

RF TEST REPORT

Applicant Sengled Co.,Ltd.
FCC ID 2AGN8-W71N15
Product Sengled smart Wifi bulb
Brand Sengled
Model W71-N15; W71-N11;
W71-N11DL
Report No. R2409A1417-R1
Issue Date November 4, 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.

Prepared by: Xu Ying

Approved by: Xu Kai

Eurofins TA Technology (Shanghai) Co., Ltd.

Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

TABLE OF CONTENT

1. Test Laboratory	5
1.1. Notes of the Test Report.....	5
1.2. Test Facility	5
1.3. Testing Location.....	5
2. General Description of Equipment Under Test.....	6
2.1. Applicant and Manufacturer Information	6
2.2. General Information	6
3. Applied Standards	7
4. Test Configuration	8
5. Test Case Results	9
5.1. Maximum output power	9
5.2. 99% Bandwidth and 6dB Bandwidth	12
5.3. Band Edge	36
5.4. Power Spectral Density	51
5.5. Spurious RF Conducted Emissions.....	66
5.6. Unwanted Emission	89
5.7. Conducted Emission	178
6. Main Test Instruments.....	180
ANNEX A: The EUT Appearance.....	182
ANNEX B: Test Setup Photos	183

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: September 25, 2024 ~ October 29, 2024			
Date of Sample Received: September 25, 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.			

Testing location

Test Items	Test location
Maximum output power	Eurofins TA Technology (Shanghai) Co., Ltd. Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China A2LA (Certificate Number: 3857.01)
99% Bandwidth and 6dB Bandwidth	
Power spectral density	
Band Edge	
Spurious RF Conducted Emissions	BTL INC. (SHANGHAI) No. 29, Jintang Road, Tangzhen Industry Park Pudong New Area, shanghai 201210 People's Republic of China A2LA (Certificate Number: 7136.01)
Unwanted Emissions	

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
Post code: 201201
Country: P. R. China
Contact: Xu Kai
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
Website: <https://www.eurofins.com/electrical-and-electronics>
E-mail: Kain.Xu@cpt.eurofinscn.com

2. General Description of Equipment Under Test

2.1. Applicant and Manufacturer Information

Applicant	Sengled Co.,Ltd.
Applicant address	Room 103/02-B, Floor 1, Building 1, No. 498, Guoshoujing Road, Pilot Free Trade Zone Shanghai China
Manufacturer	Sengled Co.,Ltd.
Manufacturer address	Room 103/02-B, Floor 1, Building 1, No. 498, Guoshoujing Road, Pilot Free Trade Zone Shanghai China

2.2. General Information

EUT Description	
Model	W71-N15; W71-N11; W71-N11DL
Lab internal SN	R2409A1417/S01
Hardware Version	V1
Software Version	1.0.0
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	1.57 dBi
Additional Beamforming Gain	NA
Operating Frequency Range(s)	802.11b/g/n(HT20): 2412 ~ 2462 MHz Bluetooth LE V5.2: 2402 ~2480 MHz
Modulation Type	802.11b: DSSS 802.11g/n: OFDM Bluetooth LE: GFSK
Max. Output Power	Wi-Fi 2.4G: 18.36 dBm Bluetooth LE: 9.10 dBm
Note: 1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant. 2. The customer declares that W71-N15; W71-N11; and W71-N11DL are the same except for different models. This report only tests W71-N15.	

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

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
Bluetooth (Low Energy) (S=2)	500kbps
Bluetooth (Low Energy) (S=8)	125kbps
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0

5. Test Case Results

5.1. Maximum output power

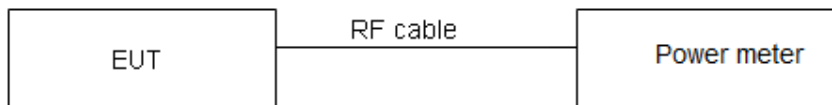
Ambient Condition

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)
----------------------	--------------------------

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
CH1	default	13	default
CH6	default	13	default
CH11	default	13	1

Power Index	
Channel	Bluetooth (Low Energy)
CH0	11
CH19	11
CH39	11

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11b	1.000	0.000
802.11g	1.000	0.000
802.11n HT20	1.000	0.000
Bluetooth LE (1M)	1.000	0.000
Bluetooth LE (2M)	1.000	0.000
Bluetooth LE (S=2)	1.000	0.000
Bluetooth LE (S=8)	1.000	0.000
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	18.36	18.36	30	PASS
	2437/CH 6	18.16	18.16	30	PASS
	2462/CH 11	18.29	18.29	30	PASS
802.11g	2412/CH 1	16.20	16.20	30	PASS
	2437/CH 6	16.80	16.80	30	PASS
	2462/CH 11	16.12	16.12	30	PASS
802.11n HT20	2412/CH 1	16.52	16.52	30	PASS
	2437/CH 6	16.31	16.31	30	PASS
	2462/CH11	16.15	16.15	30	PASS
Bluetooth (Low Energy) (1M)	2402/CH 0	8.92	8.92	30	PASS
	2440/CH 19	8.43	8.43	30	PASS
	2480/CH 39	8.22	8.22	30	PASS
Bluetooth (Low Energy) (2M)	2402/CH 0	9.01	9.01	30	PASS
	2440/CH 19	8.13	8.13	30	PASS
	2480/CH 39	8.01	8.01	30	PASS
Bluetooth (Low Energy) (S=2)	2402/CH 0	8.91	8.91	30	PASS
	2440/CH 19	8.32	8.32	30	PASS
	2480/CH 39	8.30	8.30	30	PASS
Bluetooth (Low Energy) (S=8)	2402/CH 0	9.10	9.10	30	PASS
	2440/CH 19	8.41	8.41	30	PASS
	2480/CH 39	8.08	8.08	30	PASS

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

5.2. 99% Bandwidth and 6dB Bandwidth

Ambient Condition

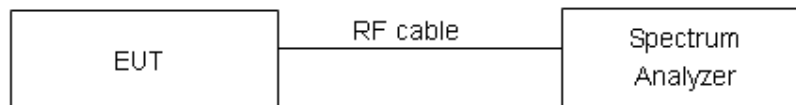
Temperature	Relative humidity
15°C ~ 35°C	20% ~ 80%

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. 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

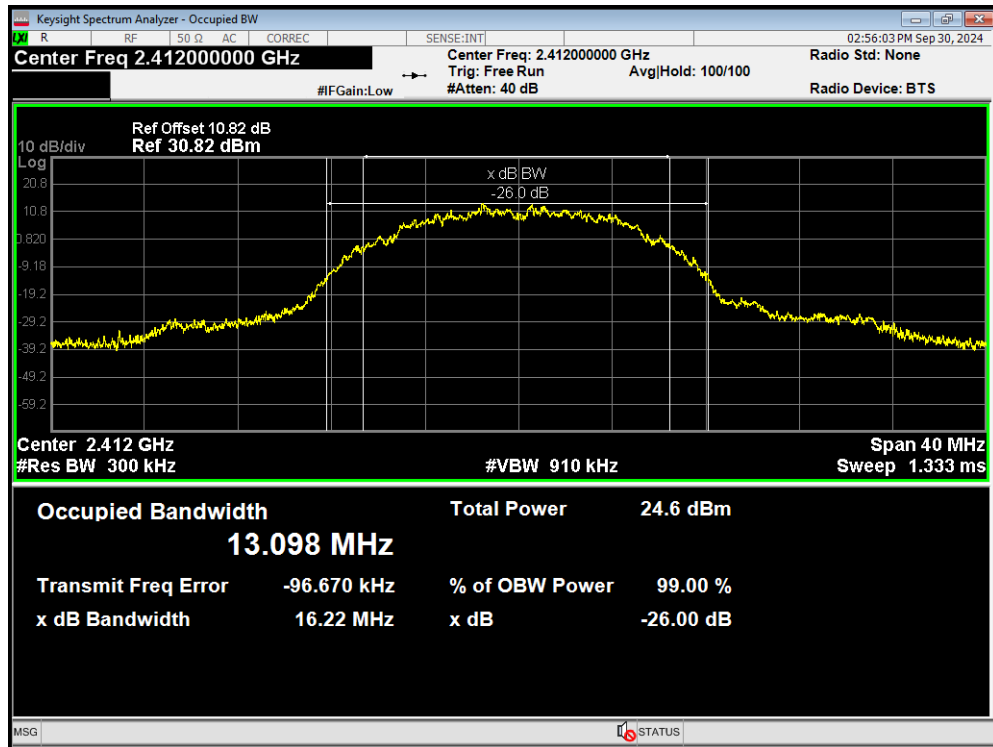
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 936$ Hz.

Test Results:

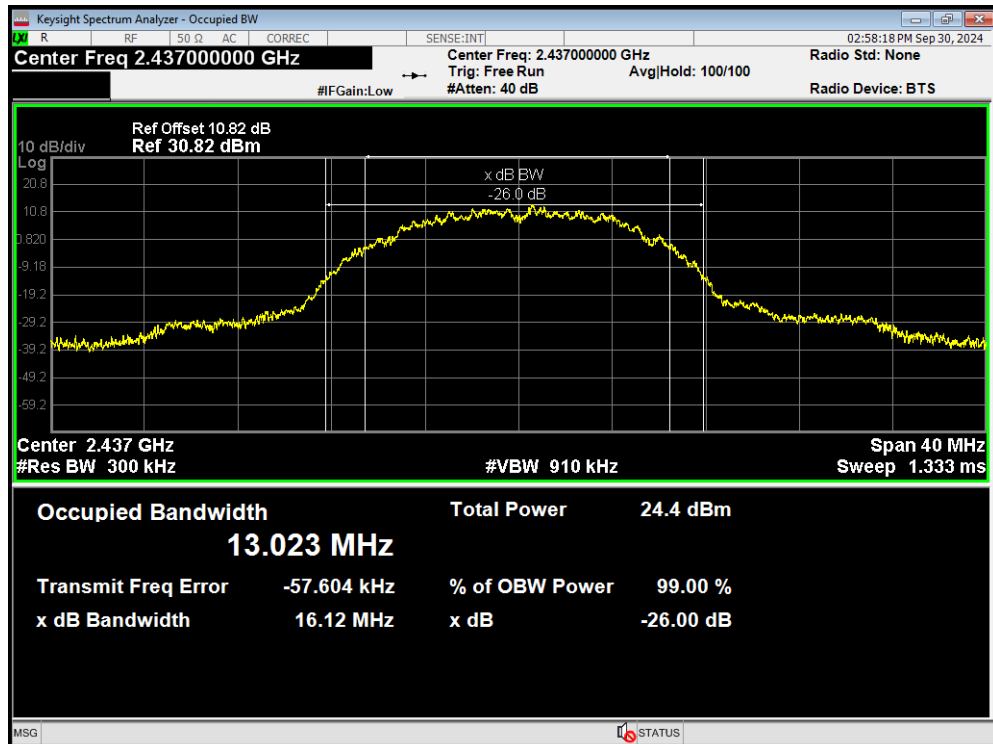
Test Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11b	2412	13.098	9.557	500	PASS
	2437	13.023	10.078	500	PASS
	2462	13.340	8.685	500	PASS
802.11g	2412	16.519	16.093	500	PASS
	2437	17.356	16.301	500	PASS
	2462	16.413	16.122	500	PASS
802.11n HT20	2412	17.355	16.577	500	PASS
	2437	17.315	16.153	500	PASS
	2462	17.259	15.833	500	PASS
Bluetooth (Low Energy) (1M)	2402	1.079	0.683	500	PASS
	2440	1.073	0.672	500	PASS
	2480	1.078	0.683	500	PASS
Bluetooth (Low Energy) (2M)	2402	2.064	1.144	500	PASS
	2440	2.069	1.150	500	PASS
	2480	2.065	1.108	500	PASS
Bluetooth (Low Energy) (S=2)	2402	1.064	0.655	500	PASS
	2440	1.069	0.650	500	PASS
	2480	1.065	0.653	500	PASS
Bluetooth (Low Energy) (S=8)	2402	1.083	0.670	500	PASS
	2440	1.083	0.672	500	PASS
	2480	1.082	0.668	500	PASS

