	1709, WeiXing Building 61 GaoXin South 9th Rd Nanshan District, Shenzhen China
Factory	FJ Dynamics Co.,Ltd
Address	4th floor building 2, Nangang Second Industrial Park, Nanshan District, Shenzhen China
Product Designation	FJD Trion P1 LiDAR Scanner
Brand Name	FJ Dynamics
Test Model	P1
Series Model(s)	N/A
Difference Description	N/A
Date of receipt of test item	Dec. 04, 2023
Date of Test	Dec. 04, 2023 to Dec. 27, 2023
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-2.4GWLAN-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By

Alan Duan
(Project Engineer)
Dec. 27, 2023

Reviewed By

Calvin Liu
(Reviewer)
Dec. 27, 2023

Approved By

Max Zhang
(Authorized Officer)
Dec. 27, 2023

2. Product Information

2.1 Product Technical Description

Equipment Type	WLAN 2.4G
Frequency Band	2400MHz ~ 2483.5MHz
Operation Frequency	2412MHz ~ 2462MHz
Output Power (Average)	IEEE 802.11b:15.78dBm; IEEE 802.11g:15.33dBm; IEEE 802.11n(HT20):14.28dBm; IEEE 802.11ax (HE20):13.89dBm;
Output Power (Peak)	IEEE 802.11b:22.45dBm; IEEE 802.11g:21.85dBm; IEEE 802.11n(HT20):22.15dBm; IEEE 802.11ax (HE20):22.45dBm;
Output Power (MIMO- Average)	IEEE 802.11n(HT20):17.28dBm; IEEE 802.11ax (HE20):16.75dBm
Output Power (MIMO- Peak)	IEEE 802.11n(HT20):24.95dBm; IEEE 802.11ax (HE20):25.38dBm
Modulation	802.11b:(DQPSK, DBPSK, CCK) DSSS 802.11g/n:(64-QAM,16-QAM, QPSK, BPSK) OFDM 802.11ax:(1024-QAM,256-QAM,64-QAM,16-QAM,QPSK,BPSK)OFDMA
Data Rate	802.11b:1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ax: up to 574Mbps
Number of channels	11
Hardware Version	V1.4
Software Version	V1.0.5
Antenna Designation	FPC Antenna
Antenna Gain	Please refer to report section 2.10 description
Number of transmit chain	2(802.11b/g/n/ax all used two antennas,802.11b/g support SISO, 802.11n/ax support MIMO)
Power Supply	DC 10.8V, 3A

2.2 Table of Carrier Frequency

For 2412-2462MHz:

11 channels are provided for 802.11b/g/n(HT20)/ax(HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz		

2.3 IEEE 802.11n Modulation Scheme

MCS Index	Nss	Modulation	R	N_{BPSC}	N_{CBPS}		N_{DBPS}		Data Rate(Mbps) 800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	**Explanation**
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

2.4 IEEE 802.11ax Modulation Scheme

HE-MCSs for 242-tone RU, N_{SS}=1

HE-MCS Index	DCM	Modulation	R	N_{BPSCS}	N_{SD}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s) 0.8µsGI	1.6µsGI	3.2µsGI
0	1	BPSK	1/2	1	117	117	58	4.3	4.0	3.6
	0		1/2		234	234	117	8.6	8.1	7.3
1	1	QPSK	1/2	2	117	234	117	8.6	8.1	7.3
	0		1/2		234	468	234	17.2	16.3	14.6
2	N/A		3/4		234	468	351	25.8	24.4	21.9
3	1	16-QAM	1/2	4	117	468	234	17.2	16.3	14.6
	0		1/2		234	936	468	34.4	32.5	29.3
4	1		3/4		117	468	351	25.8	24.4	21.9
	0		3/4		234	936	702	51.6	48.8	43.9
5	N/A	64-QAM	2/3	6	234	1404	936	68.8	65.0	58.5
6			3/4				1053	77.4	73.1	65.8
7			5/6				1170	86.0	81.3	73.1
8		256-QAM	3/4	8		1872	1404	103.2	97.5	87.8
9			5/6				1560	114.7	108.3	97.5
10		1024-QAM	3/4	10		2340	1755	129.0	121.9	109.7
11			5/6				1950	143.4	135.4	121.9

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

HE-MCSs for 484-tone RU, N_{SS}=1

HE-MCS Index	DCM	Modulation	R	N_{BPSCS}	N_{SD}	N_{CBPS}	N_{DBPS}	Data rate (Mb/s)		
								0.8μsGI	1.6μsGI	3.2μsGI
0	1	BPSK	1/2	1	234	234	117	8.6	8.1	7.3
	0		1/2		468	468	234	17.2	16.3	14.6
1	1	QPSK	1/2	2	234	468	234	17.2	16.3	14.6
	0		1/2		468	936	468	34.4	32.5	29.3
2	N/A		3/4		468	936	702	51.6	48.8	43.9
3	1	16-QAM	1/2	4	234	936	468	34.4	32.5	29.3
	0		1/2		468	1872	936	68.8	65.0	58.5
4	1		3/4		234	936	702	51.6	48.8	43.9
	0		3/4		468	1872	1404	103.2	97.5	87.8
5	N/A	64-QAM	2/3	6	468	2808	1872	137.6	130.0	117.0
6			3/4				2106	154.9	146.3	131.6
7			5/6				2340	172.1	162.5	146.3
8		256-QAM	3/4	8		3744	2808	206.5	195.0	175.5
9			5/6				3120	229.4	216.7	195.0
10		1024-QAM	3/4	10		4680	3510	258.1	243.8	219.4
11			5/6				3900	286.8	270.8	243.8

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

2.5 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2A2LL-P1, filing to comply with Part 2, Part 15 of the Federal Communication Commission rules.

2.6 Test Methodology

The tests were performed according to following standards:

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 662911	KDB 662911 D01 Multiple Transmitter Output v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)

2.7 Special Accessories

Refer to section 4.4.

2.8 Equipment Modifications

Not available for this EUT intended for grant.

2.9 Antenna Requirement

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi
EUT Antenna:
The non-detachable antenna inside the device cannot be replaced by the user at will. For the antenna gain, please refer to the description in Chapter 2.10 of the report.

2.10 Description of Available Antennas

Antenna Type	Frequency Band (MHz)	TX Paths	Bandwidth (MHz)	Max Peak Gain (dBi)		Max Directional Gain (dBi)
				Ant 1	Ant 2	
2.4GWIFI FPC Antenna List (2.4GHz 2*2 MIMO)						
FPC Antenna	2400~2483.5	2	20	-1.61	-1.61	1.40

Note 1: The EUT supports Cyclic Delay Diversity (CDD) technology for 802.11n/ax mode.

Note 2: The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on devices:

  Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 3.01;

- For power measurements on IEEE 802.1devices:

  Array Gain = 0 dB for $N_{ANT} \leq 4$;

  Array Gain = 0 dB (i.e., no array gain) for channel widths ≥40 MHz for any N_{ANT};

  Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20 MHz channel widths with $N_{ANT} \geq 5$.

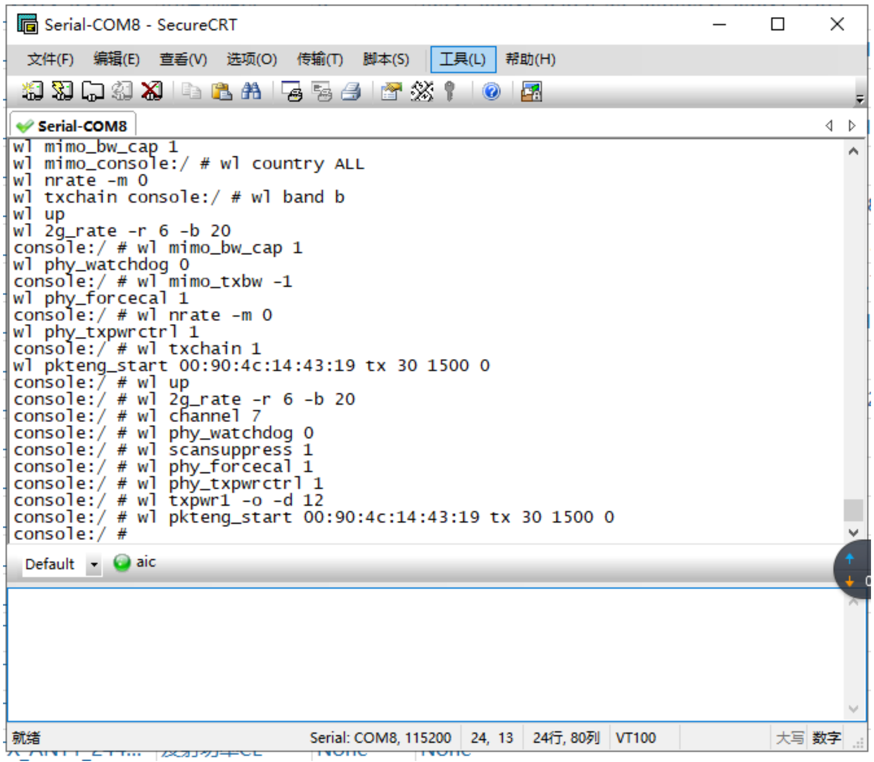
If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

2.11 Description of Test Software

For IEEE 802.11 mode:

The test utility software used during testing was “SecureCRT”, and the version was “V1.0”.

Software Setting Diagram



Test Mode	Channel	Power Index	
		Chain 1	Chain 2
802.11b	L/M/H	12	12
802.11g	L/M/H	12	12
802.11n-HT20	L/M/H	12	12
802.11ax-HE20	L/M/H	12	12

3. Test Environment

3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories).

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842 (CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

3.3 Environmental Conditions

	Normal Conditions
Temperature range (℃)	15 - 35
Relative humidity range	20 % - 75 %
Pressure range (kPa)	86 - 106

3.4 Measurement Uncertainty

The reported uncertainty of measurement y±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	U_c = ±2.9 dB
Uncertainty of Radiated Emission below 1GHz	U_c = ±3.9 dB
Uncertainty of Radiated Emission above 1GHz	U_c = ±4.9 dB
Uncertainty of total RF power, conducted	U_c = ±0.8 dB
Uncertainty of RF power density, conducted	U_c = ±2.6 dB
Uncertainty of spurious emissions, conducted	U_c = ±2 %
Uncertainty of Occupied Channel Bandwidth	U_c = ±2 %

3.5 List of Equipment Used

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2023-06-01	2024-05-31
☒	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2023-03-03	2024-03-02
☒	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2023-03-03	2024-03-02
☒	AGC-EM-A152	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08
☒	AGC-ER-E083	Signal Generator	Agilent	E4421B	US39340815	2023-06-01	2024-05-31
☒	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A
☒	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2023-02-18	2024-02-17
☒	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2023-06-03	2024-06-02
☒	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2023-06-01	2024-05-31
☒	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2022-03-12	2024-03-11
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2023-03-23	2024-03-22
☒	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
☒	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2022-08-04	2024-08-03
☒	AGC-EM-A119	2.4G Filter	SongYi	N/A	N/A	2023-06-01	2024-05-31
☒	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08
☐	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08

● AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2023-06-03	2024-06-02
☐	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2024-06-08
☐	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2023-06-03	2024-06-02

● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☒	AGC-EM-S003	RE Test System	FARA	EZ-EMC	V.RA-03A
☒	AGC-EM-S011	RSE Test System	Tonscend	TS^{+} Ver2.1(JS36-RSE)	4.0.0.0
☐	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71
☒	AGC-ER-S009	BT/WIFI Test System	Tonscend	JS1120-3	2.6.77.0518

4.System Test Configuration

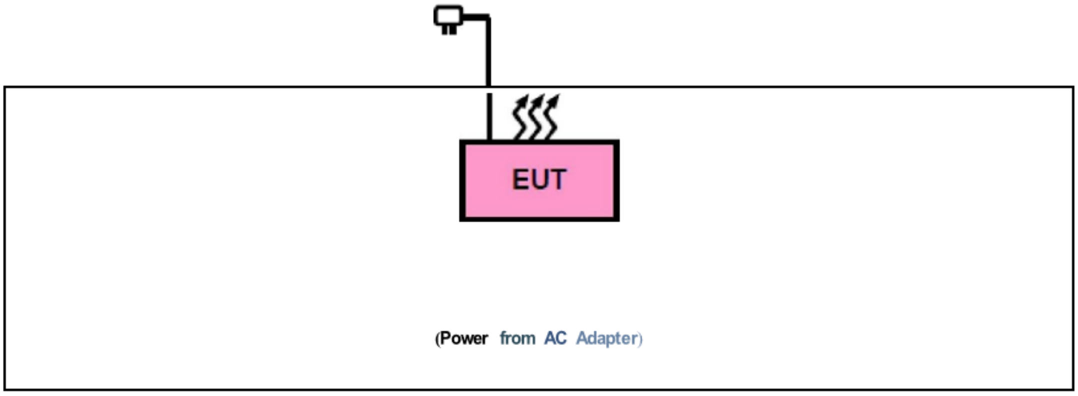
4.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

4.3 Configuration of Tested System



4.4 Equipment Used In Tested System

The following peripheral devices and interface cables were connected during the measurement:

☐ Test Accessories Come From The Laboratory

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	--	--	--	--	--

☒ Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	--	--	--	--	--

4.5 Summary of Test Results

Item	FCC Rules	Description of Test	Result
1	§15.203&15.247(b)(4)	Antenna Equipment	Pass
2	§15.247 (b)(3)	RF Output Power	Pass
3	§15.247 (a)(2)	6 dB Bandwidth	Pass
4	§15.247 (e)	Power Spectral Density	Pass
5	§15.247 (d)	Conducted Band Edge and Out-of-Band Emissions	Pass
6	§15.247 (d)&15.209	Radiated Spurious Emission	Pass
7	§15.207	AC Power Line Conducted Emission	Not applicable

Note: The WIFI function cannot transmit when charging.

5. Description of Test Modes

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	2.4G WLAN – 802.11b/g/n/ax (DSSS/OFDM/OFDMA)
Radiated & Conducted Test Cases	Mode 1: 802.11b_TX CH01_2412 MHz_1 Mbps(Battery powered) Mode 2: 802.11b_TX CH06_2437 MHz_1 Mbps(Battery powered) Mode 3: 802.11b_TX CH11_2462 MHz_1 Mbps(Battery powered) Mode 4: 802.11g_TX CH01_2412 MHz_6 Mbps(Battery powered) Mode 5: 802.11g_TX CH06_2437 MHz_6 Mbps(Battery powered) Mode 6: 802.11g_TX CH11_2462 MHz_6 Mbps (Battery powered) Mode 7: 802.11n-HT20_TX CH01_2412 MHz_MCS0 Mbps(Battery powered) Mode 8: 802.11n-HT20_TX CH06_2437 MHz_ MCS0 Mbps(Battery powered) Mode 9: 802.11n-HT20_TX CH11_2462 MHz_ MCS0 Mbps(Battery powered) Mode 10: 802.11ax-HE20_TX CH01_2412 MHz_MCS0 Mbps(Battery powered) Mode 11: 802.11ax-HE20_TX CH06_2437 MHz_ MCS0 Mbps(Battery powered) Mode 12: 802.11ax-HE20_TX CH11_2462 MHz_ MCS0 Mbps(Battery powered)
AC Conducted Emission	N/A

Note:
1. The battery is full-charged during the test.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.
4. All modes and antennas in the radiation spurious test are pre-scanned. When there is no MIMO technology mode, antenna 1 is evaluated. When there is MIMO technology mode, antenna 1 + antenna 2 are evaluated as the worst data.

6. Duty Cycle Measurement

2.4GHz WLAN (DTS) operation is possible in 20MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Peak. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11b	1	98.92	--	--	--
IEEE 802.11g	6	100	--	--	--
IEEE 802.11n-HT20	MCS0	90.91	0.31	0.76	-0.63
IEEE 802.11ax-HE20	MCS0	87.44	0.41	0.98	-0.83

Remark:

1. Duty Cycle factor = 10 * log (1/ Duty cycle)
2. Average factor = 20 log10 Duty Cycle
3. The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value.

The test plots as follows:

<table>
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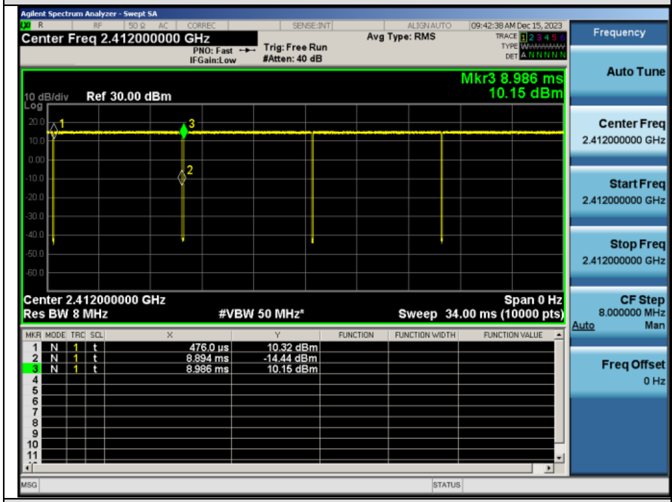
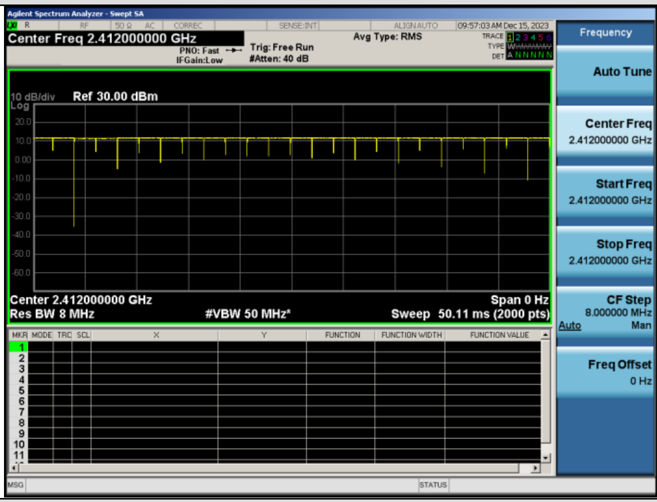
<tr><td>
</td><td>
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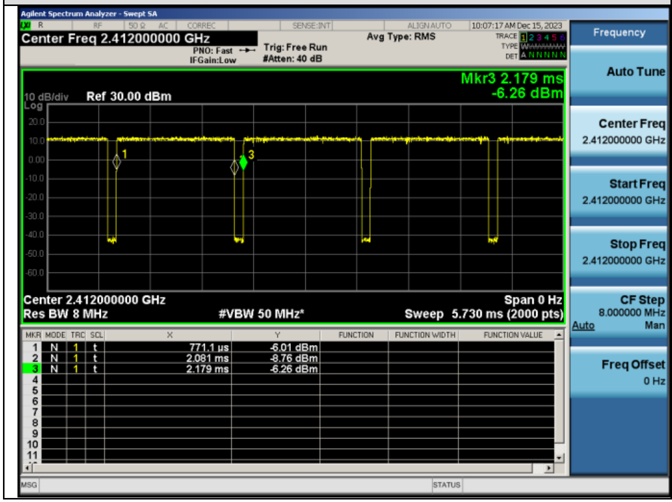
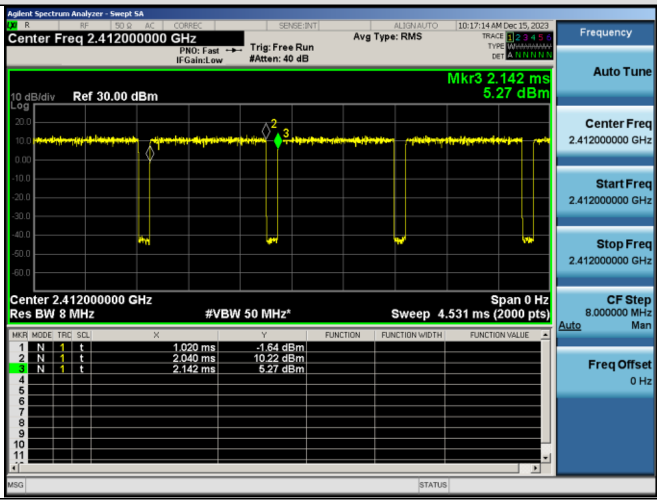
<tr><td>
</td><td>
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7. RF Output Power Measurement

7.1 Provisions Applicable

For DTSs employing digital modulation techniques operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W.

7.2 Measurement Procedure

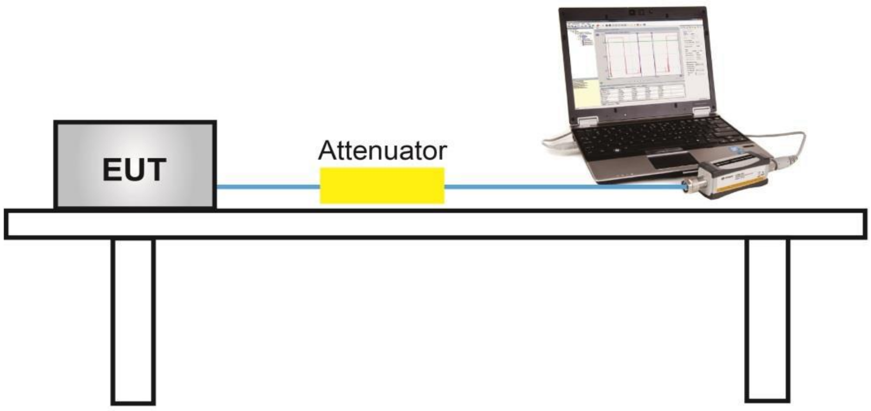
☒Method PM is Measurement using an RF Peak power meter. The procedure for this method is as follows:

1. The testing follows the ANSI C63.10 Section 11.9.1.3
2. The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

☒Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

1. The testing follows the ANSI C63.10 Section 11.9.2.3
2. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
3. The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
4. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
5. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
6. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
7. Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
8. Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle {e.g., [10 log (1 / 0.25)], if the duty cycle is 25%}.
9. Record the test results in the report.

7.3 Measurement Setup (Block Diagram of Configuration)



7.4 Measurement Result

Test Data of Conducted Output Power-antenna 1					
Test Mode	Test Channel (MHz)	Average Power (dBm)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
802.11b	2412	13.89	22.45	≤30	Pass
	2437	13.23	21.90	≤30	Pass
	2462	13.01	21.50	≤30	Pass
802.11g	2412	15.33	17.83	≤30	Pass
	2437	14.69	17.18	≤30	Pass
	2462	14.47	16.94	≤30	Pass
802.11n20	2412	14.28	22.15	≤30	Pass
	2437	13.56	21.38	≤30	Pass
	2462	13.69	21.14	≤30	Pass
802.11ax20	2412	13.89	22.45	≤30	Pass
	2437	13.23	21.90	≤30	Pass
	2462	13.01	21.50	≤30	Pass

Test Data of Conducted Output Power-antenna 2					
Test Mode	Test Channel (MHz)	Average Power (dBm)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
802.11b	2412	15.71	18.52	≤30	Pass
	2437	15.72	18.27	≤30	Pass
	2462	15.78	18.12	≤30	Pass
802.11g	2412	13.96	21.85	≤30	Pass
	2437	13.78	21.65	≤30	Pass
	2462	13.55	21.47	≤30	Pass
802.11n20	2412	14.26	21.72	≤30	Pass
	2437	14.18	21.57	≤30	Pass
	2462	13.89	21.32	≤30	Pass
802.11ax20	2412	13.59	22.28	≤30	Pass
	2437	13.52	22.19	≤30	Pass
	2462	13.29	21.89	≤30	Pass

Test Data of Conducted Output Power-MIMO					
Test Mode	Test Channel (MHz)	Average Power (dBm)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
802.11n20	2412	17.28	24.95	⩽30	Pass
	2437	16.89	24.49	⩽30	Pass
	2462	16.80	24.24	⩽30	Pass
802.11ax20	2412	16.75	25.38	⩽30	Pass
	2437	16.39	25.06	⩽30	Pass
	2462	16.16	24.71	⩽30	Pass

8. 6dB Bandwidth Measurement

8.1 Provisions Applicable

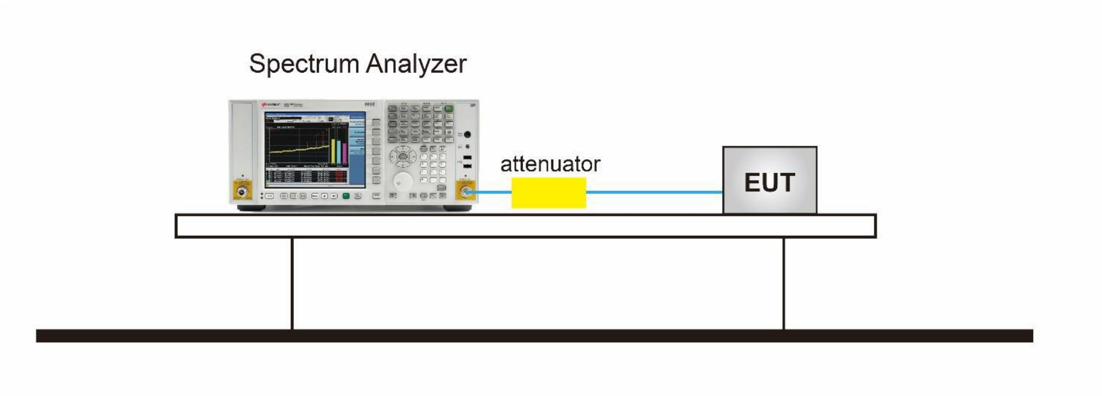
The minimum 6dB bandwidth shall be 500 kHz.

8.2 Measurement Procedure

The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. For 6dB Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement.
4. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the OBW and set the Video bandwidth (VBW) ≥ 3 * RBW.
5. Detector = peak
6. Trace mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize.
9. Measure and record the results in the test report.

8.3 Measurement Setup (Block Diagram of Configuration)

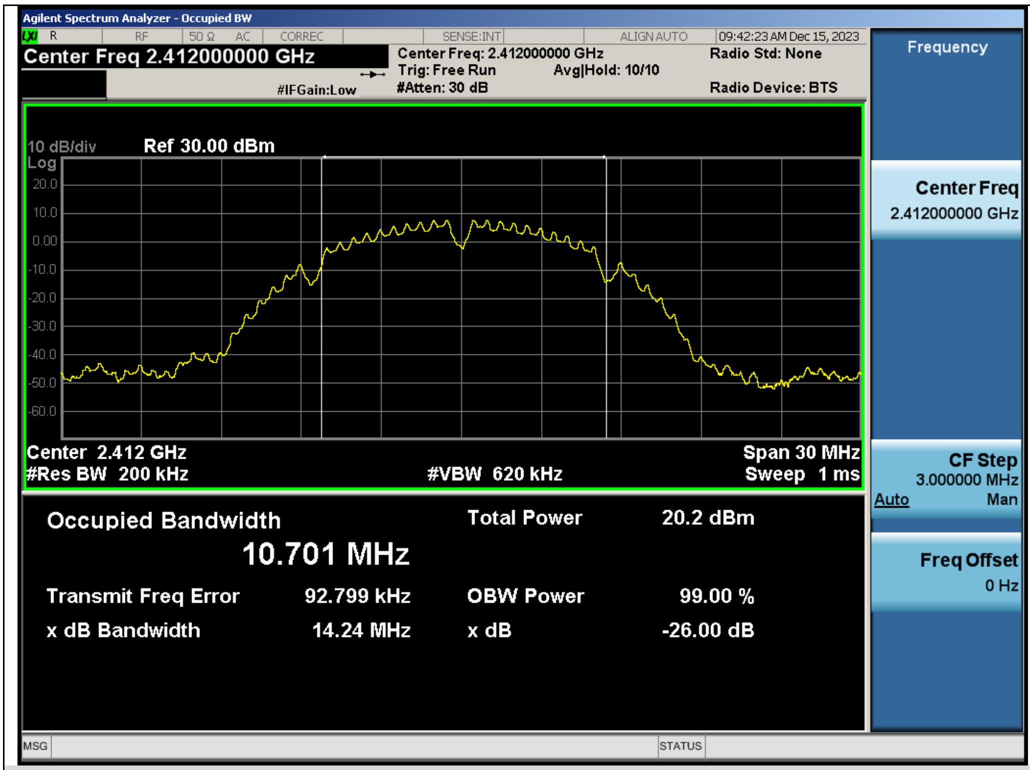


8.4 Measurement Result

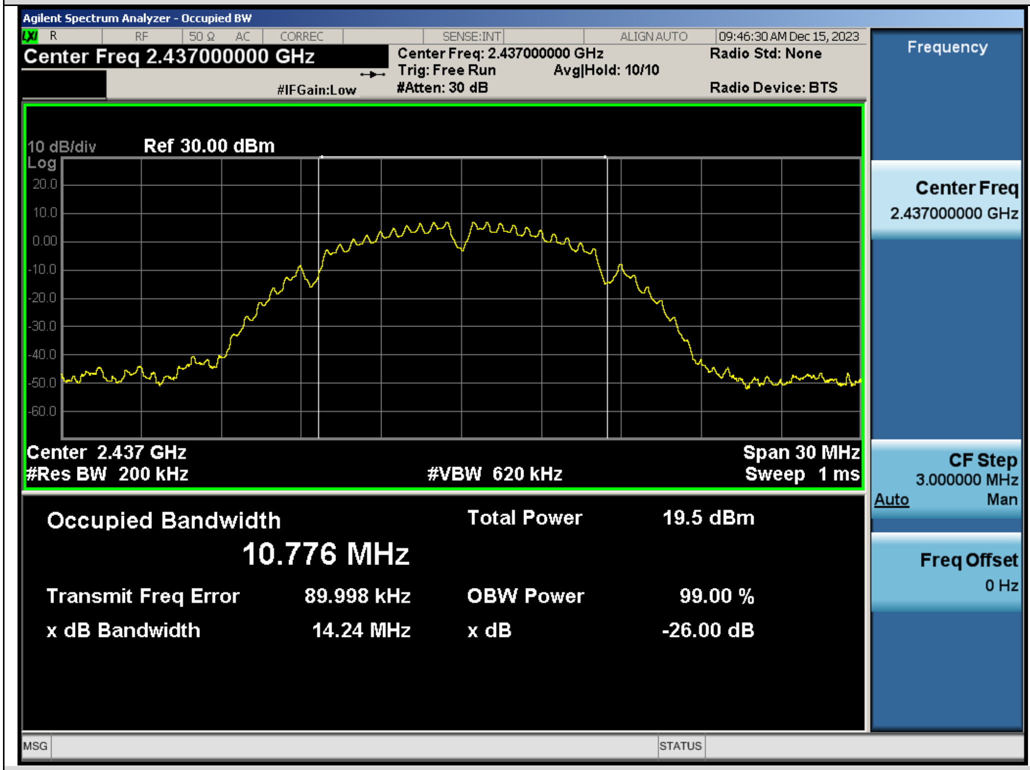
Test Data of Occupied Bandwidth and DTS Bandwidth-antenna 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	DTS Bandwidth Limits (MHz)	Pass or Fail
802.11b	2412	10.701	7.552	⩾0.5	Pass
	2437	10.776	7.559	⩾0.5	Pass
	2462	10.848	7.090	⩾0.5	Pass
802.11g	2412	16.634	16.377	⩾0.5	Pass
	2437	16.645	16.368	⩾0.5	Pass
	2462	16.650	16.361	⩾0.5	Pass
802.11n20	2412	17.771	17.594	⩾0.5	Pass
	2437	17.781	17.610	⩾0.5	Pass
	2462	17.776	17.603	⩾0.5	Pass
802.11ax20	2412	18.926	18.616	⩾0.5	Pass
	2437	18.896	18.866	⩾0.5	Pass
	2462	18.927	18.891	⩾0.5	Pass

Test Data of Occupied Bandwidth and DTS Bandwidth-antenna 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	DTS Bandwidth Limits (MHz)	Pass or Fail
802.11b	2412	10.506	8.036	⩾0.5	Pass
	2437	10.672	7.572	⩾0.5	Pass
	2462	10.715	7.077	⩾0.5	Pass
802.11g	2412	16.638	16.360	⩾0.5	Pass
	2437	16.655	16.390	⩾0.5	Pass
	2462	16.618	16.363	⩾0.5	Pass
802.11n20	2412	17.798	17.600	⩾0.5	Pass
	2437	17.788	17.616	⩾0.5	Pass
	2462	17.765	17.604	⩾0.5	Pass
802.11ax20	2412	18.923	18.768	⩾0.5	Pass
	2437	18.932	18.867	⩾0.5	Pass
	2462	18.918	18.771	⩾0.5	Pass

Test Graphs of Occupied Bandwidth



Test_Graph_802.11b_ANT1_2412_1Mbps_OBW



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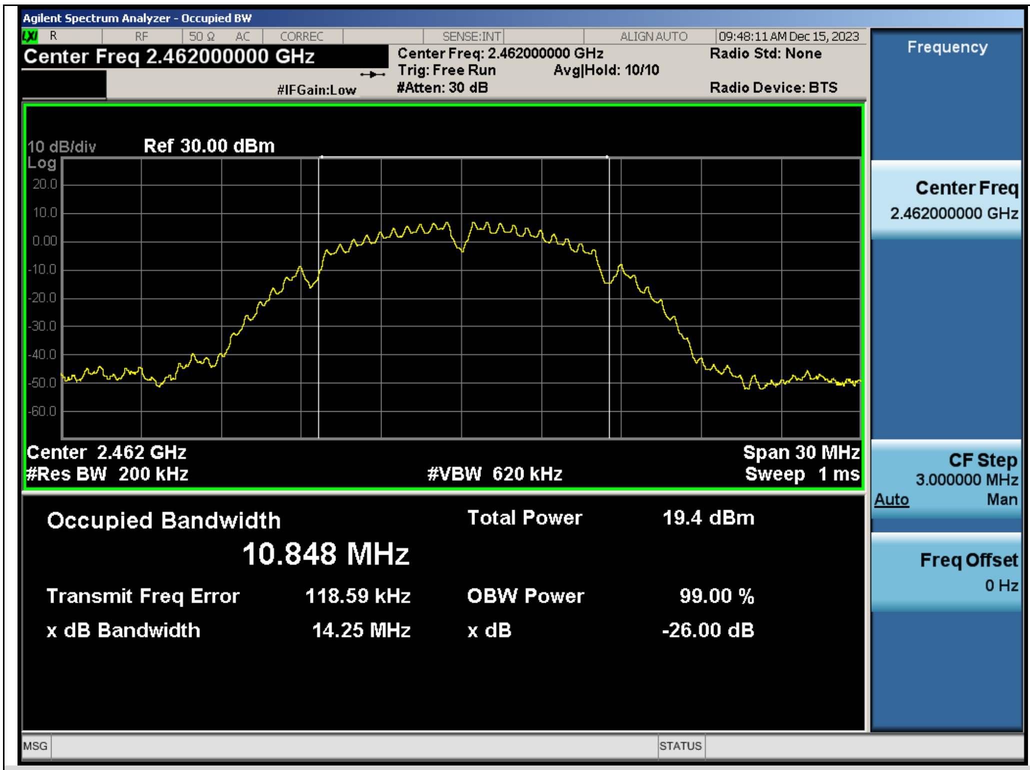

