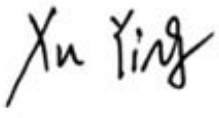
RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd.
FCC ID	XMR2023FGS060N
Product	Wi-Fi, Bluetooth & 802.15.4 Module
Brand	Quectel
Model	FGS060N
Report No.	R2304A0500-R1V2
Issue Date	November 30, 2023

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15C (2022)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.



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Version	Revision Description	Issue Date
Rev.0	Initial issue of report.	November 24, 2023
Rev.1	Update Main Test Instruments.	November 27, 2023
Rev.2	Update data.	November 30, 2023
Note: This revised report (Report No.: R2304A0500-R1V2) supersedes and replaces the previously issued report (Report No.: R2304A0500-R1V1). Please discard or destroy the previously issued report and dispose of it accordingly.		

Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	Maximum output power	15.247(b)(3)	PASS
2	99% Bandwidth and 6dB Bandwidth	15.247(a)(2) C63.10 6.9	PASS
3	Power spectral density	15.247(e)	PASS
4	Band Edge	15.247(d)	PASS
5	Spurious RF Conducted Emissions	15.247(d)	PASS
6	Unwanted Emissions	15.247(d),15.205,15.209	PASS
7	Conducted Emissions	15.207	NA
Date of Testing: June 2, 2023 ~ November 30, 2023 Date of Sample Received: May 31, 2023			
Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

1. Test Laboratory

1.1. Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test Facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

2. General Description of Equipment Under Test

2.1. Applicant and Manufacturer Information

Applicant	Quectel Wireless Solutions Co., Ltd.
Applicant address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233
Manufacturer	Quectel Wireless Solutions Co., Ltd.
Manufacturer address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China, 200233

2.2. General Information

EUT Description		
Model	FGS060N	
SN	Conducted	E1Y23EC27000023
	Radiated	E1Y23EC27000037
Hardware Version	R1.0	
Software Version	NA	
Power Supply	External power supply	
Antenna Type	External Antenna	
Antenna Connector	SMA Male (Center Pin) (module use unique antenna connector meet with the standard FCC Part 15.203 unique antenna connector requirement)	
Antenna Gain	Wi-Fi 2.4G/Thread: 0.73 dBi Bluetooth LE: 0.73 dBi	
Additional Beamforming Gain	NA	
Operating Frequency Range(s)	802.11b/g/n(HT20)/ax(HE20): 2412 ~ 2462 MHz 802.11n(HT40)/ax(HE40): 2422 ~ 2452 MHz Thread: 2405 ~ 2480 MHz Bluetooth LE V5.3: 2402 ~2480 MHz	
Modulation Type	802.11b: DSSS 802.11g/n: OFDM 802.11ax SU: OFDM 802.11ax TB/ERSU: OFDMA Thread: O-QPSK Bluetooth LE: GFSK	
Max. Output Power	Wi-Fi 2.4G: 16.18 dBm Bluetooth LE: 2.83 dBm Thread: 4.73 dBm	
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.		

3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards:

FCC CFR47 Part 15C (2022) Radio Frequency Devices

ANSI C63.10-2013

Reference standard:

KDB 558074 D01 15.247 Meas Guidance v05r02

4. Test Configuration

Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT polarization (horizontal and vertical). The worst emission was found in lie-down position (horizontal axis) and the loop antenna is vertical, the others are vertical and horizontal. and the worst case was recorded.

In order to find the worst case condition, Pre-tests are needed at the presence of different data rate. Preliminary tests have been done on all the configuration for confirming worst case. Data rate below means worst-case rate of each test item.

Worst-case data rates are shown as following table.

Test Mode	Data Rate
Bluetooth (Low Energy)	1Mbps; 2Mbps
Bluetooth (Low Energy) (S=2)	500kbps
Bluetooth (Low Energy) (S=8)	125kbps
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ax HE20	MCS0
802.11ax HE40	MCS0
Thread	250kbps

5. Test Case Results

5.1. Maximum output power

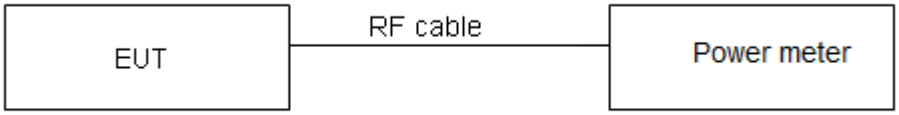
Ambient Condition

Temperature	Relative humidity
20°C ~ 25°C	45% ~ 50%

Methods of Measurement

During the process of the testing, The EUT was connected to Power meter with a known loss. The EUT is max power transmission with proper modulation.

Test Setup



Limits

Rule Part 15.247 (b) (3) specifies that " For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz: 1 Watt."

Average Output Power	≤ 1W (30dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.44 dB.

Test Results

Power Index							
Channel	**802.11b**	**802.11g**	**802.11n HT20**	**802.11ax HE20**	**Channel**	**802.11n HT40**	**802.11ax HE40**
CH1	16	15	14	14	**CH3**	13	14
CH2	/	16	/	/	**CH4**	14	/
CH6	16	16	14	14	**CH6**	14	14
CH9	/	/	/	/	**CH7**	14	/
CH10	/	16	/	/	**CH8**	13.5	/
CH11	16	15	14	14	**CH9**	13.5	14

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11b	0.999	0.00
802.11g	0.990	0.00
802.11n HT20	0.989	0.00
802.11n HT40	0.978	0.10
802.11ax HE20	0.985	0.00
802.11ax HE40	0.973	0.12
Note: when Duty cycle⩾0.98, Duty cycle correction Factor not required.		

Test Mode	Carrier frequency (MHz) / Channel	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11b	2412/CH1	14.80	14.80	30	PASS
	2437/CH6	14.86	14.86	30	PASS
	2462/CH11	14.92	14.92	30	PASS
802.11g	2412/CH1	14.82	14.82	30	PASS
	2417/CH2	15.75	15.75	30	PASS
	2437/CH6	15.45	15.45	30	PASS
	2457/CH10	16.18	16.18	30	PASS
	2462/CH11	15.10	15.10	30	PASS
802.11n HT20	2412/CH1	13.79	13.79	30	PASS
	2437/CH6	13.42	13.42	30	PASS
	2462/CH11	13.76	13.76	30	PASS
802.11n HT40	2422/CH3	12.76	12.86	30	PASS
	2427/CH4	13.76	13.86	30	PASS
	2437/CH6	13.29	13.39	30	PASS
	2442/CH7	13.38	13.48	30	PASS
	2447/CH8	13.14	13.24	30	PASS
	2452/CH9	13.26	13.36	30	PASS
802.11ax HE20	2412/CH1	13.80	13.80	30	PASS
	2437/CH6	13.35	13.35	30	PASS
	2462/CH11	13.68	13.68	30	PASS
802.11ax HE40	2422/CH3	13.55	13.67	30	PASS
	2437/CH6	13.67	13.79	30	PASS
	2452/CH9	13.78	13.90	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

Power Index	
Channel	**Thread**
CH11	4
CH18	4
CH26	4

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
Thread	0.265	5.766
Note: when Duty cycle≥0.98, Duty cycle correction Factor not required.		

Test Mode	Carrier frequency (MHz) / Channel	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
Thread	2405/CH11	-1.04	4.73	30	PASS
	2440/CH18	-1.24	4.53	30	PASS
	2480/CH26	-5.14	0.63	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

TB Mode

SISO Antenna Power Index							
Channel	802.11ax HE20 26-Tone	802.11ax HE20 52-Tone	802.11ax HE20 106-Tone	802.11ax HE20 242-Tone	Channel	802.11ax HE20 242-Tone	802.11ax HE20 242-Tone
CH1	14	14	14	13	CH3	12	12
CH6	14	14	14	/	CH9	12	12
CH11	14	14	14	13	/	/	/

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11ax HE20 26-Tone:RU Index 0	0.954	0.21
802.11ax HE20 26-Tone:RU Index 4	0.954	0.21
802.11ax HE20 26-Tone:RU Index 8	0.954	0.21
802.11ax HE20 52-Tone:RU Index 37	0.954	0.21
802.11ax HE20 52-Tone:RU Index 38	0.954	0.21
802.11ax HE20 52-Tone:RU Index 40	0.954	0.21
802.11ax HE20106-Tone:RU Index 53	0.954	0.21
802.11ax HE20106-Tone:RU Index 54	0.954	0.21
802.11ax HE20 242-Tones:RU Index 61	0.954	0.21
802.11ax HE40 26-Tones:RU Index 0	0.954	0.21
802.11ax HE40 26-Tones:RU Index 17	0.954	0.21
802.11ax HE40 484-Tones:RU Index 65	0.954	0.21
Note: when Duty cycle⩾0.98, Duty cycle correction Factor not required.		

Test Mode	Carrier frequency (MHz) / Channel	RU Index	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11ax HE20 26-Tone	2412/CH 1	0	13.22	13.43	30	PASS
	2437/CH 6	4	13.71	13.92	30	PASS
	2462/CH11	8	13.74	13.95	30	PASS
802.11ax HE20 52-Tone	2412/CH 1	37	13.60	13.81	30	PASS
	2437/CH 6	38	14.06	14.27	30	PASS
	2462/CH11	40	13.88	14.09	30	PASS
802.11ax HE20 106-Tone	2412/CH 1	53	13.82	14.03	30	PASS
	2437/CH 6	53	13.76	13.97	30	PASS
	2462/CH11	54	14.00	14.21	30	PASS
802.11ax HE20 242-Tone	2412/CH 1	61	12.25	12.46	30	PASS
	2462/CH11	61	12.34	12.55	30	PASS
802.11ax HE40 26-Tone	2422/CH 3	0	10.6	10.81	30	PASS
	2452/CH 9	17	11.2	11.41	30	PASS
802.11ax HE40 484-Tone	2422/CH 3	65	11.43	11.64	30	PASS
	2452/CH 9	65	11.25	11.46	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor						

ERSU Mode

SISO Antenna Power Index	
Channel	**802.11ax HE20 242-Tones**
CH1	13
CH6	13
CH11	13

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11ax HE20 242-Tones	0.954	0.21
Note: when Duty cycle⩾0.98, Duty cycle correction Factor not required.		

Test Mode	Carrier frequency (MHz) / Channel	RU Index	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11ax HE20 242-Tones	2412/CH 1	61	12.87	13.08	30	PASS
	2437/CH 6	61	13.19	13.40	30	PASS
	2462/CH11	61	13.72	13.93	30	PASS

Power Index	
Channel	**Bluetooth (Low Energy)**
CH0	3
CH19	3
CH39	3

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
Bluetooth LE (1M)	0.621	2.07
Bluetooth LE (2M)	0.431	3.66
Bluetooth LE (S=2)	0.853	0.69
Bluetooth LE (S=8)	0.827	0.83
Note: when Duty cycle≥0.98, Duty cycle correction Factor not required.		

Test Mode	Carrier frequency (MHz) / Channel	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
Bluetooth (Low Energy) (1M)	2402/CH0	0.67	2.74	30	PASS
	2440/CH19	0.33	2.40	30	PASS
	2480/CH39	0.36	2.43	30	PASS
Bluetooth (Low Energy) (2M)	2402/CH0	-0.83	2.83	30	PASS
	2440/CH19	-1.25	2.41	30	PASS
	2480/CH39	-1.16	2.50	30	PASS
Bluetooth (Low Energy) (S=2)	2402/CH0	1.97	2.66	30	PASS
	2440/CH19	1.62	2.31	30	PASS
	2480/CH39	1.97	2.66	30	PASS
Bluetooth (Low Energy) (S=8)	2402/CH0	1.83	2.66	30	PASS
	2440/CH19	1.51	2.34	30	PASS
	2480/CH39	1.68	2.51	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

5.2. 99% Bandwidth and 6dB Bandwidth

Ambient Condition

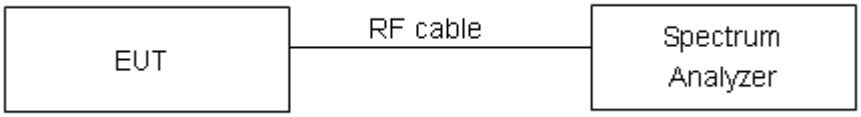
Temperature	Relative humidity
20°C ~ 25°C	45% ~ 50%

Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable. RBW is set to 100 kHz; VBW is set to 300 kHz on spectrum analyzer.
Dector=Peak, Trace mode=max hold.

The EUT was connected to the spectrum analyzer through a known loss cable. The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value.

Test Setup



Limits

Rule Part 15.247 (a) (2) specifies that “Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.”

minimum 6 dB bandwidth	≥ 500 kHz

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936 Hz.

Test Results:

Test Mode	Carrier frequency (MHz) / Channel	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11b	2412/CH1	13.436	10.058	500	PASS
	2437/CH6	13.436	9.704	500	PASS
	2462/CH11	13.414	9.625	500	PASS
802.11g	2412/CH1	16.693	16.333	500	PASS
	2417/CH2	16.707	16.346	500	PASS
	2437/CH6	16.805	16.346	500	PASS
	2457/CH10	16.744	16.343	500	PASS
	2462/CH11	16.715	16.337	500	PASS
802.11n HT20	2412/CH1	17.652	17.537	500	PASS
	2437/CH6	17.713	17.551	500	PASS
	2462/CH11	17.676	17.387	500	PASS
802.11n HT40	2422/CH3	36.284	35.368	500	PASS
	2427/CH4	36.222	35.790	500	PASS
	2437/CH6	36.232	35.336	500	PASS
	2442/CH7	37.608	36.772	500	PASS
	2447/CH8	37.528	36.759	500	PASS
	2452/CH9	37.700	36.569	500	PASS
802.11ax HE20	2412/CH1	18.784	18.084	500	PASS
	2437/CH6	18.814	18.552	500	PASS
	2462/CH11	18.835	18.188	500	PASS
802.11ax HE40	2422/CH3	37.678	36.082	500	PASS
	2437/CH6	37.610	37.046	500	PASS
	2452/CH9	37.555	36.168	500	PASS

Test Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
Thread	2405	2.380	1.581	500	PASS
	2440	2.368	1.589	500	PASS
	2480	2.253	1.545	500	PASS

TB Mode

Test Mode	Carrier frequency (MHz)	RU Index	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11ax HE20 26-Tone	2412	0	17.726	1.940	500	PASS
	2437	4	15.945	2.688	500	PASS
	2462	8	18.028	1.990	500	PASS
802.11ax HE20 52-Tone	2412	37	17.789	15.687	500	PASS
	2437	38	16.897	15.035	500	PASS
	2462	40	17.537	16.874	500	PASS
802.11ax HE20 106-Tone	2412	53	17.468	16.983	500	PASS
	2437	53	17.787	15.737	500	PASS
	2462	54	17.323	16.924	500	PASS
802.11ax HE20 242-Tone	2412	61	18.790	18.334	500	PASS
	2462	61	18.809	18.236	500	PASS
802.11ax HE40 26-Tone	2422	0	22.306	2.682	500	PASS
	2452	17	21.920	2.011	500	PASS
802.11ax HE40 484-Tone	2422	65	37.508	36.076	500	PASS
	2452	65	37.580	37.103	500	PASS

ERSU Mode

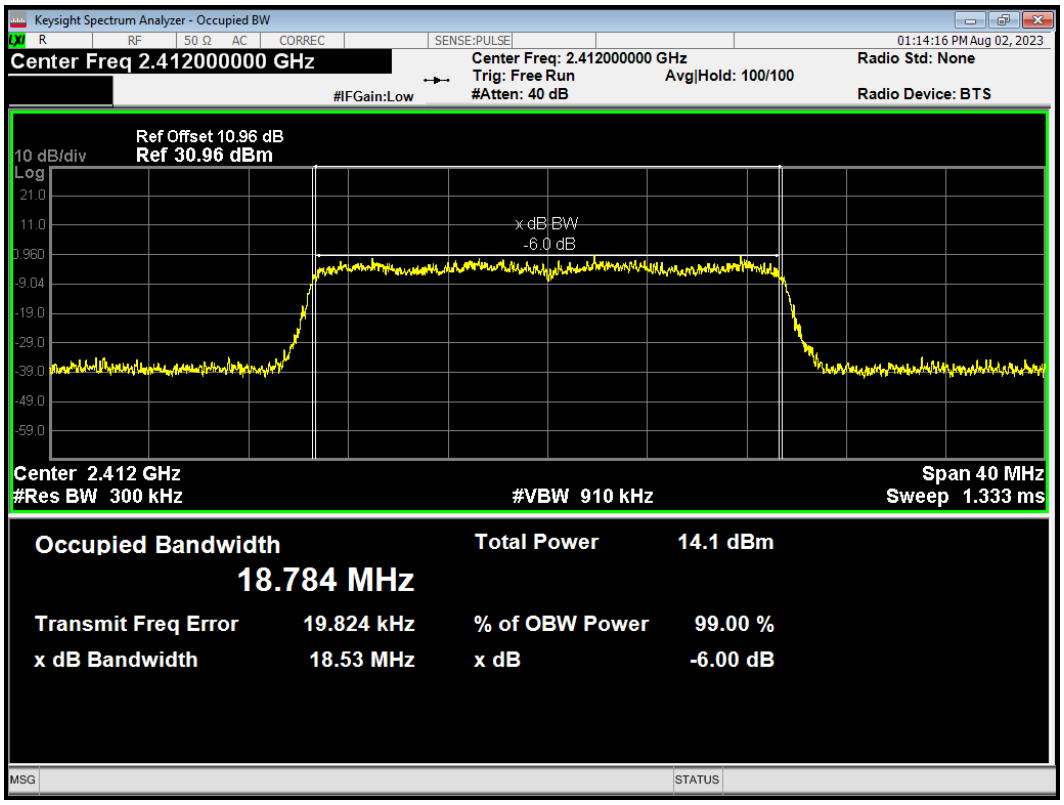
Test Mode	Carrier frequency (MHz)	RU Index	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11ax HE20 242-Tones	2412	61	18.810	18.303	500	PASS
	2437	61	18.812	18.176	500	PASS
	2462	61	18.795	18.197	500	PASS

Test Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
Bluetooth (Low Energy) (1M)	2402	1.035	0.695	500	PASS
	2440	1.034	0.699	500	PASS
	2480	1.037	0.689	500	PASS
Bluetooth (Low Energy) (2M)	2402	2.059	1.131	500	PASS
	2440	2.086	1.209	500	PASS
	2480	2.065	1.149	500	PASS
Bluetooth (Low Energy) (S=2)	2402	1.019	0.664	500	PASS
	2440	1.021	0.660	500	PASS
	2480	1.020	0.666	500	PASS

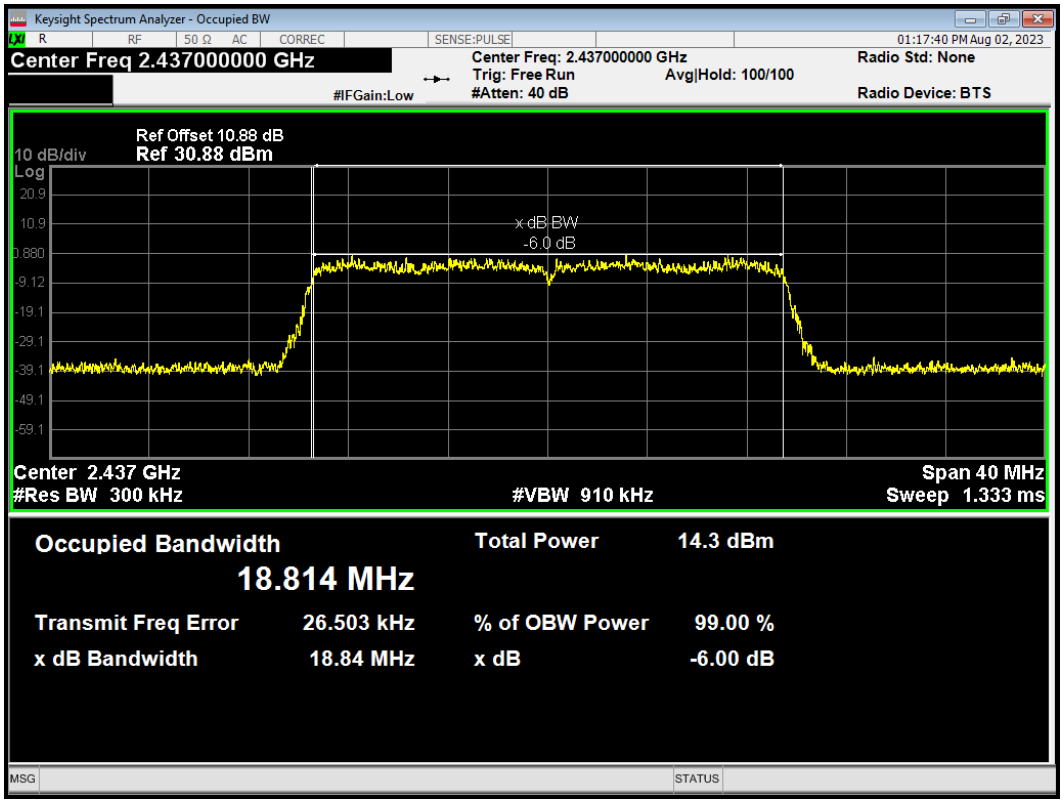
Bluetooth (Low Energy) (S=8)	2402	1.055	0.646	500	PASS
	2440	1.053	0.649	500	PASS
	2480	1.061	0.648	500	PASS

99%bandwidth

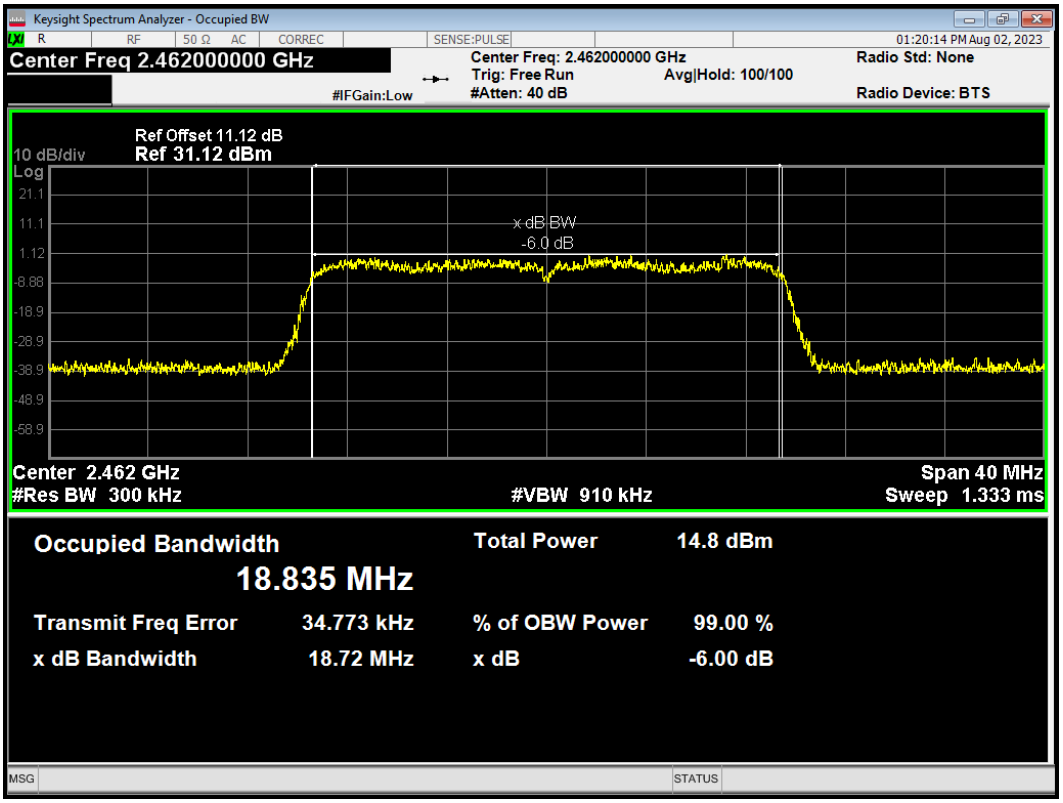
OBW 802.11ax(HE20) 2412MHz



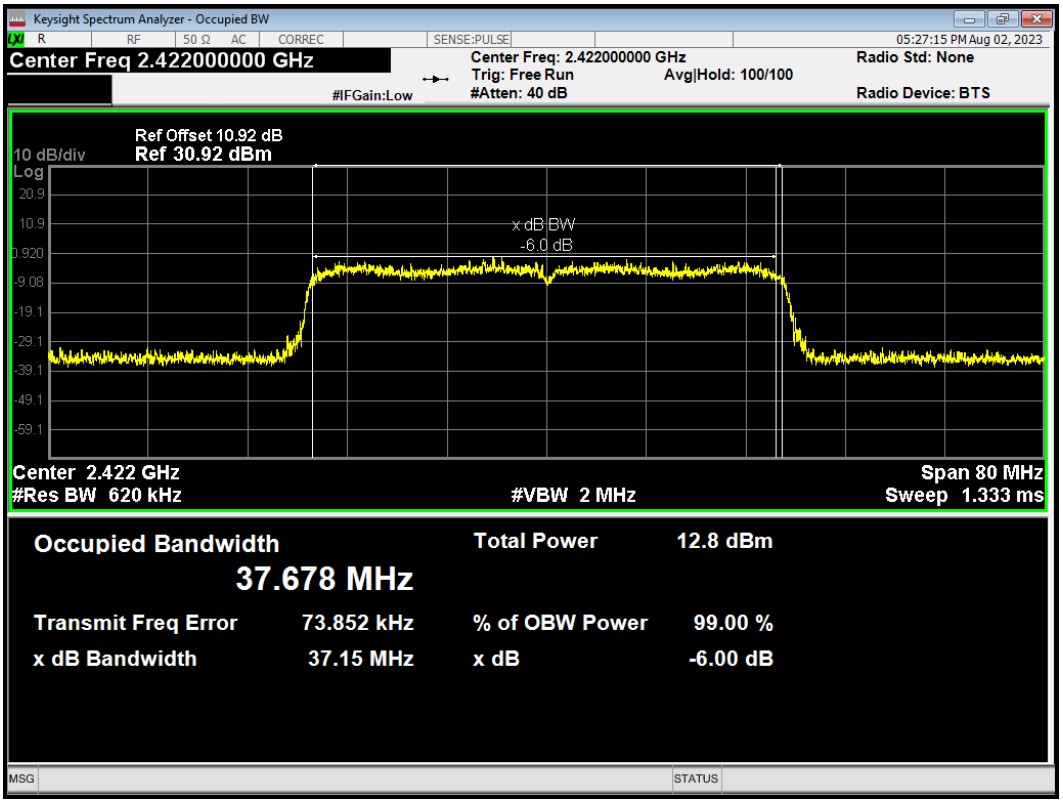
OBW 802.11ax(HE20) 2437MHz



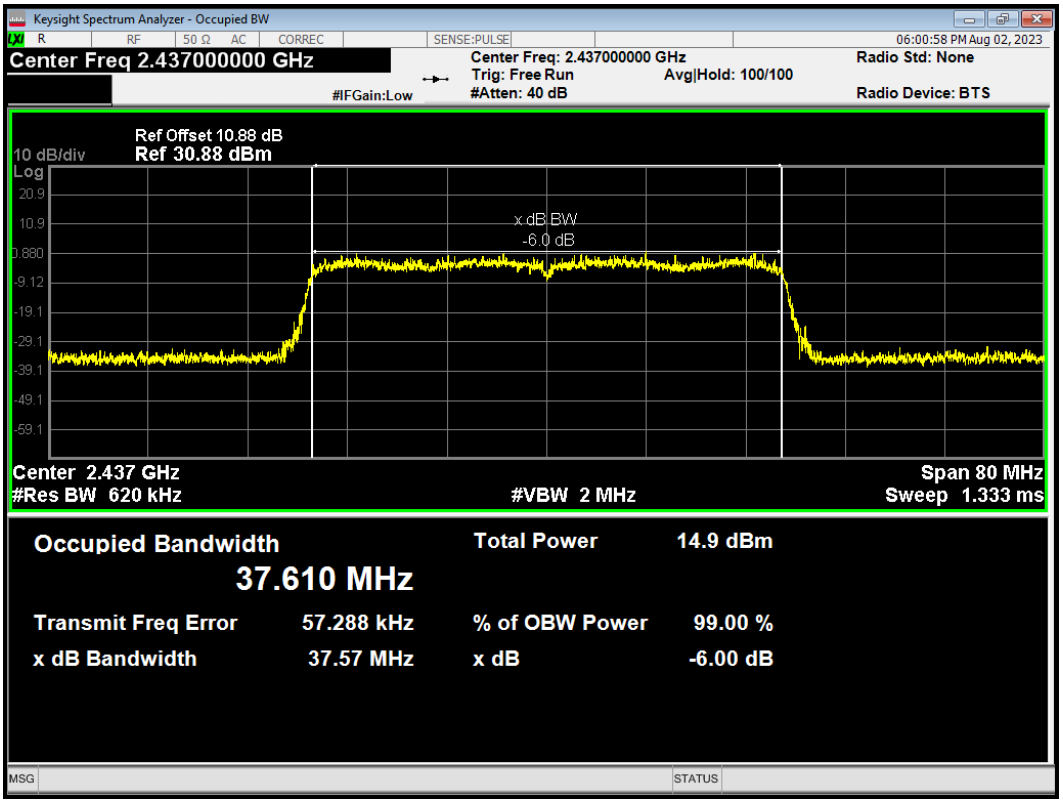
OBW 802.11ax(HE20) 2462MHz



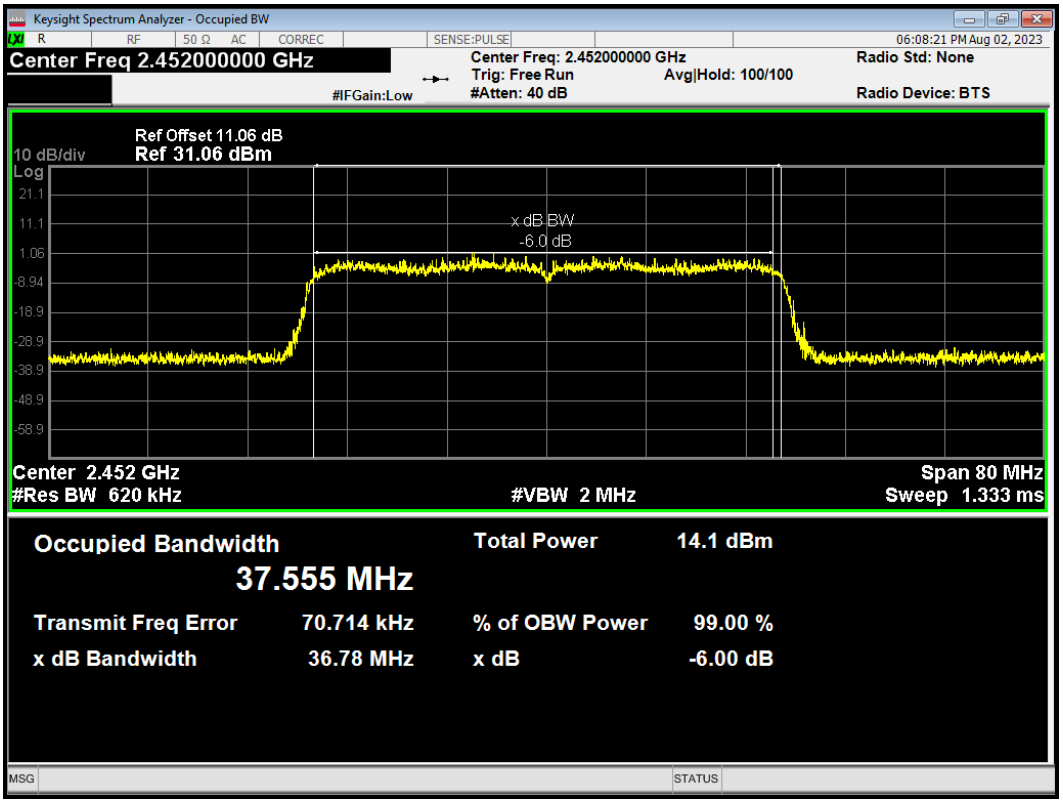
OBW 802.11ax(HE40) 2422MHz



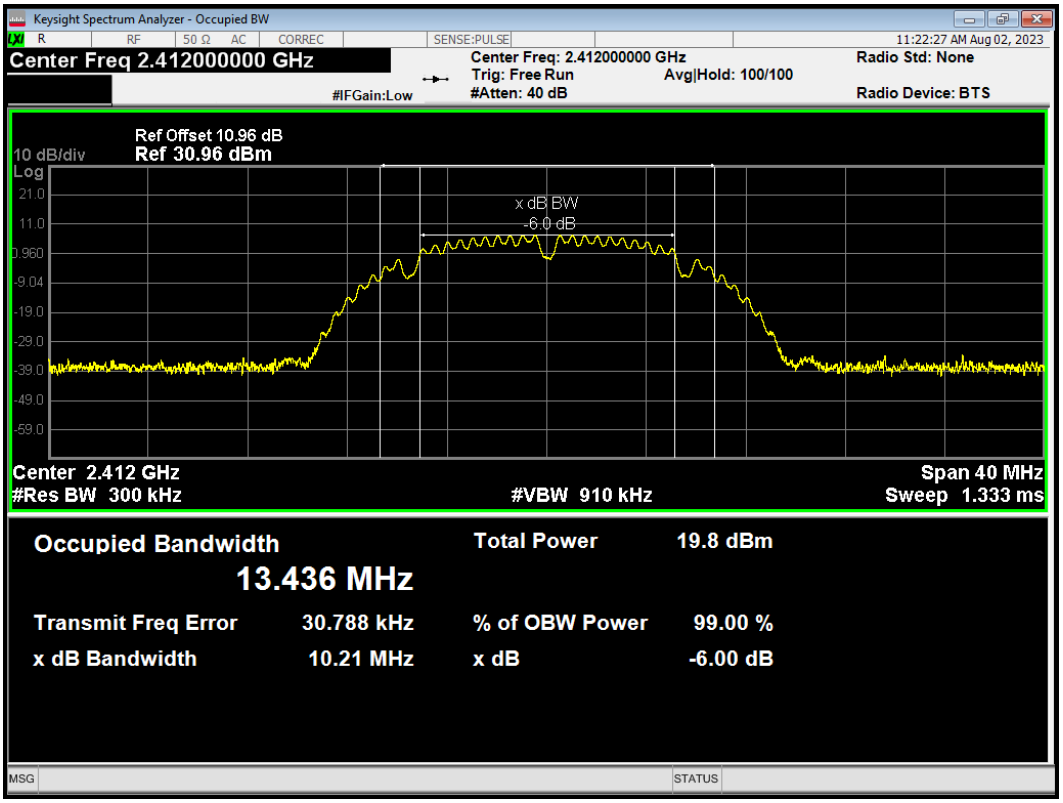
OBW 802.11ax(HE40) 2437MHz



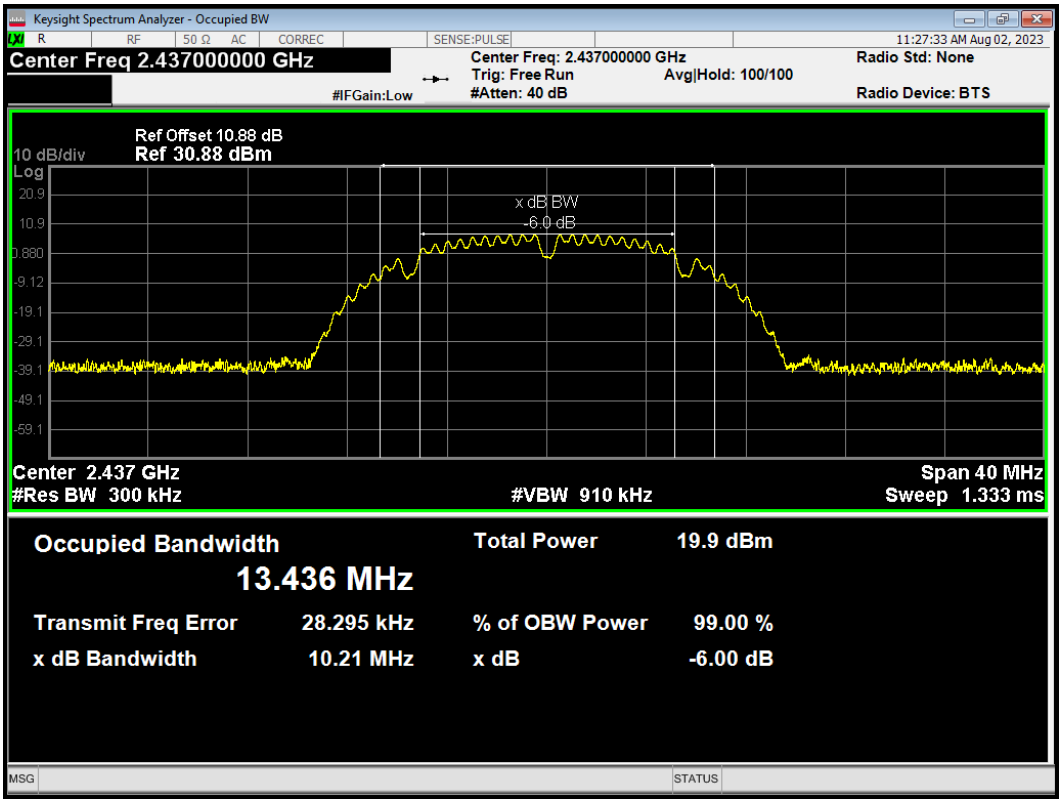
OBW 802.11ax(HE40) 2452MHz



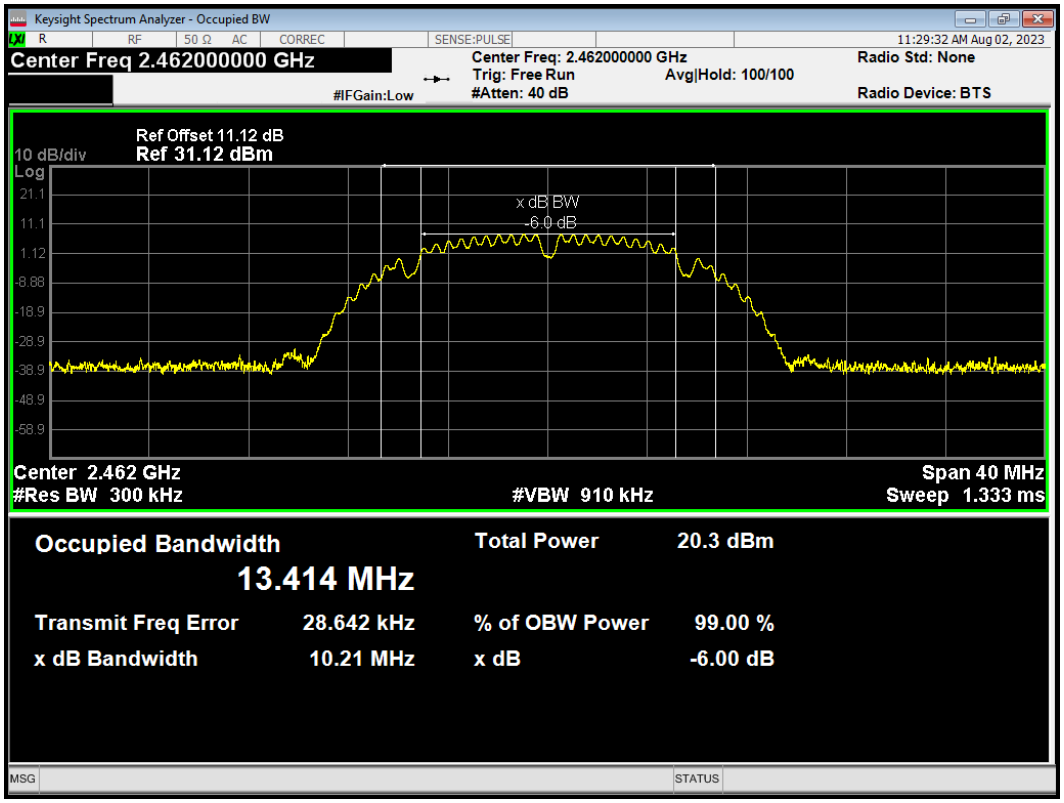
OBW 802.11b 2412MHz



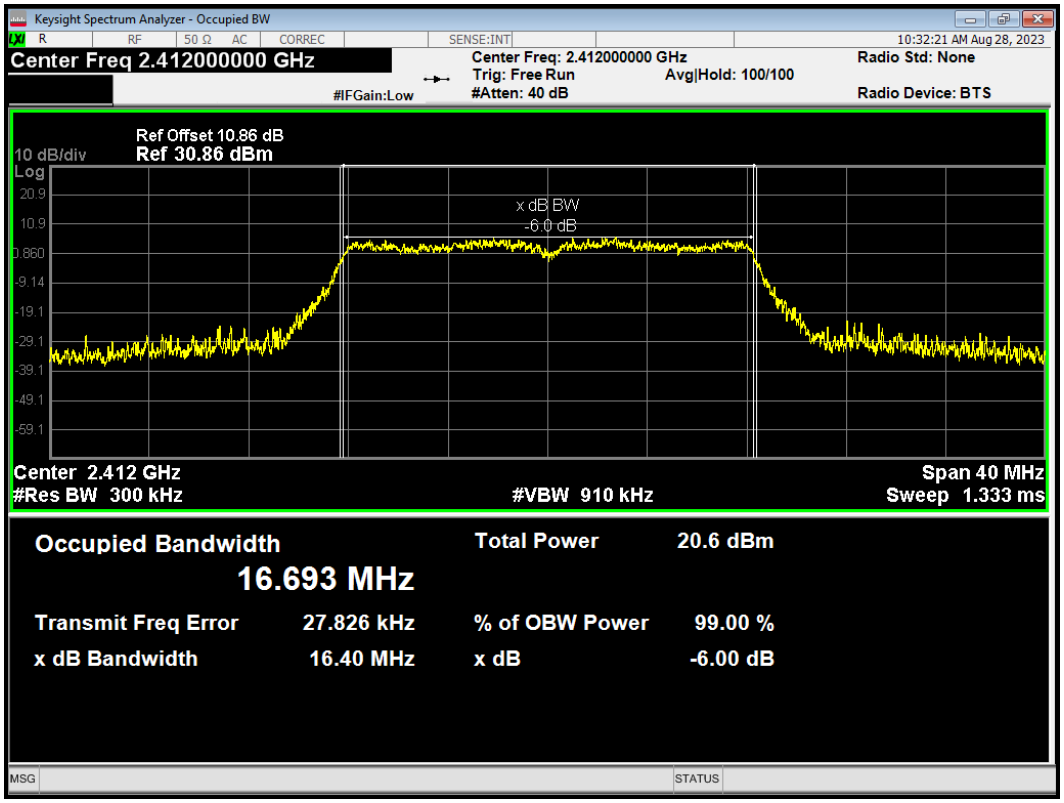
OBW 802.11b 2437MHz



OBW 802.11b 2462MHz



OBW 802.11g 2412MHz



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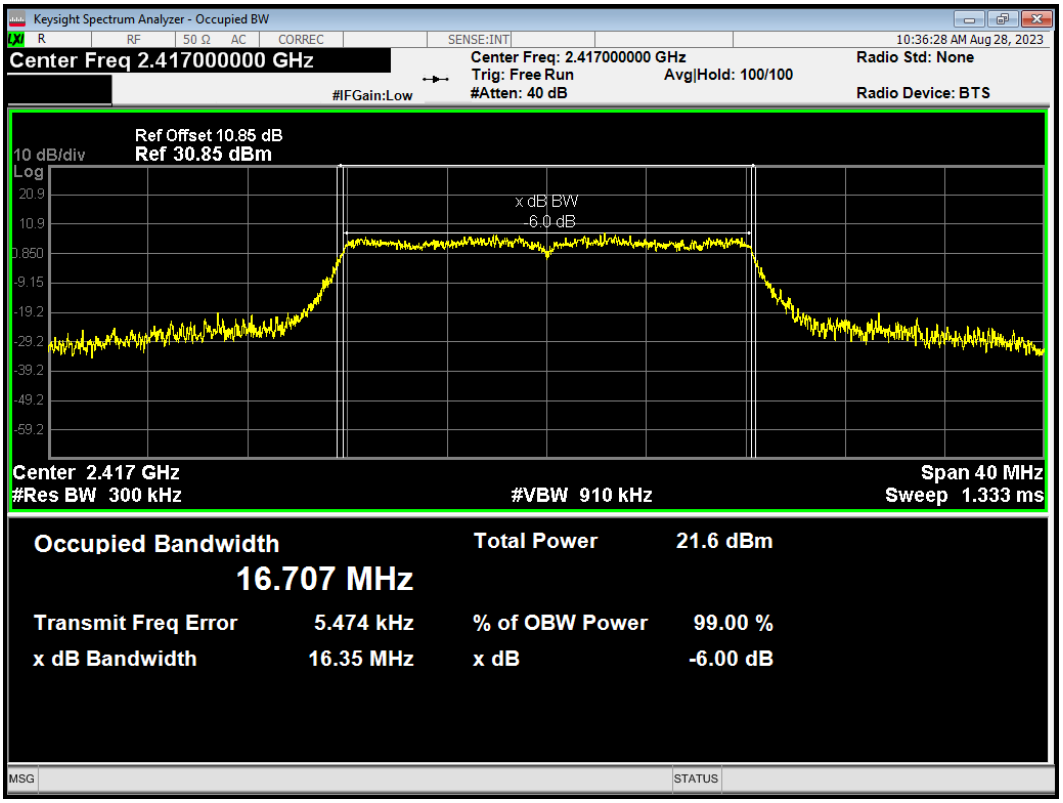
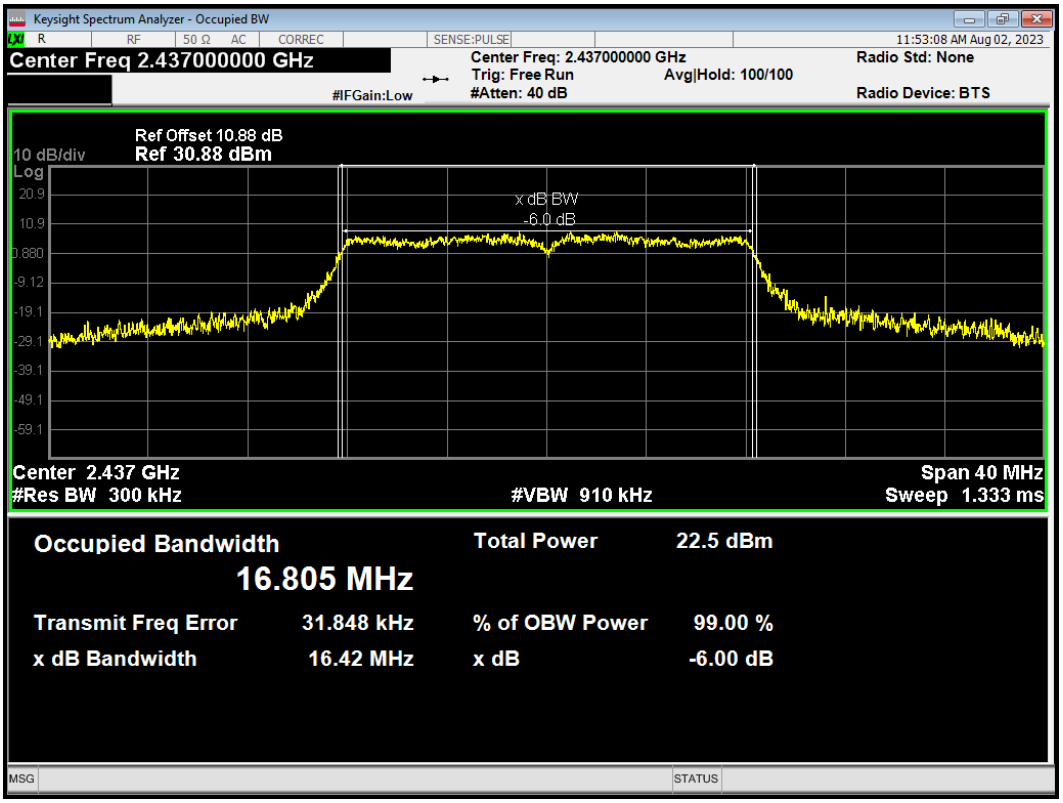
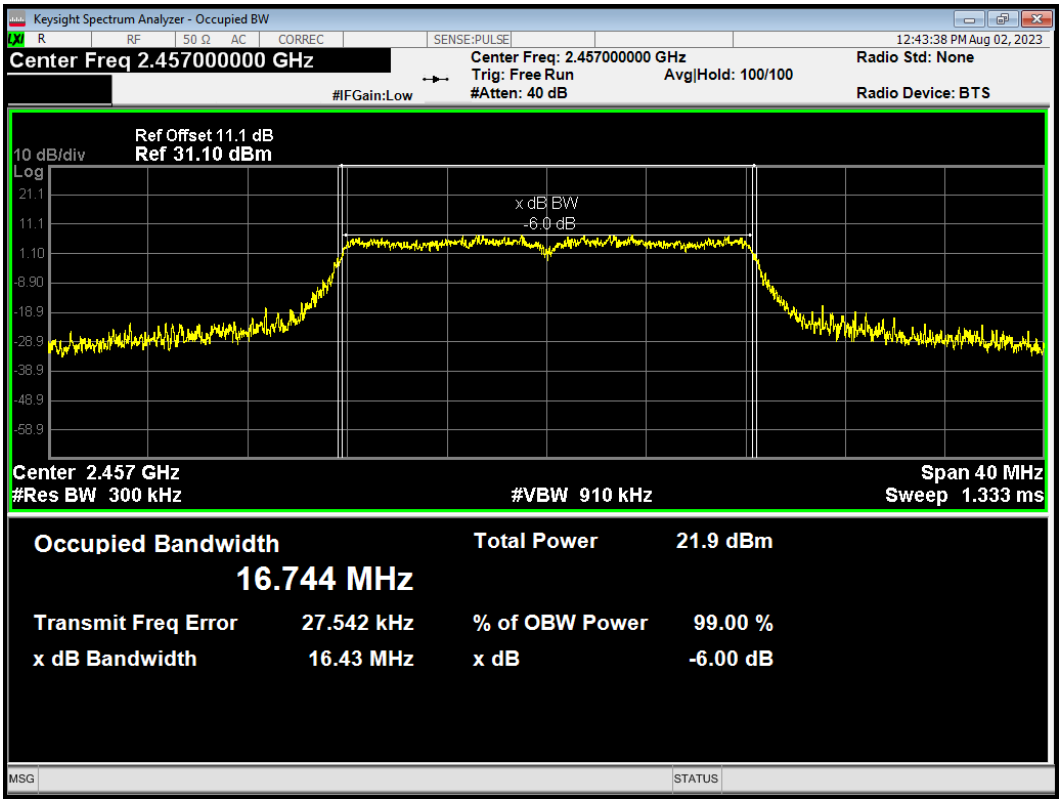