99%bandwidth

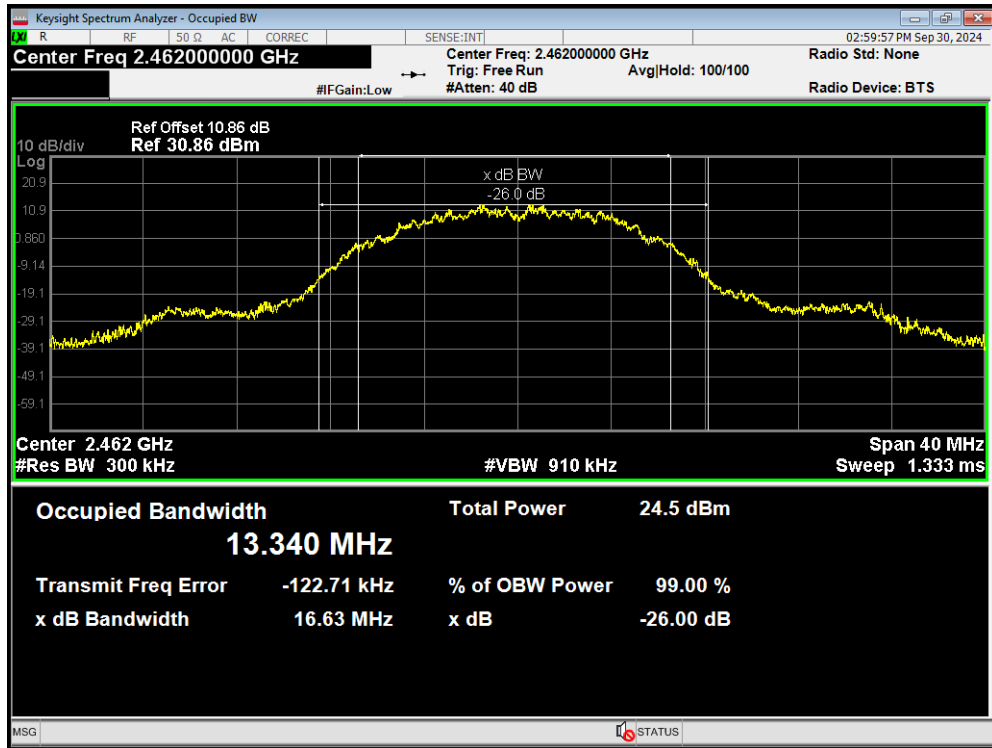
OBW 802.11b 2412MHz



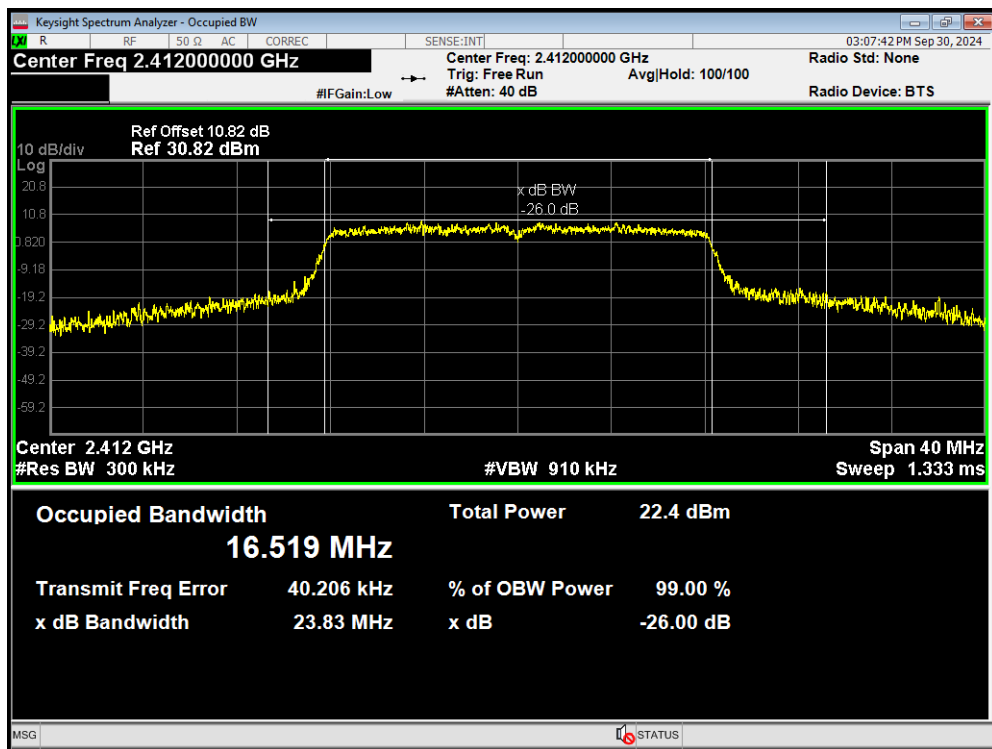
OBW 802.11b 2437MHz



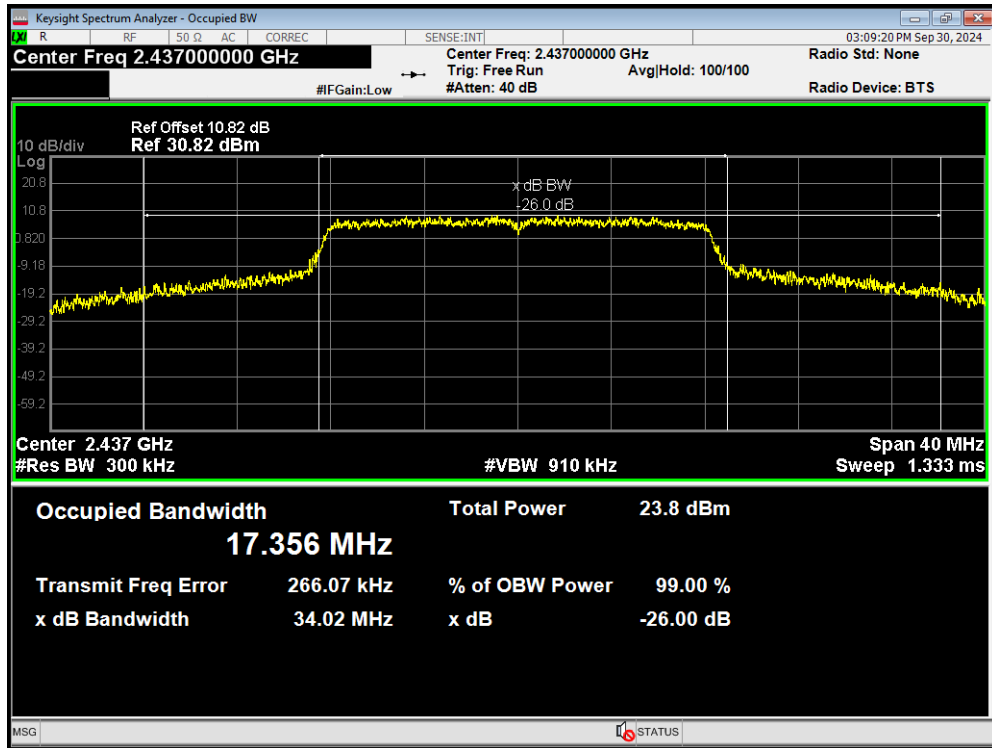
OBW 802.11b 2462MHz



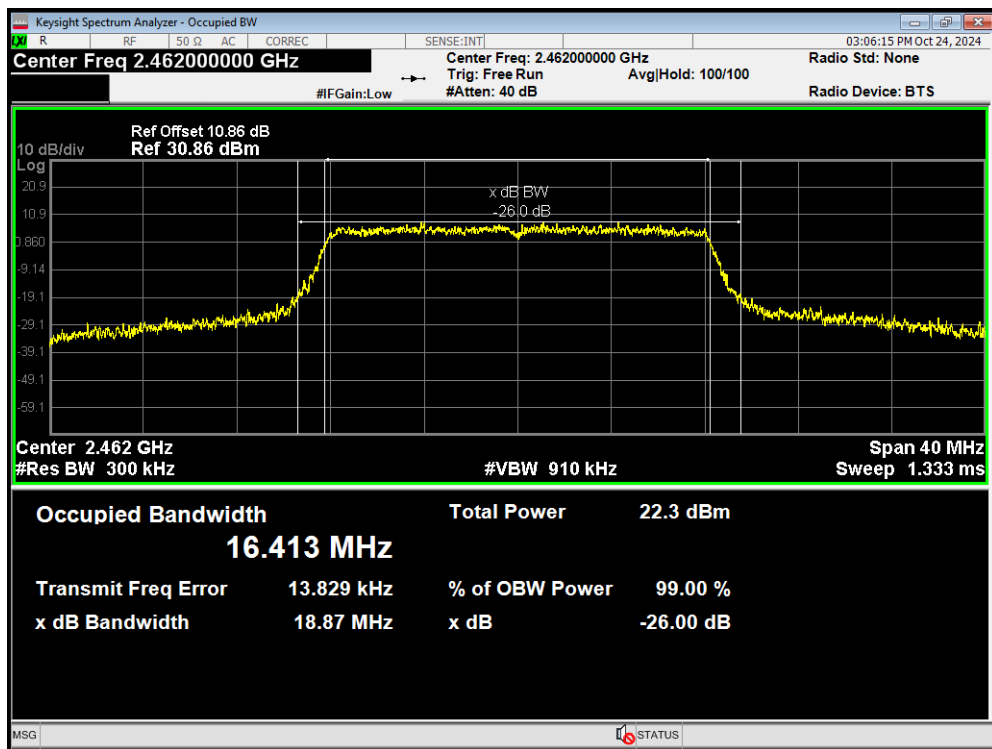
OBW 802.11g 2412MHz



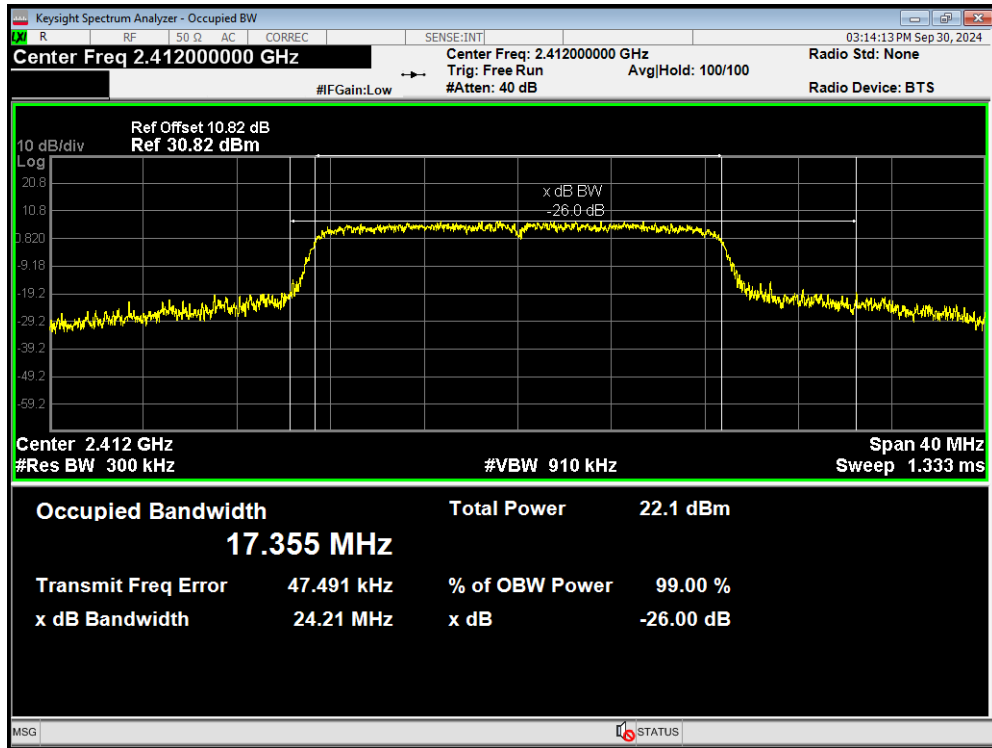
OBW 802.11g 2437MHz



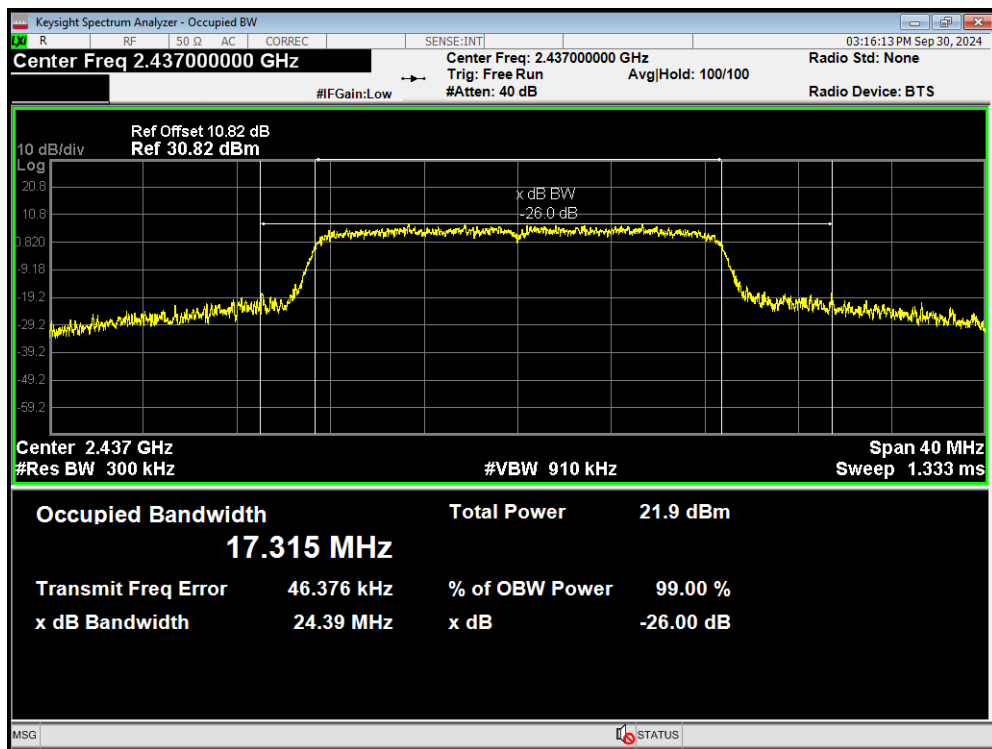
OBW 802.11g 2462MHz



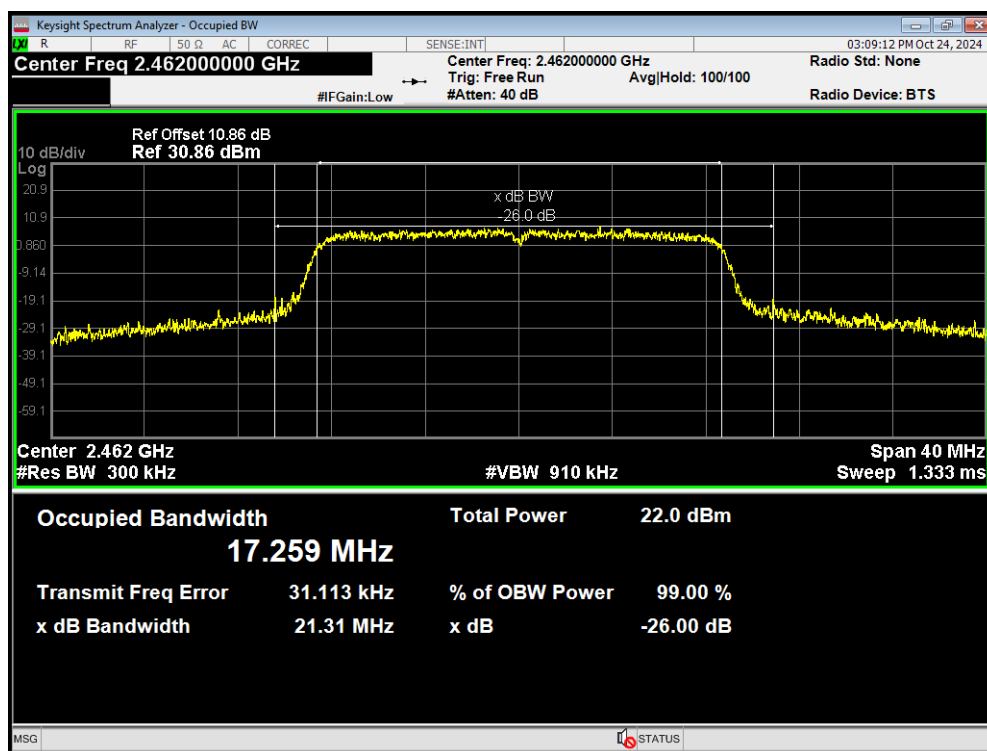
OBW 802.11n(HT20) 2412MHz



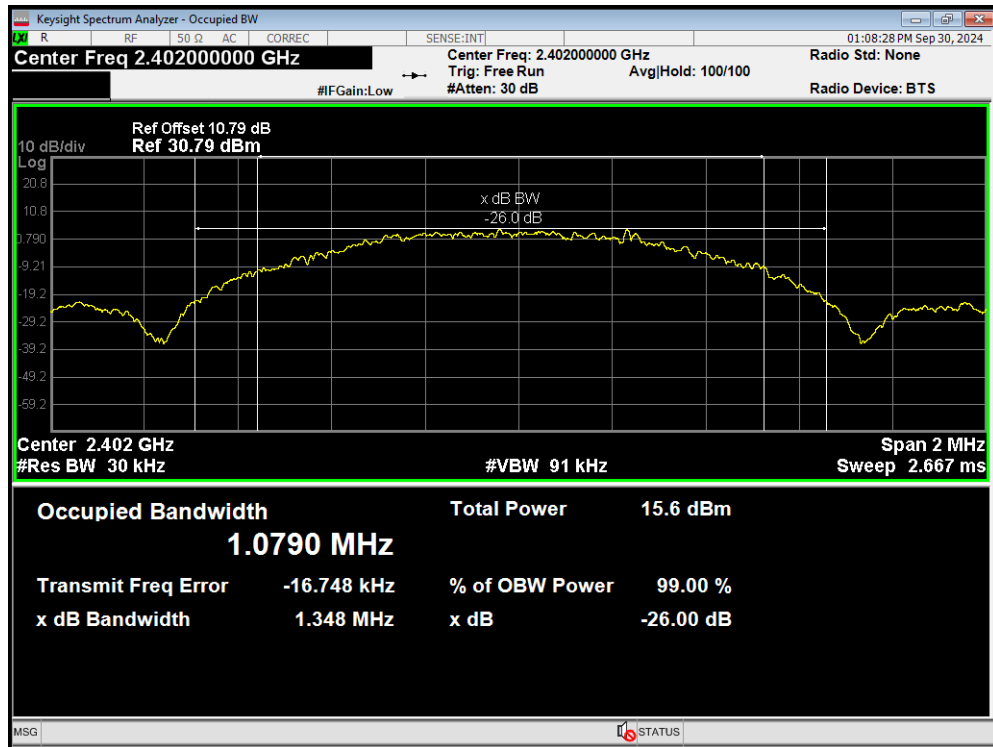
OBW 802.11n(HT20) 2437MHz



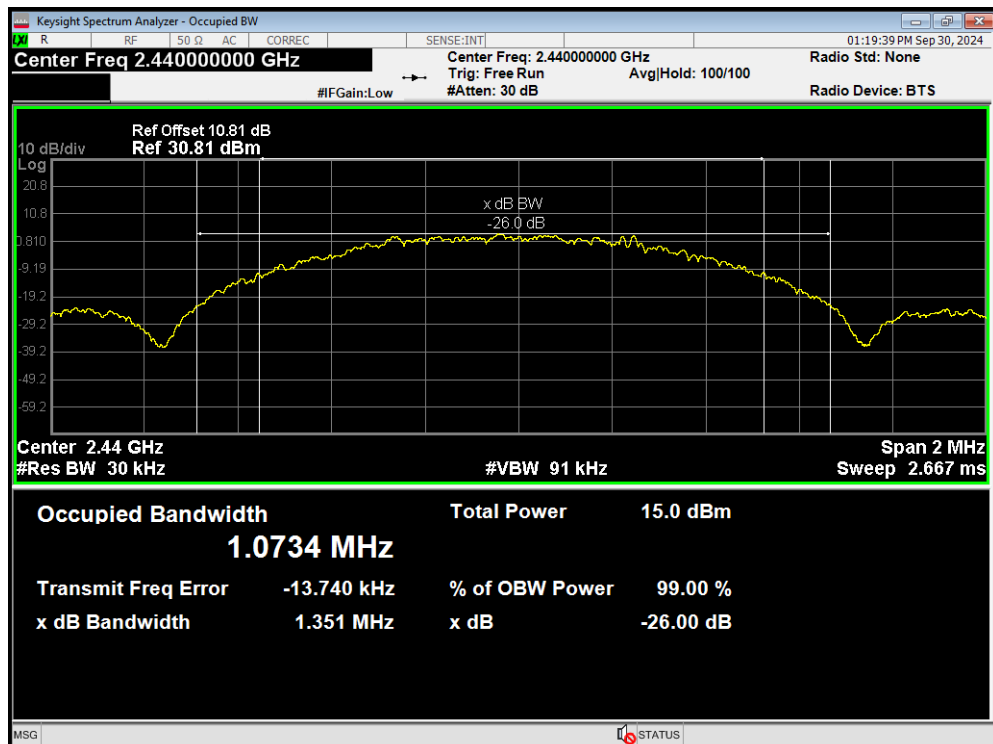
OBW 802.11n(HT20) 2462MHz



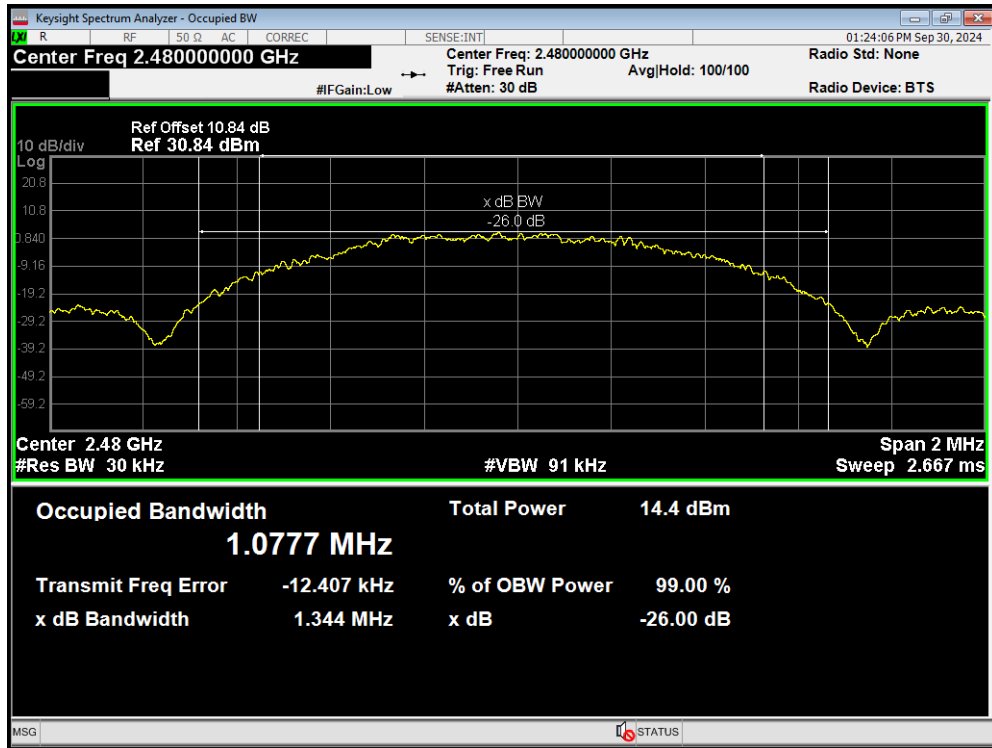
OBW Bluetooth LE (1M) 2402MHz



OBW Bluetooth LE (1M) 2440MHz



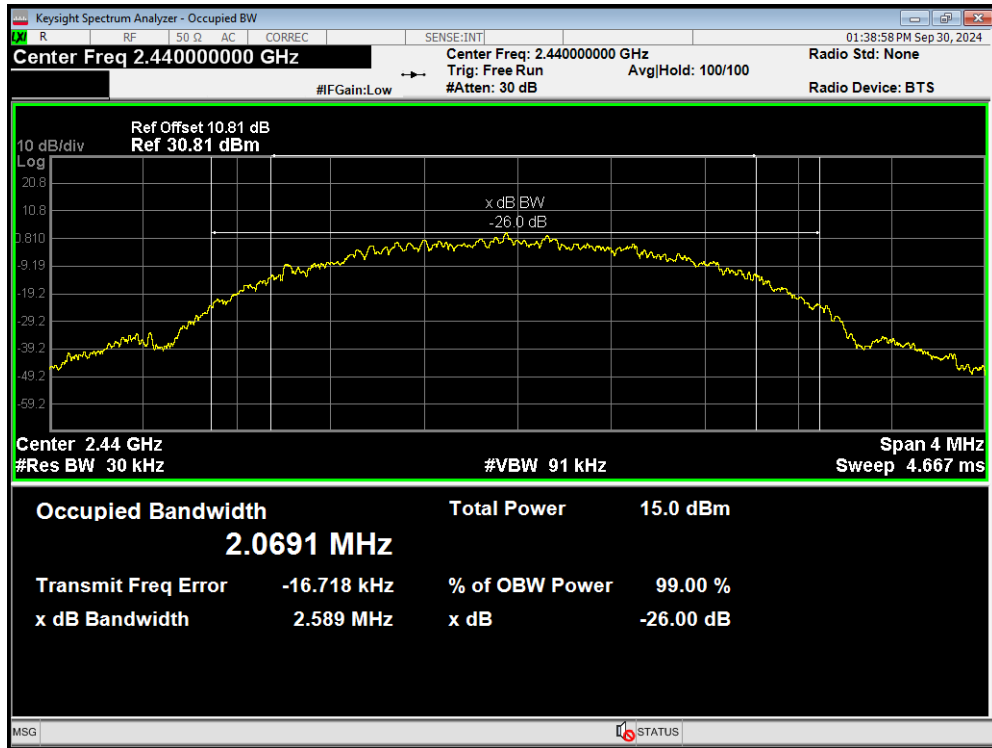
OBW Bluetooth LE (1M) 2480MHz



OBW Bluetooth LE (2M) 2402MHz



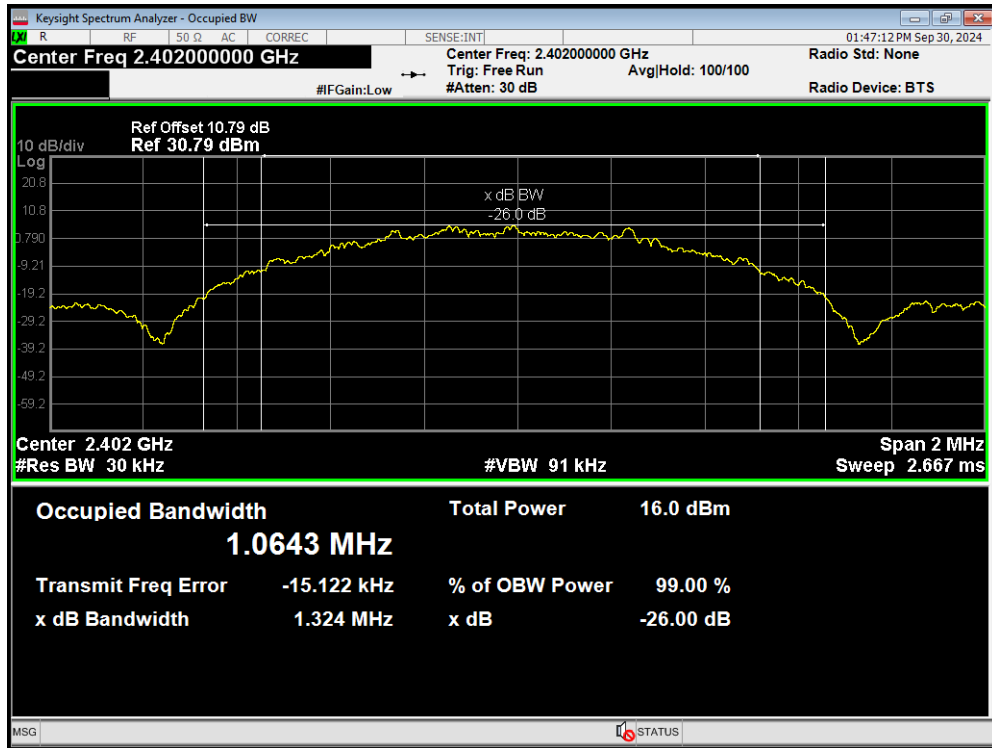
OBW Bluetooth LE (2M) 2440MHz



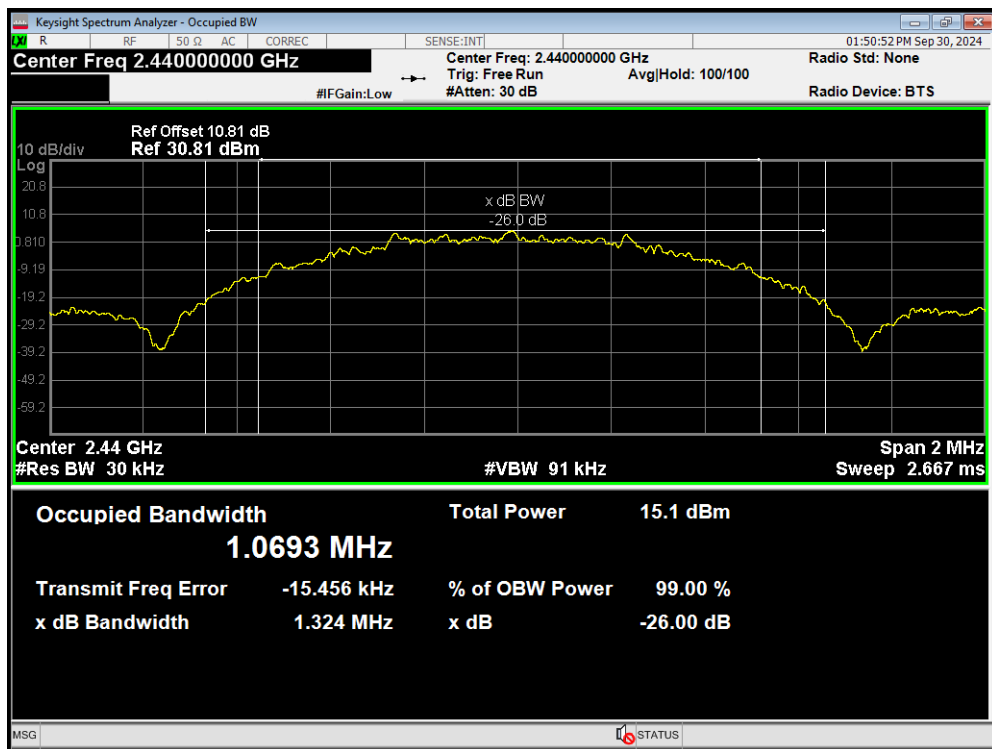
OBW Bluetooth LE (2M) 2480MHz



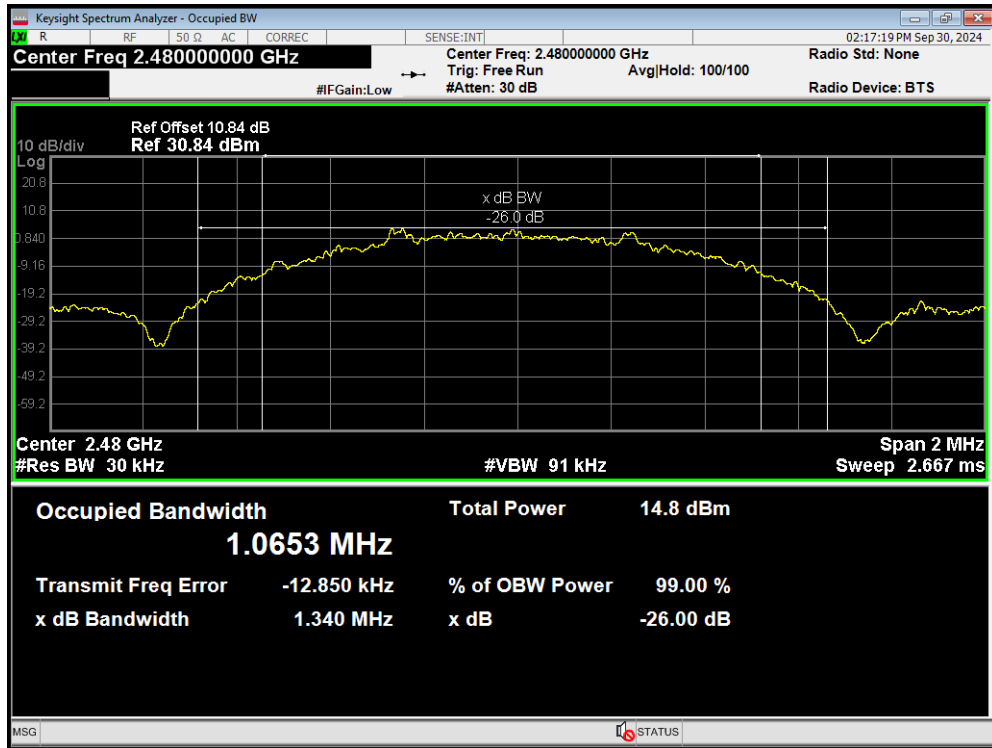
OBW Bluetooth LE (S=2) 2402MHz



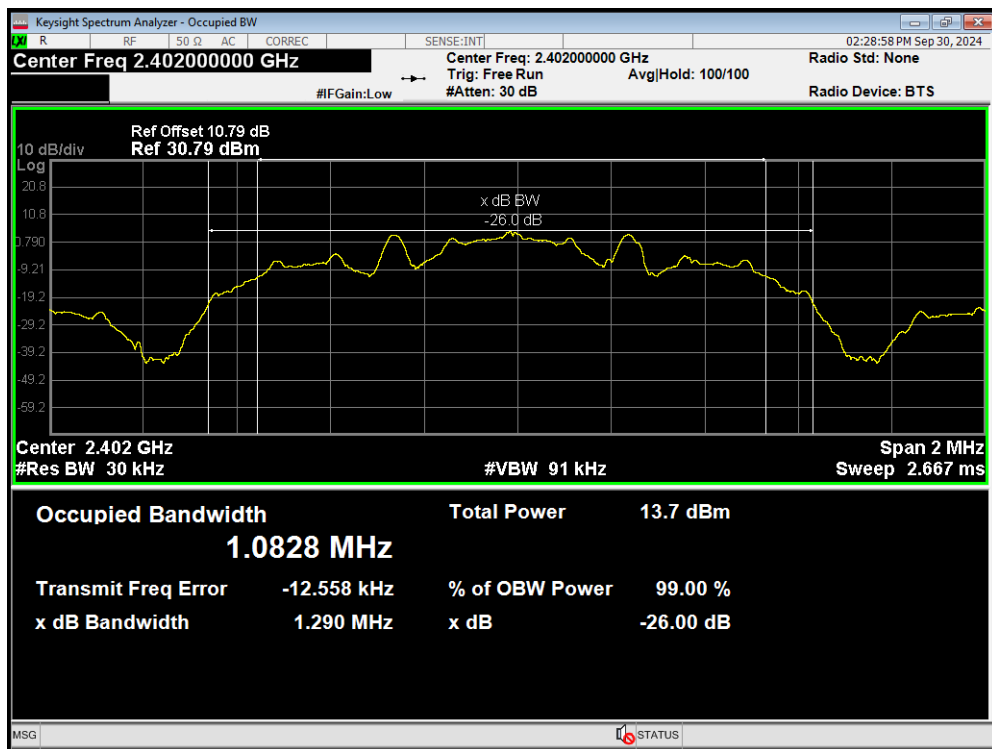
