

RF TEST REPORT

Applicant Quectel Wireless Solutions Company
Limited

FCC ID XMR2025FCM665D

Product Wi-Fi & Bluetooth Module

Brand Quectel

Model FCM665D

Report No. EFTA25040029-IE-06-R1

Issue Date April 24, 2025

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15C (2024)**. 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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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: April 9, 2025 ~ April 19, 2025 Date of Sample Received: April 6, 2025			
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.
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2. General Description of Equipment Under Test

2.1. Applicant and Manufacturer Information

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

2.2. General Information

EUT Description	
Model	FCM665D
SN	E1N25BB0H000157
Hardware Version	R1.0
Software Version	NA
Power Supply	External power supply
Antenna Type	PCB Antenna
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)
Antenna Gain	2.40 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 Bluetooth LE V5.4: 2402 ~2480 MHz
Modulation Type	802.11b: DSSS 802.11g/n: OFDM 802.11ax: OFDM Bluetooth LE: GFSK
Max. Output Power	Wi-Fi 2.4GHz: 16.05 dBm Bluetooth LE: 7.22 dBm
Operating voltage range	3.0 Vdc to 3.6 Vdc
State voltage	3.3 Vdc
Auxiliary Test Equipment	
PC	Manufacturer: DELL Model: Latitude E5470 (SN: 3YGWQ72)
Mother board	Manufacturer: Quectel Wireless Solutions Co., Ltd. Model: /

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 (2024) 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 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.

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

5. Test Case Results

5.1. Maximum output power

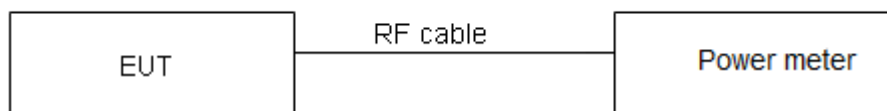
Ambient Condition

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.

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	$\leq 1\text{W}$ (30dBm)
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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	55	51	48	CH3	54	50
CH6	16	55	52	49	CH6	54	50
CH11	17	56	53	50	CH9	55	50

Power Index	
Channel	Bluetooth (Low Energy)
CH0	62
CH19	60
CH39	60

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11b	0.990	0.000
802.11g	0.989	0.000
802.11n HT20	0.989	0.000
802.11n HT40	0.986	0.000
802.11ax HE20	0.954	0.210
802.11ax HE40	0.941	0.390
Bluetooth LE (1M)	0.633	1.99
Bluetooth LE (2M)	0.336	4.74
Bluetooth LE (S=2)	0.570	2.44
Bluetooth LE (S=8)	0.827	0.82
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/CH 1	15.90	15.90	30	PASS
	2437/CH 6	15.76	15.76	30	PASS
	2462/CH11	16.05	16.05	30	PASS
802.11g	2412/CH 1	16.02	16.02	30	PASS
	2437/CH 6	15.97	15.97	30	PASS
	2462/CH11	16.05	16.05	30	PASS
802.11n HT20	2412/CH 1	14.86	14.86	30	PASS
	2437/CH 6	15.05	15.05	30	PASS
	2462/CH11	15.15	15.15	30	PASS
802.11n HT40	2422/CH3	15.15	15.15	30	PASS
	2437/CH6	15.13	15.13	30	PASS
	2452/CH9	15.17	15.17	30	PASS
802.11ax HE20	2412/CH 1	13.80	14.01	30	PASS
	2437/CH 6	13.98	14.19	30	PASS
	2462/CH11	14.06	14.27	30	PASS
802.11ax HE40	2422/CH3	13.83	14.22	30	PASS
	2437/CH6	13.88	14.27	30	PASS
	2452/CH9	13.86	14.25	30	PASS
Bluetooth (Low Energy) (1M)	2402/CH0	5.04	7.03	30	PASS
	2440/CH19	4.83	6.82	30	PASS
	2480/CH39	5.11	7.10	30	PASS
Bluetooth (Low Energy) (2M)	2402/CH0	2.37	7.11	30	PASS
	2440/CH19	2.06	6.80	30	PASS
	2480/CH39	2.48	7.22	30	PASS
Bluetooth (Low Energy) (S=2)	2402/CH0	4.58	7.02	30	PASS
	2440/CH19	4.48	6.92	30	PASS
	2480/CH39	4.68	7.12	30	PASS
Bluetooth (Low Energy) (S=8)	2402/CH0	6.00	6.82	30	PASS
	2440/CH19	5.93	6.75	30	PASS
	2480/CH39	6.29	7.11	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

5.2. 99% Bandwidth and 6dB Bandwidth

Ambient Condition

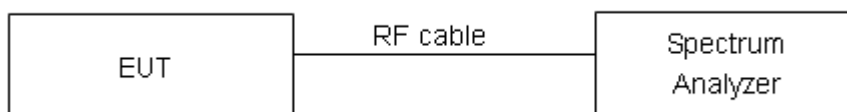
Temperature	Relative humidity
15°C ~ 35°C	20% ~ 80%

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. Detector=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
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Measurement Uncertainty

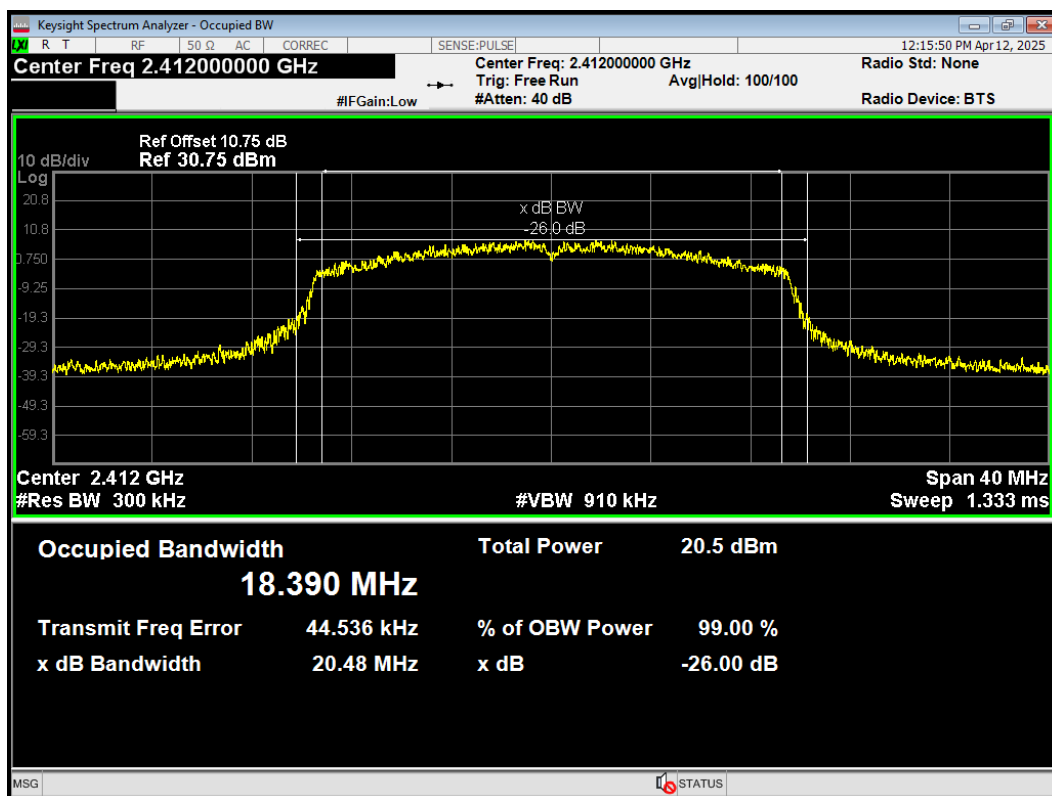
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 936$ Hz.

Test Results:

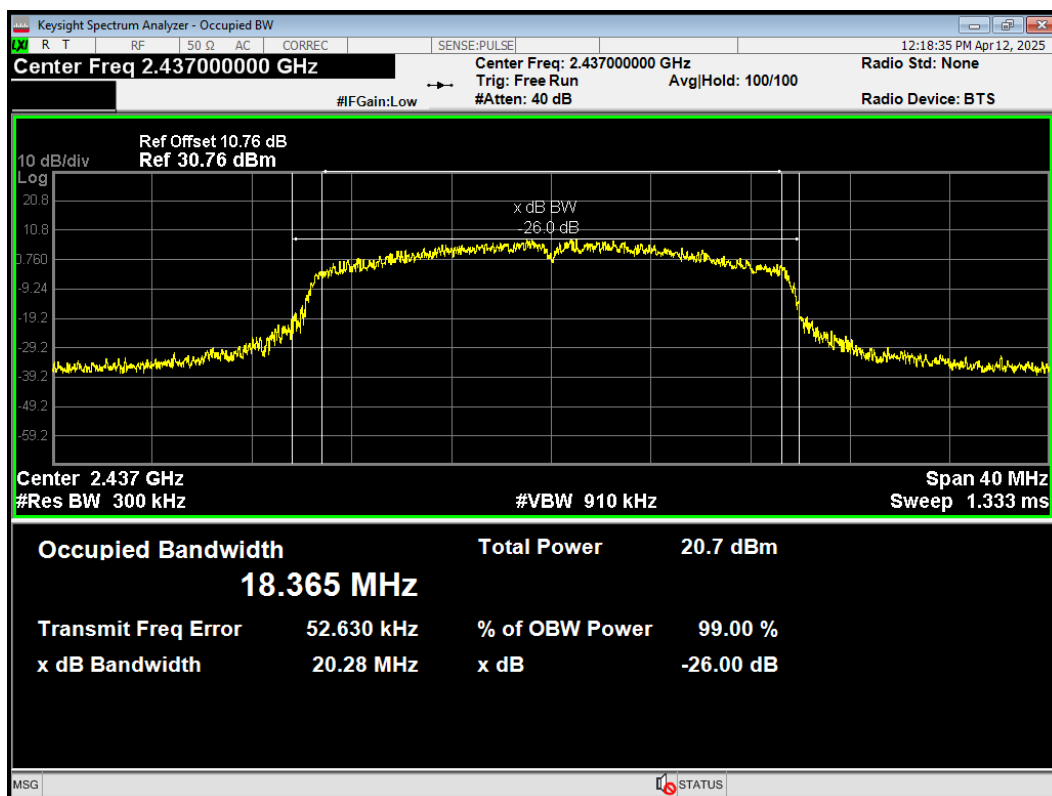
Test Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11b	2412	13.981	8.576	500	PASS
	2437	13.978	8.544	500	PASS
	2462	13.989	9.060	500	PASS
802.11g	2412	16.274	13.771	500	PASS
	2437	16.168	15.091	500	PASS
	2462	16.277	14.056	500	PASS
802.11n HT20	2412	17.818	6.307	500	PASS
	2437	17.729	2.533	500	PASS
	2462	17.800	3.814	500	PASS
802.11n HT40	2422	34.633	23.777	500	PASS
	2437	34.601	25.048	500	PASS
	2452	34.646	22.550	500	PASS
802.11ax HE20	2412	18.390	12.202	500	PASS
	2437	18.365	13.860	500	PASS
	2462	18.435	13.675	500	PASS
802.11ax HE40	2422	35.931	24.995	500	PASS
	2437	35.893	23.852	500	PASS
	2452	35.947	23.737	500	PASS
Bluetooth (Low Energy) (1M)	2402	1.029	0.679	500	PASS
	2440	1.030	0.655	500	PASS
	2480	1.025	0.669	500	PASS
Bluetooth (Low Energy) (2M)	2402	2.049	1.163	500	PASS
	2440	2.047	1.172	500	PASS
	2480	2.049	1.167	500	PASS
Bluetooth (Low Energy) (S=2)	2402	1.014	0.641	500	PASS
	2440	1.011	0.657	500	PASS
	2480	1.007	0.638	500	PASS
Bluetooth (Low Energy) (S=8)	2402	1.038	0.646	500	PASS
	2440	1.041	0.669	500	PASS
	2480	1.042	0.624	500	PASS