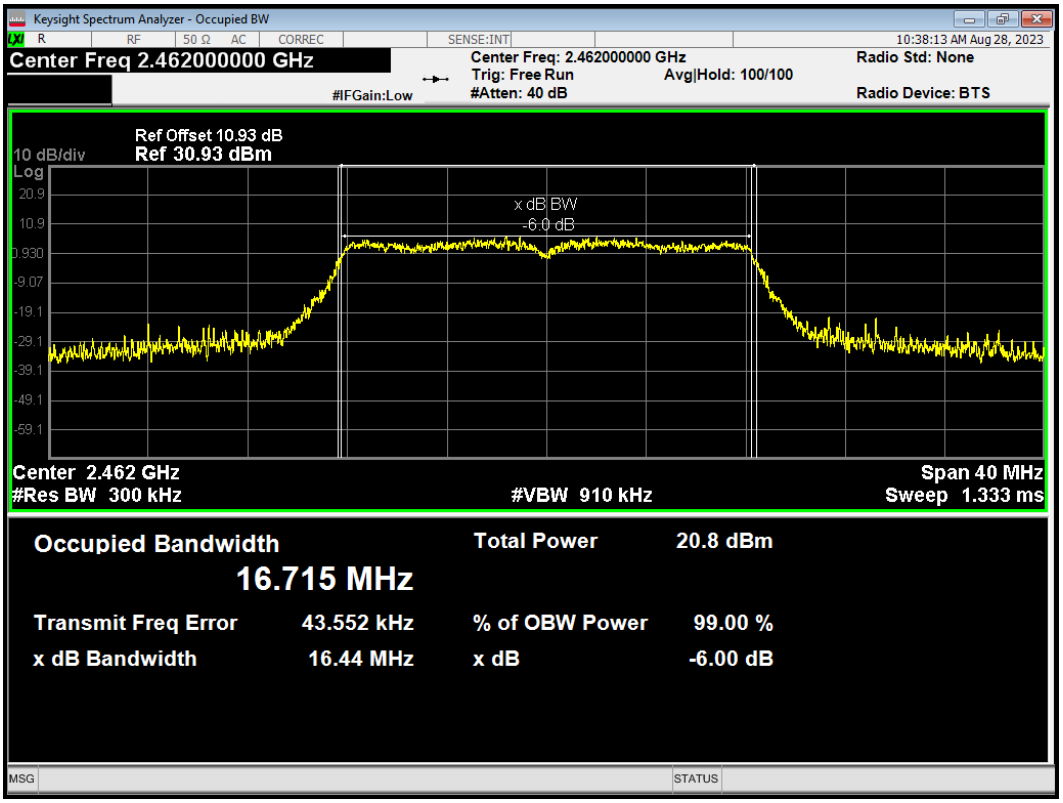
OBW 802.11g 2437MHz



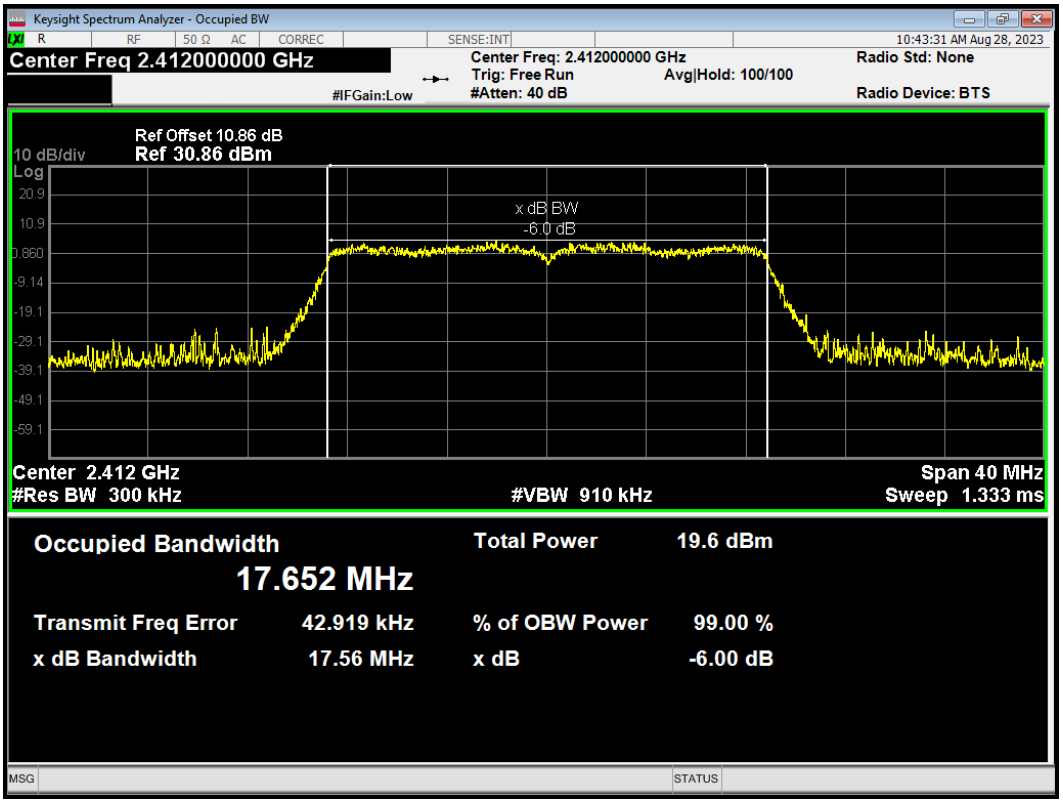
OBW 802.11g 2457MHz



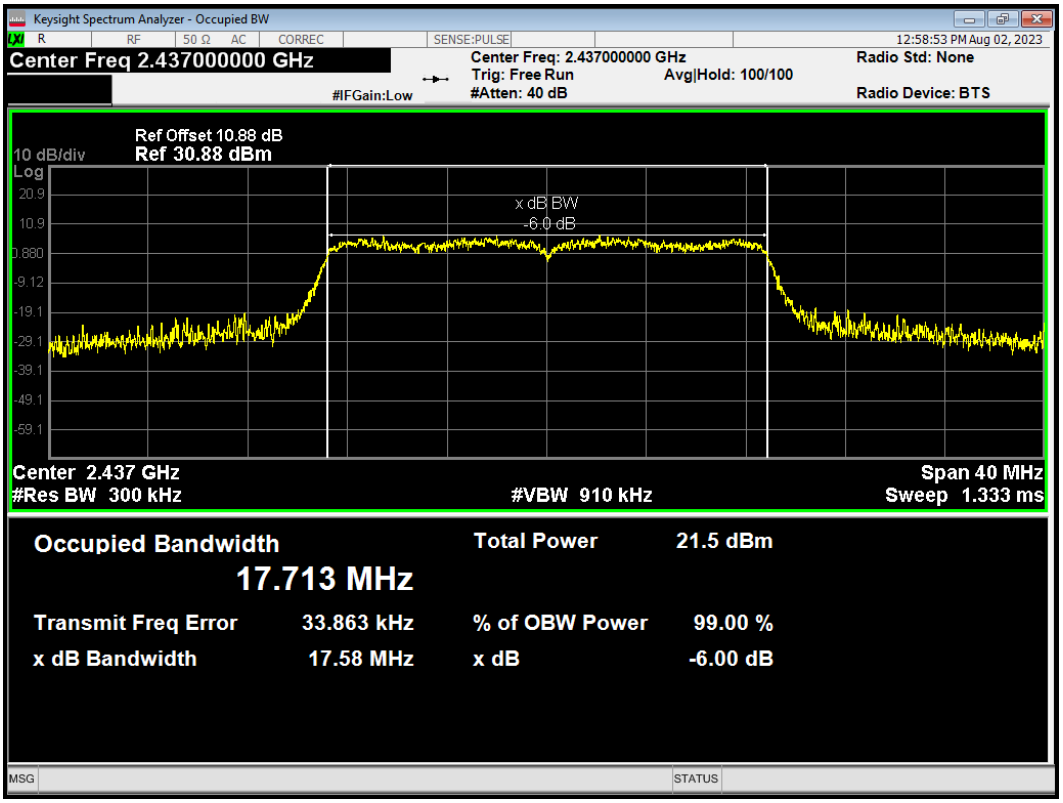
OBW 802.11g 2462MHz



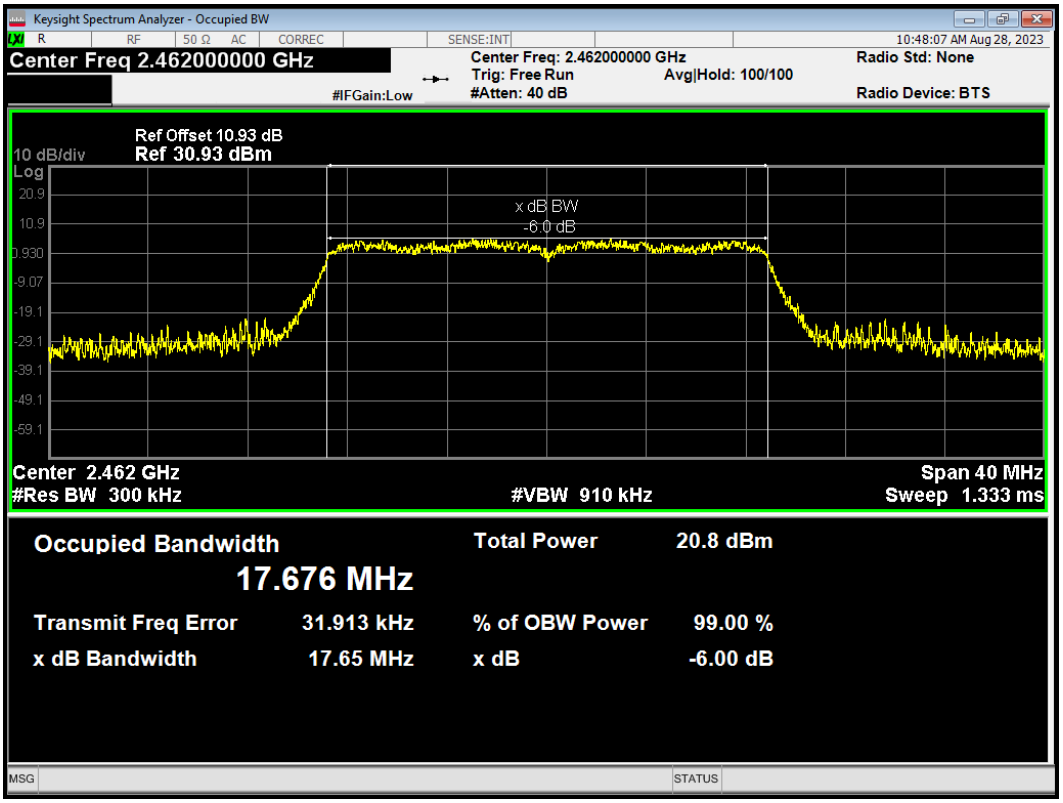
OBW 802.11n(HT20) 2412MHz



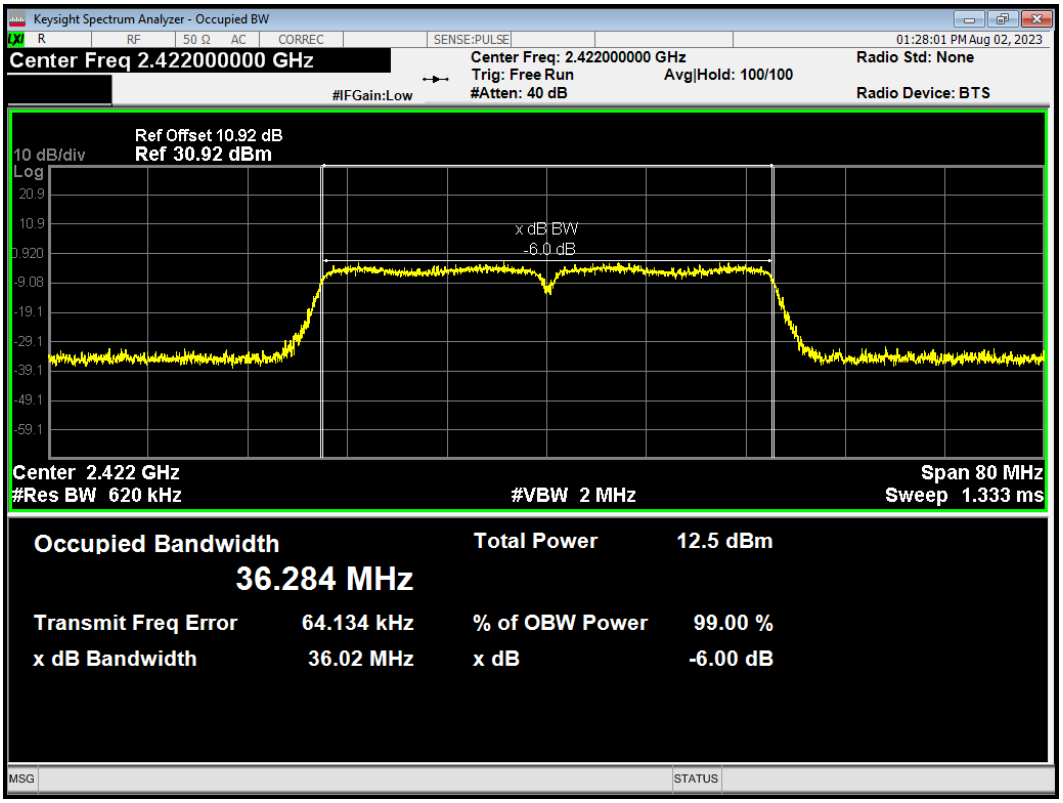
OBW 802.11n(HT20) 2437MHz



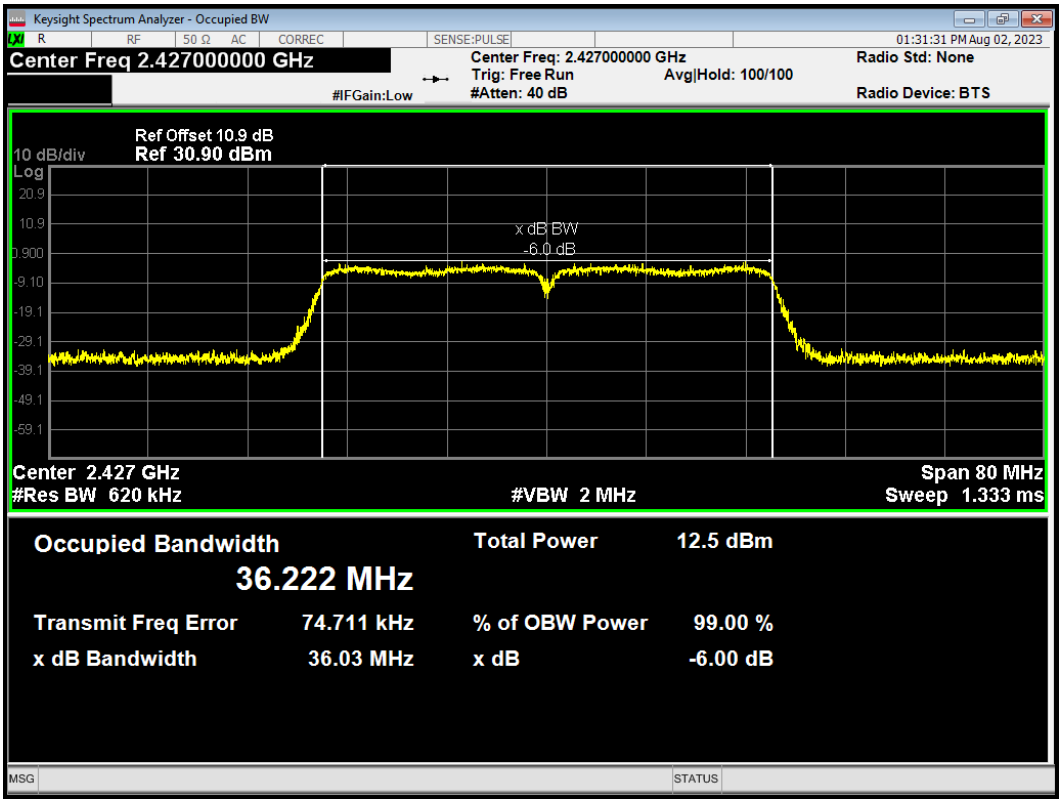
OBW 802.11n(HT20) 2462MHz



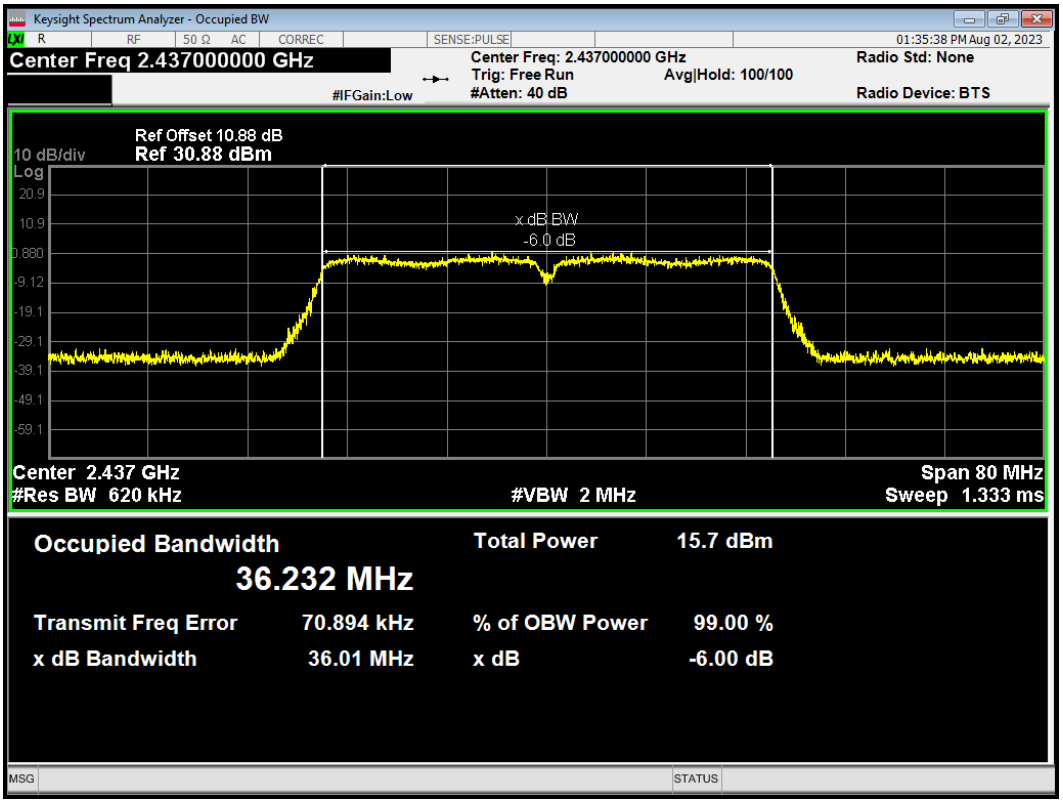
OBW 802.11n(HT40) 2422MHz



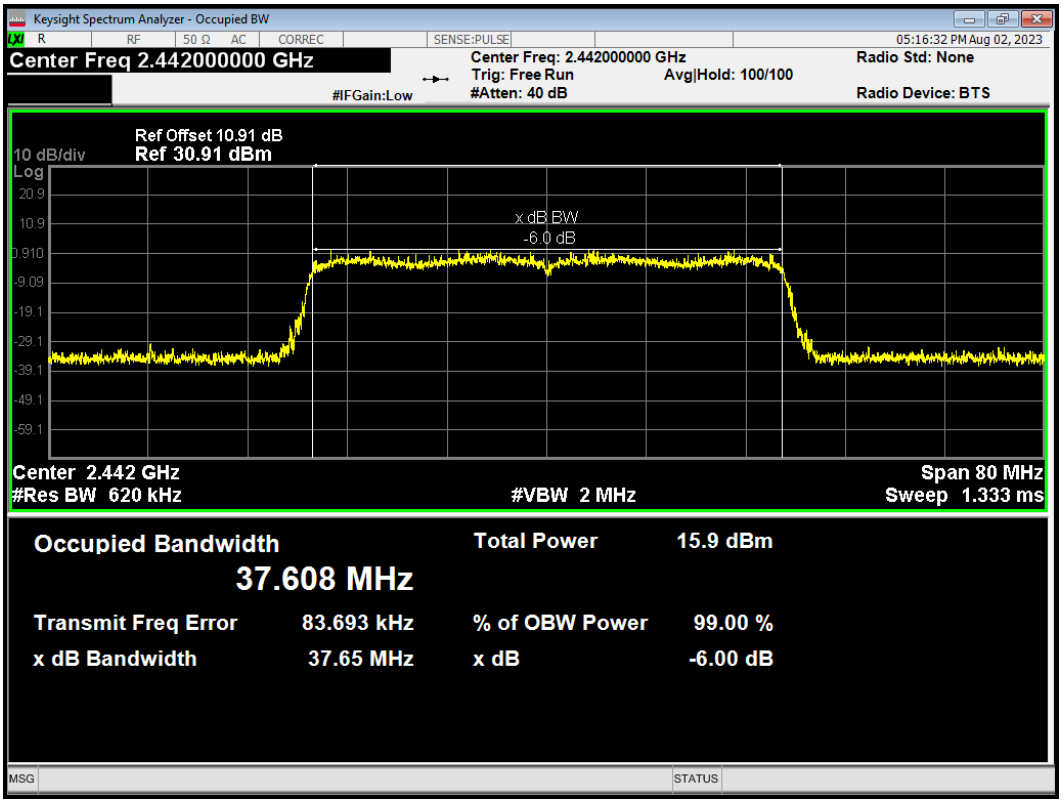
OBW 802.11n(HT40) 2427MHz



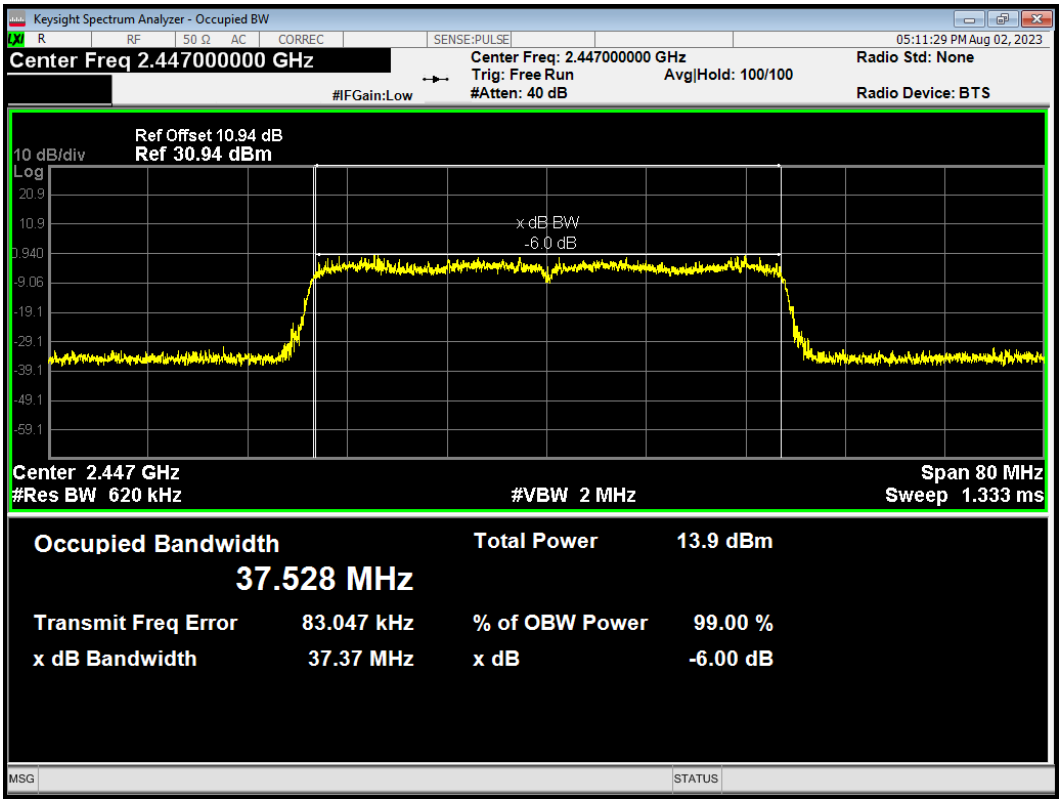
OBW 802.11n(HT40) 2437MHz



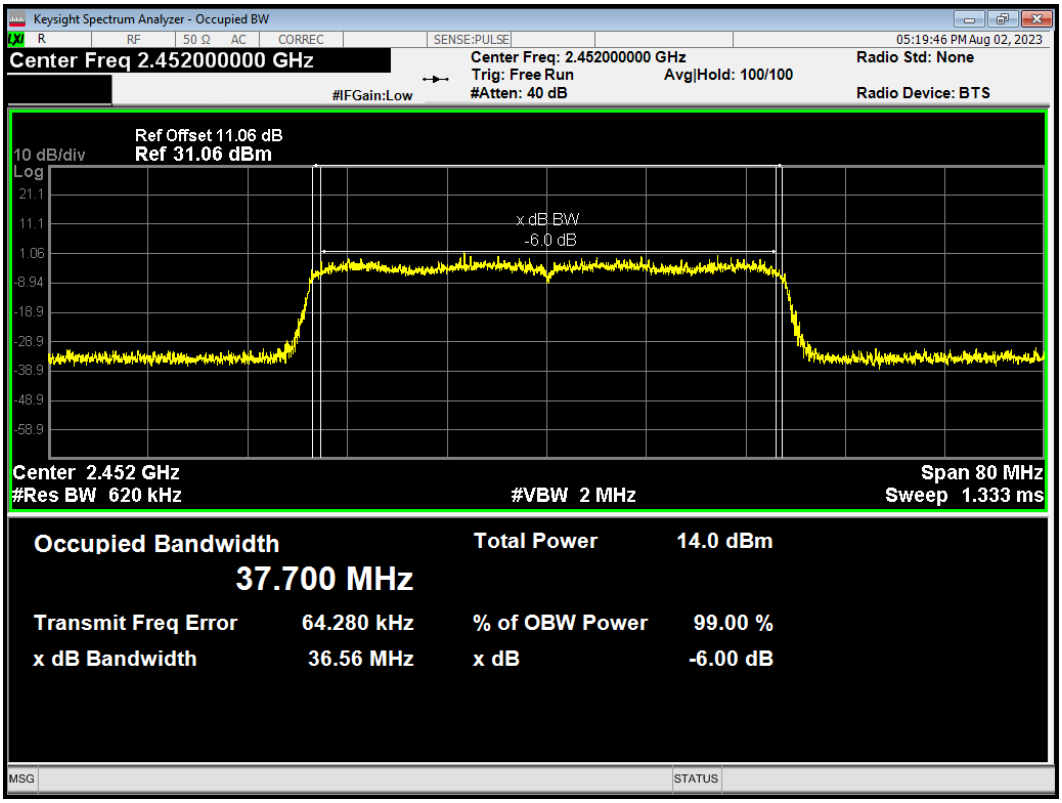
OBW 802.11n(HT40) 2442MHz



OBW 802.11n(HT40) 2447MHz

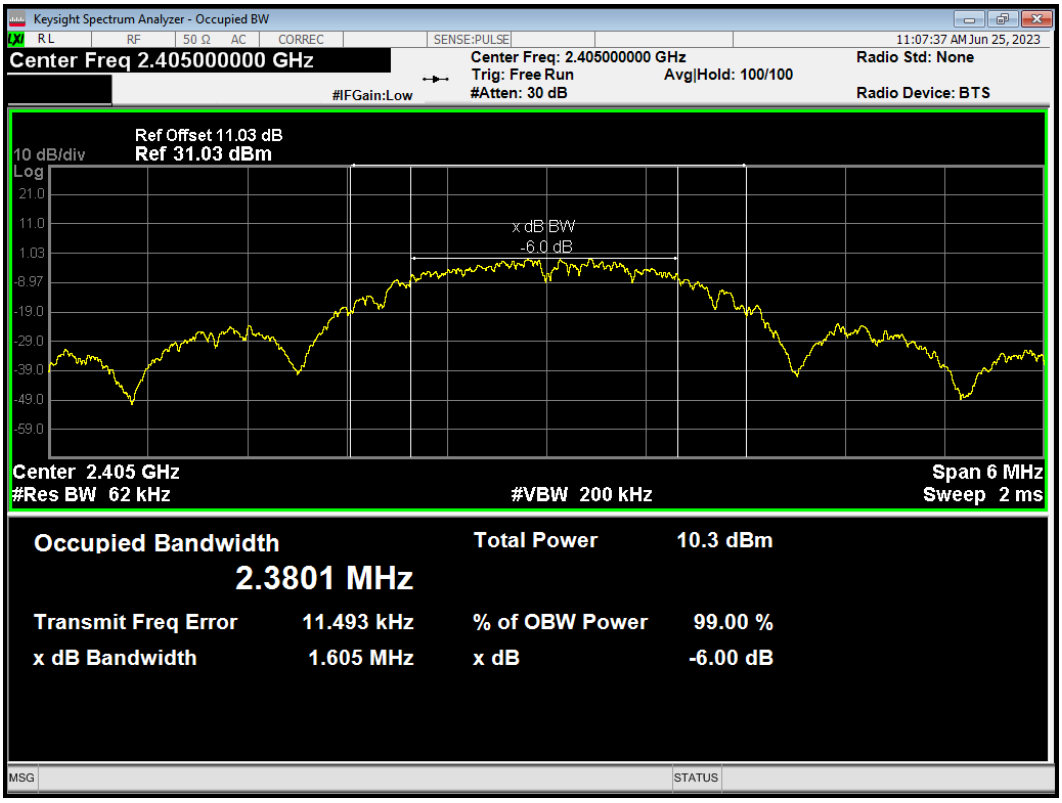


OBW 802.11n(HT40) 2452MHz

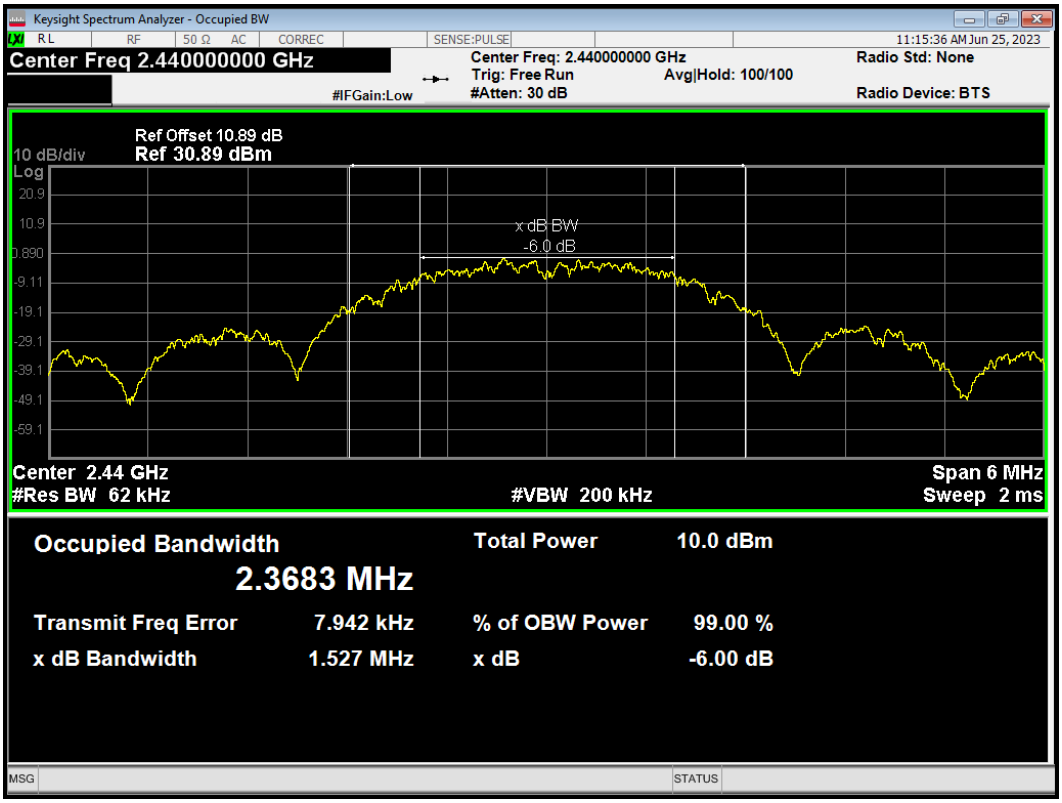


Thread

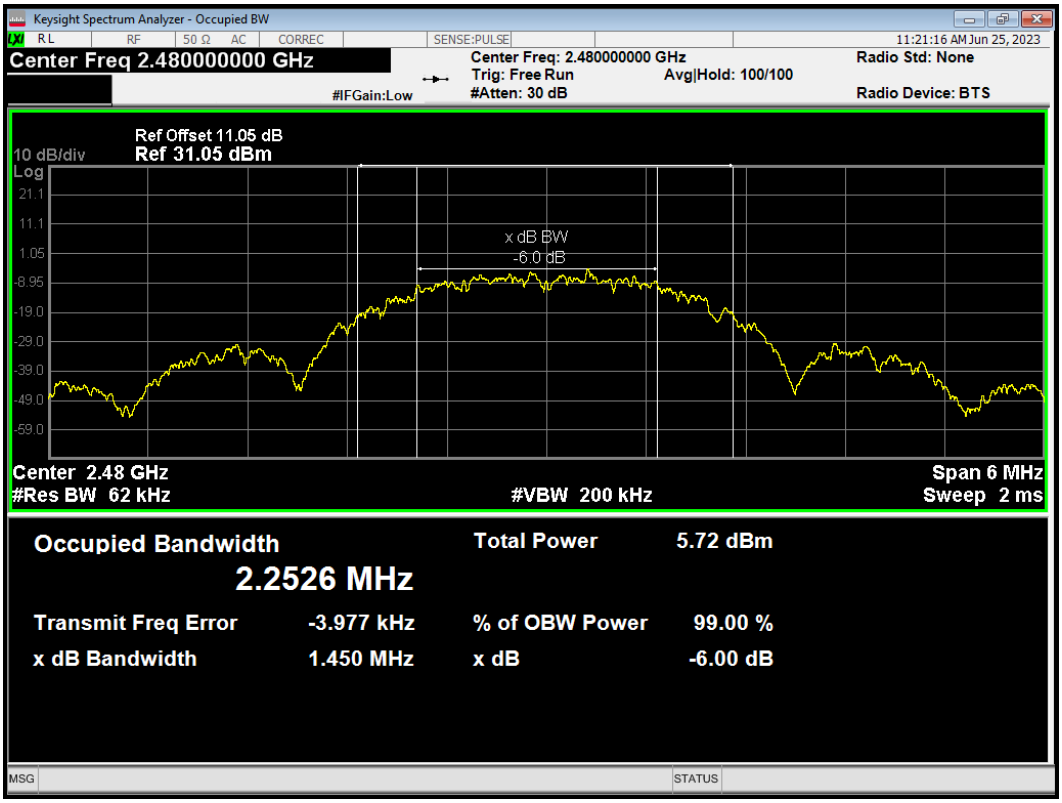
OBW thread 2405MHz



OBW thread 2440MHz

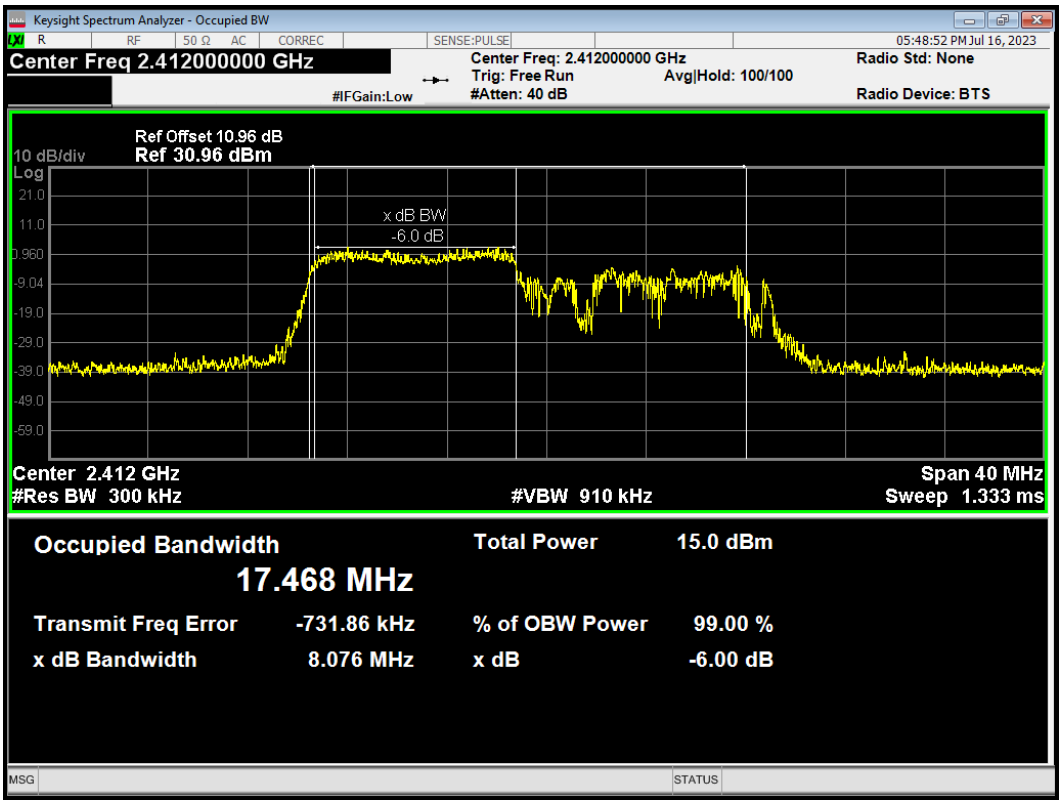


OBW thread 2480MHz

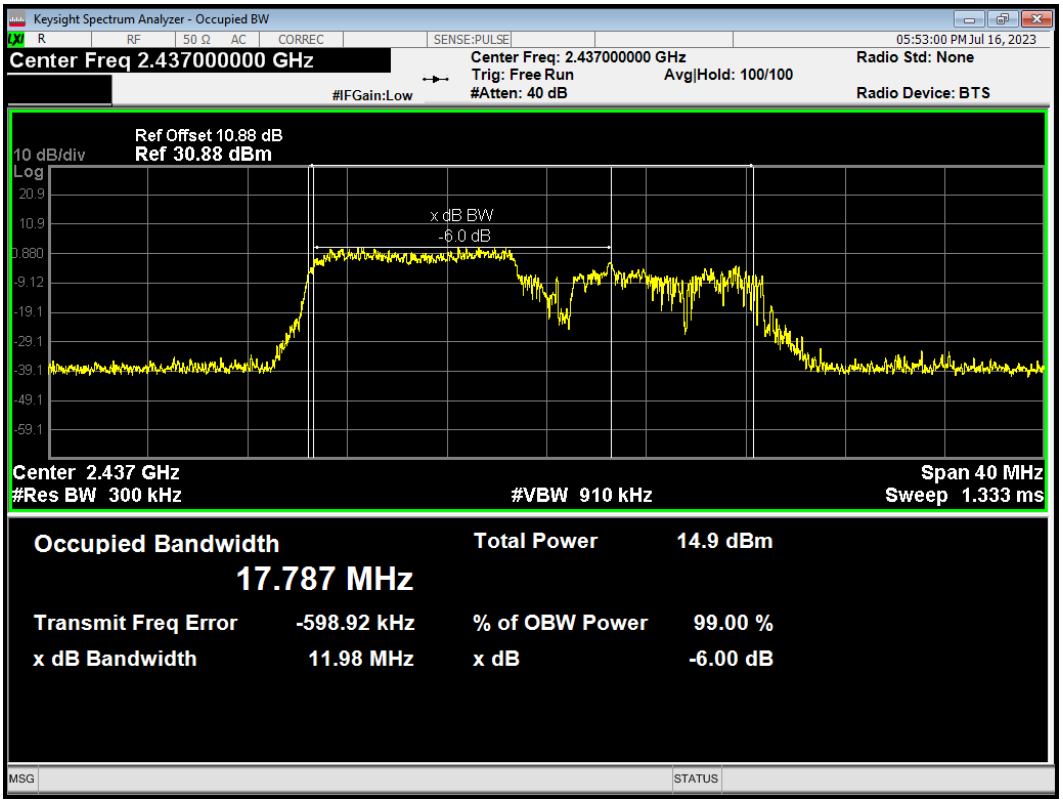


TB Mode

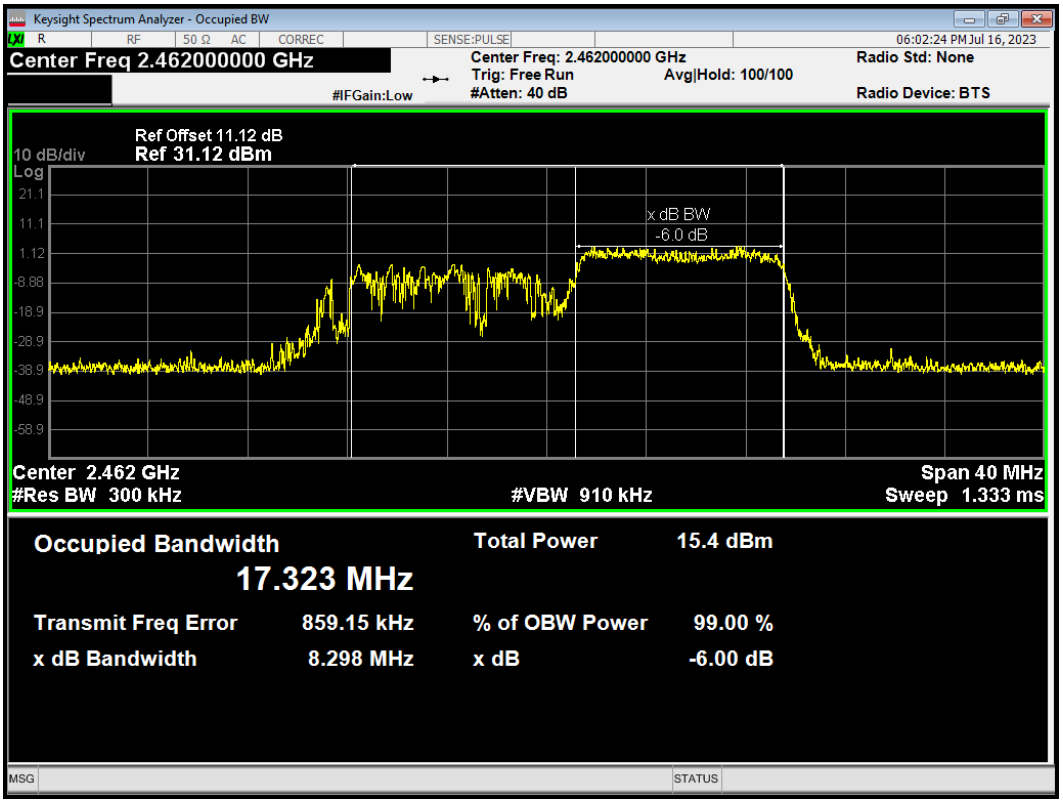
OBW 802.11ax HE20 106-Tones 2412MHz



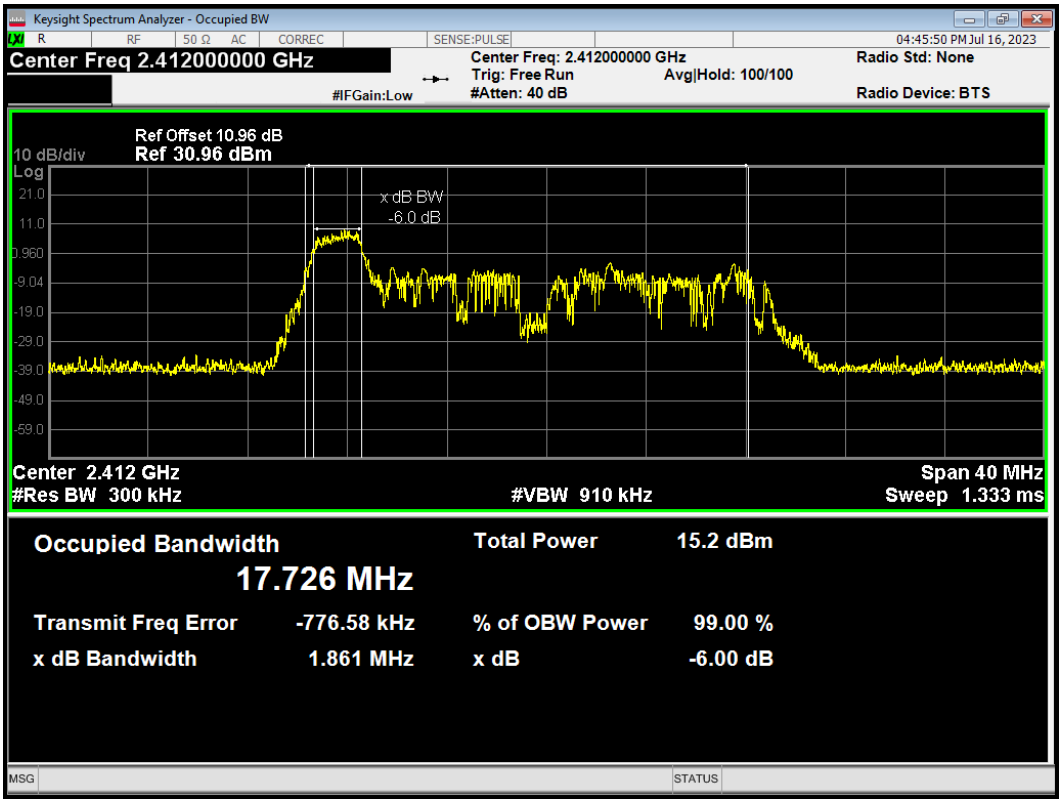
OBW 802.11ax HE20 106-Tones 2437MHz



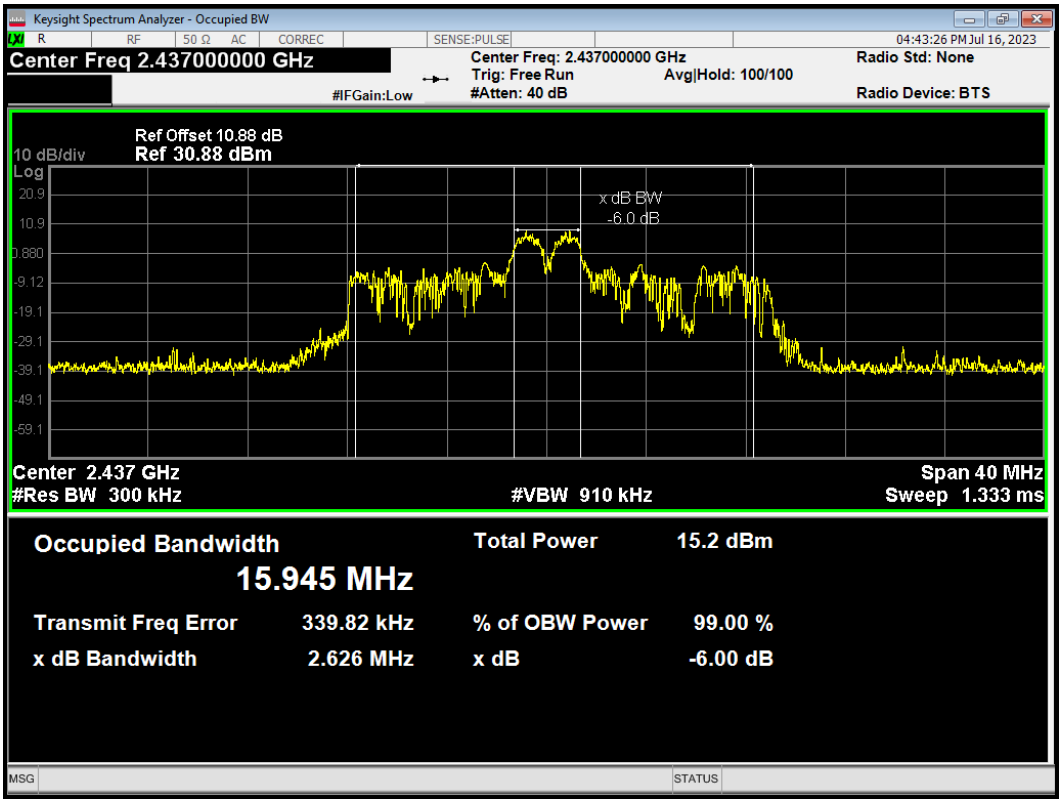
OBW 802.11ax HE20 106-Tones 2462MHz



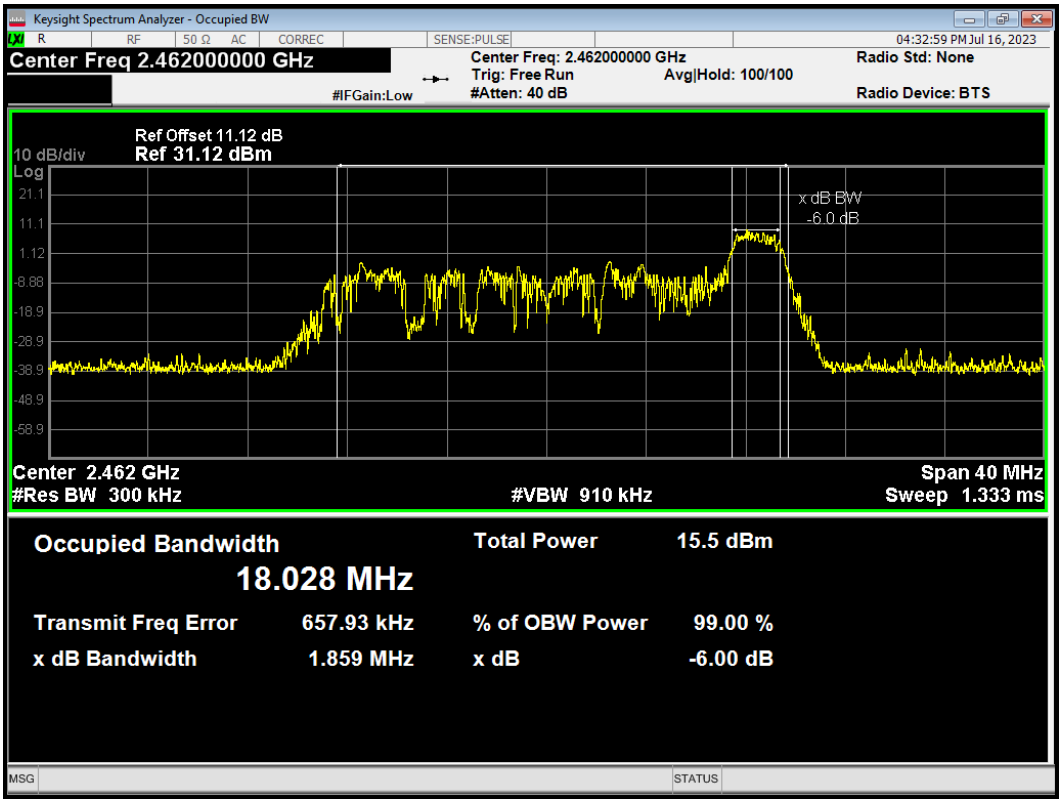
OBW 802.11ax HE20 26-Tones 2412MHz



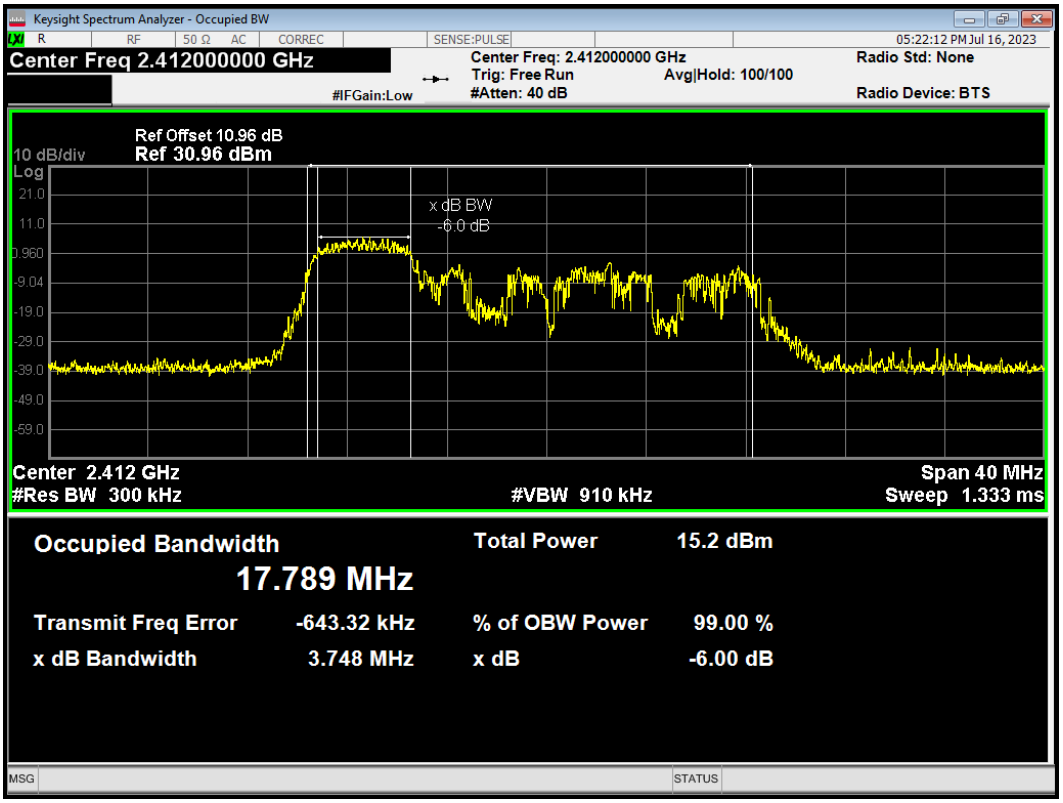
OBW 802.11ax HE20 26-Tones 2437MHz



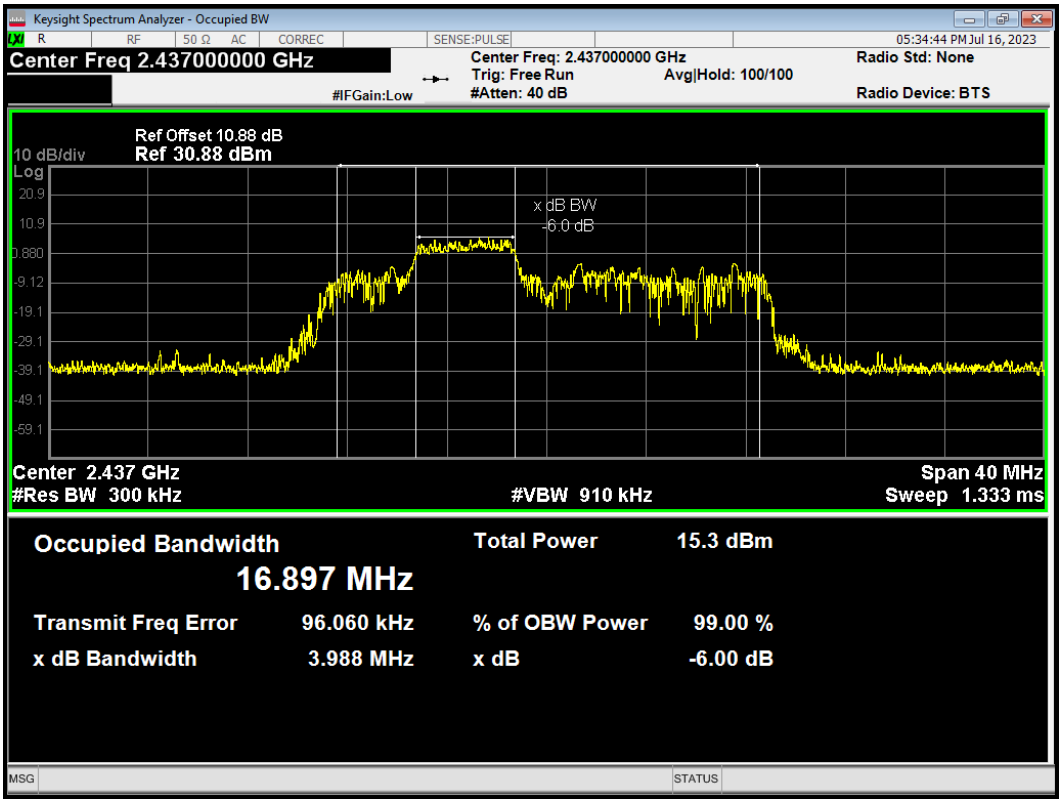
OBW 802.11ax HE20 26-Tones 2462MHz



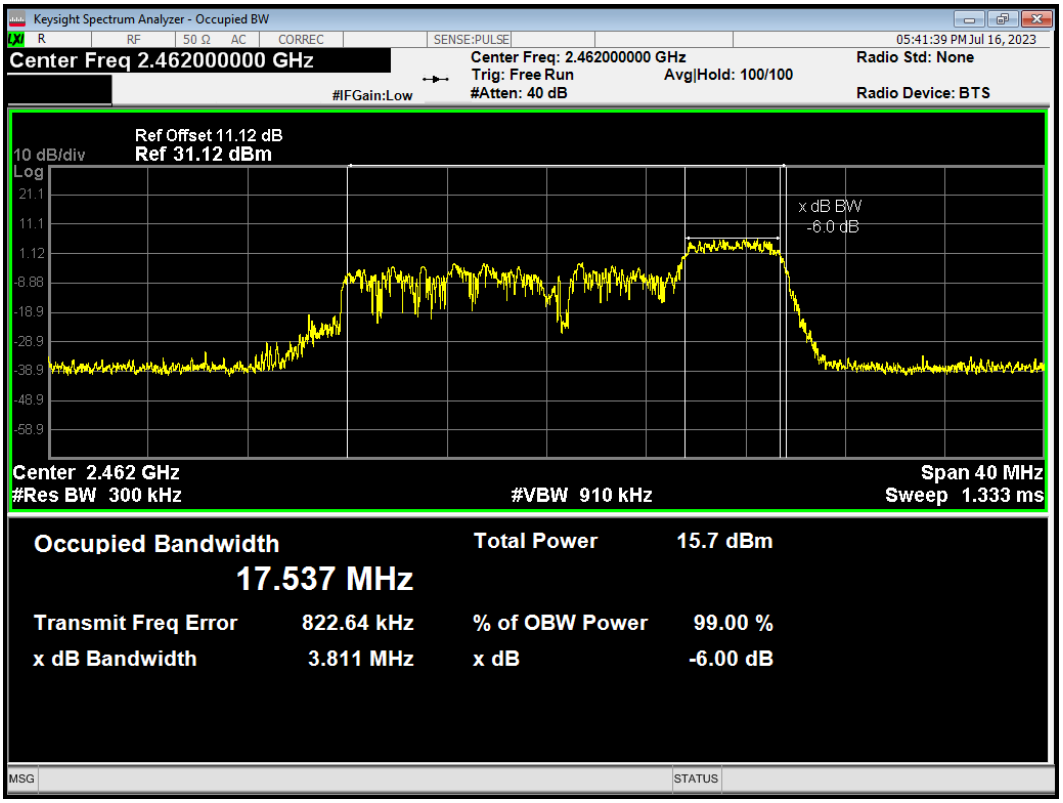
OBW 802.11ax HE20 52-Tones 2412MHz



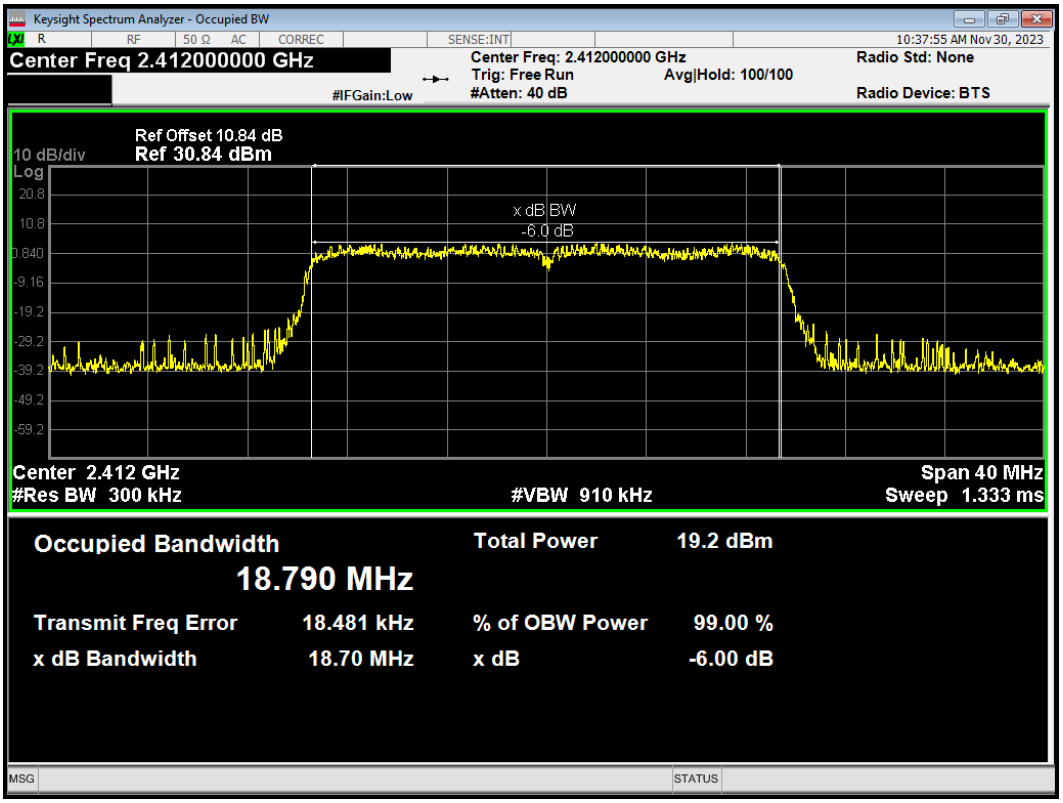
OBW 802.11ax HE20 52-Tones 2437MHz



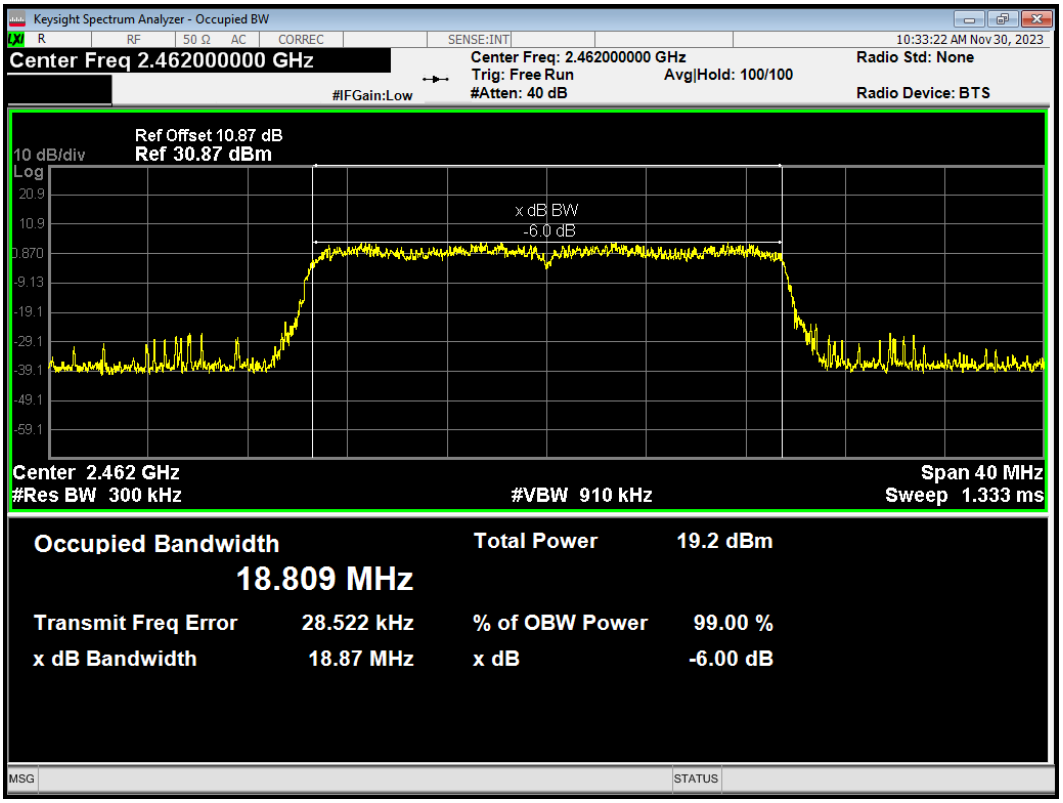
OBW 802.11ax HE20 52-Tones 2462MHz



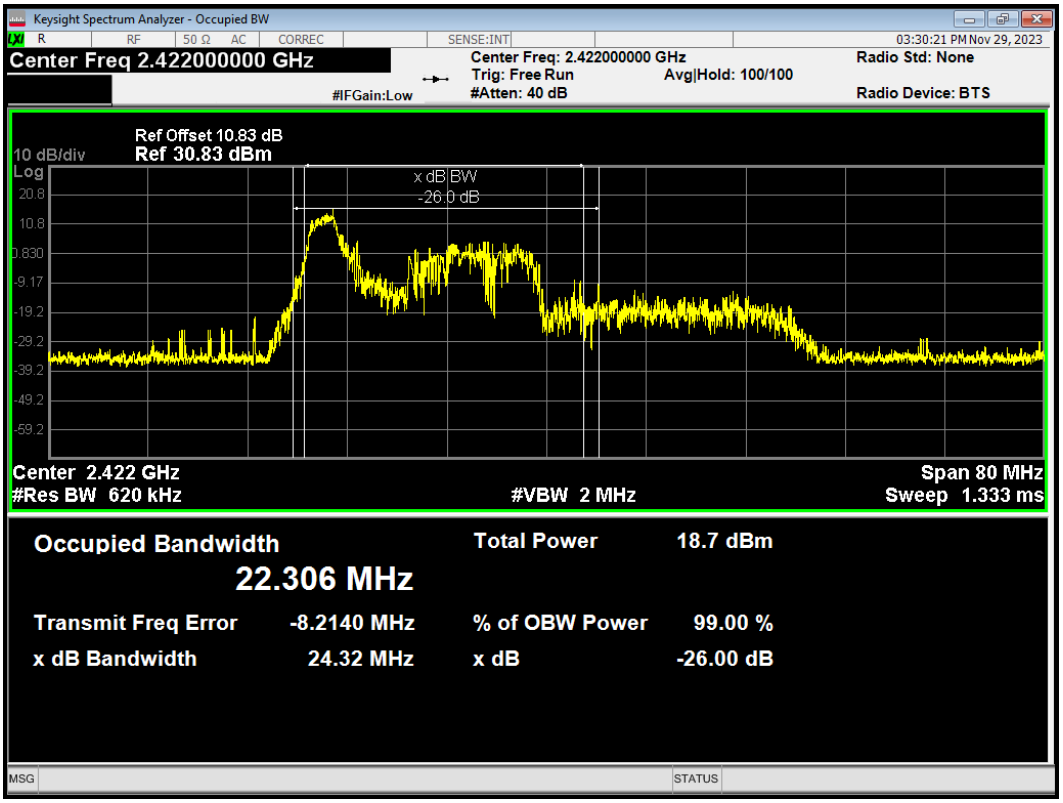
OBW 802.11ax HE20 242-Tones 2412MHz



