FCC Test Report

Report No.: AGC10514230801FR02

FCC ID	:	2BCRN-BREAKX1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Party speaker
BRAND NAME	:	Ikarao
MODEL NAME	:	BREAK X1, BREAK i300
APPLICANT	:	Dongguan Aika Electronic Technology Co., Ltd.
DATE OF ISSUE	:	Sep. 06, 2023
STANDARD(S)	:	FCC Part 15 Subpart C §15.247
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 06, 2023	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	Dongguan Aika Electronic Technology Co., Ltd.
Address	Room 201, Building 2, No. 388, Bihu Road, Fenggang Town, Dongguan City, Guangdong Province, China
manufacturer	GUANGDONG TAIDE ZHILIAN TECHNOLOGY CO.,LTD
Address	No. 388 Bihu Road, Fenggang Town, Dongguan city, Guangdong Province, China
Factory	GUANGDONG TAIDE ZHILIAN TECHNOLOGY CO.,LTD
Address	No. 388 Bihu Road, Fenggang Town, Dongguan city, Guangdong Province, China
Product Designation	Party speaker
Brand Name	Ikarao
Test Model	BREAK X1
Series Model	BREAK i300
Difference description	All the series models are the same as the test model except for the model names.
Date of receipt of test item	Aug. 17, 2023
Date of Test	Aug. 17, 2023~ Sep. 06, 2023
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Prepared By	Thea Huang	
	Thea Huang (Project Engineer)	Sep. 06, 2023
Reviewed By	Calvin Liu	
	Calvin Liu (Reviewer)	Sep. 06, 2023
Approved By	Max Zhang	
	Max Zhang Authorized Officer	Sep. 06, 2023

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “Party speaker”. It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

Equipment Type	WLAN 2.4G
Frequency Band	2400MHz ~ 2483.5MHz
Operation Frequency	2412MHz ~ 2462MHz
Output Power (Average)	IEEE 802.11b:11.56dBm; IEEE 802.11g:10.80dBm; IEEE 802.11n(HT20):10.56dBm; IEEE 802.11n(HT40):10.23dBm
Output Power (Peak)	IEEE 802.11b:14.60dBm; IEEE 802.11g: 18.54dBm; IEEE 802.11n(HT20): 18.41dBm; IEEE 802.11n(HT40): 17.58dBm
Modulation	802.11b:DSSS(DQPSK, DBPSK, CCK) 802.11g/n: OFDM(64-QAM, 16-QAM, QPSK, BPSK)
Data Rate	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps
Number of channels	11
Hardware Version	V1.1
Software Version	V1.0
Antenna Designation	FPC Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	4.9dBi
Power Supply	DC 18.5V by battery or AC110~240V/ 50-60HZ

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
2400~2483.5MHz	1	2412 MHz
	2	2417 MHz
	3	2422 MHz
	4	2427 MHz
	5	2432 MHz
	6	2437 MHz
	7	2442 MHz
	8	2447 MHz
	9	2452 MHz
	10	2457 MHz
	11	2462 MHz

Note: For 20MHz bandwidth system use Channel 1 to Channel 11. For 40MHz bandwidth system use Channel 3 to Channel 9

2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		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. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2BCRN-BREAKX1** filing to comply with the FCC Part 15 requirements.

2.5. TEST METHODOLOGY

KDB 558074 D01 15.247 Meas Guidance v05: Guidance for compliance measurements on Digital transmissio n system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules
ANSI C63.10:2013: American National Standard for Testing Unlicensed Wireless Devices

2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.8. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

2.9. DUTY CYCLE

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:

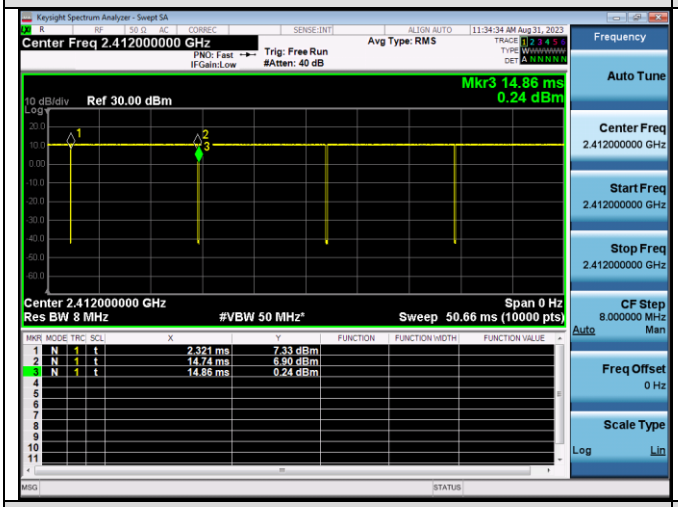
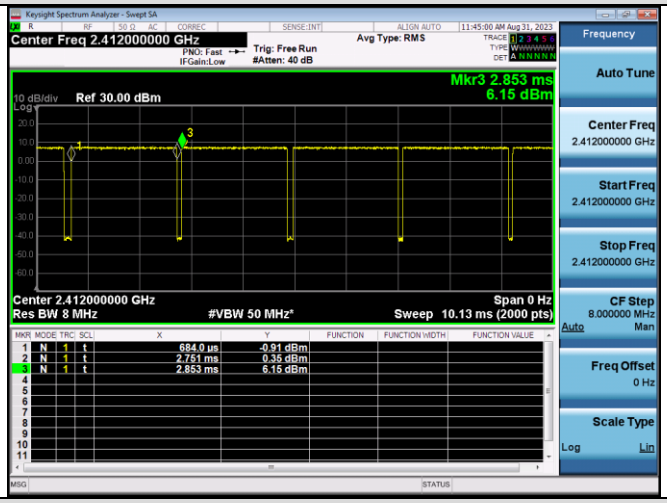
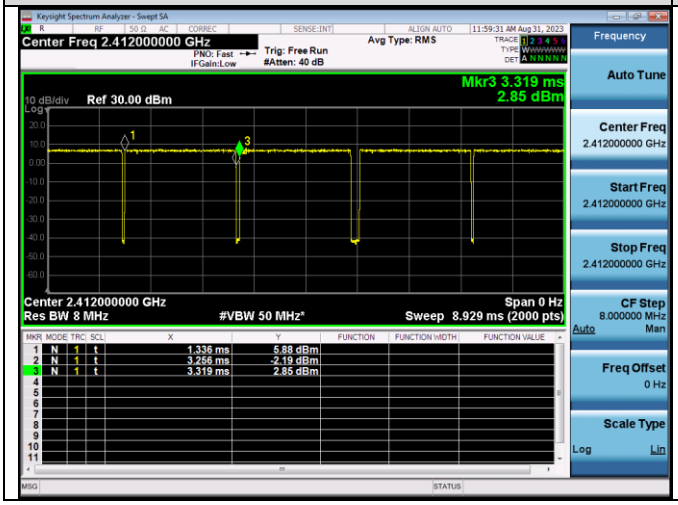
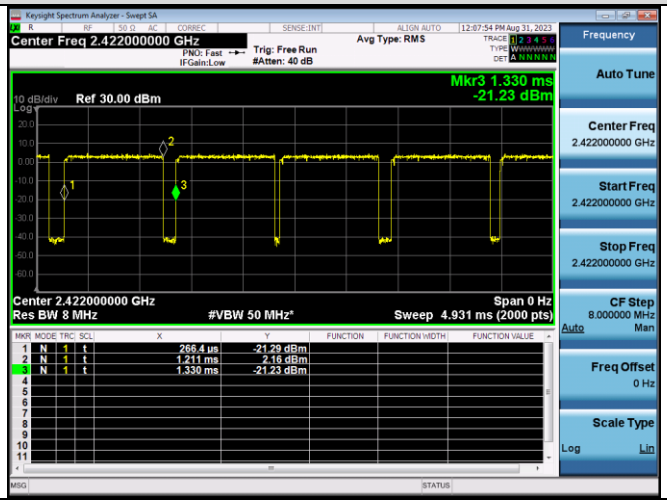
Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11b	1	99.04	0.04	0.08	-0.08
IEEE 802.11g	6	95.30	0.21	0.48	-0.42
IEEE 802.11n-HT20	MCS0	96.82	0.14	0.52	-0.28
IEEE 802.11n-HT40	MCS0	88.81	0.52	1.06	-1.03

Remark:

1. Duty Cycle factor = 10 * log (1/ Duty cycle) 2. Average factor = 20 log10 Duty Cycle

The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value

The test plots as follows:

IEEE 802.11b	IEEE 802.11g
	
IEEE 802.11n-HT20	**IEEE 802.11n-HT40**
	

3. 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 = ±4.0 dB
Uncertainty of Radiated Emission above 1GHz	U_c = ±4.8 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 %

4. DESCRIPTION OF TEST MODES

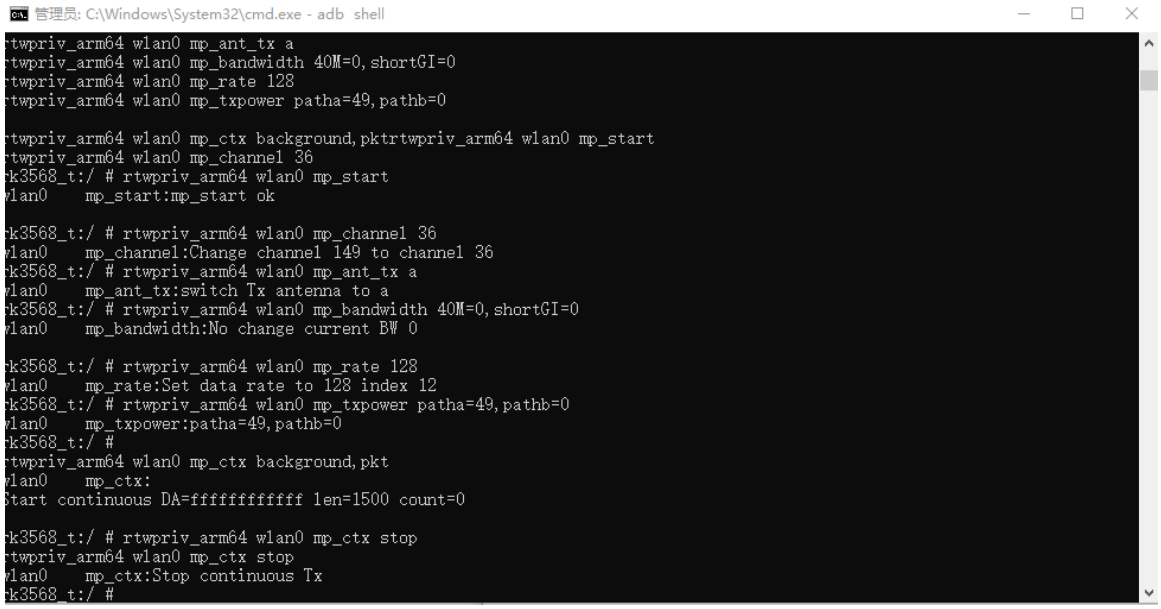
NO.	TEST MODE DESCRIPTION
1	Low channel transmitting (TX)
2	Middle channel transmitting (TX)
3	High channel transmitting (TX)

Note:
Transmit by 802.11b with Date rate (1/2/5.5/11)
Transmit by 802.11g with Date rate (6/9/12/18/24/36/48/54)
Transmit by 802.11n (20MHz) with Date rate (6.5/13/19.5/26/39/52/58.5/65)
Transmit by 802.11n (40MHz) with Date rate (13.5/27/40.5/54/81/108/121.5/135)
The test channel for 20MHz bandwidth system is channel 1, 6 and 11.
The test channel for 40MHz bandwidth system is channel 3, 6 and 9.

Note:

1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the EUT is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.

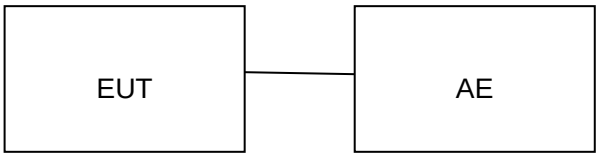
Software Setting



5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Party speaker	BREAK X1	2BCRN-BREAKX1	EUT
2	Data Cable	--	0.8m, unshielded	AE

5.3. 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)(1)	RF Output Power	Pass
3	§15.247 (a)(1)	6 dB Bandwidth	Pass
4	§15.247 (e)	Power Spectral Density	Pass
4	§15.247 (d)	Conducted Spurious Emission	Pass
5	§15.209	Radiated Emission& Band Edge	Pass
6	§15.207	AC Power Line Conducted Emission	Pass

6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun. 03, 2023	Jun. 02, 2024
LISN	R&S	ESH2-Z5	100086	Jun. 03, 2023	Jun. 02, 2024
Attenuator	Dongfang Xupu	LM-XX-6-5W	N/A	Jun. 09, 2023	Jun. 08, 2024
Test software	R&S	Ver.V1.71	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Feb. 18, 2023	Feb. 17, 2024
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Jun. 01, 2023	May 31, 2024
2.4GHz Filter	EM Electronics	N/A	N/A	Mar. 18, 2022	Mar. 19, 2024
Attenuator	ZHINAN	E-002	N/A	Aug. 04, 2022	Aug. 03, 2024
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Oct. 31, 2021	Oct. 30, 2023
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2023	Apr. 22, 2024
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 01, 2022	Sep. 02, 2024
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 05, 2023	Jan. 04, 2025
Test software	Tonscend	Ver.2.5	N/A	N/A	N/A

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. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power					
Test Mode	Test Channel (MHz)	Average Power (dBm)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
802.11b	2412	11.56	14.60	≤30	Pass
	2437	10.71	13.47	≤30	Pass
	2462	9.66	12.47	≤30	Pass
802.11g	2412	10.80	18.54	≤30	Pass
	2437	9.74	17.47	≤30	Pass
	2462	8.64	16.45	≤30	Pass
802.11n20	2412	10.56	18.41	≤30	Pass
	2437	10.02	17.40	≤30	Pass
	2462	8.91	16.28	≤30	Pass
802.11n40	2422	10.23	17.58	≤30	Pass
	2437	9.39	16.89	≤30	Pass
	2452	8.75	16.19	≤30	Pass

8. 6DB BANDWIDTH MEASUREMENT

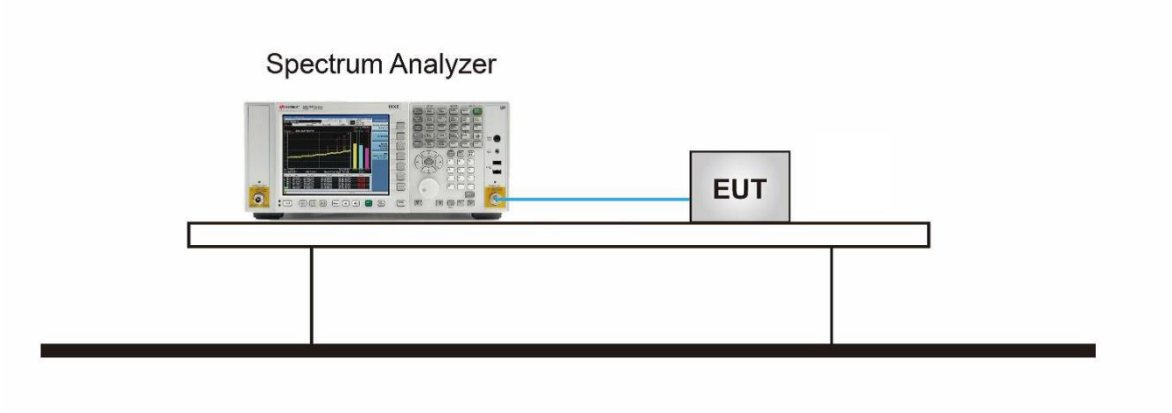
8.1 MEASUREMENT LIMITS

The minimum 6dB bandwidth shall be at least 500 kHz.

8.2 MEASUREMENT PROCEDURE

1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
2. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. 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.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW) ≥ 3 * RBW.
6. Detector = peak
7. Trace mode = max hold.
8. Sweep = auto couple.
9. Allow the trace to stabilize.
10. Measure and record the results in the test report.

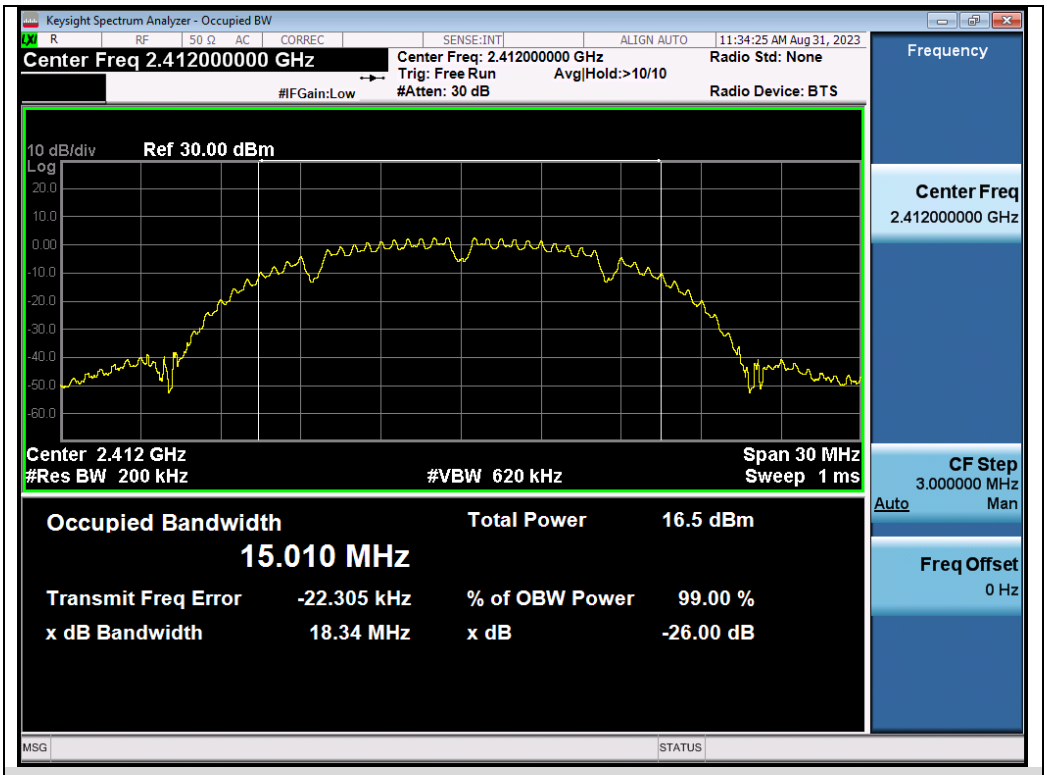
8.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



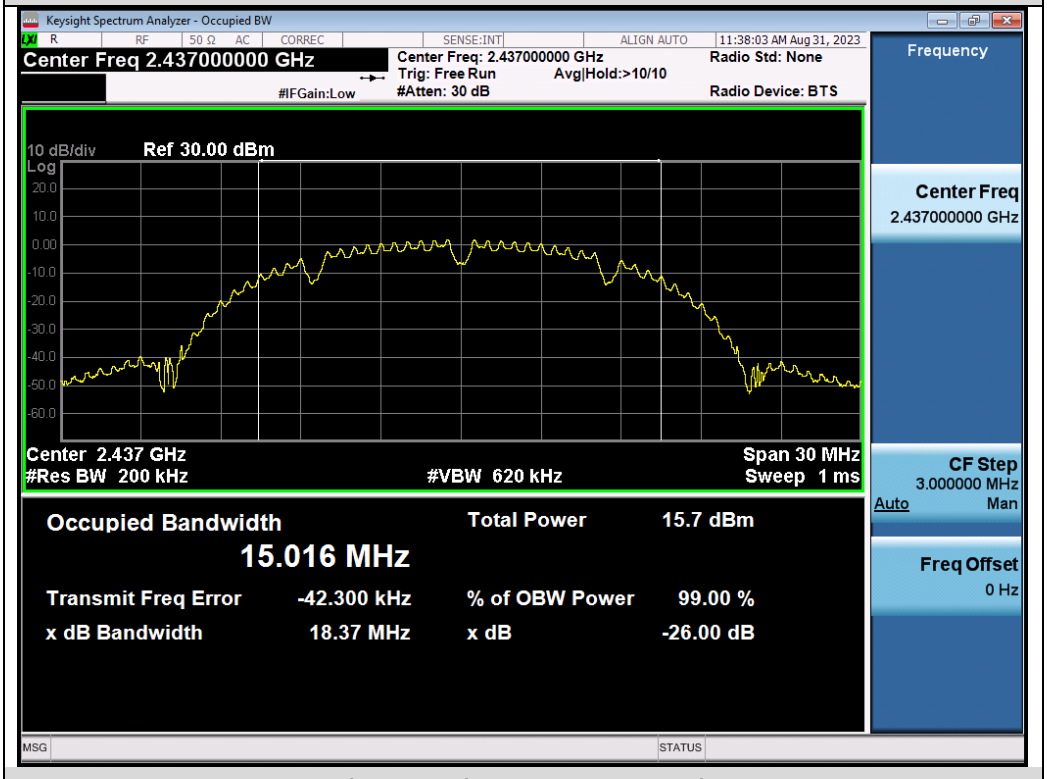
8.4. MEASUREMENT RESULTS

Test Data of Occupied Bandwidth and DTS Bandwidth					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	DTS Limits (MHz)	Pass or Fail
802.11b	2412	15.010	10.069	≥0.5	Pass
	2437	15.016	10.081	≥0.5	Pass
	2462	15.021	10.090	≥0.5	Pass
802.11g	2412	16.702	16.347	≥0.5	Pass
	2437	16.585	16.340	≥0.5	Pass
	2462	16.709	16.346	≥0.5	Pass
802.11n20	2412	17.662	17.542	≥0.5	Pass
	2437	17.719	17.251	≥0.5	Pass
	2462	17.695	17.309	≥0.5	Pass
802.11n40	2422	36.179	35.735	≥0.5	Pass
	2437	36.287	35.729	≥0.5	Pass
	2452	36.224	35.727	≥0.5	Pass

