RF TEST REPORT

Applicant	Play For Dream (Shanghai) Technologies Co., Ltd.
FCC ID	2BMM9-MRD3A0
Product	PLAY FOR DREAM MR
Brand	PLAY FOR DREAM
Model	PFDM D3
Report No.	R2411A1737-R1
Issue Date	January 15, 2025

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15C (2023)**. 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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TABLE OF CONTENT

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	PASS
Date of Testing: November 25, 2024 ~ December 25, 2024 Date of Sample Received: November 19, 2024			
Note: All indications of Pass/Fail in this report are opinions expressed by Eurofins 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 **Eurofins 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)

Eurofins 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)

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

1.3. Testing Location

Company:	Eurofins TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City:	Shanghai
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2. General Description of Equipment Under Test

2.1. Applicant and Manufacturer Information

Applicant	Play For Dream (Shanghai) Technologies Co., Ltd.
Applicant address	Room 501, Building No 3, Caosong Road No.1, Xinqiao Town, Songjiang District, Shanghai City, China
Manufacturer	Play For Dream (Shanghai) Technologies Co., Ltd.
Manufacturer address	Room 501, Building No 3, Caosong Road No.1, Xinqiao Town, Songjiang District, Shanghai City, China

2.2. General Information

EUT Description		
Model	PFDM D3	
Lab internal SN	R2411A1737/S01	
Hardware Version	4.0	
Software Version	D3_DEV_3.0.1.290	
Power Supply	Battery / AC adapter	
Antenna Type	Internal Antenna	
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)	
Antenna Gain	nRF 2.4GHz	2.92 dBi
	Wi-Fi 2.4GHz	Antenna 1: 2.13 dBi
		Antenna 2: 1.68 dBi
Additional Beamforming Gain	NA	
Direction Gain	Power: 2.13 dBi PSD: 5.14 dBi	
Operating Frequency Range(s)	nRF 2.4GHz	2402 MHz ~ 2480 MHz
	Wi-Fi 2.4GHz	802.11b/g/n(HT20)/ax(HE20)/be(EHT20): 2412 ~ 2462 MHz 802.11n(HT40)/ax(HE40)/be(EHT40): 2422 ~ 2452 MHz
Modulation Type	nRF 2.4GHz	GFSK
	Wi-Fi 2.4GHz	802.11b: DSSS 802.11g/n: OFDM 802.11ax: OFDM 802.11ax RU: OFDMA
Max. Output Power	nRF 2.4GHz: 8.18 dBm Wi-Fi 2.4GHz: 21.35 dBm	
EUT Accessory		
Adapter	Manufacturer: Shenzhen Kosun Industrial Co., Ltd.	

	Model:623005
Data Cable	Manufacturer: Shenzhen Zhishang Technology Co., LTD 1200±20mm, Shielded
Note: 1. The EUT is sent from the applicant to Eurofins 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 (2023) Radio Frequency Devices

ANSI C63.10-2013

Reference standard:

KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 662911 D01 Multiple Transmitter Output v02r01

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 stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X 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.

nRF 2.4GHz

Test Mode	Data Rate
nRF 2.4GHz	1 Mbps

Wi-Fi 2.4GHz

Test Mode	Data Rate		
	Antenna 1	Antenna 2	MIMO/CDD
802.11b	1 Mbps	1 Mbps	/
802.11g	6 Mbps	6 Mbps	/
802.11n HT20	MCS0	MCS0	MCS8
802.11n HT40	MCS0	MCS0	MCS8
802.11ax HE20	MCS0	MCS0	MCS0
802.11ax HE40	MCS0	MCS0	MCS0
802.11be EHT20	MCS0	MCS0	MCS0
802.11be EHT40	MCS0	MCS0	MCS0

nRF 2.4GHz

The worst case Antenna mode for each of the following tests for Wi-Fi:

Test Cases	Antenna 1
Maximum output power	O
6dB Bandwidth	O
Band Edge	O
Power Spectral Density	O
Spurious RF Conducted Emissions	O
Unwanted Emissions	--
Conducted Emission	--
Note: “O”: test all bands	

Wi-Fi 2.4GHz

The worst case Antenna mode for each of the following tests for Wi-Fi:

Test Cases	Antenna 1	Antenna 2	MIMO
Maximum output power	O	O	O
6dB Bandwidth	O	--	--
Band Edge	O	--	--
Power Spectral Density	O	O	O
Spurious RF Conducted Emissions	O	--	--
Unwanted Emissions	--	--	O
Conducted Emission	--	--	O
Note: “O”: test all bands			

TB Mode

Test Cases	MIMO
Maximum output power	O
6dB Bandwidth	O
Band Edge	O
Power Spectral Density	O
Spurious RF Conducted Emissions	O
Unwanted Emissions	O
Conducted Emission	--
Note: “O”: test all bands	

MRU Mode

Test Cases	MIMO
Maximum output power	O
6dB Bandwidth	--
Band Edge	--
Power Spectral Density	O
Spurious RF Conducted Emissions	--
Unwanted Emissions	O
Conducted Emission	--
Note: “O”: test all bands	

5. Test Case Results

5.1. Maximum output power

Ambient Condition

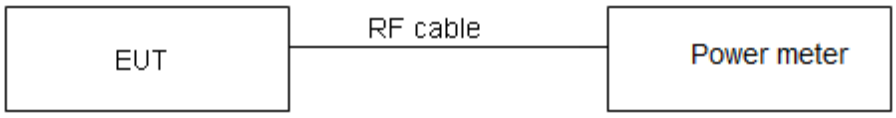
Temperature	Relative humidity
15°C ~ 35°C	20% ~ 80%

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.

The conducted Power is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically.

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

nRF 2.4GHz

Power Index	
Channel	**nRF 2.4GHz**
CH0	default
CH19	default
CH39	default

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
nRF 2.4GHz	0.331	4.800
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
nRF 2.4GHz	2402/CH 0	2.40	7.20	30	PASS
	2440/CH 19	2.33	7.13	30	PASS
	2480/CH 39	2.23	7.03	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

Wi-Fi 2.4GHz

Power Index				
Test Mode	**Channel**	**Antenna 1**	**Antenna 2**	**MIMO**
802.11b	2412	18	18	18
	2437	18	18	18
	2462	18	18	18
802.11g	2412	10	10	10
	2417	12	12	12
	2422	15	15	15
	2437	17	17	17
	2457	15	15	15
	2462	13	13	13
802.11n HT20	2412	9	9	9
	2417	12	12	12
	2422	15	15	15
	2437	17	17	17
	2452	15	15	15
	2457	13	13	13
	2462	11	11	11
802.11n HT40	2422	8	8	8
	2427	13	13	13
	2437	17	17	17
	2442	13	13	13
	2447	10	10	10
	2452	6	6	6
802.11ax HE20	2412	14	14	14
	2437	17	17	17
	2462	16	16	16
802.1ax HE40	2422	13	13	13
	2427	15	15	15
	2437	17	17	17
	2447	15	15	15
	2452	11	11	11

TB Mode

Power Index		
Test Mode	**Channel**	**MIMO**
802.11ax HE20 26-Tones	2412	14
	2437	17
	2462	16
802.11ax HE20 52-Tones	2412	14
	2437	17
	2462	16
802.11ax HE20 106-Tones	2412	14
	2437	17
	2462	16
802.11ax HE20 242-Tones	2412	14
	2437	17
	2462	16
802.11ax HE40 26-Tones	2422	13
	2452	11
802.11ax HE40 484-Tones	2422	13
802.11be EHT20 26-Tones	2412	17
	2437	17
	2462	16
802.11be EHT20 52-Tones	2412	17
	2437	17
	2462	16
802.11be EHT20 106-Tones	2412	17
	2437	17
	2462	16
802.11be EHT20 242-Tones	2412	17
	2437	17
	2462	16
802.11be EHT40 26-Tones	2422	12
	2452	11
802.11be EHT40 484-Tones	2422	12

MRU Mode

Power Index		
Test Mode	**Channel**	**MIMO**
802.11be BE40 52+26-Tones	2422	11
	2452	10
802.11be BE40 106+26-Tones	2422	11
	2452	10

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11b	0.97	0.13
802.11g	0.99	0.00
802.11n HT20	1.00	0.00
802.11n HT40	0.99	0.00
802.11ax HE20	0.99	0.00
802.11ax HE40	0.99	0.00
802.11be HE20	0.99	0.00
802.11be HE40	0.99	0.00
Note: when Duty cycle⩾0.98, Duty cycle correction Factor not required.		

Antenna 1

Test Mode	Carrier frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11b	2412	17.96	18.09	30	PASS
	2437	16.99	17.12	30	PASS
	2462	17.80	17.93	30	PASS
802.11g	2412	9.09	9.09	30	PASS
	2417	11.19	11.19	30	PASS
	2422	14.30	14.30	30	PASS
	2437	15.61	15.61	30	PASS
	2457	15.19	15.19	30	PASS
	2462	12.38	12.38	30	PASS
802.11n HT20	2412	7.84	7.84	30	PASS
	2417	11.19	11.19	30	PASS
	2422	14.32	14.32	30	PASS
	2437	15.65	15.65	30	PASS
	2452	15.13	15.13	30	PASS
	2457	13.15	13.15	30	PASS
	2462	10.43	10.43	30	PASS
802.11n HT40	2422	6.72	6.72	30	PASS
	2427	12.34	12.34	30	PASS
	2437	15.76	15.76	30	PASS
	2442	12.51	12.51	30	PASS
	2447	9.78	9.78	30	PASS
	2452	5.49	5.49	30	PASS
802.11ax HE20	2412	13.32	13.32	30	PASS
	2437	16.28	16.28	30	PASS
	2462	15.77	15.77	30	PASS
802.1ax HE40	2422	12.04	12.04	30	PASS
	2427	14.44	14.44	30	PASS
	2437	16.24	16.24	30	PASS
	2447	12.41	12.41	30	PASS
	2452	10.96	10.96	30	PASS

802.11BE EHT20	2412	16.65	16.65	30	PASS
	2437	16.36	16.36	30	PASS
	2462	15.83	15.83	30	PASS
802.11BE EHT40	2422	10.95	10.95	30	PASS
	2427	14.32	14.32	30	PASS
	2437	16.04	16.04	30	PASS
	2447	12.29	12.29	30	PASS
	2452	10.71	10.71	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

Antenna 2

Test Mode	Carrier frequency (MHz)	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11b	2412	18.52	18.65	30	PASS
	2437	17.58	17.71	30	PASS
	2462	18.76	18.89	30	PASS
802.11g	2412	10.37	10.37	30	PASS
	2417	11.76	11.76	30	PASS
	2422	14.56	14.56	30	PASS
	2437	16.38	16.38	30	PASS
	2457	14.79	14.79	30	PASS
	2462	13.24	13.24	30	PASS
802.11n HT20	2412	9.35	9.35	30	PASS
	2417	11.55	11.55	30	PASS
	2422	14.39	14.39	30	PASS
	2437	16.48	16.48	30	PASS
	2452	14.41	14.41	30	PASS
	2457	12.47	12.47	30	PASS
	2462	11.20	11.20	30	PASS
802.11n HT40	2422	7.84	7.84	30	PASS
	2427	12.38	12.38	30	PASS
	2437	16.80	16.80	30	PASS
	2442	12.34	12.34	30	PASS
	2447	9.39	9.39	30	PASS
	2452	6.04	6.04	30	PASS
802.11ax HE20	2412	14.52	14.52	30	PASS
	2437	17.63	17.63	30	PASS
	2462	16.84	16.84	30	PASS
802.1ax HE40	2422	13.53	13.53	30	PASS
	2427	14.38	14.38	30	PASS
	2437	17.66	17.66	30	PASS
	2447	14.25	14.25	30	PASS
	2452	11.47	11.47	30	PASS
802.11BE	2412	17.72	17.72	30	PASS

EHT20	2437	17.70	17.70	30	PASS
	2462	16.92	16.92	30	PASS
802.11BE EHT40	2422	12.37	12.37	30	PASS
	2427	14.05	14.05	30	PASS
	2437	17.56	17.56	30	PASS
	2447	11.88	11.88	30	PASS
	2452	11.35	11.35	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