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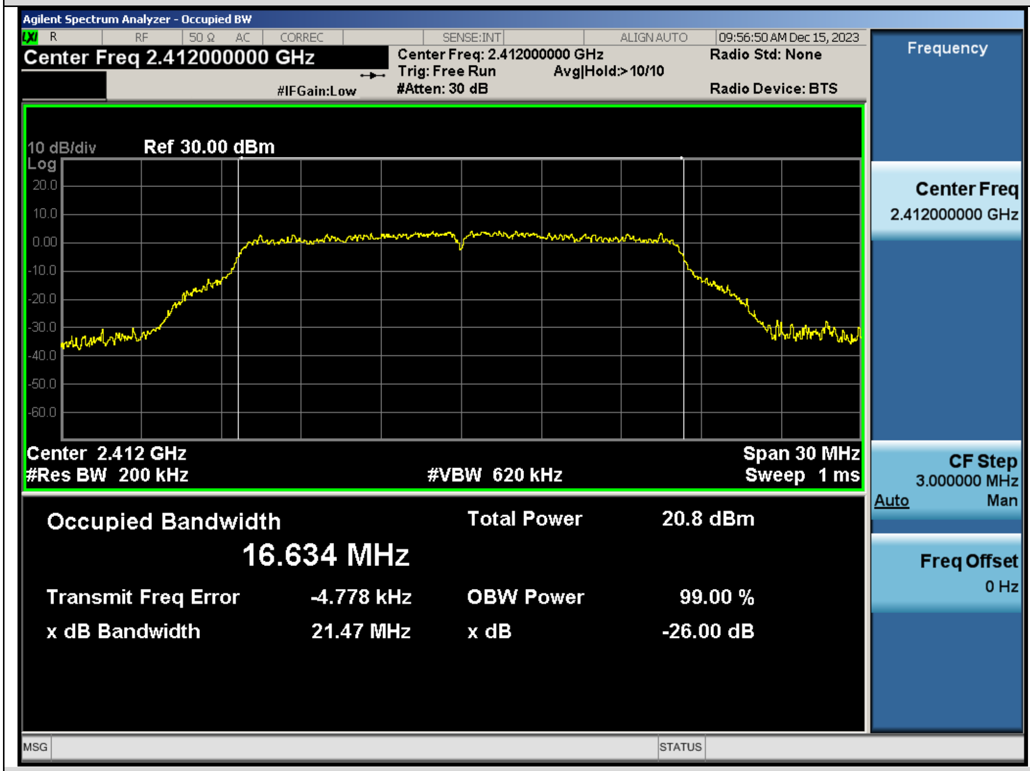
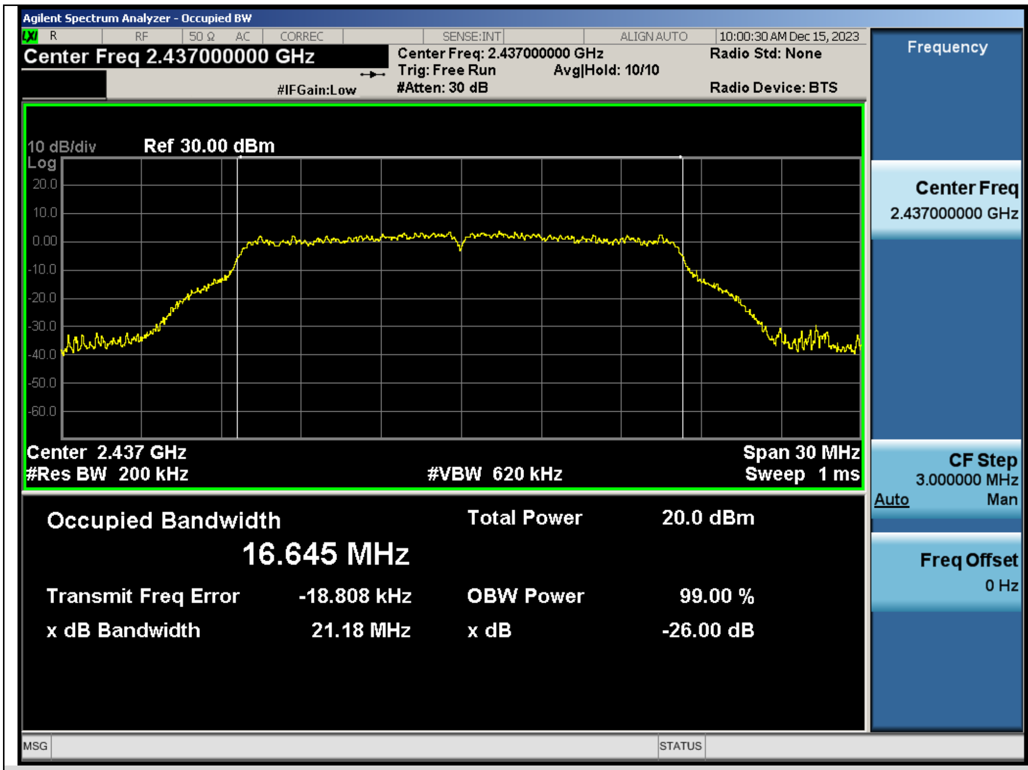


Test_Graph_802.11g_ANT1_2412_6Mbps_OBW



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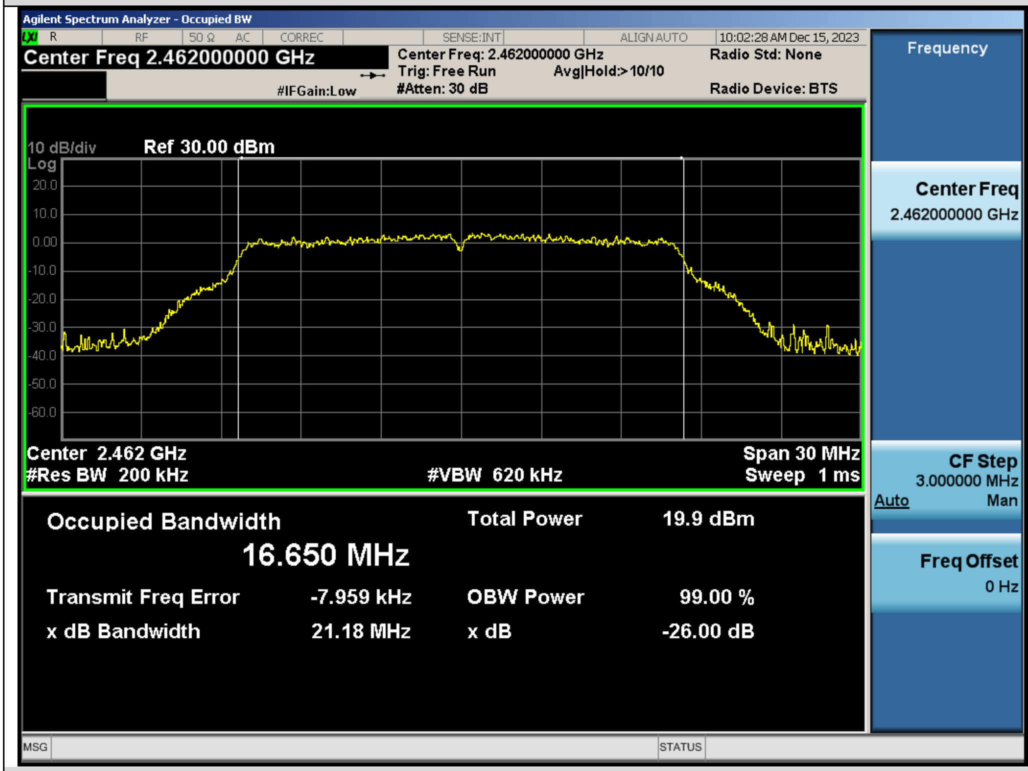

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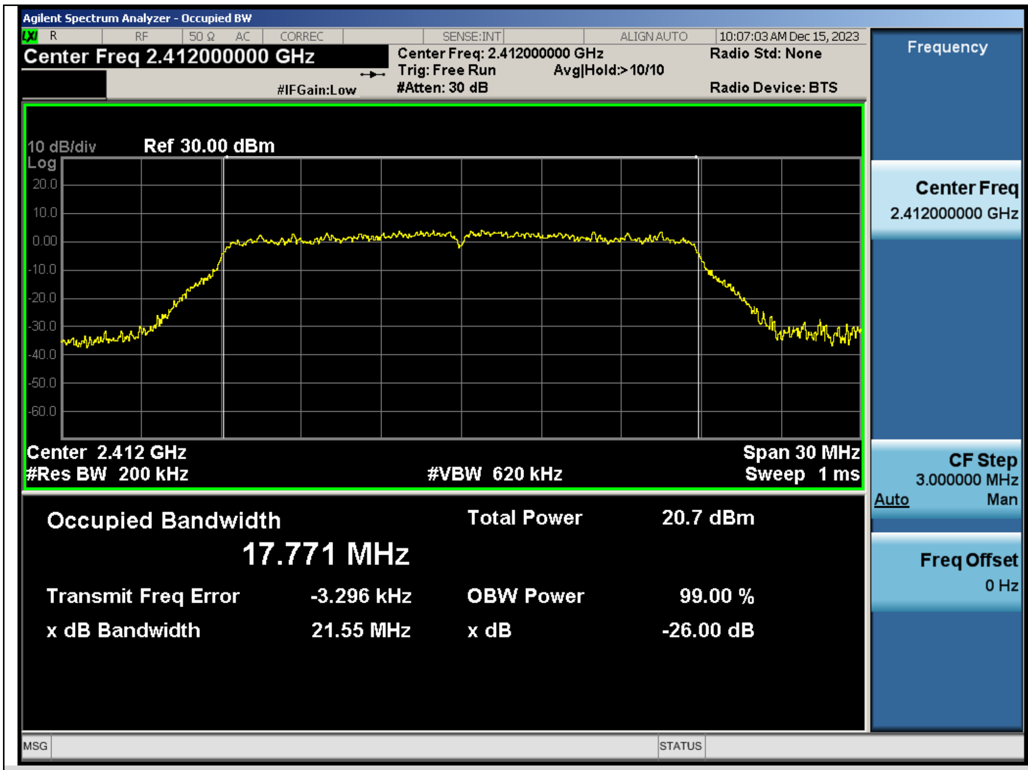

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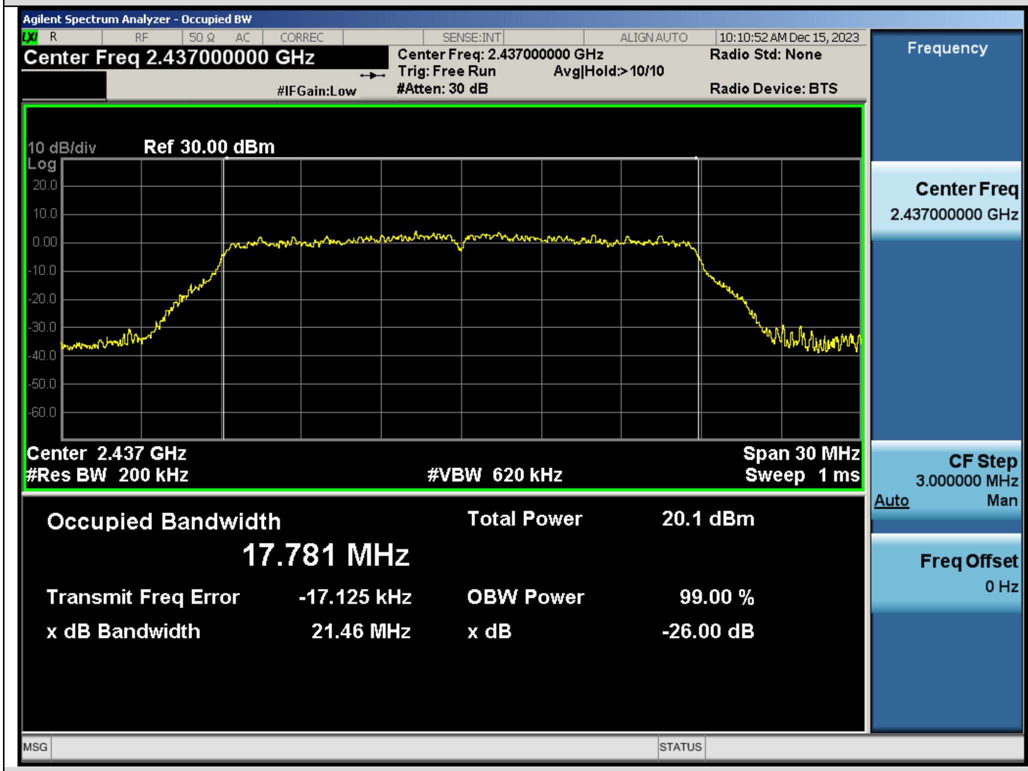

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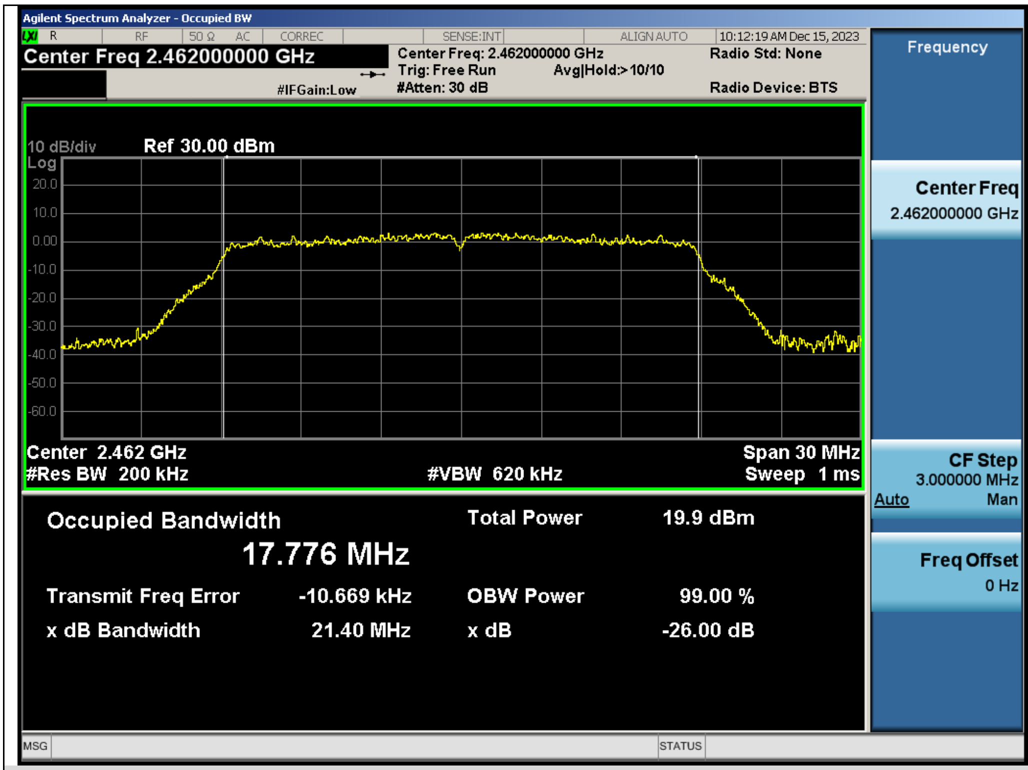

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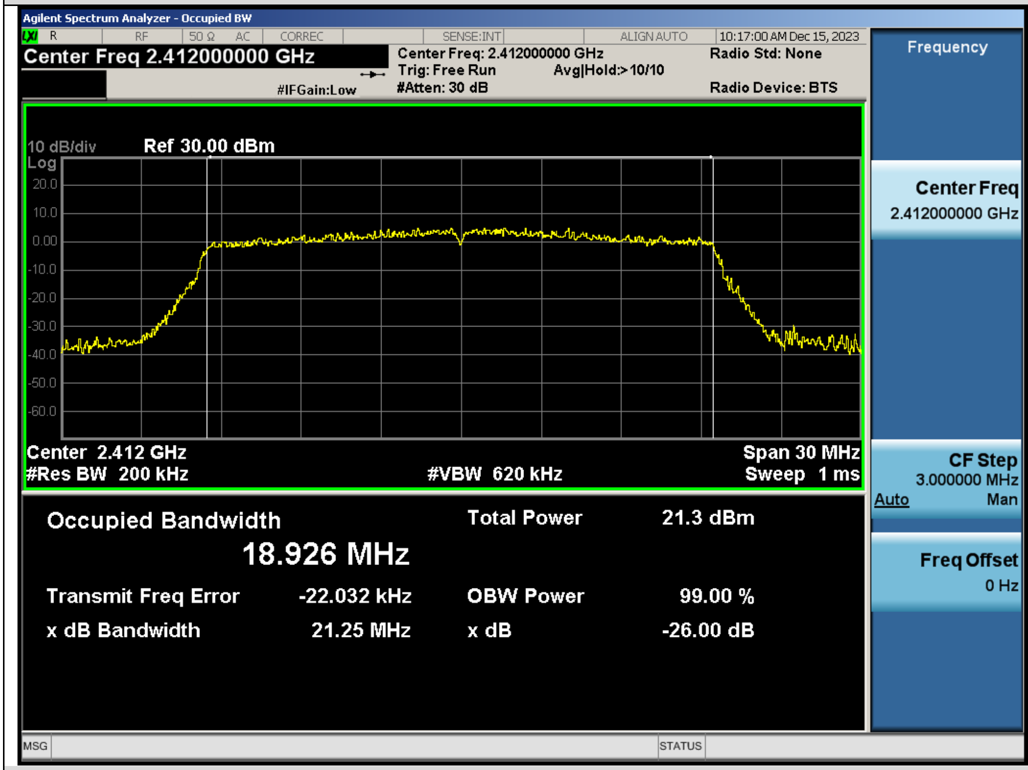

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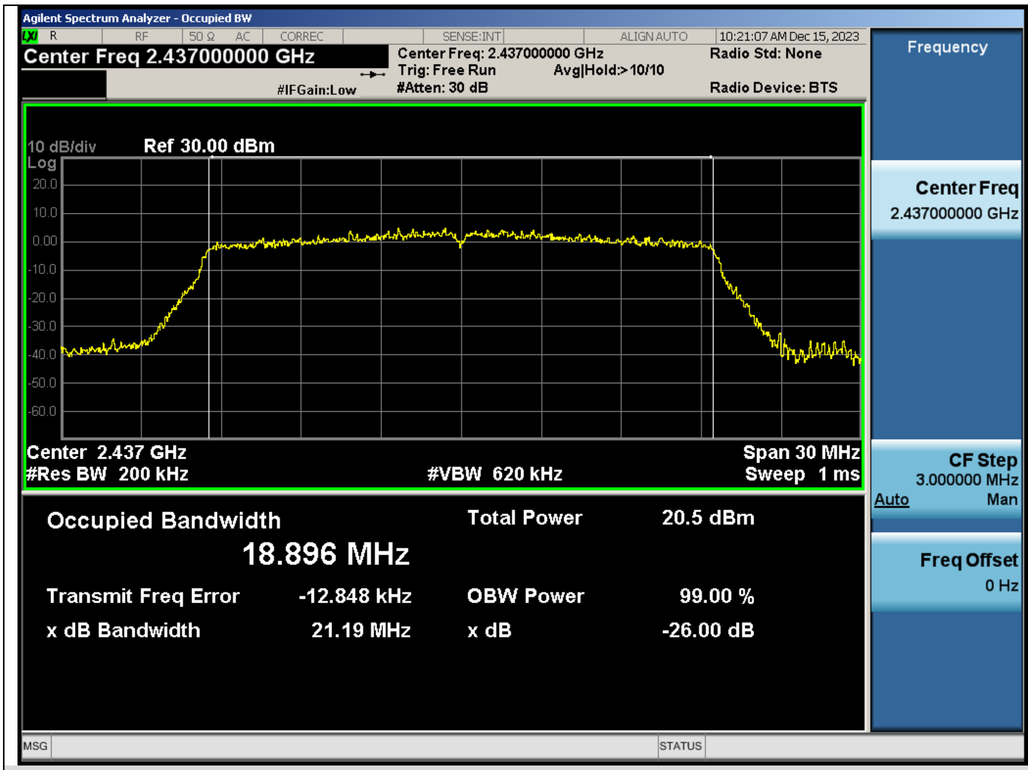

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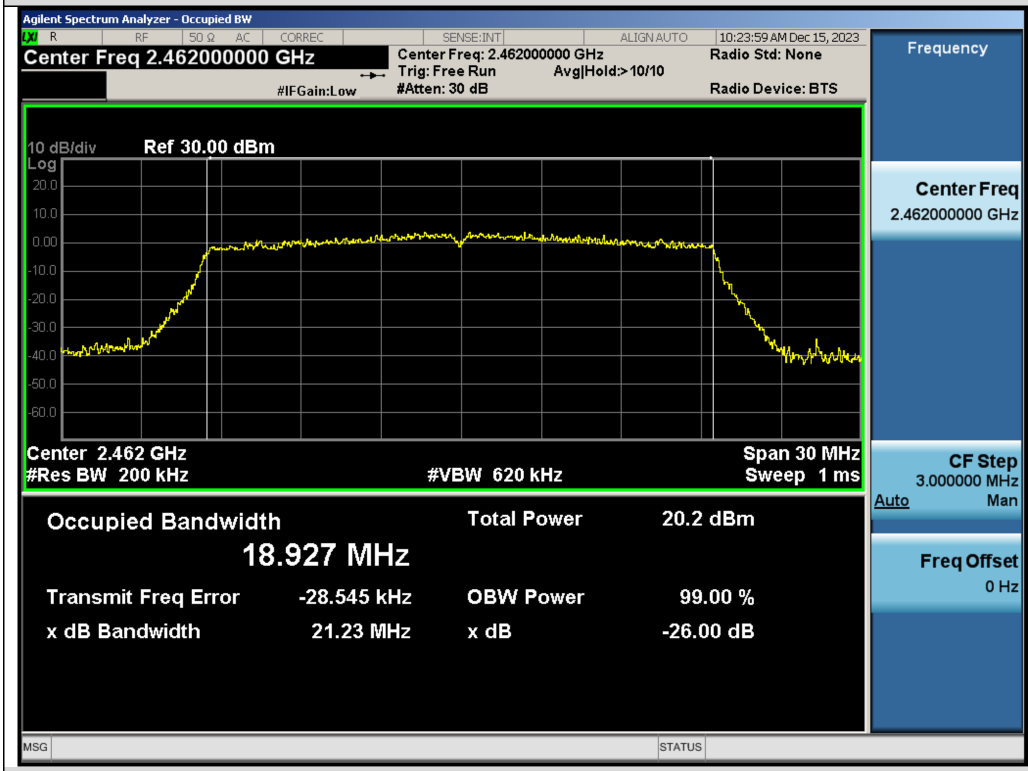

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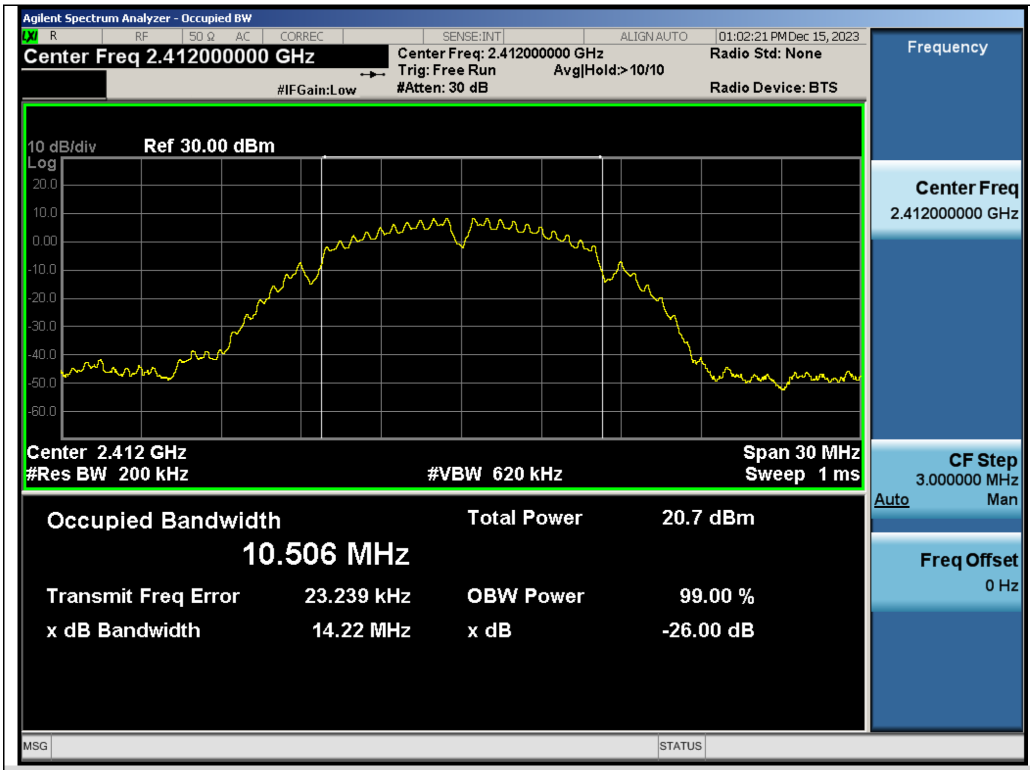

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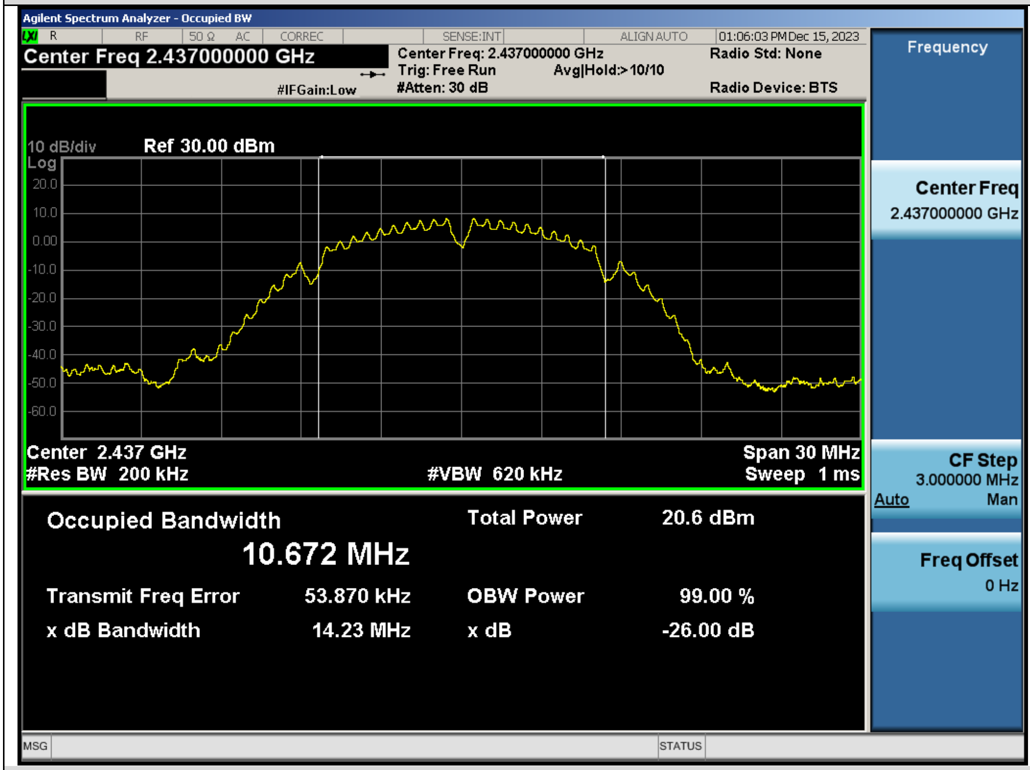

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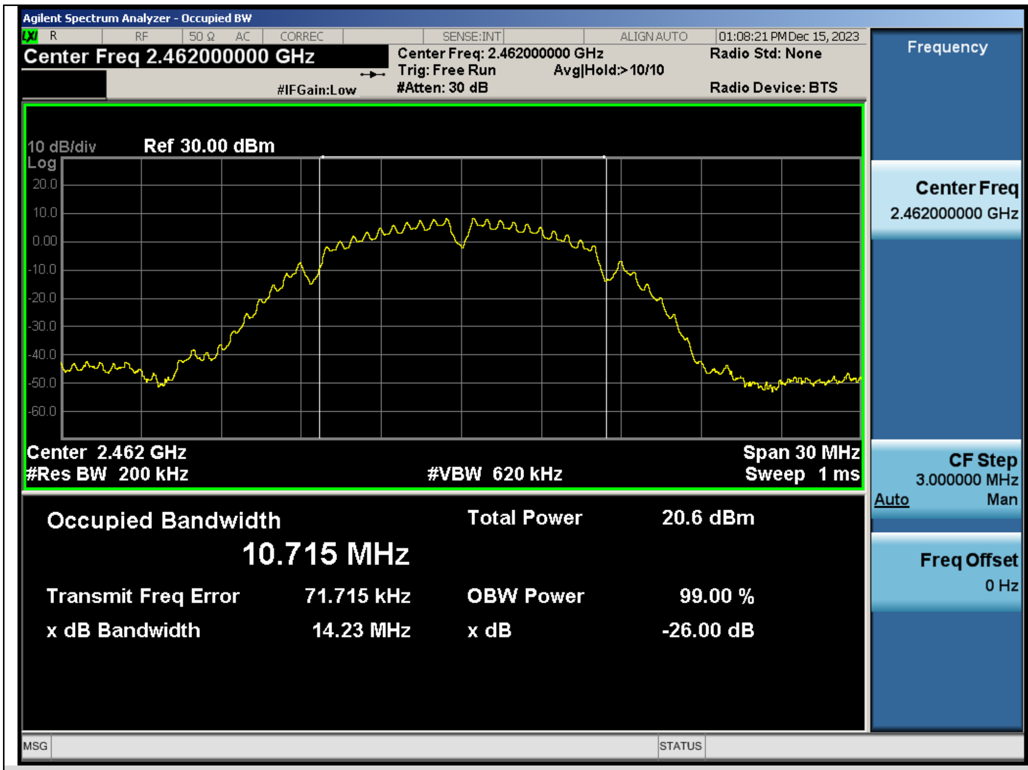

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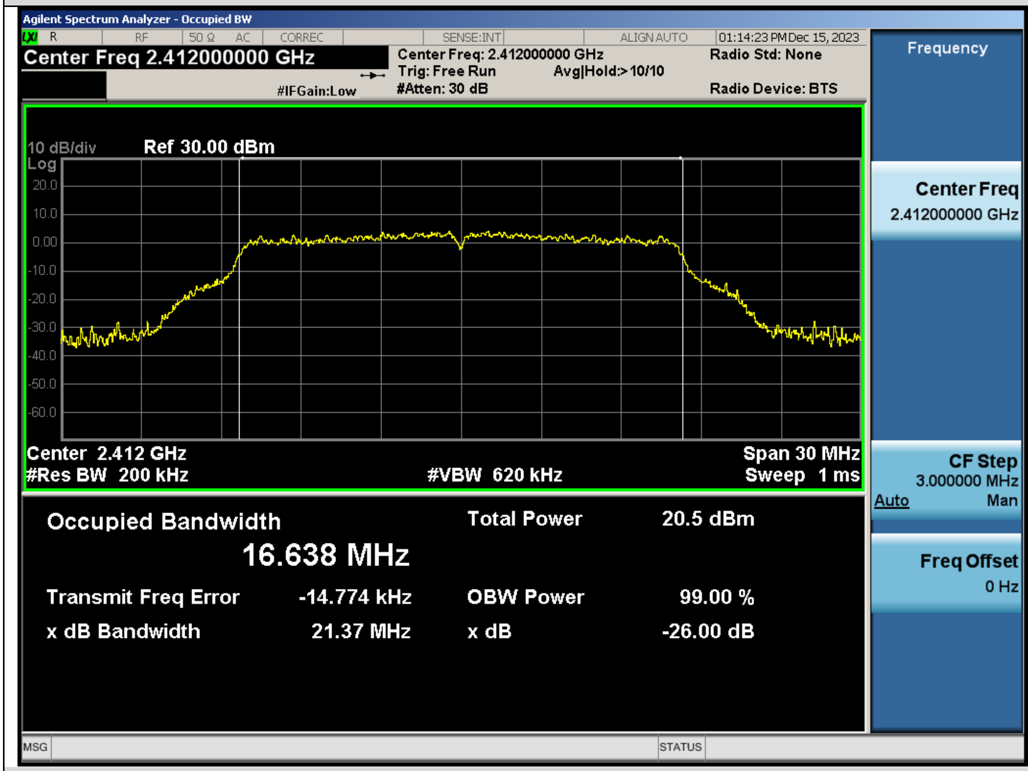

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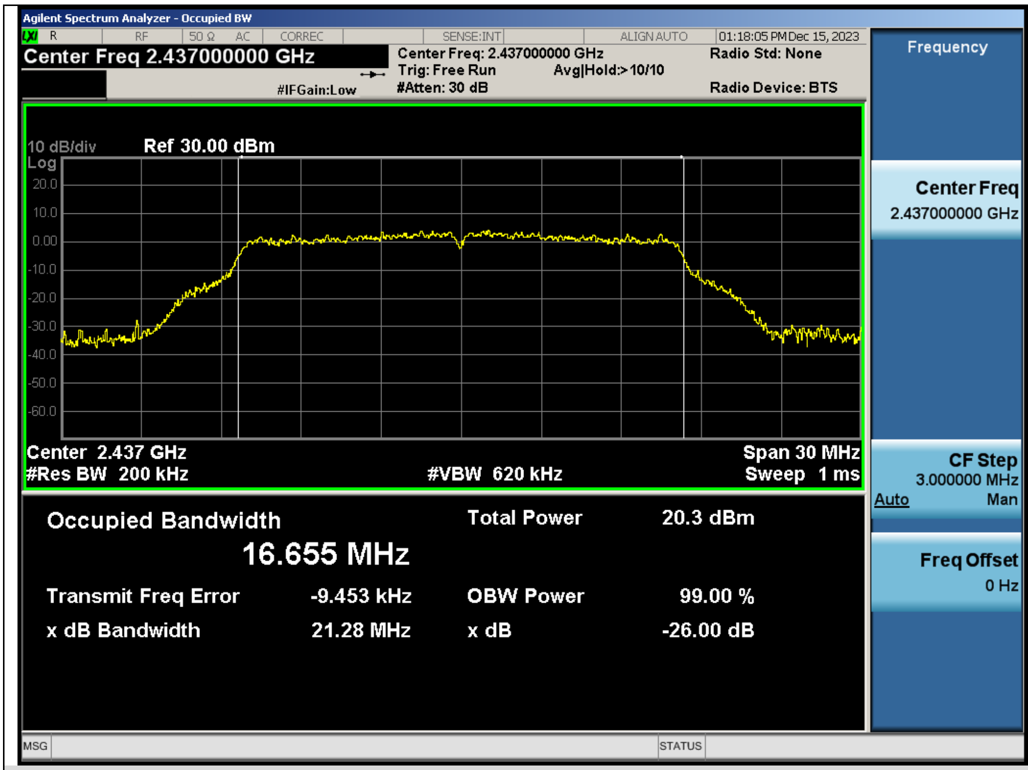

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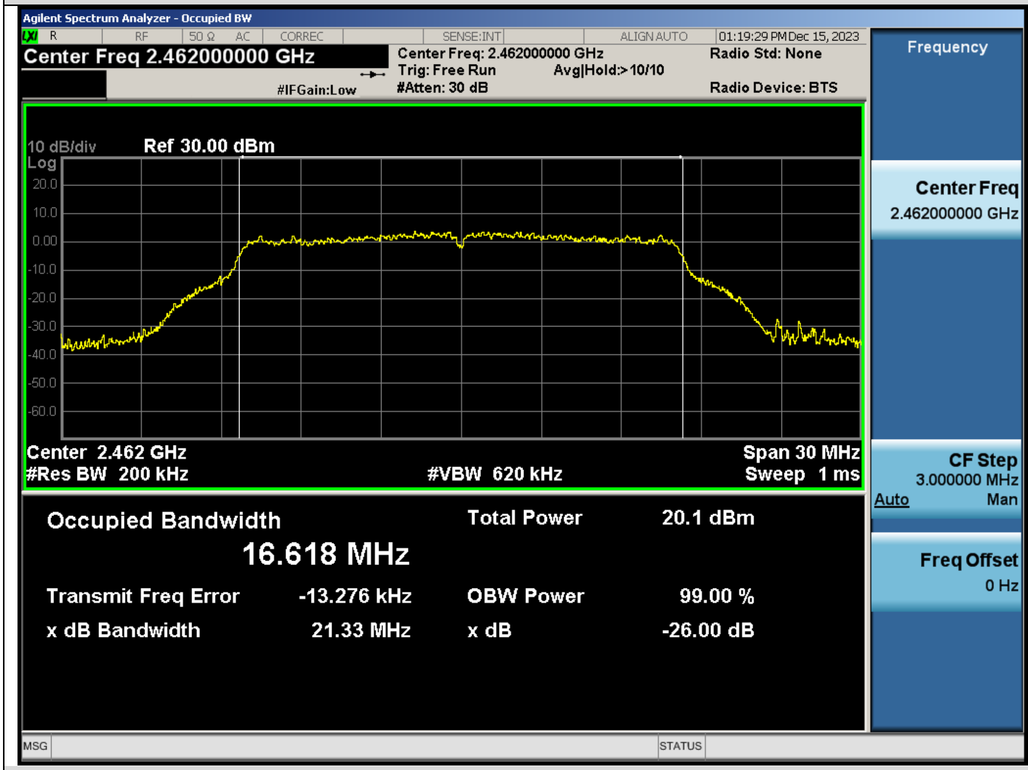