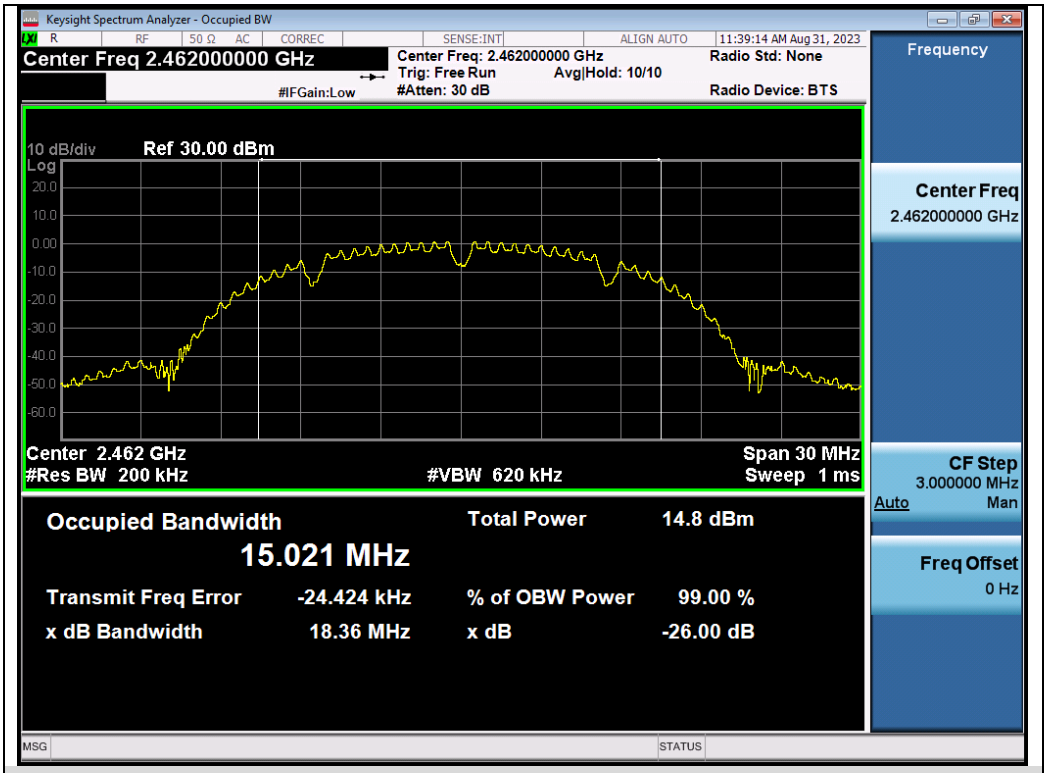
Test Graphs of Occupied Bandwidth



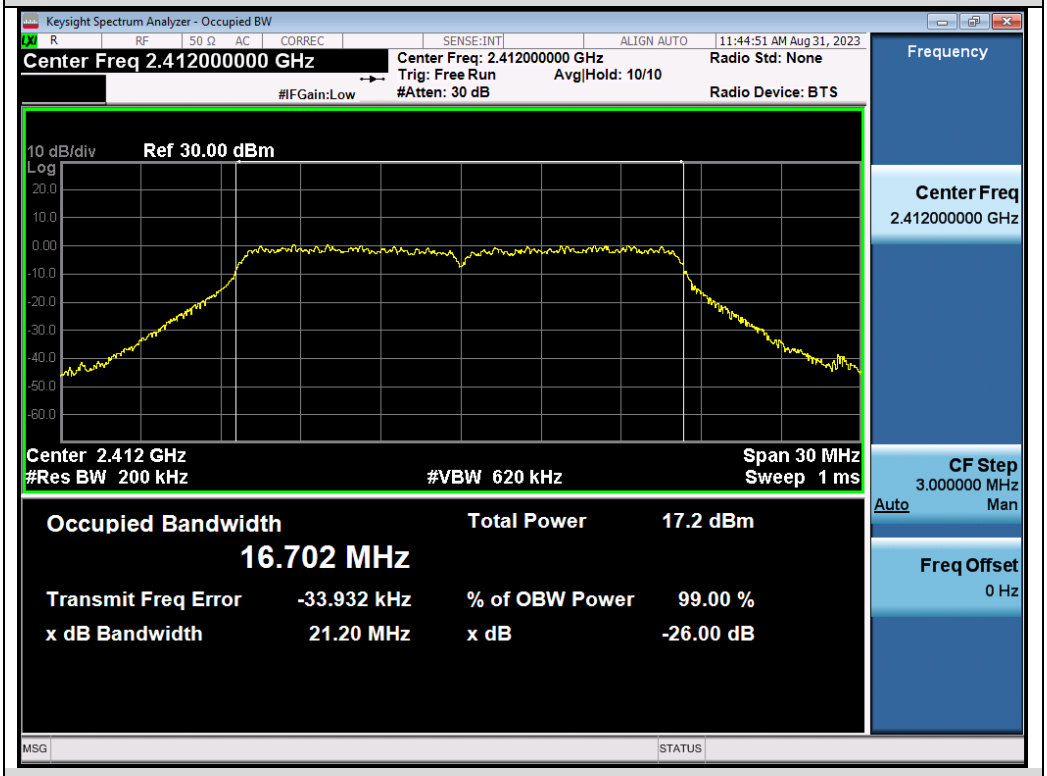
Test_Graph_802.11b_ANT1_2412_1Mbps_OBW



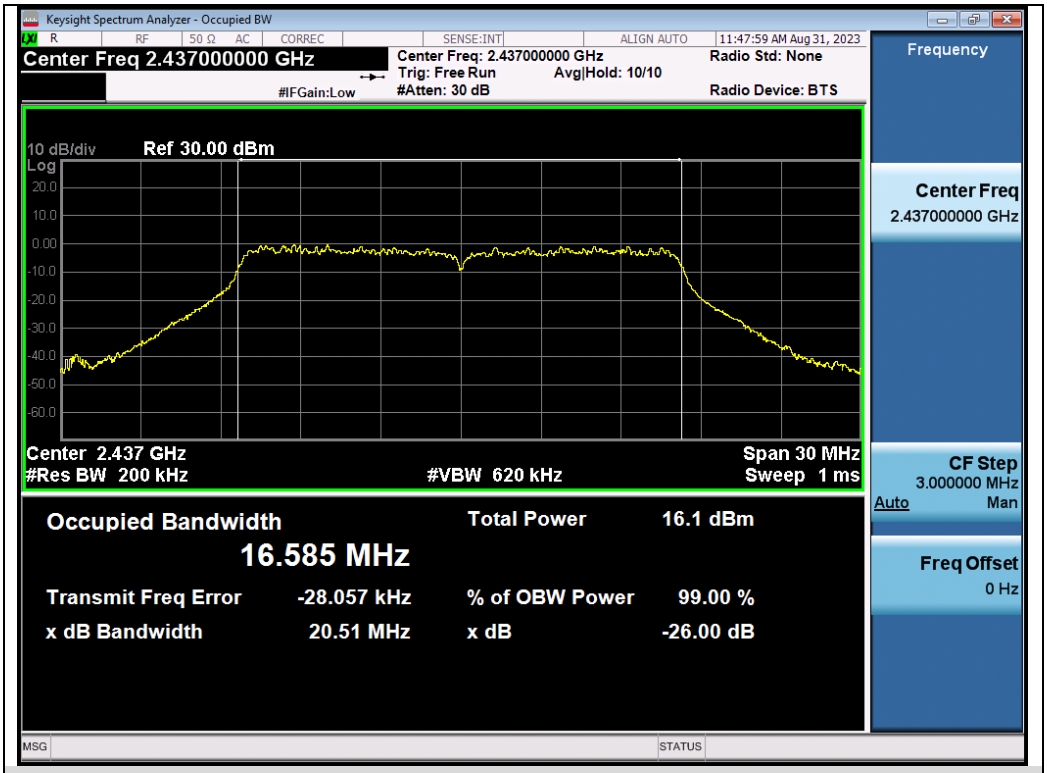
Test_Graph_802.11b_ANT1_2437_1Mbps_OBW



Test_Graph_802.11b_ANT1_2462_1Mbps_OBW



Test_Graph_802.11g_ANT1_2412_6Mbps_OBW



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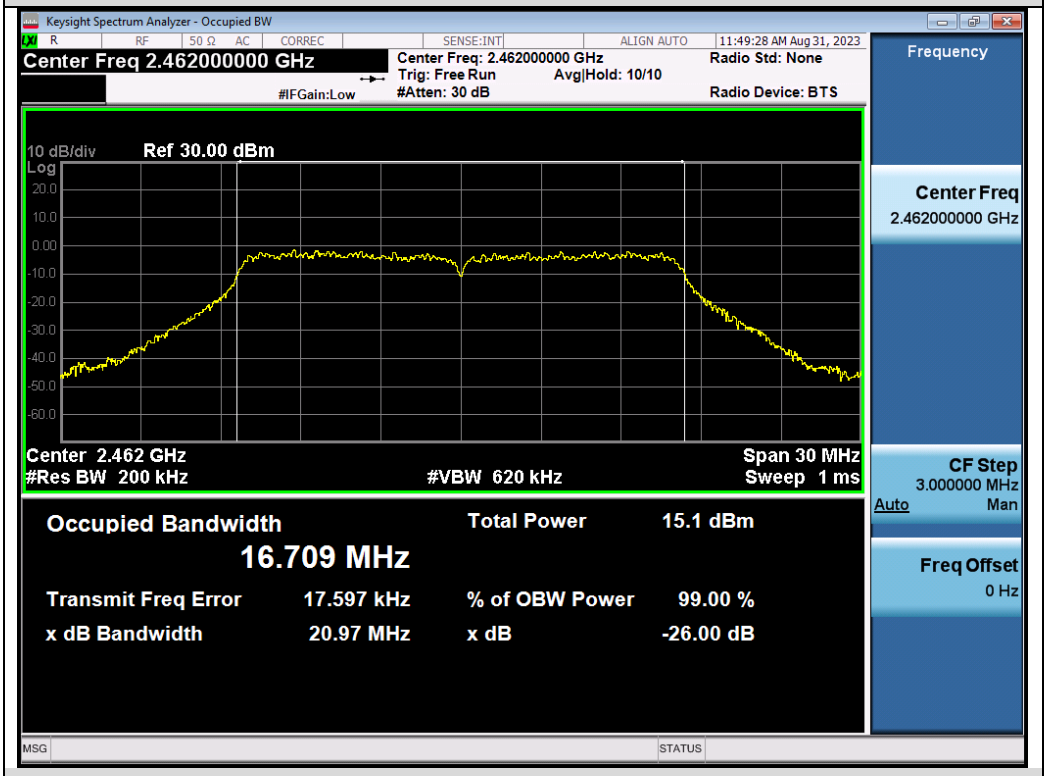

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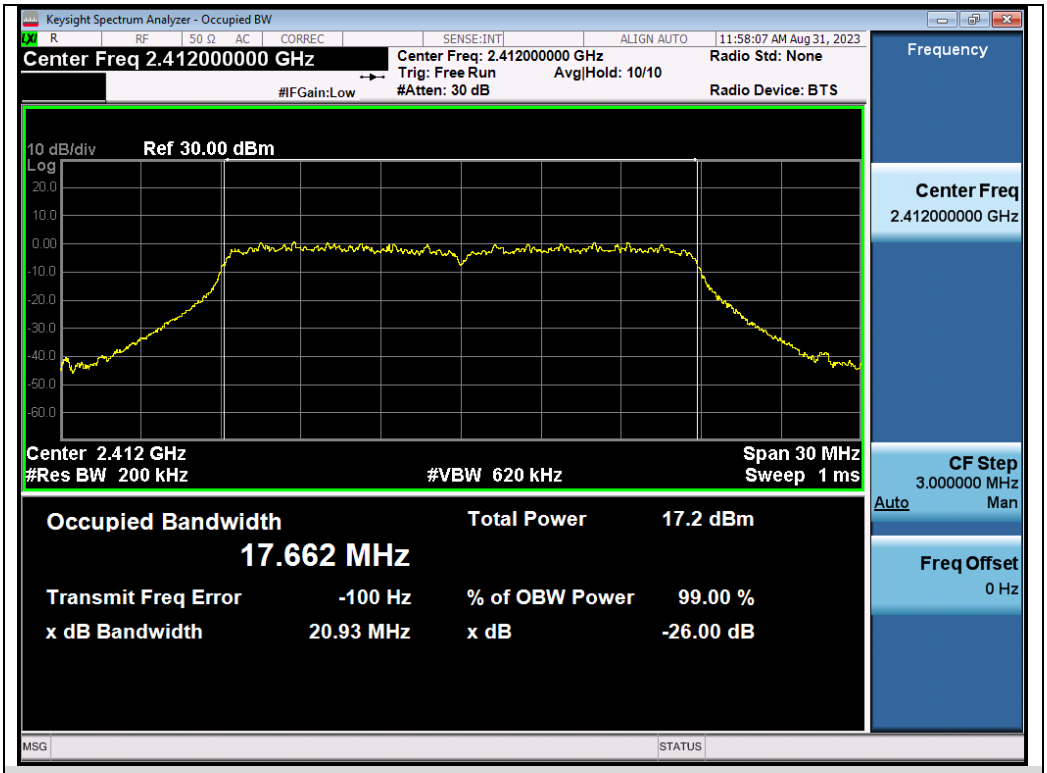
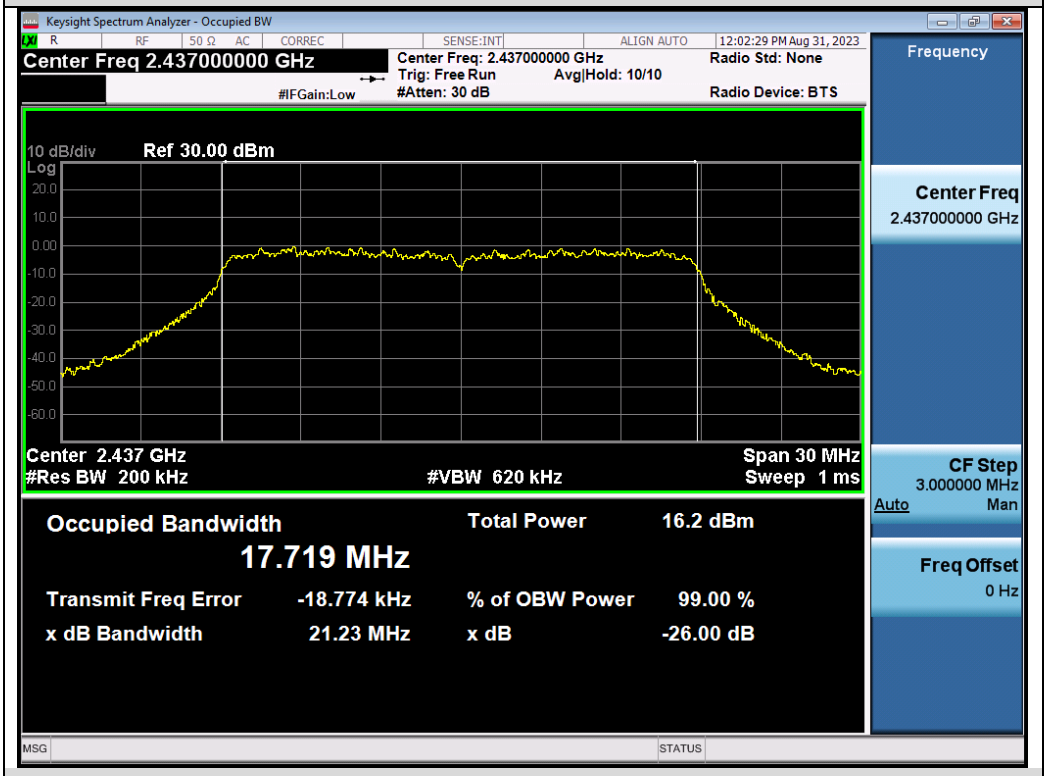


Test_Graph_802.11n20_ANT1_2412_MCS0_OBW



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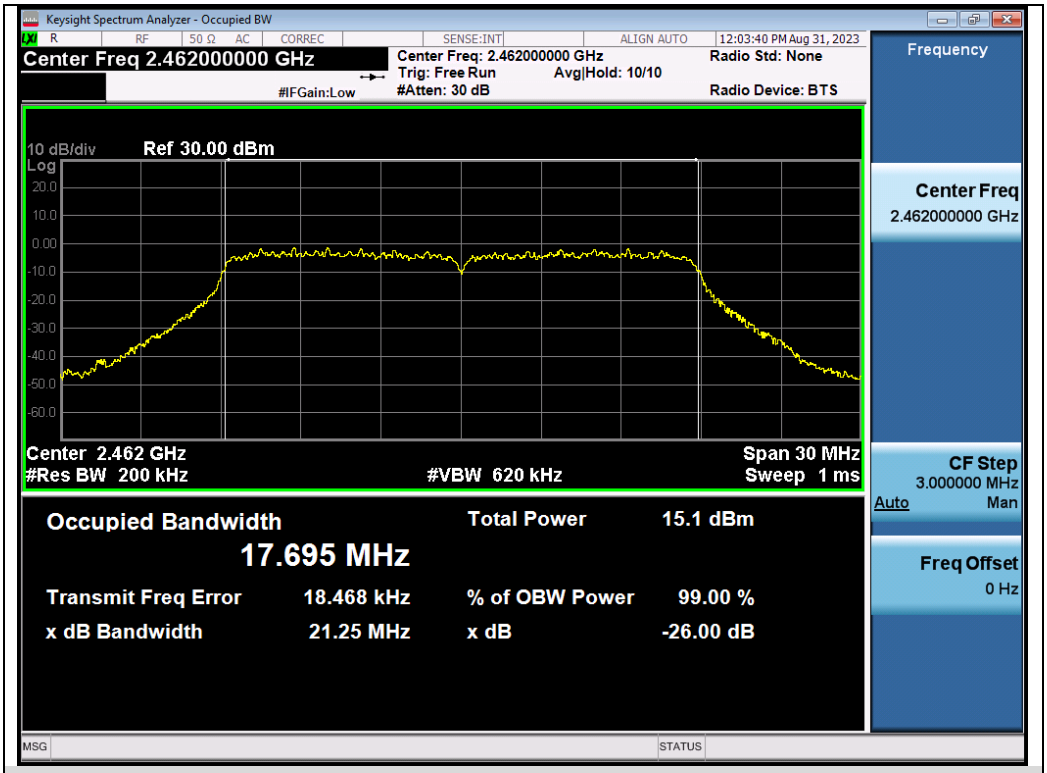
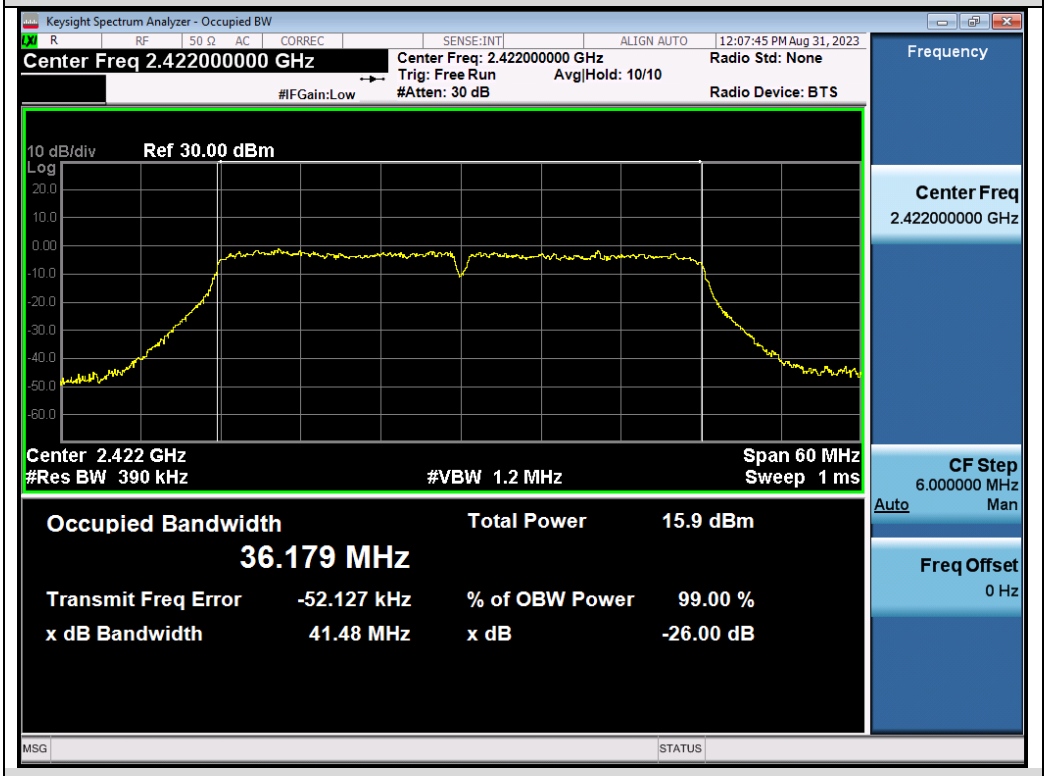


Test_Graph_802.11n20_ANT1_2462_MCS0_OBW



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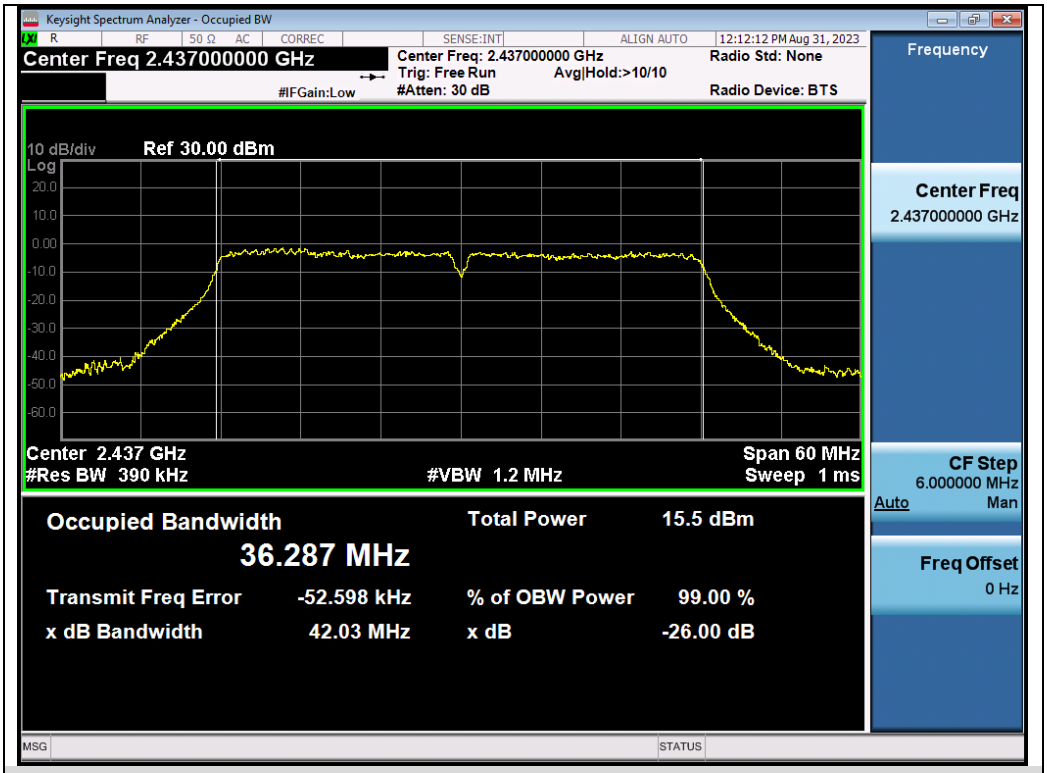
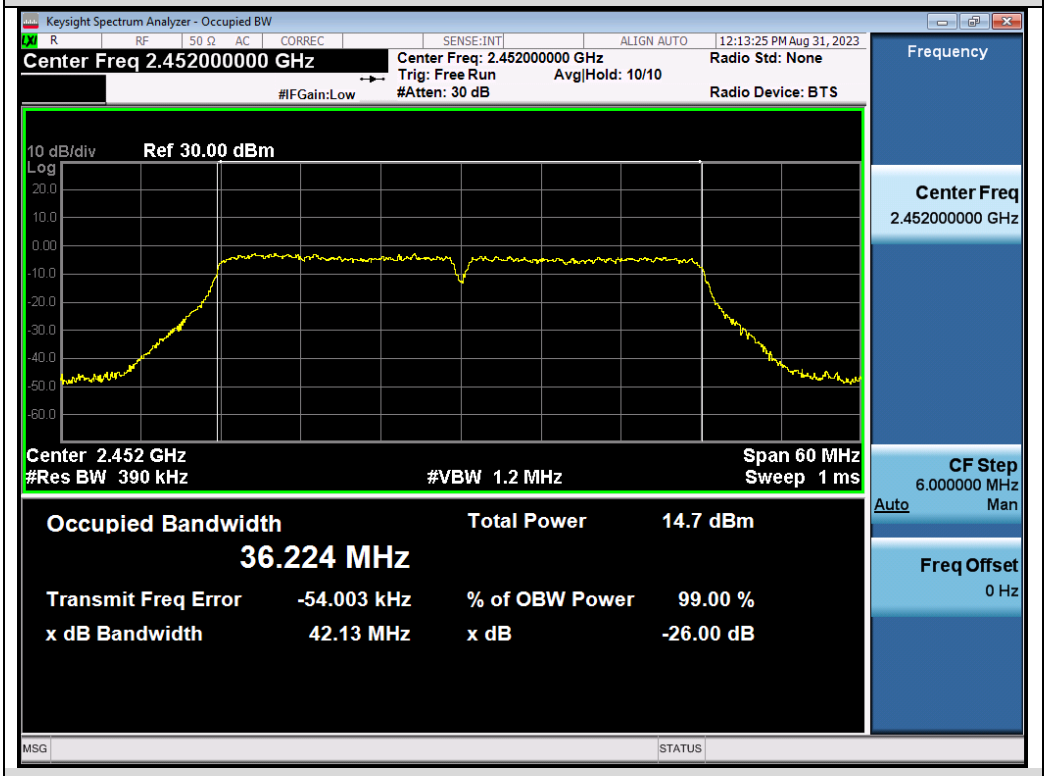