99%bandwidth

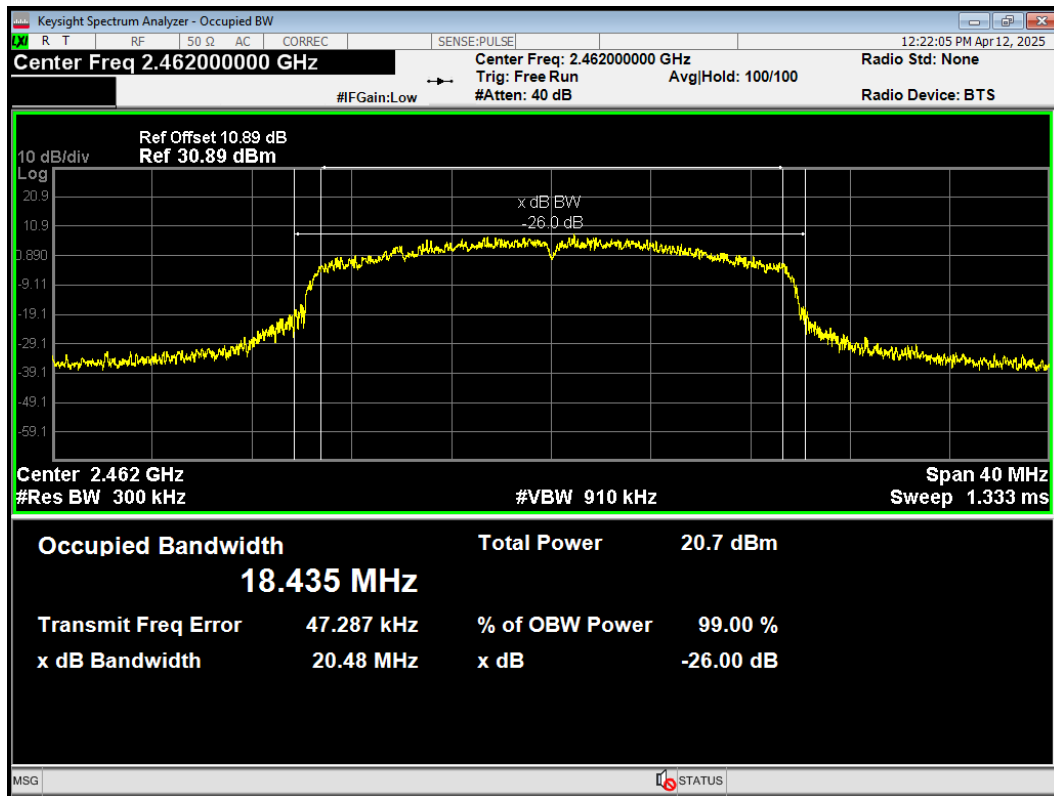
OBW 802.11ax(HE20) 2412MHz



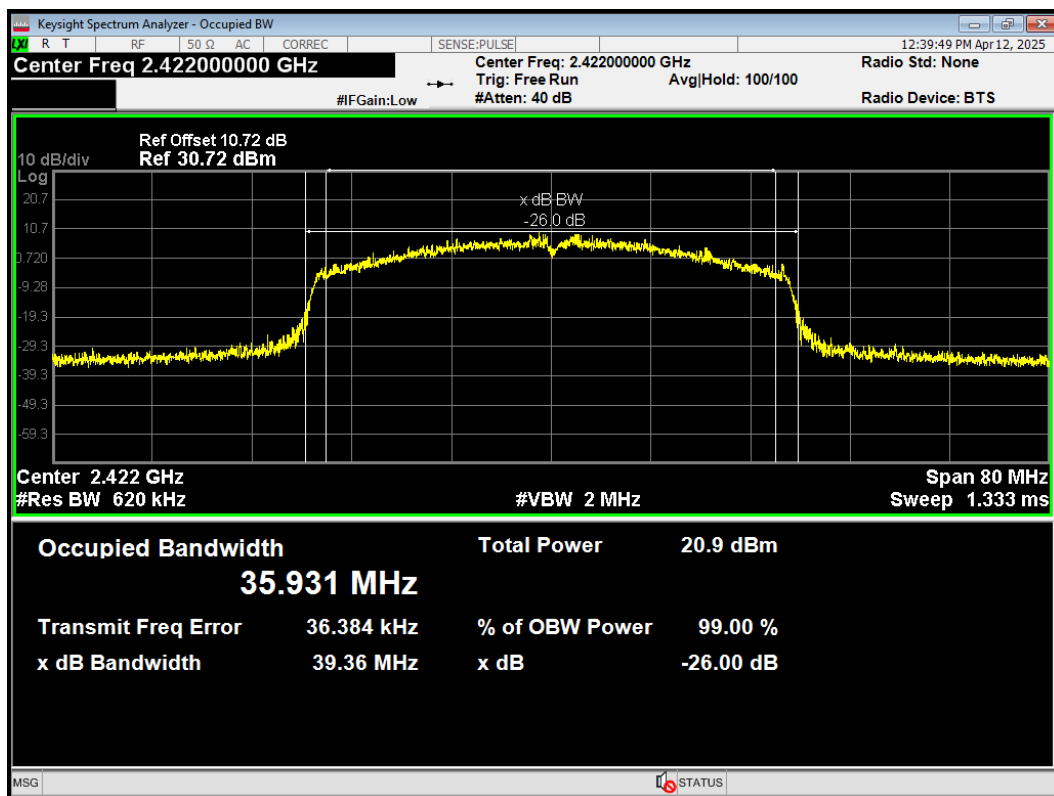
OBW 802.11ax(HE20) 2437MHz



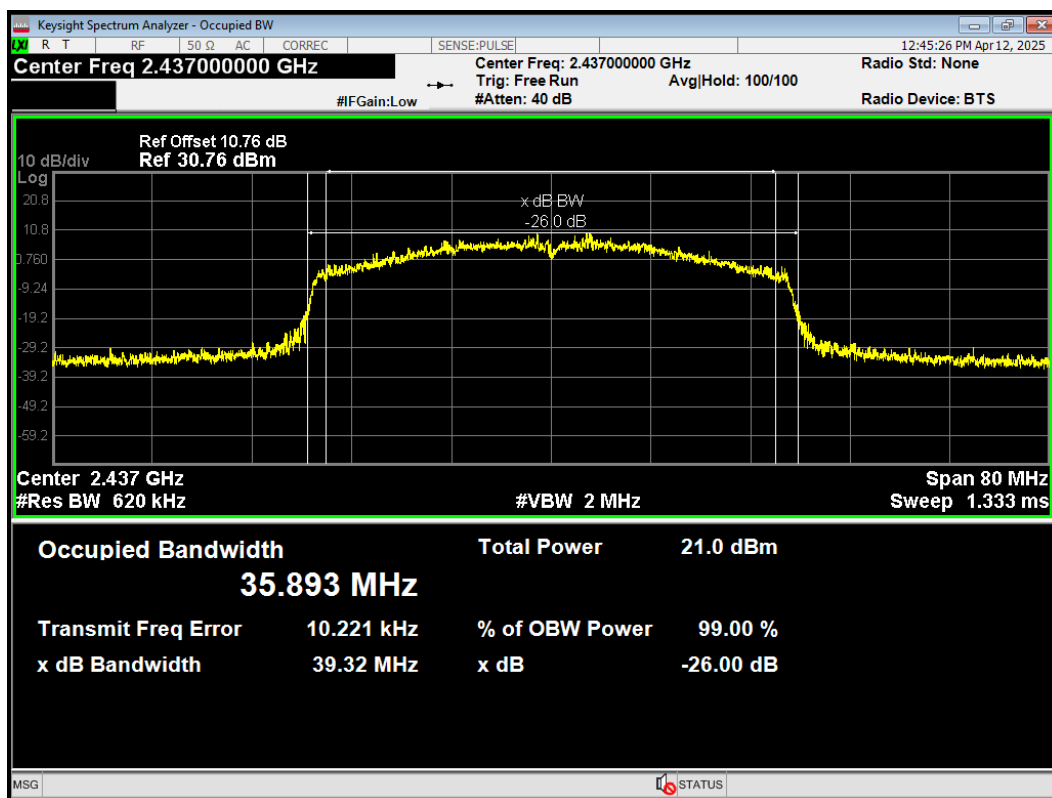
OBW 802.11ax(HE20) 2462MHz



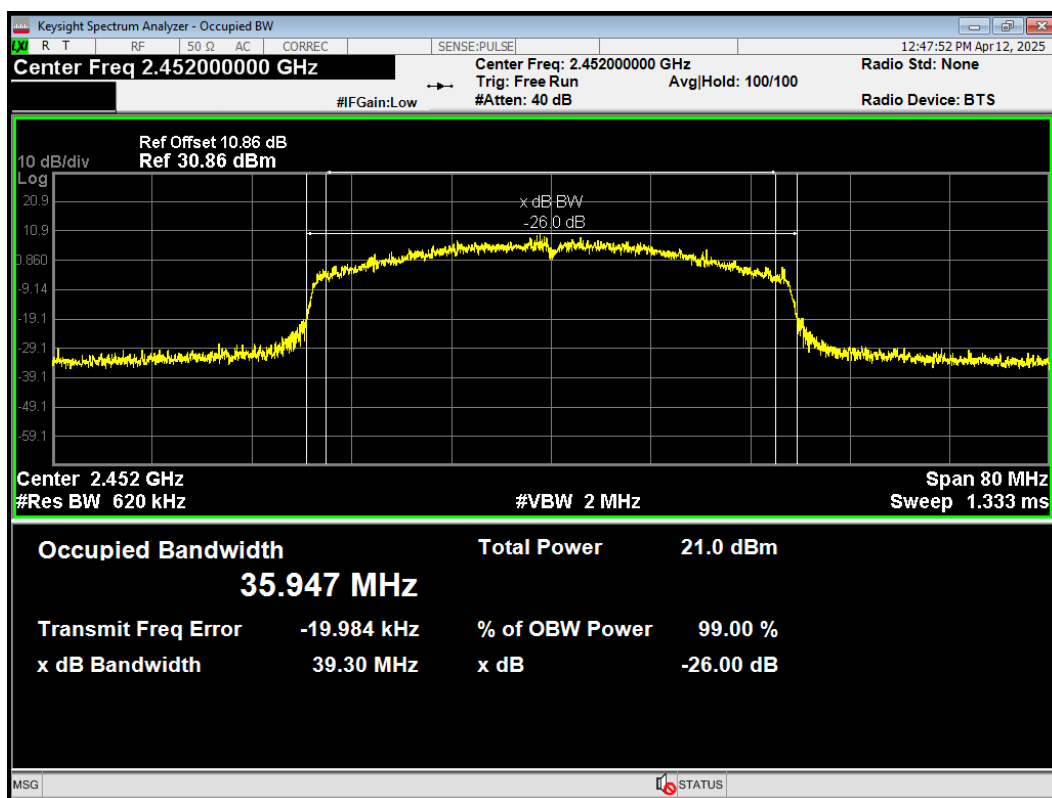
OBW 802.11ax(HE40) 2422MHz



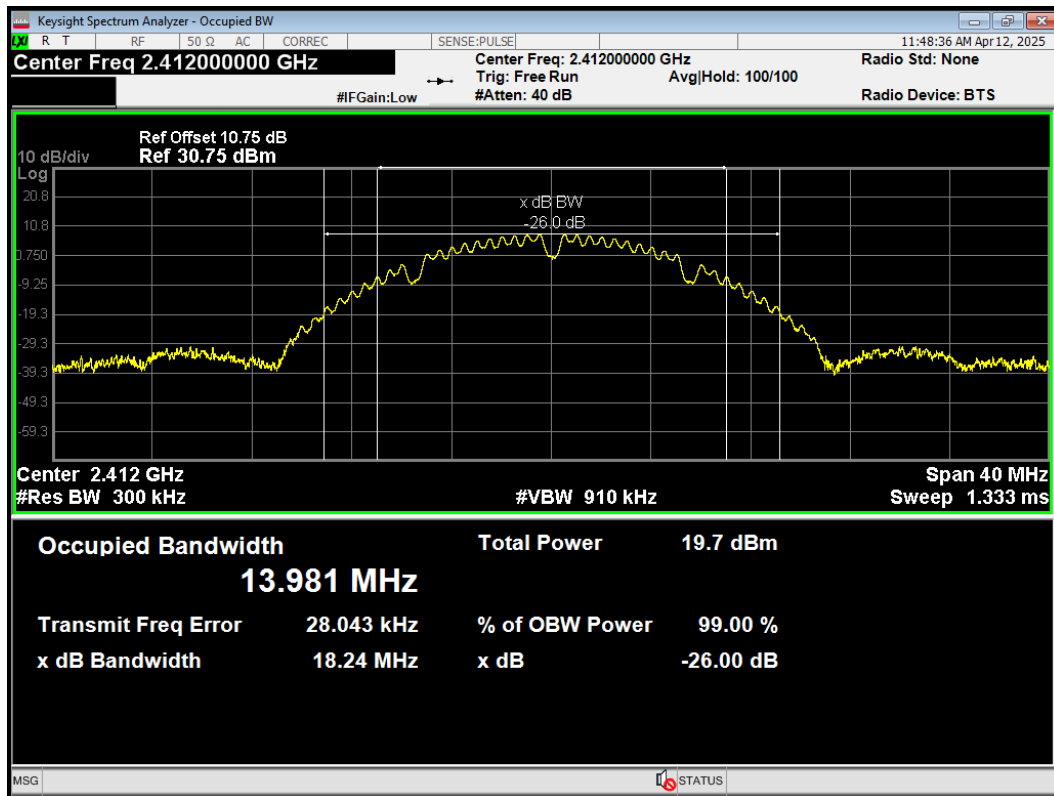
OBW 802.11ax(HE40) 2437MHz



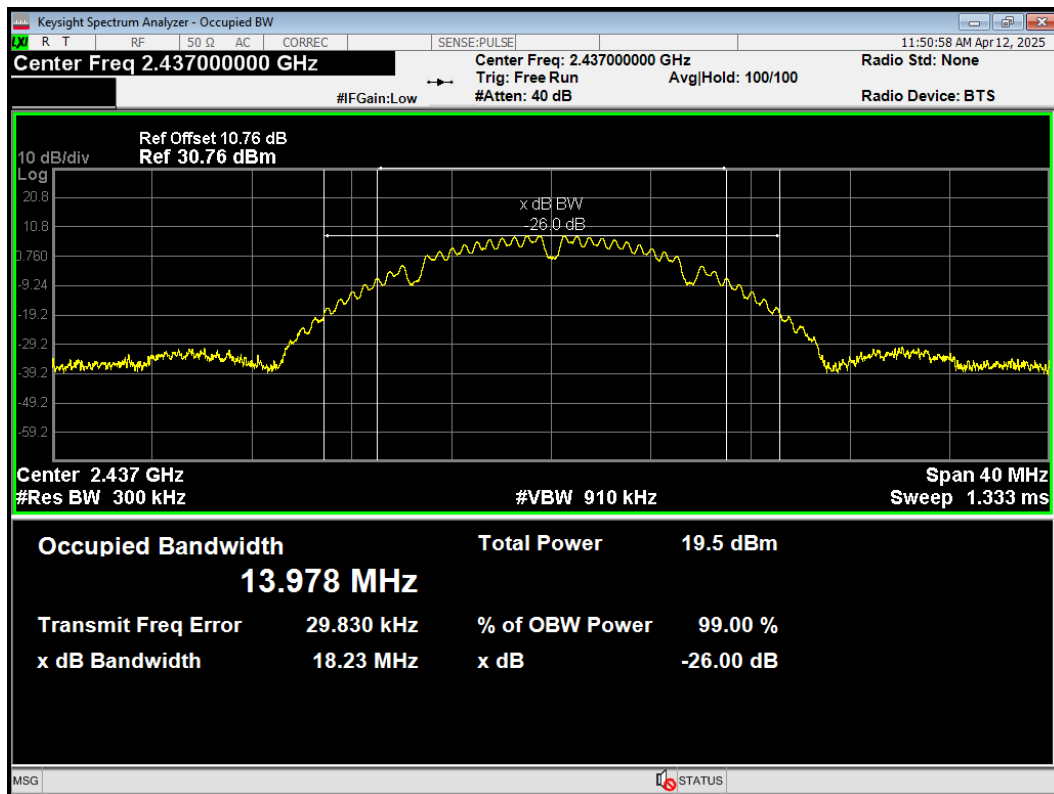
OBW 802.11ax(HE40) 2452MHz



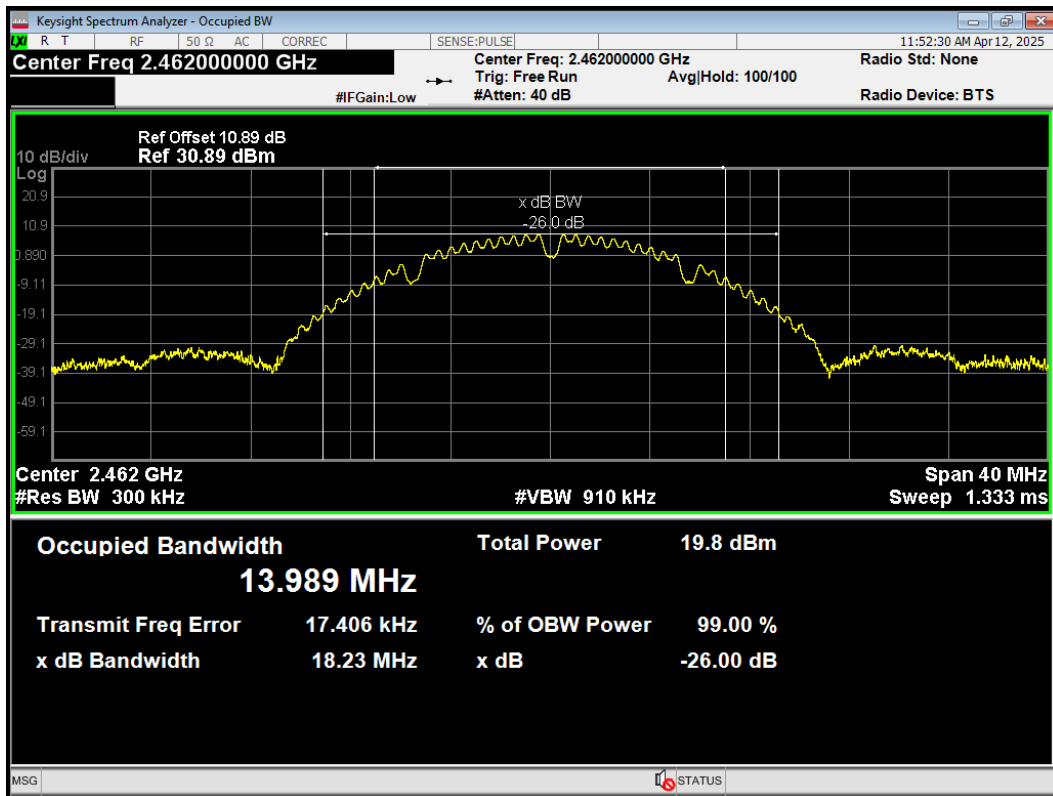
OBW 802.11b 2412MHz



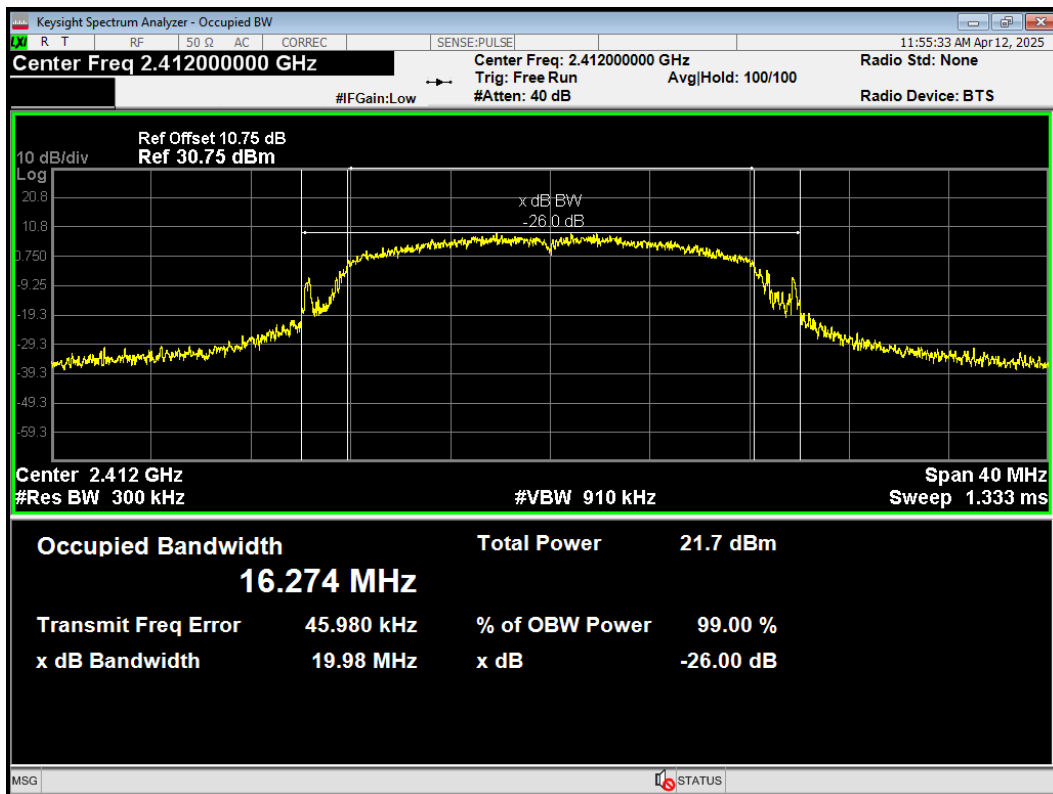
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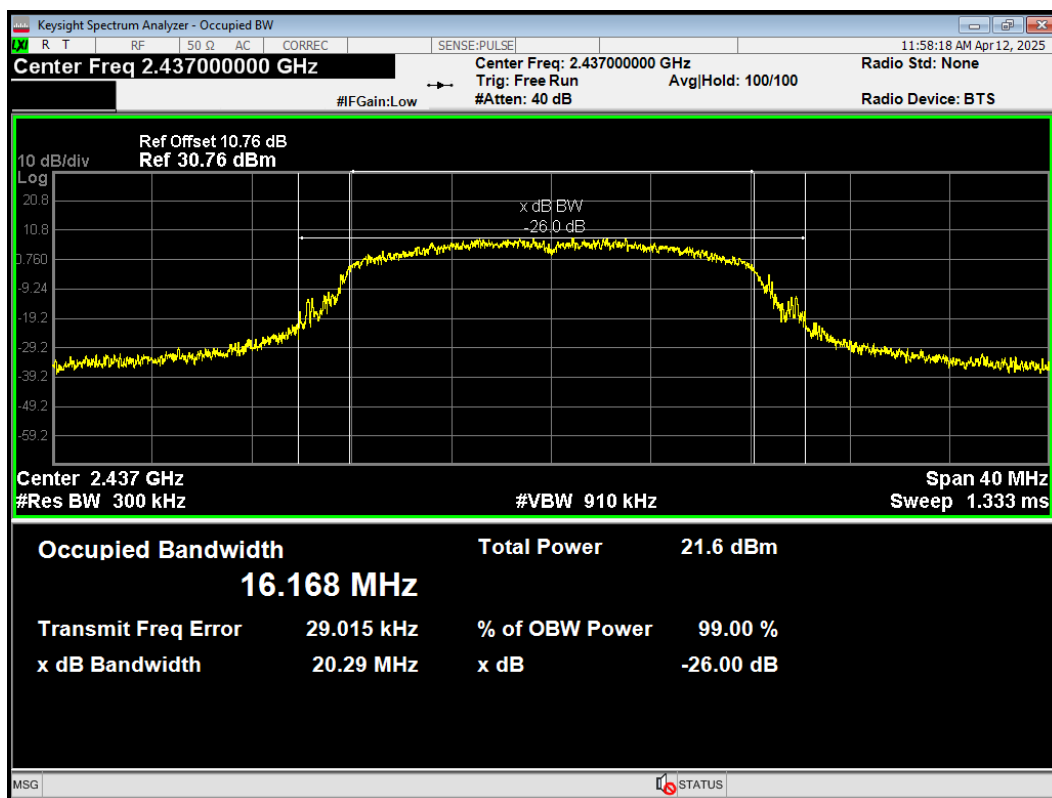
OBW 802.11b 2462MHz



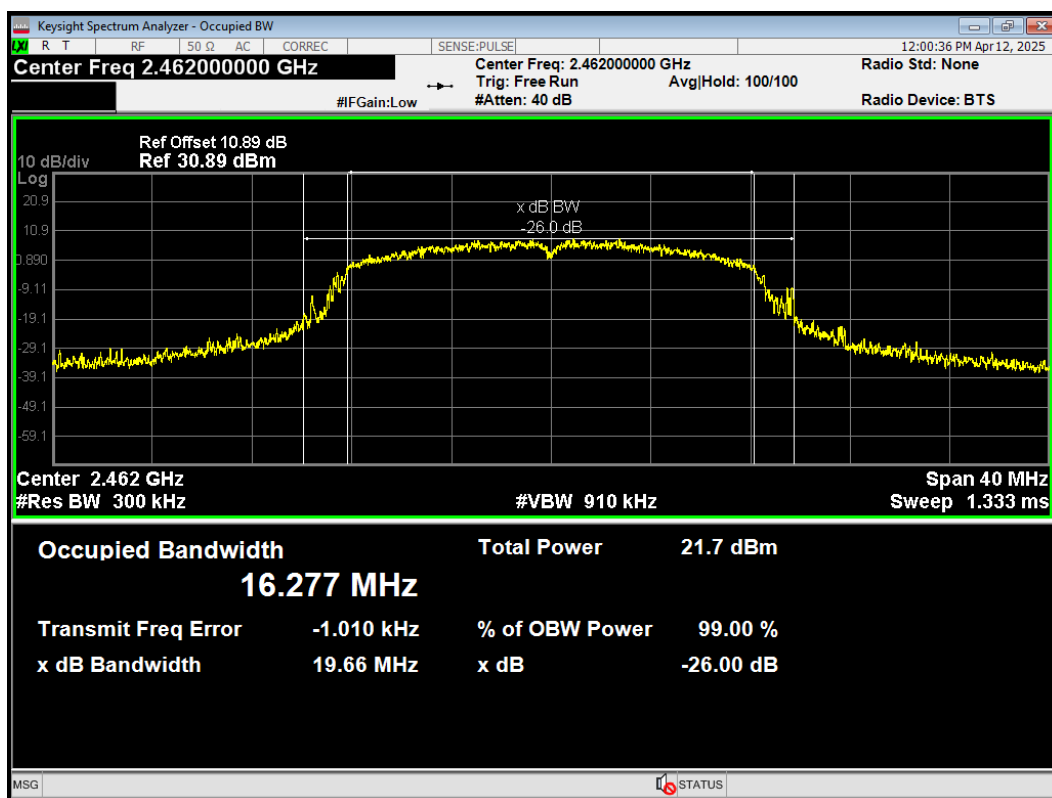
OBW 802.11g 2412MHz



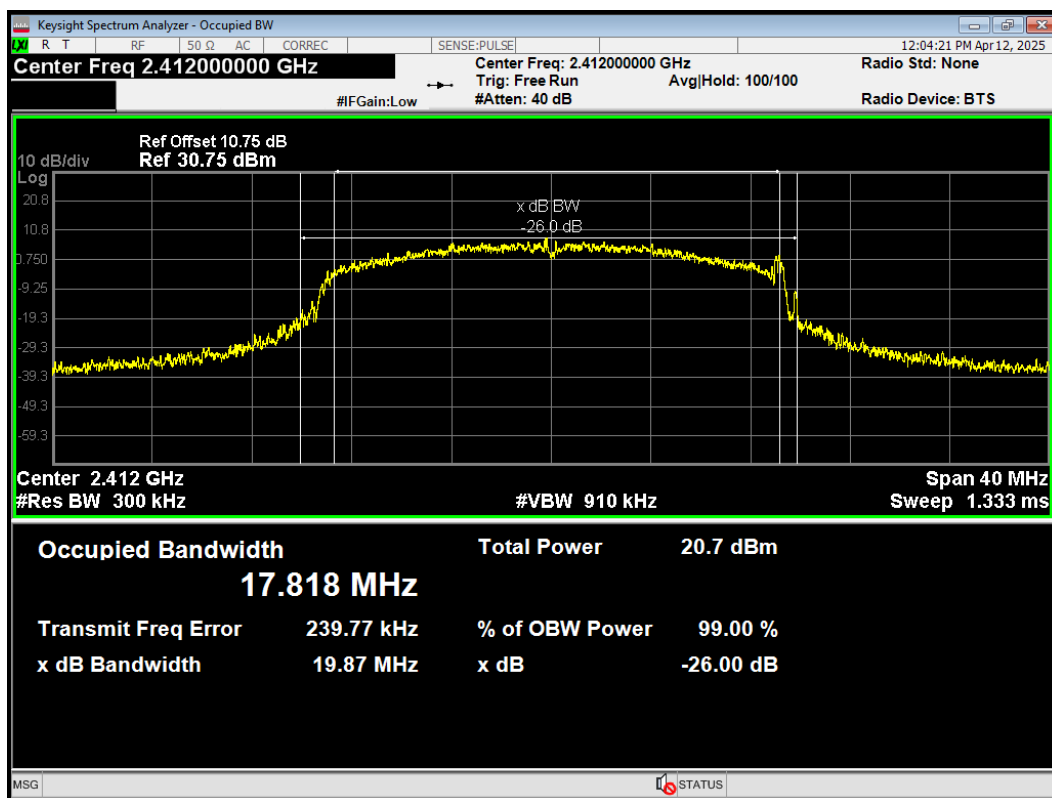
OBW 802.11g 2437MHz



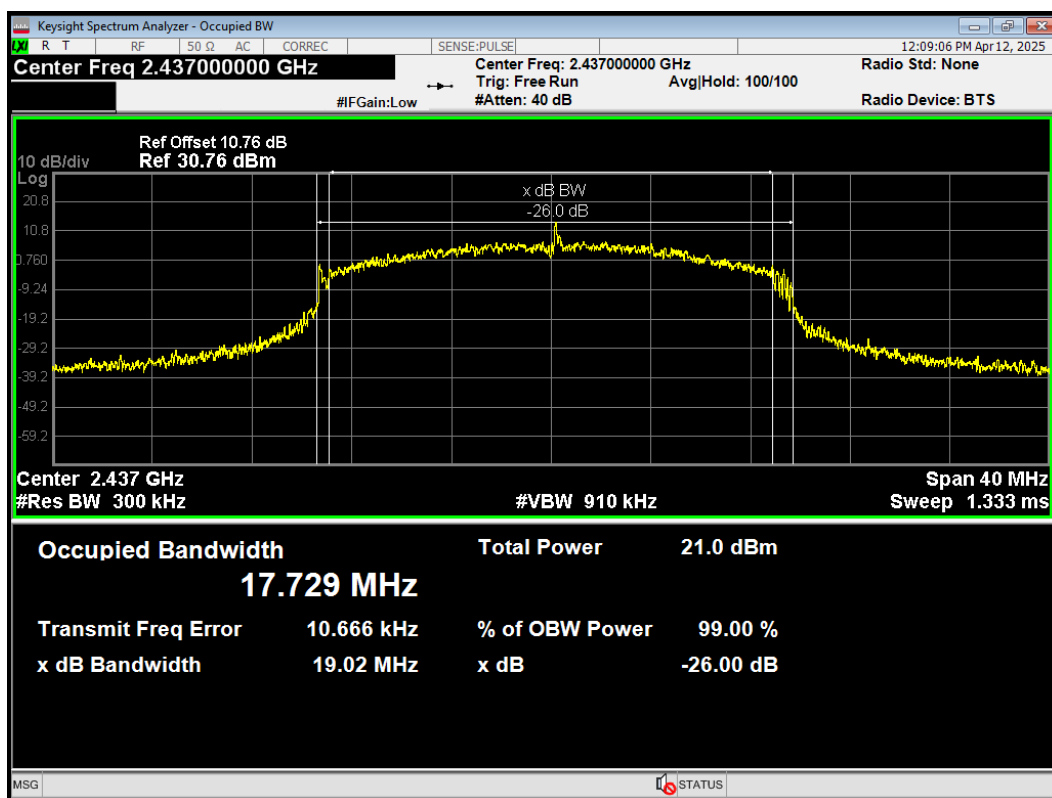
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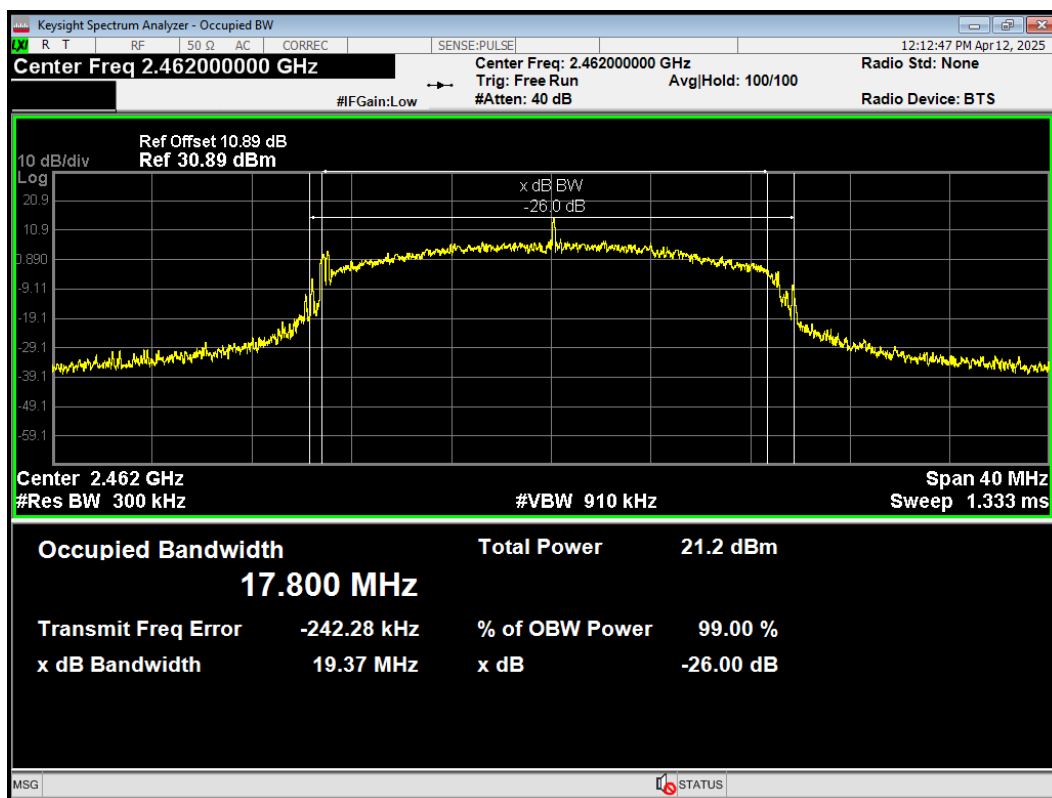
OBW 802.11n(HT20) 2412MHz