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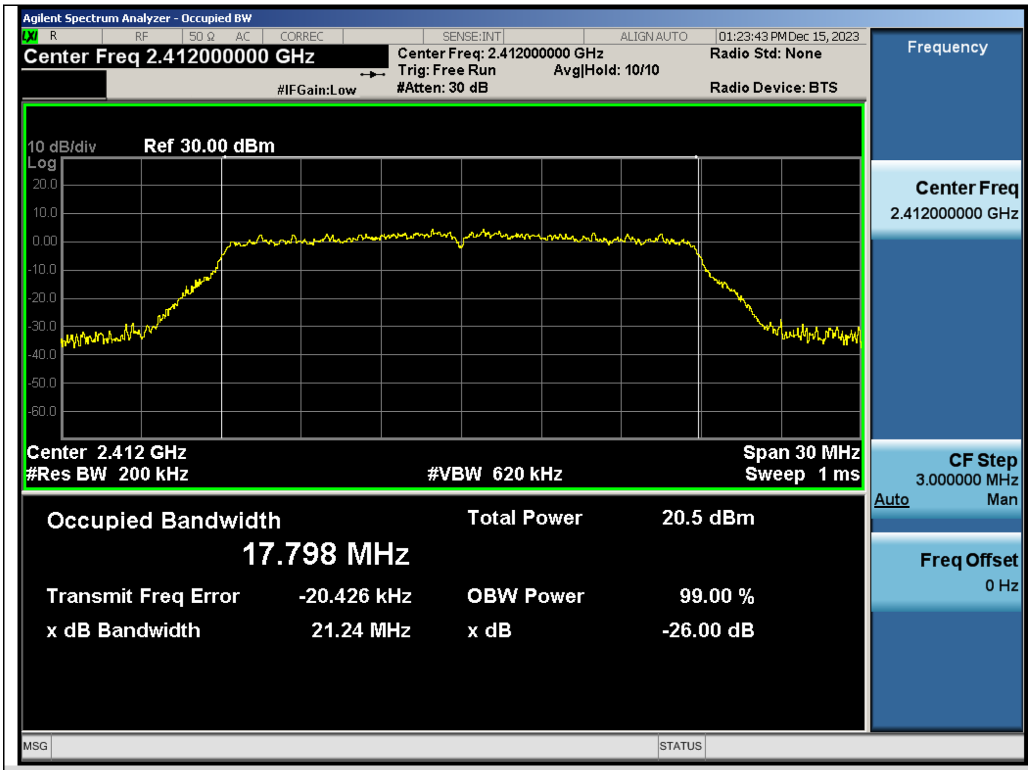

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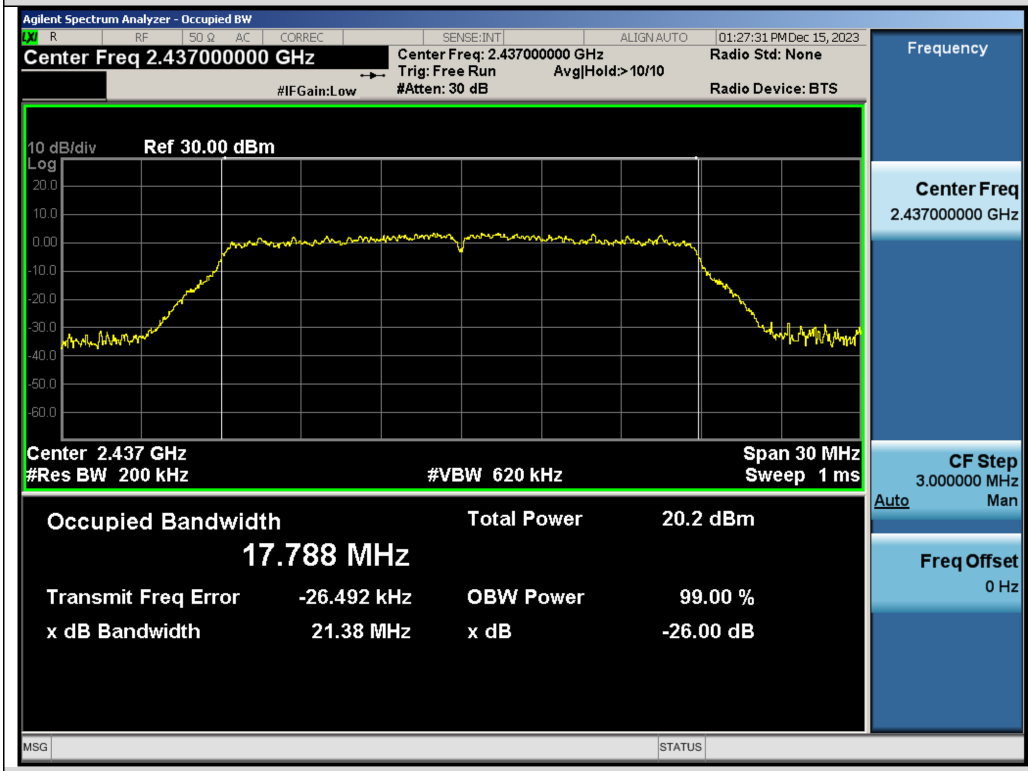

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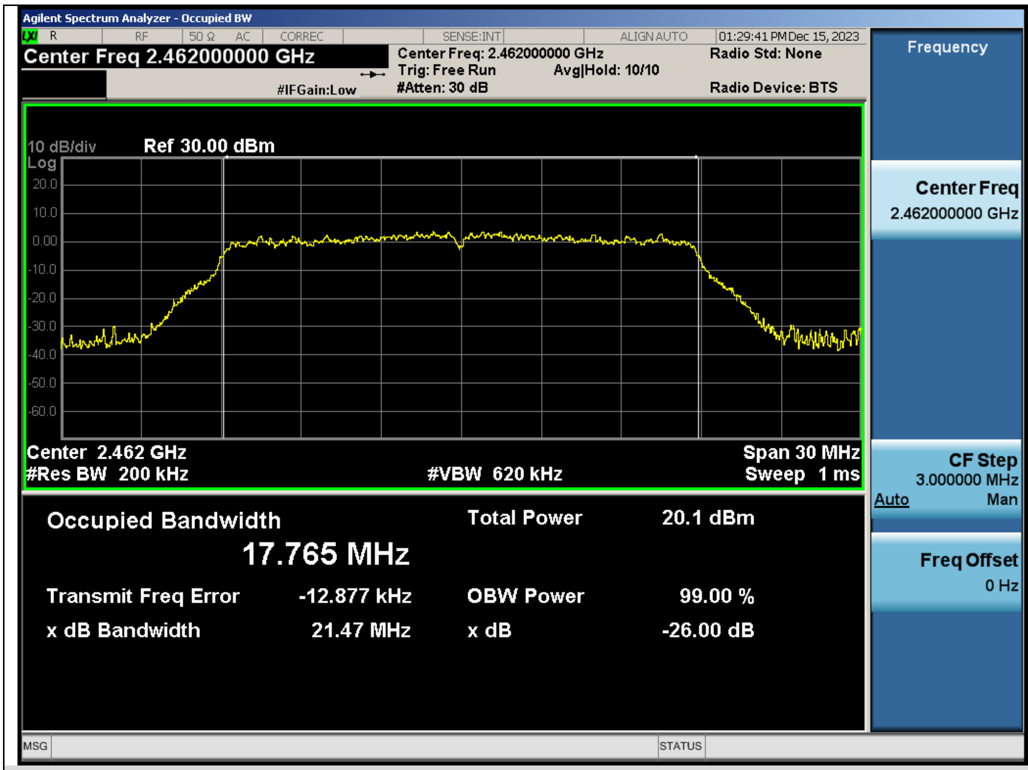

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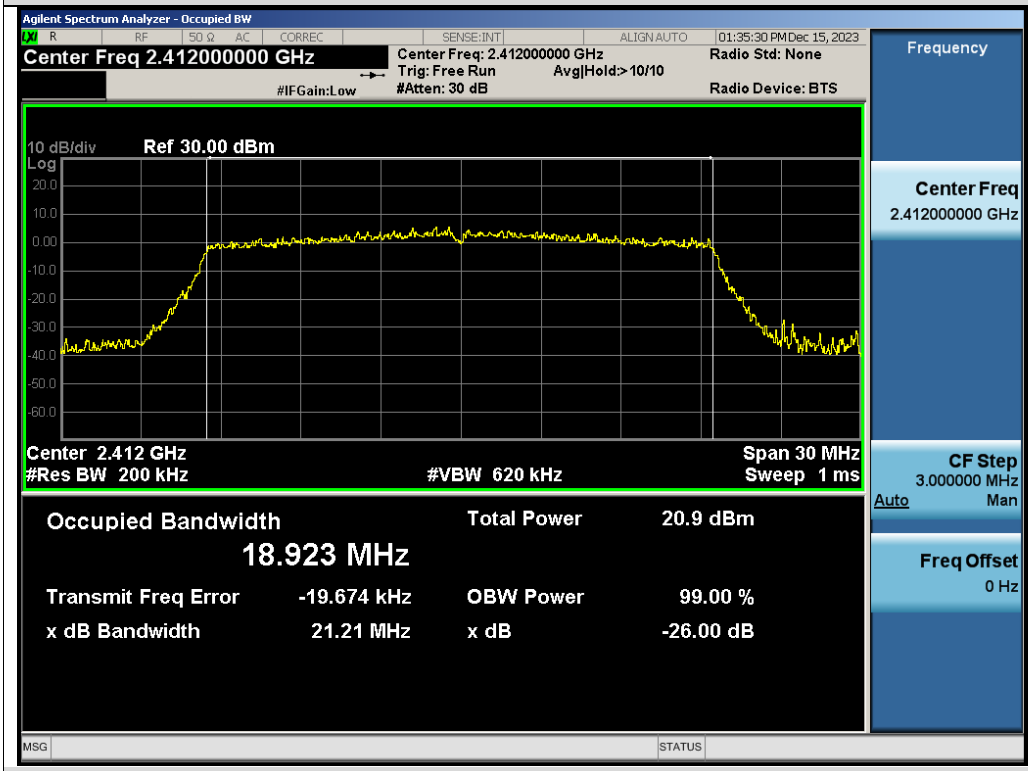

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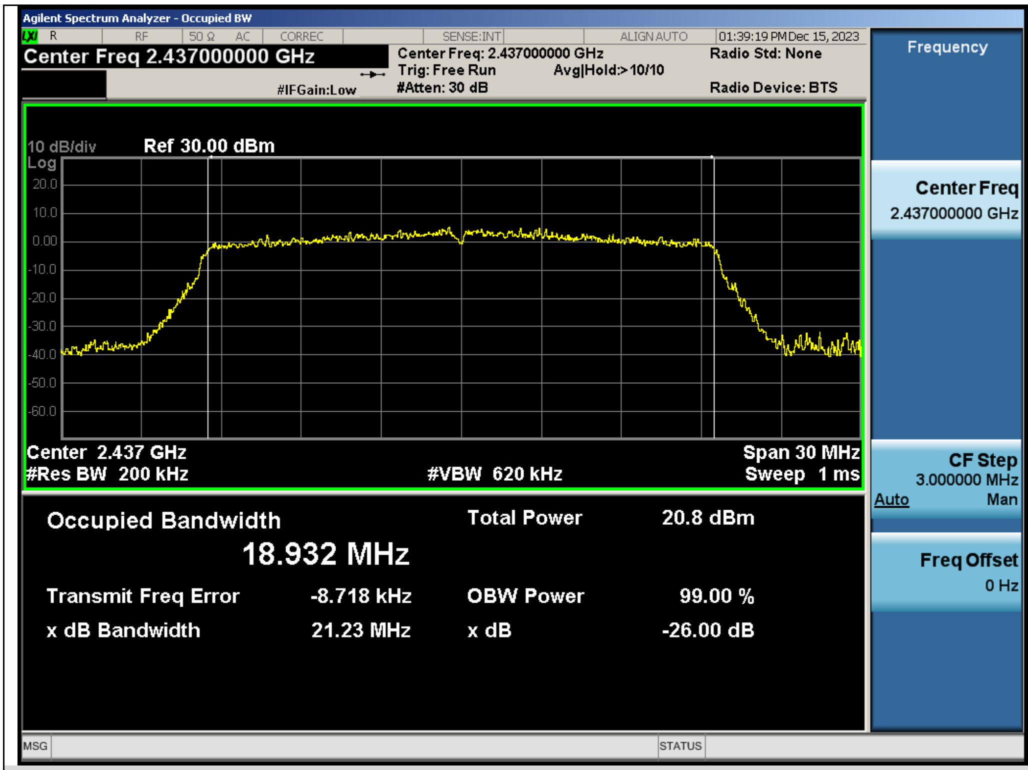

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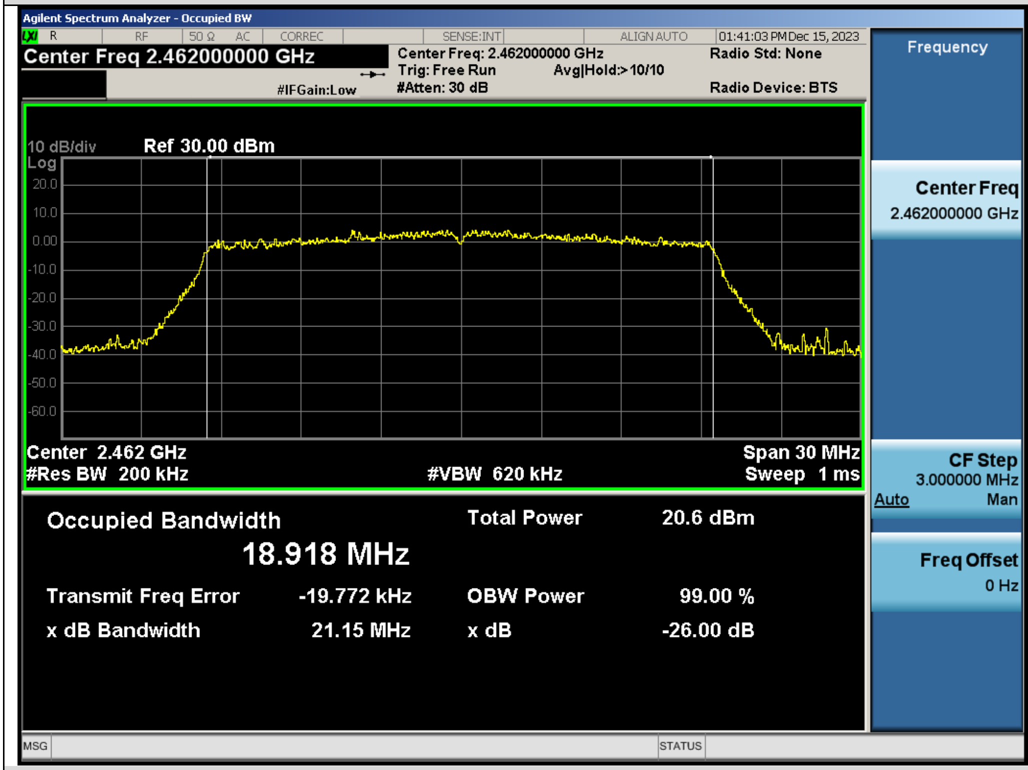
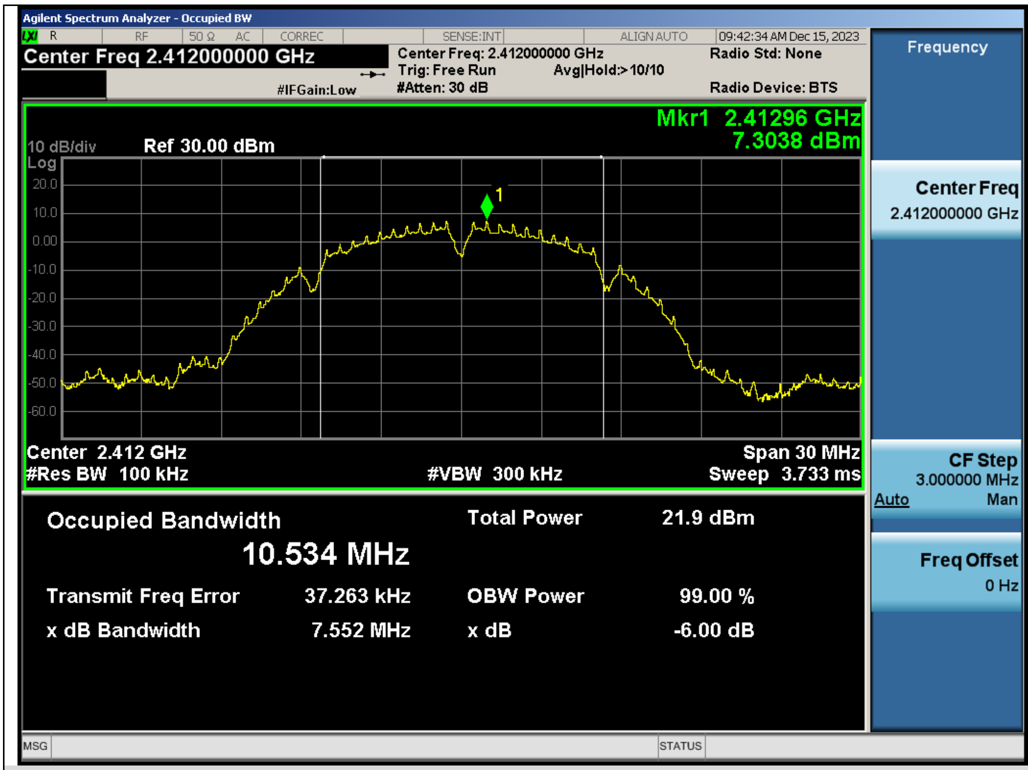


Test_Graph_802.11ax20_ANT2_2462_MCS0_OBW

Test Graphs of DTS Bandwidth



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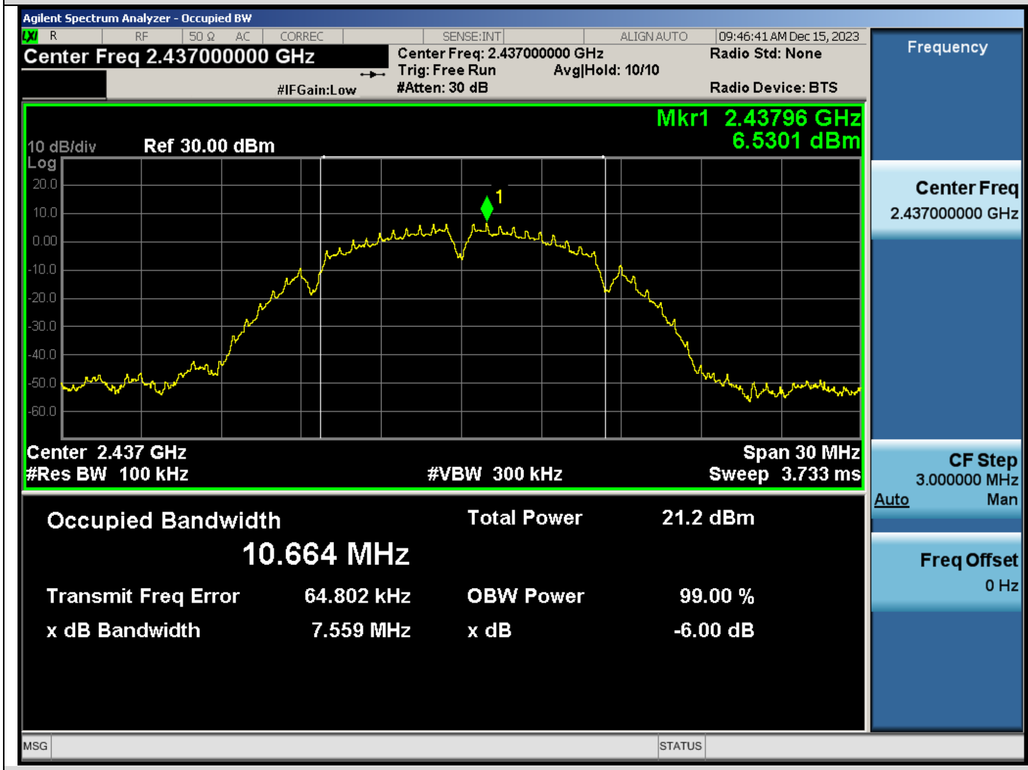

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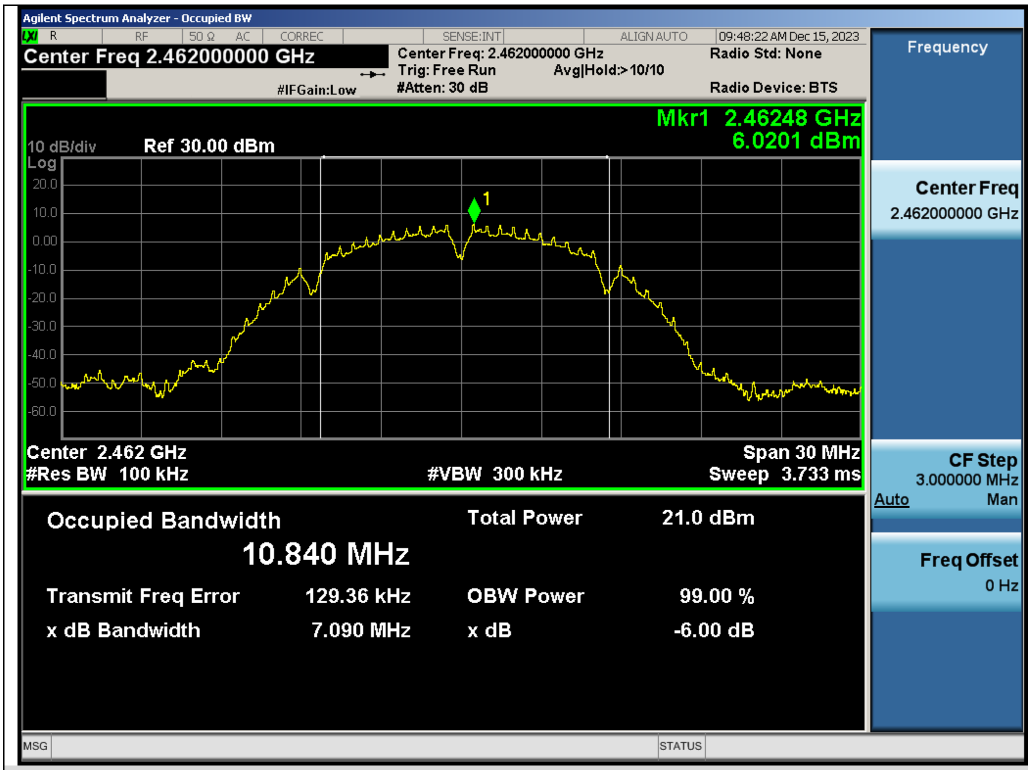

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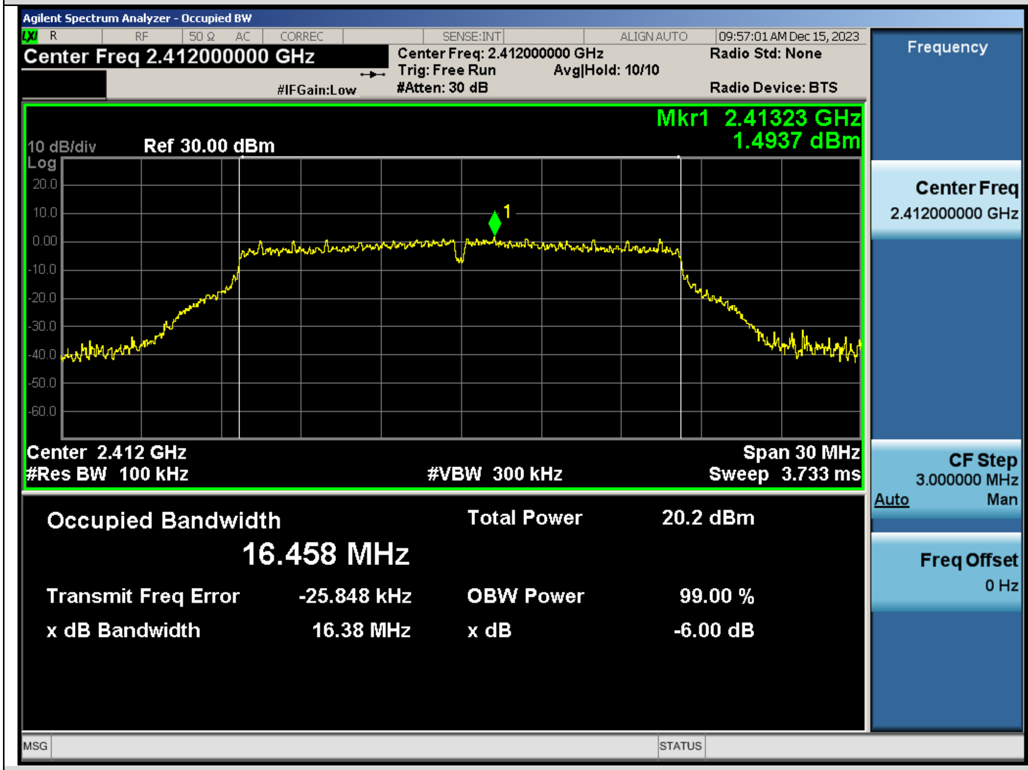

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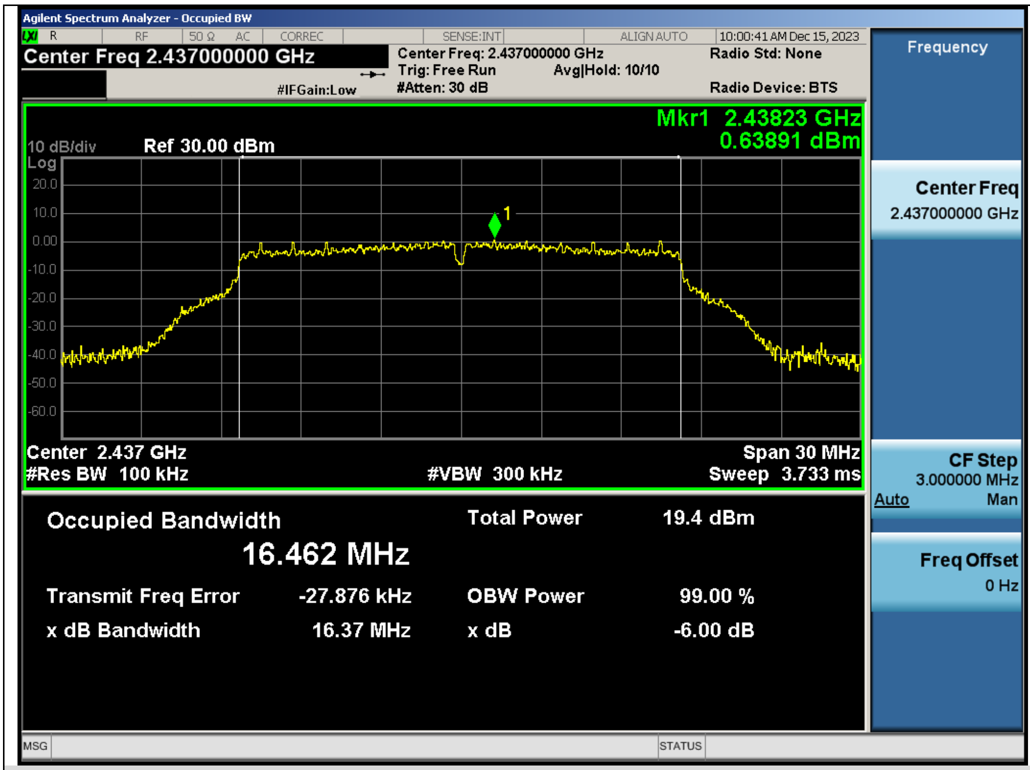

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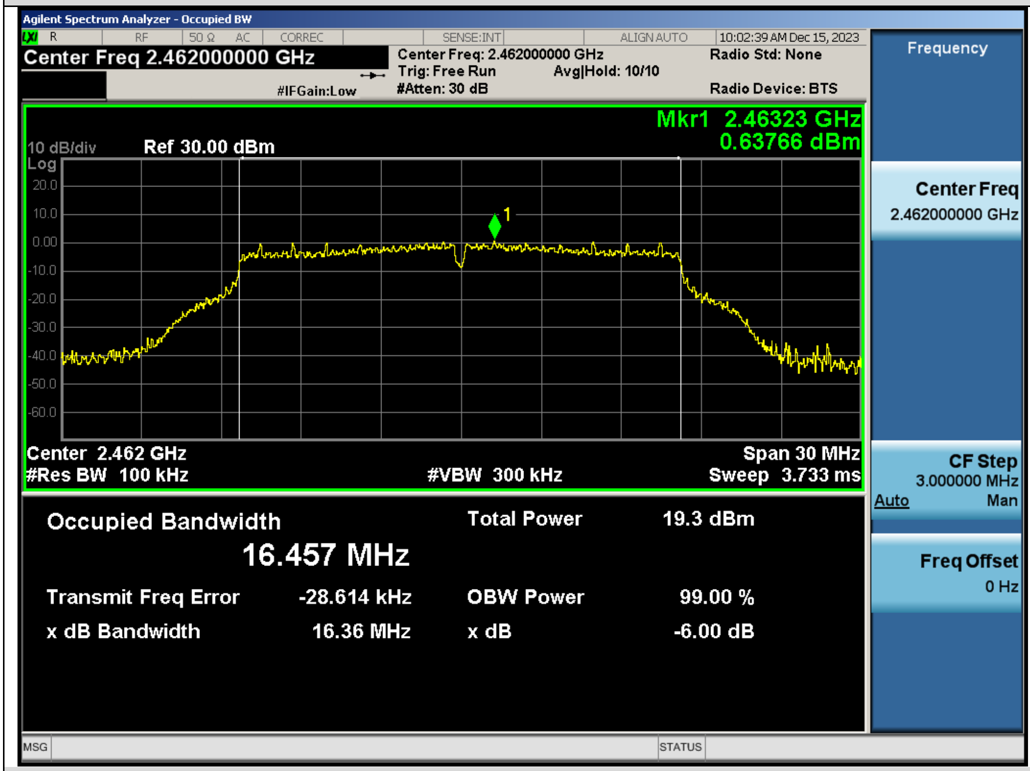

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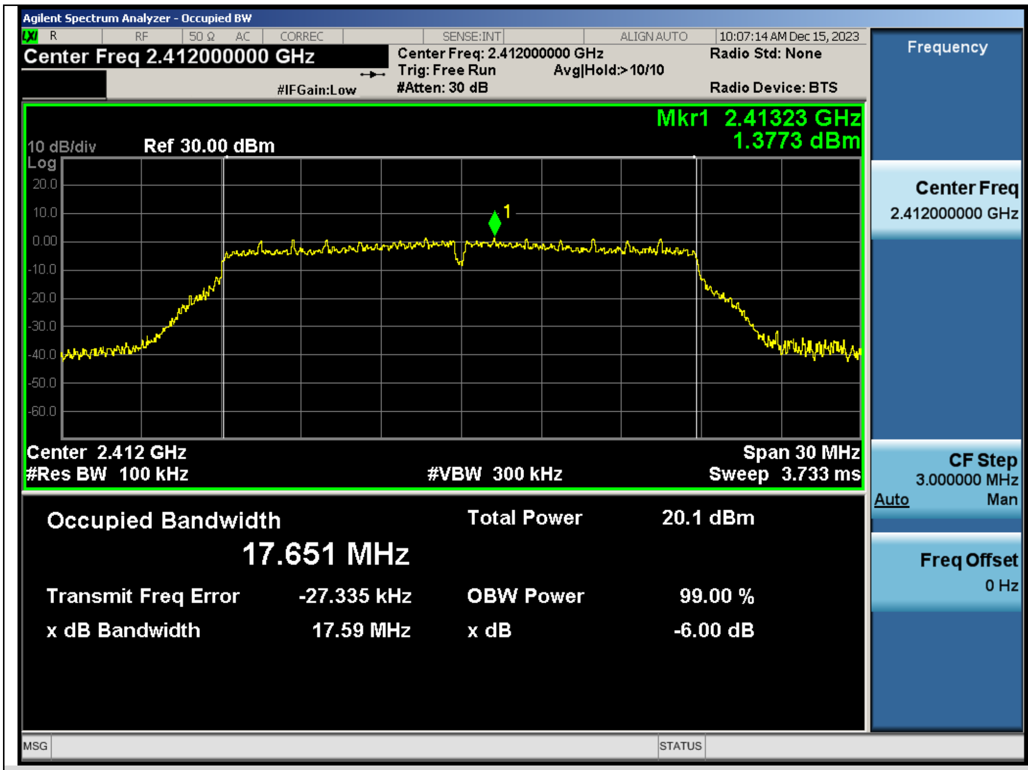

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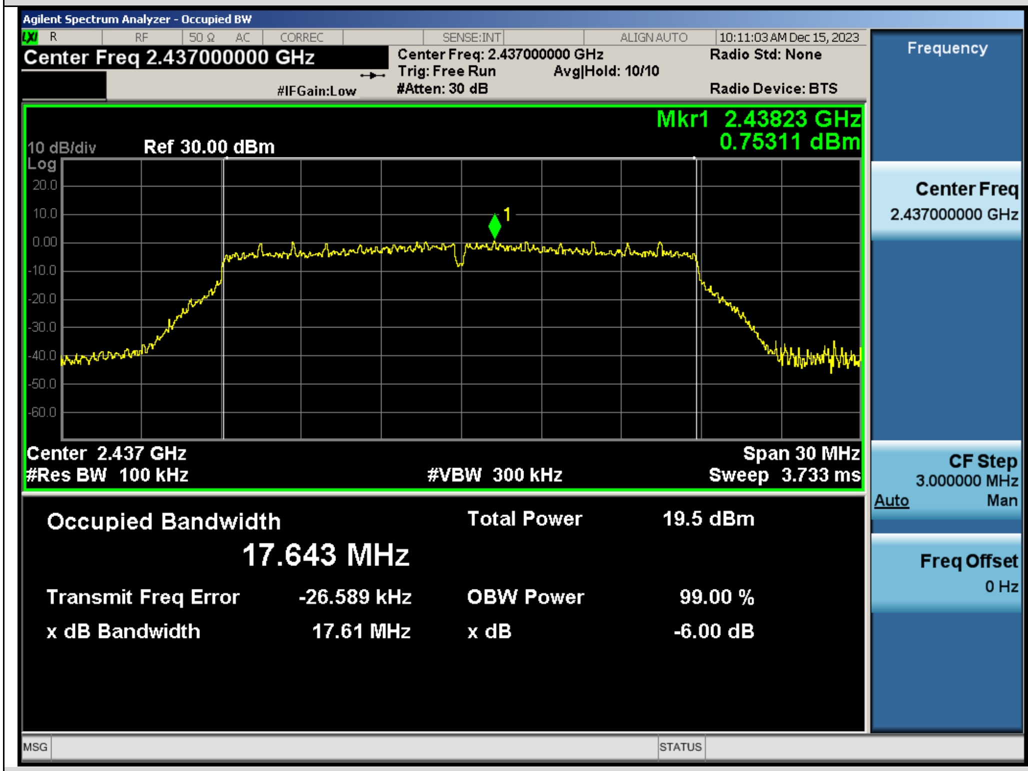