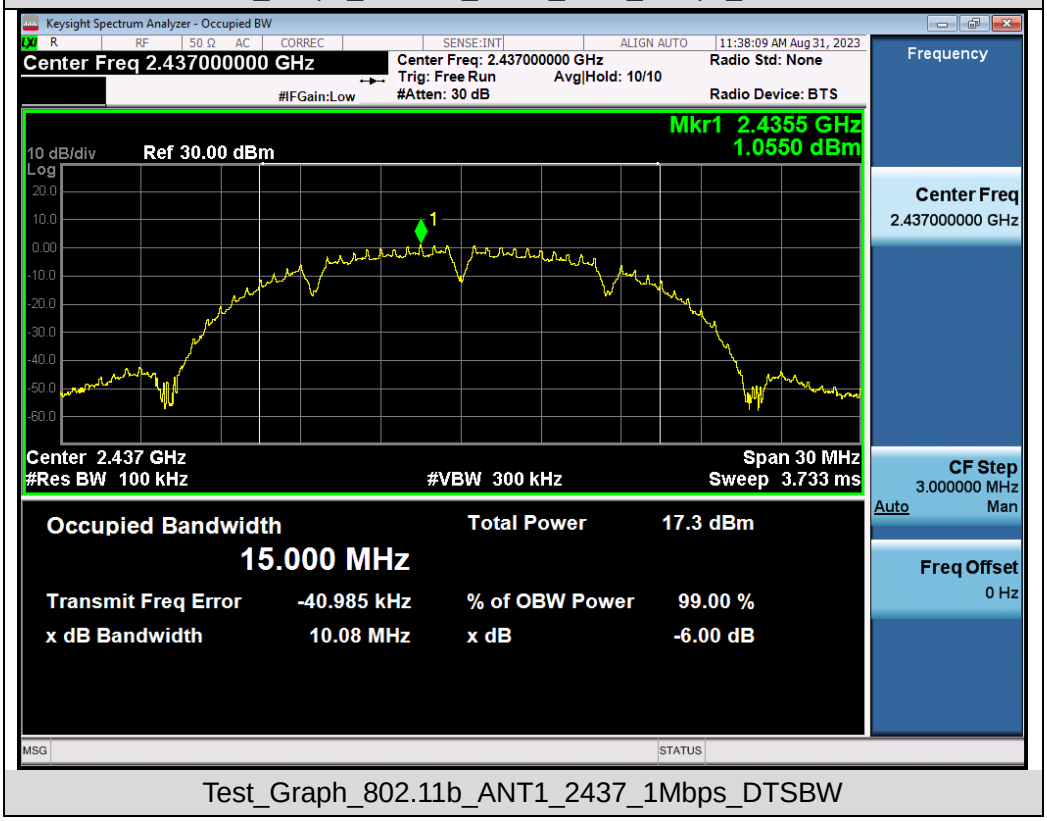
Test_Graph_802.11n40_ANT1_2437_MCS0_OBW



Test_Graph_802.11n40_ANT1_2452_MCS0_OBW

Test Graphs of DTS Bandwidth

Test_Graph_802.11b_ANT1_2412_1Mbps_DTSBW



Test_Graph_802.11b_ANT1_2437_1Mbps_DTSBW

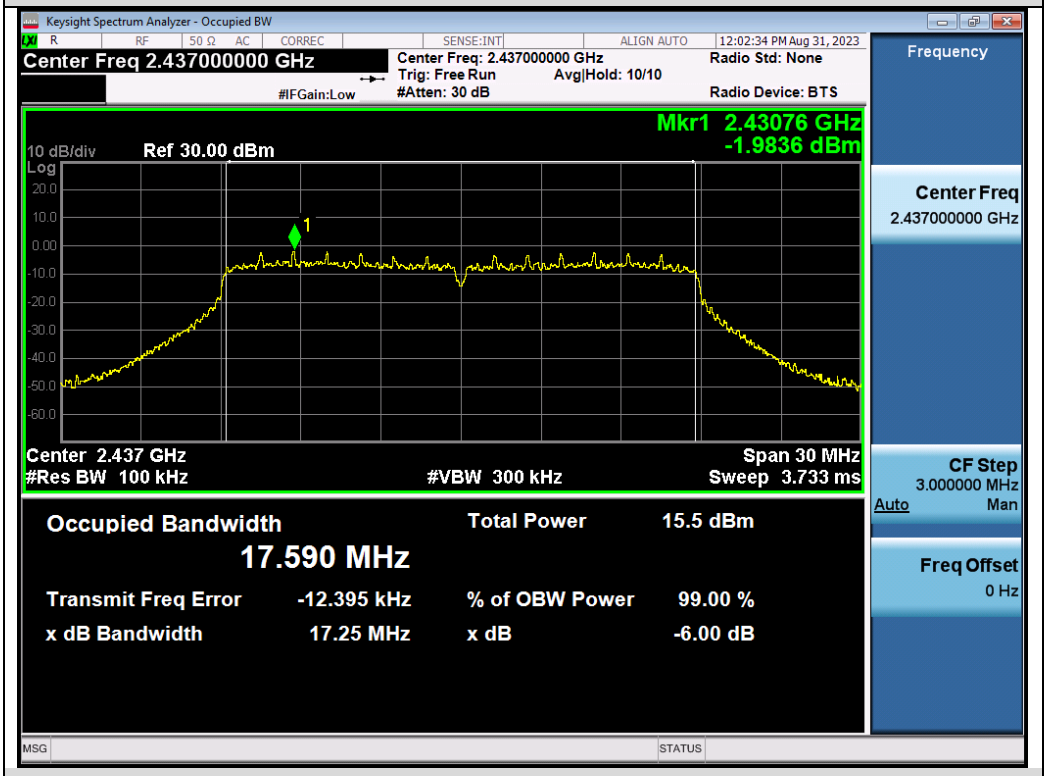
Test_Graph_802.11b_ANT1_2462_1Mbps_DTSBW

Test_Graph_802.11g_ANT1_2412_6Mbps_DTSBW

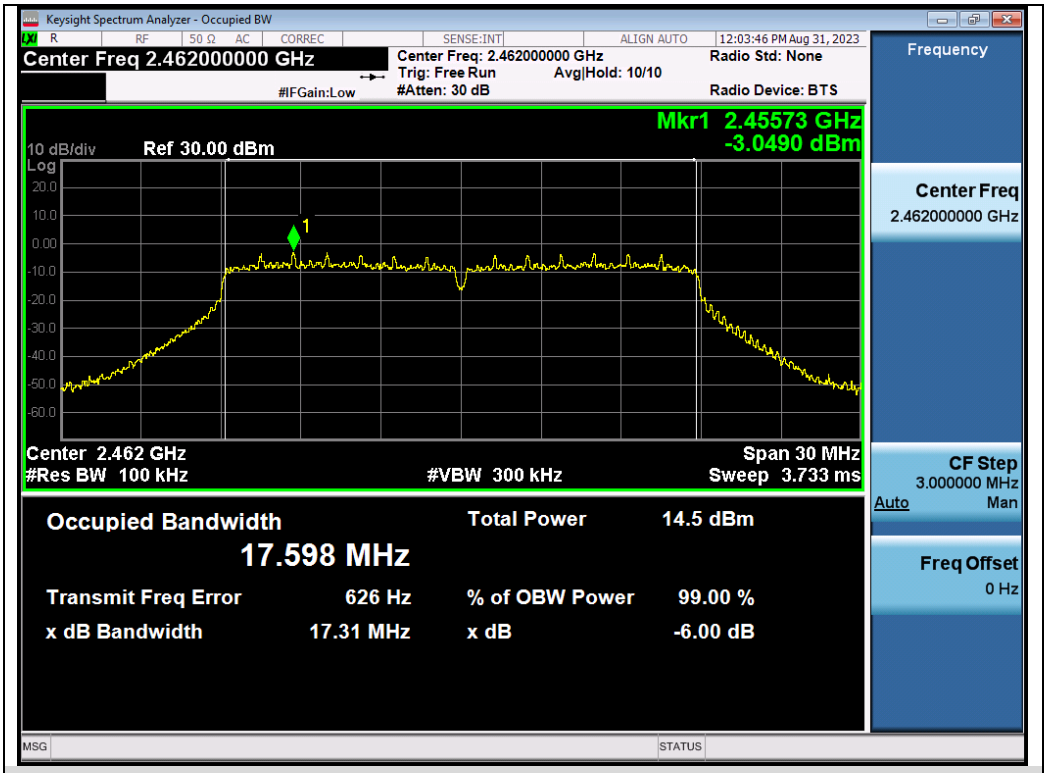
Test_Graph_802.11g_ANT1_2437_6Mbps_DTSBW

Test_Graph_802.11g_ANT1_2462_6Mbps_DTSBW

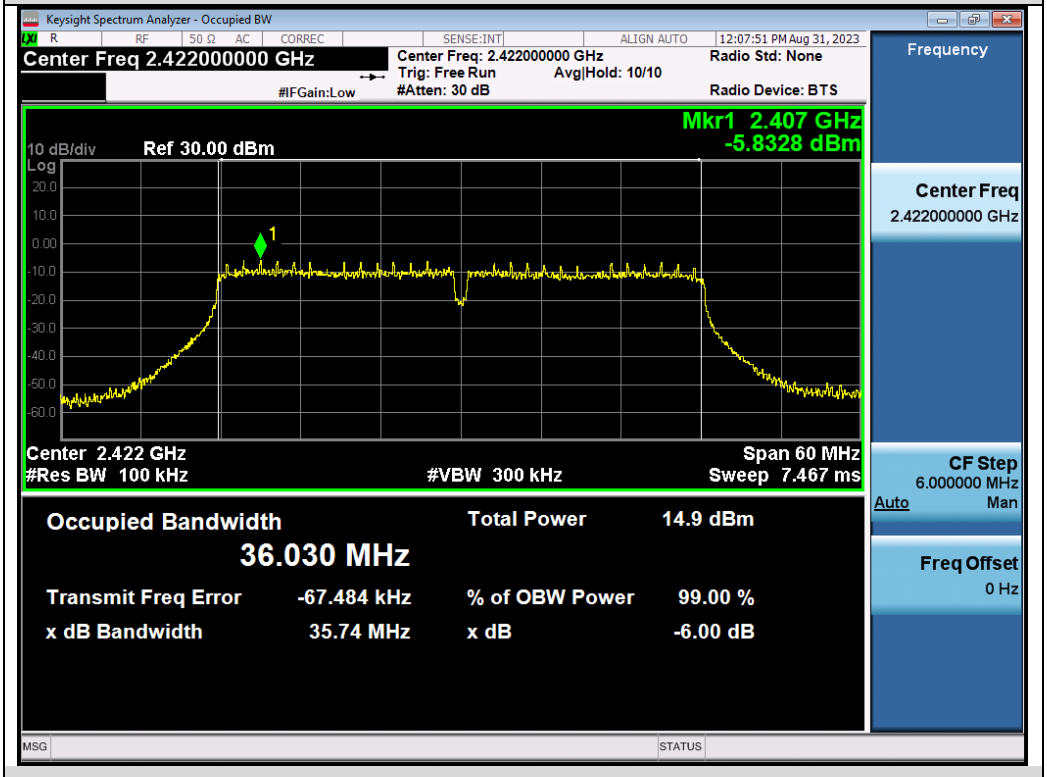
Test_Graph_802.11n20_ANT1_2412_MCS0_DTSBW



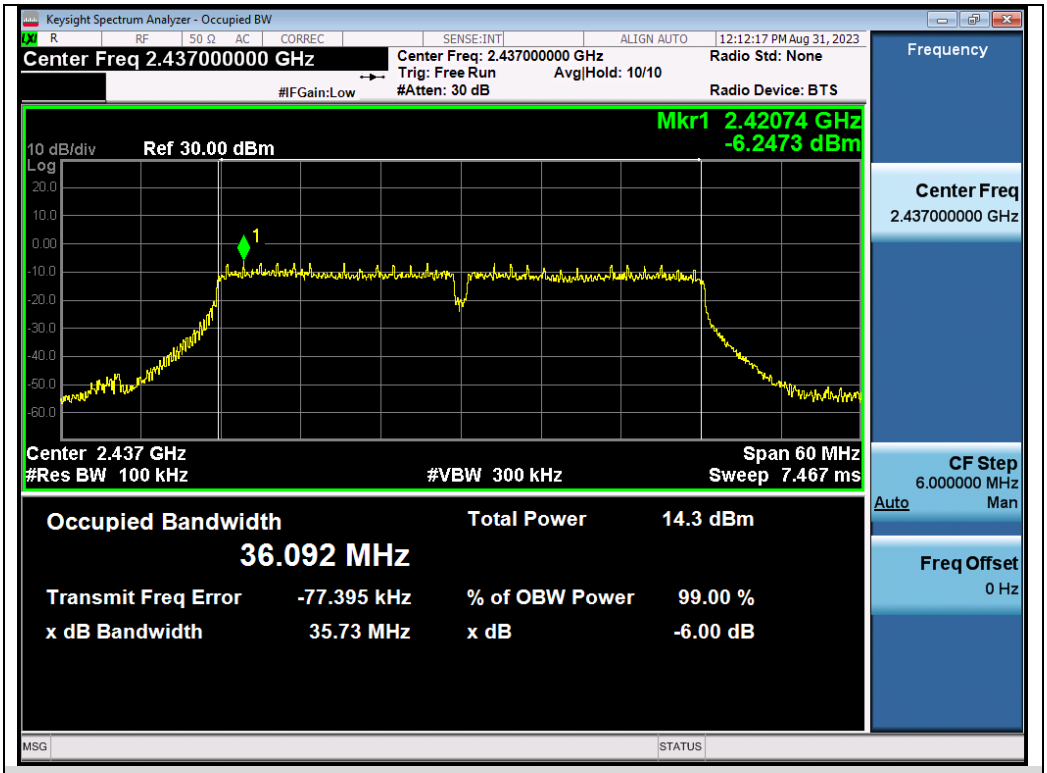
Test_Graph_802.11n20_ANT1_2437_MCS0_DTSBW



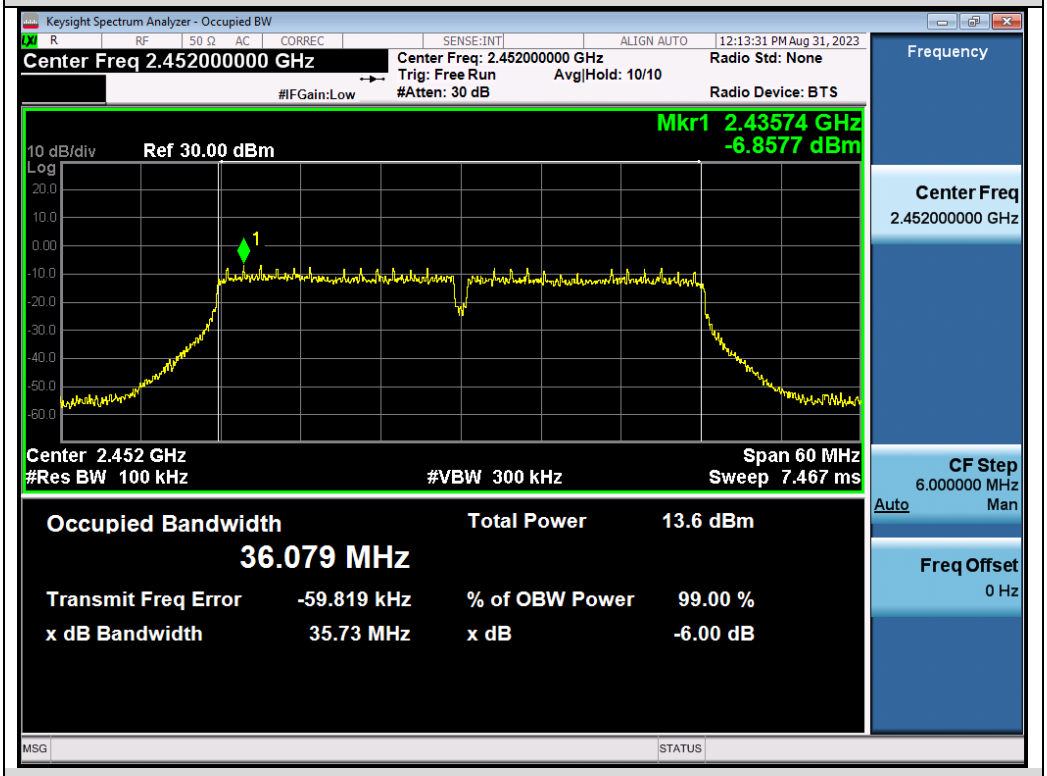
Test_Graph_802.11n20_ANT1_2462_MCS0_DTSBW



Test_Graph_802.11n40_ANT1_2422_MCS0_DTSBW



Test_Graph_802.11n40_ANT1_2437_MCS0_DTSBW



Test_Graph_802.11n40_ANT1_2452_MCS0_DTSBW

9. CONDUCTED SPURIOUS EMISSION

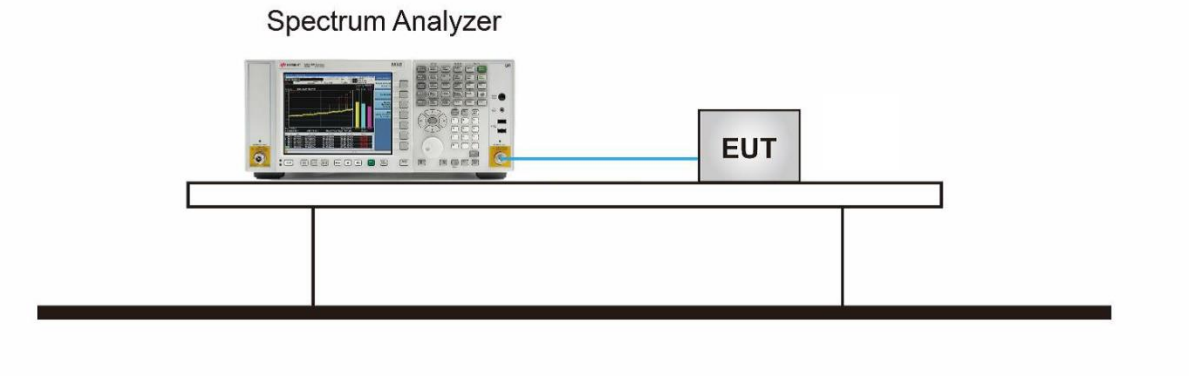
9.1 MEASUREMENT LIMIT

LIMITS AND MEASUREMENT RESULT		
Applicable Limits	**Measurement Result**	
	Test Data	**Criteria**
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS

9.2 MEASUREMENT PROCEDURE

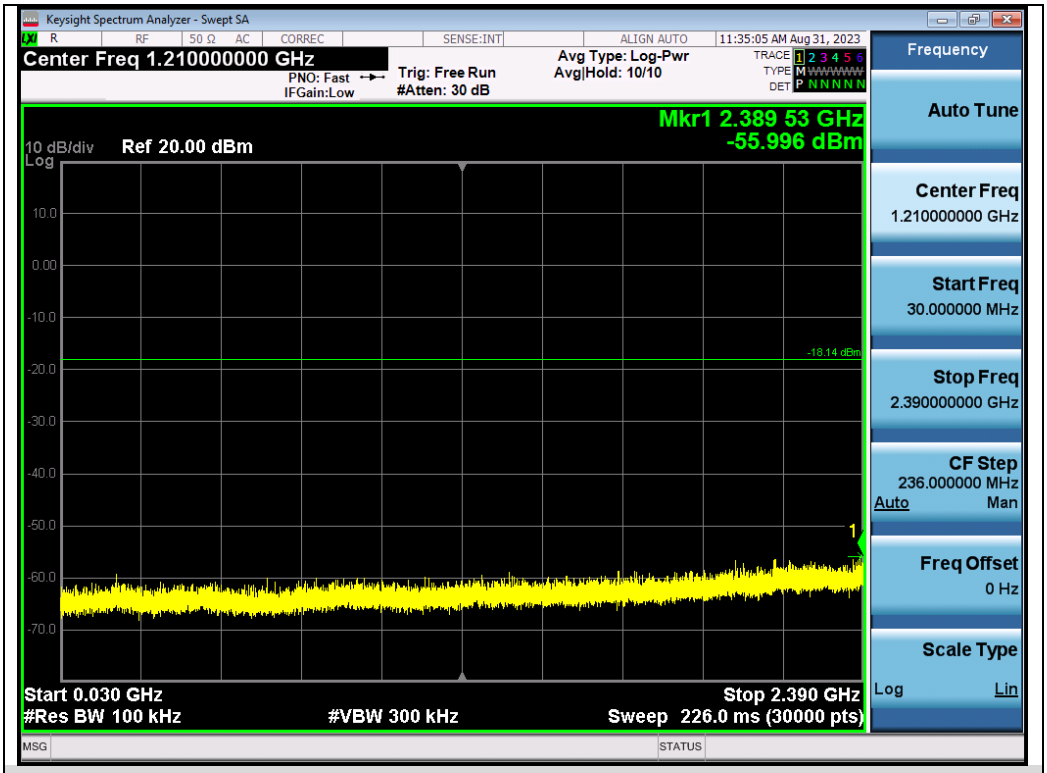
1. Connect EUT RF output port to the Spectrum Analyzer
2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
4. RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.(Test frequency below 1GHz)
5. RBW = 1 MHz; VBW= 3 MHz; Sweep = auto; Detector function = peak.(Test frequency Above 1GHz)
6. Set SPA Trace 1 Max hold, then View.
7. Mark the maximum useless stray point and compare it with the limit value to record the result.

