RF TEST REPORT

Applicant	MeiG Smart Technology Co., Ltd
FCC ID	2APJ4-SNM909
Product	Smart Module
Brand	MEIGLink
Model	SNM909
Report No.	R2410A1558-R1V1
Issue Date	November 12, 2024

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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Version	Revision Description	Issue Date
Rev.0	Initial issue of report.	November 8, 2024
Rev.1	Update data and information.	November 12, 2024
Note: This revised report (Report No.: R2410A1558-R1V1) supersedes and replaces the previously issued report (Report No.: R2410A1558-R1). 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
Date of Testing: October 29, 2024 ~ November 7, 2024 Date of Sample Received: October 21, 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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E-mail:	Kain.Xu@cpt.eurofinscn.com

2. General Description of Equipment Under Test

2.1. Applicant and Manufacturer Information

Applicant	MeiG Smart Technology Co., Ltd
Applicant address	2nd Floor, Office Building, No.5 Lingxia Road, Fenghuang, Fuyong Street, Bao'an District, Shenzhen City.
Manufacturer	MeiG Smart Technology Co., Ltd
Manufacturer address	2nd Floor, Office Building, No.5 Lingxia Road, Fenghuang, Fuyong Street, Bao'an District, Shenzhen City.

2.2. General Information

EUT Description		
Model	SNM909	
SN	M90943AAYC112800629	
Hardware Version	V1.00	
Software Version	T16	
Power Supply	External power supply	
Antenna Type	External Antenna	
Antenna Connector	SMA-J antenna (meet with the standard FCC Part 15.203 requirement)	
Antenna Gain	Bluetooth LE	3.95 dBi
	Wi-Fi 2.4G	Antenna 1: 3.95 dBi Antenna 2: 3.95 dBi
Additional Beamforming Gain	NA	
Operating Frequency Range(s)	802.11b/g/n(HT20): 2412 ~ 2462 MHz Bluetooth LE V5.0: 2402 ~2480 MHz	
Modulation Type	802.11b: DSSS 802.11g/n: OFDM Bluetooth LE: GFSK	
Max. Output Power	Wi-Fi 2.4G: 20.42 dBm Bluetooth LE: 7.08 dBm	
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.

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

Test Mode	Data Rate		
	Antenna 1	Antenna 2	MIMO
802.11b	1 Mbps	1 Mbps	1 Mbps
802.11g	6 Mbps	6 Mbps	6 Mbps
802.11n HT20	MCS0	MCS0	MCS8

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	--	--
Note: “O”: test all bands			

5. Test Case Results

5.1. Maximum output power

Ambient Condition

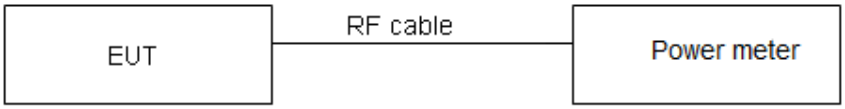
Temperature	Relative humidity
15°C ~ 35°C	20% ~ 80%

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

Power Index		
Bluetooth (Low Energy)		
Channel	1M	2M
CH0	default	default
CH19	default	default
CH39	default	default

SISO Antenna Power Index				
Antenna	Channel	802.11b	802.11g	802.11n HT20
Antenna 1	CH1	15	14	12
	CH6	15	14	12
	CH11	15	14	12
Antenna 2	CH1	15	14	12
	CH6	15	14	12
	CH11	15	14	12
MIMO Antenna Power Index				
Antenna	Channel	802.11b	802.11g	802.11n HT20
Antenna 1	CH1	15	14	12
	CH6	15	14	12
	CH11	15	14	12
Antenna 2	CH1	15	14	12
	CH6	15	14	12
	CH11	15	14	12

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11b	0.875	0.58
802.11g	0.983	0.00
802.11n HT20	0.982	0.00
Bluetooth LE (1M)	0.626	2.03
Bluetooth LE (2M)	0.330	4.81
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	2.55	4.58	30	PASS
	2440/CH19	1.73	3.76	30	PASS
	2480/CH39	4.81	6.84	30	PASS
Bluetooth (Low Energy) (2M)	2402/CH0	-0.29	4.52	30	PASS
	2440/CH19	-1.15	3.67	30	PASS
	2480/CH39	2.01	6.82	30	PASS
Note: 1. Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

SISO Antenna 1

Test Mode	Carrier frequency (MHz)/ Channel	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11b	2412/CH 1	16.79	17.37	30	PASS
	2437/CH 6	16.70	17.28	30	PASS
	2462/CH11	16.59	17.17	30	PASS
802.11g	2412/CH 1	15.48	15.48	30	PASS
	2437/CH 6	15.25	15.25	30	PASS
	2462/CH11	15.29	15.29	30	PASS
802.11n HT20	2412/CH 1	13.31	13.31	30	PASS
	2437/CH 6	13.13	13.13	30	PASS
	2462/CH11	12.95	12.95	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

SISO Antenna 2

Test Mode	Carrier frequency (MHz)/ Channel	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11b	2412/CH 1	16.73	16.73	30	PASS
	2437/CH 6	17.01	17.01	30	PASS
	2462/CH11	17.22	17.22	30	PASS
802.11g	2412/CH 1	15.54	15.54	30	PASS
	2437/CH 6	16.01	16.01	30	PASS
	2462/CH11	16.12	16.12	30	PASS
802.11n HT20	2412/CH 1	13.06	13.06	30	PASS
	2437/CH 6	13.49	13.49	30	PASS
	2462/CH11	13.33	13.33	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

MIMO

Test Mode	Carrier frequency (MHz) / Channel	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/CH 1	16.56	17.14	16.68	17.26	20.21	30	PASS
	2437/CH 6	16.81	17.39	16.84	17.42	20.42	30	PASS
	2462/CH11	16.83	17.41	16.80	17.38	20.40	30	PASS
802.11g	2412/CH 1	15.32	15.32	15.00	15.00	18.17	30	PASS
	2437/CH 6	15.10	15.10	15.43	15.43	18.28	30	PASS
	2462/CH11	15.07	15.07	15.26	15.26	18.18	30	PASS
802.11n HT20	2412/CH 1	13.17	13.17	12.72	12.72	15.96	30	PASS
	2437/CH 6	12.96	12.96	13.22	13.22	16.10	30	PASS
	2462/CH11	12.79	12.79	12.79	12.79	15.80	30	PASS

Note:

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

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

The Total Power $=10\log(10^{(\text{Power antenna1 in dBm}/10)}+10^{(\text{Power antenna2 in dBm}/10)})$.

3. The manufacturer declared the transmitter output signals is CDD mode. And $N_{ss}=1$. According to KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + 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} + Array Gain =3.95+0=3.95 dBi<6dBi. So the power limit is 30dBm

5.2. 99% Bandwidth and 6dB Bandwidth

Ambient Condition

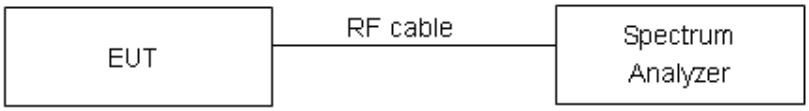
Temperature	Relative humidity
15°C ~ 35°C	20% ~ 80%

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

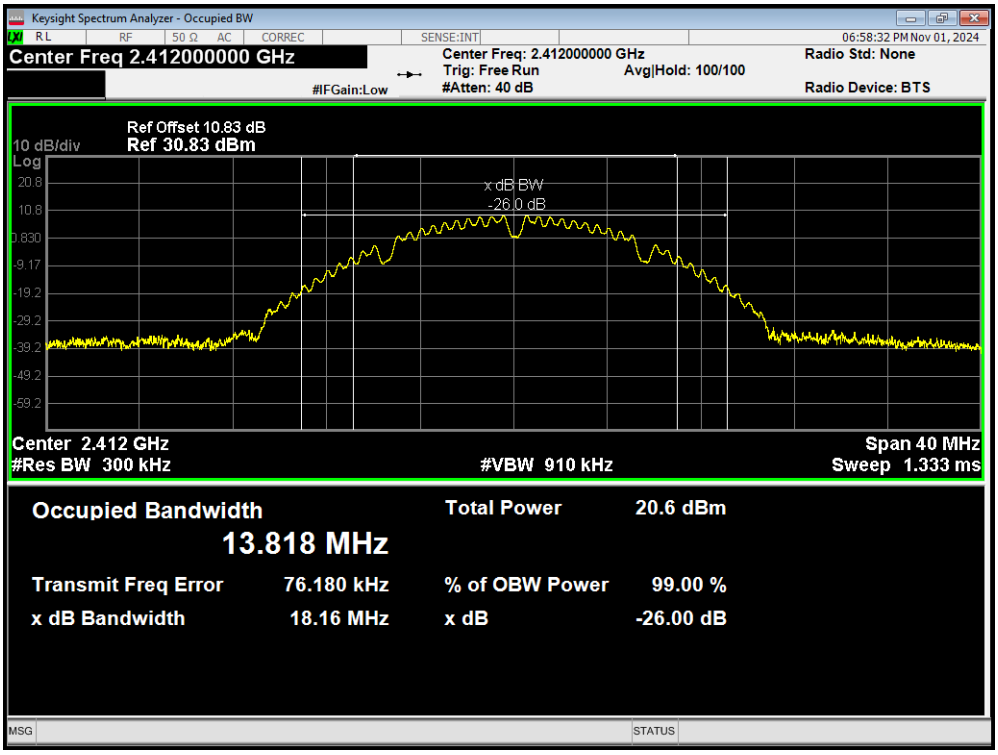
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936 Hz.

Test Results:

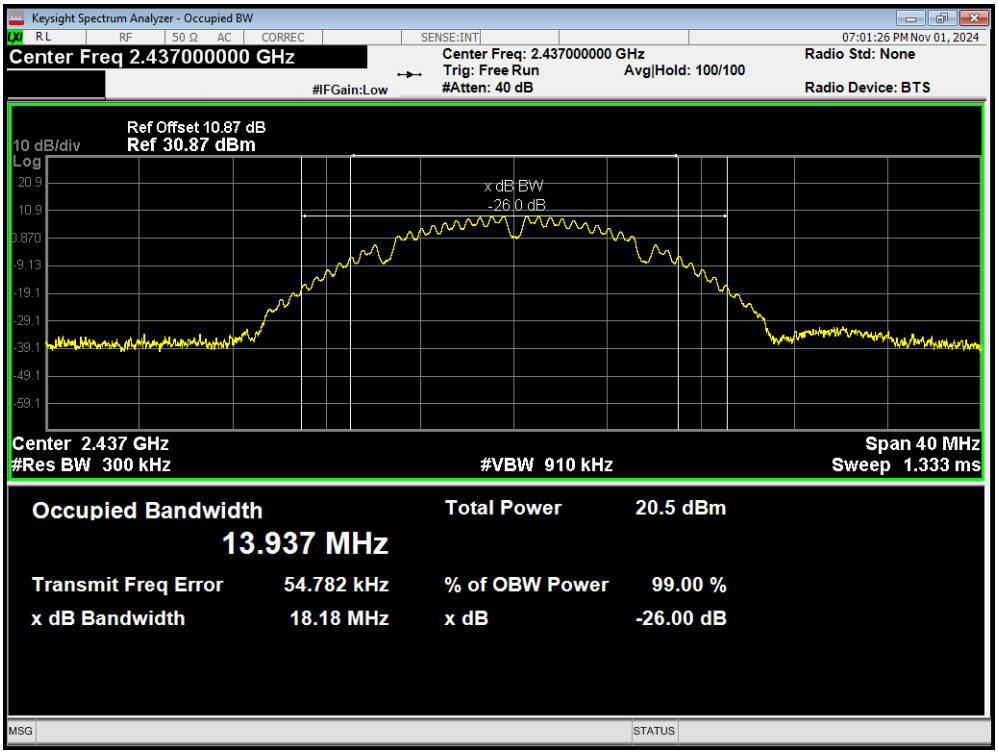
Test Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11b	2412	13.818	8.057	500	PASS
	2437	13.937	9.044	500	PASS
	2462	14.016	9.060	500	PASS
802.11g	2412	16.704	15.636	500	PASS
	2437	16.716	15.649	500	PASS
	2462	16.690	16.290	500	PASS
802.11n HT20	2412	17.832	17.321	500	PASS
	2437	17.870	17.519	500	PASS
	2462	17.879	16.518	500	PASS
Bluetooth (Low Energy) (1M)	2402	1.028	0.661	500	PASS
	2440	1.036	0.654	500	PASS
	2480	1.032	0.653	500	PASS
Bluetooth (Low Energy) (2M)	2402	2.036	1.112	500	PASS
	2440	2.048	1.132	500	PASS
	2480	2.044	1.111	500	PASS