MIMO

Test Mode	Carrier frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11b	2412	17.87	18.00	18.48	18.61	21.33	30	PASS
	2437	16.82	16.95	17.44	17.57	20.28	30	PASS
	2462	17.72	17.85	18.65	18.78	21.35	30	PASS
802.11g	2412	8.95	8.95	10.22	10.22	12.64	30	PASS
	2417	10.80	10.80	11.52	11.52	14.18	30	PASS
	2422	13.99	13.99	14.44	14.44	17.23	30	PASS
	2437	15.40	15.40	16.18	16.18	18.82	30	PASS
	2457	14.88	14.88	14.57	14.57	17.73	30	PASS
	2462	12.25	12.25	13.18	13.18	15.75	30	PASS
802.11n HT20	2412	7.78	7.78	9.26	9.26	11.59	30	PASS
	2417	10.86	10.86	11.53	11.53	14.22	30	PASS
	2422	13.97	13.97	14.42	14.42	17.21	30	PASS
	2437	15.49	15.49	16.32	16.32	18.94	30	PASS
	2452	14.81	14.81	14.36	14.36	17.60	30	PASS
	2457	12.80	12.80	12.50	12.50	15.66	30	PASS
	2462	10.33	10.33	11.14	11.14	13.76	30	PASS
802.11n HT40	2422	6.59	6.59	7.79	7.79	10.24	30	PASS
	2427	11.94	11.94	12.46	12.46	15.22	30	PASS
	2437	15.64	15.64	16.74	16.74	19.24	30	PASS
	2442	12.17	12.17	12.41	12.41	15.30	30	PASS
	2447	9.44	9.44	9.43	9.43	12.44	30	PASS
	2452	5.47	5.47	5.96	5.96	8.73	30	PASS
802.11ax HE20	2412	13.35	13.35	14.50	14.50	16.97	30	PASS
	2437	16.20	16.20	17.64	17.64	19.99	30	PASS
	2462	15.72	15.72	16.88	16.88	19.35	30	PASS
802.1ax HE40	2422	11.94	11.94	13.55	13.55	15.83	30	PASS
	2427	14.29	14.29	14.46	14.46	17.39	30	PASS
	2437	16.10	16.10	17.74	17.74	20.01	30	PASS
	2447	14.47	14.47	14.35	14.35	17.42	30	PASS
	2452	10.85	10.85	11.52	11.52	14.21	30	PASS
802.11BE EHT20	2412	16.52	16.52	17.67	17.67	20.14	30	PASS
	2437	16.17	16.17	17.69	17.69	20.01	30	PASS
	2462	15.68	15.68	16.94	16.94	19.37	30	PASS
802.11BE EHT40	2422	10.80	10.80	12.40	12.40	14.68	30	PASS
	2427	14.07	14.07	14.25	14.25	17.17	30	PASS

	2437	15.90	15.90	17.61	17.61	19.85	30	PASS
	2447	12.05	12.05	12.07	12.07	15.07	30	PASS
	2452	10.65	10.65	11.33	11.33	11.19	30	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),

Average Power with duty factor = Average Power Measured +Duty cycle correction factor

The Total Power $=10\log(10^{(\text{Power Antenna 1 in dBm}/10)}+10^{(\text{Power Antenna 2 in dBm}/10)}$.

2. According to KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)f)(ii): If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream: Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Directional gain = $G_{ANT\ MAX}$ + Array Gain,

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

So directional gain = $G_{ANT\ MAX}$ + Array Gain =2.13+0=2.13 dBi<6dBi. So limit is 30dBm.

TB Mode

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11ax HE20 26-Tones:RU Index 0	0.995	0.00
802.11ax HE20 26-Tones:RU Index 4	0.995	0.00
802.11ax HE20 26-Tones:RU Index 8	0.995	0.00
802.11ax HE20 52-Tones:RU Index 37	0.995	0.00
802.11ax HE20 52-Tones:RU Index 38	0.995	0.00
802.11ax HE20 52-Tones:RU Index 40	0.995	0.00
802.11ax HE20 106-Tones:RU Index 53	0.995	0.00
802.11ax HE20 106-Tones:RU Index 54	0.995	0.00
802.11ax HE20 242-Tones:RU Index 61	0.997	0.00
802.11ax HE40 26-Tones:RU Index 0	0.995	0.00
802.11ax HE40 26-Tones:RU Index 17	0.995	0.00
802.11ax HE40 484-Tones:RU Index 65	0.997	0.00
802.11be EHT20 26-Tones:RU Index 0	1.000	0.00
802.11be EHT20 26-Tones:RU Index 4	0.995	0.00
802.11be EHT20 26-Tones:RU Index 8	0.995	0.00
802.11be EHT20 52-Tones:RU Index 37	0.995	0.00
802.11be EHT20 52-Tones:RU Index 38	0.995	0.00
802.11be EHT20 52-Tones:RU Index 40	0.995	0.00
802.11be EHT20 106-Tones:RU Index 53	0.995	0.00
802.11be EHT20 106-Tones:RU Index 54	0.995	0.00
802.11be EHT20 242-Tones:RU Index 61	0.993	0.00
802.11be EHT40 26-Tones:RU Index 0	0.995	0.00
802.11be EHT40 26-Tones:RU Index 17	0.995	0.00
802.11be EHT40 484-Tones:RU Index 65	0.997	0.00
Note: when Duty cycle⩾0.98, Duty cycle correction Factor not required.		

MIMO

Test Mode	Carrier frequency (MHz)	RU Index	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
			Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11ax HE20 26-Tones	2412	0	13.73	13.73	14.36	14.36	17.07	30	PASS
	2437	4	15.83	15.83	15.59	15.59	18.72	30	PASS
	2462	8	16.37	16.37	16.72	16.72	19.56	30	PASS
802.11ax HE20 52-Tones	2412	37	13.68	13.68	14.53	14.53	17.14	30	PASS
	2437	38	16.63	16.63	17.42	17.42	20.05	30	PASS
	2462	40	16.22	16.22	16.78	16.78	19.52	30	PASS
802.11ax HE20 106-Tones	2412	53	13.94	13.94	14.39	14.39	17.18	30	PASS
	2437	53	16.20	16.20	16.36	16.36	19.29	30	PASS
	2462	54	16.25	16.25	16.73	16.73	19.51	30	PASS
802.11ax HE20 242-Tones	2412	61	13.25	13.25	13.73	13.73	16.51	30	PASS
	2437	61	16.11	16.11	16.08	16.08	19.10	30	PASS
	2462	61	15.68	15.68	15.80	15.80	18.75	30	PASS
802.11ax HE40 26-Tones	2422	0	12.13	12.13	12.57	12.57	15.36	30	PASS
	2452	17	10.89	12.13	9.65	9.65	14.07	30	PASS
802.11ax HE40 484-Tones	2422	65	11.60	11.60	12.23	12.23	14.94	30	PASS
802.11be EHT20 26-Tones	2412	0	17.10	17.10	17.60	17.60	20.37	30	PASS
	2437	4	16.47	16.47	17.40	17.40	19.97	30	PASS
	2462	8	16.33	16.33	16.78	16.78	19.57	30	PASS
802.11be EHT20 52-Tones	2412	37	16.99	16.99	17.54	17.54	20.28	30	PASS
	2437	38	16.67	16.67	17.41	17.41	20.07	30	PASS
	2462	40	15.66	15.66	15.15	15.15	18.42	30	PASS
802.11be EHT20 106-Tones	2412	53	16.89	16.89	17.67	17.67	20.31	30	PASS
	2437	53	16.28	16.28	16.38	16.38	19.34	30	PASS
	2462	54	15.62	15.62	15.23	15.23	18.44	30	PASS
802.11be EHT20 242-Tones	2412	61	16.27	16.27	16.68	16.68	19.49	30	PASS
	2437	61	16.03	16.03	16.00	16.00	19.02	30	PASS
	2462	61	15.66	15.66	15.79	15.79	18.73	30	PASS
802.11be EHT40 26-Tones	2422	0	11.25	11.25	11.51	11.51	14.40	30	PASS
	2452	17	10.65	10.65	9.63	9.63	13.18	30	PASS
802.11be EHT40 484-Tones	2422	65	10.63	10.63	11.17	11.17	13.92	30	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),

Average Power with duty factor = Average Power Measured +Duty cycle correction factor

The Total Power $=10\log(10^{(\text{Power Antenna 1 in dBm}/10)}+10^{(\text{Power Antenna 2 in dBm}/10)}$.

2. According to KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)f)(ii): If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial

stream: Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Directional gain = $G_{ANT\ MAX}$ + Array Gain,

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

So directional gain = $G_{ANT\ MAX}$ + Array Gain =2.13+0=2.13 dBi<6dBi. So limit is 30dBm.

MRU Mode

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11be EHT40 Low 52+26-Tones	0.994	0.00
802.11be EHT40 High 52+26-Tones	0.994	0.00
802.11be EHT40 Low 106+26-Tones	0.994	0.00
802.11be EHT40 High 106+26-Tones	0.994	0.00
Note: when Duty cycle⩾0.98, Duty cycle correction Factor not required.		

MIMO

Test Mode	Carrier frequency (MHz)	MIMO Antenna 1		MIMO Antenna 2		Total Power (dBm)	Limit (dBm)	Conclusion
		Average Power Measured (dBm)	Average Power with duty factor (dBm)	Average Power Measured (dBm)	Average Power with duty factor (dBm)			
802.11be EHT40 52+26-Tones(low)	2422	10.87	10.87	11.28	11.28	14.09	30.00	PASS
802.11be EHT40 52+26-Tones(high)	2452	10.56	10.56	10.50	10.50	13.54	30.00	PASS
802.11be EHT40 106+26-Tones(low)	2422	10.83	10.83	11.22	11.22	14.04	30.00	PASS
802.11be EHT40 106+26-Tones(high)	2452	10.38	10.38	10.39	10.39	13.40	30.00	PASS

Note: 1. For Total Power, according to KDB 662911 D01 Multiple Transmitter Output v02r01 1),

Average Power with duty factor = Average Power Measured +Duty cycle correction factor

The Total Power =$10\log(10^{(\text{Power Antenna 1 in dBm}/10)}+10^{(\text{Power Antenna 2 in dBm}/10)}$.

2. According to KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)f)(ii): If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream: Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Directional gain = $G_{ANT\ MAX}$ + Array Gain,

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

So directional gain = $G_{ANT\ MAX}$ + Array Gain =2.13+0=2.13 dBi<6dBi. So limit is 30dBm.

5.2. 99% Bandwidth and 6dB Bandwidth

Ambient Condition

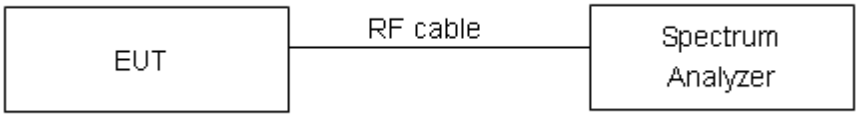
Temperature	Relative humidity
15°C ~ 35°C	20% ~ 80%

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.