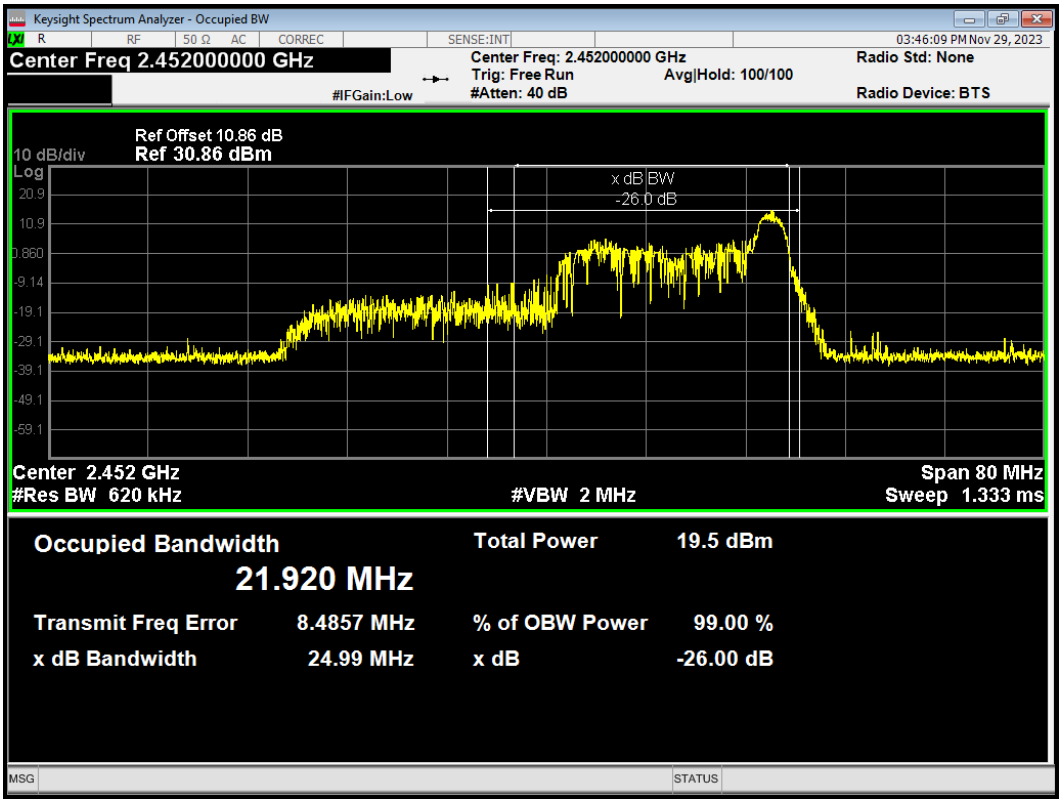
OBW 802.11ax HE20 242-Tones 2462MHz



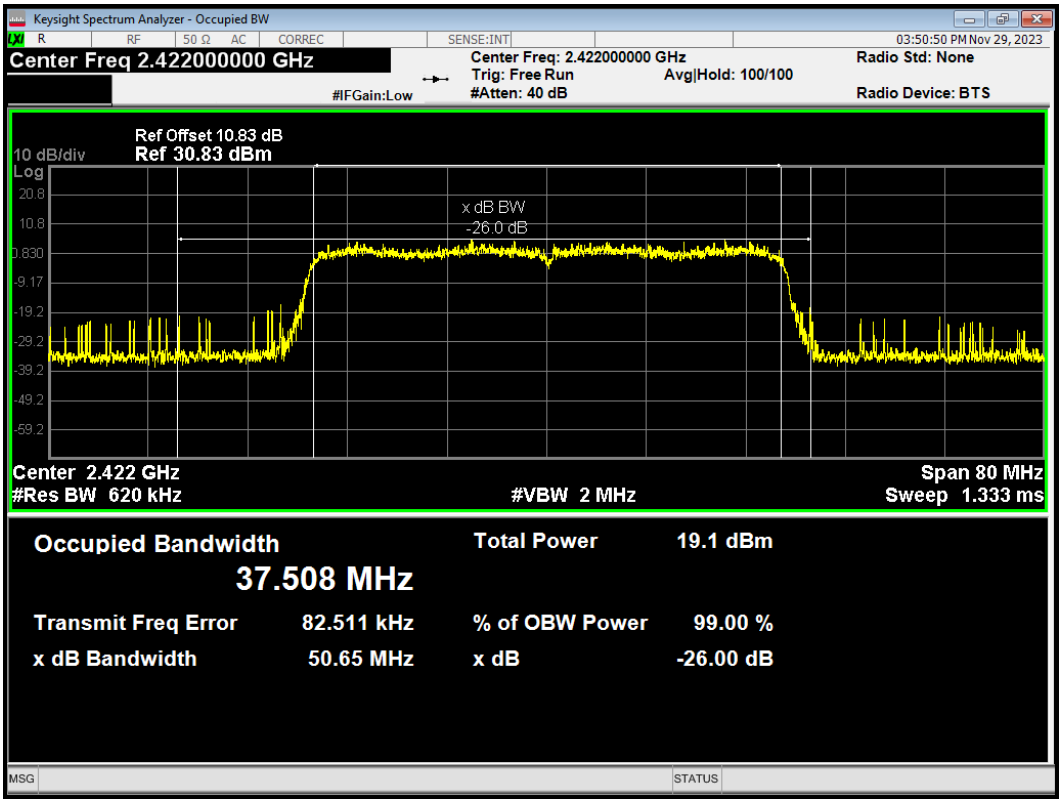
OBW 802.11ax HE40 26-Tones 2422MHz



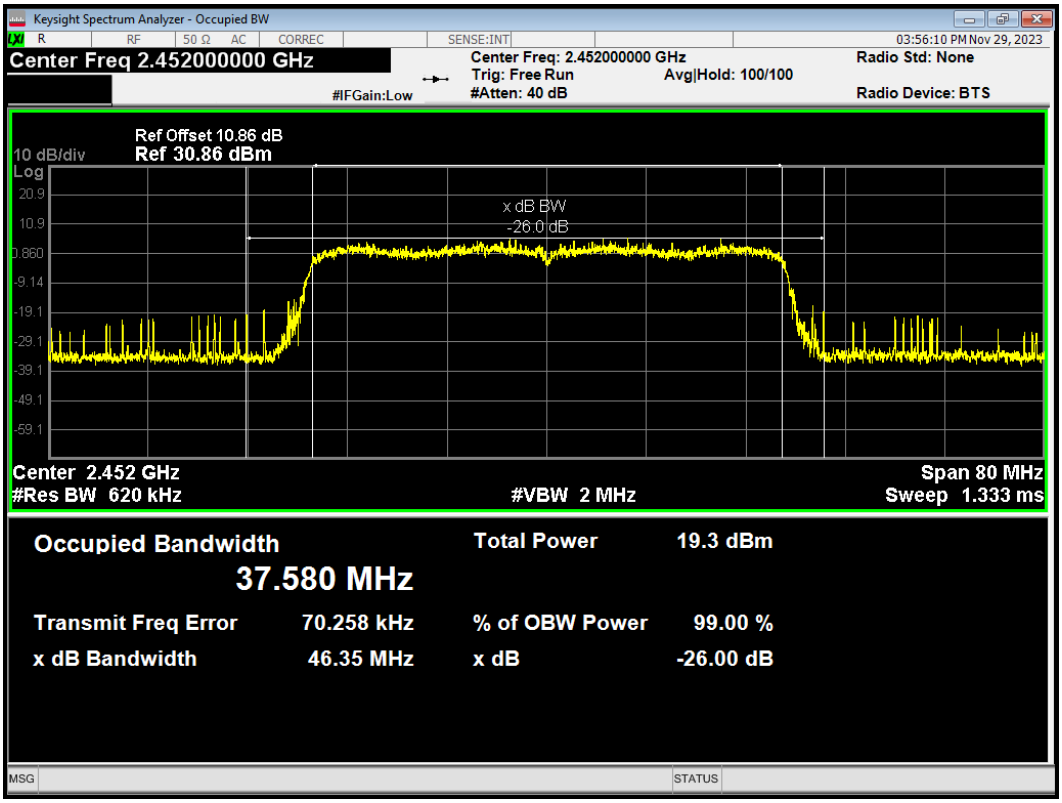
OBW 802.11ax HE40 26-Tones 2452MHz



OBW 802.11ax HE40 484-Tones 2422MHz

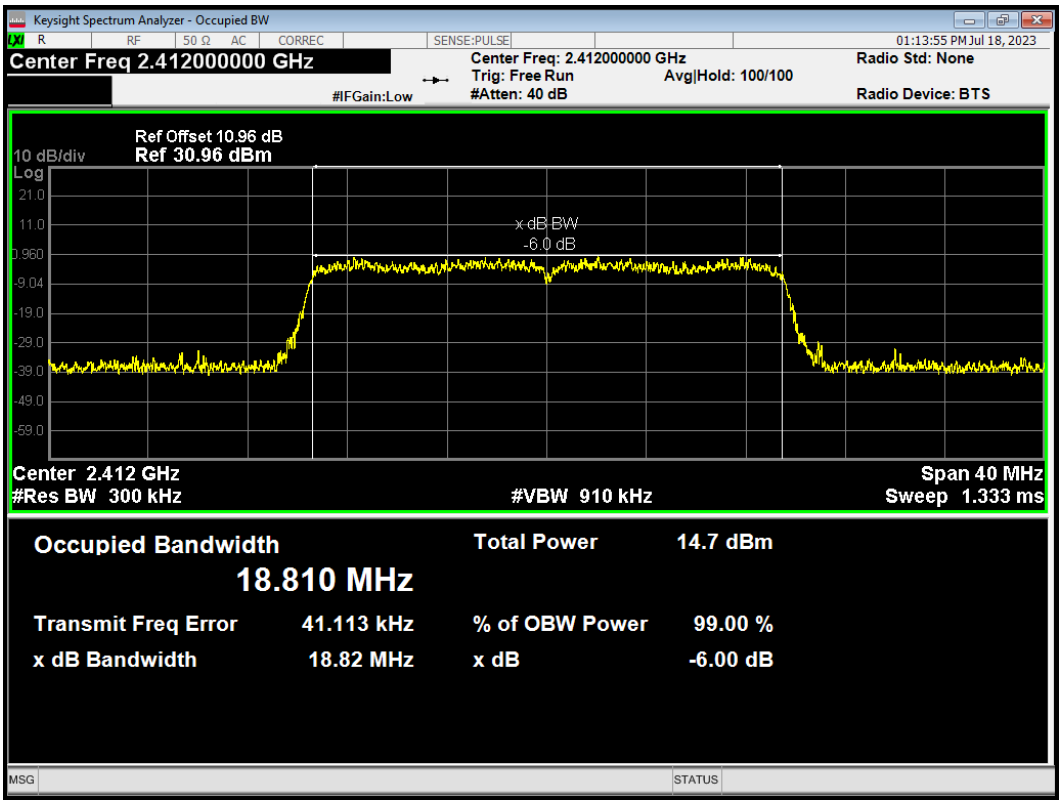


OBW 802.11ax HE40 484-Tones 2452MHz

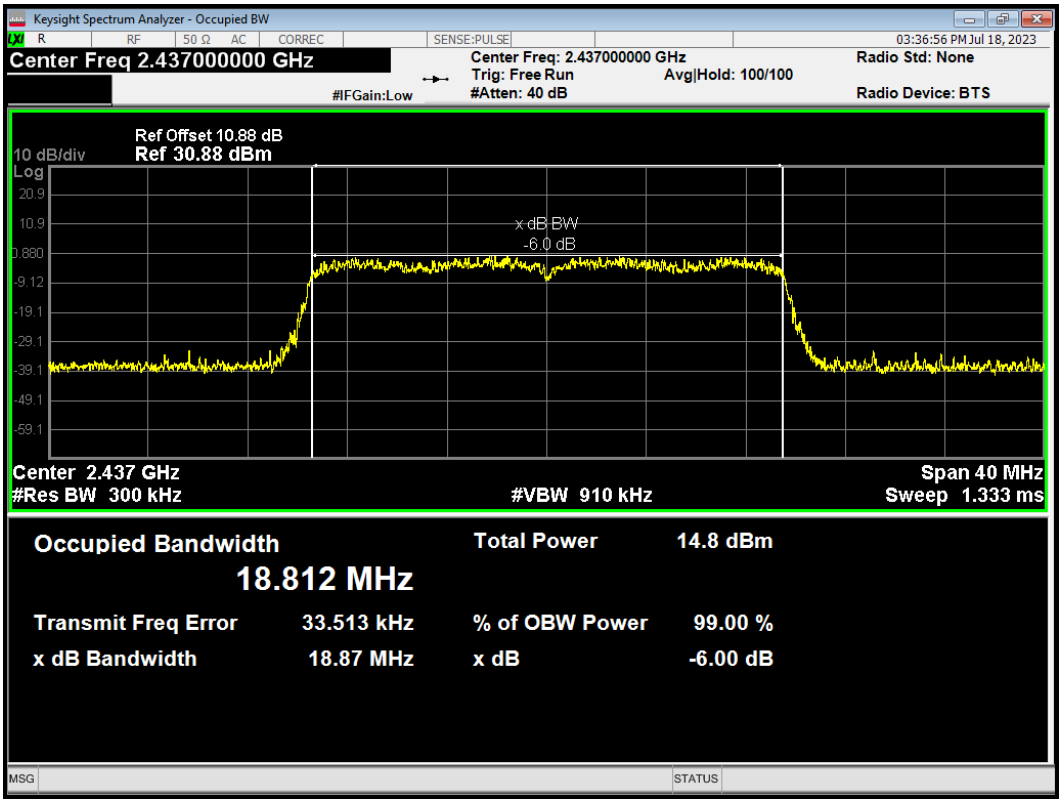


ERSU Mode

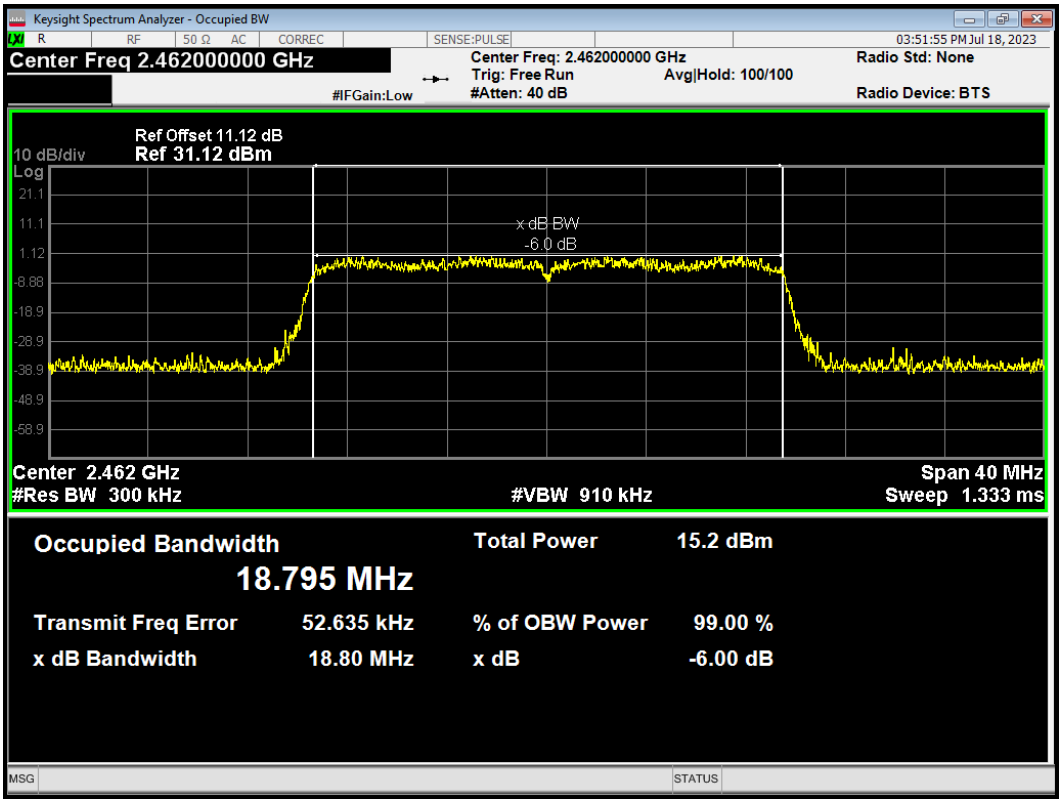
OBW 802.11ax HE20 242-Tones 2412MHz



OBW 802.11ax HE20 242-Tones 2437MHz

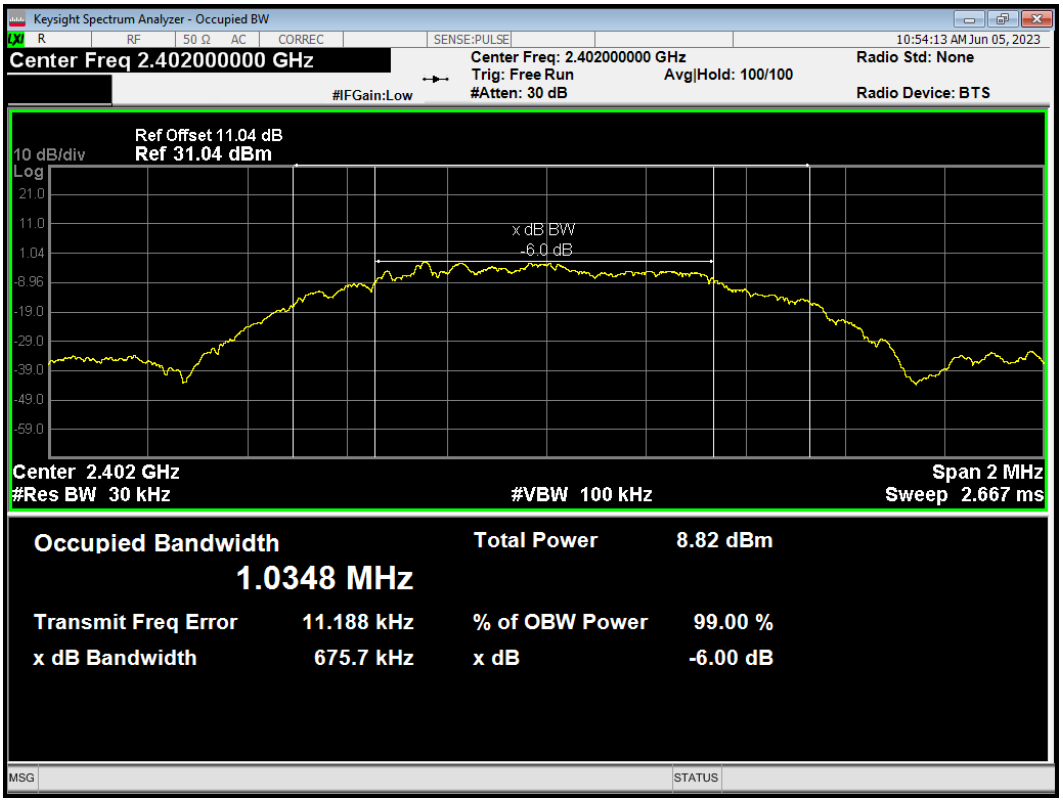


OBW 802.11ax HE20 242-Tones 2462MHz

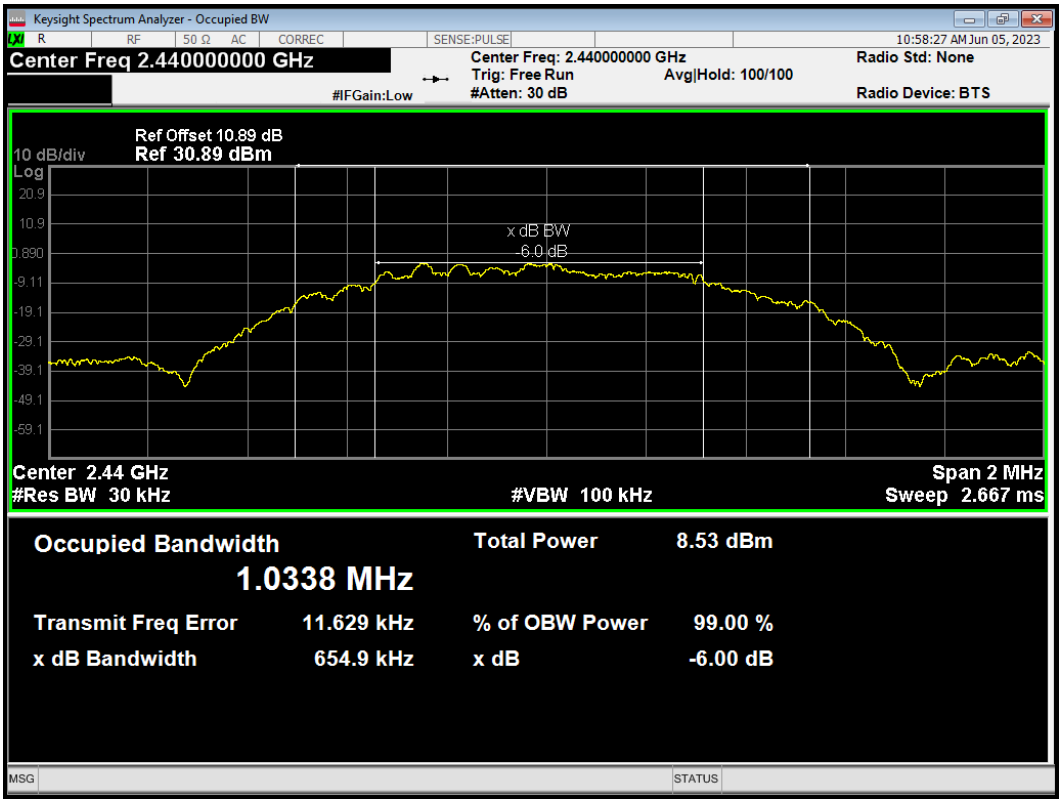


Bluetooth LE

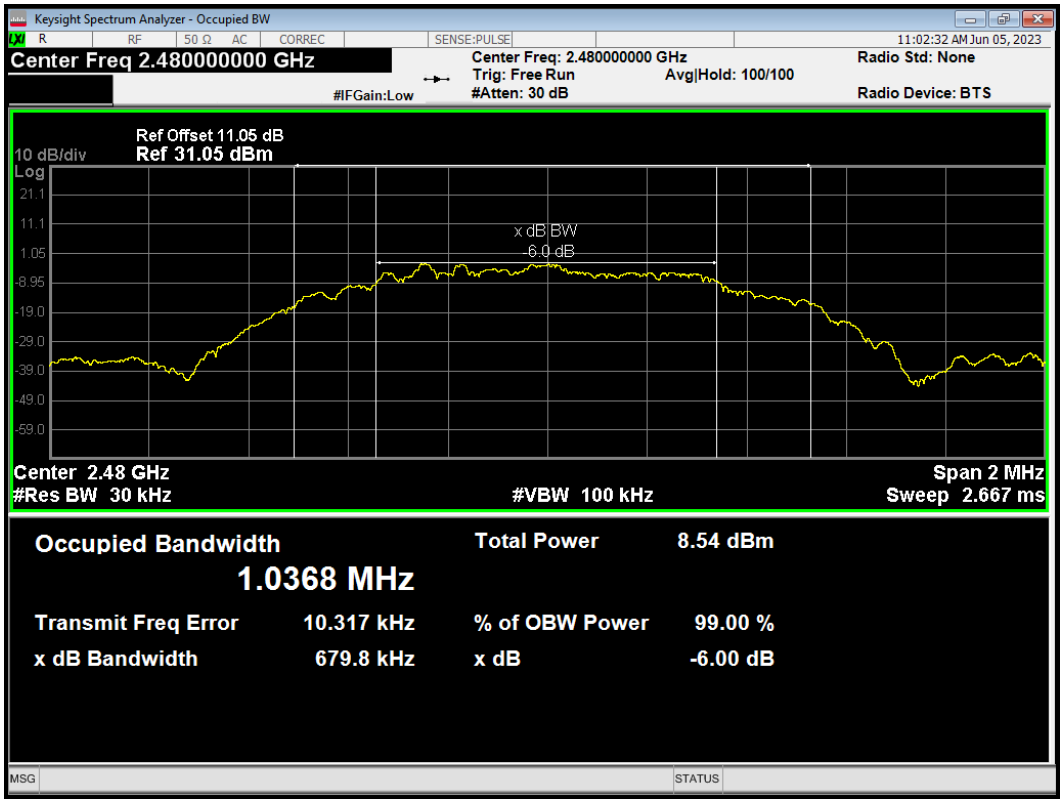
OBW BLE (1M) 2402MHz



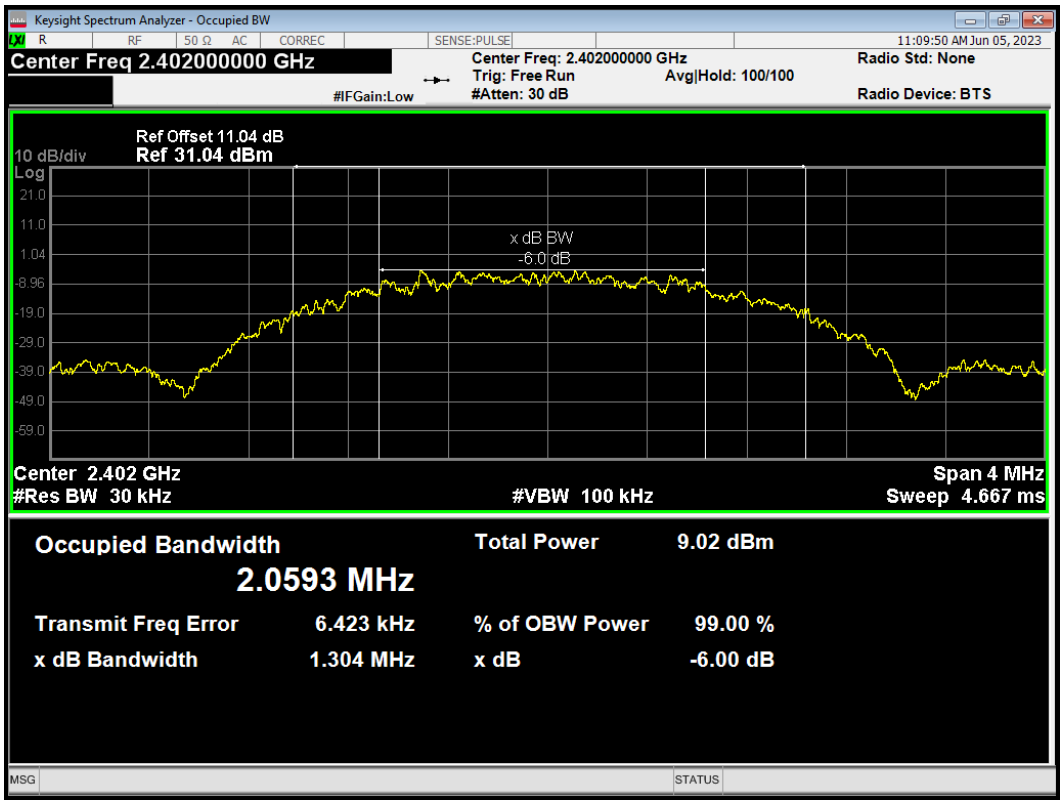
OBW BLE (1M) 2440MHz



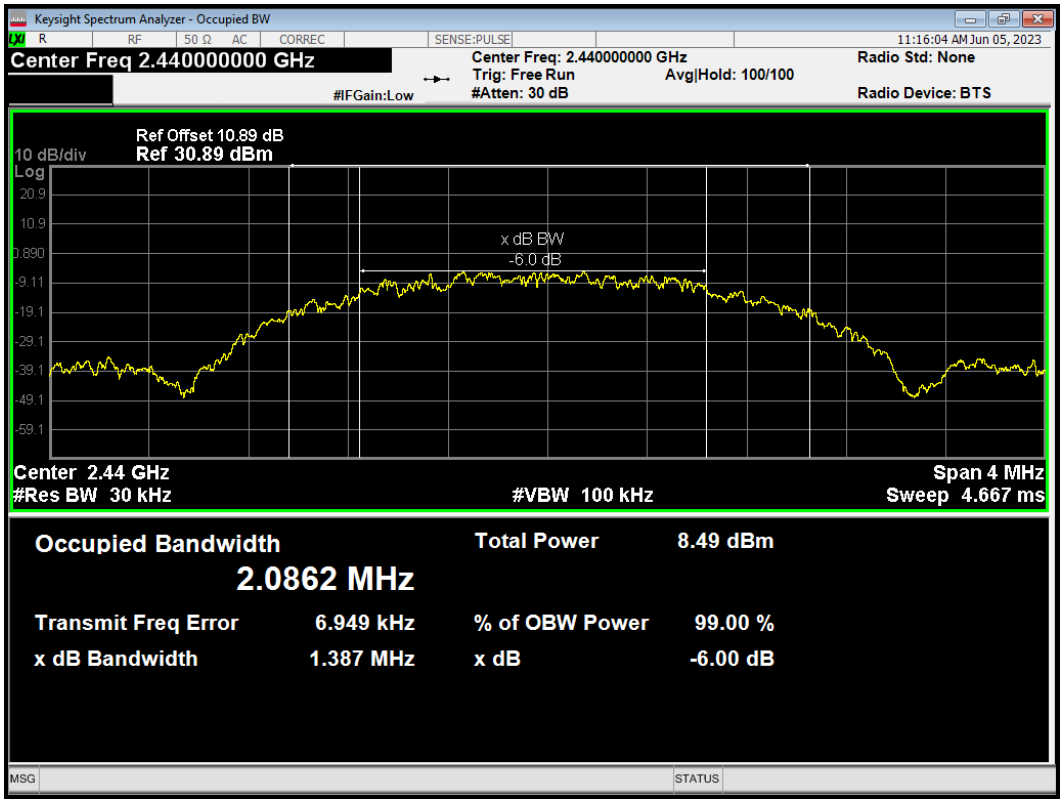
OBW BLE (1M) 2480MHz



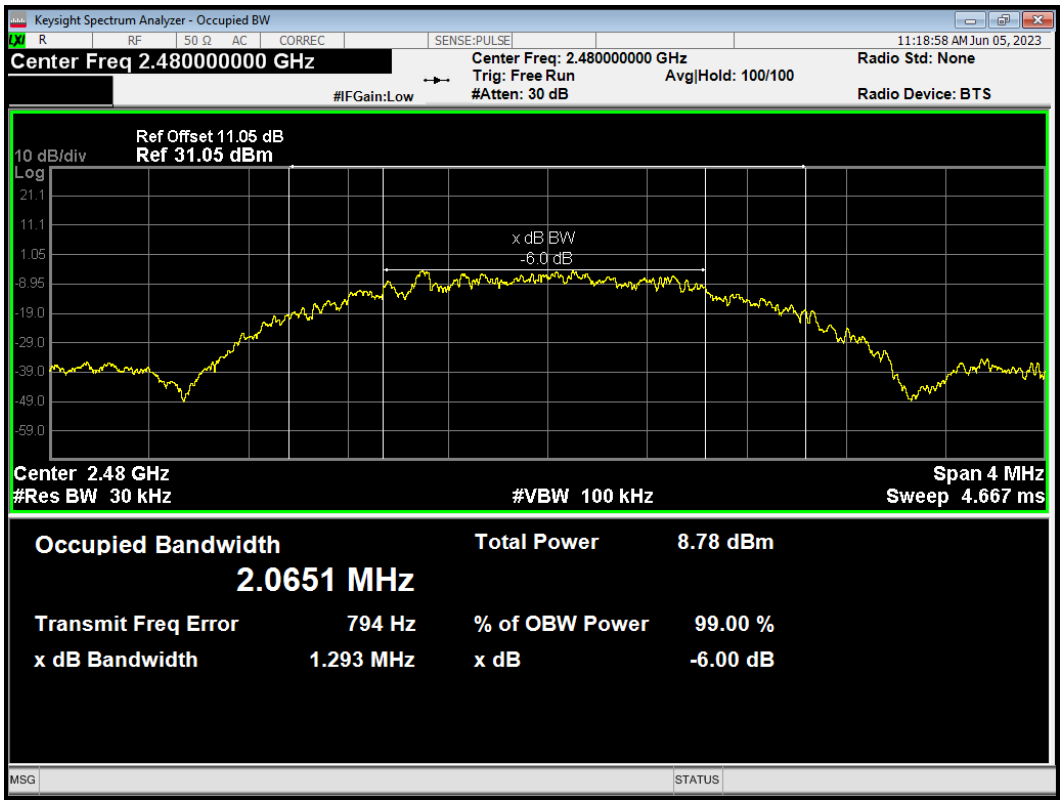
OBW BLE (2M) 2402MHz



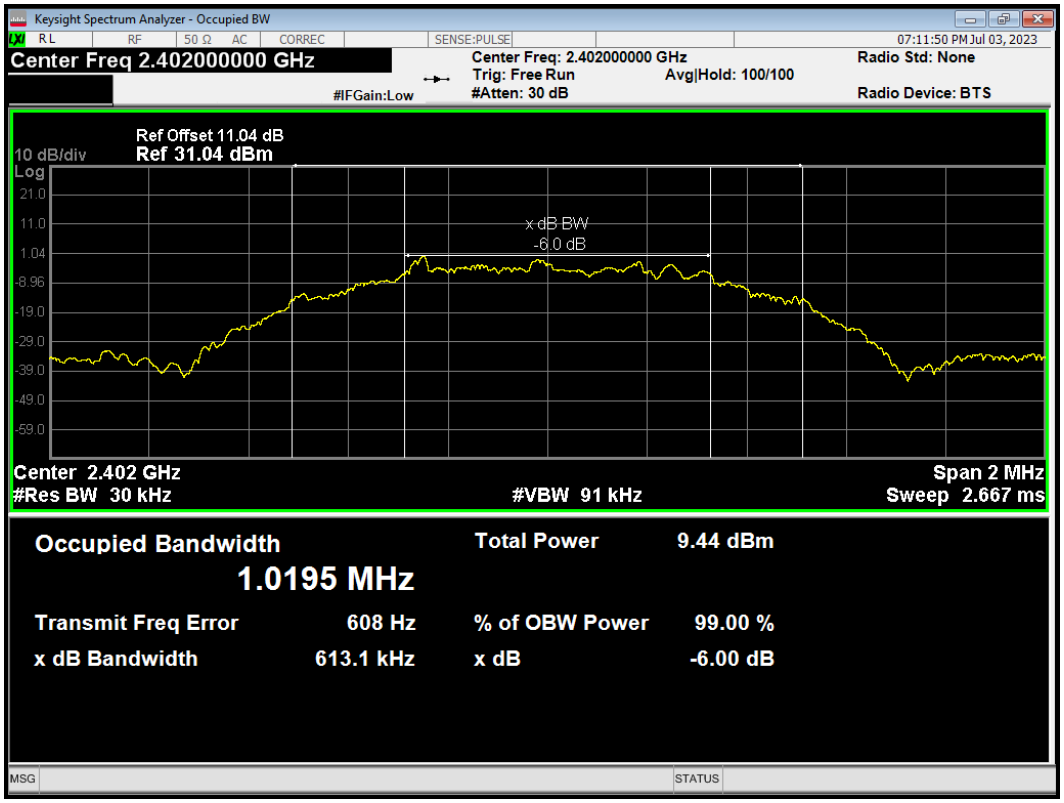
OBW BLE (2M) 2440MHz



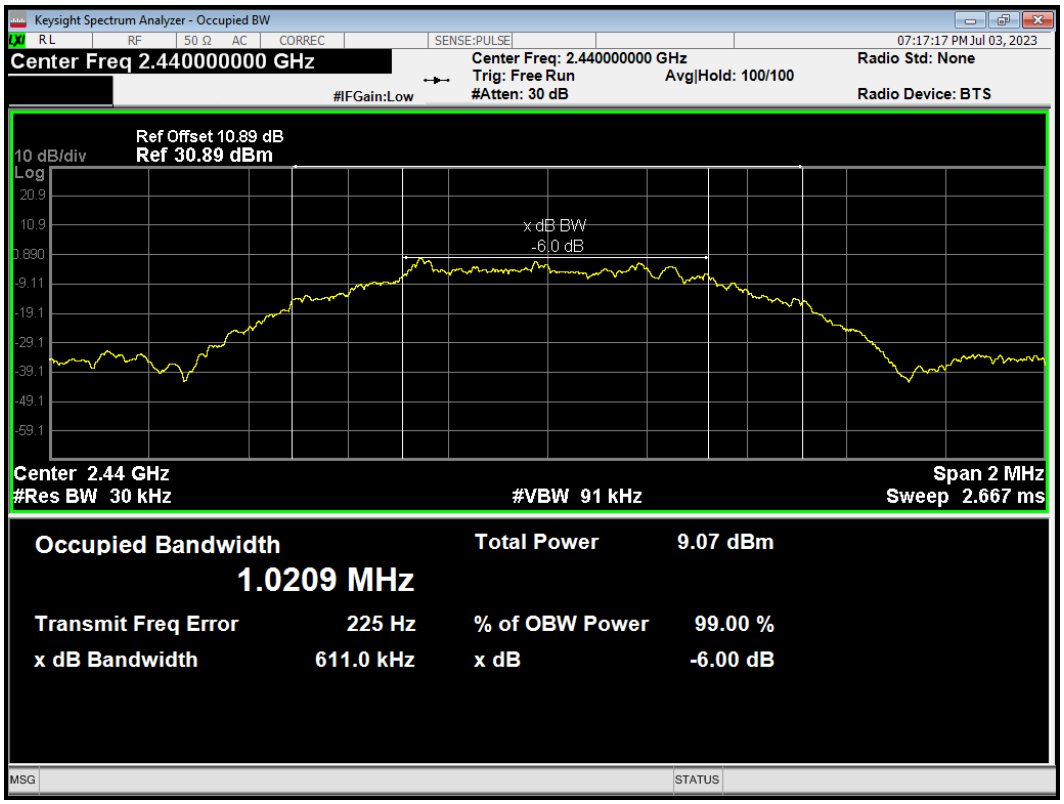
OBW BLE (2M) 2480MHz



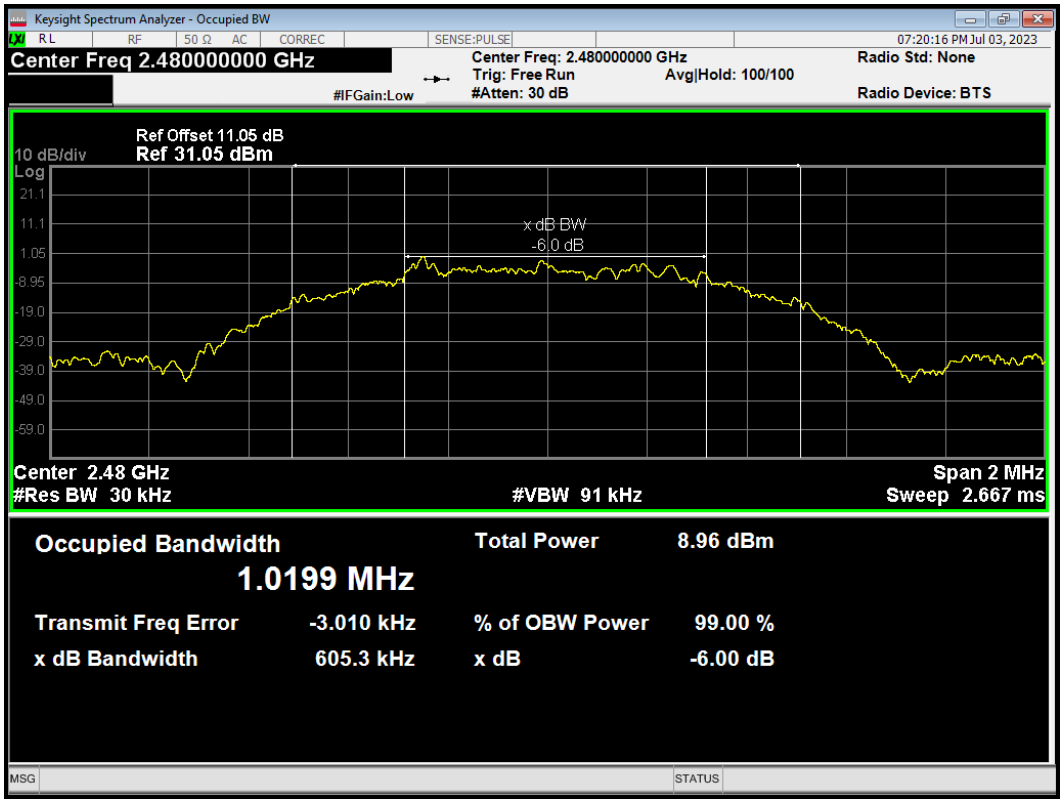
OBW BLE (S=2) 2402MHz



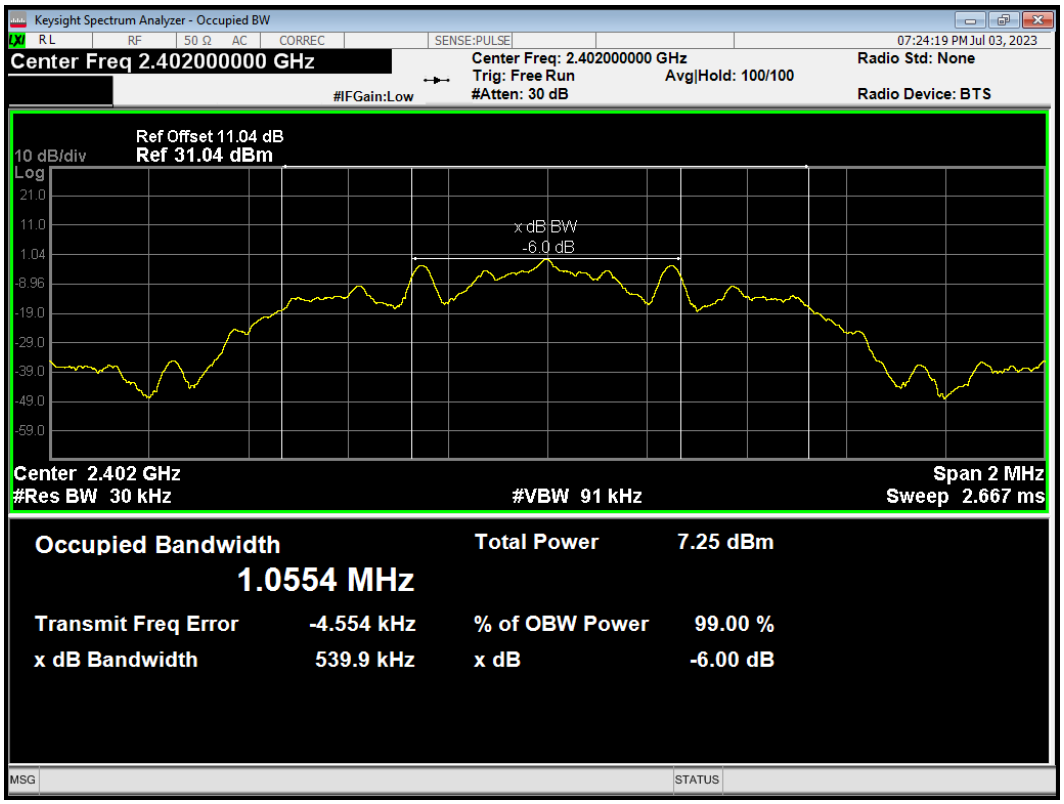
OBW BLE (S=2) 2440MHz



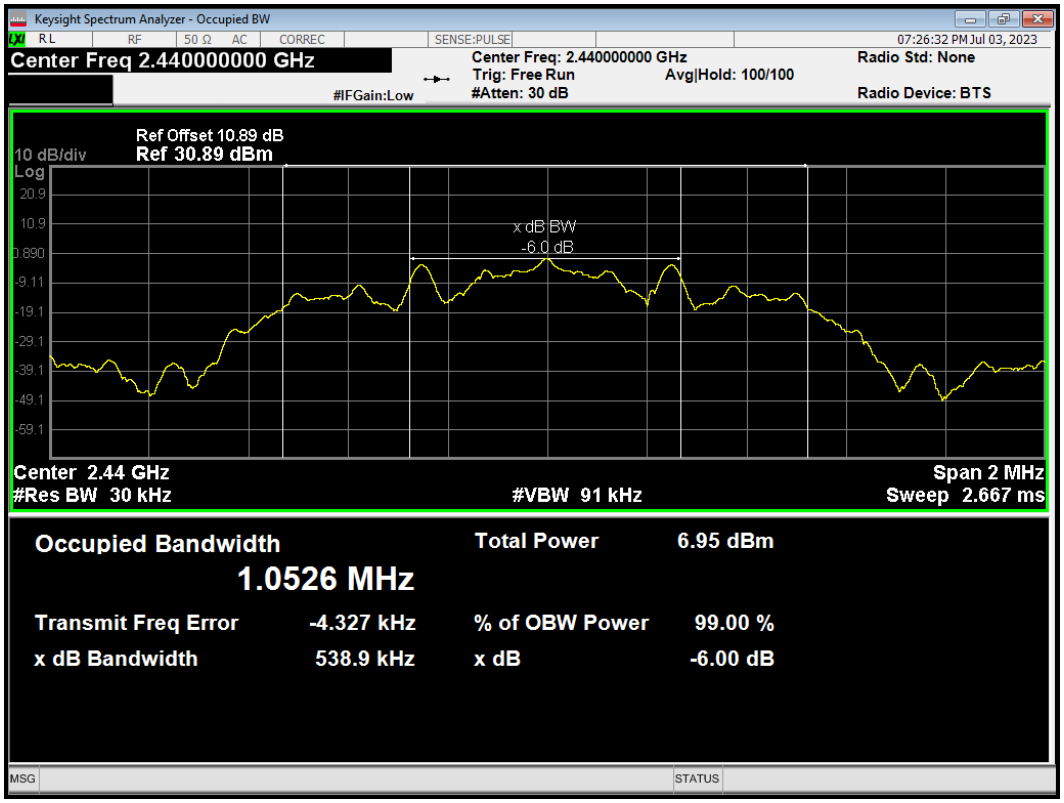
OBW BLE (S=2) 2480MHz



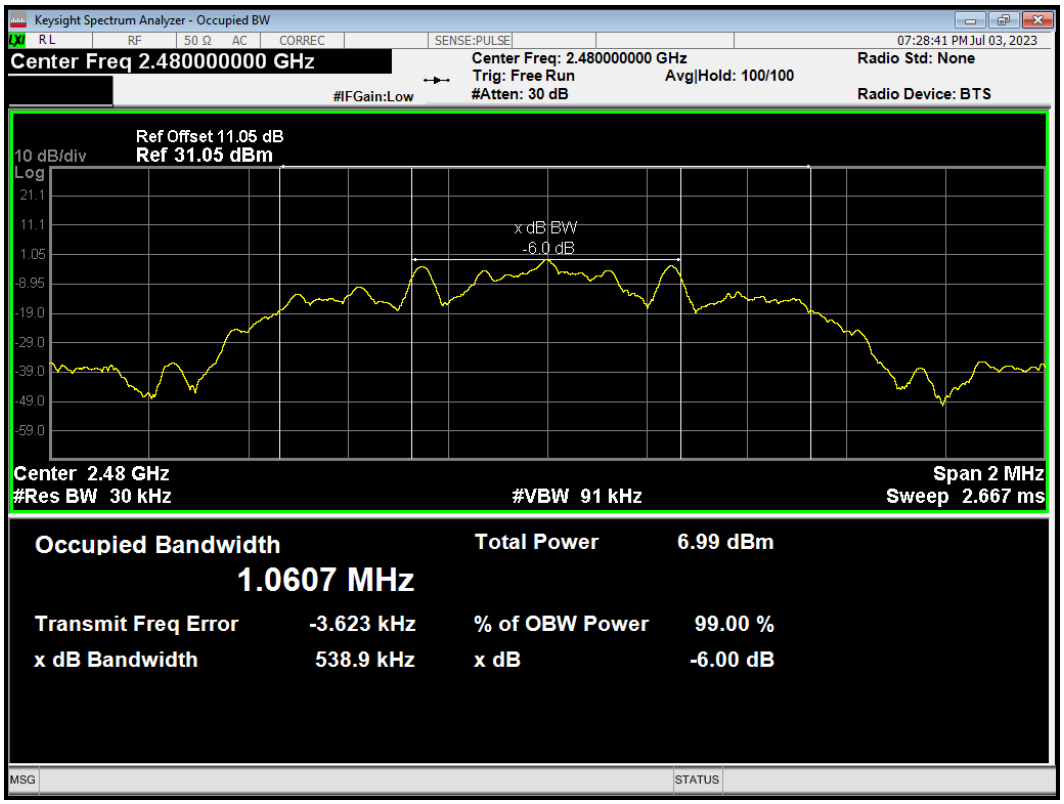
OBW BLE (S=8) 2402MHz



OBW BLE (S=8) 2440MHz

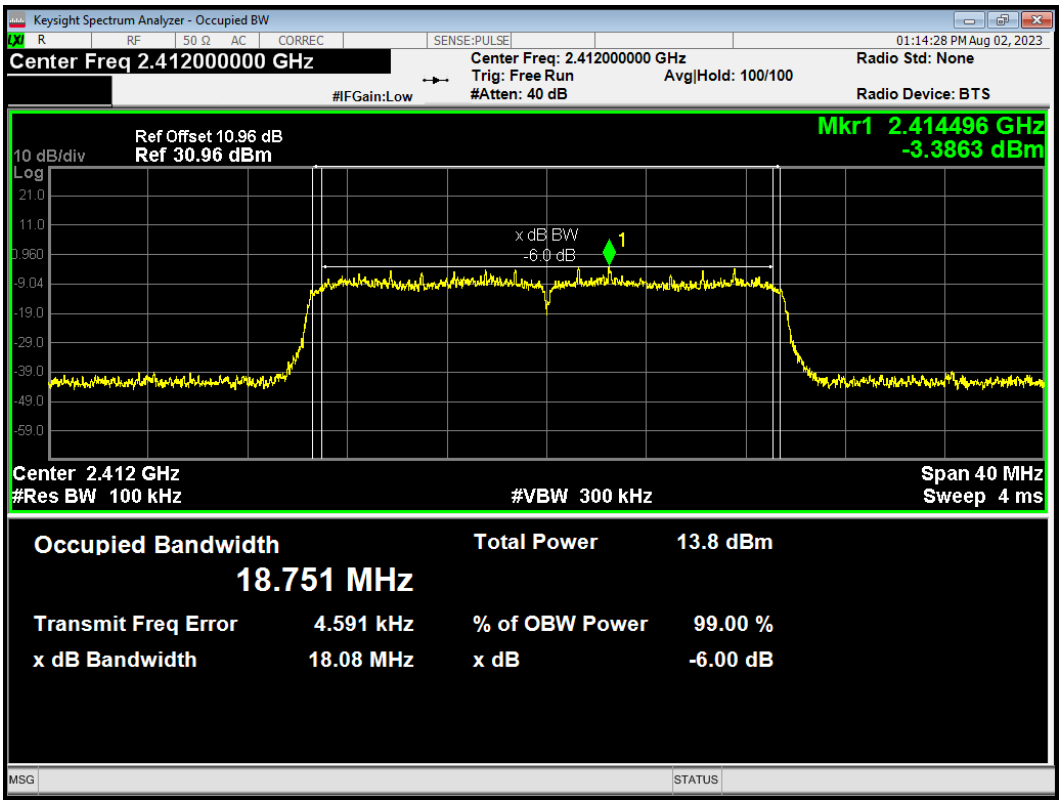


OBW BLE (S=8) 2480MHz

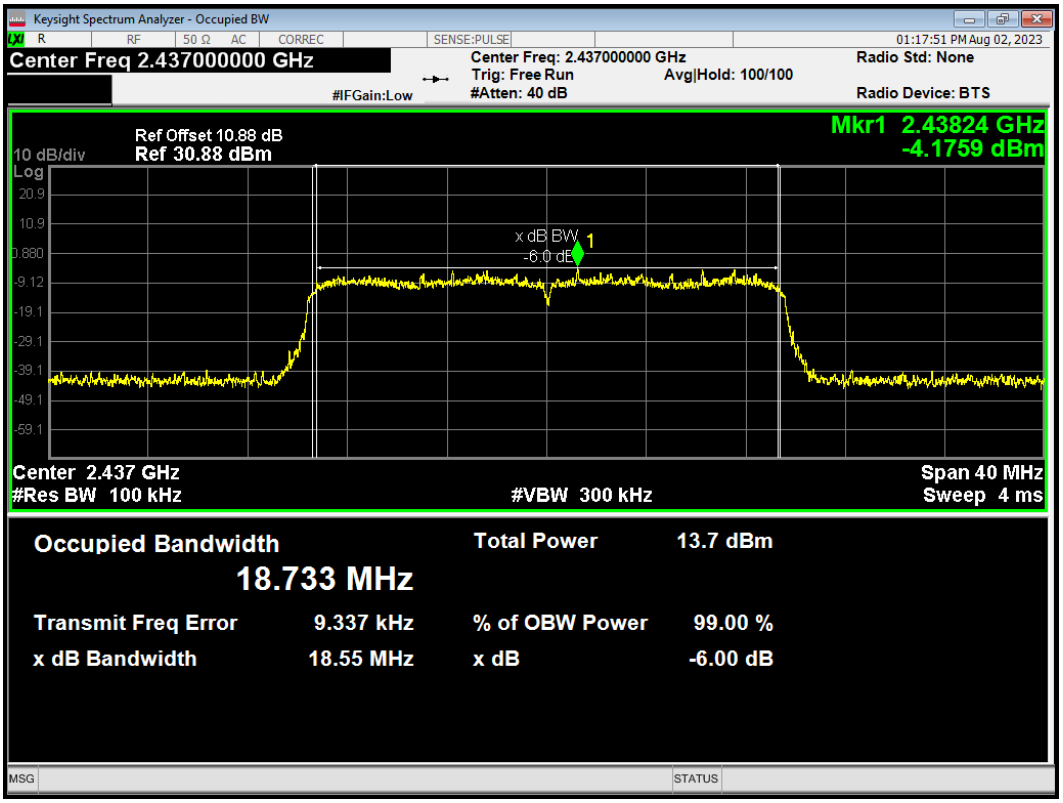


6 dB bandwidth

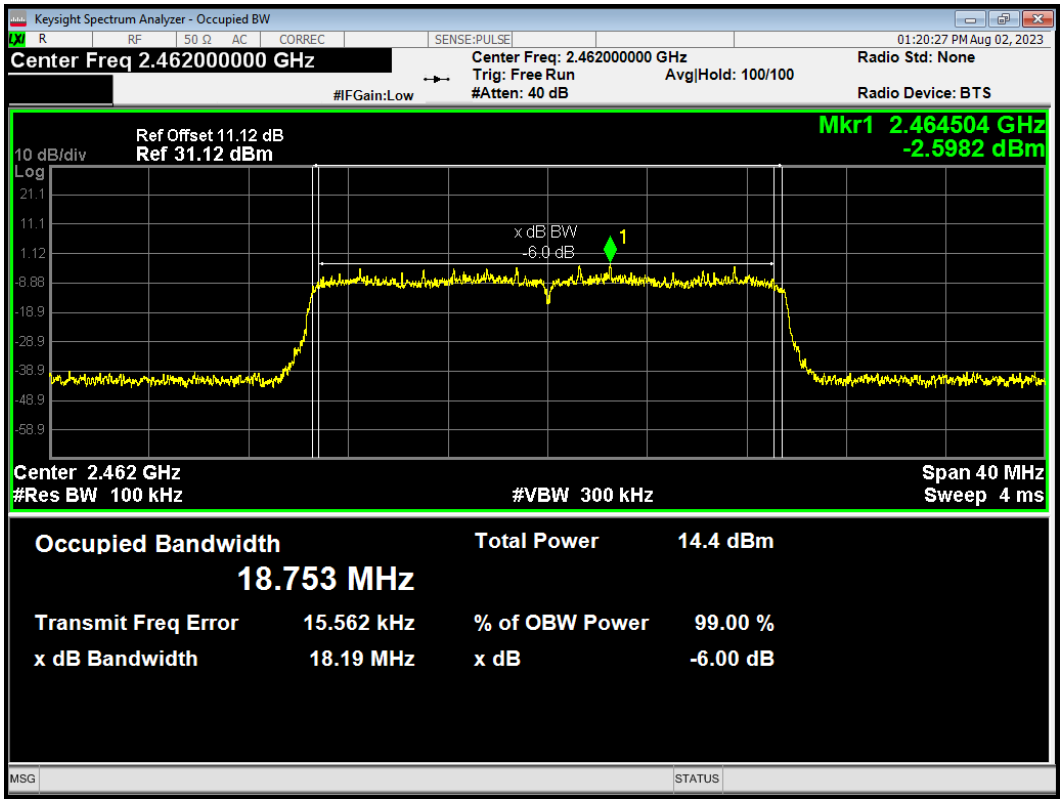
-6dB Bandwidth 802.11ax(HE20) 2412MHz



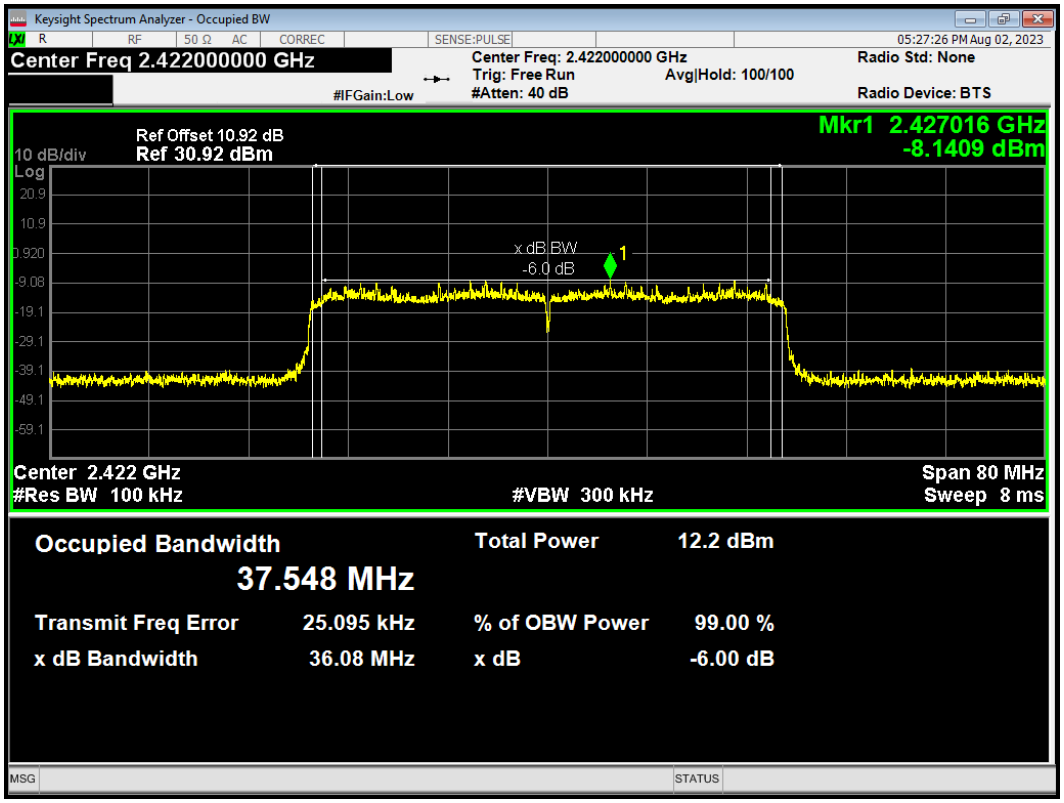
-6dB Bandwidth 802.11ax(HE20) 2437MHz



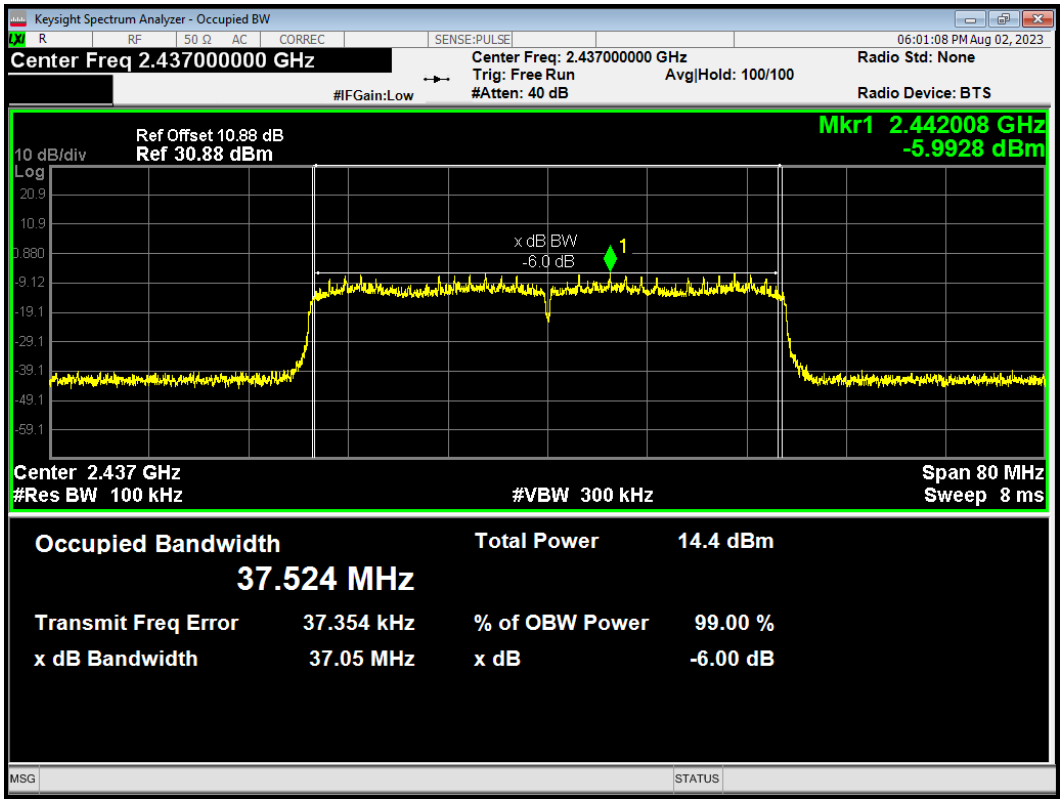
-6dB Bandwidth 802.11ax(HE20) 2462MHz



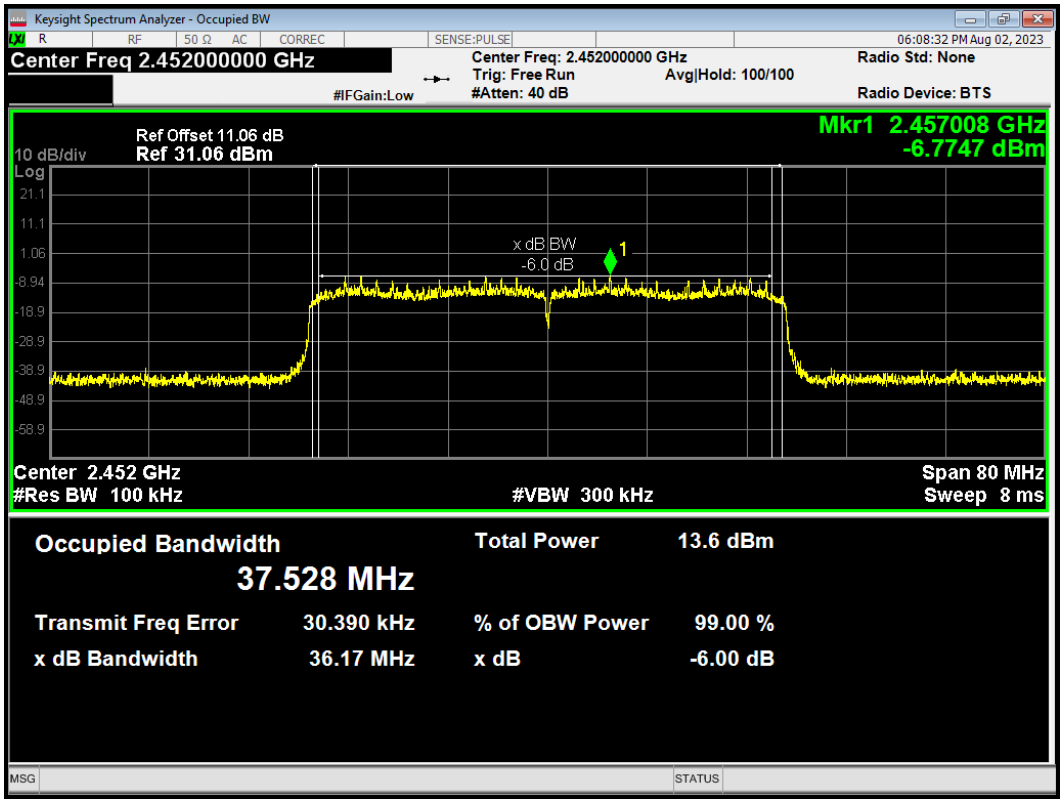
-6dB Bandwidth 802.11ax(HE40) 2422MHz