99%bandwidth

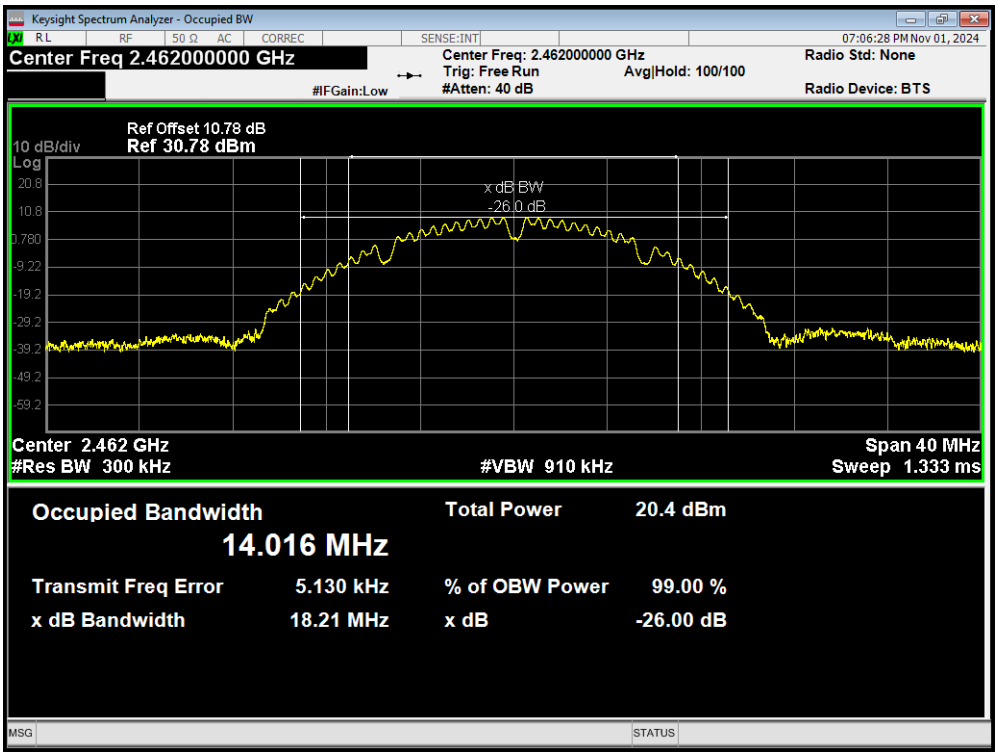
OBW 802.11b 2412MHz



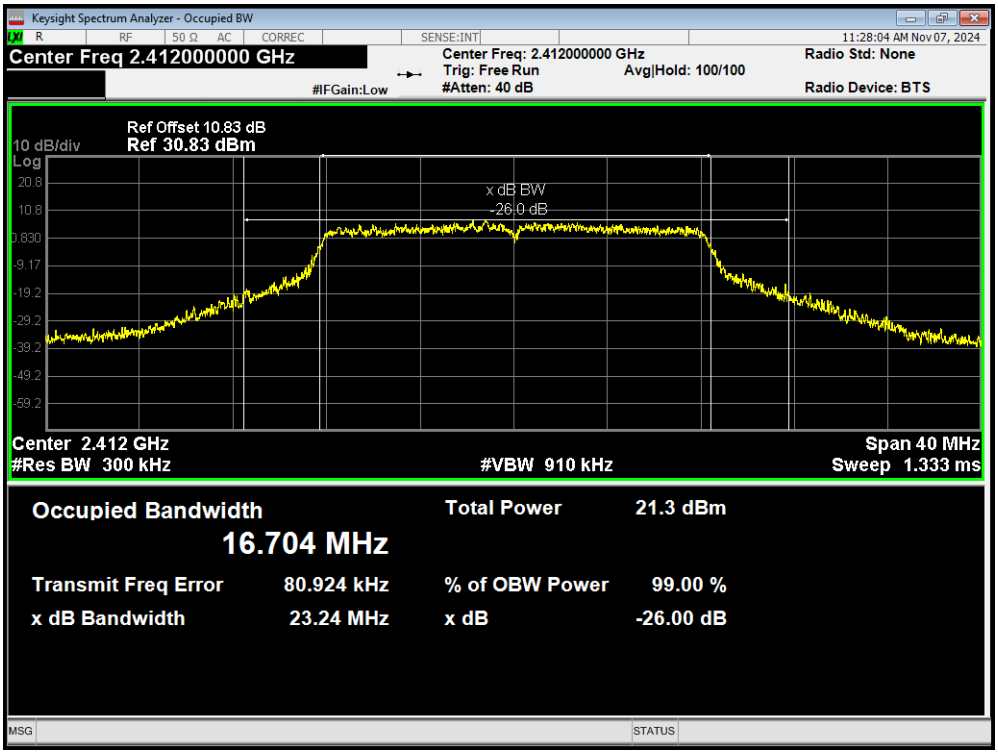
OBW 802.11b 2437MHz



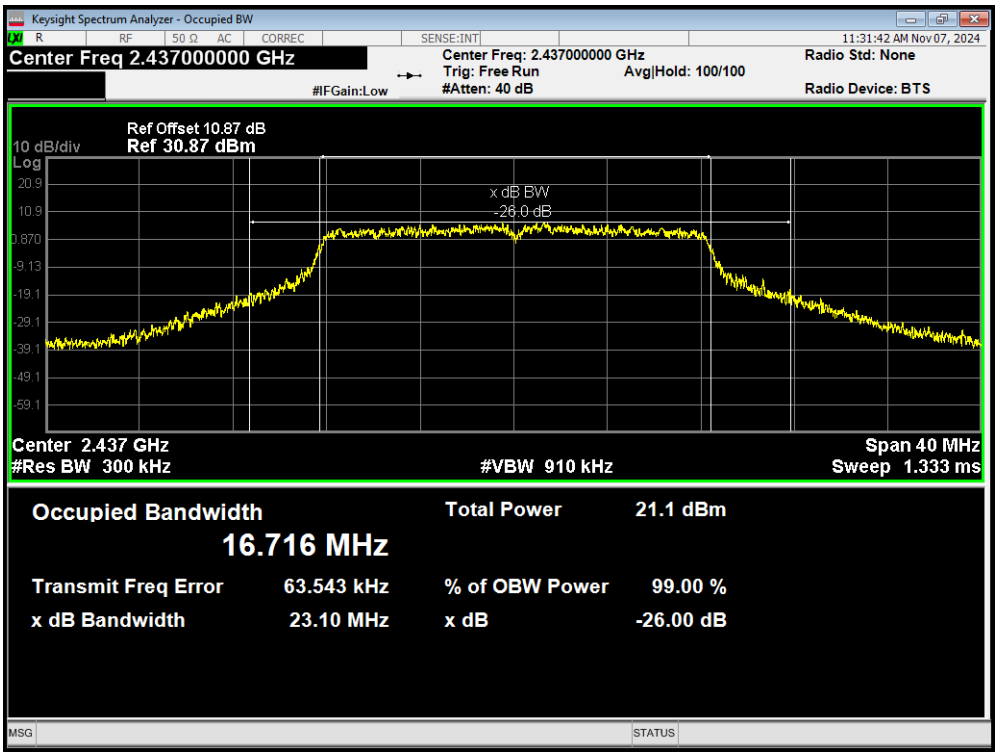
OBW 802.11b 2462MHz



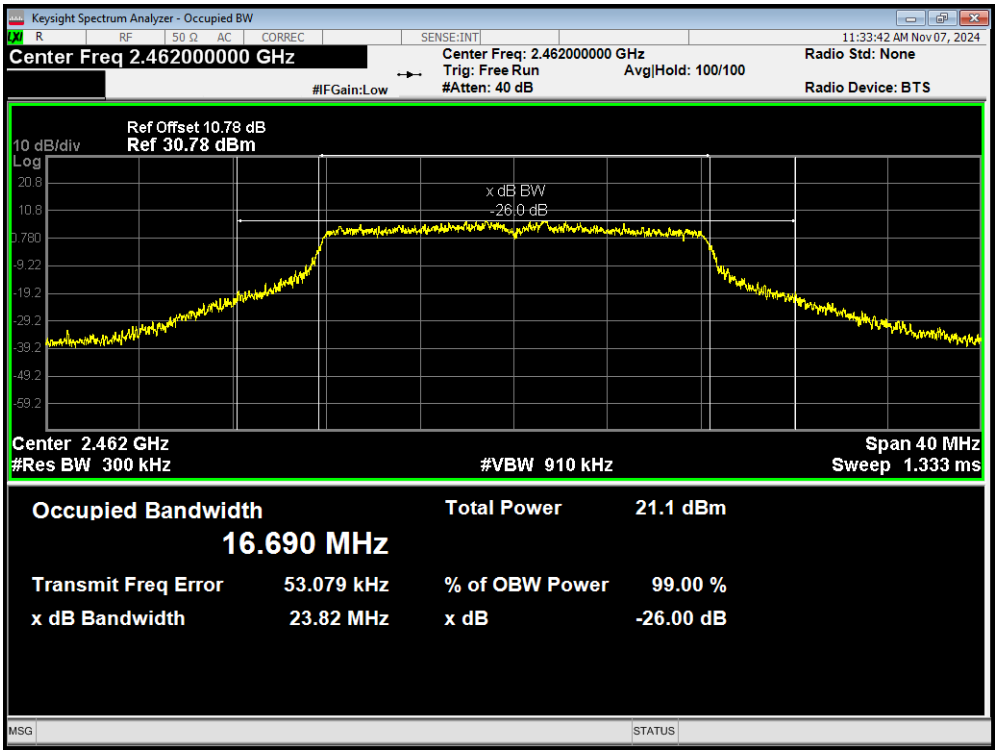
OBW 802.11g 2412MHz



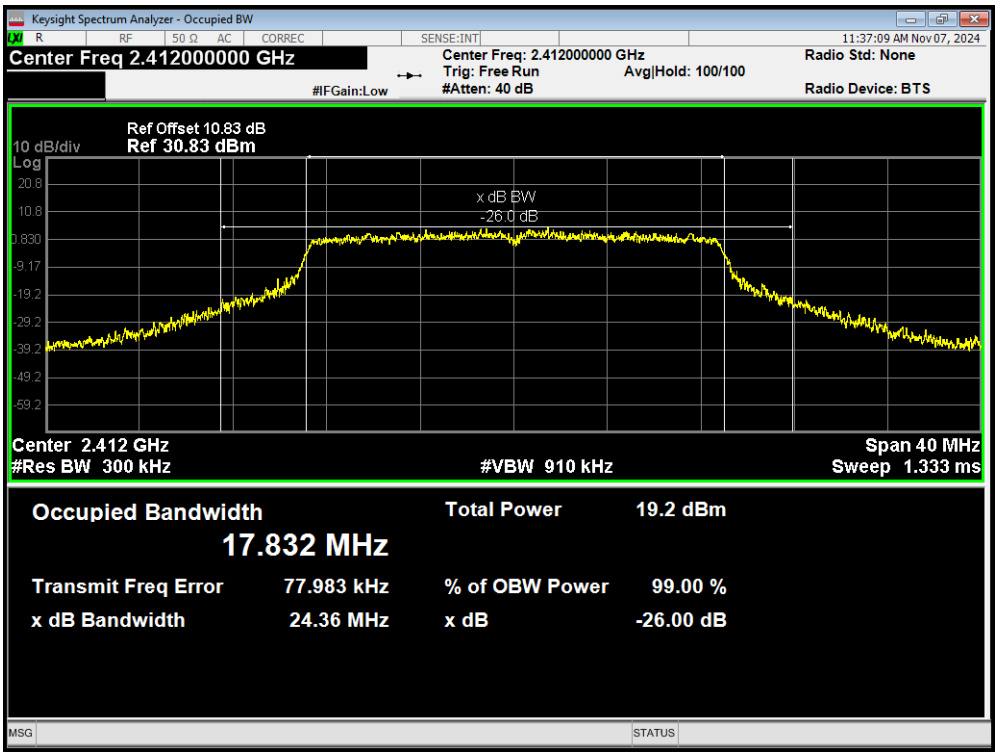
OBW 802.11g 2437MHz



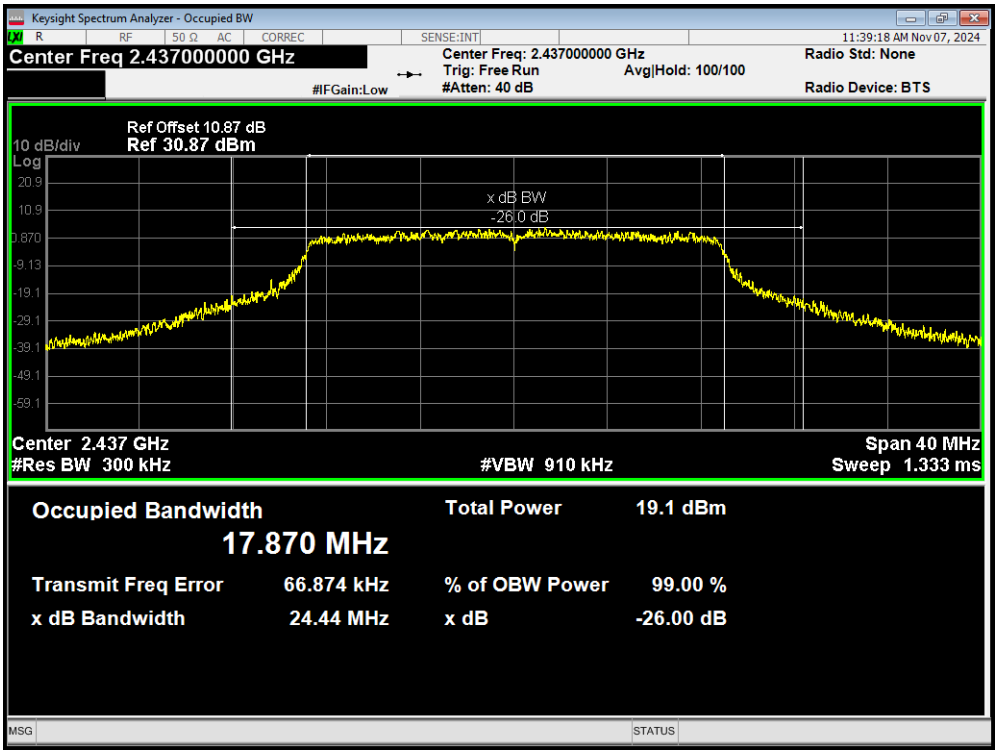
OBW 802.11g 2462MHz



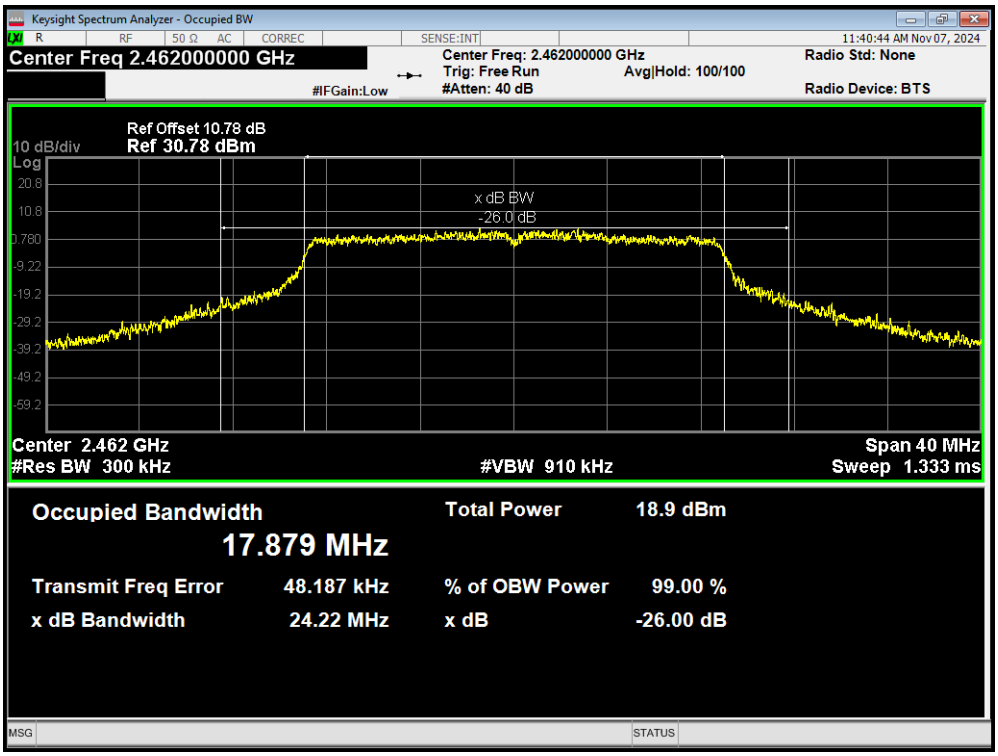
OBW 802.11n(HT20) 2412MHz



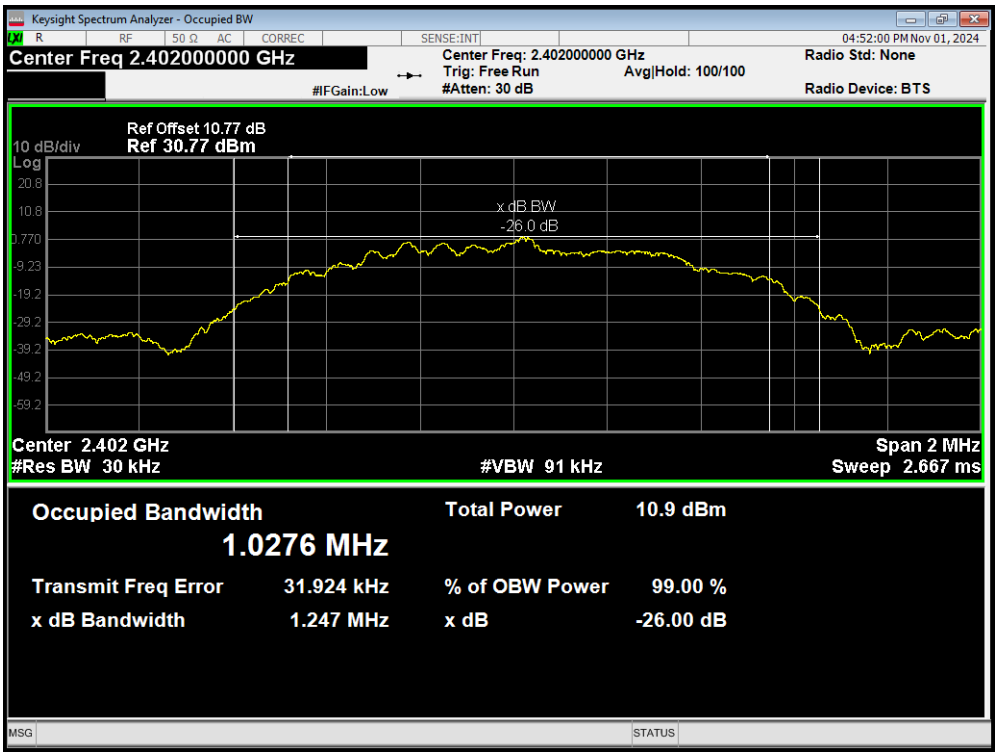
OBW 802.11n(HT20) 2437MHz



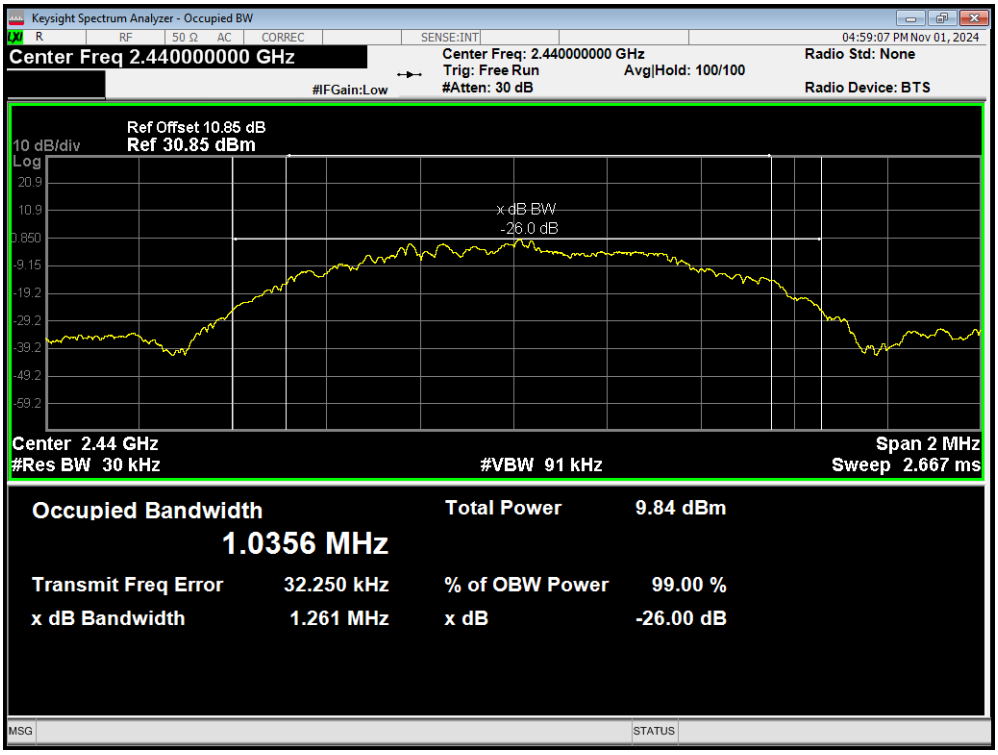
OBW 802.11n(HT20) 2462MHz



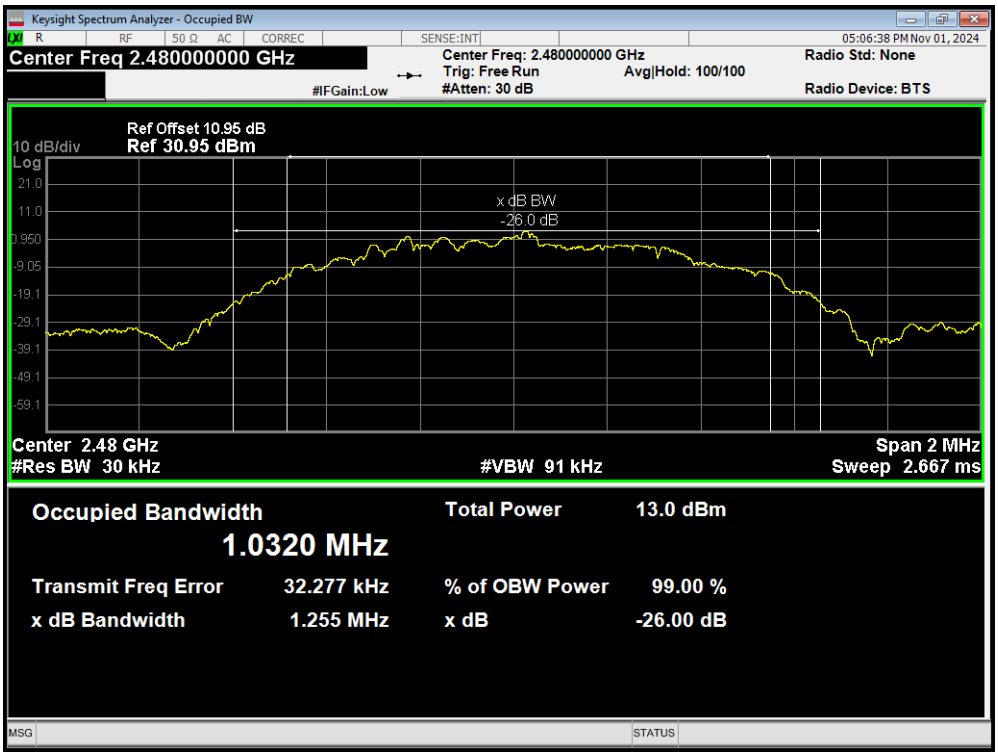
OBW BLE (1M) 2402MHz



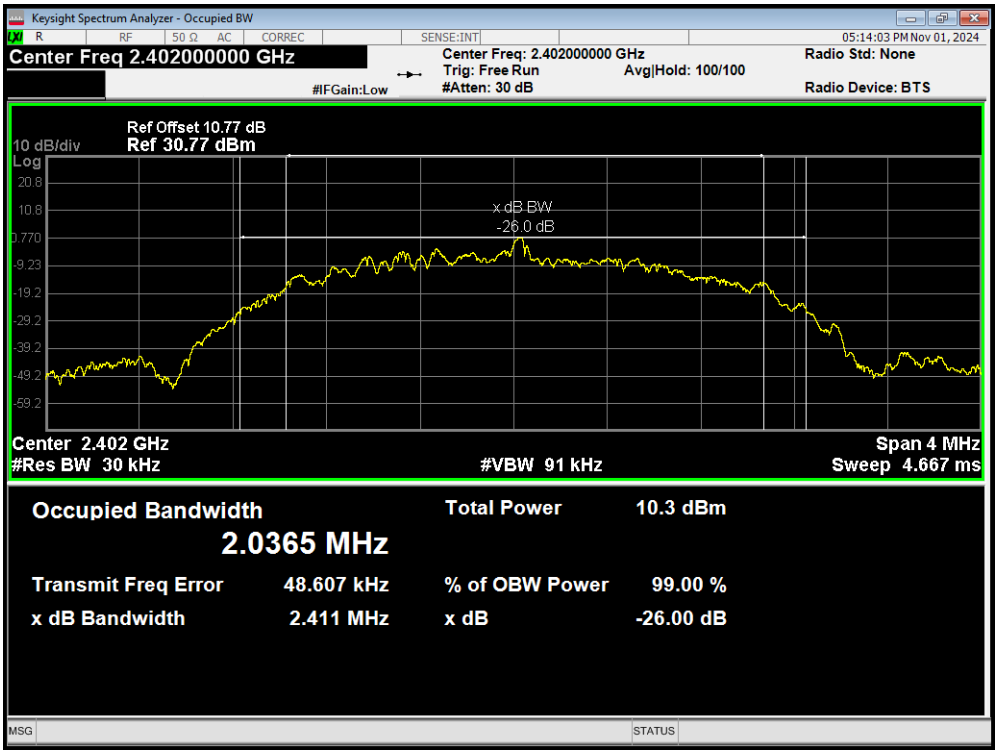
OBW BLE (1M) 2440MHz



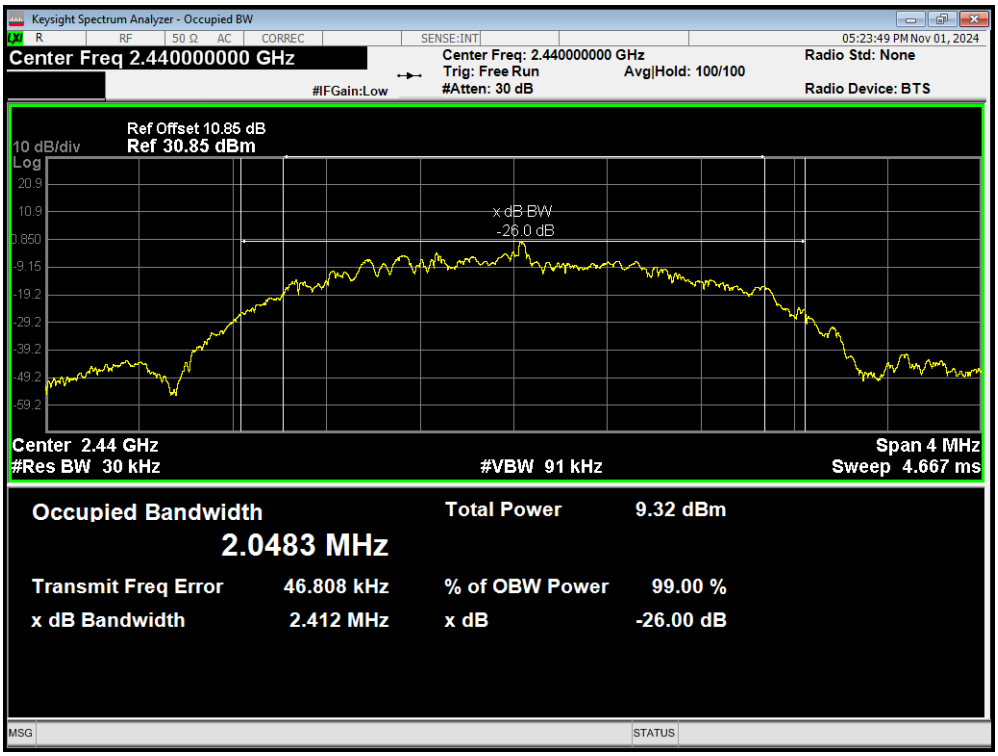
OBW BLE (1M) 2480MHz



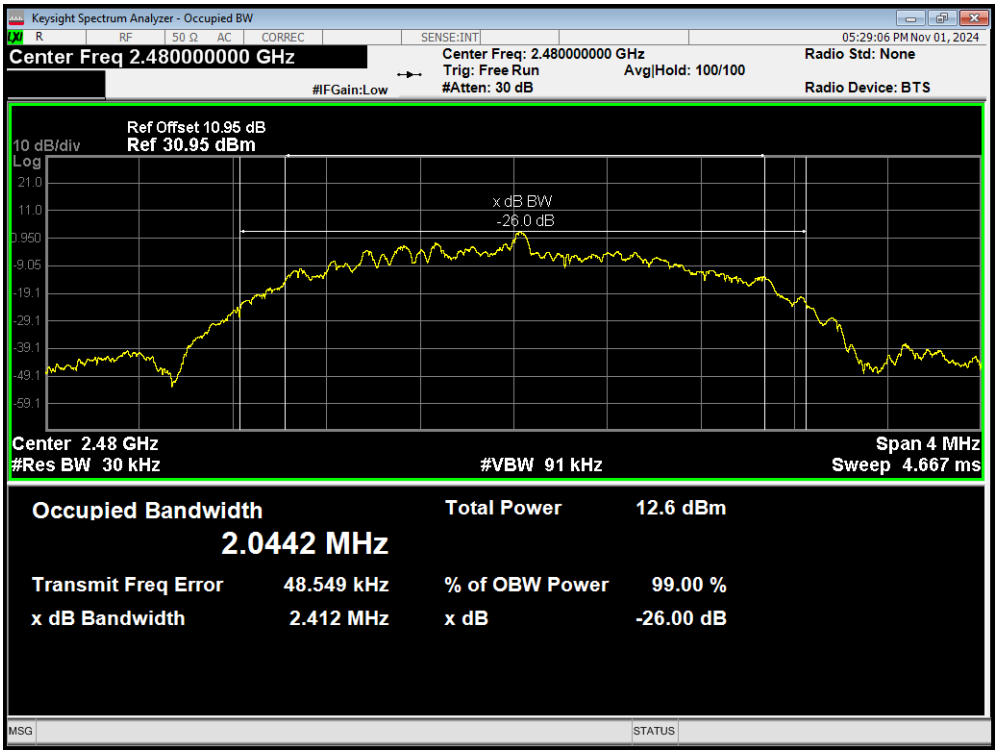
OBW BLE (2M) 2402MHz



OBW BLE (2M) 2440MHz

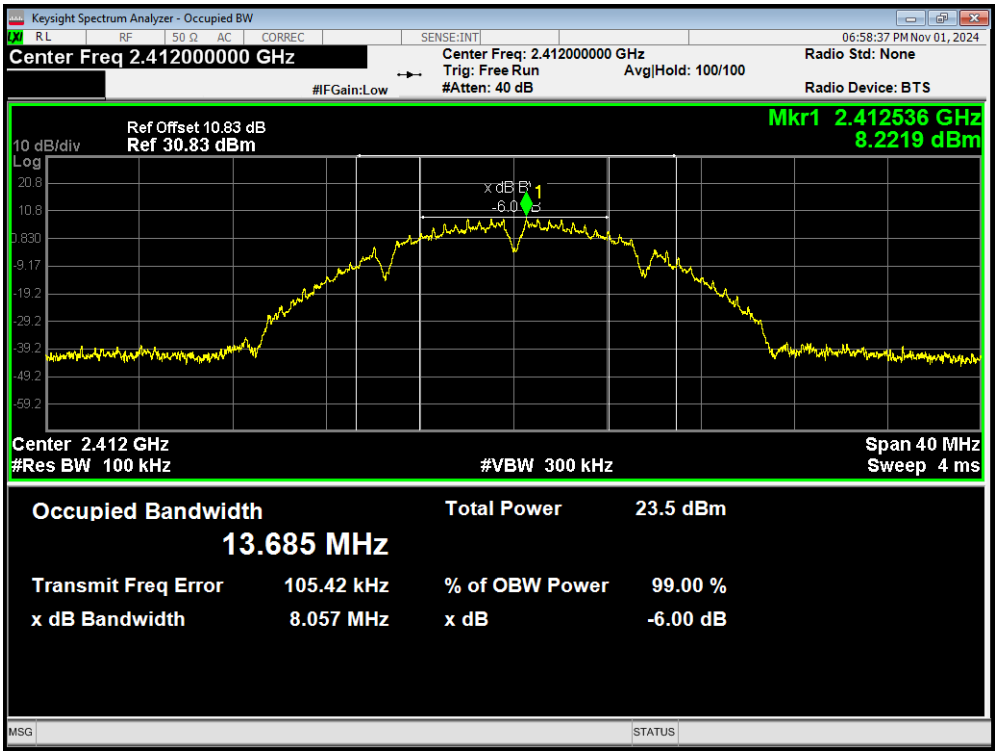


OBW BLE (2M) 2480MHz

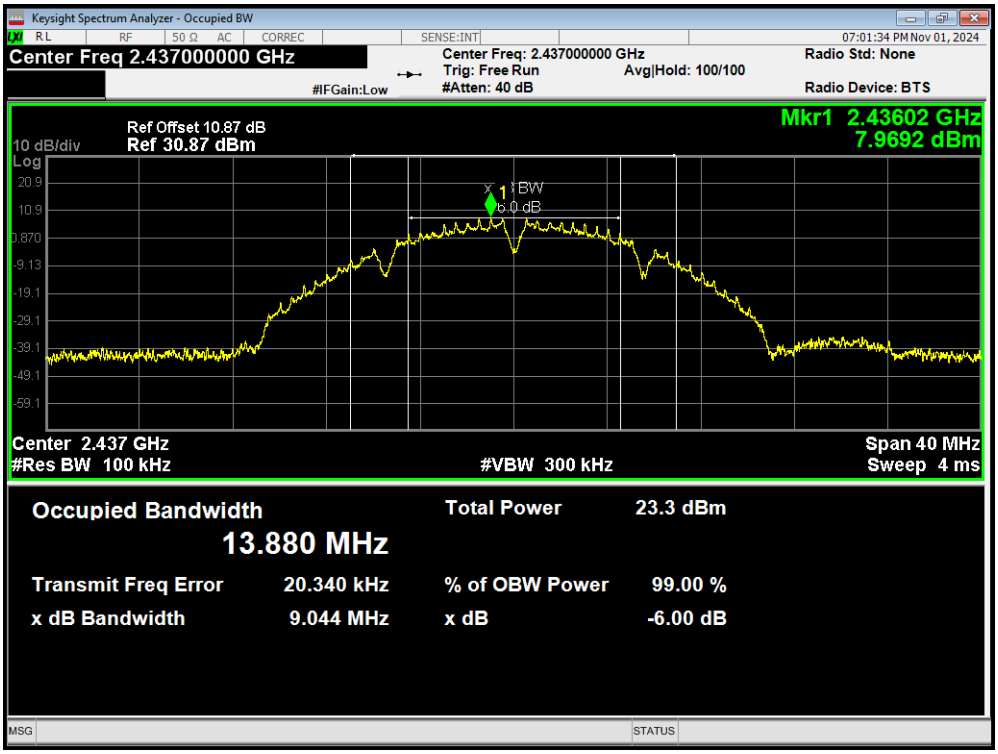


6 dB bandwidth

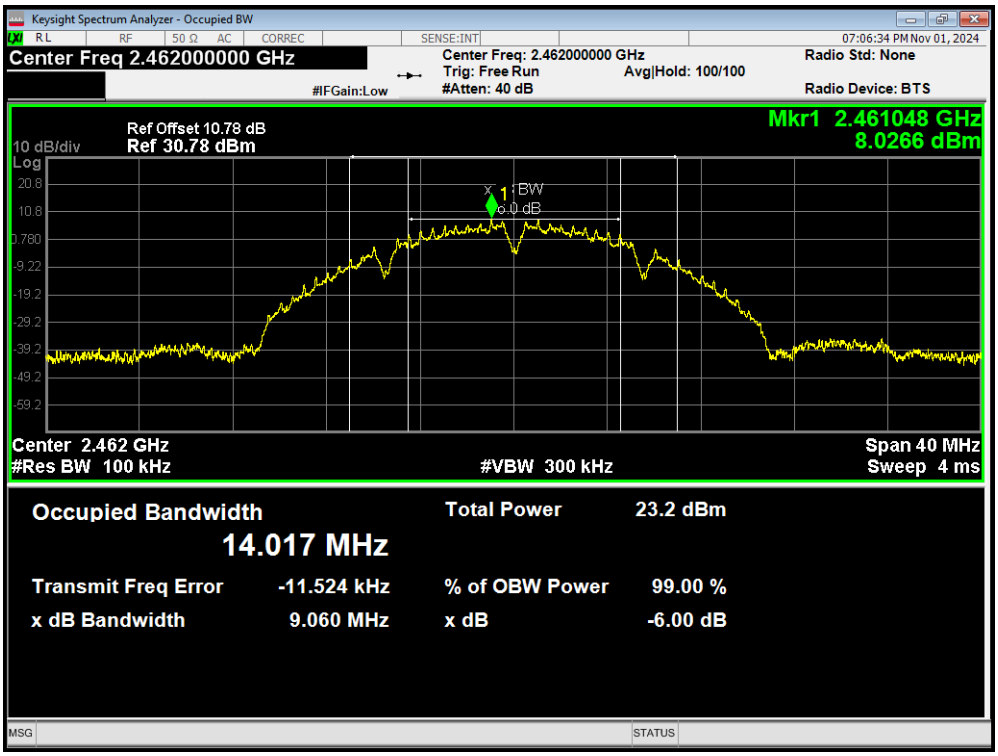
-6dB Bandwidth 802.11b 2412MHz



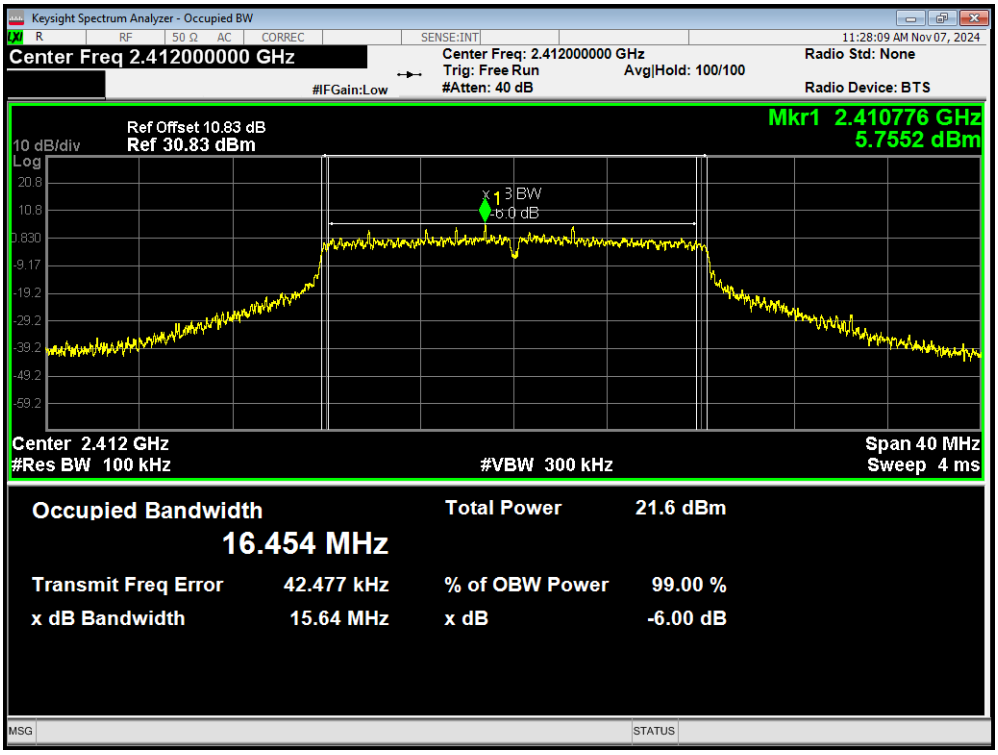
-6dB Bandwidth 802.11b 2437MHz



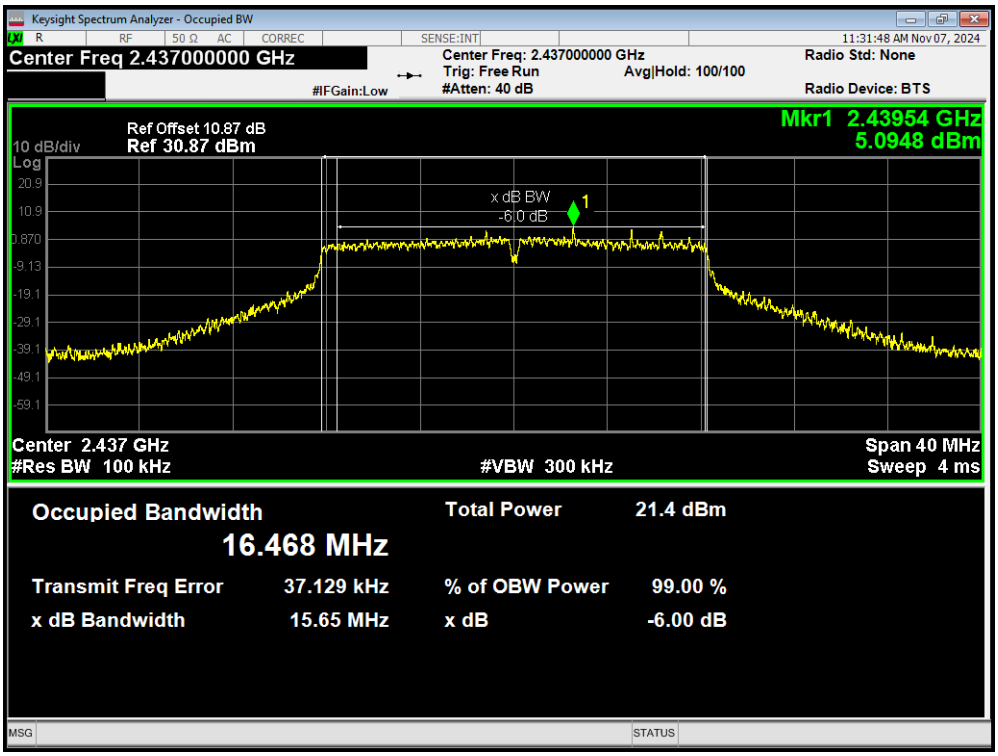
-6dB Bandwidth 802.11b 2462MHz



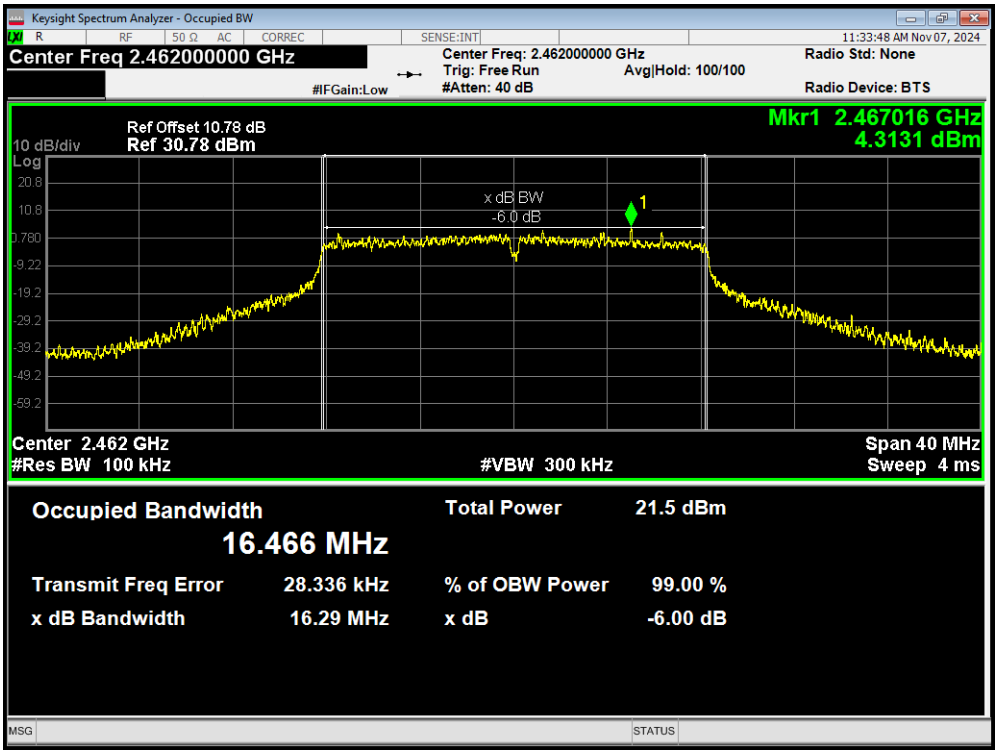
-6dB Bandwidth 802.11g 2412MHz



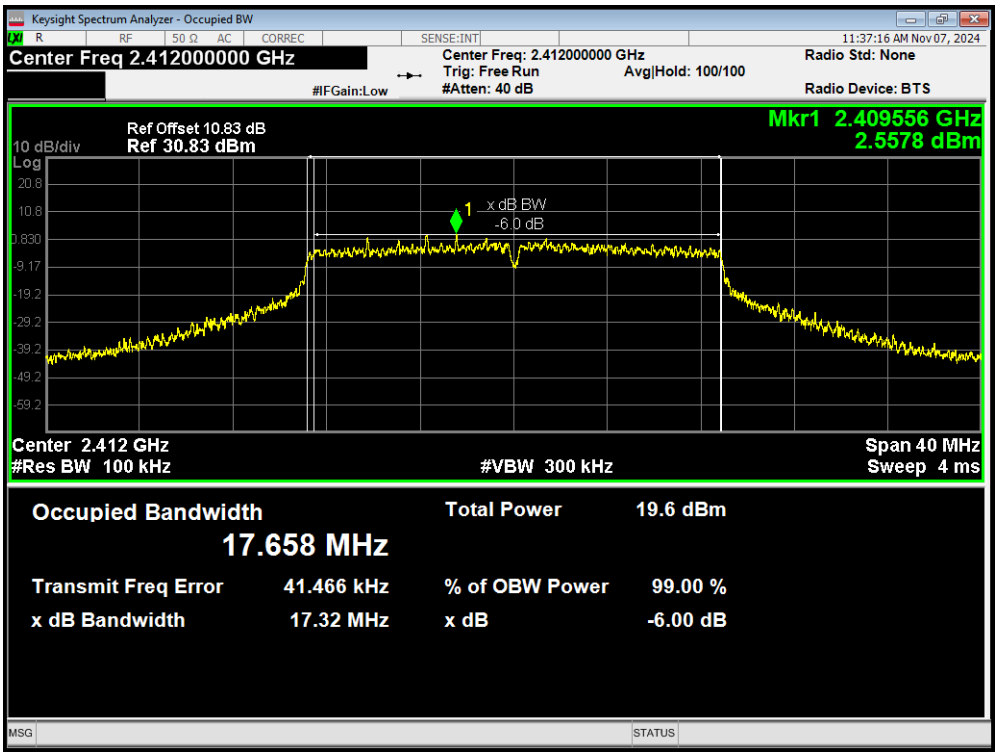
-6dB Bandwidth 802.11g 2437MHz



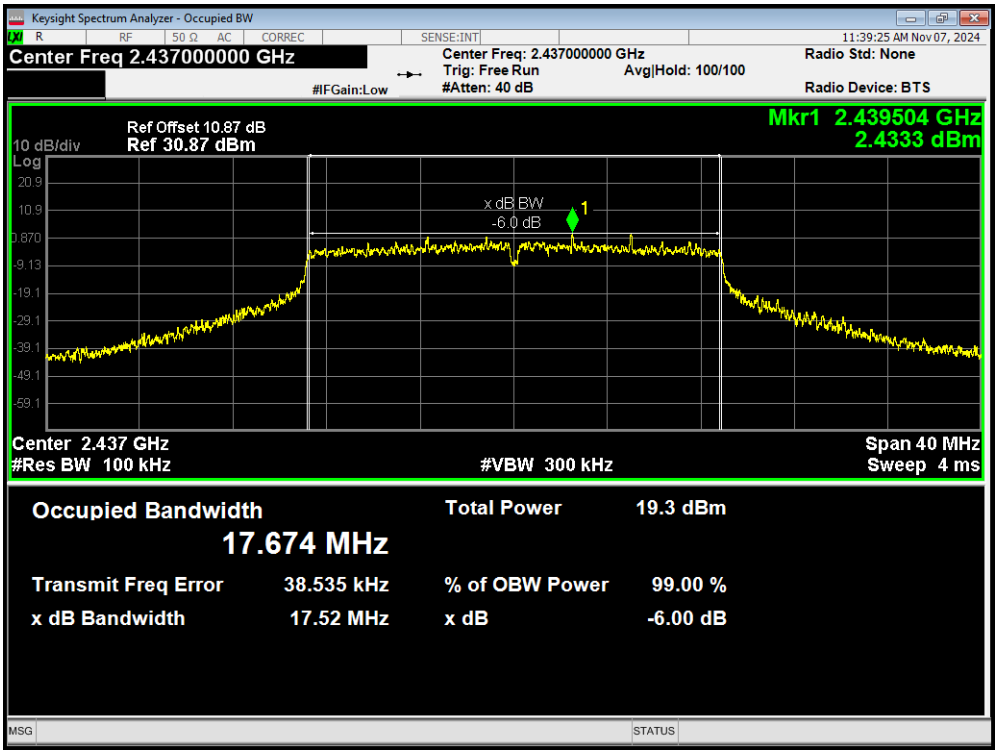
-6dB Bandwidth 802.11g 2462MHz



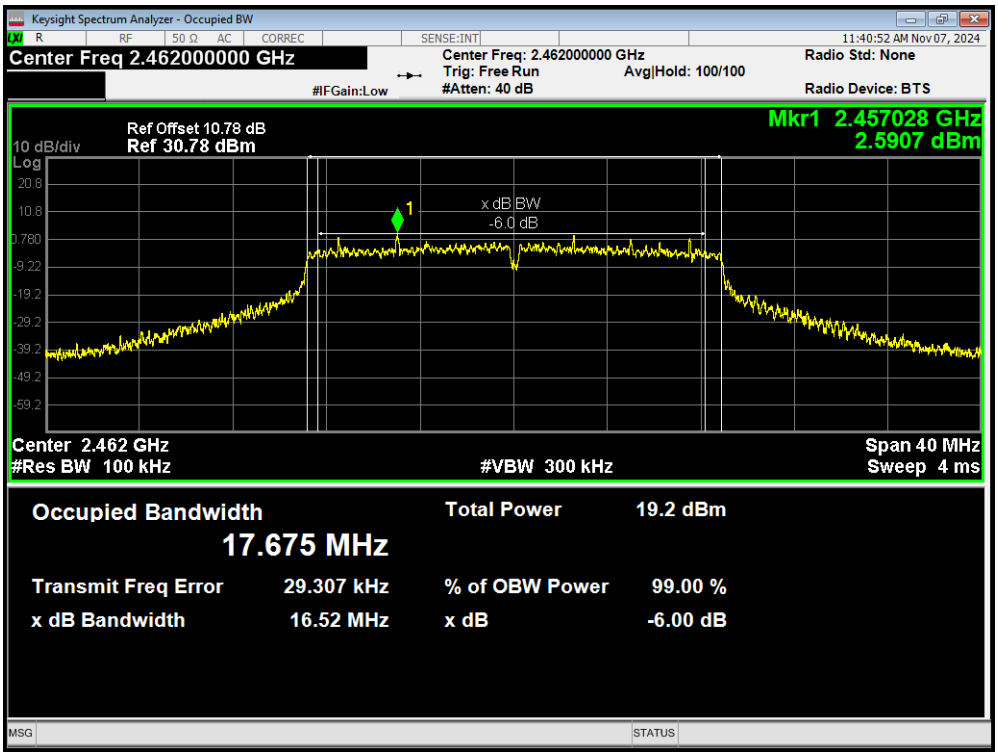
-6dB Bandwidth 802.11n(HT20) 2412MHz



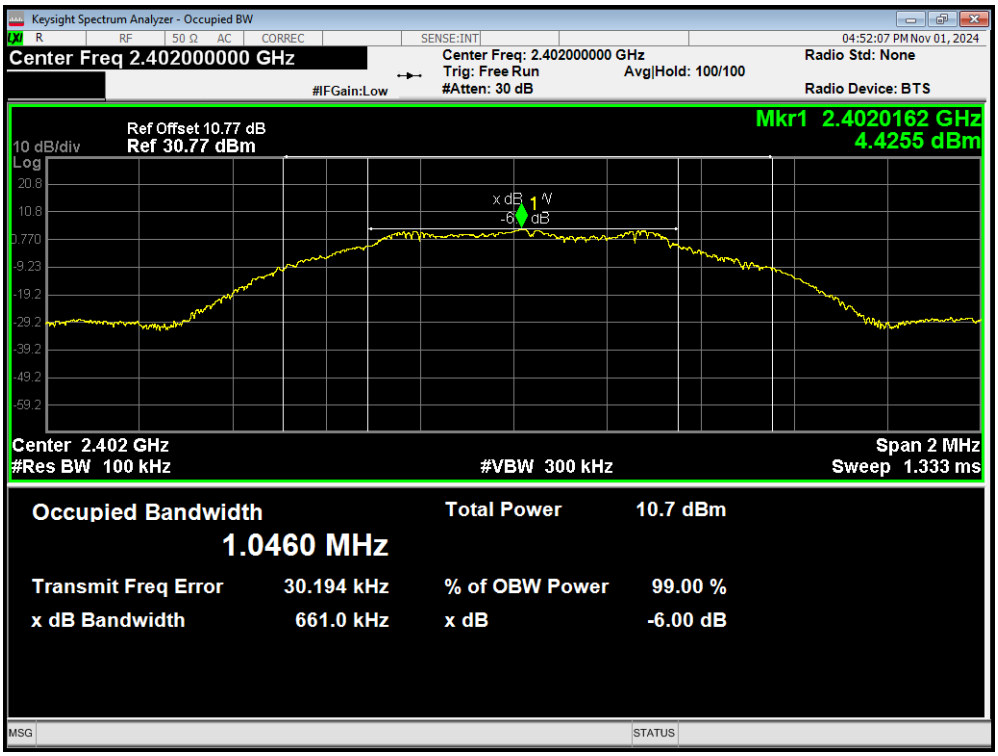
-6dB Bandwidth 802.11n(HT20) 2437MHz



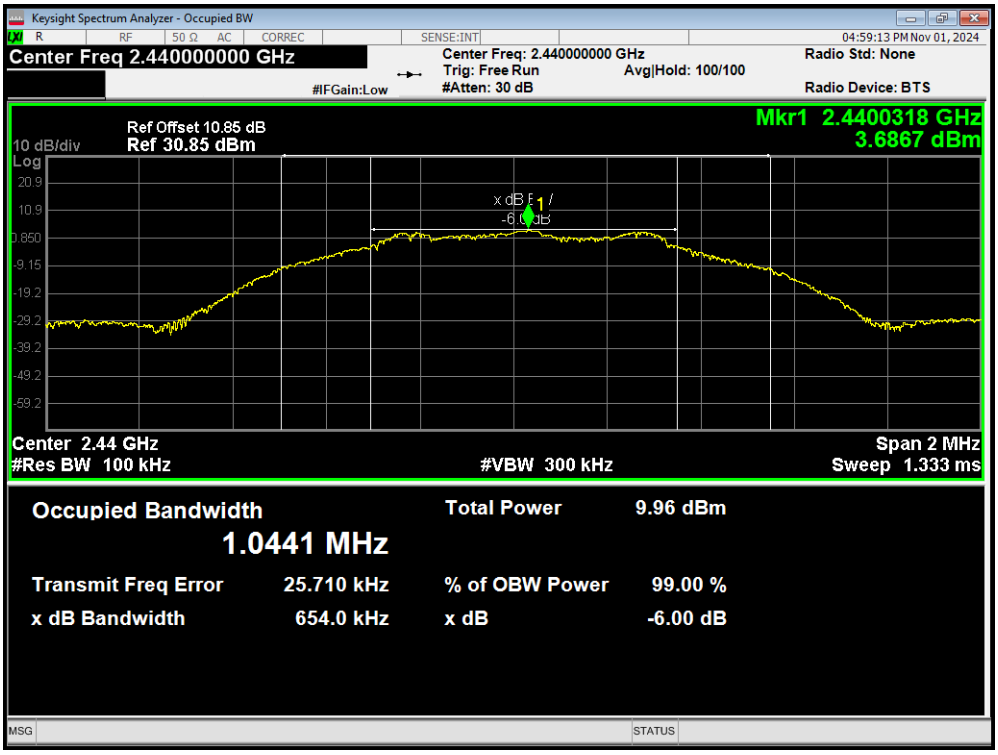
-6dB Bandwidth 802.11n(HT20) 2462MHz



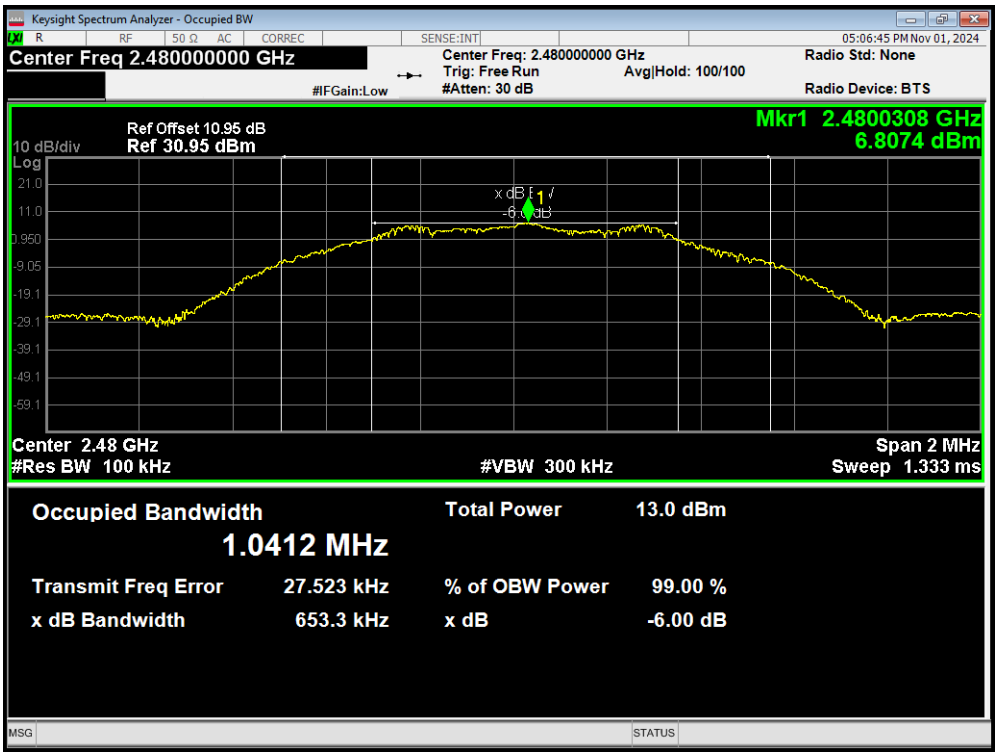
-6dB Bandwidth BLE (1M) 2402MHz



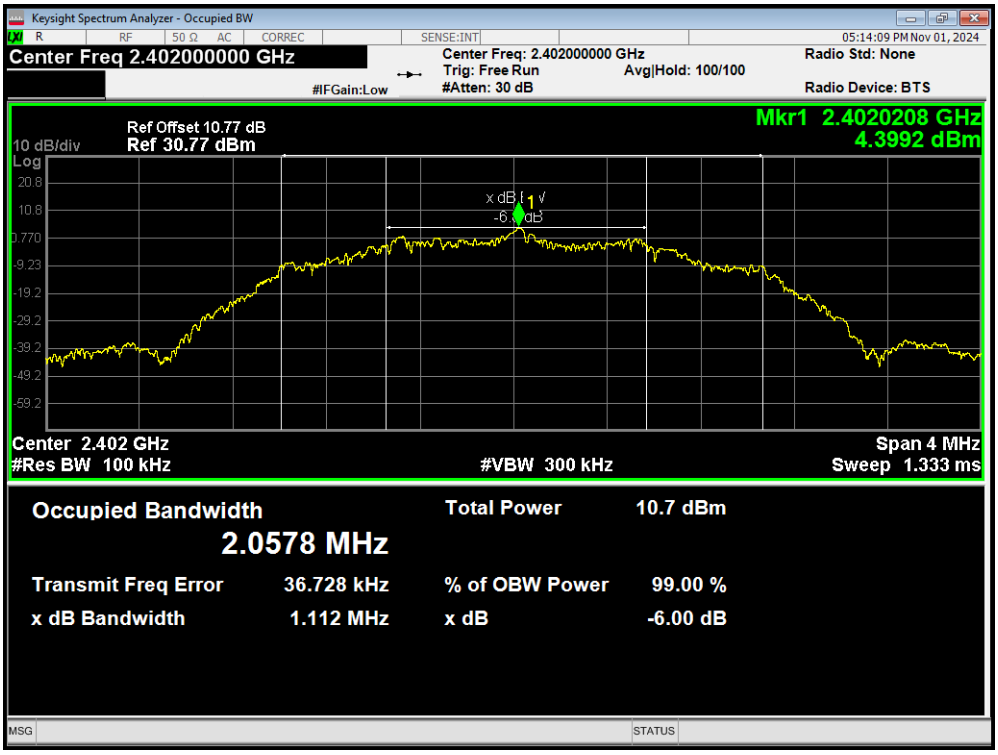
-6dB Bandwidth BLE (1M) 2440MHz



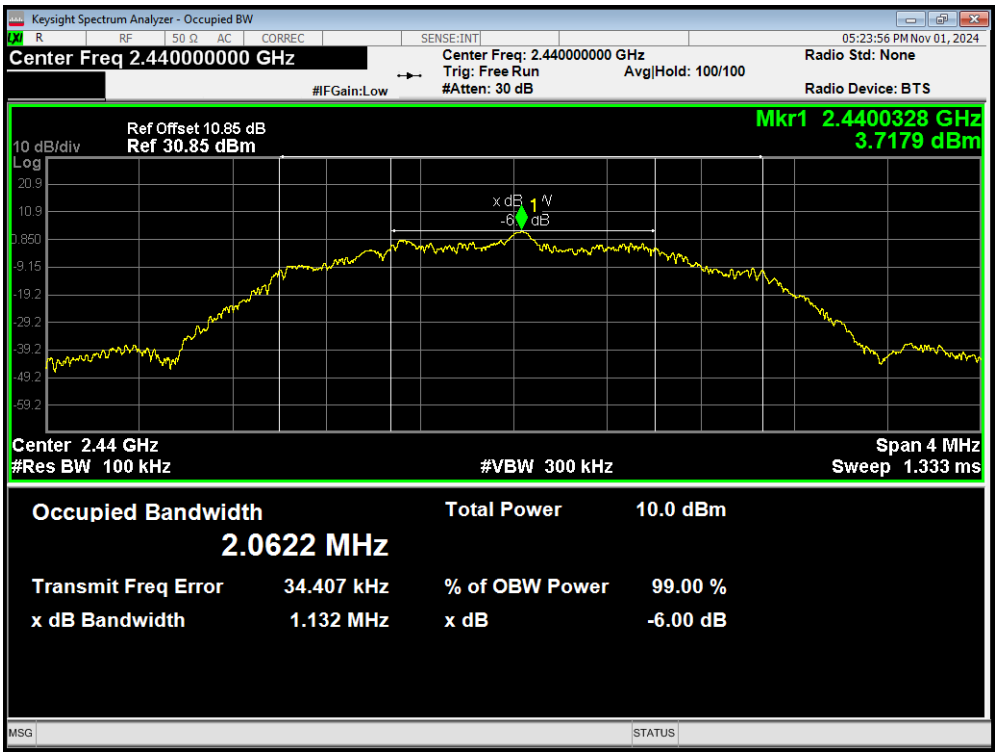
-6dB Bandwidth BLE (1M) 2480MHz



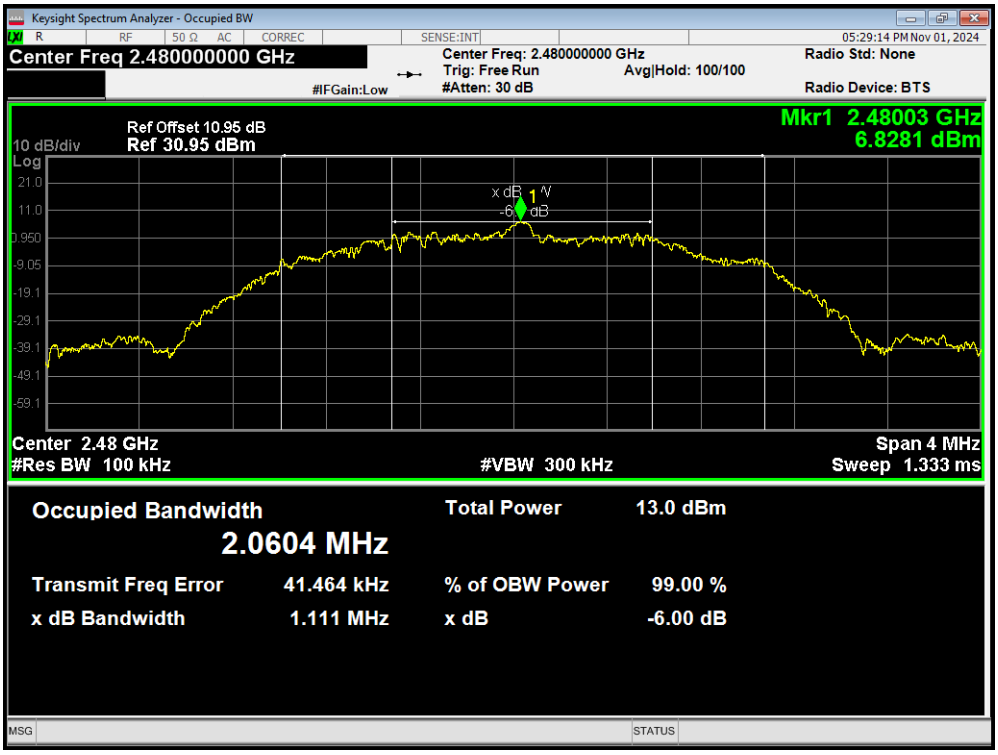
-6dB Bandwidth BLE (2M) 2402MHz



-6dB Bandwidth BLE (2M) 2440MHz



-6dB Bandwidth BLE (2M) 2480MHz



5.3. Band Edge

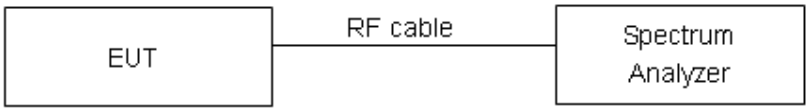
Ambient Condition

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.”