OBW Bluetooth LE (S=2) 2440MHz



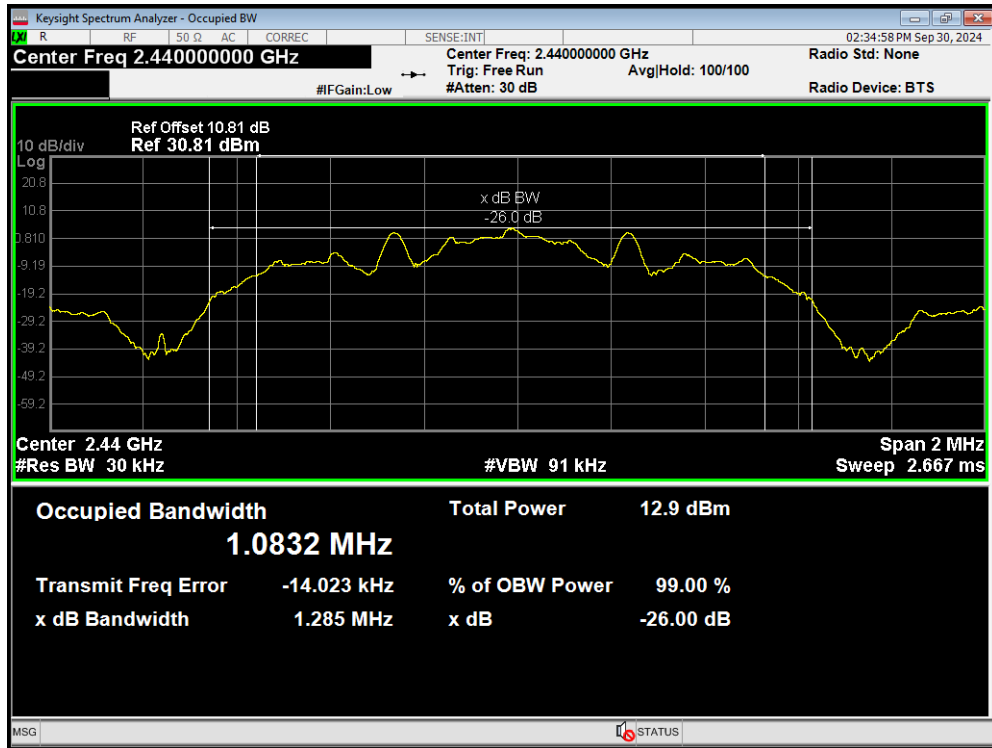
OBW Bluetooth LE (S=2) 2480MHz



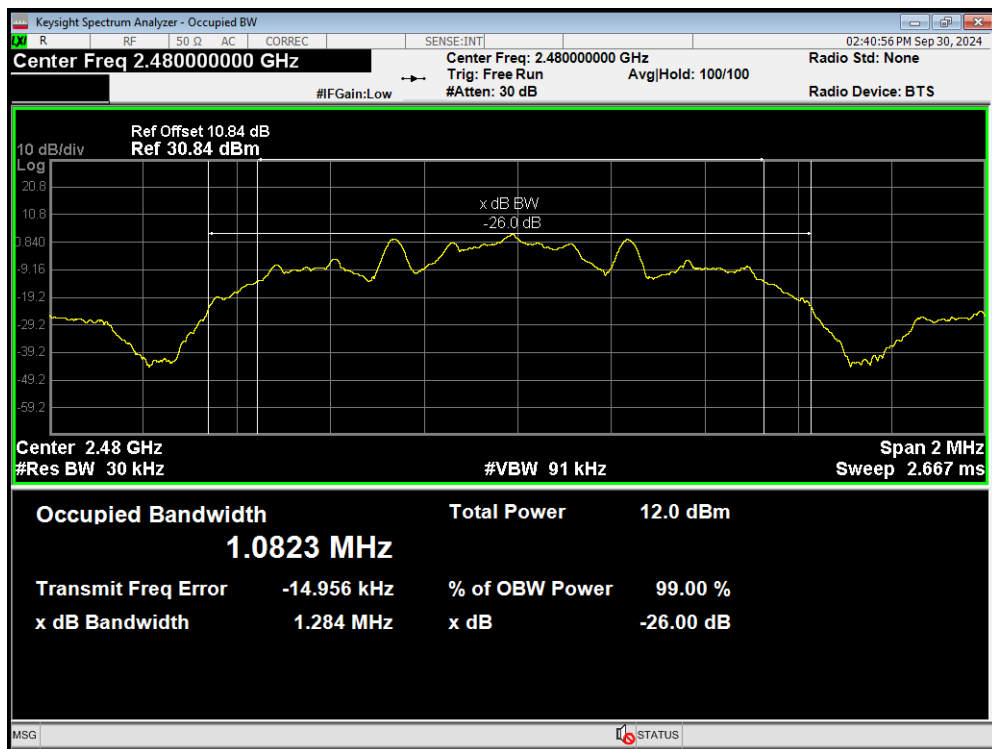
OBW Bluetooth LE (S=8) 2402MHz



OBW Bluetooth LE (S=8) 2440MHz

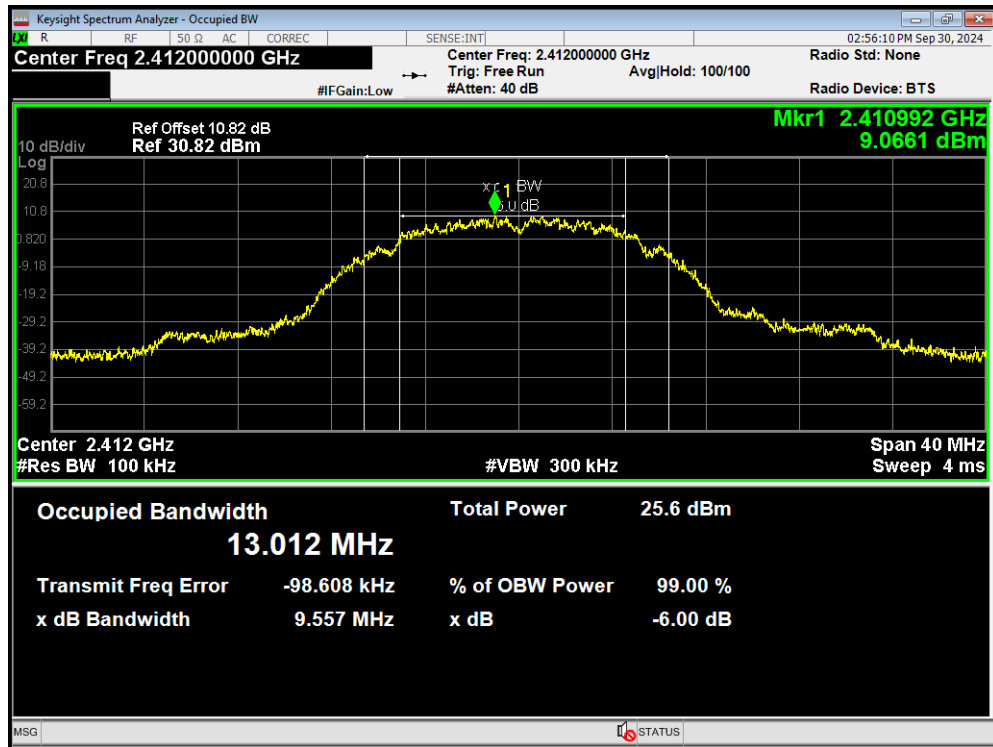


OBW Bluetooth LE (S=8) 2480MHz

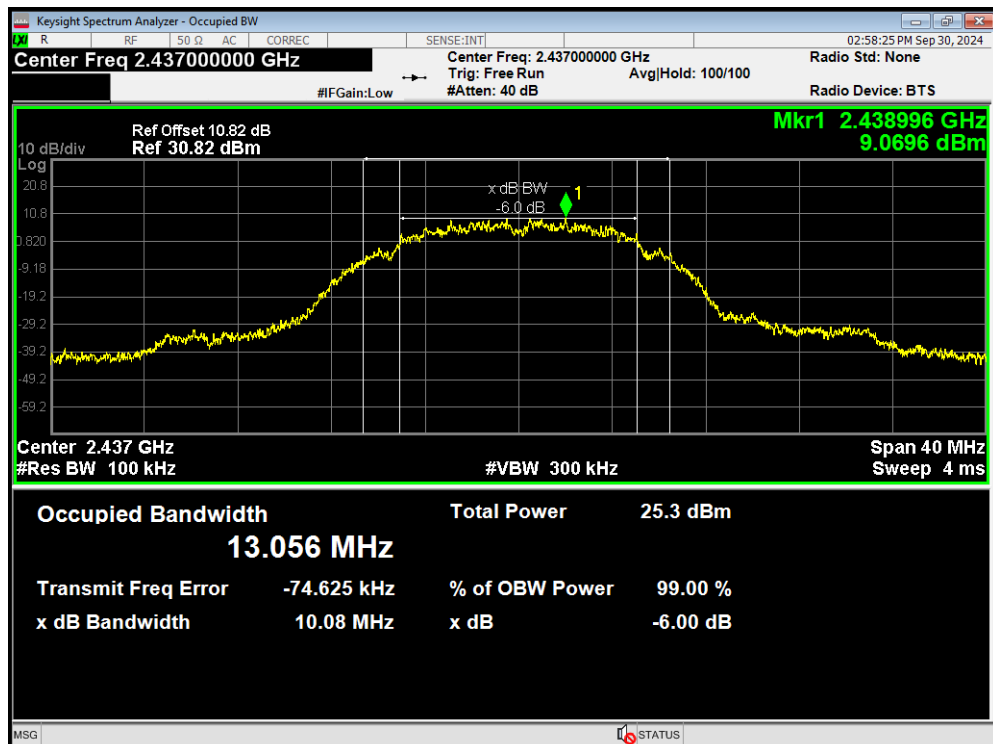


6 dB bandwidth

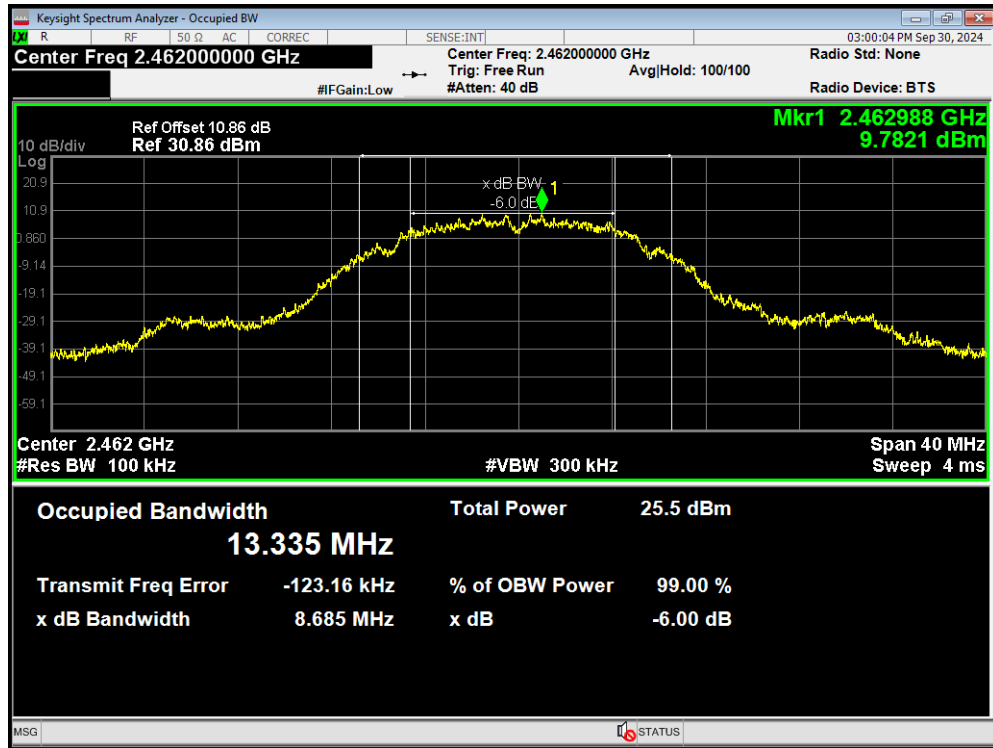
-6dB Bandwidth 802.11b 2412MHz



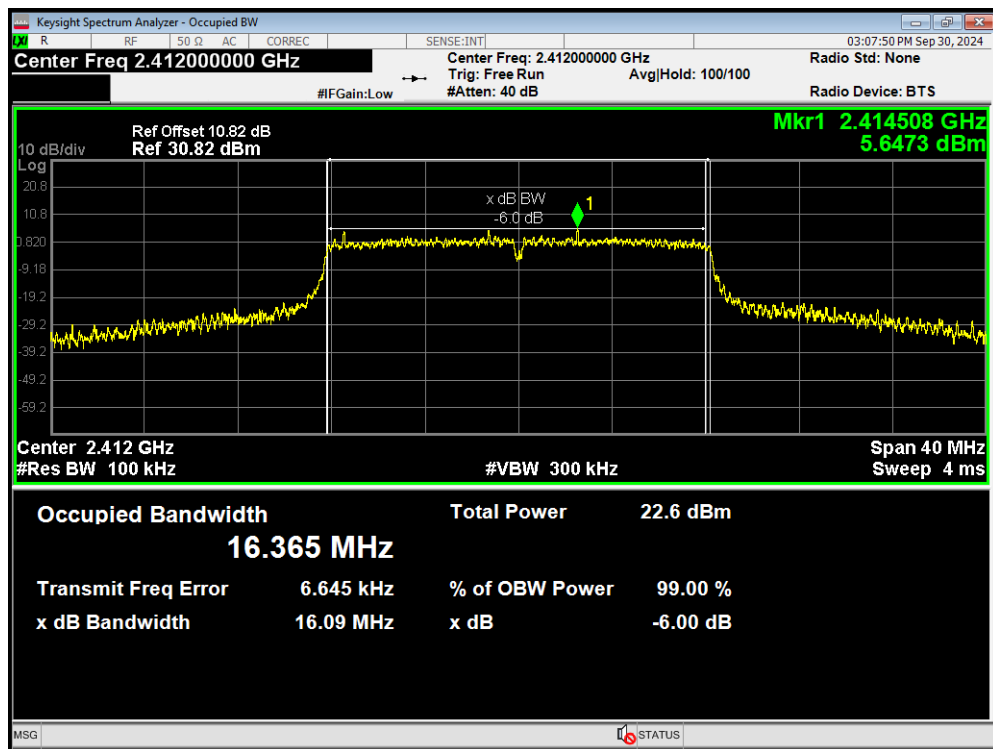
-6dB Bandwidth 802.11b 2437MHz



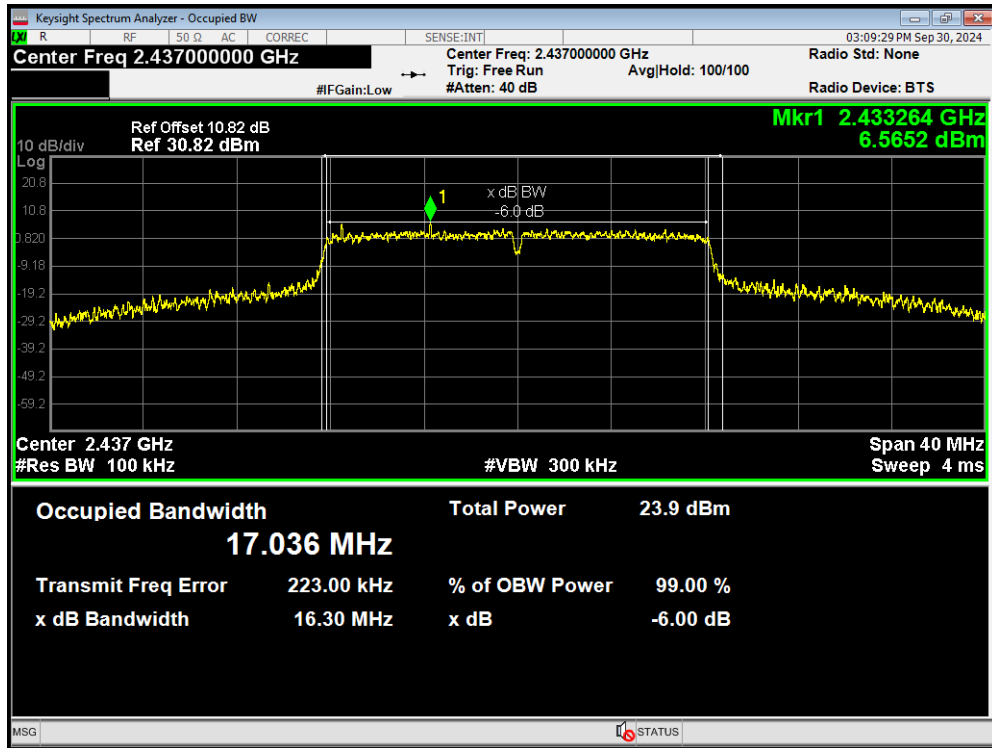
-6dB Bandwidth 802.11b 2462MHz



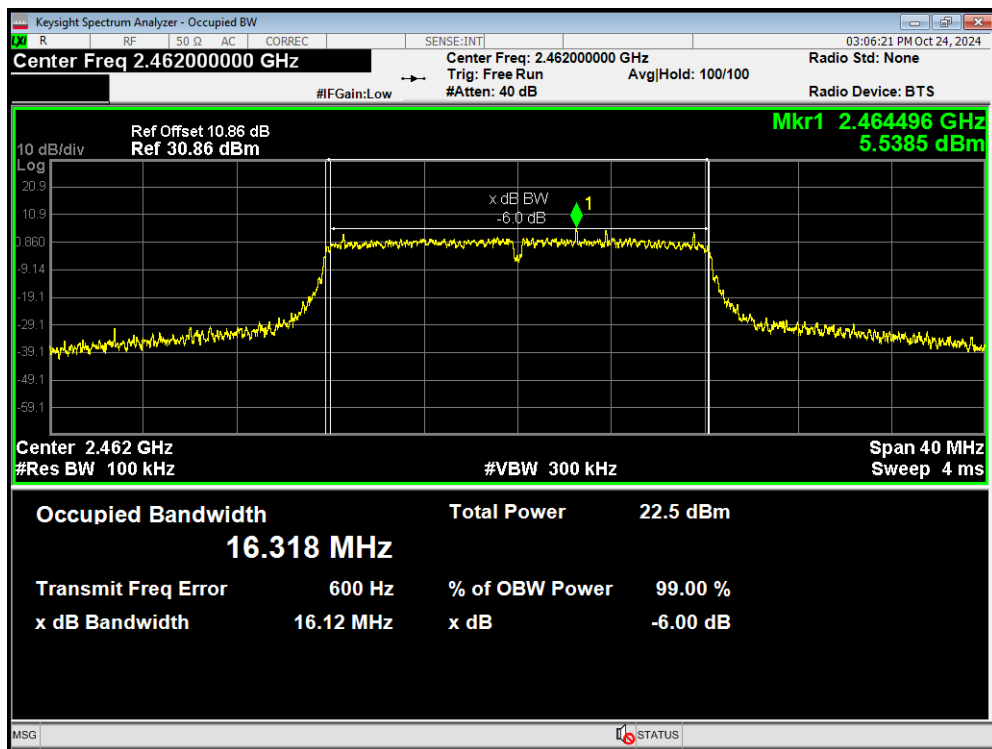
-6dB Bandwidth 802.11g 2412MHz



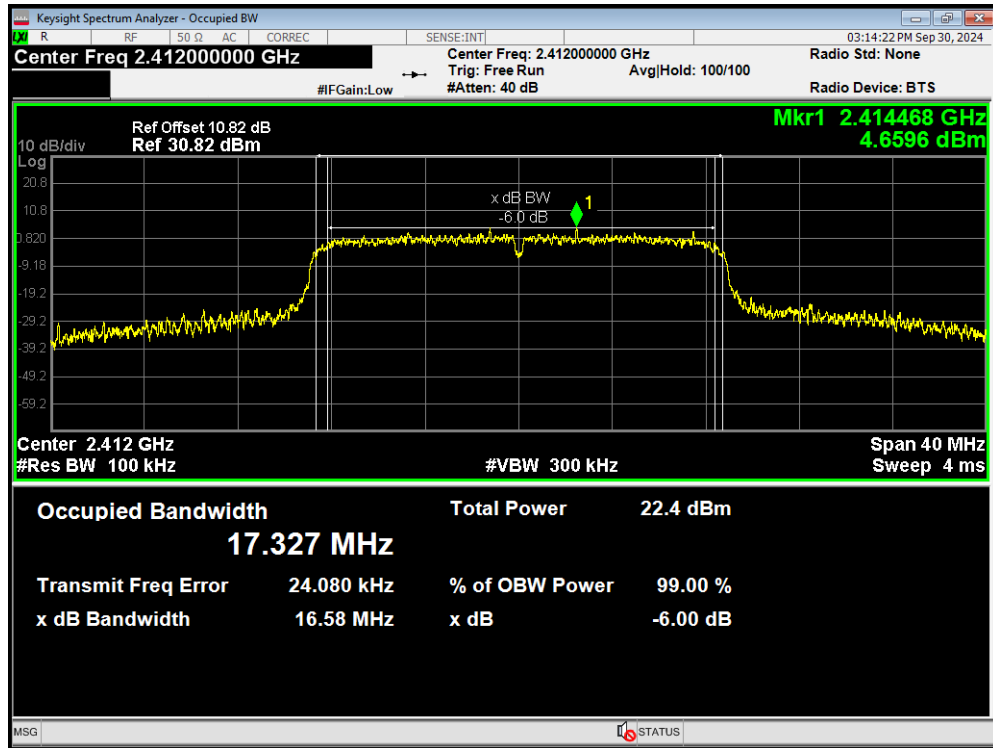
-6dB Bandwidth 802.11g 2437MHz



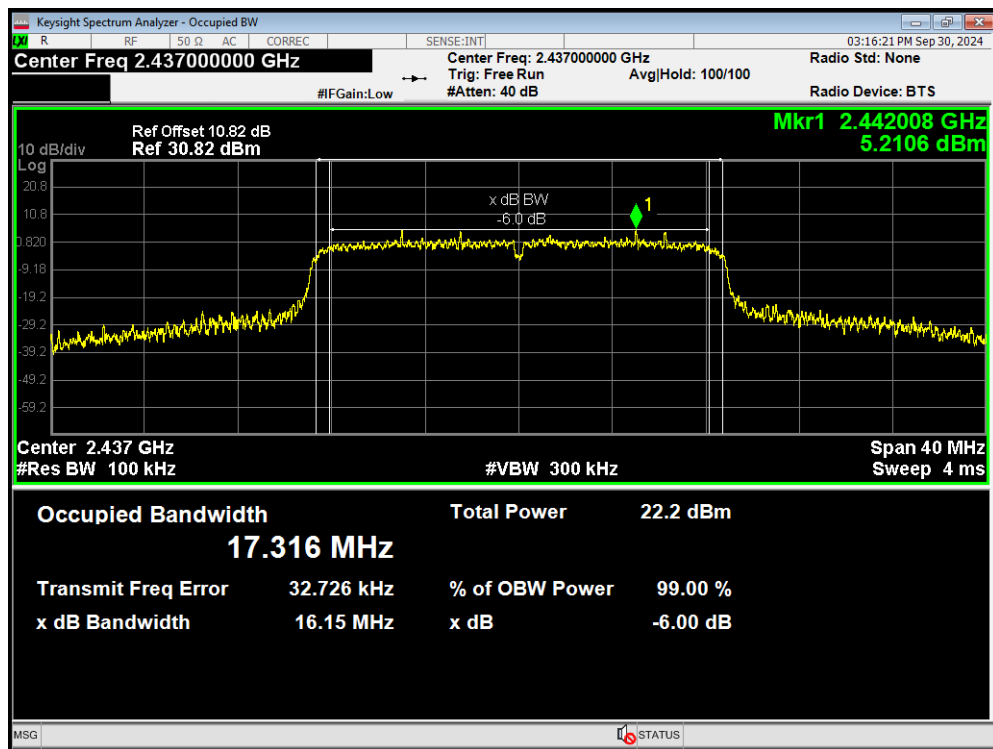
-6dB Bandwidth 802.11g 2462MHz



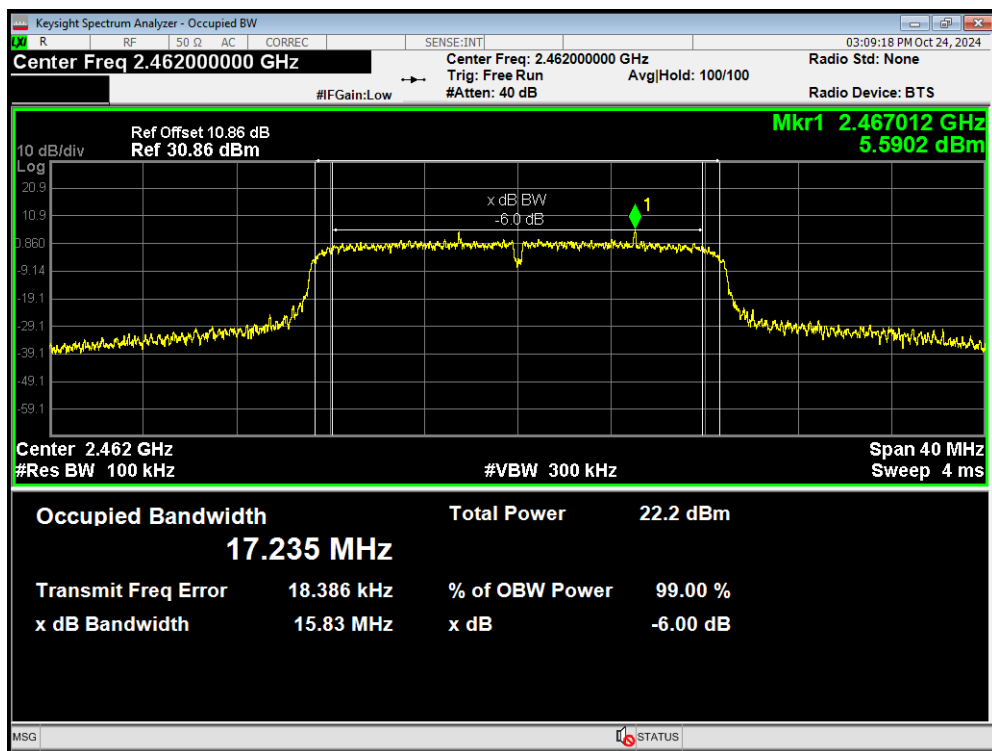
-6dB Bandwidth 802.11n(HT20) 2412MHz



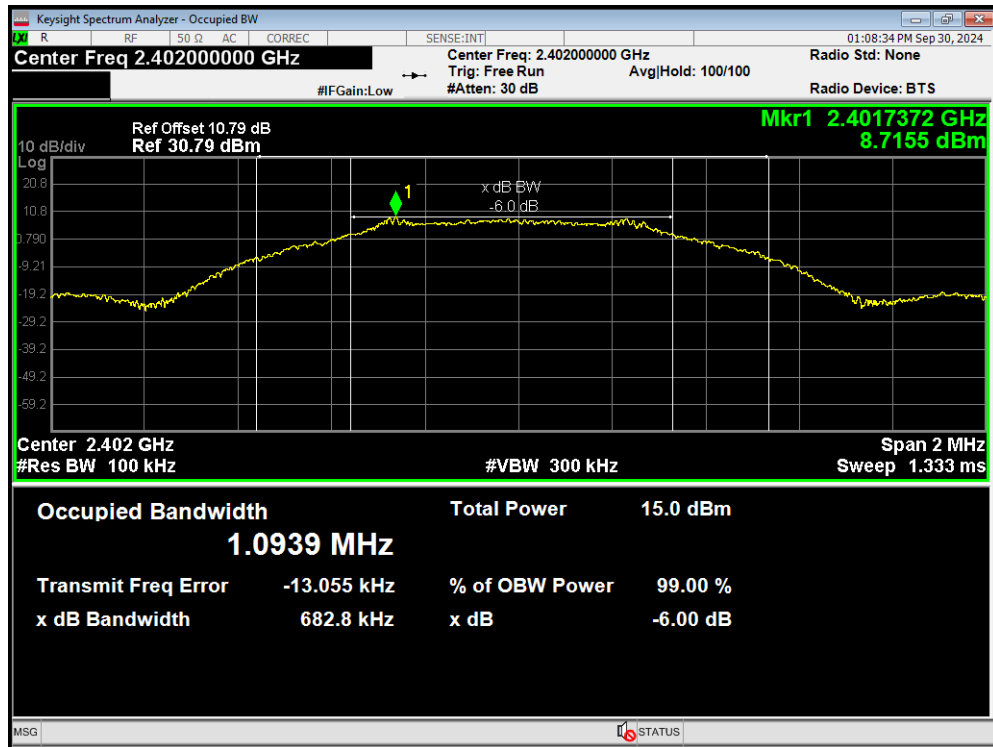
-6dB Bandwidth 802.11n(HT20) 2437MHz



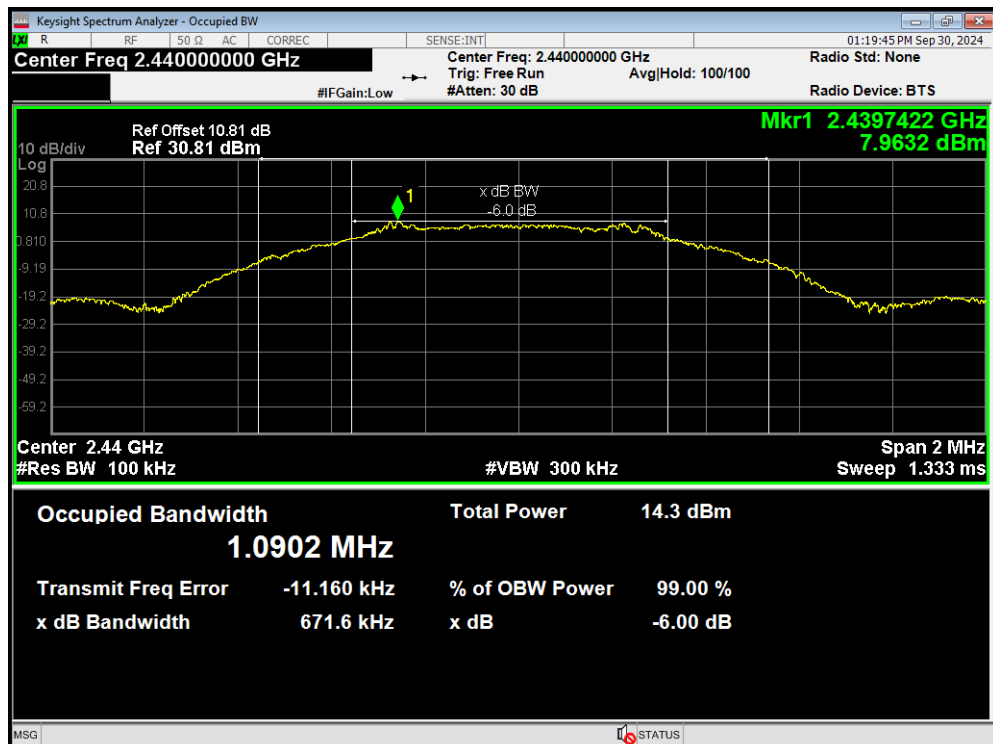
-6dB Bandwidth 802.11n(HT20) 2462MHz



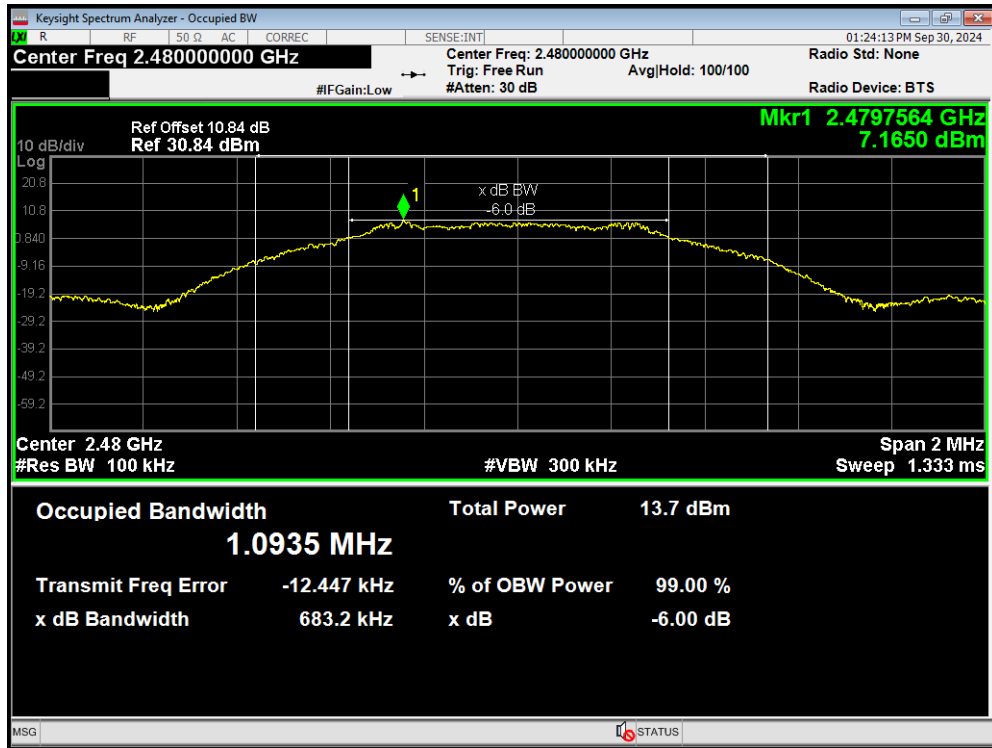