9.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)

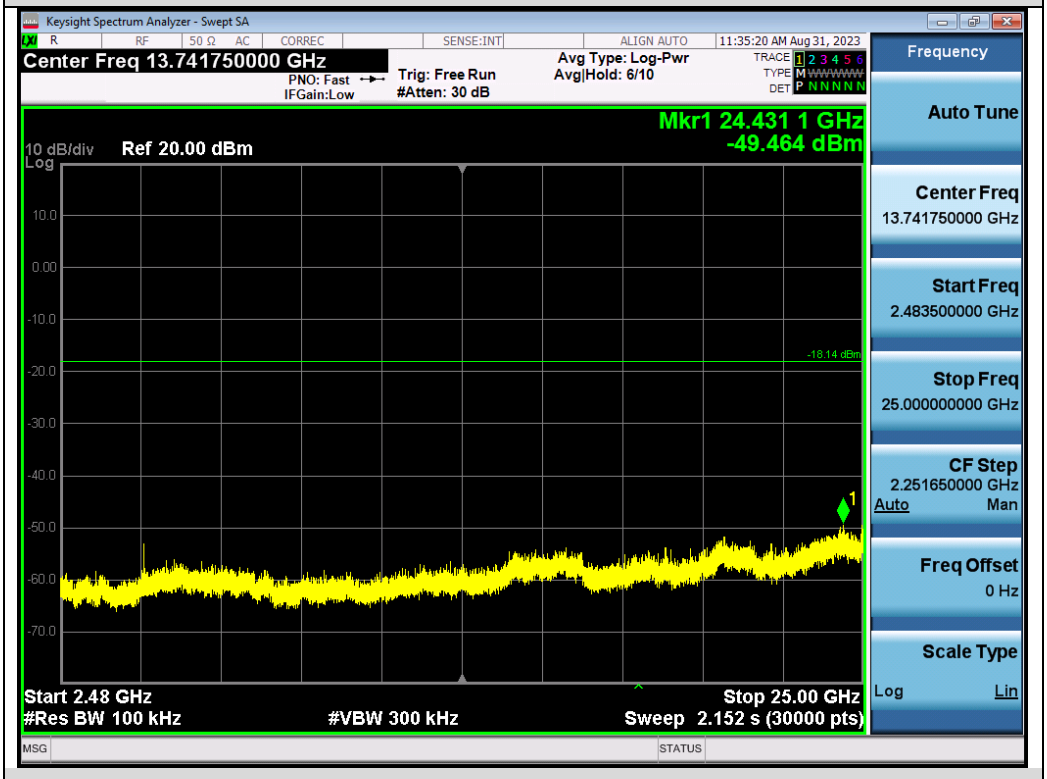


9.4 MEASUREMENT RESULTS

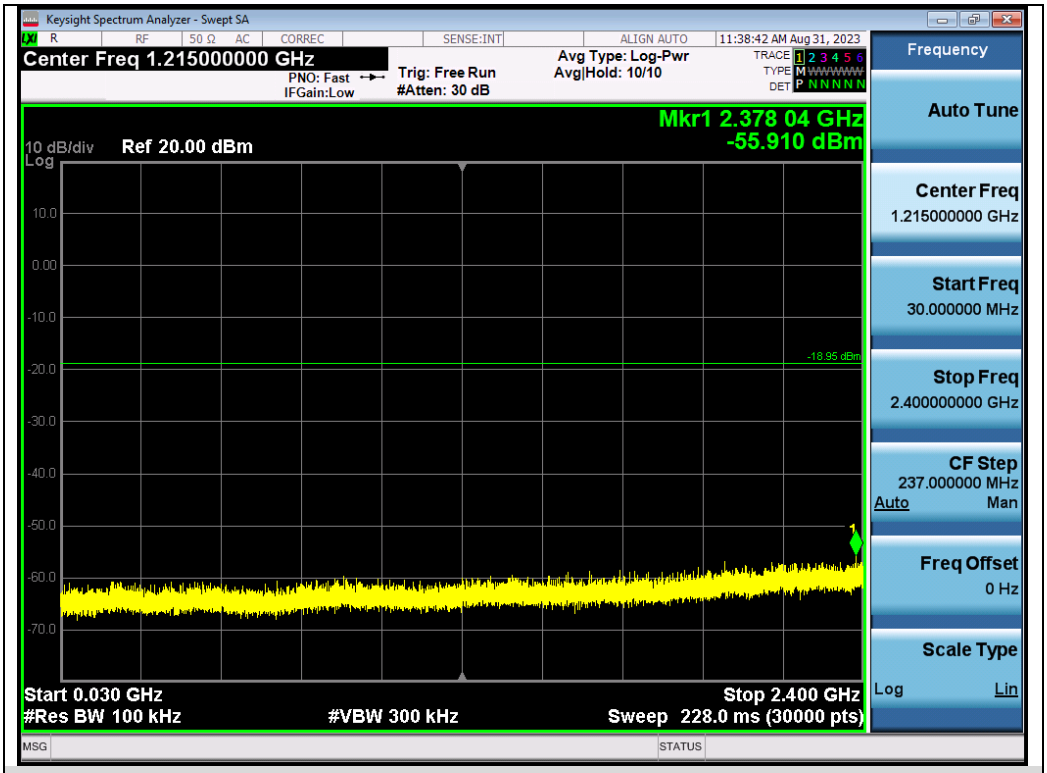
Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



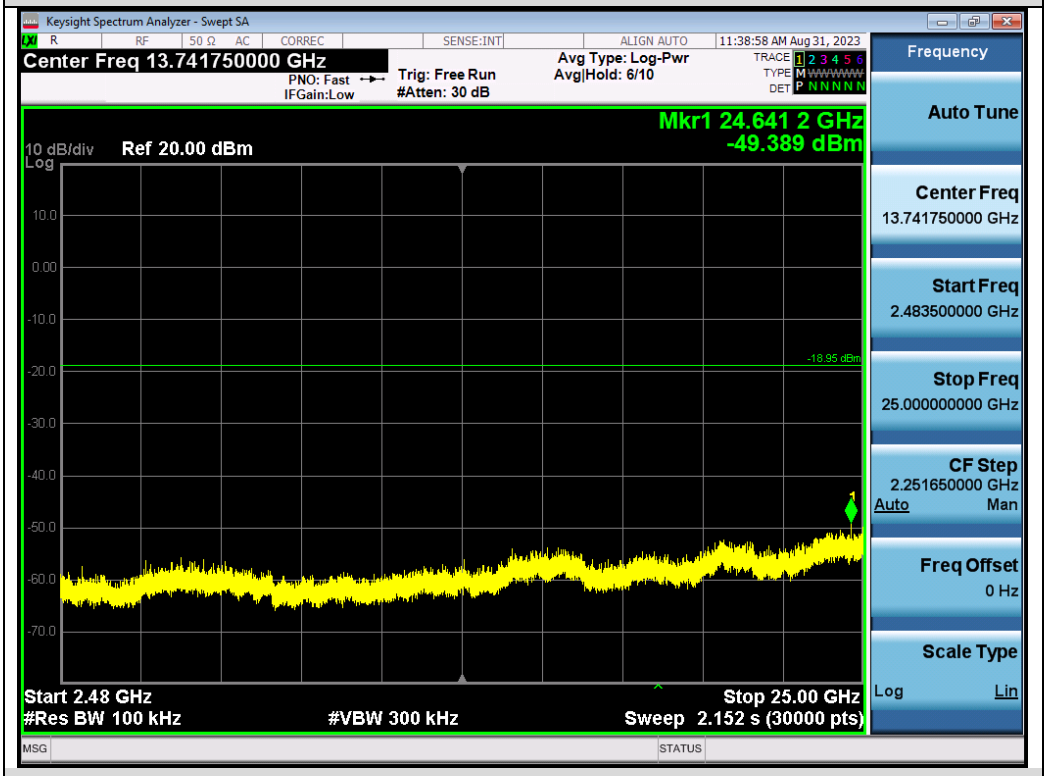
Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Emissions



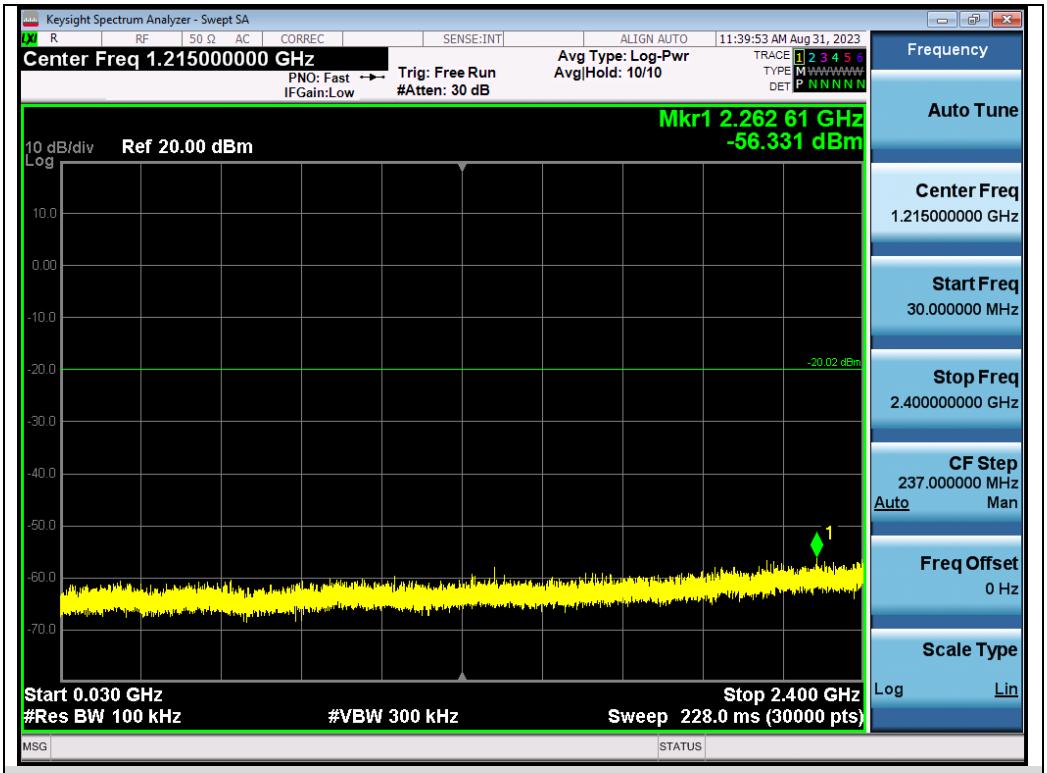
Test_Graph_802.11b_ANT1_2412_1Mbps_Higher Band Emissions



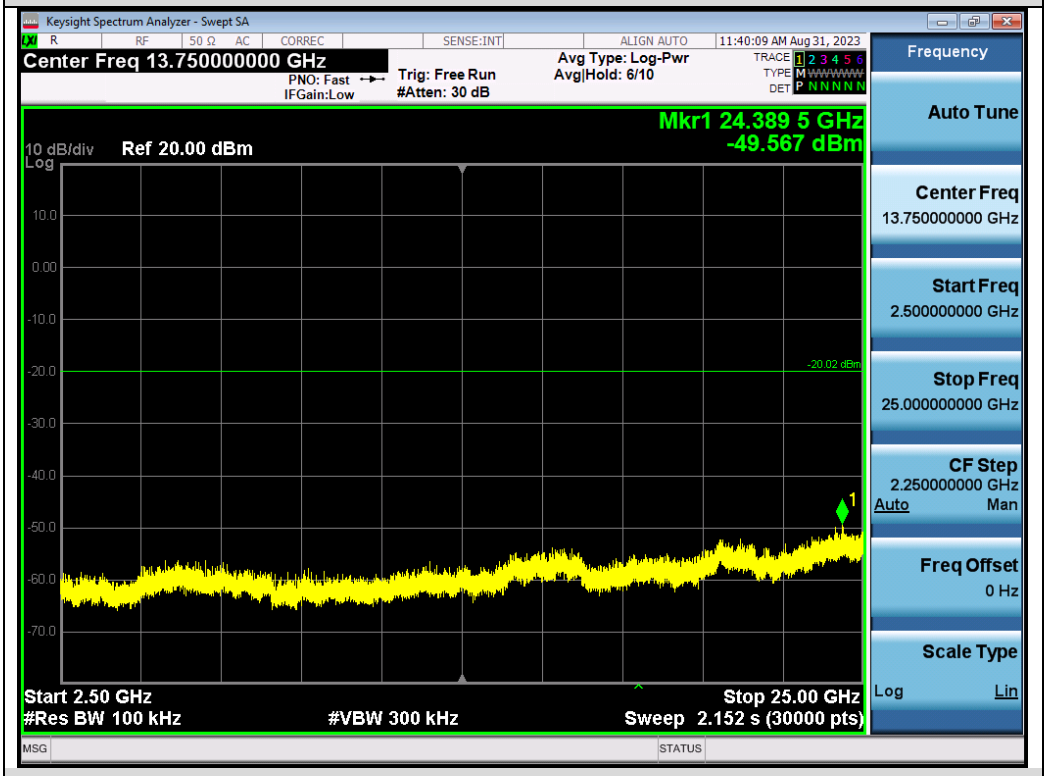
Test_Graph_802.11b_ANT1_2437_1Mbps_Lower Band Emissions



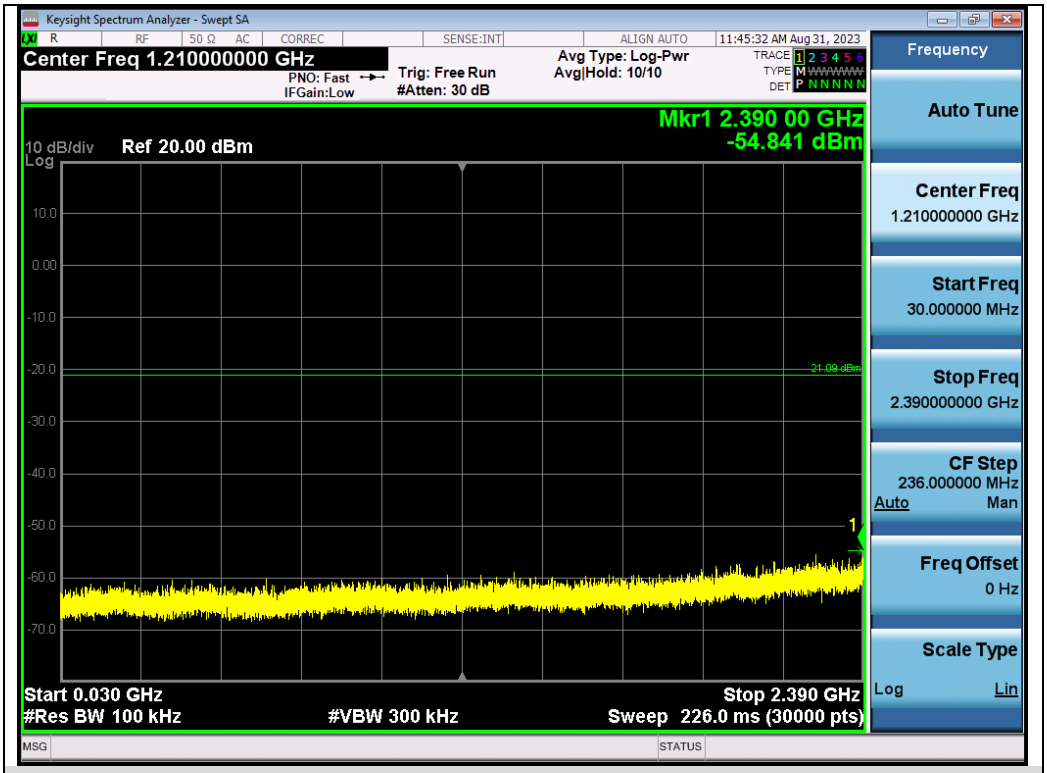
Test_Graph_802.11b_ANT1_2437_1Mbps_Higher Band Emissions



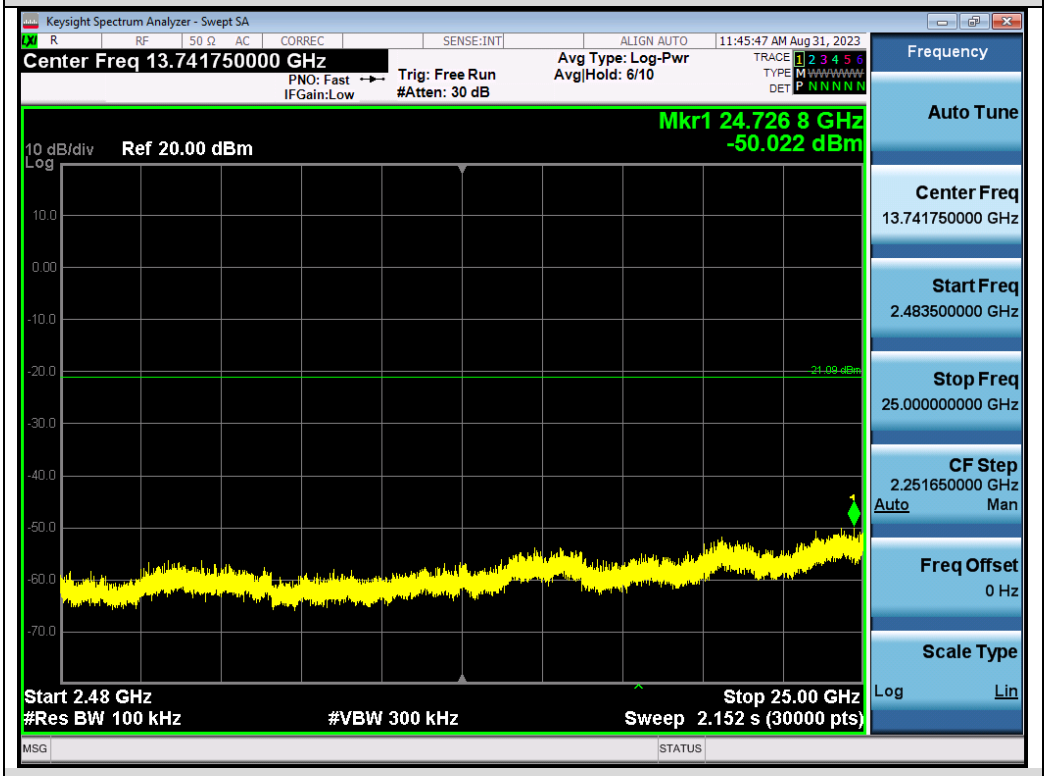
Test_Graph_802.11b_ANT1_2462_1Mbps_Lower Band Emissions



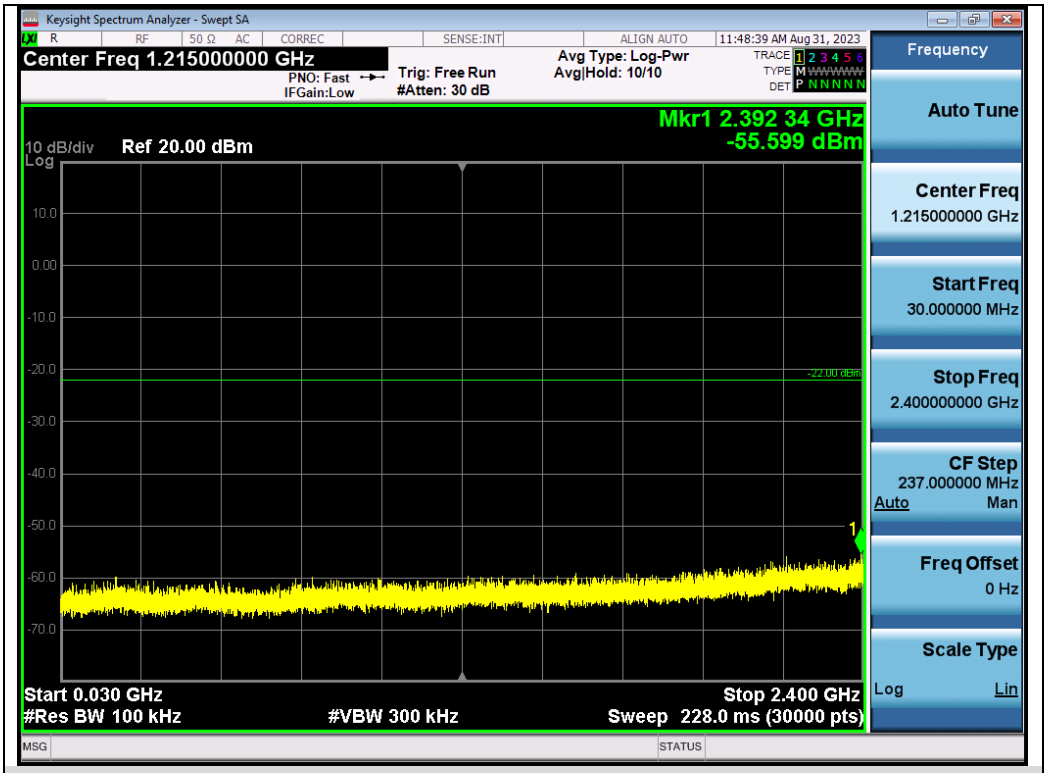
Test_Graph_802.11b_ANT1_2462_1Mbps_Higher Band Emissions