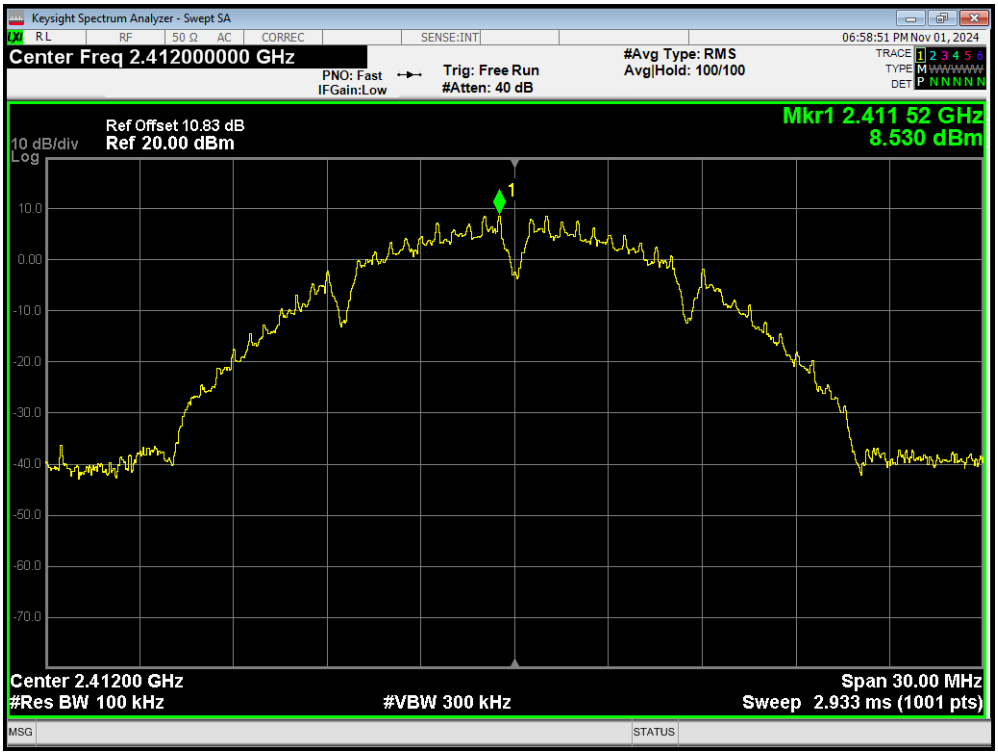
Measurement Uncertainty

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

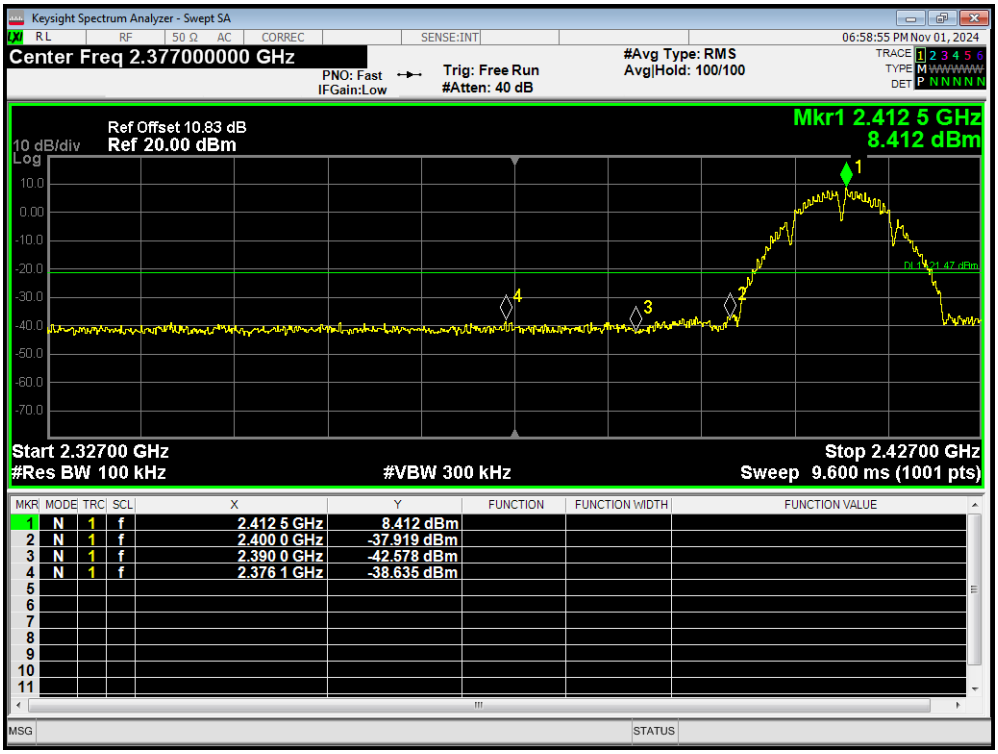
Frequency	Uncertainty
2GHz-3GHz	1.407 dB

Test Results: PASS

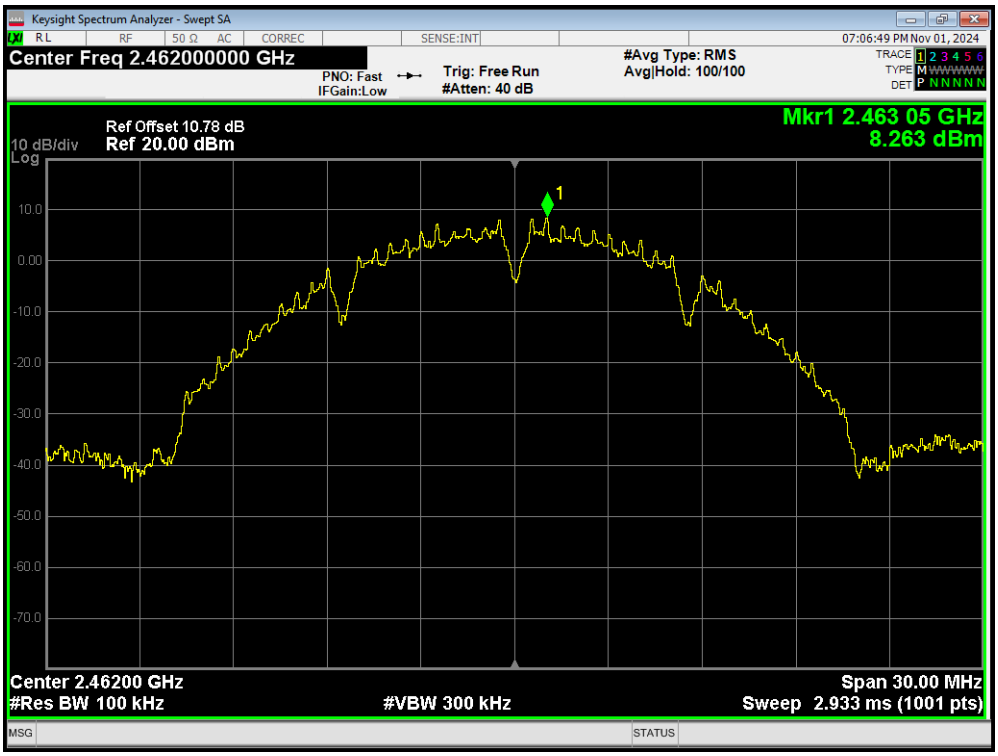
Band Edge 802.11b 2412MHz Ref



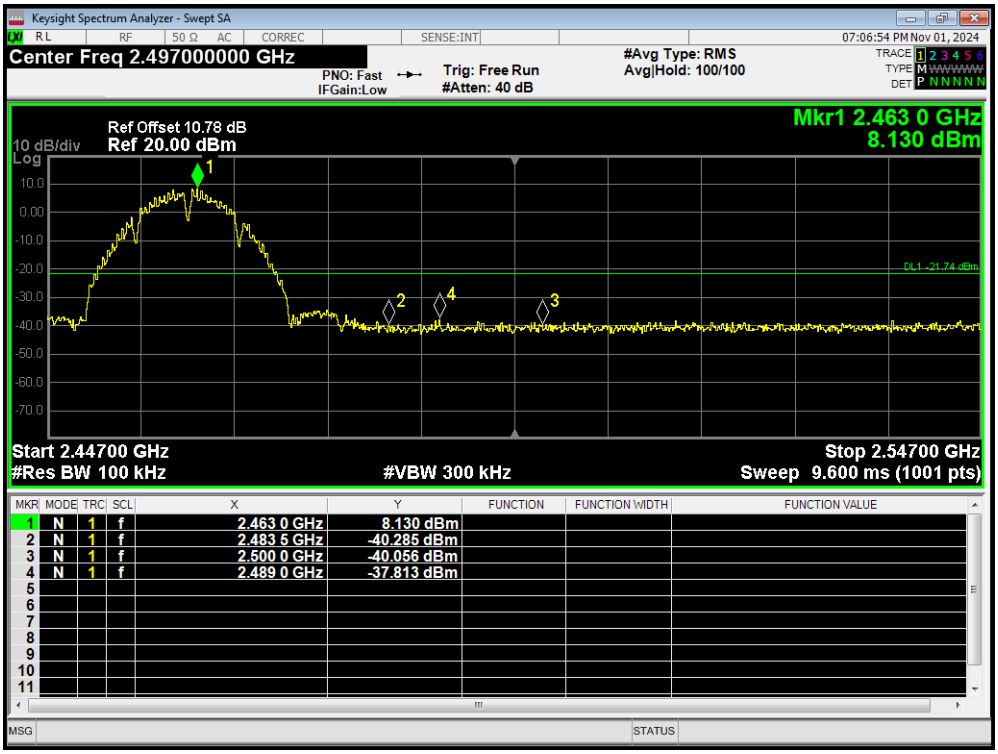
Band Edge 802.11b 2412MHz Emission



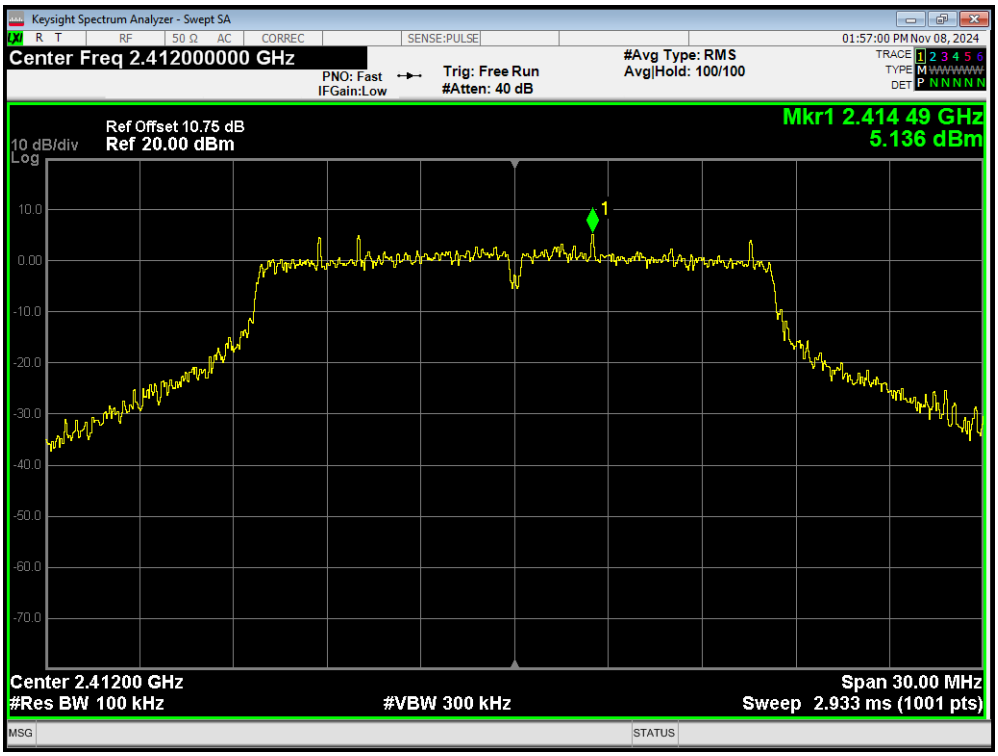
Band Edge 802.11b 2462MHz Ref



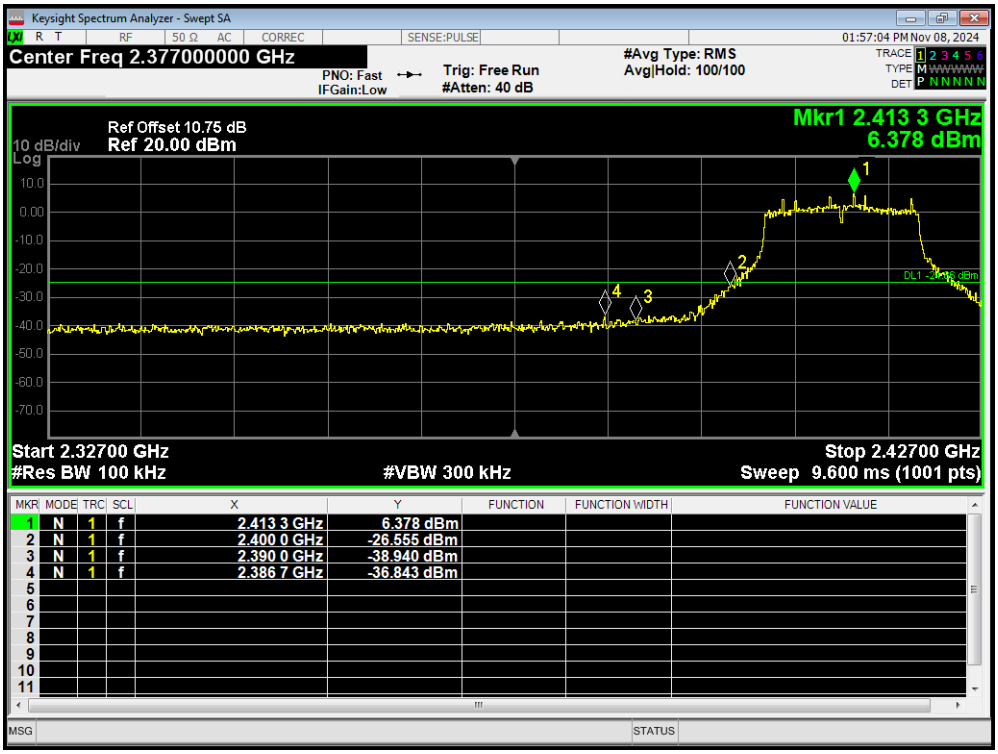
Band Edge 802.11b 2462MHz Emission



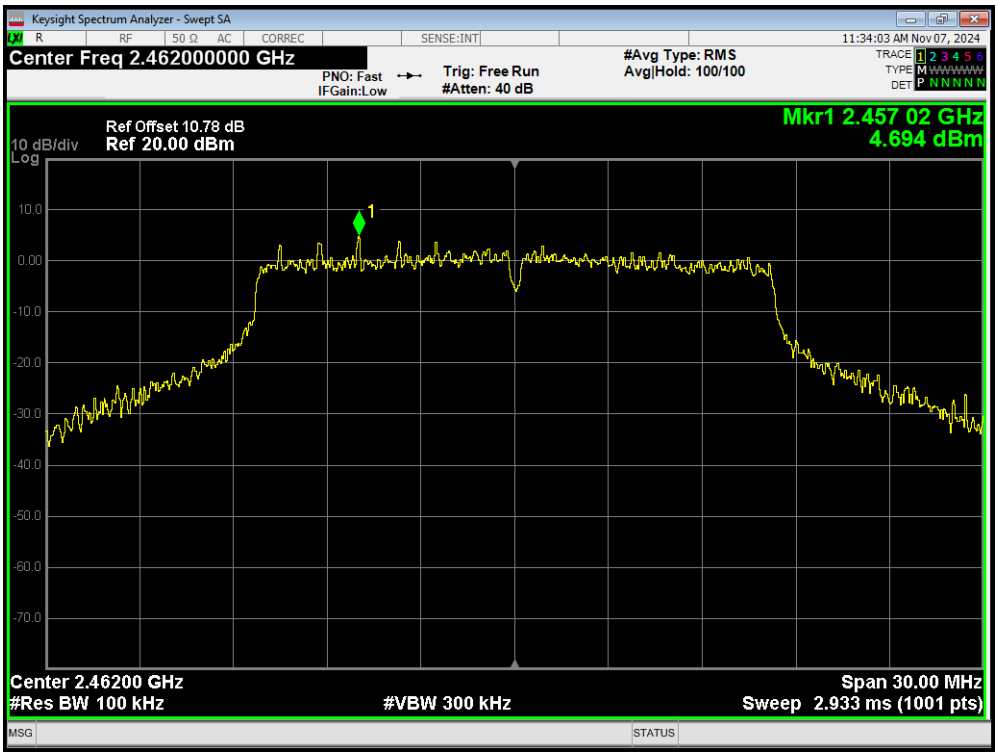
Band Edge 802.11g 2412MHz Ref



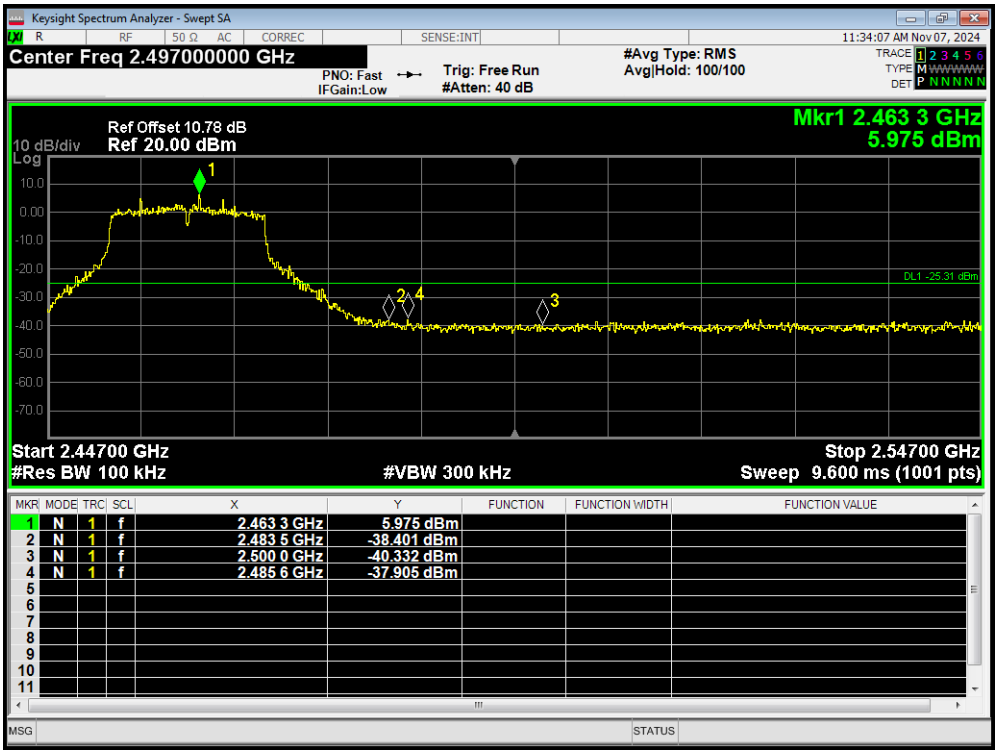
Band Edge 802.11g 2412MHz Emission



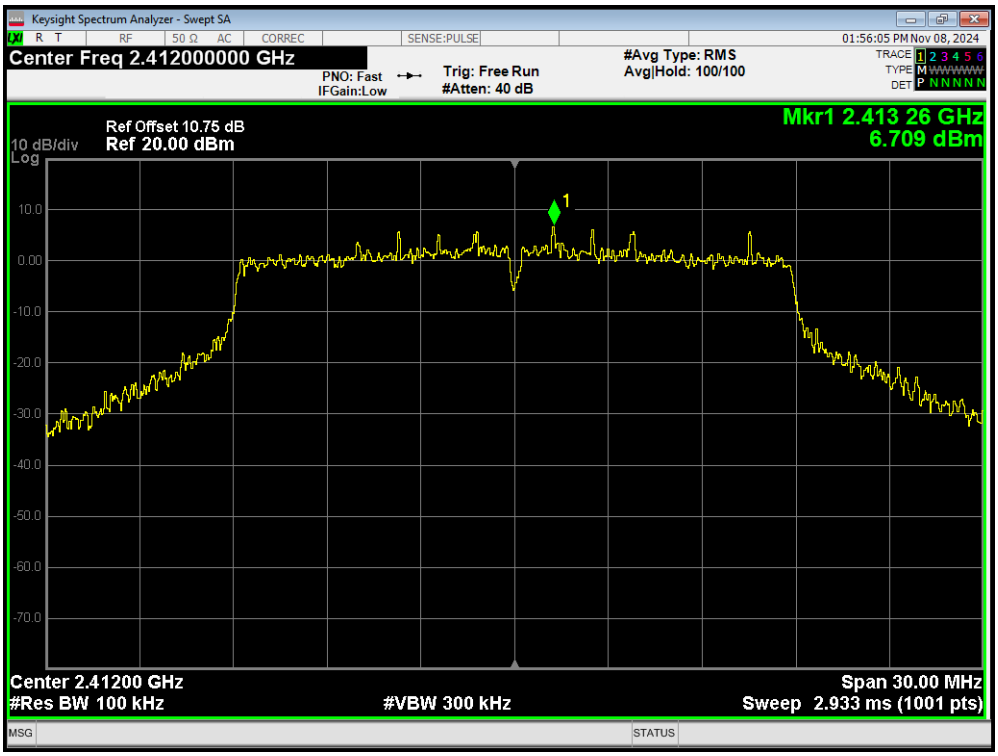
Band Edge 802.11g 2462MHz Ref



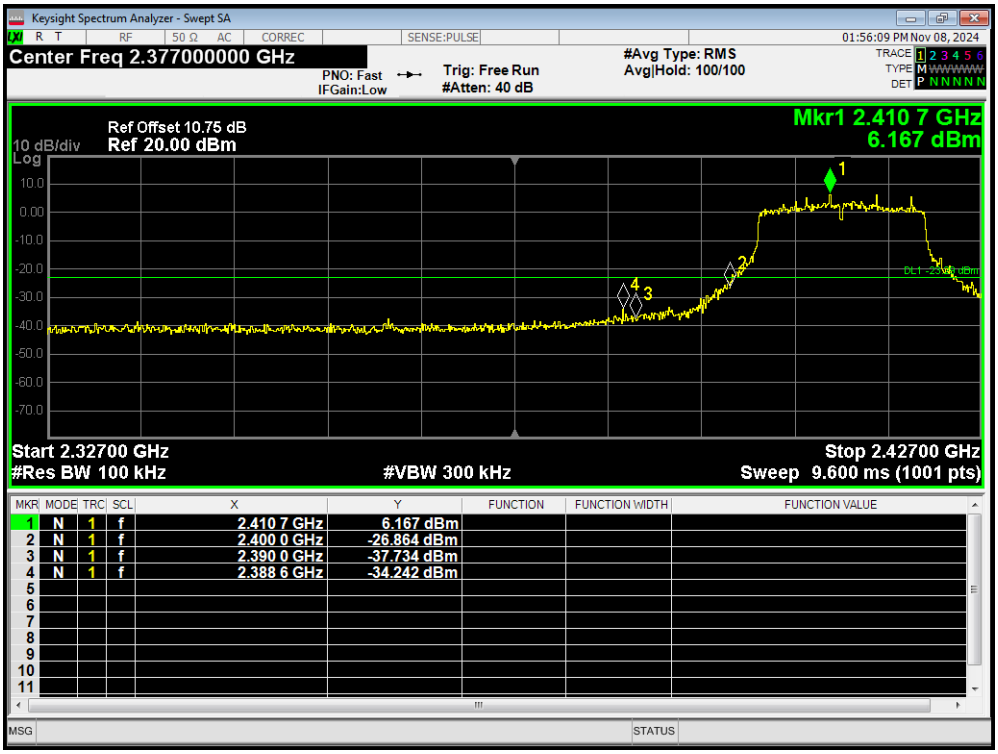
Band Edge 802.11g 2462MHz Emission



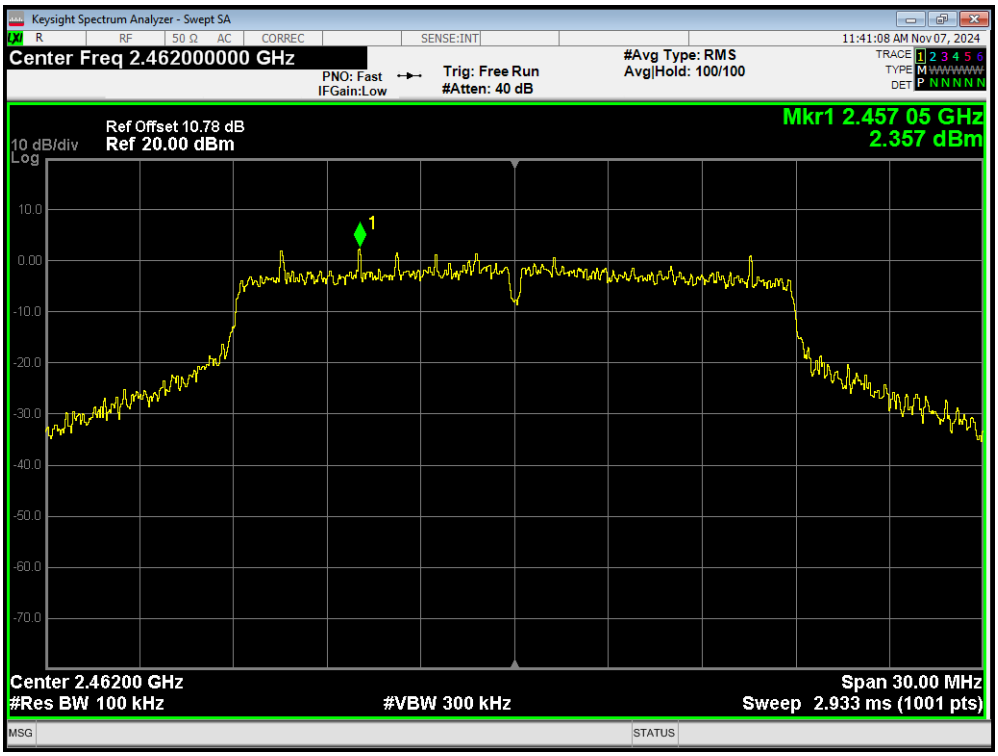
Band Edge 802.11n(HT20) 2412MHz Ref



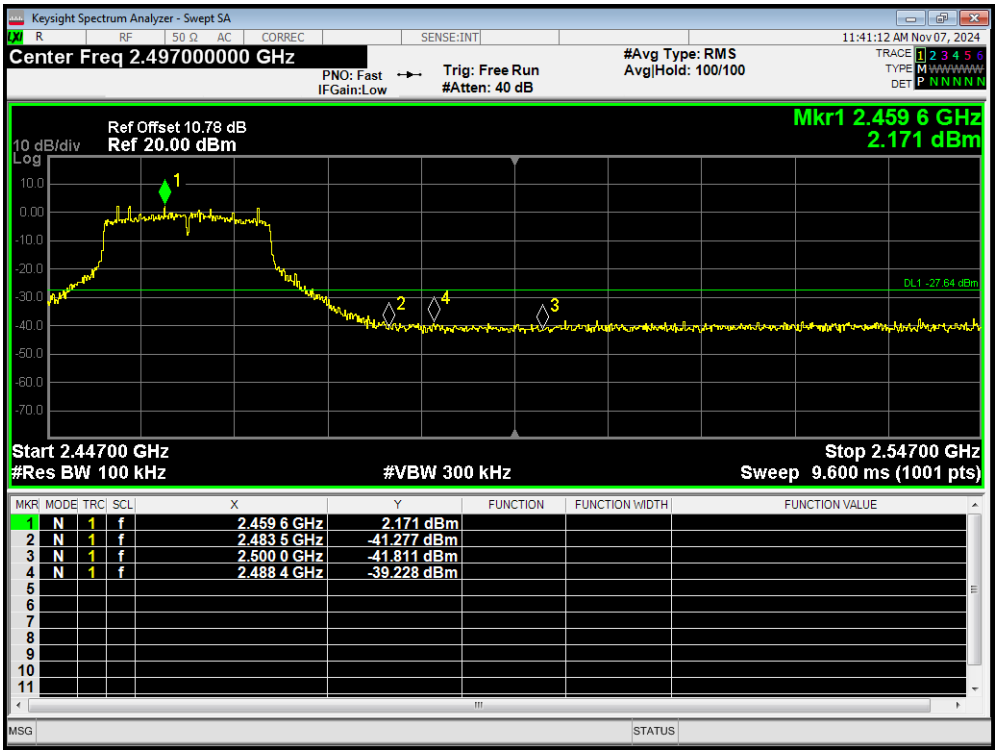
Band Edge 802.11n(HT20) 2412MHz Emission



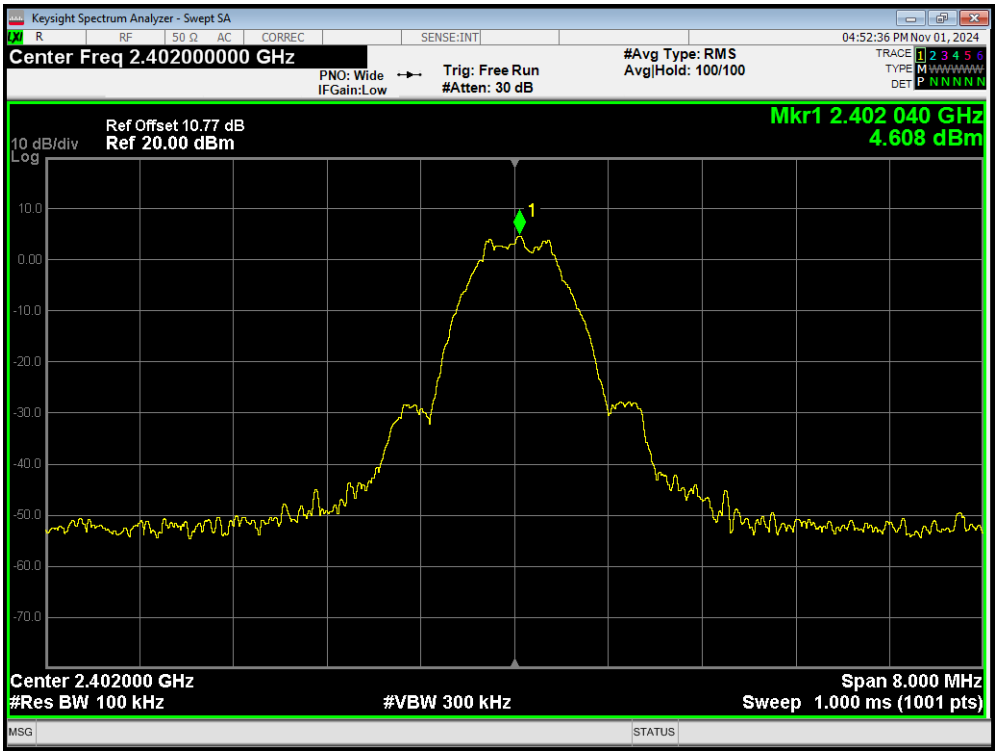
Band Edge 802.11n(HT20) 2462MHz Ref



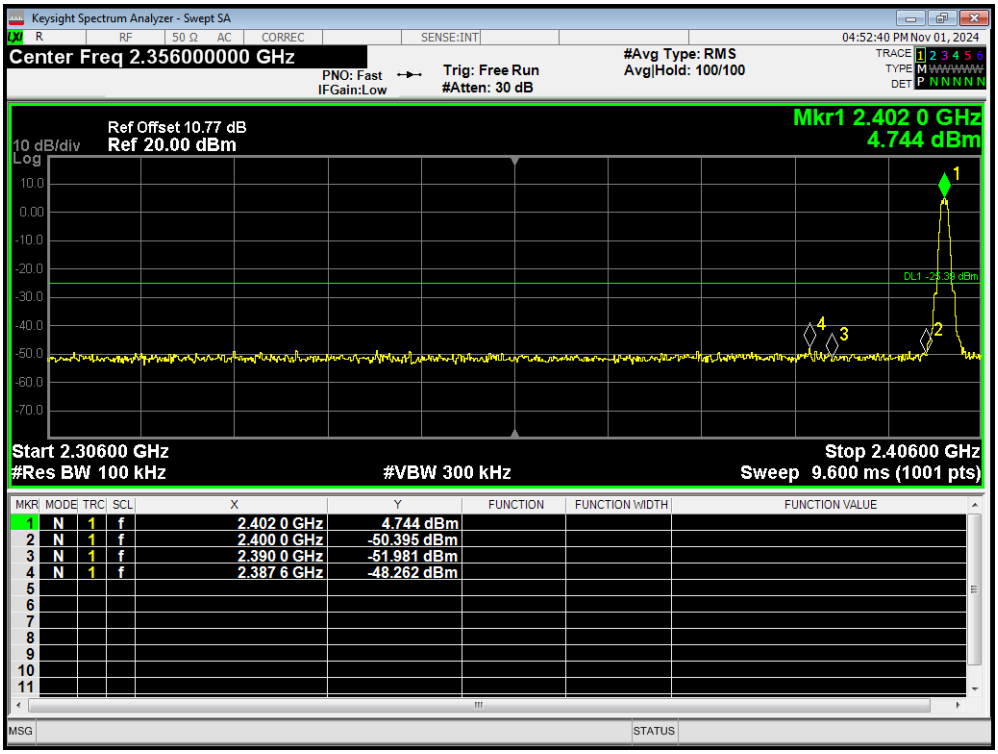
Band Edge 802.11n(HT20) 2462MHz Emission