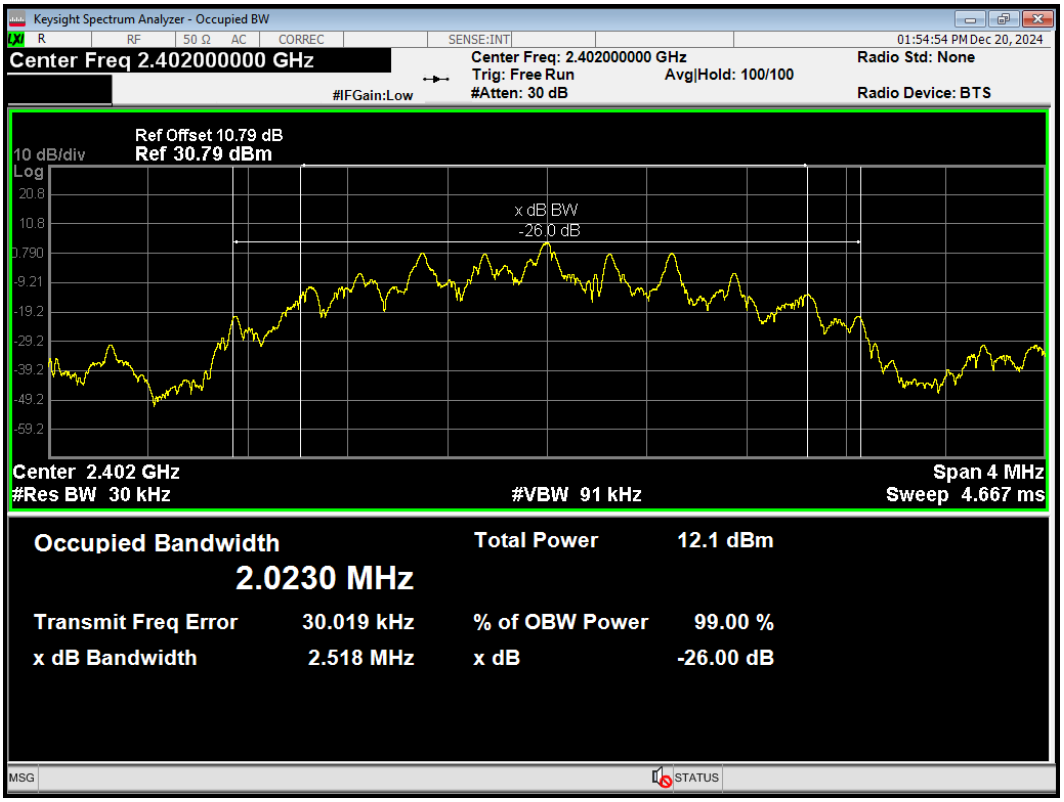
Test Results:

nRF 2.4GHz

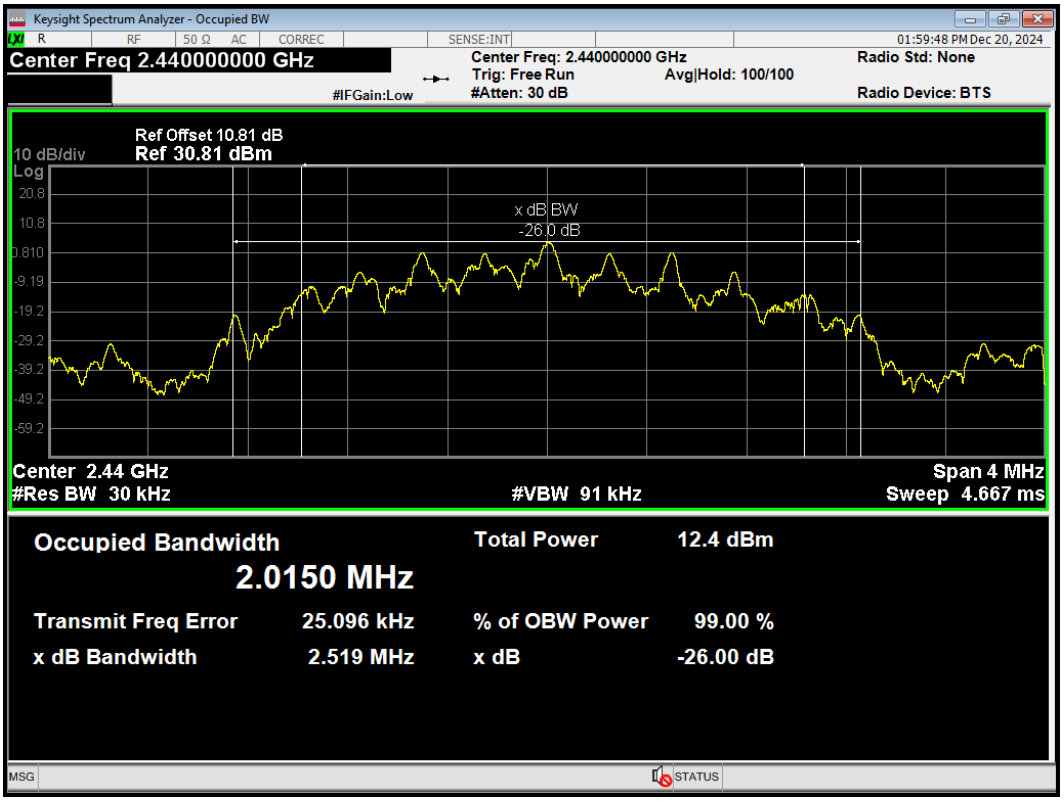
Test Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
nRF 2.4GHz	2402/CH 0	2.023	1.021	500	PASS
	2440/CH 19	2.015	0.599	500	PASS
	2480/CH 39	2.027	0.766	500	PASS