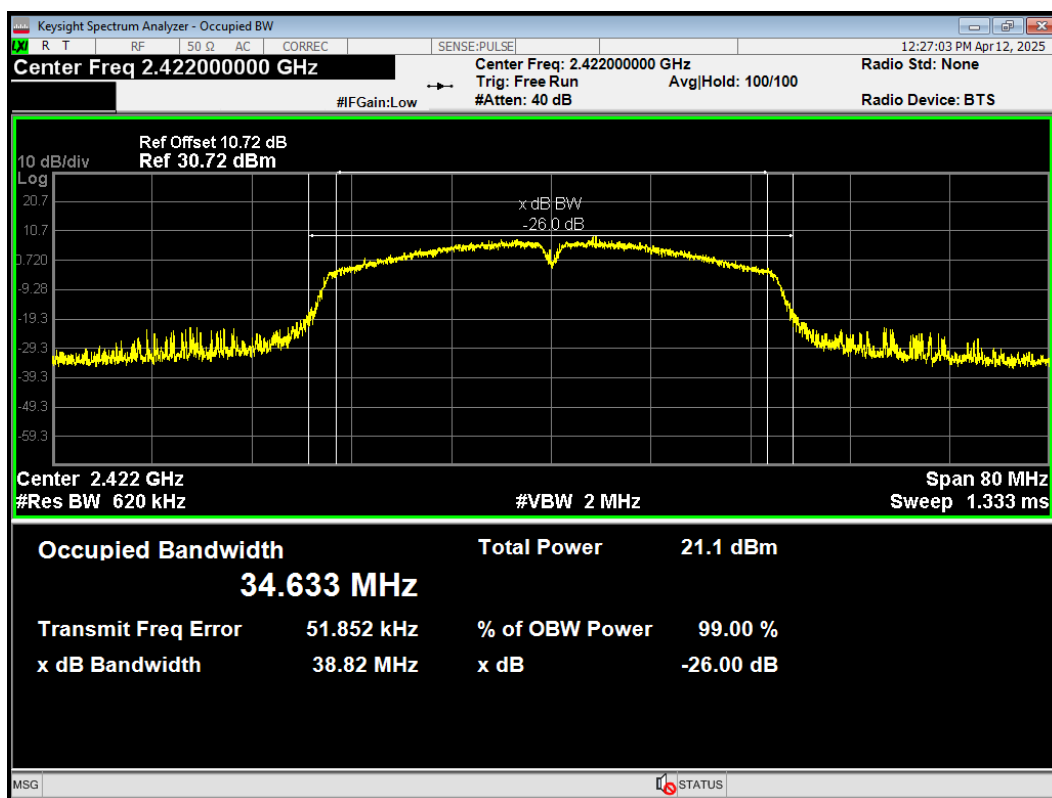
OBW 802.11n(HT20) 2437MHz



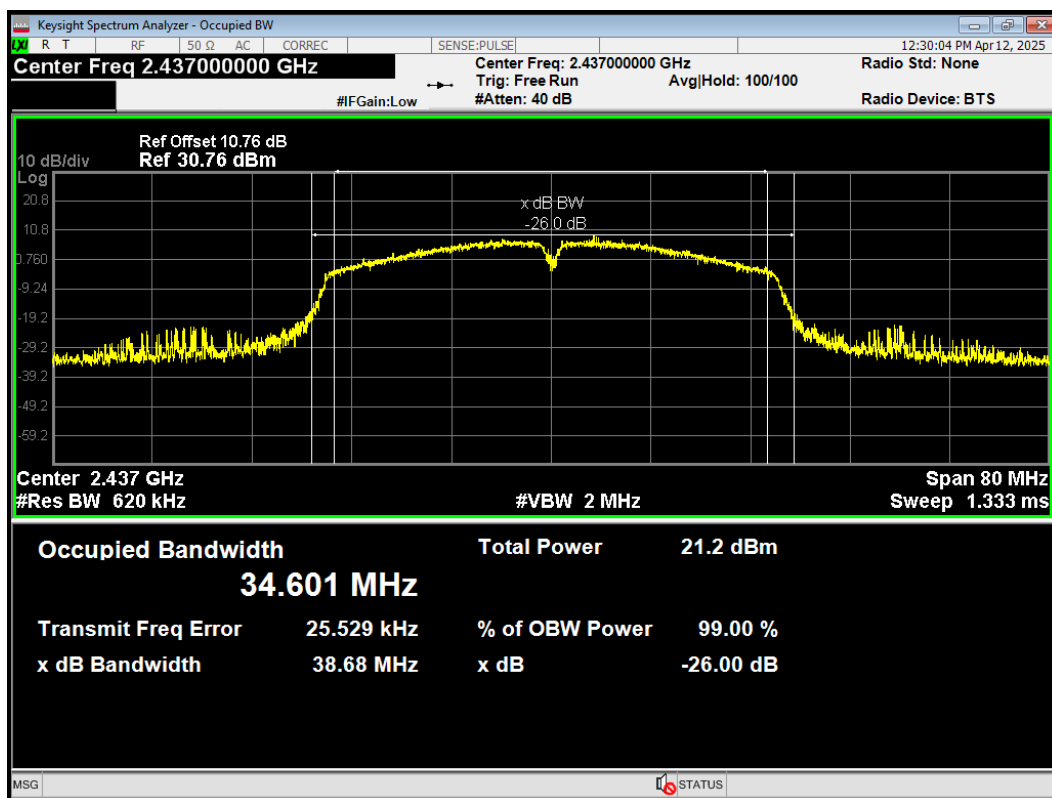
OBW 802.11n(HT20) 2462MHz



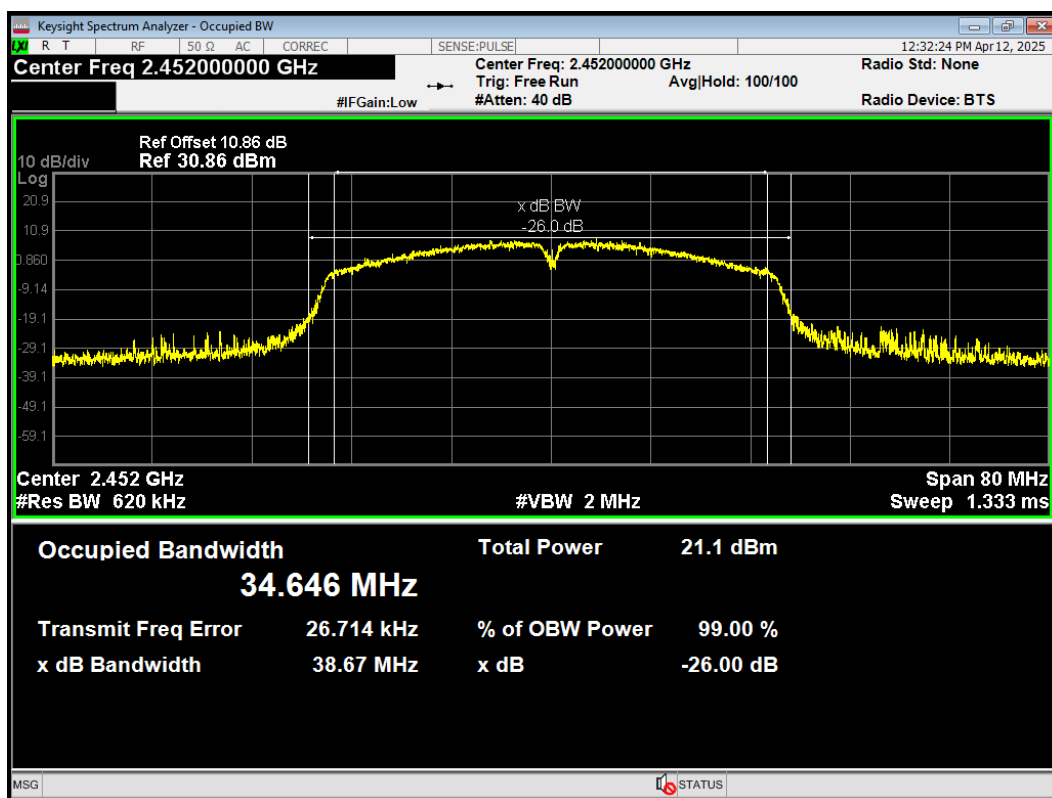
OBW 802.11n(HT40) 2422MHz



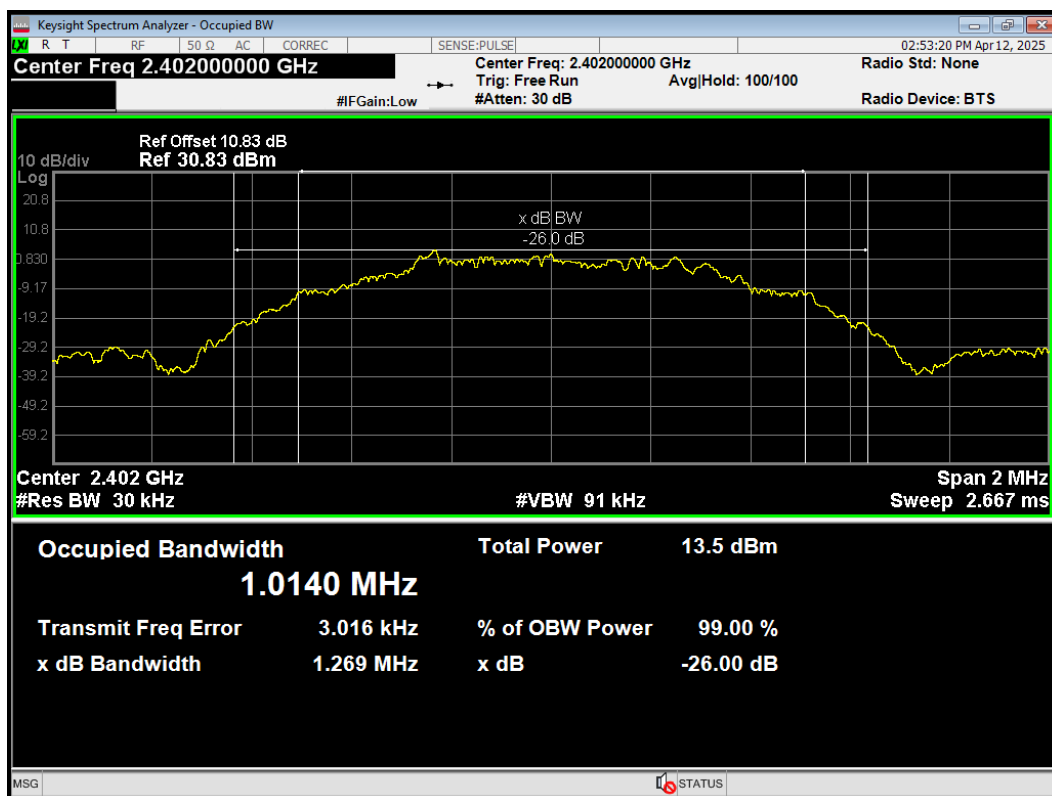
OBW 802.11n(HT40) 2437MHz



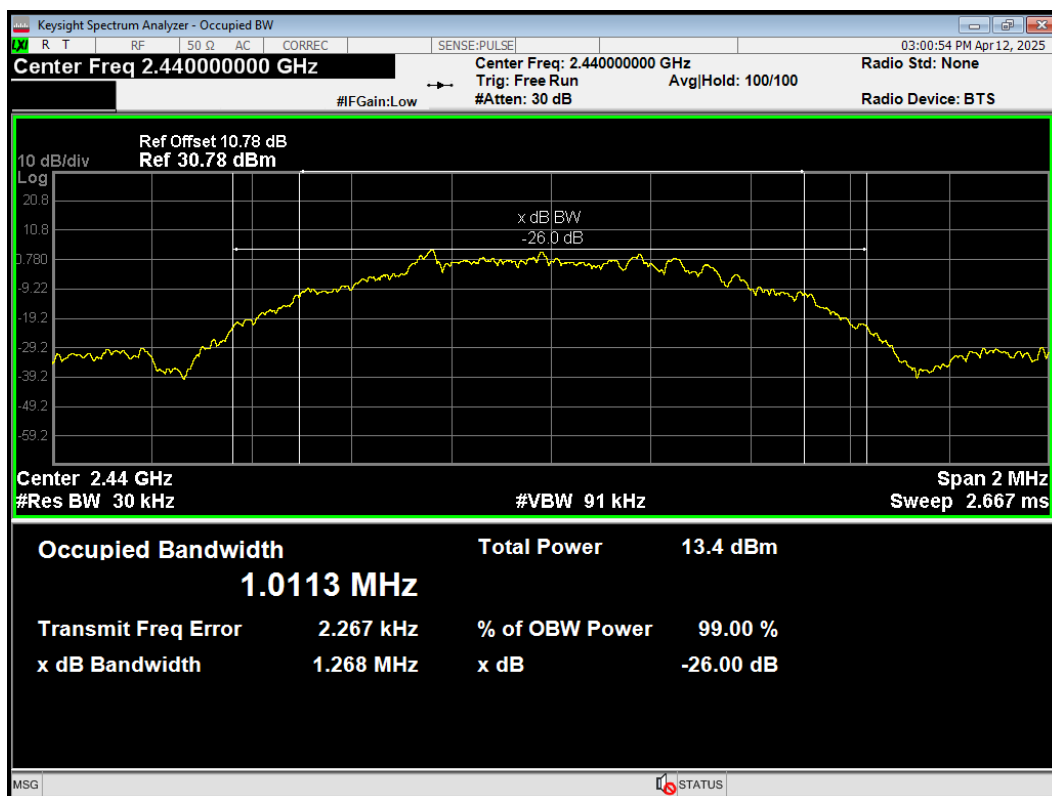
OBW 802.11n(HT40) 2452MHz



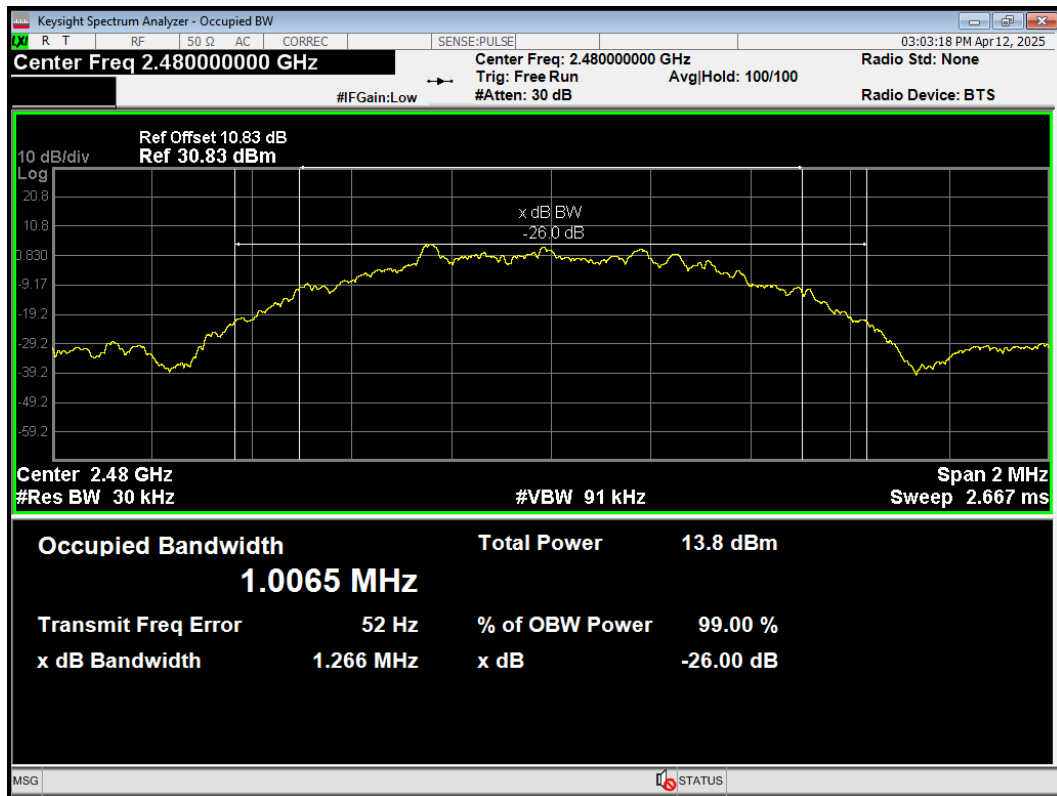
OBW Bluetooth LE (S=2) 2402MHz



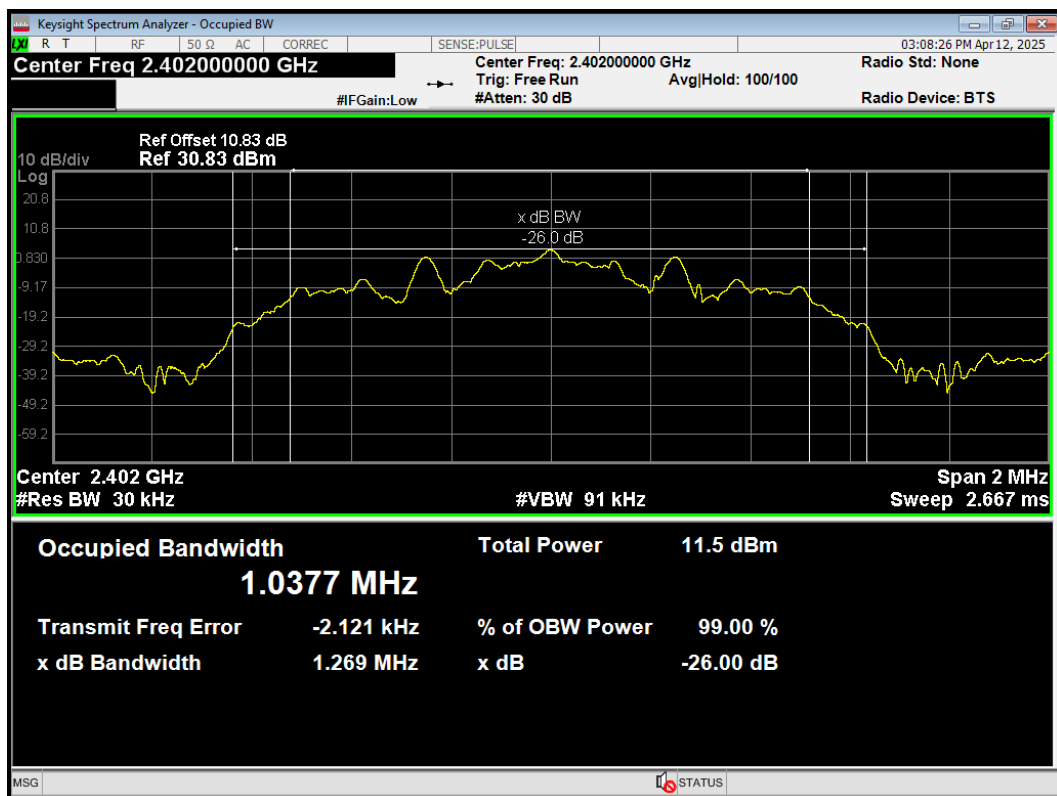
OBW Bluetooth LE (S=2) 2440MHz



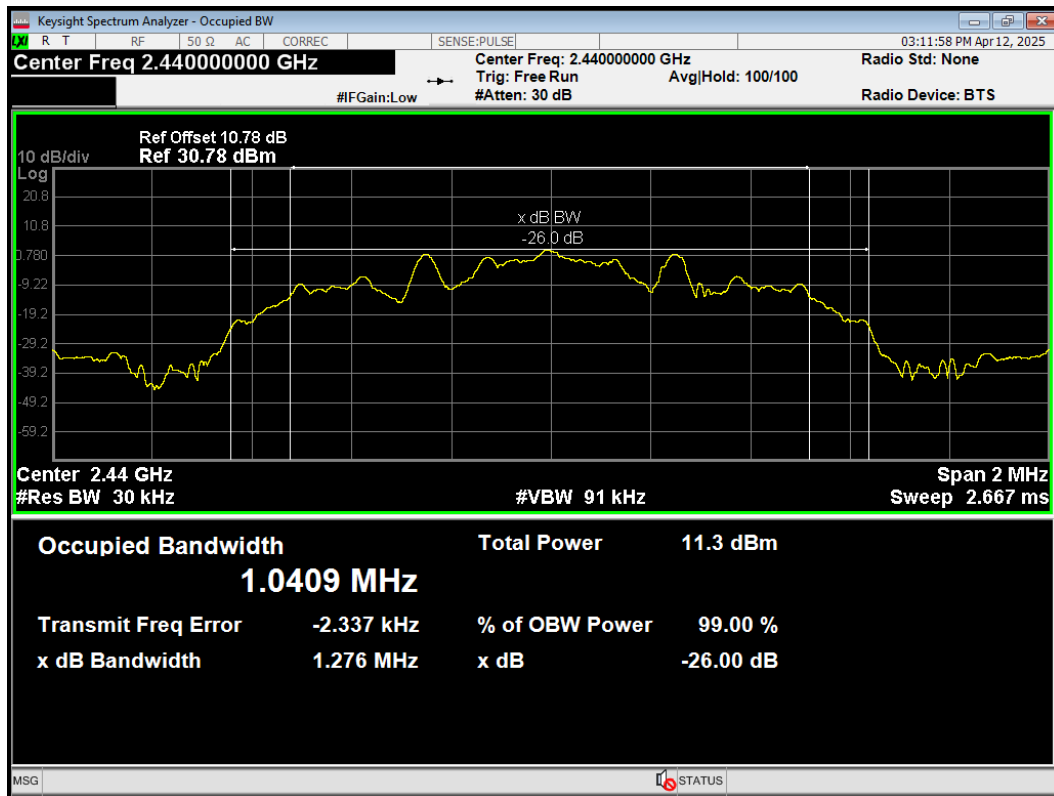
OBW Bluetooth LE (S=2) 2480MHz



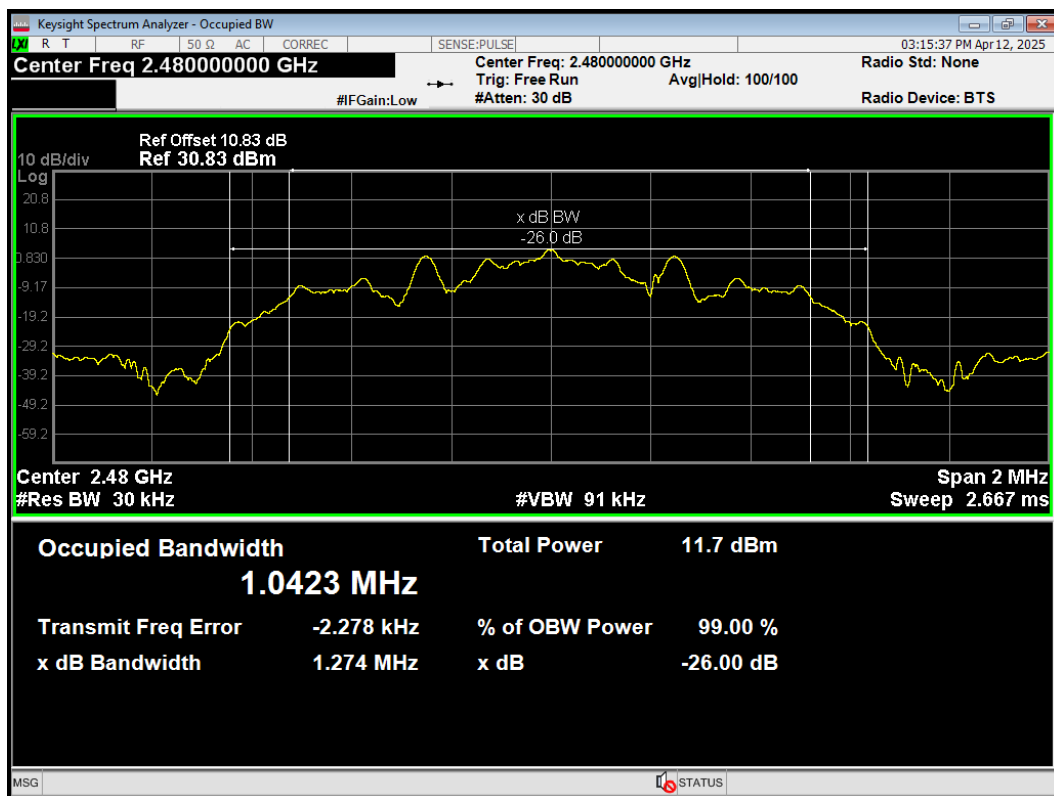
OBW Bluetooth LE (S=8) 2402MHz



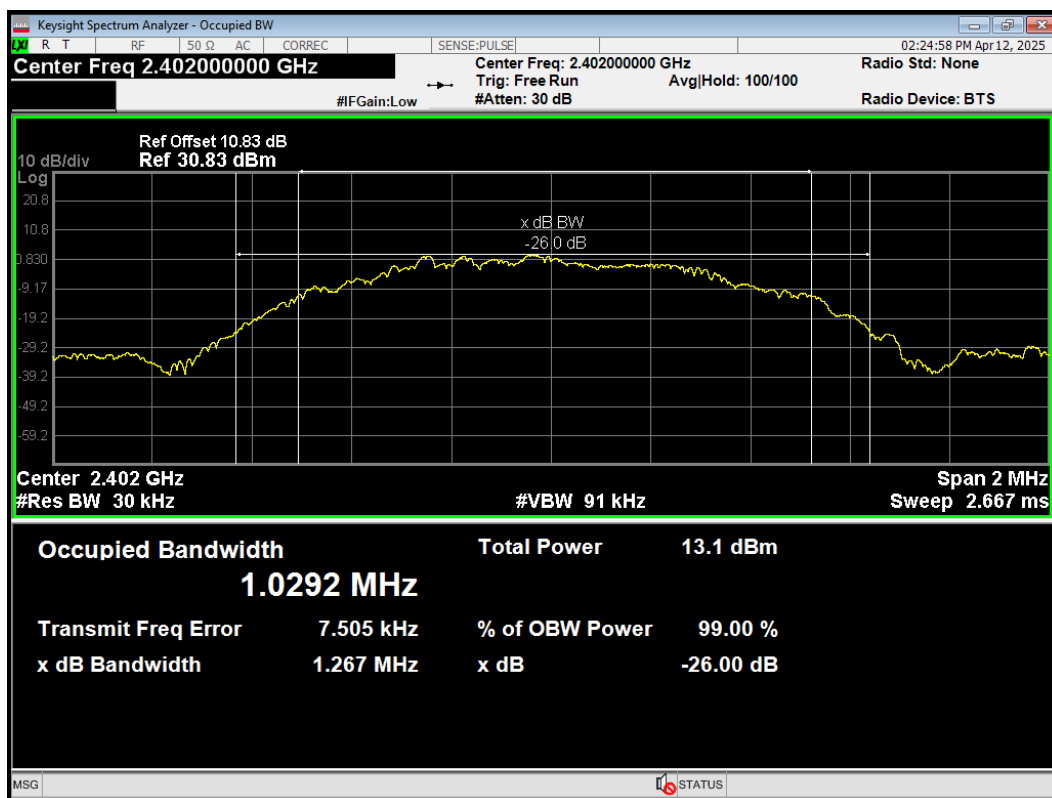
OBW Bluetooth LE (S=8) 2440MHz



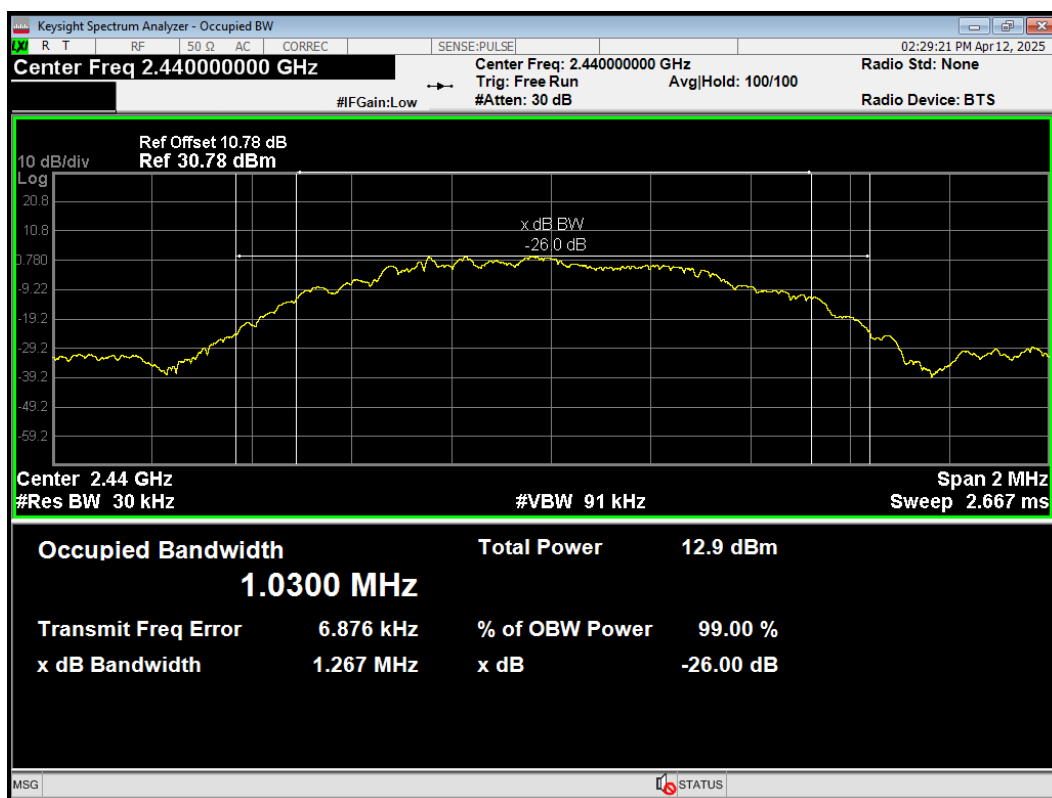
OBW Bluetooth LE (S=8) 2480MHz



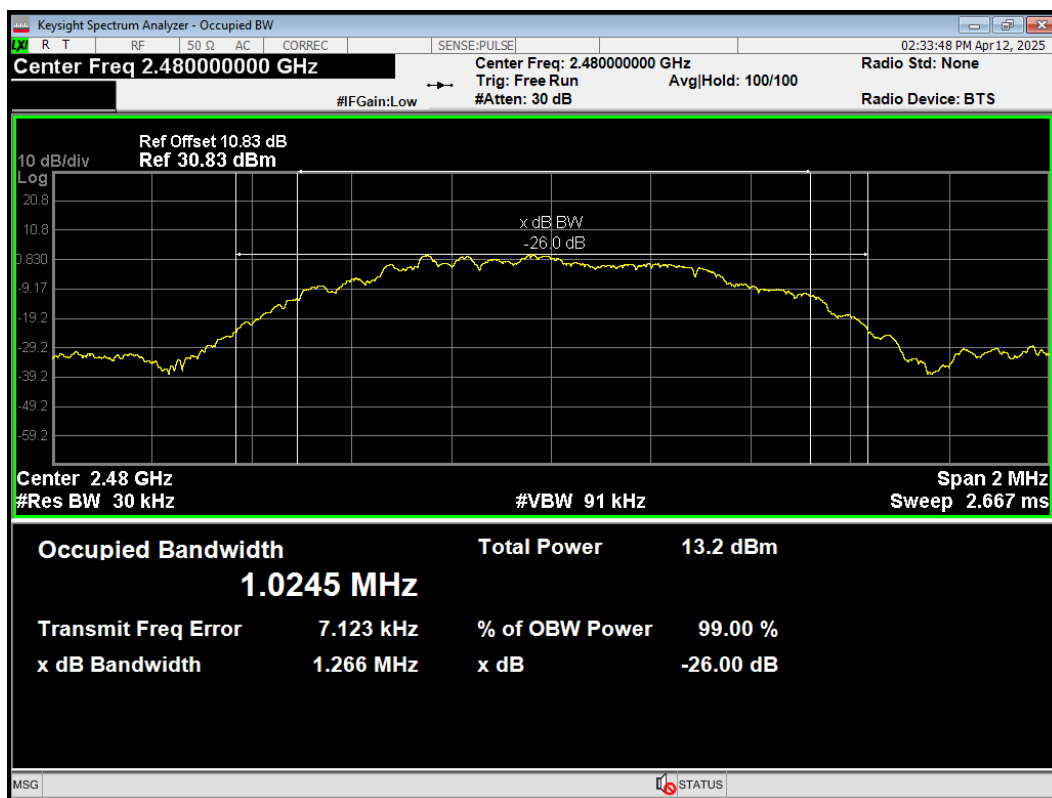
OBW Bluetooth LE (1M) 2402MHz



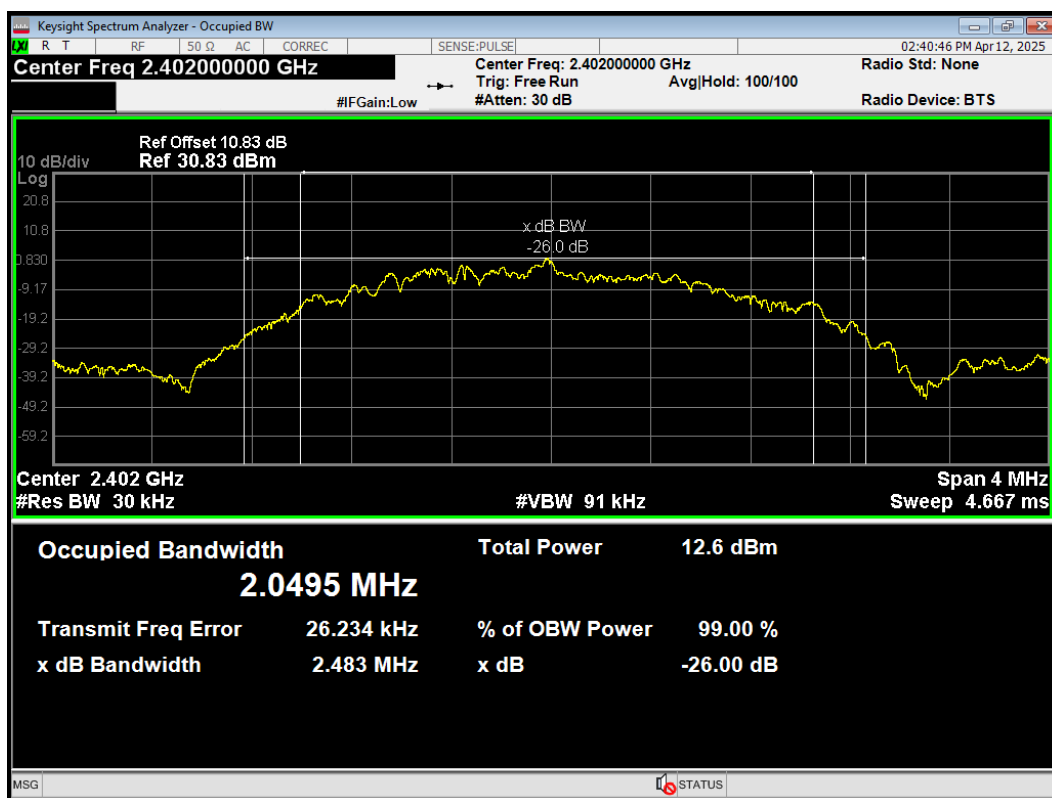
OBW Bluetooth LE (1M) 2440MHz