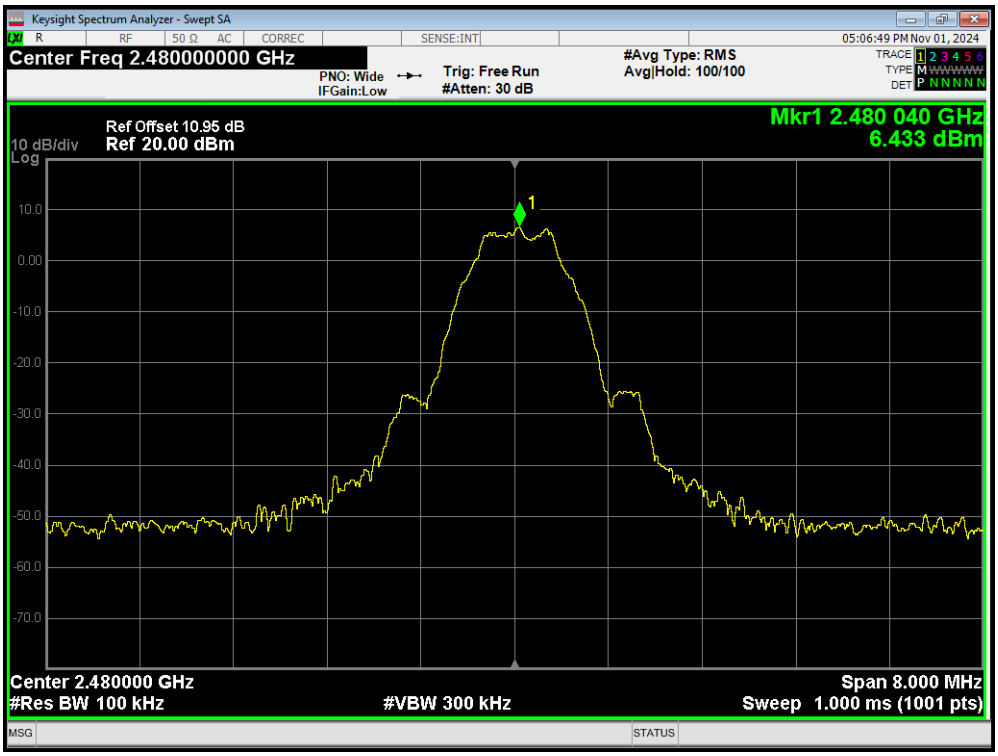
Band Edge BLE (1M) 2402MHz Ref



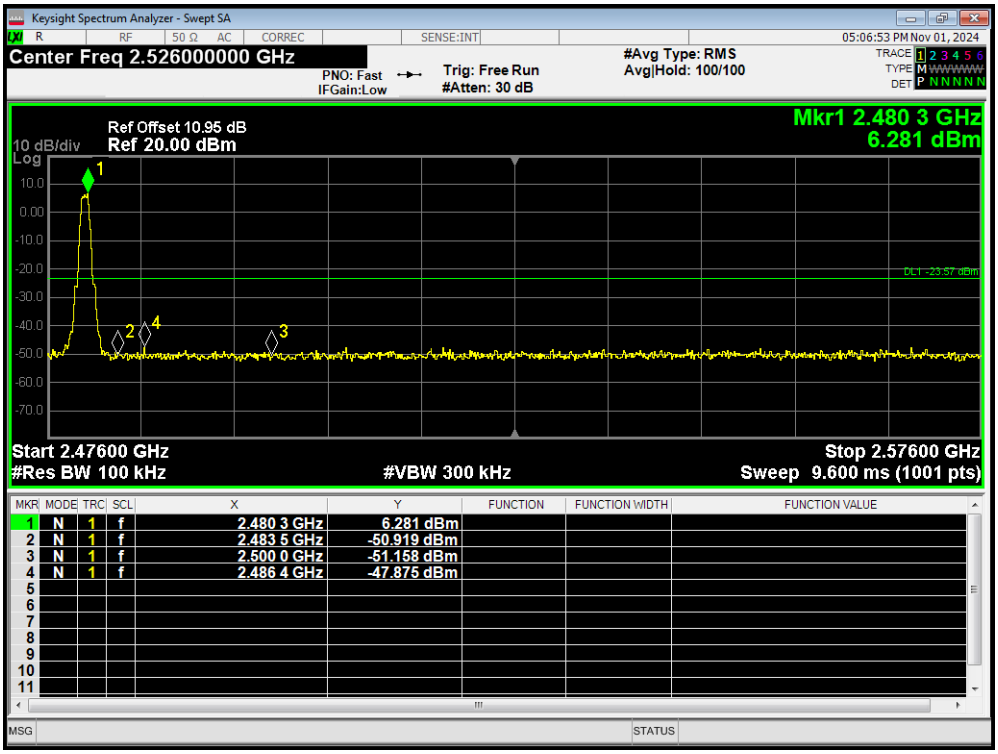
Band Edge BLE (1M) 2402MHz Emission



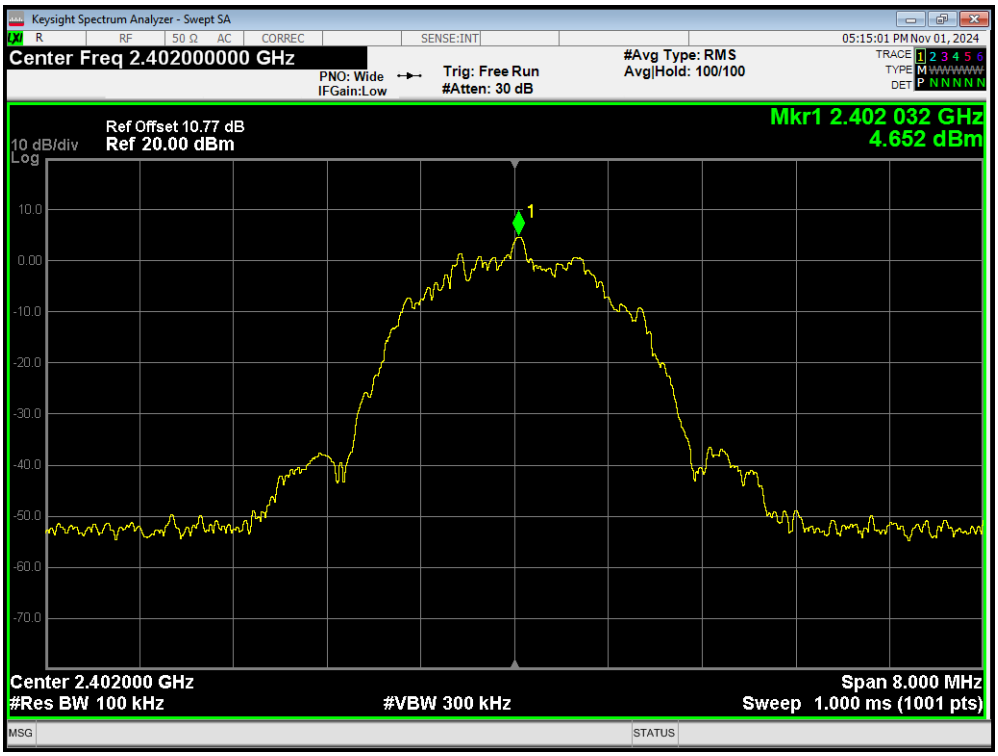
Band Edge BLE (1M) 2480MHz Ref



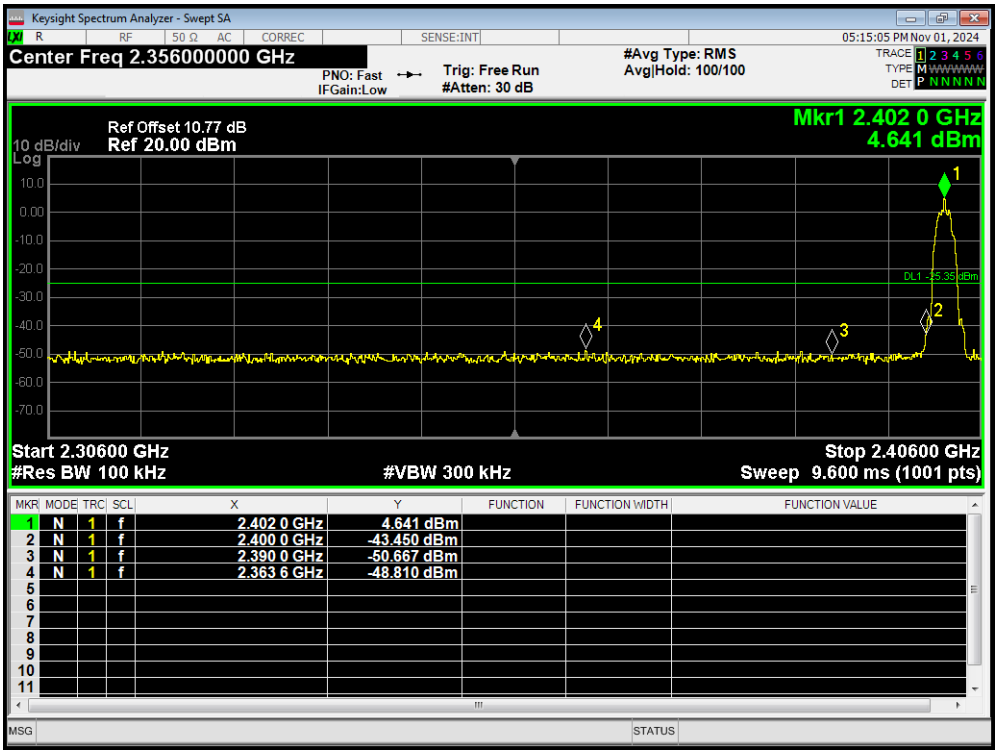
Band Edge BLE (1M) 2480MHz Emission



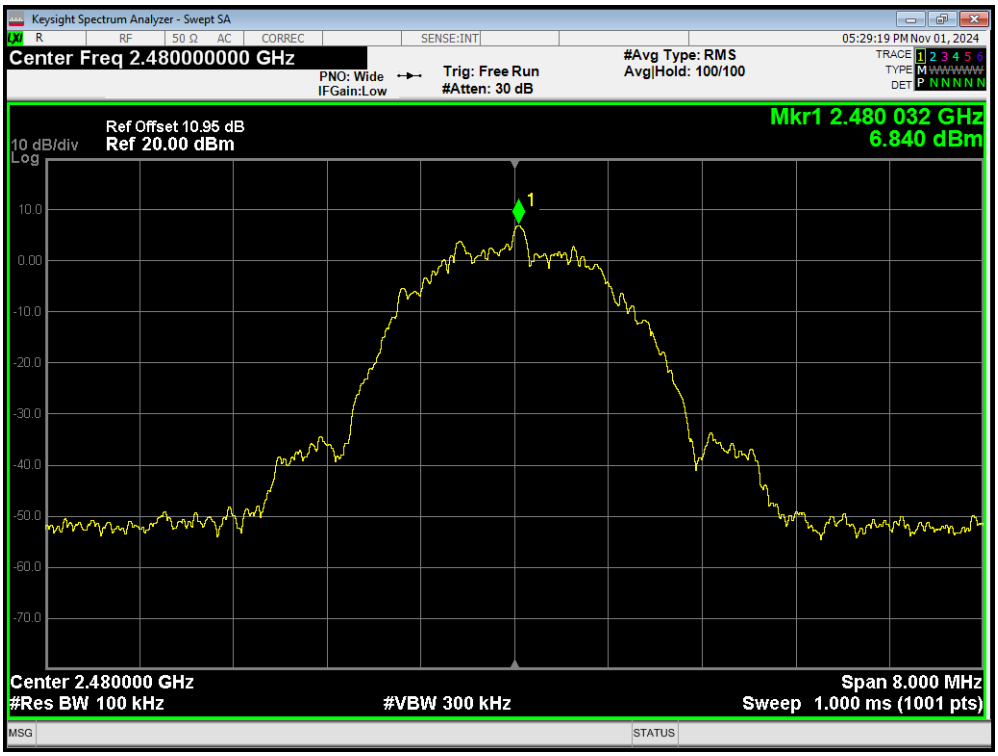
Band Edge BLE (2M) 2402MHz Ref



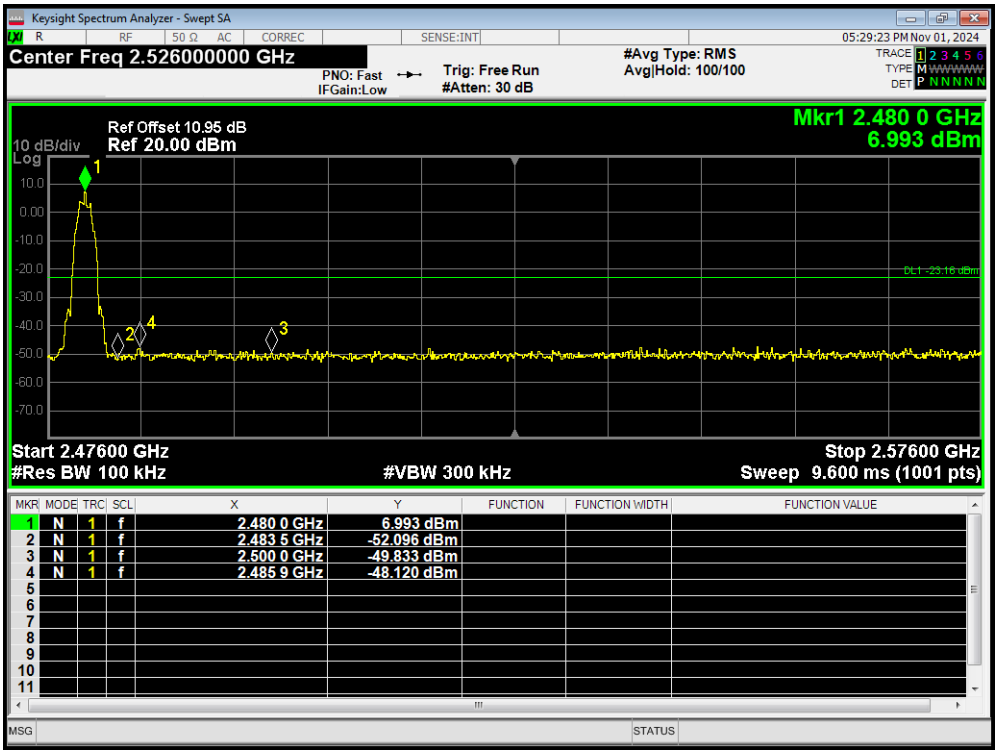
Band Edge BLE (2M) 2402MHz Emission



Band Edge BLE (2M) 2480MHz Ref



Band Edge BLE (2M) 2480MHz Emission



5.4. Power Spectral Density

Ambient Condition

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

Method of Measurement

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

Method AVGPSD-1 was used for this test.

a) Set instrument center frequency to DTS channel center frequency

b) Set span to at least 1.5 times the OBW

c) Set RBW to:3kHz≤RBW≤100kHz

d) Set VBW≥[3x RBW]

e) Detector=power averaging (rms) or sample detector (when rms not available)

f) Ensure that the number of measurement points in the sweep ≥ [2 X span/RBW]

g) Sweep time auto couple

h) Employ trace averaging (rms) mode over a minimum of 100 traces

i) Use the peak marker function to determine the maximum amplitude level.

j) If the measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced)

Method AVGPSD-2 was used for this test.

a) Measure the duty cycle (D)of the transmitter output signal as described in 11.6

b) Set instrument center frequency to DTS channel center frequency

c) Set span to at least 1.5 times the OBW

d) Set RBW to:3kHz≤RBW≤100kHz

e) Set VBW≥[3x RBW]

f) Detector= power averaging (rms) or sample detector (when rms not available)

g) Ensure that the number of measurement points in the sweep ≥ [2 X span/RBW]

h) Sweep time =auto couple

i) Do not use sweep triggering; allow sweep to "free run”

j) Employ trace averaging (rms) mode over a minimum of 100 traces

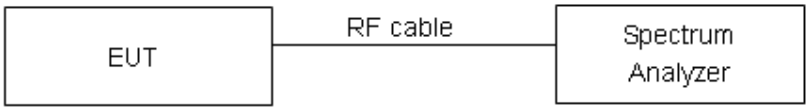
k) Use the peak marker function to determine the maximum amplitude level

l) Add [10 log(1/ D)], where D is the duty cycle measured in step a), to the measured PSD to compute the average PSD during the actual transmission time

m) If measured value exceeds requirement specified by regulatory agency then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced)

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(e) specifies that" For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. ''

Limits	≤ 8 dBm / 3kHz

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.75dB.

Test Results:

Test Mode	Carrier frequency (MHz)/ Channel	Read Value (dBm / 3kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
Bluetooth (Low Energy) (1M)	2402/CH0	-14.17	-12.14	8	PASS
	2440/CH19	-14.60	-12.57	8	PASS
	2480/CH39	-11.69	-9.66	8	PASS
Bluetooth (Low Energy) (2M)	2402/CH0	-19.43	-14.62	8	PASS
	2440/CH19	-19.89	-15.08	8	PASS
	2480/CH39	-17.10	-12.29	8	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

SISO Antenna 1

Test Mode	Carrier frequency (MHz)/ Channel	Read Value (dBm / 30kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
802.11b	2412/CH 1	-4.55	-13.97	8	PASS
	2437/CH 6	-4.64	-14.06	8	PASS
	2462/CH11	-5.15	-14.57	8	PASS
802.11g	2412/CH 1	-7.76	-17.76	8	PASS
	2437/CH 6	-8.37	-18.37	8	PASS
	2462/CH11	-8.35	-18.35	8	PASS
802.11n HT20	2412/CH 1	-10.72	-20.72	8	PASS
	2437/CH 6	-10.63	-20.63	8	PASS
	2462/CH11	-10.39	-20.39	8	PASS
Note: Power Spectral Density (dBm/3kHz) =Read Value+Duty cycle correction factor + 10*log10(3/30)					

SISO Antenna 2

Test Mode	Carrier frequency (MHz)/ Channel	Read Value (dBm / 30kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
802.11b	2412/CH 1	-4.32	-14.32	8	PASS
	2437/CH 6	-4.20	-14.20	8	PASS
	2462/CH11	-4.18	-14.18	8	PASS
802.11g	2412/CH 1	-5.86	-15.86	8	PASS
	2437/CH 6	-5.24	-15.24	8	PASS
	2462/CH11	-5.04	-15.04	8	PASS
802.11n HT20	2412/CH 1	-10.83	-20.83	8	PASS
	2437/CH 6	-9.94	-19.94	8	PASS
	2462/CH11	-10.36	-20.36	8	PASS
Note: Power Spectral Density (dBm/3kHz) =Read Value+Duty cycle correction factor + 10*log10(3/30)					

MIMO

Test Mode	Carrier frequency (MHz)/ Channel	Power Spectral Density				Total PSD	Limit (dBm / 3kHz)	Conclusion
		Antenna 1		Antenna 2				
		Read Value (dBm / 30kHz)	Power Spectral Density (dBm / 3kHz)	Read Value (dBm / 30kHz)	Power Spectral Density (dBm / 3kHz)	(dBm / 3kHz)		
802.11b	2412/CH 1	-4.45	-13.87	-4.85	-14.27	-11.06	7.04	PASS
	2437/CH 6	-4.85	-14.85	-4.60	-14.02	-11.40	7.04	PASS
	2462/CH11	-4.57	-14.57	-4.59	-14.01	-11.27	7.04	PASS
802.11g	2412/CH 1	-8.28	-18.28	-8.78	-18.78	-15.51	7.04	PASS
	2437/CH 6	-8.63	-18.63	-7.89	-17.89	-15.23	7.04	PASS
	2462/CH11	-8.24	-18.24	-8.19	-18.19	-15.20	7.04	PASS
802.11n HT20	2412/CH 1	-10.82	-20.82	-11.18	-21.18	-17.99	7.04	PASS
	2437/CH 6	-10.78	-20.78	-9.72	-19.72	-17.21	7.04	PASS
	2462/CH11	-10.89	-20.89	-11.11	-21.11	-17.99	7.04	PASS

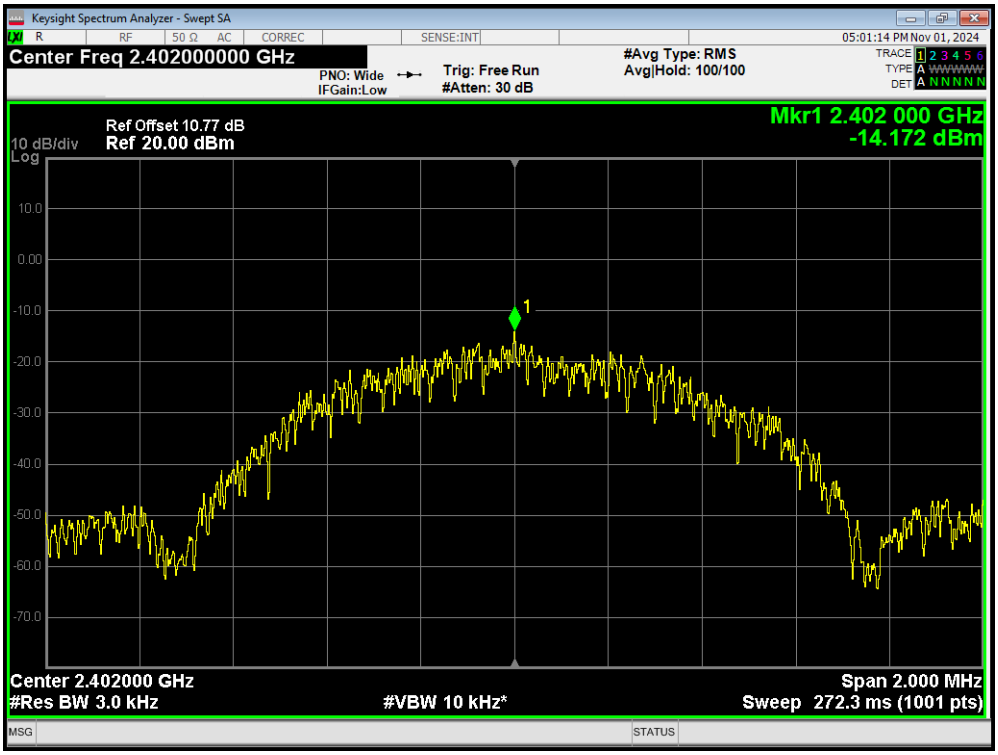
Note:

1. Power Spectral Density (dBm/3kHz) =Read Value+Duty cycle correction factor + 10*LOG10(3 / 30)

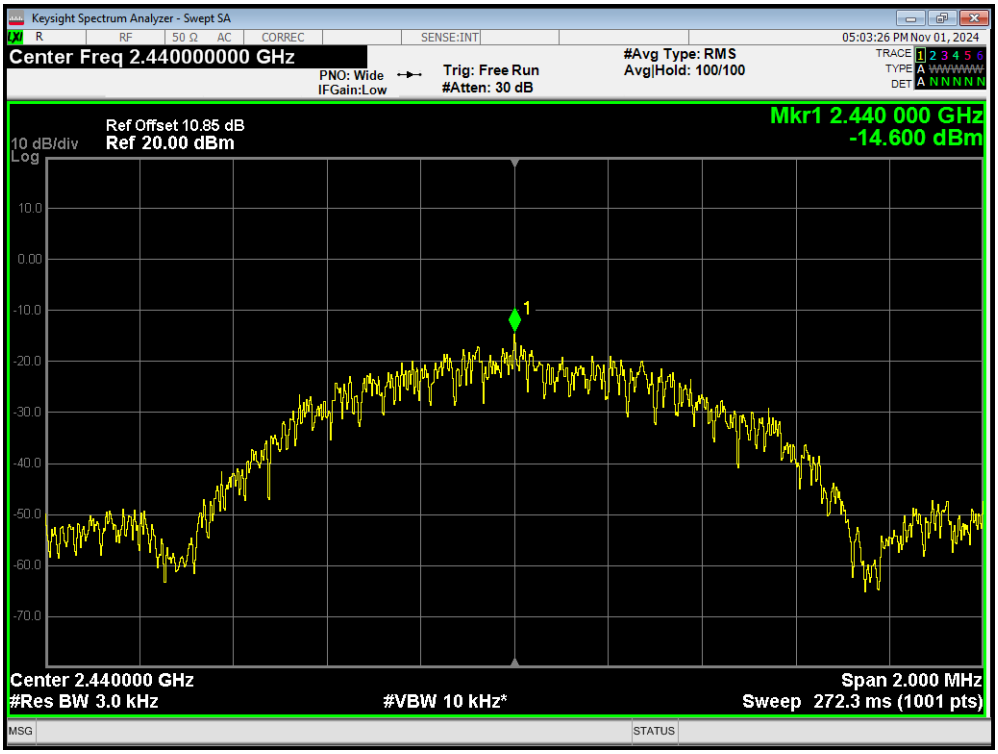
2. For Total PSD, according to KDB 662911 D01 Multiple Transmitter Output v02r01 2)a),the power spectral density=$10\log(10^{(\text{PSD antenna1 in dBm/10})}+10^{(\text{PSD antenna2 in dBm/10})}$.

3. The manufacturer declared the transmitter output signals is CDD mode. And N_{ss}=1. According to KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)f)(i): If all antennas have the same gain, Directional gain = G_{ANT} + Array Gain. For PSD measurements on all devices, Array Gain=10log(Nant/Nss)dB, so directional gain=G_{ANT}+Array Gain=3.95+10log(2/1)=6.96＞6dBi. So the PSD limit is 8+6-MAX(6, directional gain) dBm=7.04 dBm