99%bandwidth

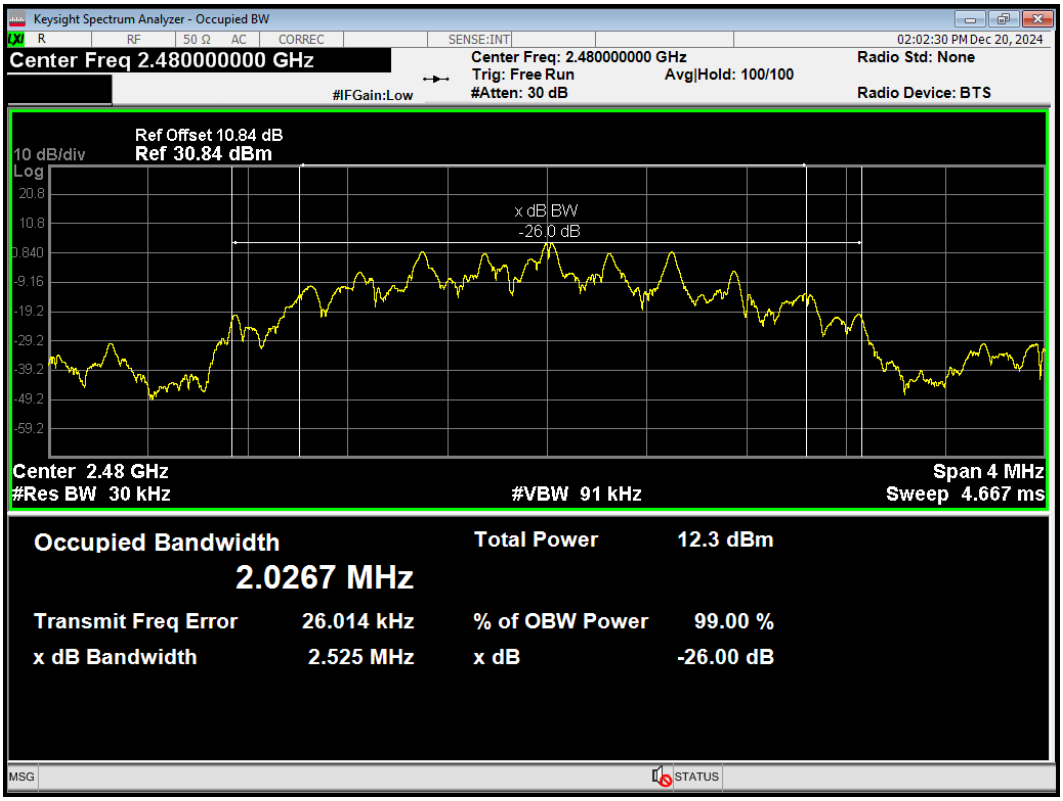
OBW nRF 2.4GHz 2402MHz



OBW nRF 2.4GHz 2440MHz

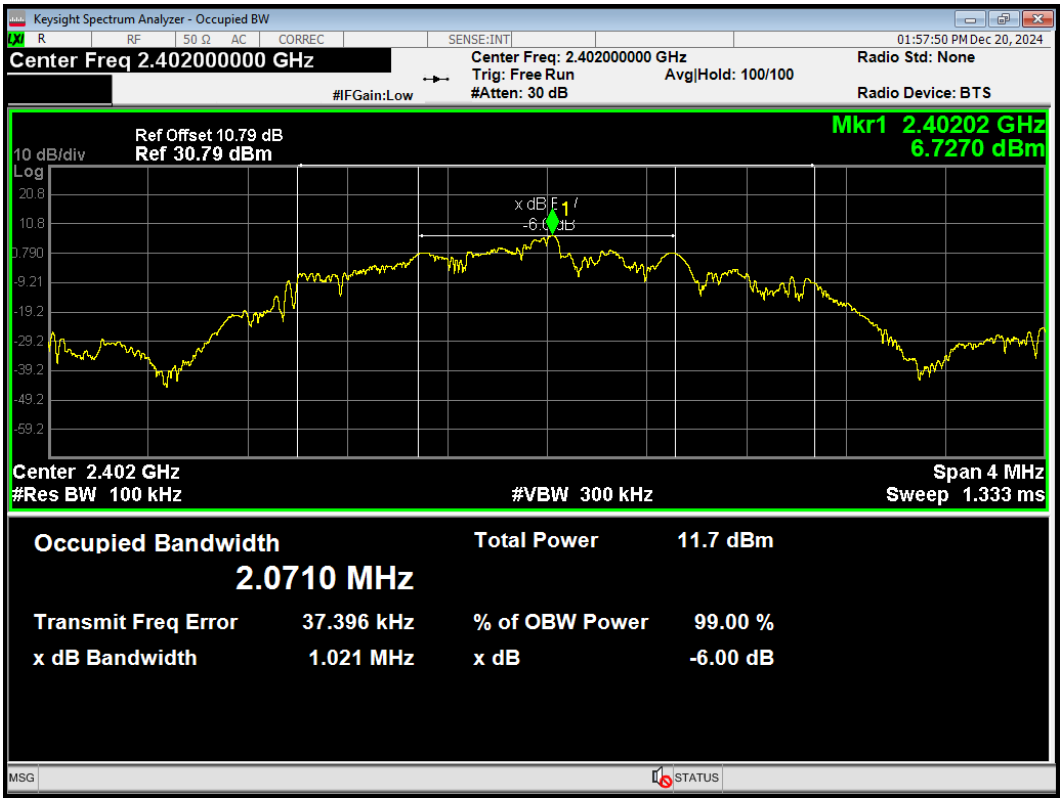


OBW nRF 2.4GHz 2480MHz

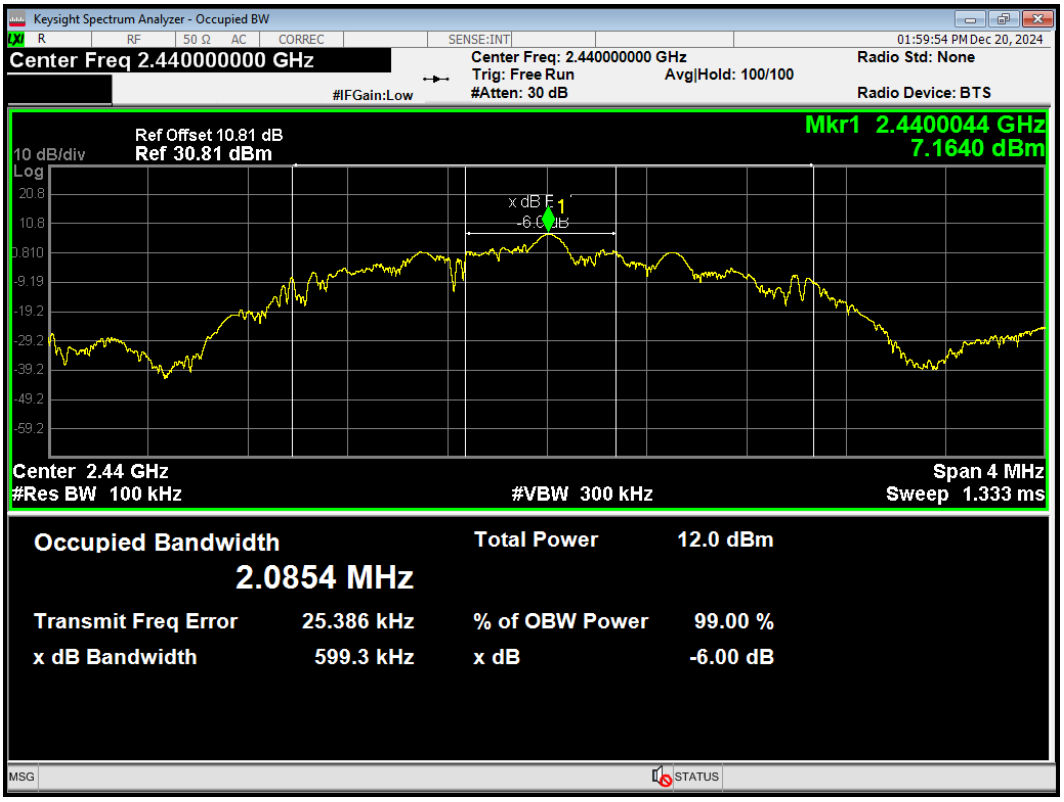


6 dB bandwidth

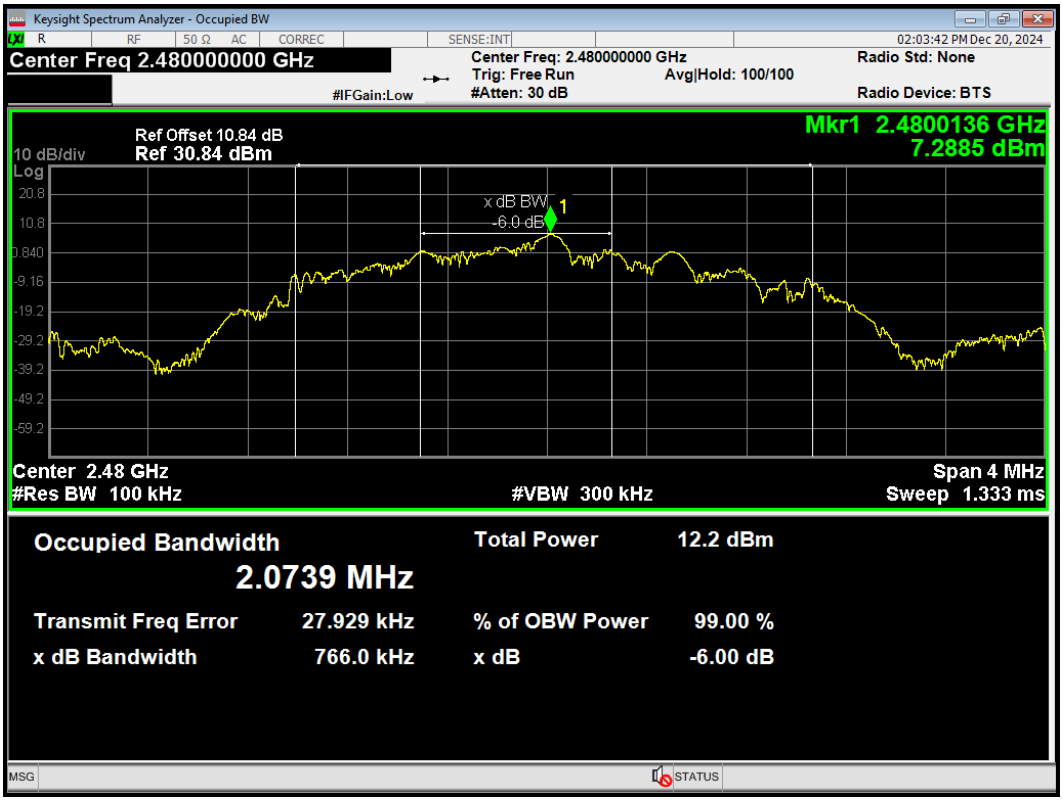
-6dB Bandwidth nRF 2.4GHz 2402MHz



-6dB Bandwidth nRF 2.4GHz 2440MHz



-6dB Bandwidth nRF 2.4GHz 2480MHz



Wi-Fi 2.4G

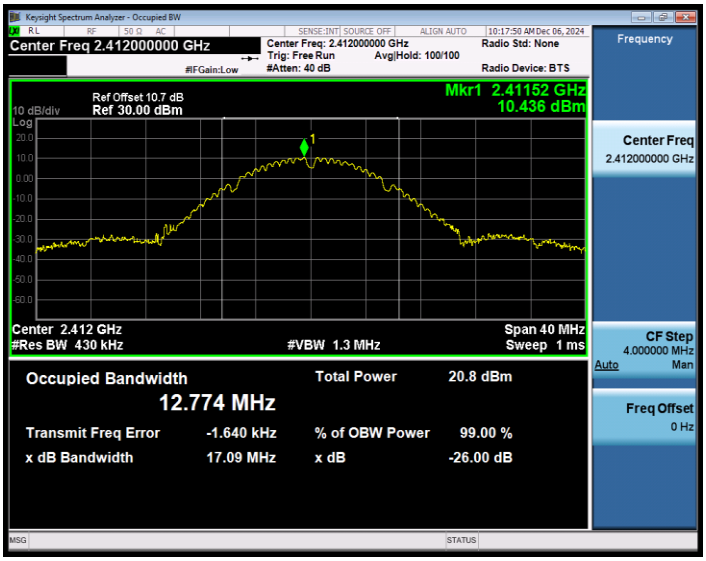
99%bandwidth

Test Mode	Channel Frequency [MHz]	99%bandwidth [MHz]
802.11b	2412	12.774
	2437	12.921
	2462	12.876
802.11g	2412	17.187
	2417	16.815
	2422	16.878
	2437	17.477
	2457	16.842
	2462	17.271
802.11n HT20 SISO	2412	18.267
	2417	17.922
	2422	17.979
	2437	18.517
	2452	17.910
	2457	17.925
	2462	18.353
802.11n HT40 SISO	2422	37.107
	2427	36.867
	2437	37.455
	2442	37.008
	2447	36.713
	2452	37.030
802.11ax HE20 SISO	2412	19.251
	2437	19.318
	2462	19.315
802.11ax HE40 SISO	2422	38.322
	2427	38.078
	2437	38.349
	2447	38.018
	2452	38.267
802.11be EHT20 SISO	2412	19.234
	2437	19.344
	2462	19.259
802.11be EHT40 SISO	2422	38.424
	2427	38.110
	2437	38.284
	2447	38.060
	2452	38.278

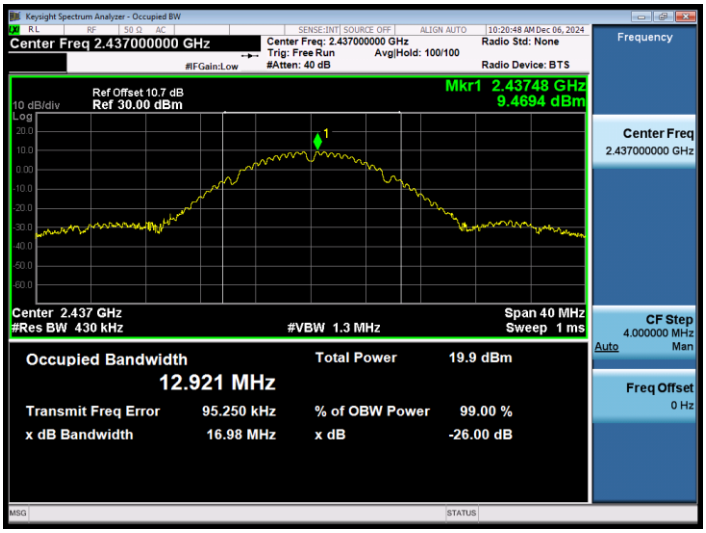
TB Mode

Test Mode	Freq (MHz)	Ru Size	Ru Index	99% bandwidth (MHz)
802.11ax HE20 SISO	2412	26Tone	RU0	17.970
		52Tone	RU37	18.058
		106Tone	RU53	18.140
		242Tone	RU61	19.079
	2437	26Tone	RU4	12.776
		52Tone	RU39	16.369
		106Tone	RU53	17.550
		242Tone	RU61	19.082
	2462	26Tone	RU8	18.303
		52Tone	RU40	18.339
		106Tone	RU54	18.300
		242Tone	RU61	19.091
802.11ax HE40 SISO	2422	26Tone	RU0	17.059
	2452	26Tone	RU17	18.813
	2422	484Tone	RU65	38.013
802.11be EHT20 SISO	2412	26Tone	RU0	18.775
		52Tone	RU37	16.112
		106Tone	RU53	18.472
		242Tone	RU61	19.064
	2437	26Tone	RU4	6.375
		52Tone	RU39	15.649
		106Tone	RU53	17.886
		242Tone	RU61	19.058
	2462	26Tone	RU8	18.692
		52Tone	RU40	16.405
		106Tone	RU54	16.283
		242Tone	RU61	19.095
802.11be EHT40 SISO	2422	26Tone	RU0	18.873
	2452	26Tone	RU17	16.239
	2422	484Tone	RU65	38.101