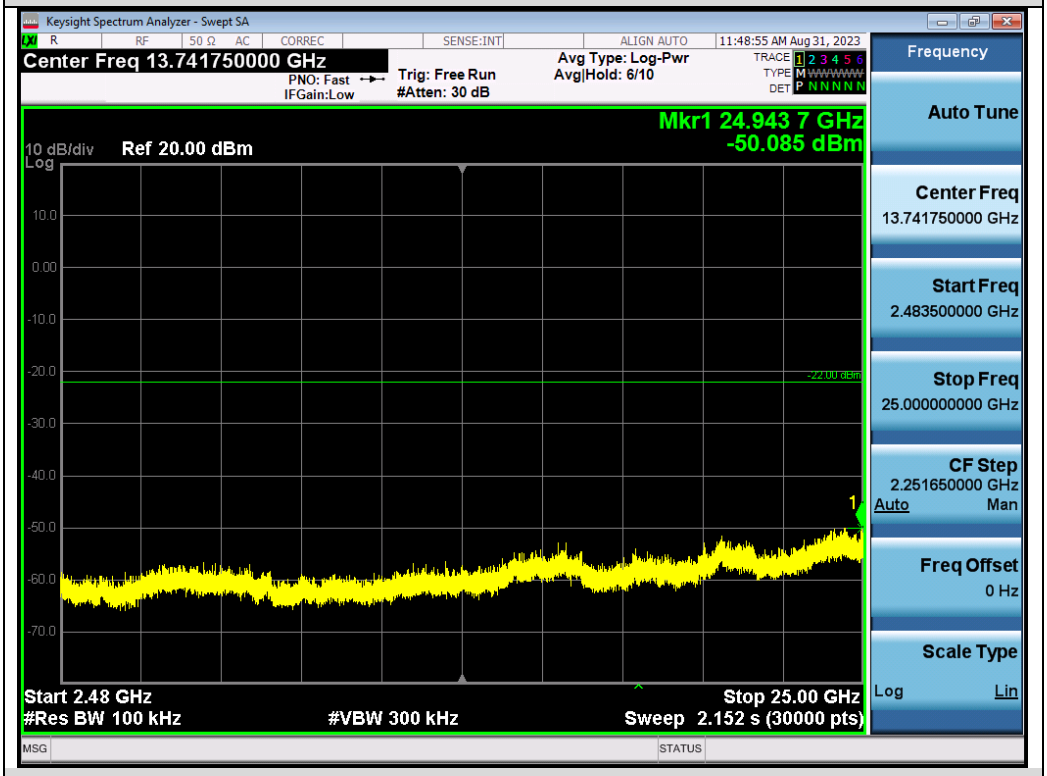
Test_Graph_802.11g_ANT1_2412_6Mbps_Lower Band Emissions



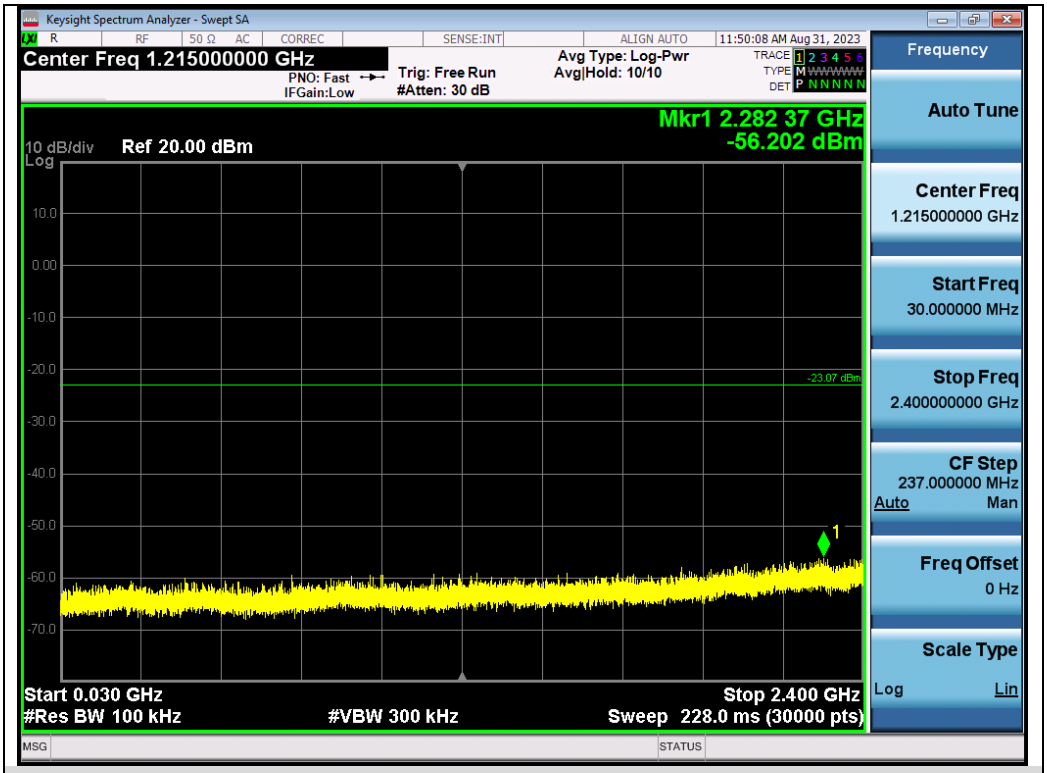
Test_Graph_802.11g_ANT1_2412_6Mbps_Higher Band Emissions



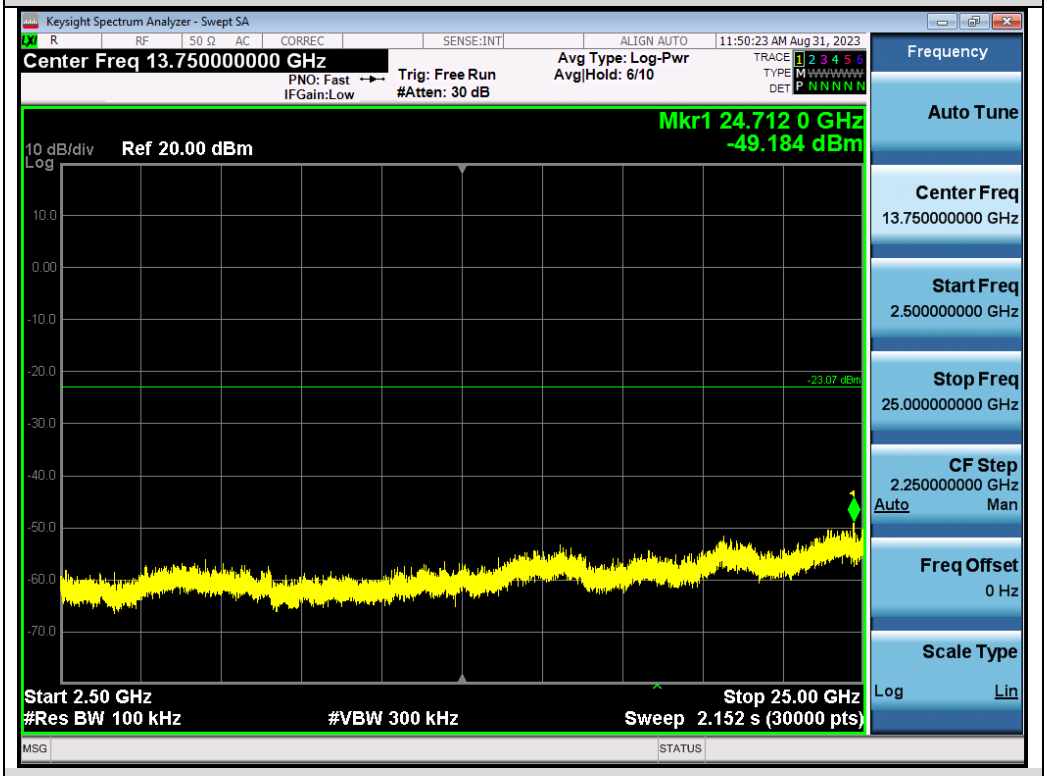
Test_Graph_802.11g_ANT1_2437_6Mbps_Lower Band Emissions



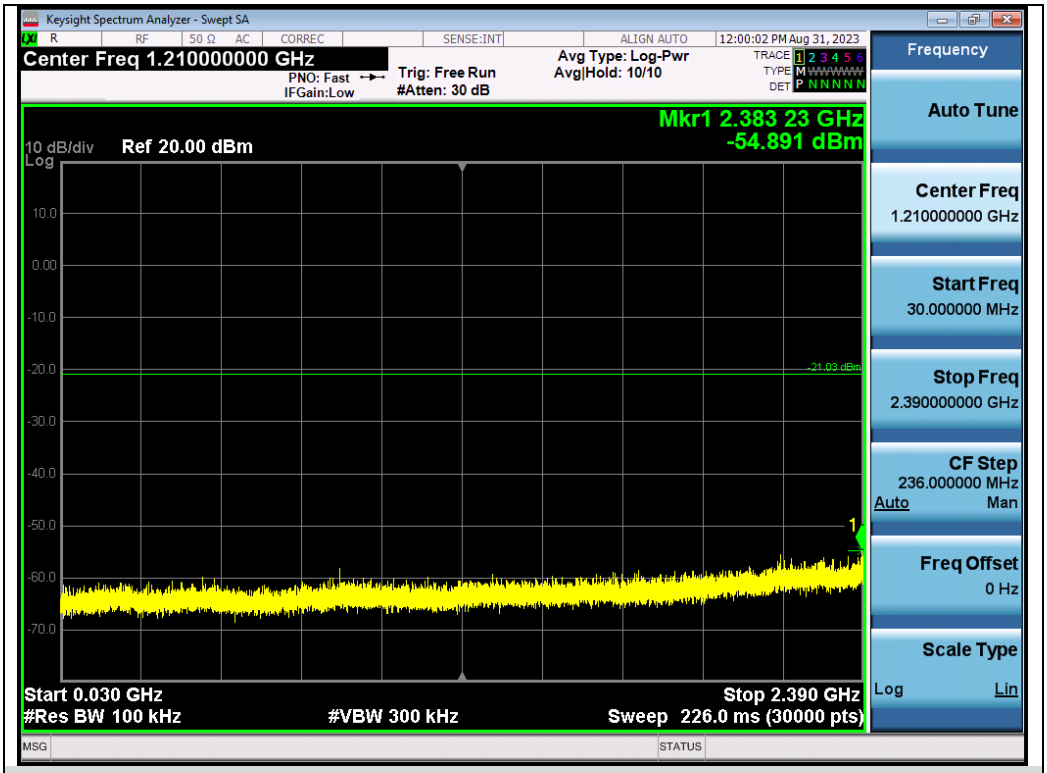
Test_Graph_802.11g_ANT1_2437_6Mbps_Higher Band Emissions



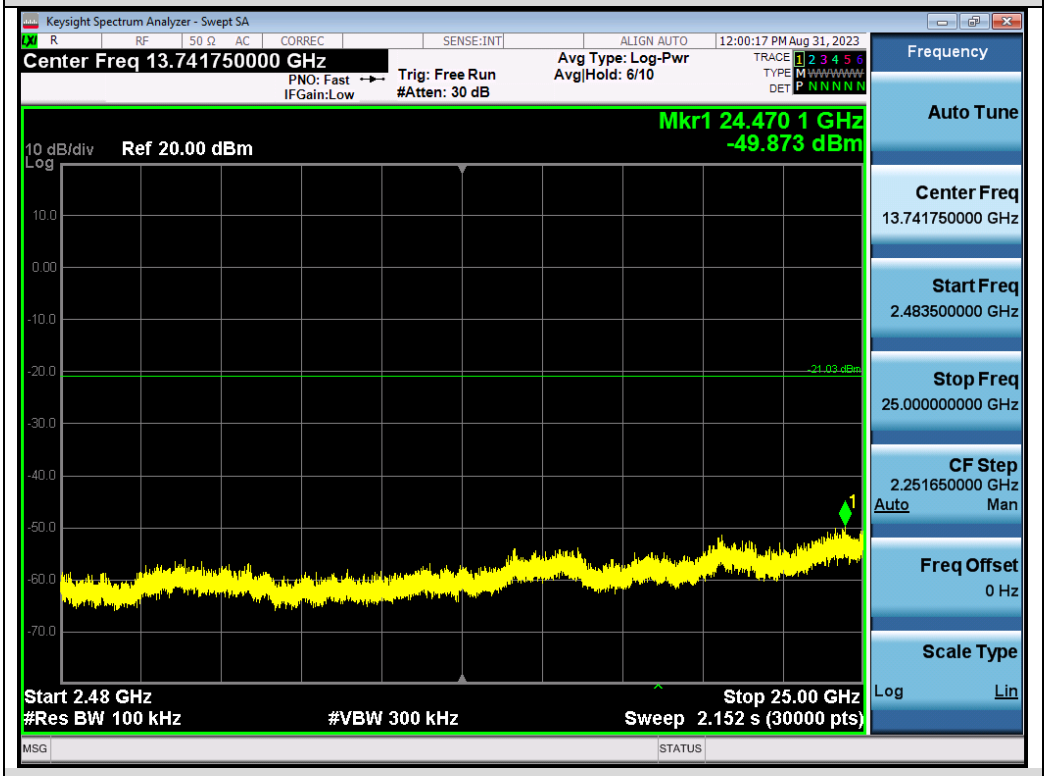
Test_Graph_802.11g_ANT1_2462_6Mbps_Lower Band Emissions



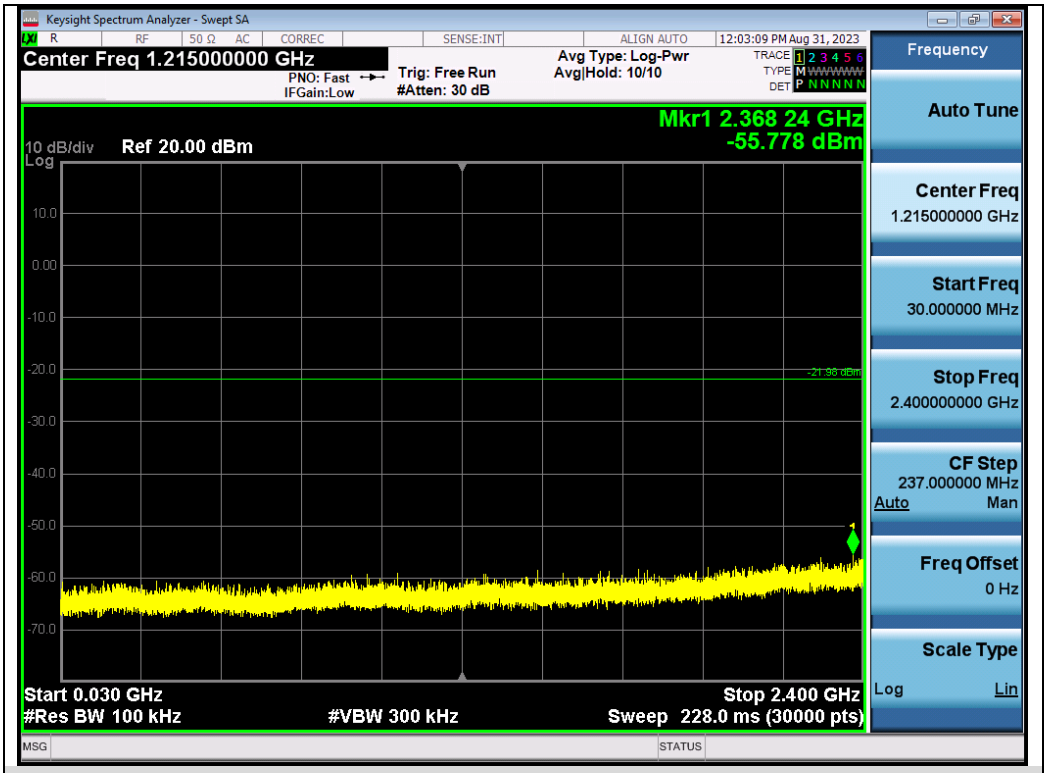
Test_Graph_802.11g_ANT1_2462_6Mbps_Higher Band Emissions



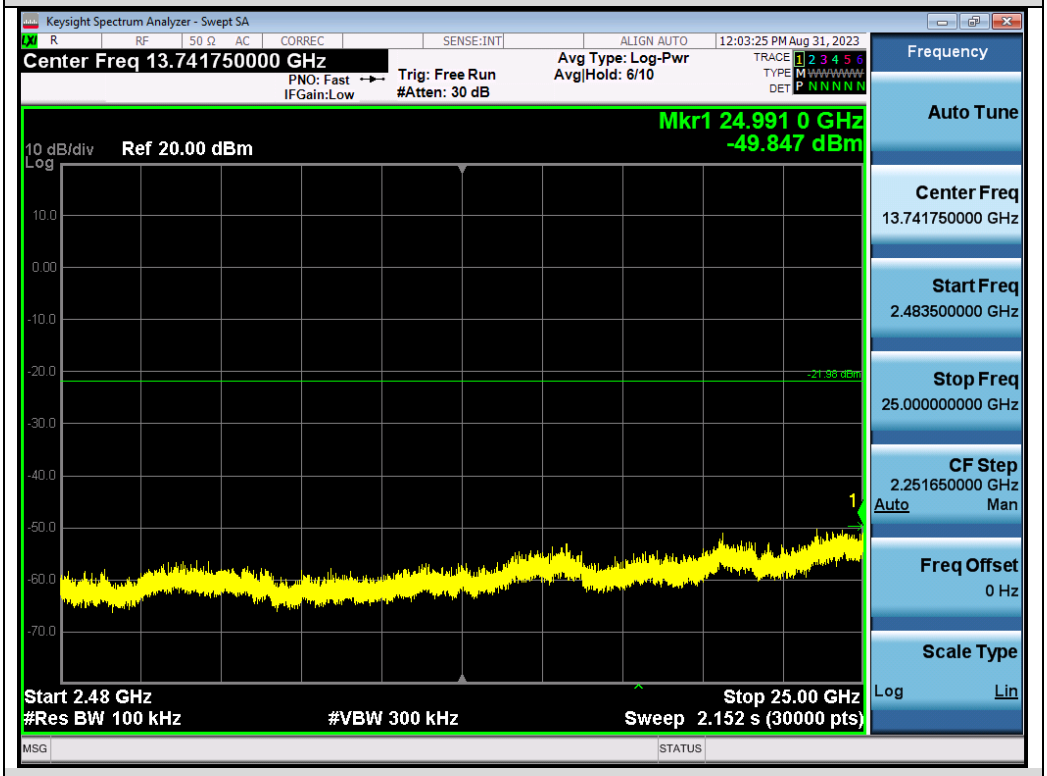
Test_Graph_802.11n20_ANT1_2412_MCS0_Lower Band Emissions



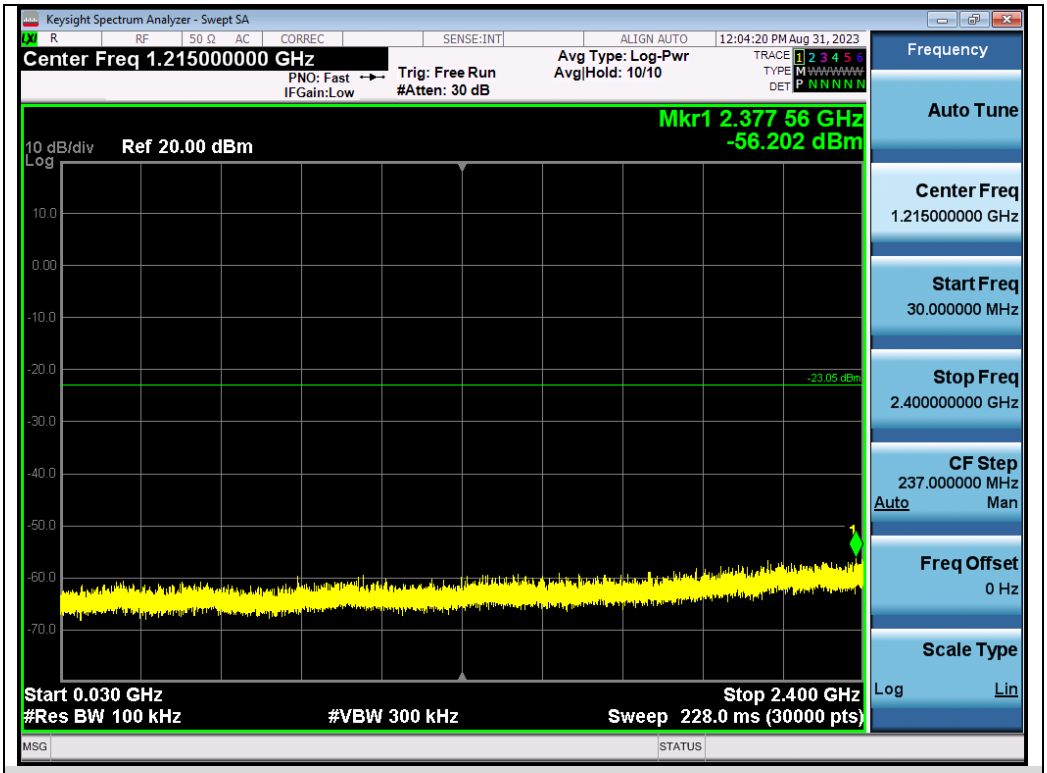
Test_Graph_802.11n20_ANT1_2412_MCS0_Higher Band Emissions



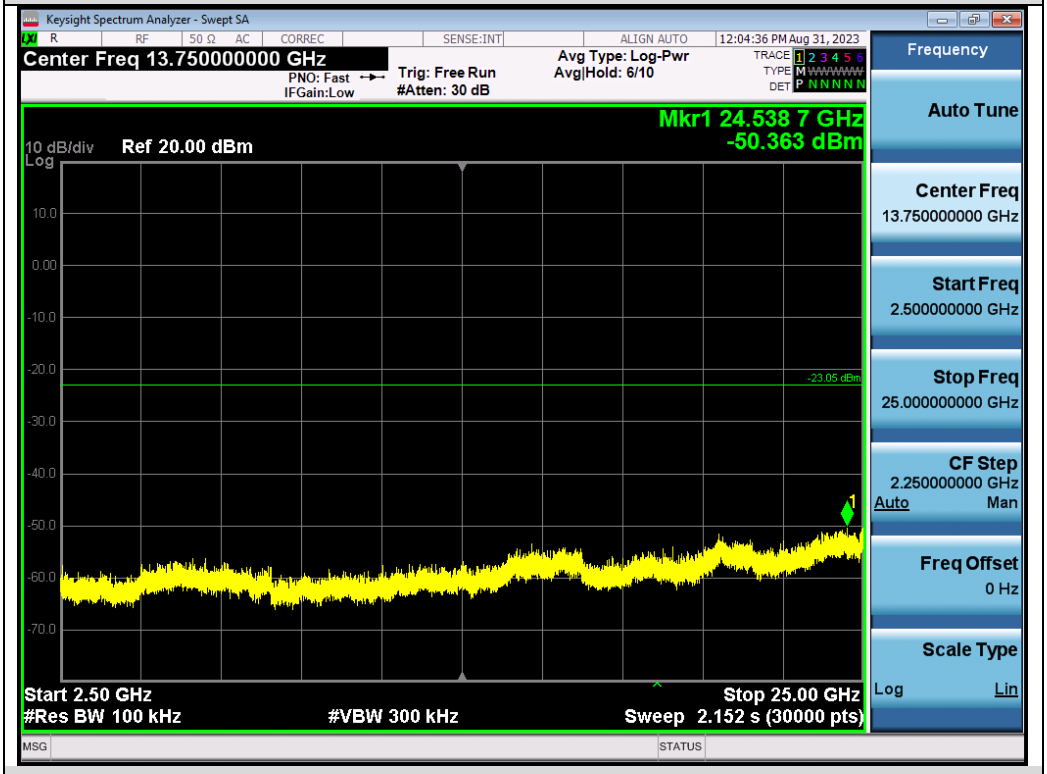
Test_Graph_802.11n20_ANT1_2437_MCS0_Lower Band Emissions