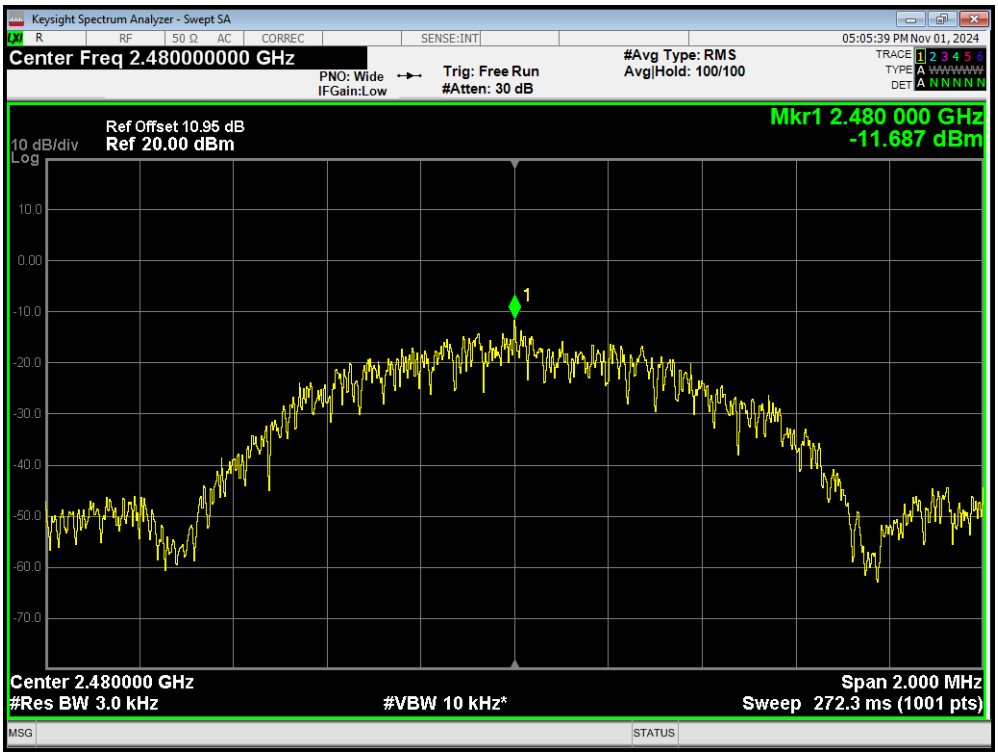
PSD BLE (1M) 2402MHz



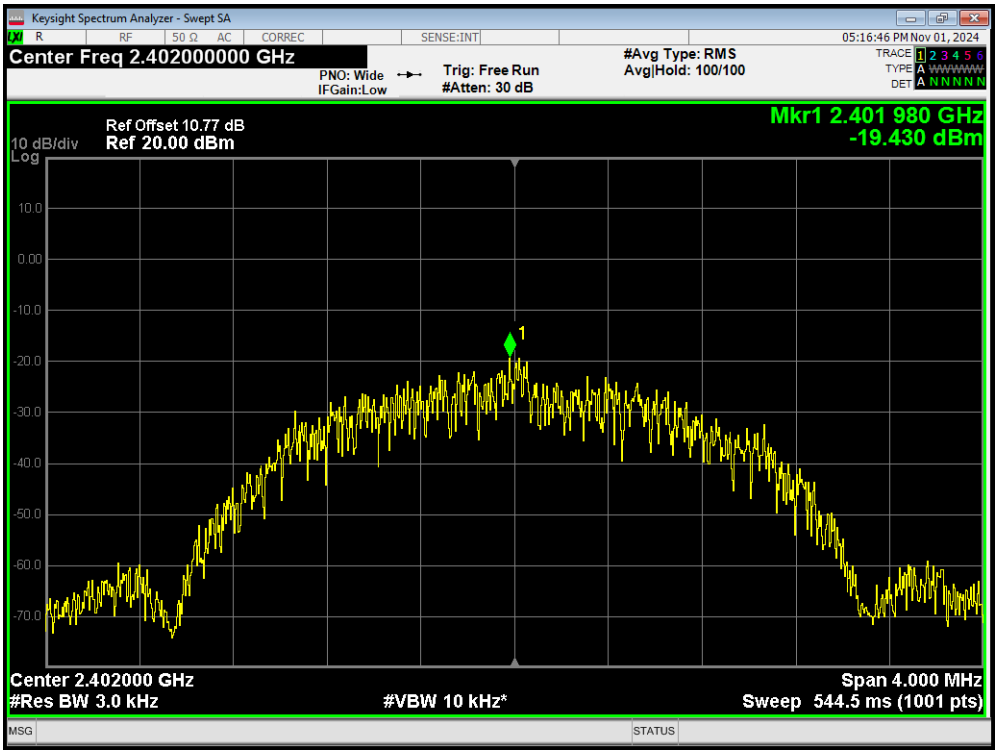
PSD BLE (1M) 2440MHz



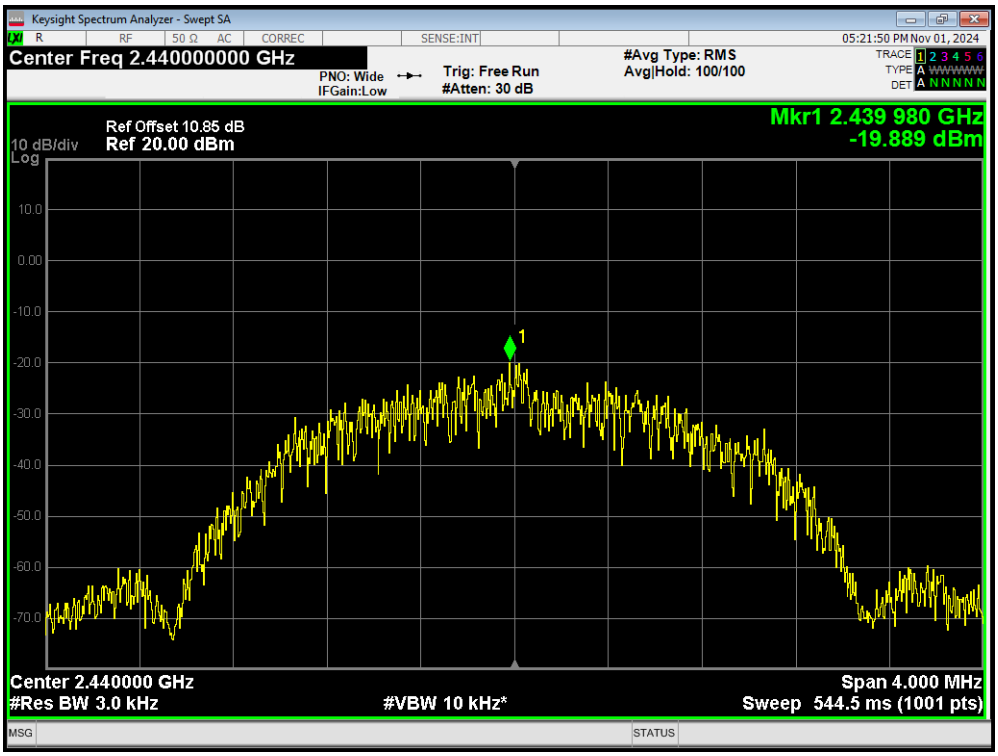
PSD BLE (1M) 2480MHz



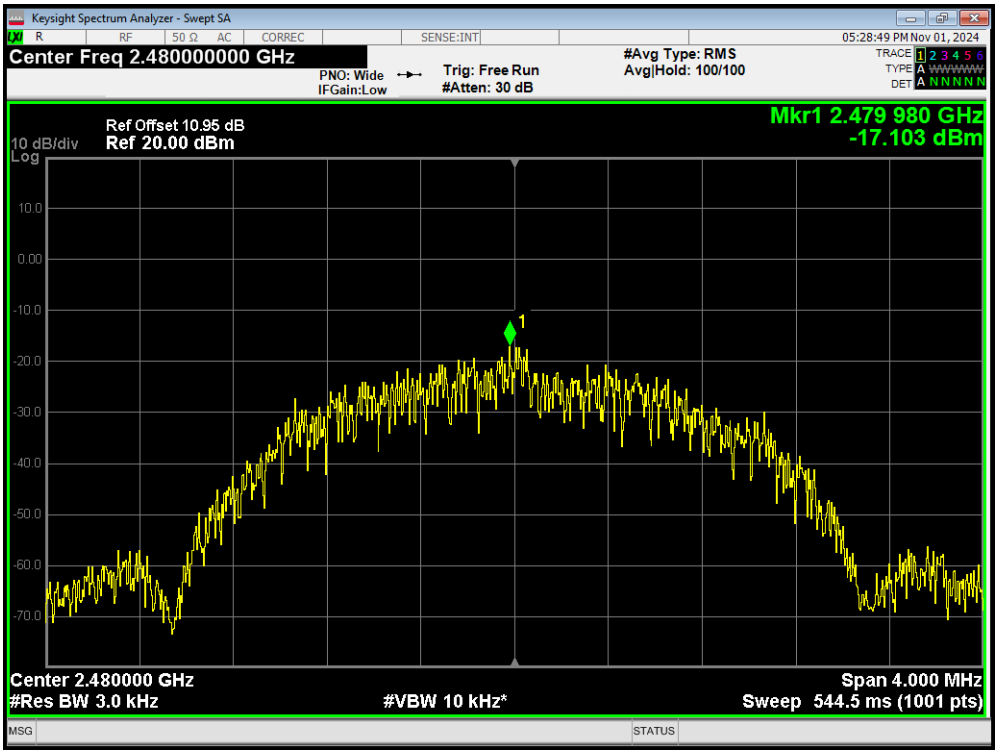
PSD BLE (2M) 2402MHz



PSD BLE (2M) 2440MHz

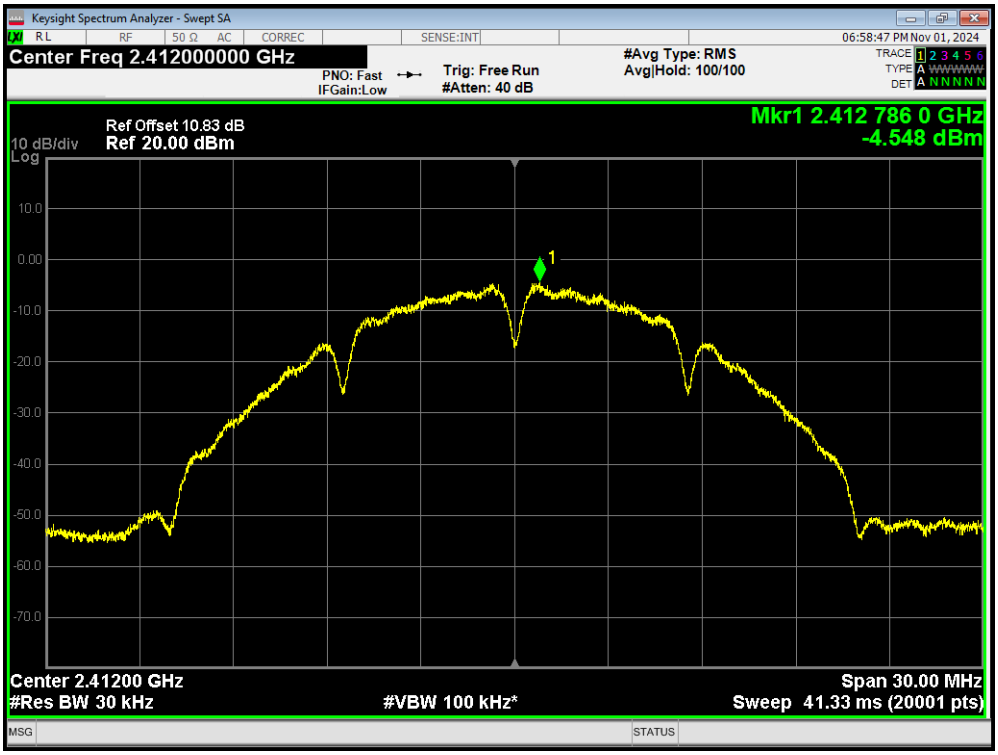


PSD BLE (2M) 2480MHz

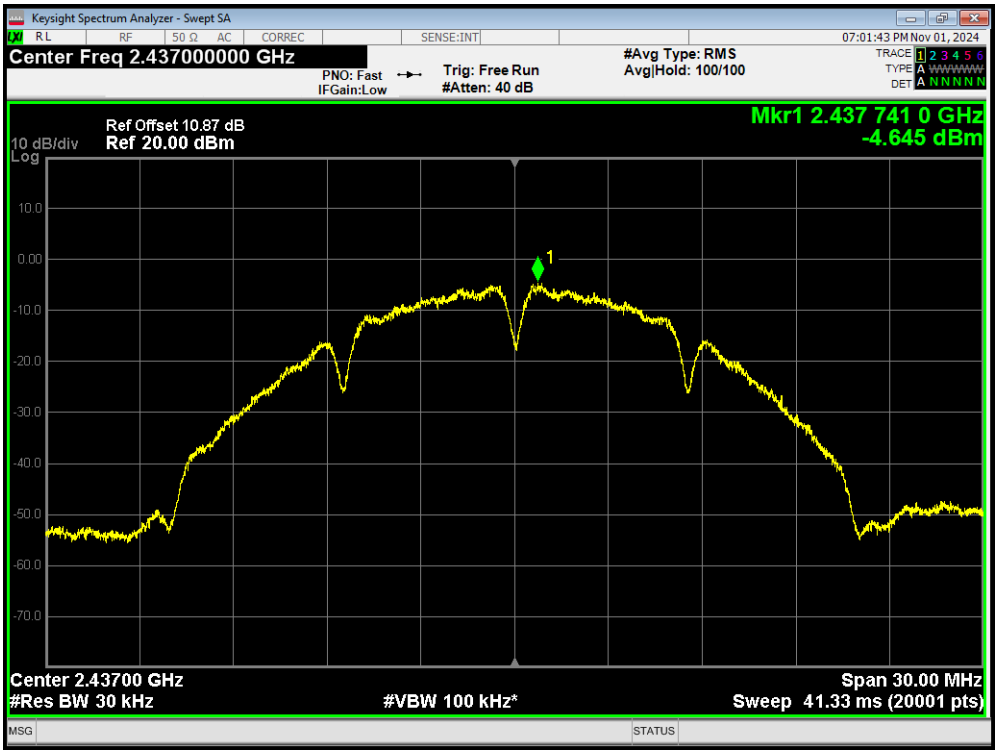


SISO Antenna 1

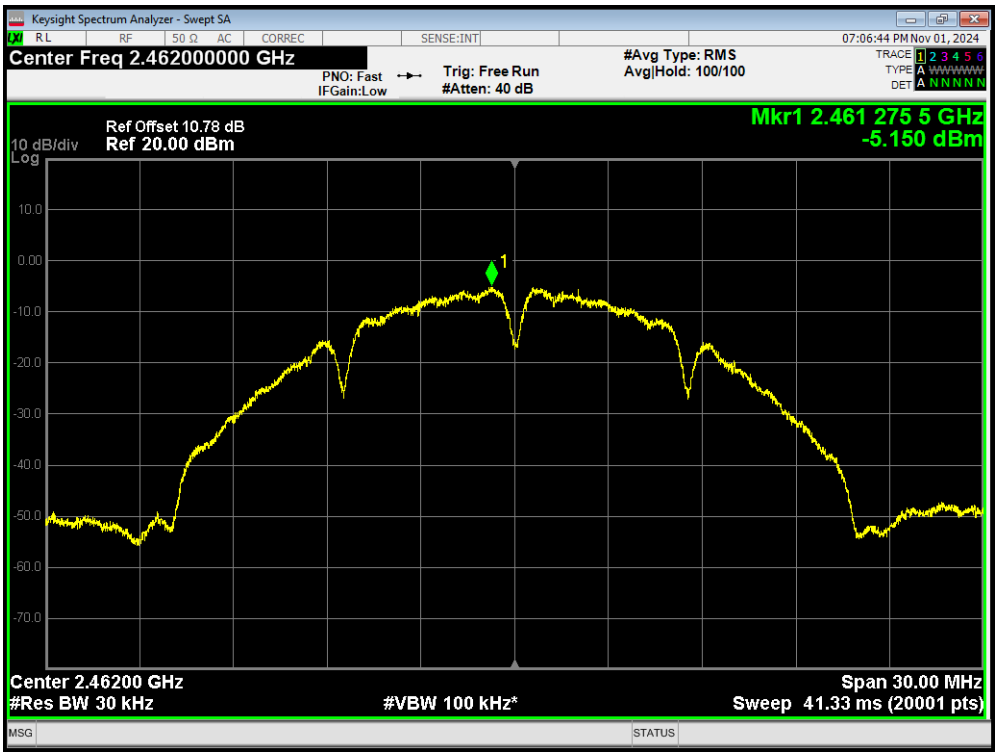
PSD 802.11b 2412MHz



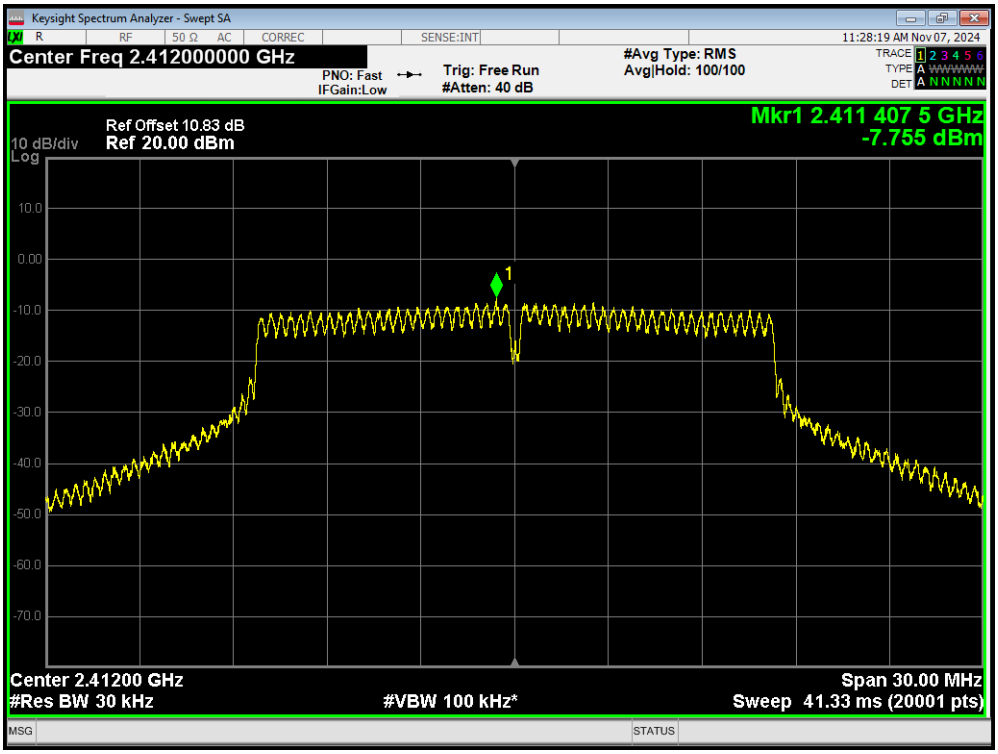
PSD 802.11b 2437MHz



PSD 802.11b 2462MHz



PSD 802.11g 2412MHz



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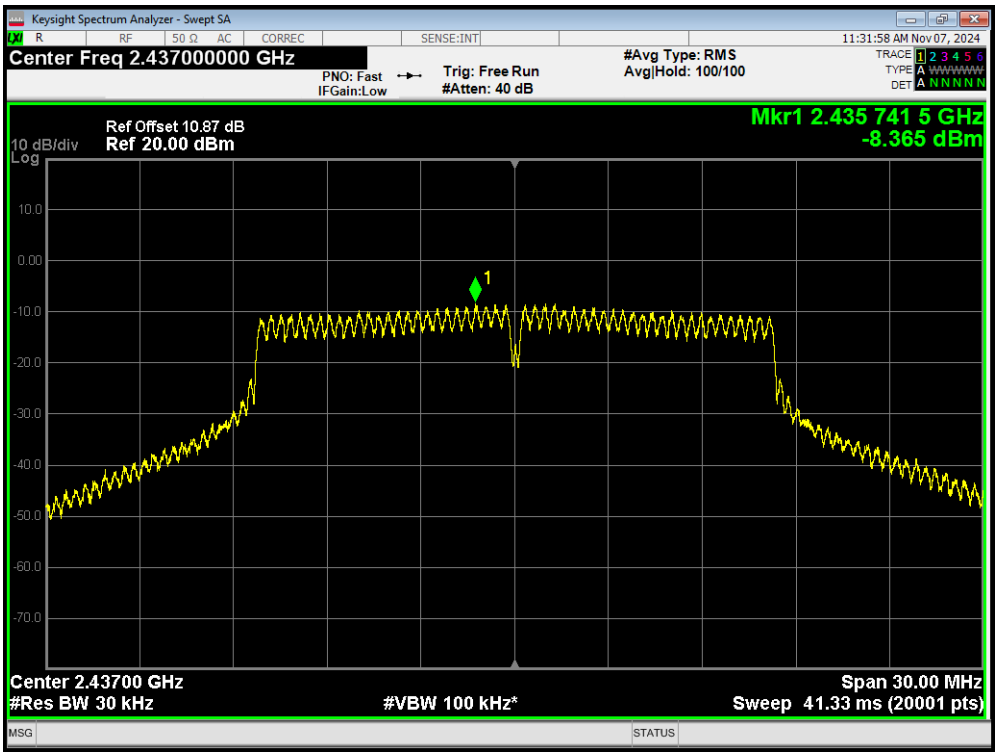

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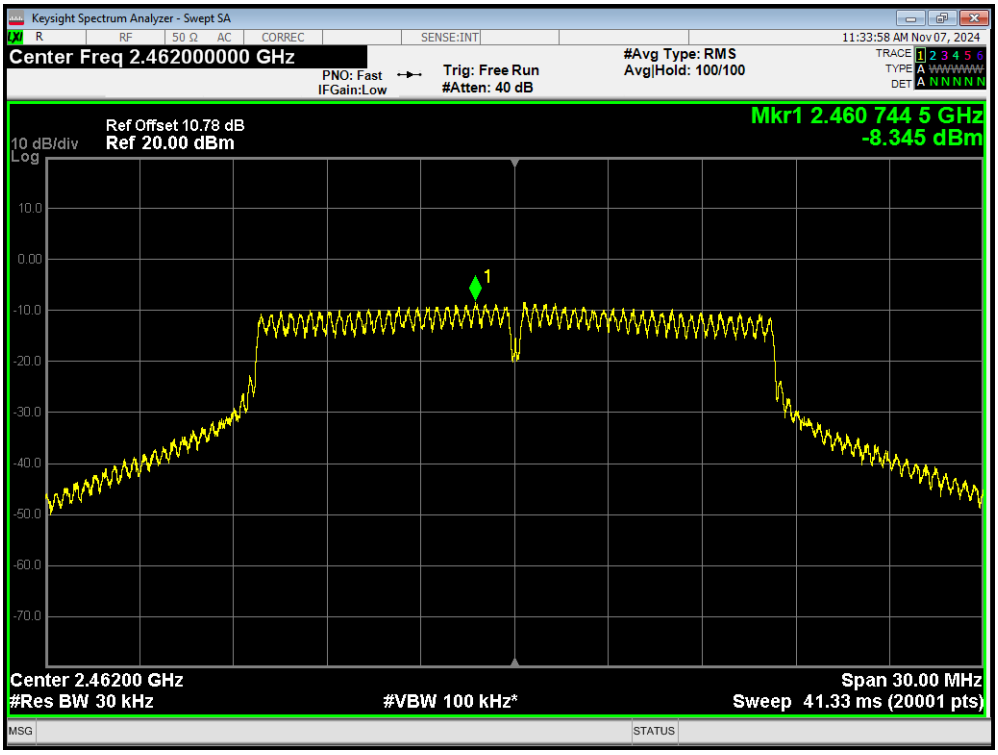
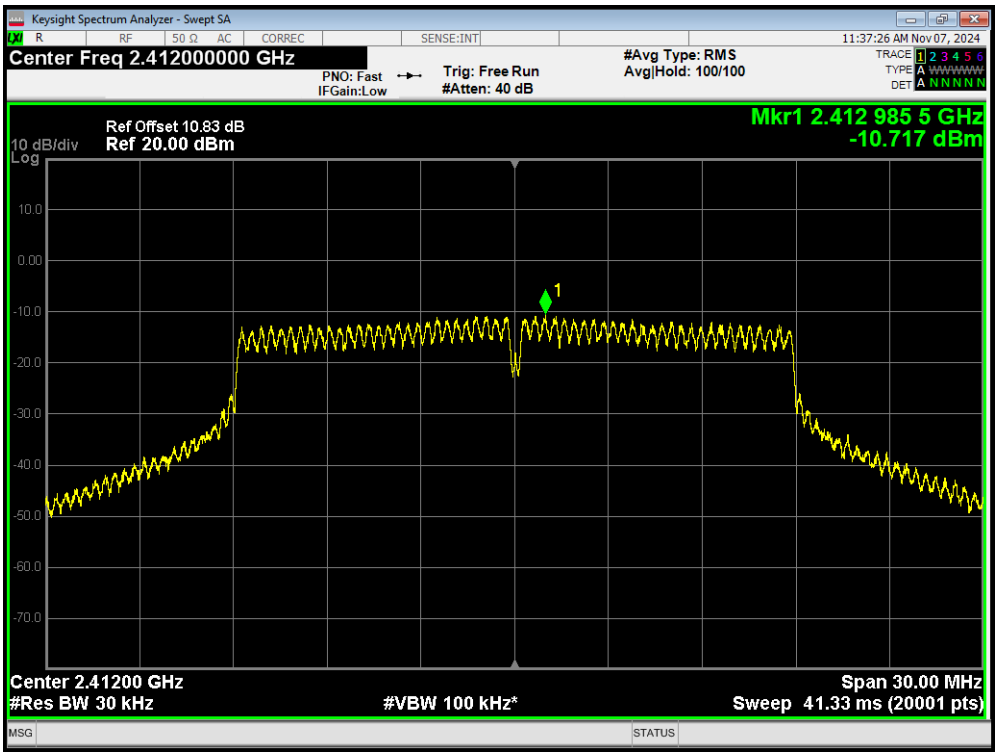


PSD 802.11n(HT20) 2412MHz



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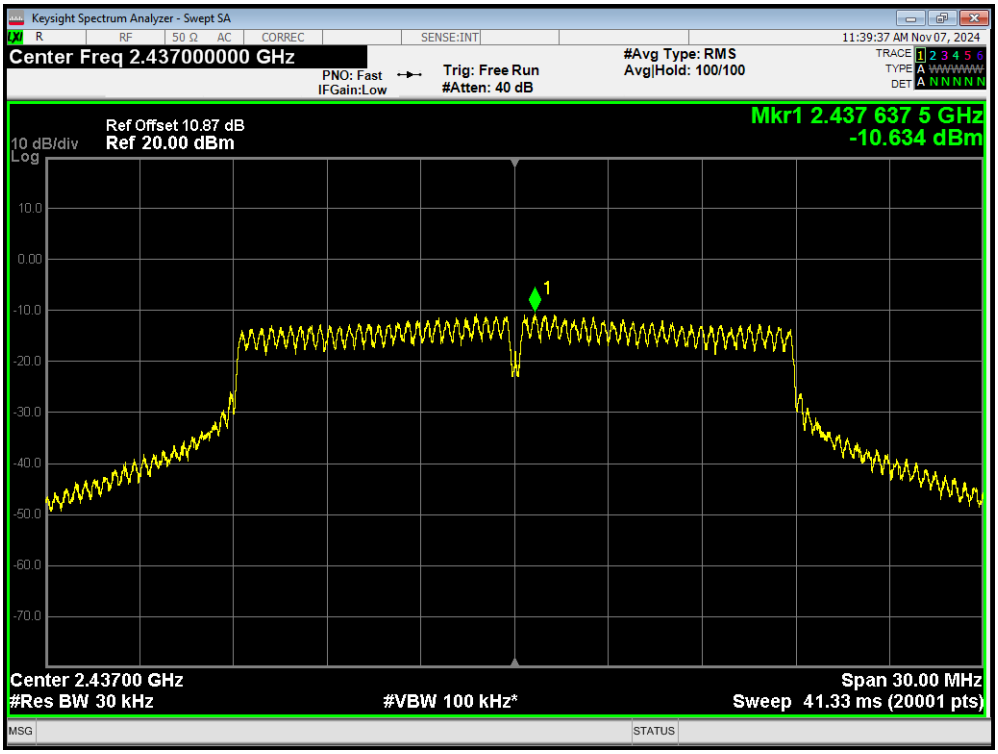

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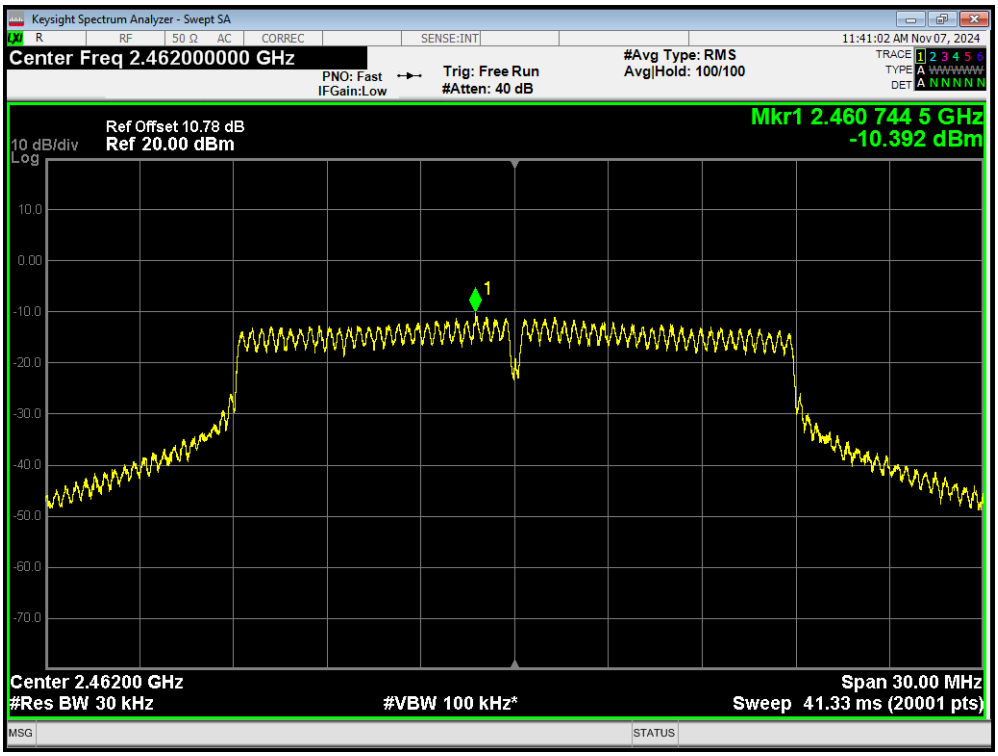

SISO Antenna 2

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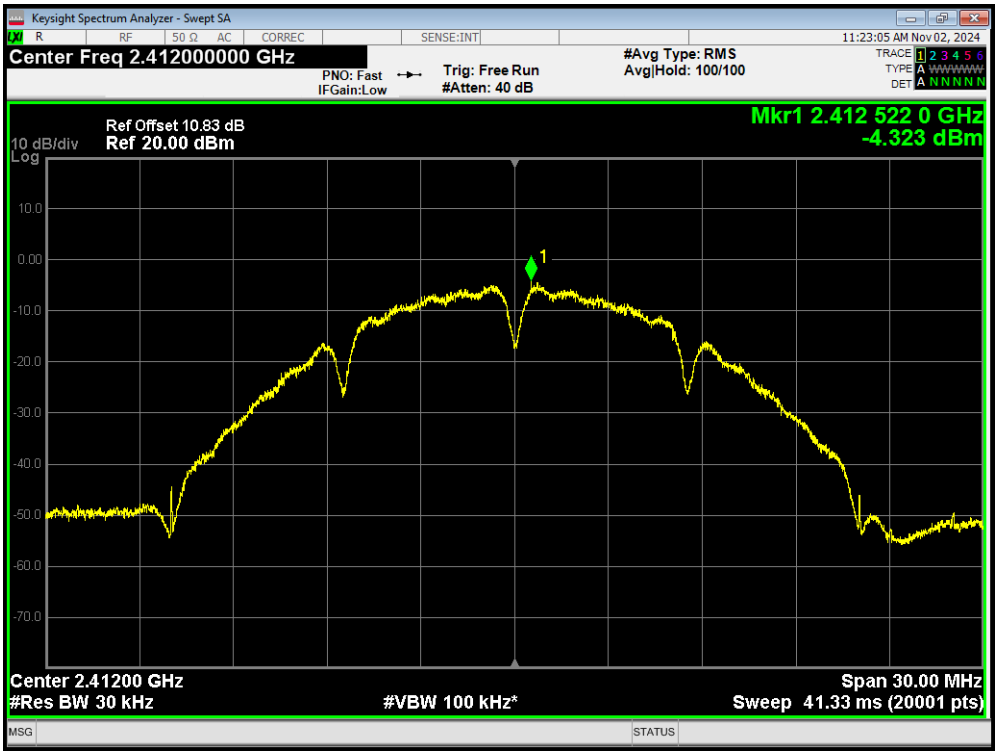

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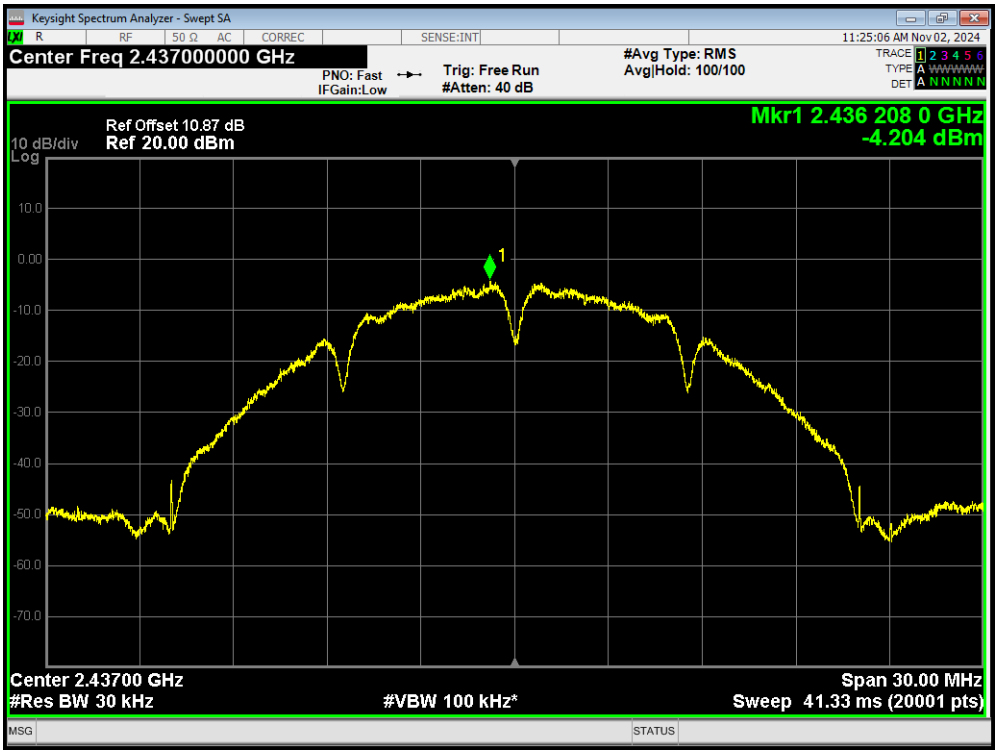

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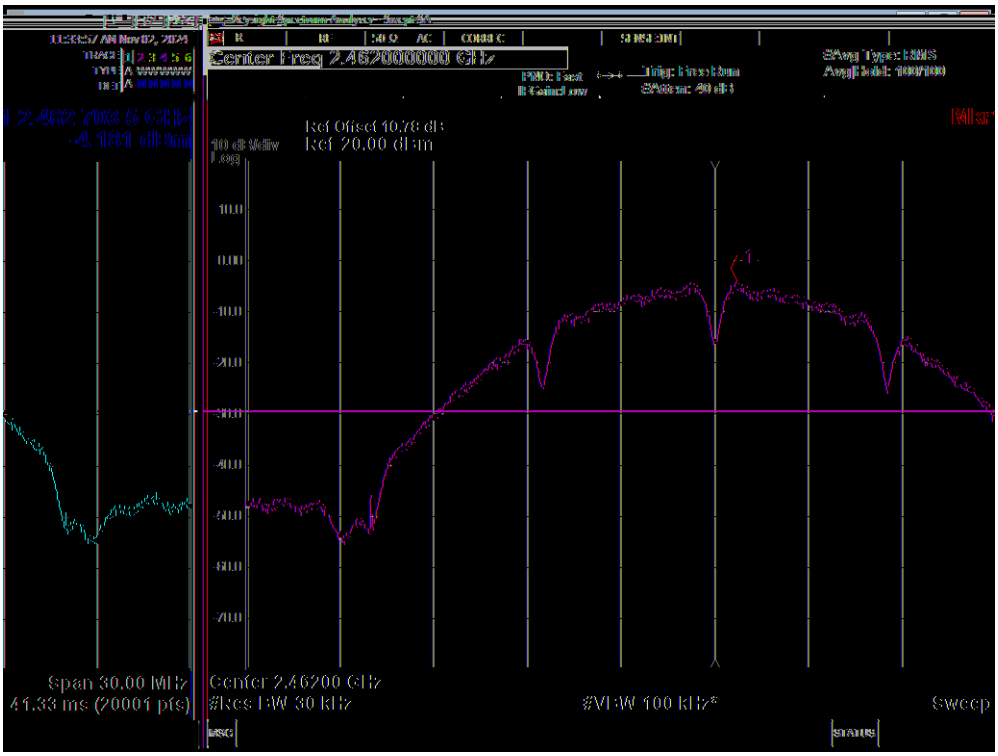

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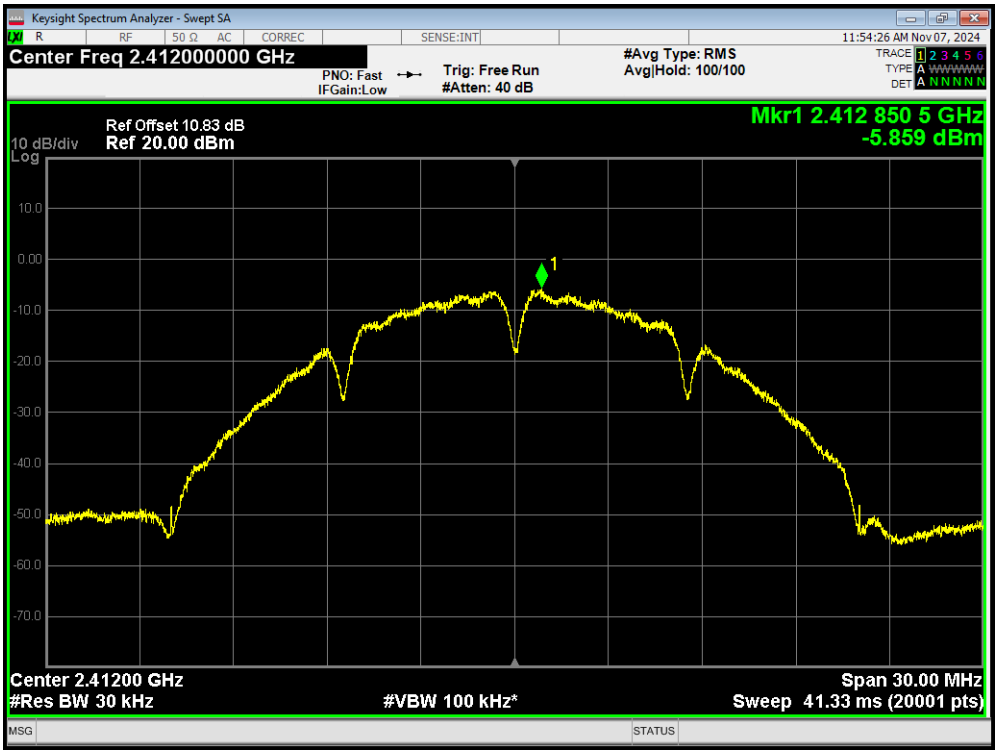

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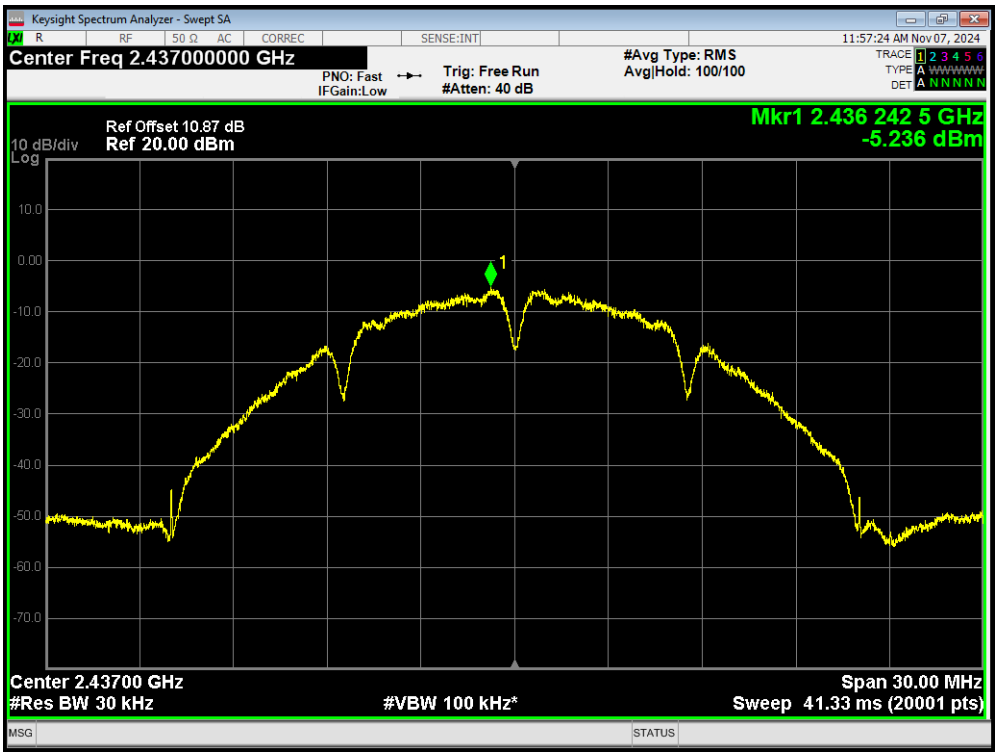

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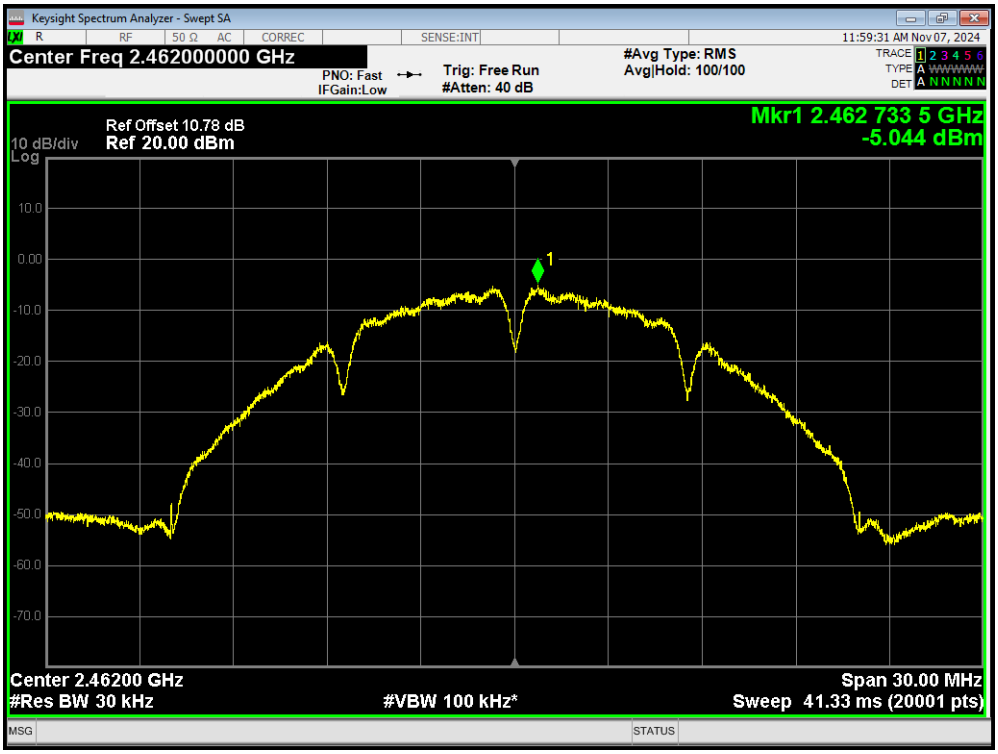

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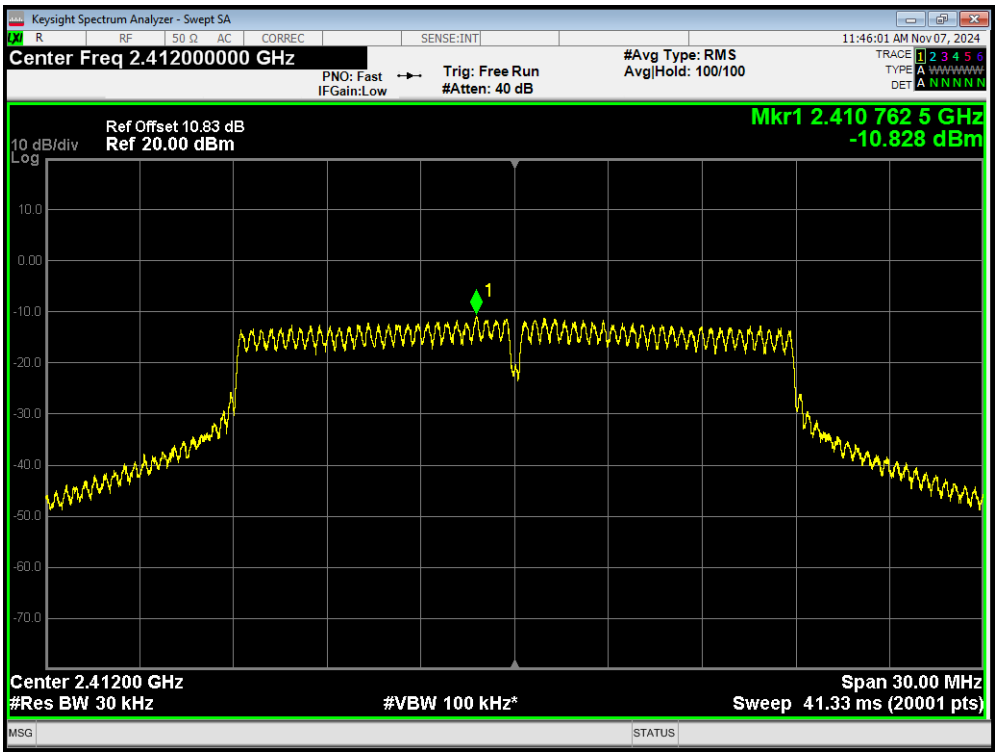

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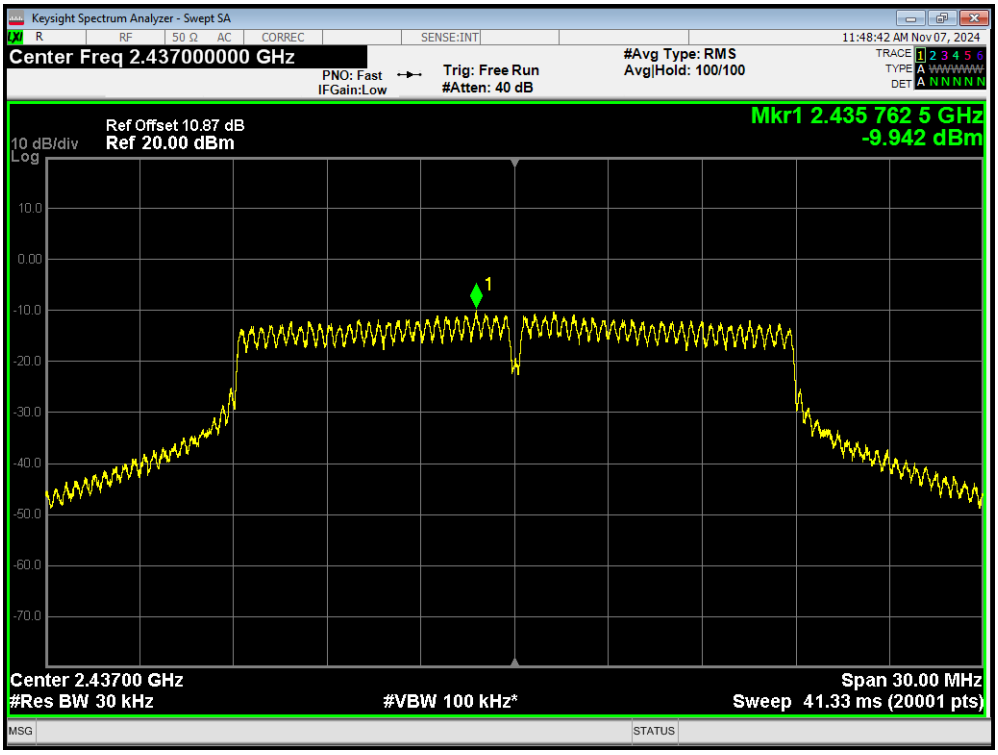