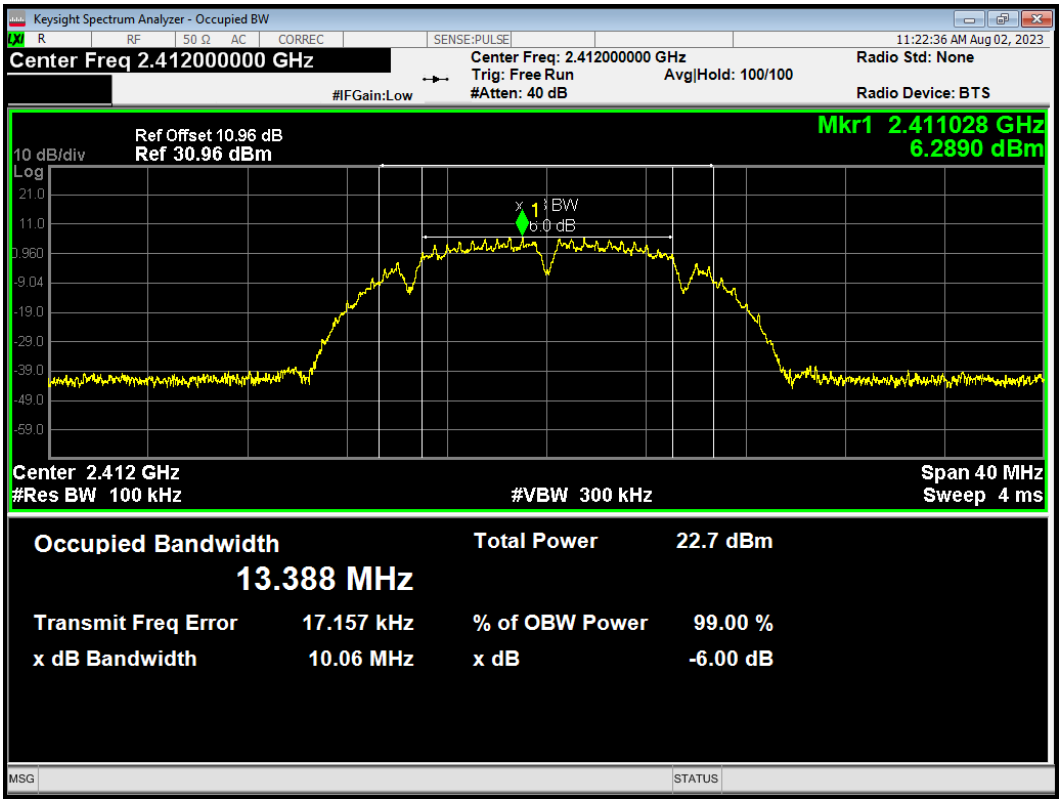
-6dB Bandwidth 802.11ax(HE40) 2437MHz



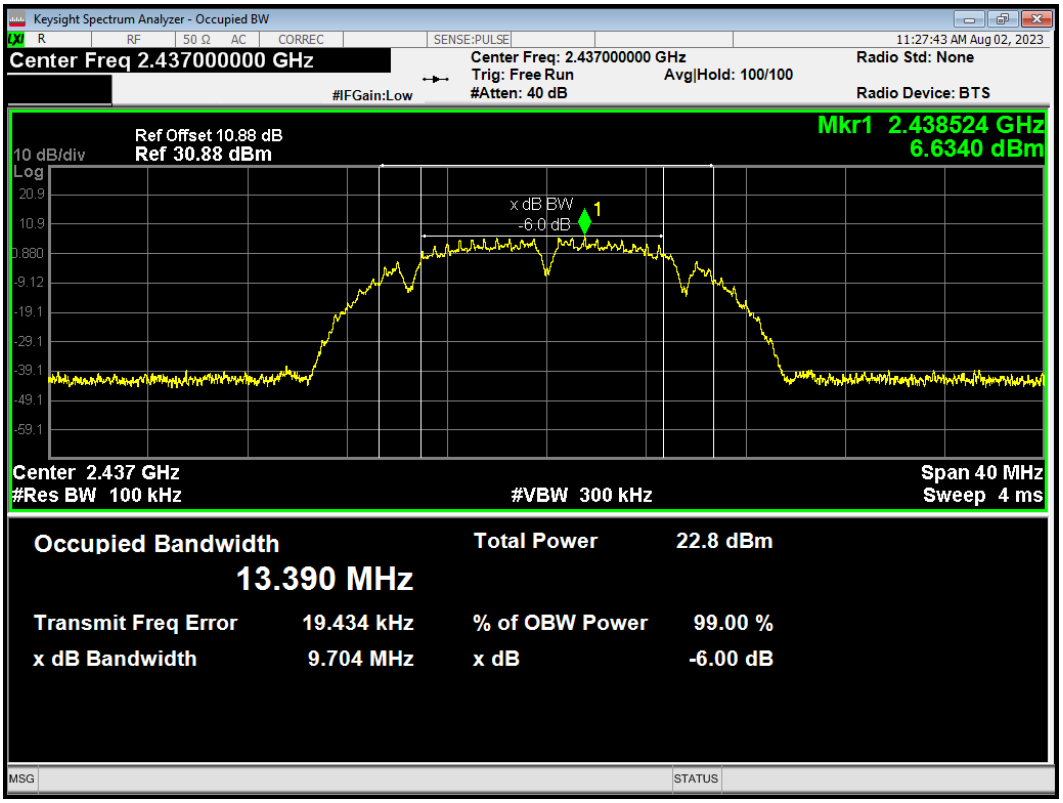
-6dB Bandwidth 802.11ax(HE40) 2452MHz



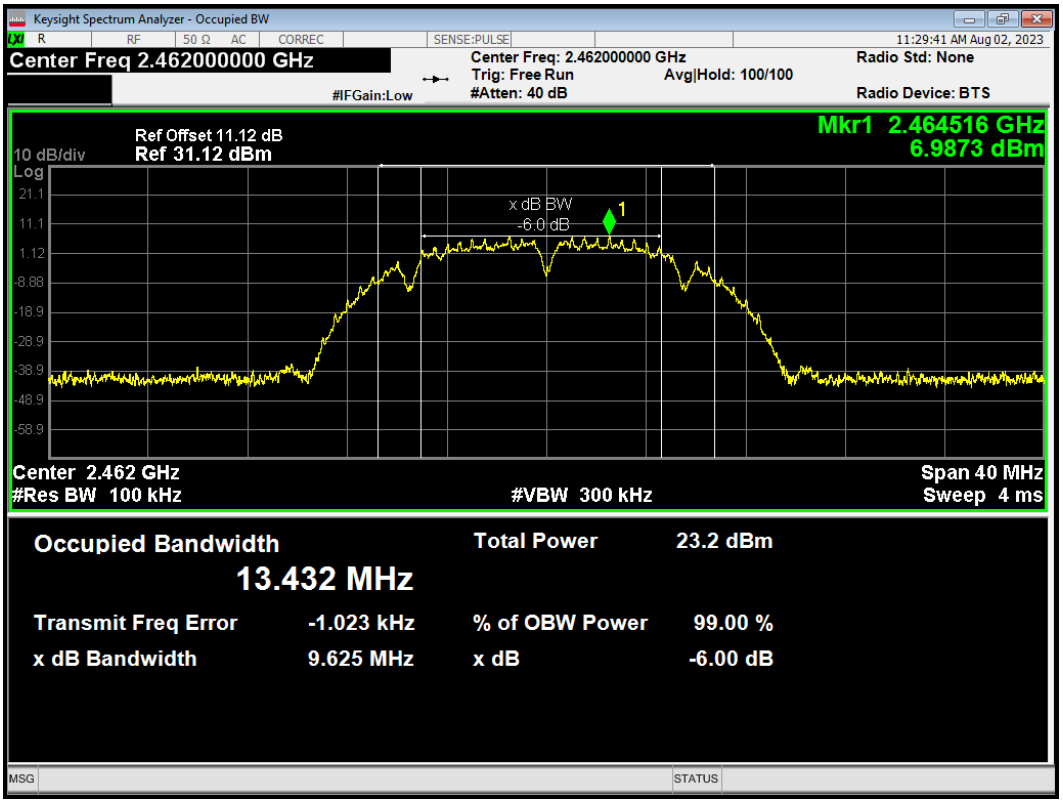
-6dB Bandwidth 802.11b 2412MHz



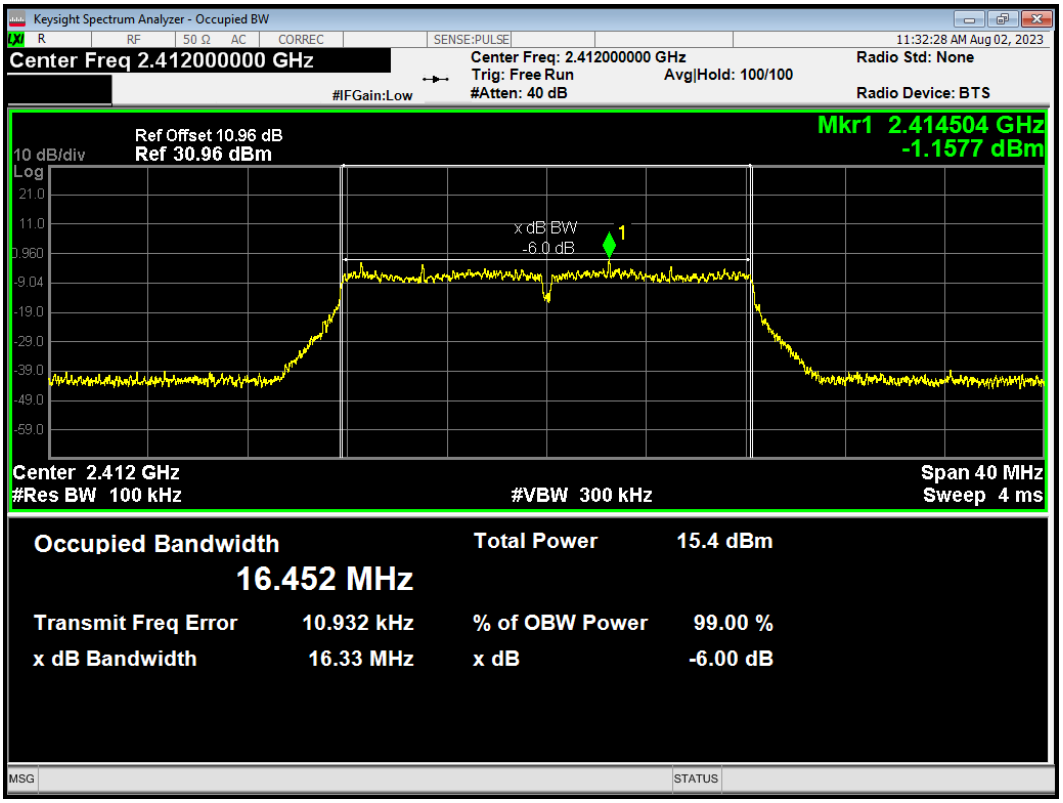
-6dB Bandwidth 802.11b 2437MHz



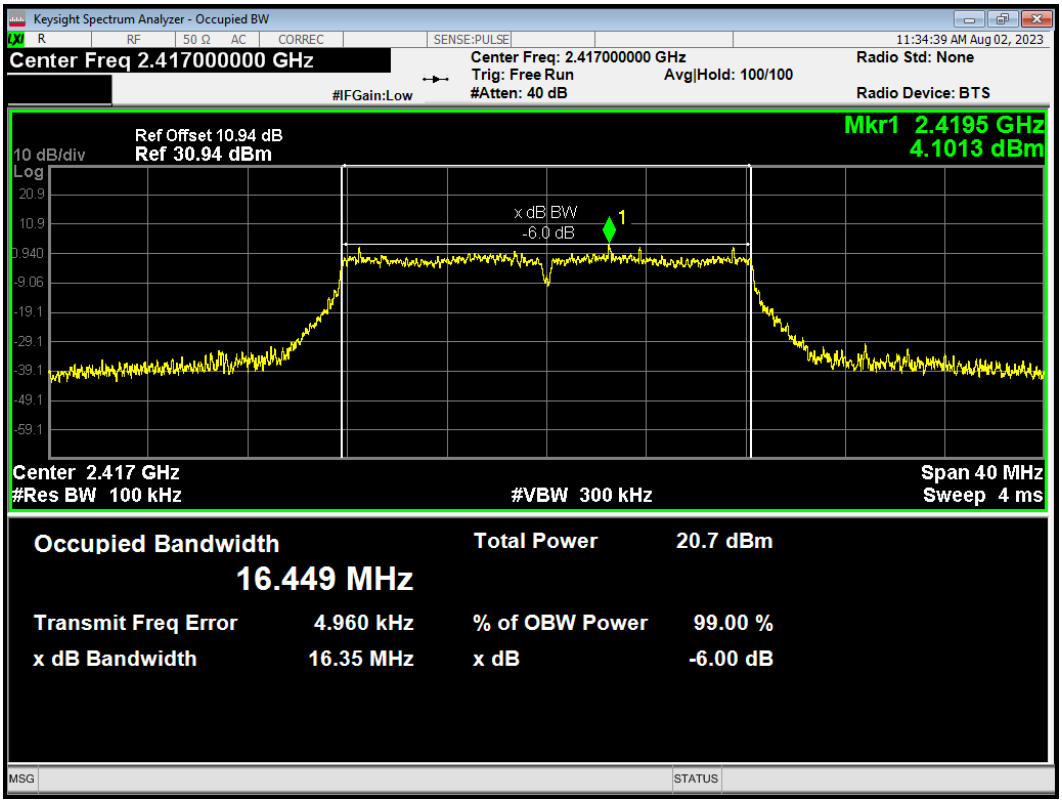
-6dB Bandwidth 802.11b 2462MHz



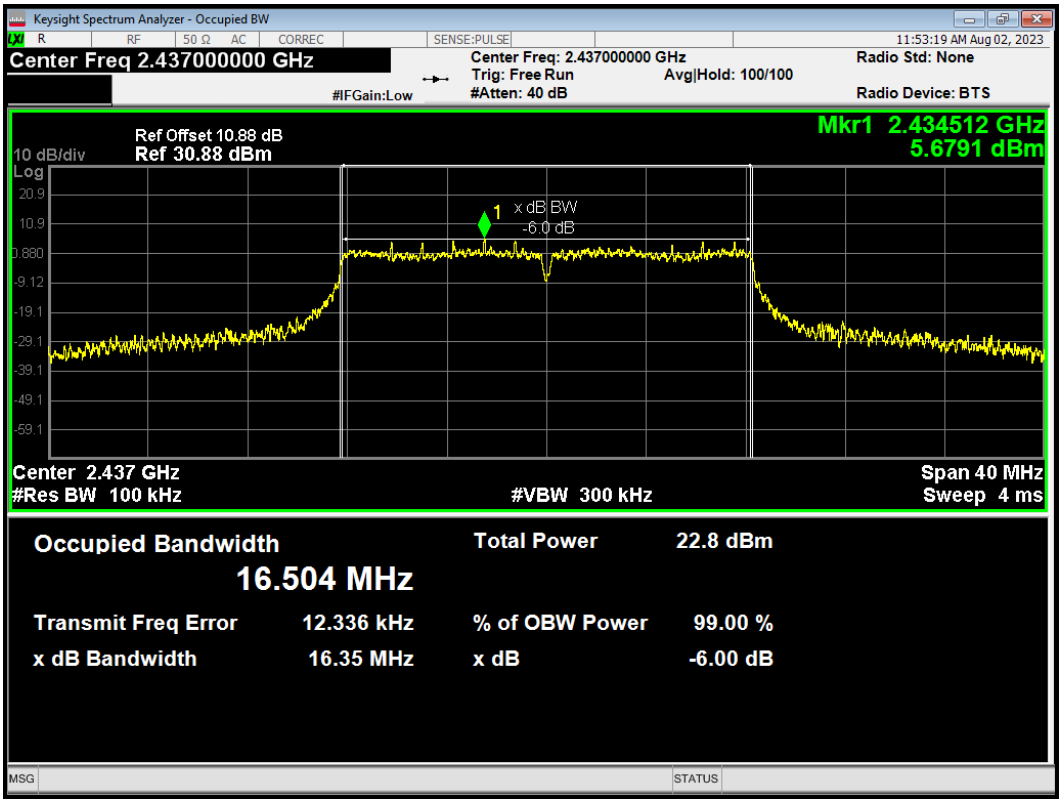
-6dB Bandwidth 802.11g 2412MHz



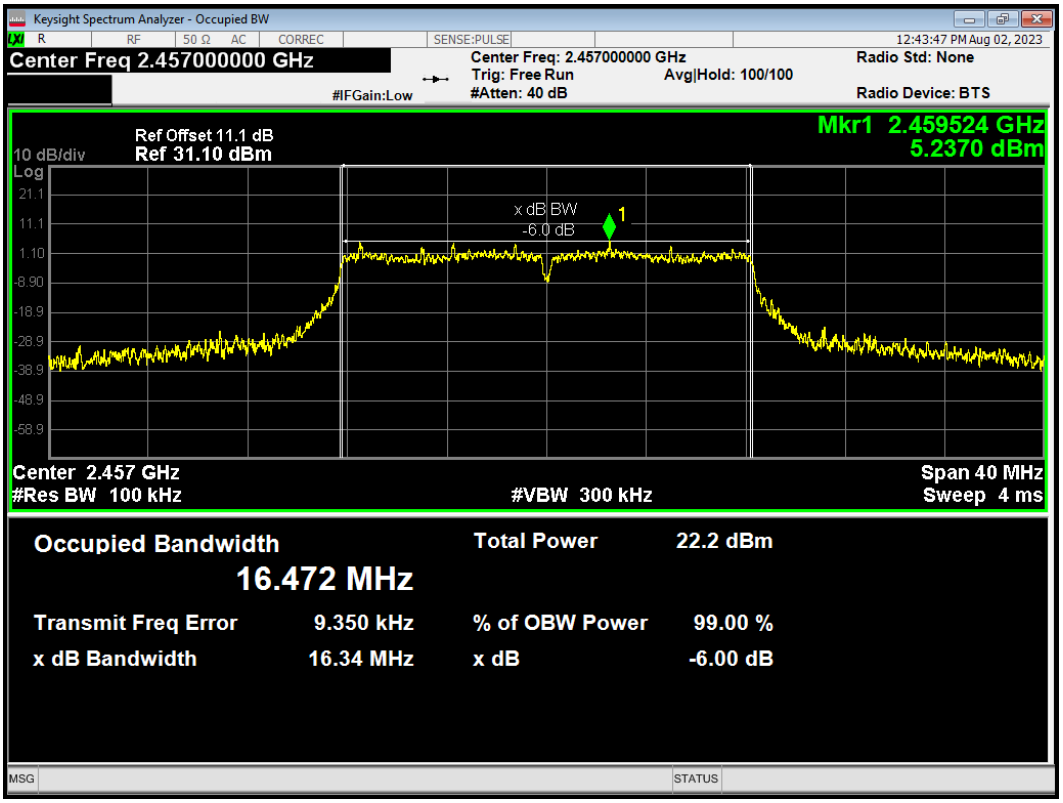
-6dB Bandwidth 802.11g 2417MHz



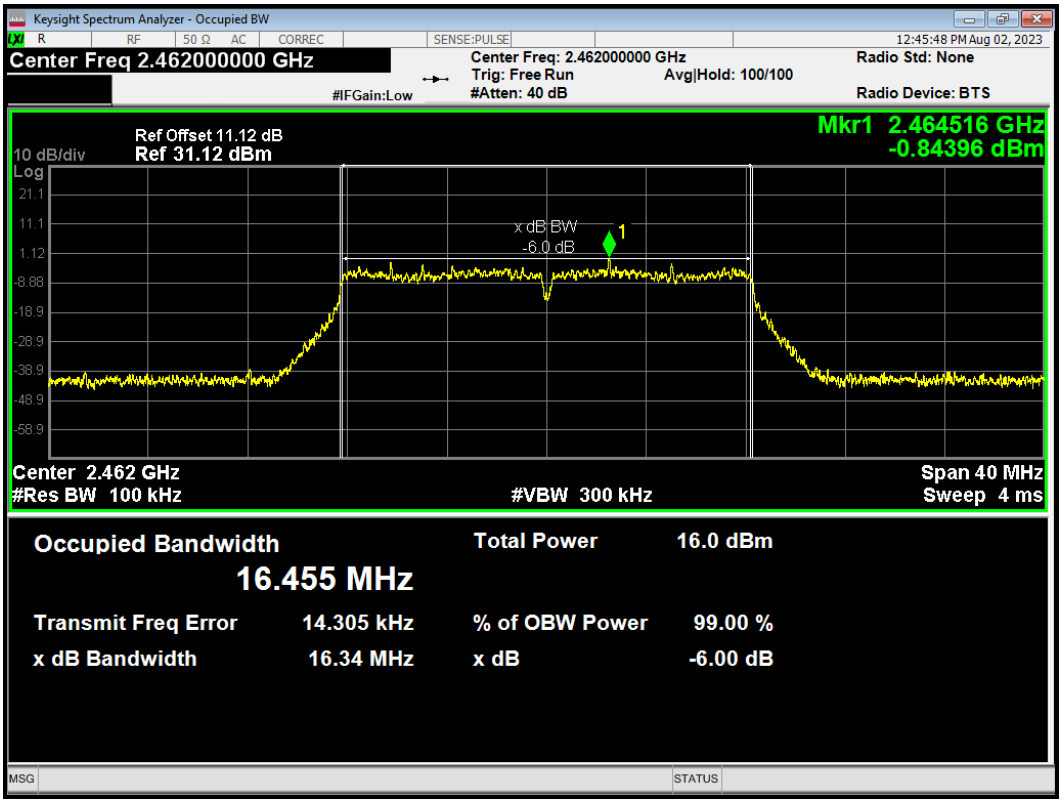
-6dB Bandwidth 802.11g 2437MHz



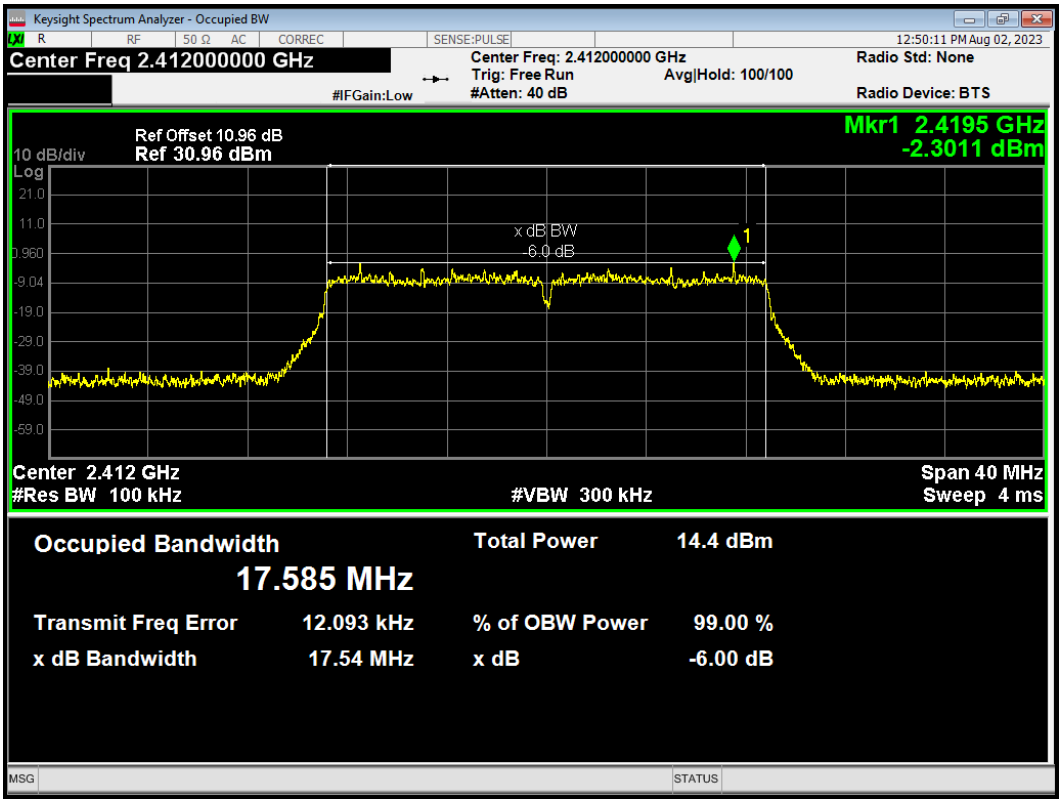
-6dB Bandwidth 802.11g 2457MHz



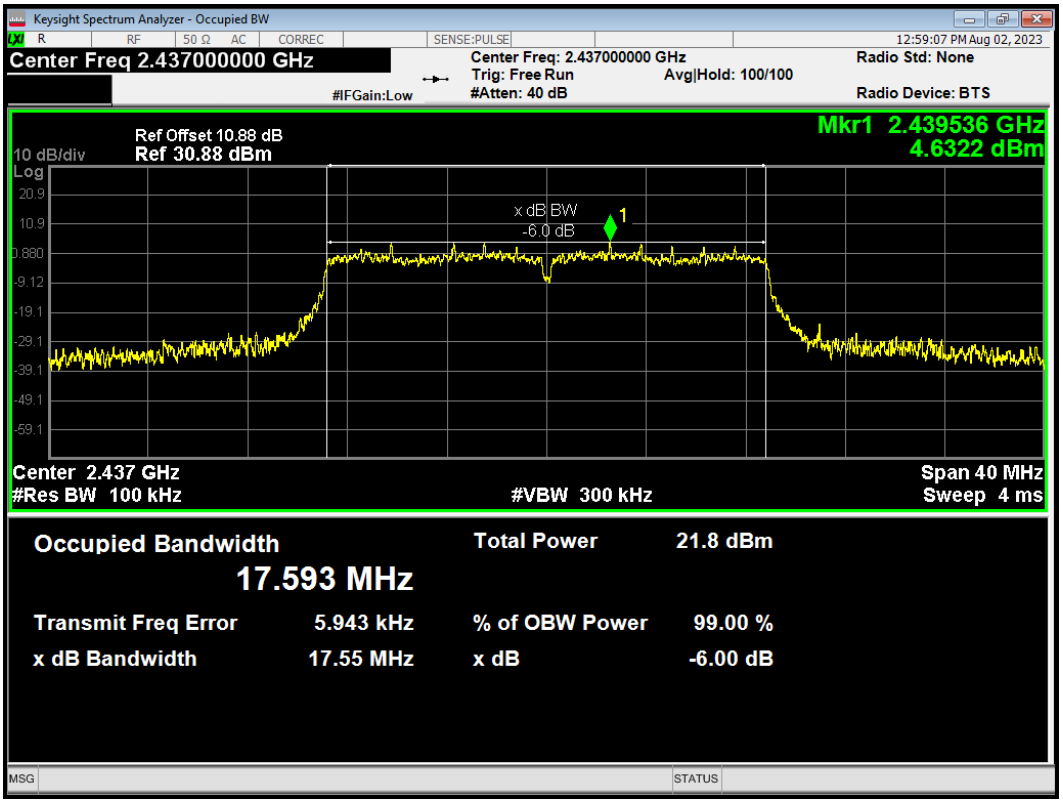
-6dB Bandwidth 802.11g 2462MHz



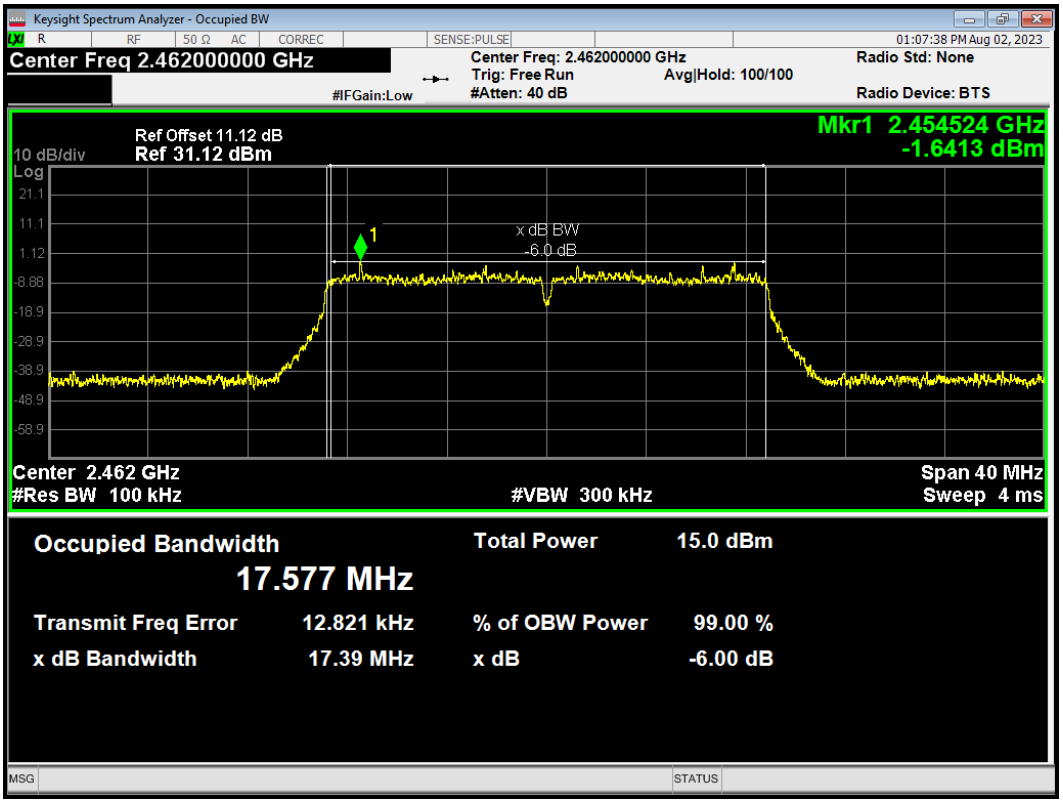
-6dB Bandwidth 802.11n(HT20) 2412MHz



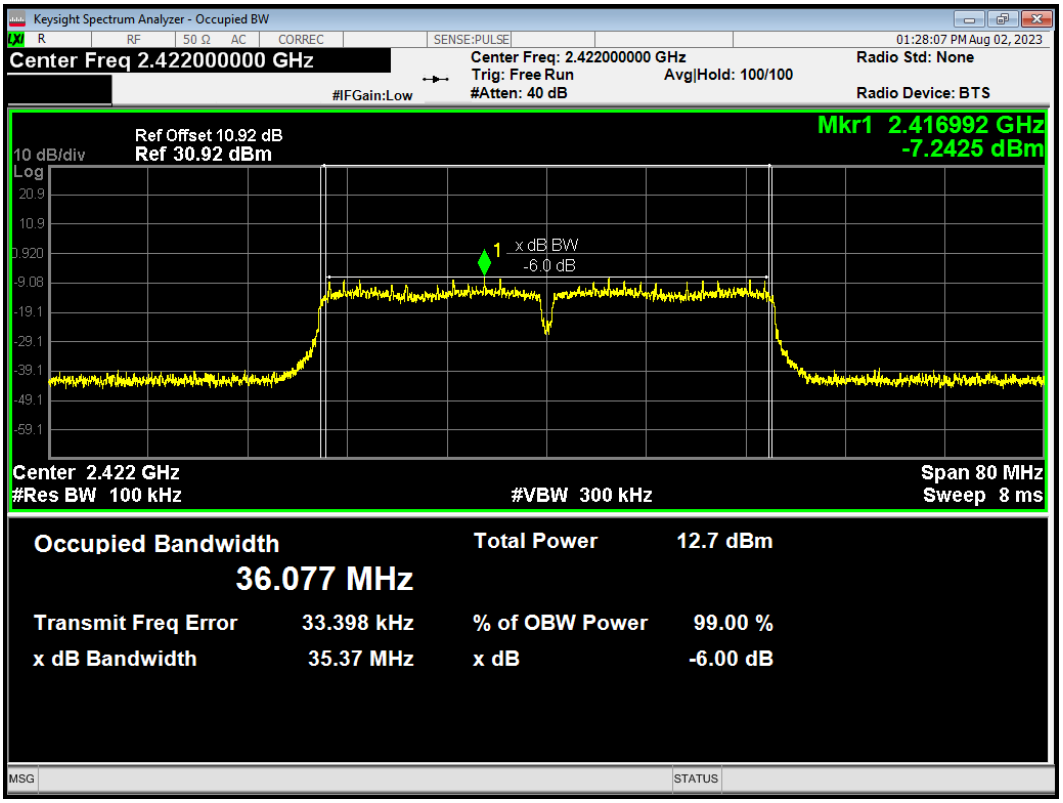
-6dB Bandwidth 802.11n(HT20) 2437MHz



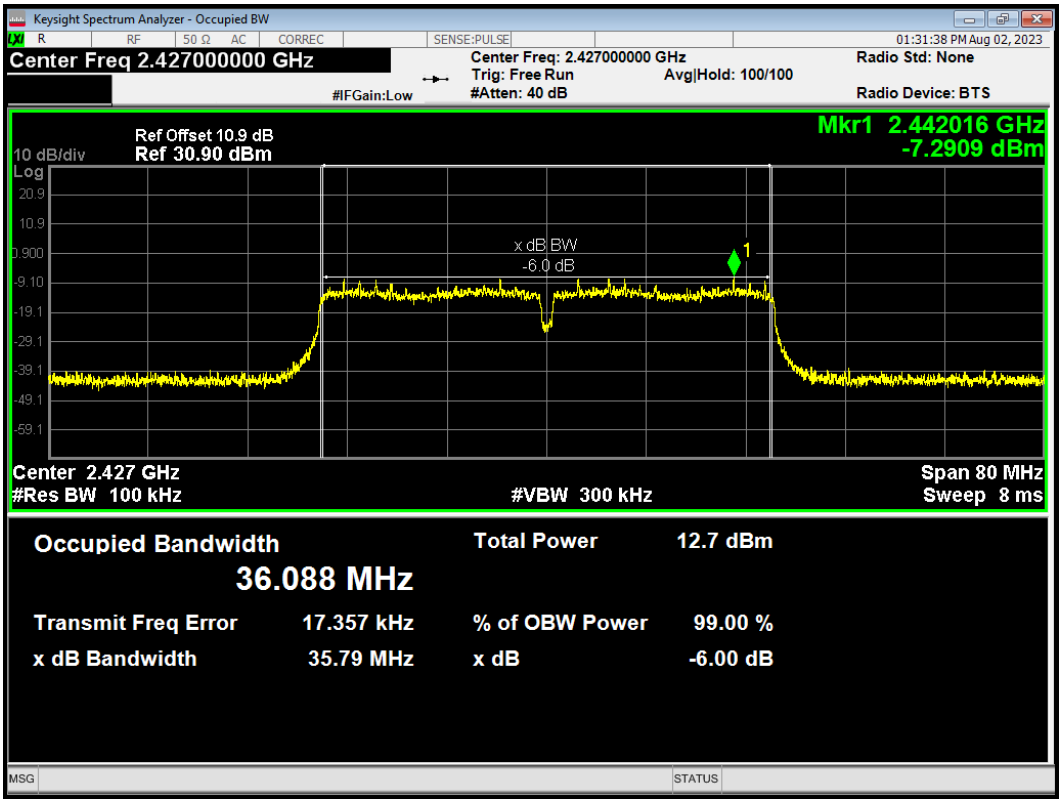
-6dB Bandwidth 802.11n(HT20) 2462MHz



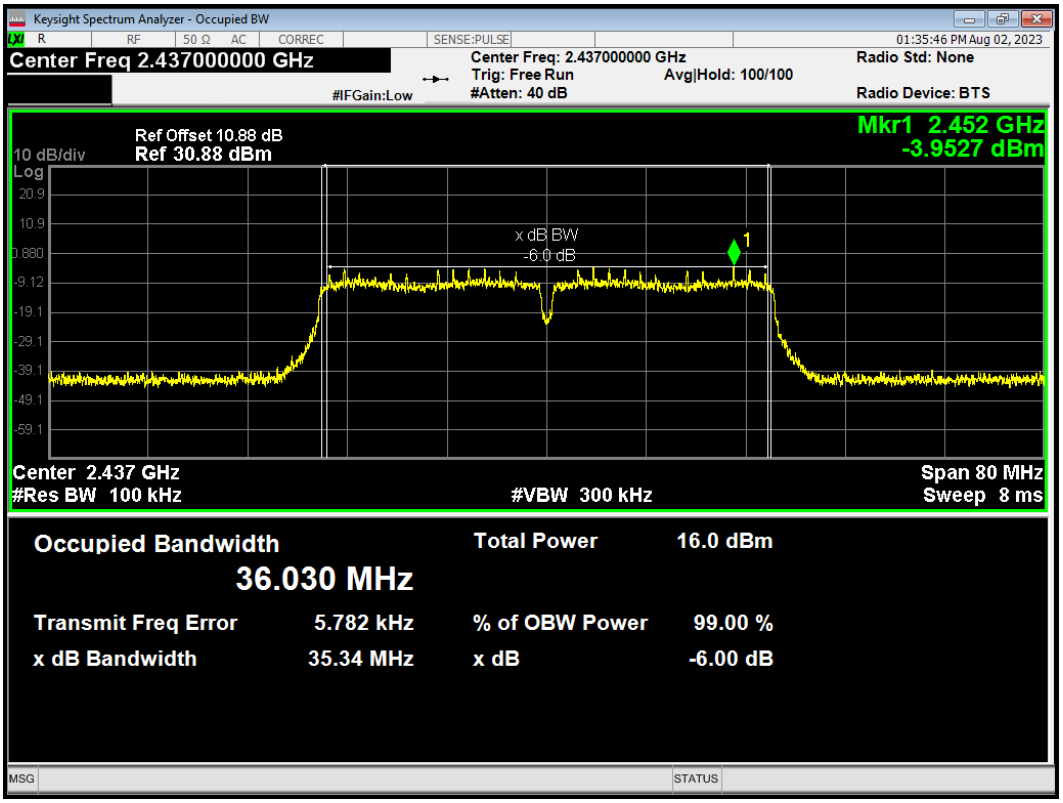
-6dB Bandwidth 802.11n(HT40) 2422MHz



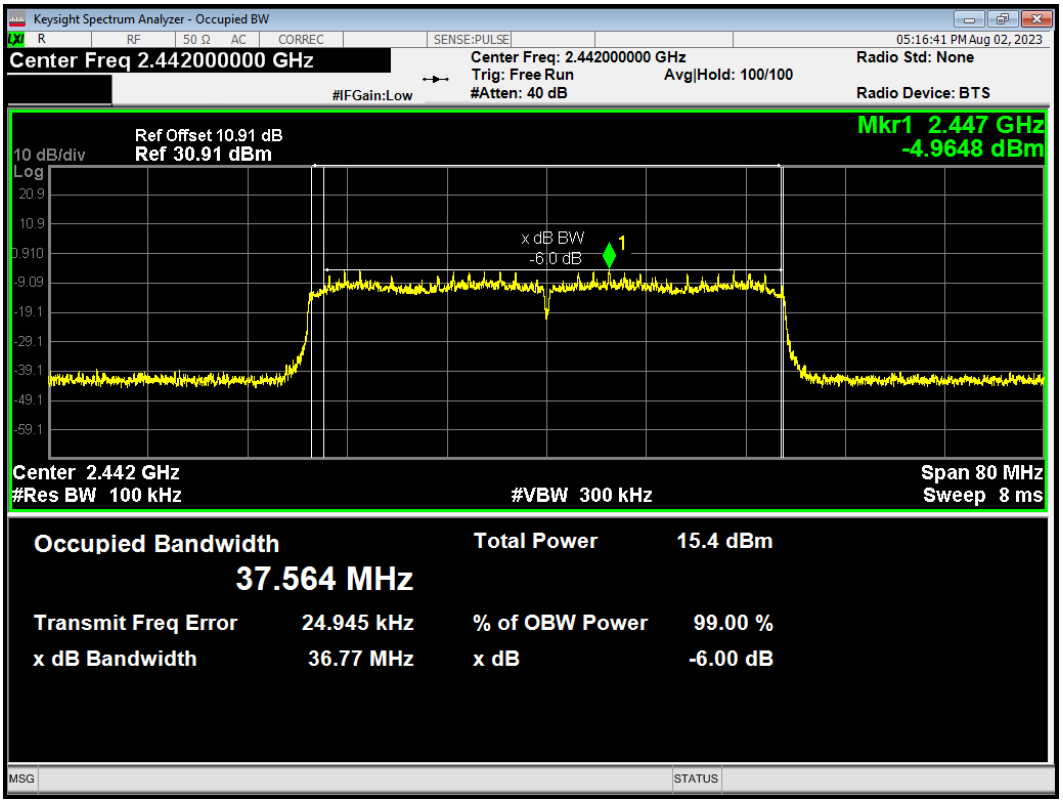
-6dB Bandwidth 802.11n(HT40) 2427MHz



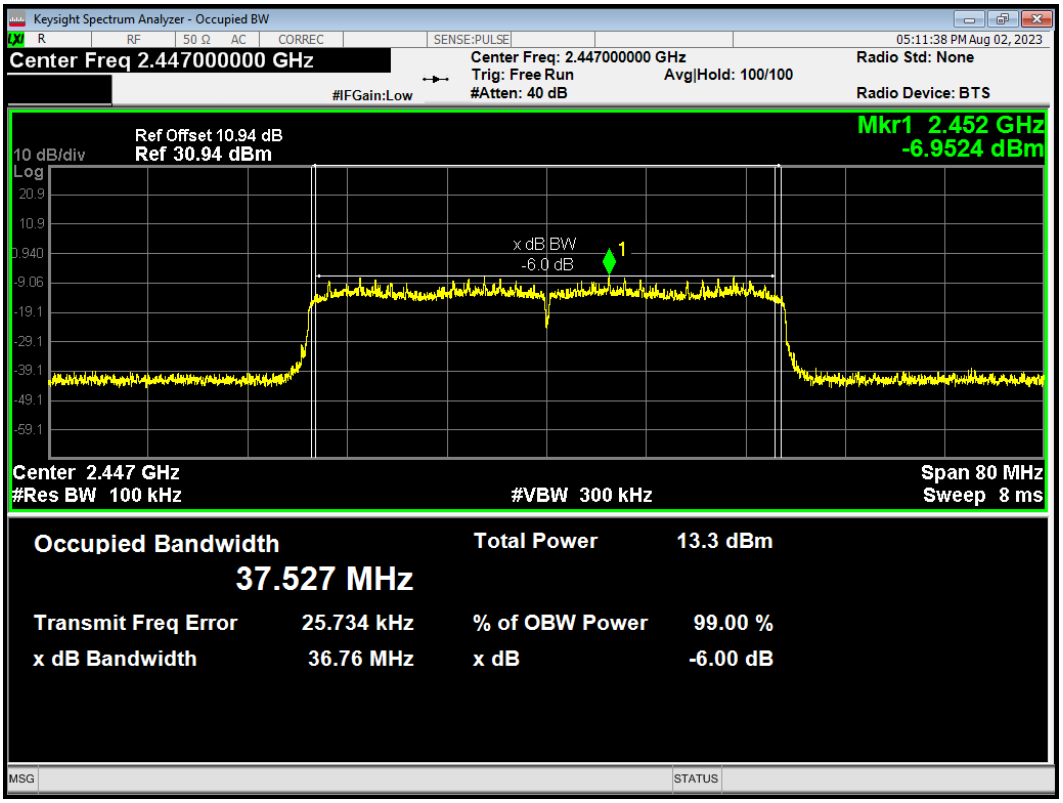
-6dB Bandwidth 802.11n(HT40) 2437MHz



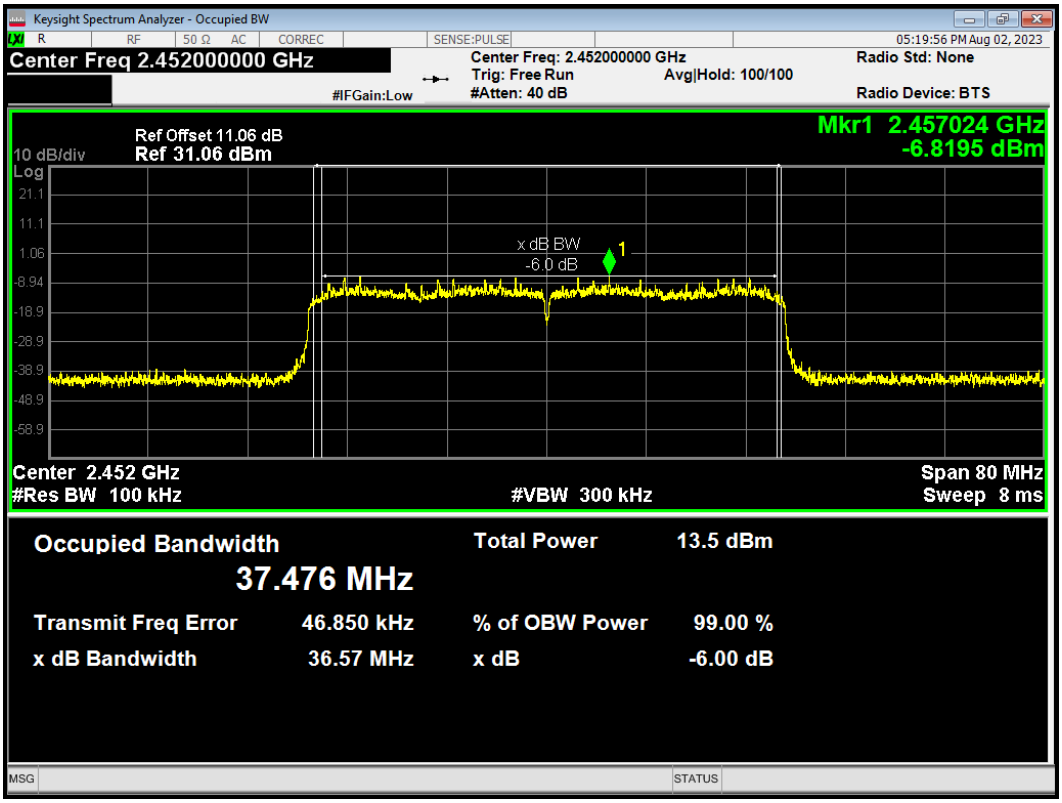
-6dB Bandwidth 802.11n(HT40) 2442MHz



-6dB Bandwidth 802.11n(HT40) 2447MHz

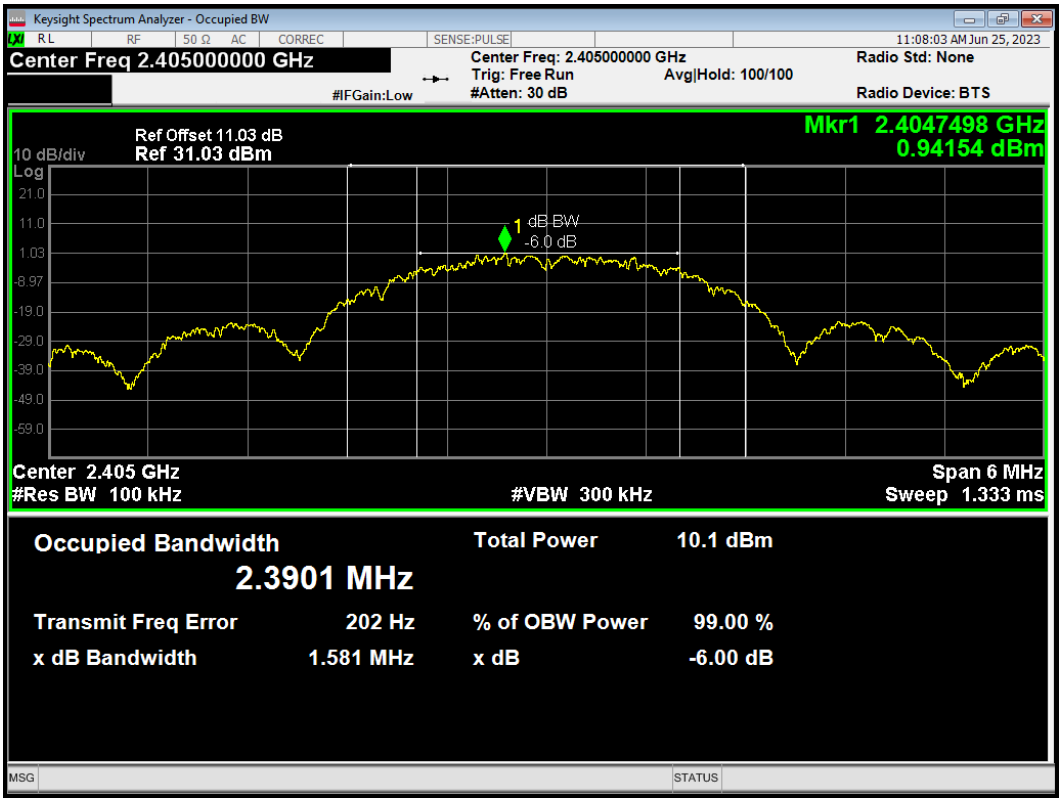


-6dB Bandwidth 802.11n(HT40) 2452MHz

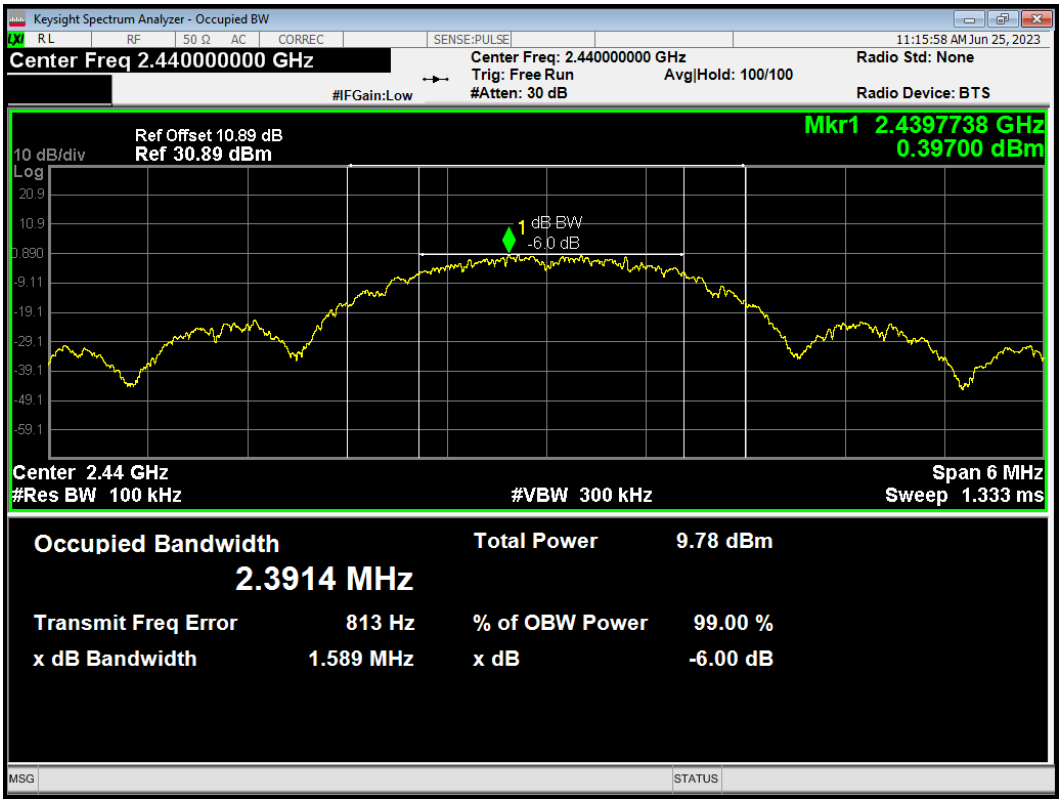


Thread

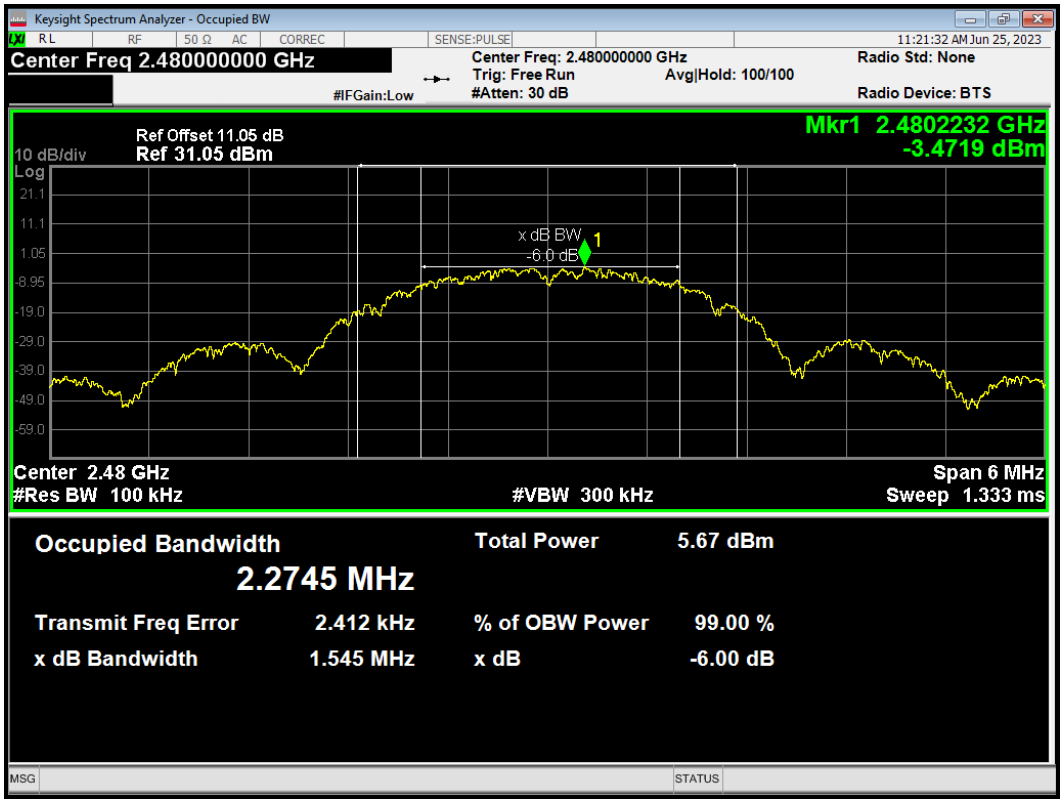
-6dB Bandwidth thread 2405MHz



-6dB Bandwidth thread 2440MHz

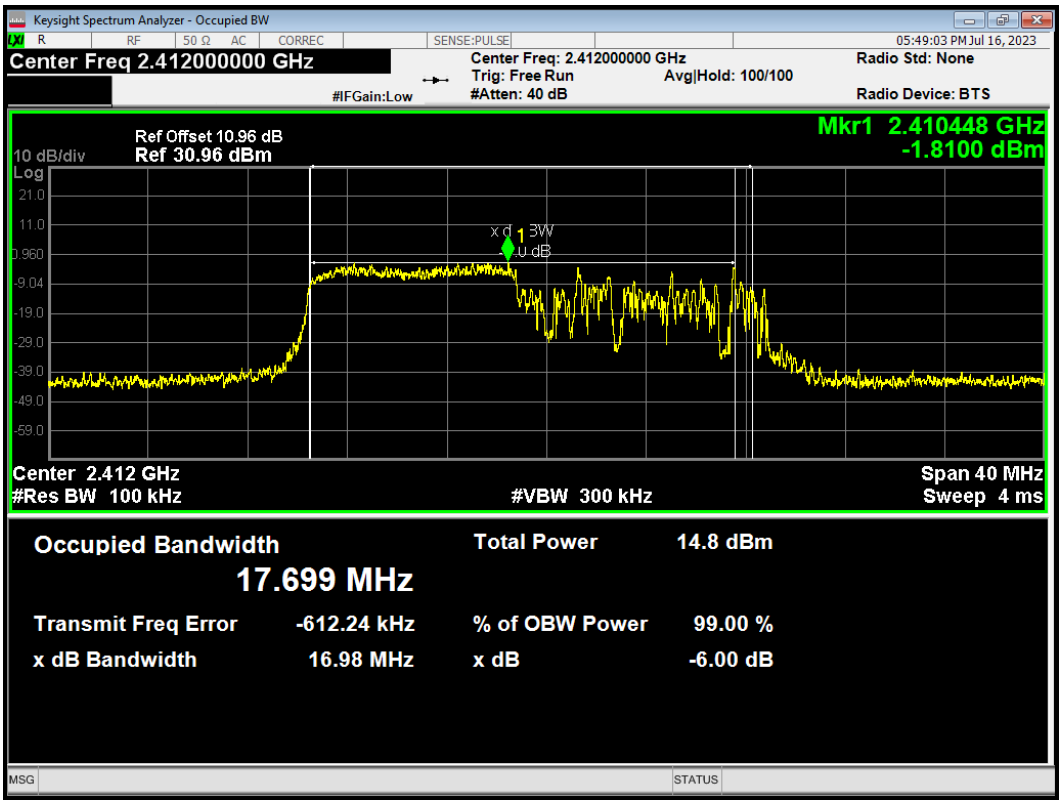


-6dB Bandwidth thread 2480MHz

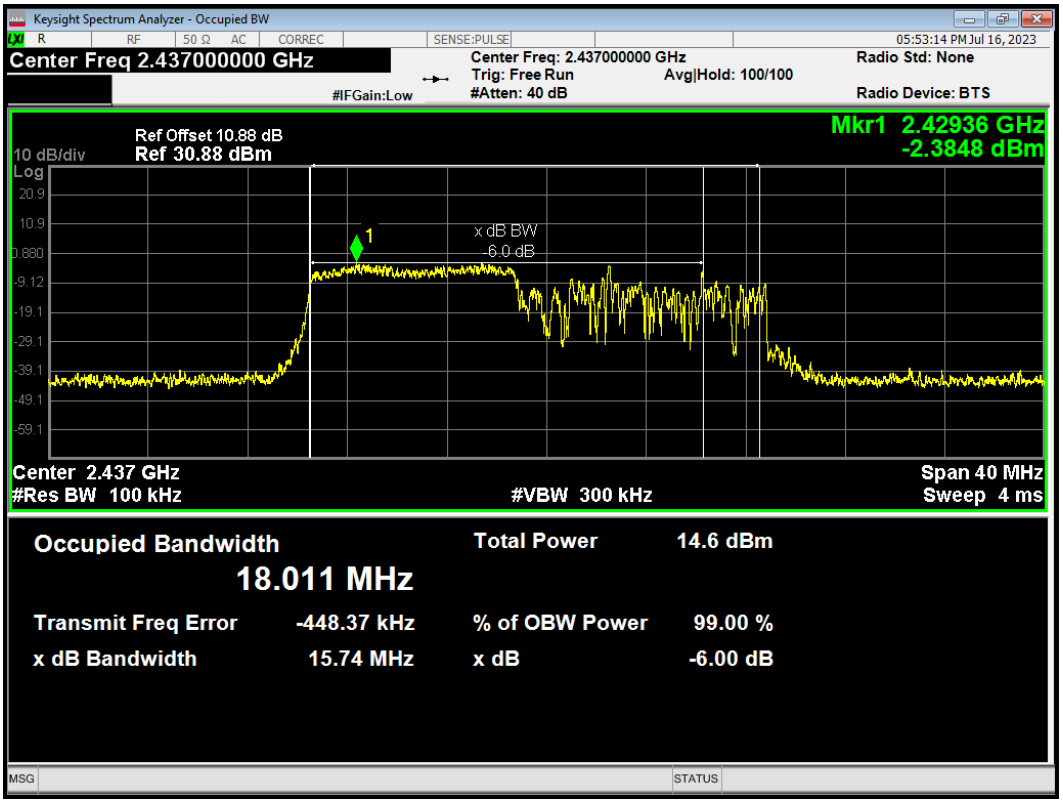


TB Mode

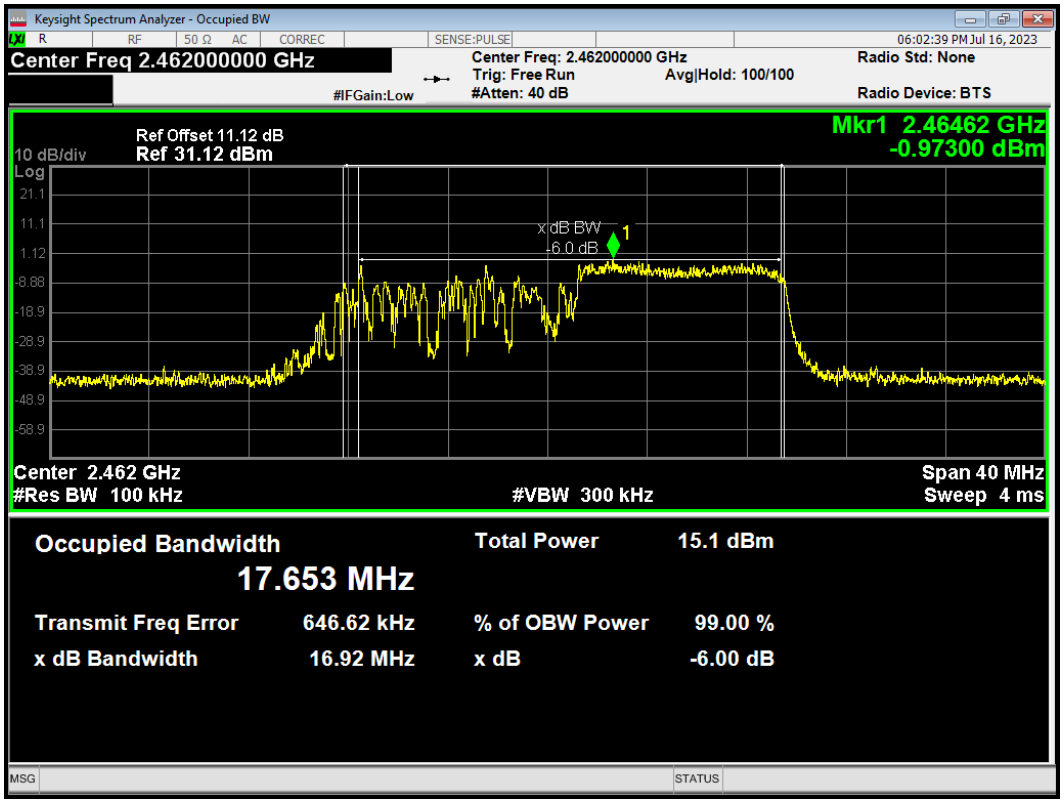
-6dB Bandwidth 802.11ax HE20 106-Tones 2412MHz