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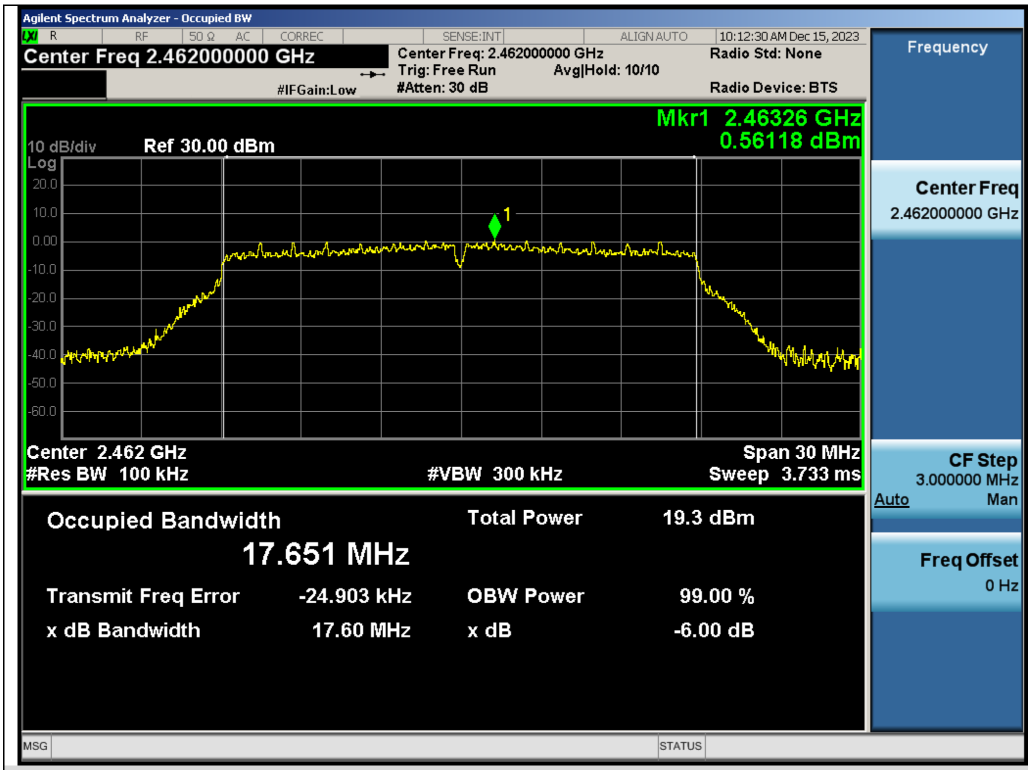

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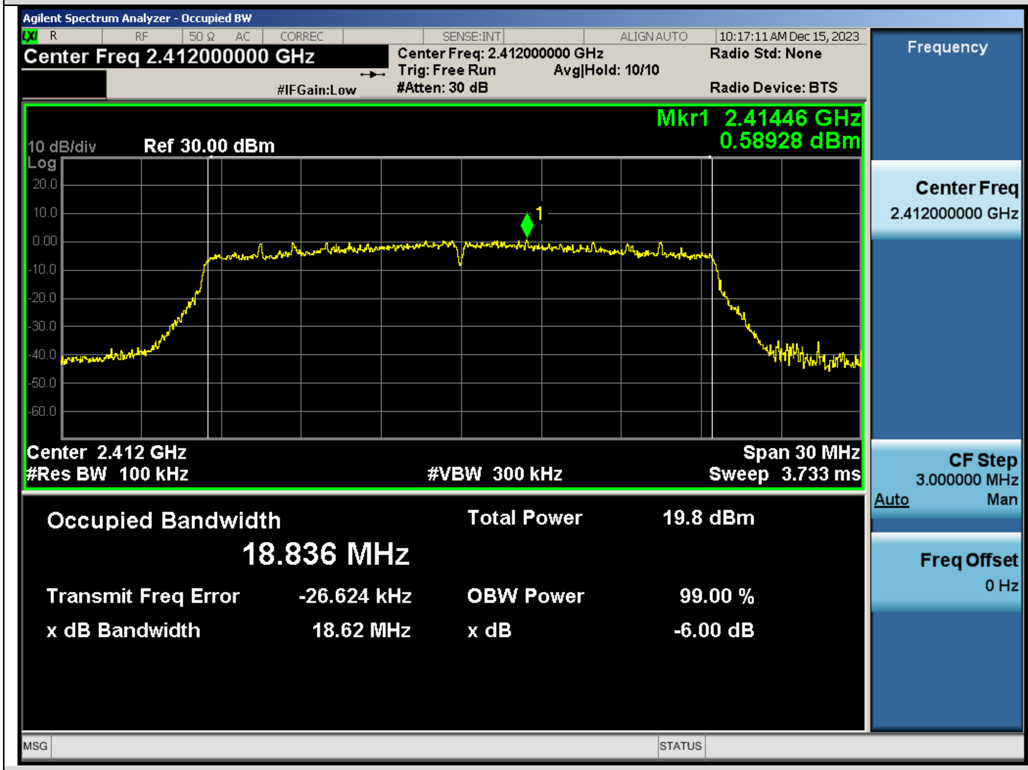

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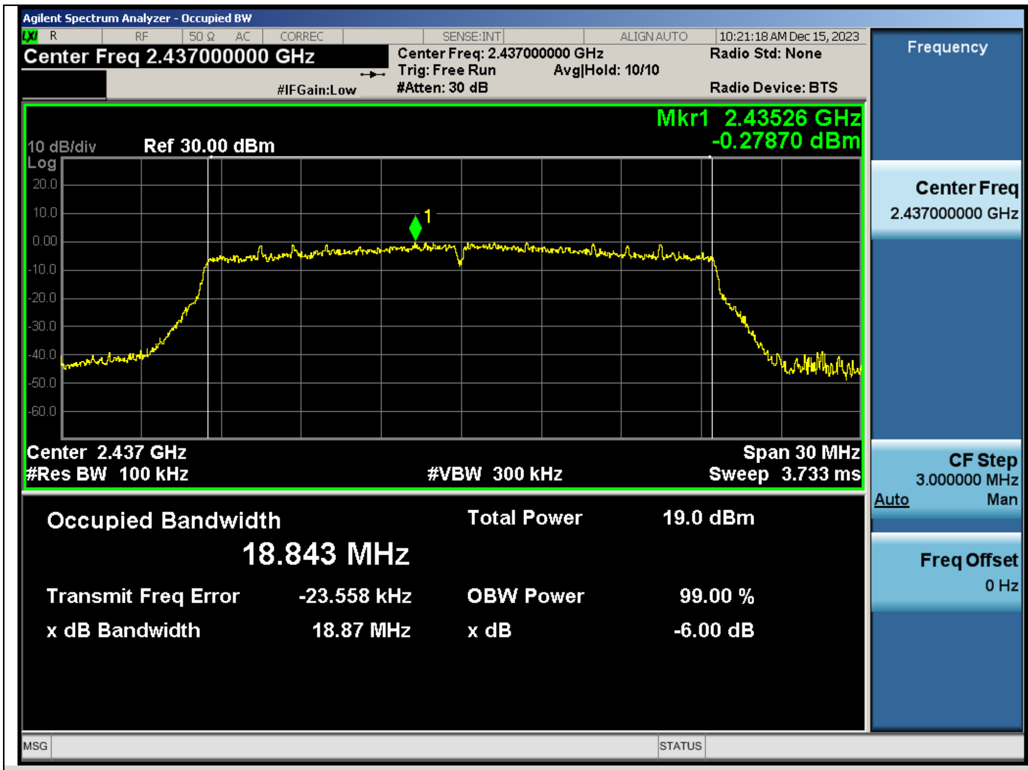

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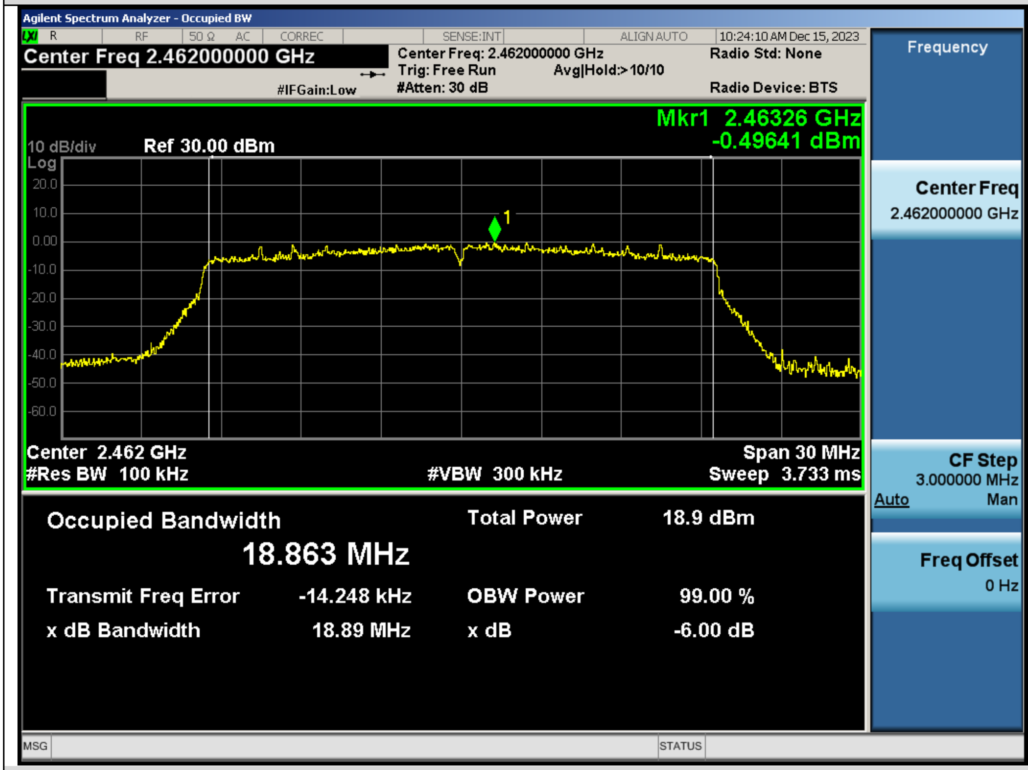

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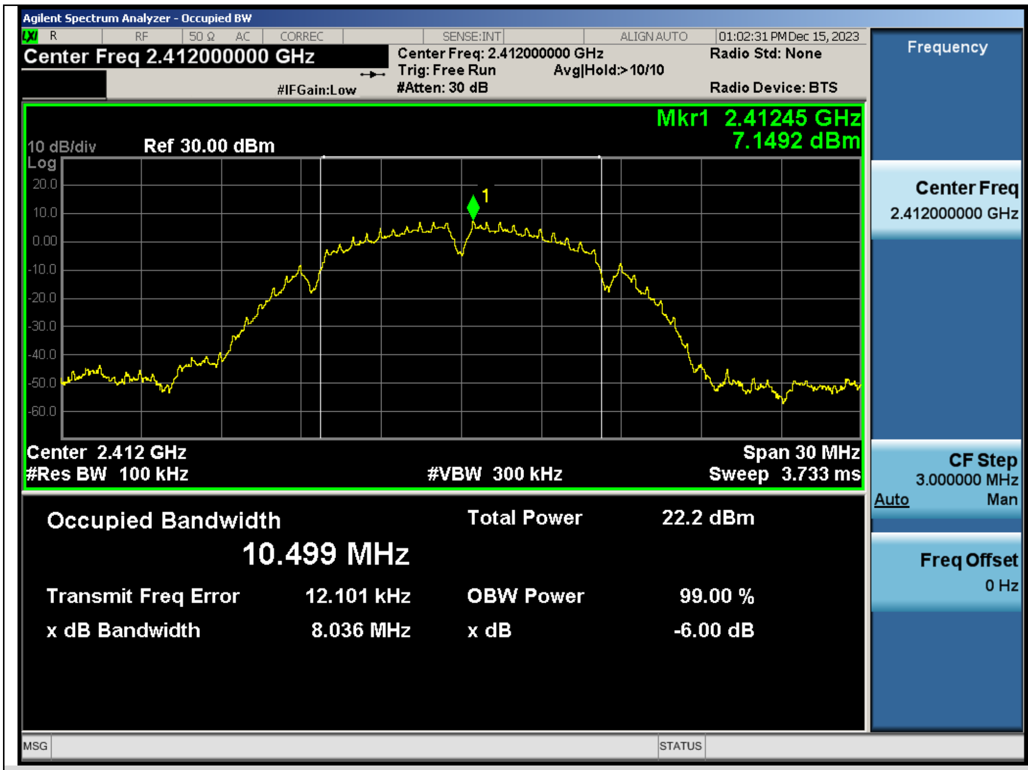
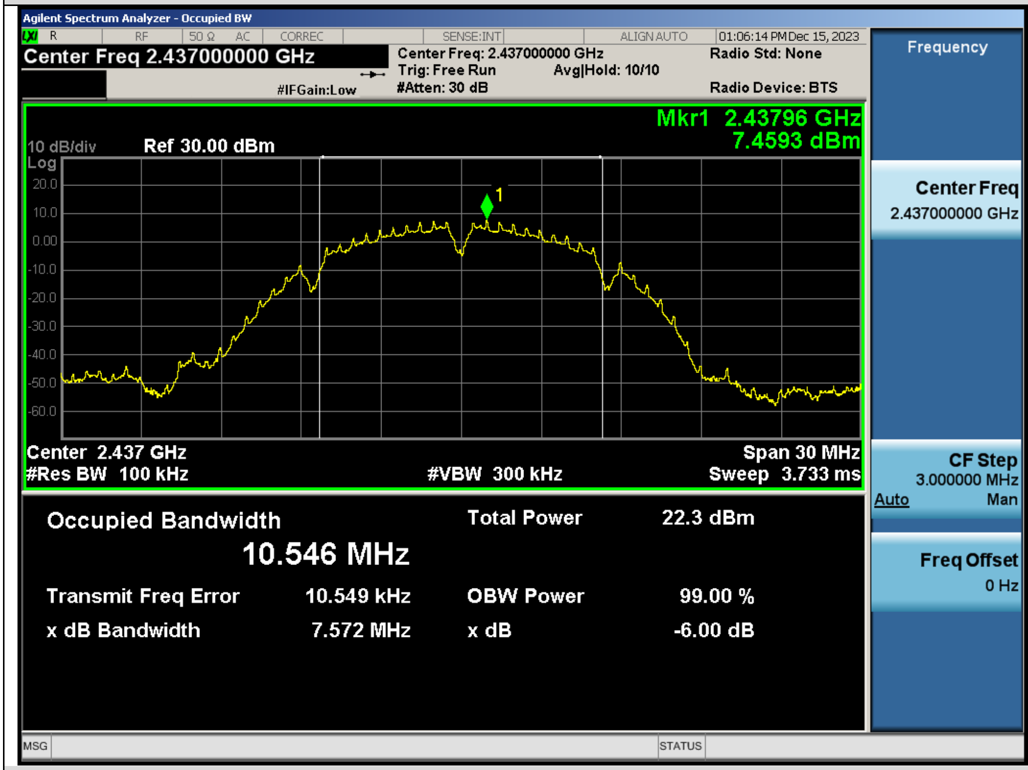
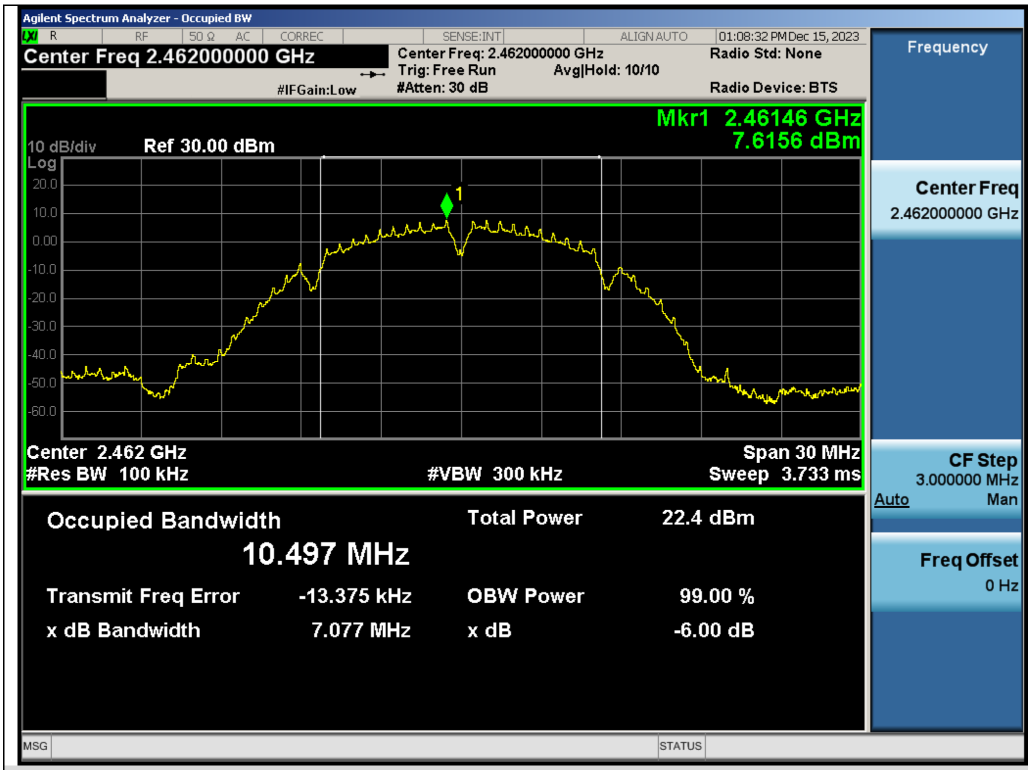


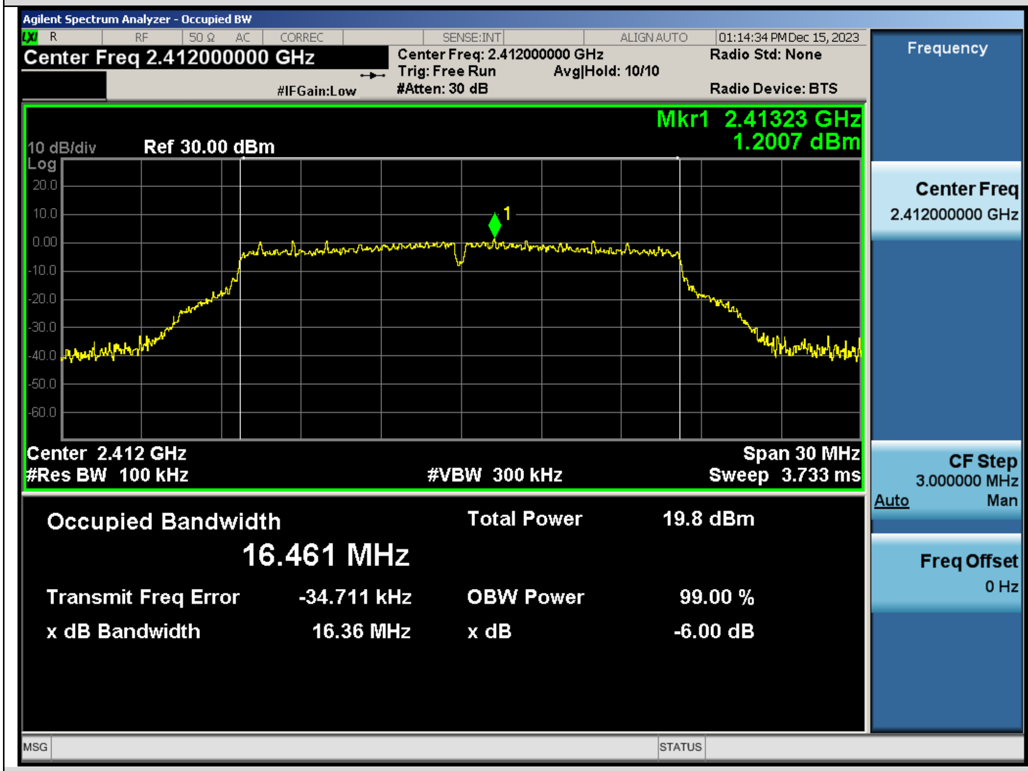
Test_Graph_802.11b_ANT2_2412_1Mbps_DTSBW



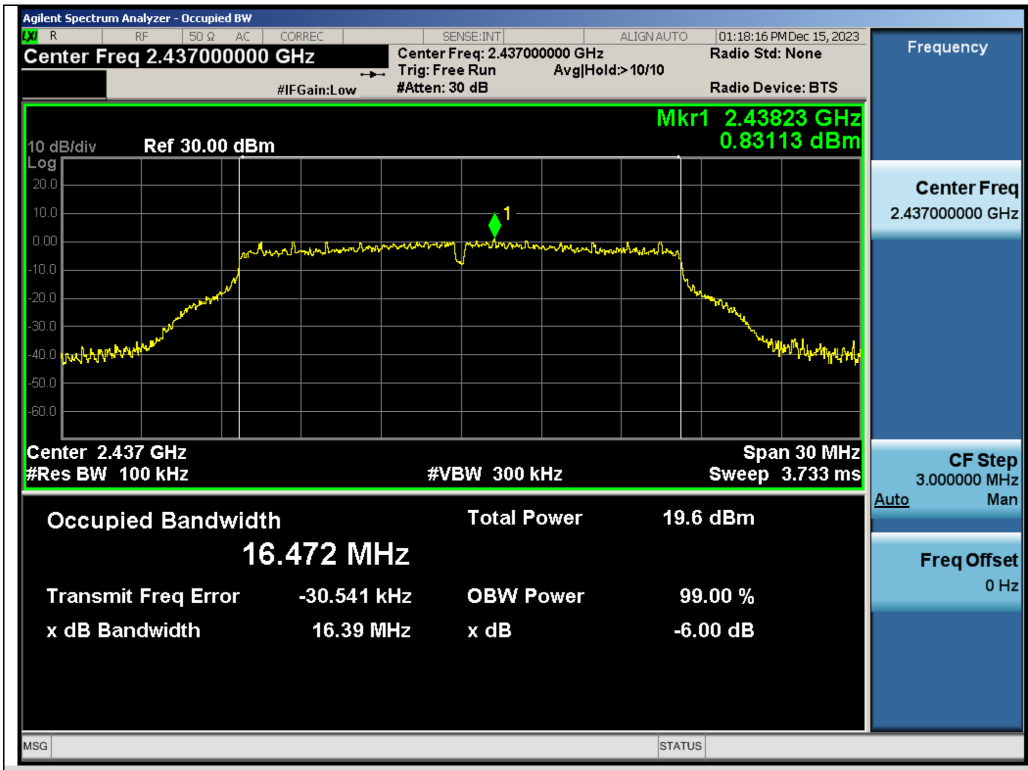
Test_Graph_802.11b_ANT2_2437_1Mbps_DTSBW



Test_Graph_802.11b_ANT2_2462_1Mbps_DTSBW



Test_Graph_802.11g_ANT2_2412_6Mbps_DTSBW



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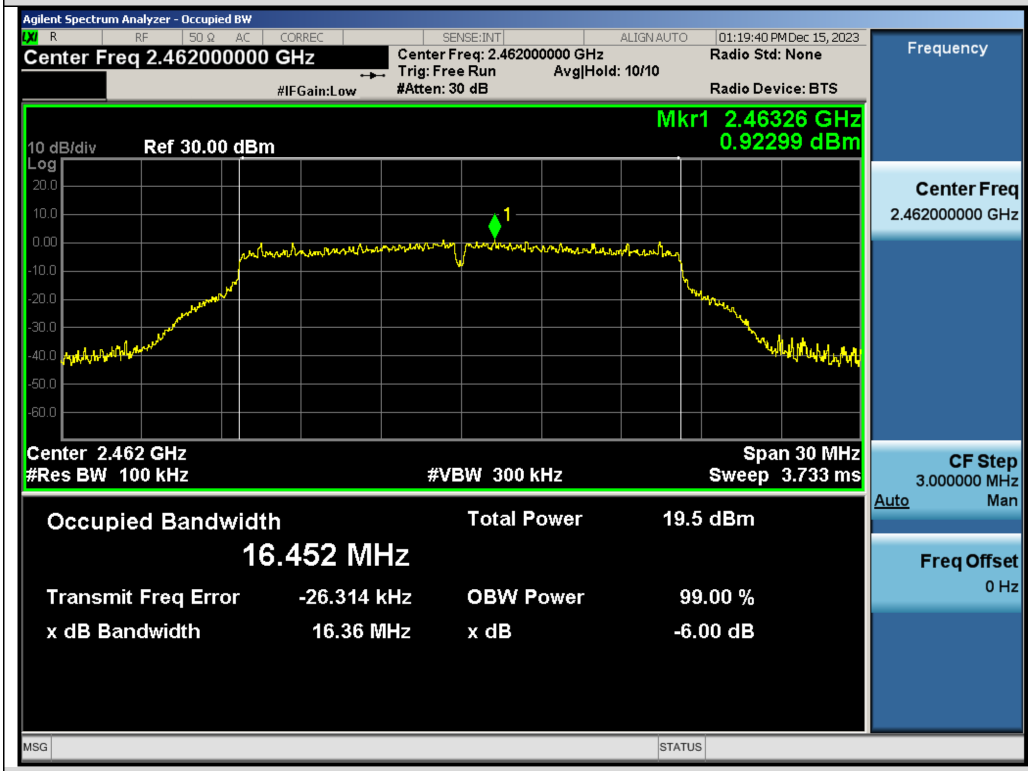

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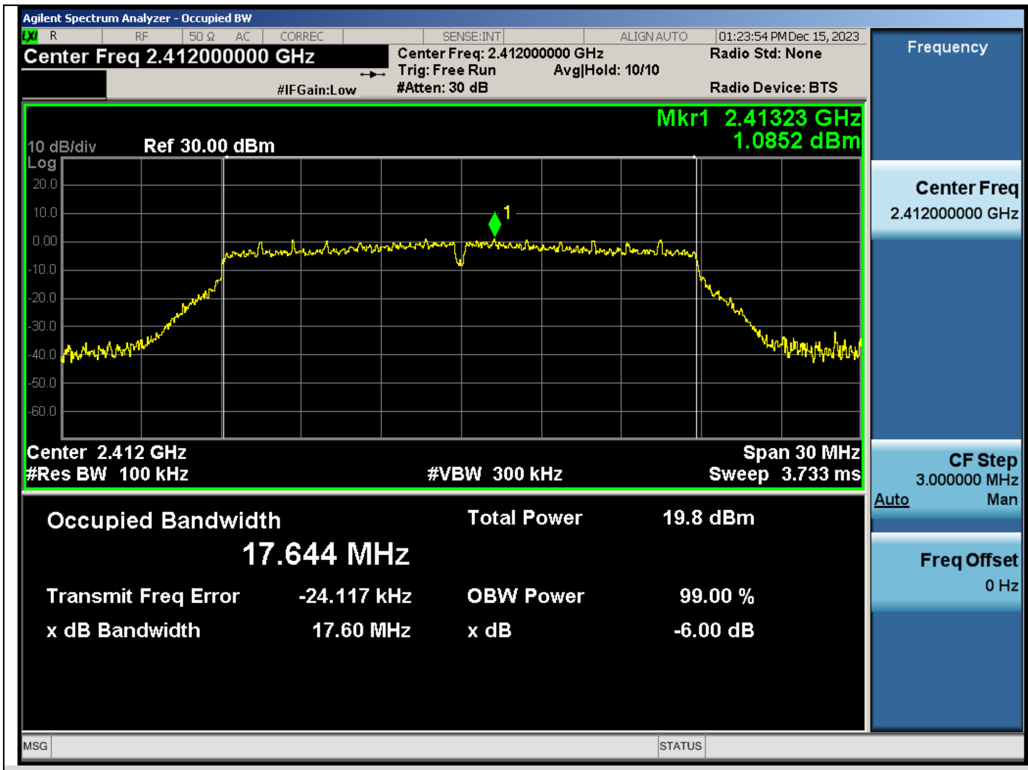

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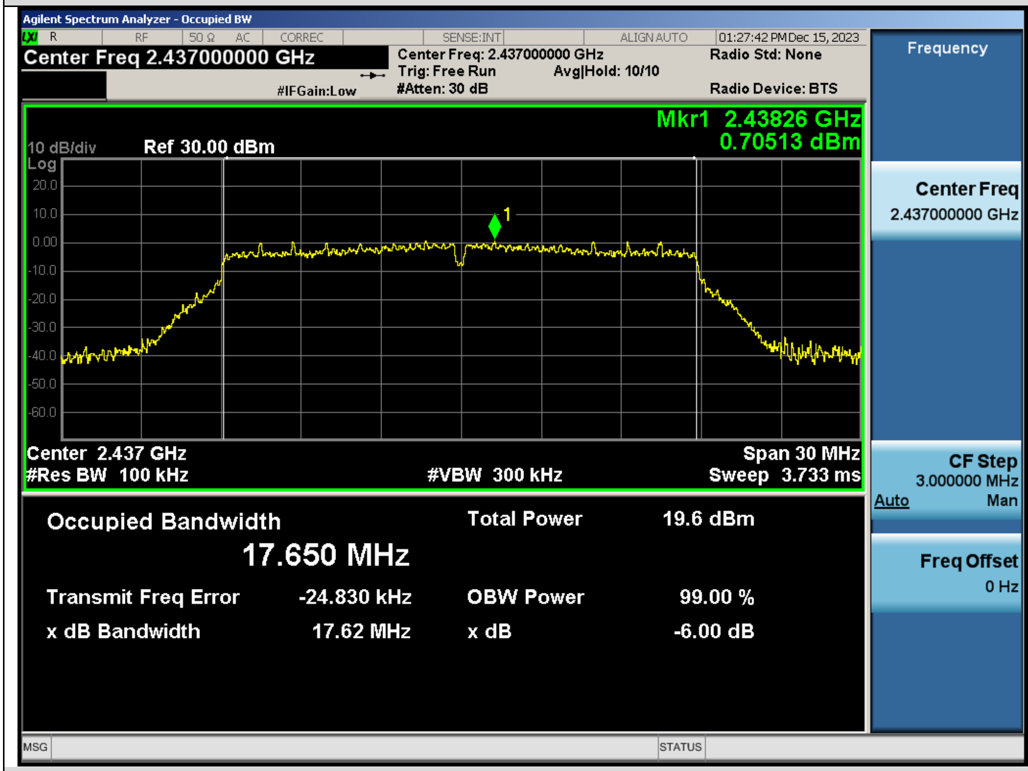

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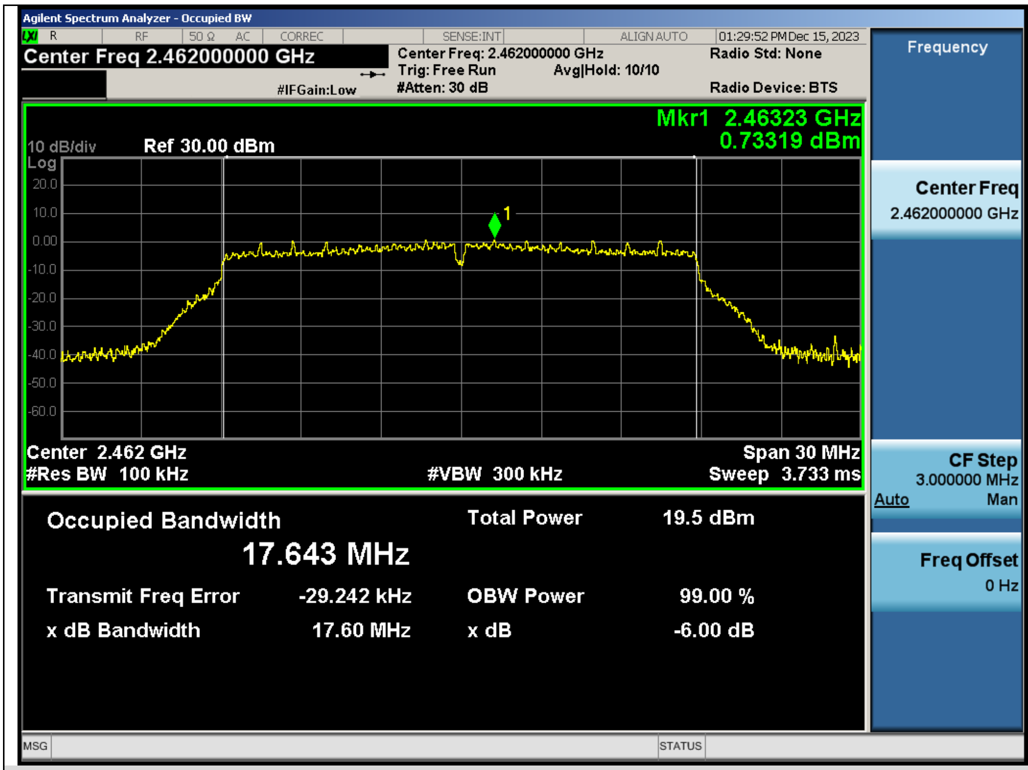

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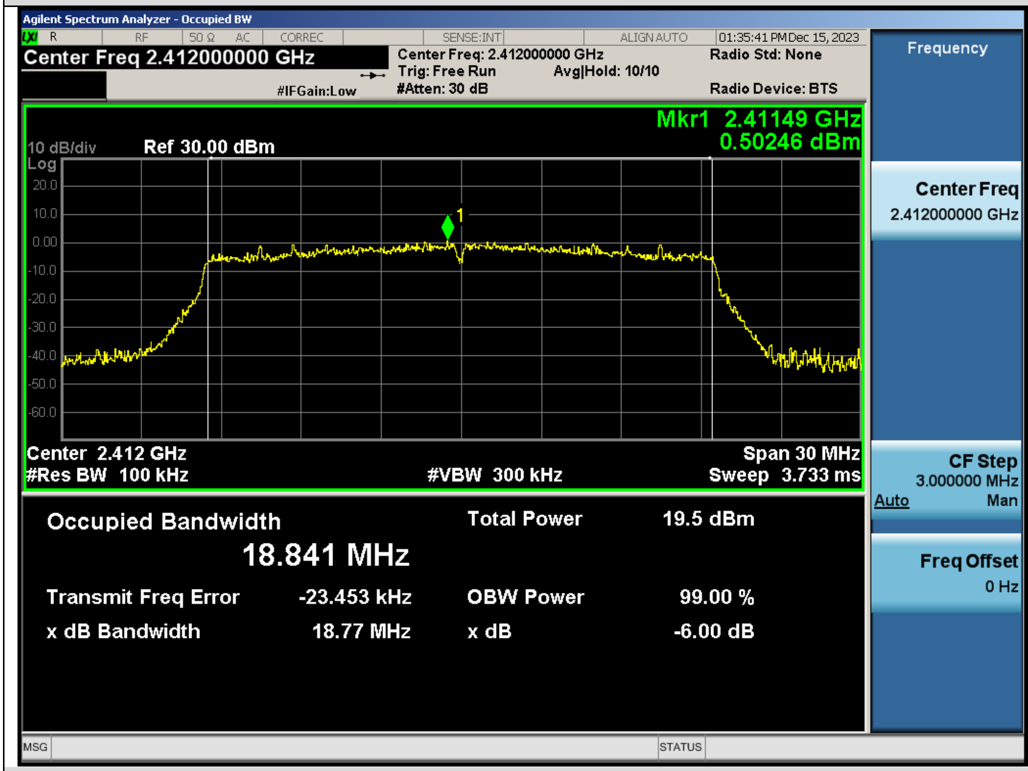