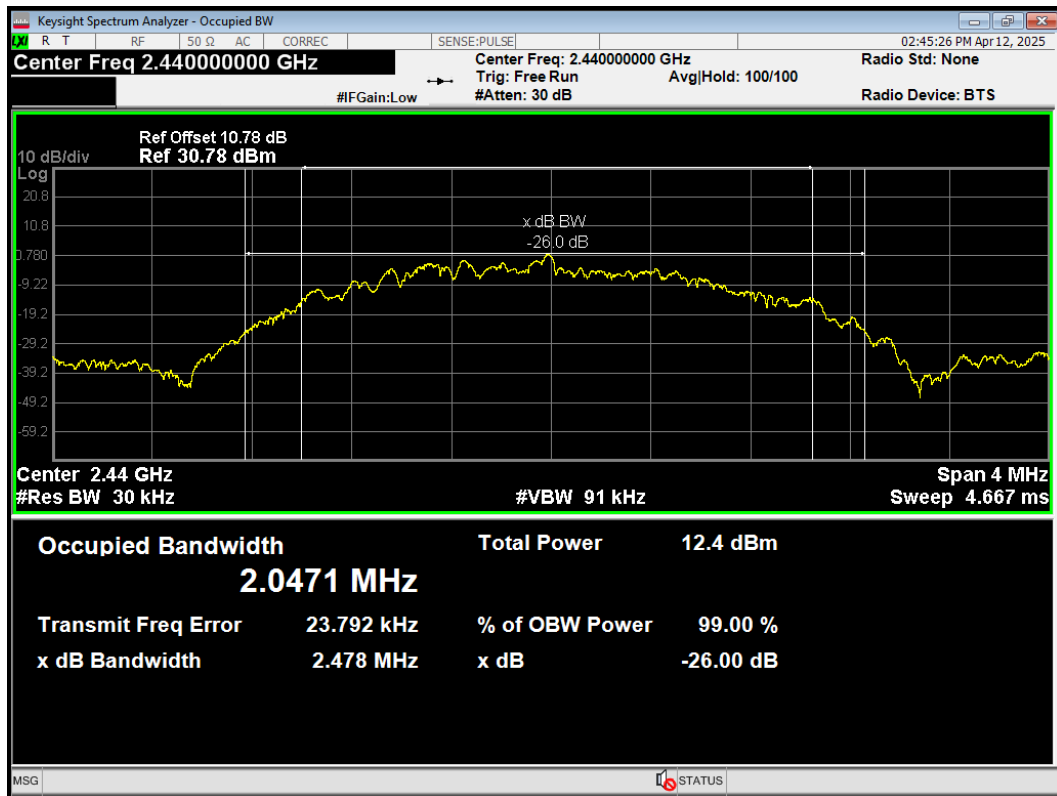
OBW Bluetooth LE (1M) 2480MHz



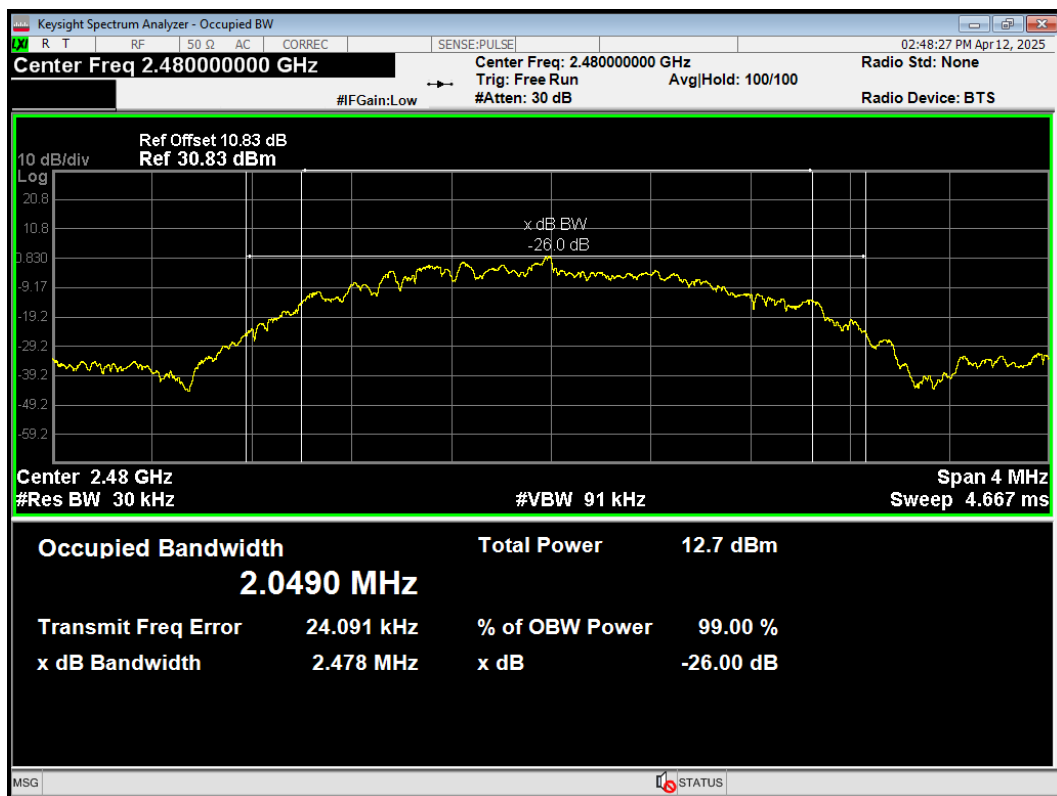
OBW Bluetooth LE (2M) 2402MHz



OBW Bluetooth LE (2M) 2440MHz

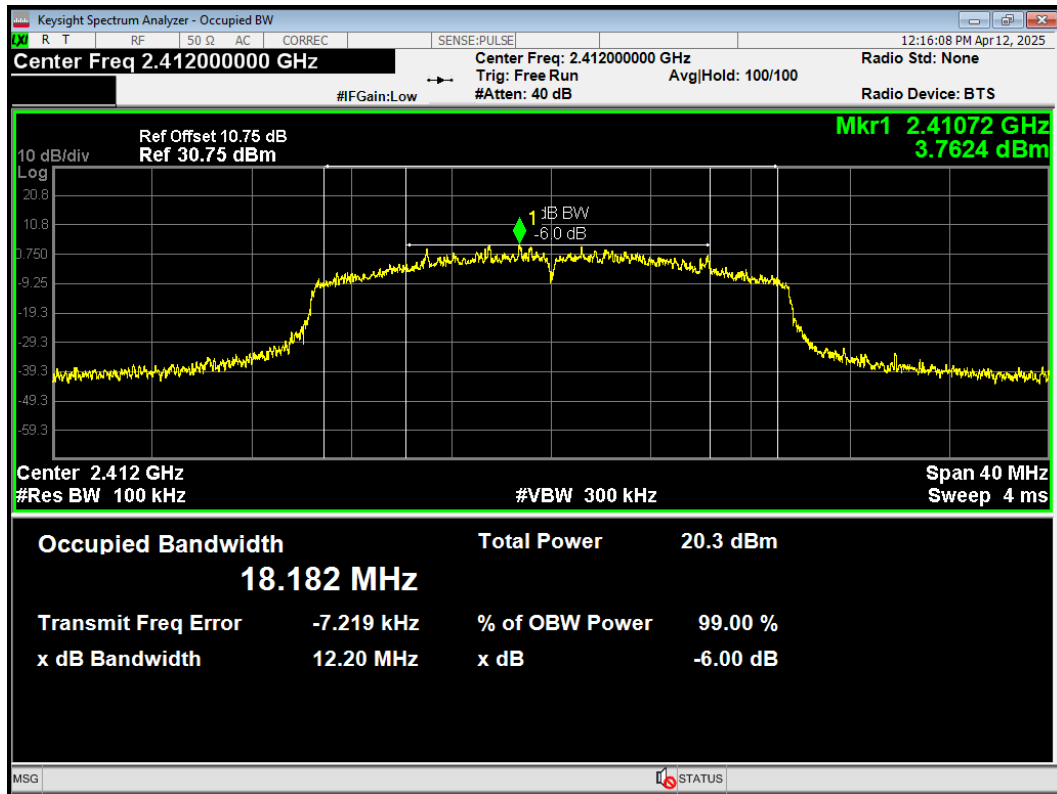


OBW Bluetooth LE (2M) 2480MHz

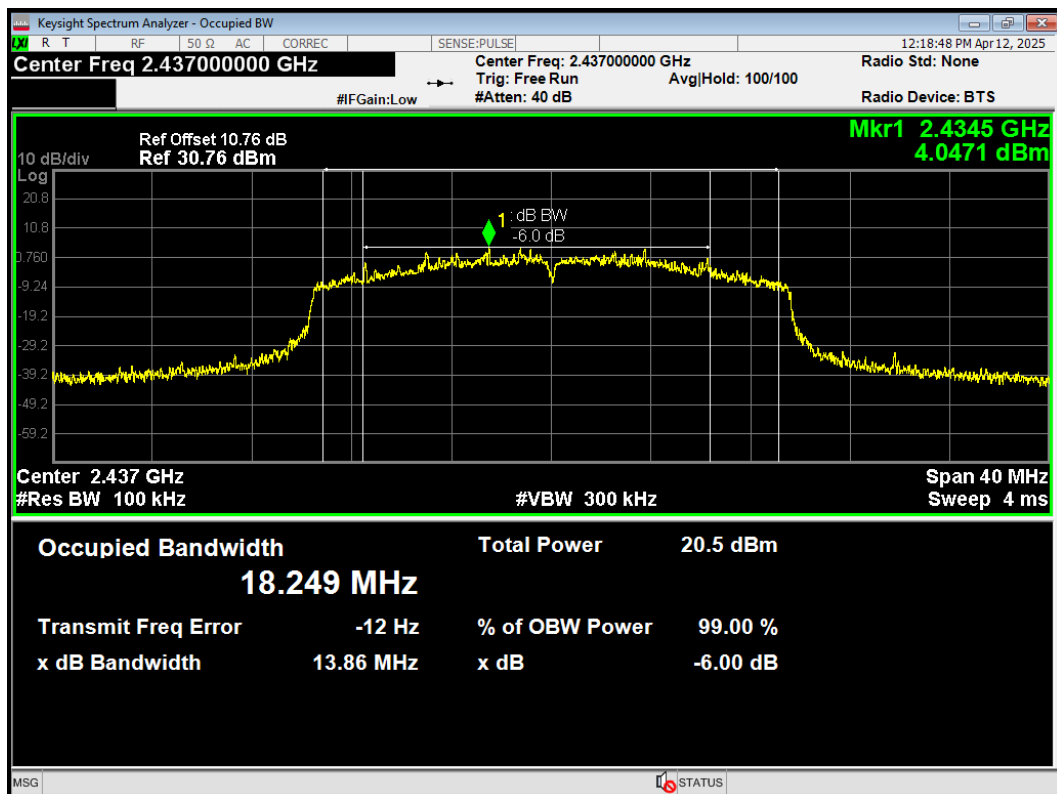


6 dB bandwidth

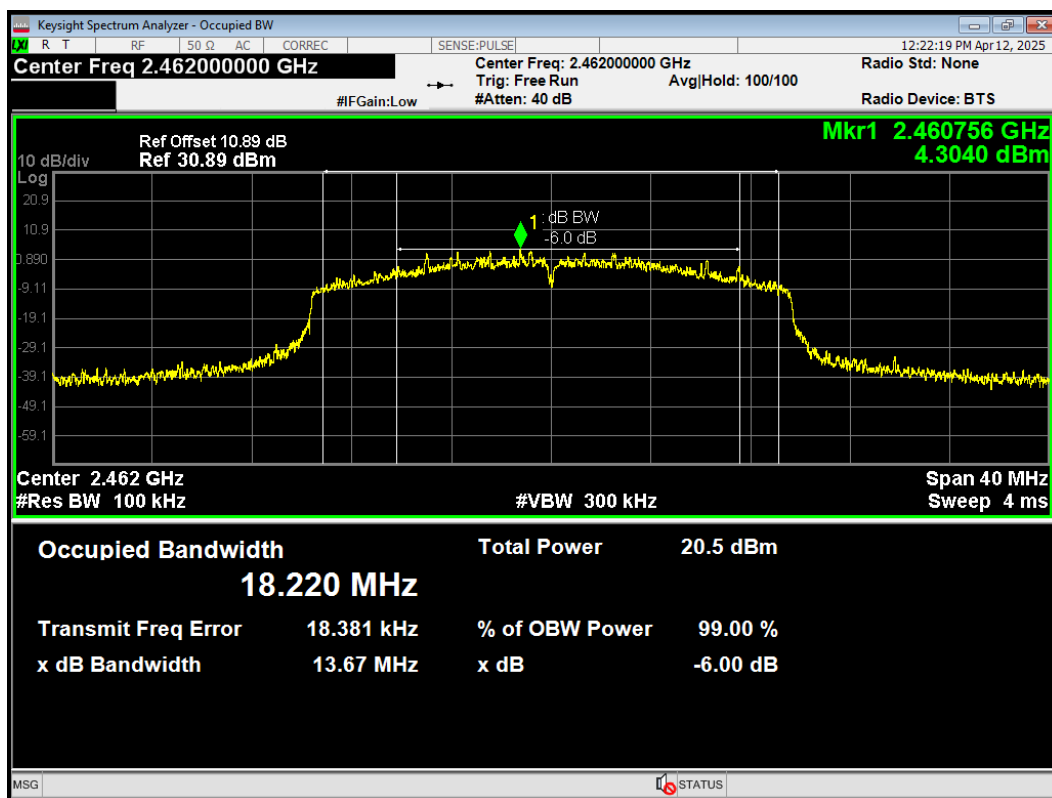
-6dB Bandwidth 802.11ax(HE20) 2412MHz



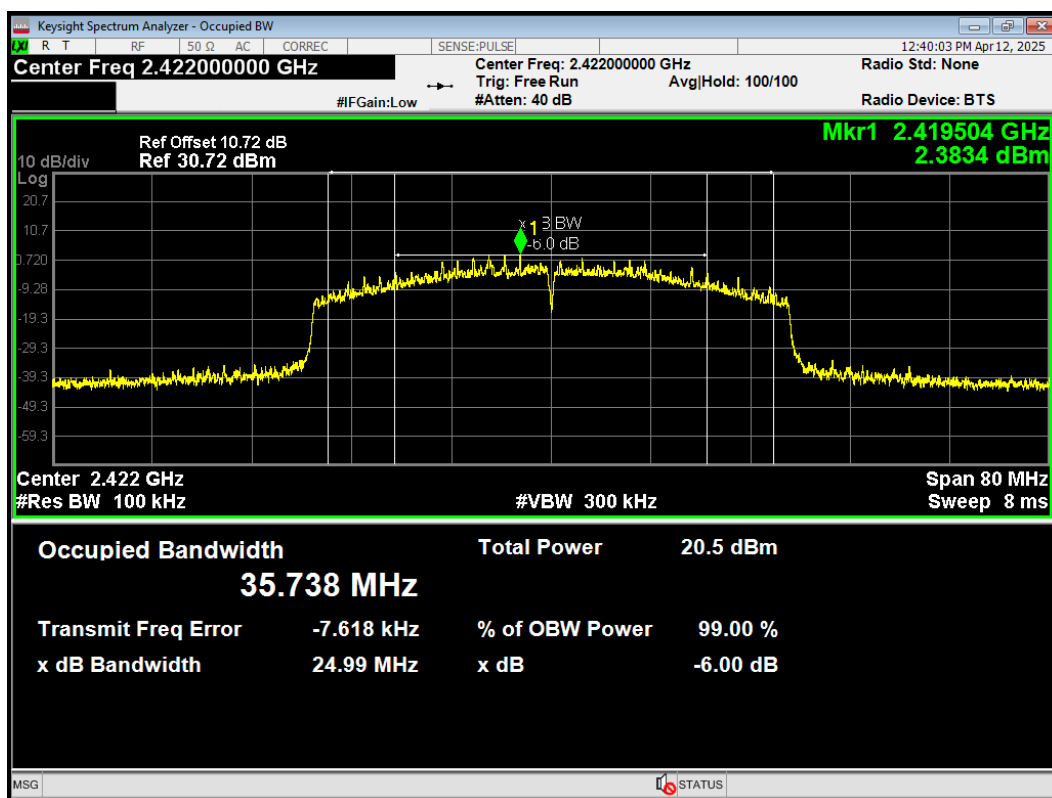
-6dB Bandwidth 802.11ax(HE20) 2437MHz



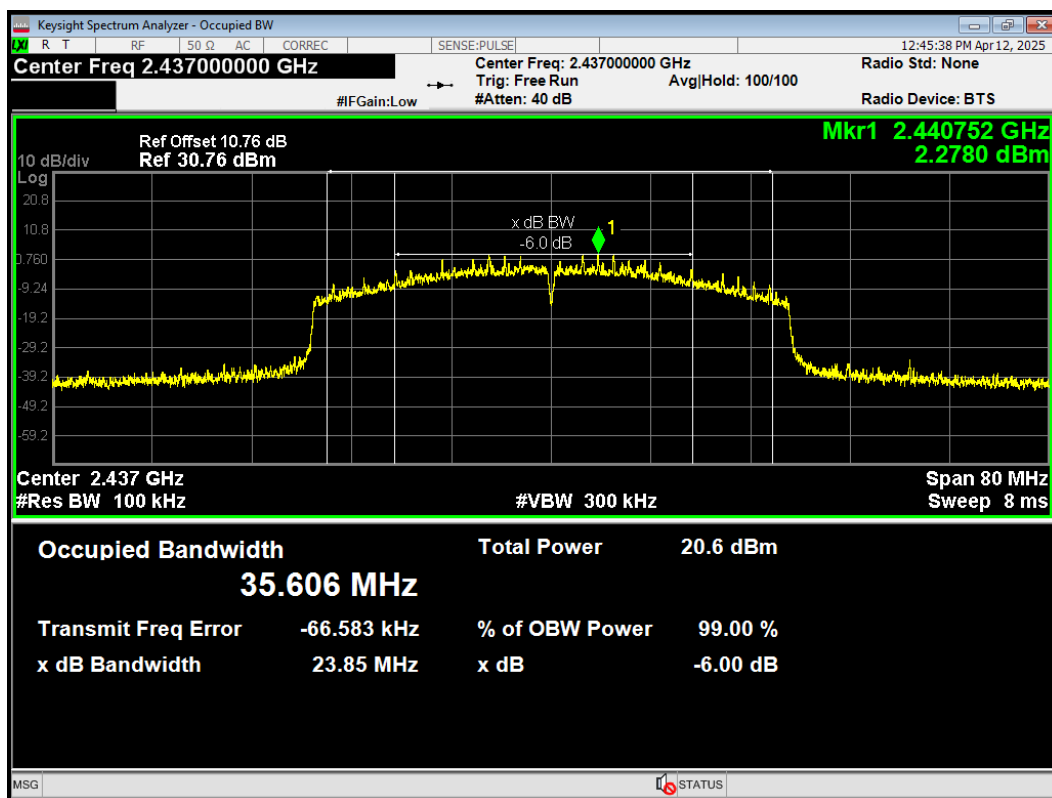
-6dB Bandwidth 802.11ax(HE20) 2462MHz



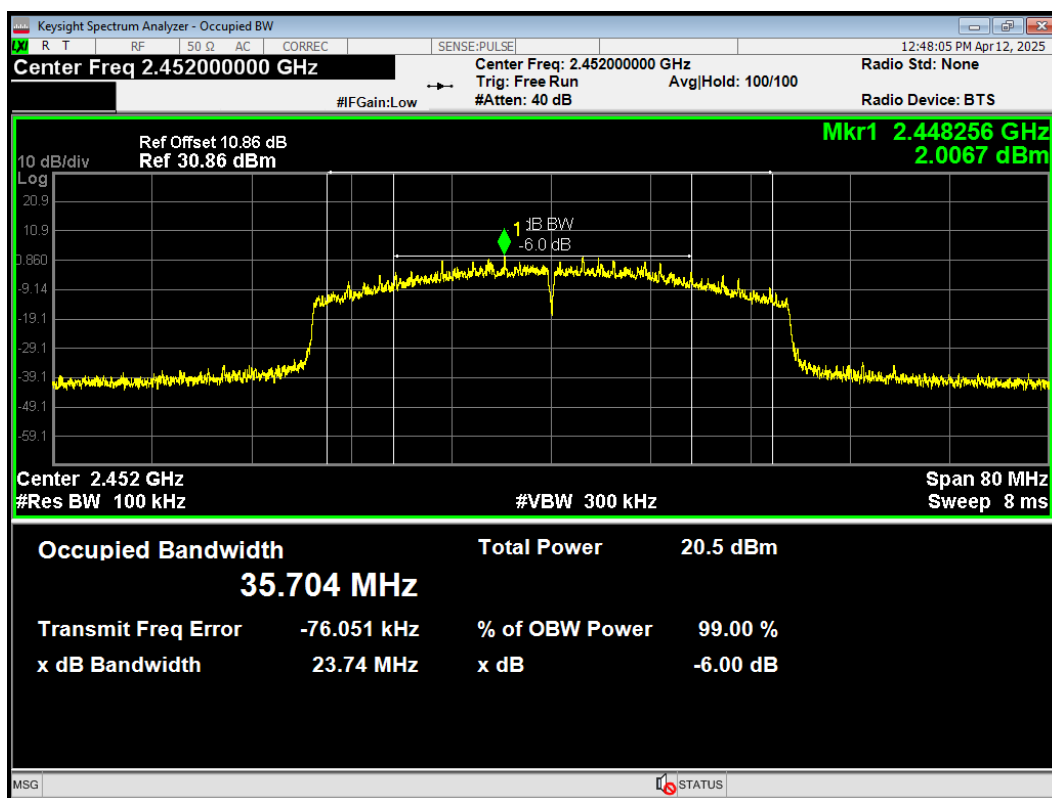
-6dB Bandwidth 802.11ax(HE40) 2422MHz



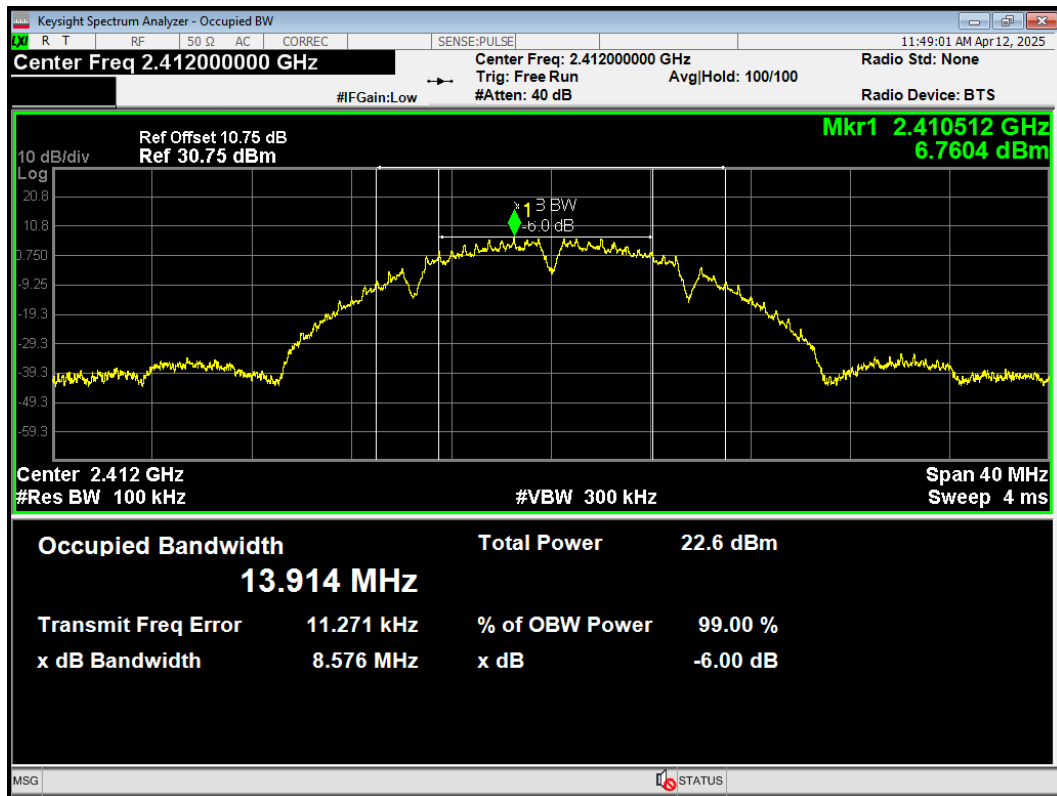
-6dB Bandwidth 802.11ax(HE40) 2437MHz



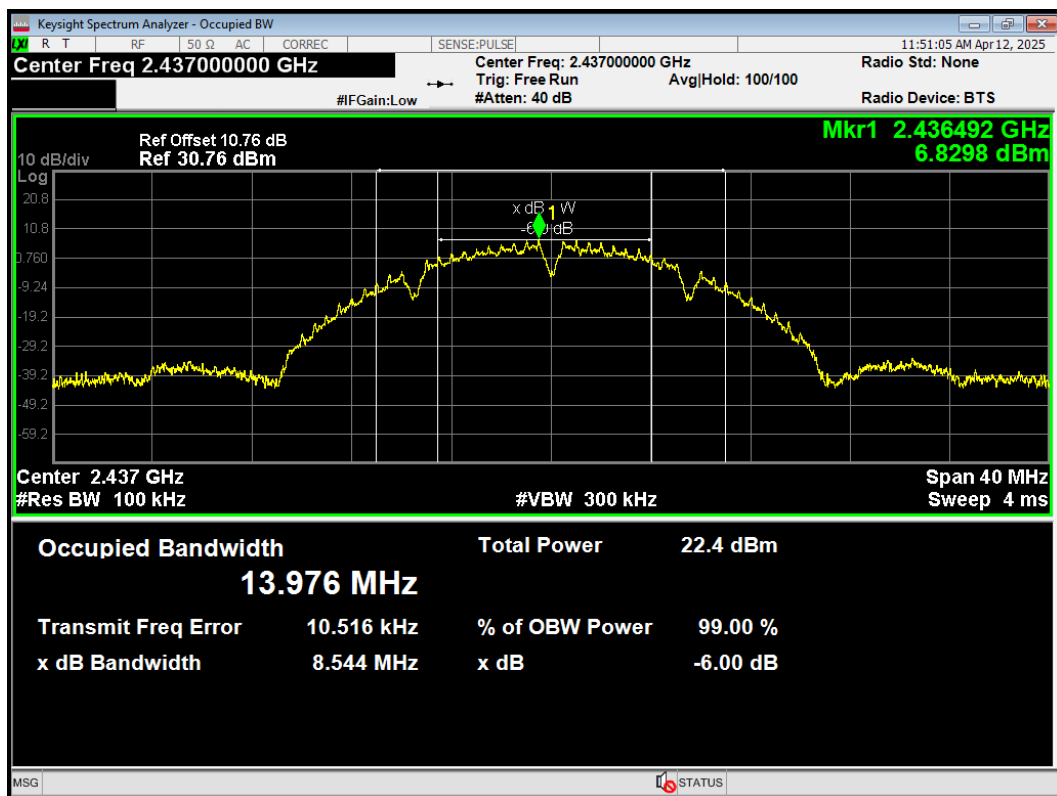
-6dB Bandwidth 802.11ax(HE40) 2452MHz



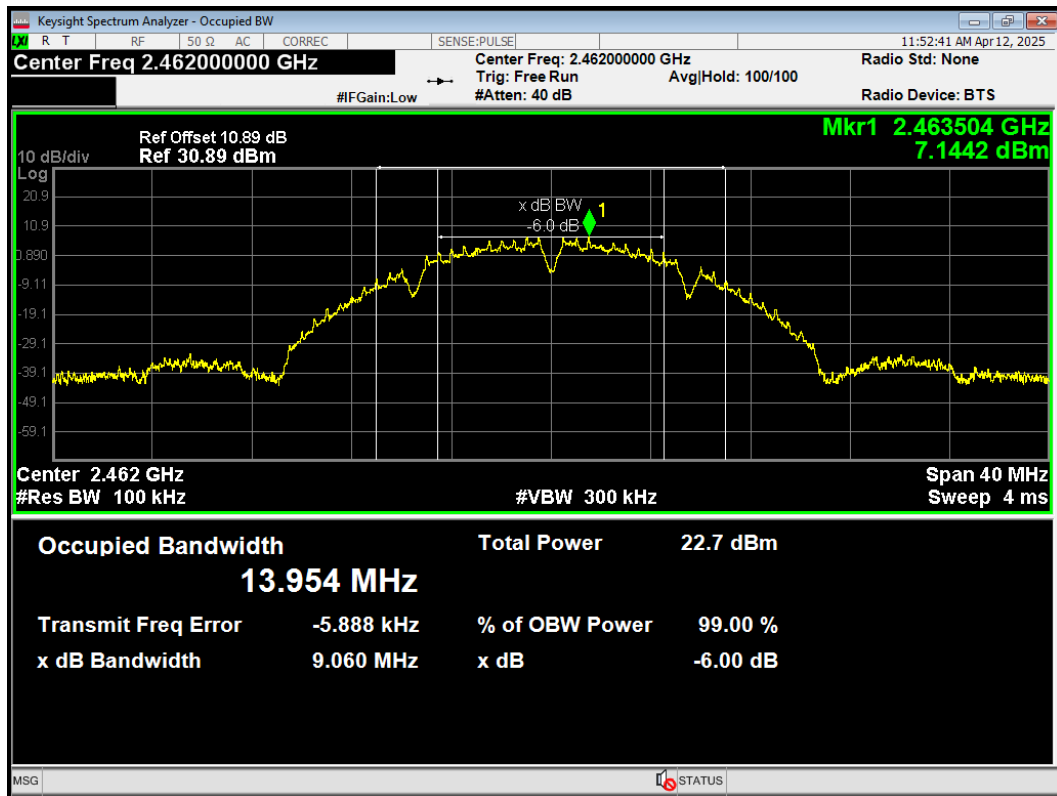
-6dB Bandwidth 802.11b 2412MHz



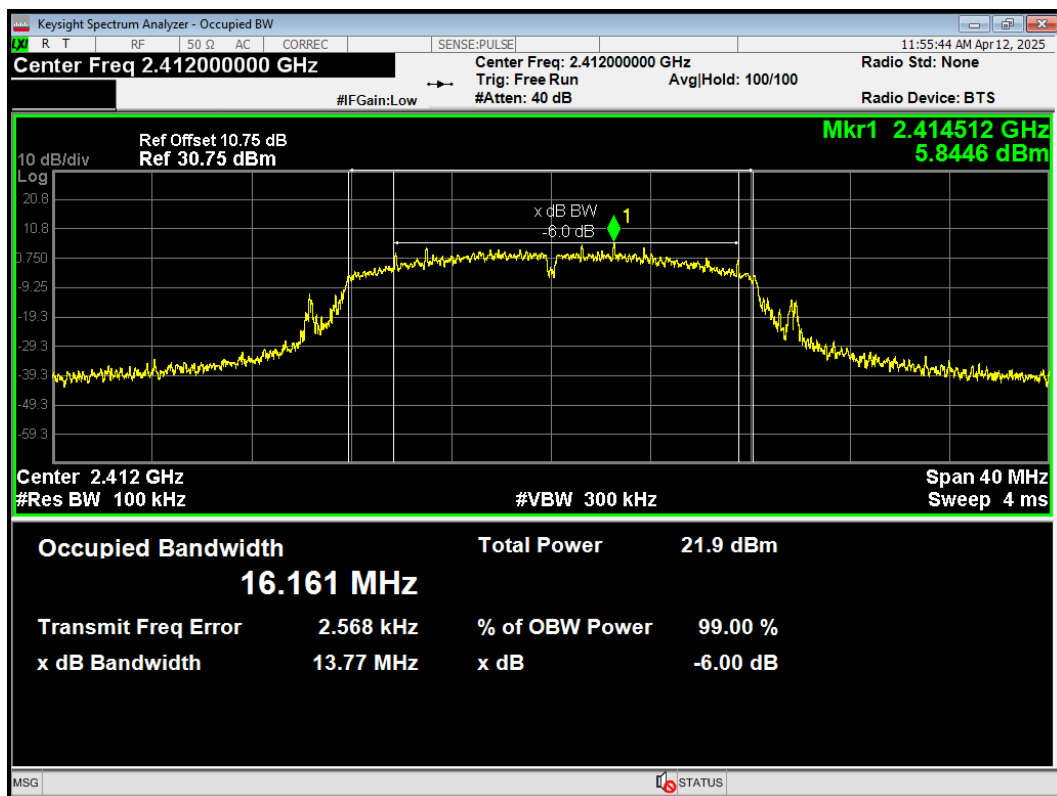
-6dB Bandwidth 802.11b 2437MHz