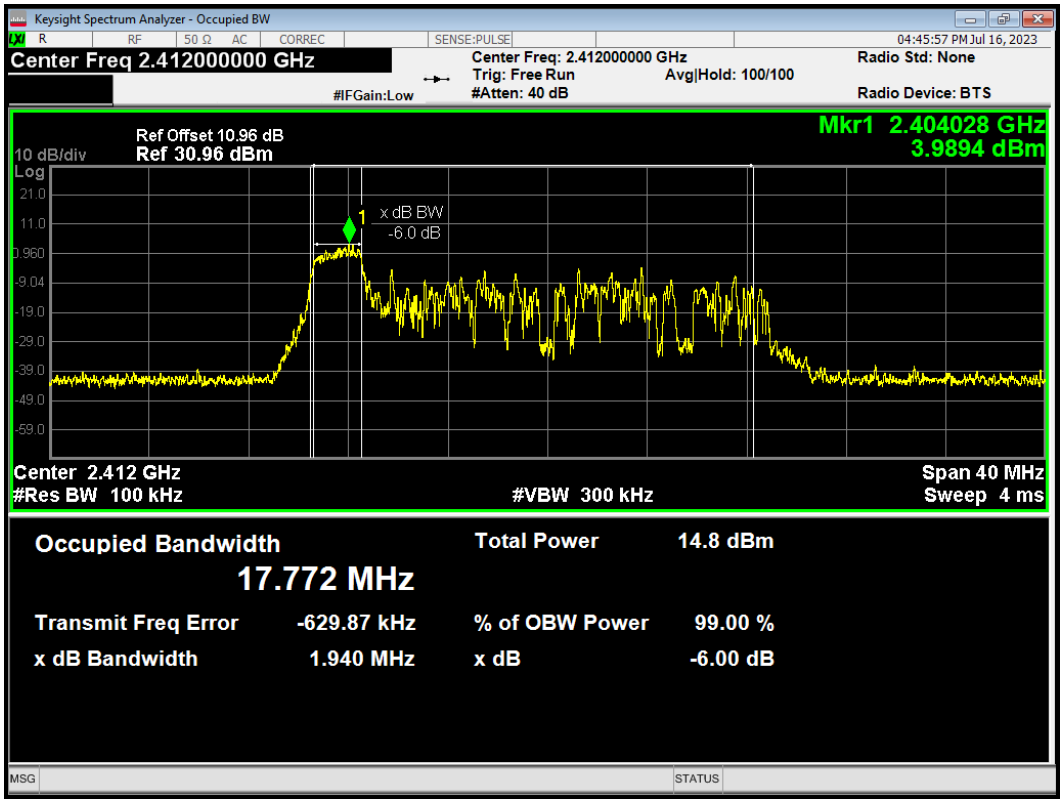
-6dB Bandwidth 802.11ax HE20 106-Tones 2437MHz



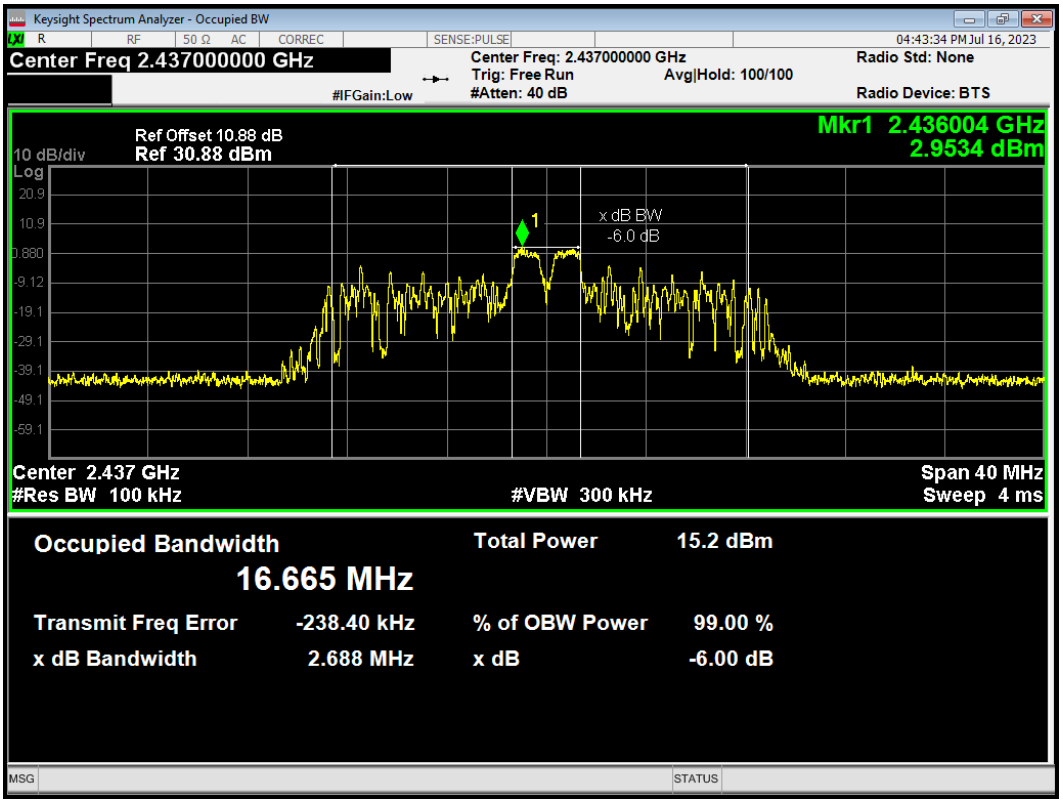
-6dB Bandwidth 802.11ax HE20 106-Tones 2462MHz



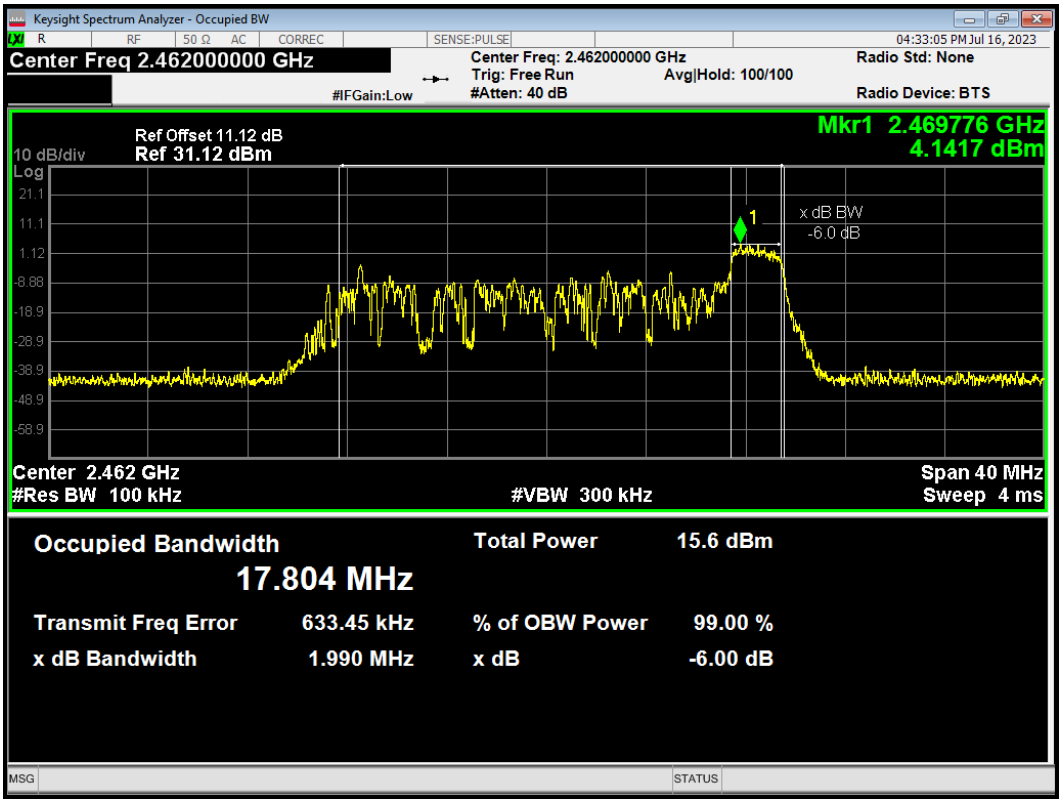
-6dB Bandwidth 802.11ax HE20 26-Tones 2412MHz



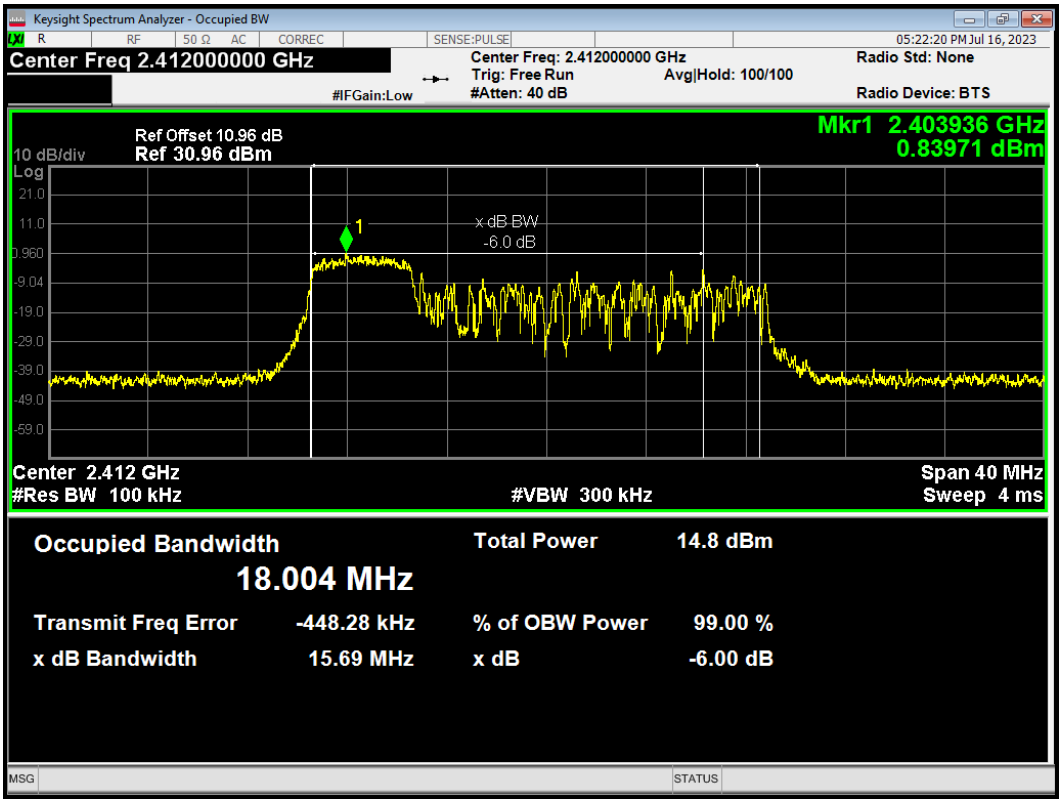
-6dB Bandwidth 802.11ax HE20 26-Tones 2437MHz



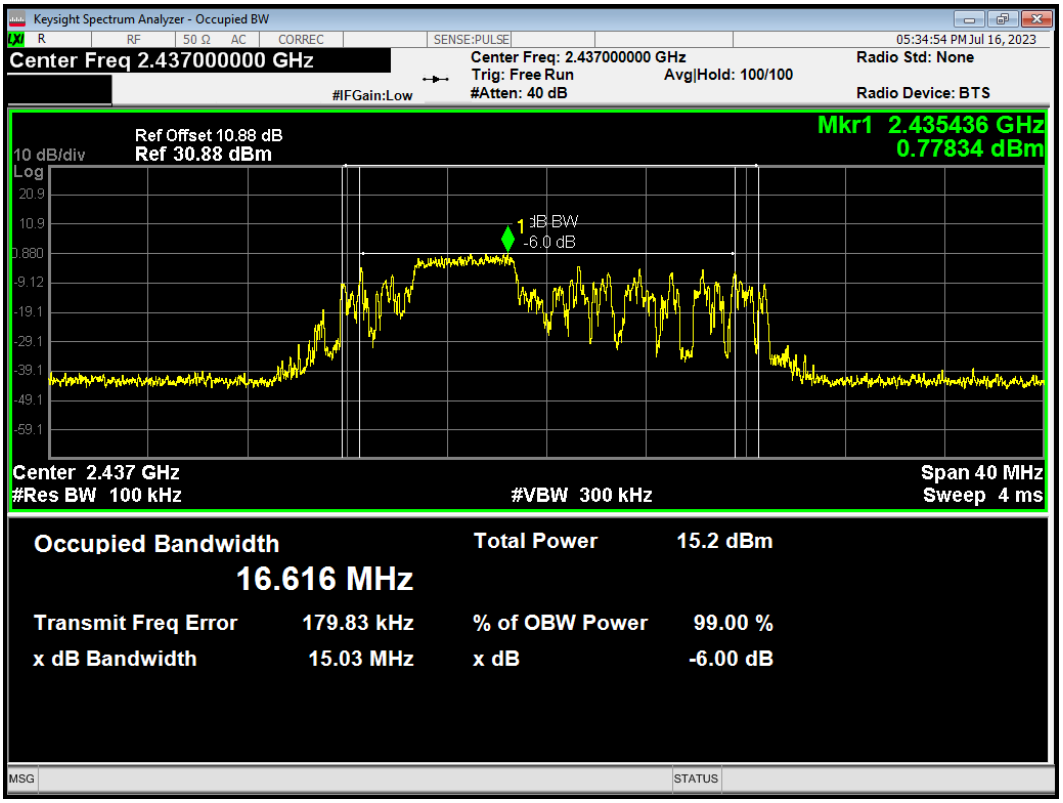
-6dB Bandwidth 802.11ax HE20 26-Tones 2462MHz



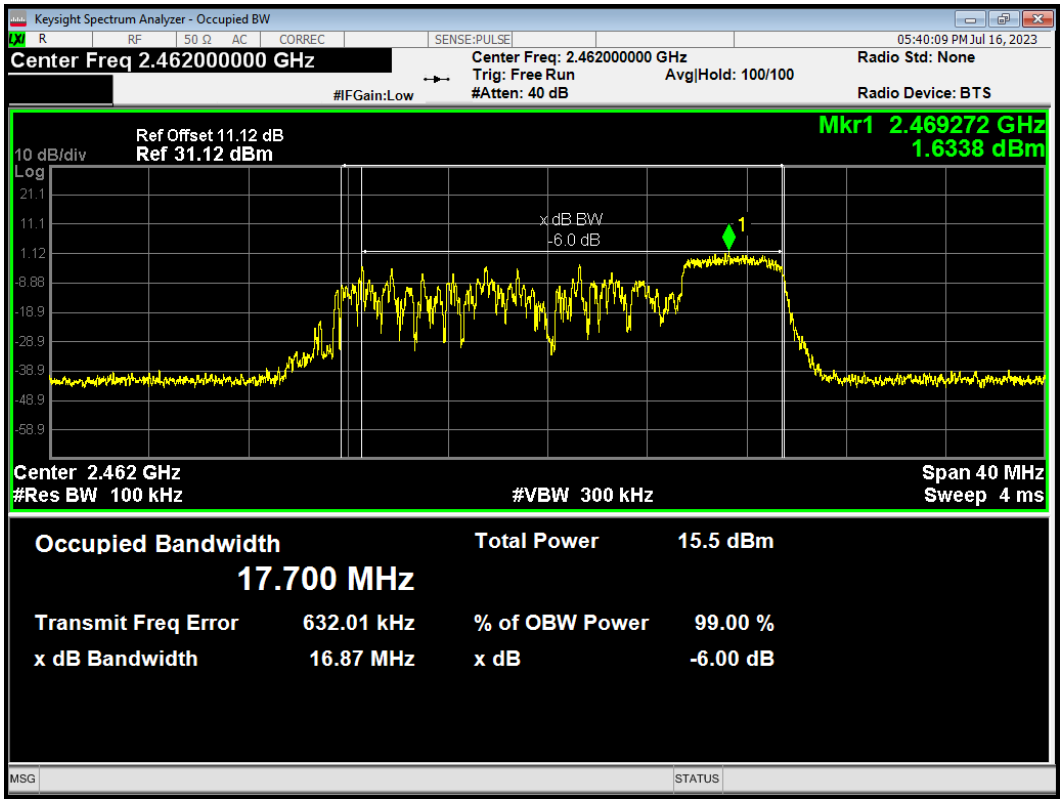
-6dB Bandwidth 802.11ax HE20 52-Tones 2412MHz



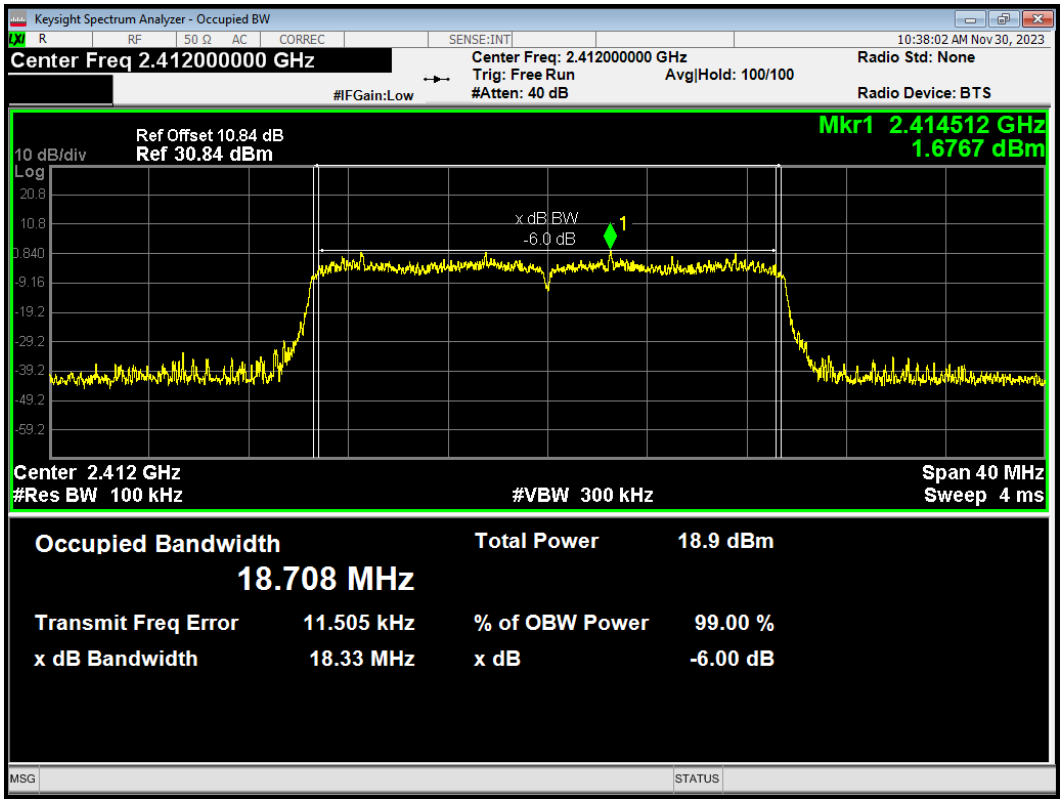
-6dB Bandwidth 802.11ax HE20 52-Tones 2437MHz



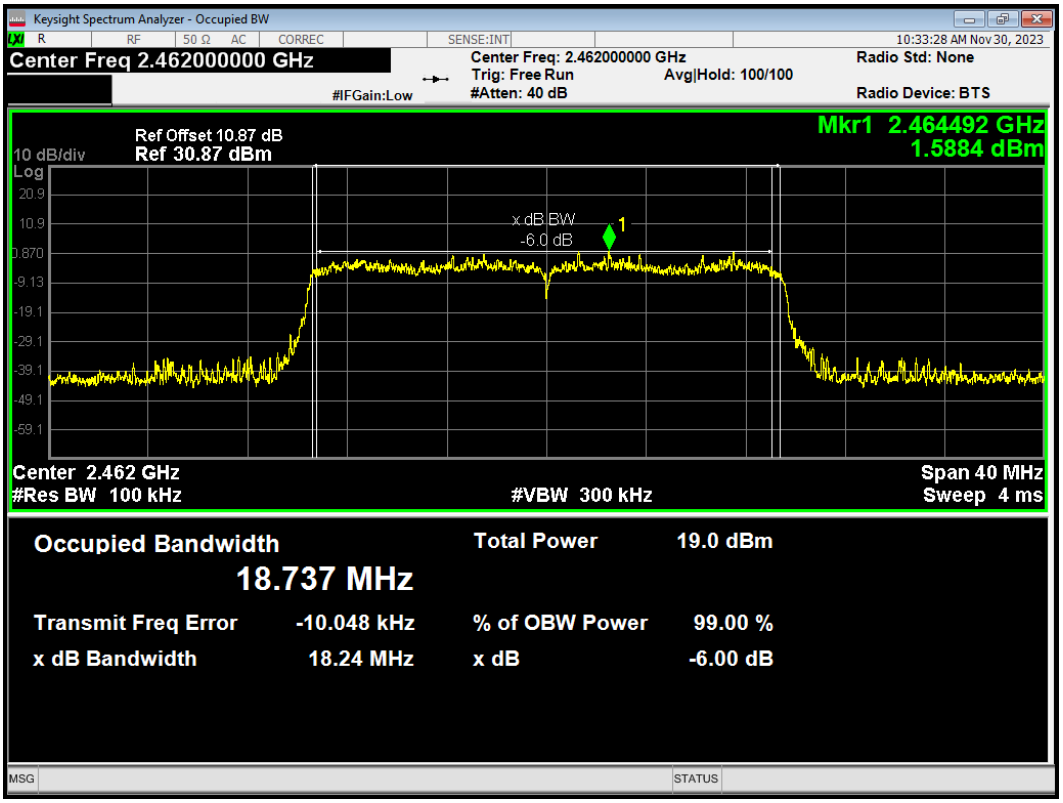
-6dB Bandwidth 802.11ax HE20 52-Tones 2462MHz



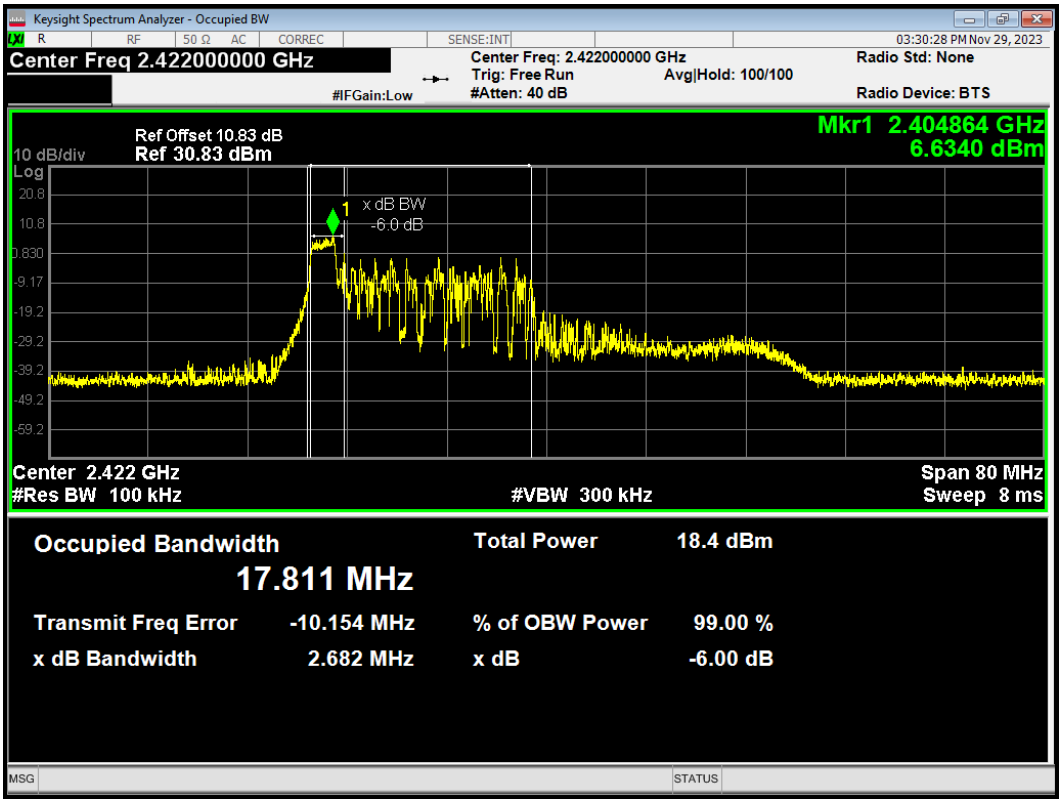
-6dB Bandwidth 802.11ax HE20 242-Tones 2412MHz



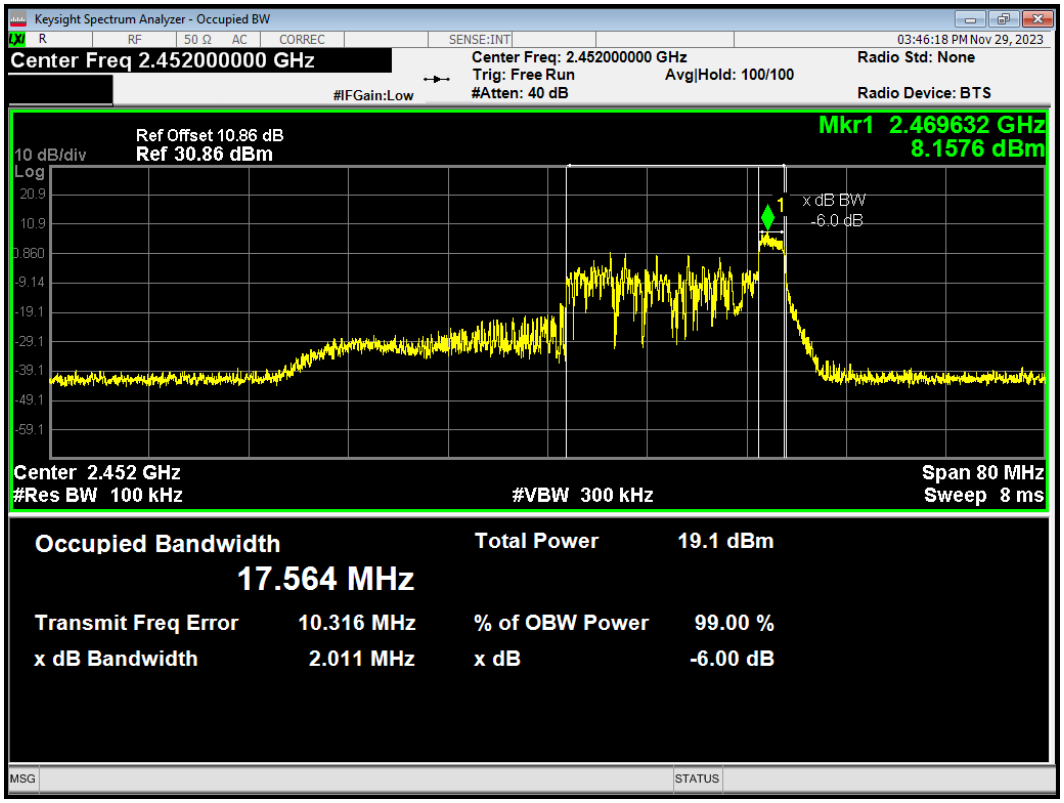
-6dB Bandwidth 802.11ax HE20 242-Tones 2462MHz



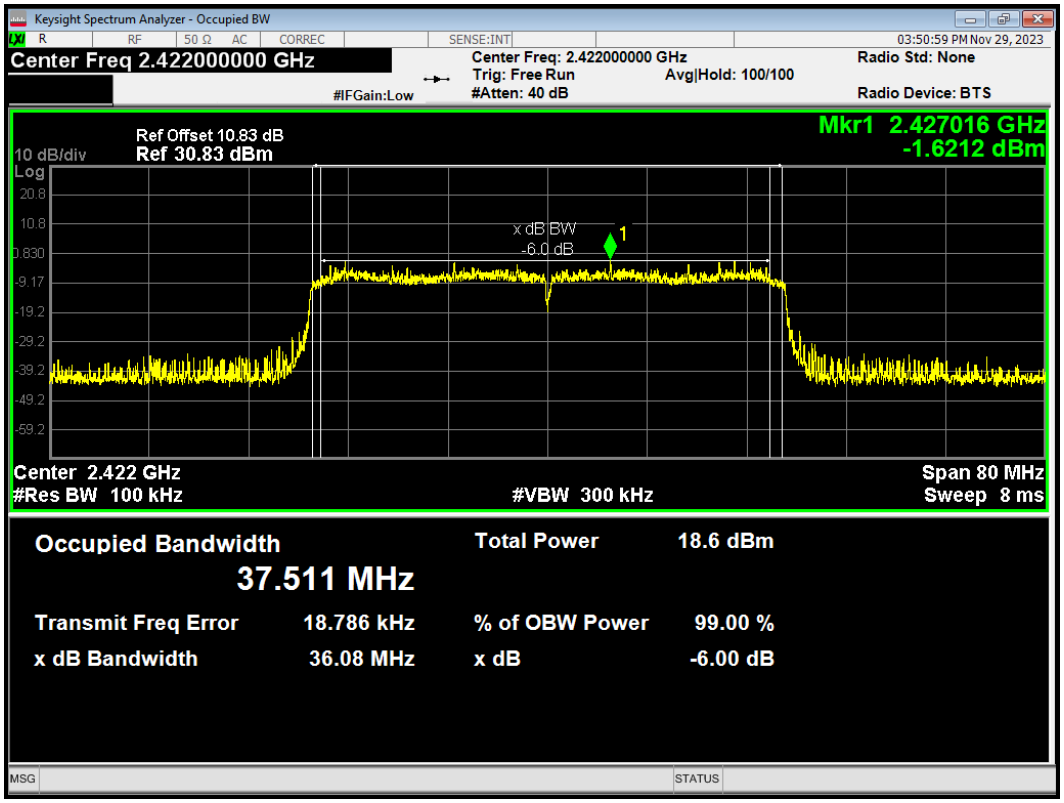
-6dB Bandwidth 802.11ax HE40 26-Tones 2422MHz



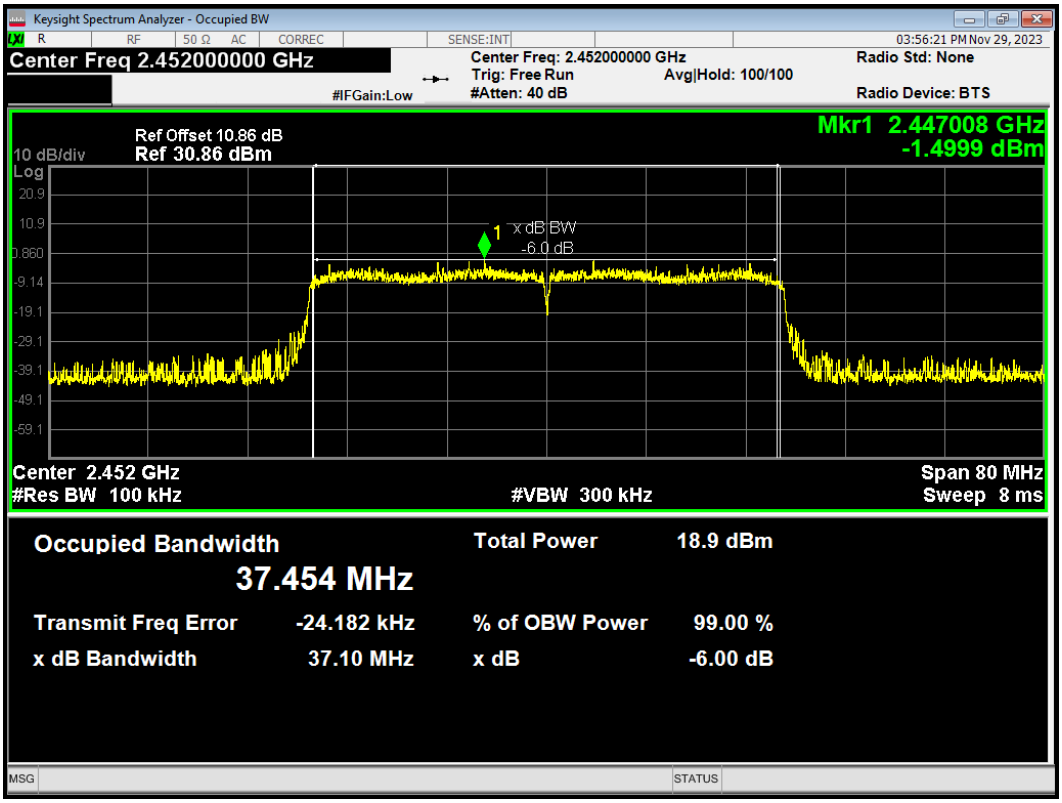
-6dB Bandwidth 802.11ax HE40 26-Tones 2452MHz



-6dB Bandwidth 802.11ax HE40 484-Tones 2422MHz

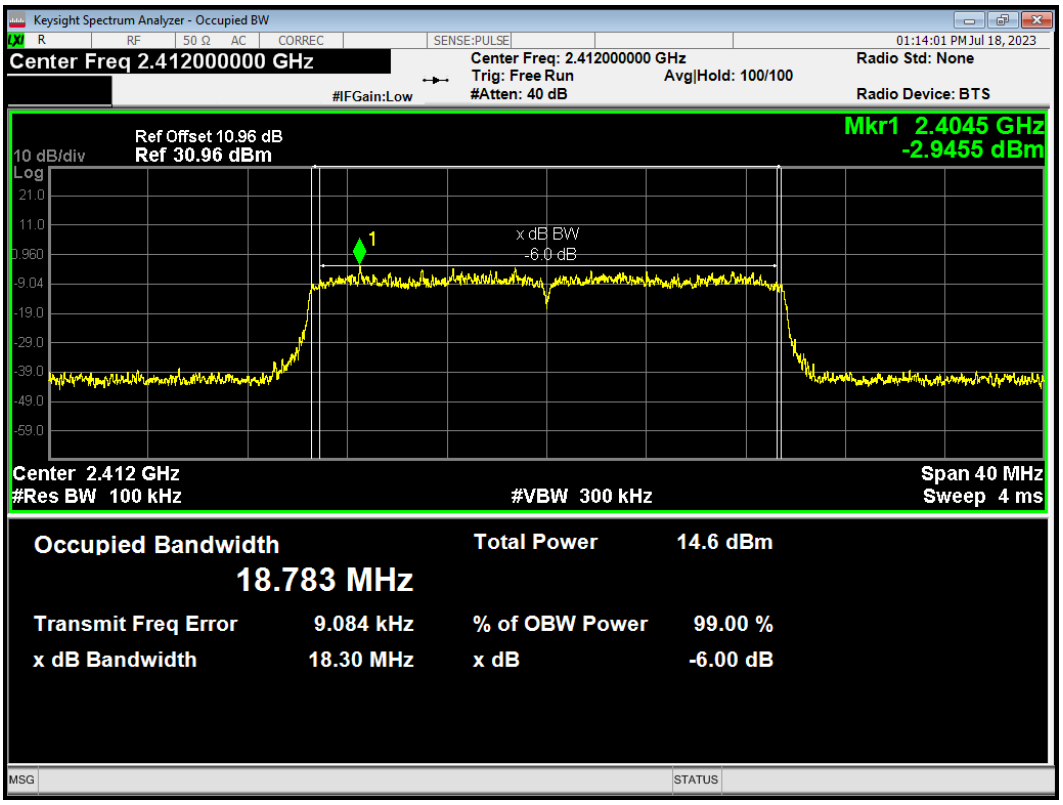


-6dB Bandwidth 802.11ax HE40 484-Tones 2452MHz

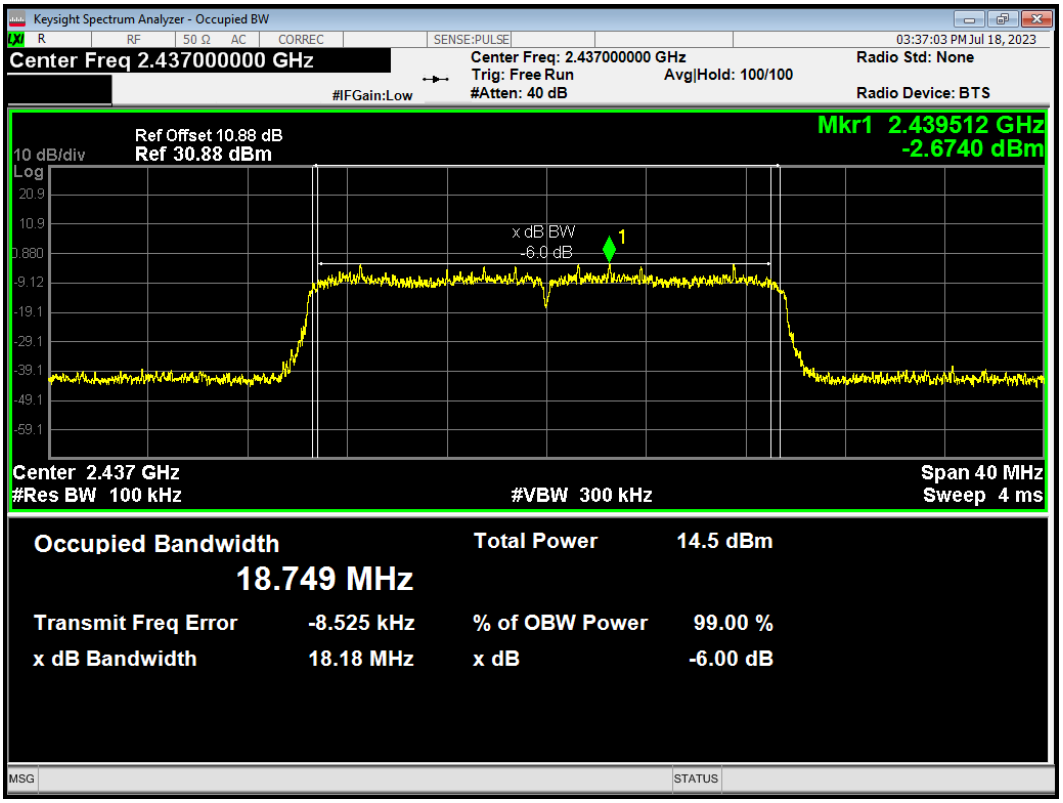


ERSU Mode

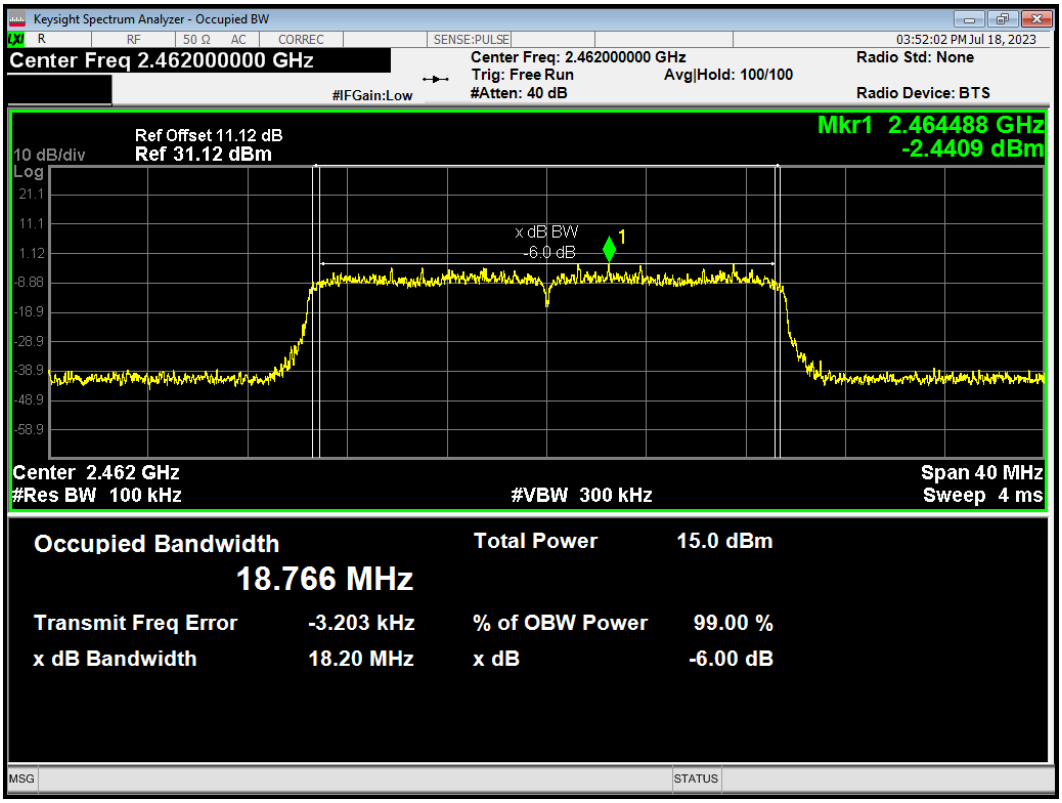
-6dB Bandwidth 802.11ax HE20 242-Tones 2412MHz