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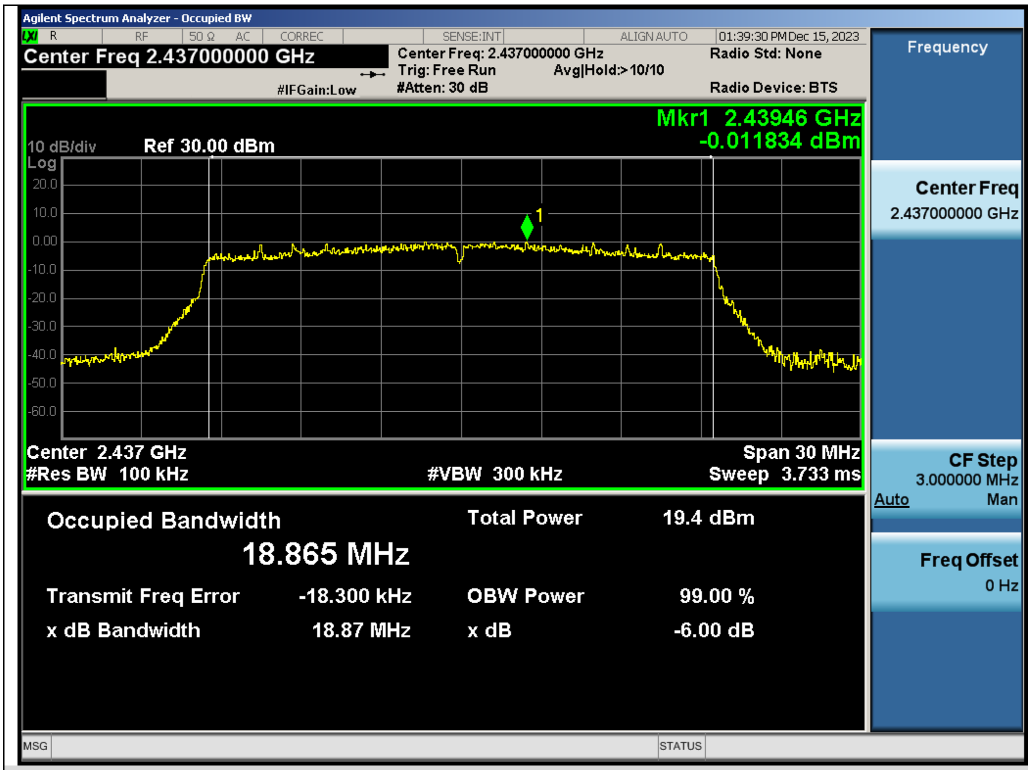
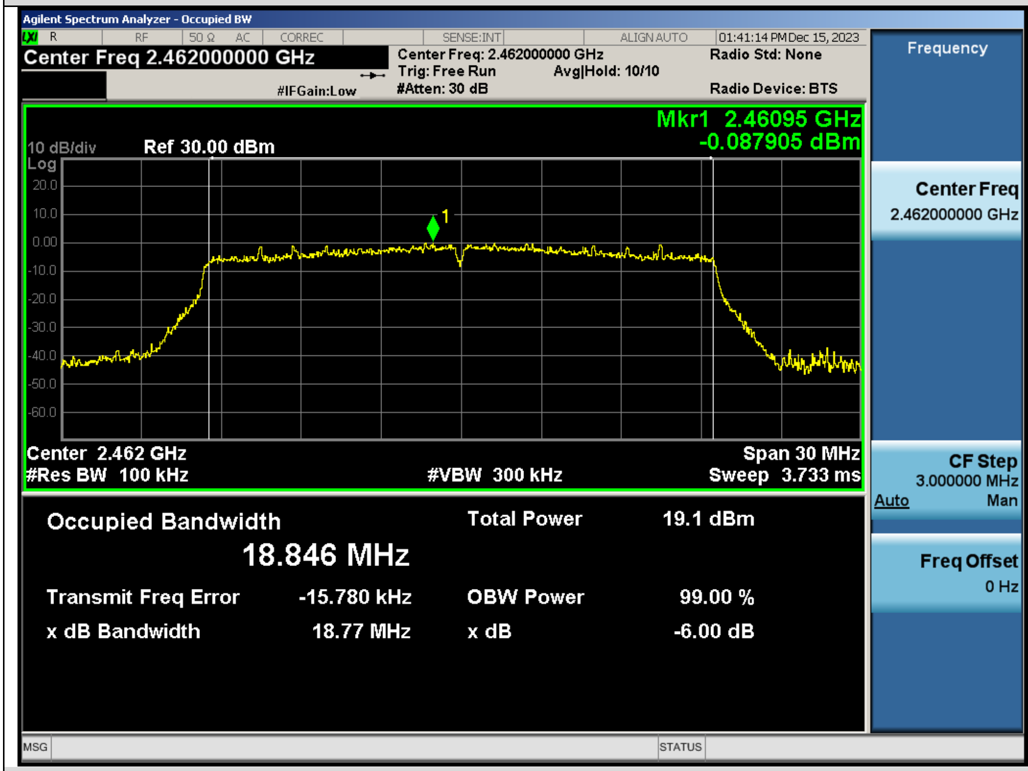


Test_Graph_802.11ax20_ANT2_2437_MCS0_DTSBW



Test_Graph_802.11ax20_ANT2_2462_MCS0_DTSBW

9. Power Spectral Density Measurement

9.1 Provisions Applicable

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

9.2 Measurement Procedure

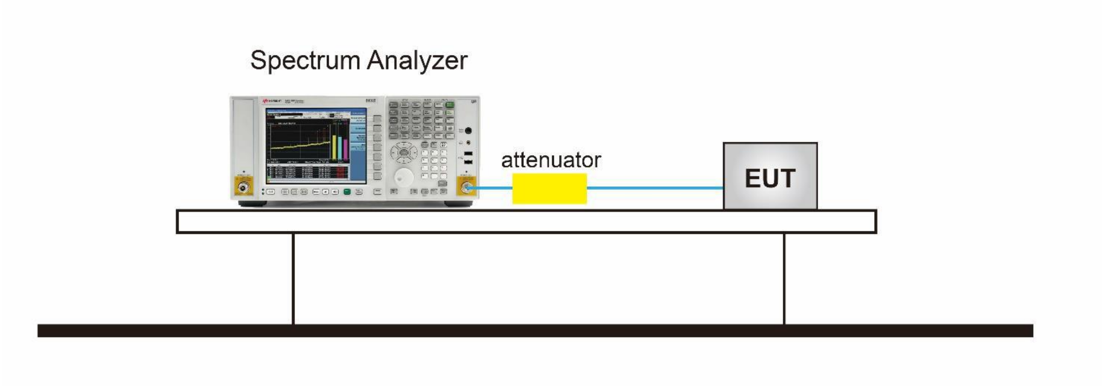
☒For Peak power spectral density test:

1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
3. Set the RBW = 20 kHz.
4. Set the VBW ≥ [3 × RBW].
5. Set the Span ≥ [1.5 × DTS bandwidth].
6. Sweep time=Auto couple.
7. Detector function=Peak.
8. Trace Mode=Max hold.
9. When the measurement bandwidth of Maximum PSD is specified in 3 kHz, add a constant factor 10*log(3kHz/20kHz) = -8.23 dB to the measured result.
10. Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission.
11. The indicated level is the peak output power, after any corrections for external attenuators and cables.

☐For Average power spectral density test:

1. The testing follows the ANSI C63.10 Section 11.10.5 Method AVPSD.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
3. Set Span to at least 1.5 times the OBW.
4. Set RBW to:3 kHz ≤ RBW ≤ 100 kHz.
5. Set VBW≥[3×RBW].
6. Sweep Time=Auto couple.
7. Detector function=RMS (i.e., power averaging).
8. Trace average at least 100 traces in power averaging (rms) mode.
9. When the measurement bandwidth of Maximum PSD is specified in 3 kHz, add a constant factor 10*log(3kHz/20kHz) = -8.23 dB to the measured result.
10. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
11. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.
12. Record the test results in the report.

9.3 Measurement Setup (Block Diagram of Configuration)



9.4 Measurement Result

Test Data of Conducted Output Power Spectral Density-antenna 1					
Test Mode	Test Channel (MHz)	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
802.11b	2412	1.282	-6.957	⩽8	Pass
	2437	1.014	-7.225	⩽8	Pass
	2462	0.184	-8.055	⩽8	Pass
802.11g	2412	-2.485	-10.724	⩽8	Pass
	2437	-2.142	-10.381	⩽8	Pass
	2462	-2.526	-10.765	⩽8	Pass
802.11n20	2412	-3.226	-11.465	⩽8	Pass
	2437	-3.001	-11.240	⩽8	Pass
	2462	-3.216	-11.455	⩽8	Pass
802.11ax20	2412	-3.247	-11.486	⩽8	Pass
	2437	-4.210	-12.449	⩽8	Pass
	2462	-4.156	-12.395	⩽8	Pass

Test Data of Conducted Output Power Spectral Density-antenna 2					
Test Mode	Test Channel (MHz)	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
802.11b	2412	1.776	-6.463	≤8	Pass
	2437	2.147	-6.092	≤8	Pass
	2462	3.540	-4.699	≤8	Pass
802.11g	2412	-2.147	-10.386	≤8	Pass
	2437	-2.330	-10.569	≤8	Pass
	2462	-2.281	-10.52	≤8	Pass
802.11n20	2412	-2.729	-10.968	≤8	Pass
	2437	-2.620	-10.859	≤8	Pass
	2462	-2.233	-10.472	≤8	Pass
802.11ax20	2412	-4.082	-12.321	≤8	Pass
	2437	-3.537	-11.776	≤8	Pass
	2462	-4.014	-12.253	≤8	Pass

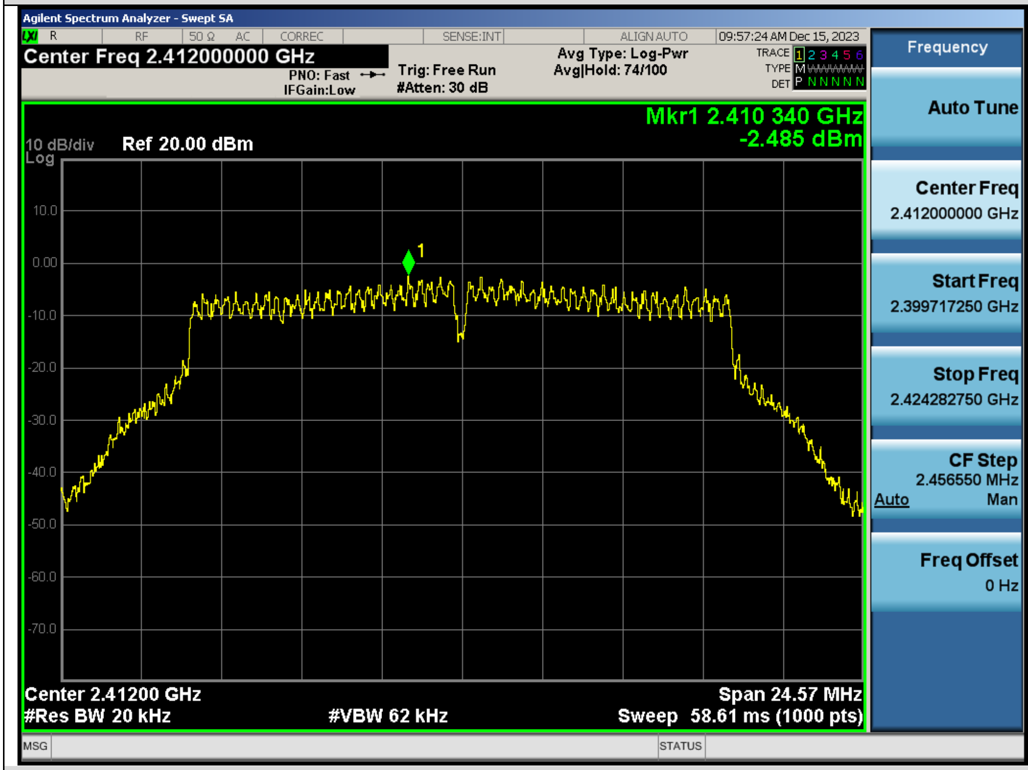
Test Data of Conducted Output Power Spectral Density-MIMO					
Test Mode	Test Channel (MHz)	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
802.11n20	2412	0.040	-8.199	≤8	Pass
	2437	0.204	-8.035	≤8	Pass
	2462	0.314	-7.925	≤8	Pass
802.11ax20	2412	-0.634	-8.873	≤8	Pass
	2437	-0.850	-9.089	≤8	Pass
	2462	-1.074	-9.313	≤8	Pass

Test Graphs of Conducted Output Power Spectral Density

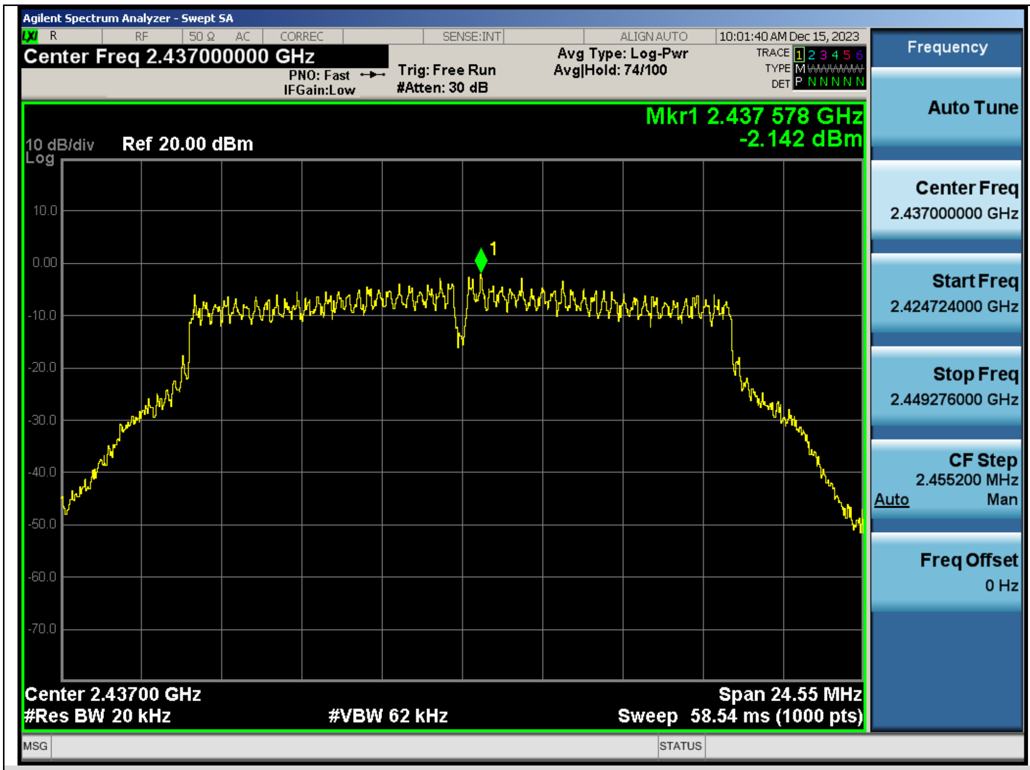
Test_Graph_802.11b_ANT1_2412_1Mbps_PSD

Test_Graph_802.11b_ANT1_2437_1Mbps_PSD

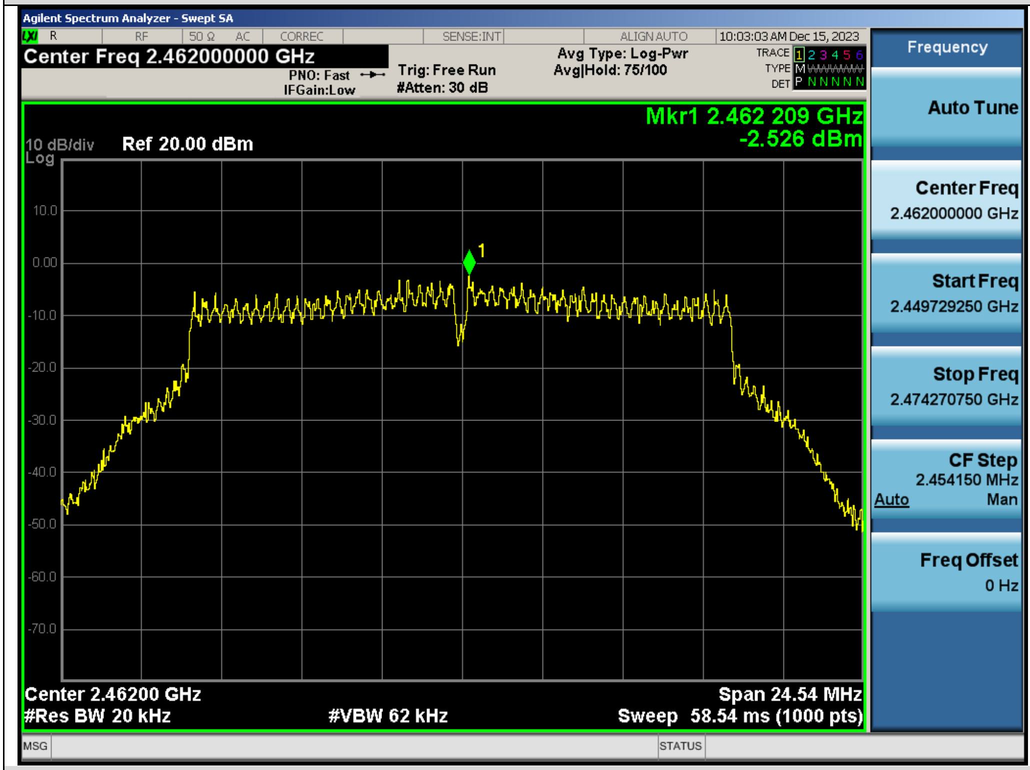
Test_Graph_802.11b_ANT1_2462_1Mbps_PSD



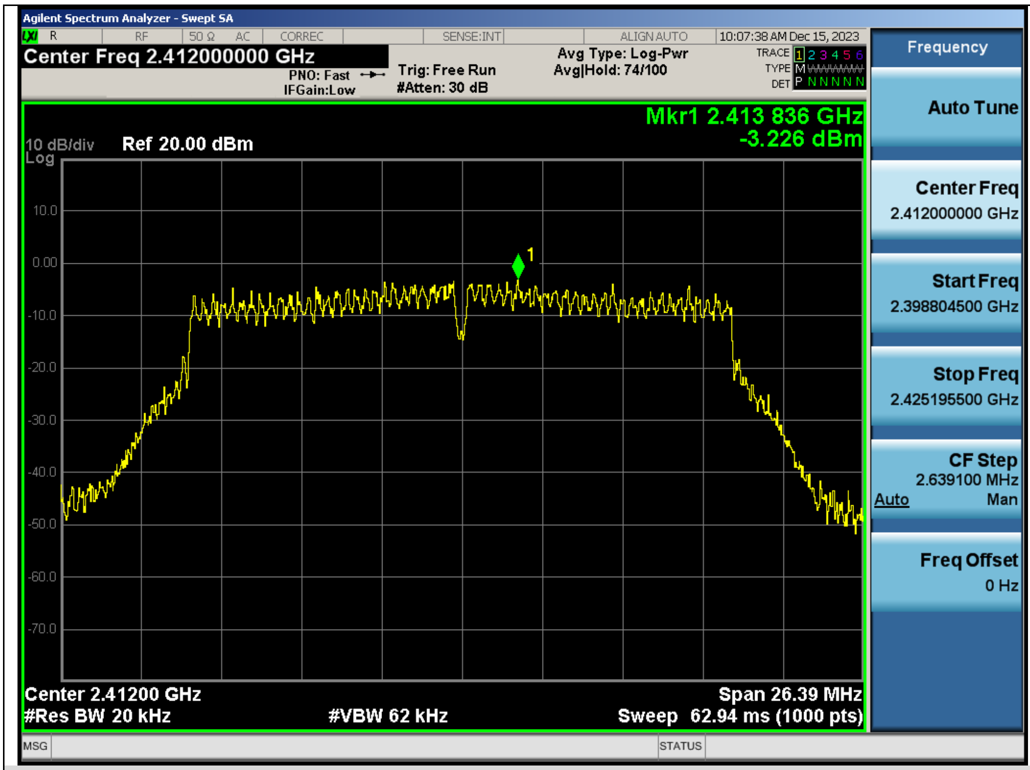
Test_Graph_802.11g_ANT1_2412_6Mbps_PSD



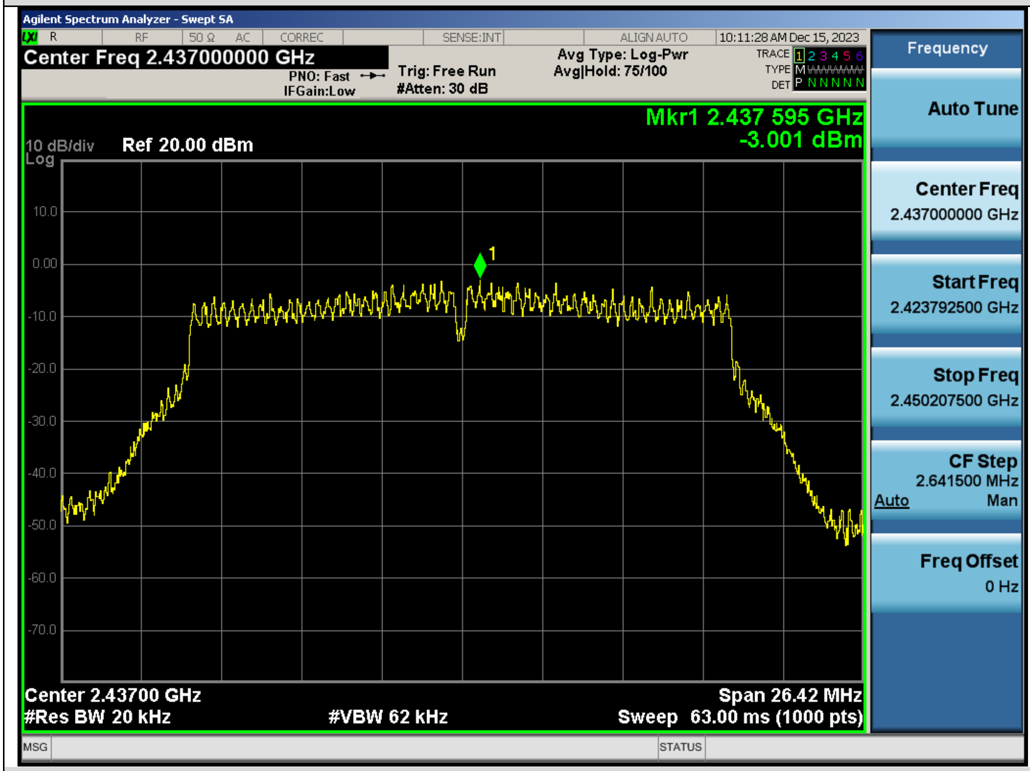
Test_Graph_802.11g_ANT1_2437_6Mbps_PSD



Test_Graph_802.11g_ANT1_2462_6Mbps_PSD



Test_Graph_802.11n20_ANT1_2412_MCS0_PSD



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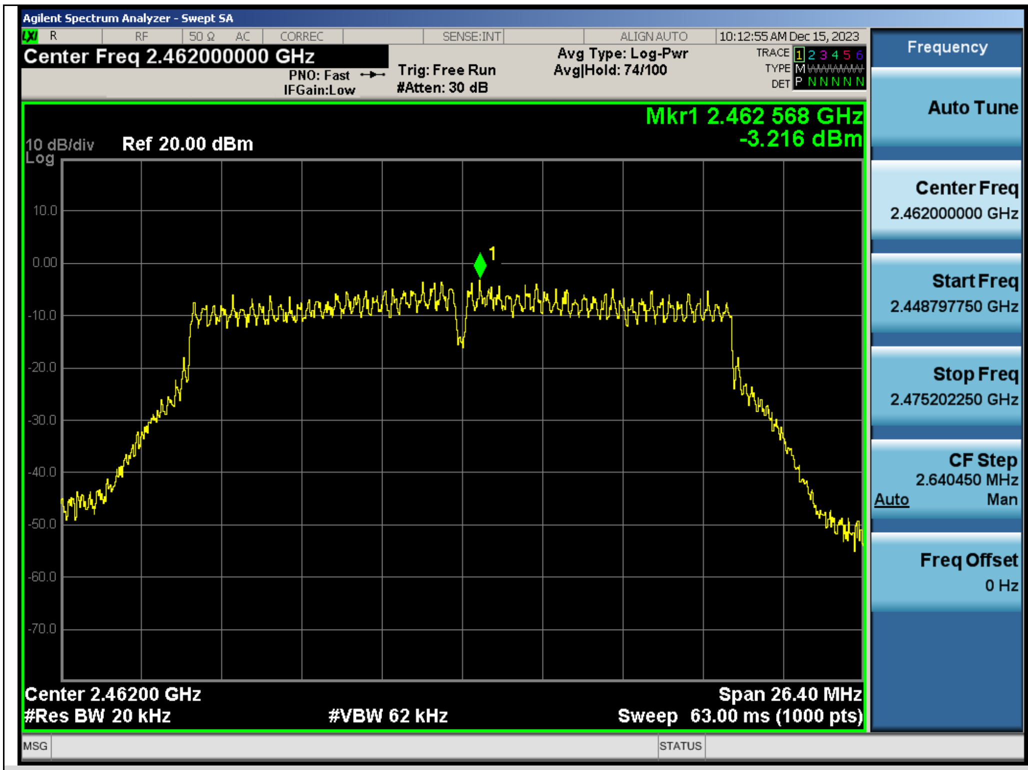

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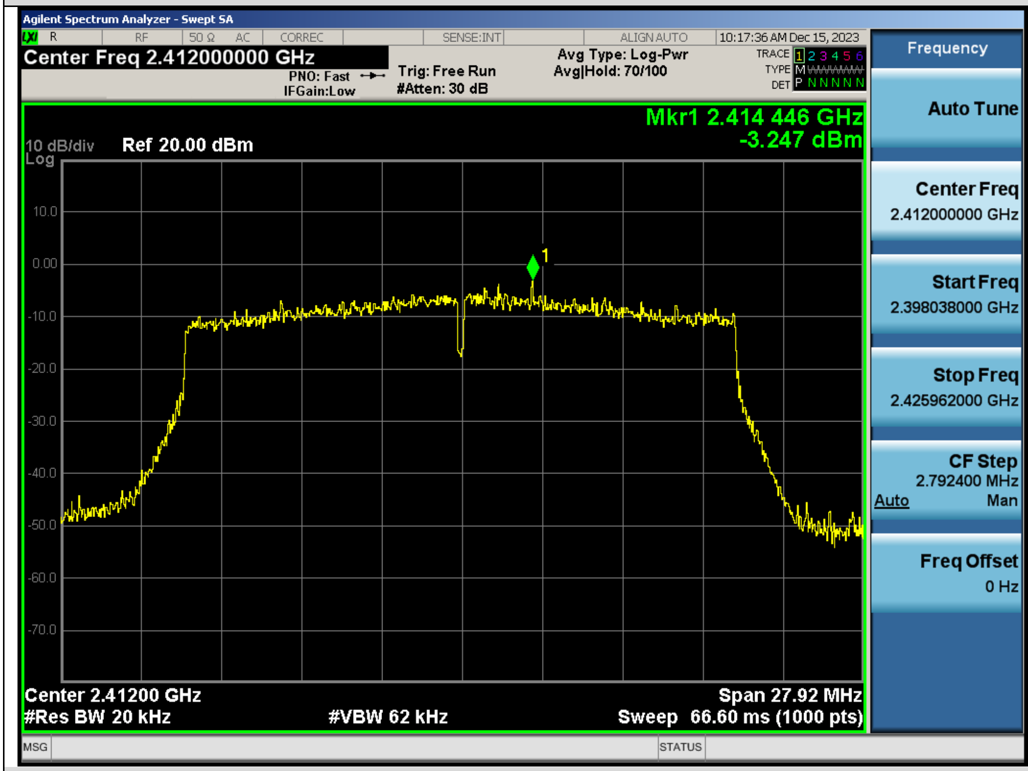

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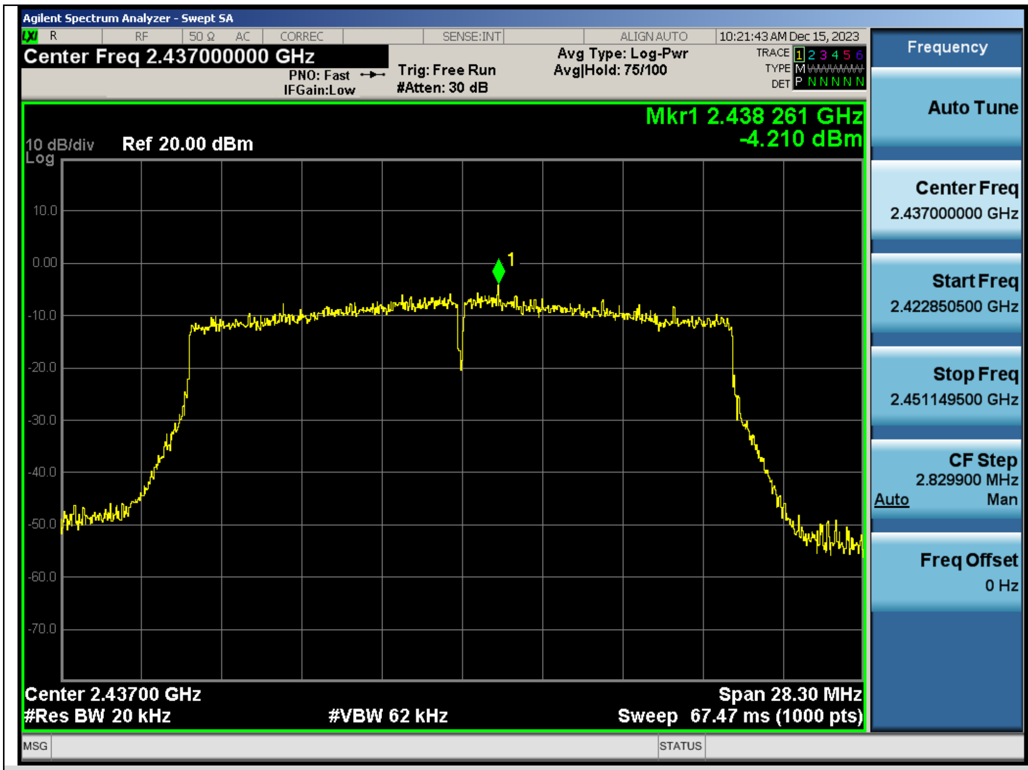

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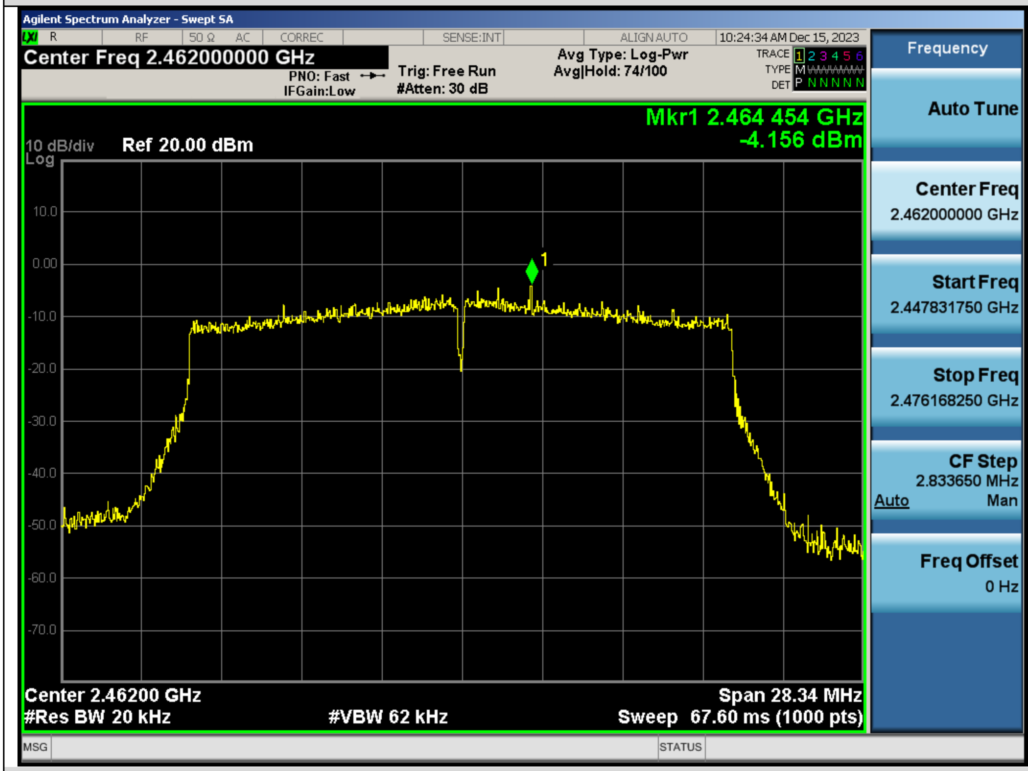
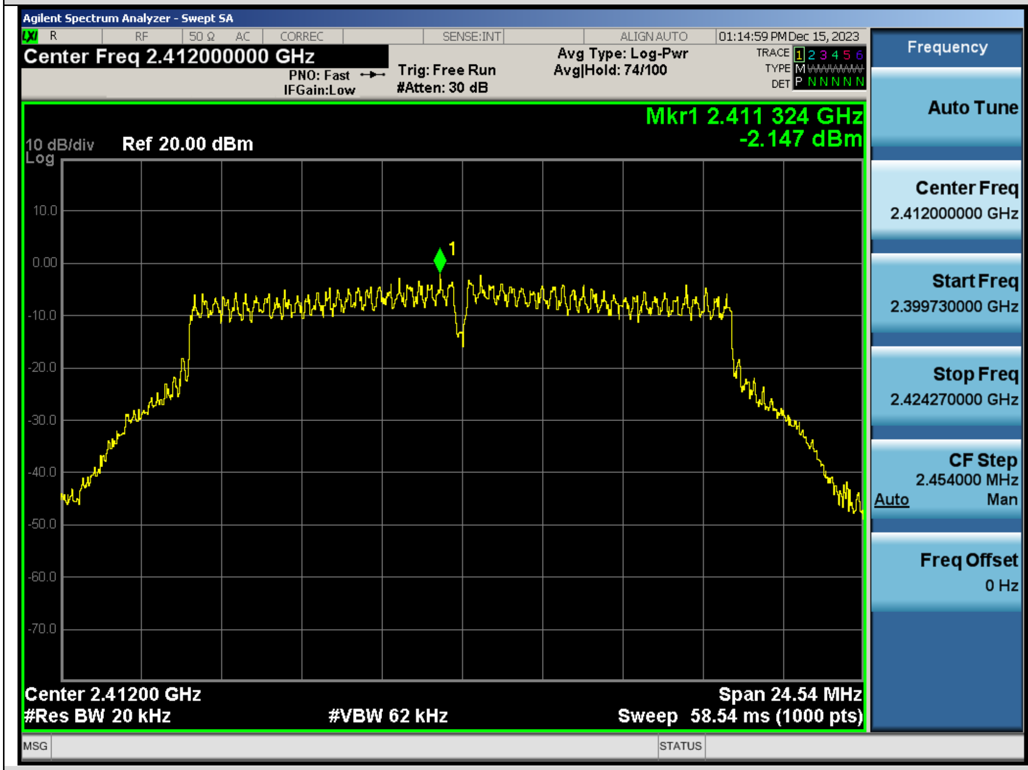