-6dB Bandwidth Bluetooth LE (1M) 2402MHz



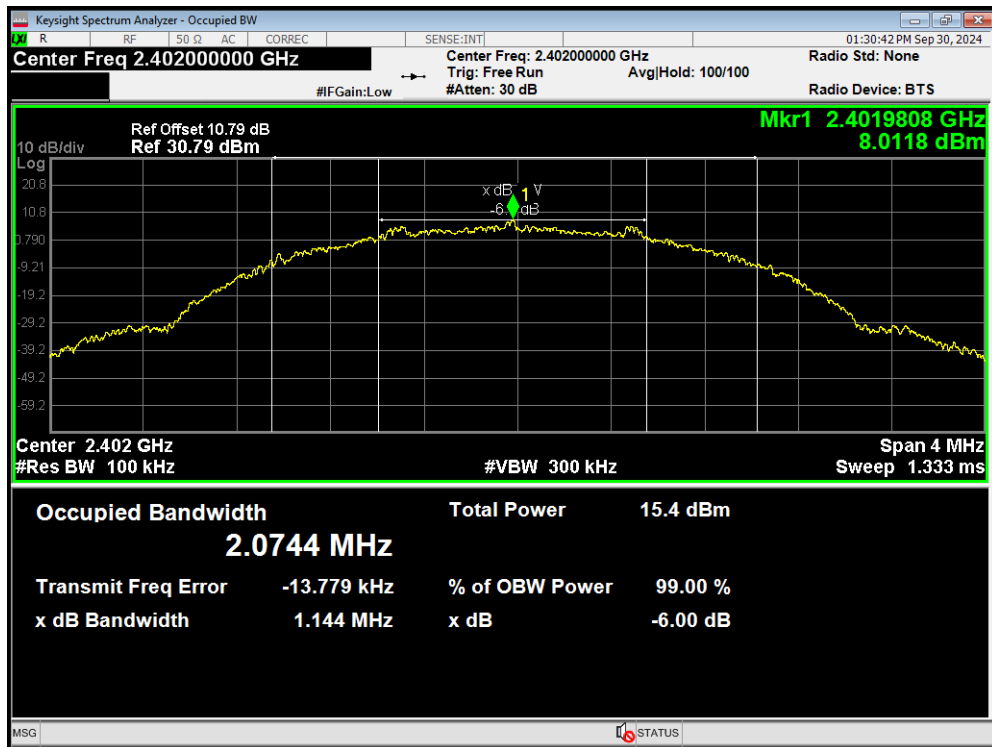
-6dB Bandwidth Bluetooth LE (1M) 2440MHz



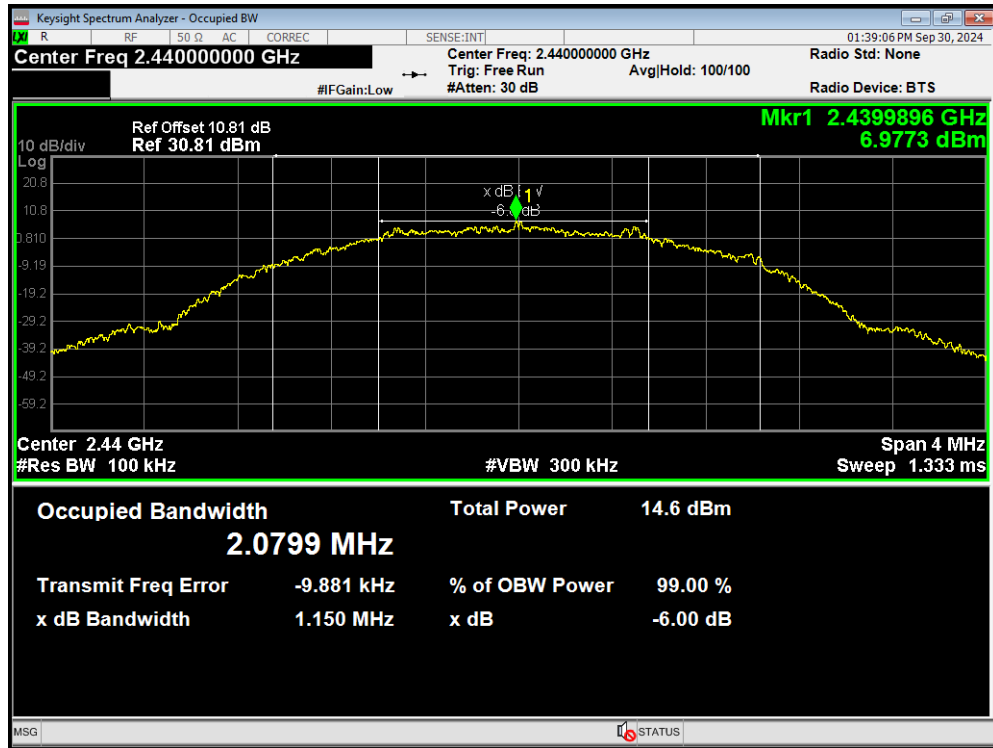
-6dB Bandwidth Bluetooth LE (1M) 2480MHz



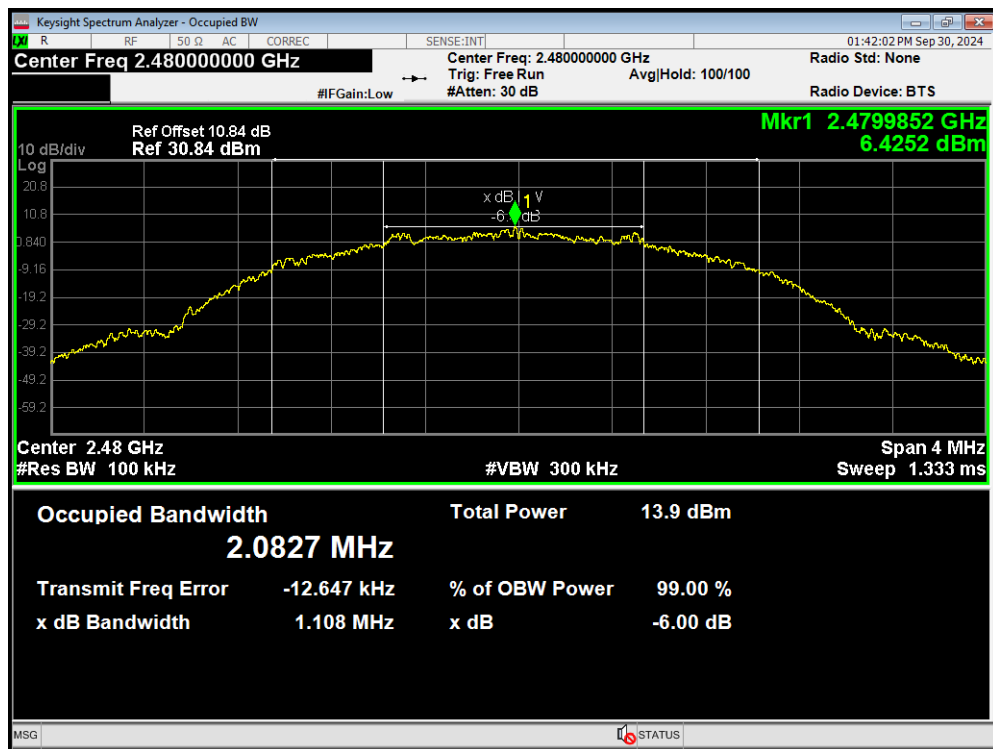
-6dB Bandwidth Bluetooth LE (2M) 2402MHz



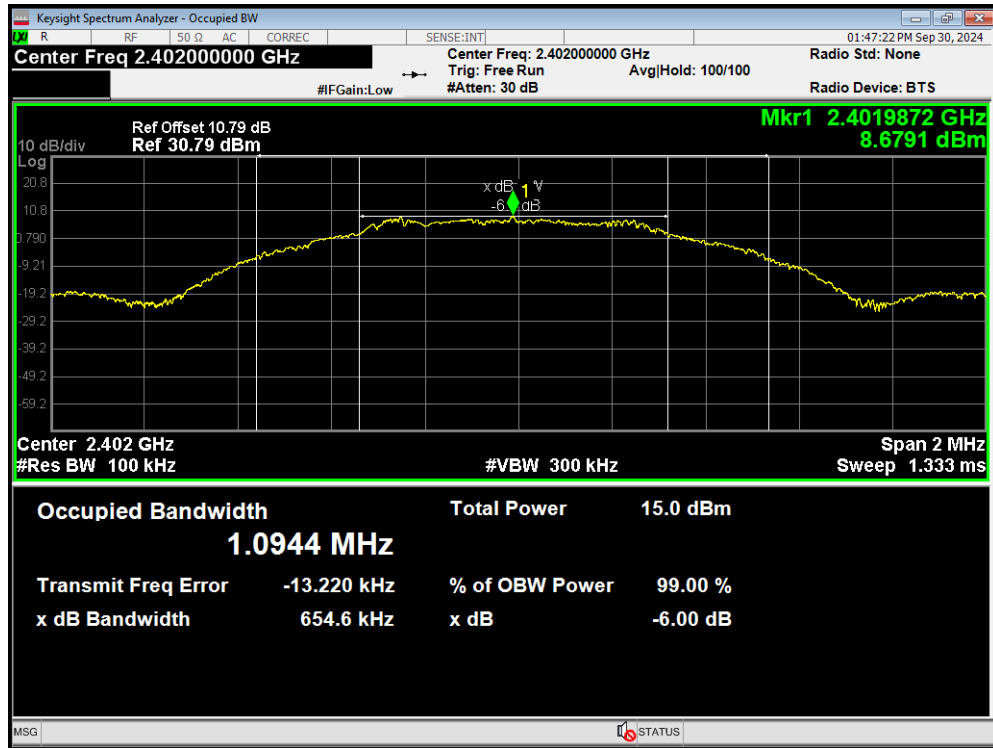
-6dB Bandwidth Bluetooth LE (2M) 2440MHz



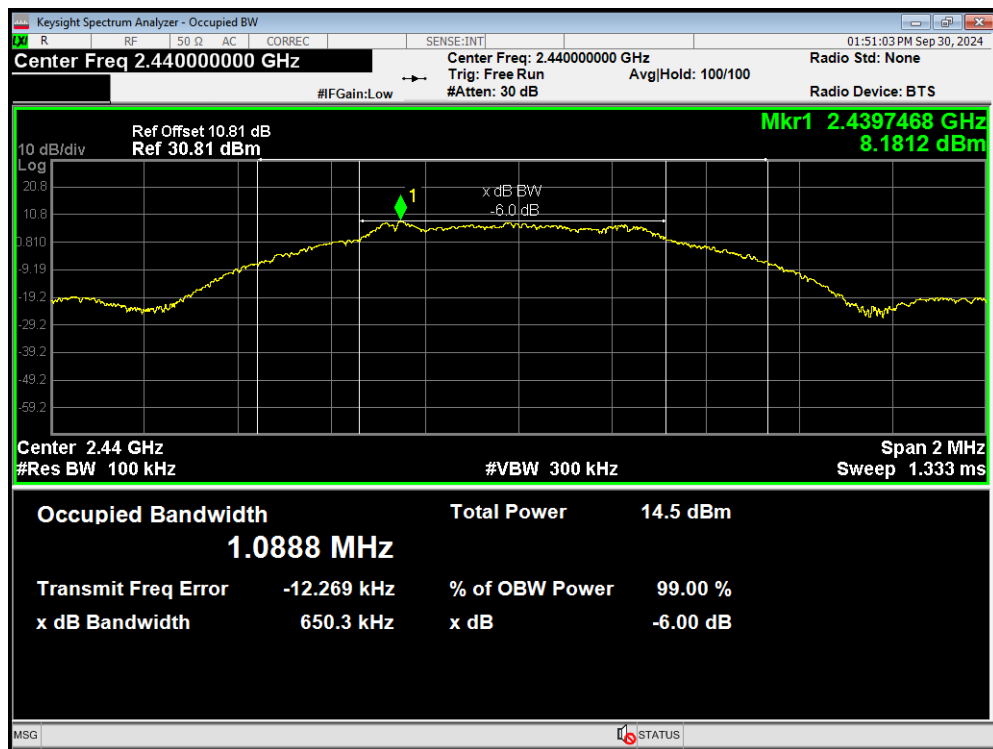
-6dB Bandwidth Bluetooth LE (2M) 2480MHz



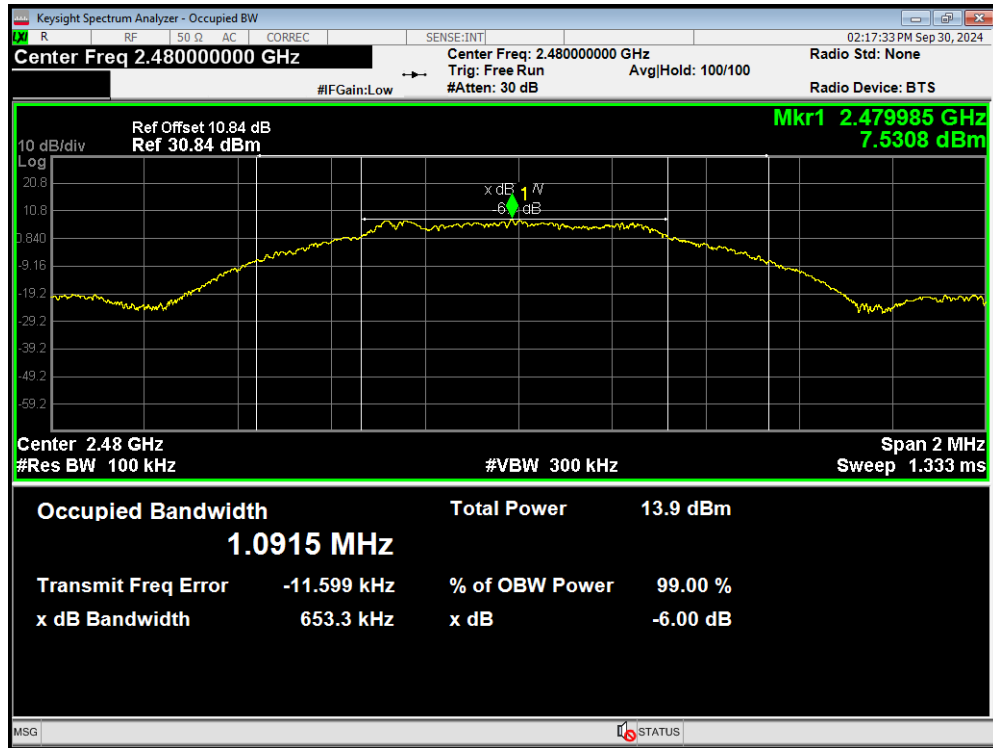
-6dB Bandwidth Bluetooth LE (S=2) 2402MHz



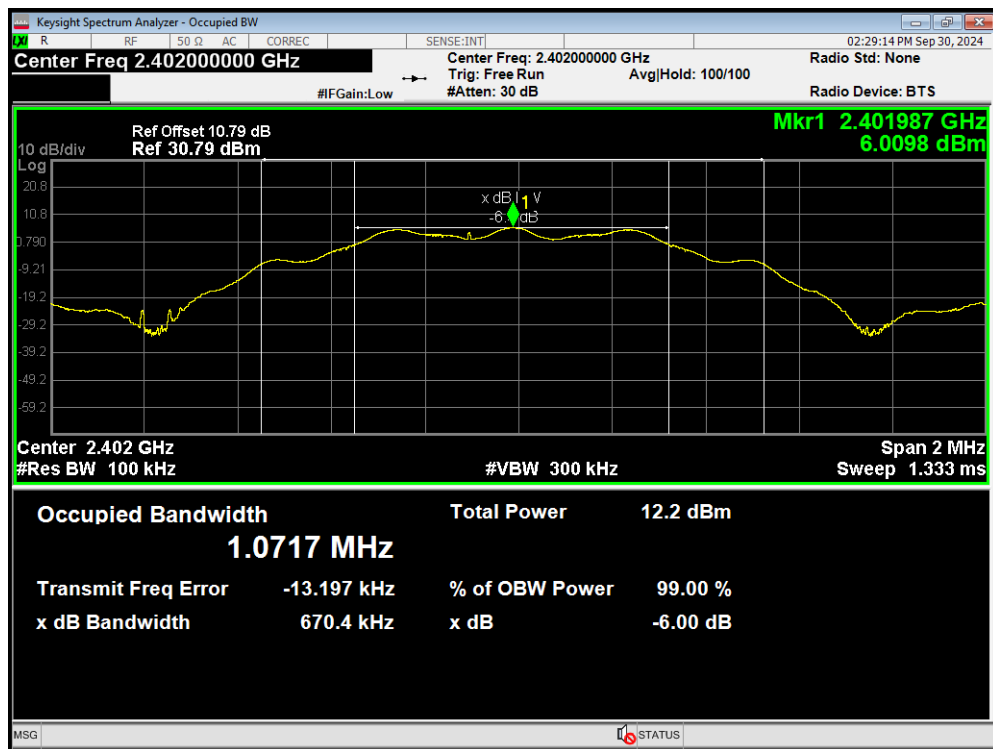
-6dB Bandwidth Bluetooth LE (S=2) 2440MHz



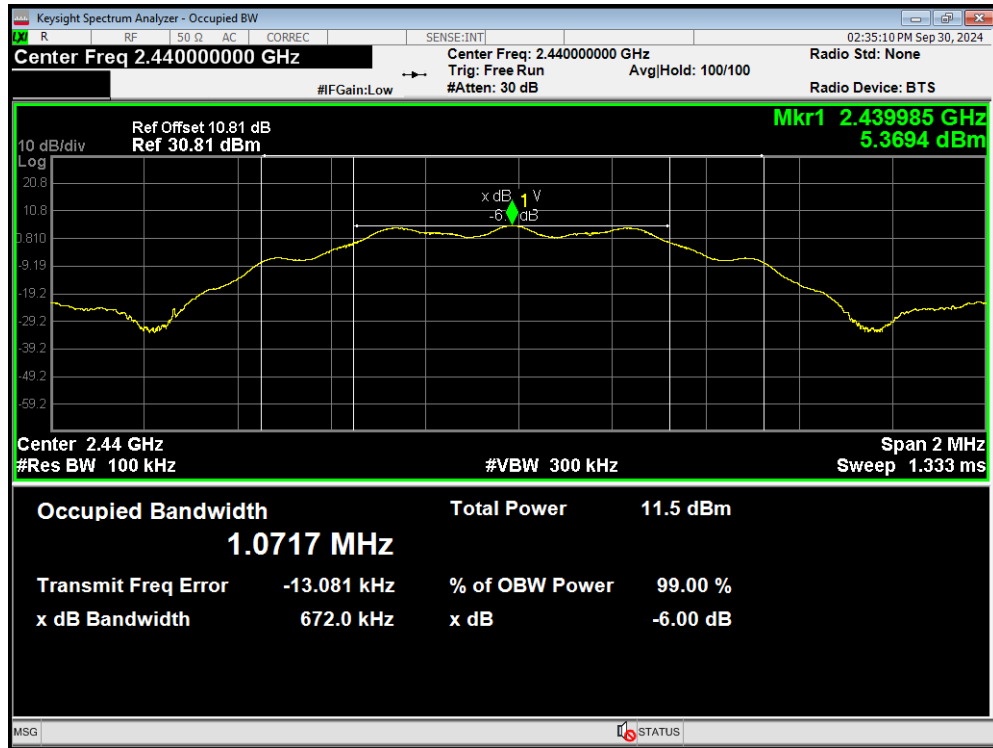
-6dB Bandwidth Bluetooth LE (S=2) 2480MHz



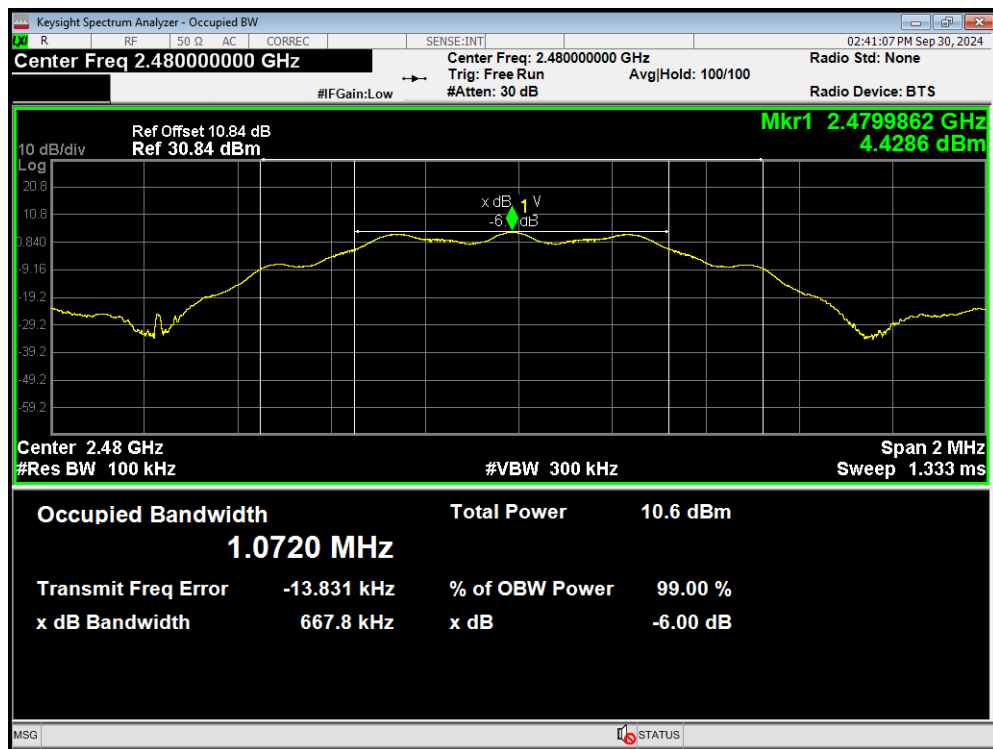
-6dB Bandwidth Bluetooth LE (S=8) 2402MHz



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



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



5.3. Band Edge

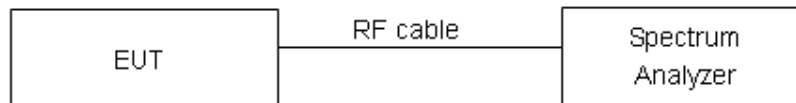
Ambient Condition

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.”