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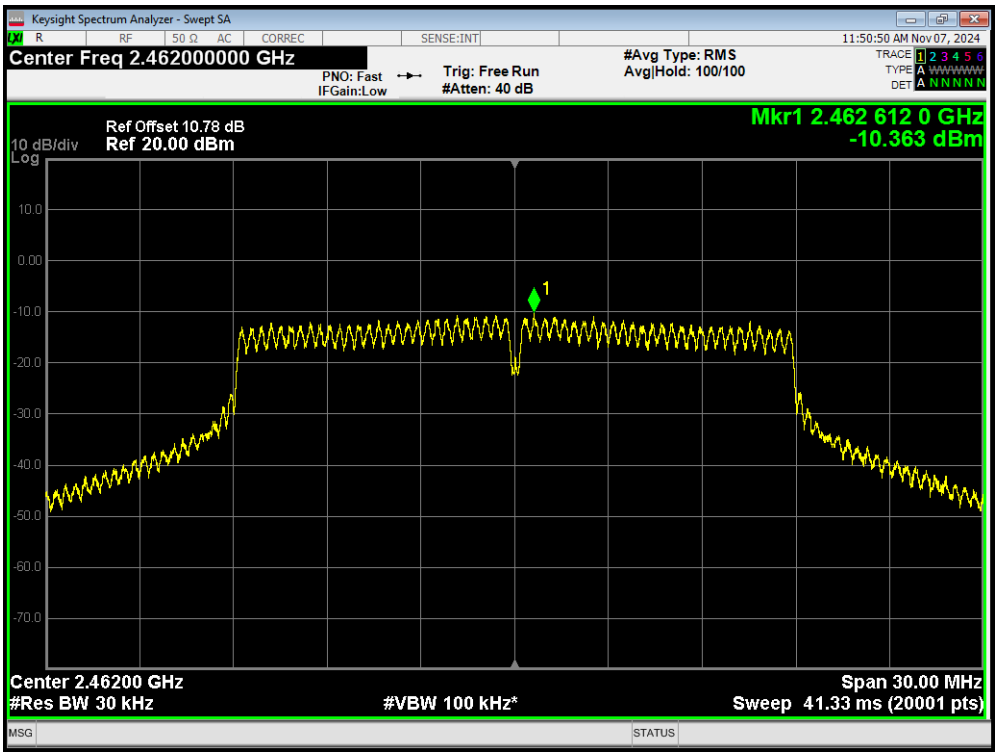
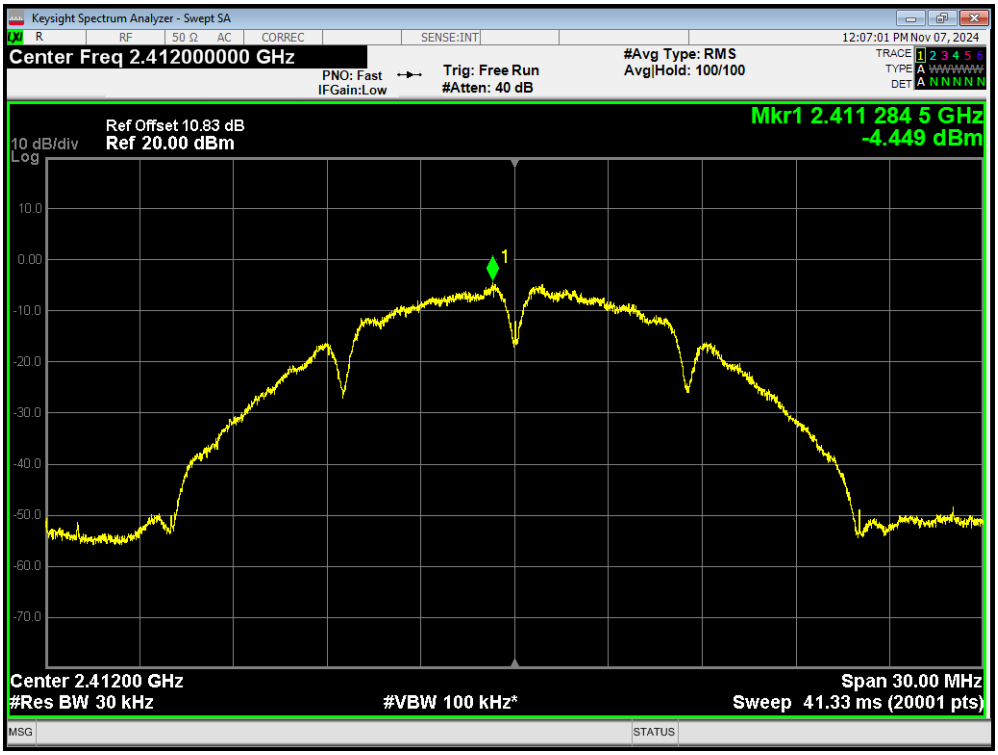


MIMO

PSD 802.11b 2412MHz Ant1



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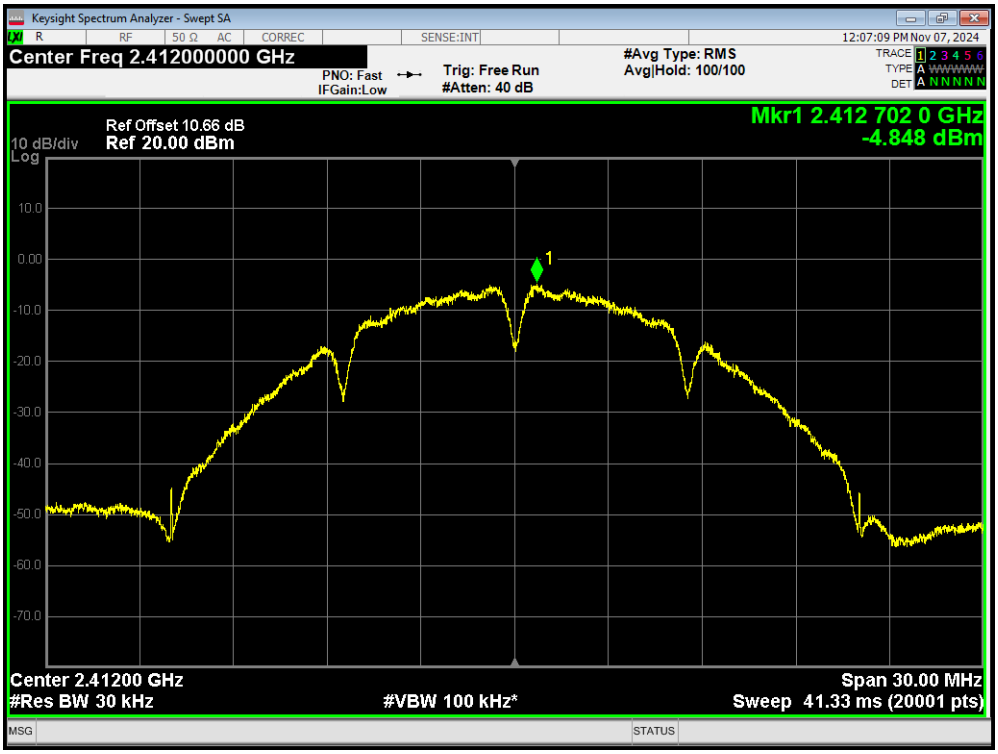
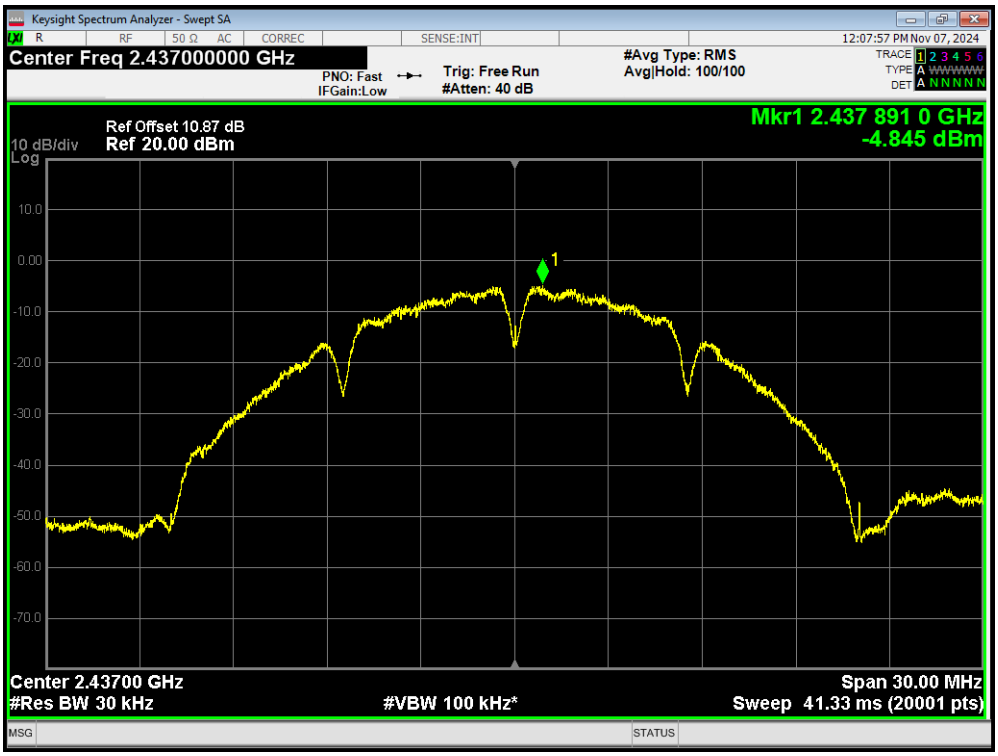


PSD 802.11b 2437MHz Ant1



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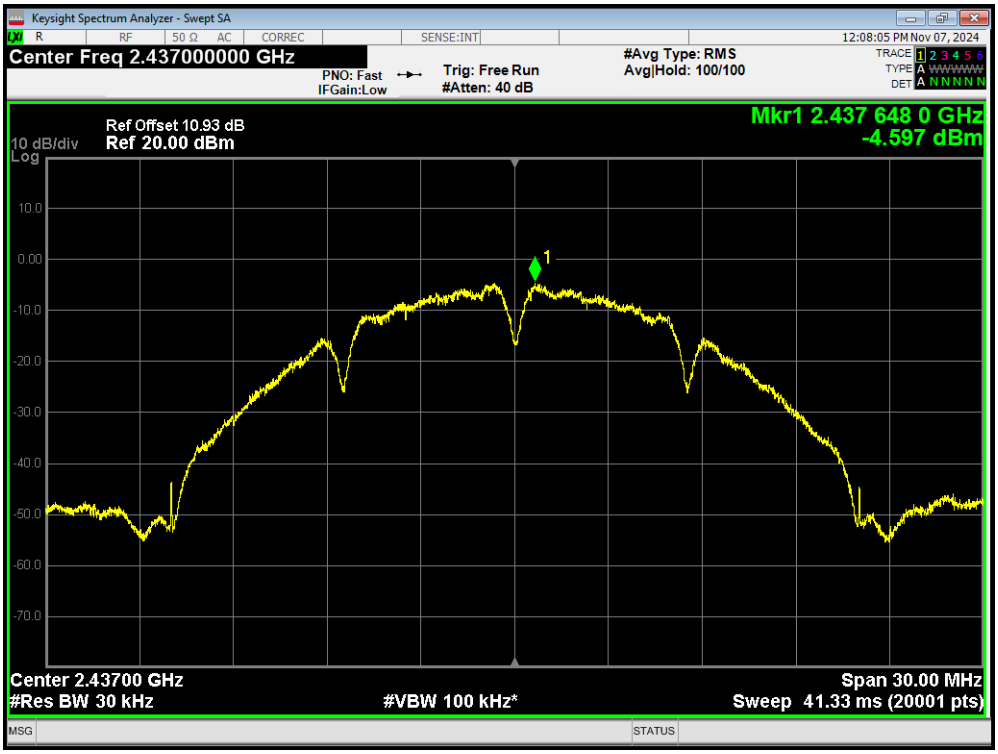

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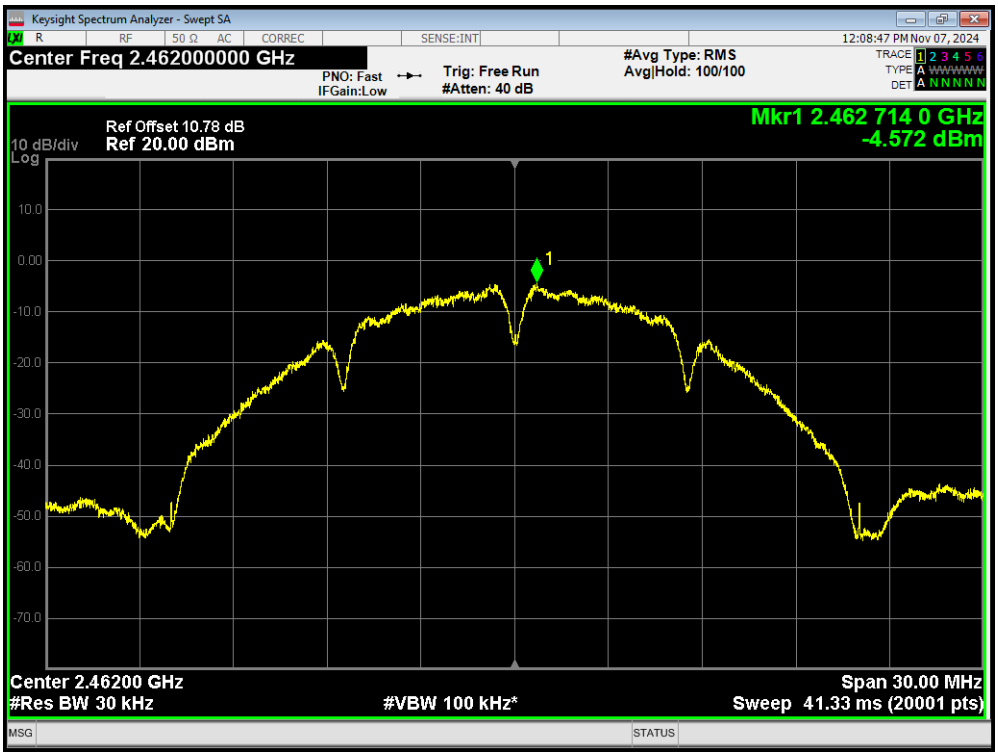

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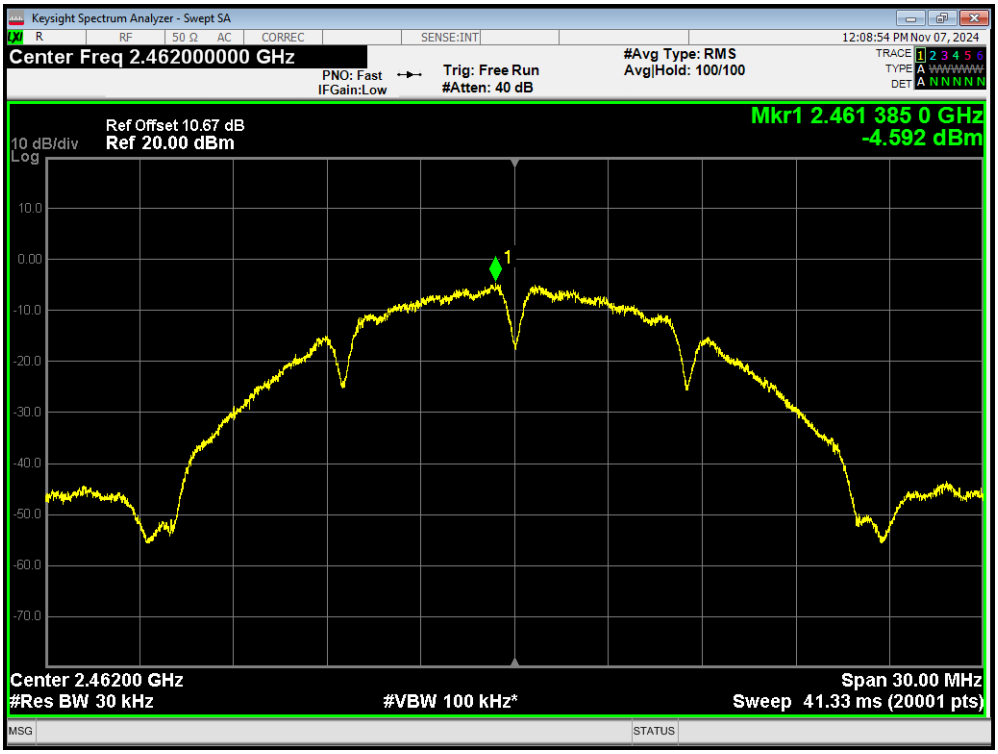

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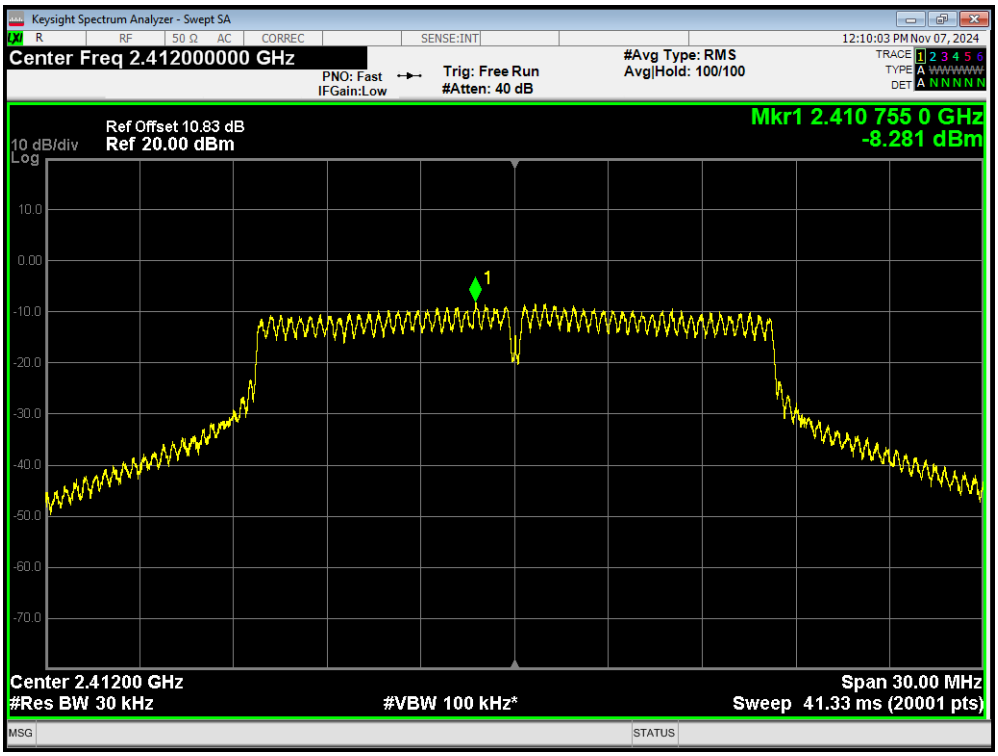

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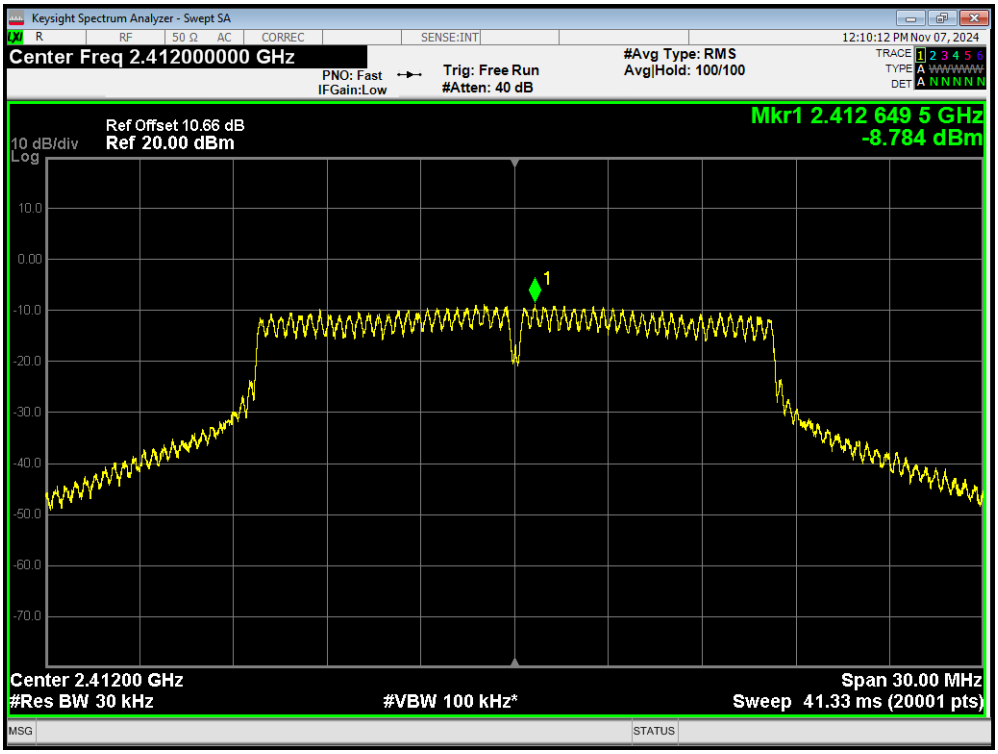

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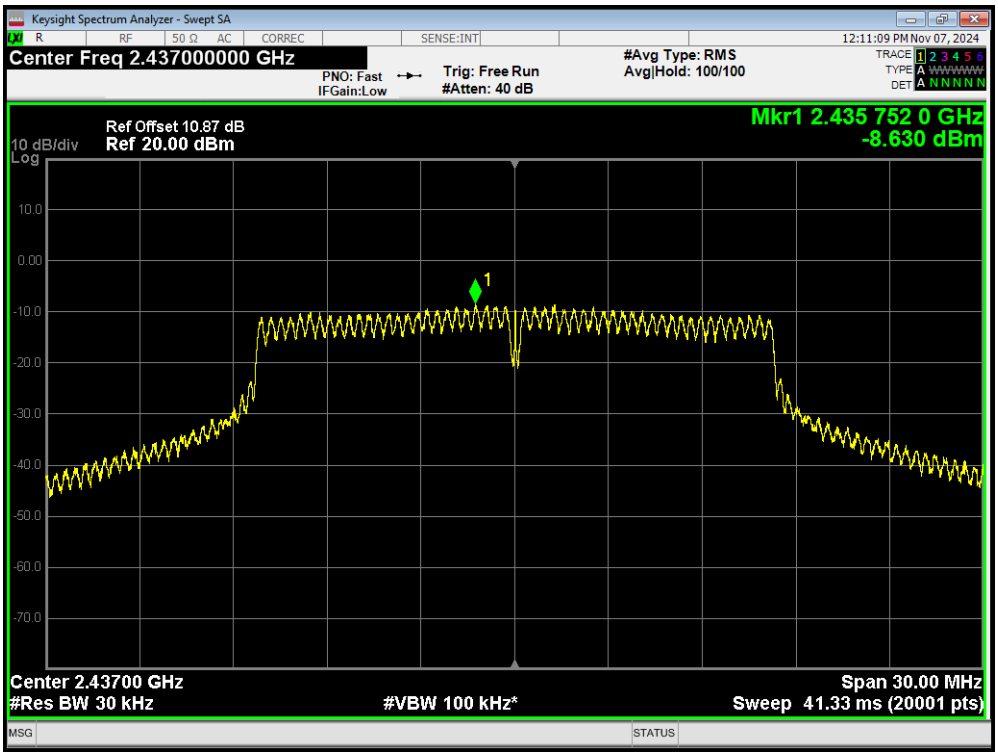

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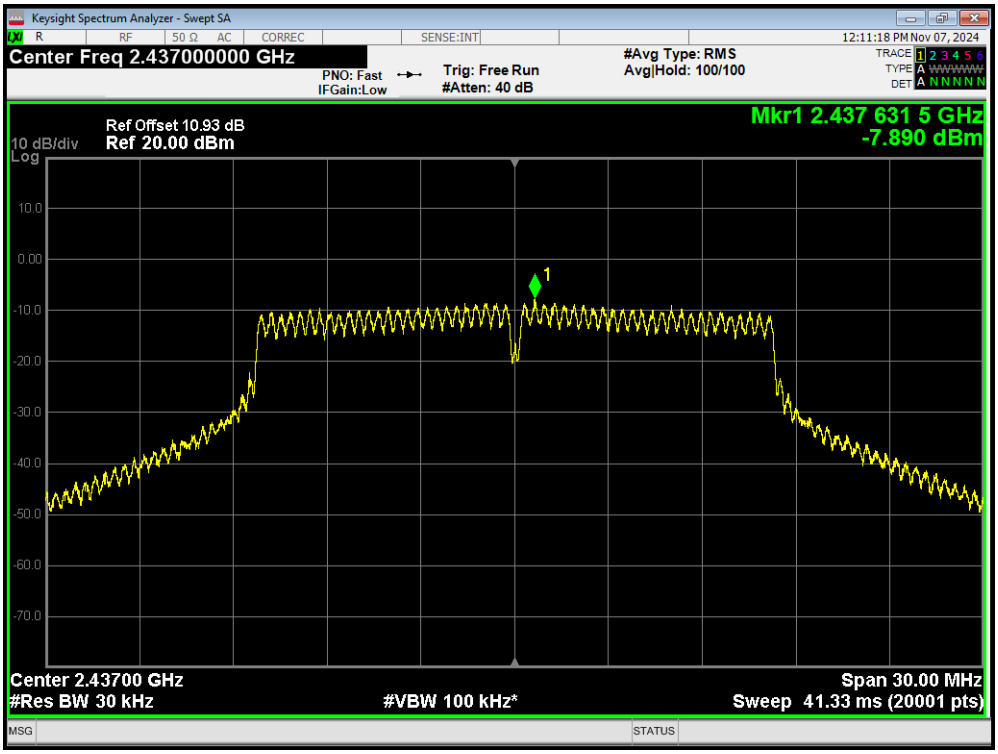

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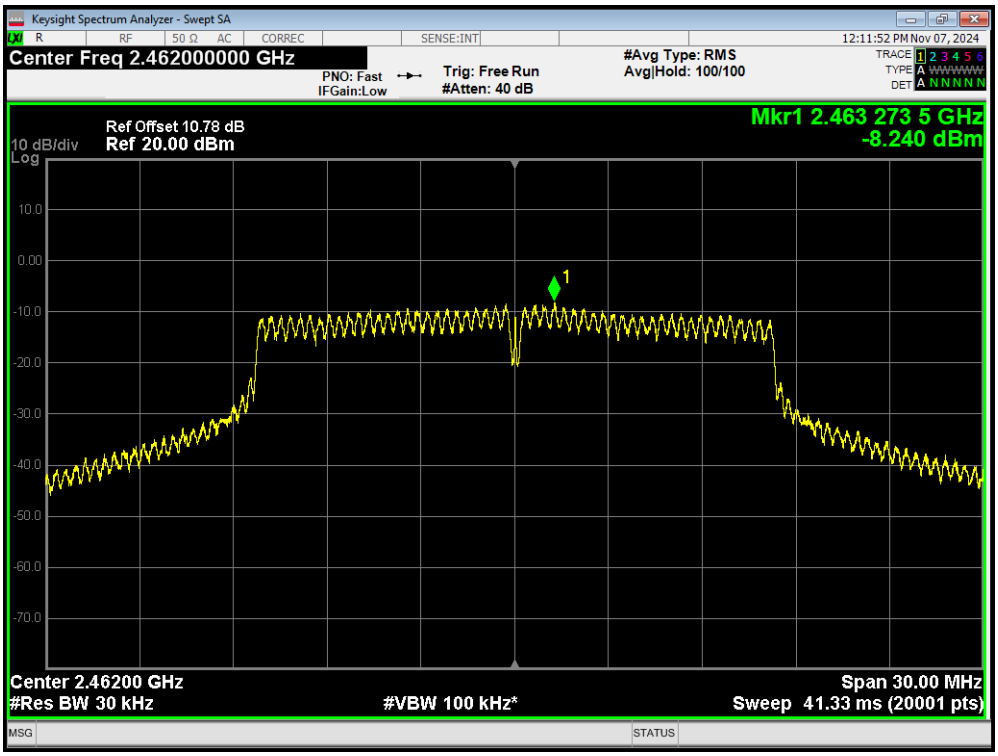

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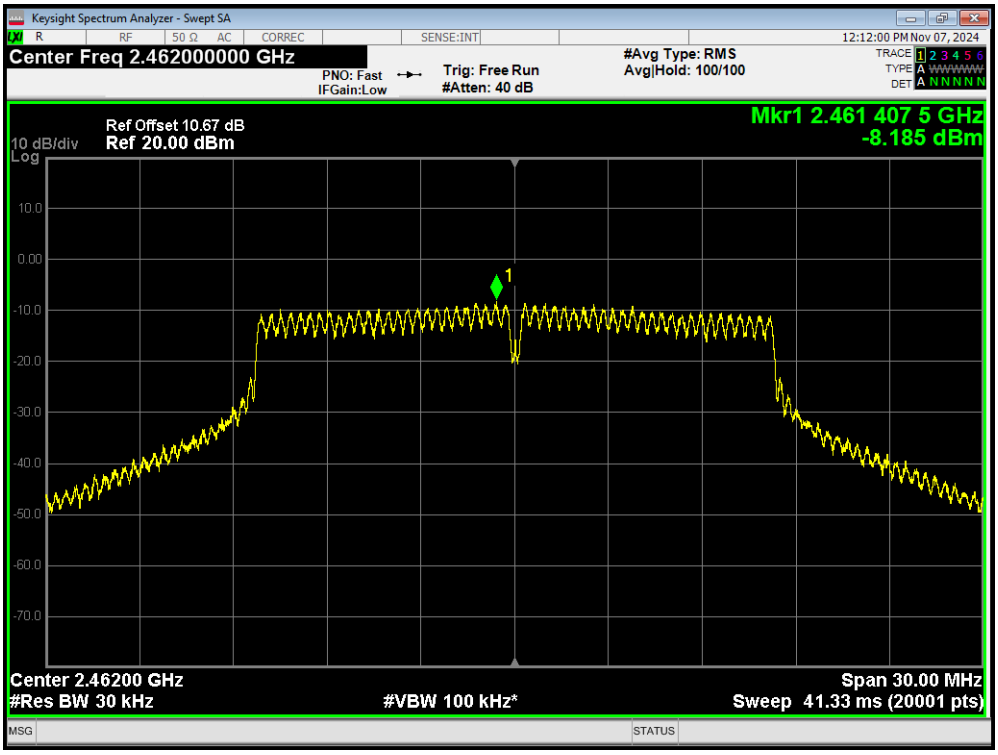
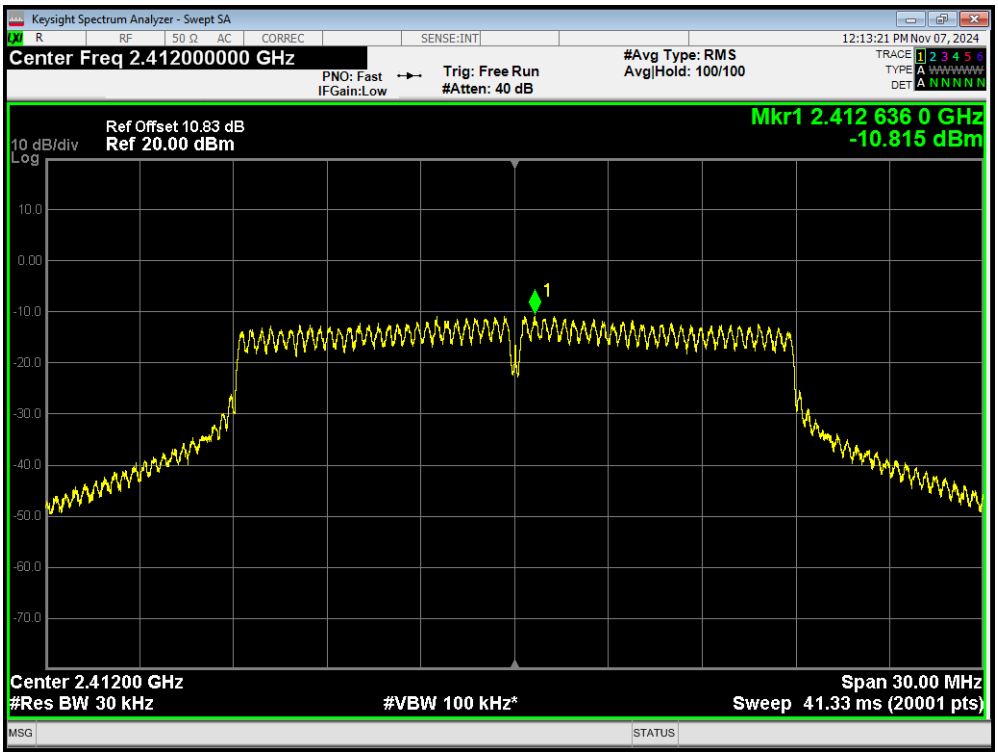


PSD 802.11n(HT20) 2412MHz Ant1



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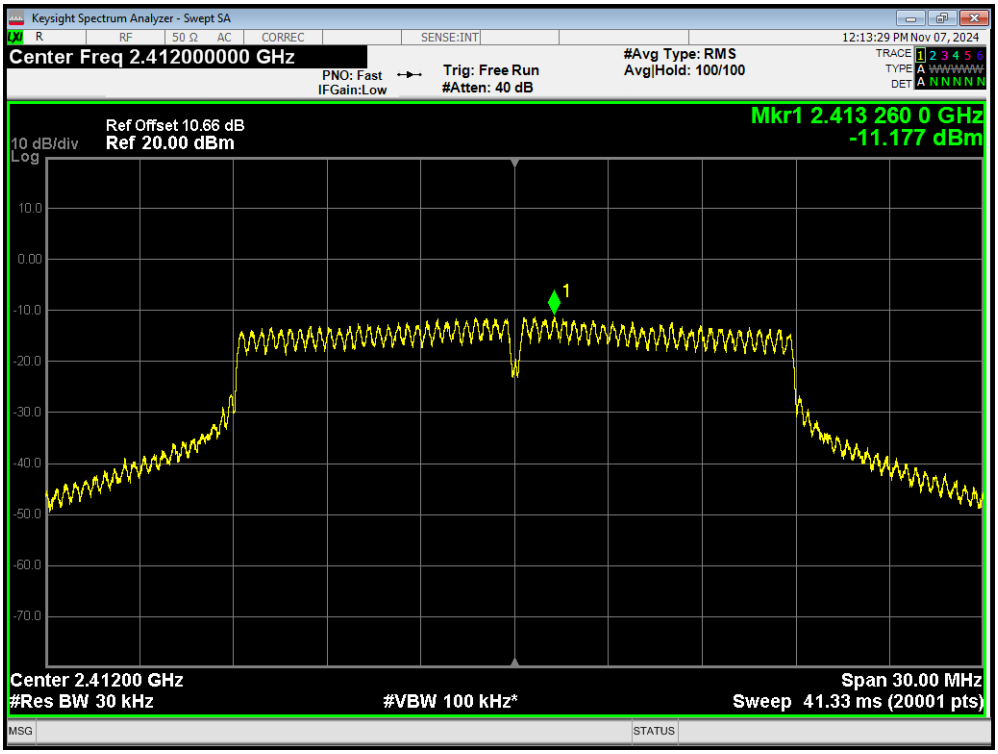

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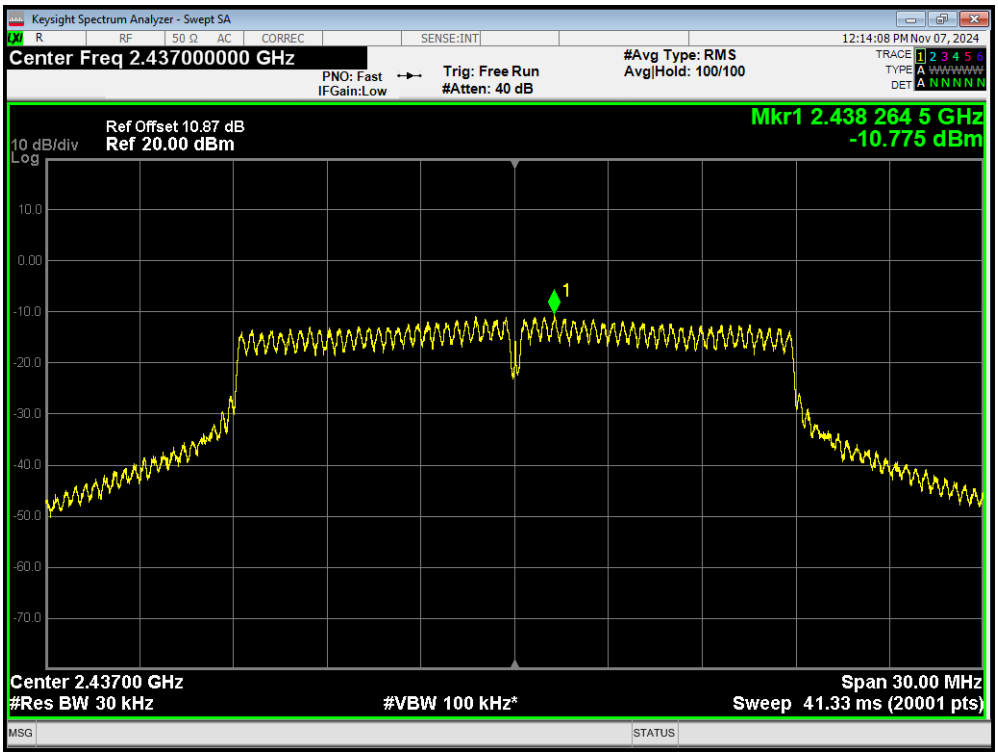