-6dB Bandwidth 802.11ax HE20 242-Tones 2437MHz

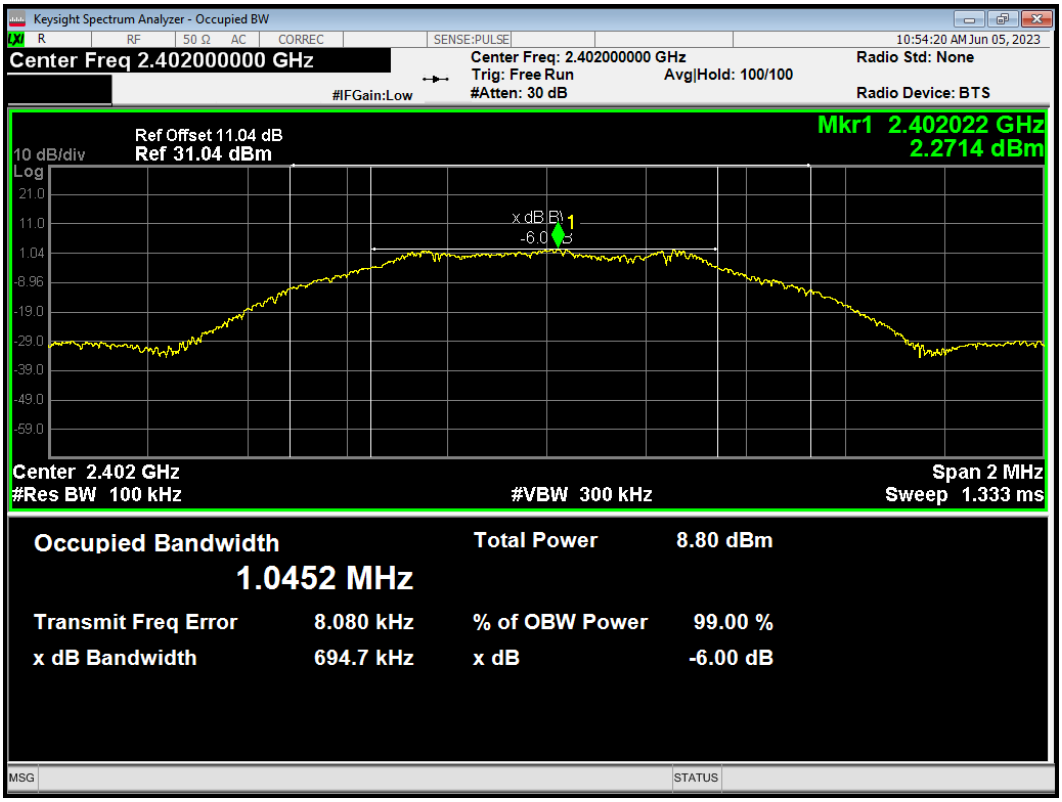


-6dB Bandwidth 802.11ax HE20 242-Tones 2462MHz

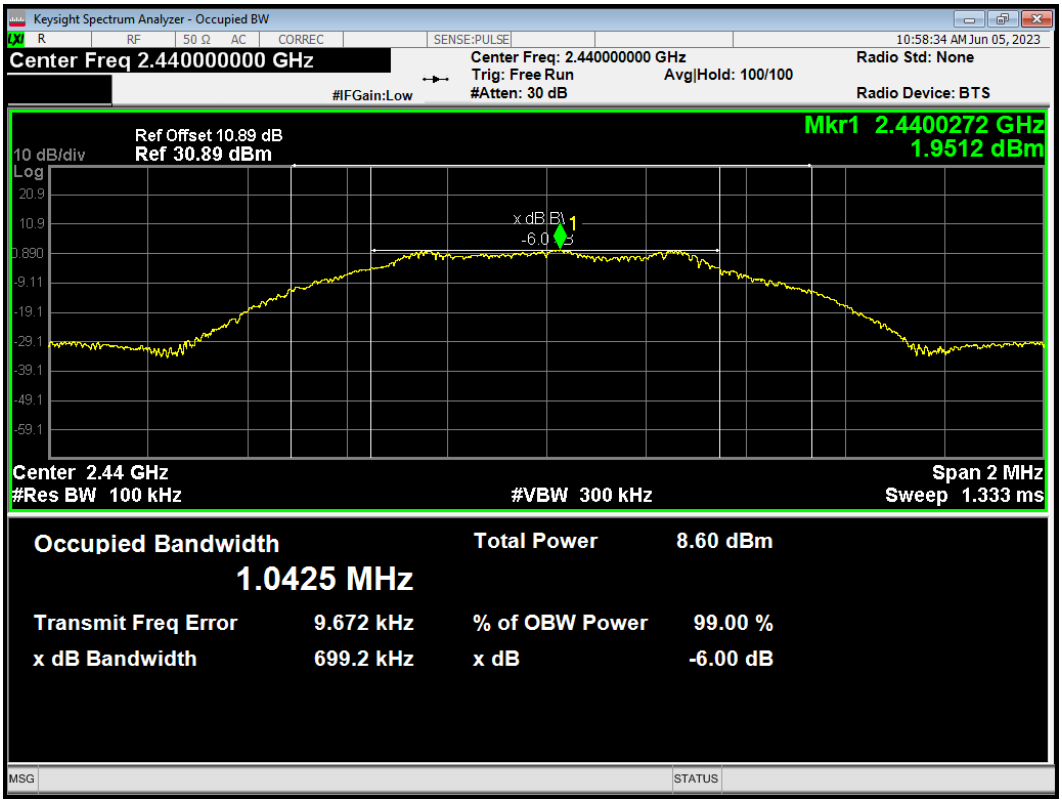


Bluetooth LE

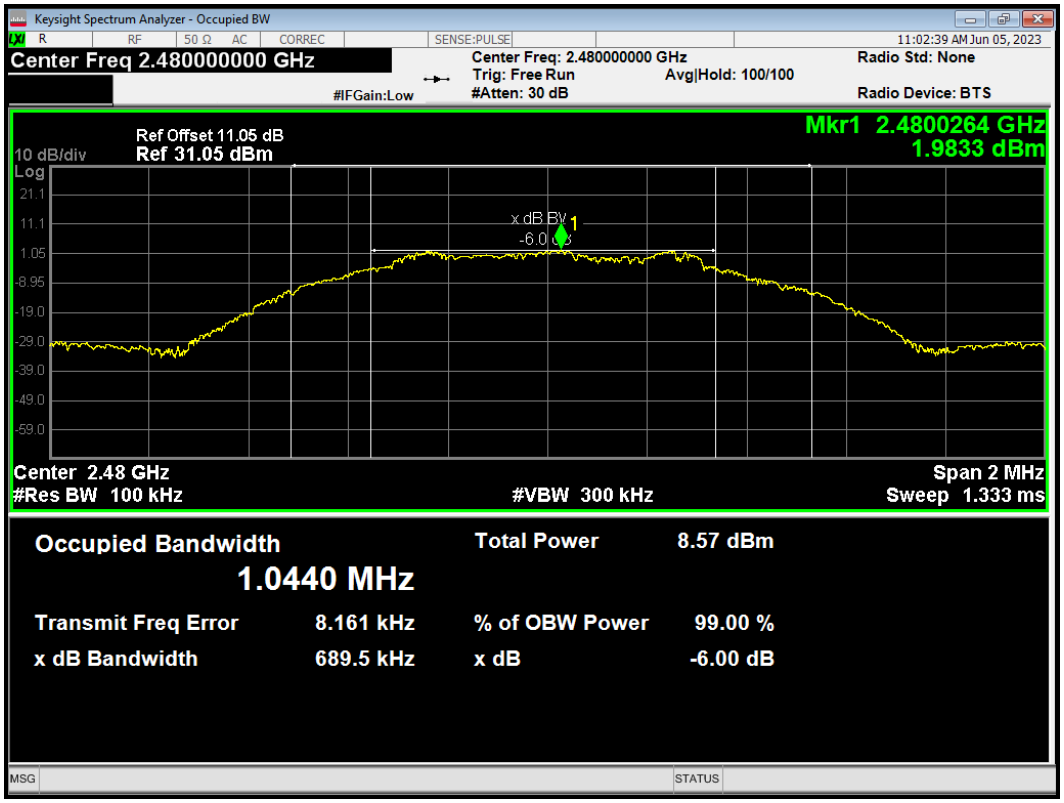
-6dB Bandwidth BLE (1M) 2402MHz



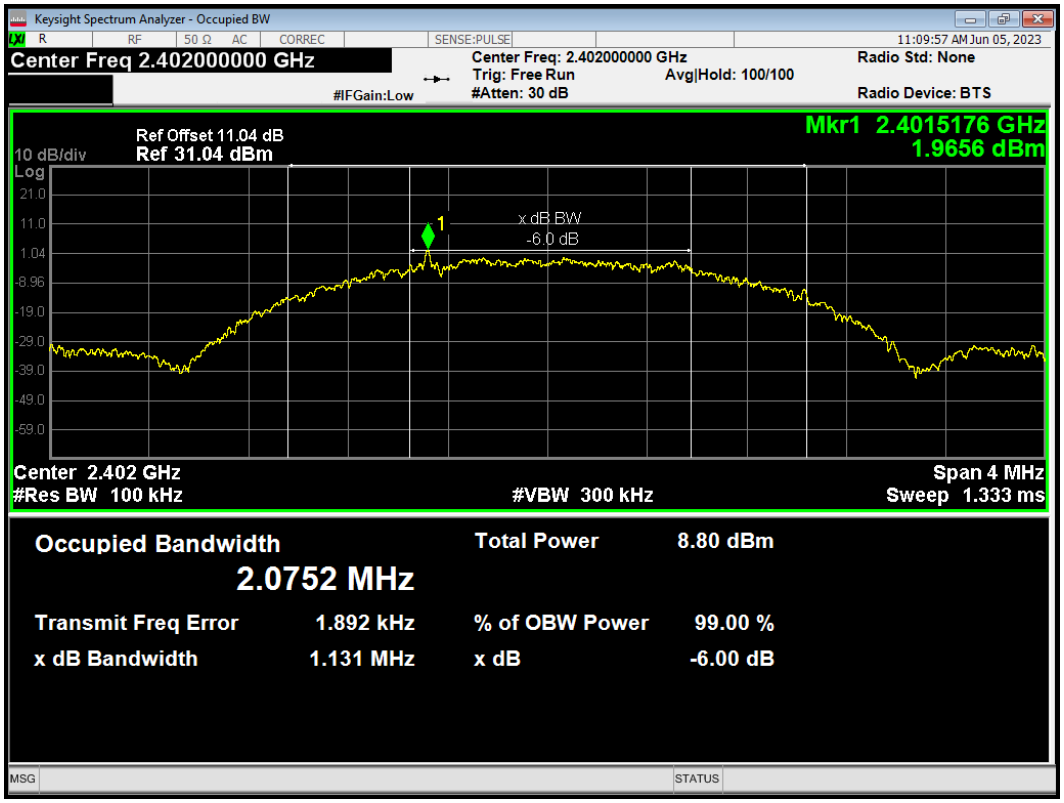
-6dB Bandwidth BLE (1M) 2440MHz



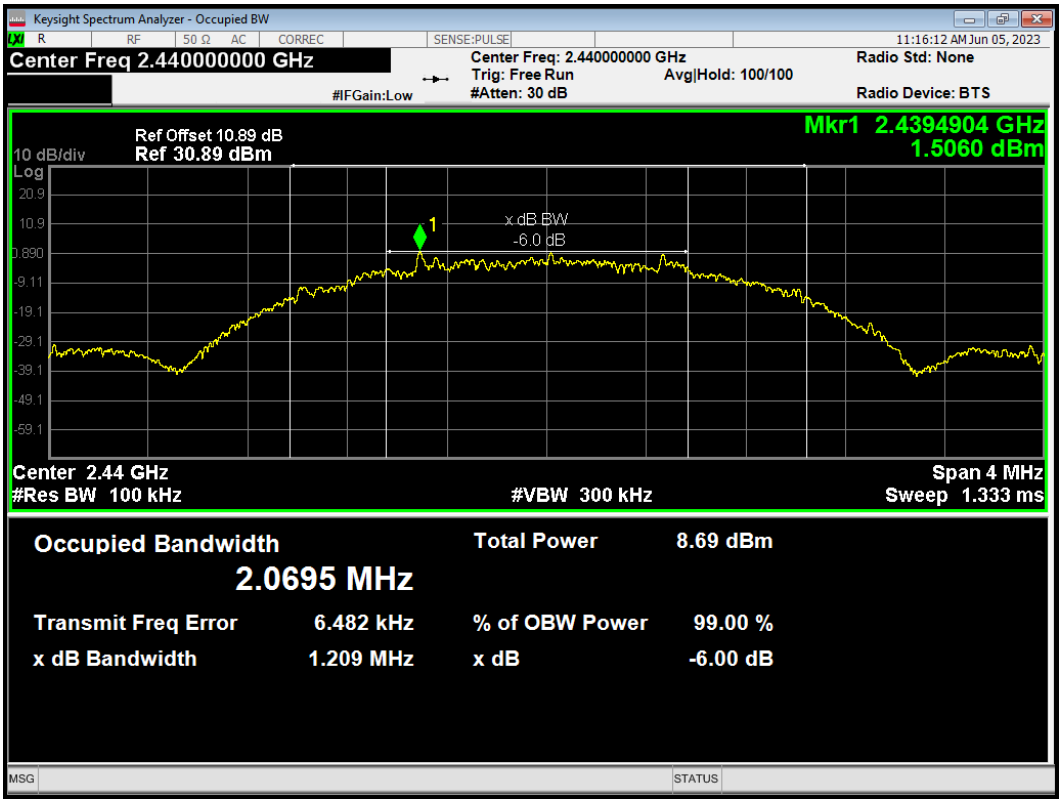
-6dB Bandwidth BLE (1M) 2480MHz



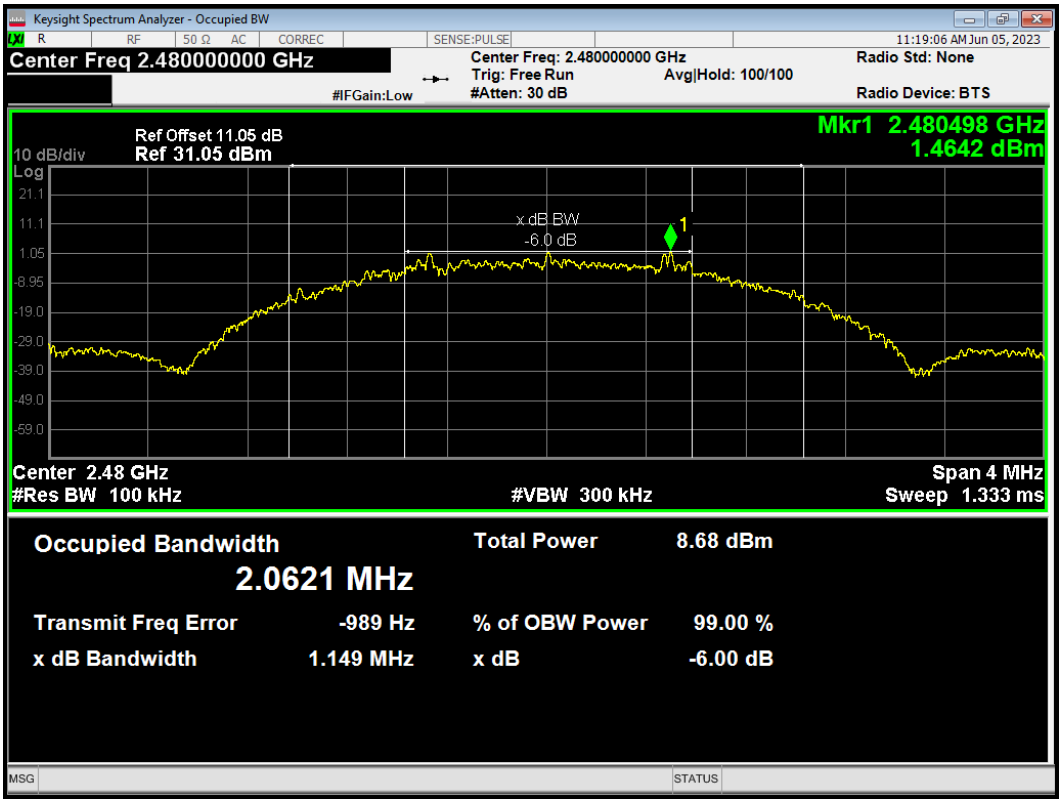
-6dB Bandwidth BLE (2M) 2402MHz



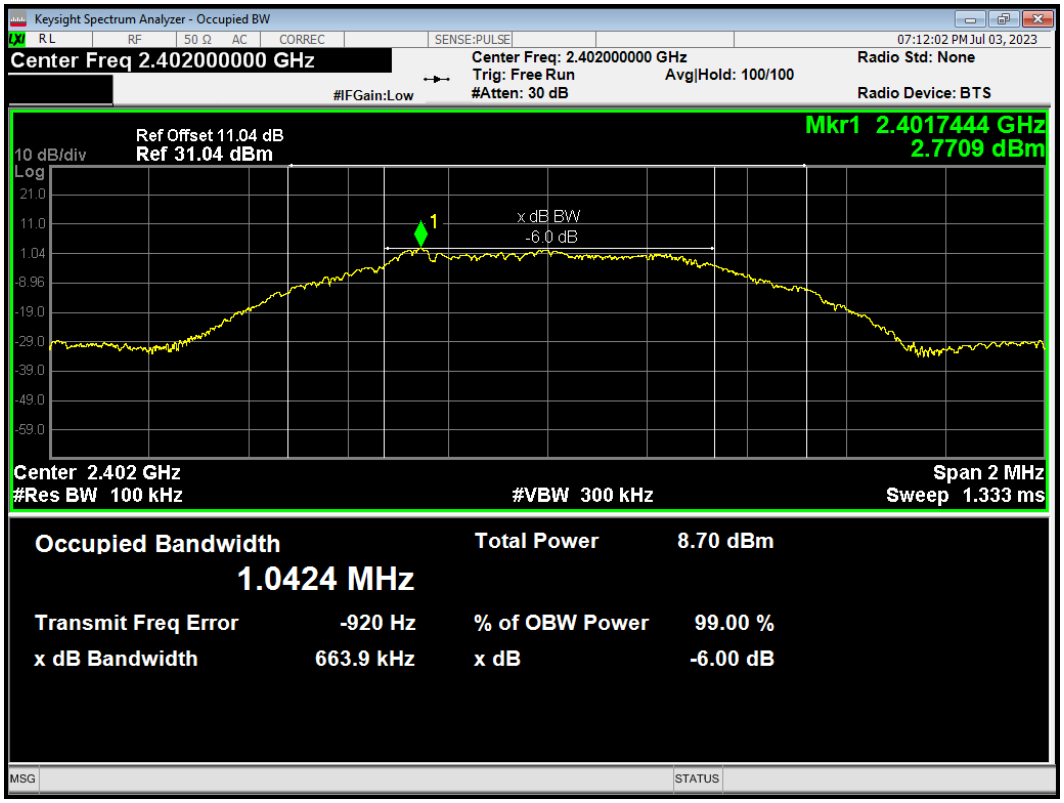
-6dB Bandwidth BLE (2M) 2440MHz



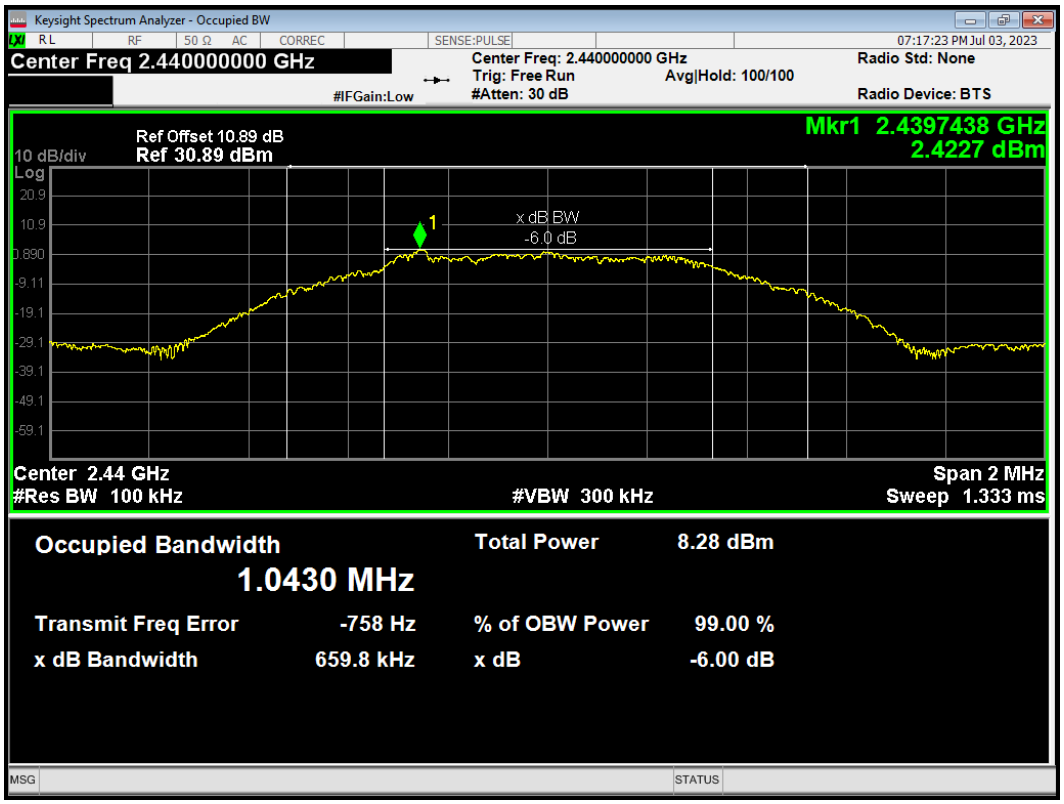
-6dB Bandwidth BLE (2M) 2480MHz



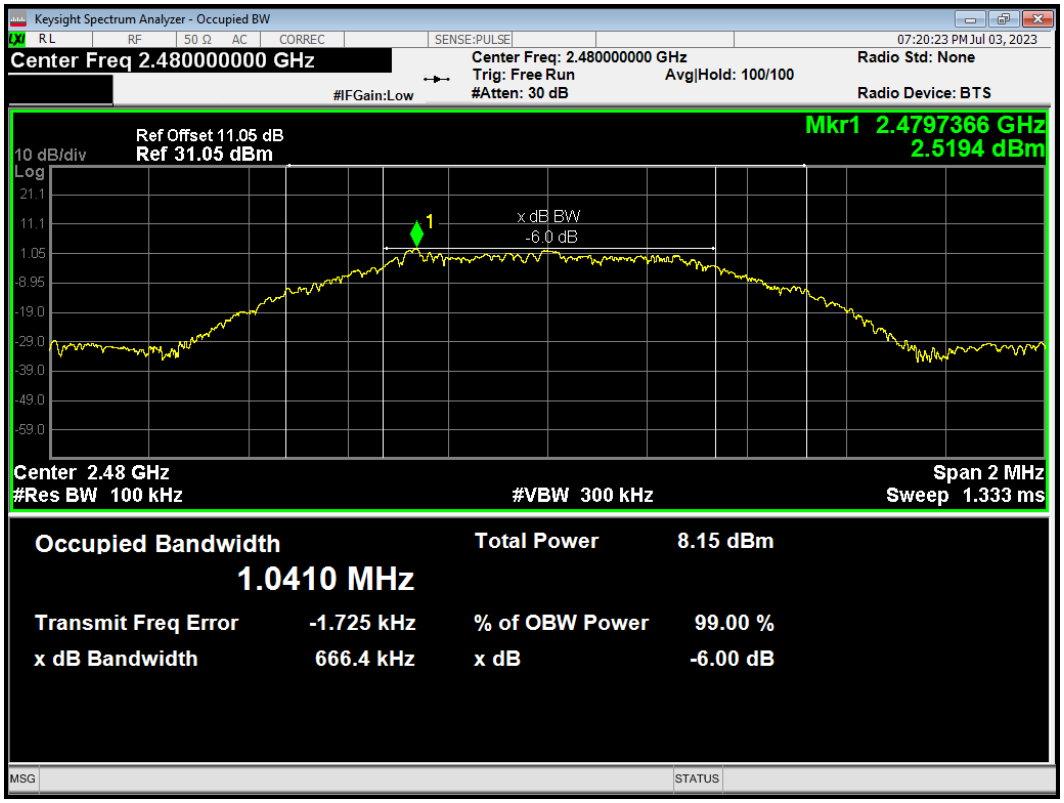
-6dB Bandwidth BLE (S=2) 2402MHz



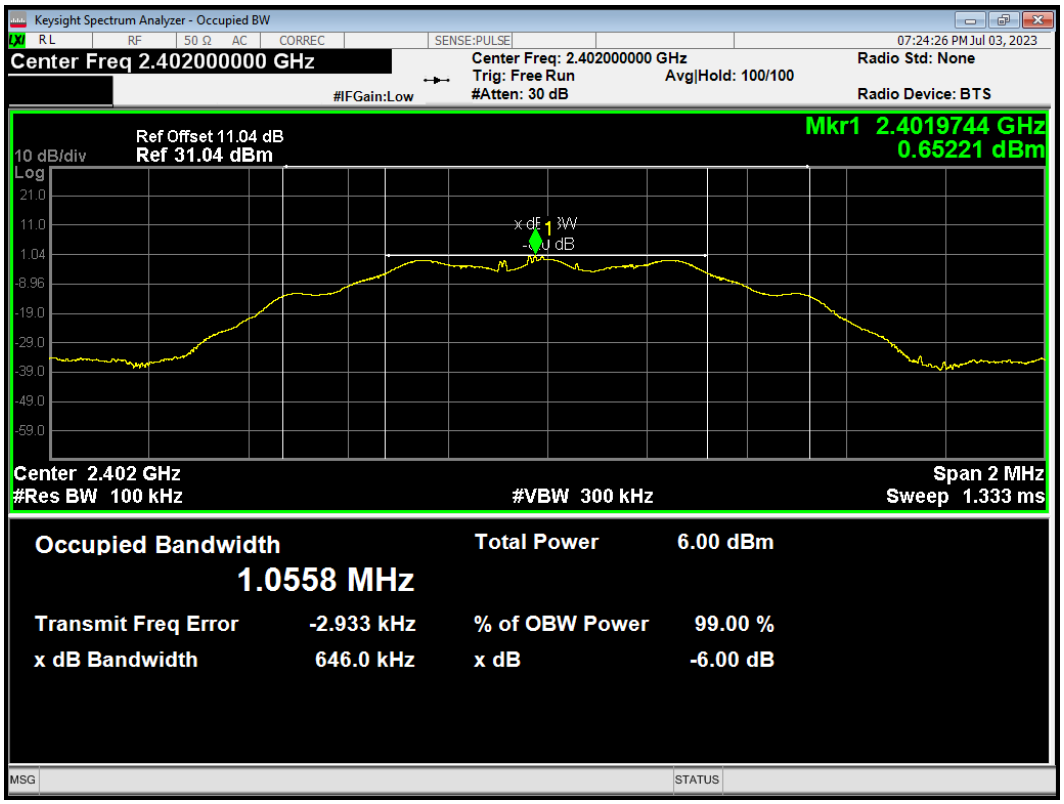
-6dB Bandwidth BLE (S=2) 2440MHz



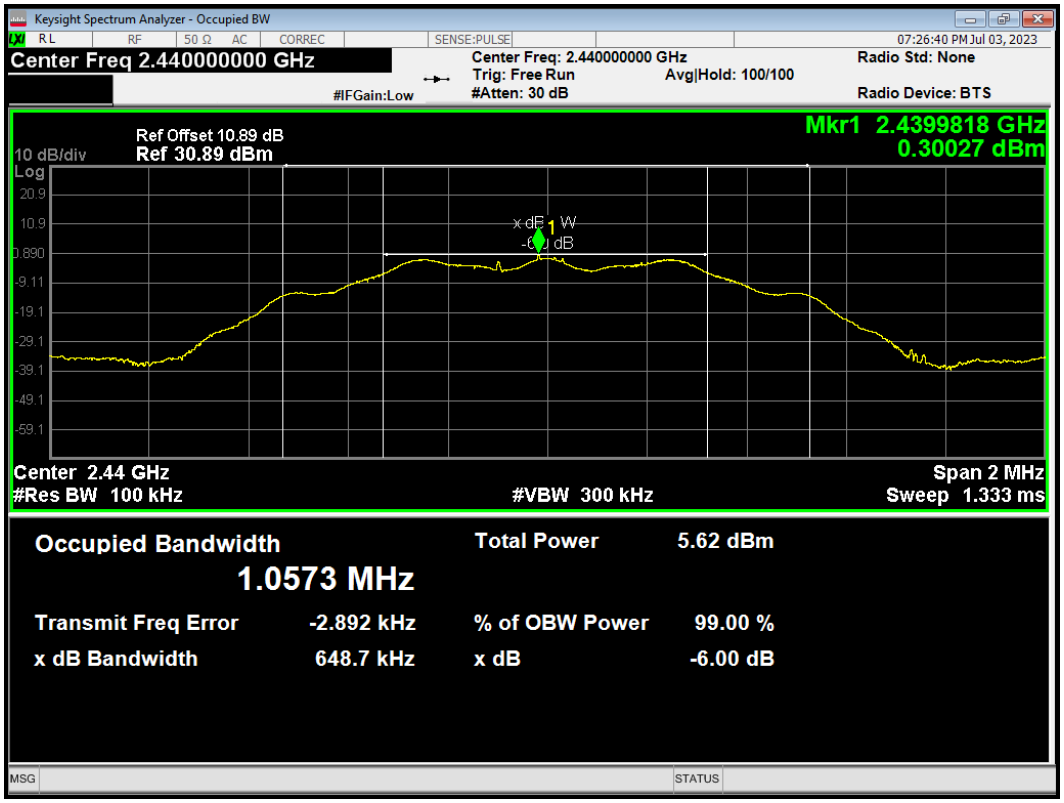
-6dB Bandwidth BLE (S=2) 2480MHz



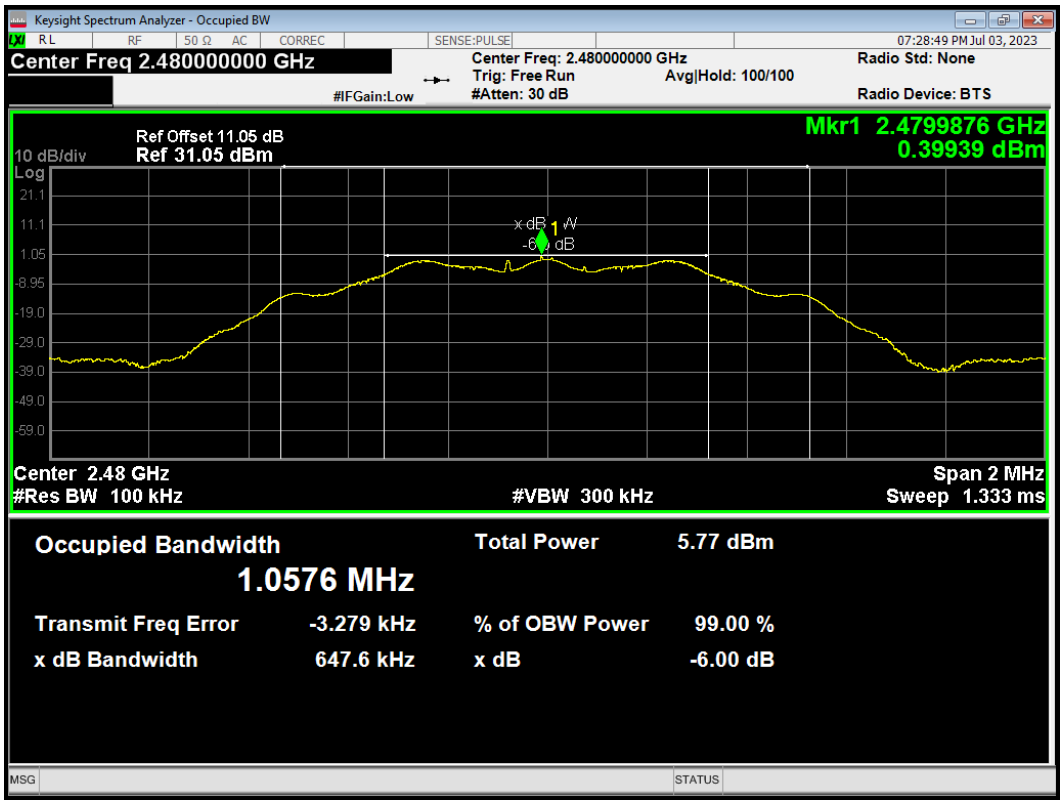
-6dB Bandwidth BLE (S=8) 2402MHz



-6dB Bandwidth BLE (S=8) 2440MHz



-6dB Bandwidth BLE (S=8) 2480MHz



5.3. Band Edge

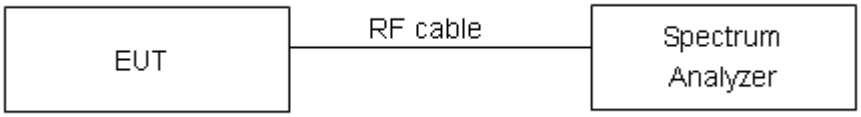
Ambient Condition

Temperature	Relative humidity
20°C ~ 25°C	45% ~ 50%

Method of Measurement

The EUT was connected to the spectrum analyzer through an external attenuator (20dB) and a known loss cable the band edge of the lowest and highest channels were measured. The peak detector is used and RBW is set to 100 kHz and VBW is set to 300 kHz on spectrum analyzer. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 15.247(d) specifies that “In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.” If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.”

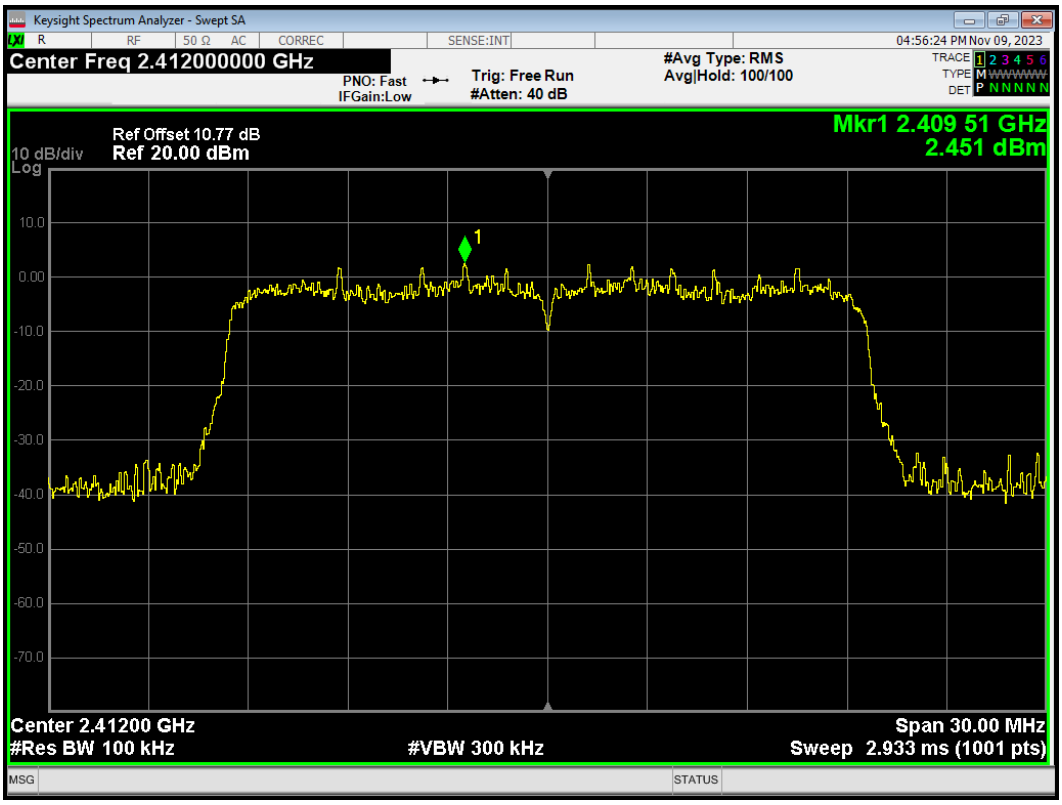
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

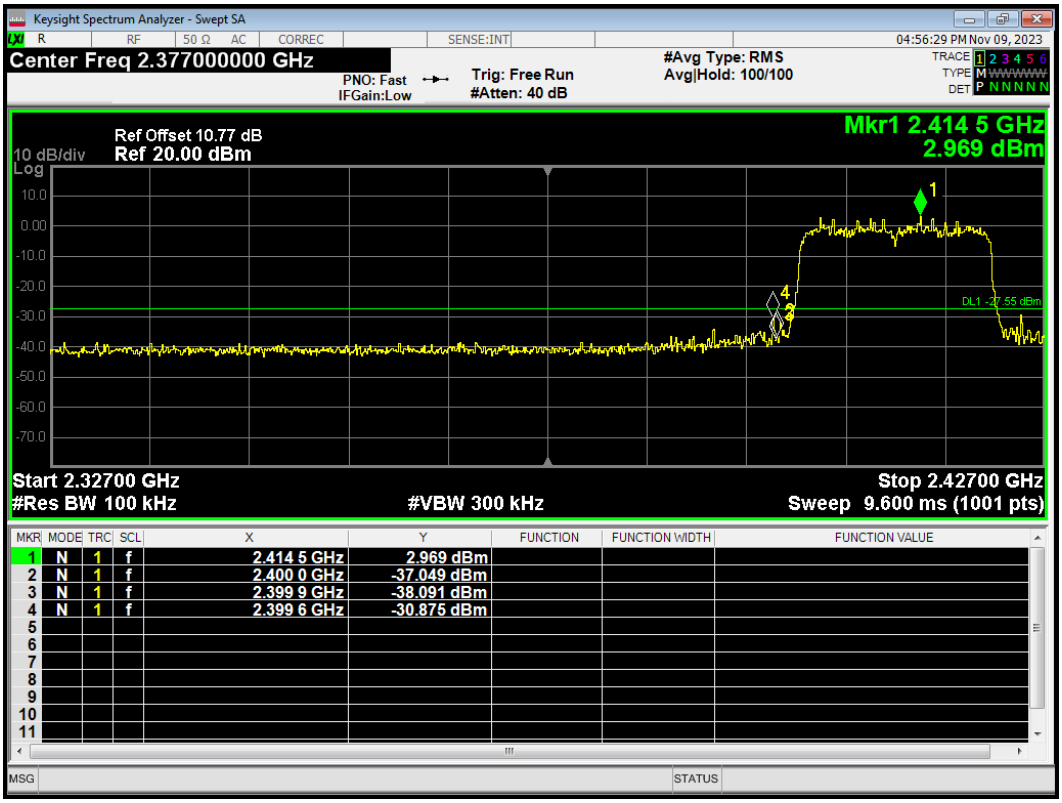
Frequency	Uncertainty
2GHz-3GHz	1.407 dB

Test Results: PASS

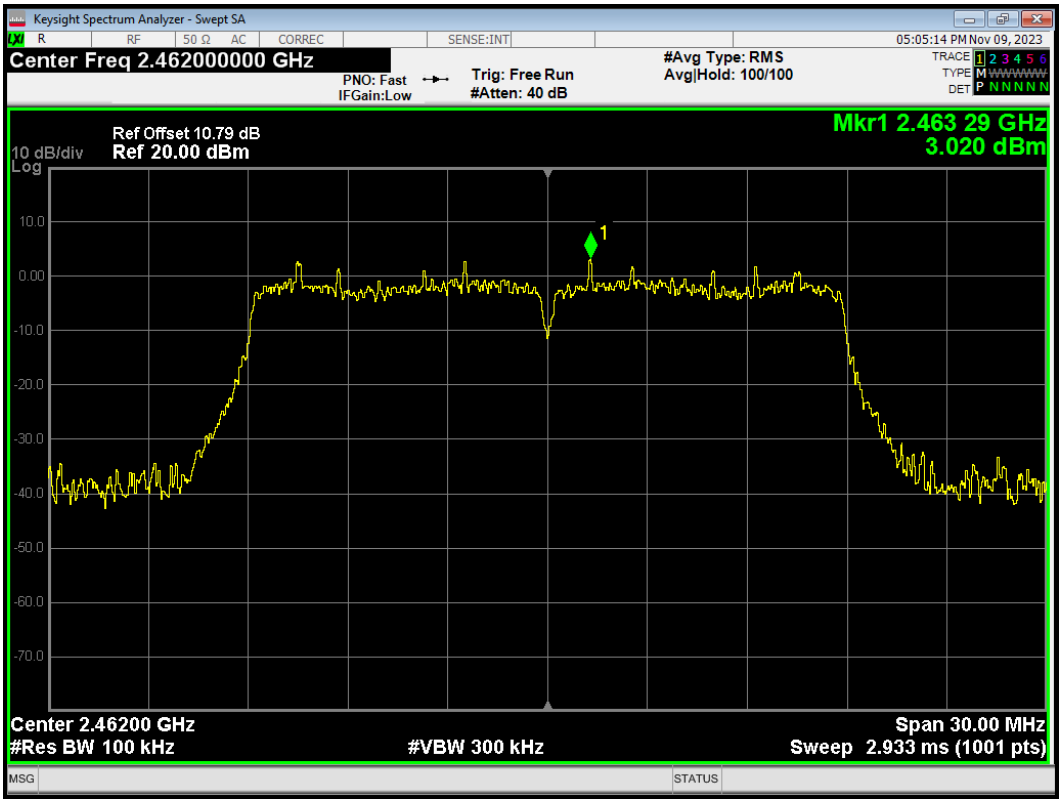
Band Edge 802.11ax(HE20) 2412MHz Ref



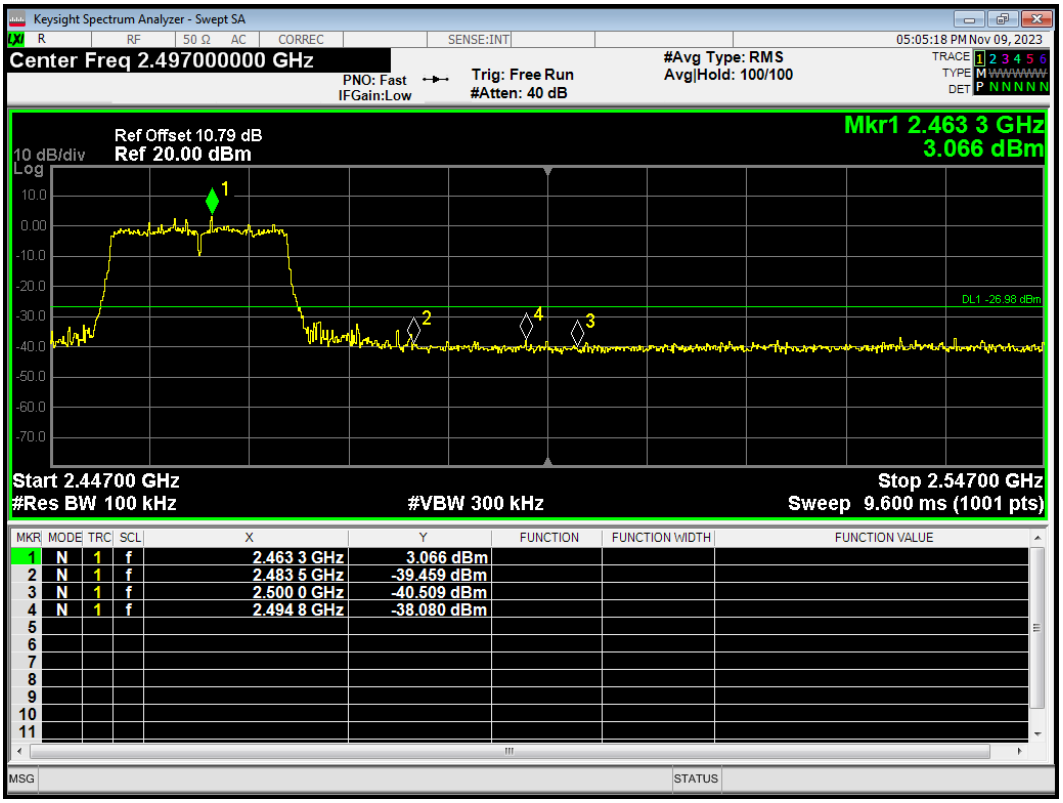
Band Edge 802.11ax(HE20) 2412MHz Emission



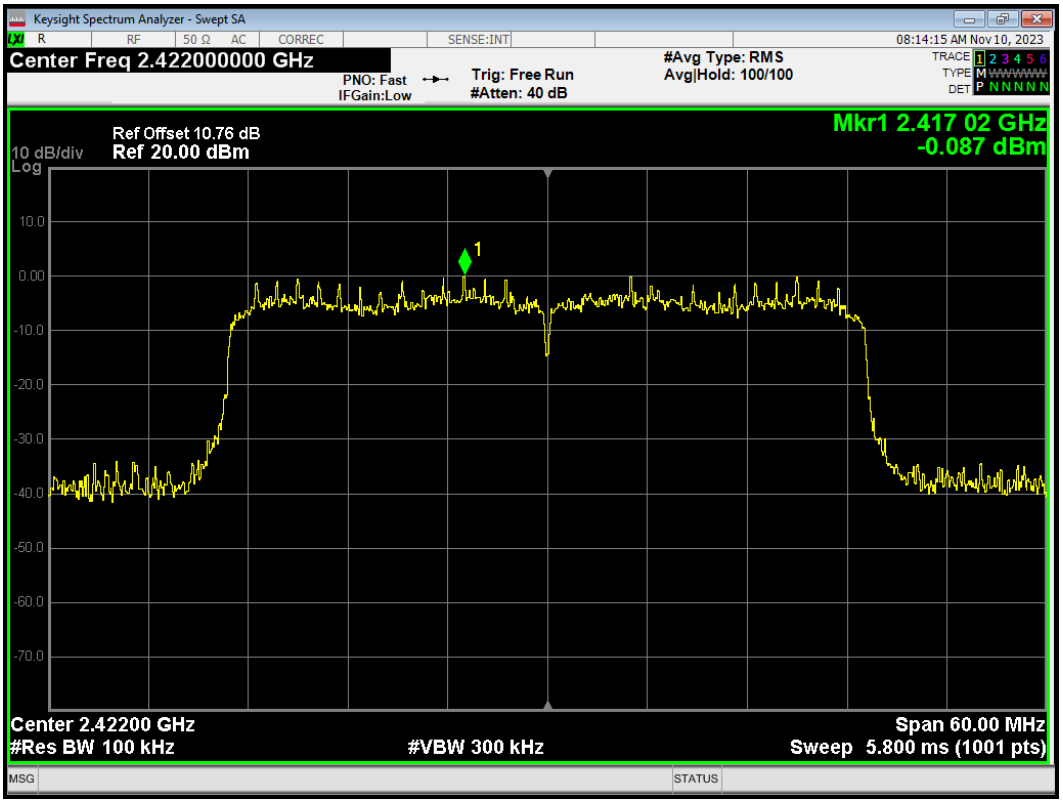
Band Edge 802.11ax(HE20) 2462MHz Ref



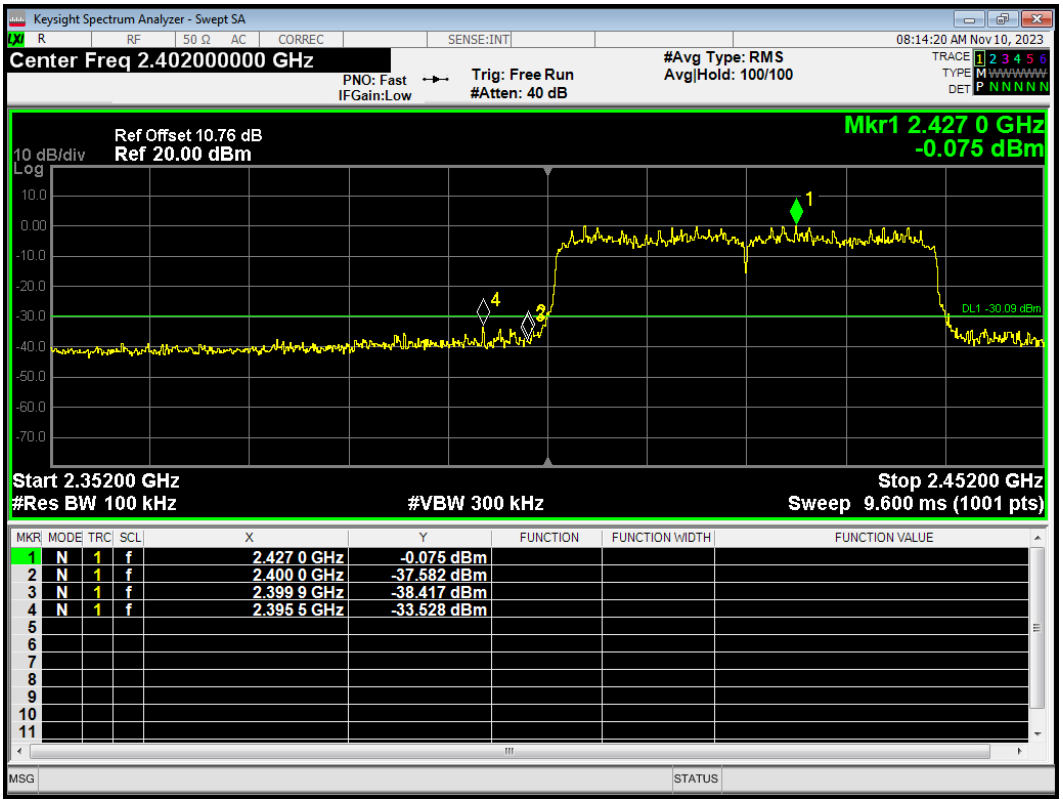
Band Edge 802.11ax(HE20) 2462MHz Emission



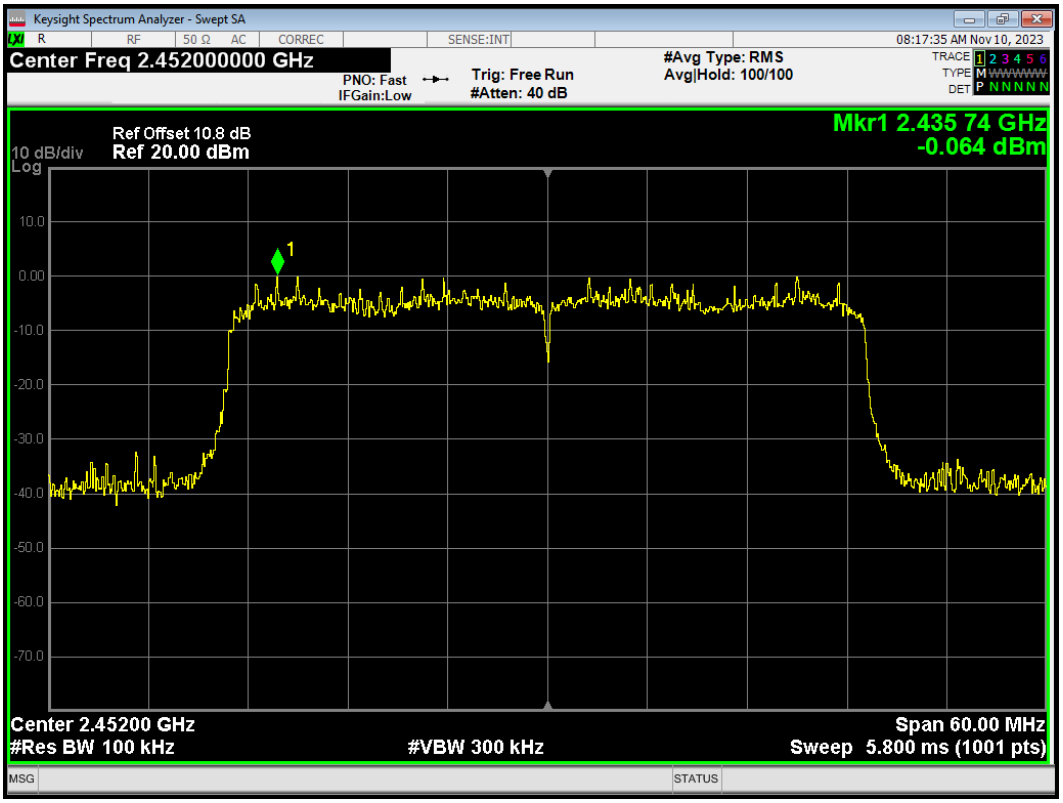
Band Edge 802.11ax(HE40) 2422MHz Ref



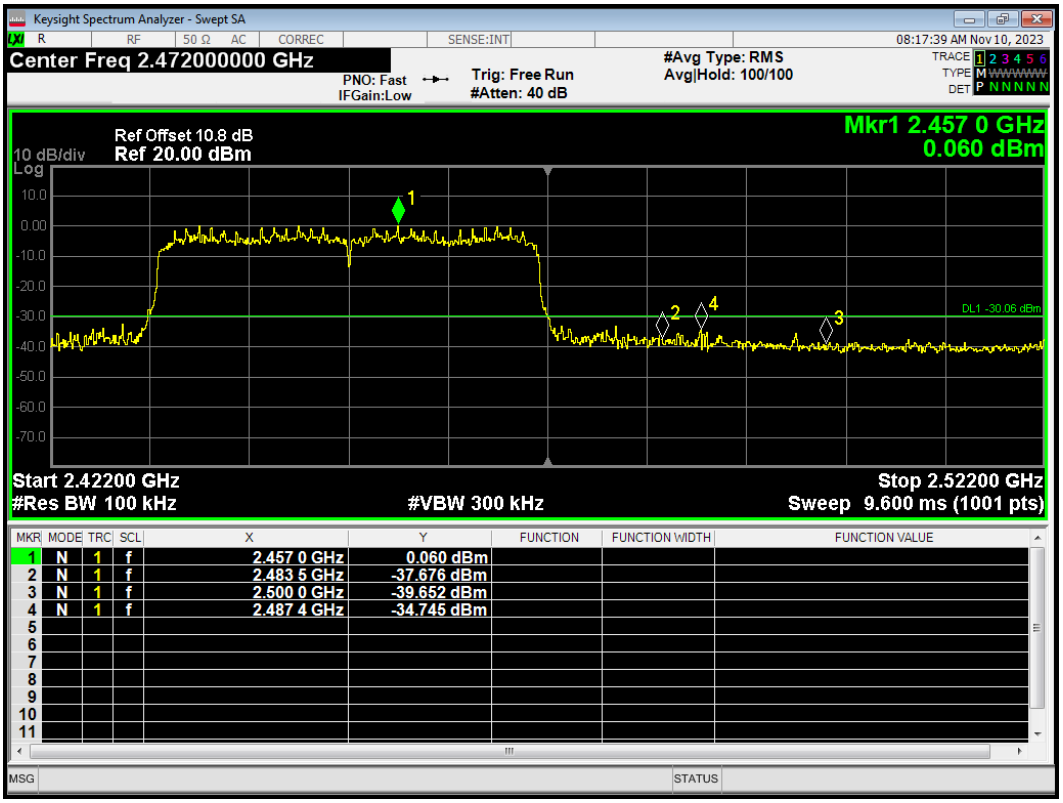
Band Edge 802.11ax(HE40) 2422MHz Emission



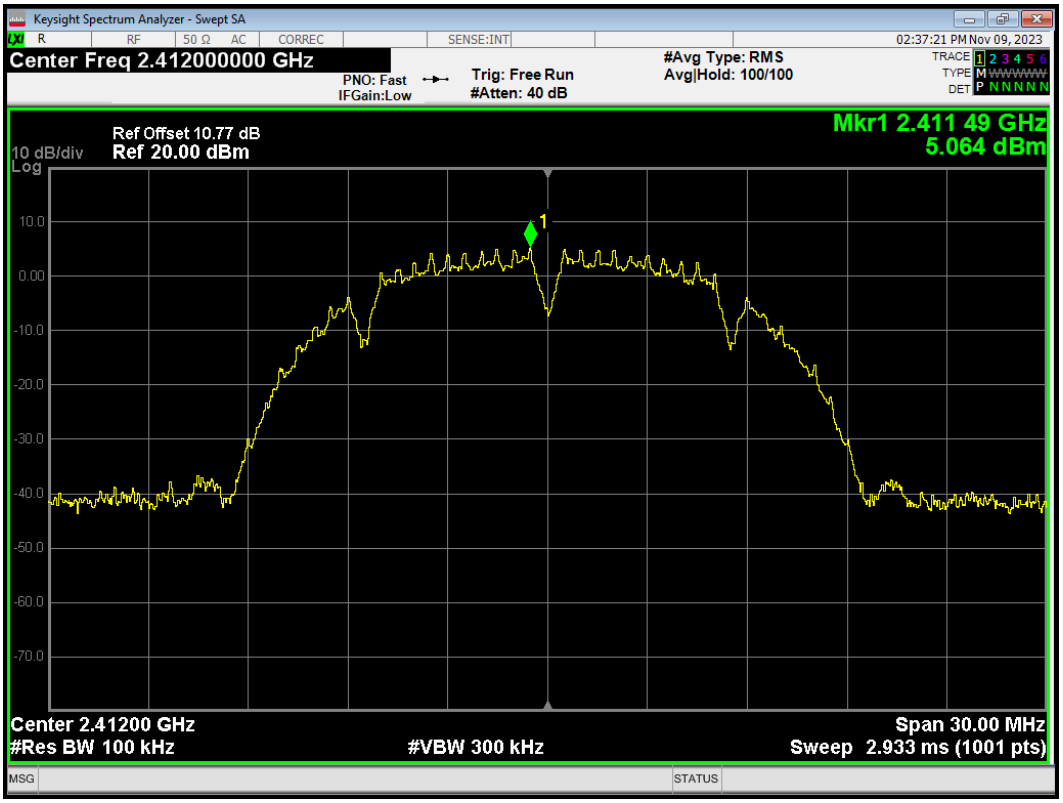
Band Edge 802.11ax(HE40) 2452MHz Ref



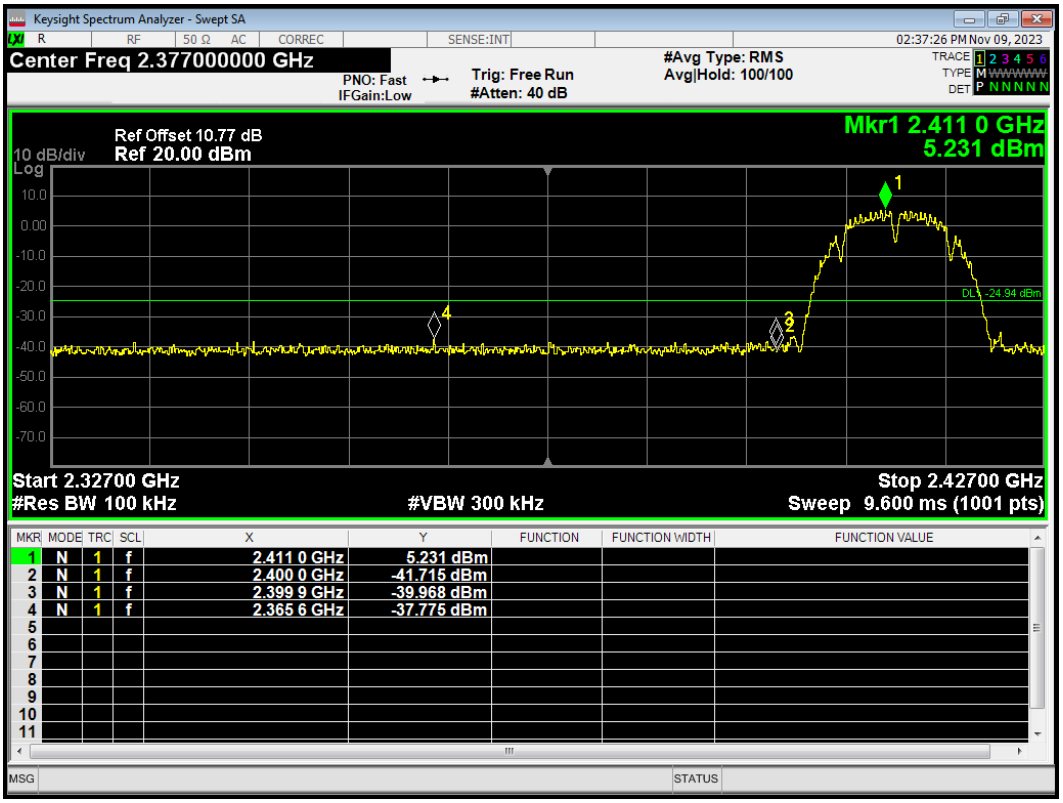
Band Edge 802.11ax(HE40) 2452MHz Emission