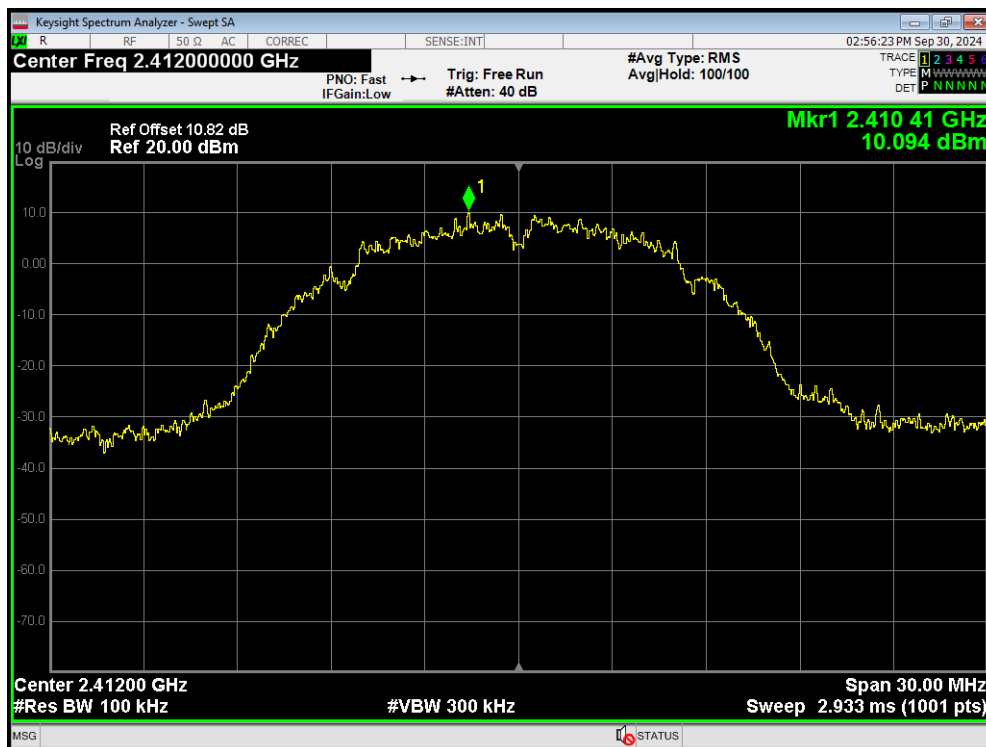
Measurement Uncertainty

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

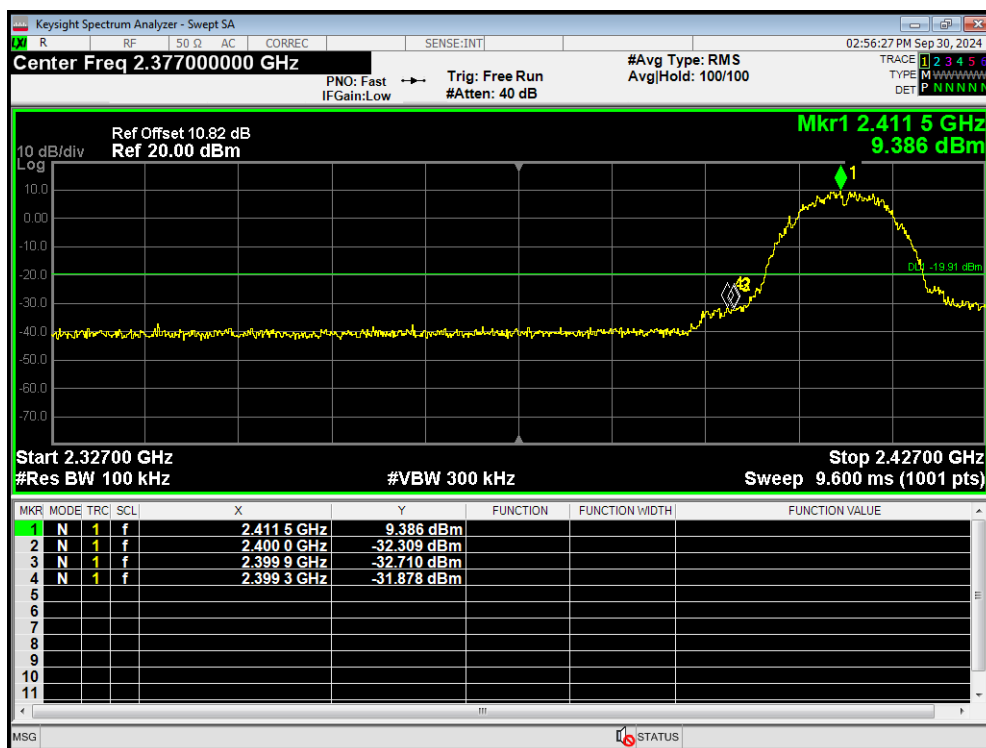
Frequency	Uncertainty
2GHz-3GHz	1.407 dB