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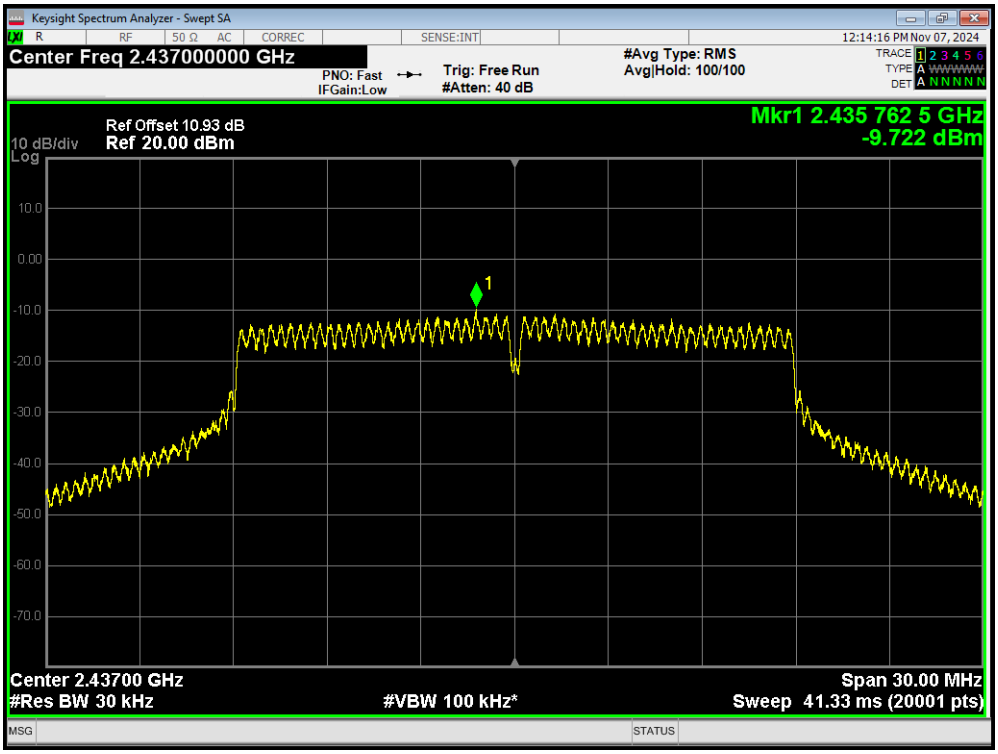

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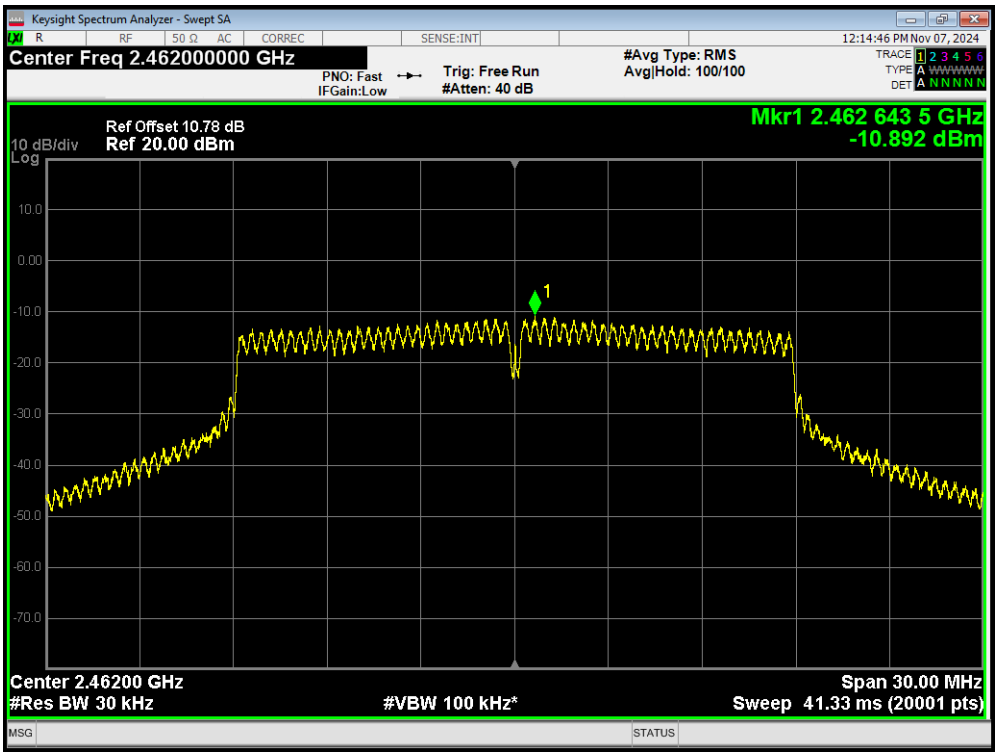

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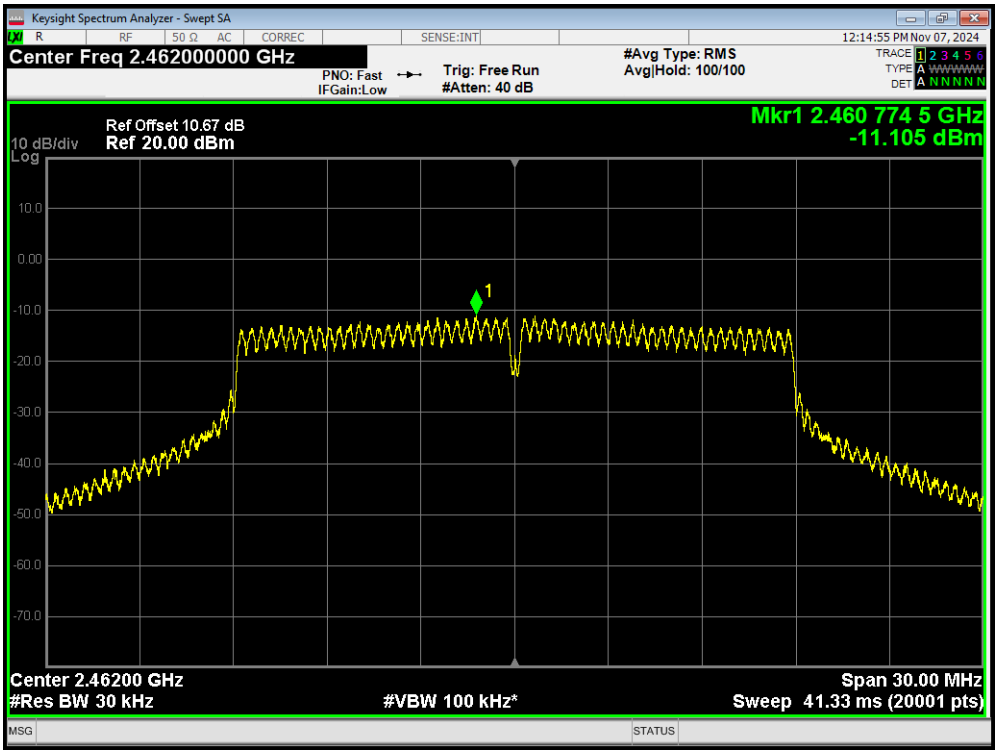


5.5. Spurious RF Conducted Emissions

Ambient Condition

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

Method of Measurement

The EUT was connected to the spectrum analyzer with a known loss. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. Set RBW to 100 kHz and VBW to 300 kHz, Sweep is set to AUTO.
The test is in transmitting mode.

Test Setup

Limits

Rule Part 15.247(d) pacifies 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. ”

Test Mode	Carrier frequency (MHz)	Reference value (dBm)	Limit
802.11b	2412	-31.860	-21.34
	2437	-30.090	-22.01
	2462	-31.870	-22.09
802.11g	2412	-31.820	-24.40
	2437	-32.460	-24.69
	2462	-32.480	-23.65
802.11n HT20	2412	-31.970	-26.26
	2437	-32.810	-27.41
	2462	-32.550	-26.91
Bluetooth (Low Energy) (1M)	2402	-32.090	-25.51
	2440	-32.460	-26.29
	2480	-30.950	-23.19

Bluetooth (Low Energy) (2M)	2402	-32.760	-25.71
	2440	-32.910	-26.29
	2480	-32.280	-23.17

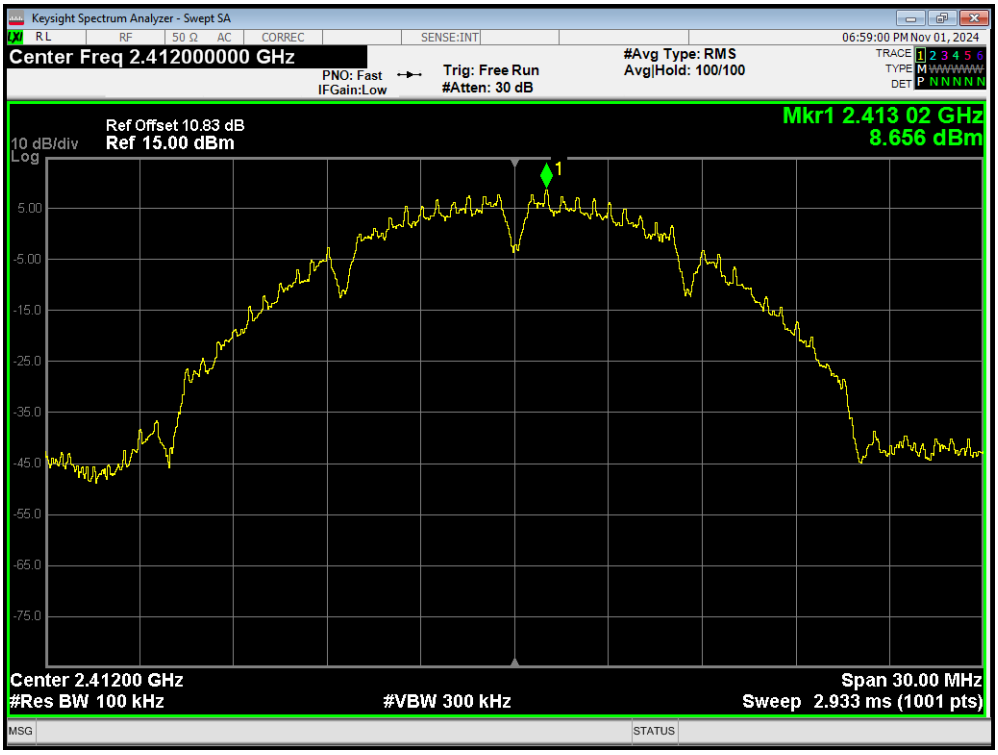
Measurement Uncertainty

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

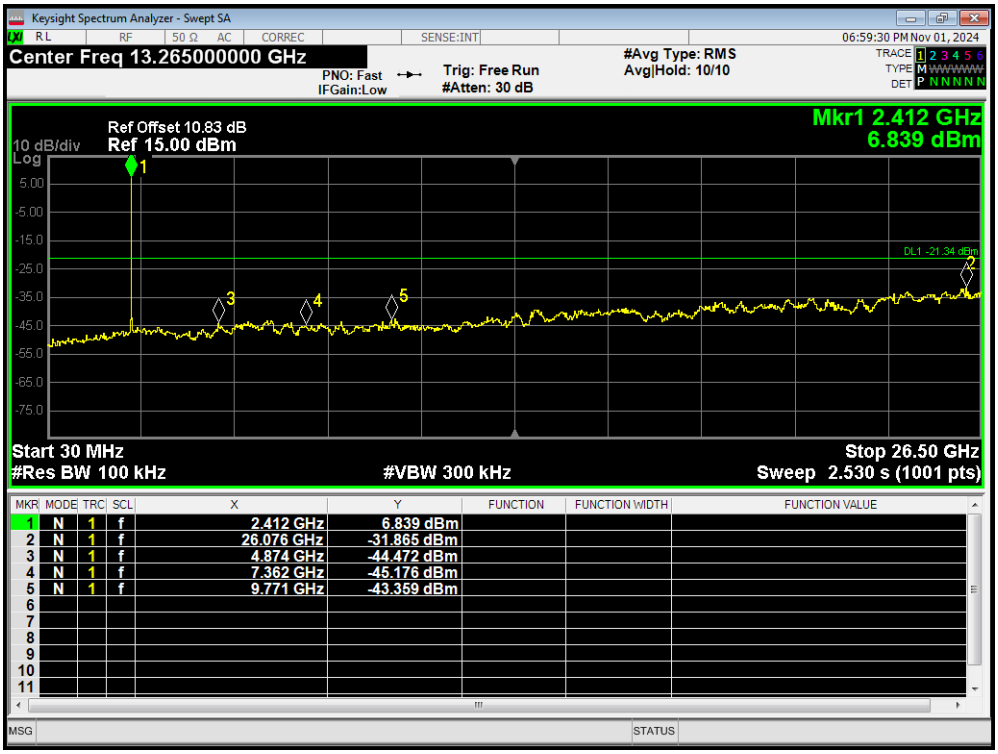
Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-26GHz	1.407 dB

Test Results:

Tx. Spurious 802.11b 2412MHz Ref



Tx. Spurious 802.11b 2412MHz Emission



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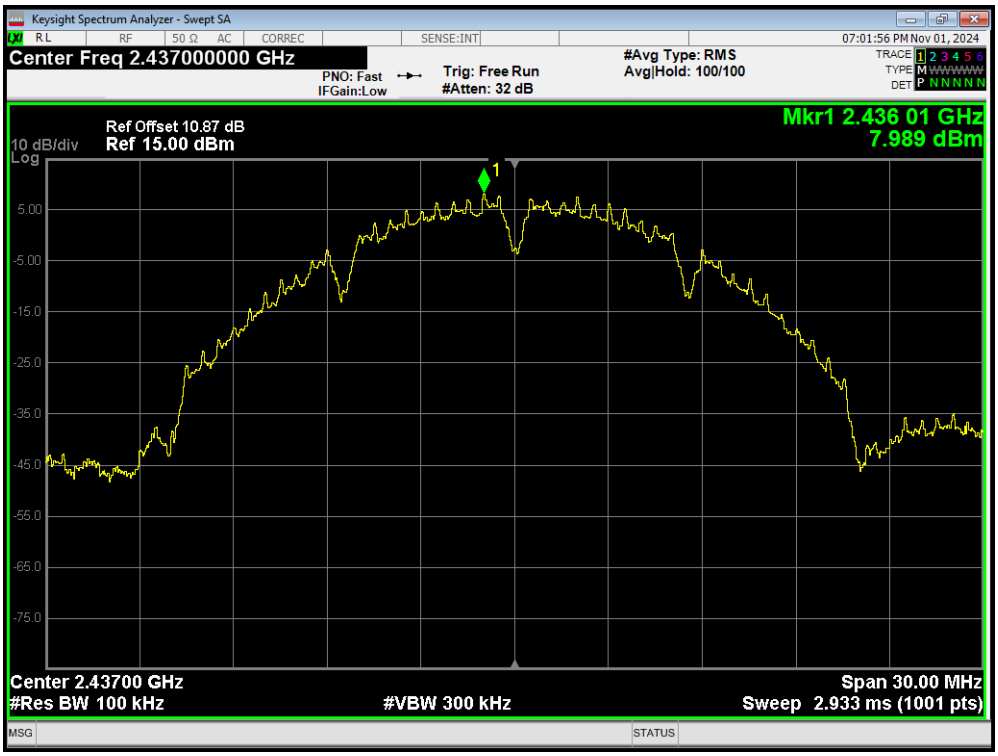

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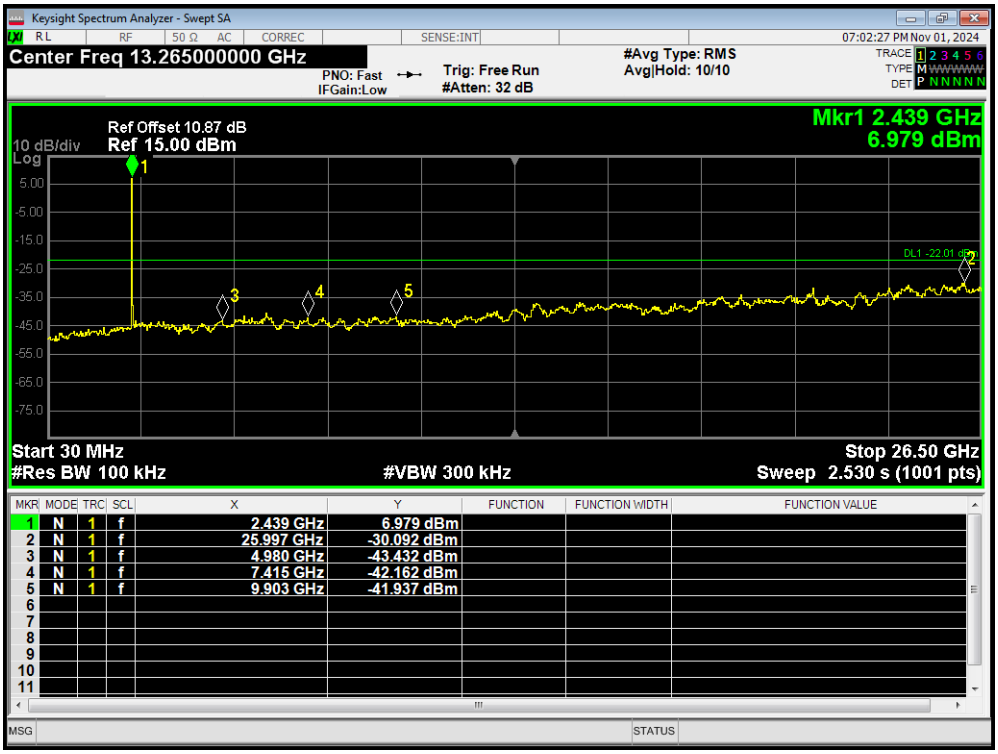
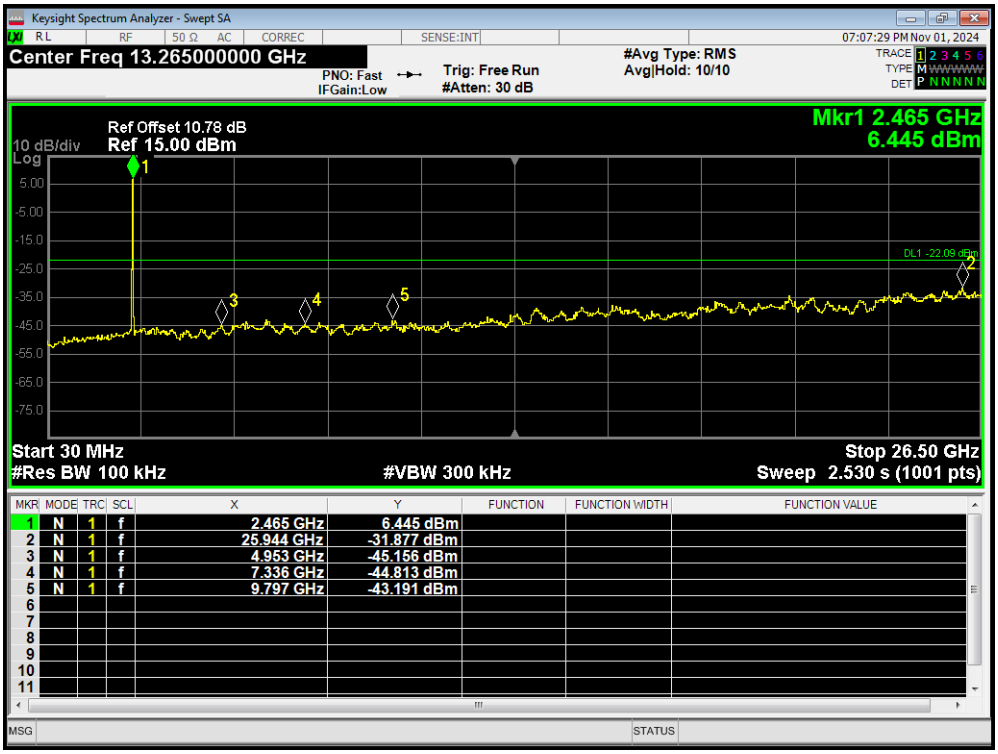


Tx. Spurious 802.11b 2462MHz Ref

Tx. Spurious 802.11b 2462MHz Emission



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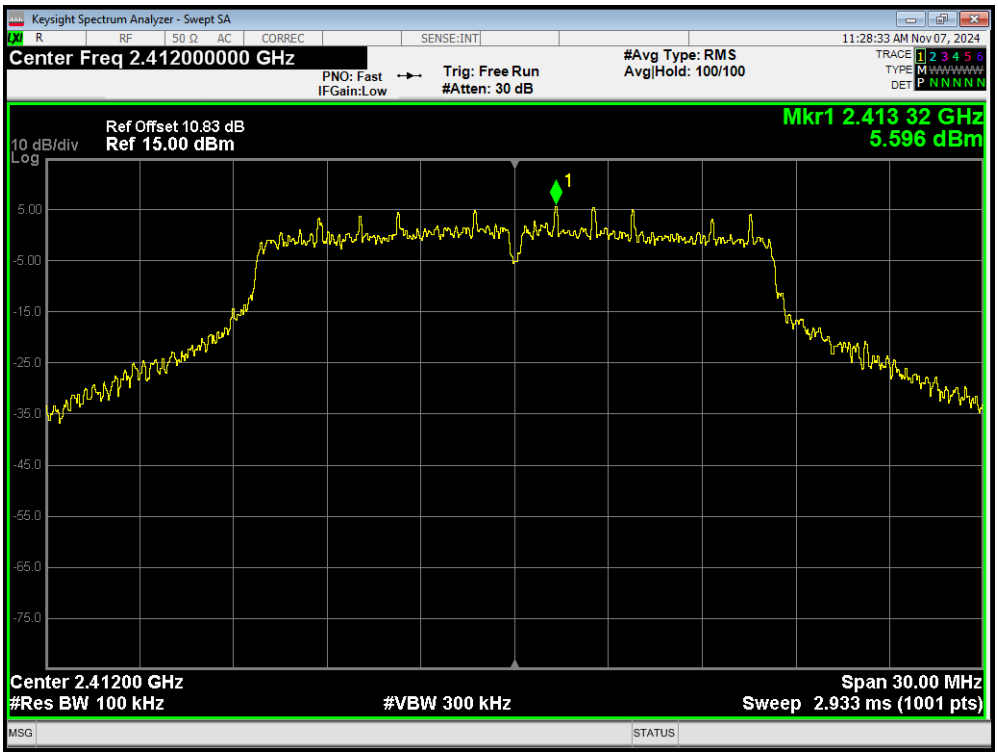

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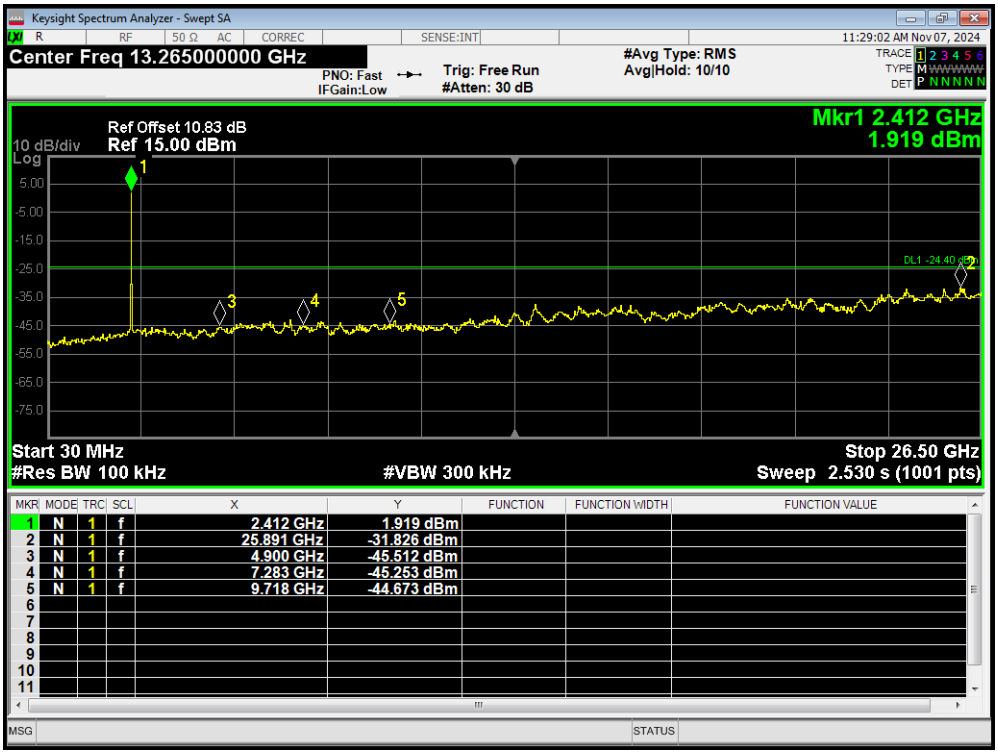

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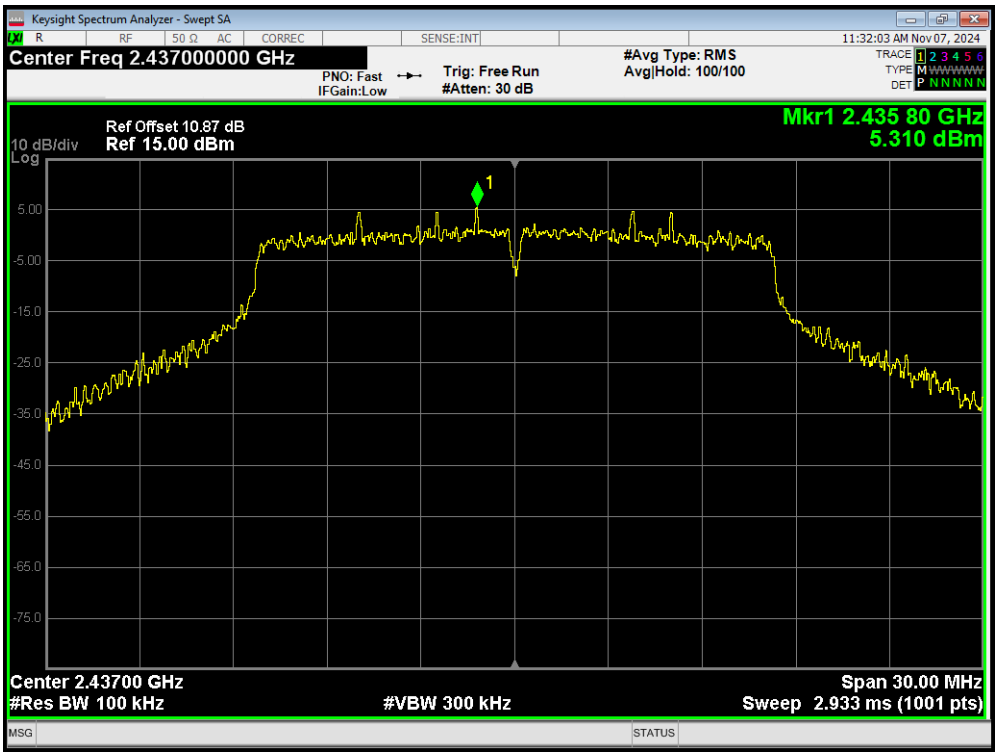

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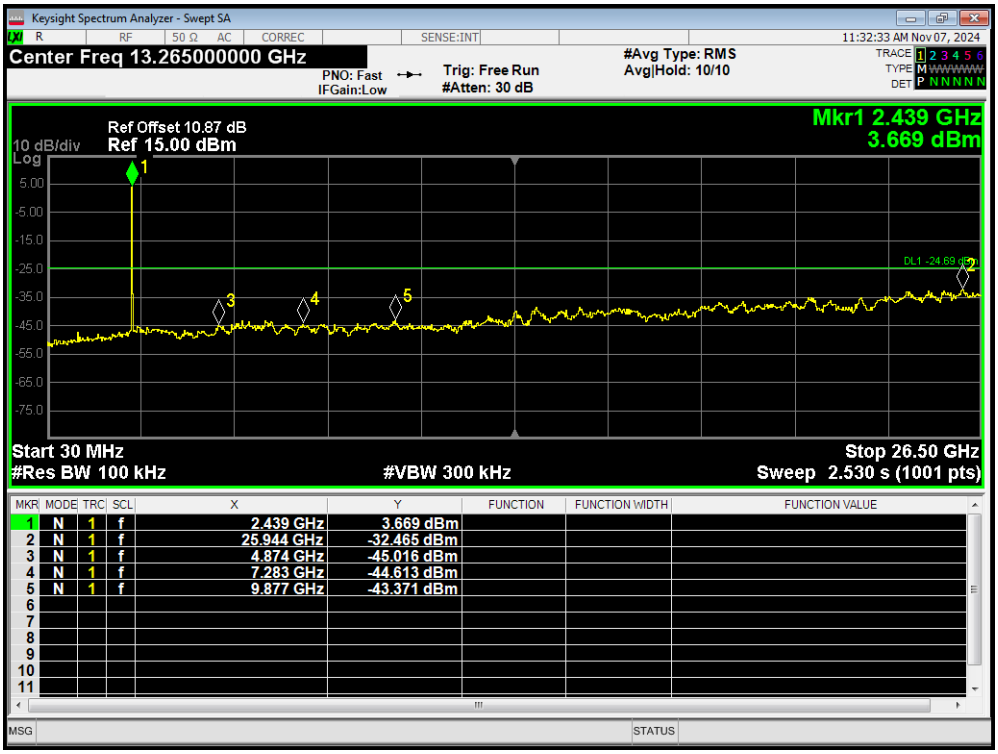

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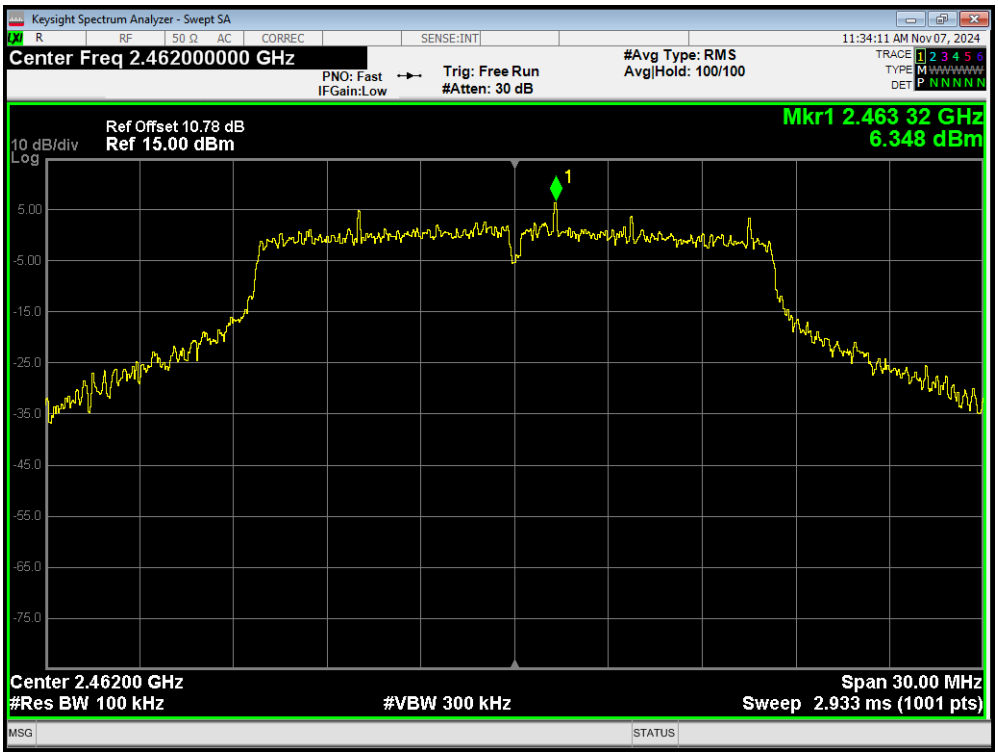

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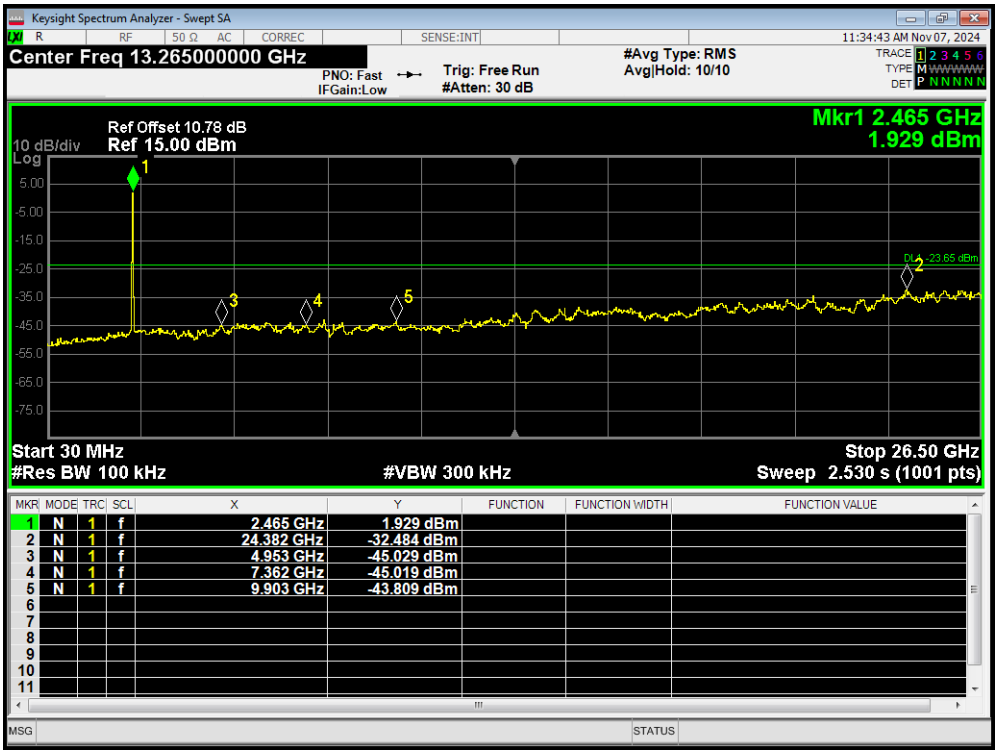
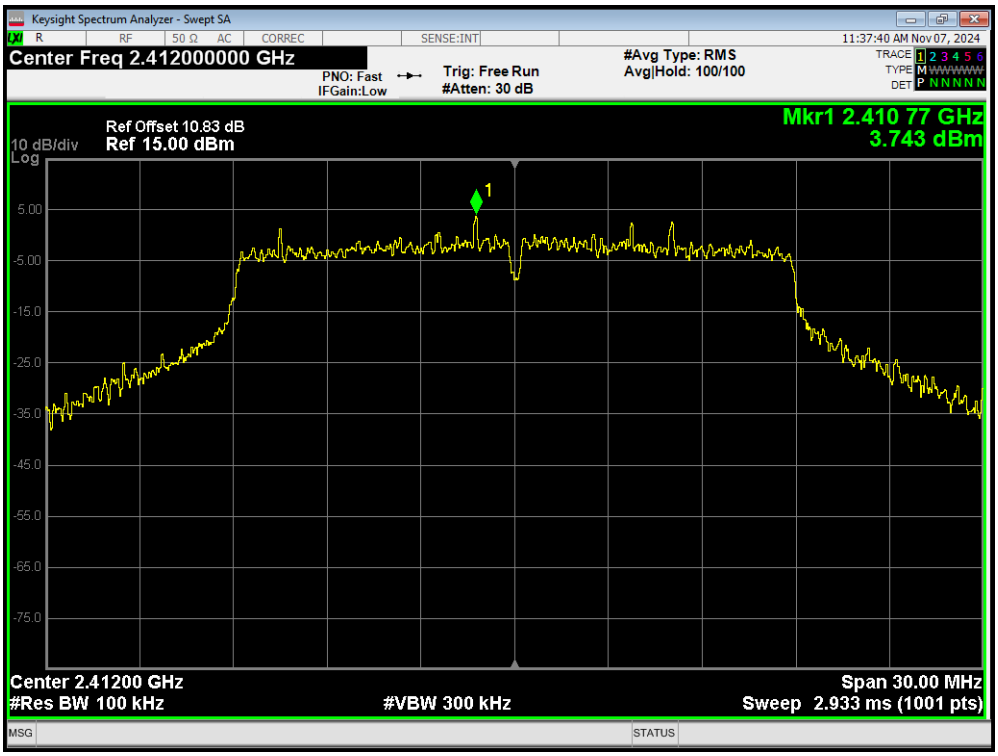