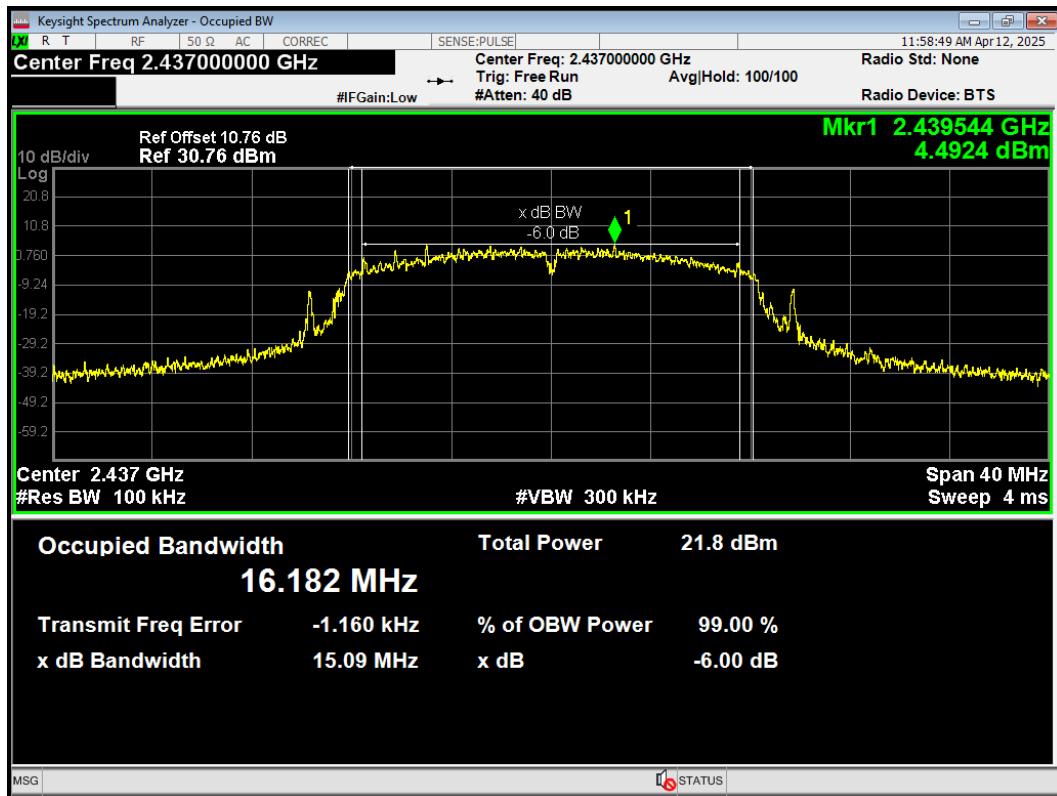
-6dB Bandwidth 802.11b 2462MHz



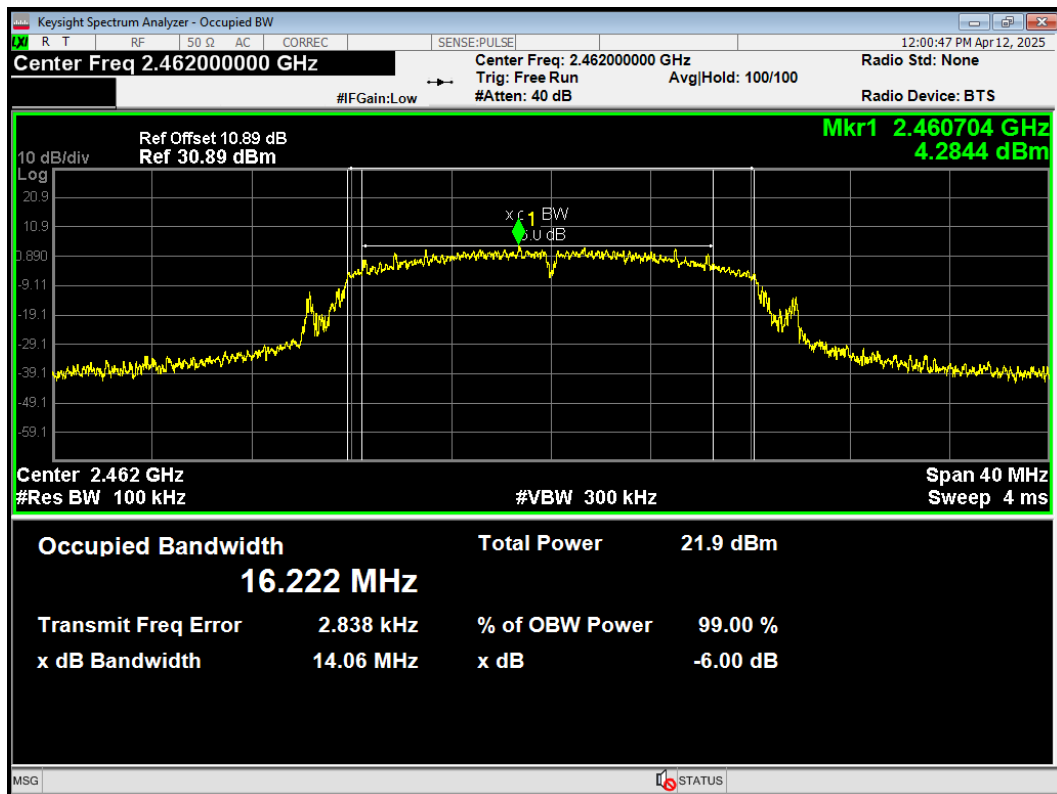
-6dB Bandwidth 802.11g 2412MHz



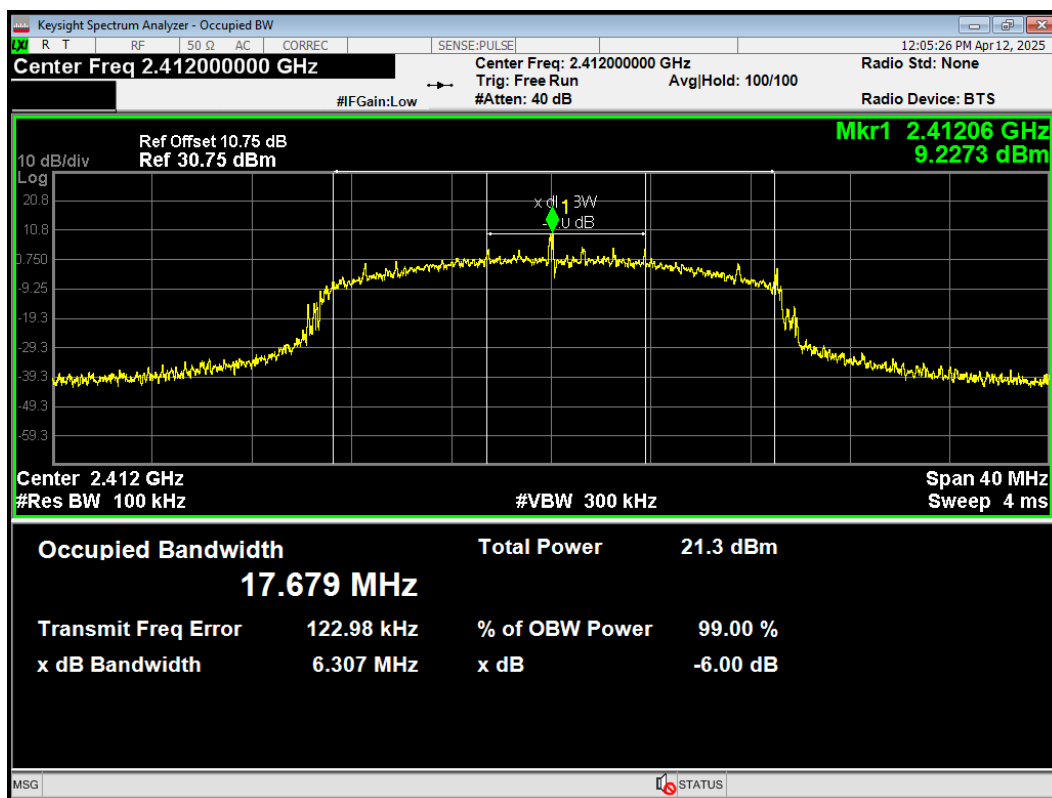
-6dB Bandwidth 802.11g 2437MHz



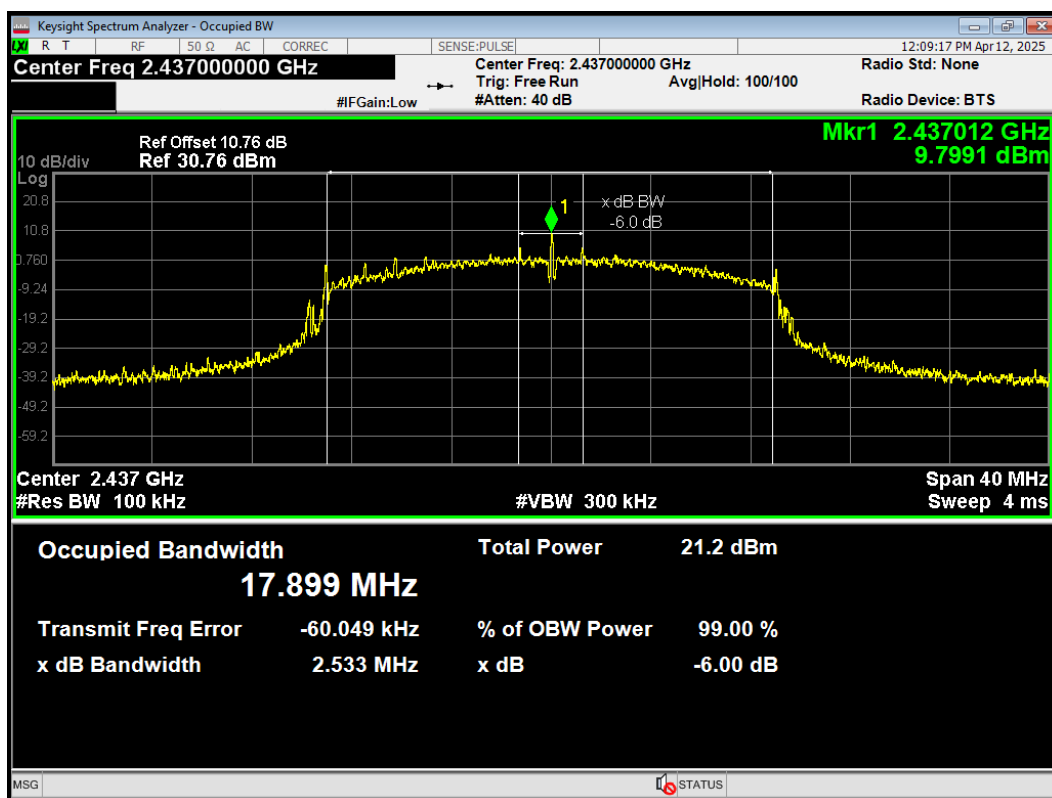
-6dB Bandwidth 802.11g 2462MHz



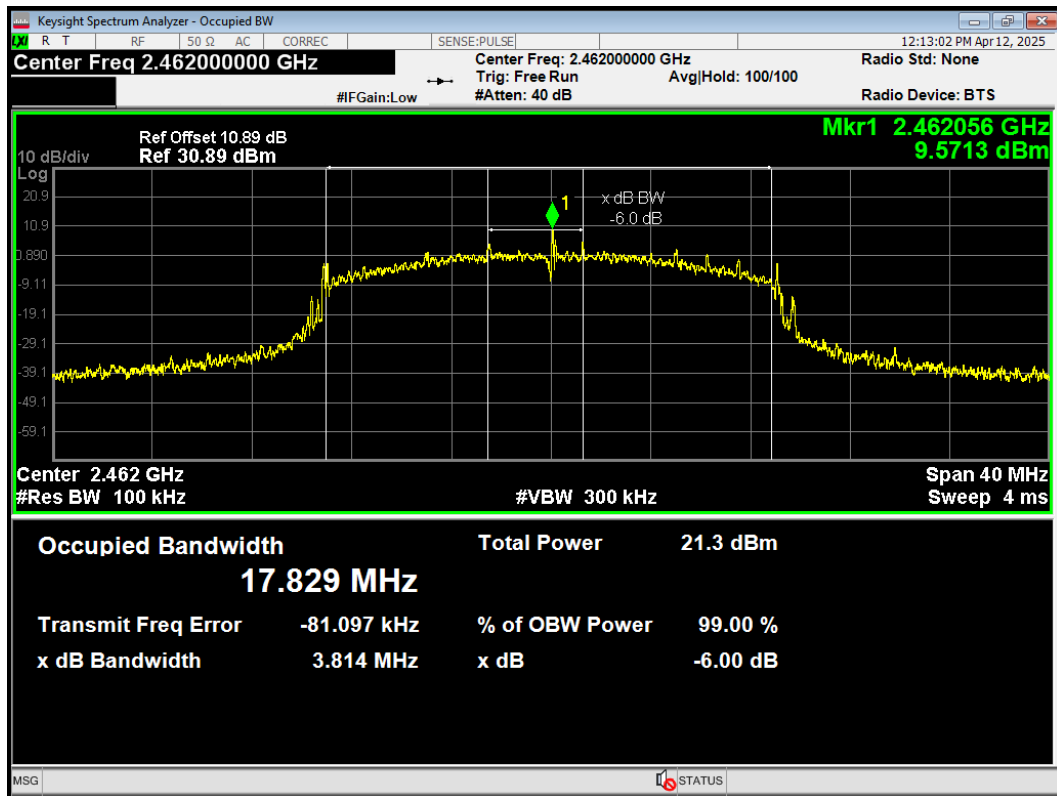
-6dB Bandwidth 802.11n(HT20) 2412MHz



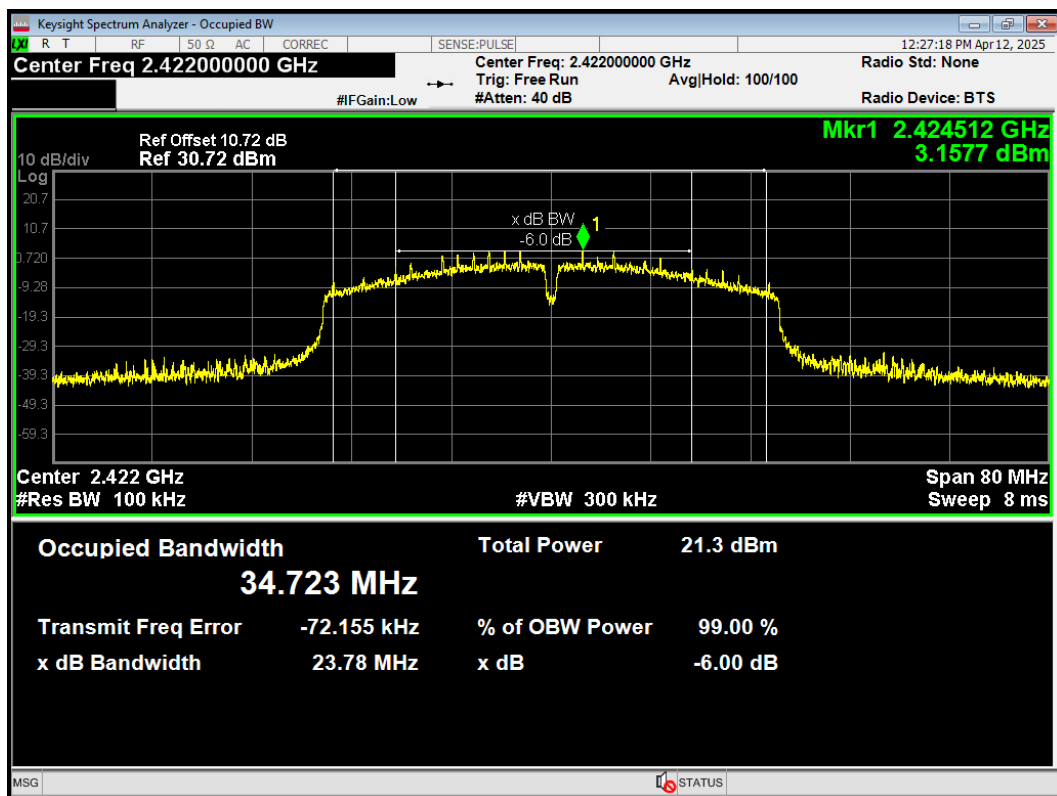
-6dB Bandwidth 802.11n(HT20) 2437MHz



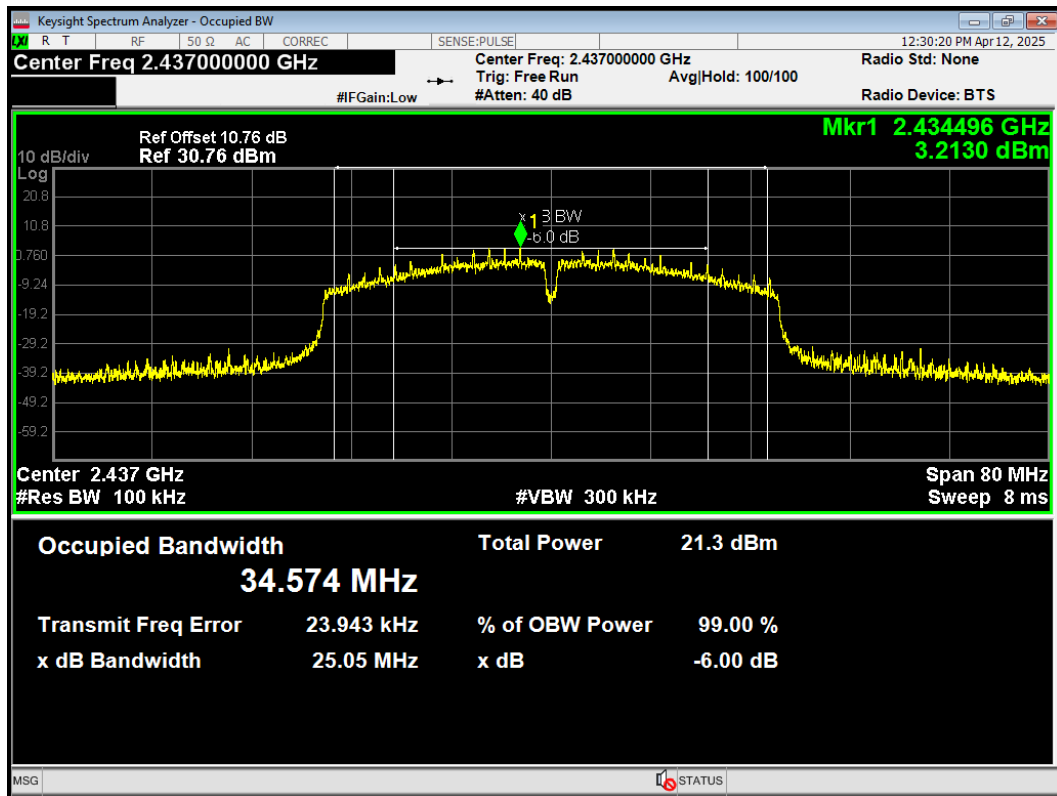
-6dB Bandwidth 802.11n(HT20) 2462MHz



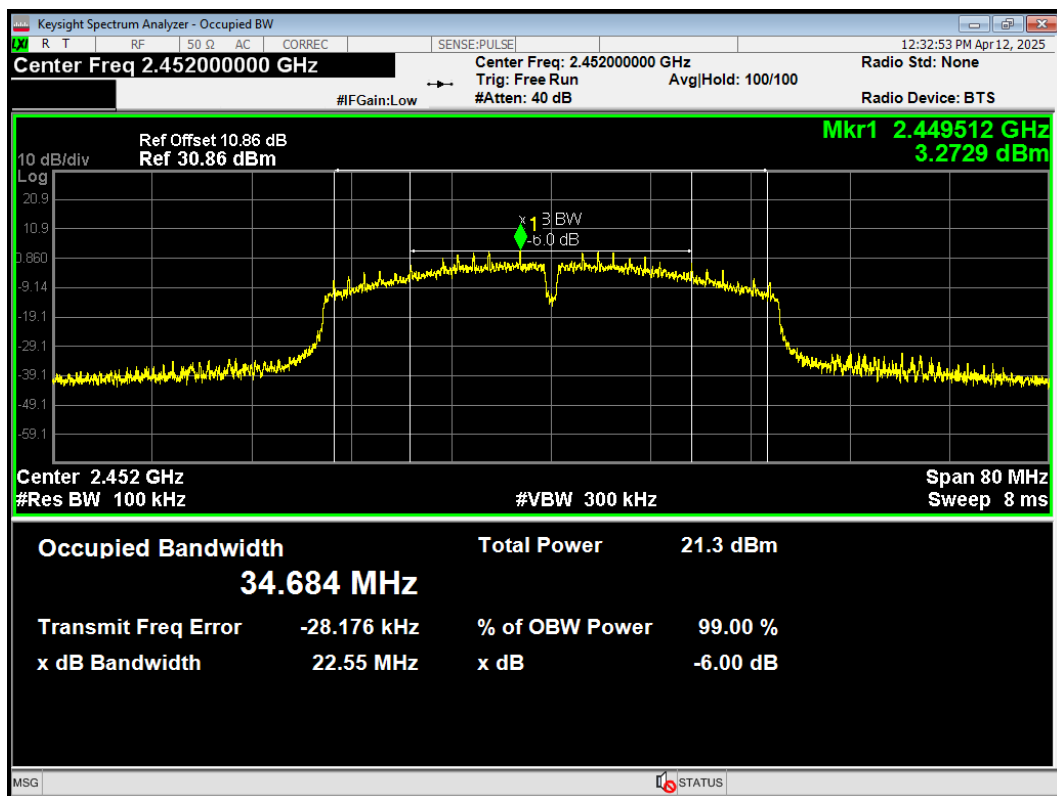
-6dB Bandwidth 802.11n(HT40) 2422MHz



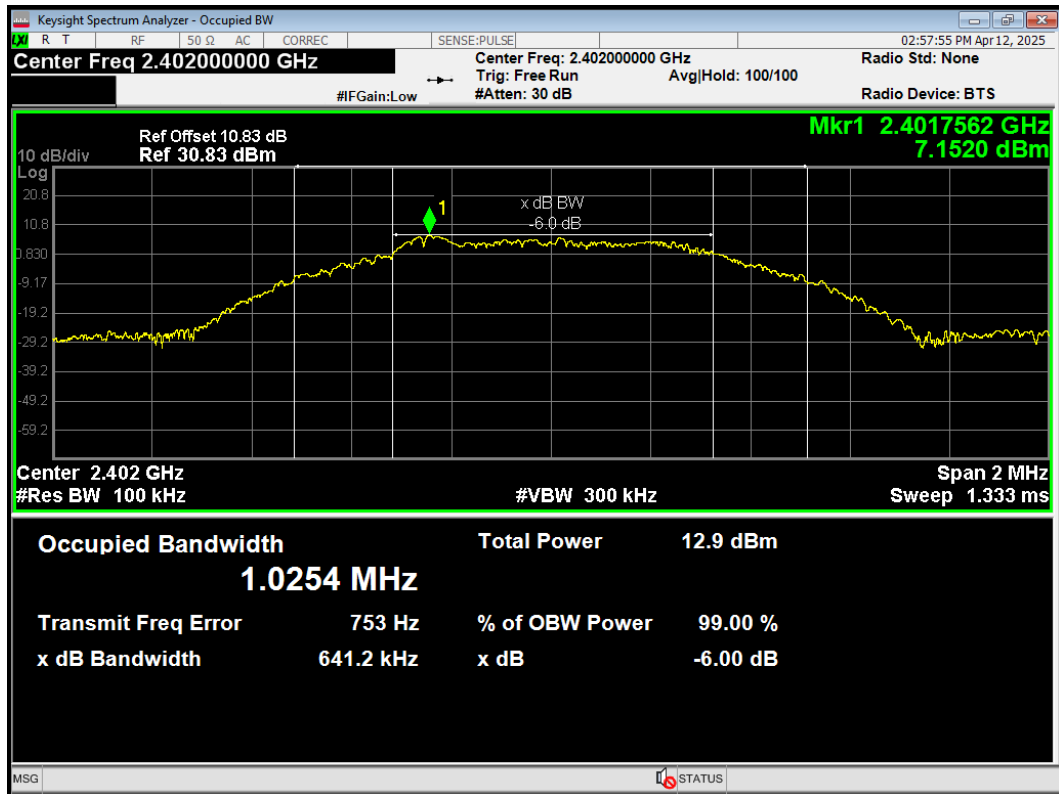
-6dB Bandwidth 802.11n(HT40) 2437MHz



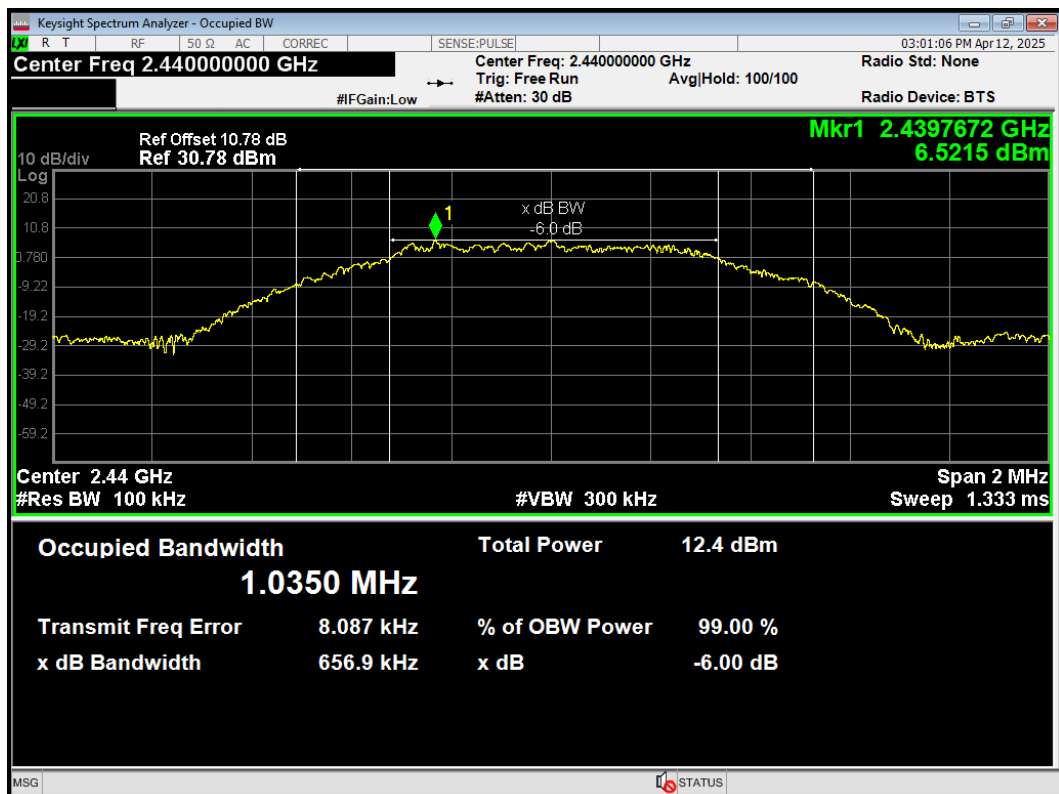
-6dB Bandwidth 802.11n(HT40) 2452MHz



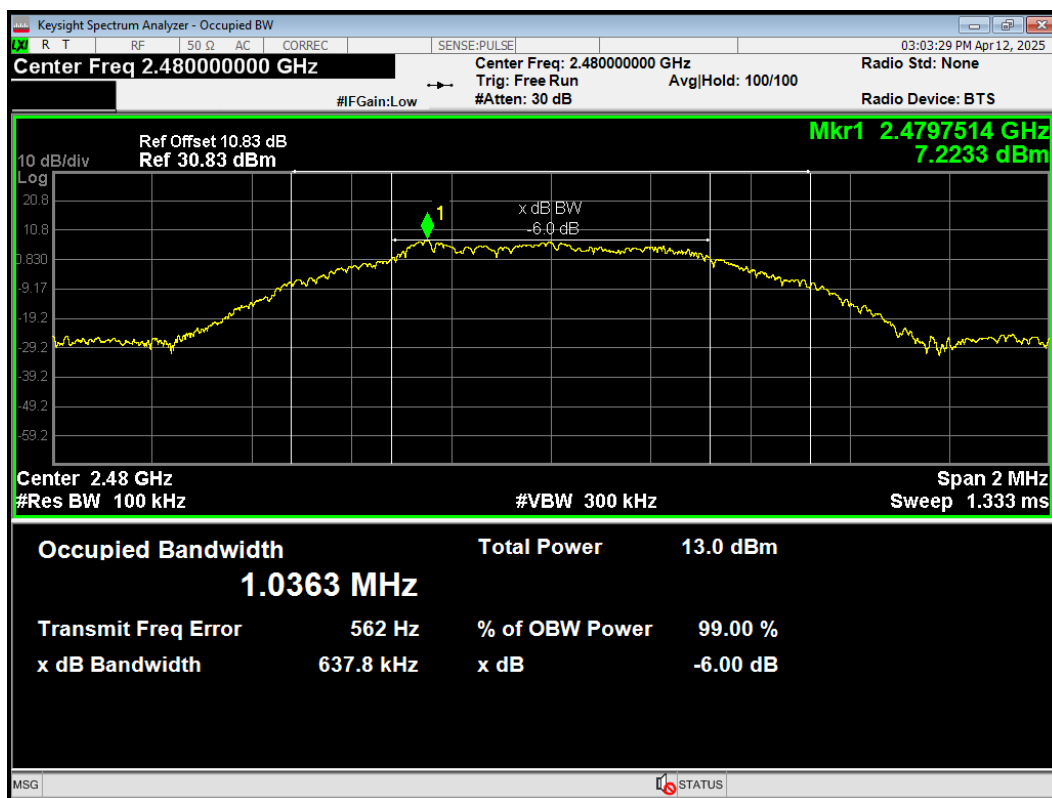
-6dB Bandwidth Bluetooth LE (S=2) 2402MHz



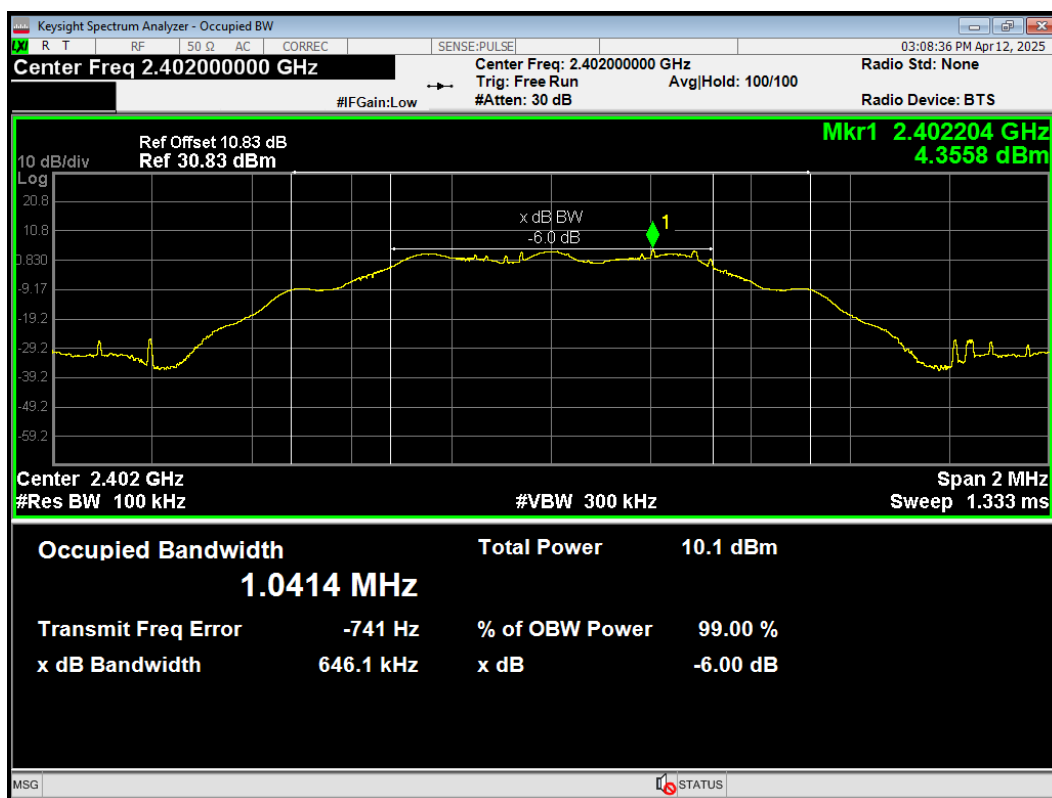
-6dB Bandwidth Bluetooth LE (S=2) 2440MHz