Test Results: PASS

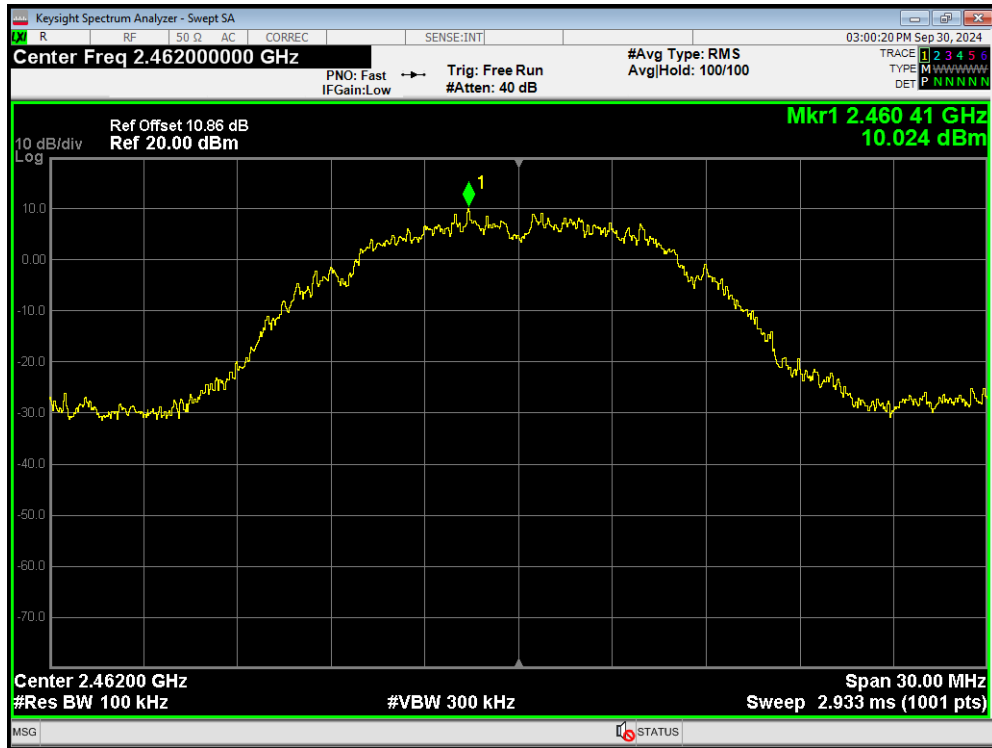
Band Edge 802.11b 2412MHz Ref



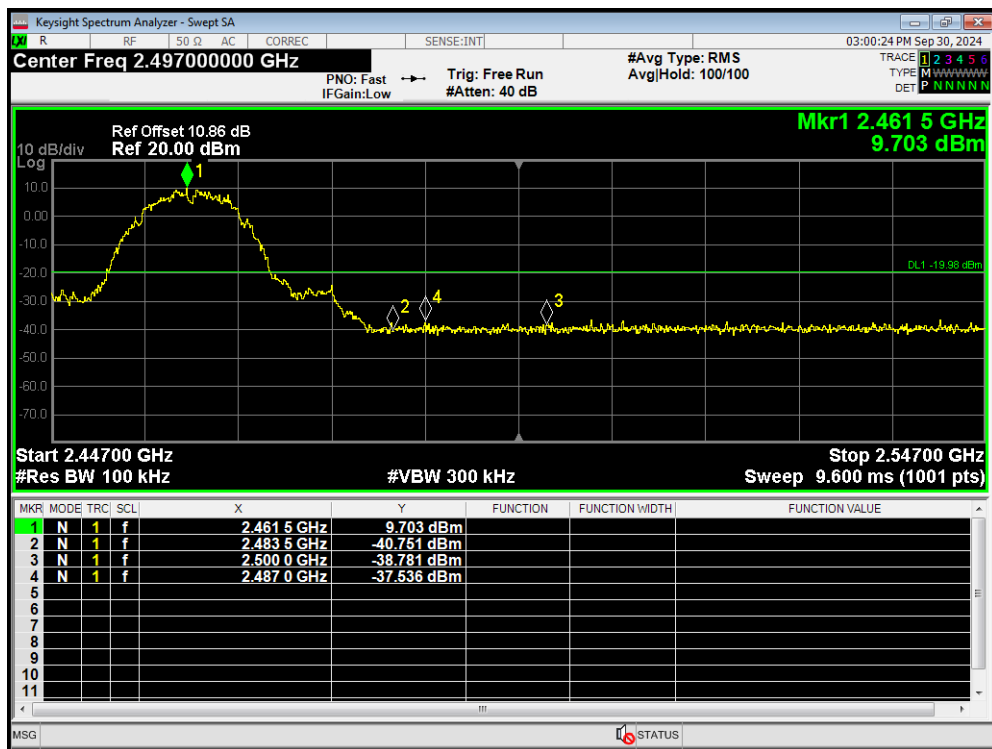
Band Edge 802.11b 2412MHz Emission



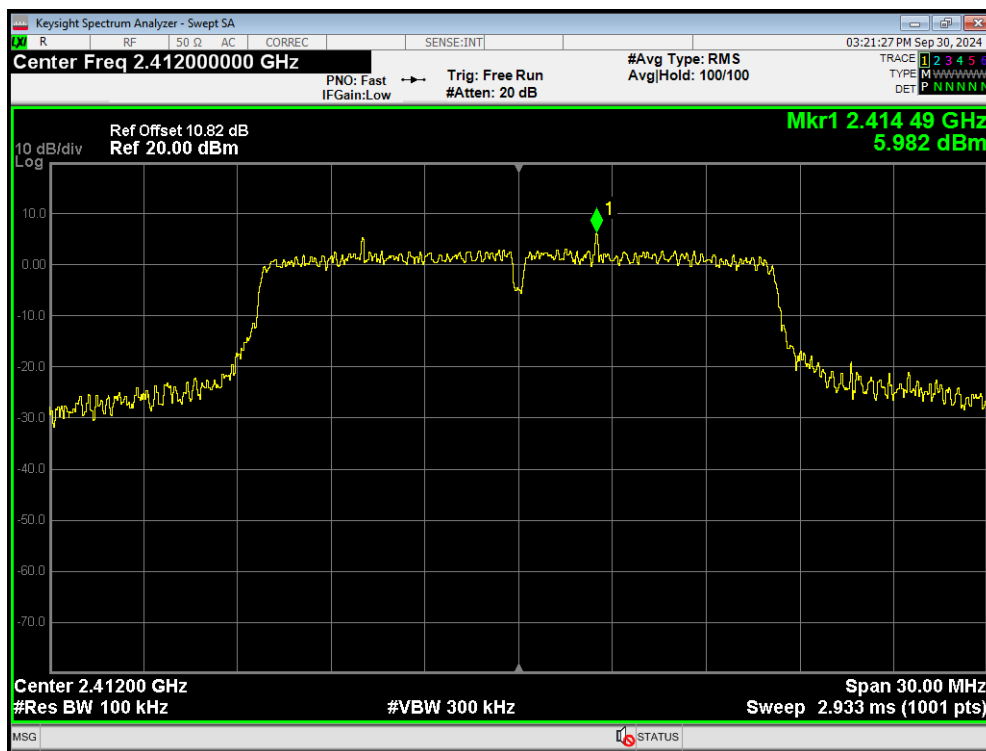
Band Edge 802.11b 2462MHz Ref



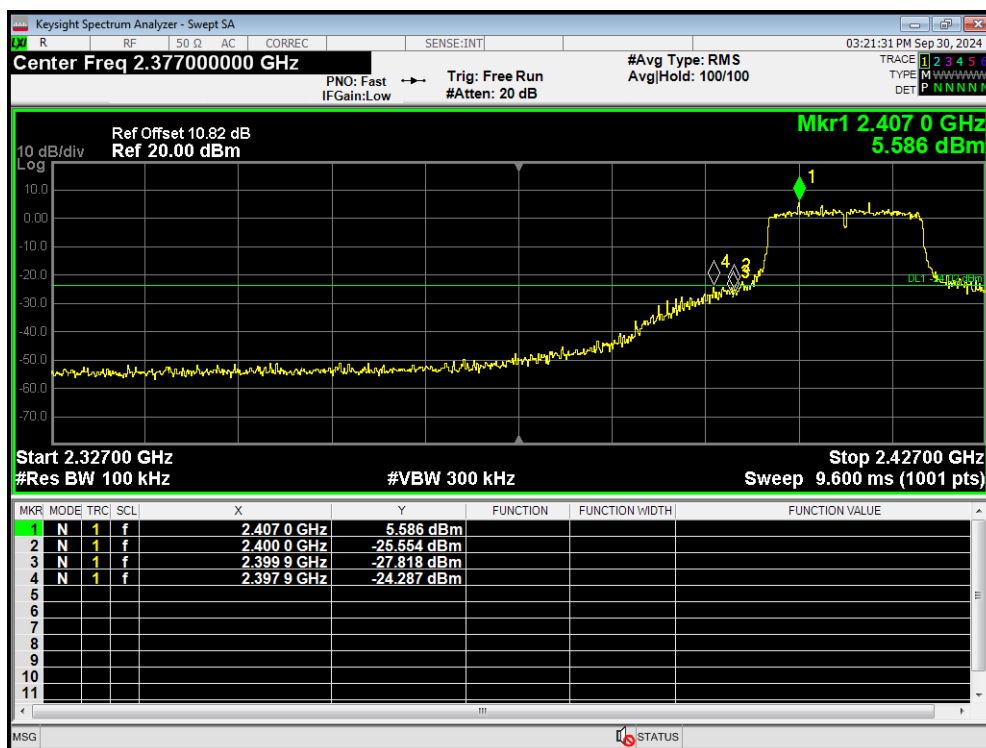
Band Edge 802.11b 2462MHz Emission



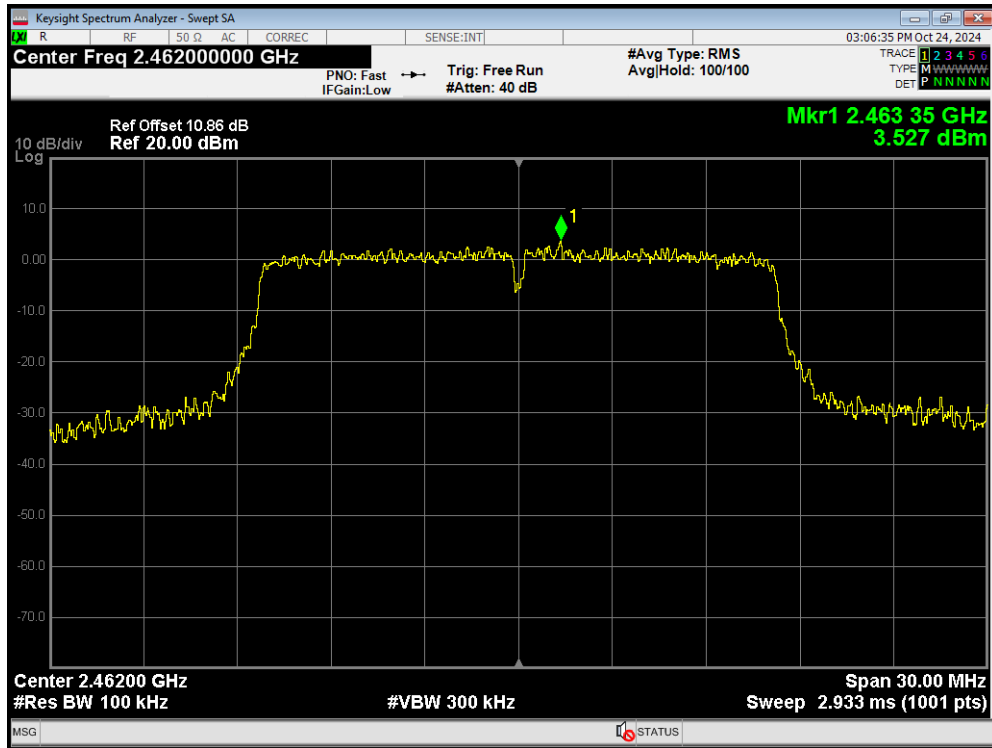
Band Edge 802.11g 2412MHz Ref



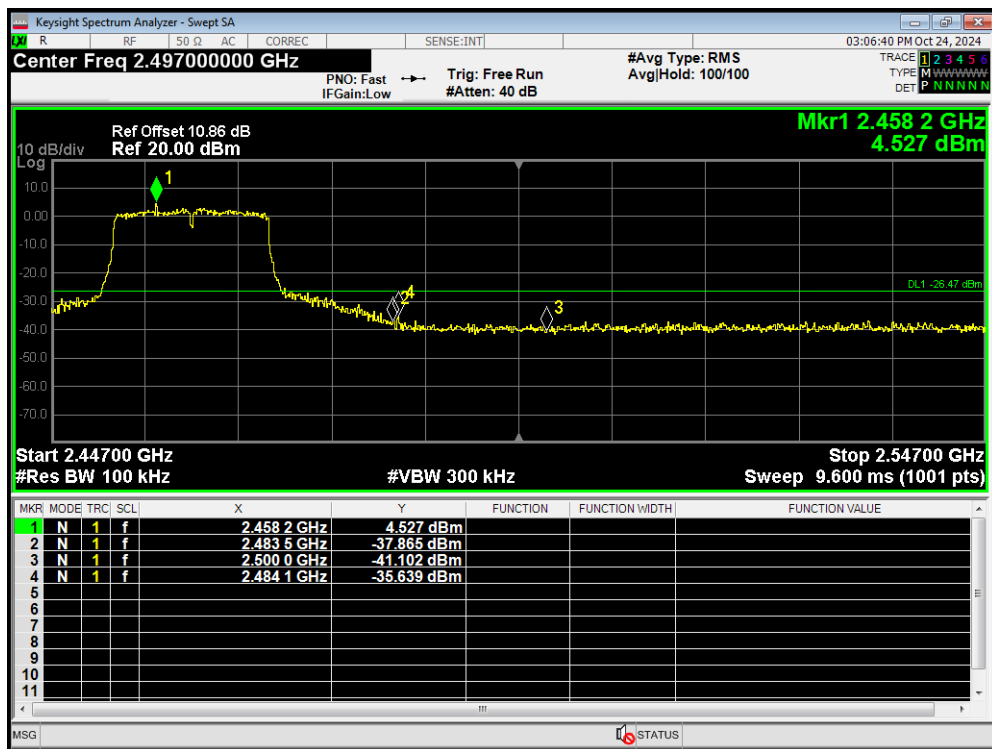
Band Edge 802.11g 2412MHz Emission



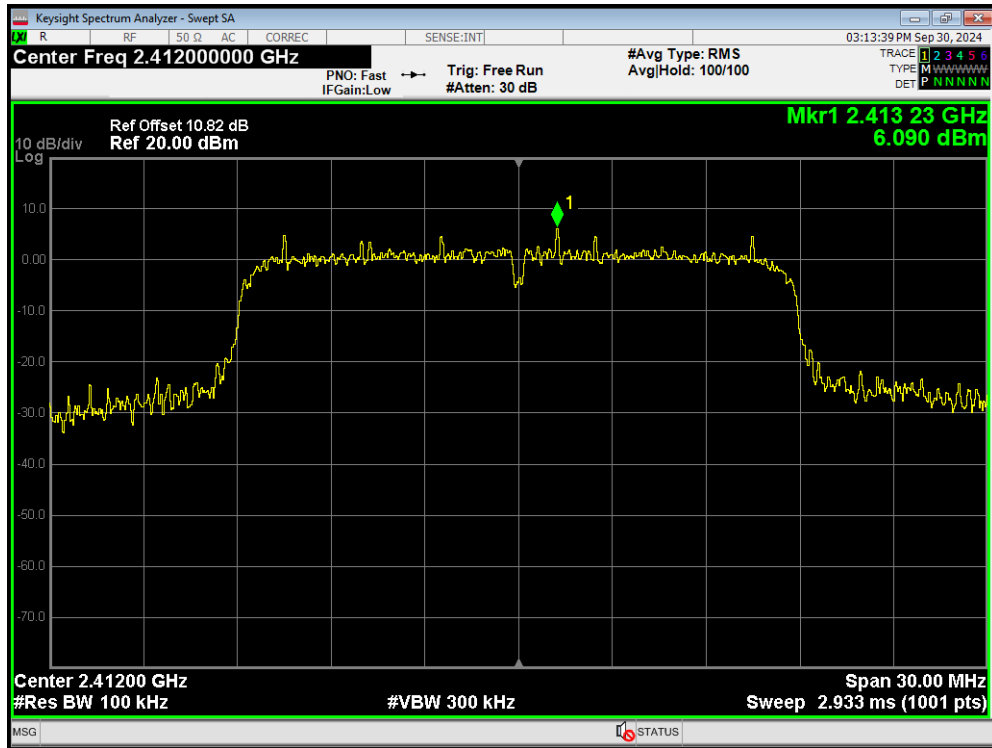
Band Edge 802.11g 2462MHz Ref



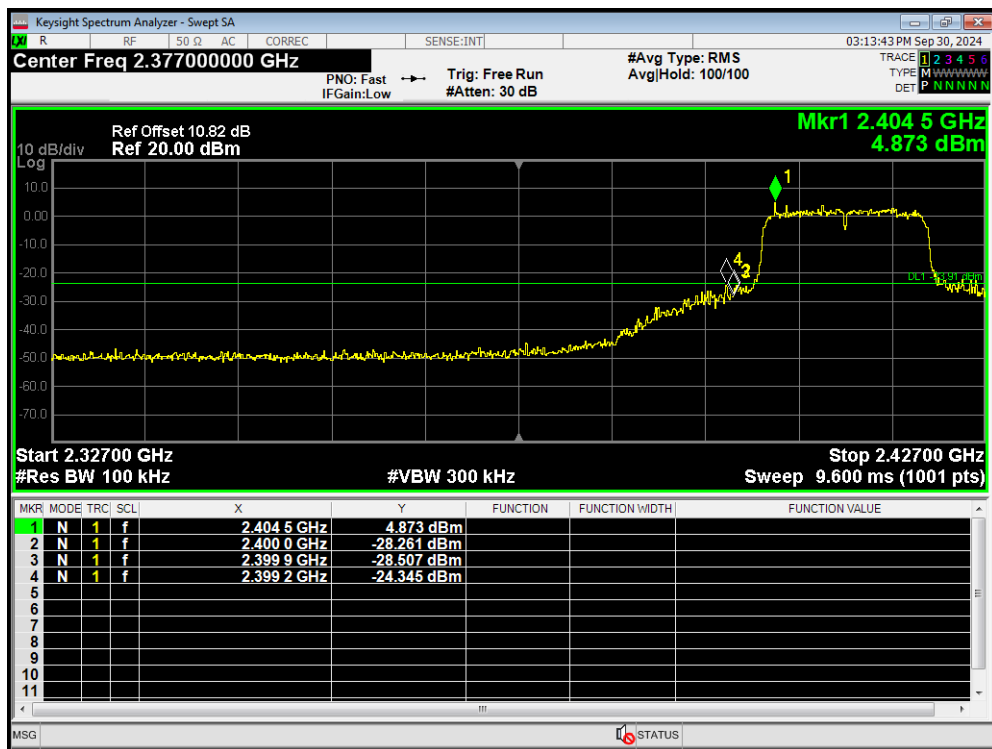
Band Edge 802.11g 2462MHz Emission



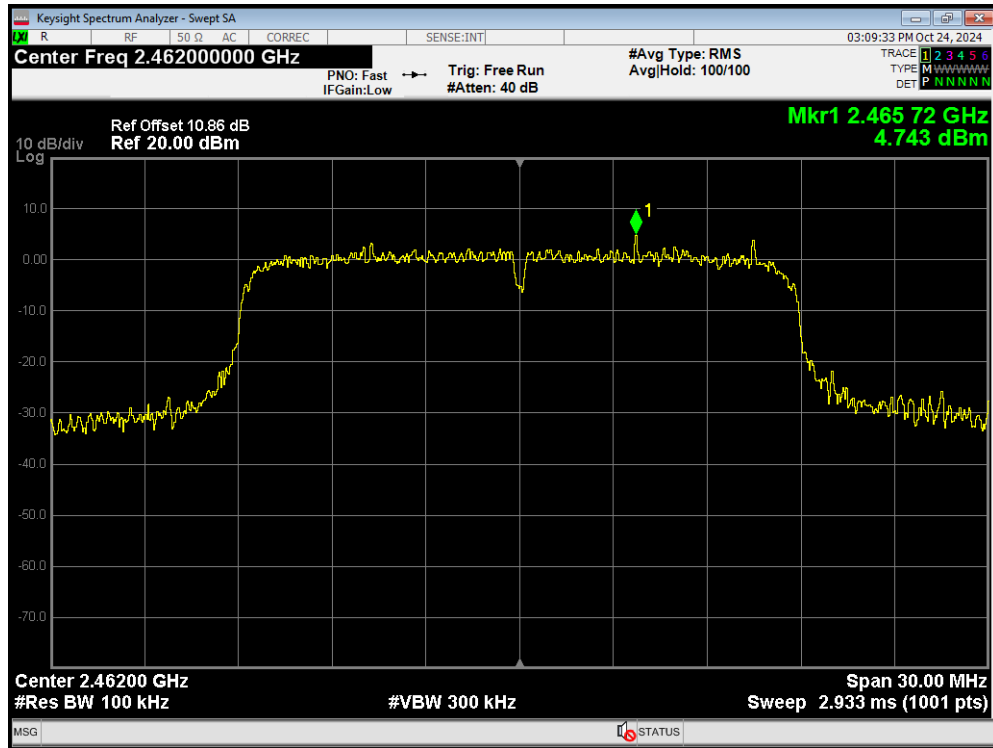
Band Edge 802.11n(HT20) 2412MHz Ref



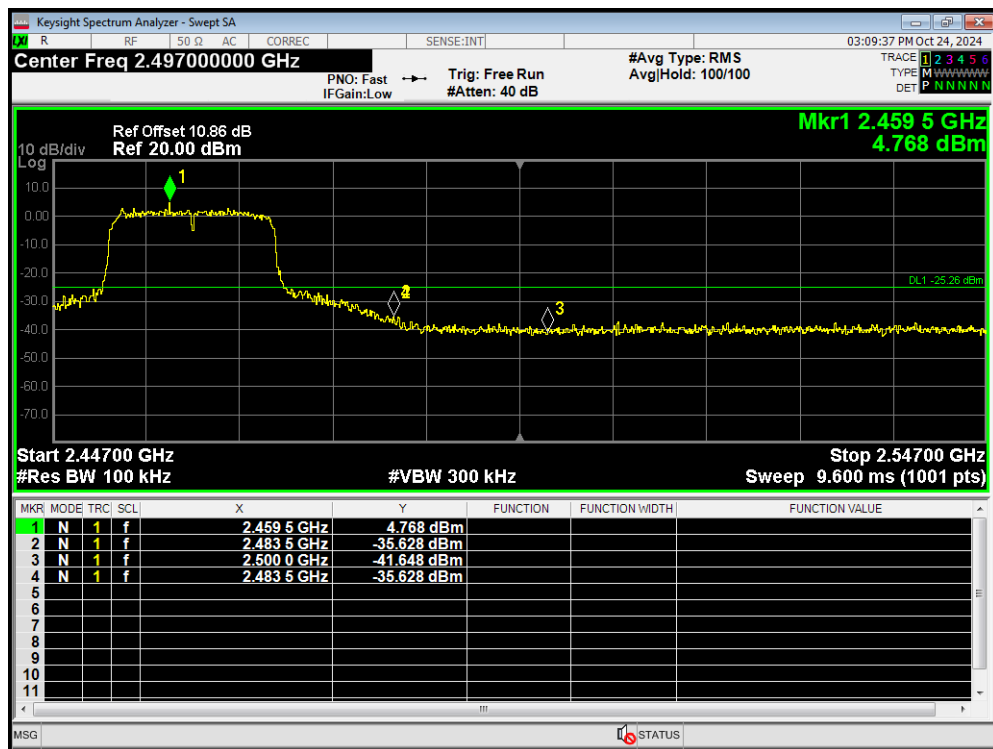
Band Edge 802.11n(HT20) 2412MHz Emission



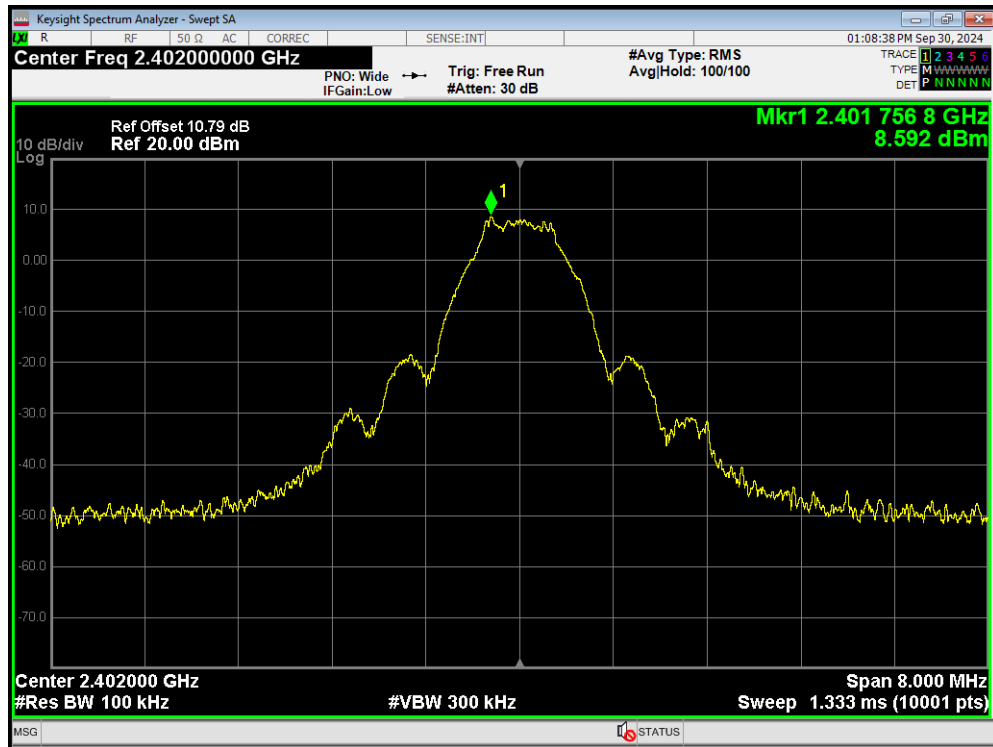
Band Edge 802.11n(HT20) 2462MHz Ref



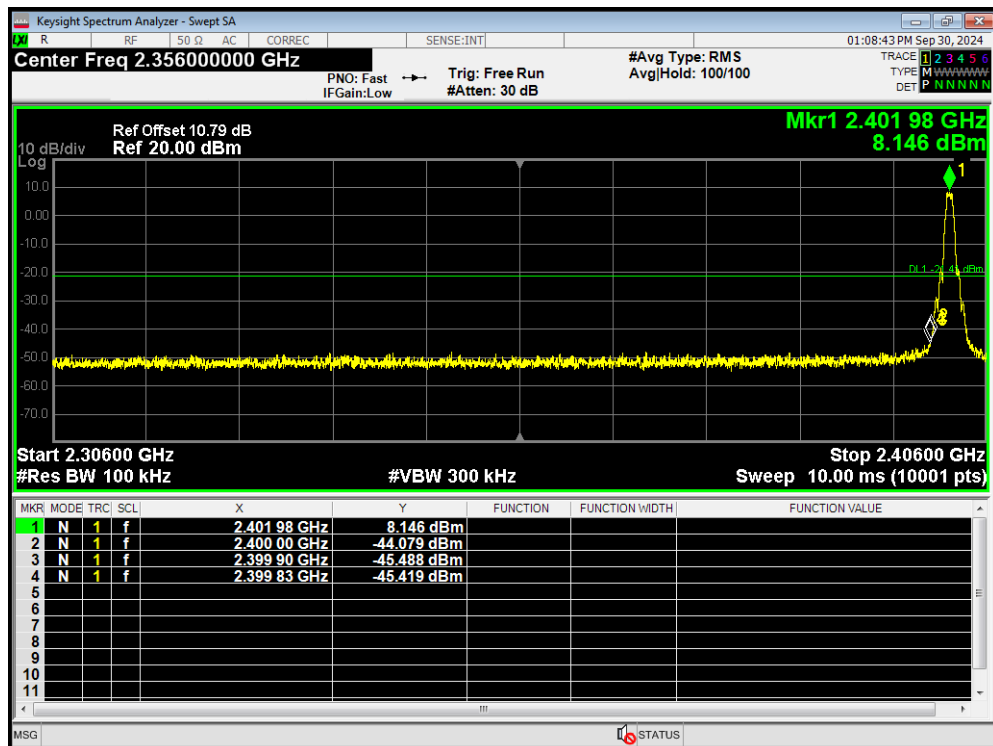
Band Edge 802.11n(HT20) 2462MHz Emission



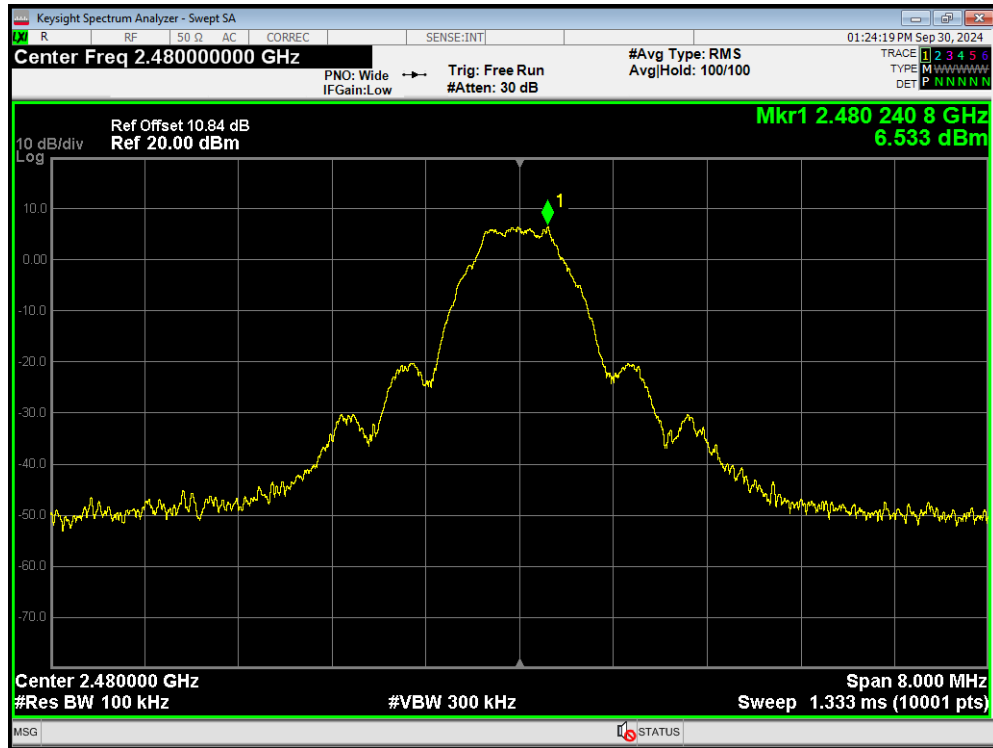
Band Edge Bluetooth LE (1M) 2402MHz Ref



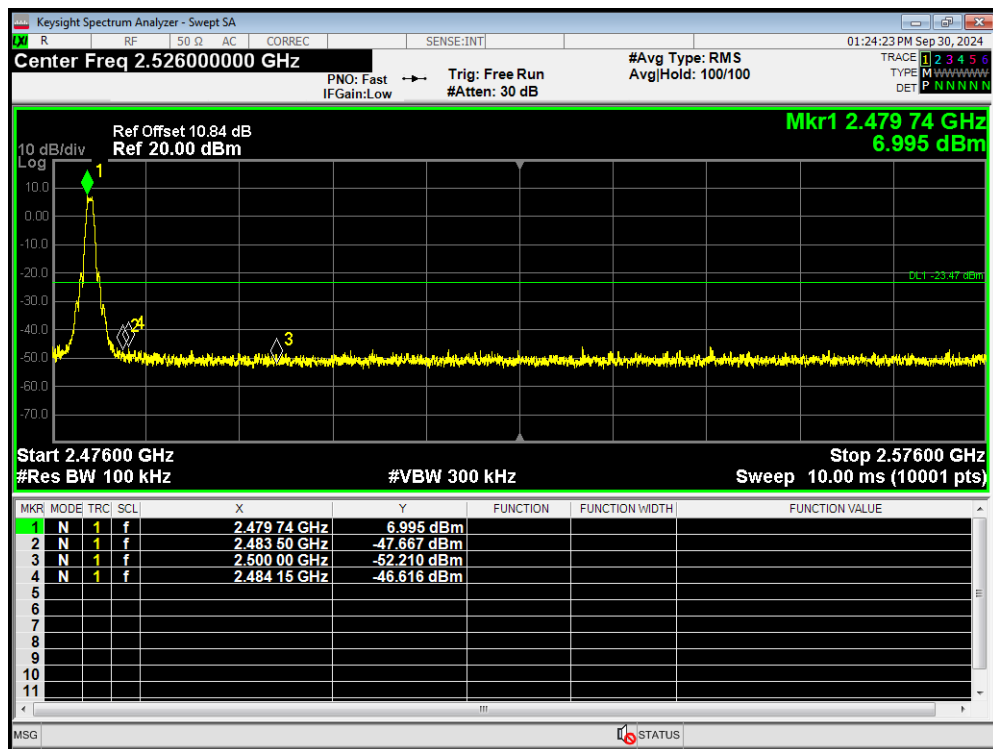
Band Edge Bluetooth LE (1M) 2402MHz Emission



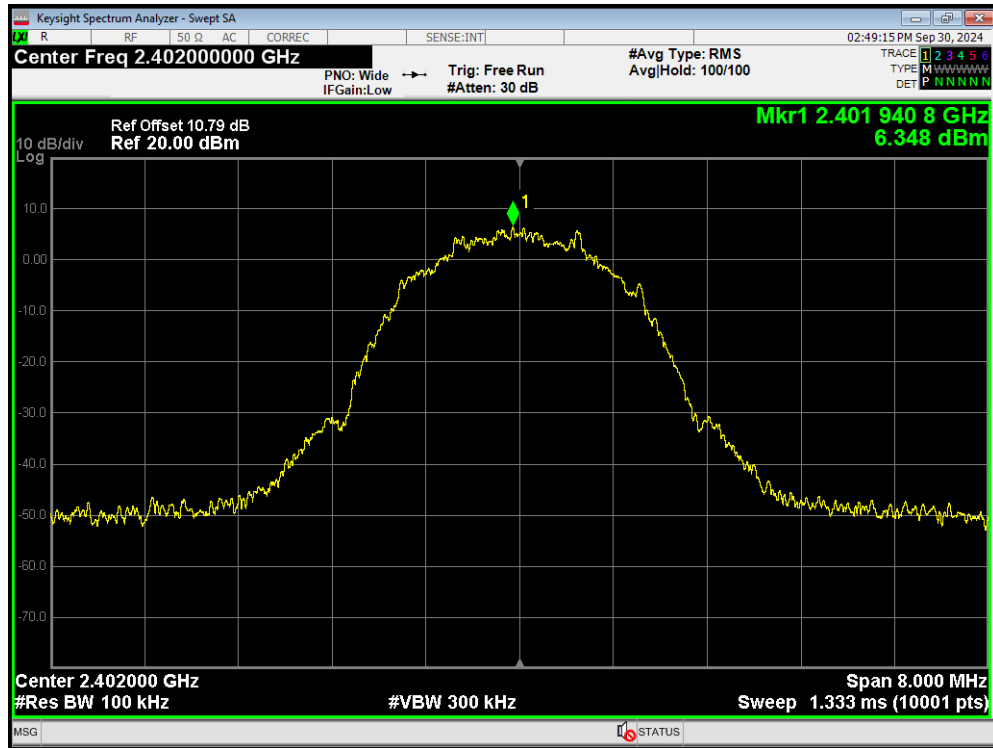
Band Edge Bluetooth LE (1M) 2480MHz Ref



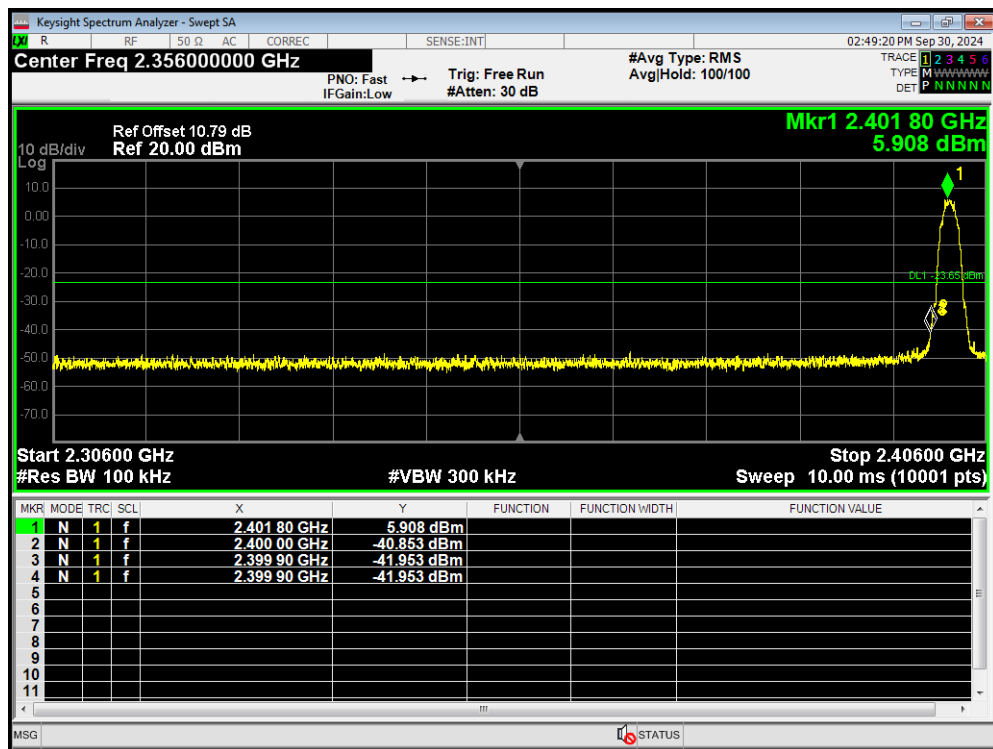
Band Edge Bluetooth LE (1M) 2480MHz Emission



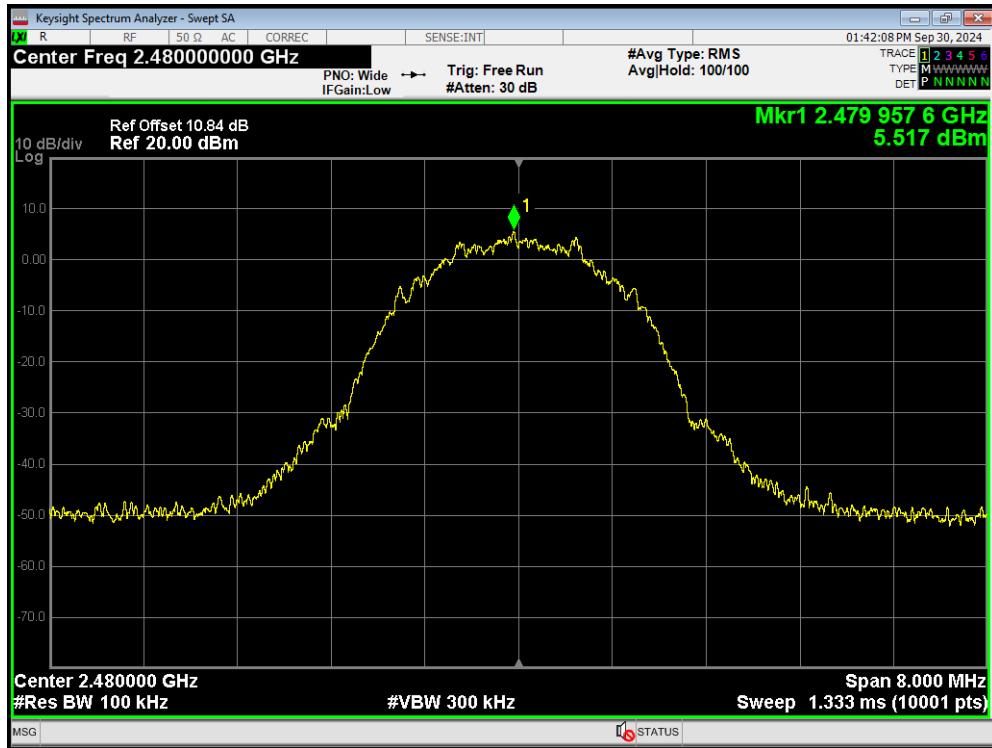
Band Edge Bluetooth LE (2M) 2402MHz Ref



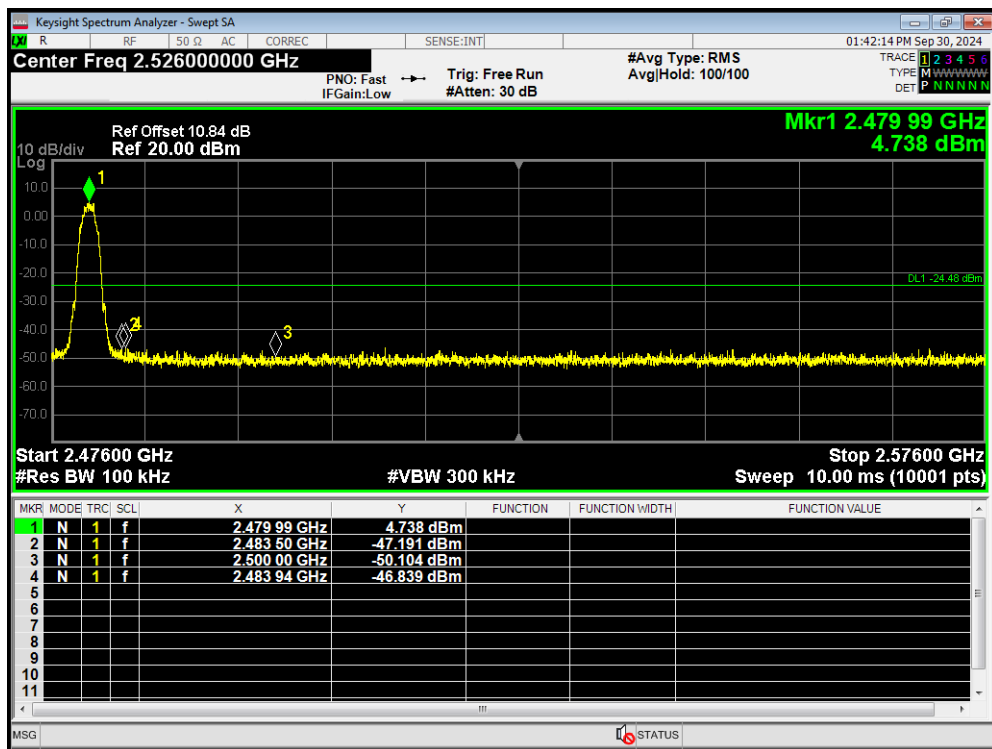
Band Edge Bluetooth LE (2M) 2402MHz Emission