Test_Graph_802.11ax20_ANT1_2462_MCS0_PSD

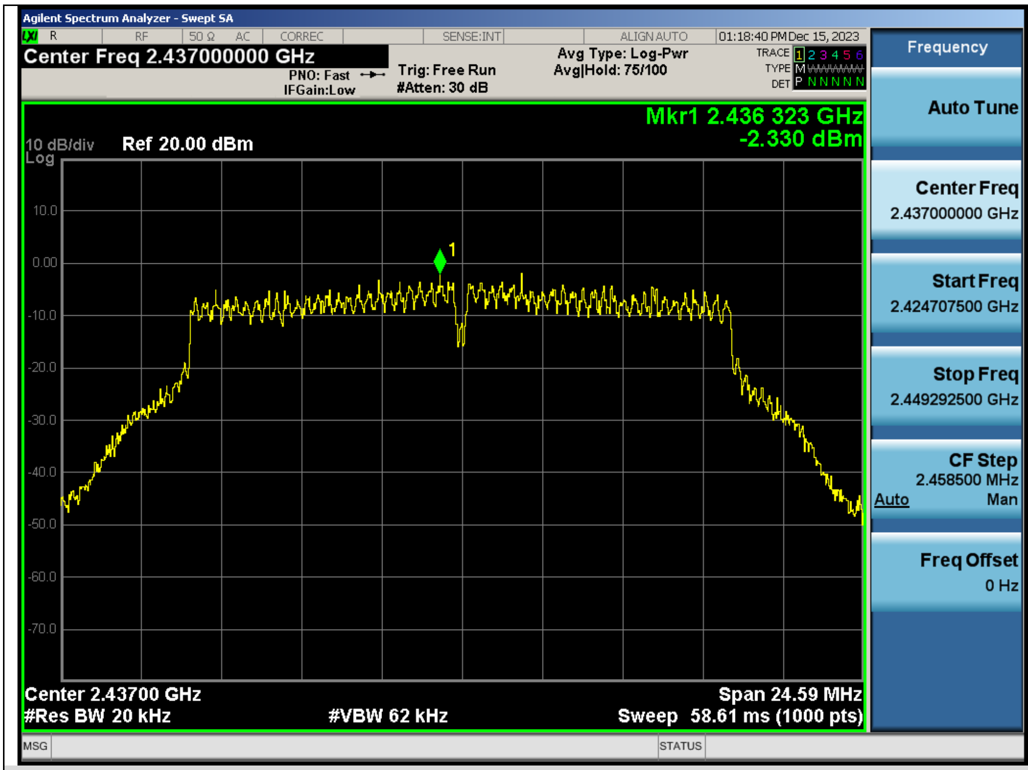
Test_Graph_802.11b_ANT2_2412_1Mbps_PSD

Test_Graph_802.11b_ANT2_2437_1Mbps_PSD

Test_Graph_802.11b_ANT2_2462_1Mbps_PSD



Test_Graph_802.11g_ANT2_2412_6Mbps_PSD



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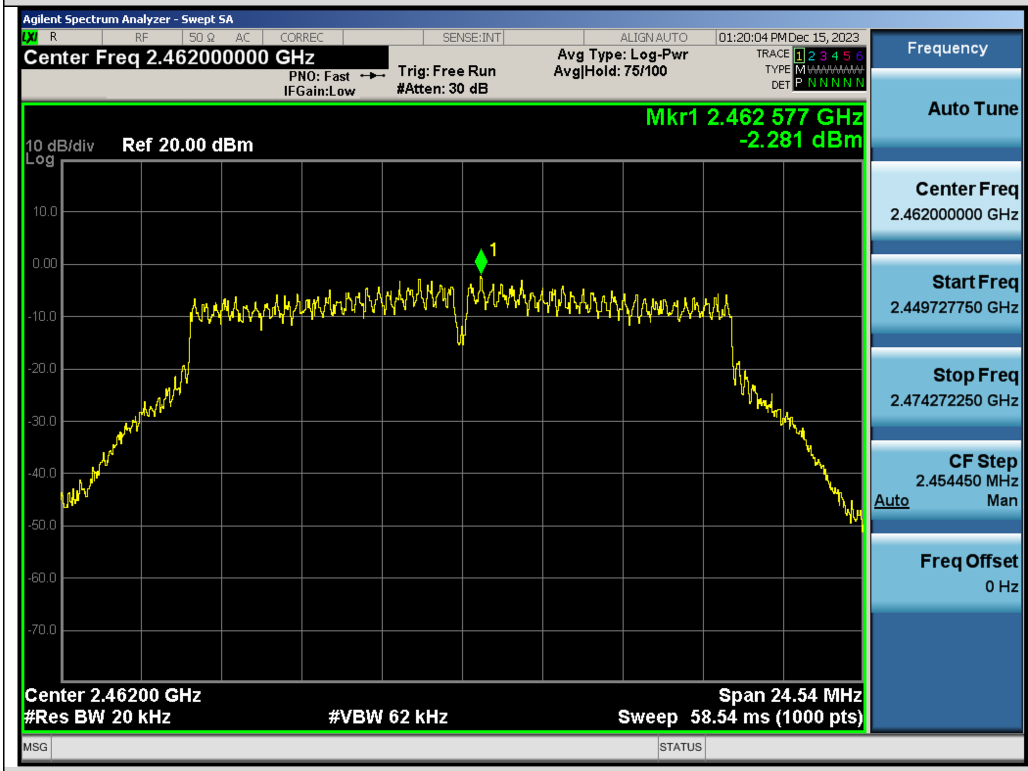

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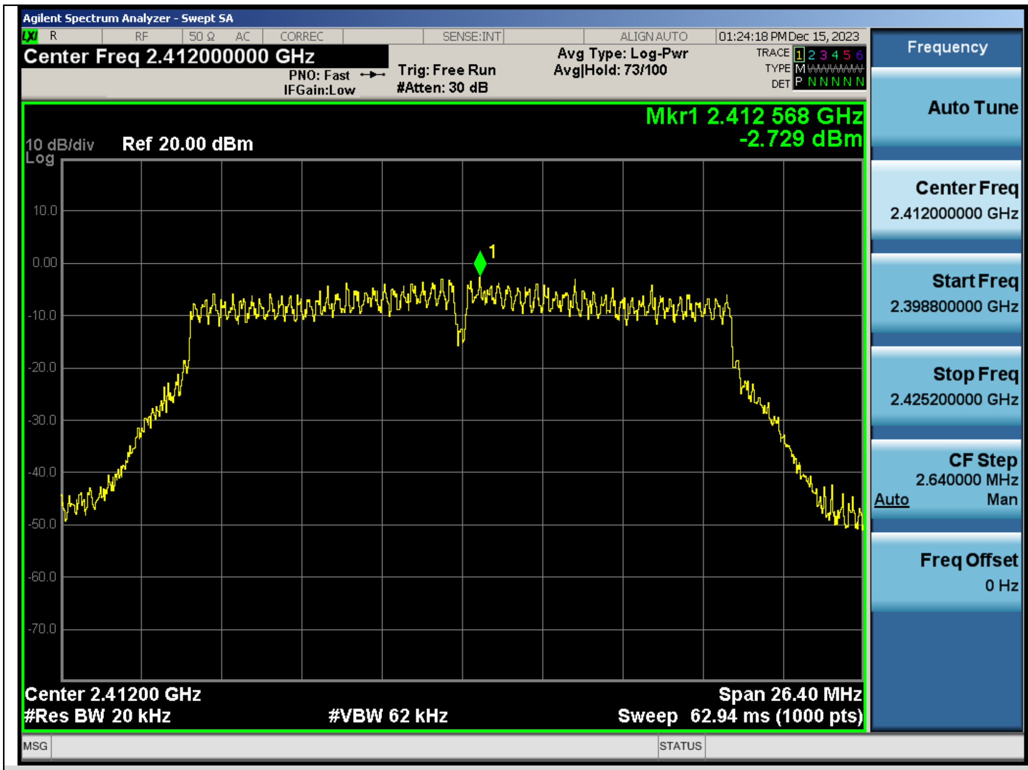

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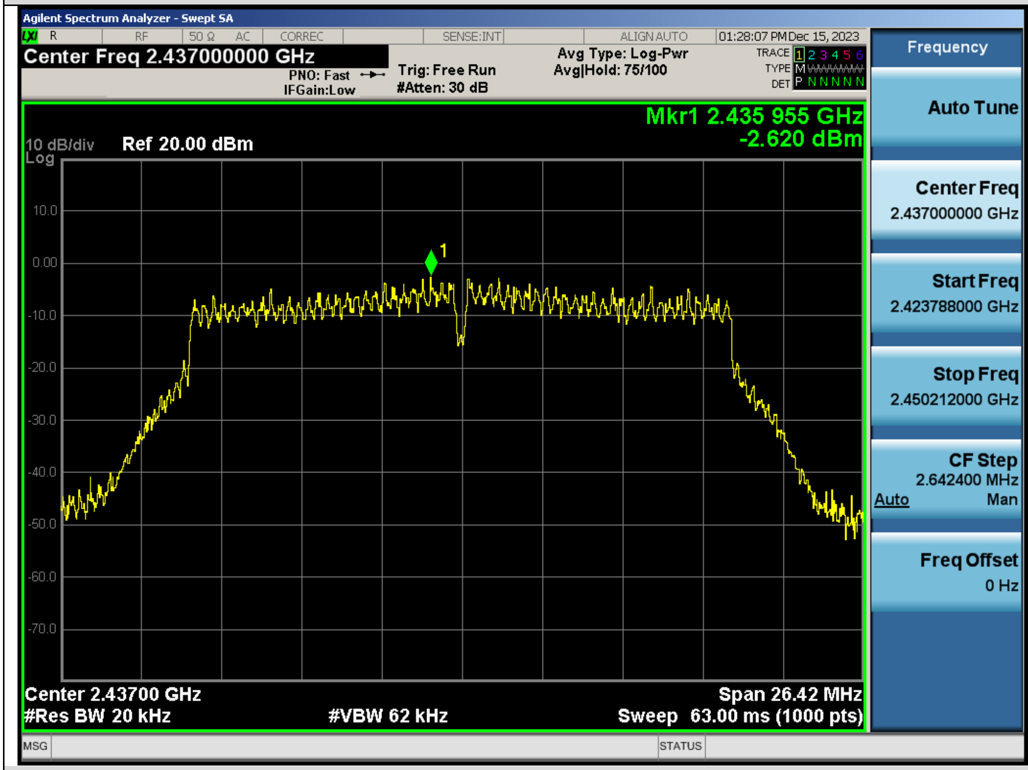

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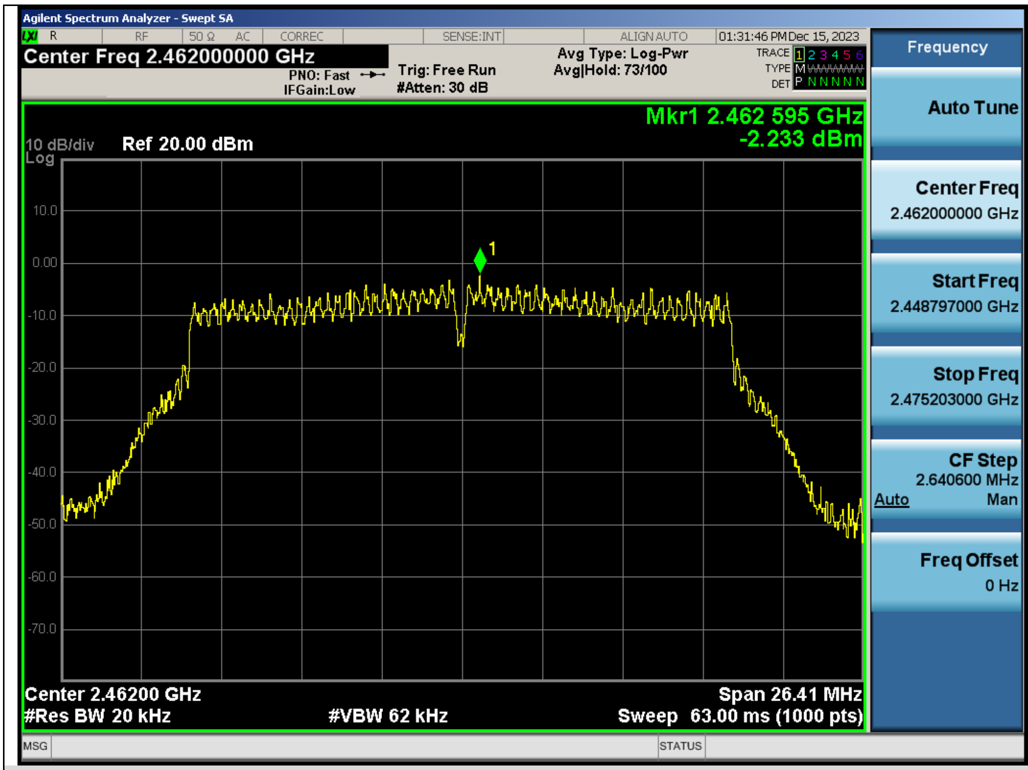

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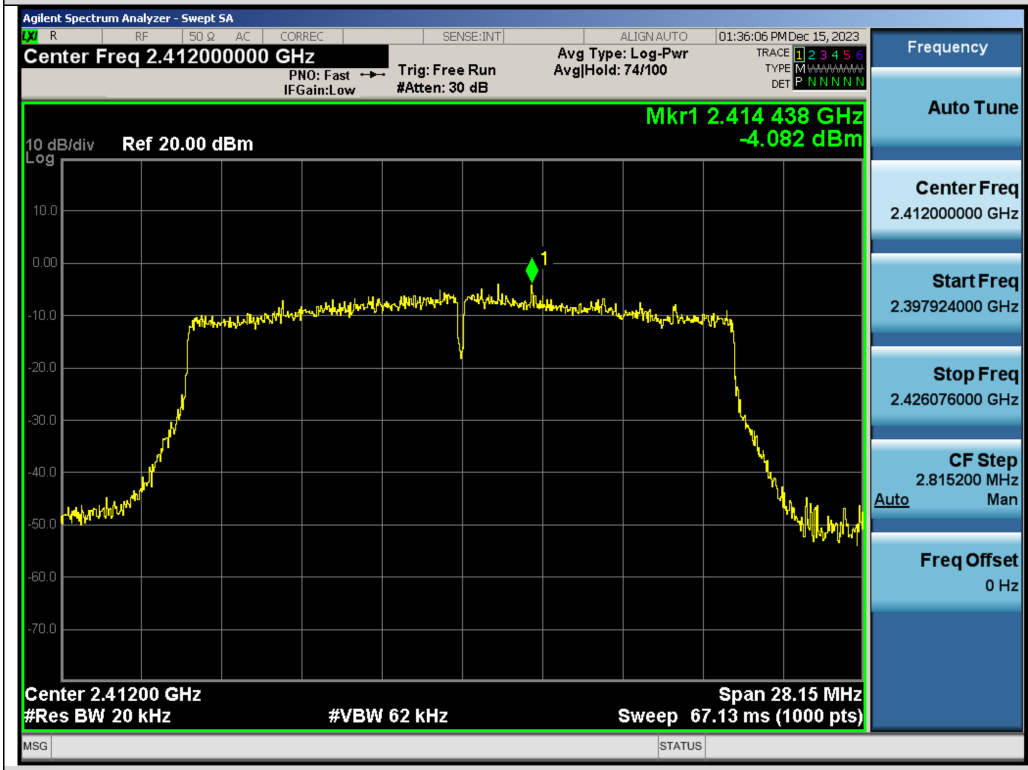
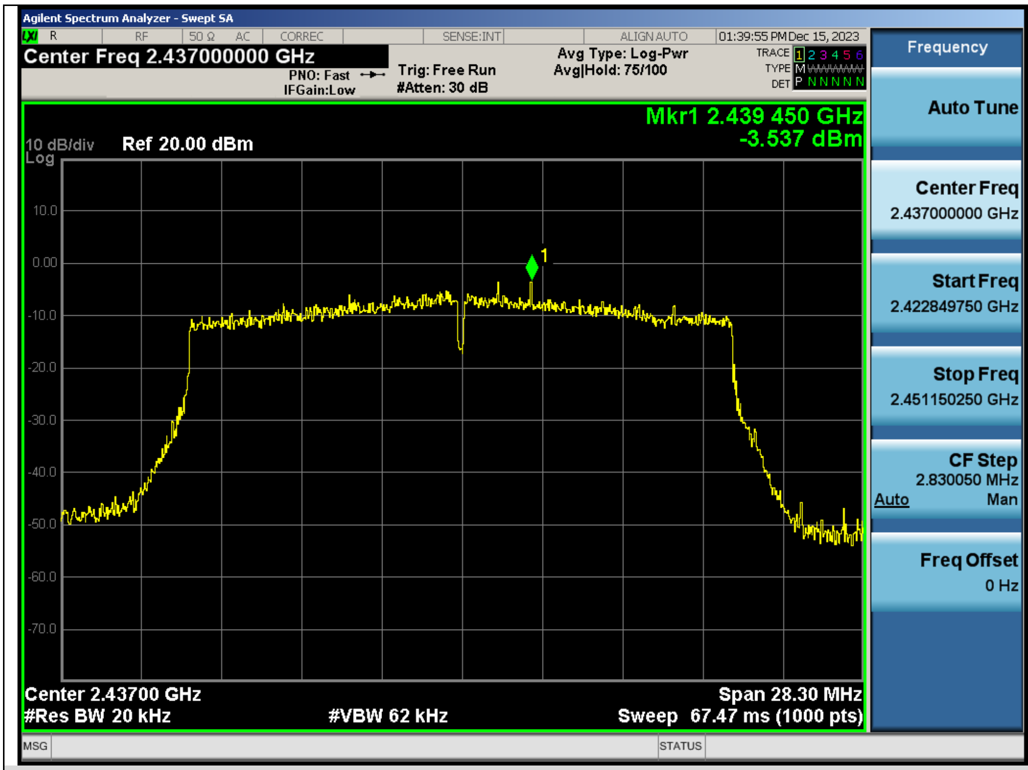
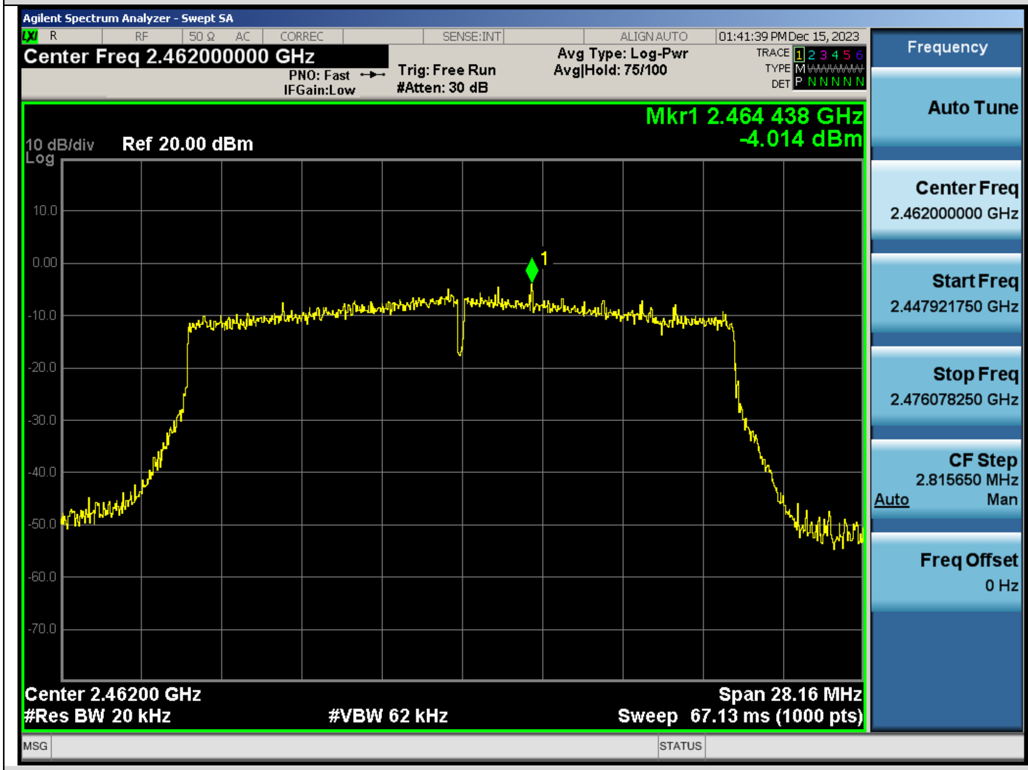


Test_Graph_802.11ax20_ANT2_2412_MCS0_PSD



Test_Graph_802.11ax20_ANT2_2437_MCS0_PSD



Test_Graph_802.11ax20_ANT2_2462_MCS0_PSD

10. Conducted Band Edge and Out-of-Band Emissions

10.1 Provisions Applicable

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

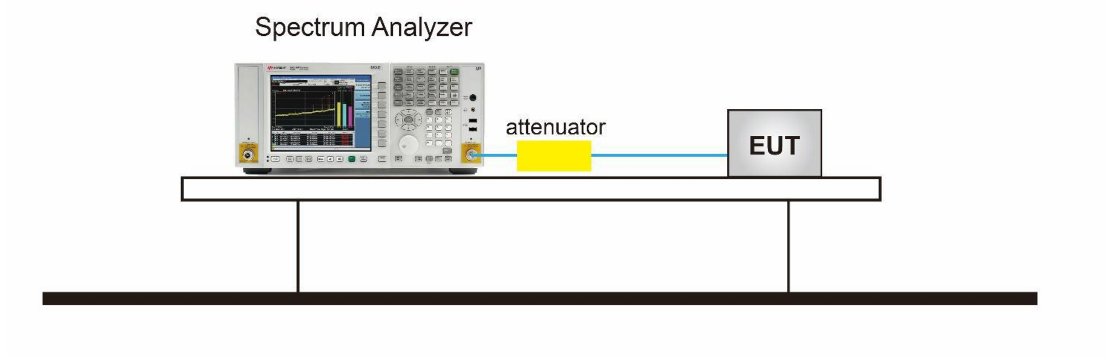
10.2 Measurement Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
Use the following spectrum analyzer settings:

- Step 1: Measurement Procedure In-Band Reference Level
  1. Set instrument center frequency to DTS channel center frequency.
  2. Set the span to ≥ 1.5 times the DTS bandwidth.
  3. Set the RBW = 100 kHz.
  4. Set the VBW ≥ 3 x RBW.
  5. Detector = peak.
  6. Sweep time = auto couple.
  7. Trace mode = max hold.
  8. Allow trace to fully stabilize.
  9. Use the peak marker function to determine the maximum PSD level.
  10. Note that the channel found to contain the maximum PSD level can be used to establish the reference level.
- Step 2: Measurement Procedure Out of Band Emission
  1. Set RBW = 100 kHz.
  2. Set VBW ≥ 300 kHz.
  3. Detector = peak.
  4. Sweep = auto couple.
  5. Trace Mode = max hold.
  6. Allow trace to fully stabilize.
  7. Use the peak marker function to determine the maximum amplitude level.

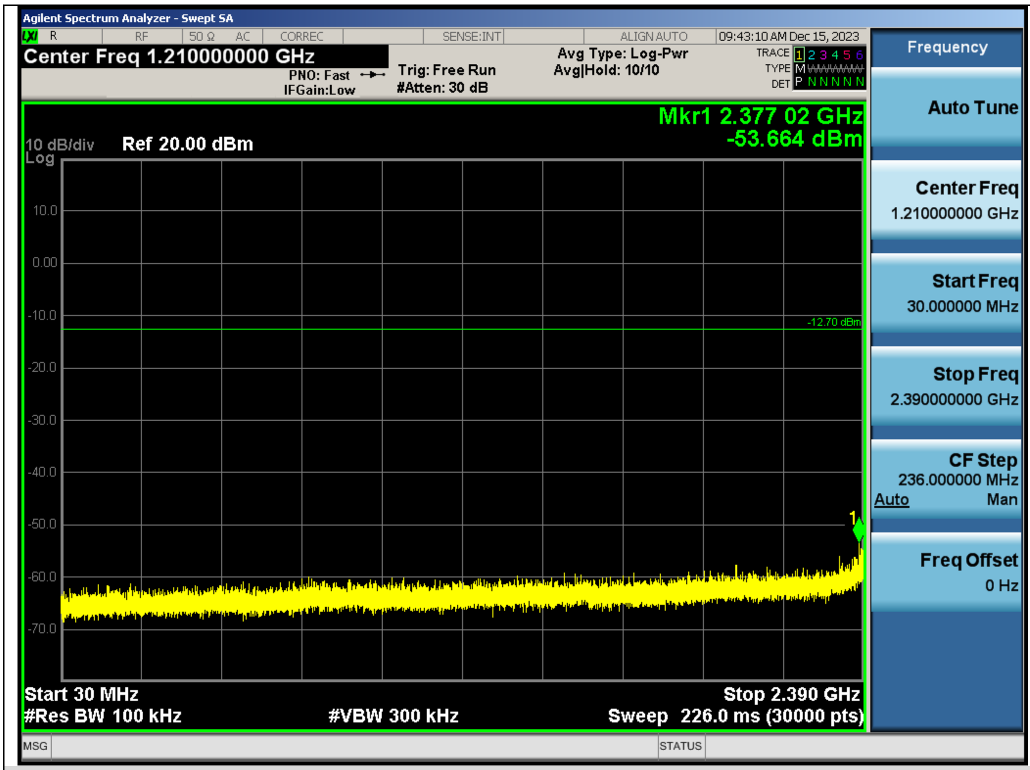
Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

10.3 Measurement Setup (Block Diagram of Configuration)

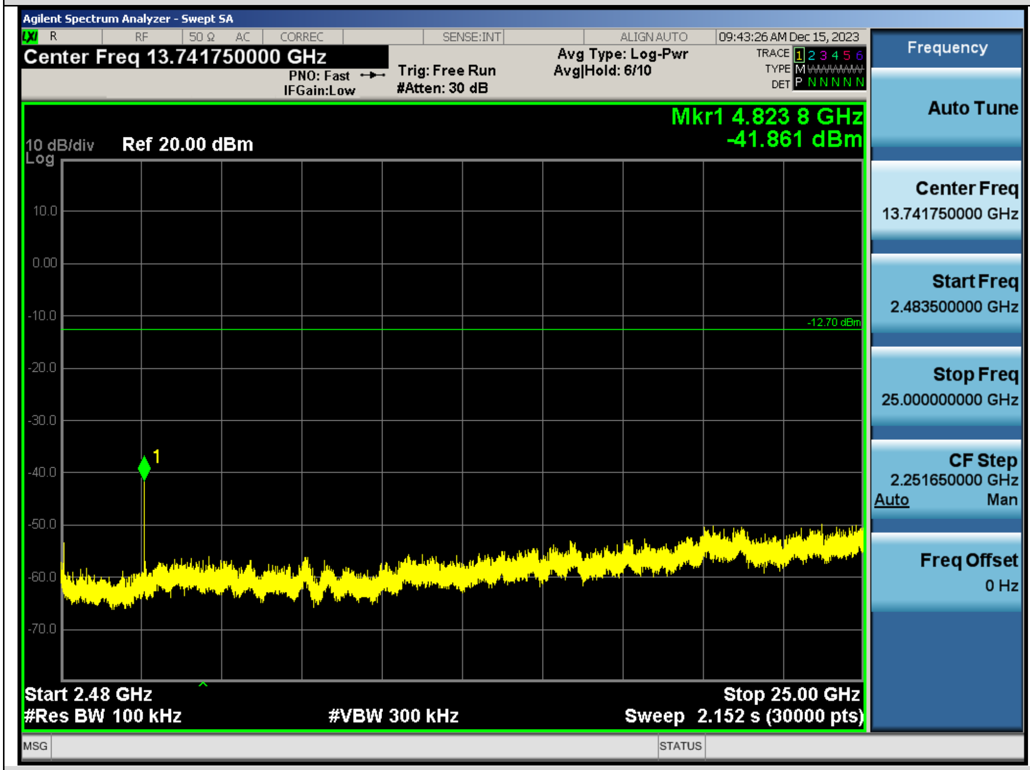


10.4 Measurement Result

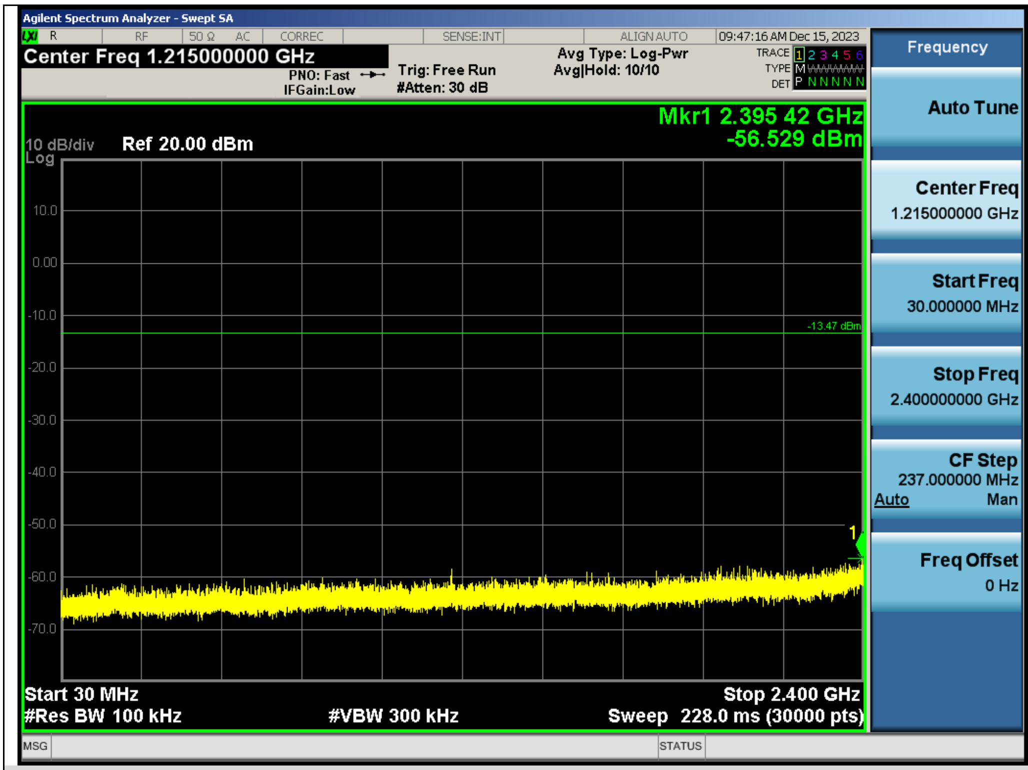
Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



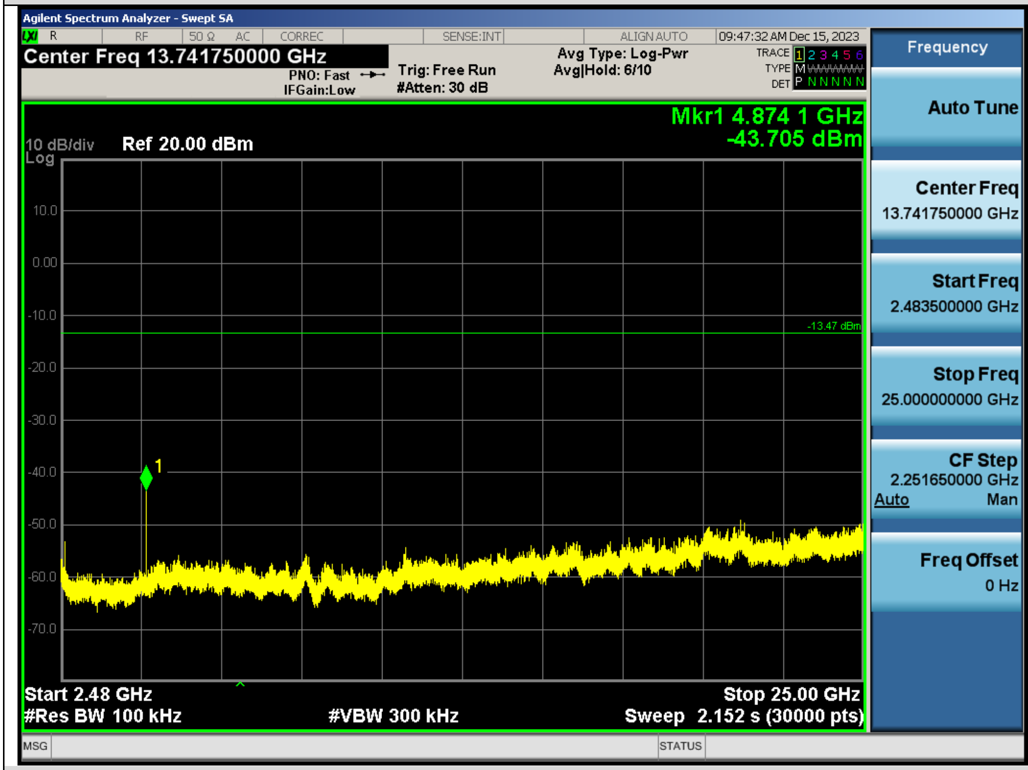
Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Emissions



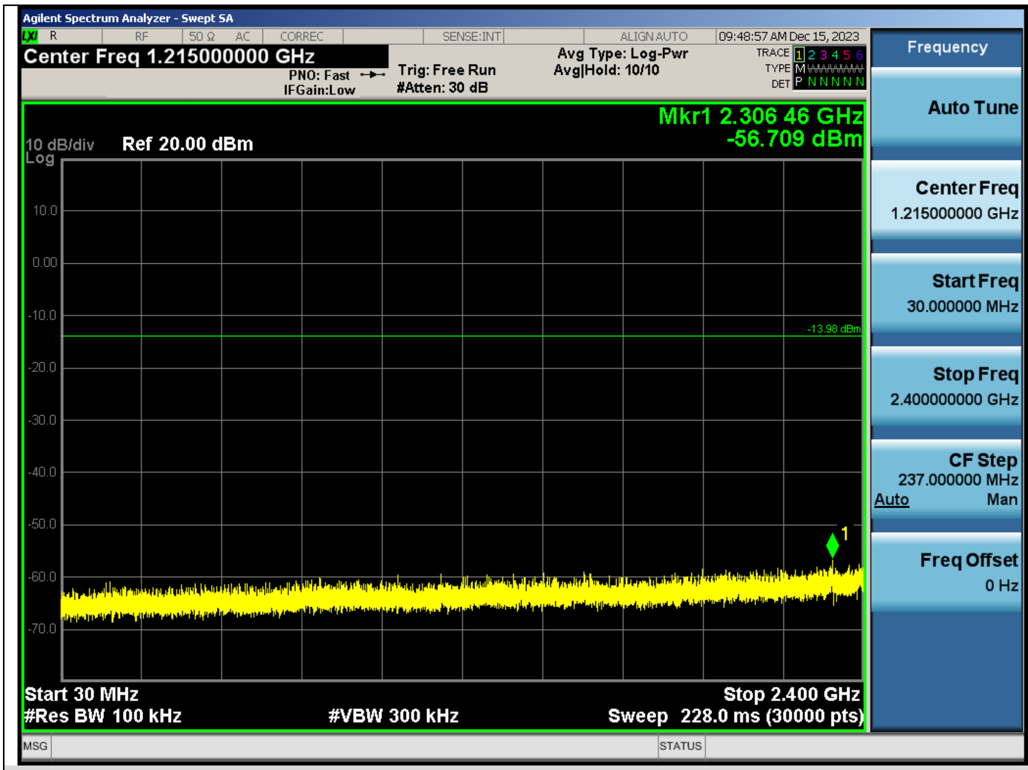
Test_Graph_802.11b_ANT1_2412_1Mbps_Higher Band Emissions



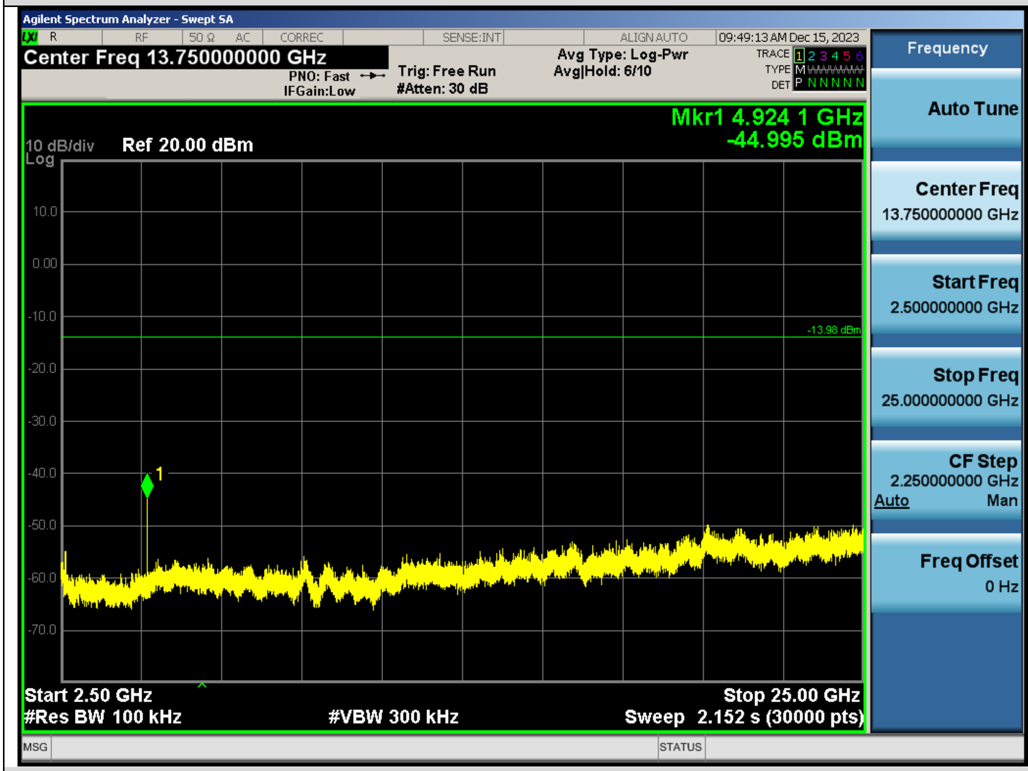
Test_Graph_802.11b_ANT1_2437_1Mbps_Lower Band Emissions