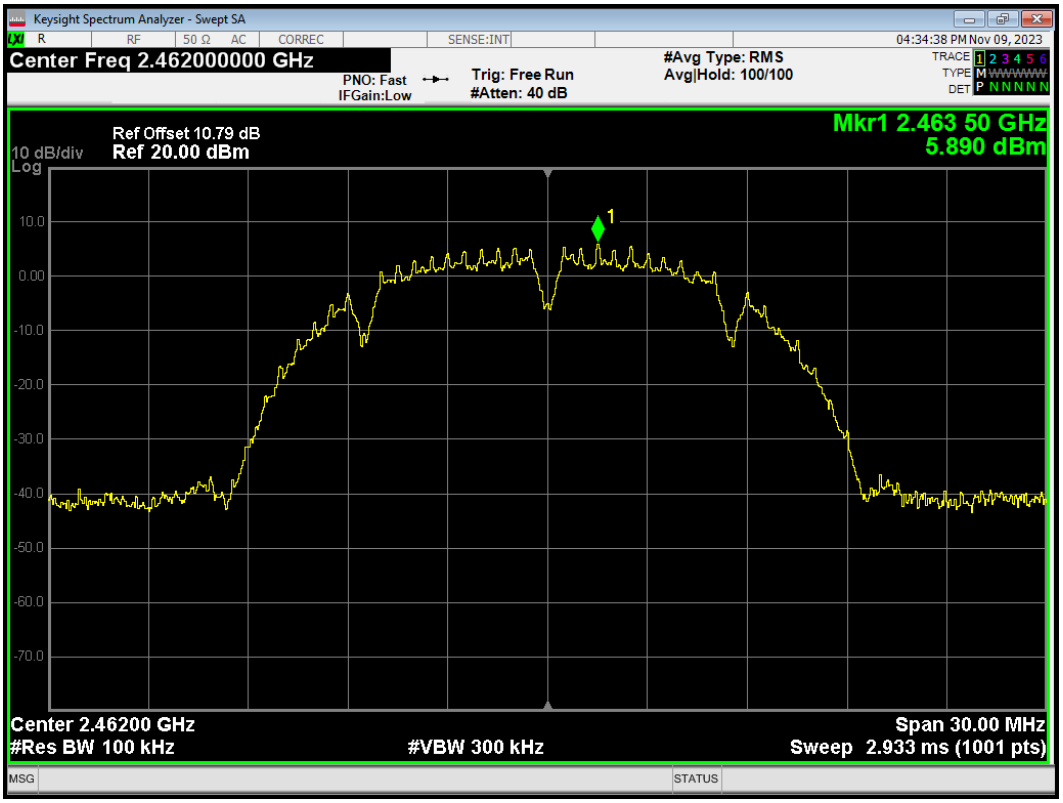
Band Edge 802.11b 2412MHz Ref



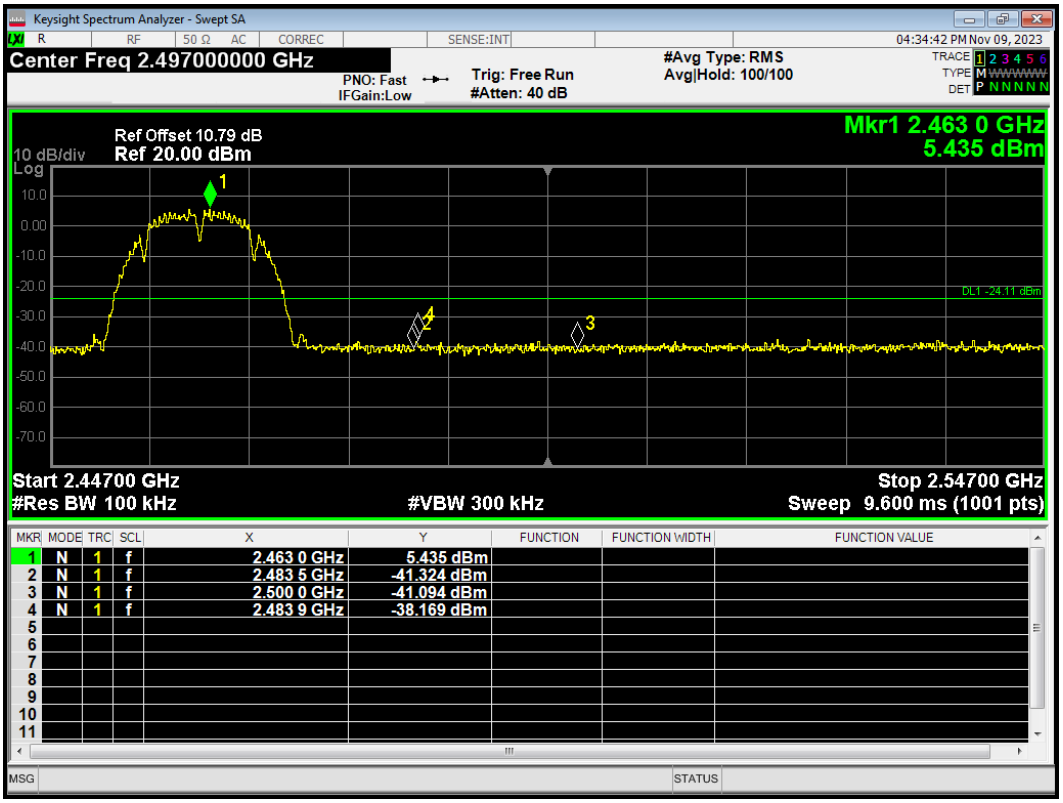
Band Edge 802.11b 2412MHz Emission



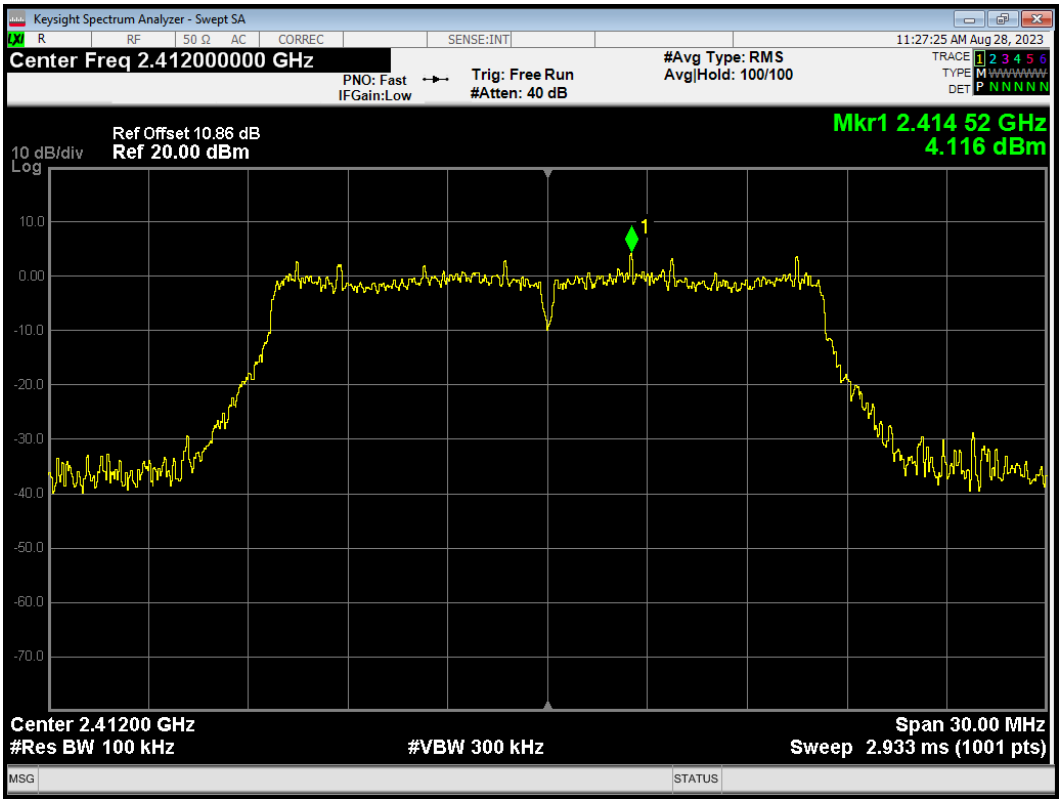
Band Edge 802.11b 2462MHz Ref



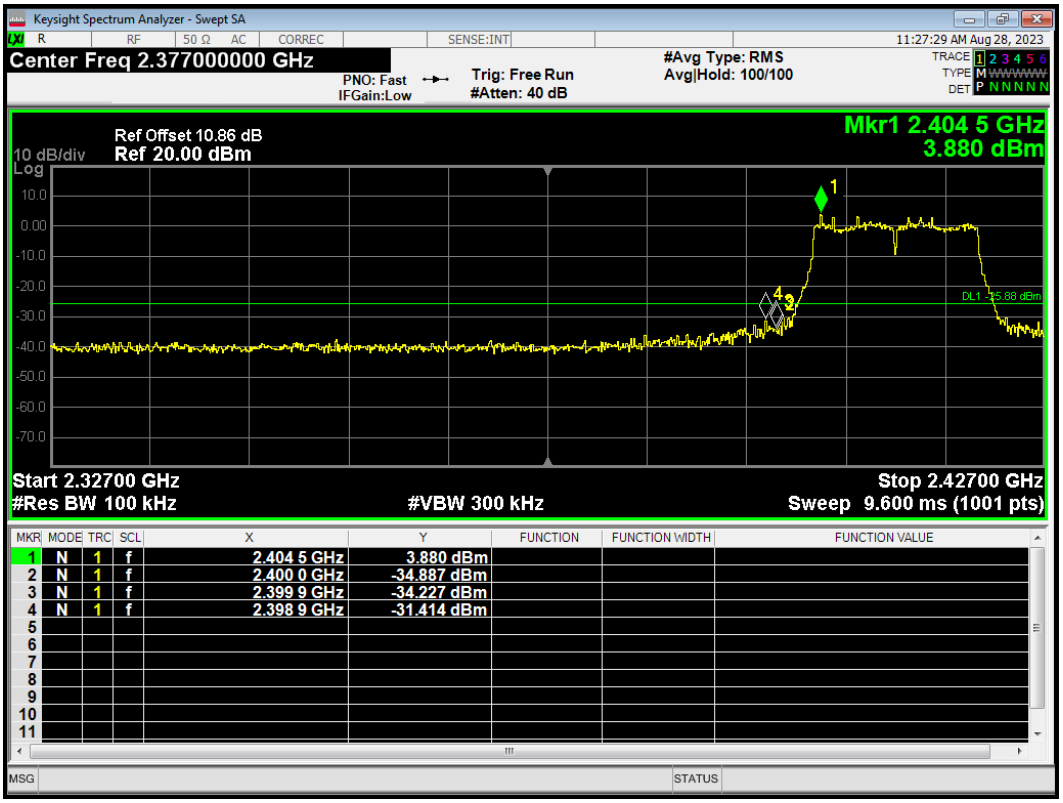
Band Edge 802.11b 2462MHz Emission



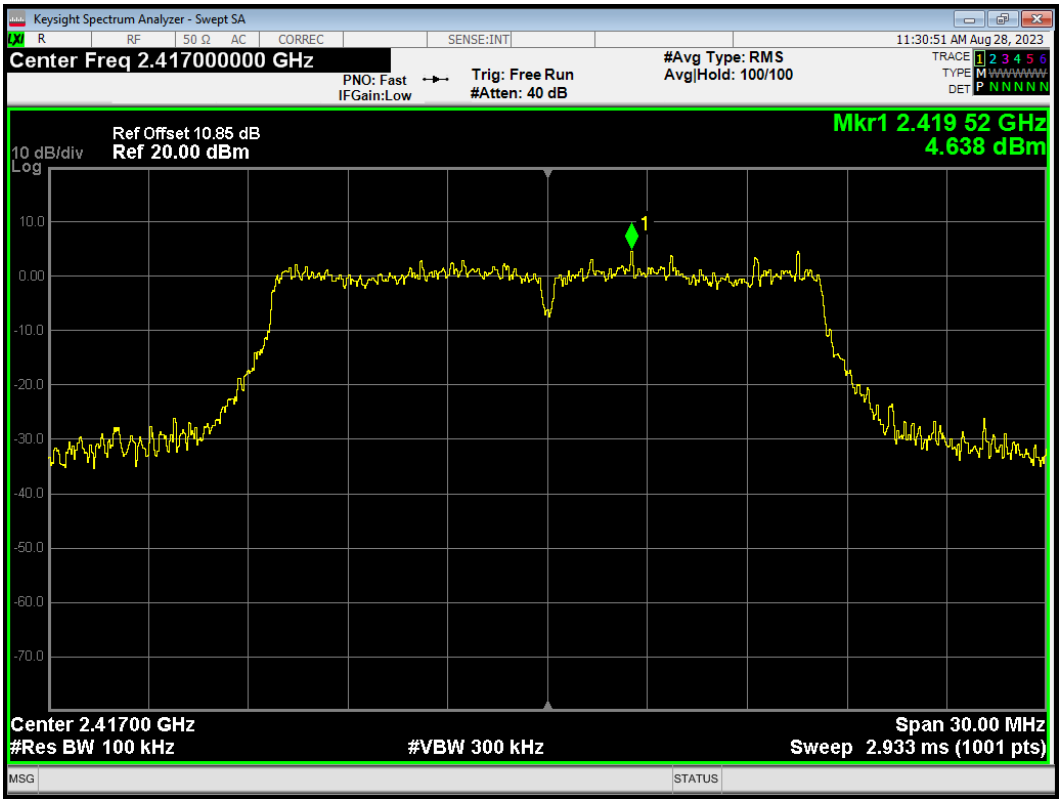
Band Edge 802.11g 2412MHz Ref



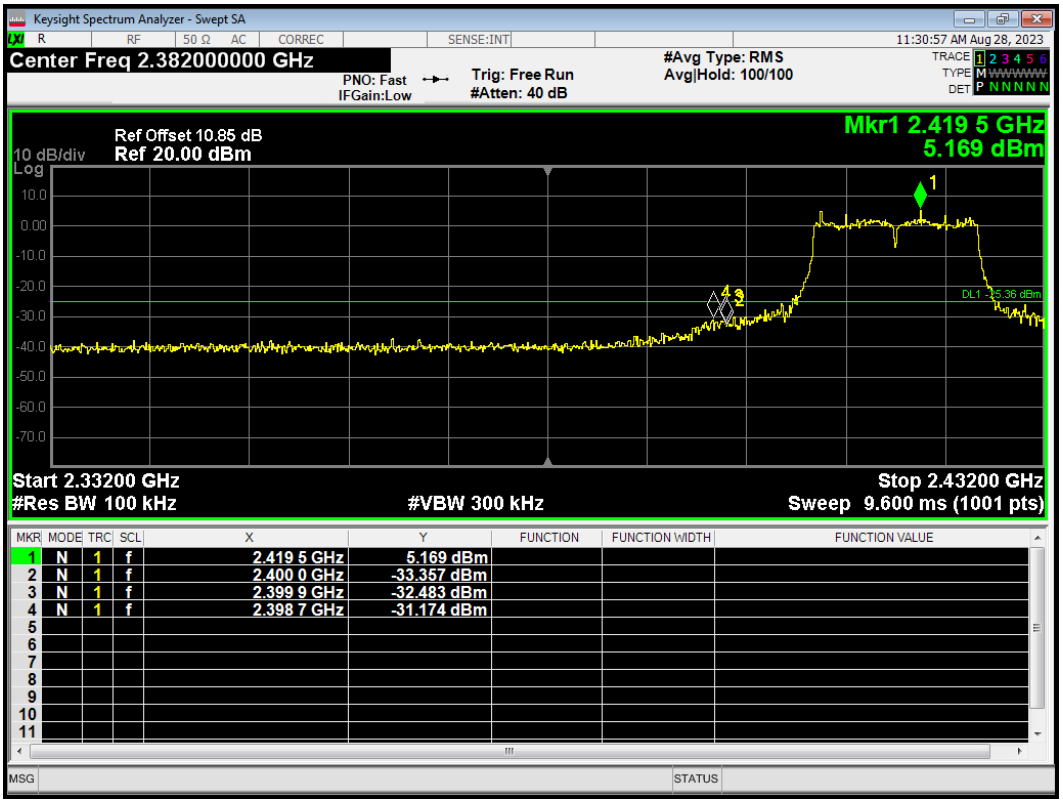
Band Edge 802.11g 2412MHz Emission



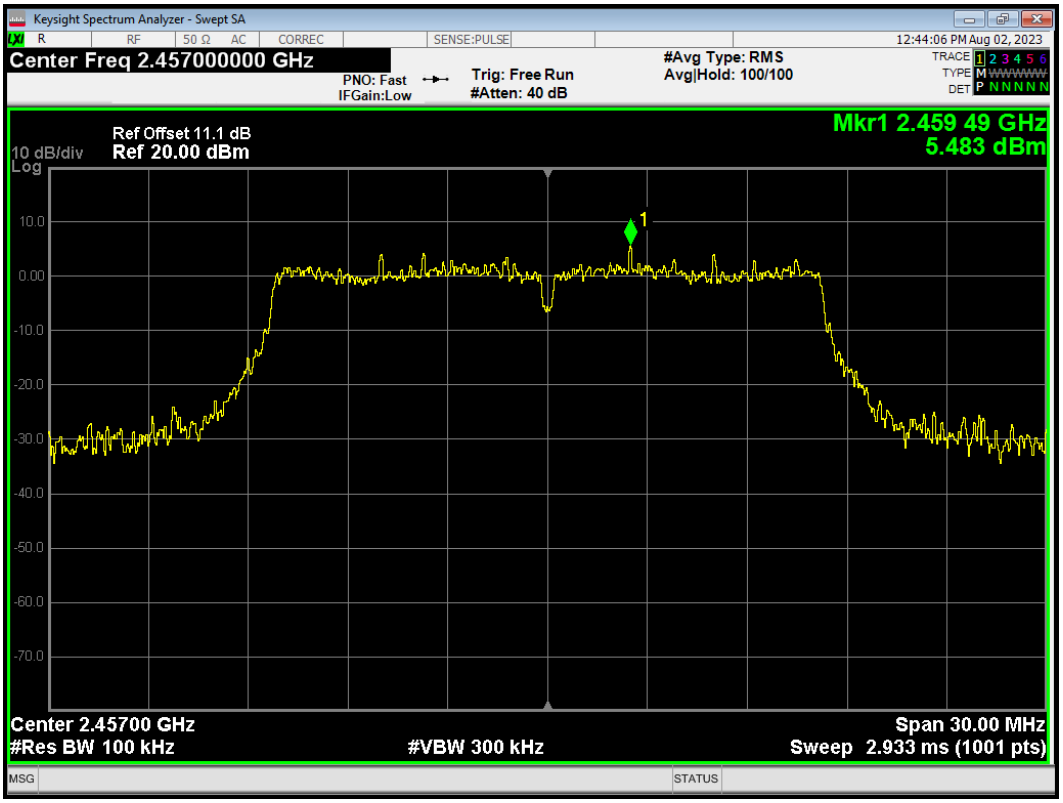
Band Edge 802.11g 2417MHz Ref



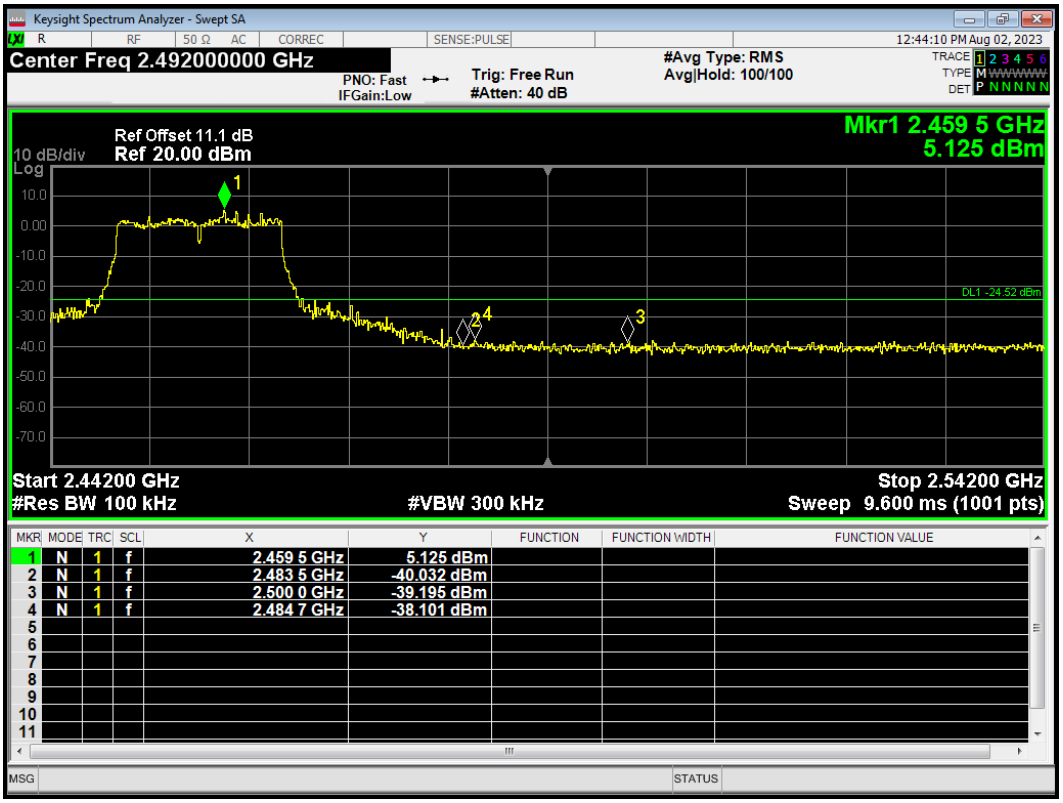
Band Edge 802.11g 2417MHz Emission



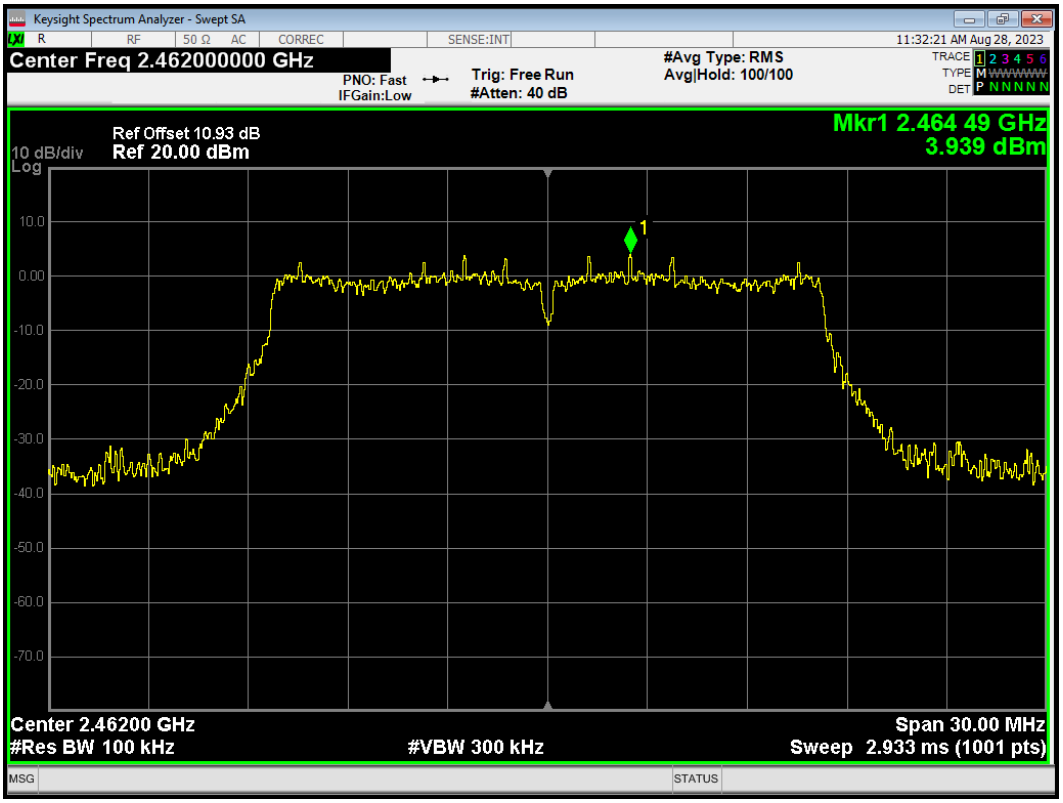
Band Edge 802.11g 2457MHz Ref



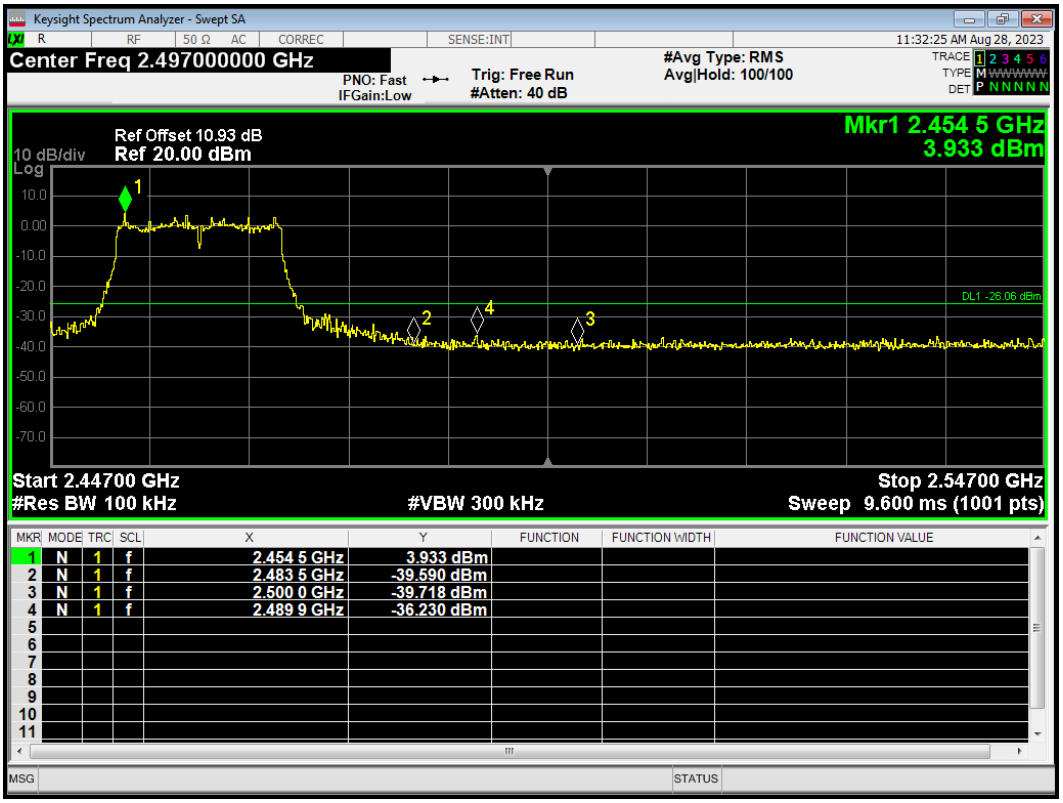
Band Edge 802.11g 2457MHz Emission



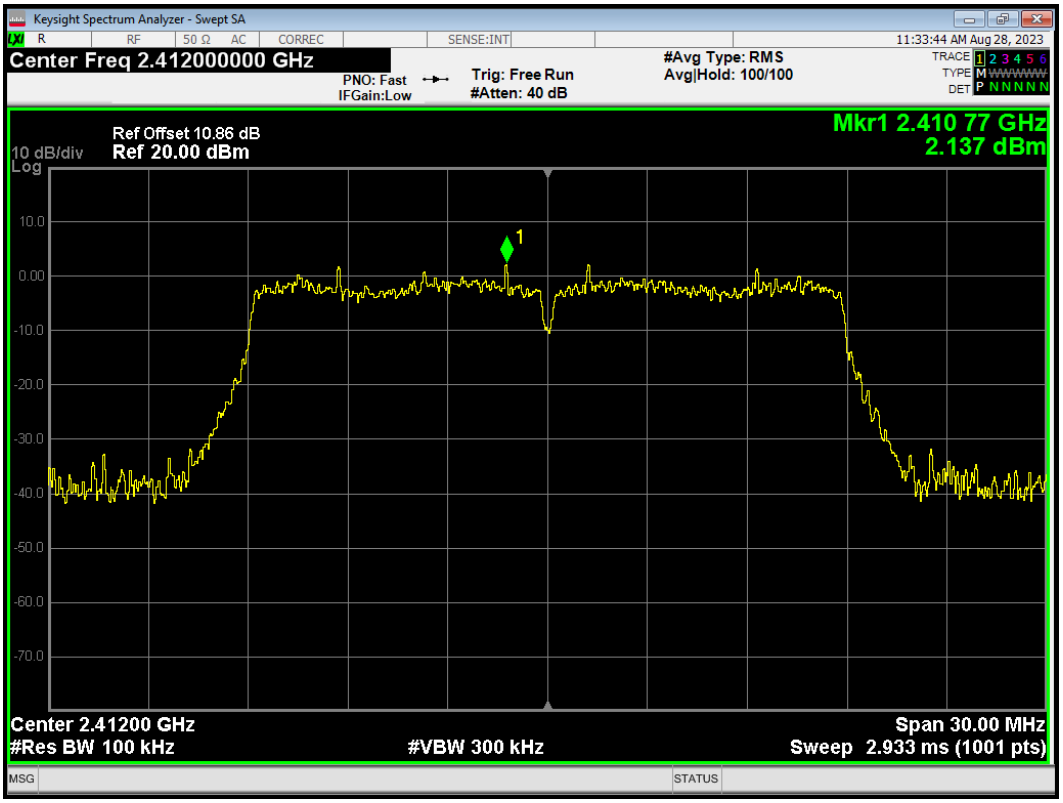
Band Edge 802.11g 2462MHz Ref



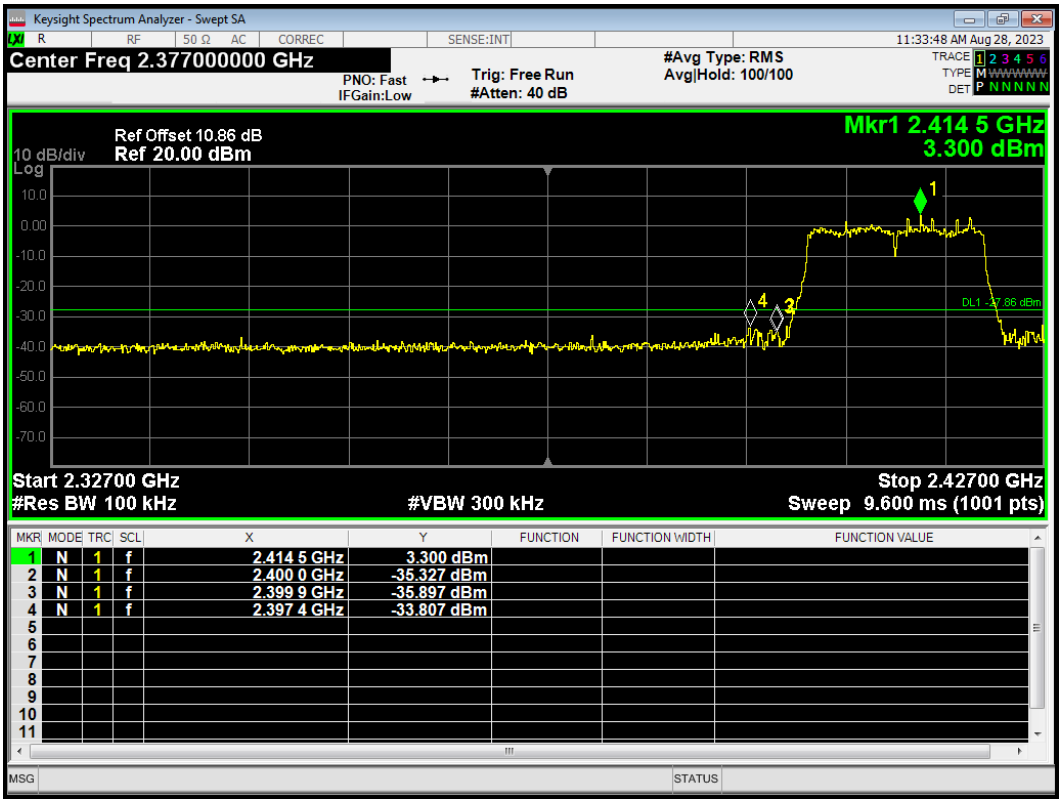
Band Edge 802.11g 2462MHz Emission



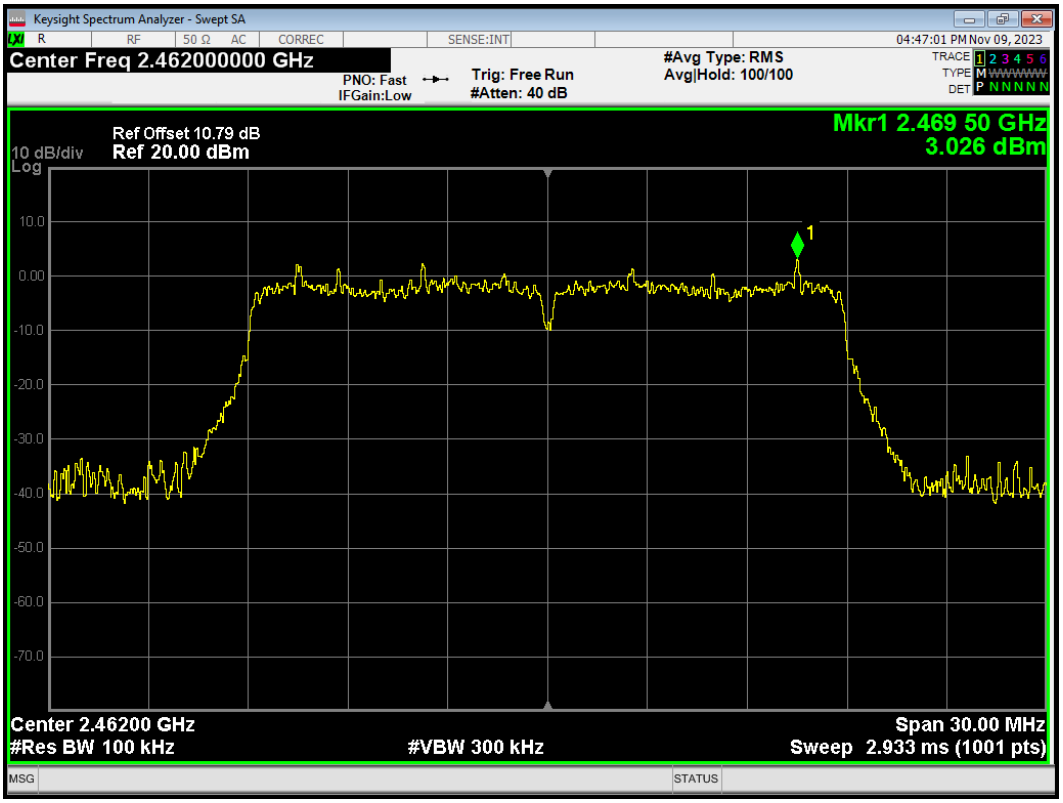
Band Edge 802.11n(HT20) 2412MHz Ref



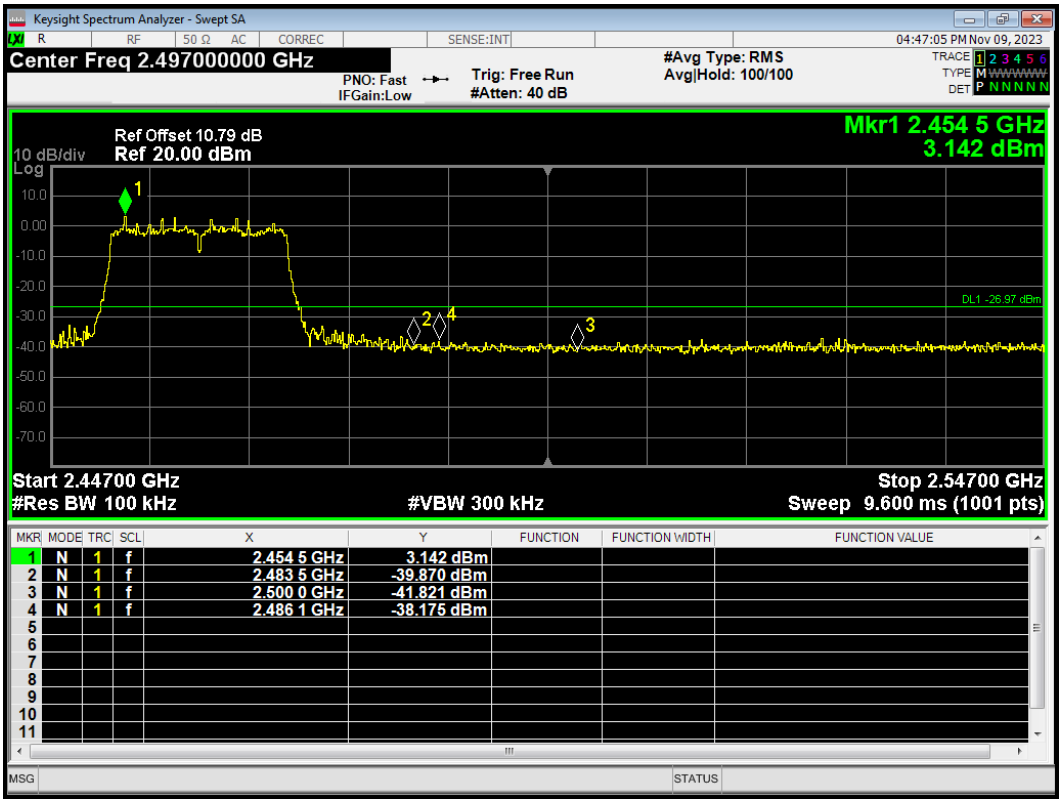
Band Edge 802.11n(HT20) 2412MHz Emission



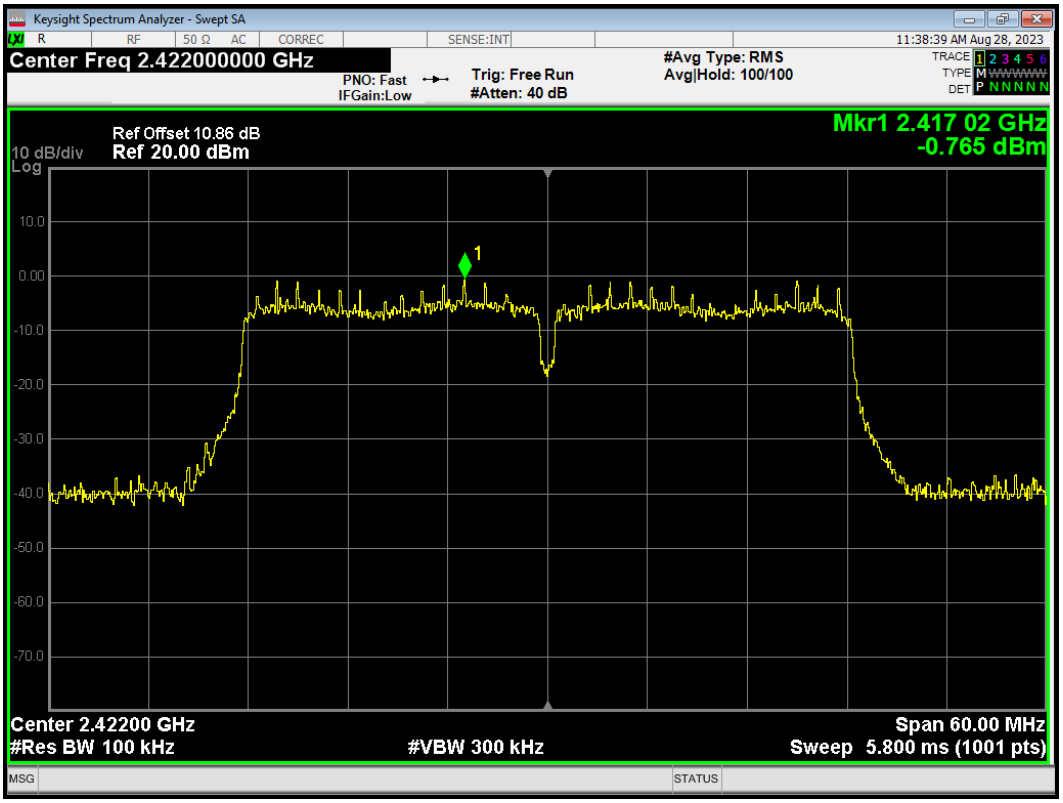
Band Edge 802.11n(HT20) 2462MHz Ref



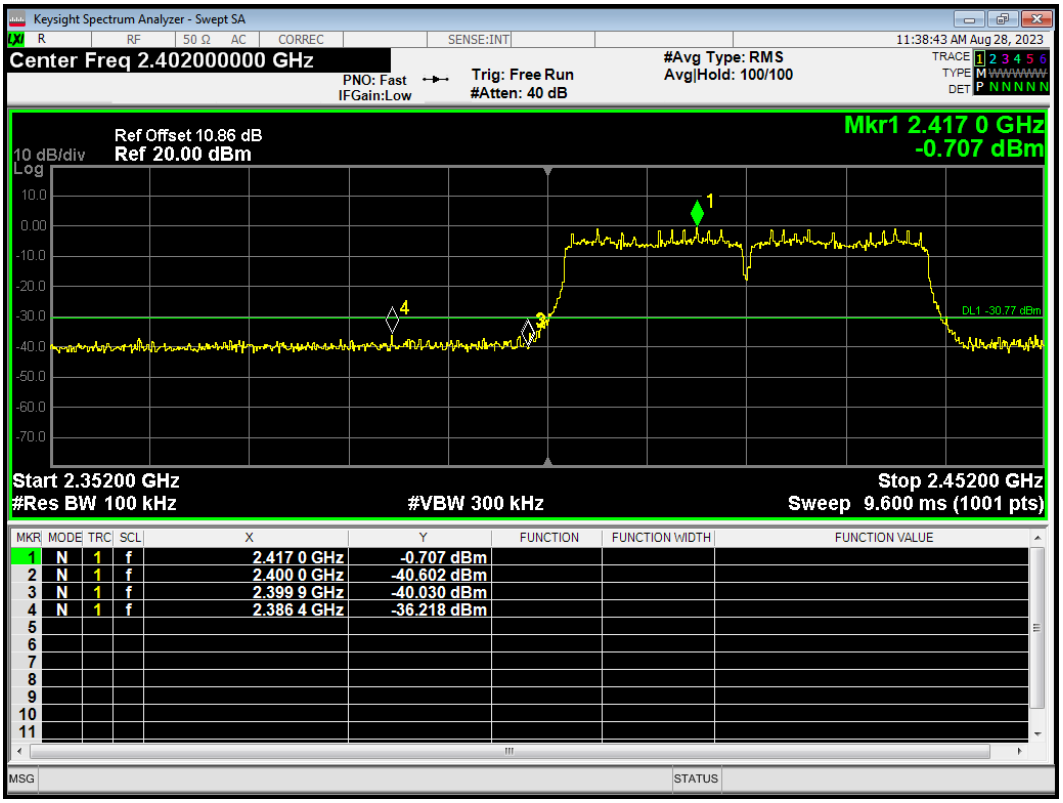
Band Edge 802.11n(HT20) 2462MHz Emission



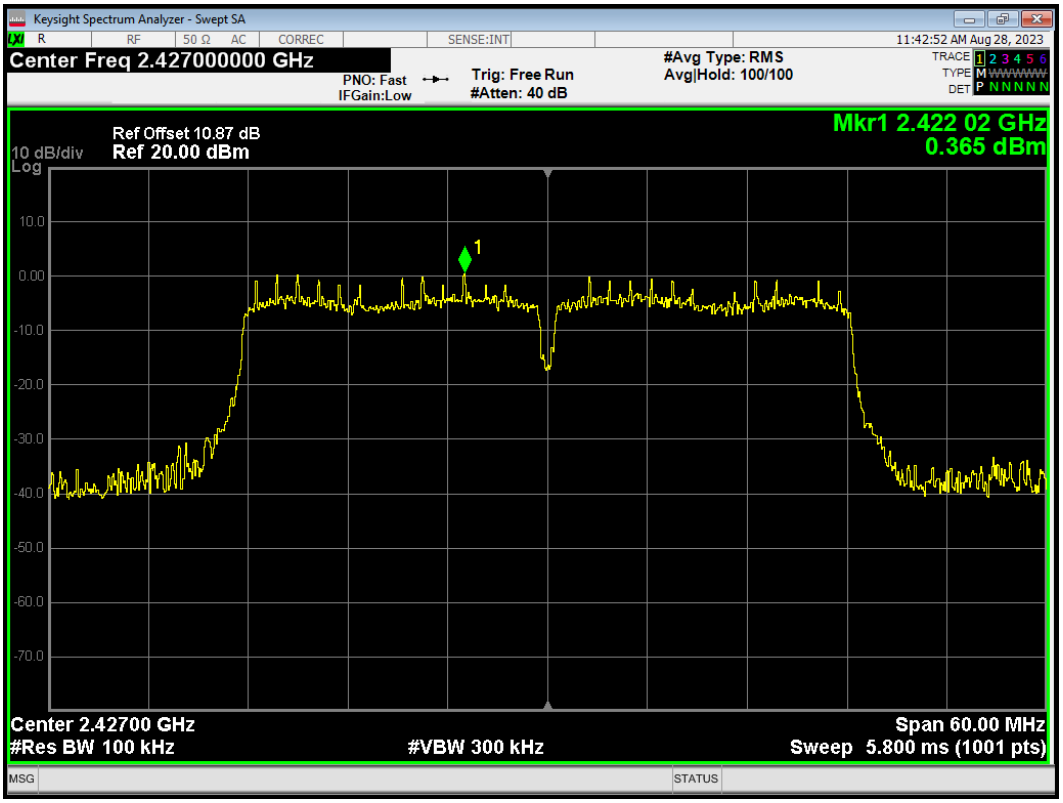
Band Edge 802.11n(HT40) 2422MHz Ref



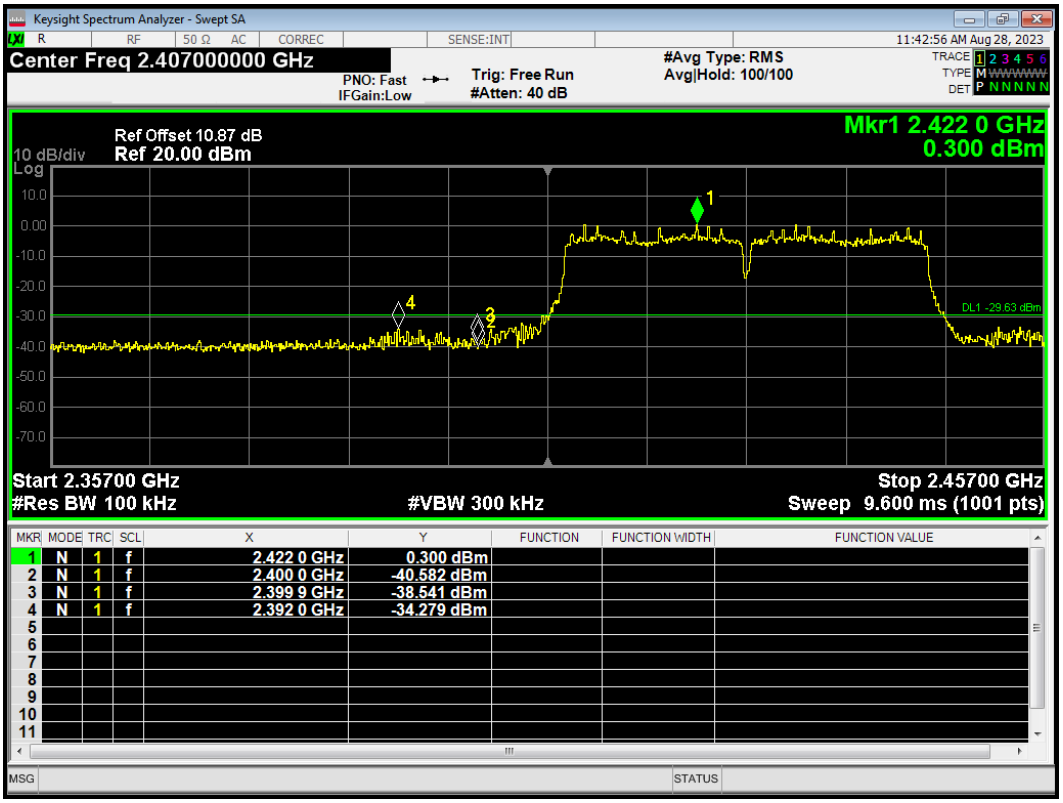
Band Edge 802.11n(HT40) 2422MHz Emission



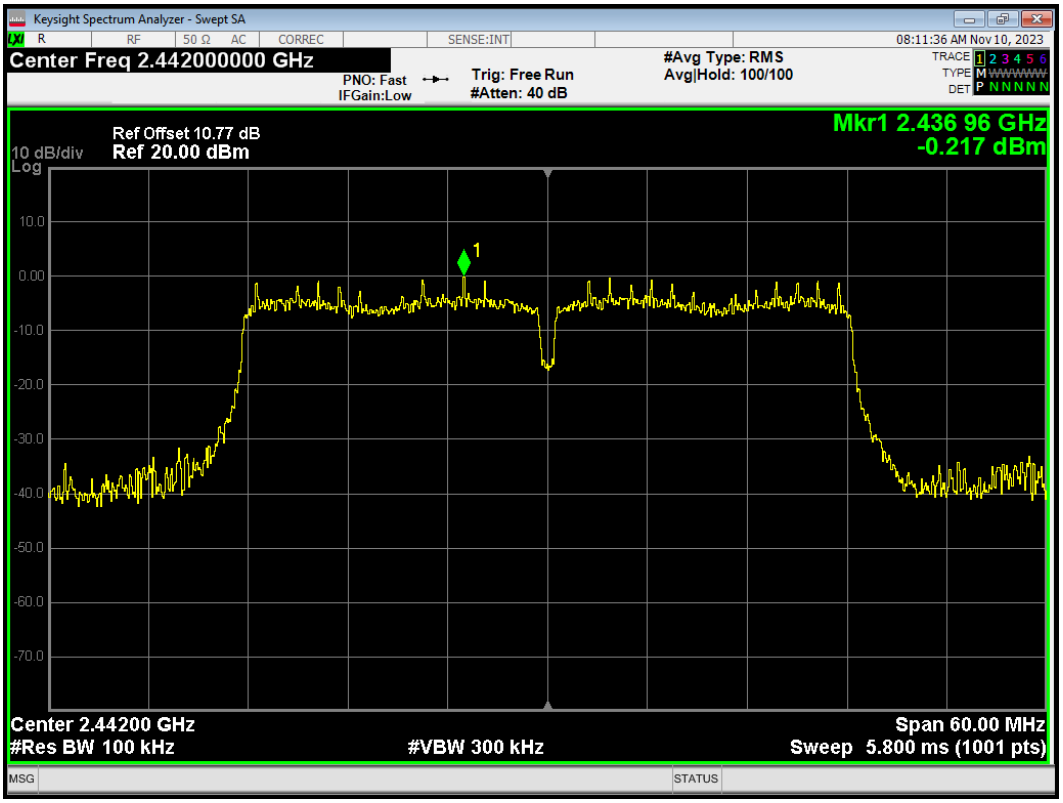
Band Edge 802.11n(HT40) 2427MHz Ref



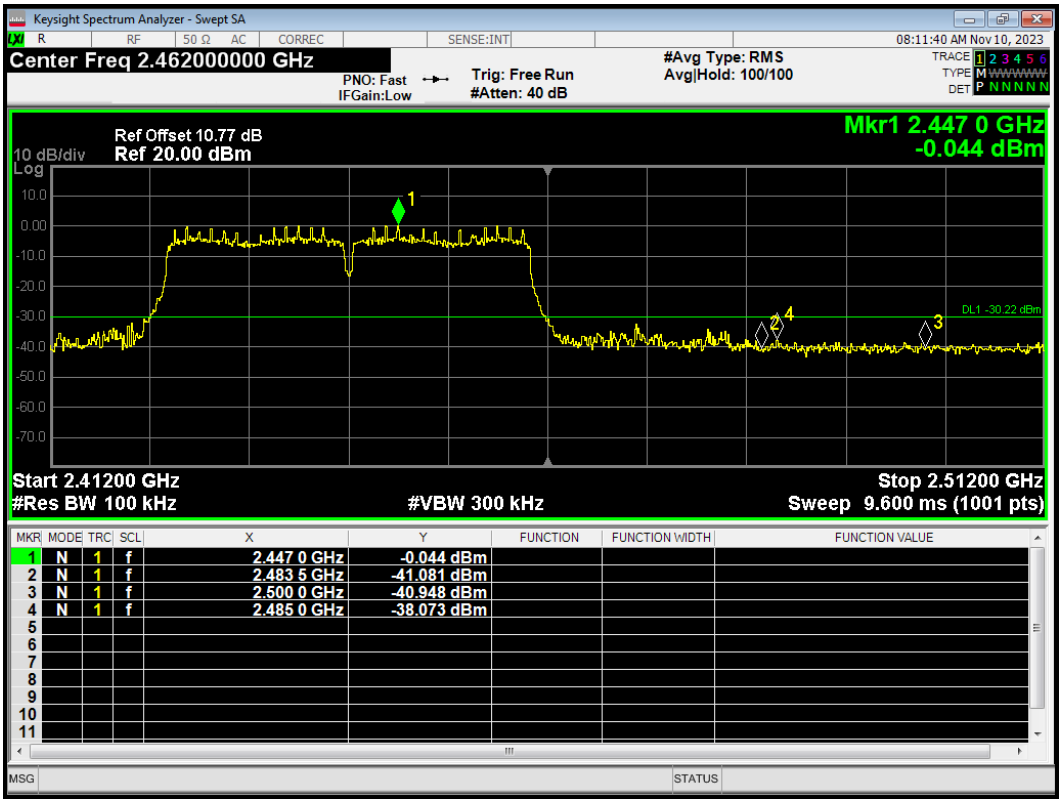
Band Edge 802.11n(HT40) 2427MHz Emission



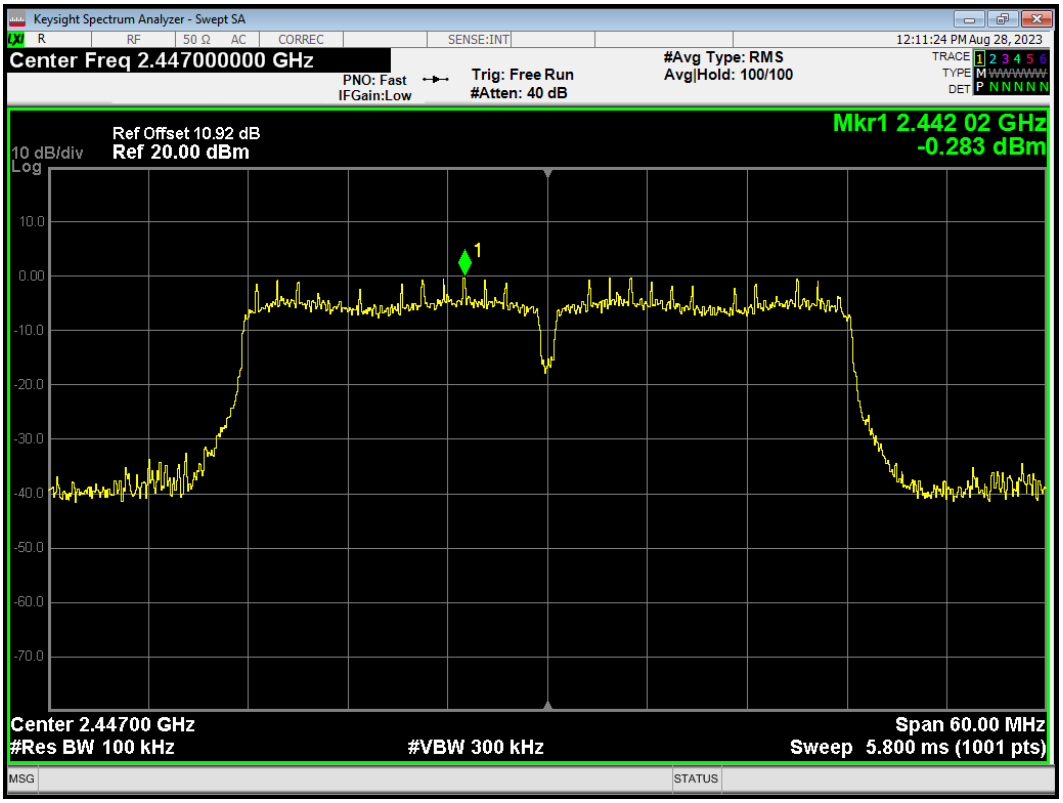
Band Edge 802.11n(HT40) 2442MHz Ref



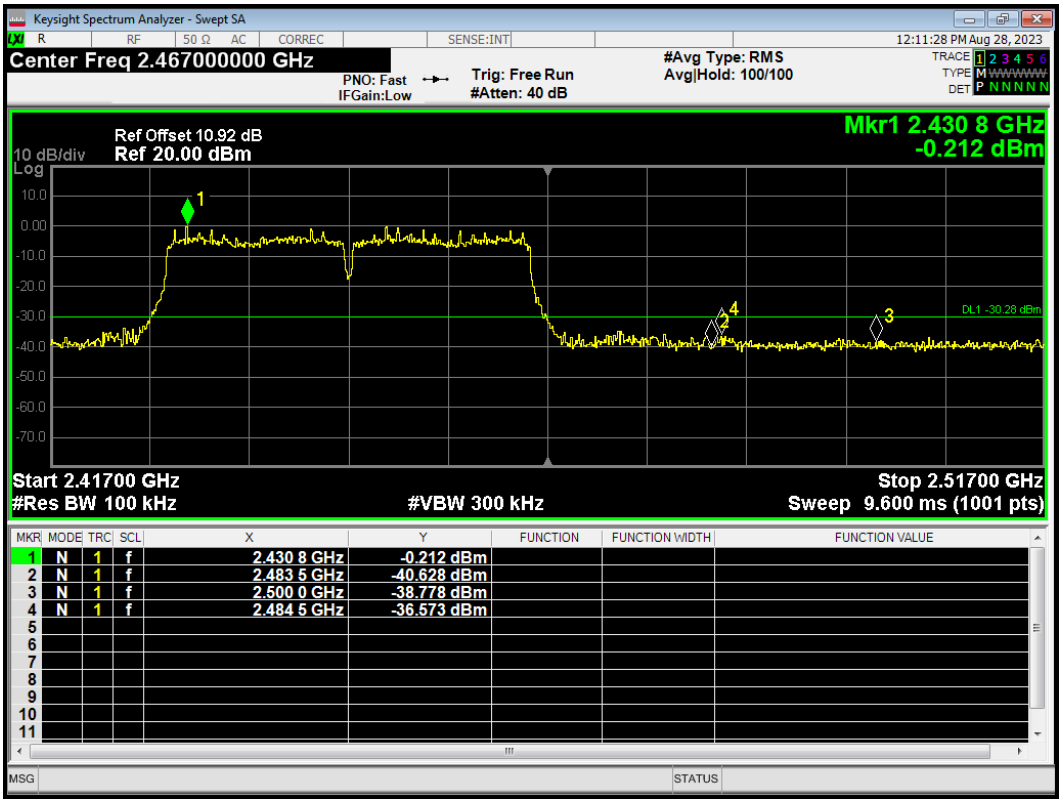
Band Edge 802.11n(HT40) 2442MHz Emission



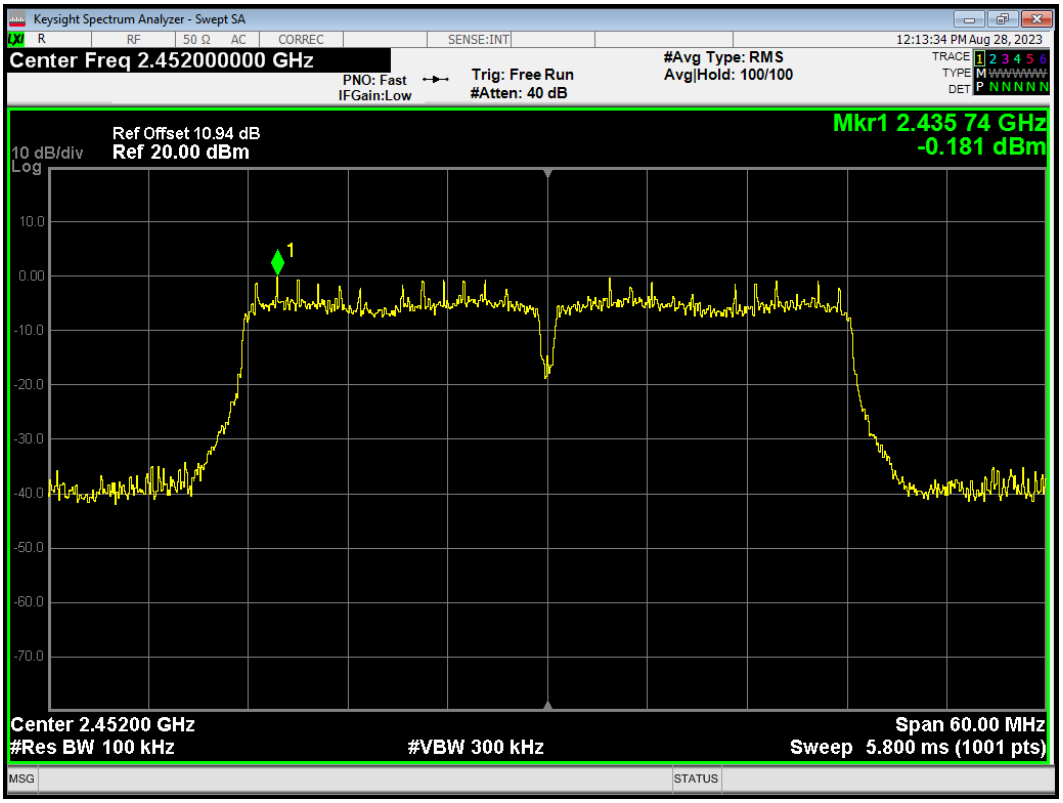
Band Edge 802.11n(HT40) 2447MHz Ref



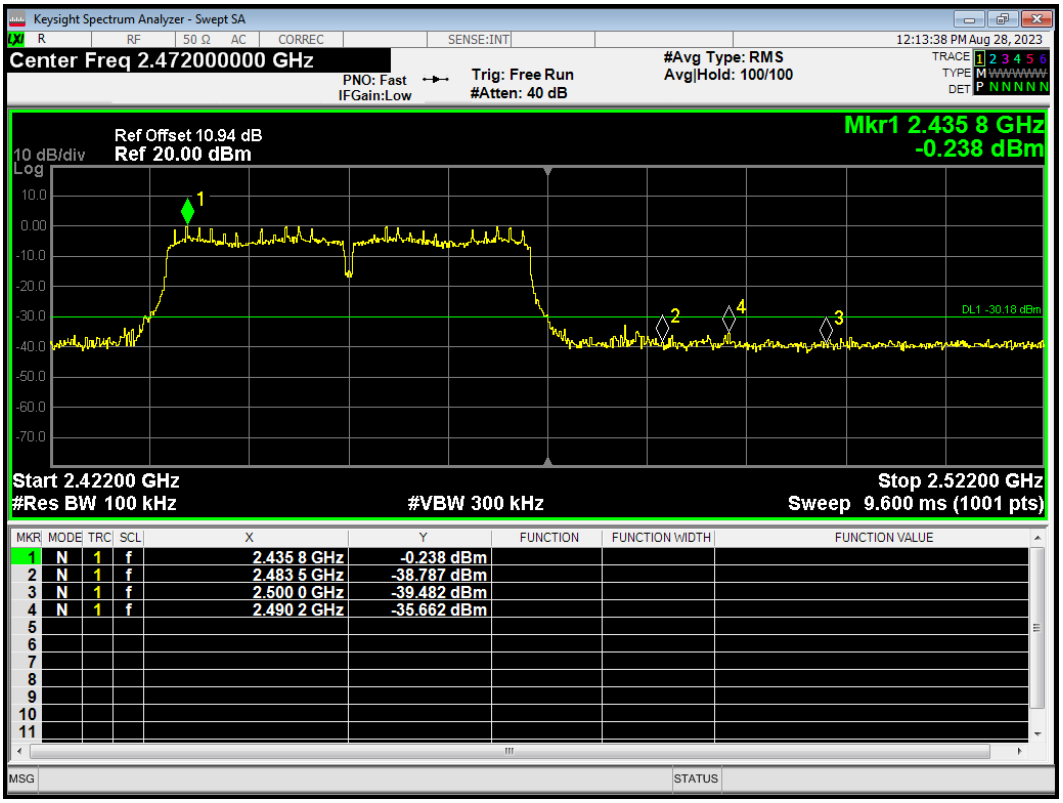
Band Edge 802.11n(HT40) 2447MHz Emission