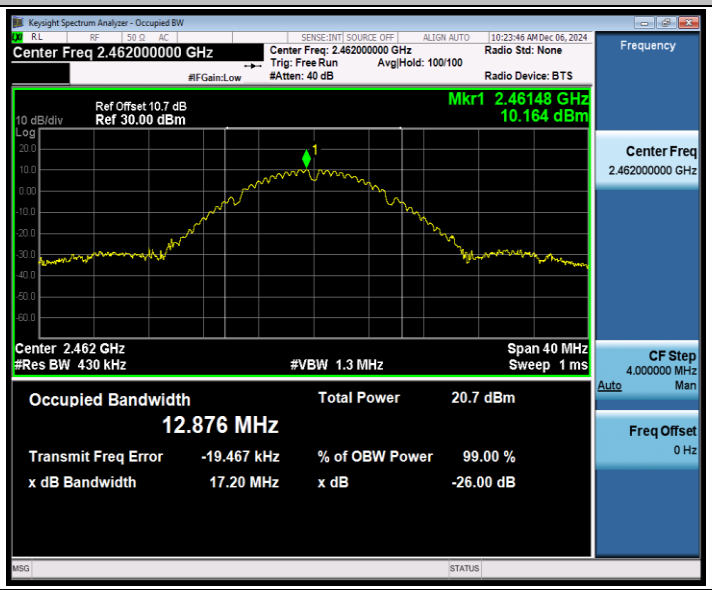
802.11b_2412



802.11b_2437



802.11b_2462



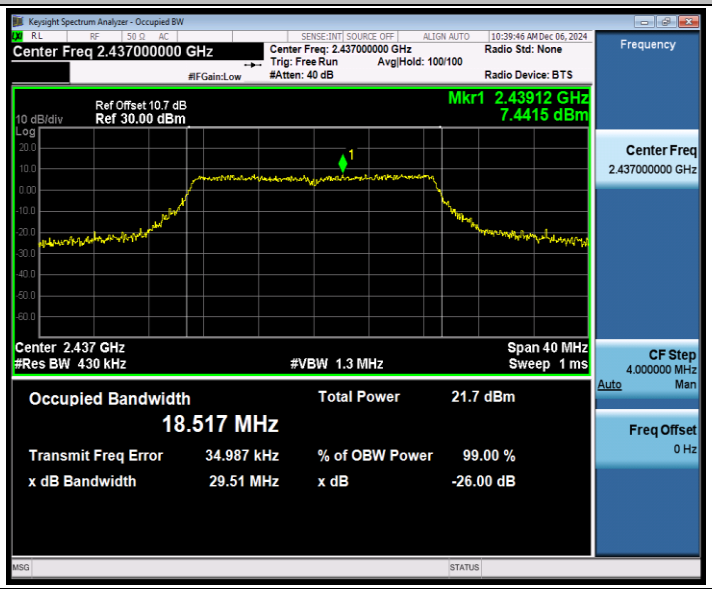
802.11g_2412

802.11g_2437

802.11g_2462

802.11n HT20 SISO_2412

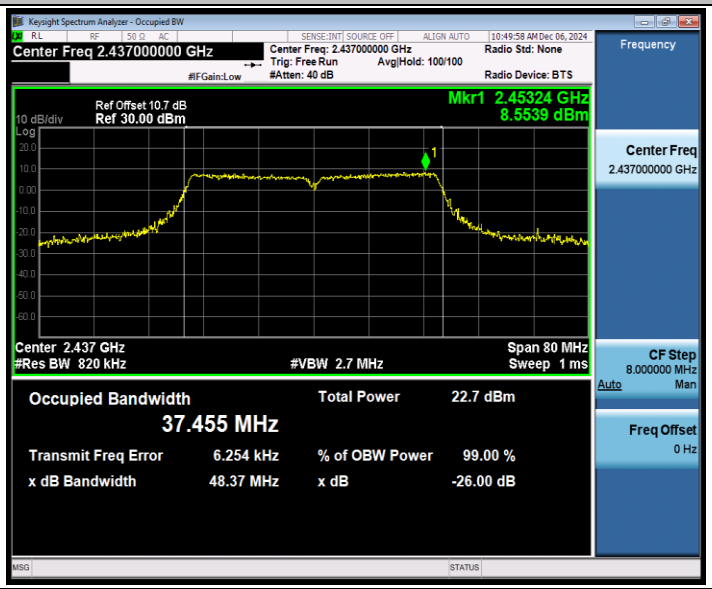
802.11n HT20 SISO_2437



802.11n HT20 SISO_2462

802.11n HT40 SISO_2422

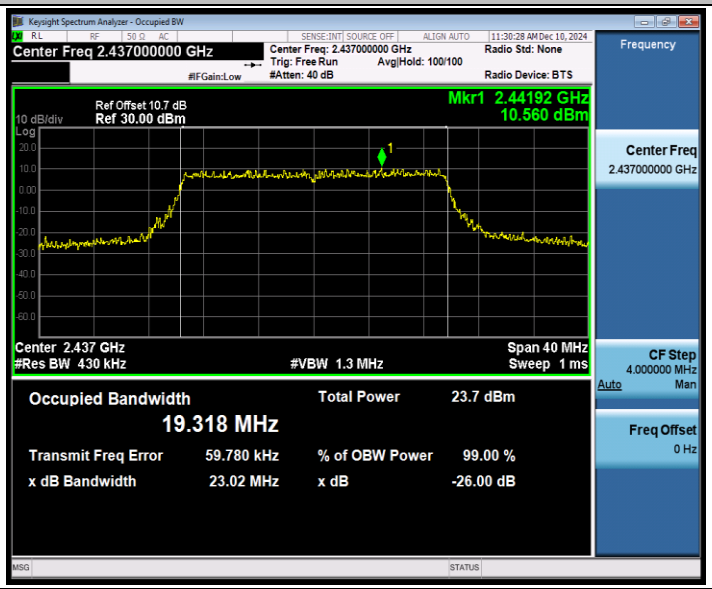
802.11n HT40 SISO_2437



802.11n HT40 SISO_2452

802.11ax HE20 SISO_2412

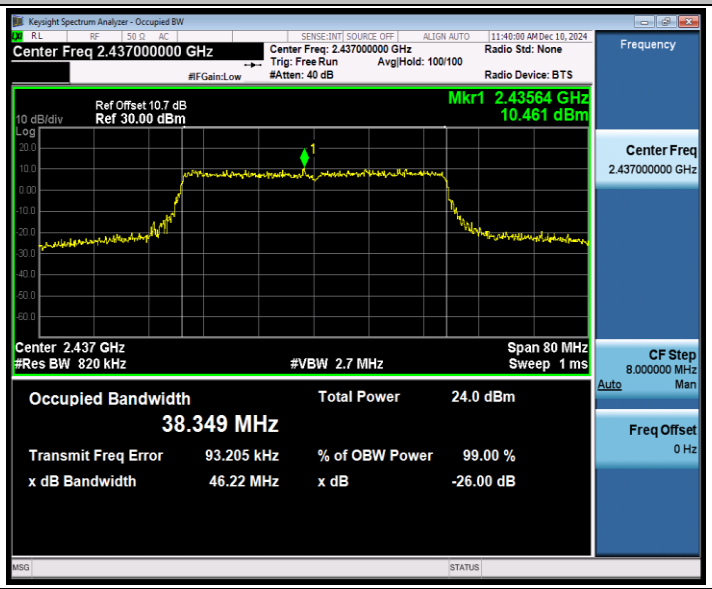
802.11ax HE20 SISO_2437



802.11ax HE20 SISO_2462

802.11ax HE40 SISO_2422

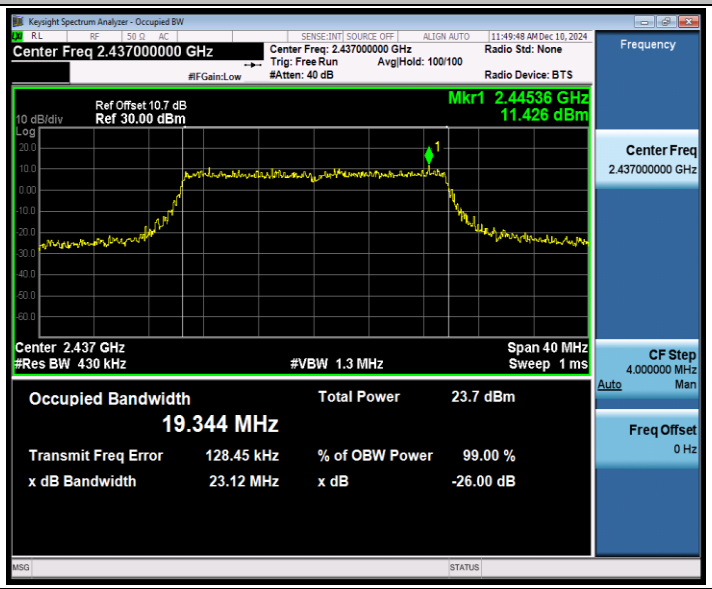