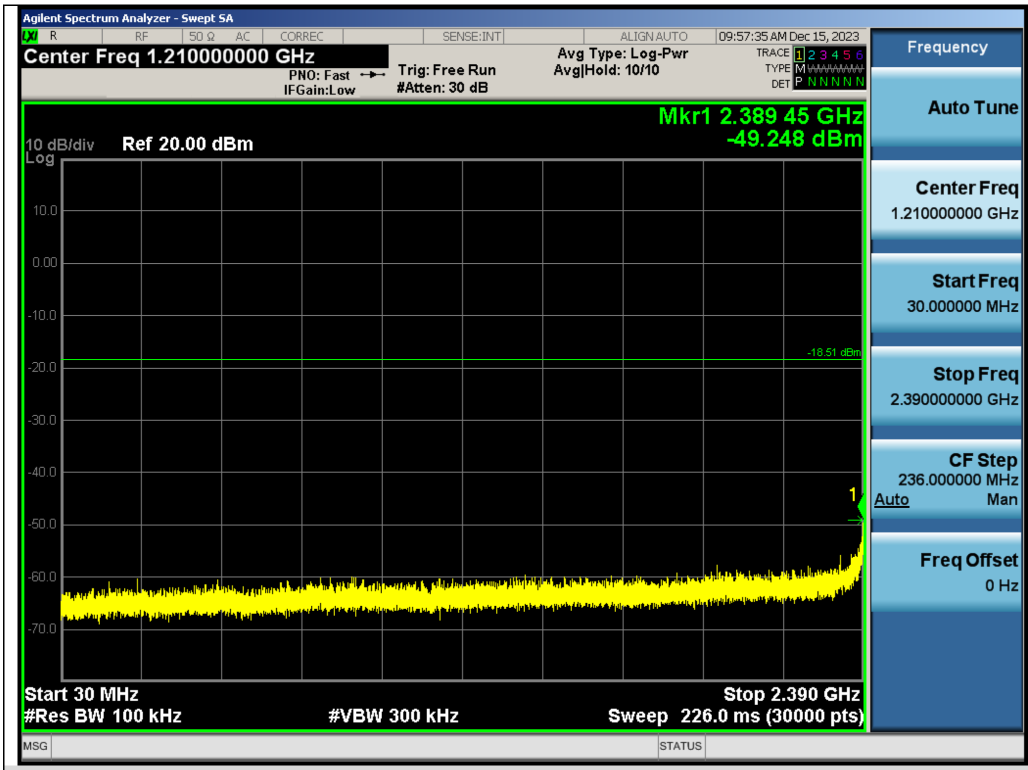
Test_Graph_802.11b_ANT1_2437_1Mbps_Higher Band Emissions



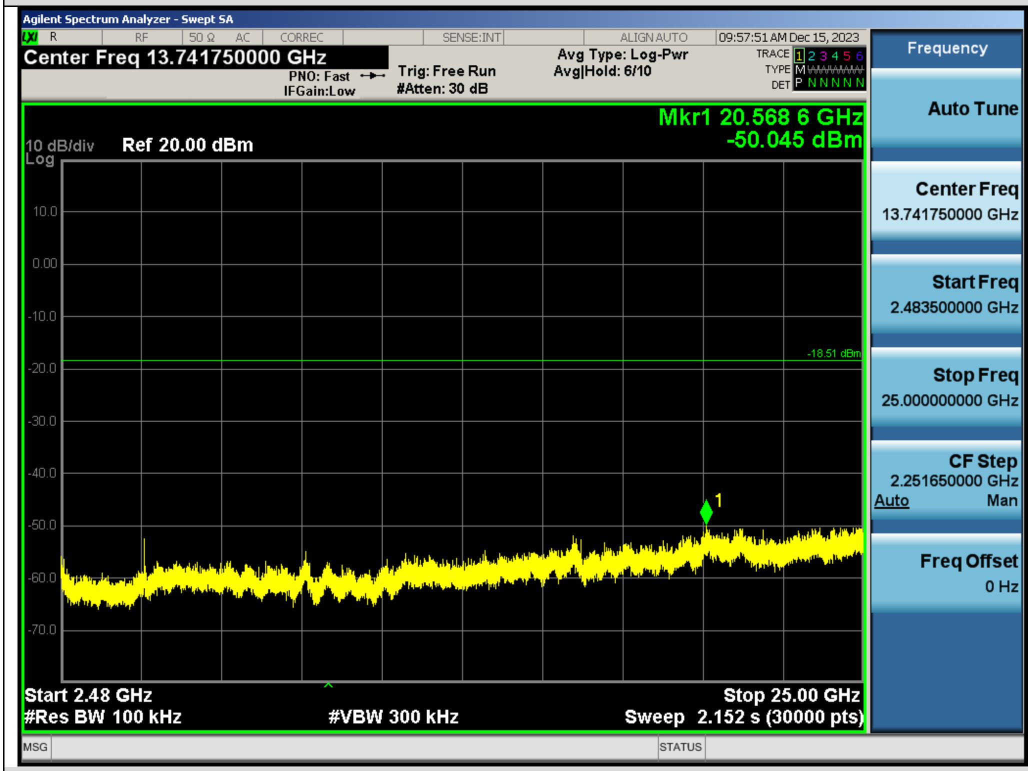
Test_Graph_802.11b_ANT1_2462_1Mbps_Lower Band Emissions



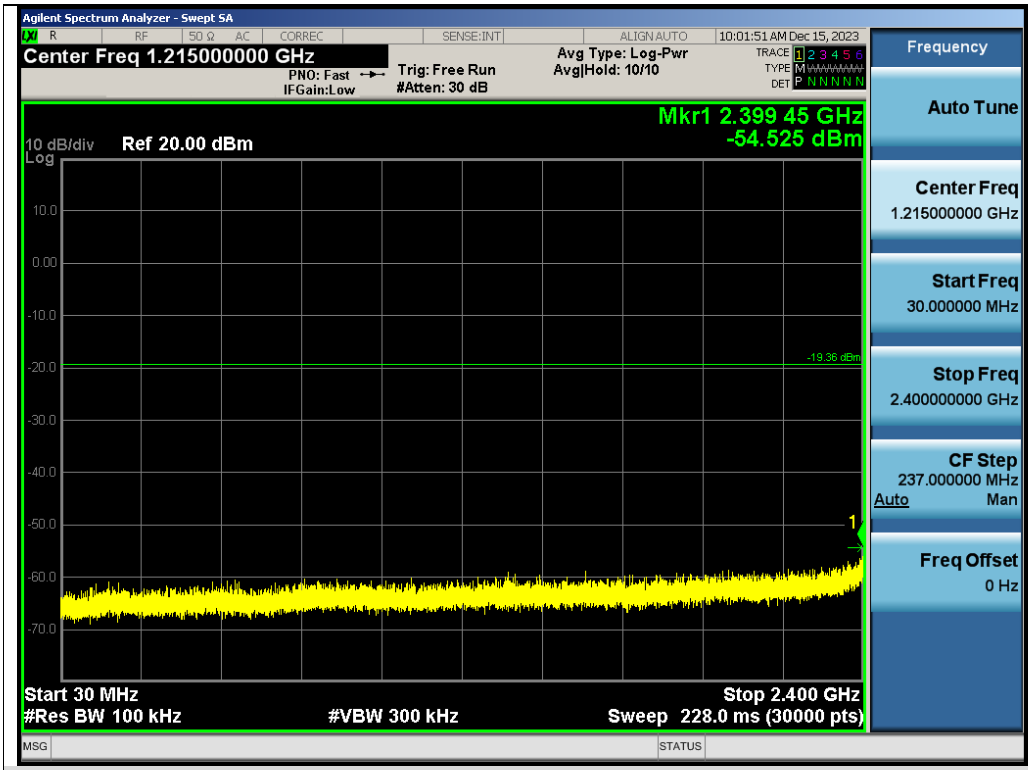
Test_Graph_802.11b_ANT1_2462_1Mbps_Higher Band Emissions



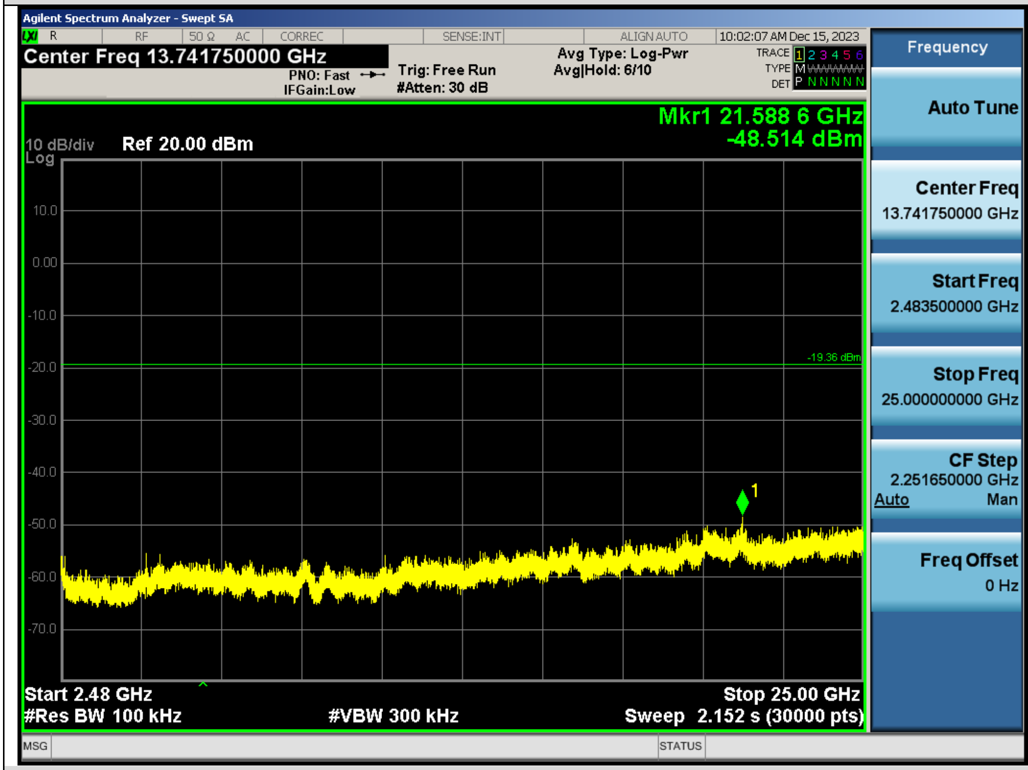
Test_Graph_802.11g_ANT1_2412_6Mbps_Lower Band Emissions



Test_Graph_802.11g_ANT1_2412_6Mbps_Higher Band Emissions



Test_Graph_802.11g_ANT1_2437_6Mbps_Lower Band Emissions



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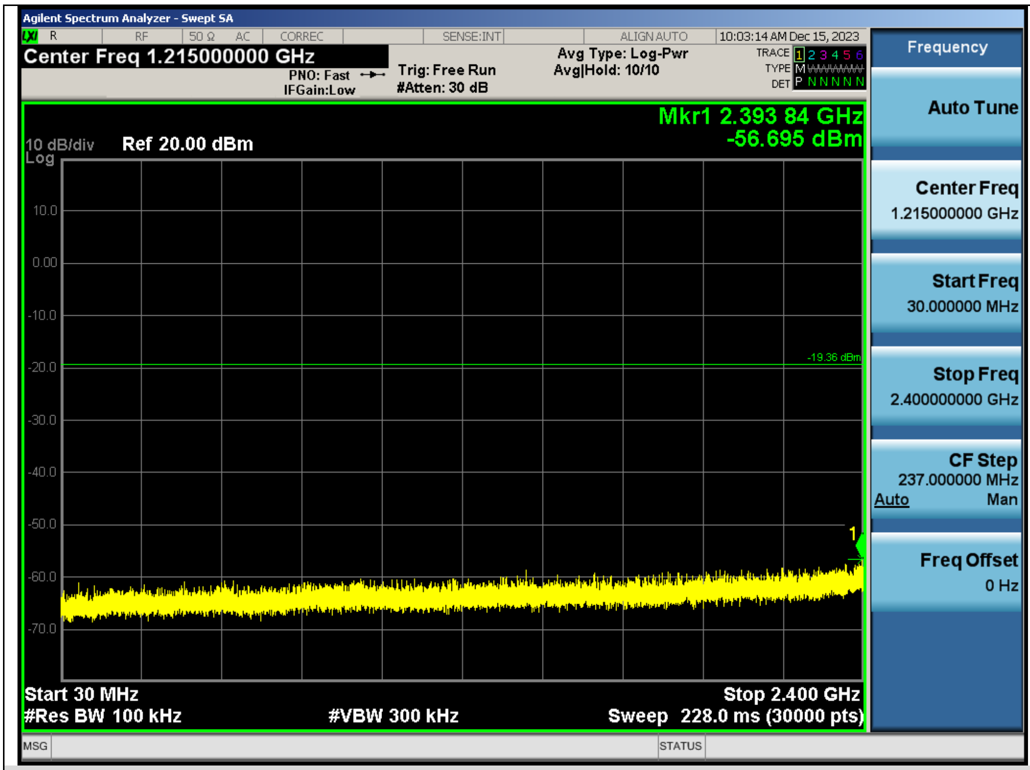

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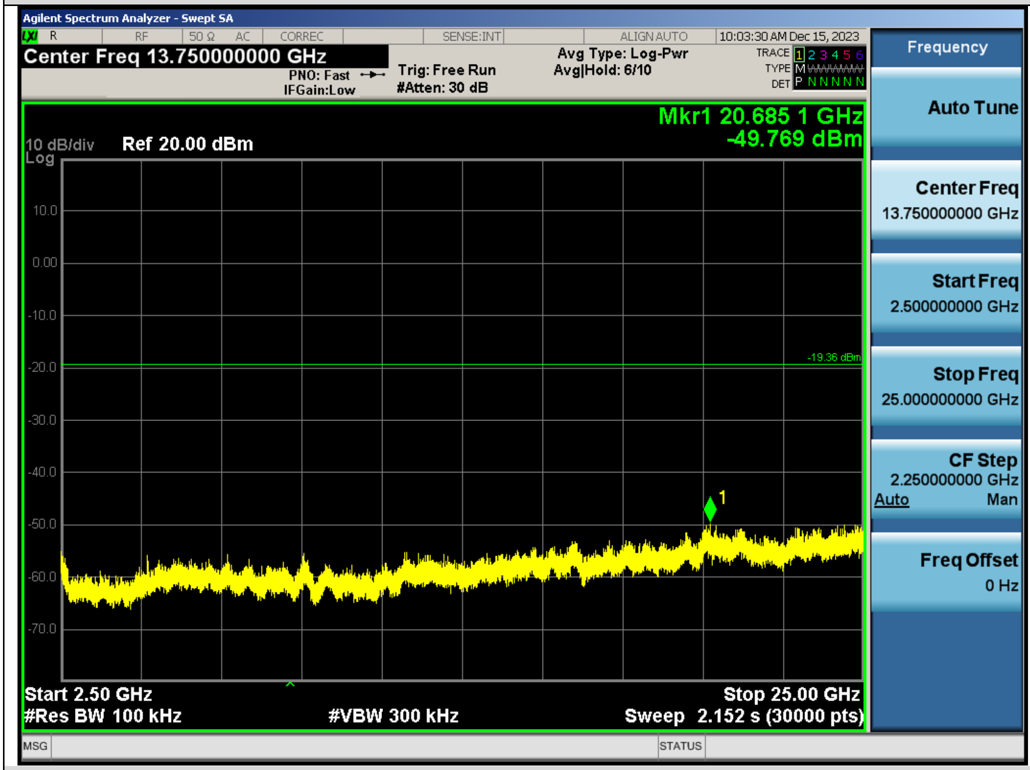
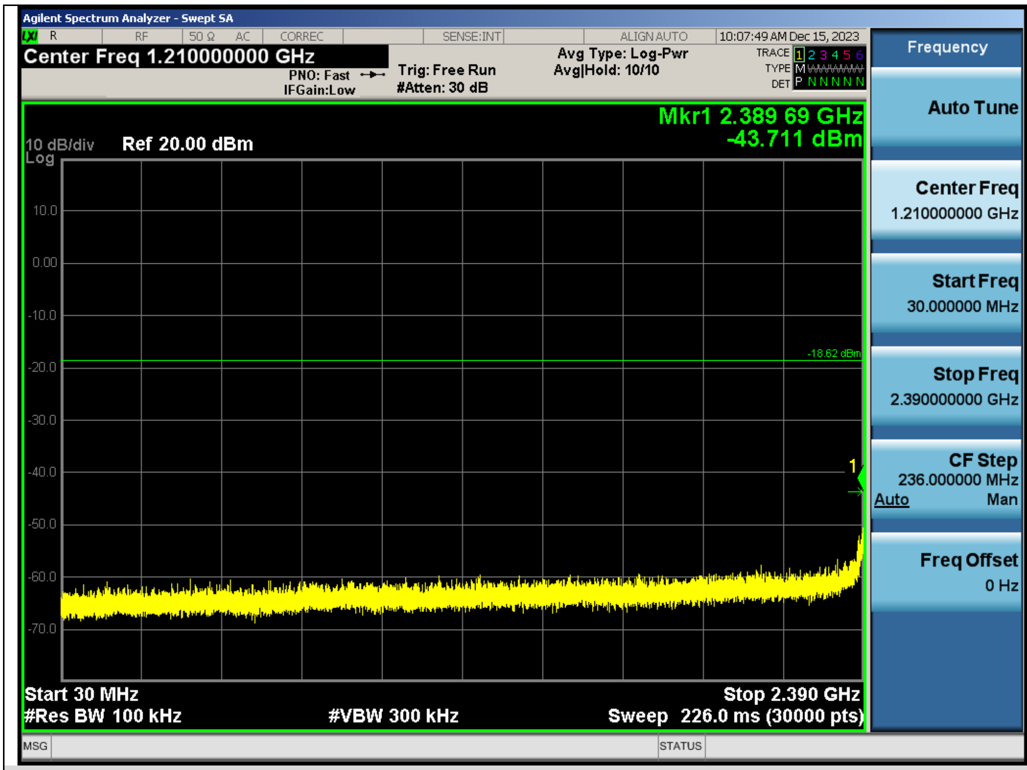
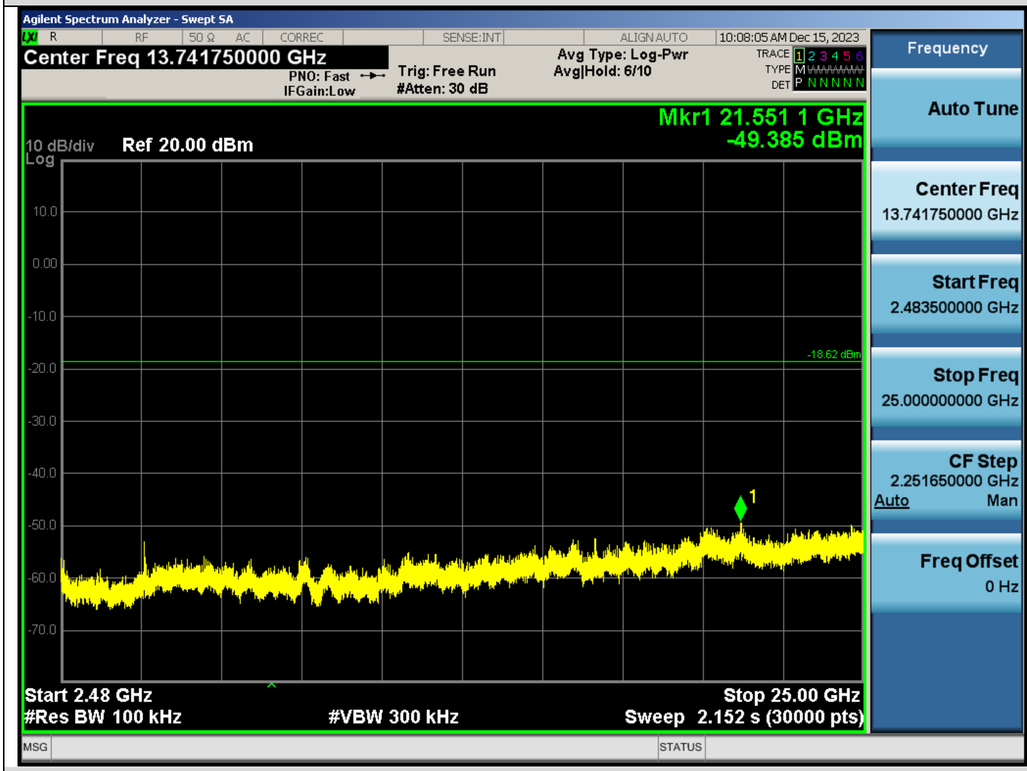


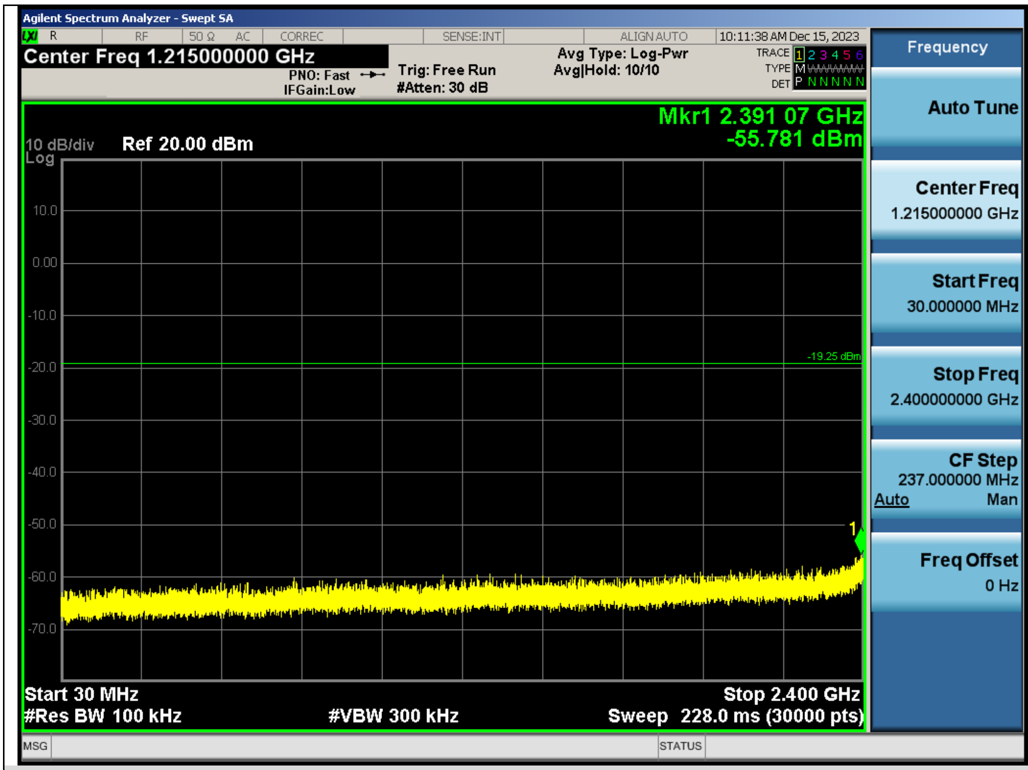
Test_Graph_802.11g_ANT1_2462_6Mbps_Higher Band Emissions



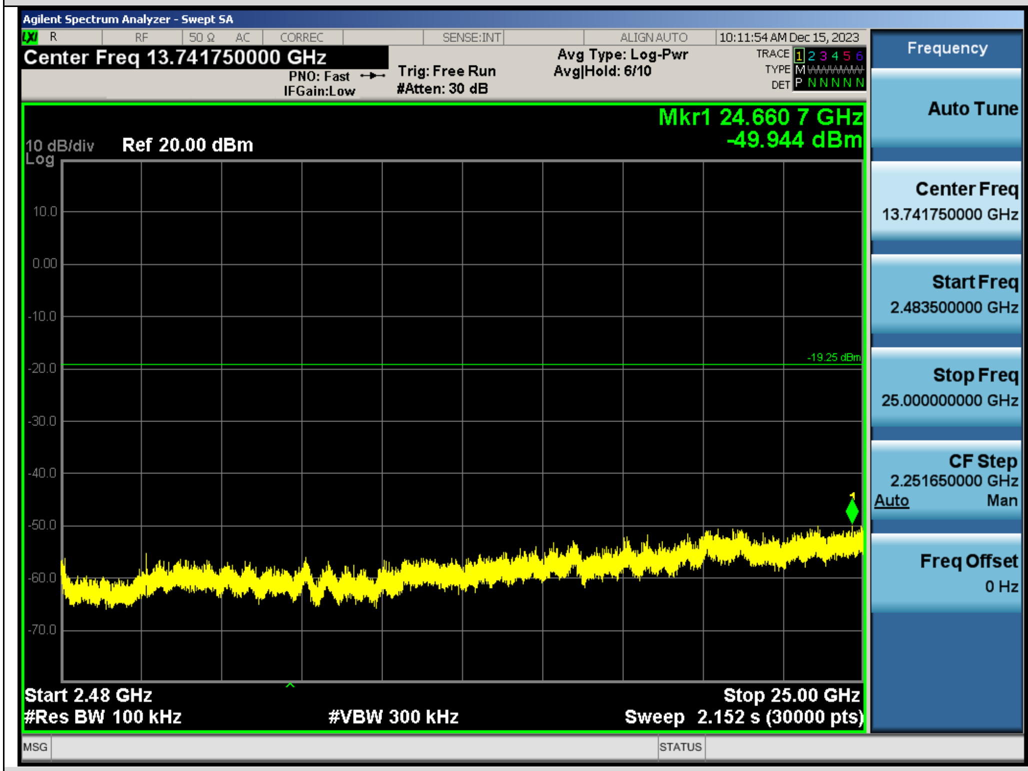
Test_Graph_802.11n20_ANT1_2412_MCS0_Lower Band Emissions



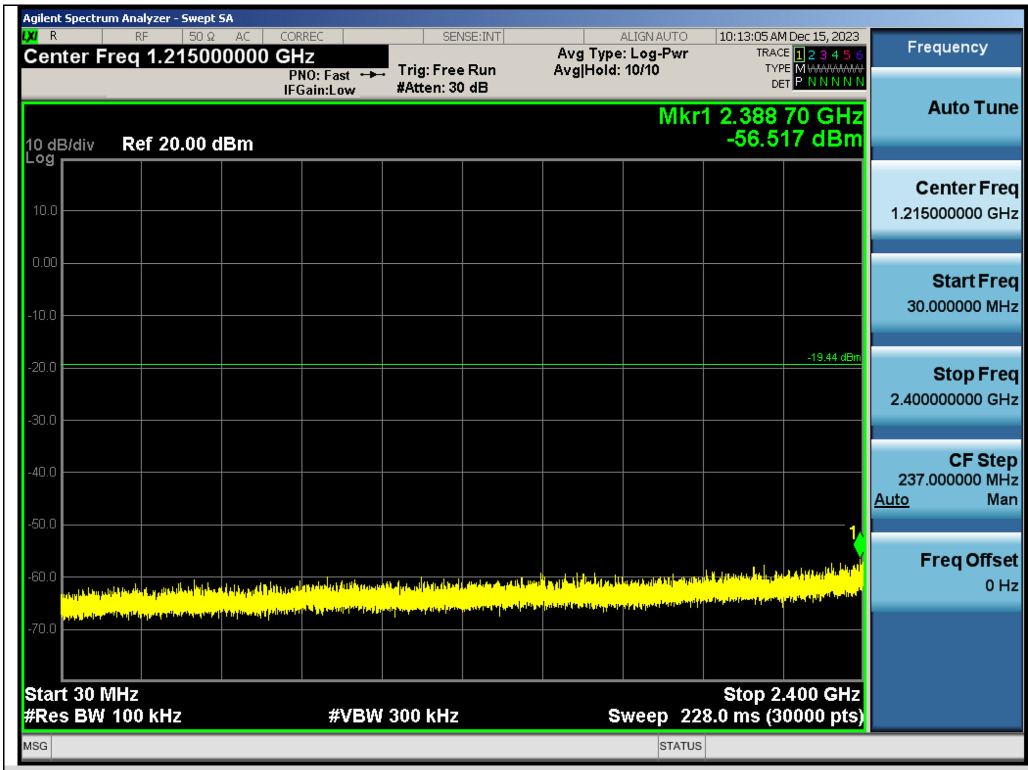
Test_Graph_802.11n20_ANT1_2412_MCS0_Higher Band Emissions



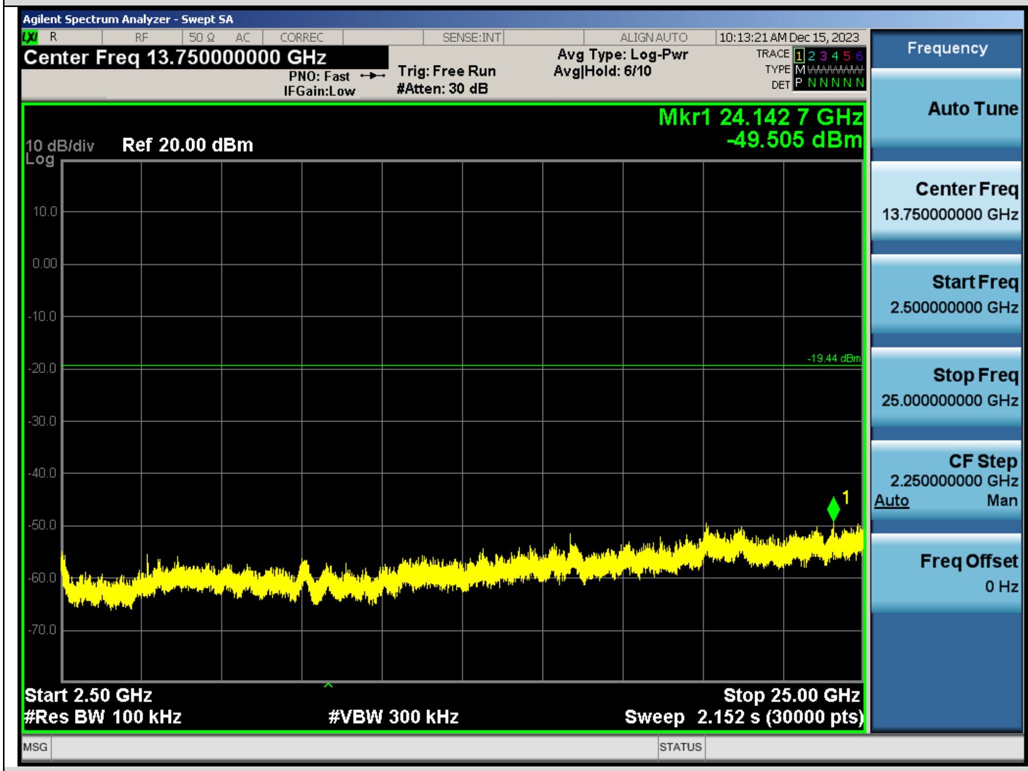
Test_Graph_802.11n20_ANT1_2437_MCS0_Lower Band Emissions



Test_Graph_802.11n20_ANT1_2437_MCS0_Higher Band Emissions



Test_Graph_802.11n20_ANT1_2462_MCS0_Lower Band Emissions



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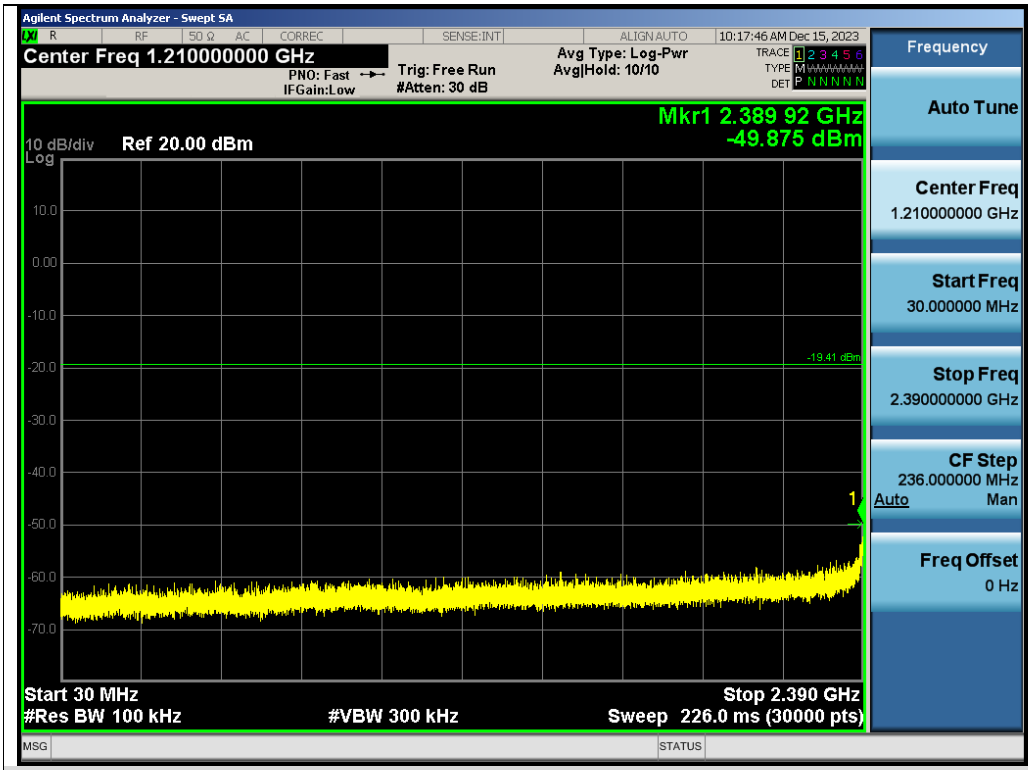
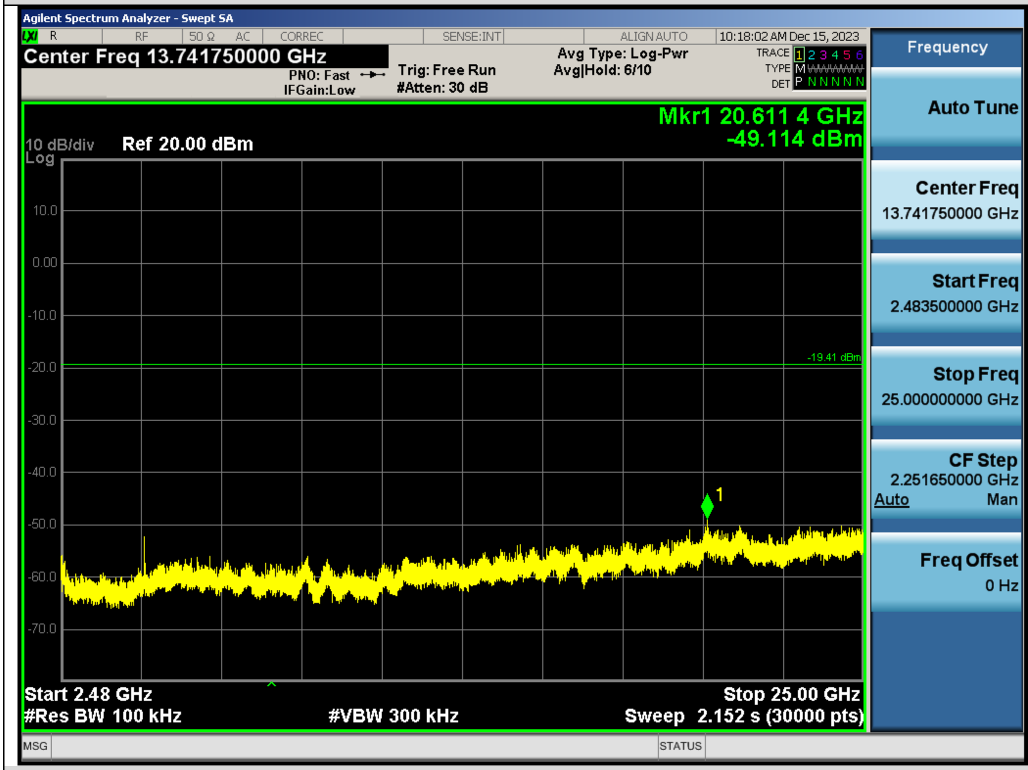