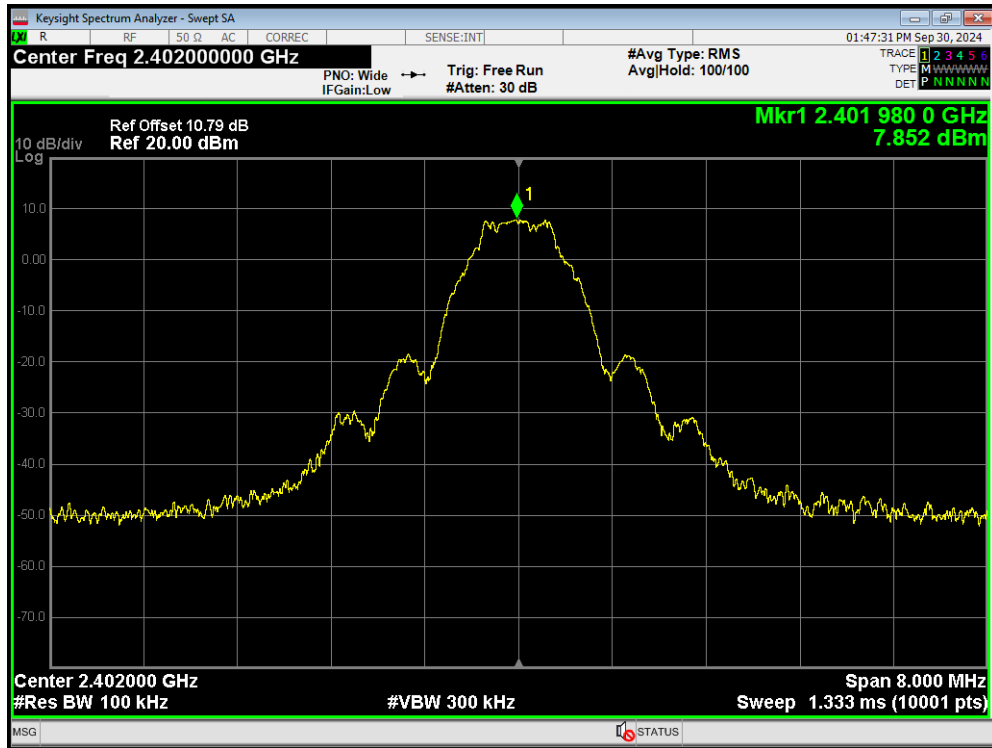
Band Edge Bluetooth LE (2M) 2480MHz Ref



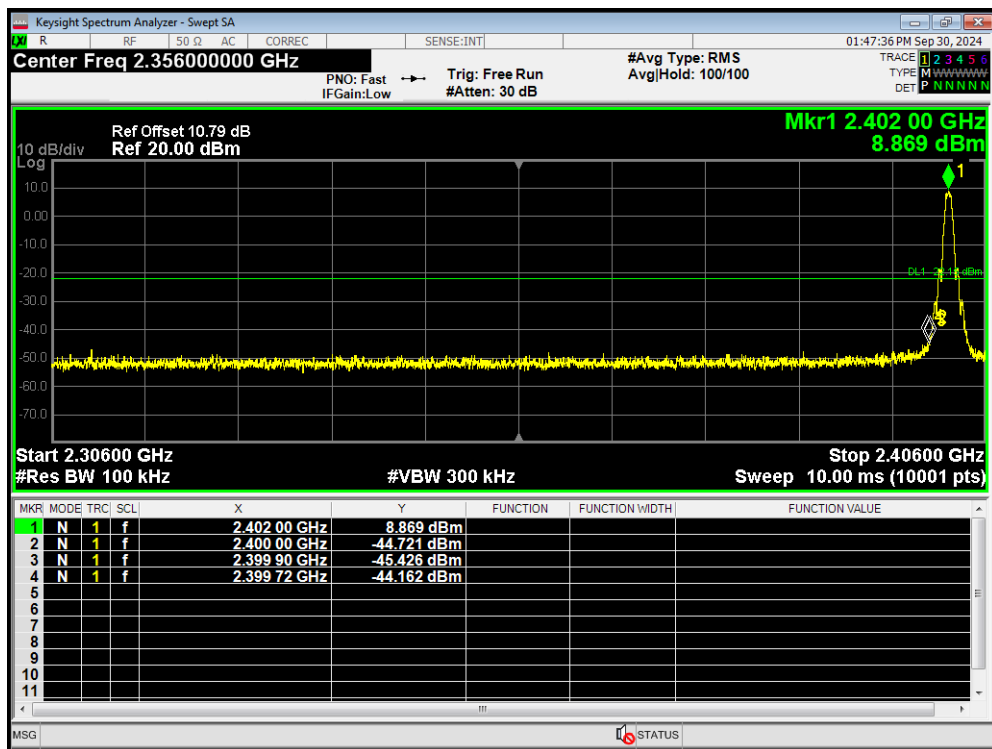
Band Edge Bluetooth LE (2M) 2480MHz Emission



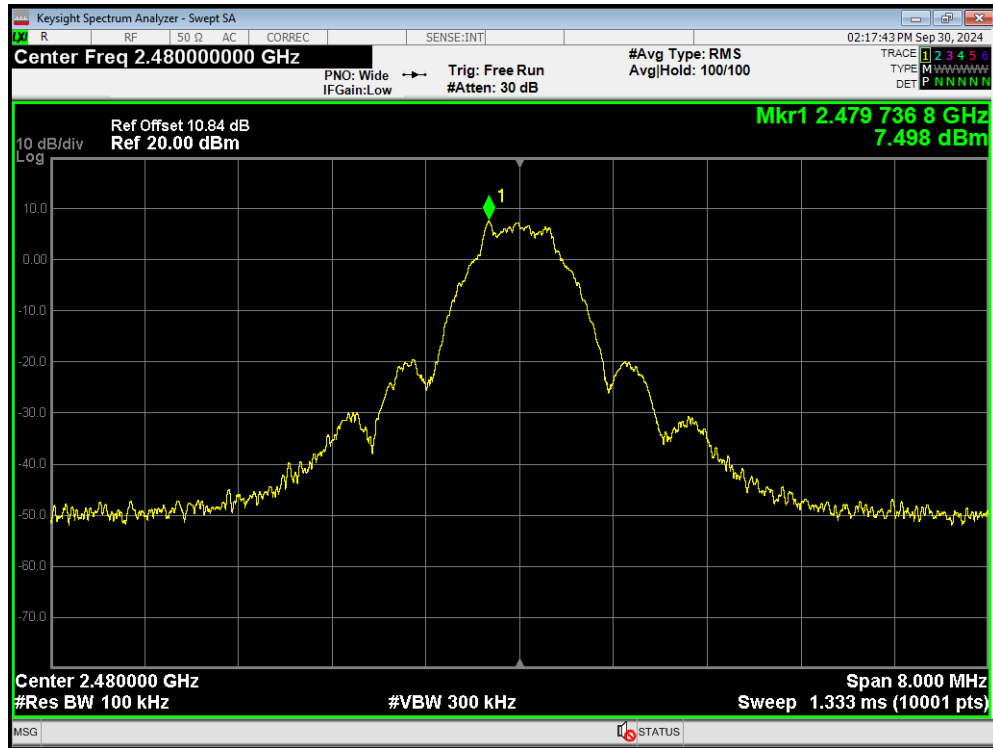
Band Edge Bluetooth LE (S=2) 2402MHz Ref



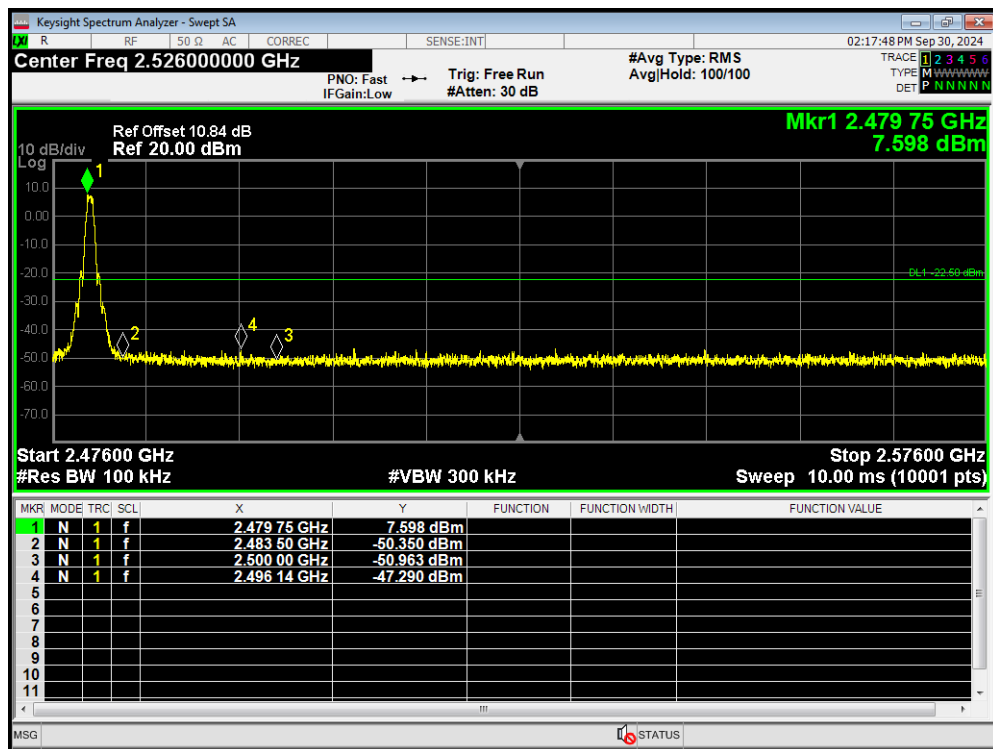
Band Edge Bluetooth LE (S=2) 2402MHz Emission



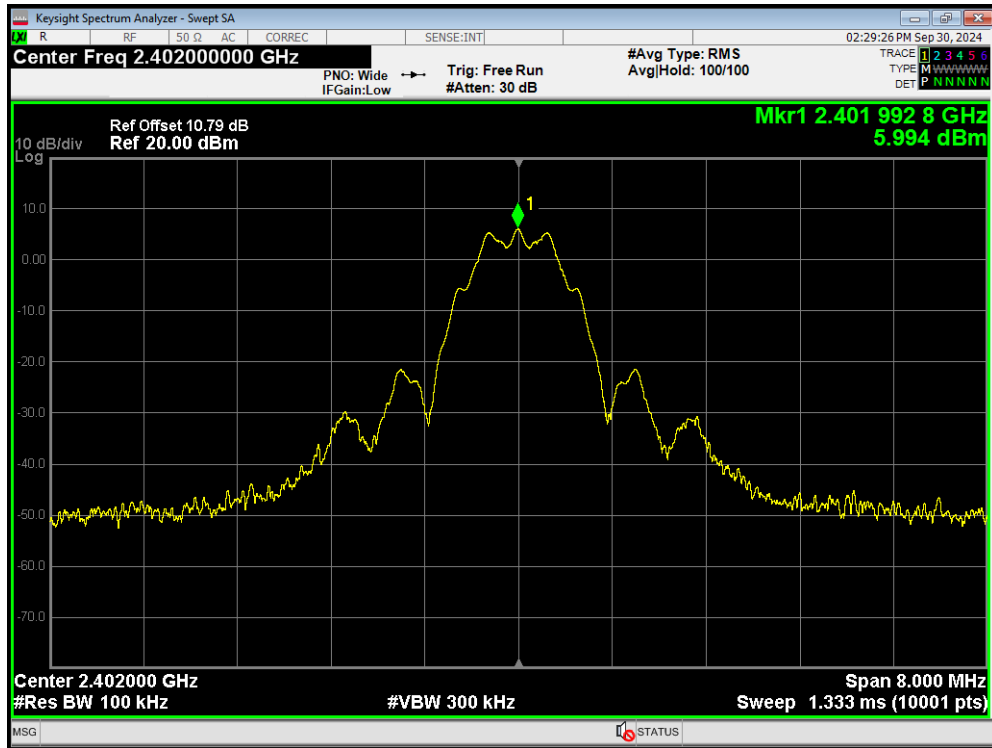
Band Edge Bluetooth LE (S=2) 2480MHz Ref



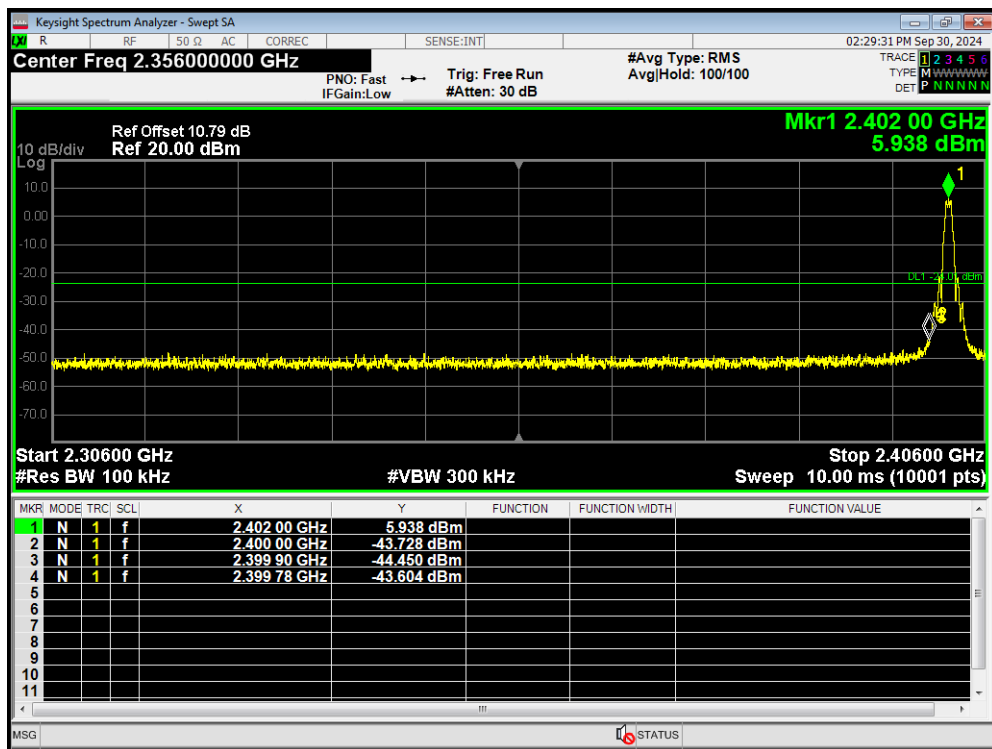
Band Edge Bluetooth LE (S=2) 2480MHz Emission



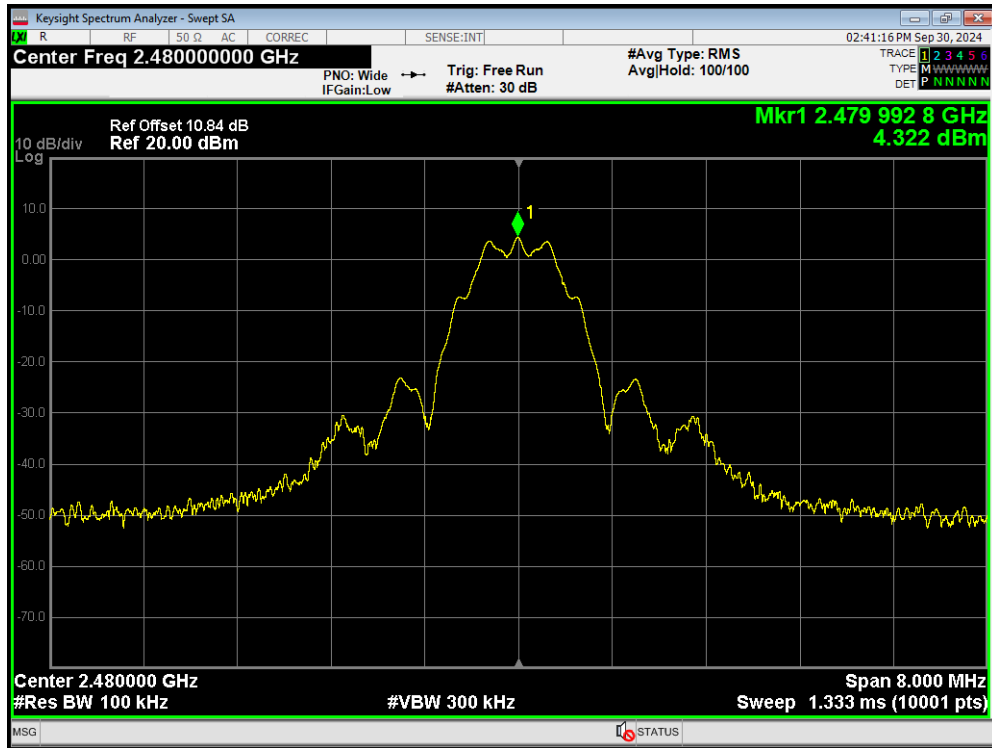
Band Edge Bluetooth LE (S=8) 2402MHz Ref



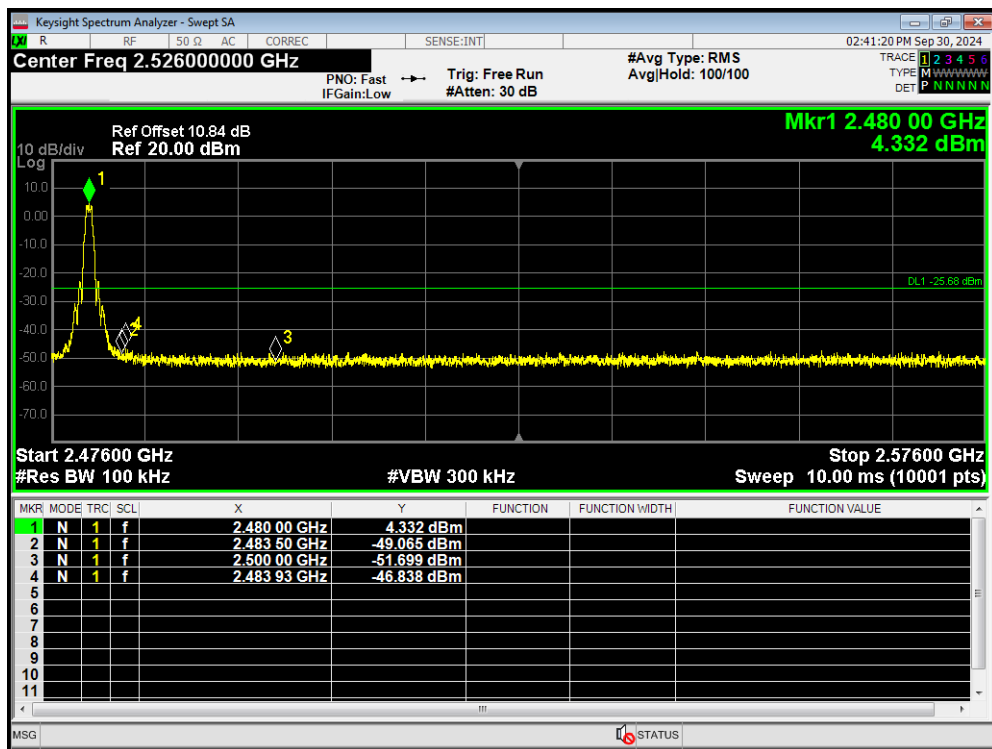
Band Edge Bluetooth LE (S=8) 2402MHz Emission



Band Edge Bluetooth LE (S=8) 2480MHz Ref



Band Edge Bluetooth LE (S=8) 2480MHz Emission



5.4. Power Spectral Density

Ambient Condition

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

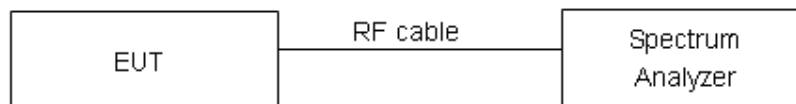
Method of Measurement

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 AVGPS-1 was used for this test.

- Set instrument center frequency to DTS channel center frequency
- Set span to at least 1.5 times the OBW
- Set RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$
- Set VBW $\geq [3 \times \text{RBW}]$
- Detector=power averaging (rms) or sample detector (when rms not available)
- Ensure that the number of measurement points in the sweep $\geq [2 \times \text{span}/\text{RBW}]$
- Sweep time auto couple
- Employ trace averaging (rms) mode over a minimum of 100 traces
- Use the peak marker function to determine the maximum amplitude level.
- 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)

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	$\leq 8 \text{ dBm} / 3\text{kHz}$
--------	------------------------------------

Measurement Uncertainty

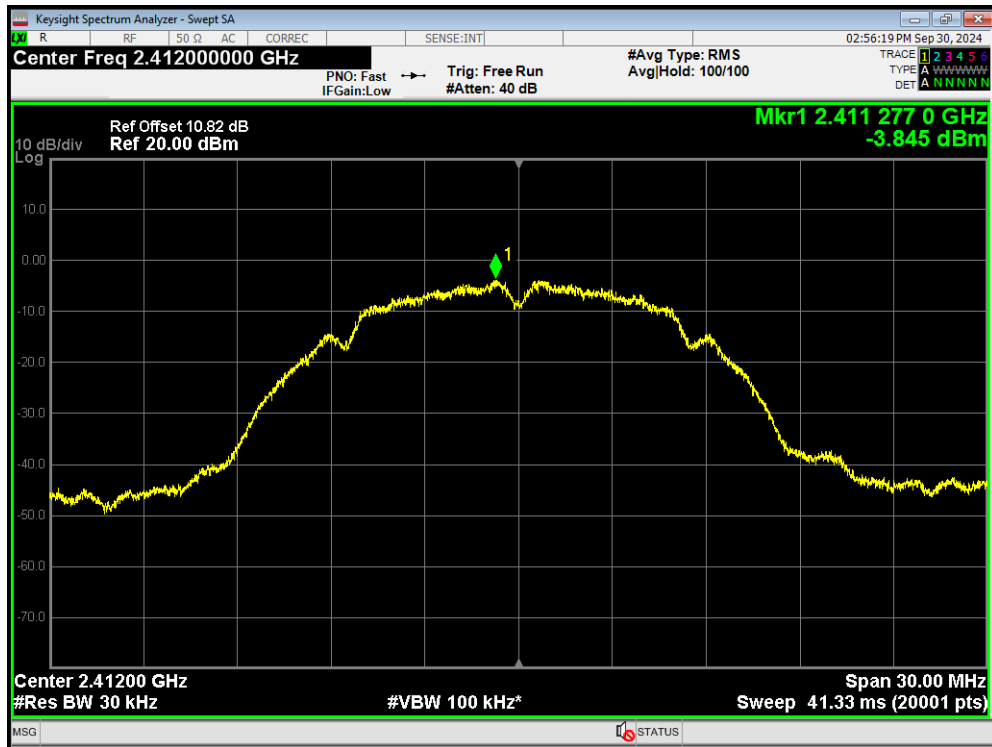
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.75\text{dB}$.