Band Edge 802.11n(HT40) 2452MHz Ref

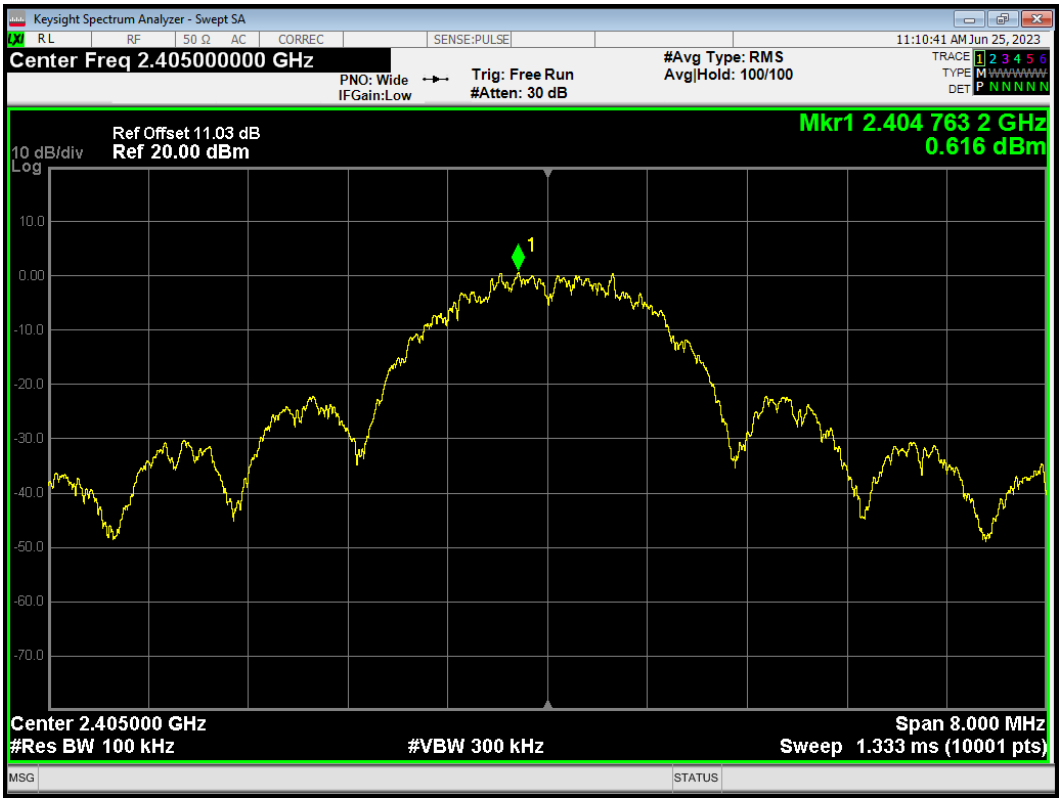


Band Edge 802.11n(HT40) 2452MHz Emission

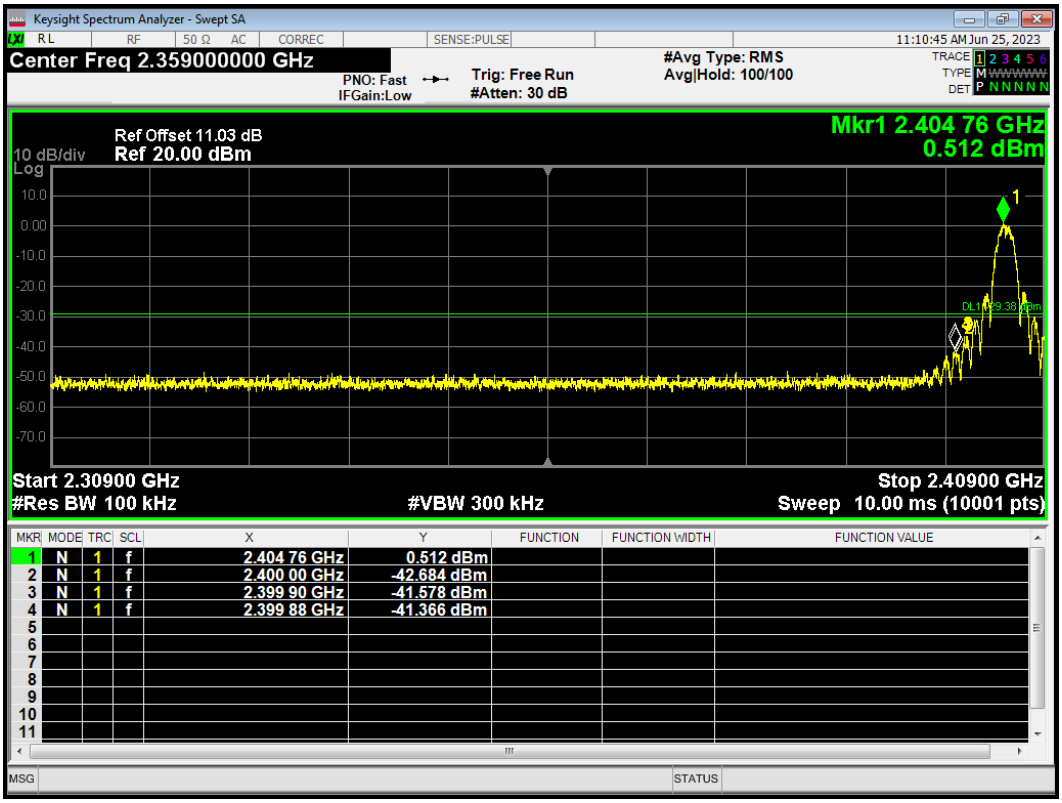


Thread

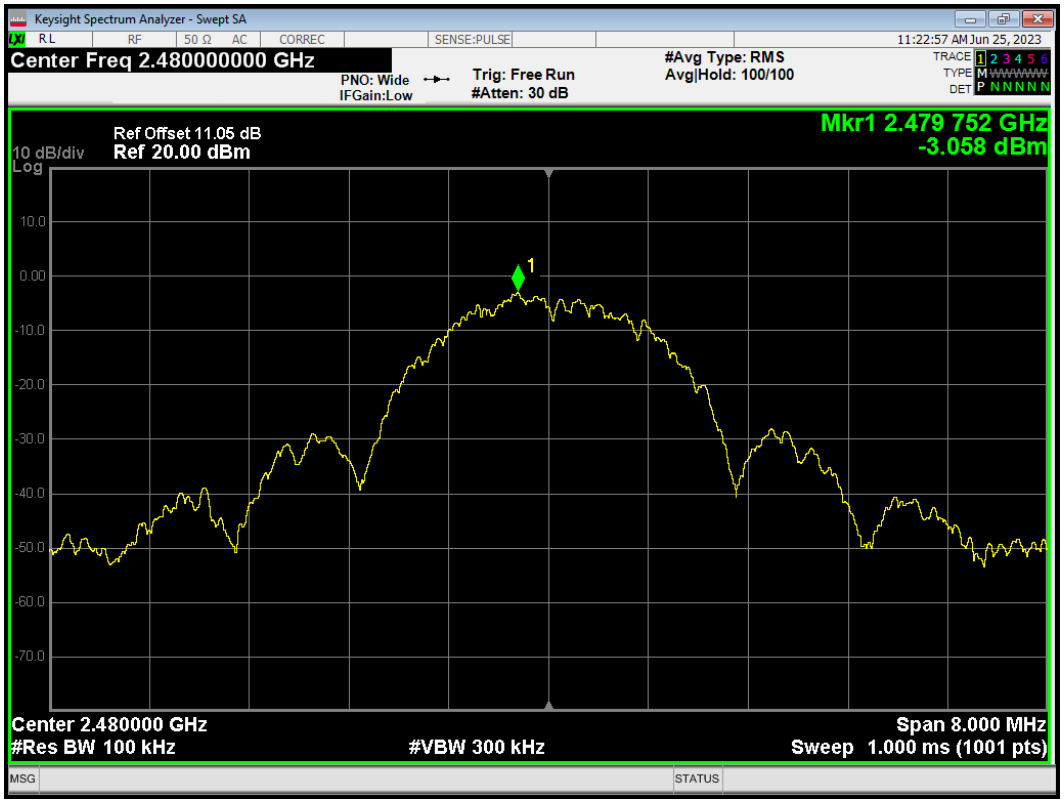
Band Edge thread 2405MHz Ref



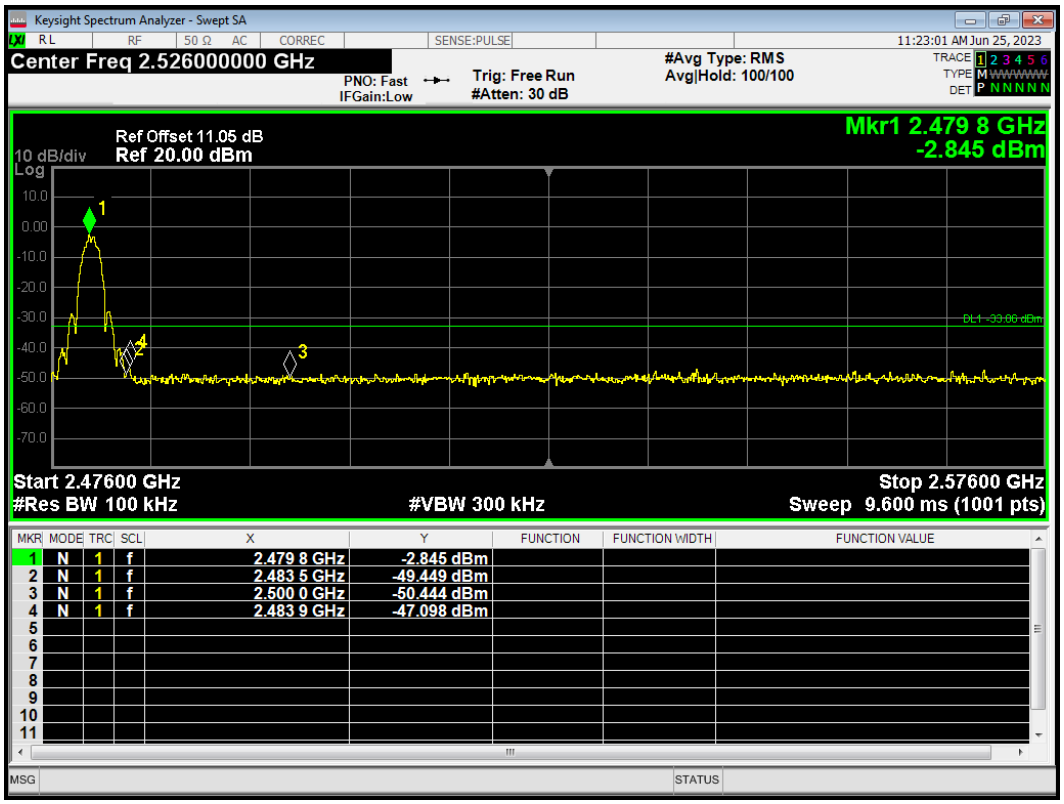
Band Edge thread 2405MHz Emission



Band Edge thread 2480MHz Ref

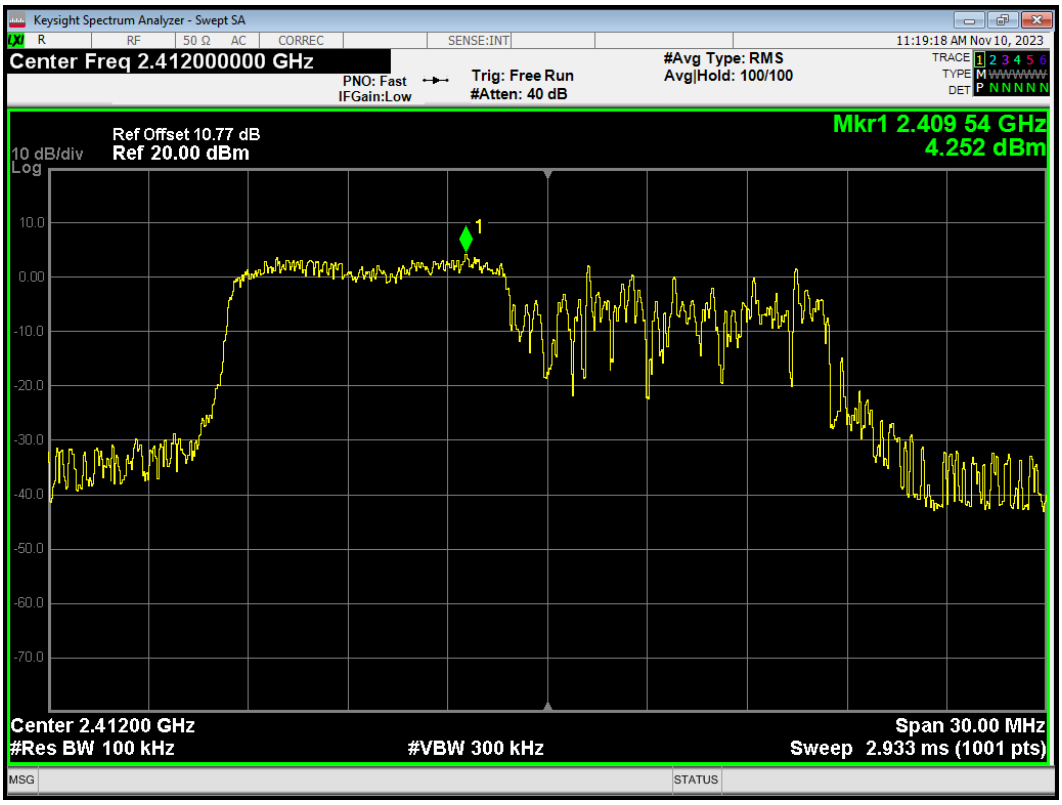


Band Edge thread 2480MHz Emission

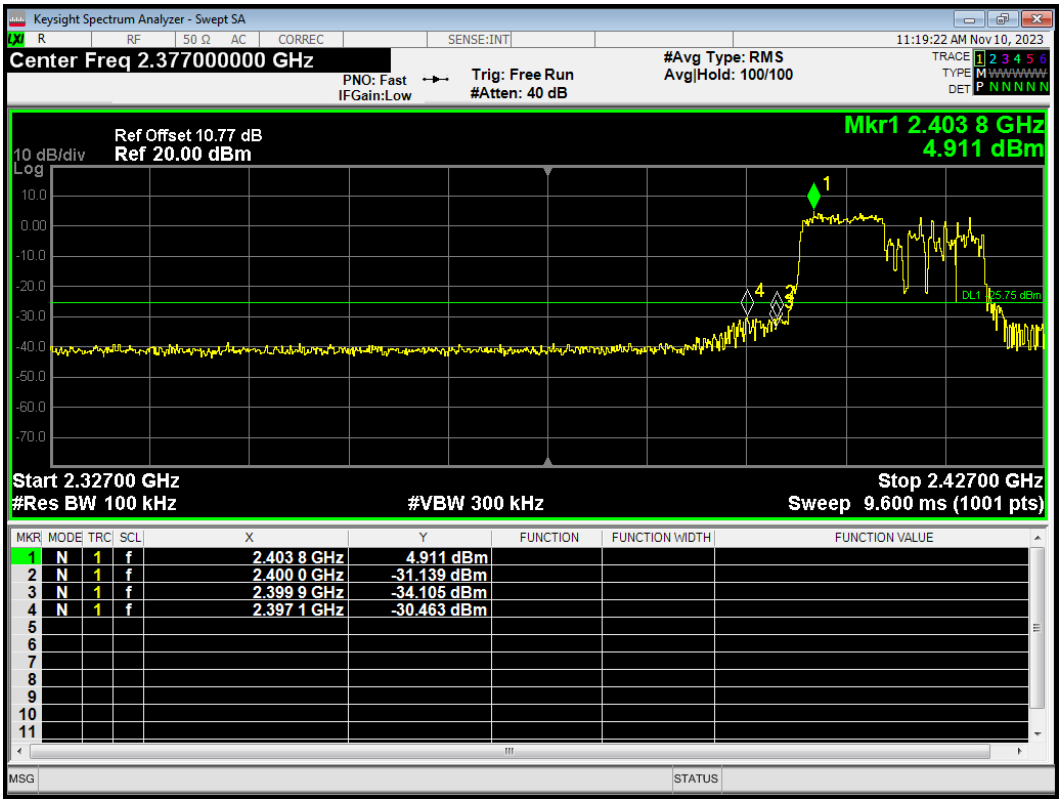


TB Mode

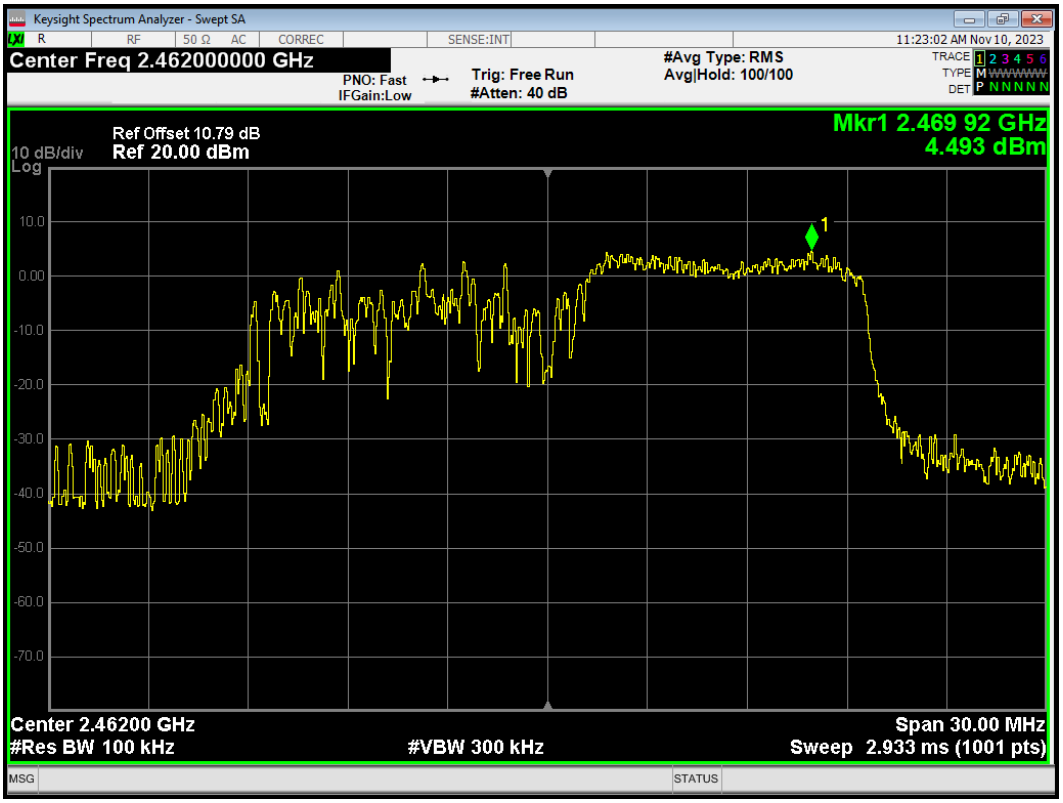
Band Edge 802.11ax HE20 106-Tones 2412MHz Ref



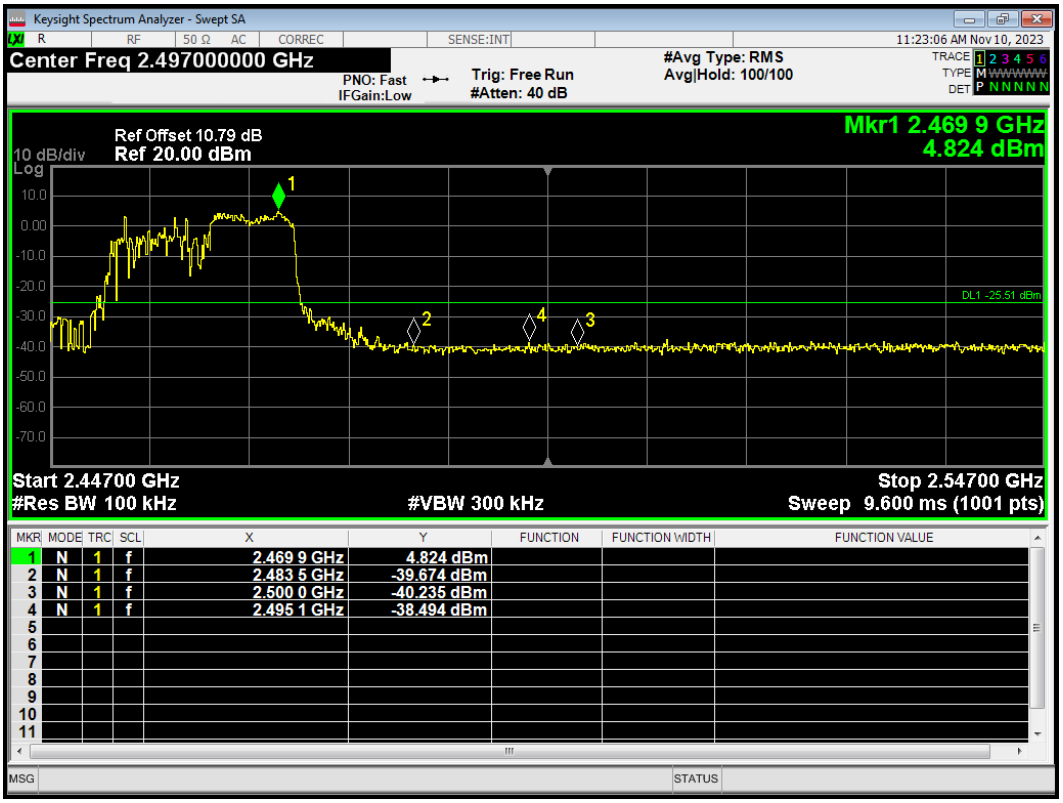
Band Edge 802.11ax HE20 106-Tones 2412MHz Emission



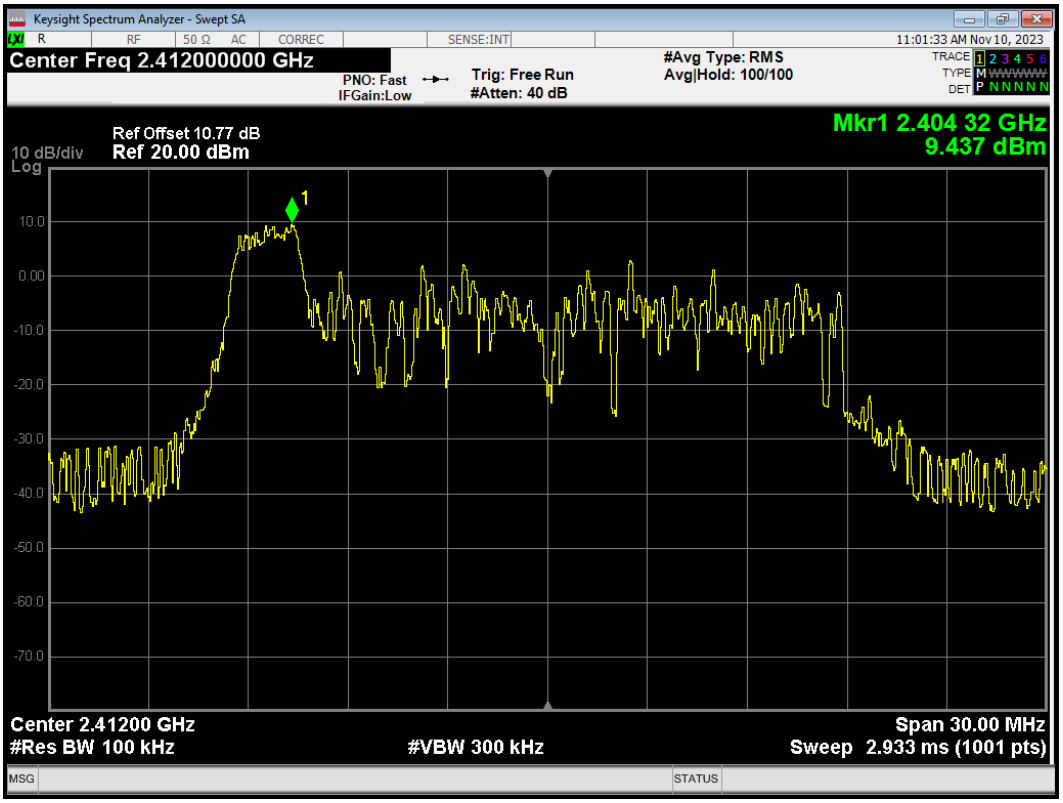
Band Edge 802.11ax HE20 106-Tones 2462MHz Ref



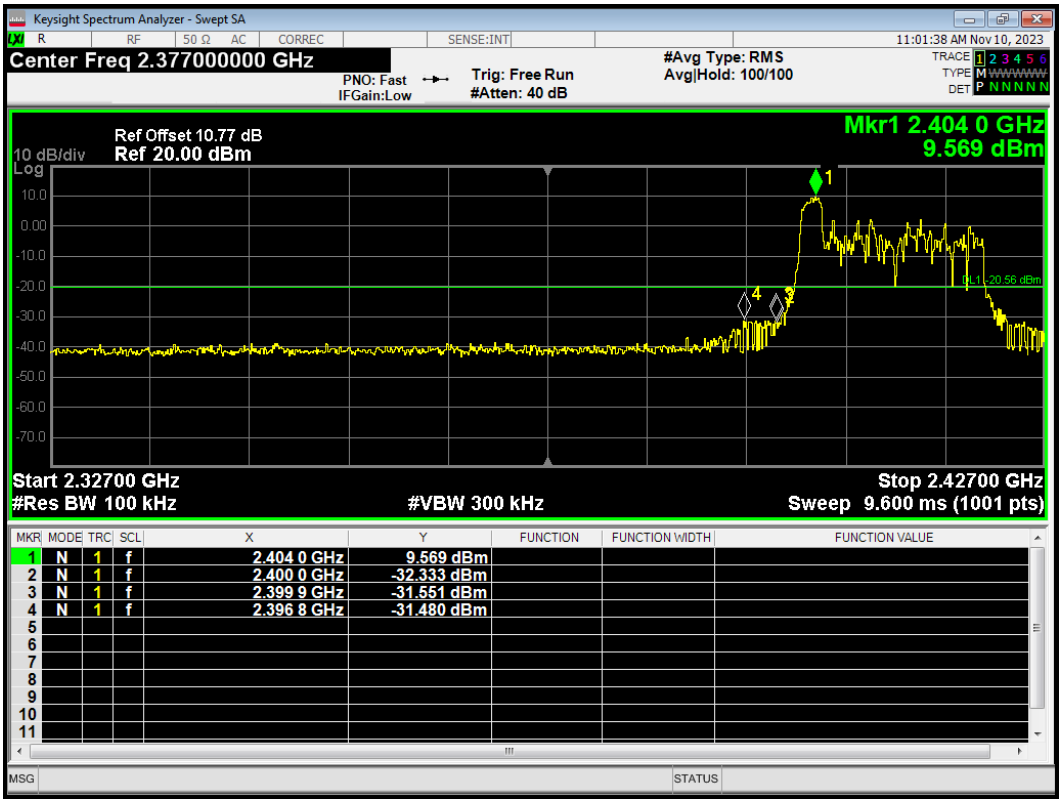
Band Edge 802.11ax HE20 106-Tones 2462MHz Emission



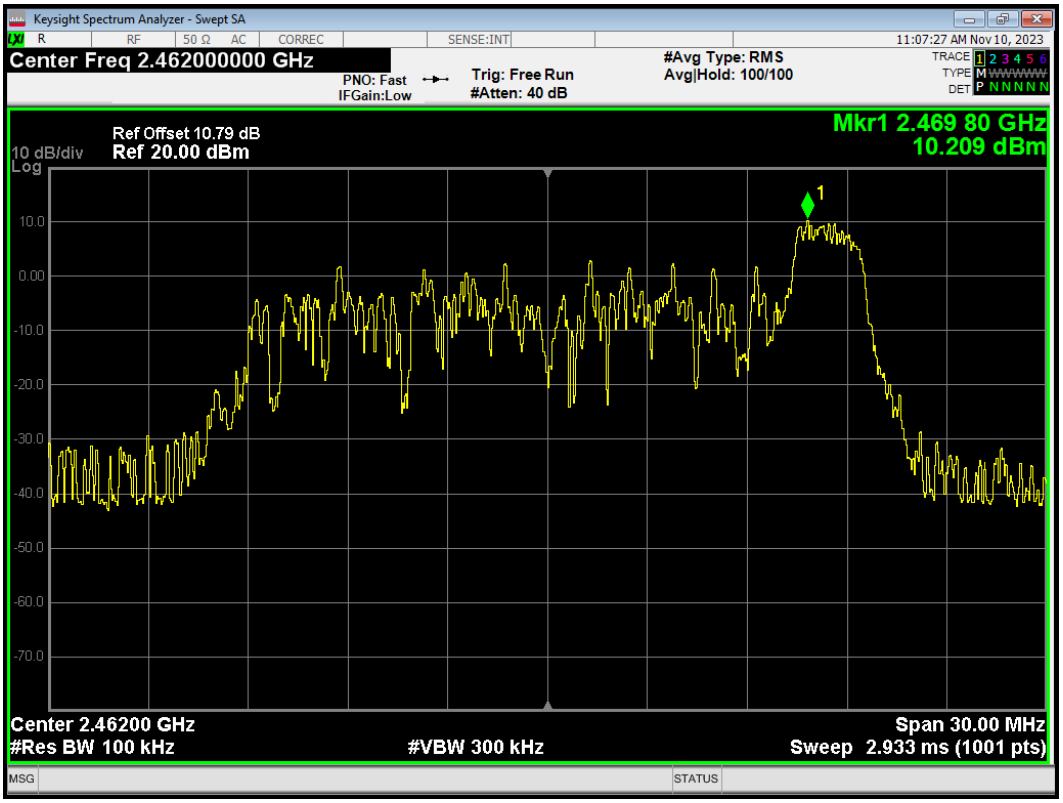
Band Edge 802.11ax HE20 26-Tones 2412MHz Ref



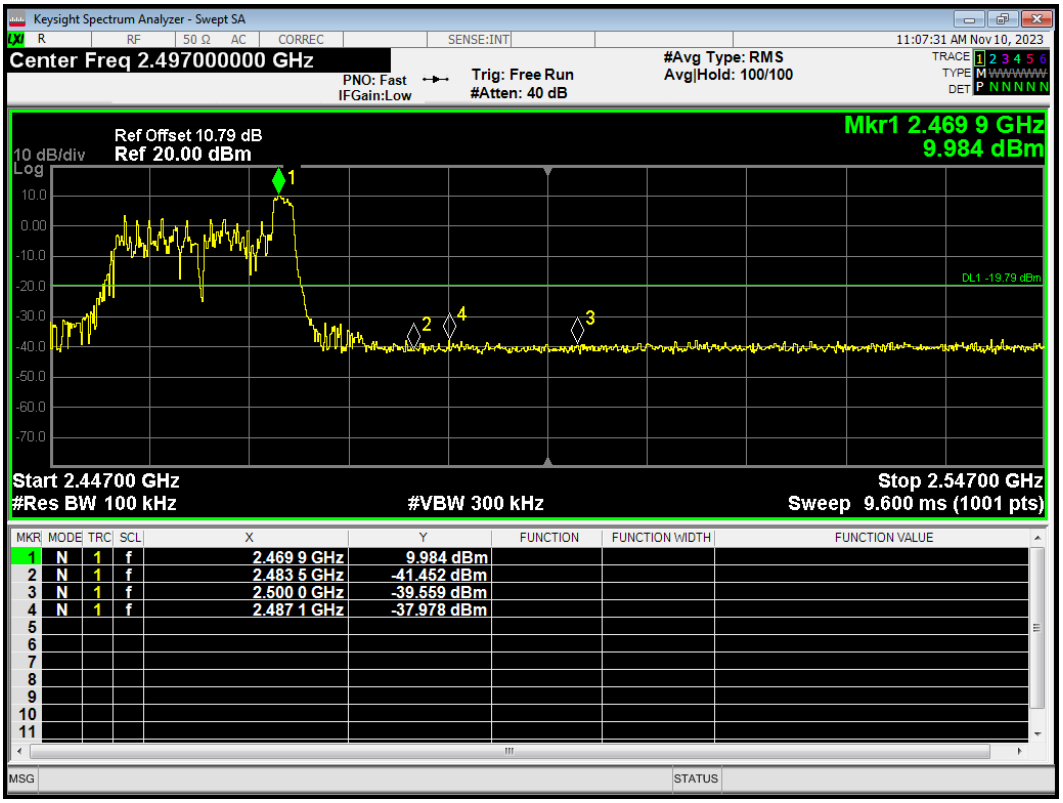
Band Edge 802.11ax HE20 26-Tones 2412MHz Emission



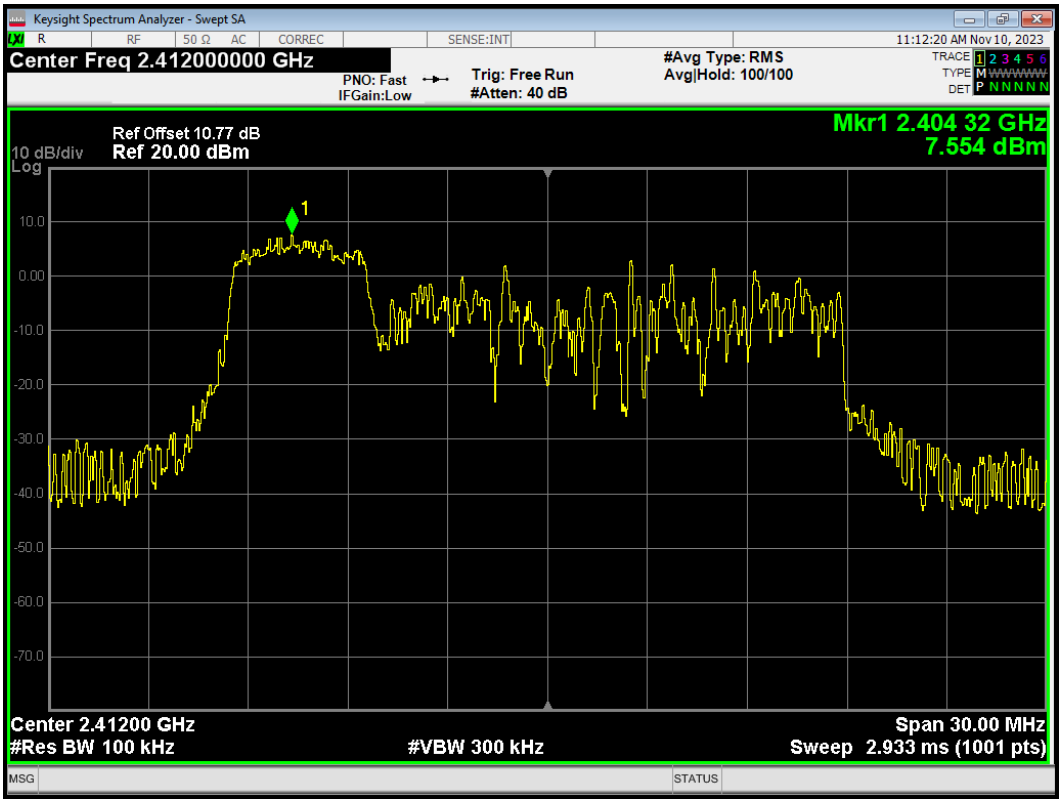
Band Edge 802.11ax HE20 26-Tones 2462MHz Ref



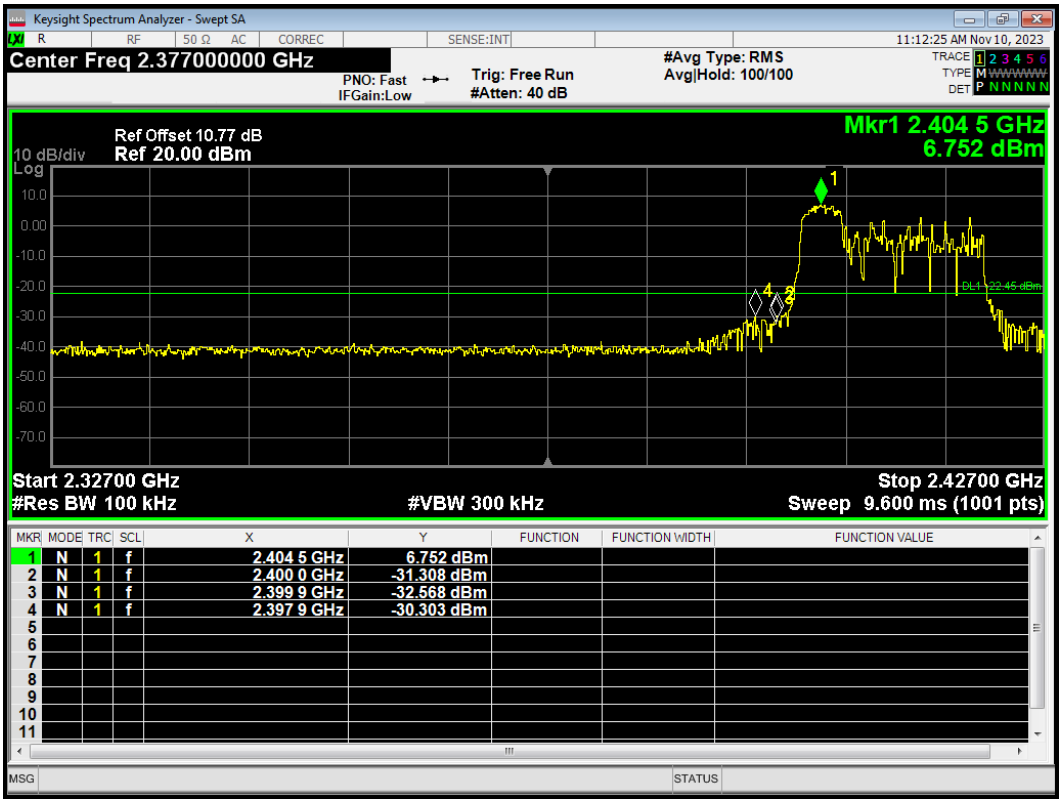
Band Edge 802.11ax HE20 26-Tones 2462MHz Emission



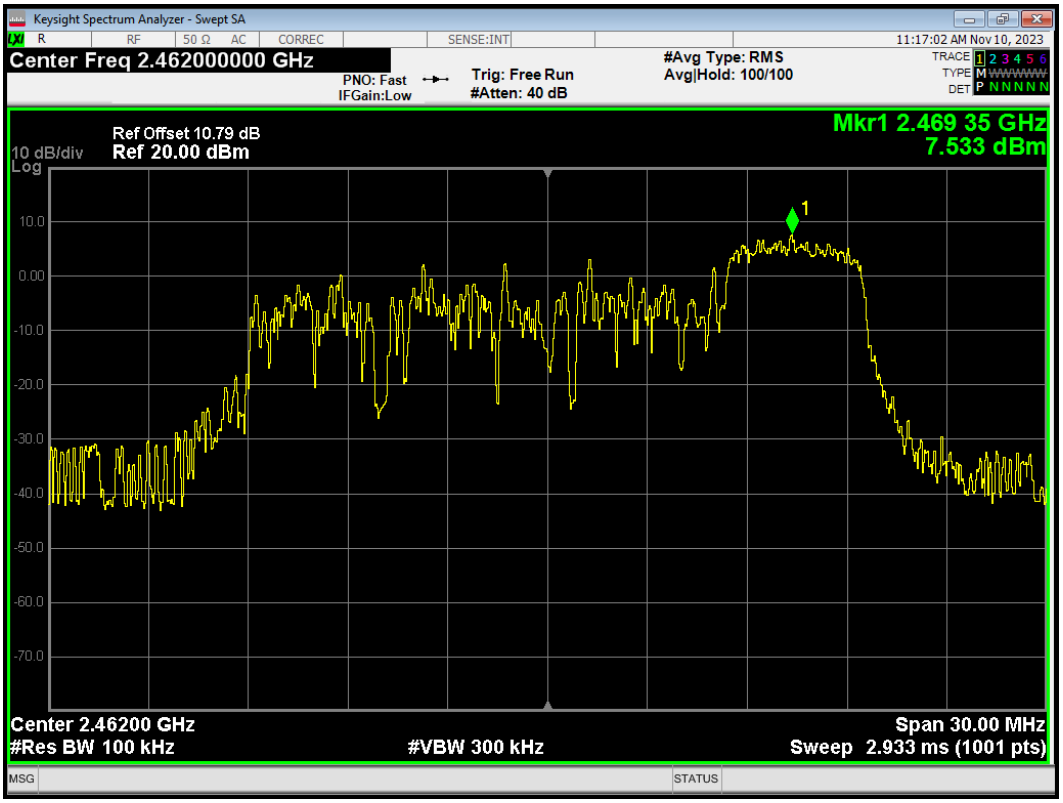
Band Edge 802.11ax HE20 52-Tones 2412MHz Ref



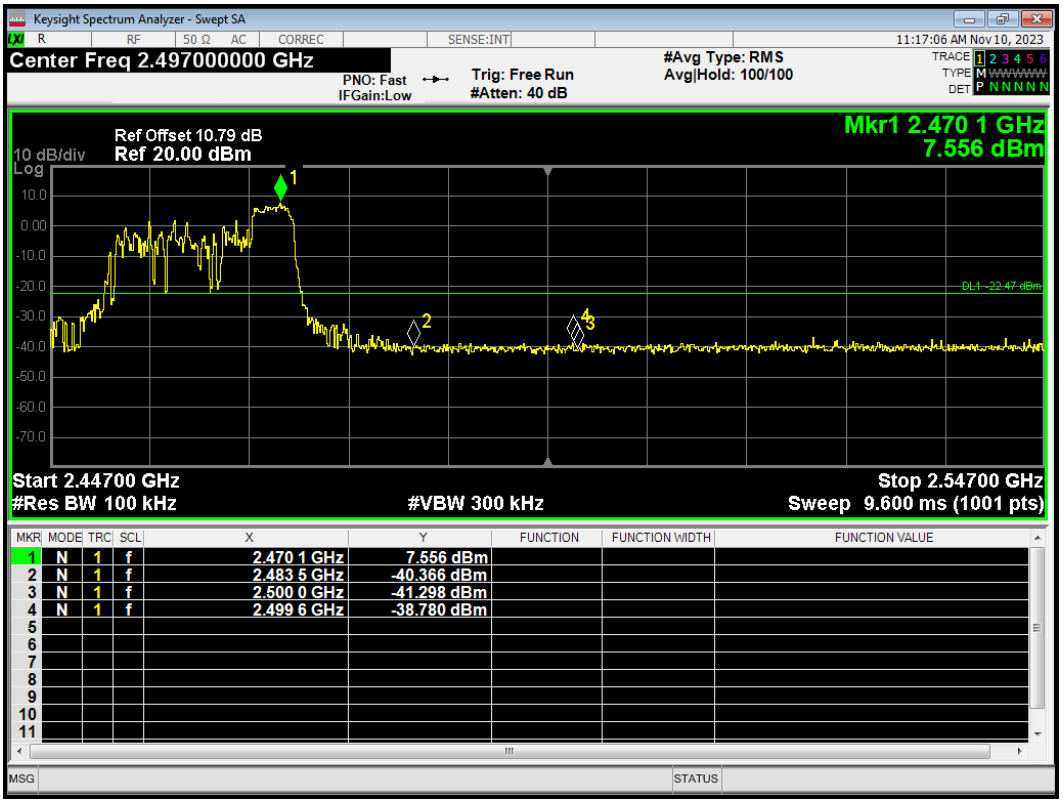
Band Edge 802.11ax HE20 52-Tones 2412MHz Emission



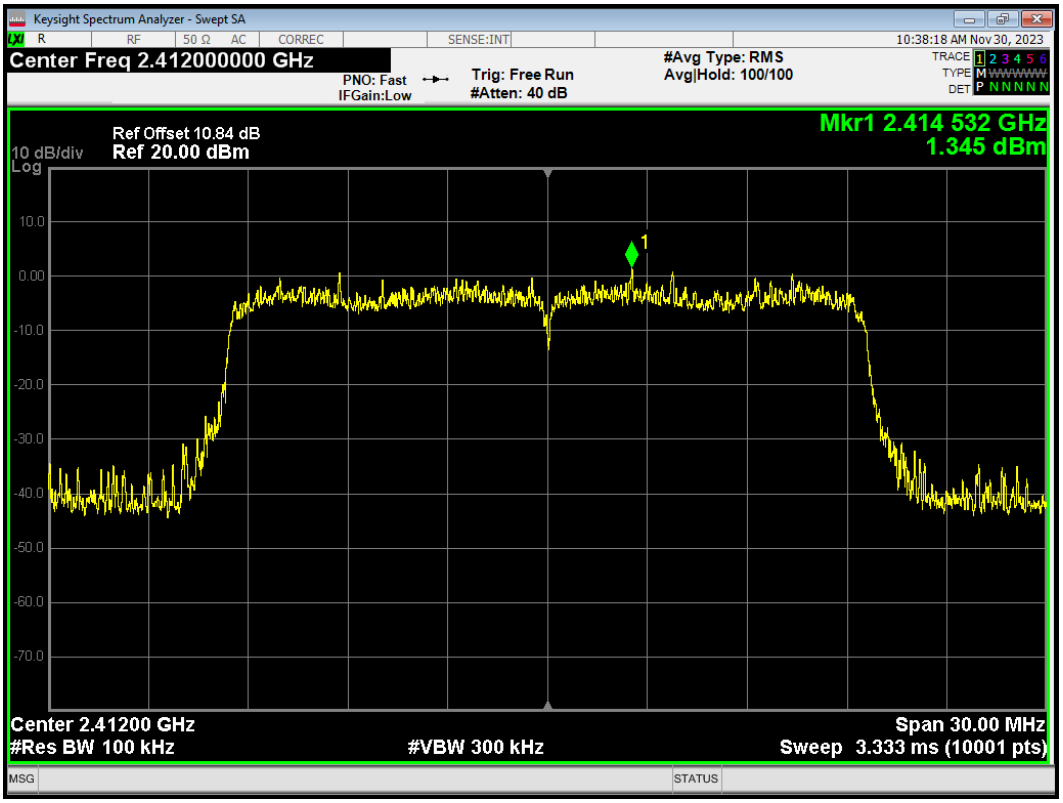
Band Edge 802.11ax HE20 52-Tones 2462MHz Ref



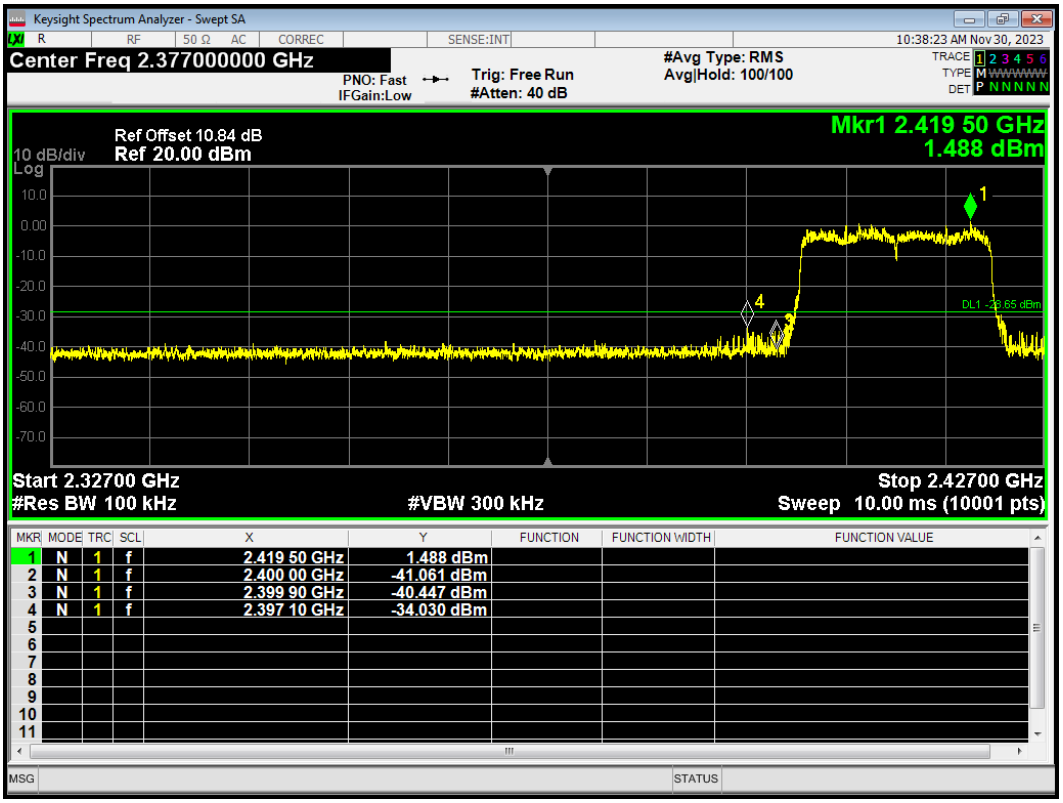
Band Edge 802.11ax HE20 52-Tones 2462MHz Emission



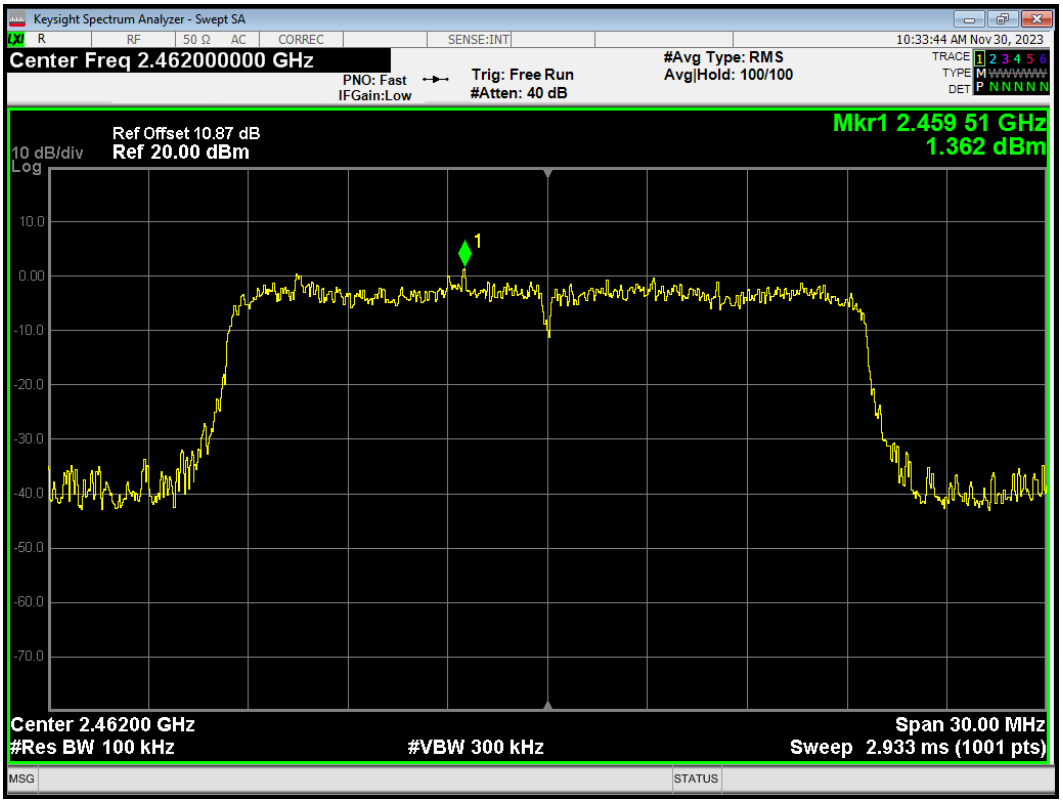
Band Edge 802.11ax HE20 242-Tones 2412MHz Ref



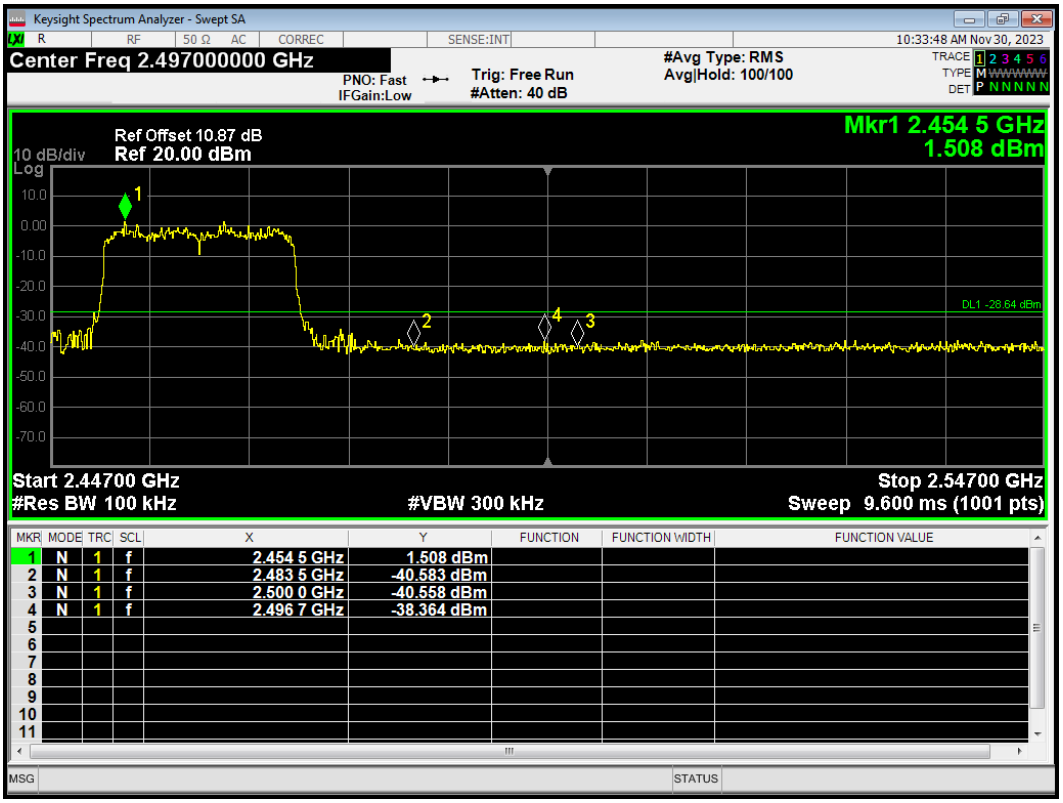
Band Edge 802.11ax HE20 242-Tones 2412MHz Emission



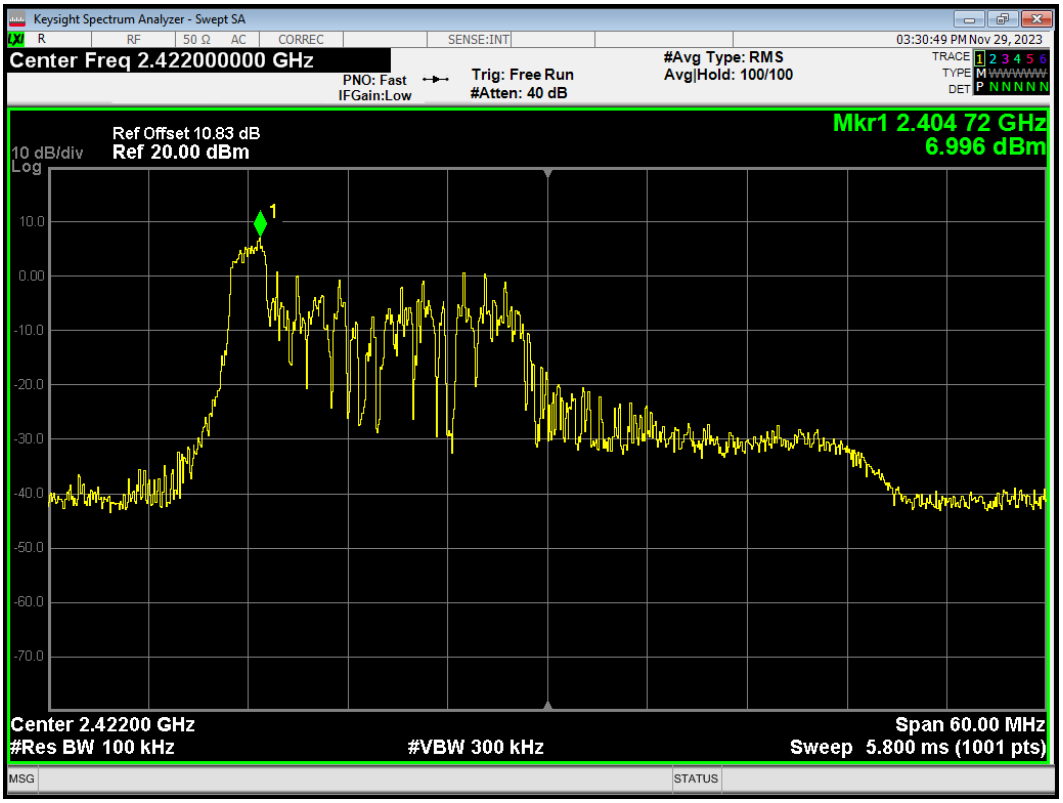
Band Edge 802.11ax HE20 242-Tones 2462MHz Ref



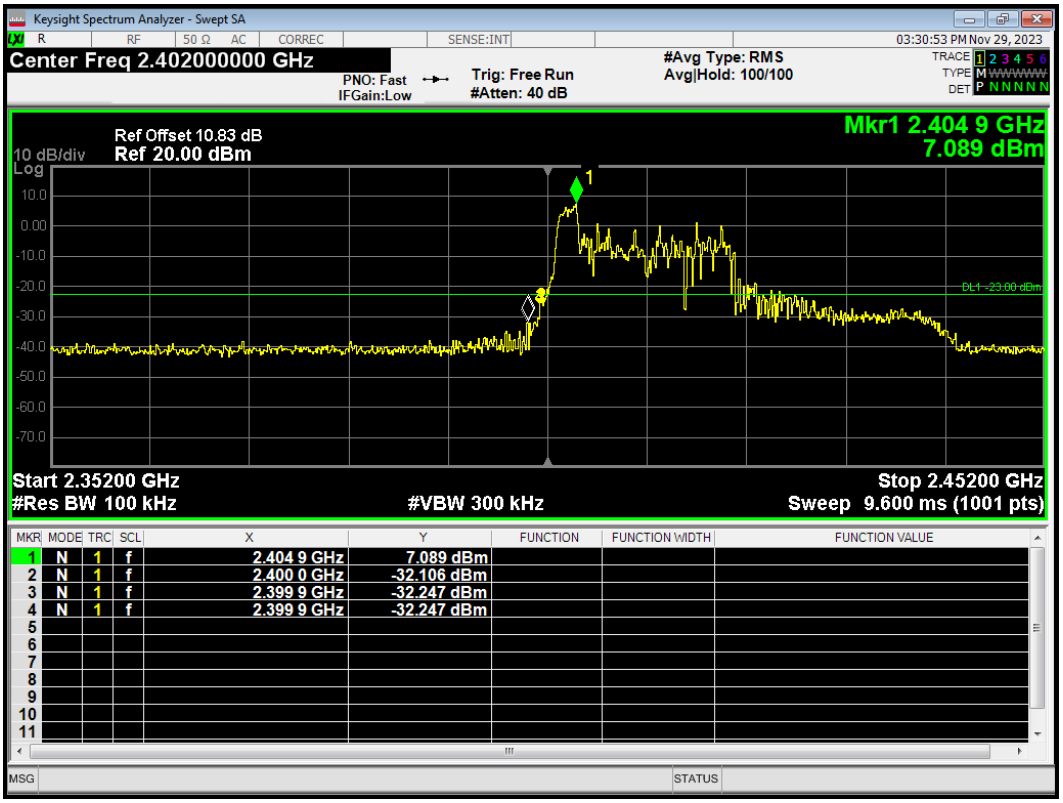
Band Edge 802.11ax HE20 242-Tones 2462MHz Emission



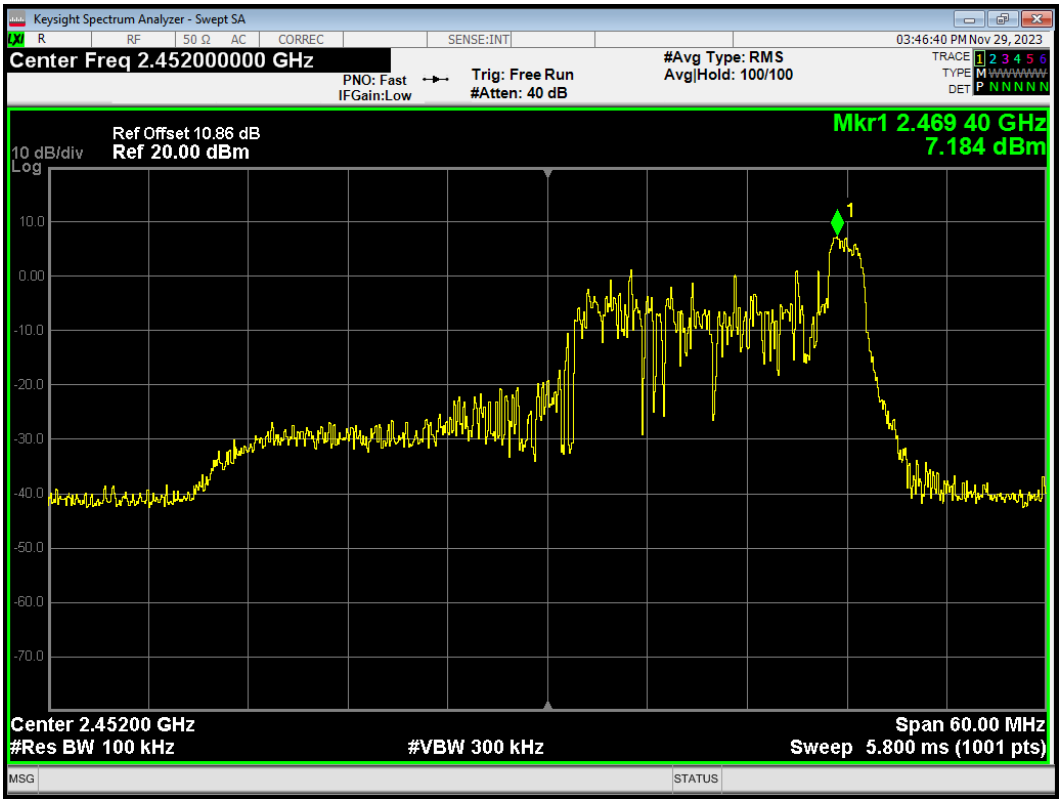
Band Edge 802.11ax HE40 26-Tones 2422MHz Ref



Band Edge 802.11ax HE40 26-Tones 2422MHz Emission



Band Edge 802.11ax HE40 26-Tones 2452MHz Ref



Band Edge 802.11ax HE40 26-Tones 2452MHz Emission