802.11ax HE40 SISO_2437



802.11ax HE40 SISO_2452

802.11be EHT20 SISO_2412

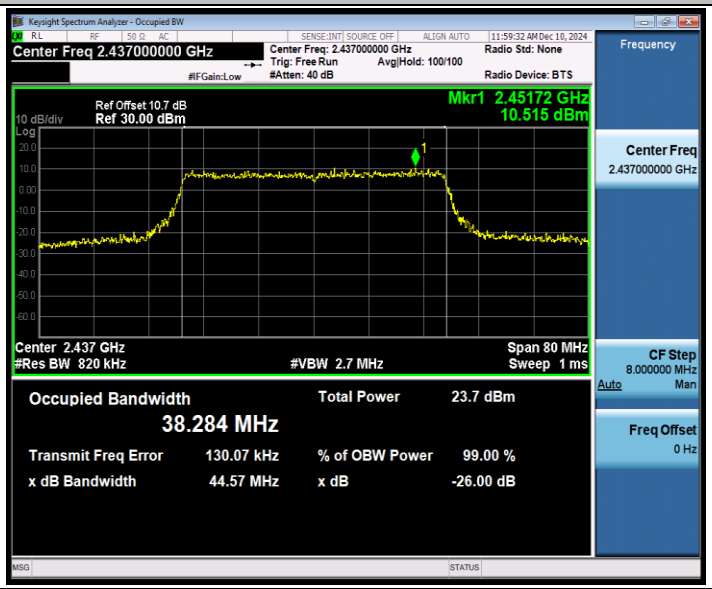
802.11be EHT20 SISO_2437



802.11be EHT20 SISO_2462

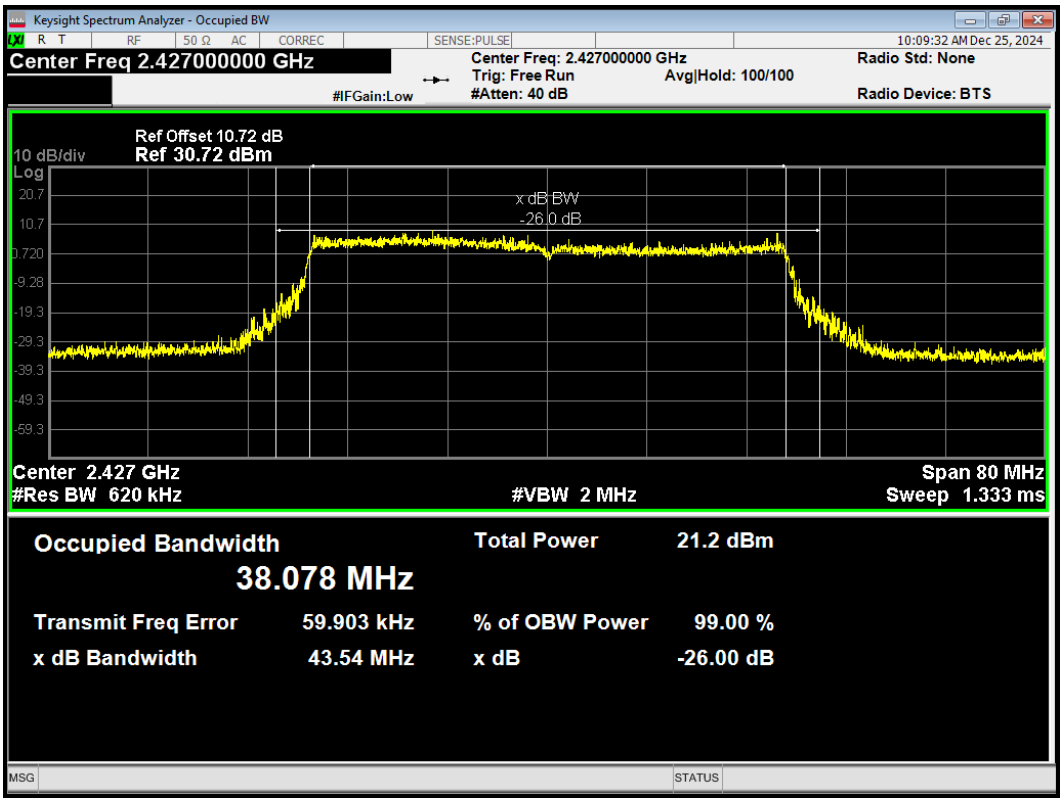
802.11be EHT40 SISO_2422

802.11be EHT40 SISO_2437

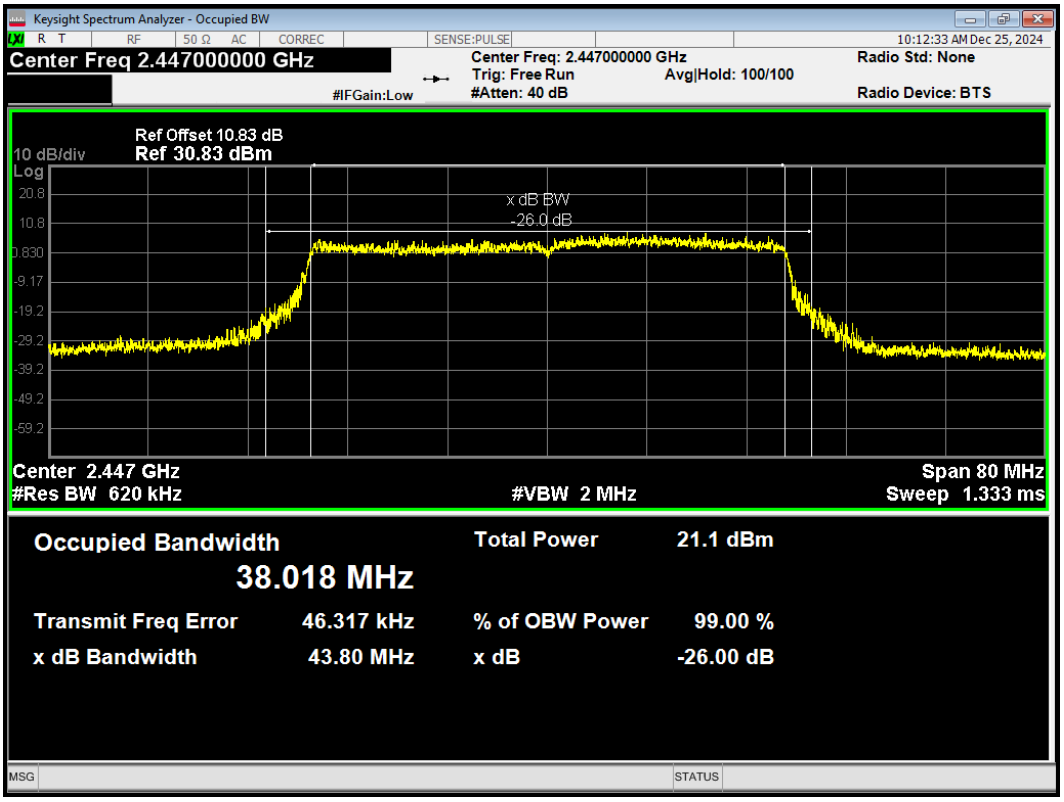


802.11be EHT40 SISO_2452

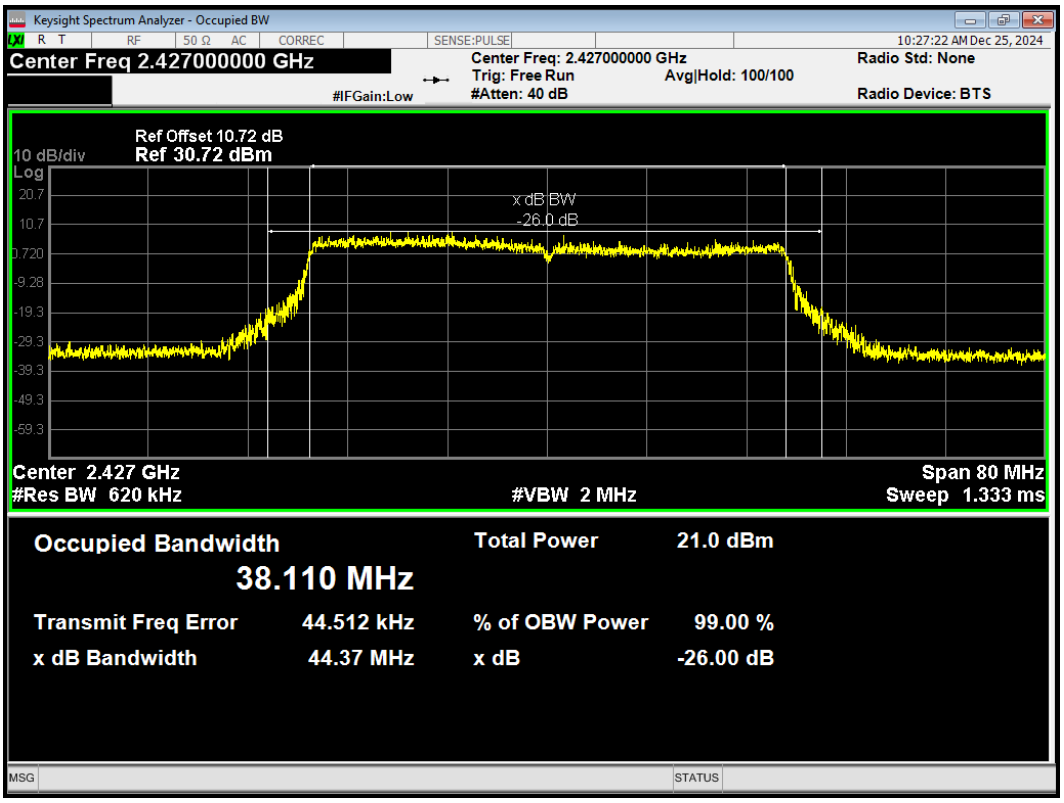
OBW 802.11ax(HE40) 2427MHz



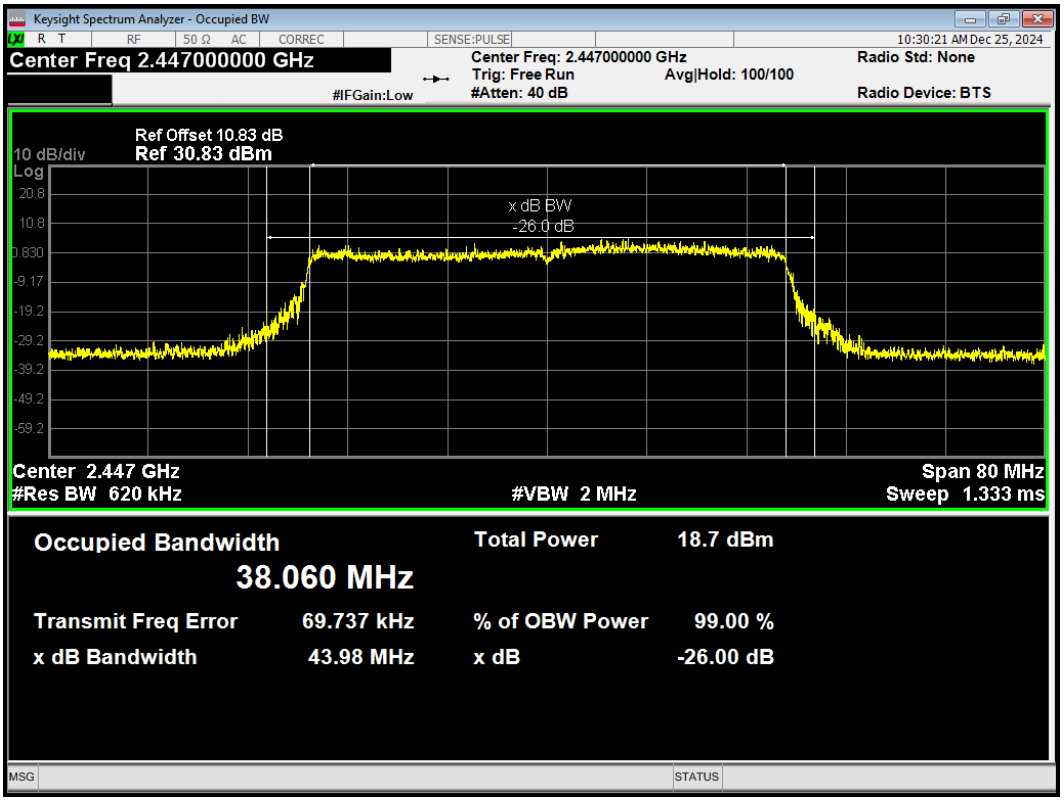
OBW 802.11ax(HE40) 2447MHz



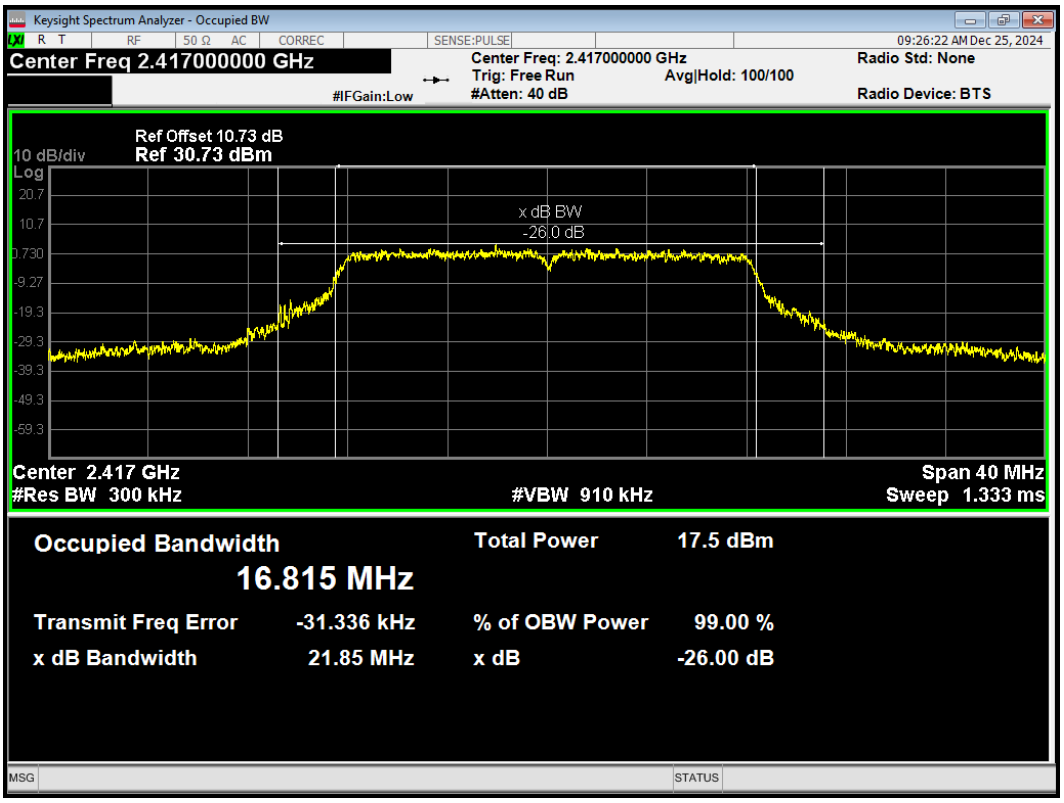
OBW 802.11be(40) 2427MHz



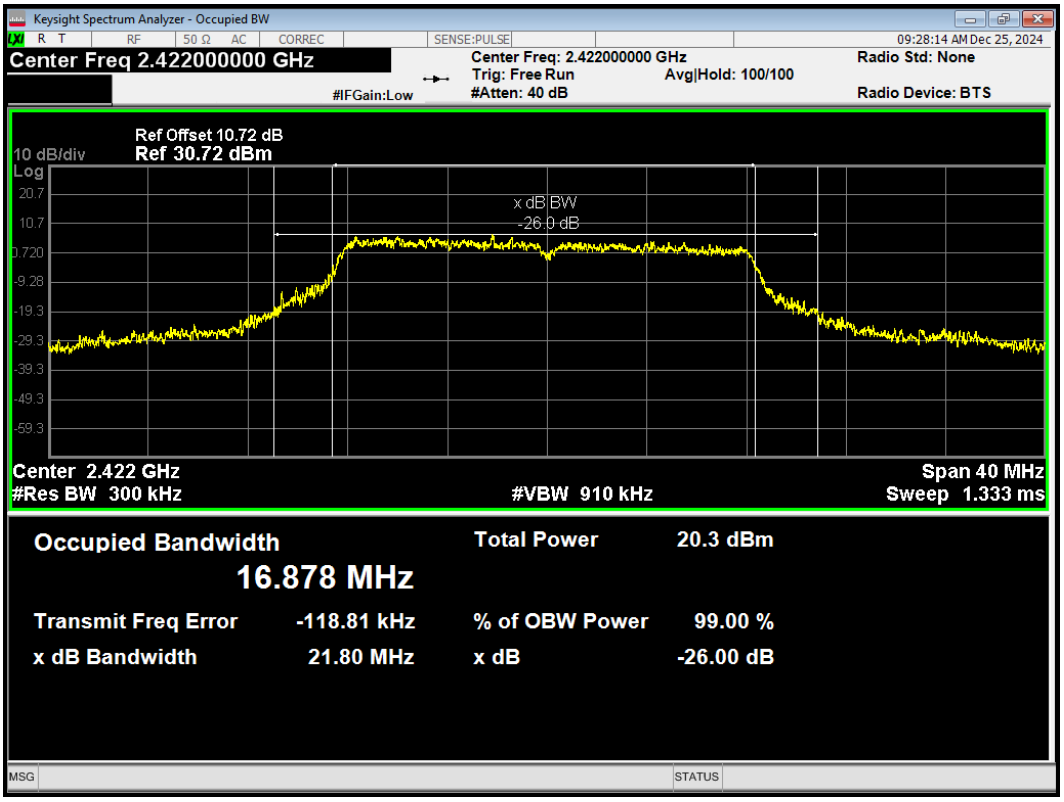