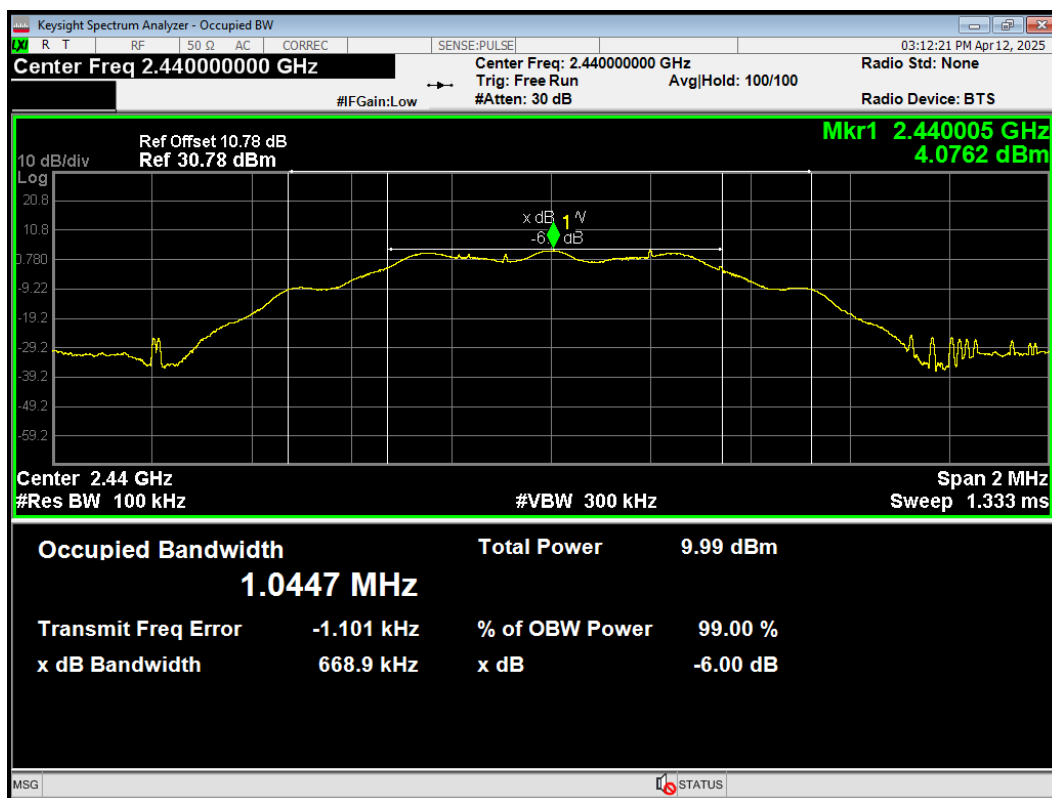
-6dB Bandwidth Bluetooth LE (S=2) 2480MHz



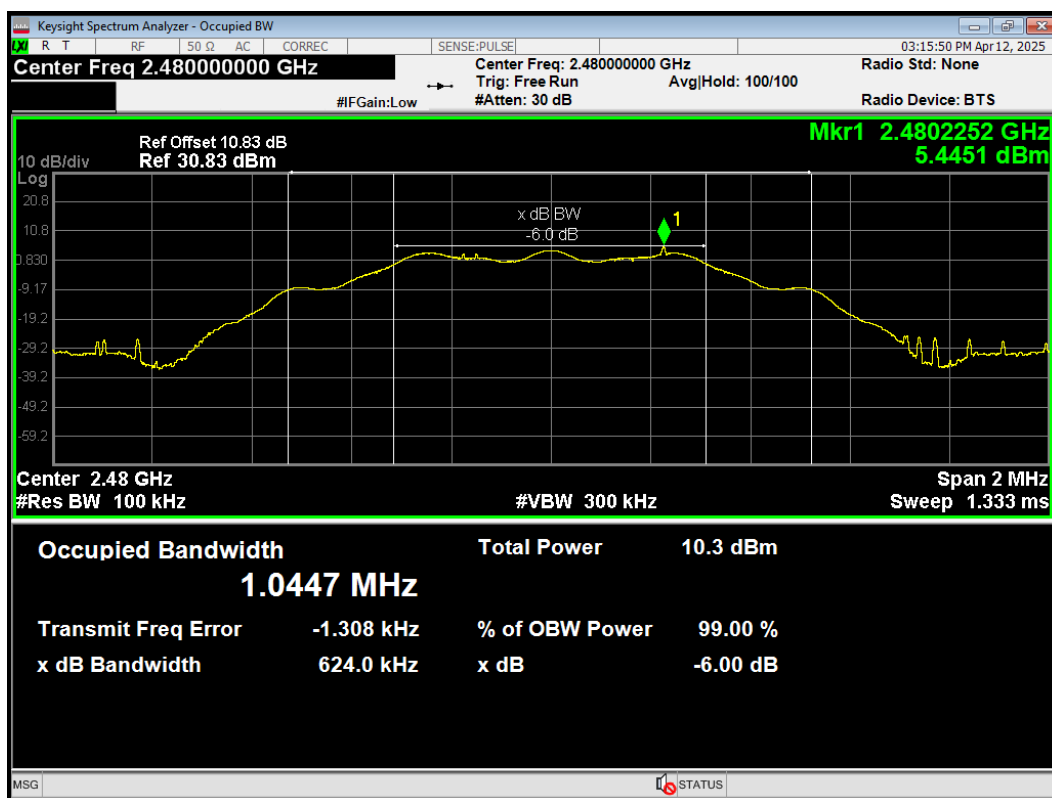
-6dB Bandwidth Bluetooth LE (S=8) 2402MHz



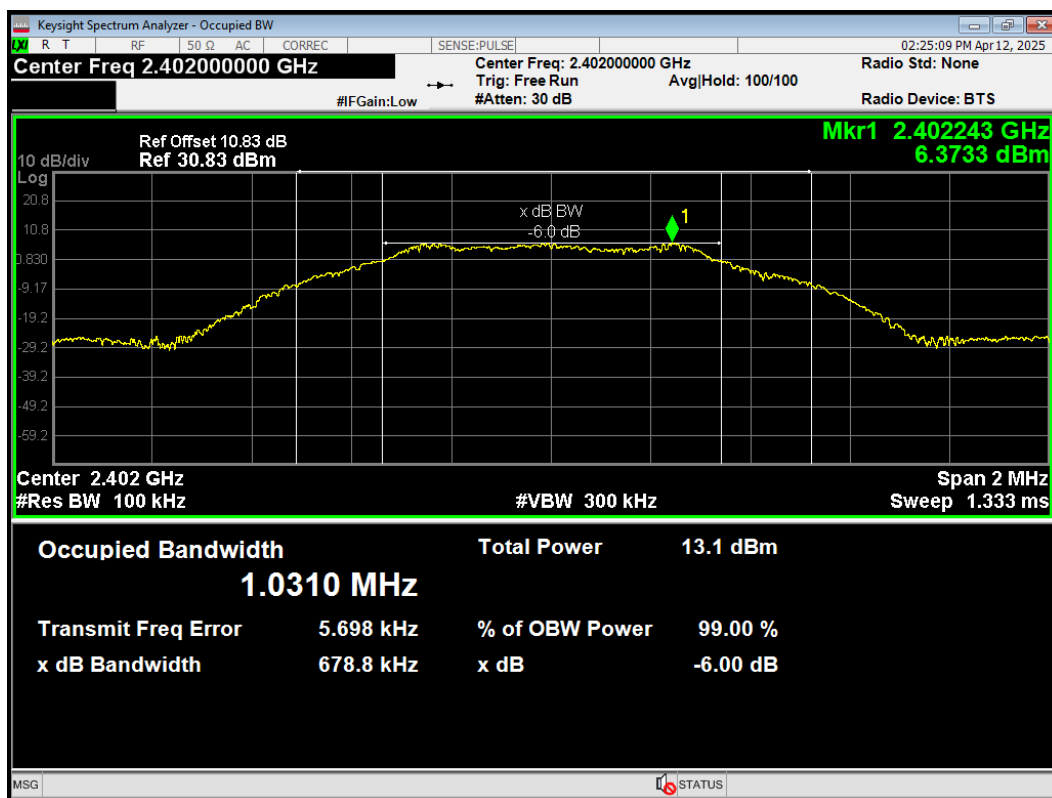
-6dB Bandwidth Bluetooth LE (S=8) 2440MHz



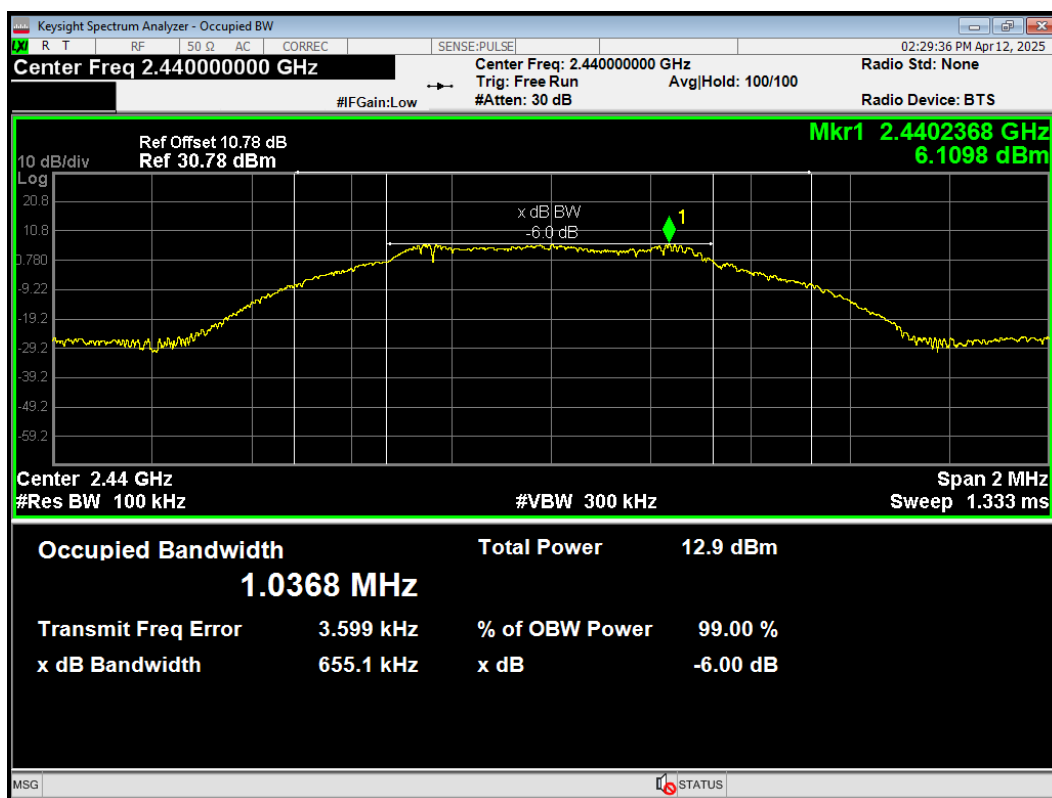
-6dB Bandwidth Bluetooth LE (S=8) 2480MHz



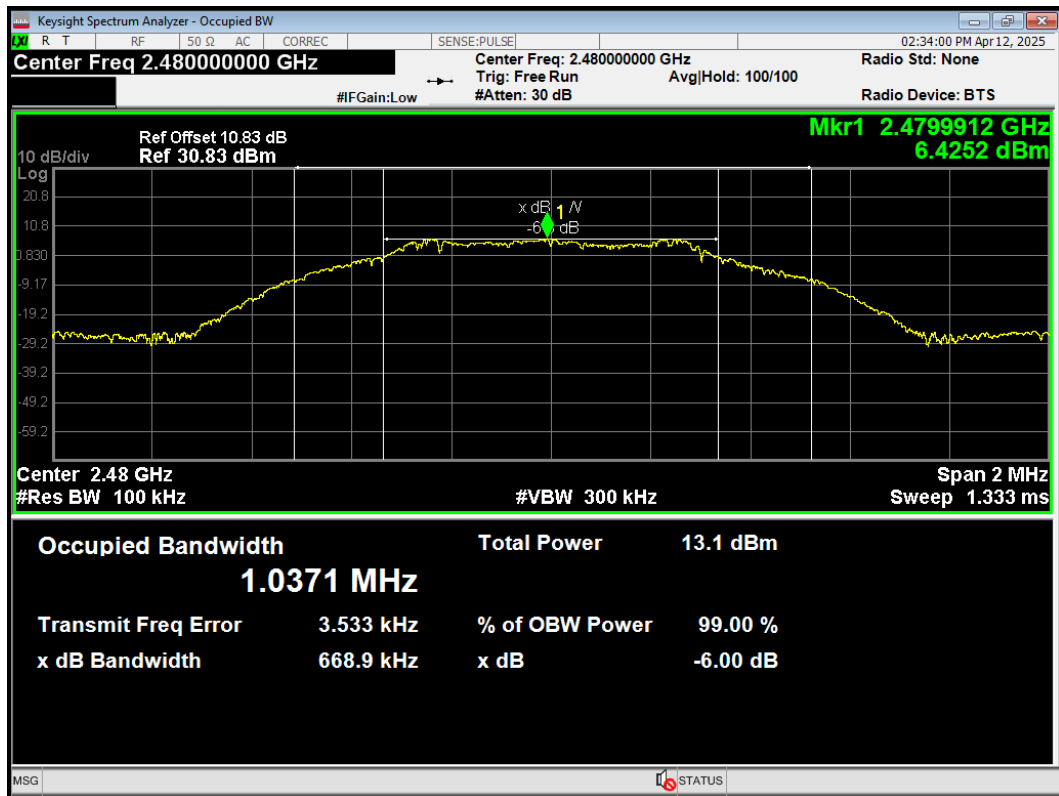
-6dB Bandwidth Bluetooth LE (1M) 2402MHz



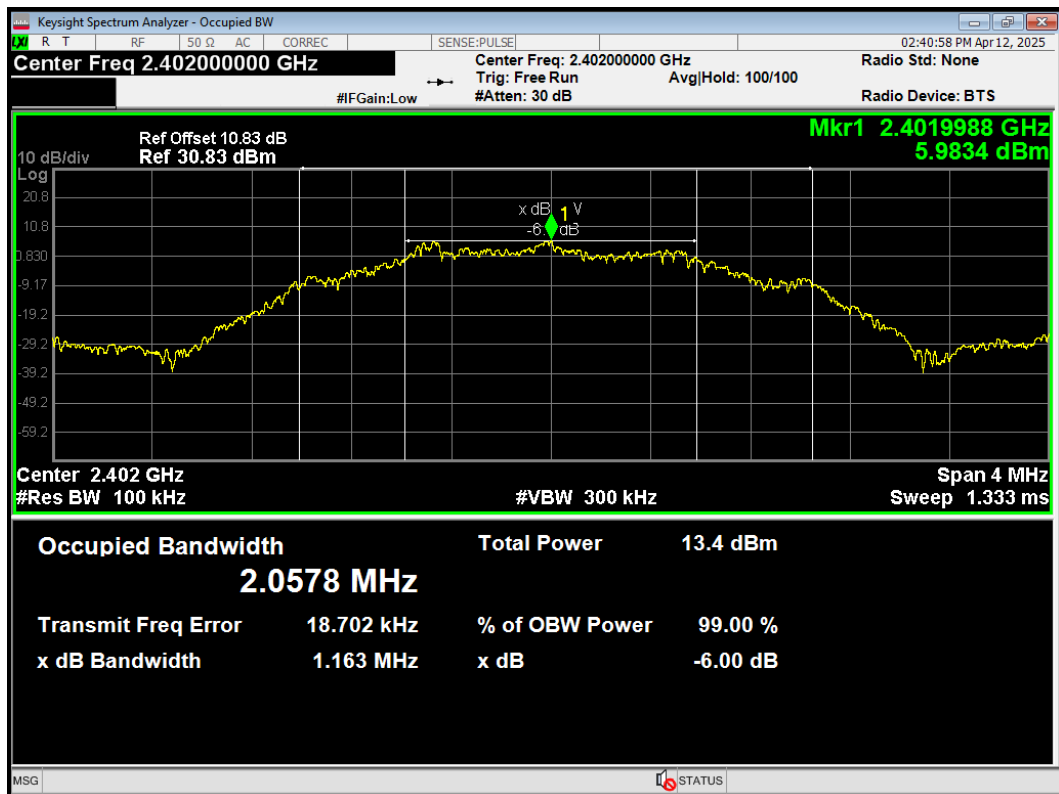
-6dB Bandwidth Bluetooth LE (1M) 2440MHz



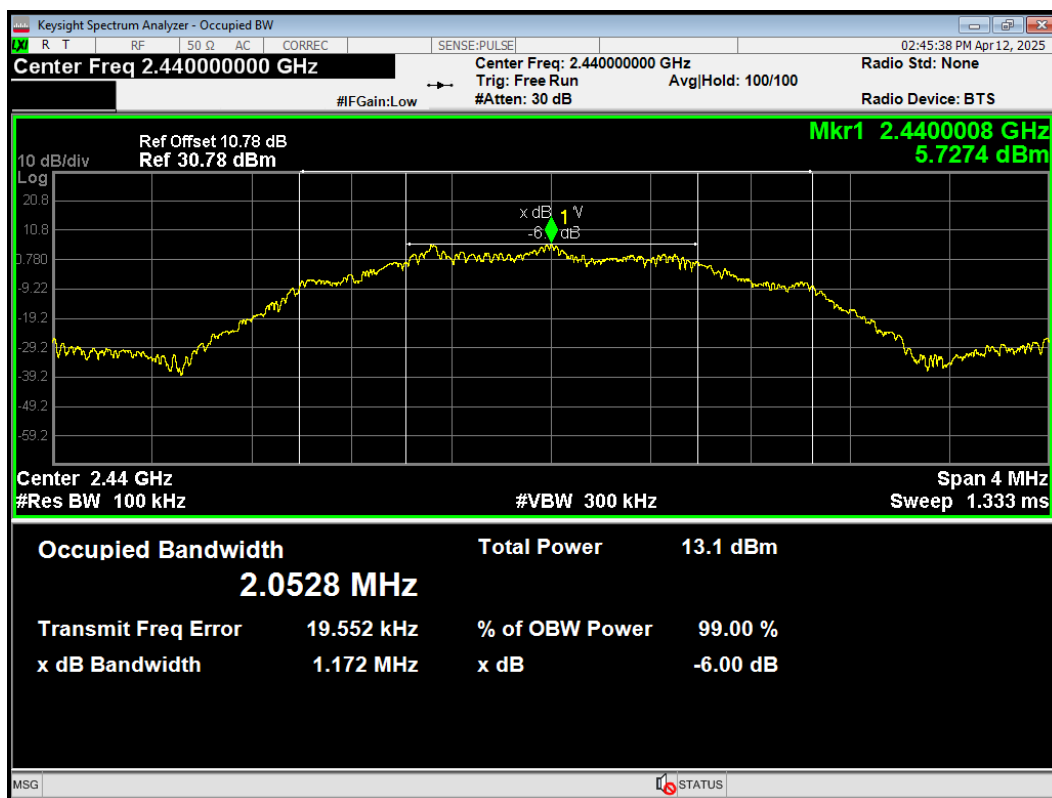
-6dB Bandwidth Bluetooth LE (1M) 2480MHz



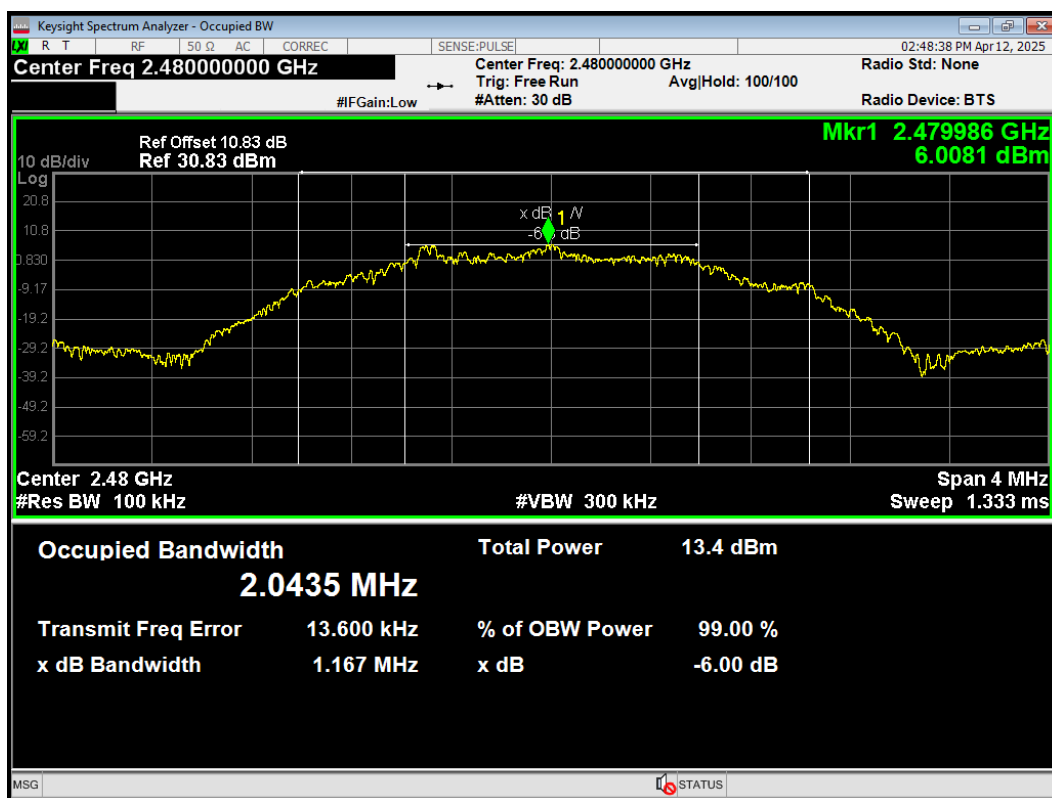
-6dB Bandwidth Bluetooth LE (2M) 2402MHz



-6dB Bandwidth Bluetooth LE (2M) 2440MHz



-6dB Bandwidth Bluetooth LE (2M) 2480MHz



5.3. Band Edge

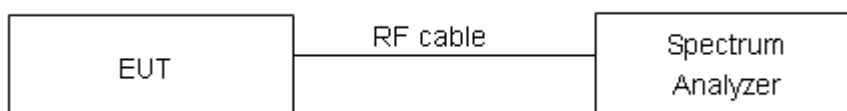
Ambient Condition

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 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.”

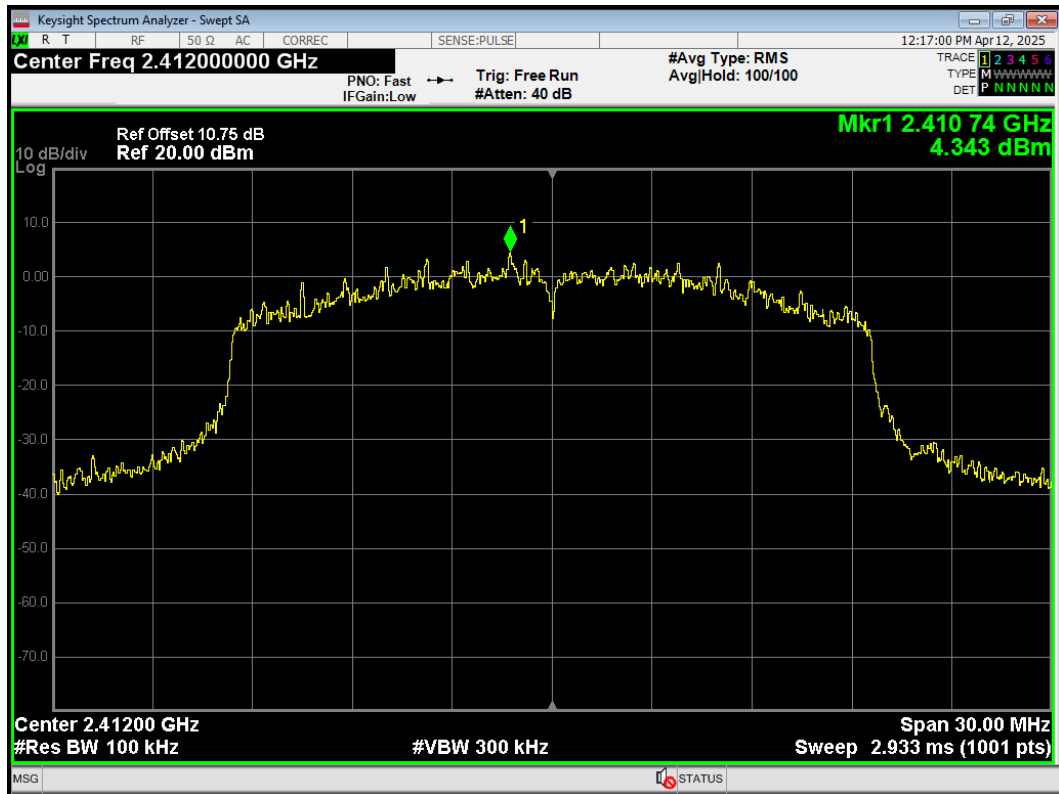
Measurement Uncertainty

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

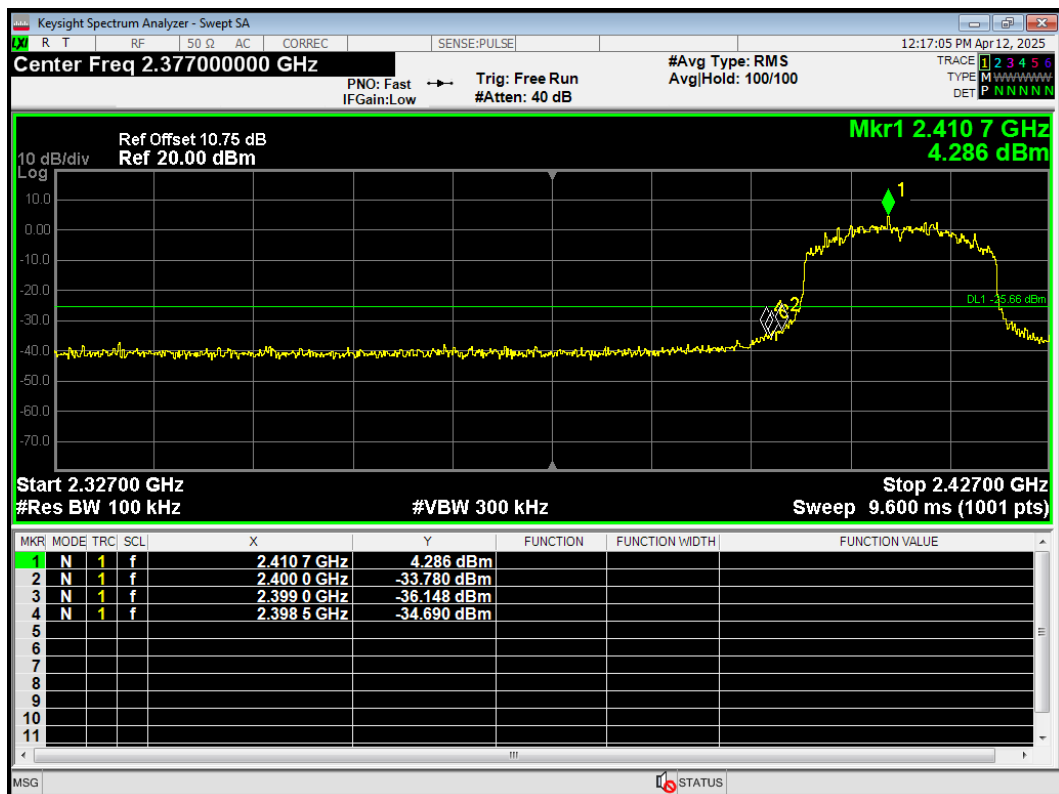
Frequency	Uncertainty
2GHz-3GHz	1.407 dB