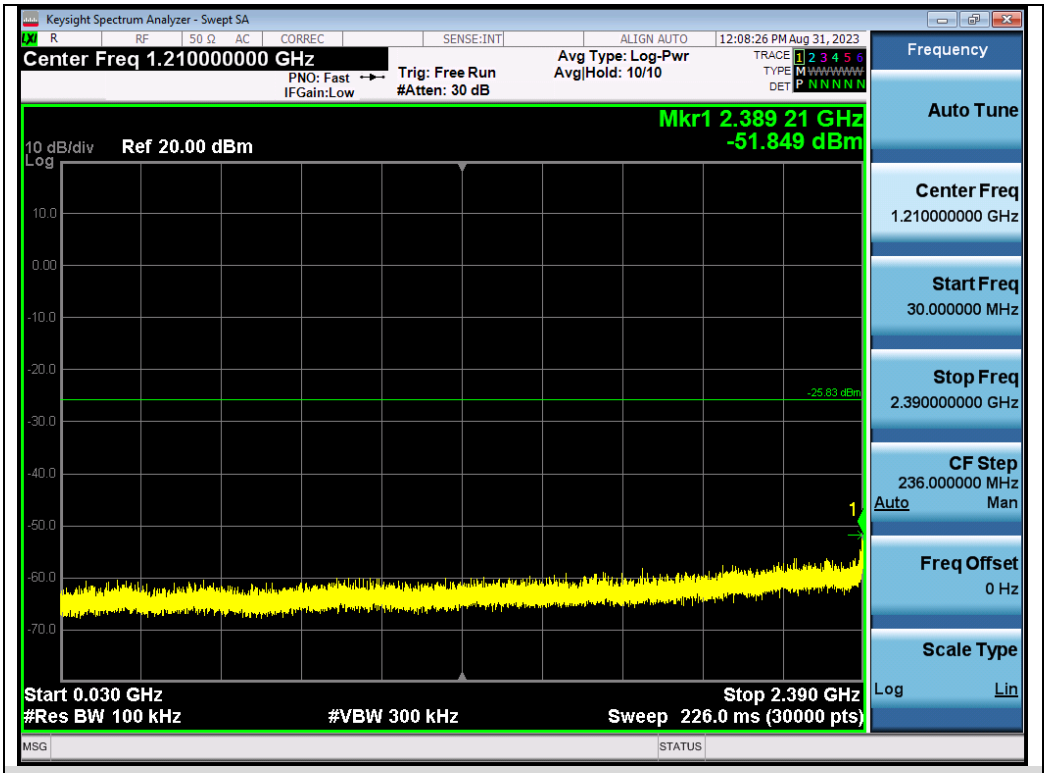
Test_Graph_802.11n20_ANT1_2437_MCS0_Higher Band Emissions



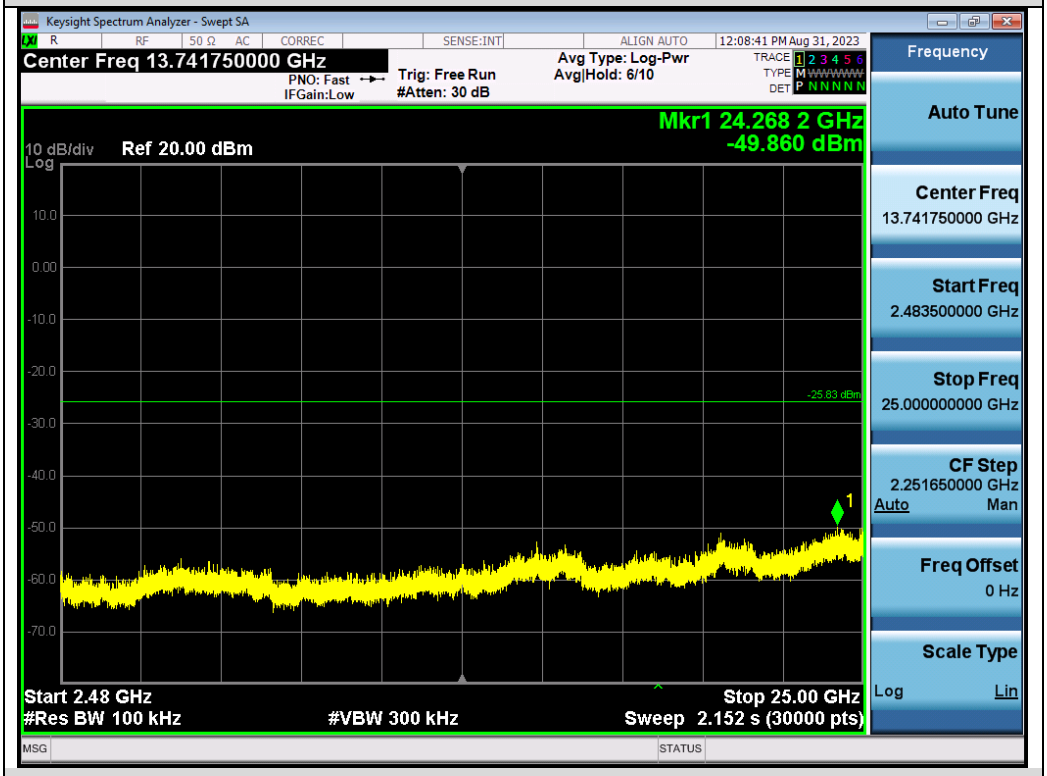
Test_Graph_802.11n20_ANT1_2462_MCS0_Lower Band Emissions



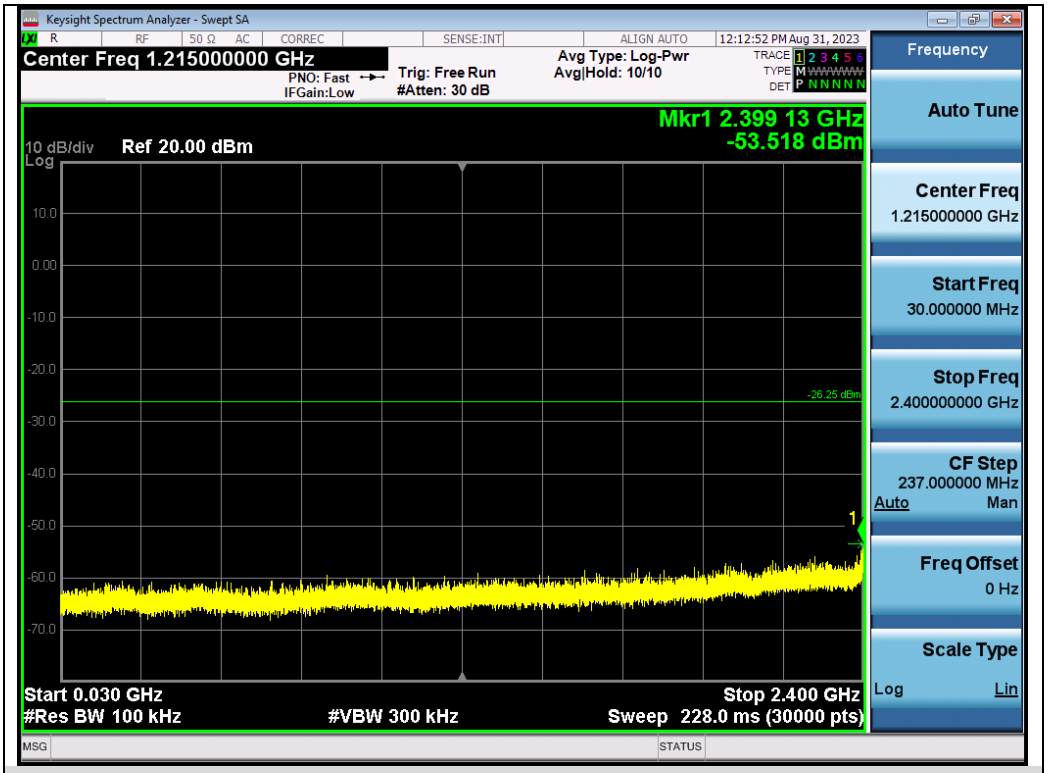
Test_Graph_802.11n20_ANT1_2462_MCS0_Higher Band Emissions



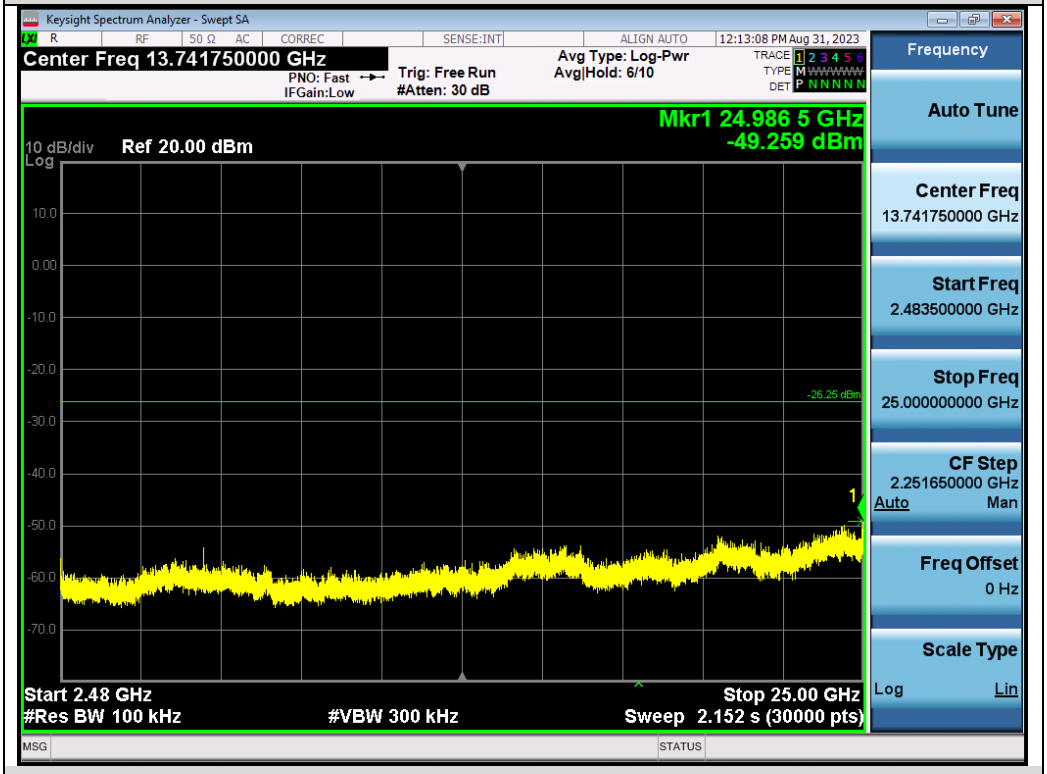
Test_Graph_802.11n40_ANT1_2422_MCS0_Lower Band Emissions



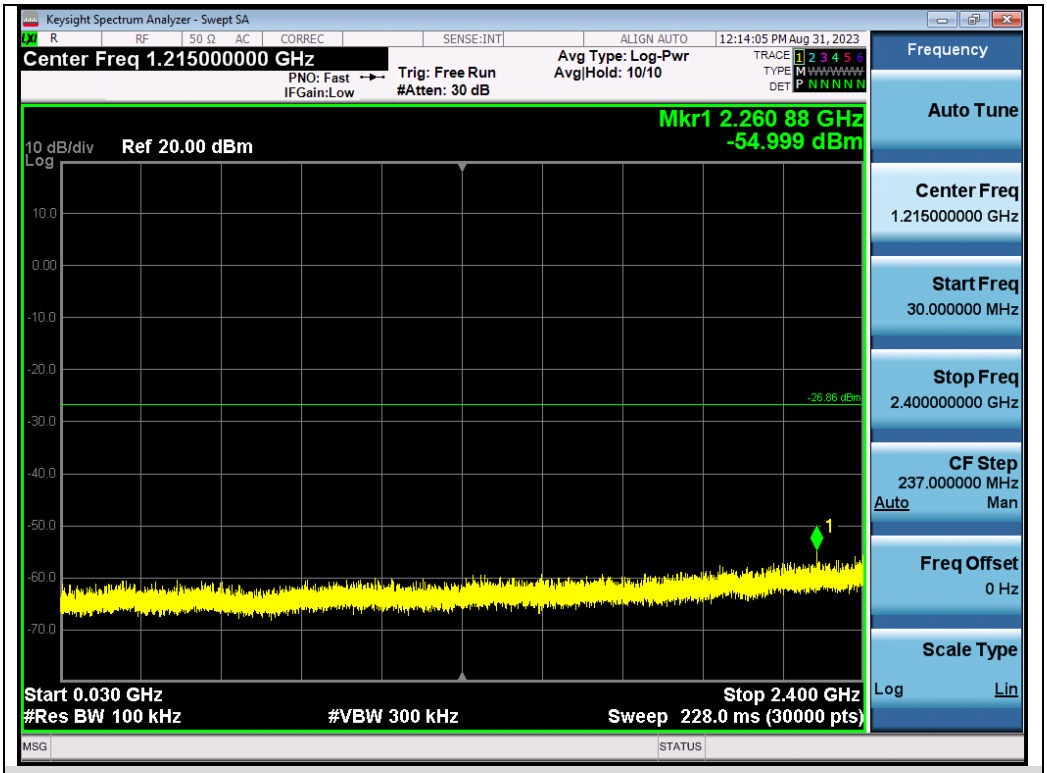
Test_Graph_802.11n40_ANT1_2422_MCS0_Higher Band Emissions



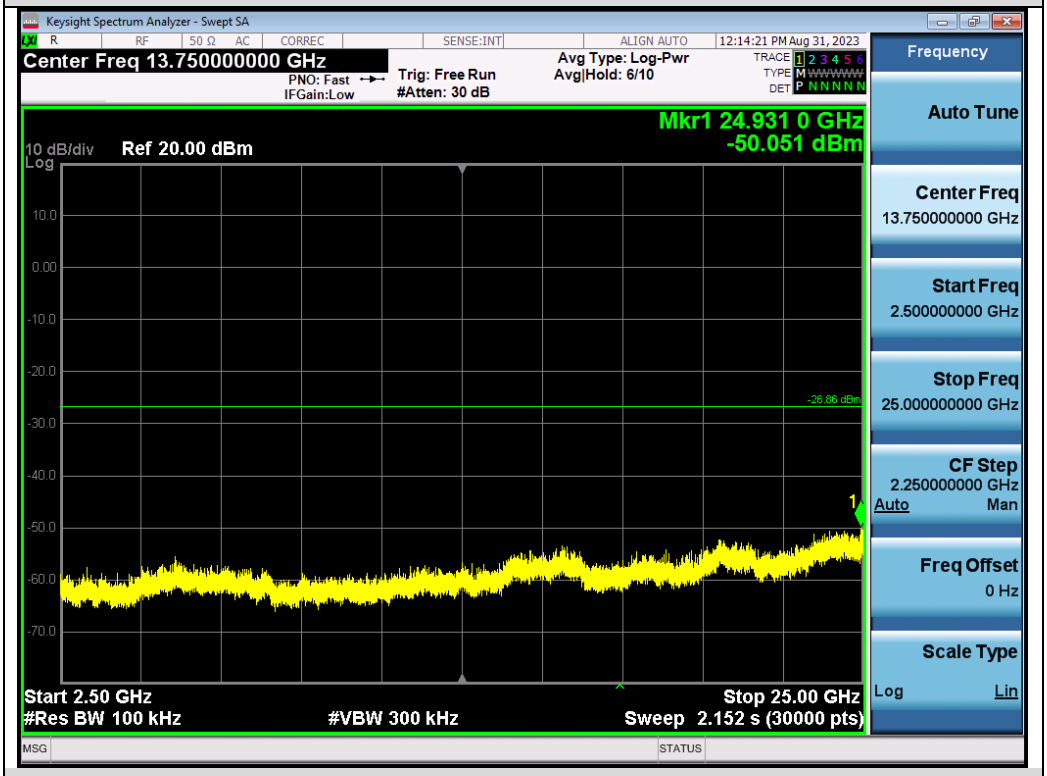
Test_Graph_802.11n40_ANT1_2437_MCS0_Lower Band Emissions



Test_Graph_802.11n40_ANT1_2437_MCS0_Higher Band Emissions



Test_Graph_802.11n40_ANT1_2452_MCS0_Lower Band Emissions

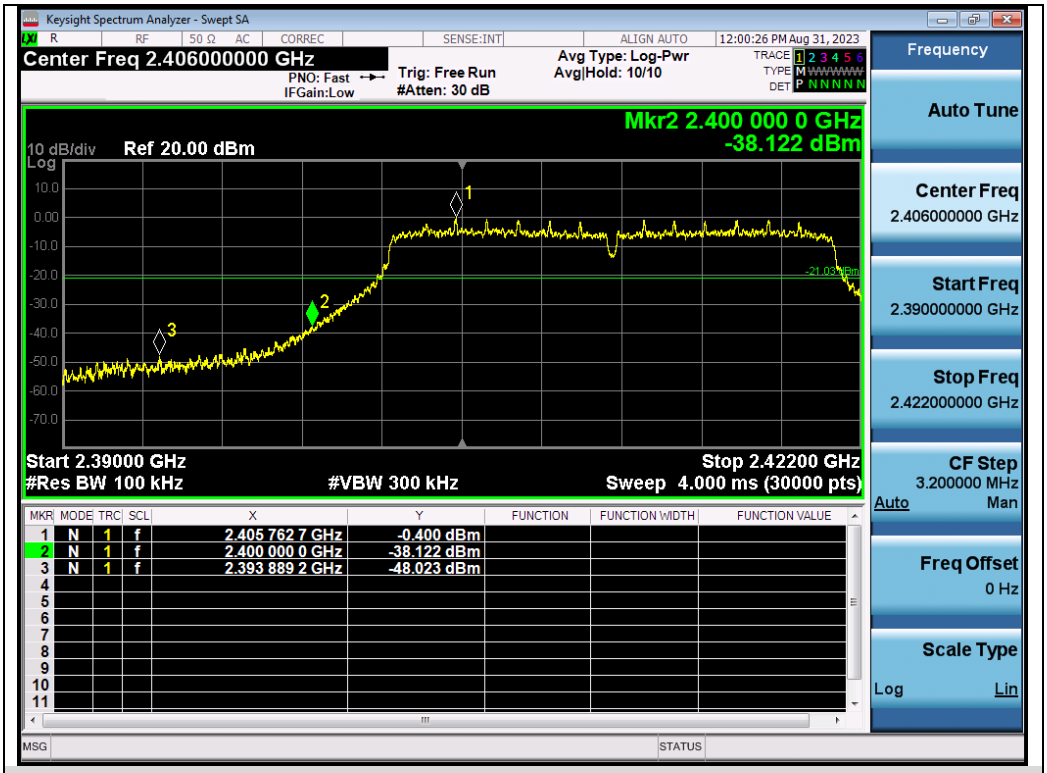


Test_Graph_802.11n40_ANT1_2452_MCS0_Higher Band Emissions

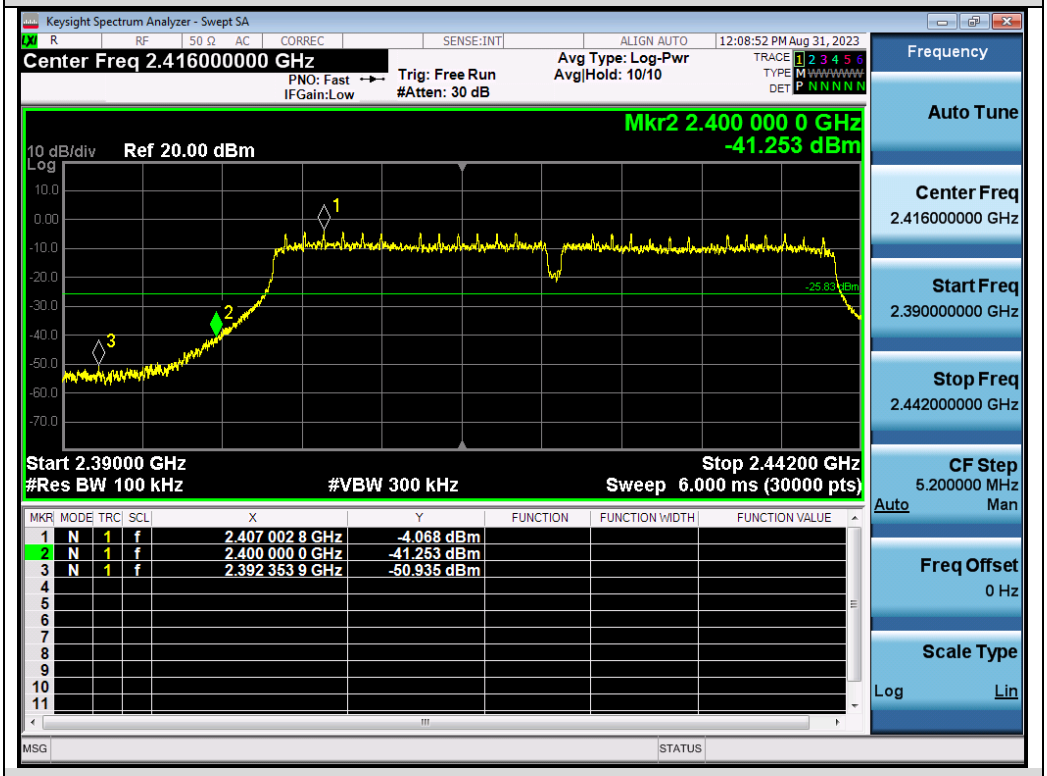
Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands

Test_Graph_802.11b_ANT1_2412_1Mbps_Lower Band Edge Emissions

Test_Graph_802.11g_ANT1_2412_6Mbps_Lower Band Edge Emissions



Test_Graph_802.11n20_ANT1_2412_MCS0_Lower Band Edge Emissions



Test_Graph_802.11n40_ANT1_2422_MCS0_Lower Band Edge Emissions

Note: Emissions from 2483.5-2500MHz which fall in the restricted bands had been considered with the radiated emission limits specified.

10. POWER SPECTRAL DENSITY MEASUREMENT

10.1 MEASUREMENT LIMITS

According to Section 5.2(b) of the RSS-247 standard:

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.

10.2 MEASUREMENT PROCEDURE

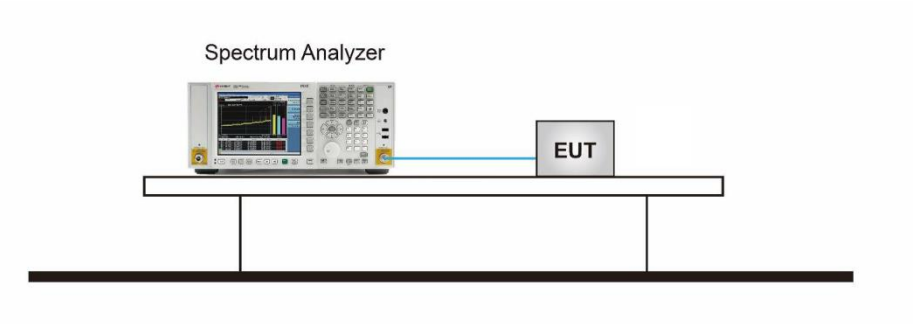
☒For Peak power spectral density test:

1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
2. Connect EUT RF output port to the Spectrum Analyzer.
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 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.
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.