Test_Graph_802.11ax20_ANT1_2412_MCS0_Lower Band Emissions



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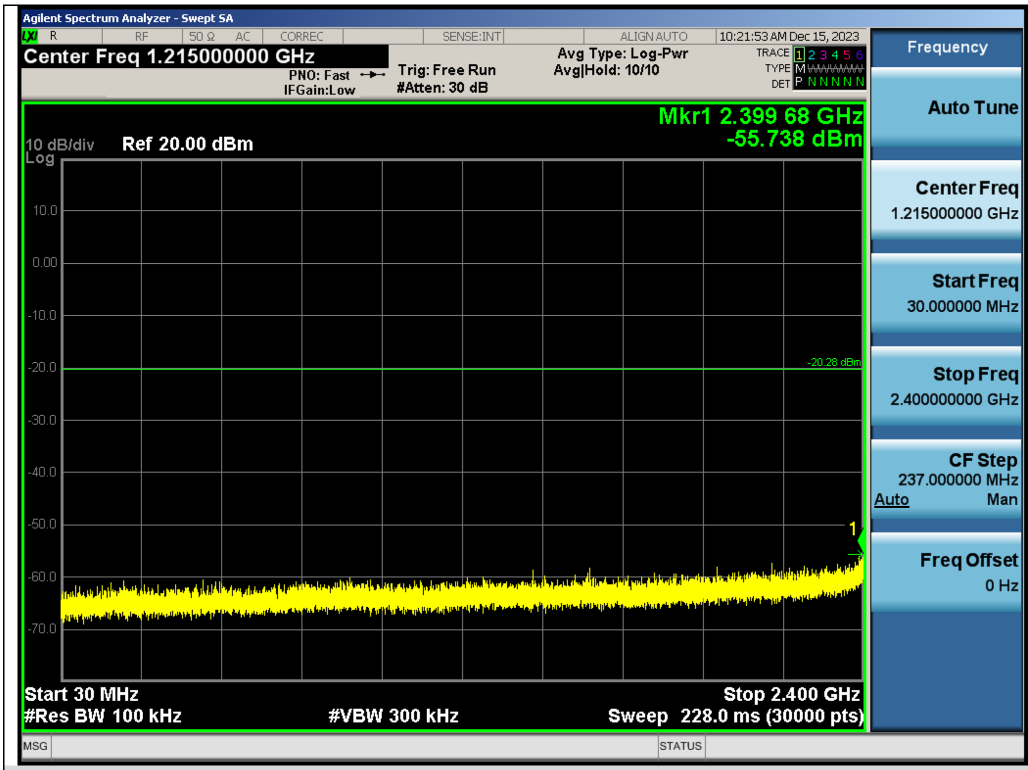

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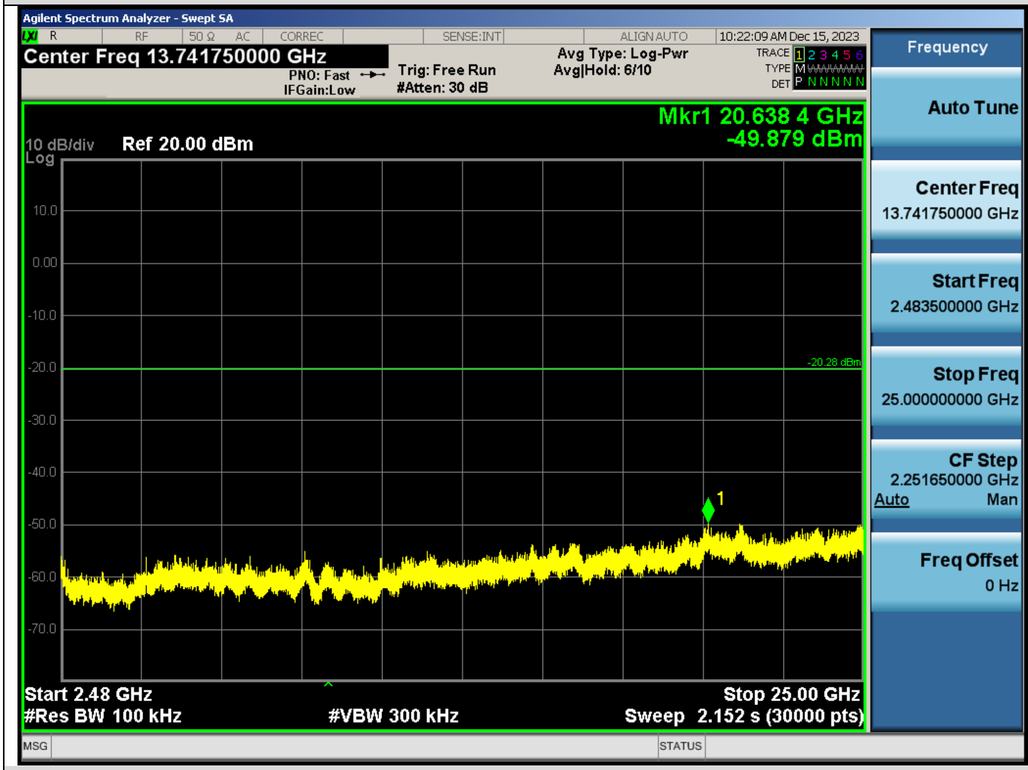

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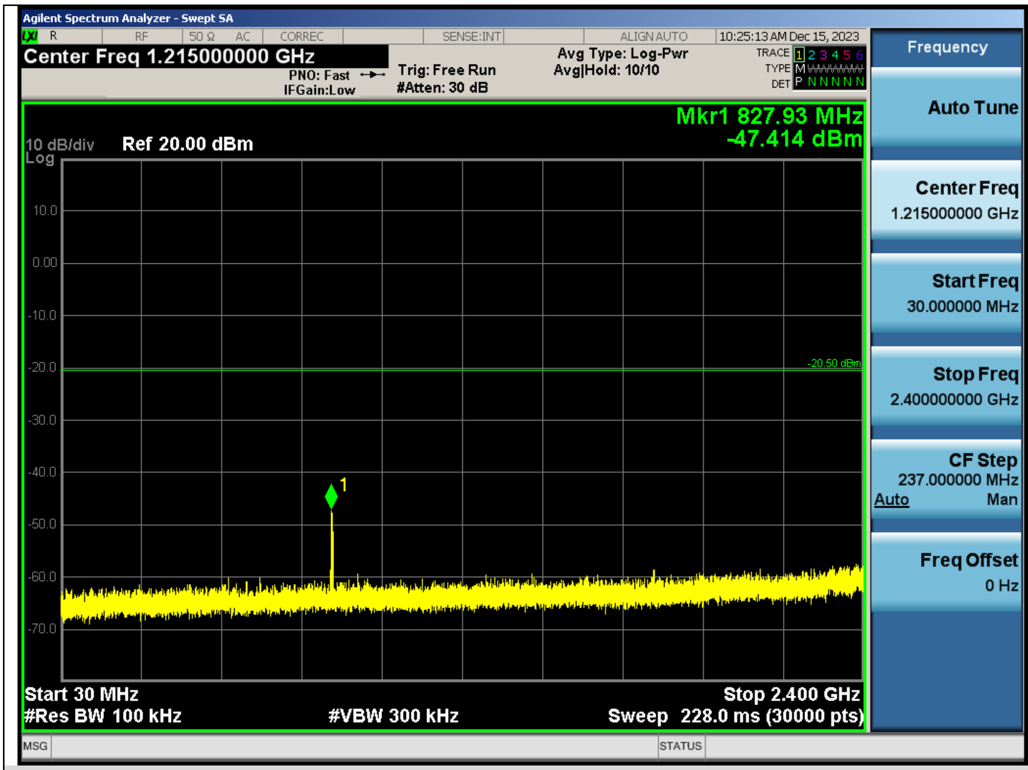

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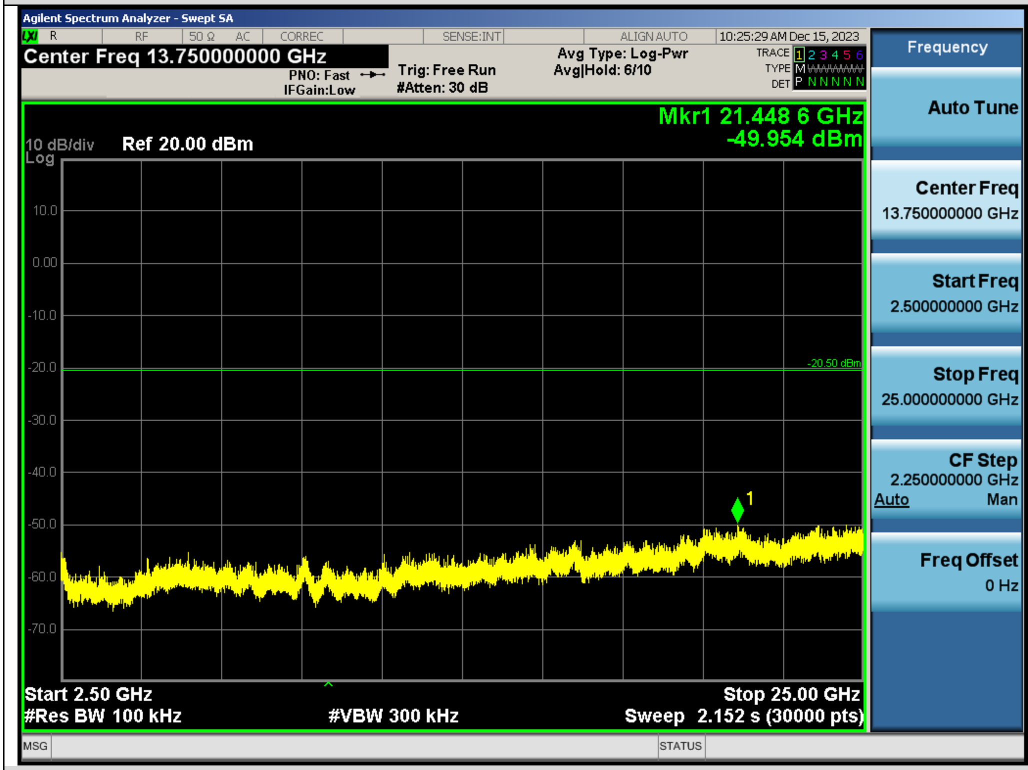

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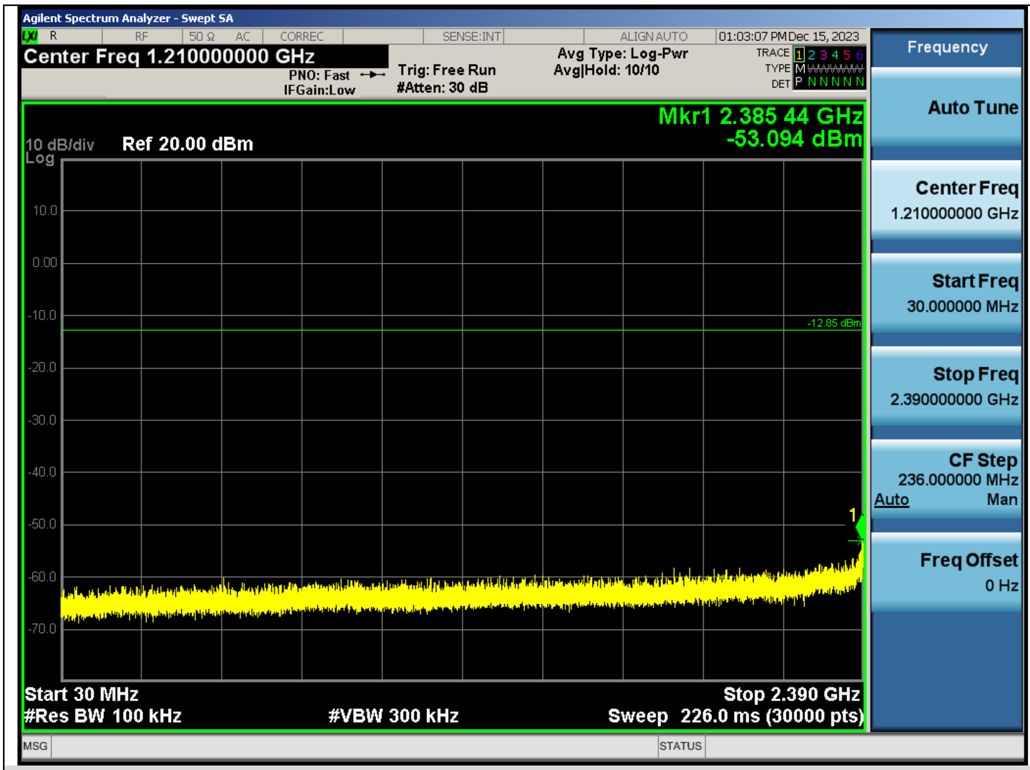
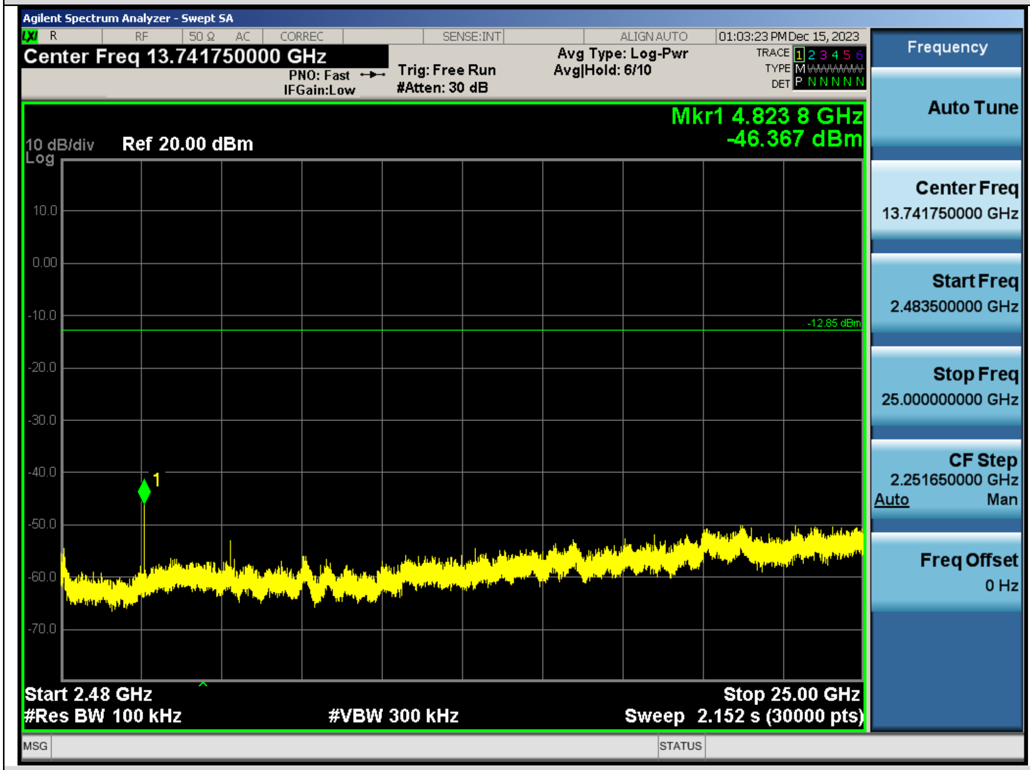
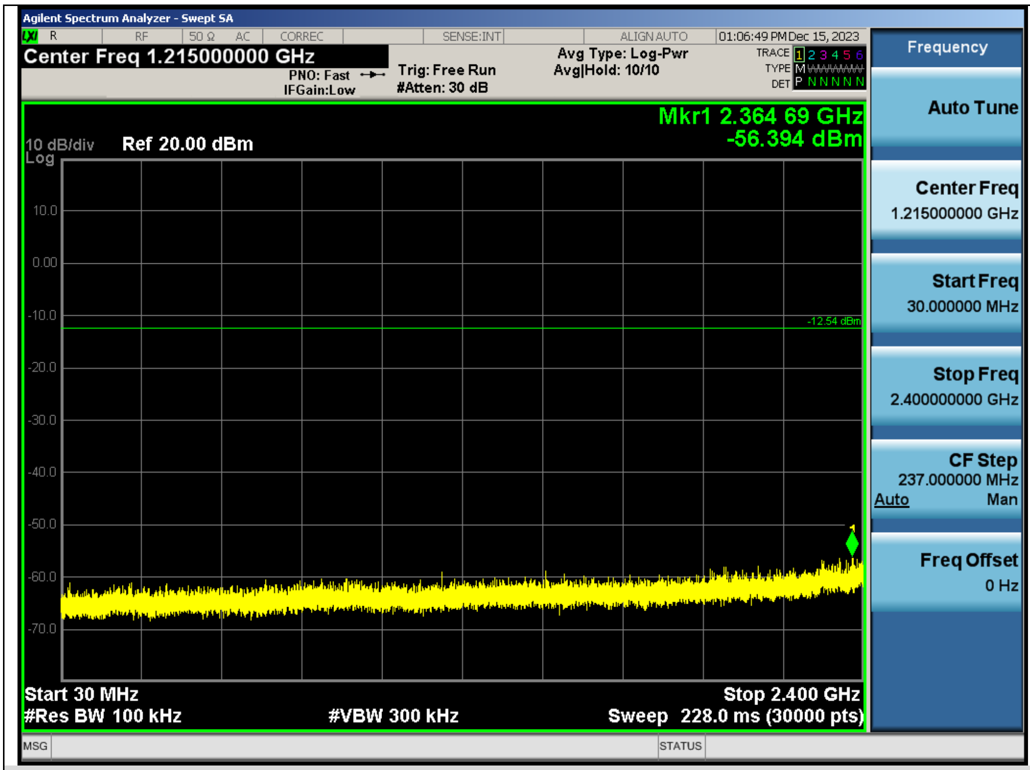


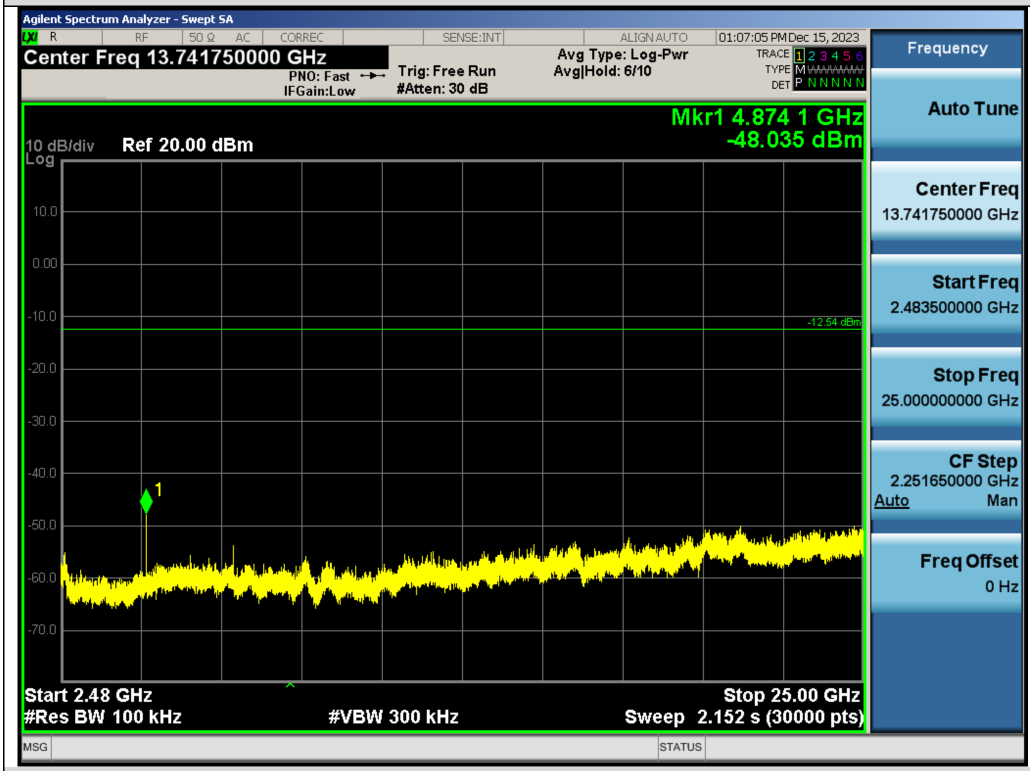
Test_Graph_802.11b_ANT2_2412_1Mbps_Lower Band Emissions



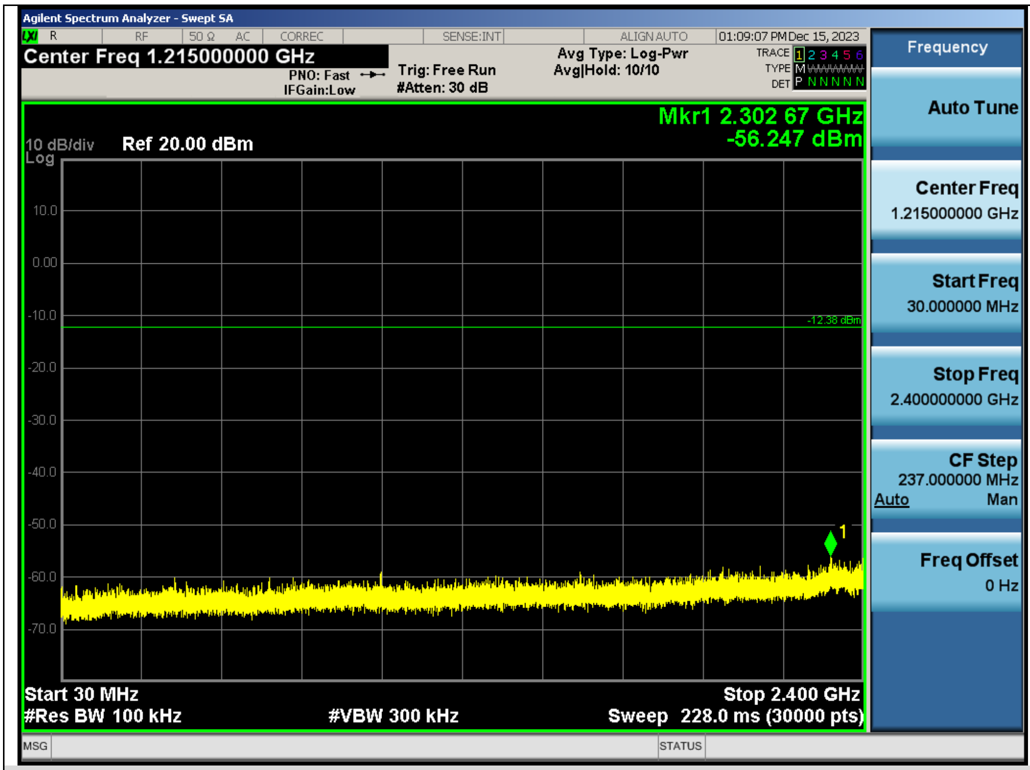
Test_Graph_802.11b_ANT2_2412_1Mbps_Higher Band Emissions



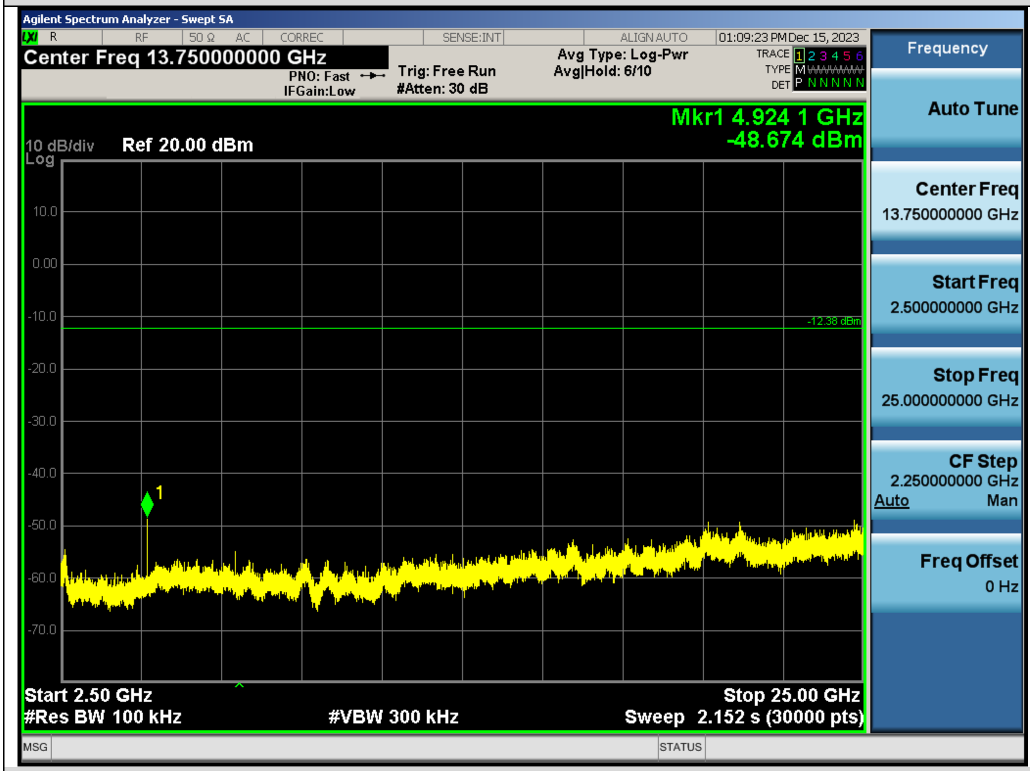
Test_Graph_802.11b_ANT2_2437_1Mbps_Lower Band Emissions



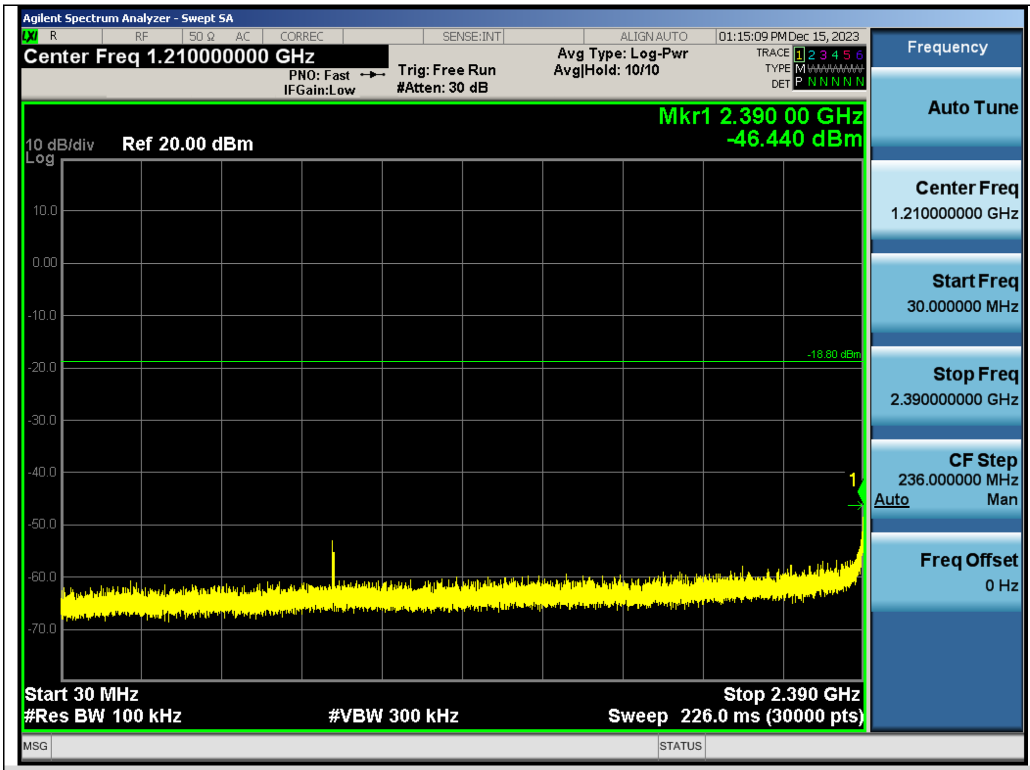
Test_Graph_802.11b_ANT2_2437_1Mbps_Higher Band Emissions



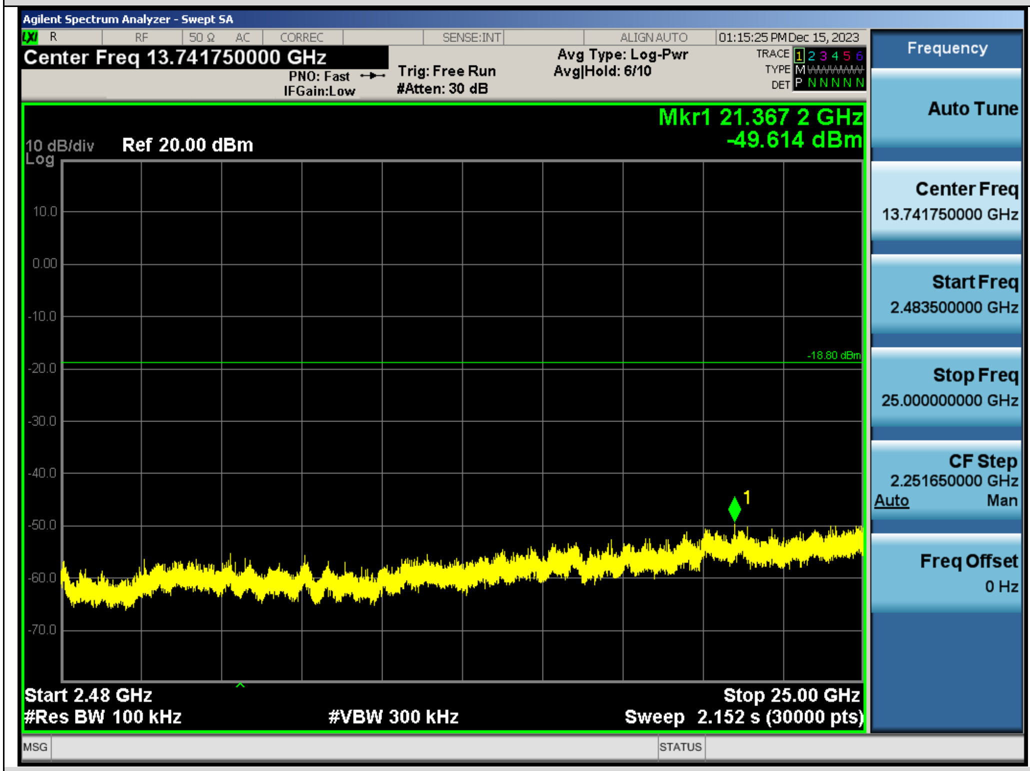
Test_Graph_802.11b_ANT2_2462_1Mbps_Lower Band Emissions



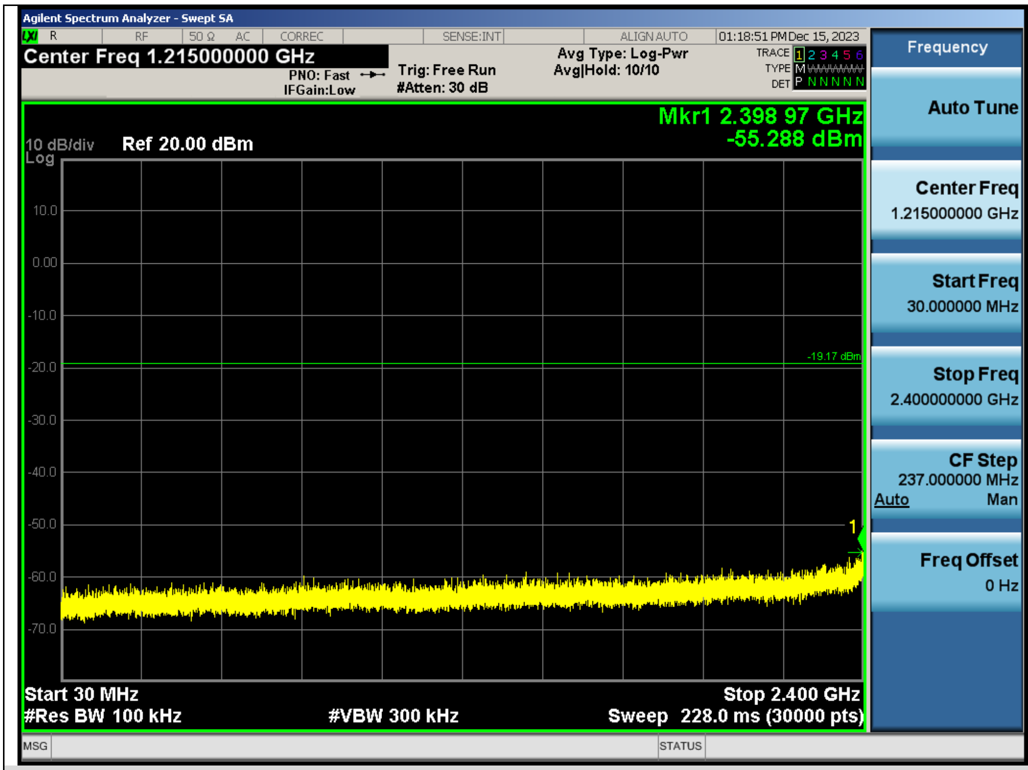
Test_Graph_802.11b_ANT2_2462_1Mbps_Higher Band Emissions



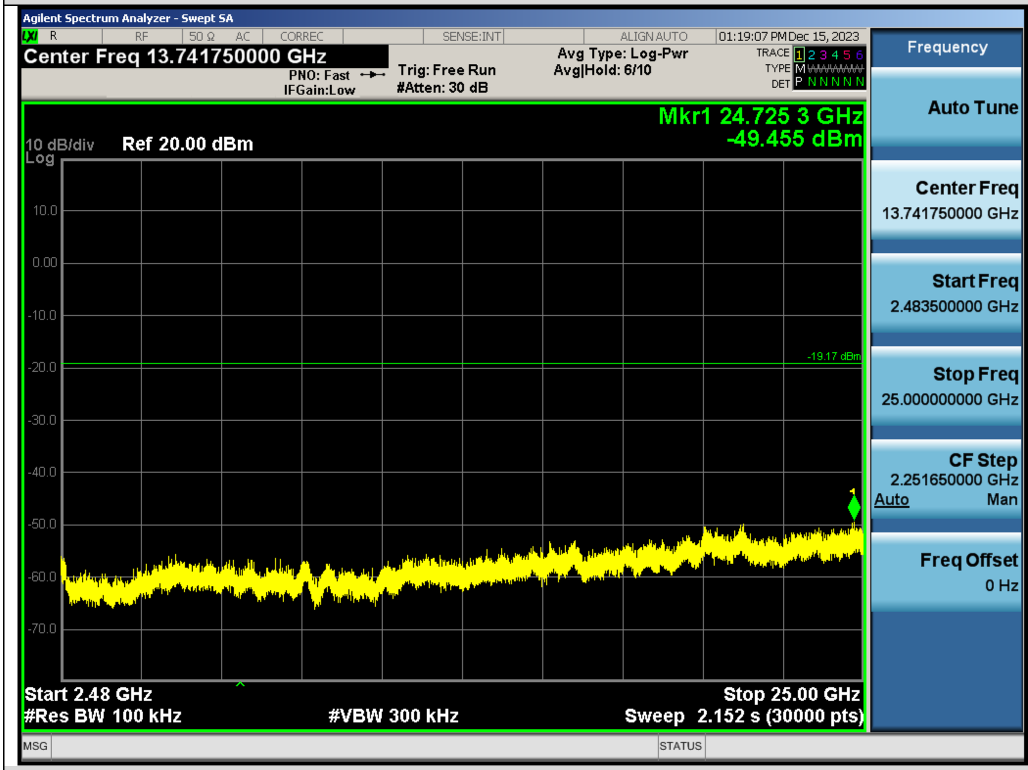
Test_Graph_802.11g_ANT2_2412_6Mbps_Lower Band Emissions



Test_Graph_802.11g_ANT2_2412_6Mbps_Higher Band Emissions



Test_Graph_802.11g_ANT2_2437_6Mbps_Lower Band Emissions



Test_Graph_802.11g_ANT2_2437_6Mbps_Higher Band Emissions