Test Results: PASS

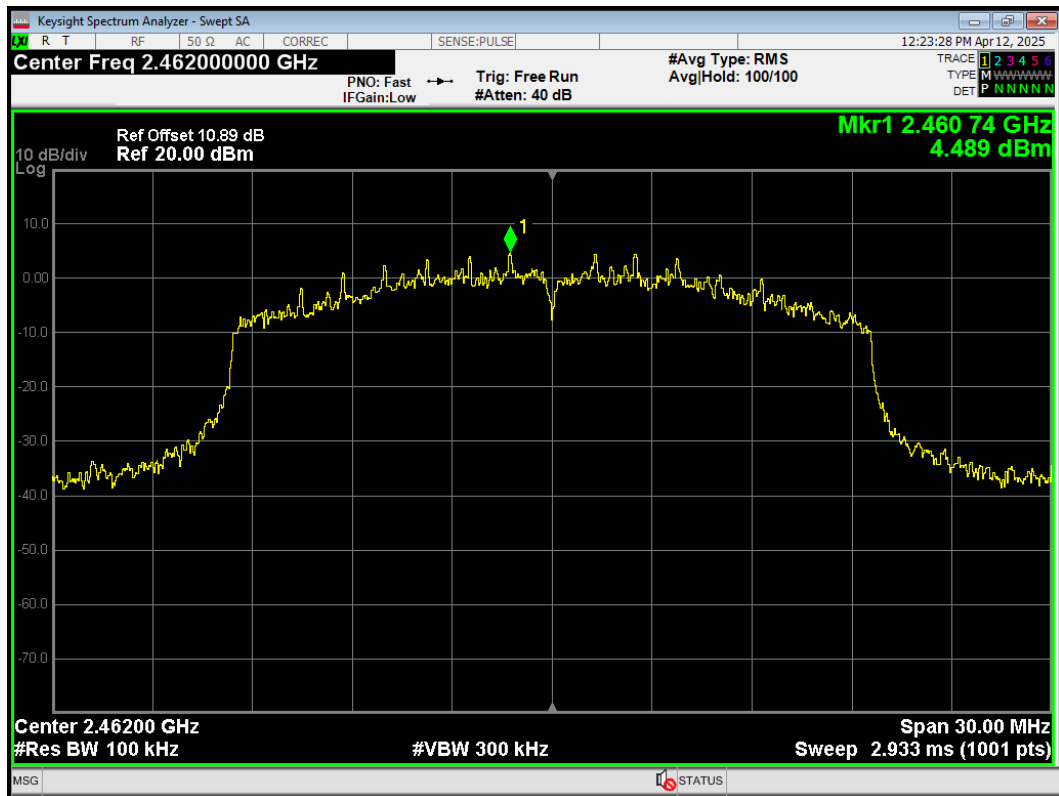
Band Edge 802.11ax(HE20) 2412MHz Ref



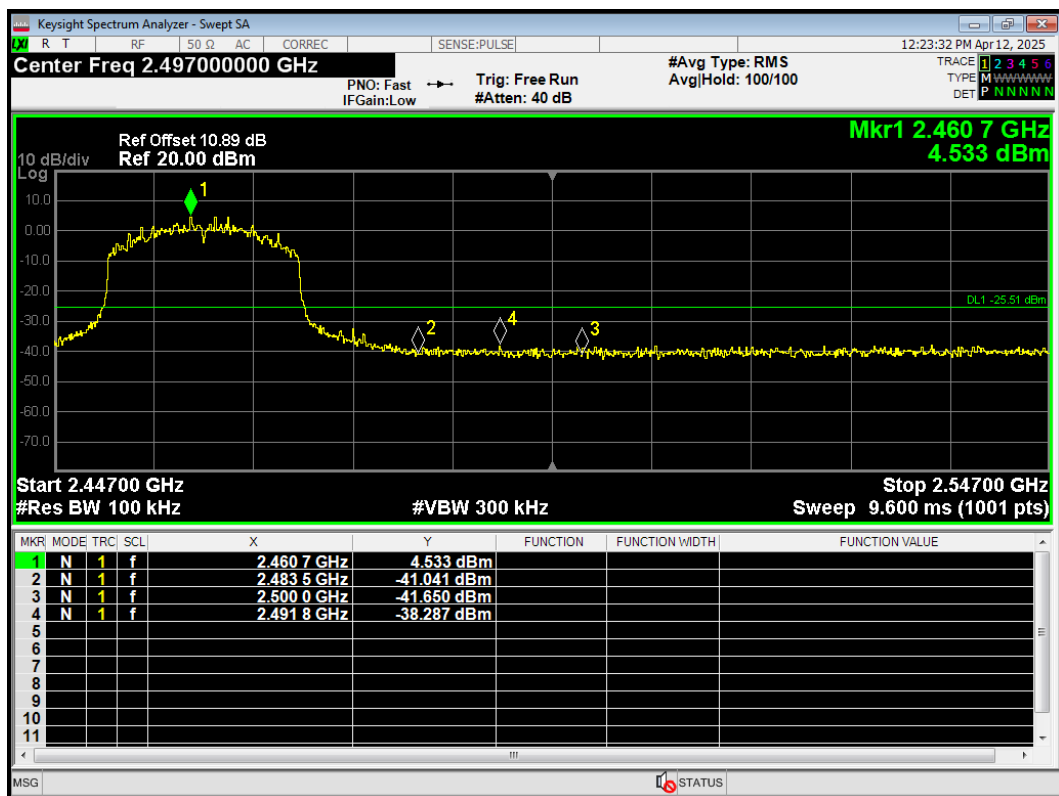
Band Edge 802.11ax(HE20) 2412MHz Emission



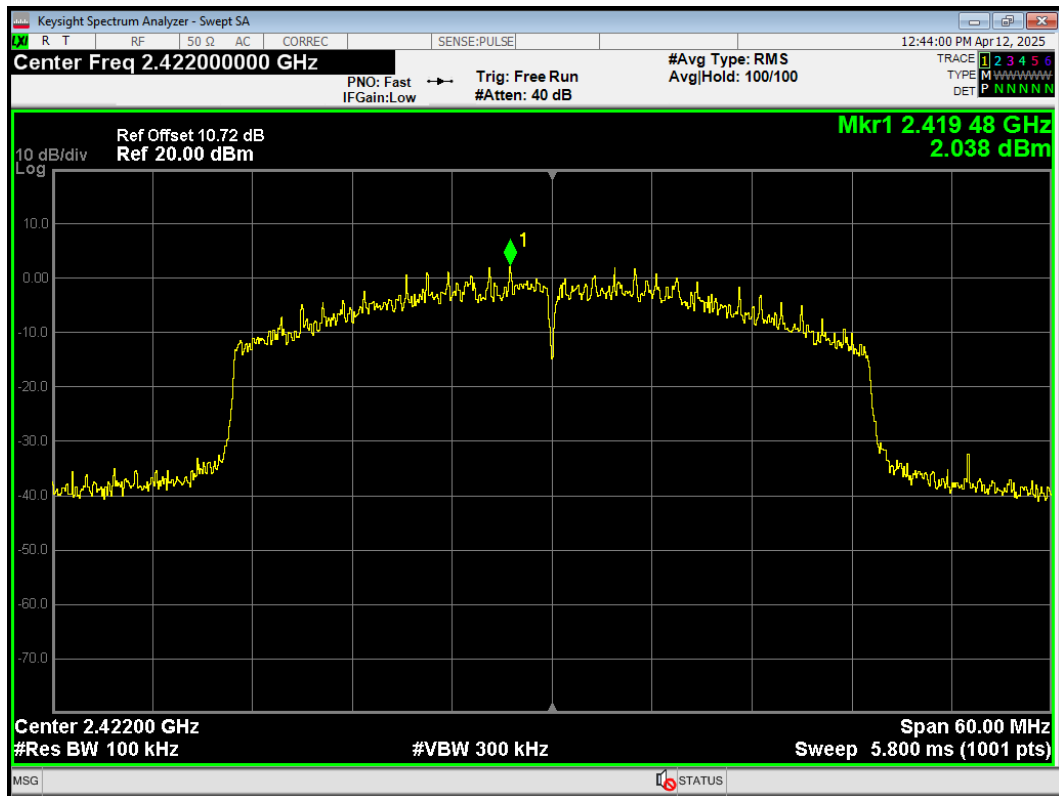
Band Edge 802.11ax(HE20) 2462MHz Ref



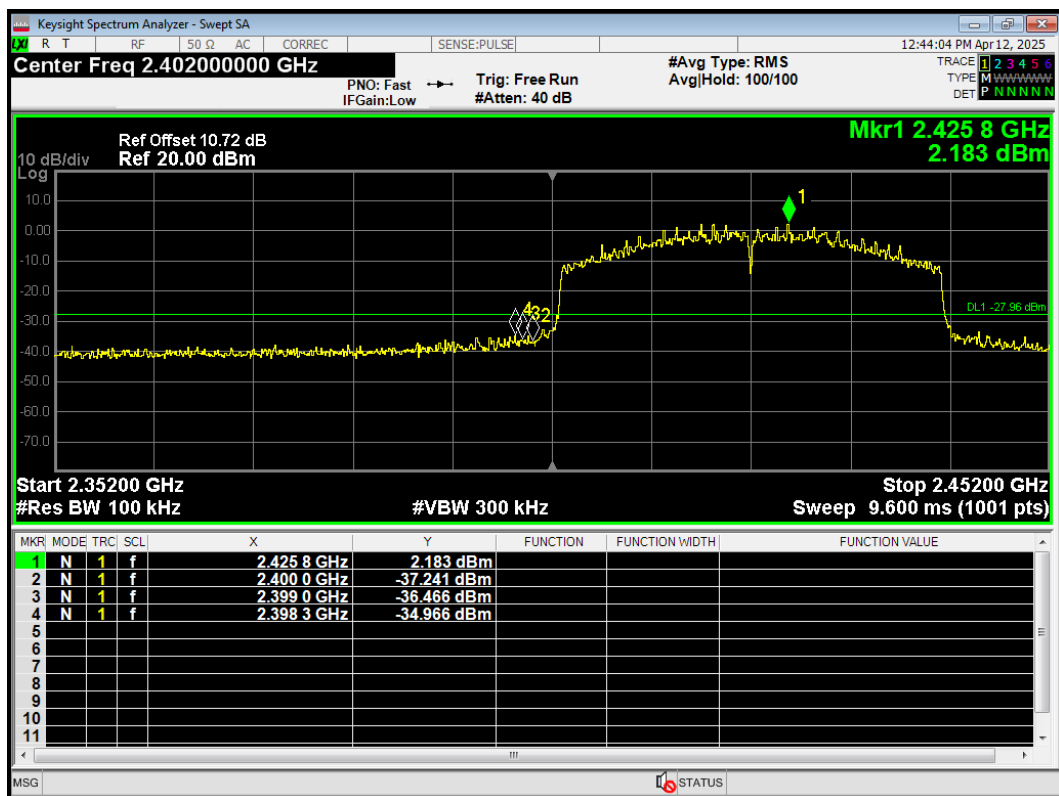
Band Edge 802.11ax(HE20) 2462MHz Emission



Band Edge 802.11ax(HE40) 2422MHz Ref



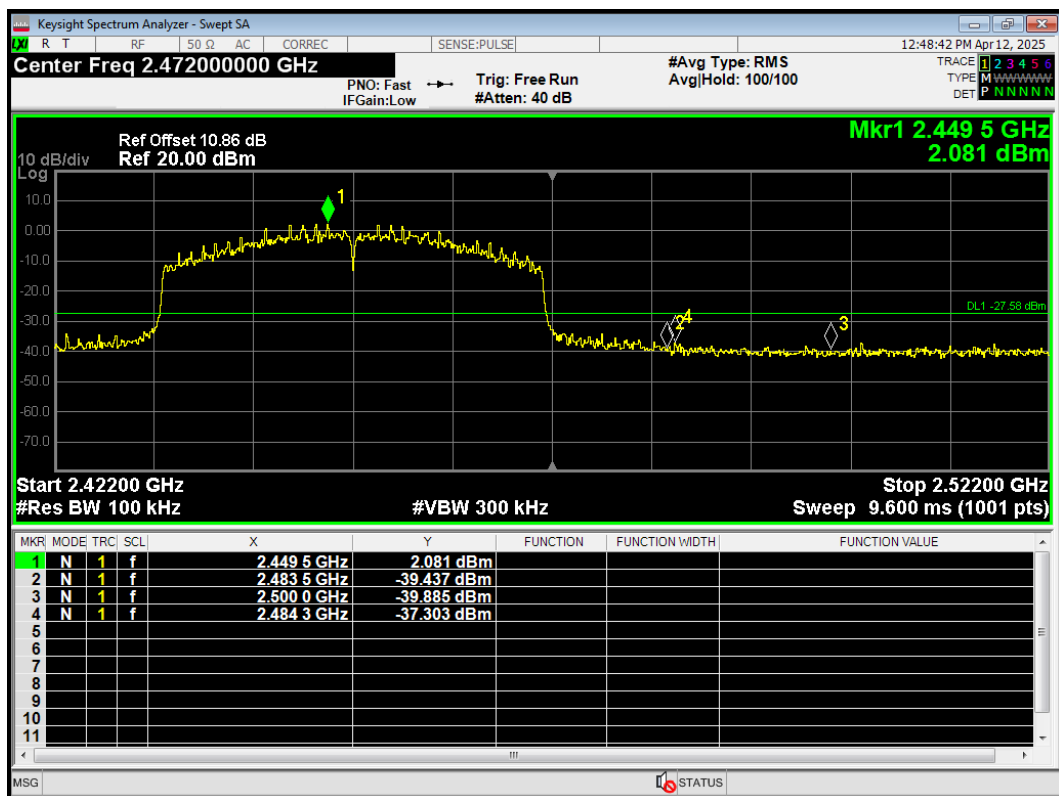
Band Edge 802.11ax(HE40) 2422MHz Emission



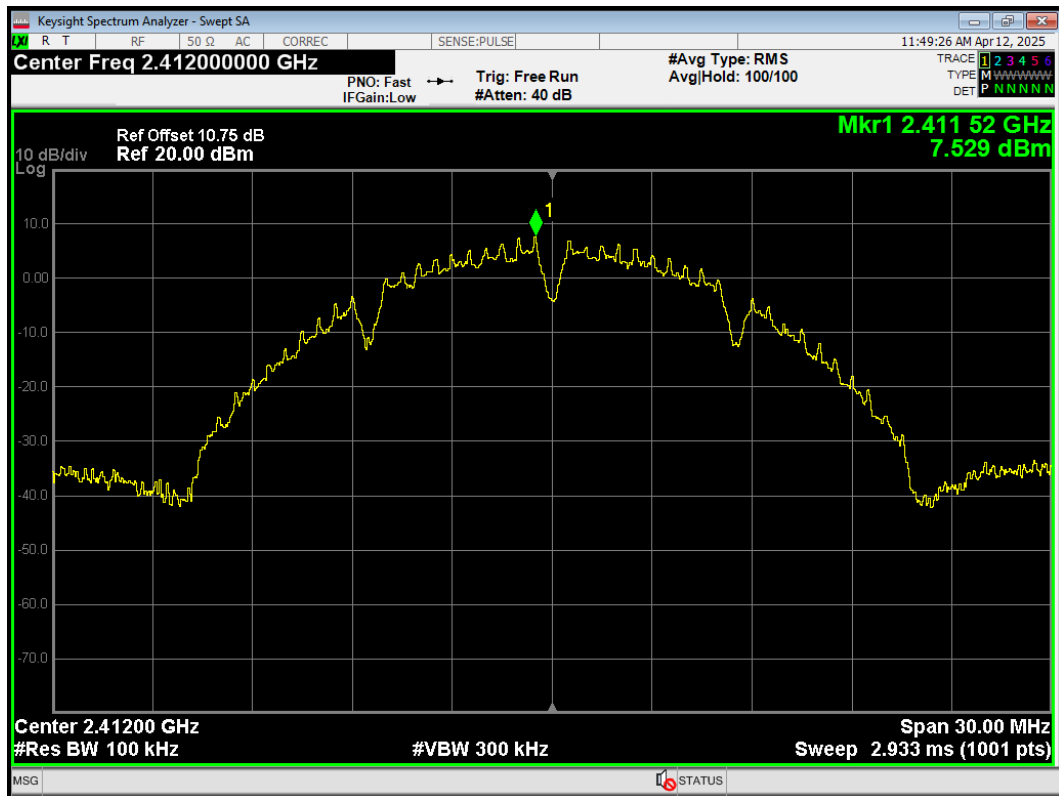
Band Edge 802.11ax(HE40) 2452MHz Ref



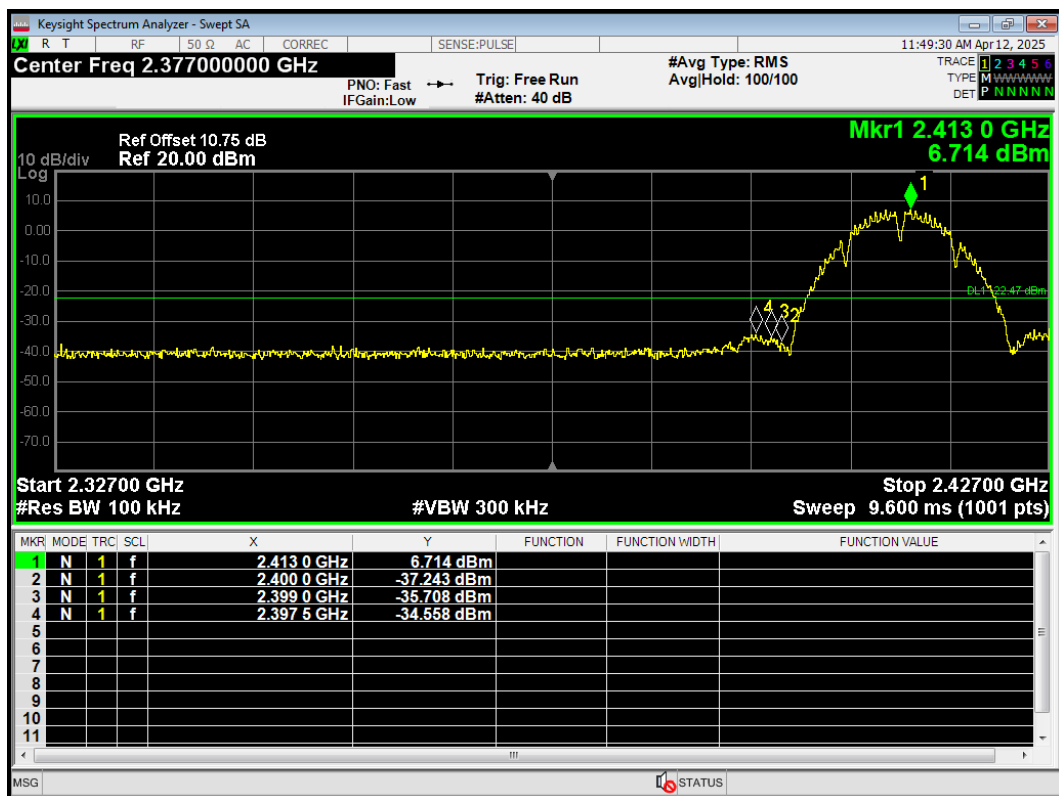
Band Edge 802.11ax(HE40) 2452MHz Emission