10.3 MEASUREMENT SETUP (BLOCK DIAGRAM OF CONFIGURATION)



10.4 MEASUREMENT RESULT

Test Data of Conducted Output Power Spectral Density					
Test Mode	Test Channel (MHz)	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail
802.11b	2412	-2.319	-10.558	⩽8	Pass
	2437	-2.147	-10.386	⩽8	Pass
	2462	-5.232	-13.471	⩽8	Pass
802.11g	2412	-6.681	-14.92	⩽8	Pass
	2437	-6.834	-15.073	⩽8	Pass
	2462	-8.436	-16.675	⩽8	Pass
802.11n20	2412	-6.887	-15.126	⩽8	Pass
	2437	-7.667	-15.906	⩽8	Pass
	2462	-9.209	-17.448	⩽8	Pass
802.11n40	2422	-10.422	-18.661	⩽8	Pass
	2437	-10.616	-18.855	⩽8	Pass
	2452	-12.098	-20.337	⩽8	Pass

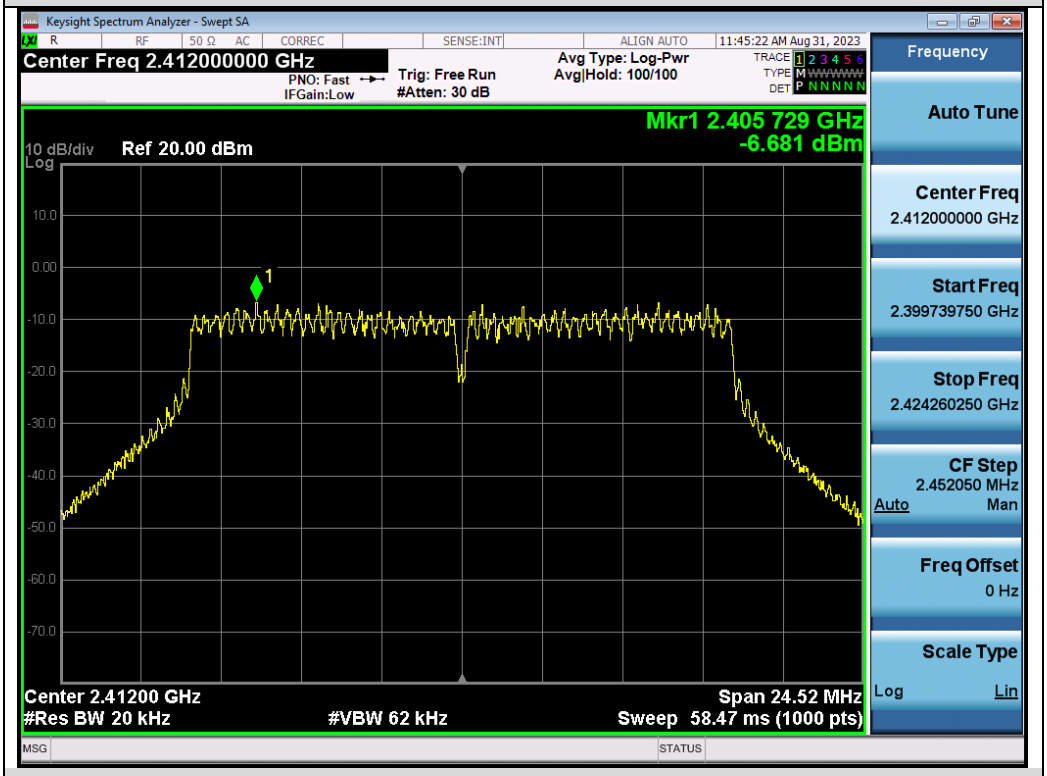
Note: Power density(dBm/3kHz) = Power density(dBm/20kHz) – 10*log(20/3).