OBW 802.11be(40) 2447MHz



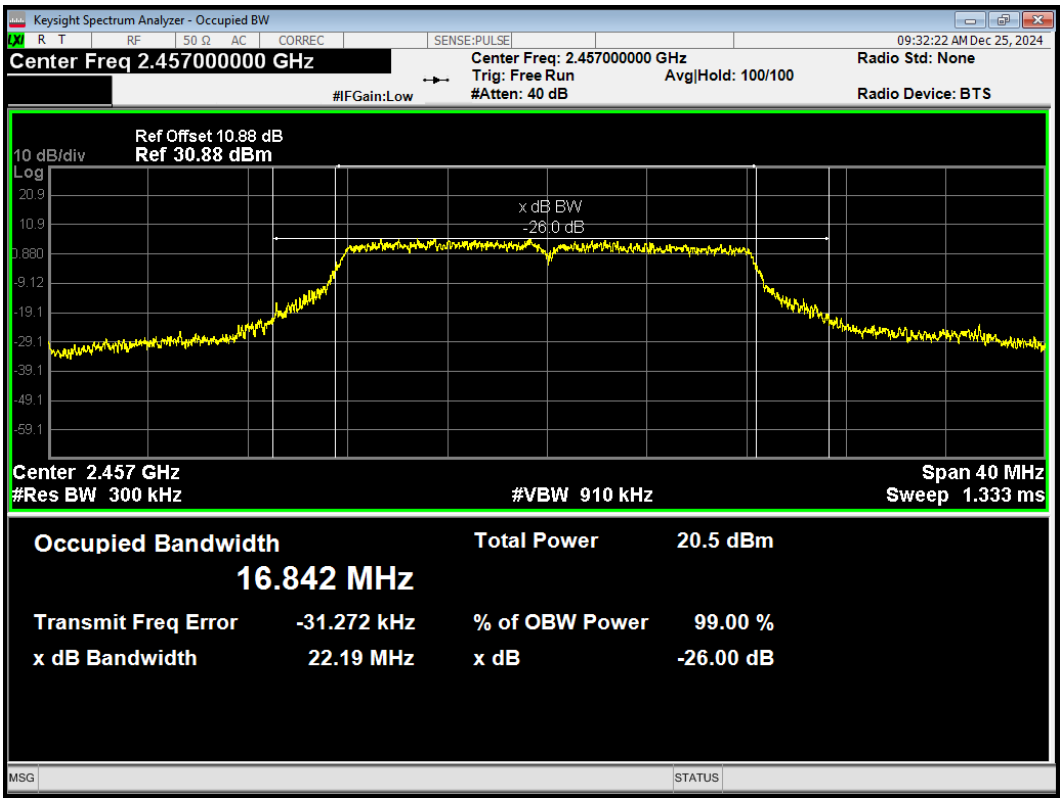
OBW 802.11g 2417MHz



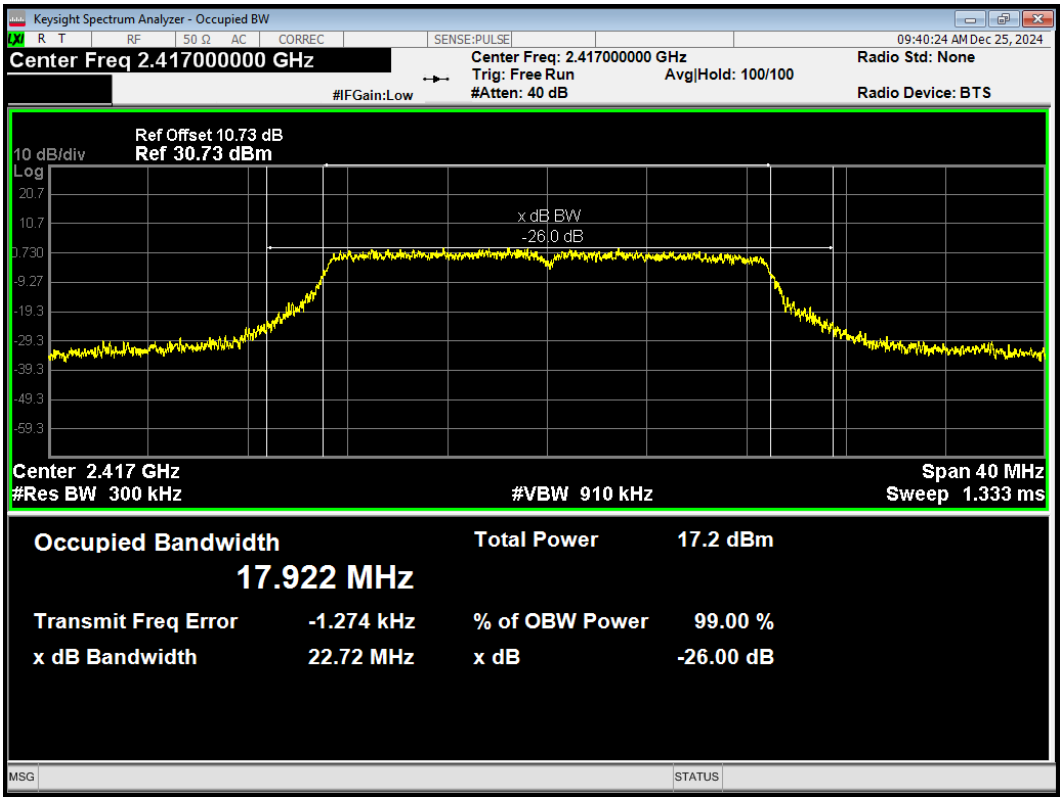
OBW 802.11g 2422MHz



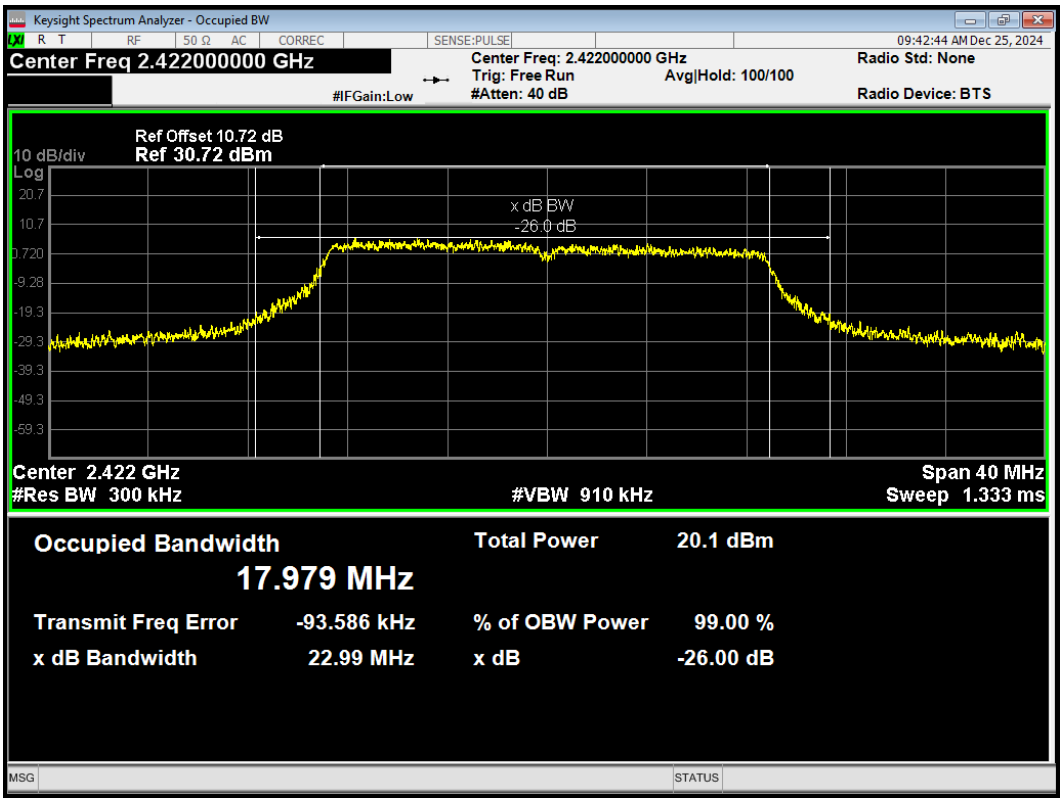
OBW 802.11g 2457MHz



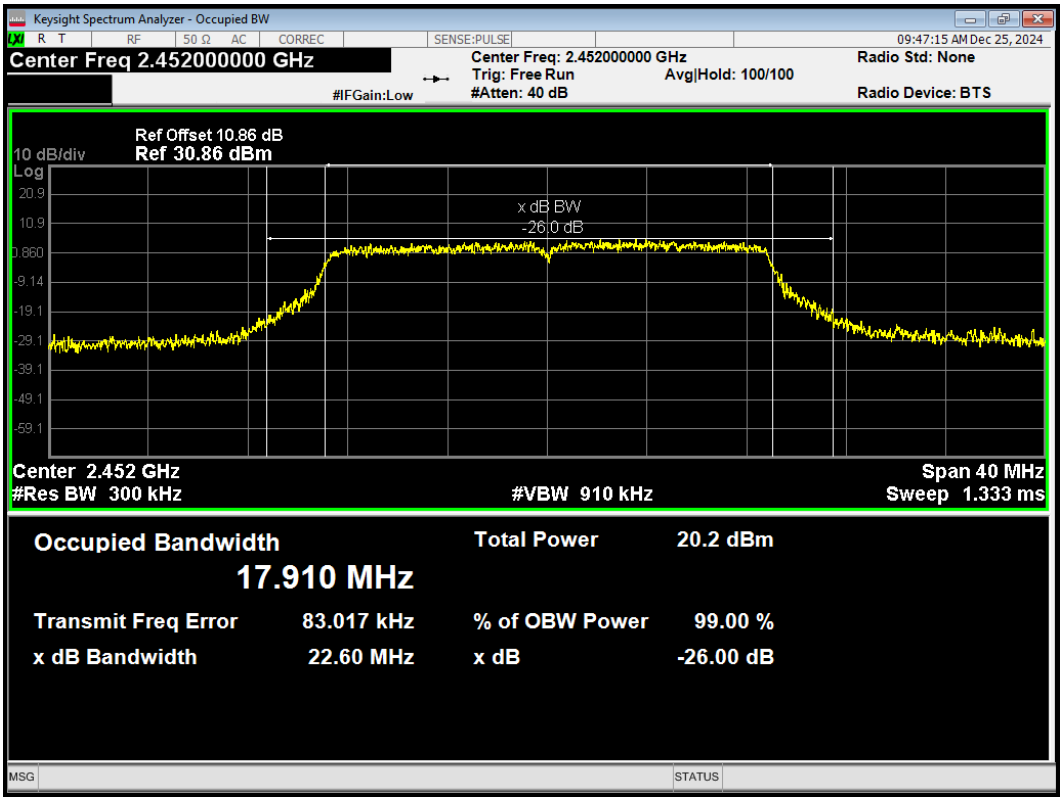
OBW 802.11n(HT20) 2417MHz



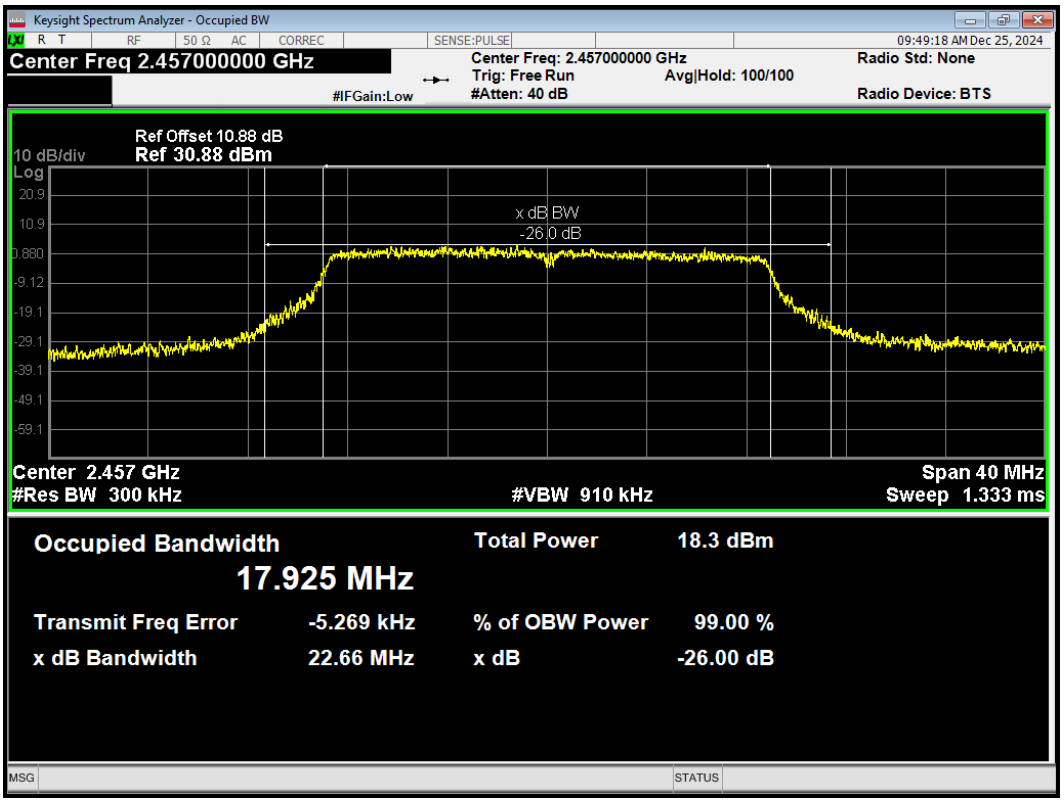
OBW 802.11n(HT20) 2422MHz



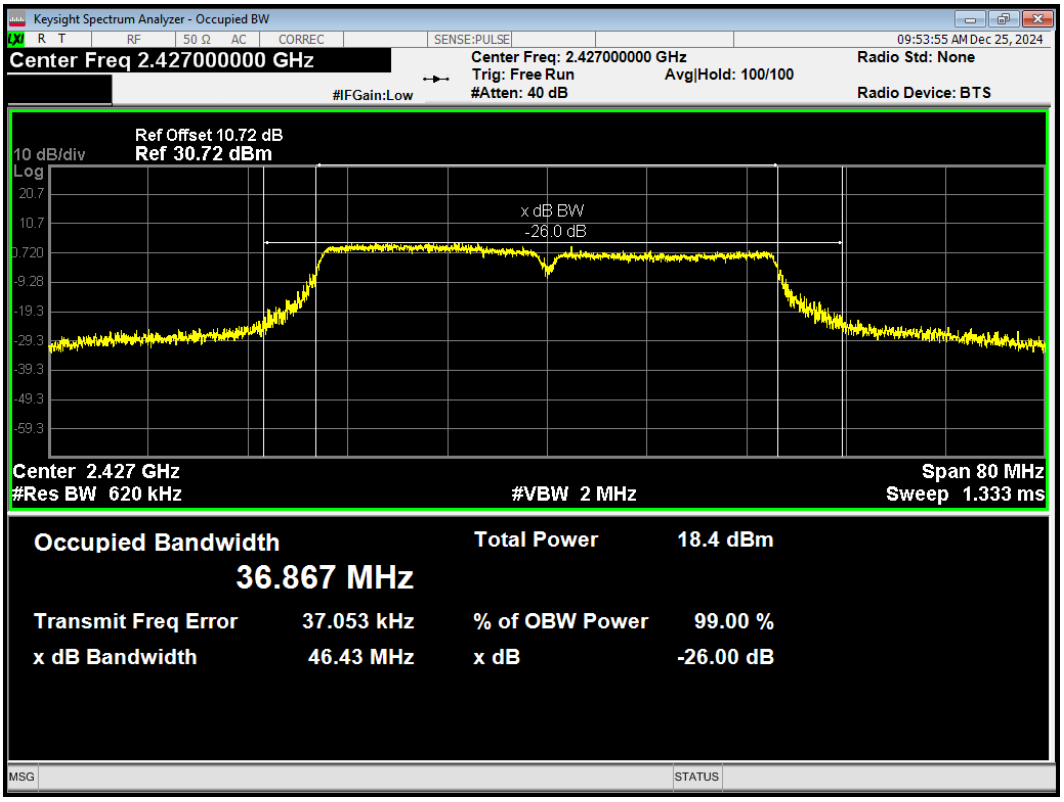
OBW 802.11n(HT20) 2452MHz



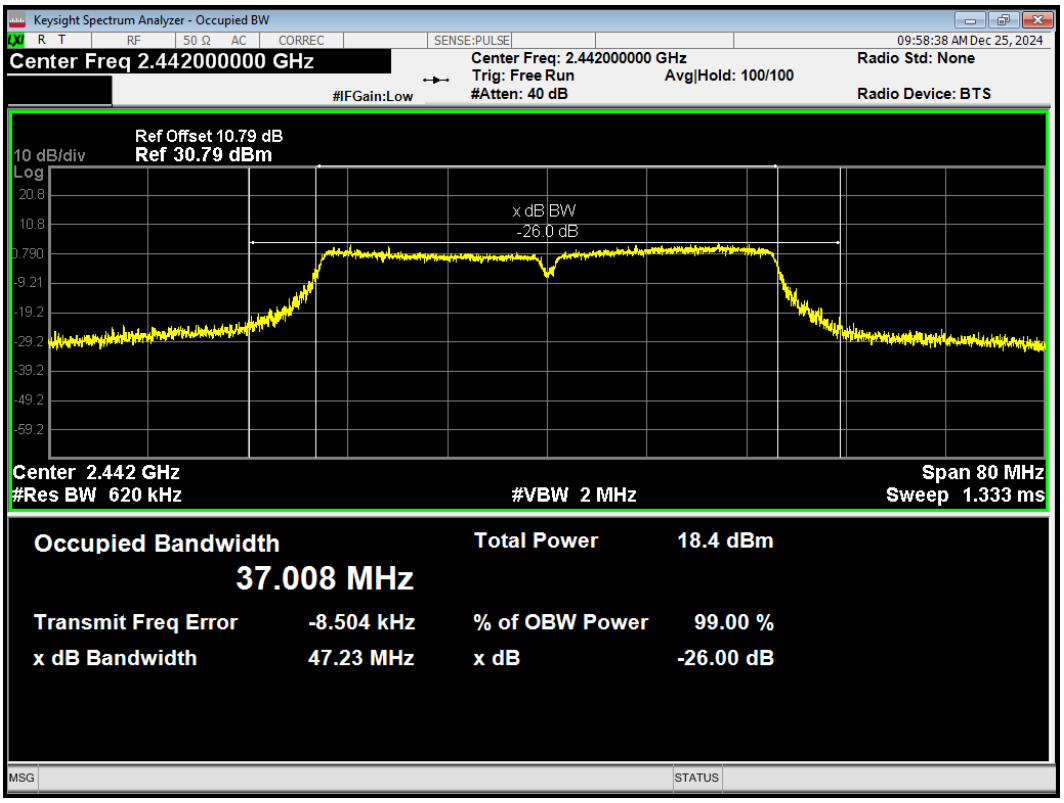
OBW 802.11n(HT20) 2457MHz



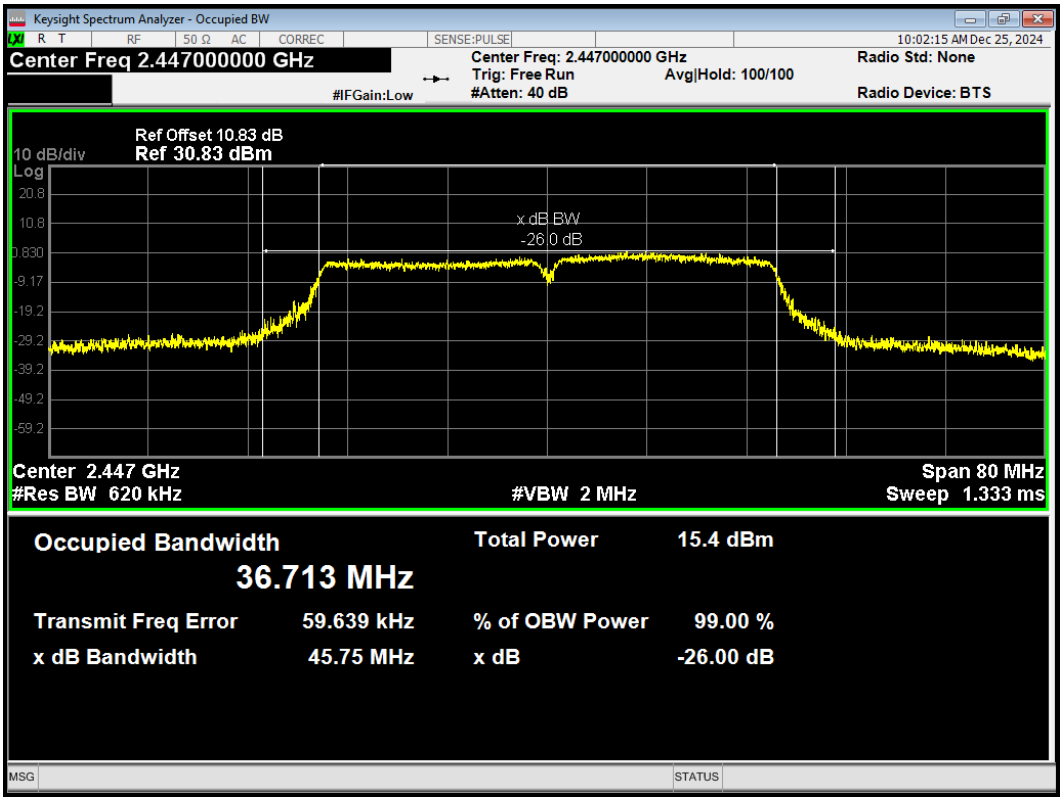
OBW 802.11n(HT40) 2427MHz