Tx. Spurious 802.11n(HT20) 2412MHz Ref



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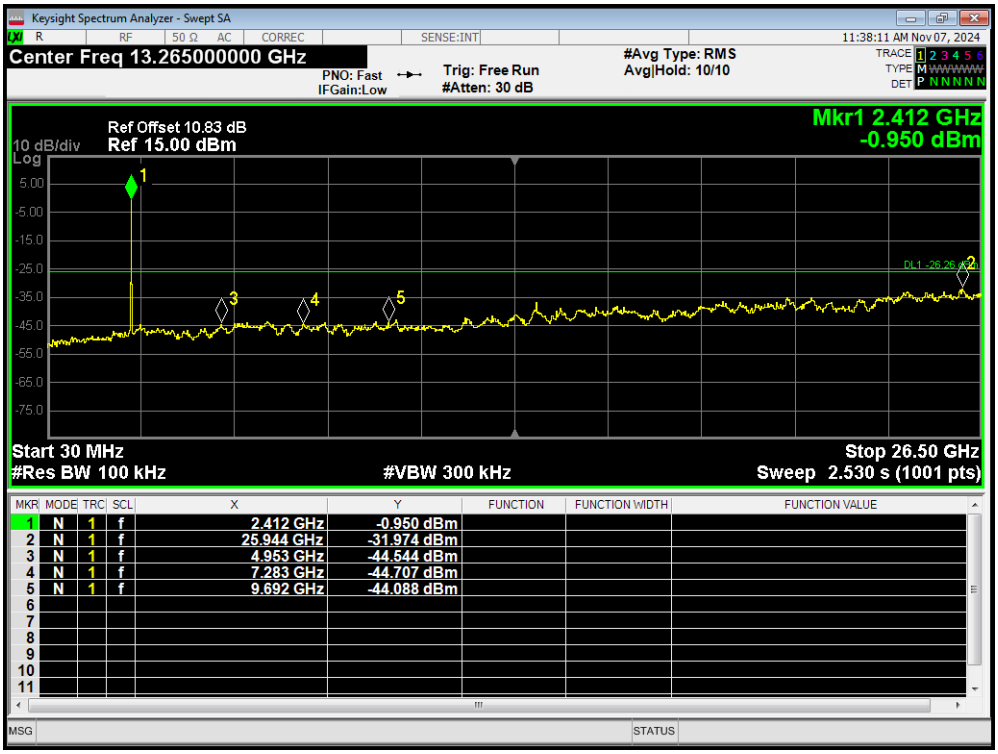

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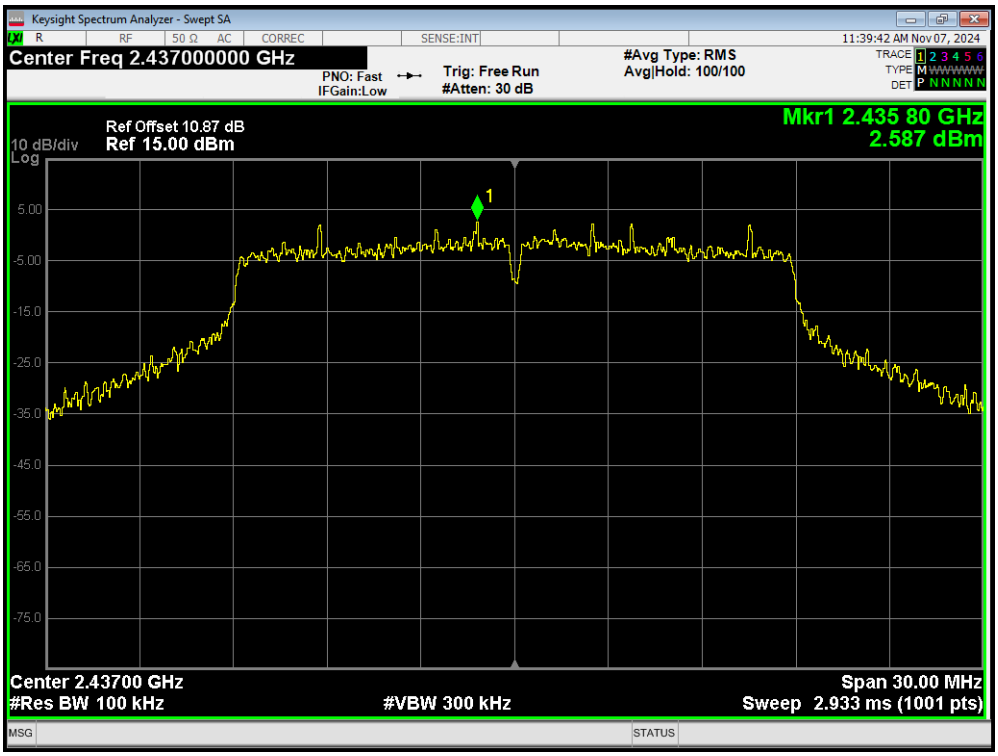

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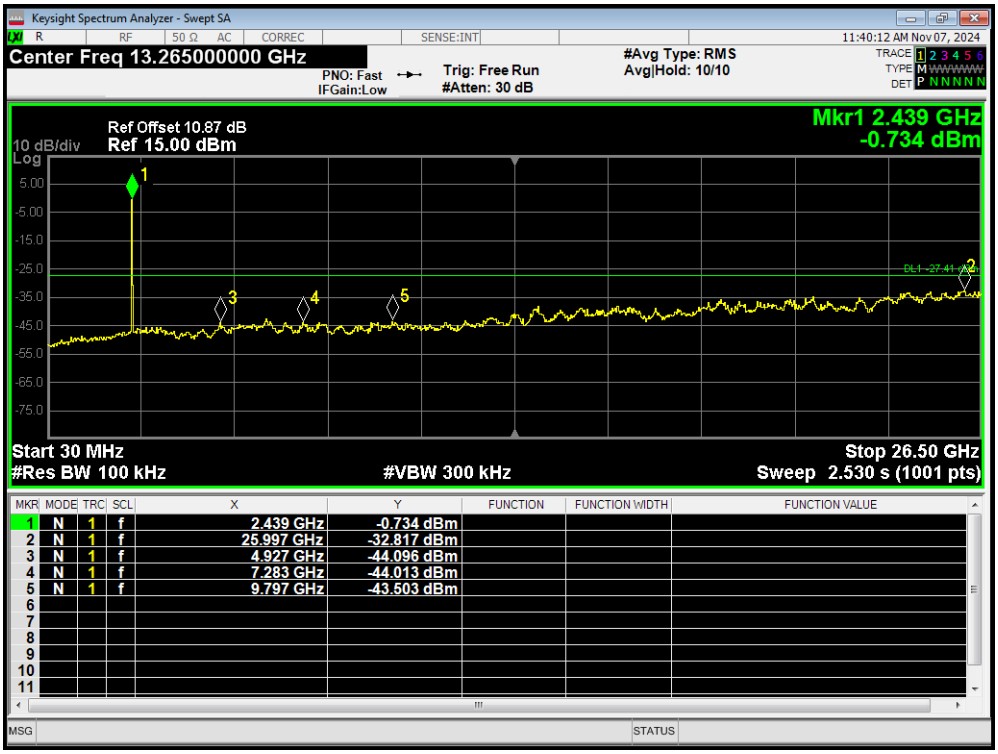

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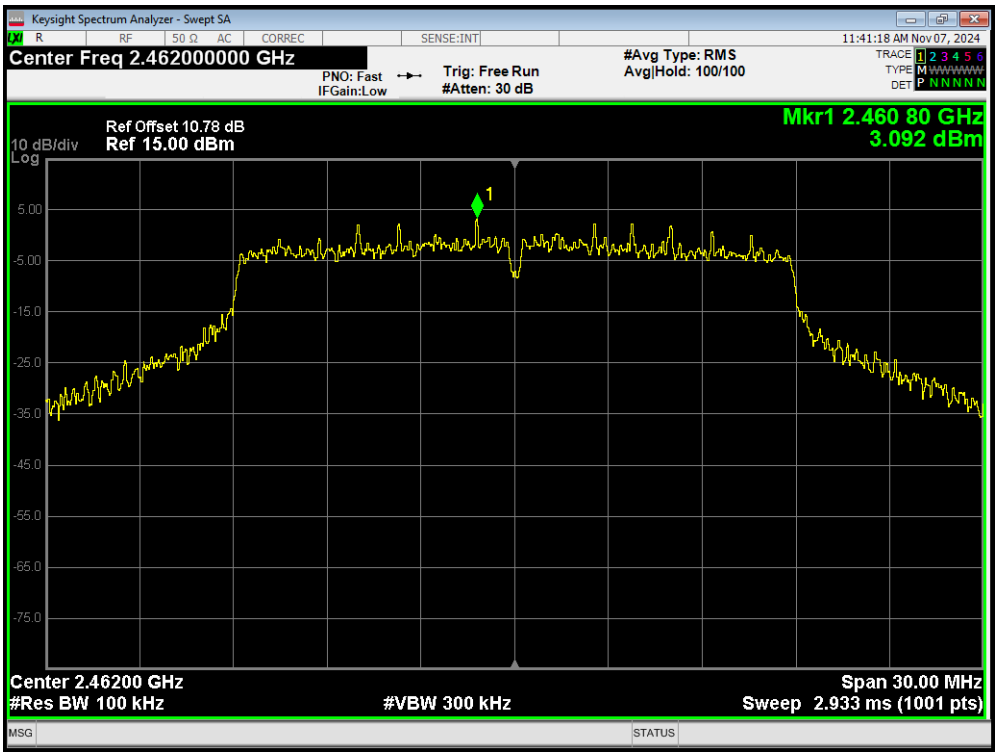

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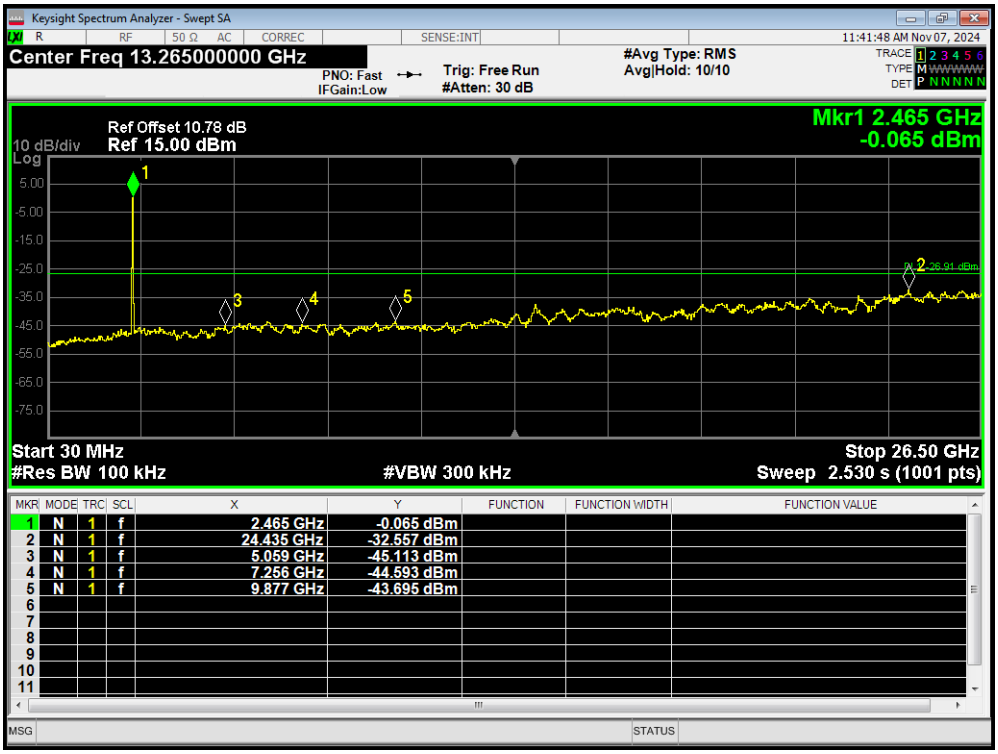
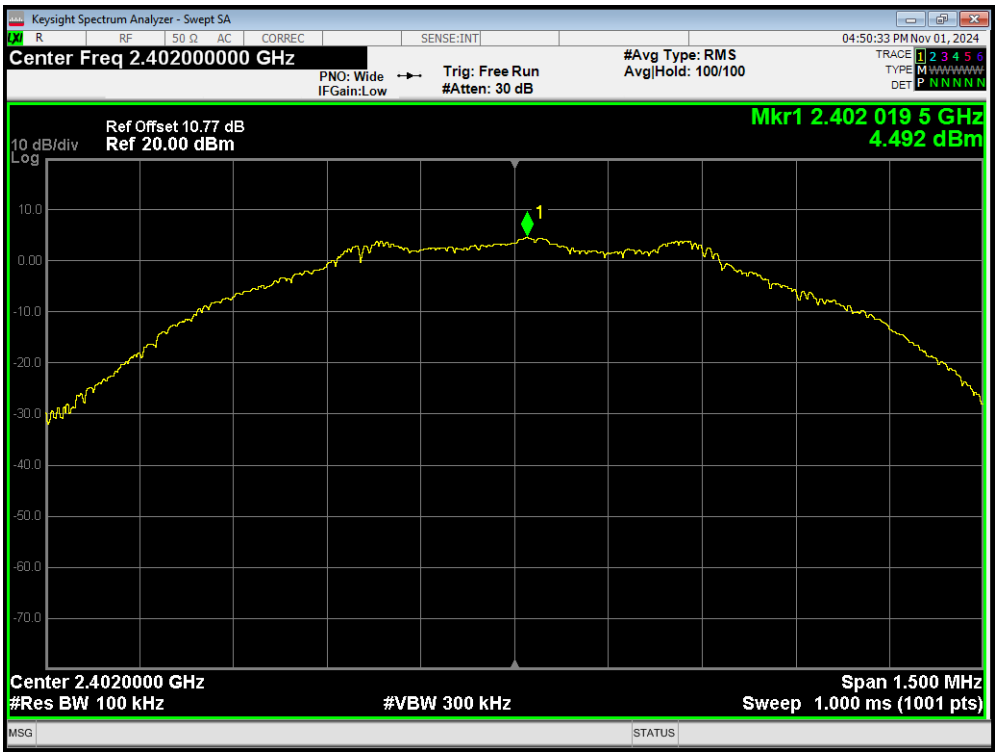
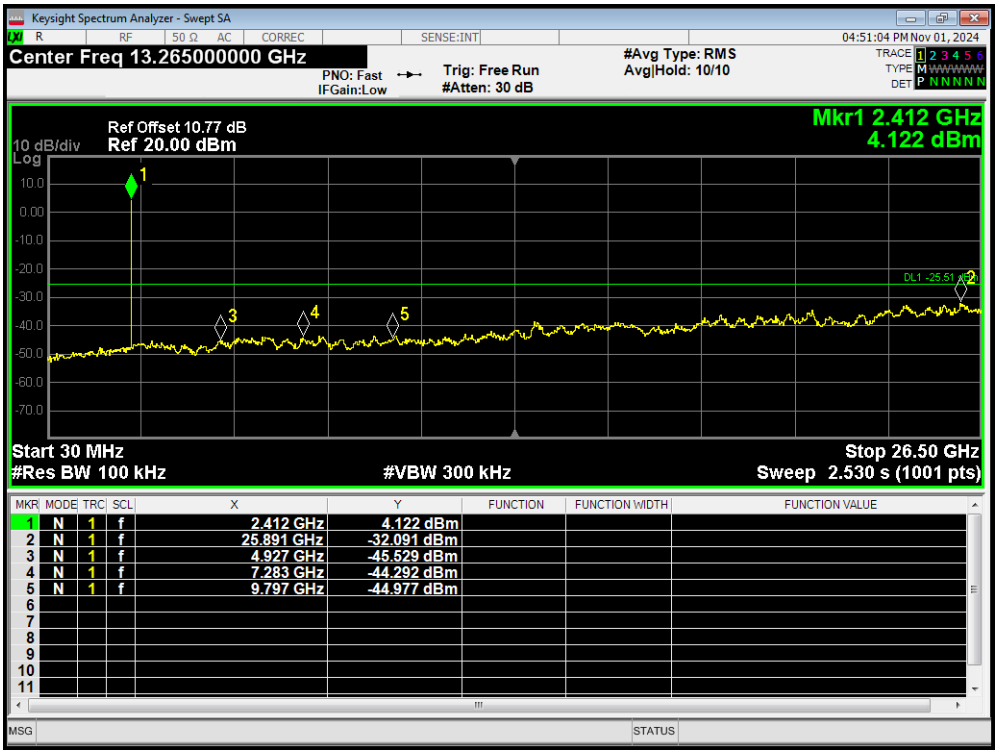


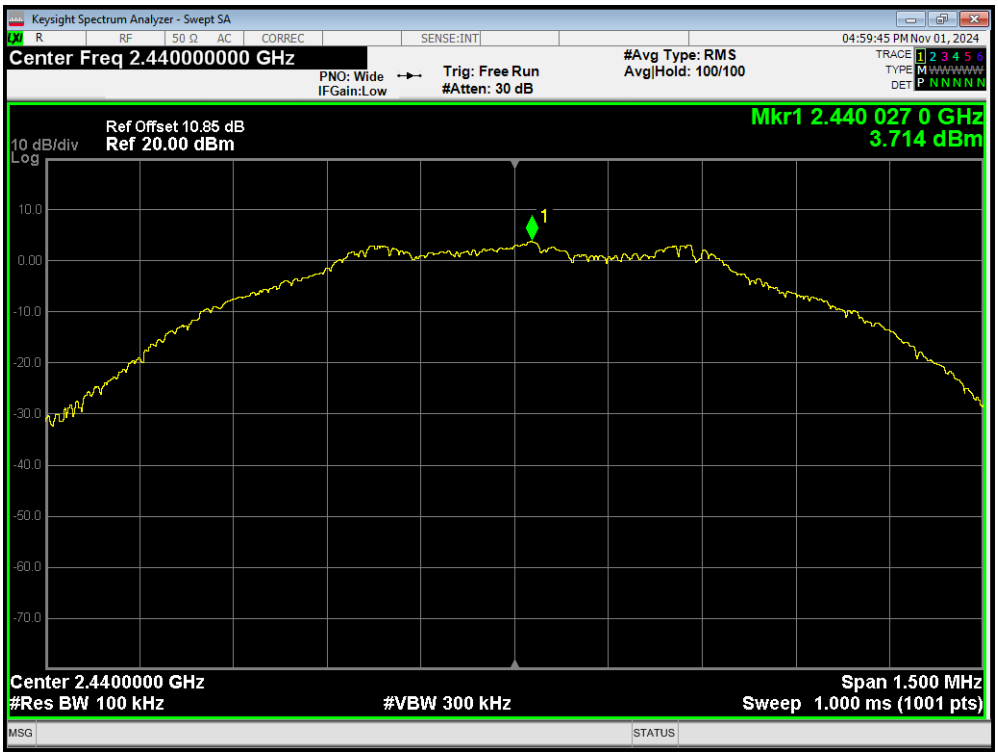
Tx. Spurious BLE (1M) 2402MHz Ref



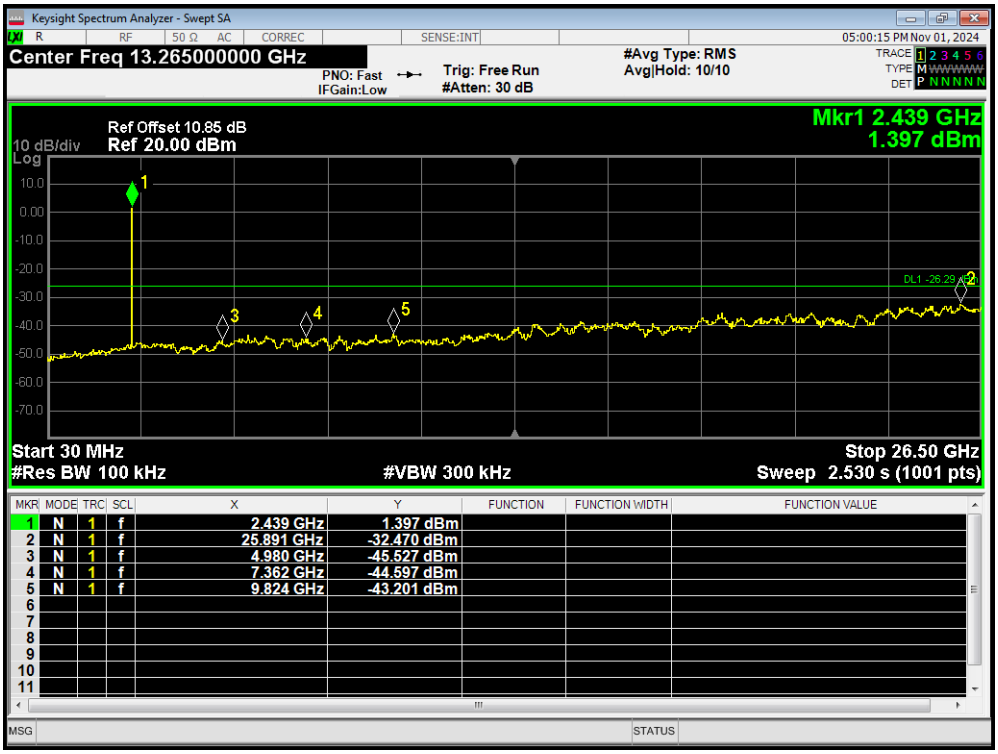
Tx. Spurious BLE (1M) 2402MHz Emission



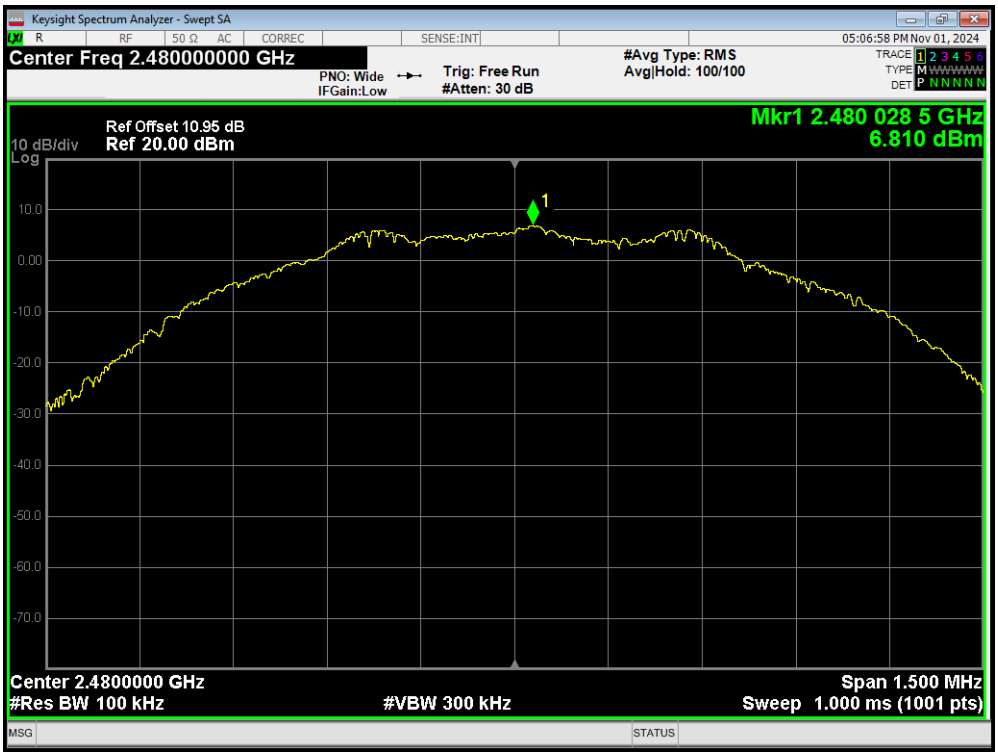
Tx. Spurious BLE (1M) 2440MHz Ref



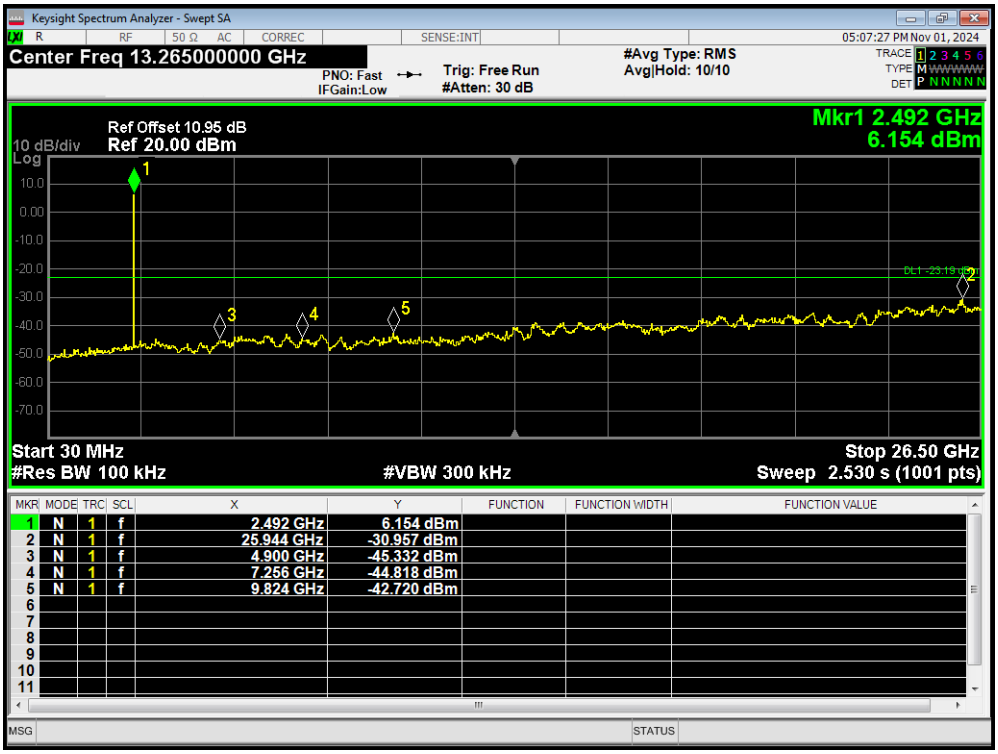
Tx. Spurious BLE (1M) 2440MHz Emission



Tx. Spurious BLE (1M) 2480MHz Ref

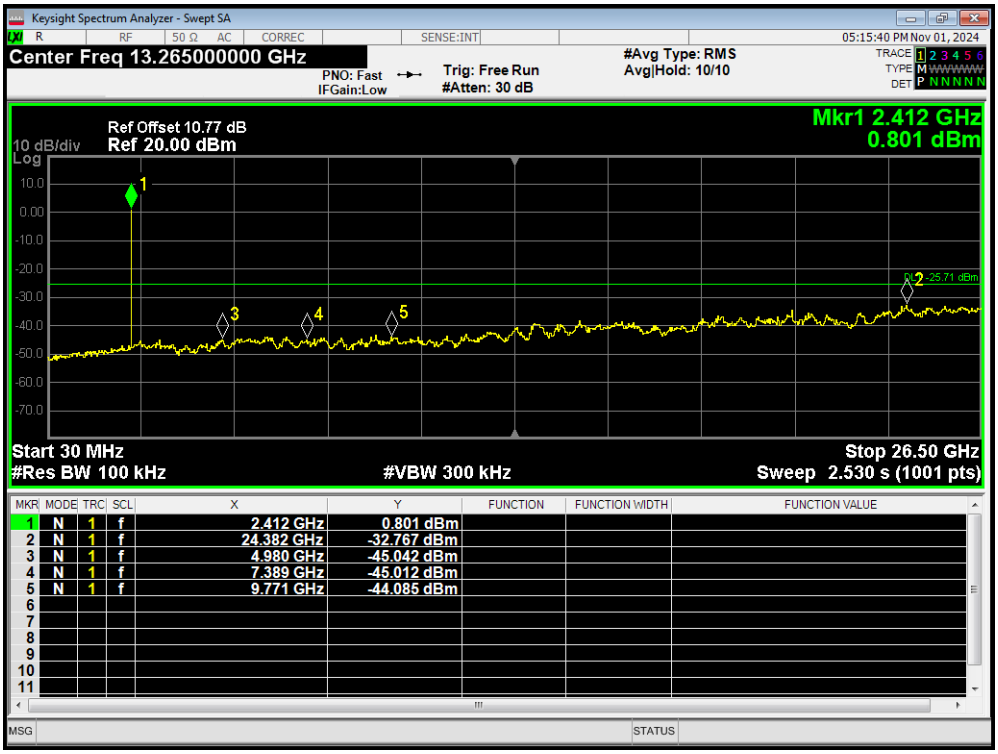


Tx. Spurious BLE (1M) 2480MHz Emission

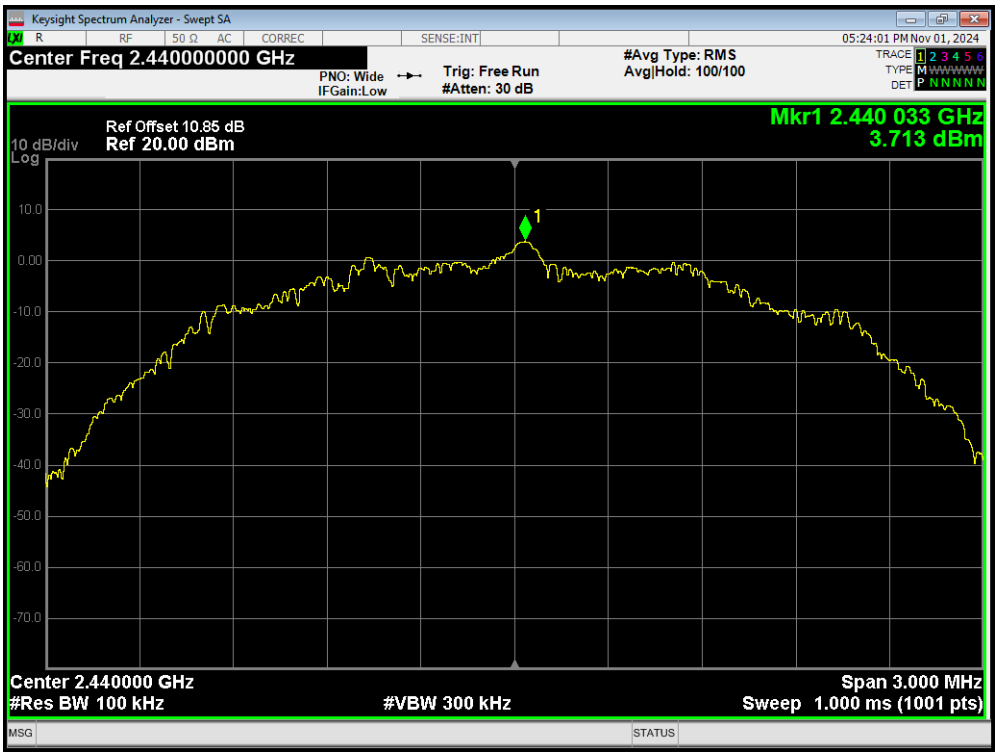


Tx. Spurious BLE (2M) 2402MHz Ref

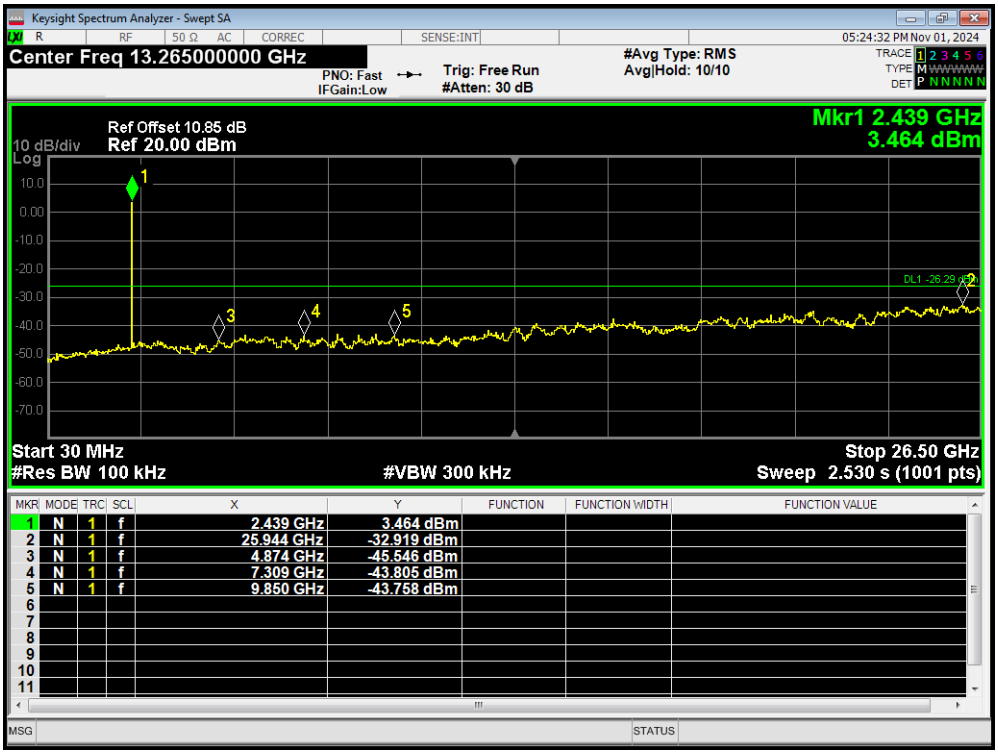
Tx. Spurious BLE (2M) 2402MHz Emission



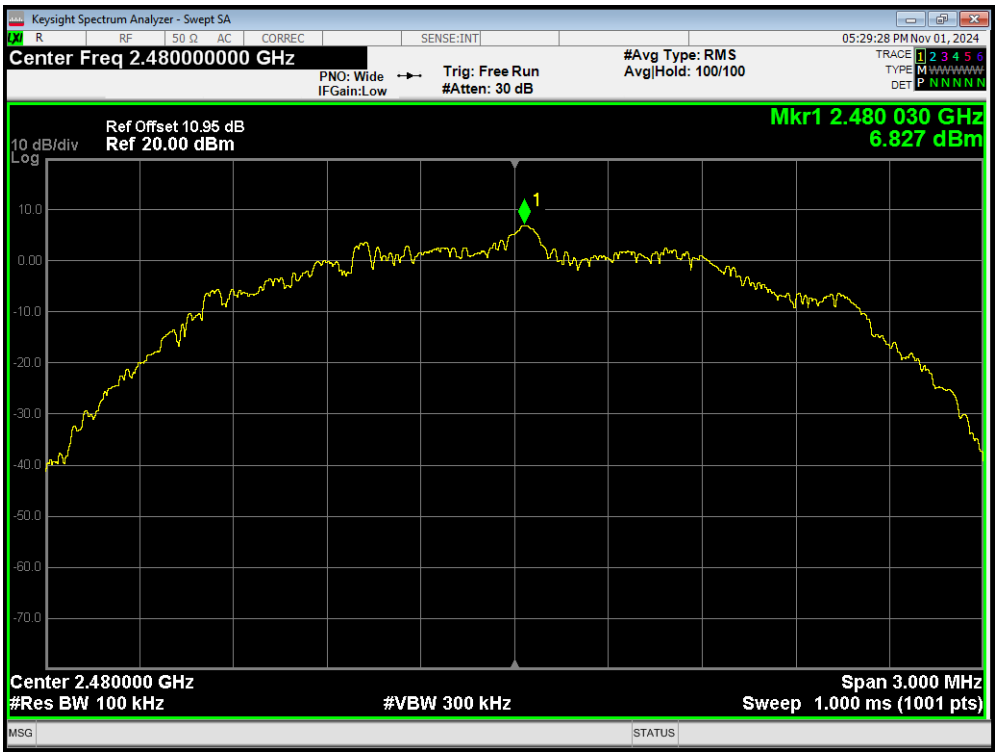
Tx. Spurious BLE (2M) 2440MHz Ref



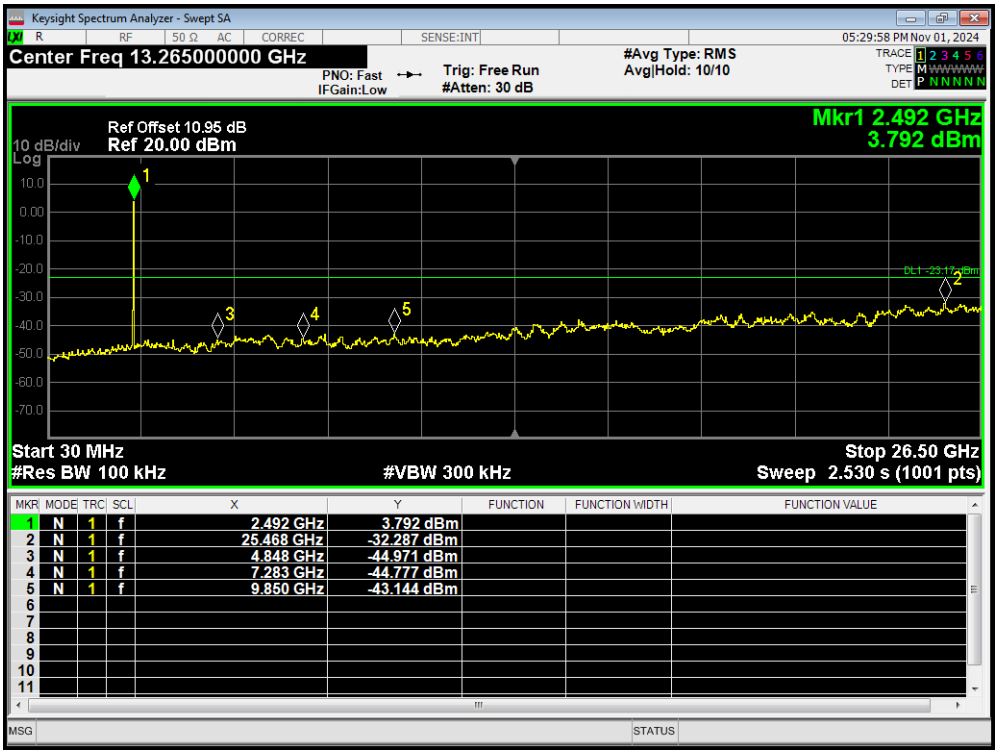
Tx. Spurious BLE (2M) 2440MHz Emission



Tx. Spurious BLE (2M) 2480MHz Ref



Tx. Spurious BLE (2M) 2480MHz Emission



6. Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Power Sensor	R&S	NRP18S	101954	2024-05-07	2025-05-06
Spectrum Analyzer	KEYSIGHT	N9020A	MY51330870	2024-05-07	2025-05-06

ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

****** END OF REPORT ******