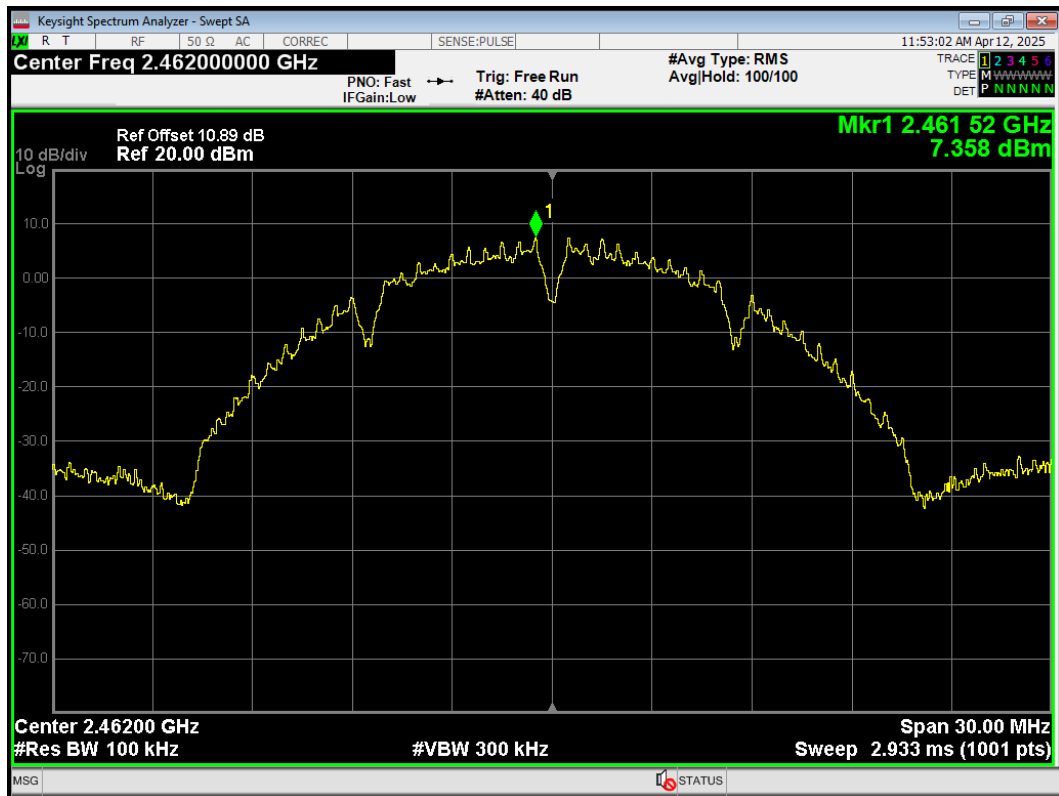
Band Edge 802.11b 2412MHz Ref



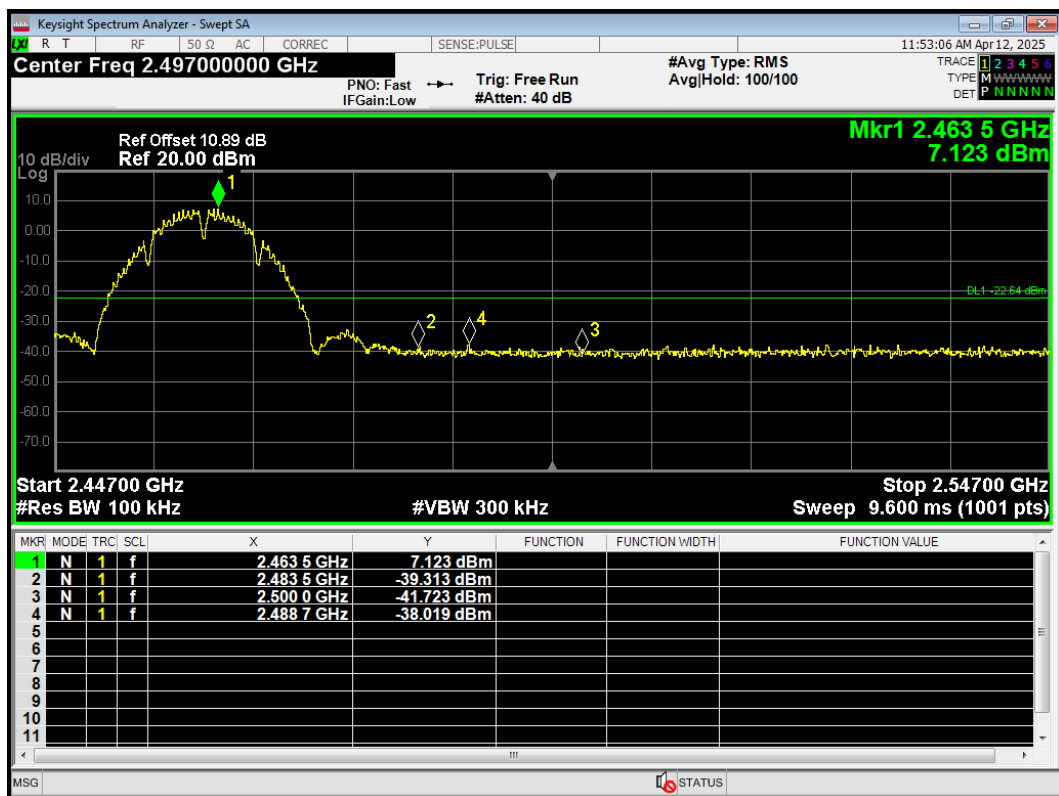
Band Edge 802.11b 2412MHz Emission



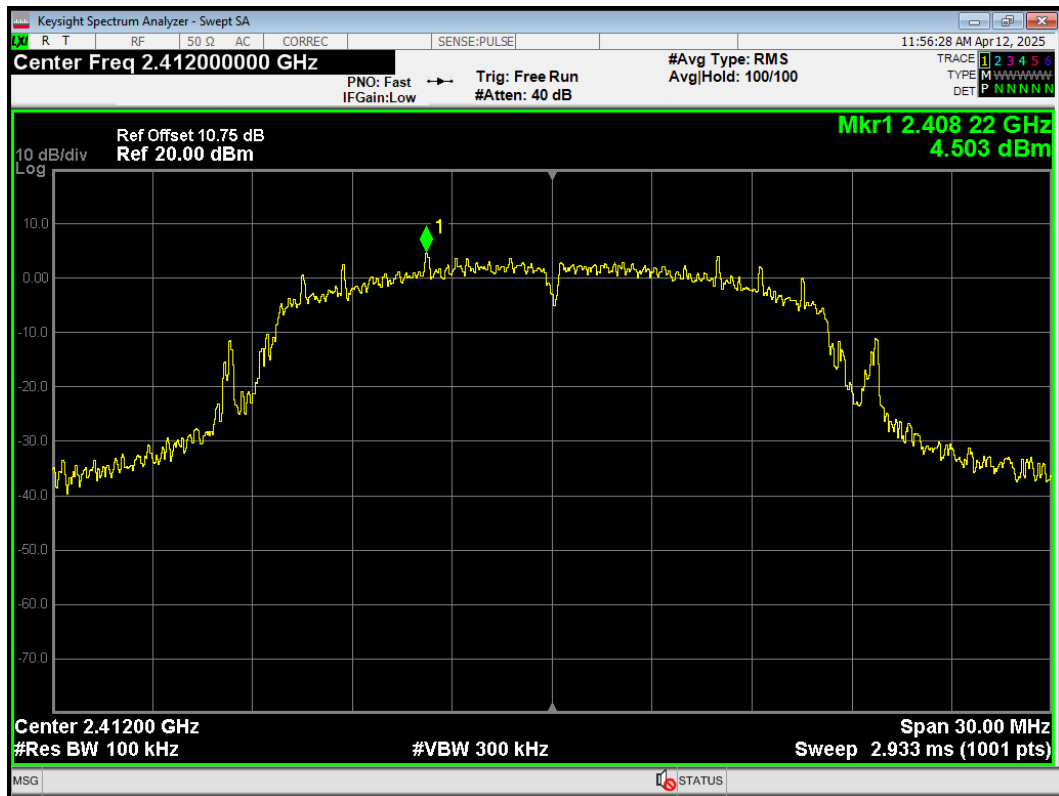
Band Edge 802.11b 2462MHz Ref



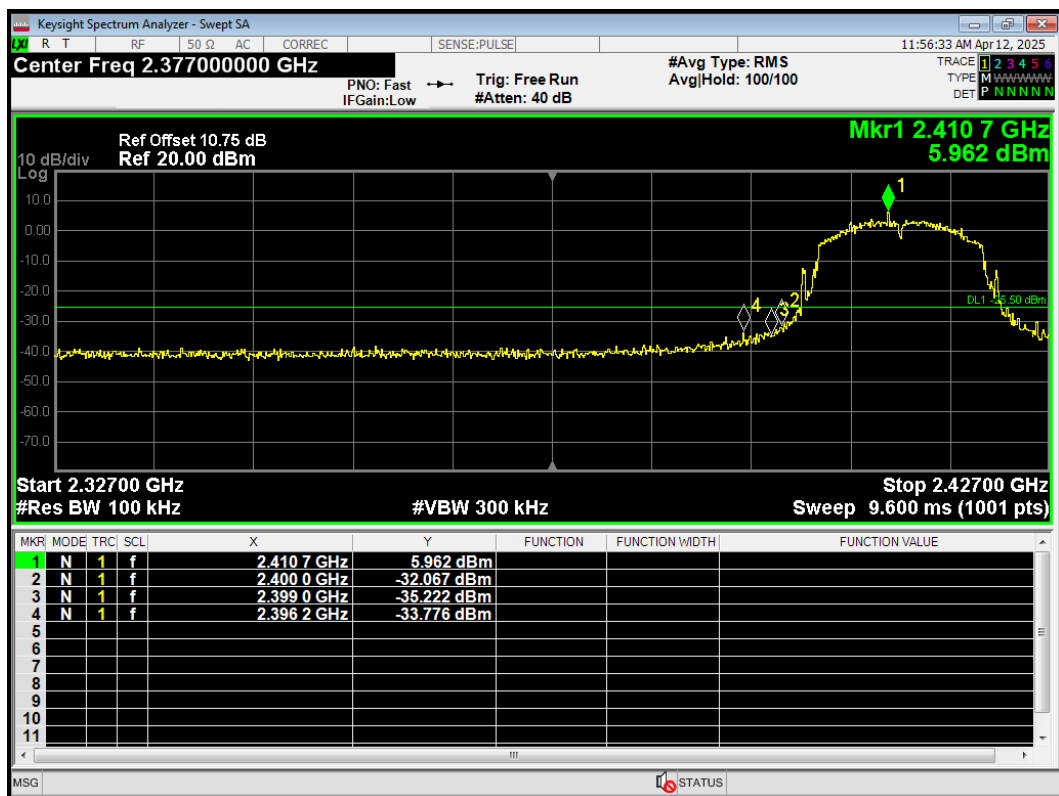
Band Edge 802.11b 2462MHz Emission



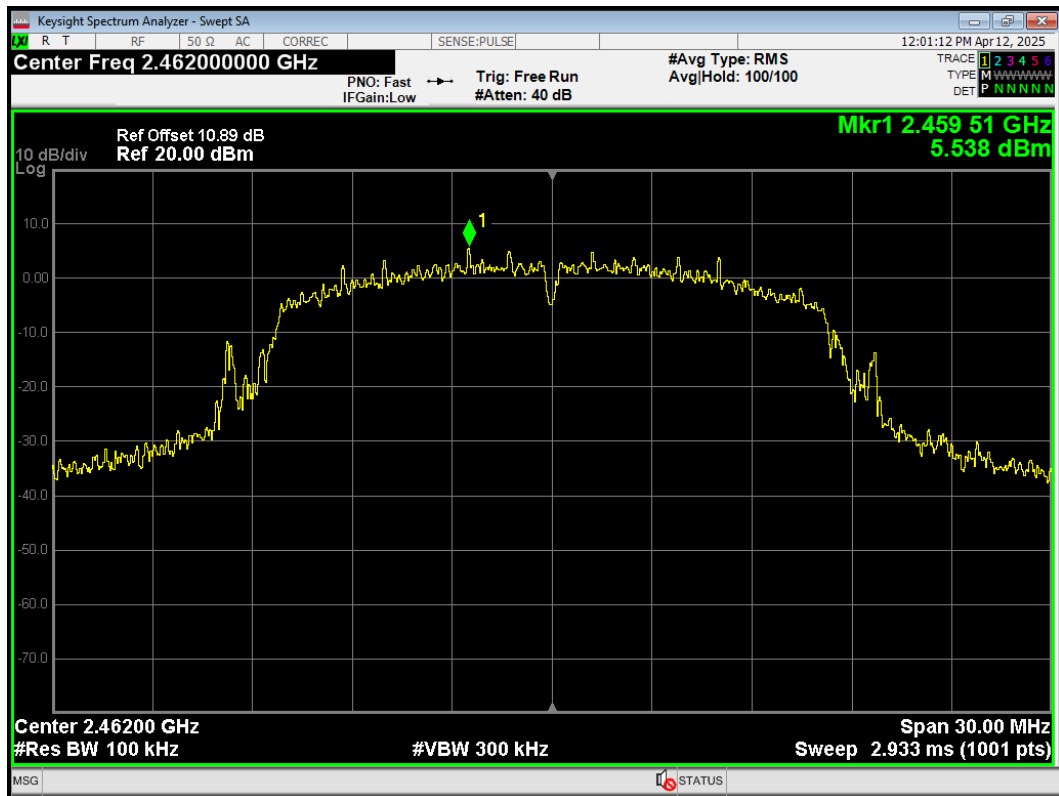
Band Edge 802.11g 2412MHz Ref



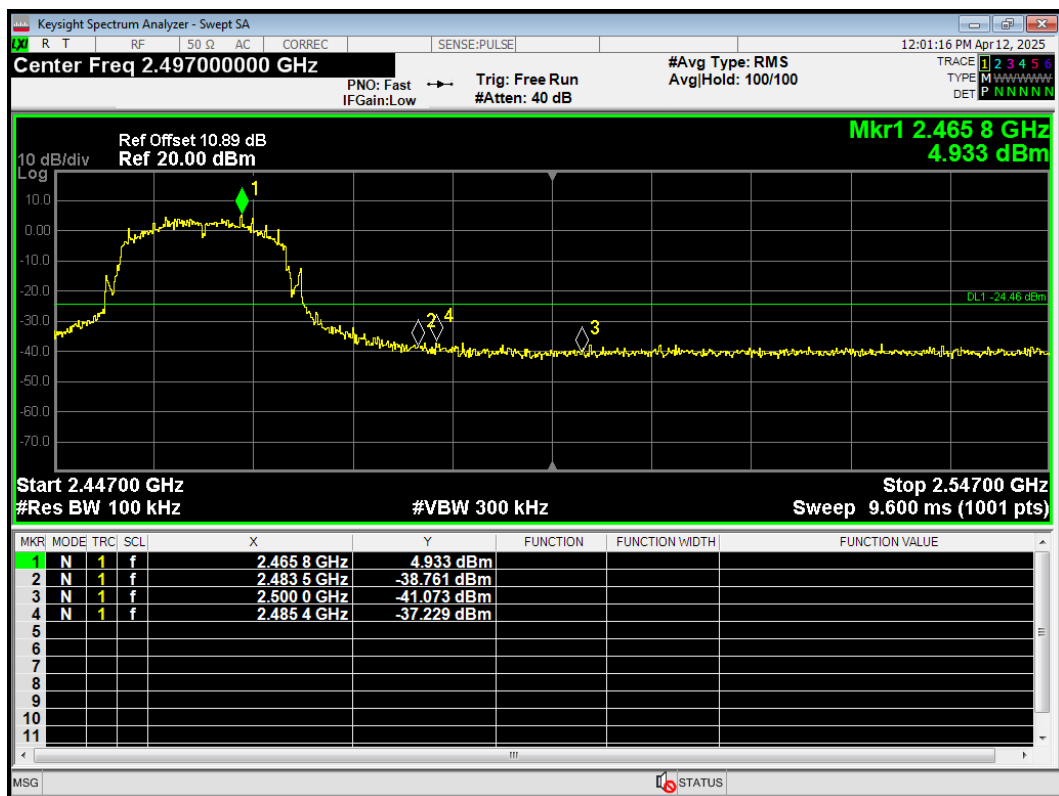
Band Edge 802.11g 2412MHz Emission



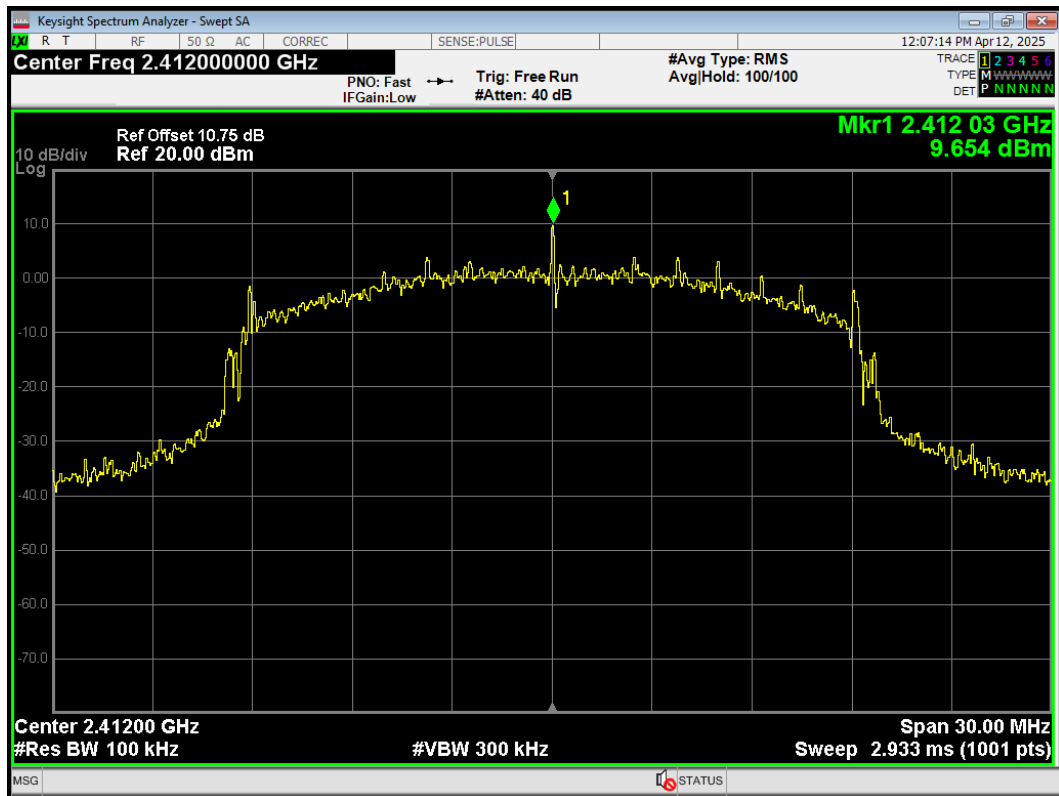
Band Edge 802.11g 2462MHz Ref



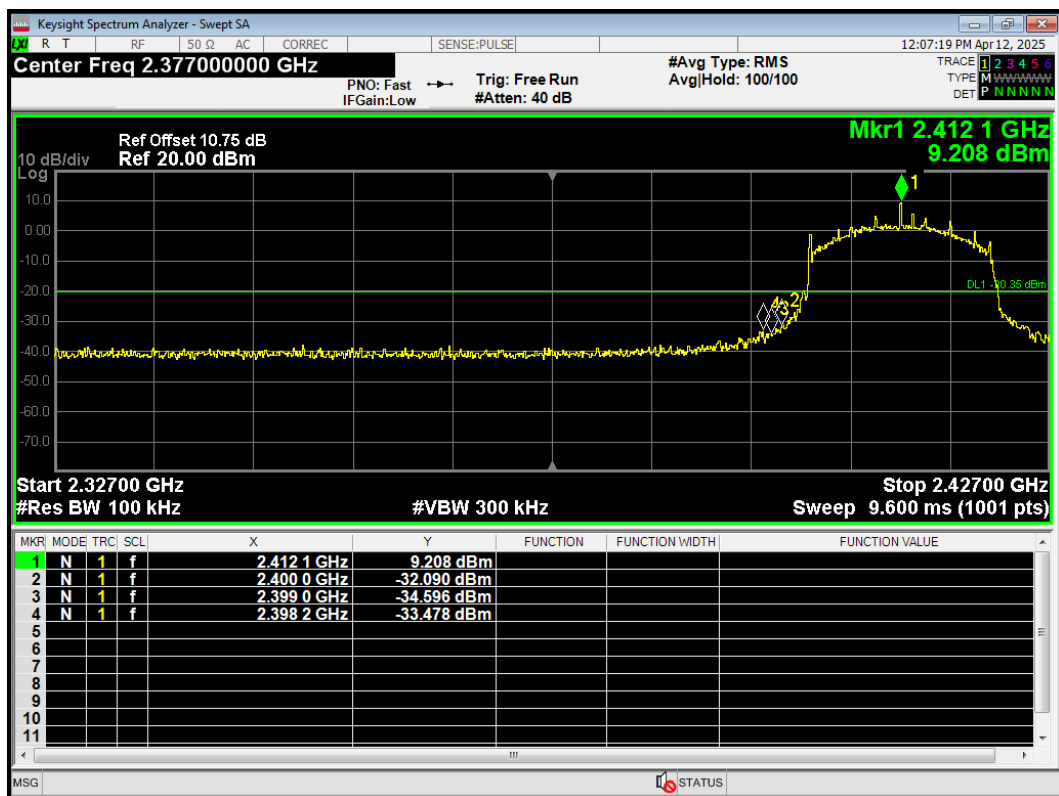
Band Edge 802.11g 2462MHz Emission



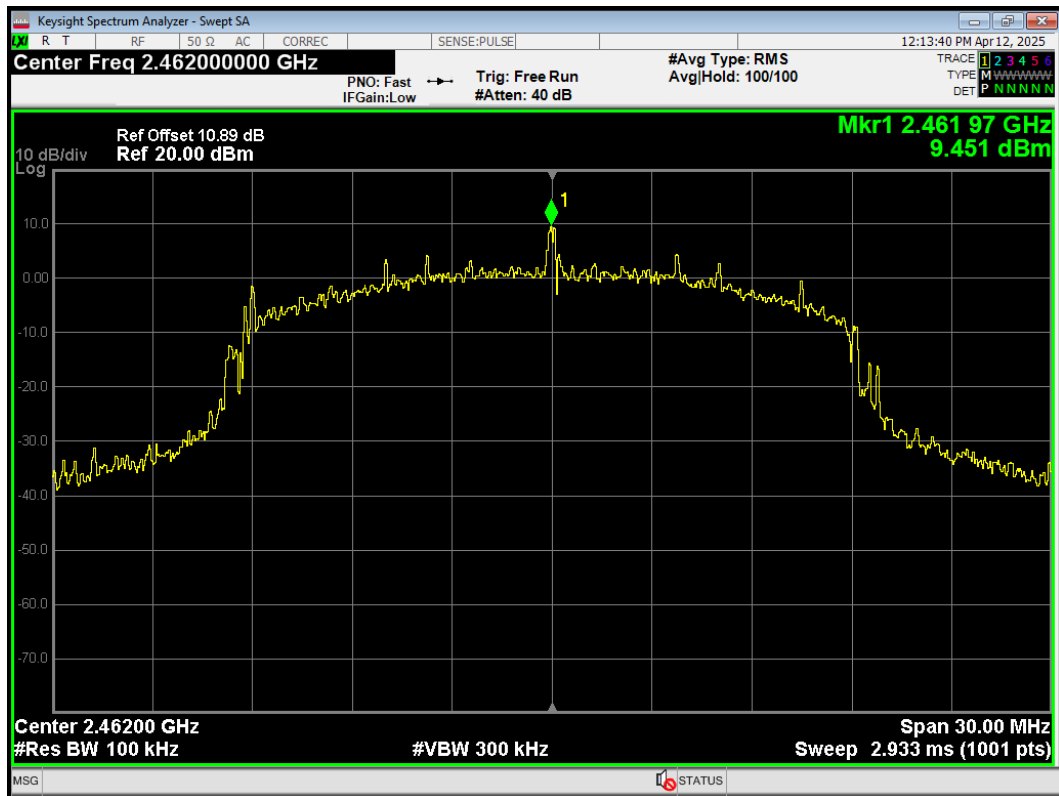
Band Edge 802.11n(HT20) 2412MHz Ref



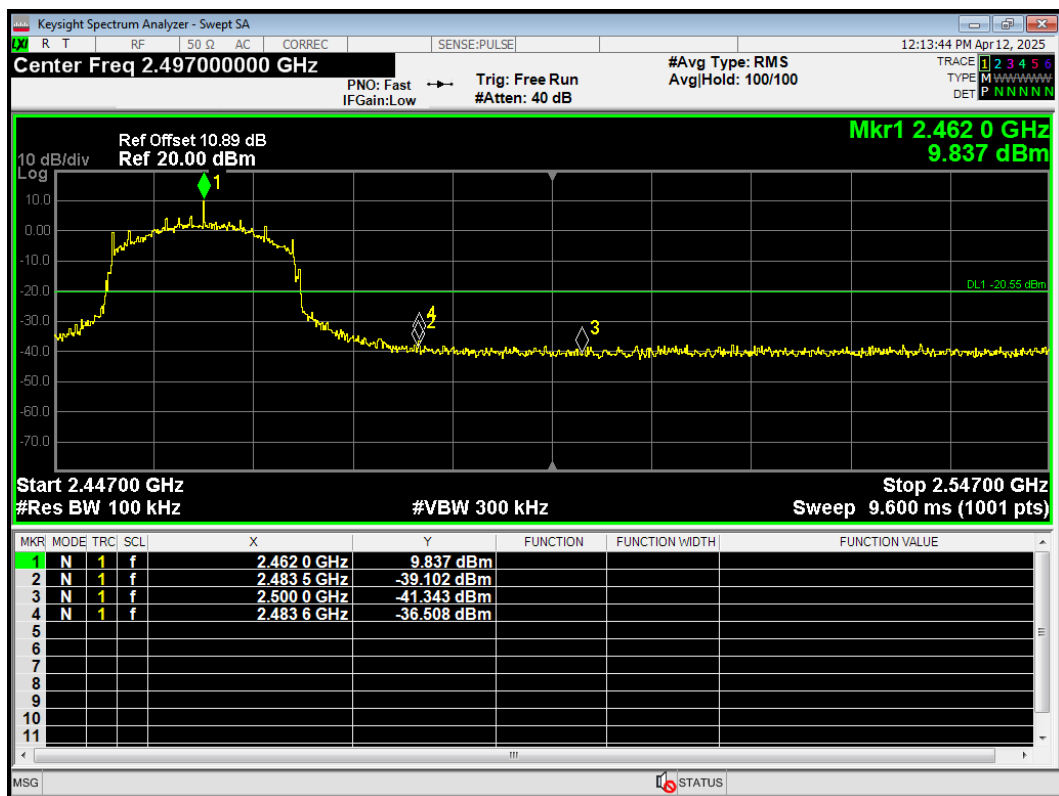
Band Edge 802.11n(HT20) 2412MHz Emission



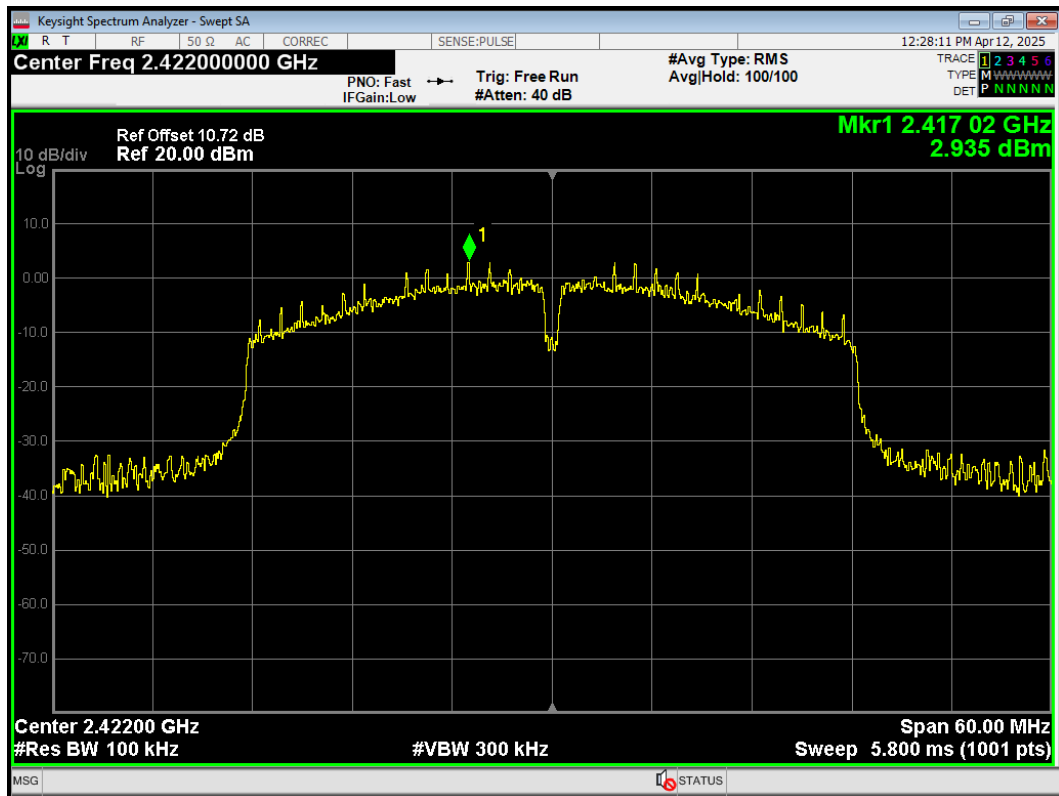
Band Edge 802.11n(HT20) 2462MHz Ref



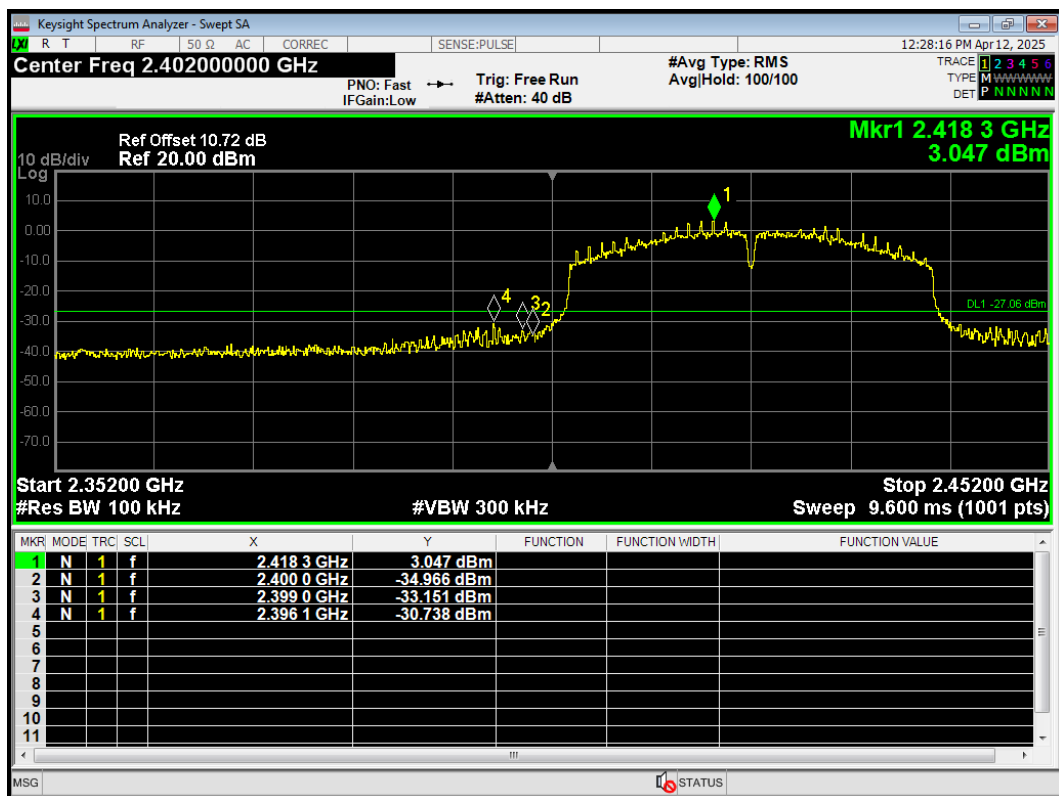
Band Edge 802.11n(HT20) 2462MHz Emission



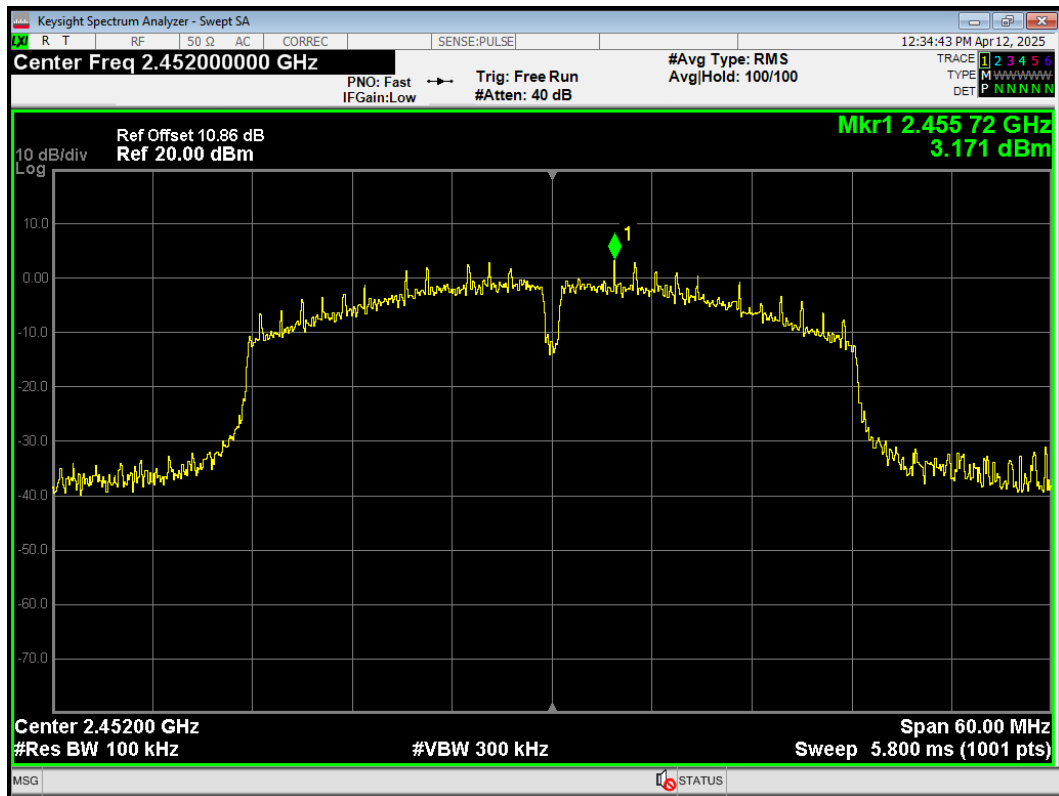
Band Edge 802.11n(HT40) 2422MHz Ref



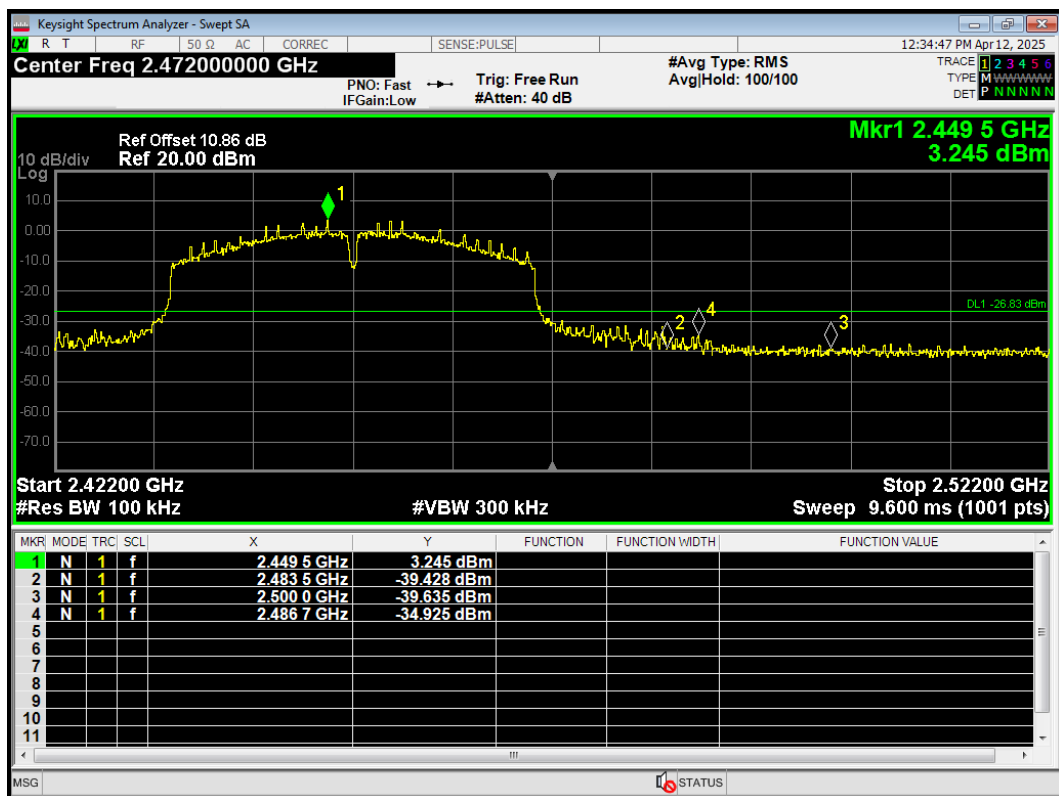
Band Edge 802.11n(HT40) 2422MHz Emission



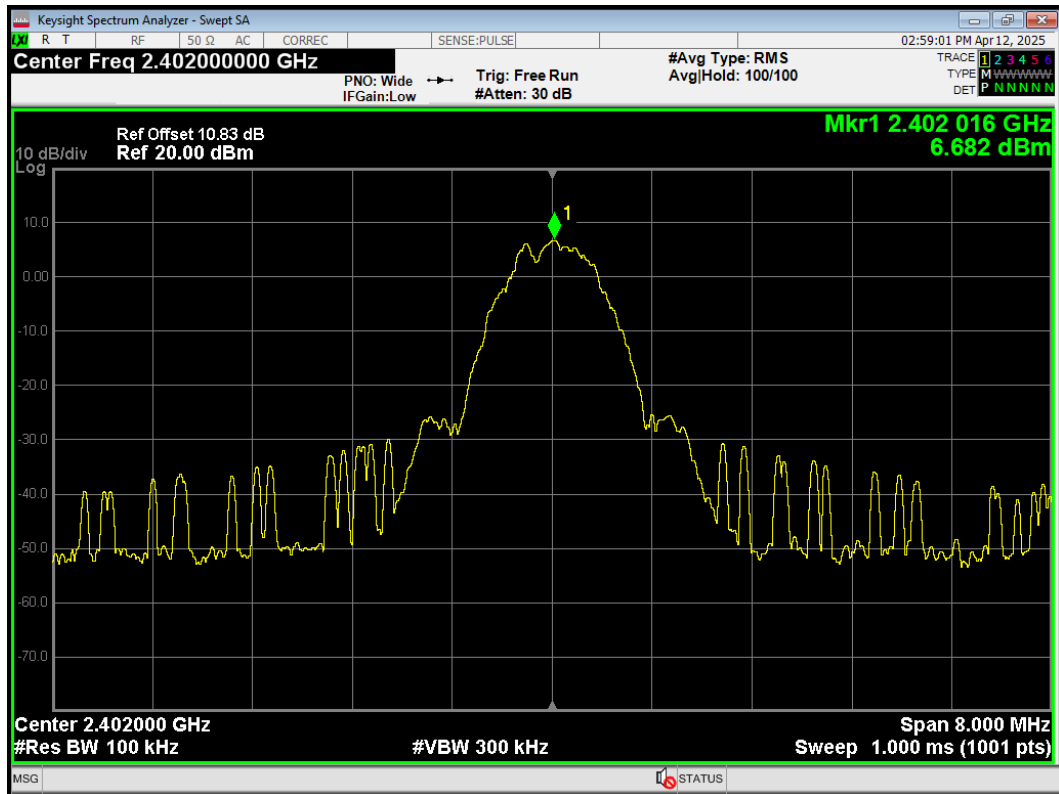
Band Edge 802.11n(HT40) 2452MHz Ref



Band Edge 802.11n(HT40) 2452MHz Emission



Band Edge Bluetooth LE (S=2) 2402MHz Ref



Band Edge Bluetooth LE (S=2) 2402MHz Emission