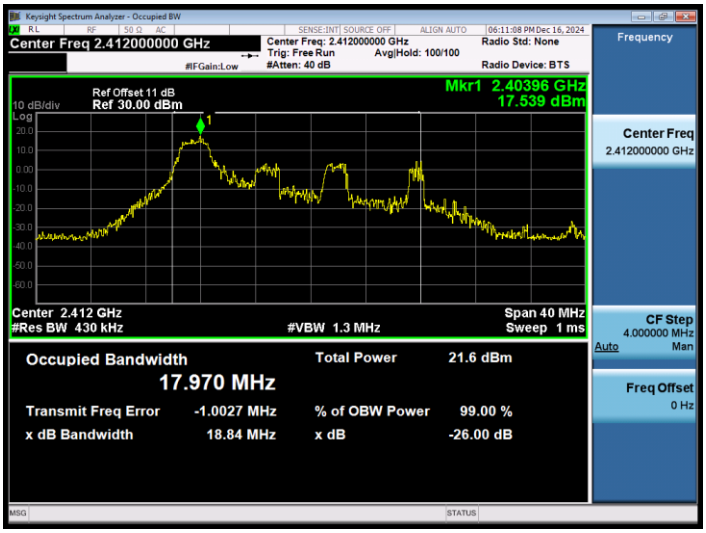
OBW 802.11n(HT40) 2442MHz



OBW 802.11n(HT40) 2447MHz



TB Mode

802.11ax HE20_2412_26Tone_RU0


802.11ax HE20_2412_52Tone_RU37


802.11ax HE20_2412_106Tone_RU53


802.11ax HE20_2437_52Tone_RU39

802.11ax HE20_2462_26Tone_RU8

802.11ax HE20_2462_52Tone_RU40

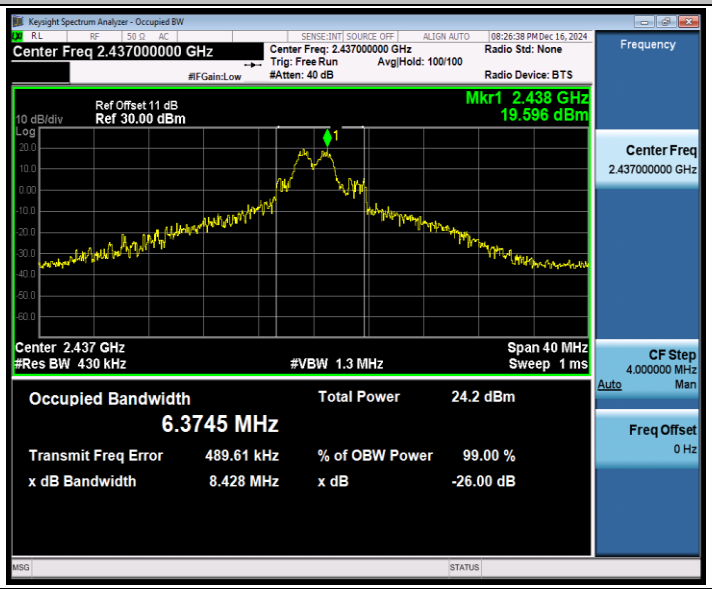
802.11ax HE20_2462_106Tone_RU54

802.11be EHT20_2412_26Tone_RU0

802.11be EHT20_2412_52Tone_RU37

802.11be EHT20_2412_106Tone_RU53

802.11be EHT20_2437_26Tone_RU4



802.11be EHT20_2437_52Tone_RU39

802.11be EHT20_2462_26Tone_RU8