Test Graphs of Conducted Output Power Spectral Density

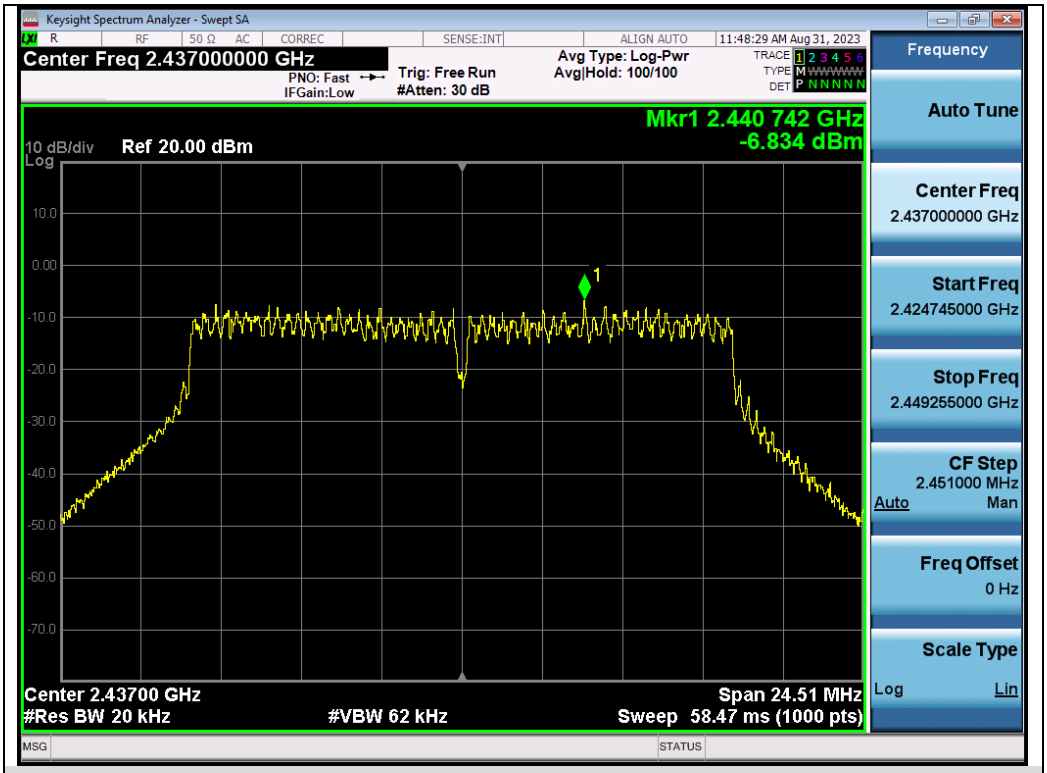
Test_Graph_802.11b_ANT1_2412_1Mbps_PSD

Test_Graph_802.11b_ANT1_2437_1Mbps_PSD

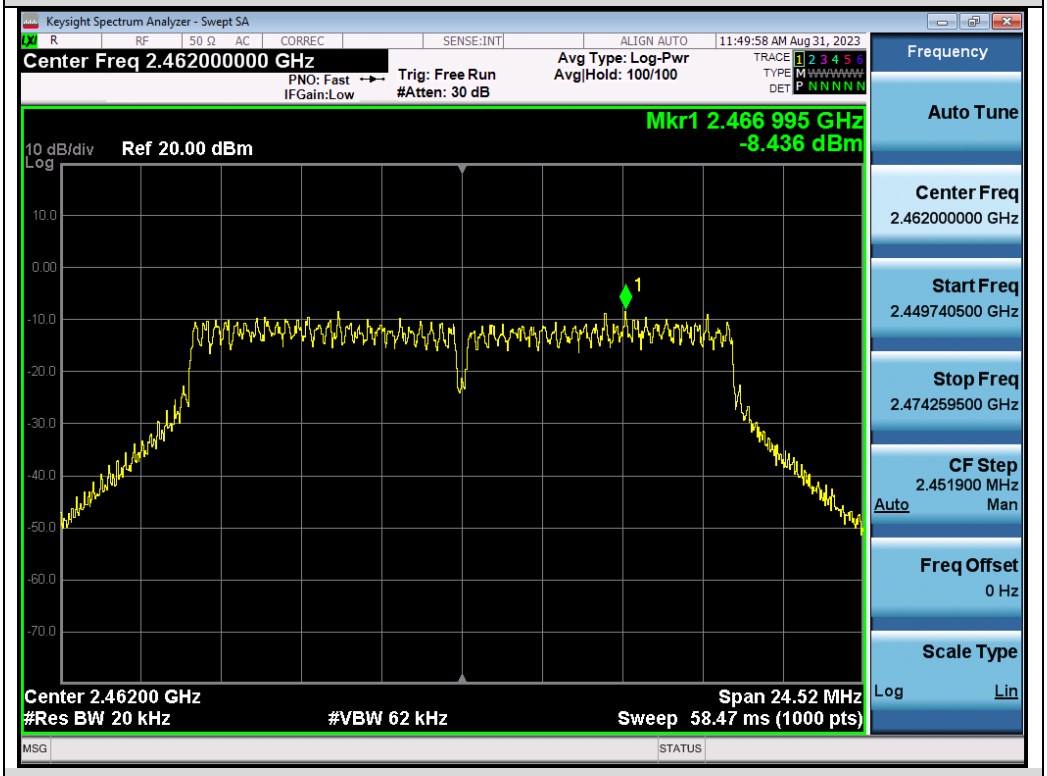
Test_Graph_802.11b_ANT1_2462_1Mbps_PSD



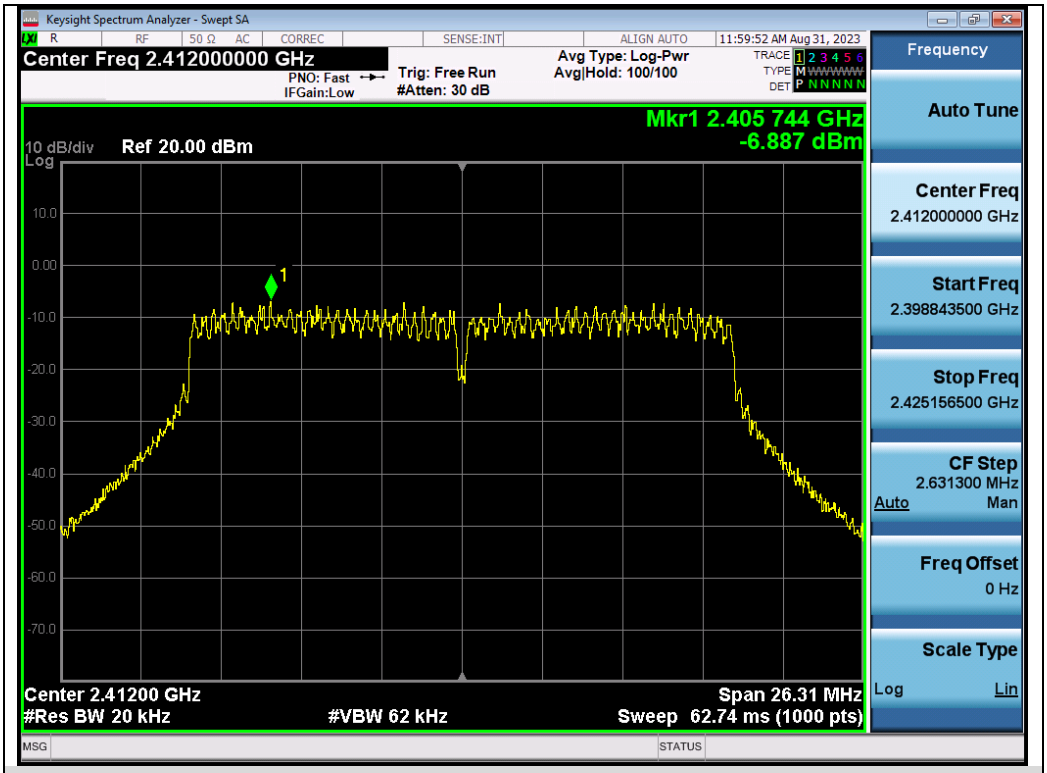
Test_Graph_802.11g_ANT1_2412_6Mbps_PSD



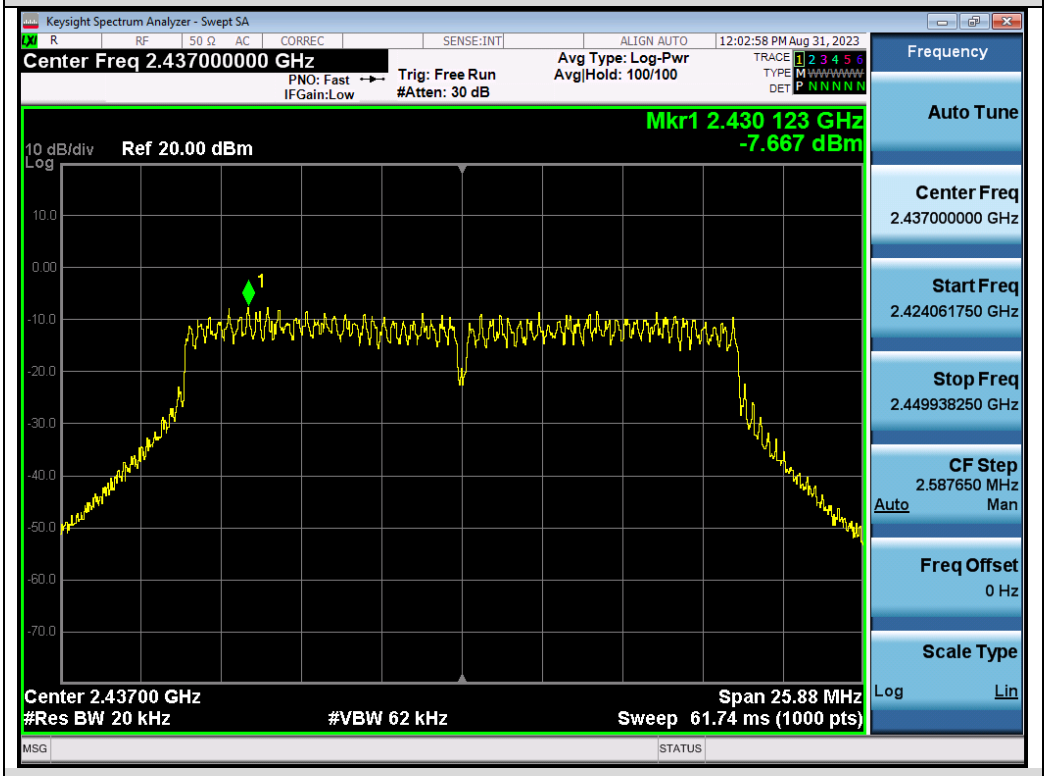
Test_Graph_802.11g_ANT1_2437_6Mbps_PSD



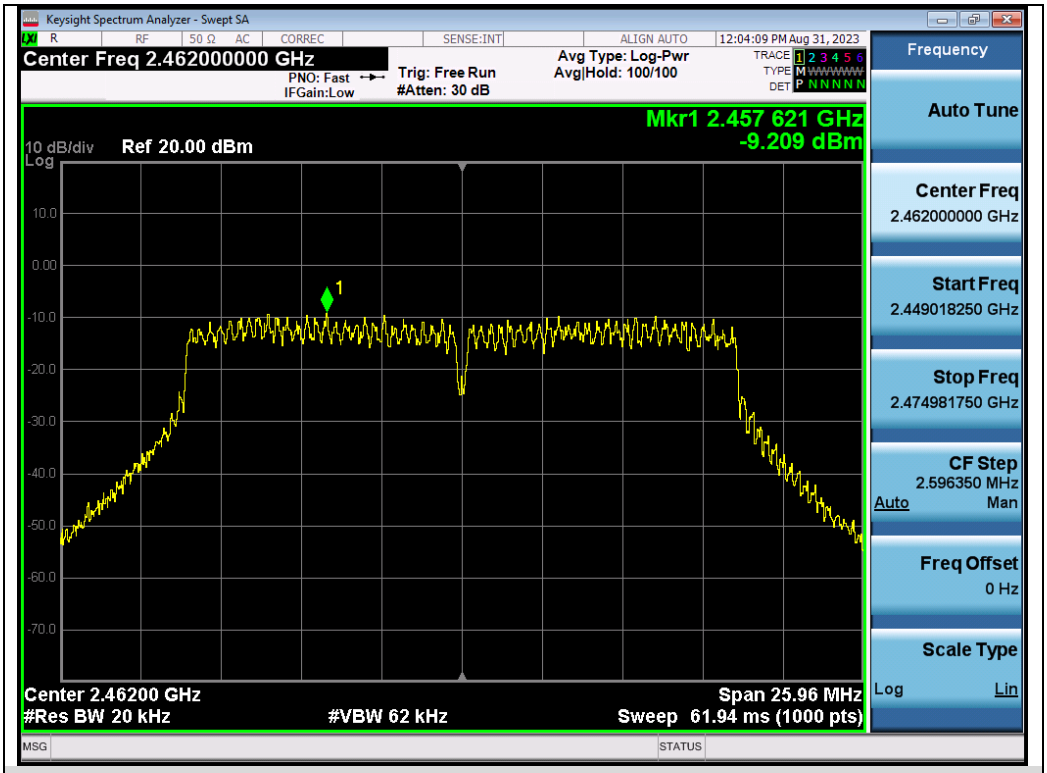
Test_Graph_802.11g_ANT1_2462_6Mbps_PSD



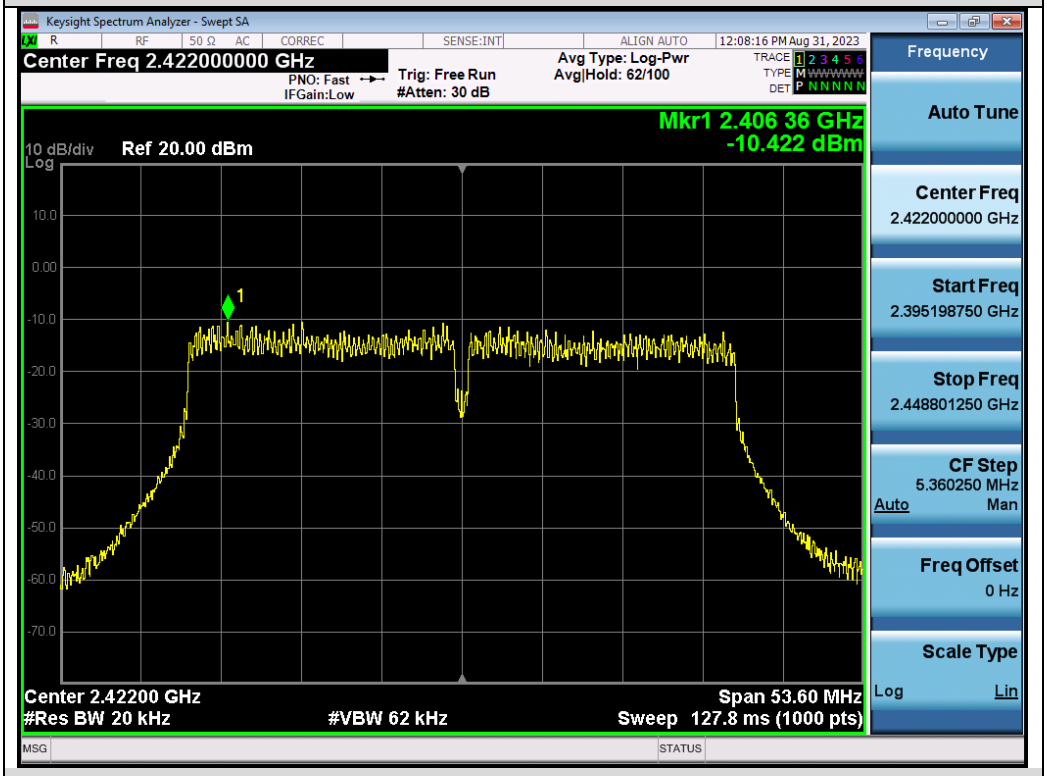
Test_Graph_802.11n20_ANT1_2412_MCS0_PSD



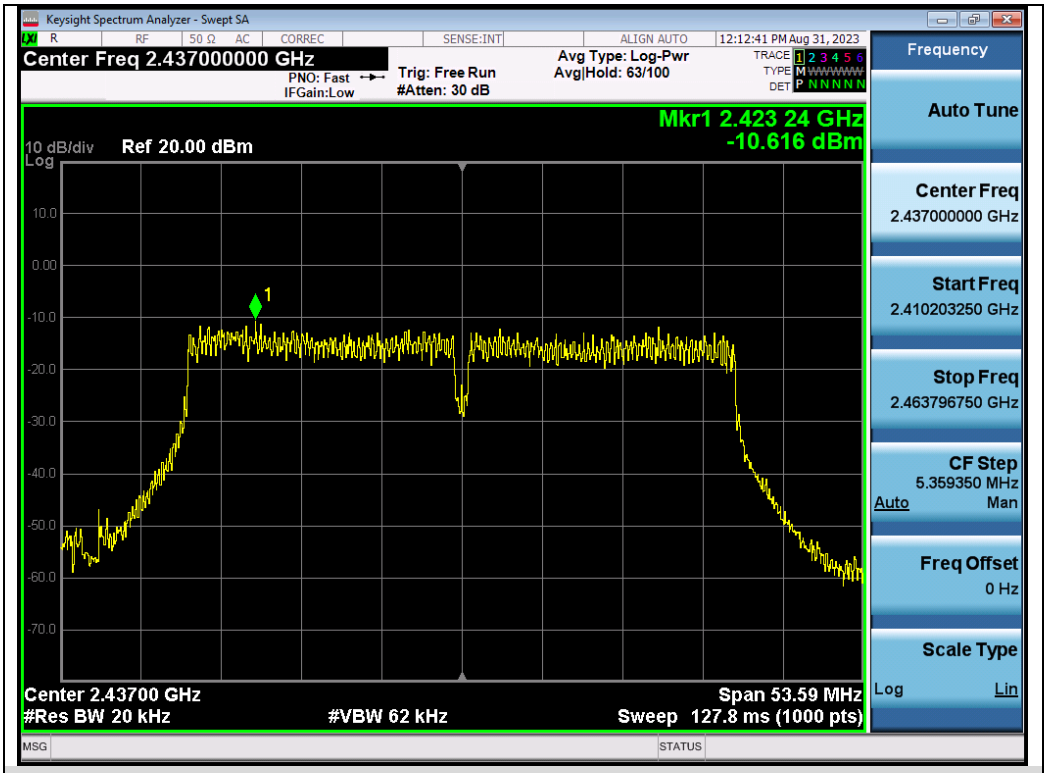
Test_Graph_802.11n20_ANT1_2437_MCS0_PSD



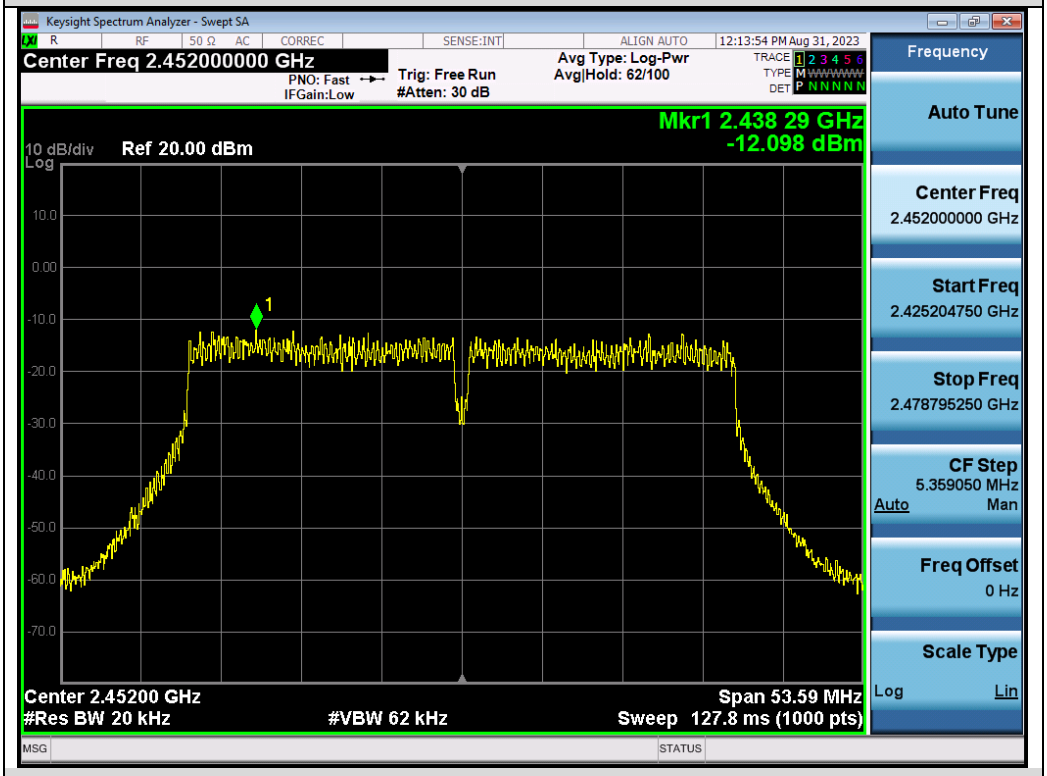
Test_Graph_802.11n20_ANT1_2462_MCS0_PSD



Test_Graph_802.11n40_ANT1_2422_MCS0_PSD



Test_Graph_802.11n40_ANT1_2437_MCS0_PSD



Test_Graph_802.11n40_ANT1_2452_MCS0_PSD

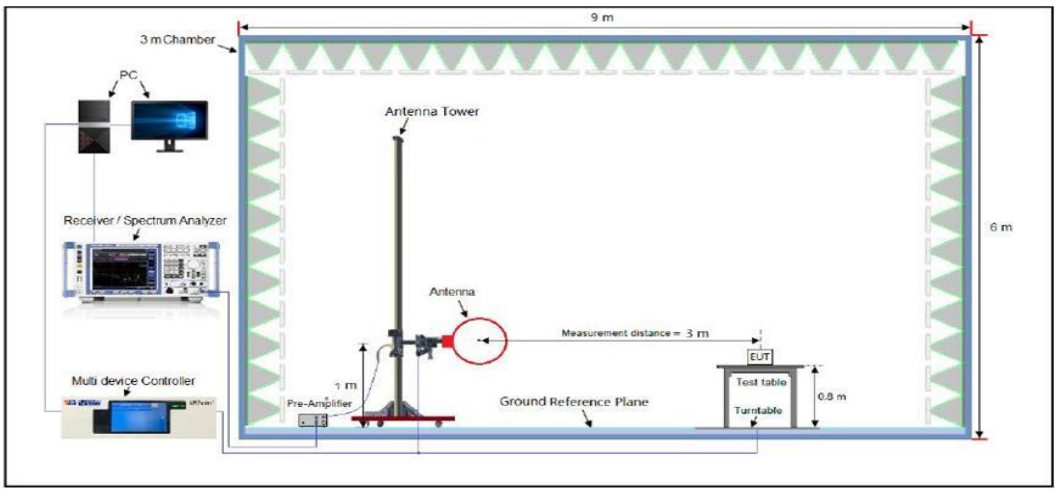
11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

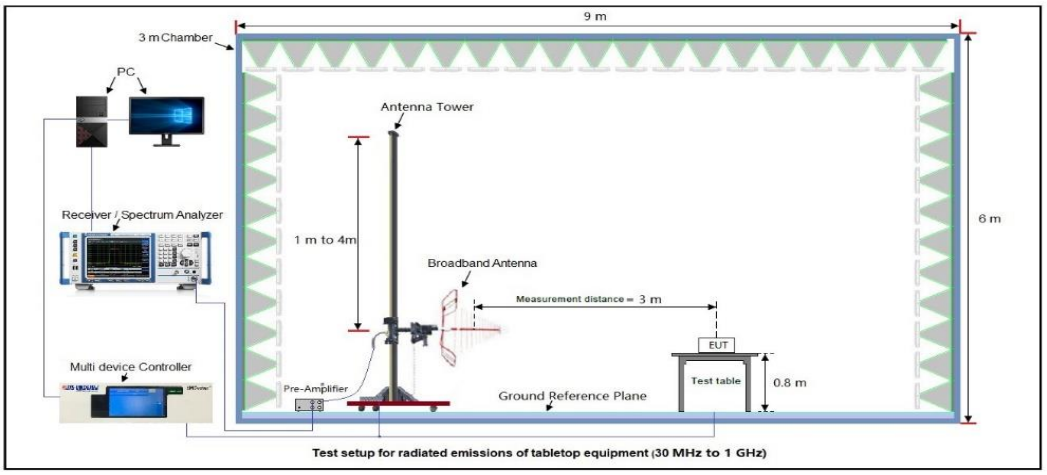
1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

11.2. TEST SETUP

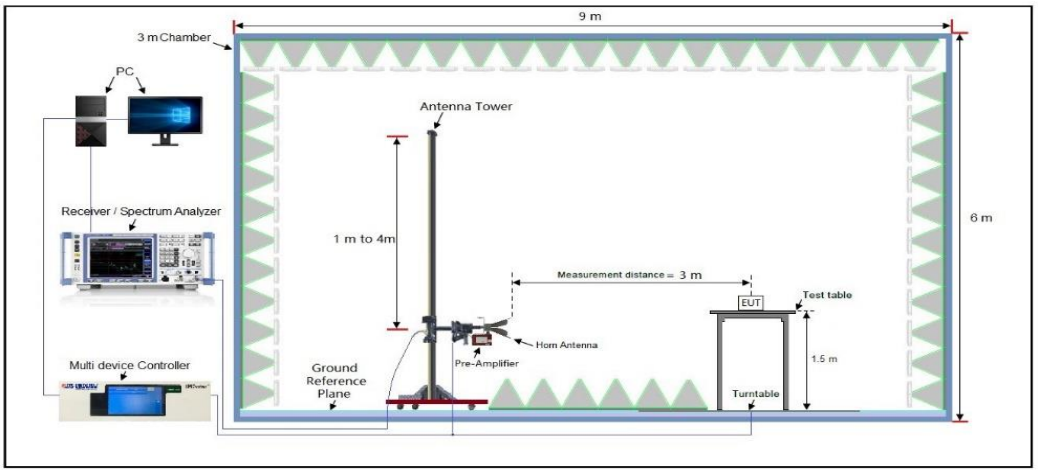
RADIATED EMISSION TEST SETUP 9KHz-30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

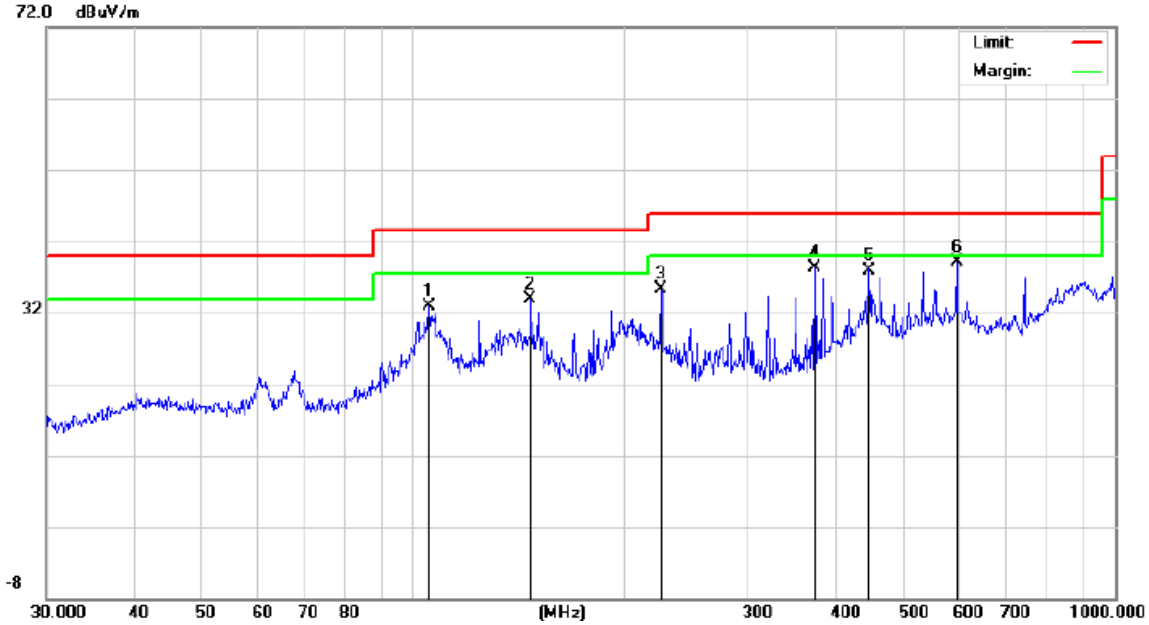
11.4. TEST RESULT

Radiated emission below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

Radiated emission from 30MHz to 1000MHz

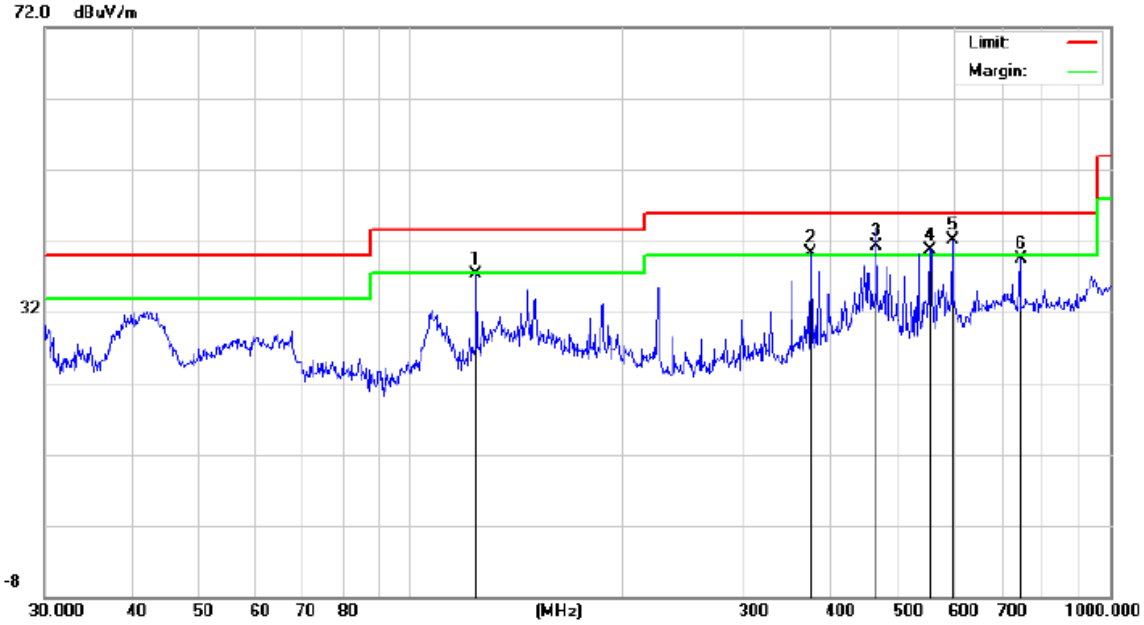
EUT	Party speaker	**Model Name**	BREAK X1
Temperature	25°C	**Relative Humidity**	58%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	**Antenna**	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		105.2718	16.72	16.25	32.97	43.50	-10.53	peak
2		146.8877	19.82	14.17	33.99	43.50	-9.51	peak
3		225.3080	20.69	14.67	35.36	46.00	-10.64	peak
4		373.3112	20.23	18.00	38.23	46.00	-7.77	peak
5		446.4141	13.12	24.88	38.00	46.00	-8.00	peak
6	*	595.1329	14.29	24.91	39.20	46.00	-6.80	peak

RESULT: PASS

EUT	Party speaker	Model Name	BREAK X1
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		124.1329	19.44	17.80	37.24	43.50	-6.26	peak
2	!	373.3110	18.97	21.33	40.30	46.00	-5.70	peak
3	!	463.9696	16.30	24.92	41.22	46.00	-4.78	QP
4	!	552.8832	16.16	24.64	40.80	46.00	-5.20	peak
5	*	595.1327	16.13	25.98	42.11	46.00	-3.89	peak
6		744.8660	12.25	27.22	39.47	46.00	-6.53	peak

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The “Factor” value can be calculated automatically by software of measurement system.

3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.

Radiated emission above 1GHz

EUT	Party speaker	**Model Name**	BREAK X1
Temperature	25°C	**Relative Humidity**	58%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	**Antenna**	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4824.000	54.26	0.08	54.34	74.00	-19.66	peak
4824.000	44.69	0.08	44.77	54.00	-9.23	AVG
7236.000	50.49	2.21	52.70	74.00	-21.30	peak
7236.000	41.34	2.21	43.55	54.00	-10.45	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Party speaker	**Model Name**	BREAK X1
Temperature	25°C	**Relative Humidity**	58%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	**Antenna**	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4824.000	55.61	0.08	55.69	74.00	-18.31	peak
4824.000	43.25	0.08	43.33	54.00	-10.67	AVG
7236.000	50.49	2.21	52.70	74.00	-21.30	peak
7236.000	41.38	2.21	43.59	54.00	-10.41	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Party speaker	Model Name	BREAK X1
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHz	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.000	53.46	0.14	53.60	74.00	-20.40	peak
4874.000	44.95	0.14	45.09	54.00	-8.91	AVG
7311.000	42.31	2.36	44.67	74.00	-29.33	peak
7311.000	38.57	2.36	40.93	54.00	-13.07	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Party speaker	Model Name	BREAK X1
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHz	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4874.000	54.26	0.14	54.40	74.00	-19.60	peak
4874.000	42.15	0.14	42.29	54.00	-11.71	AVG
7311.000	46.38	2.36	48.74	74.00	-25.26	peak
7311.000	38.46	2.36	40.82	54.00	-13.18	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Party speaker	Model Name	BREAK X1
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHz	Antenna	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4924.000	55.49	0.22	55.71	74.00	-18.29	peak
4924.000	46.34	0.22	46.56	54.00	-7.44	AVG
7386.000	50.81	2.64	53.45	74.00	-20.55	peak
7386.000	37.54	2.64	40.18	54.00	-13.82	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Party speaker	Model Name	BREAK X1
Temperature	25°C	Relative Humidity	58%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHz	Antenna	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4924.000	54.36	0.22	54.58	74.00	-19.42	peak
4924.000	42.35	0.22	42.57	54.00	-11.43	AVG
7386.000	46.35	2.64	48.99	74.00	-25.01	peak
7386.000	37.54	2.64	40.18	54.00	-13.82	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: PASS

Note:

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

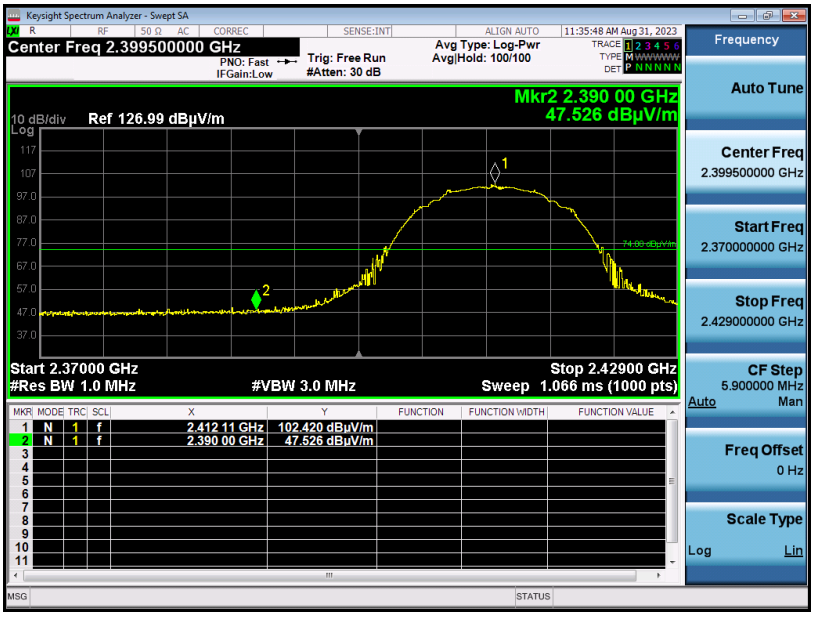
The “Factor” value can be calculated automatically by software of measurement system.

All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report.

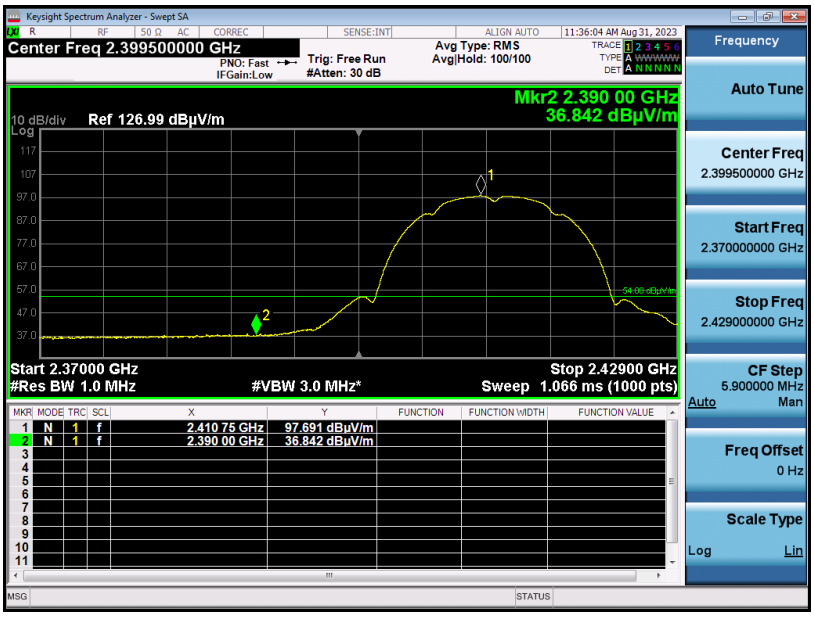
Test result for band edge emission at restricted bands

EUT	Party speaker	**Model Name**	BREAK X1
Temperature	25°C	**Relative Humidity**	60%
Pressure	960hPa	**Test Voltage**	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHz	**Antenna**	Horizontal

Test Graph for Peak Measurement



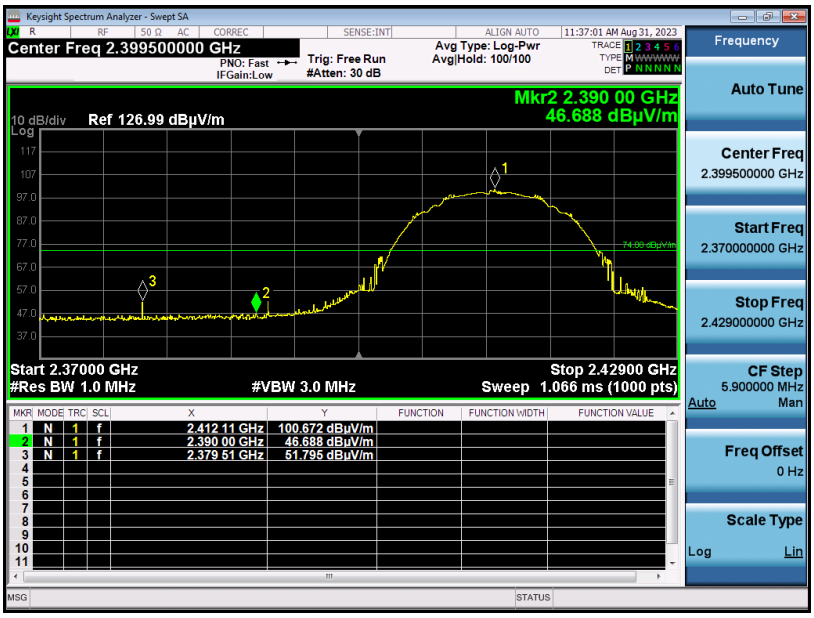
Test Graph for Average Measurement



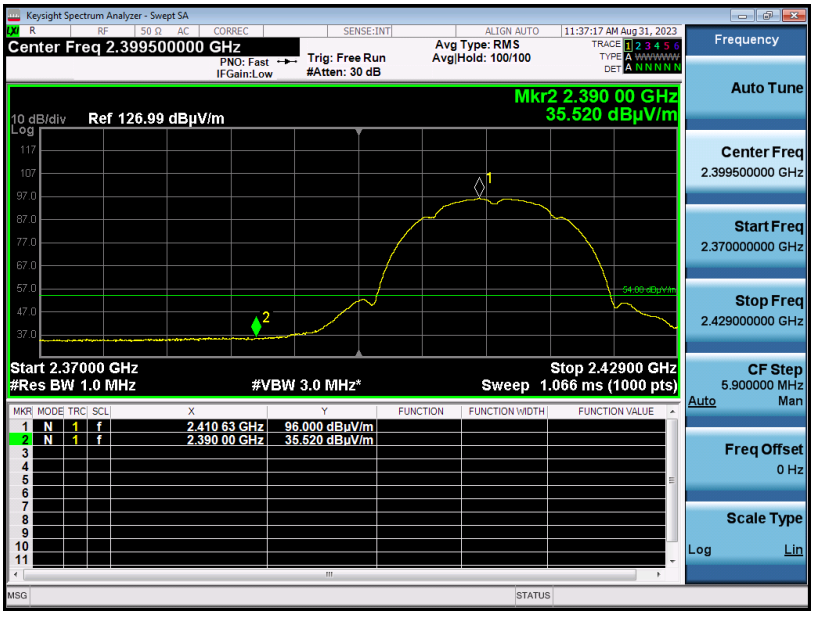
RESULT: PASS

EUT	Party speaker	Model Name	BREAK X1
Temperature	25°C	Relative Humidity	60%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



RESULT: PASS