Test Results:

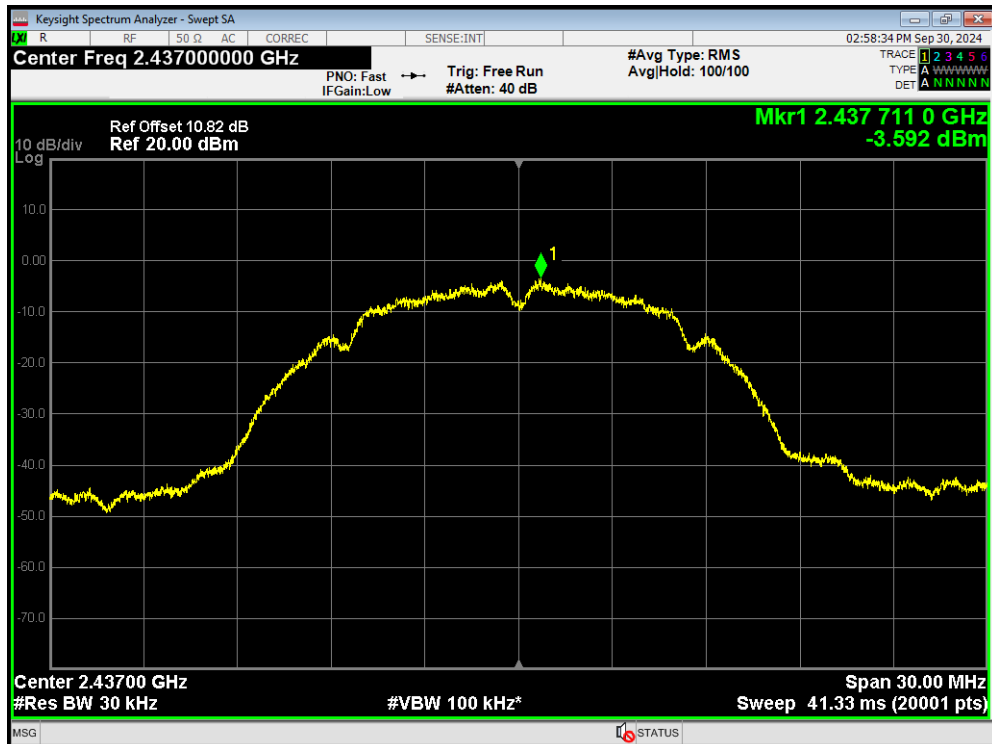
Test Mode	Carrier frequency (MHz) / Channel	Read Value (dBm / 30kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
802.11b	2412/CH 1	-3.85	-13.85	8	PASS
	2437/CH 6	-3.59	-13.59	8	PASS
	2462/CH11	-3.82	-13.82	8	PASS
802.11g	2412/CH 1	-7.42	-17.42	8	PASS
	2437/CH 6	-5.94	-15.94	8	PASS
	2462/CH11	-7.60	-17.60	8	PASS
802.11n HT20	2412/CH 1	-7.62	-17.62	8	PASS
	2437/CH 6	-7.91	-17.91	8	PASS
	2462/CH11	-8.06	-18.06	8	PASS
Note: Power Spectral Density (dBm/3kHz) =Read Value+Duty cycle correction factor + 10*log10(3/30)					

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	-11.18	-11.18	8	PASS
	2440/CH19	-11.75	-11.75	8	PASS
	2480/CH39	-11.39	-11.39	8	PASS
Bluetooth (Low Energy) (2M)	2402/CH0	-12.99	-12.99	8	PASS
	2440/CH19	-13.46	-13.46	8	PASS
	2480/CH39	-13.84	-13.84	8	PASS
Bluetooth (Low Energy) (S=2)	2402/CH0	-9.71	-9.71	8	PASS
	2440/CH19	-8.09	-8.09	8	PASS
	2480/CH39	-9.70	-9.70	8	PASS
Bluetooth (Low Energy) (S=8)	2402/CH0	2.28	2.28	8	PASS
	2440/CH19	1.53	1.53	8	PASS
	2480/CH39	1.21	1.21	8	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

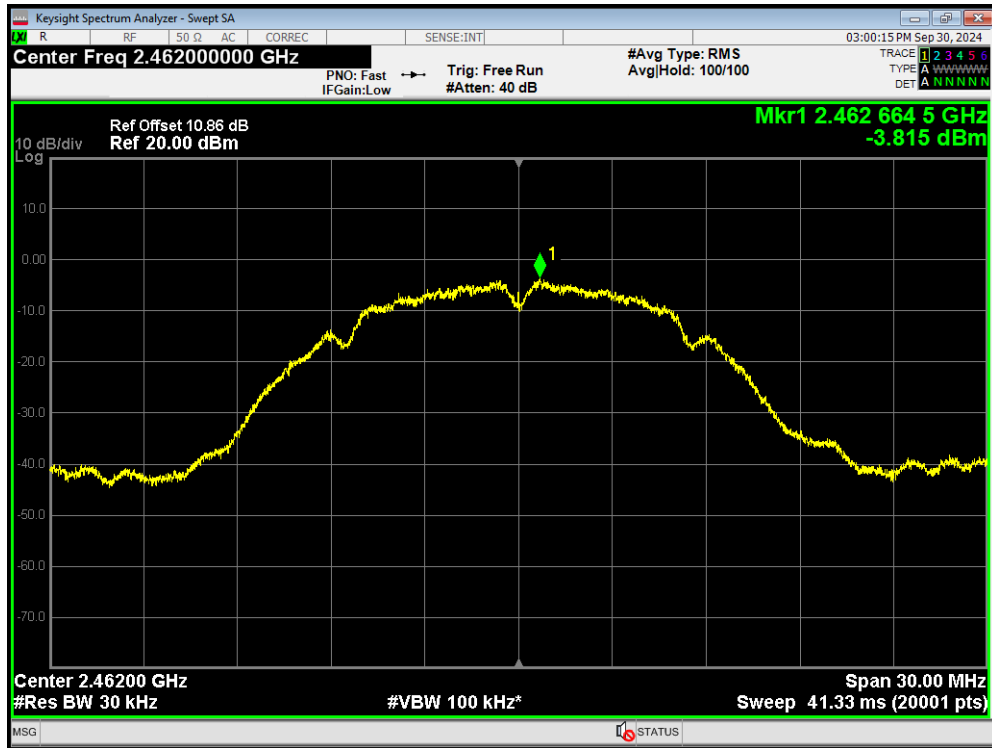
PSD 802.11b 2412MHz



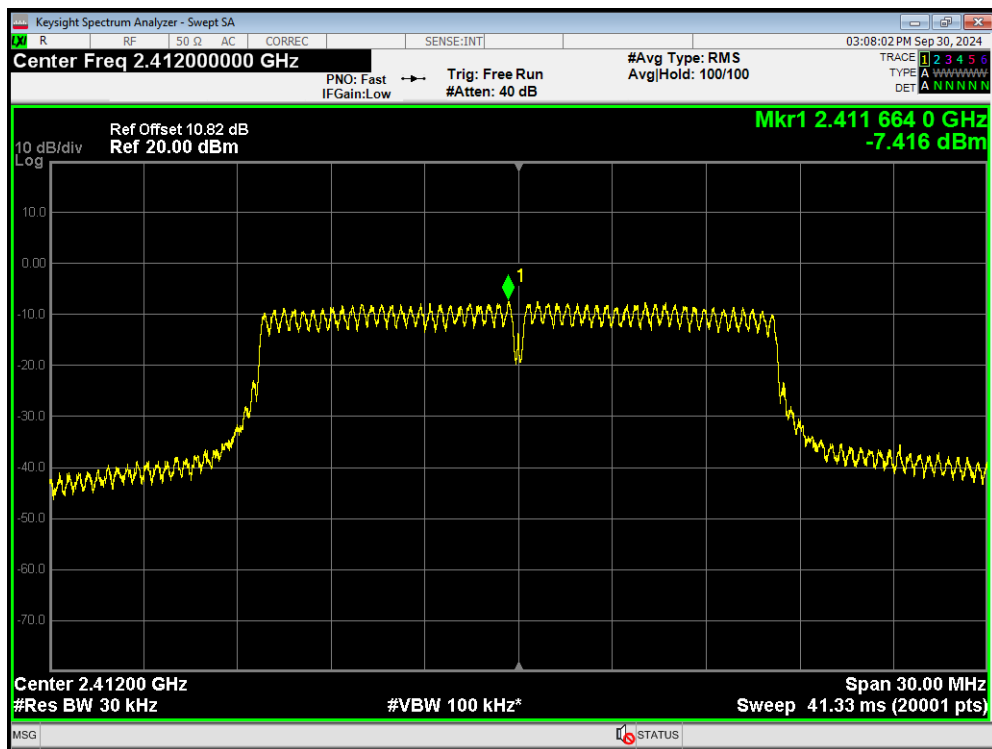
PSD 802.11b 2437MHz



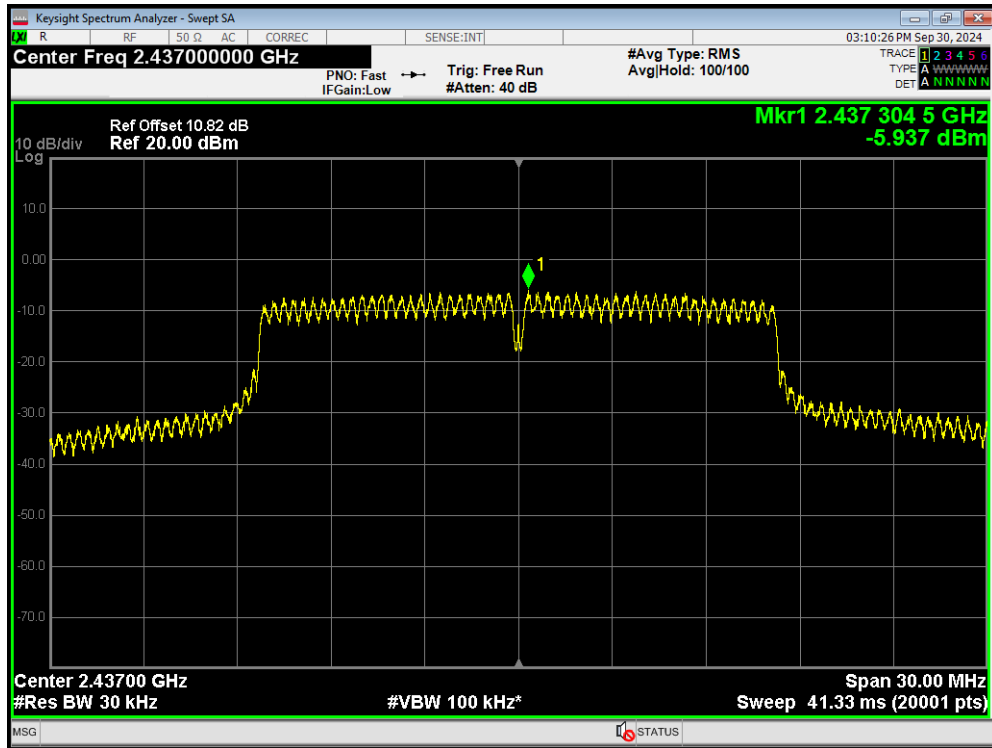
PSD 802.11b 2462MHz



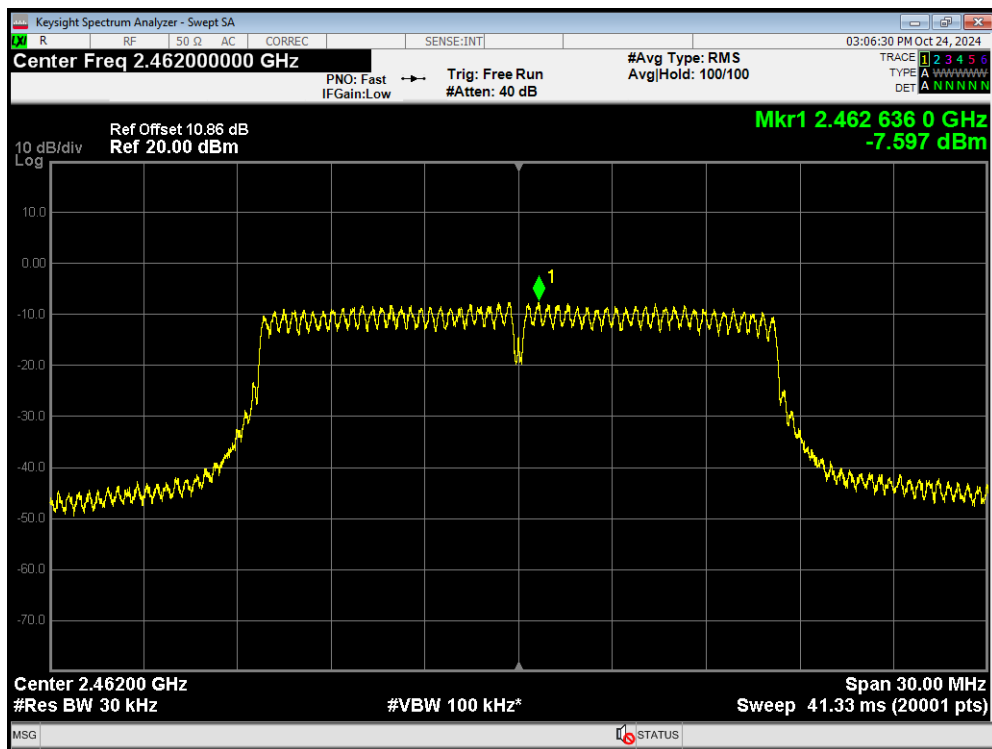
PSD 802.11g 2412MHz



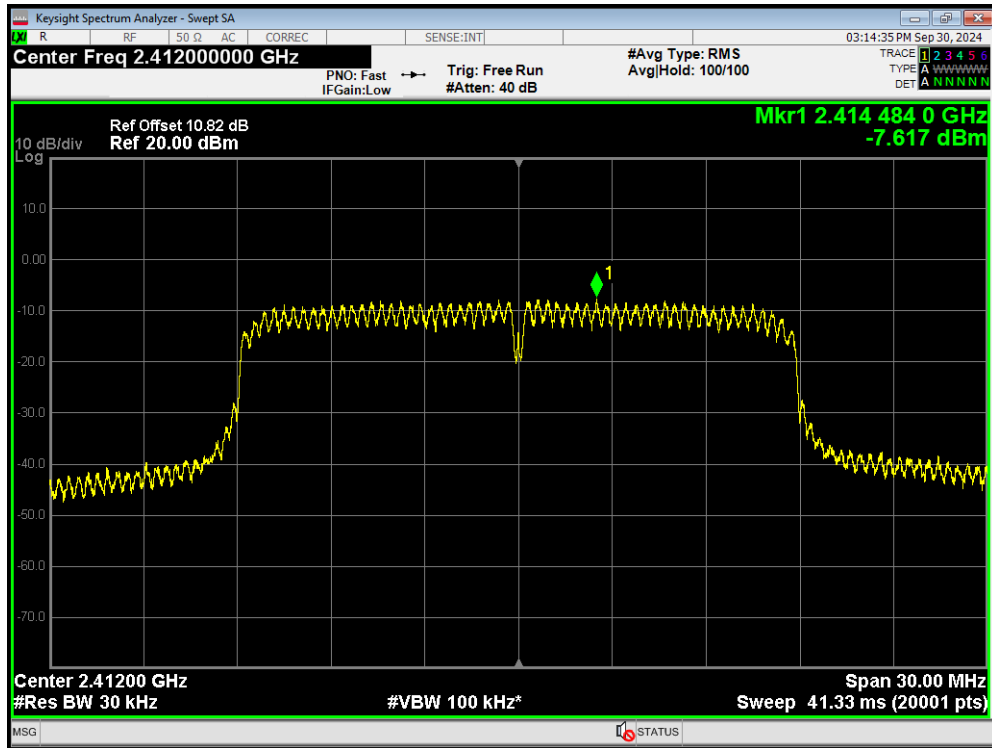
PSD 802.11g 2437MHz



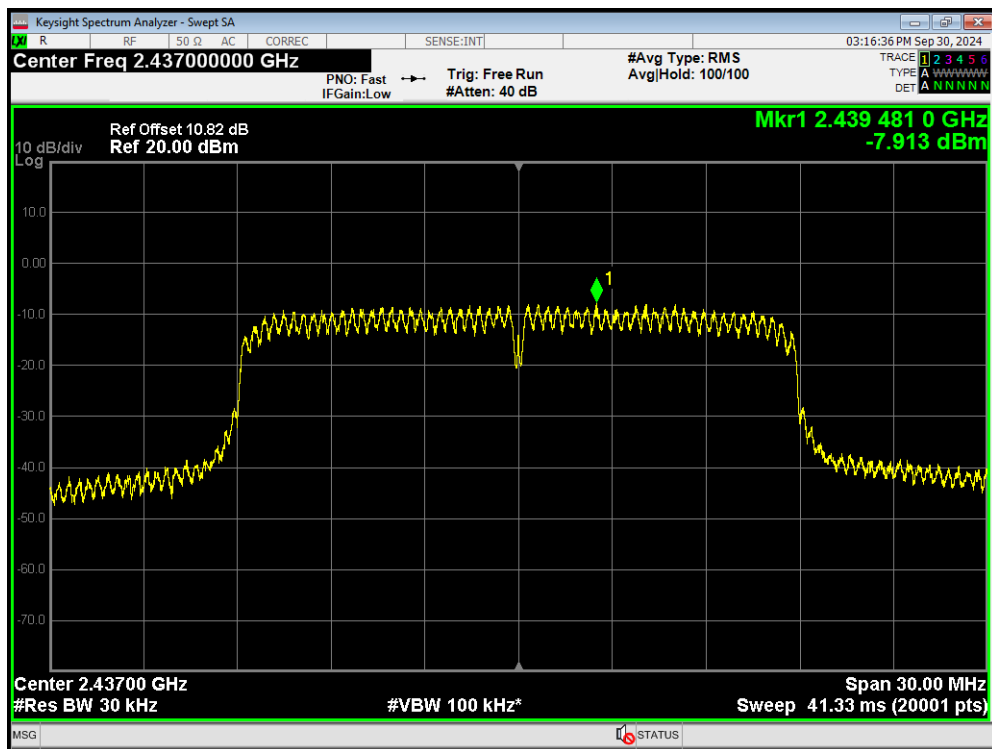
PSD 802.11g 2462MHz



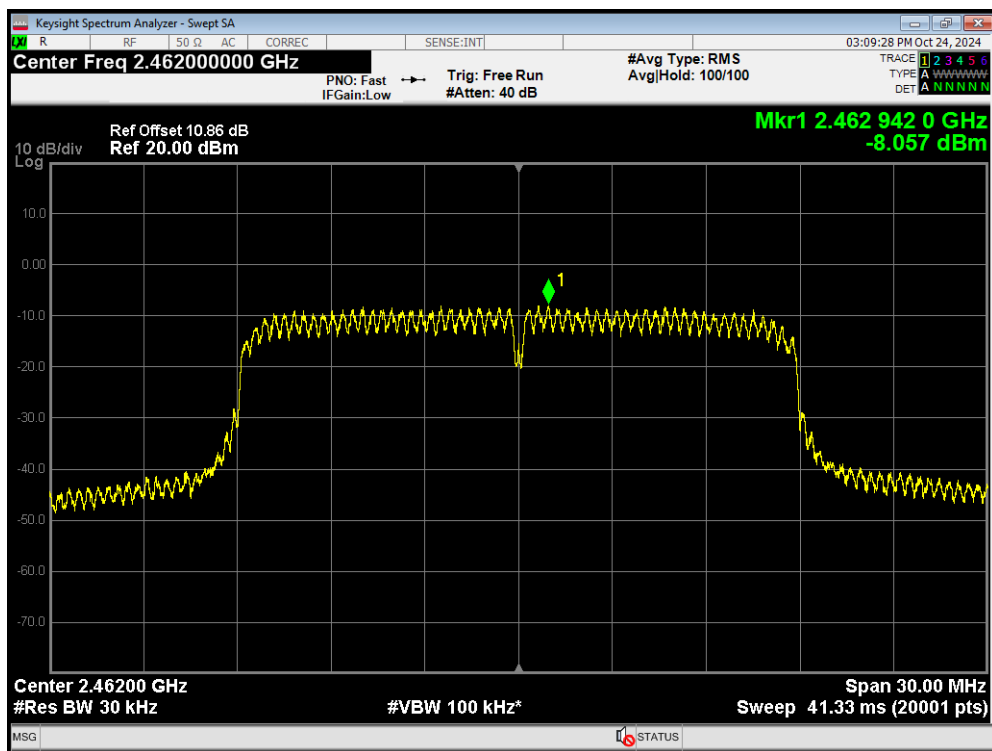
PSD 802.11n(HT20) 2412MHz



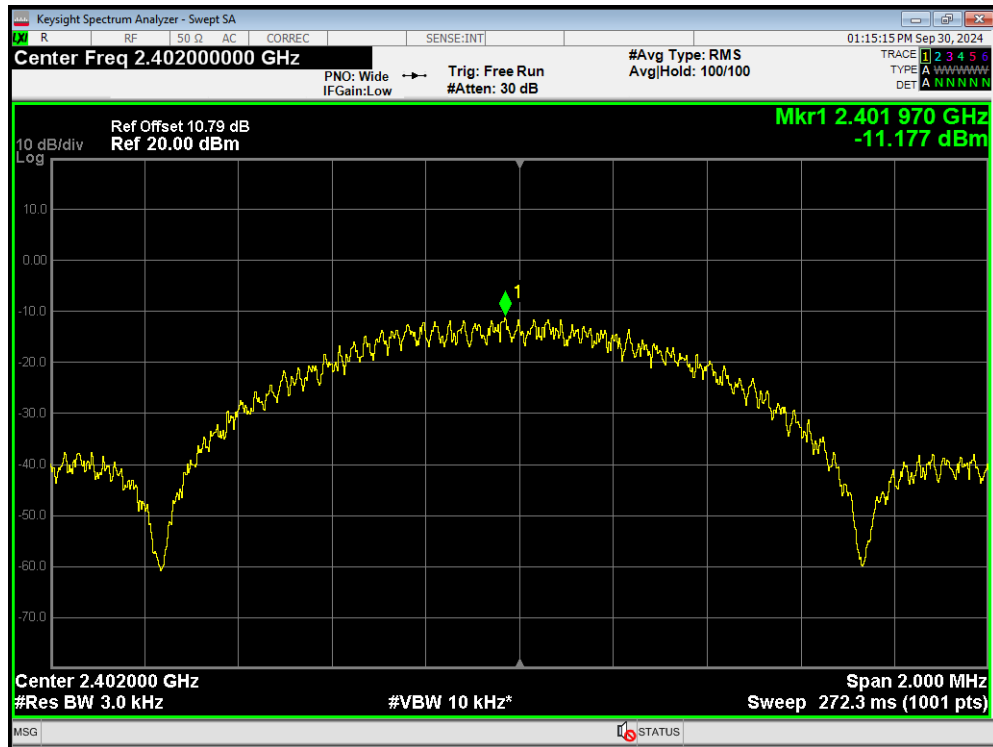
PSD 802.11n(HT20) 2437MHz



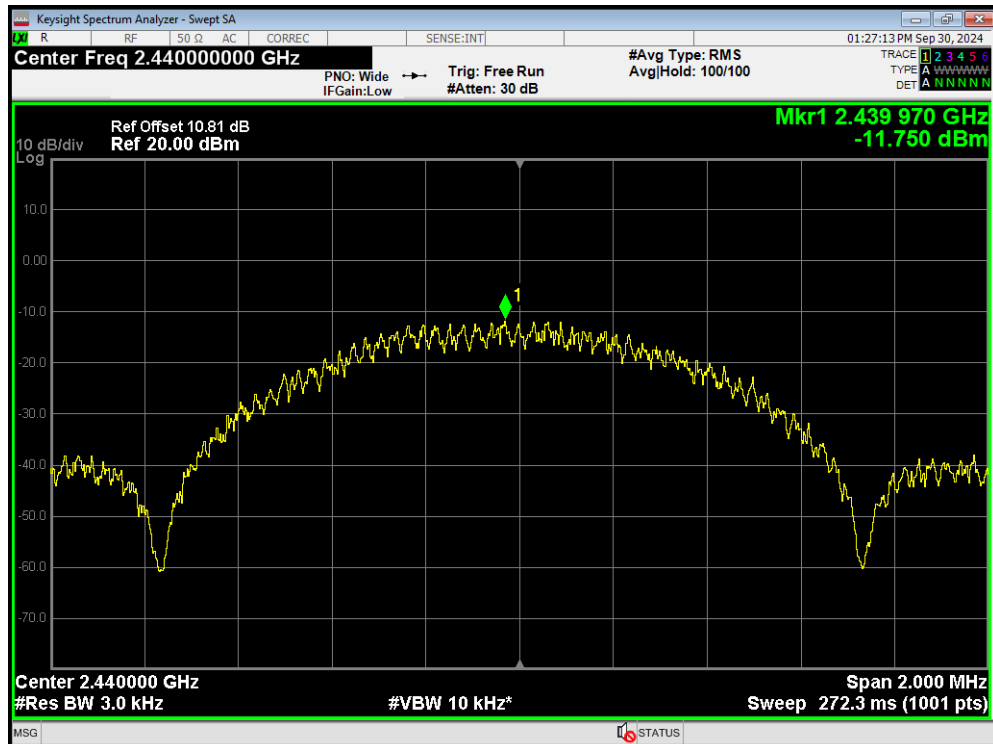
PSD 802.11n(HT20) 2462MHz



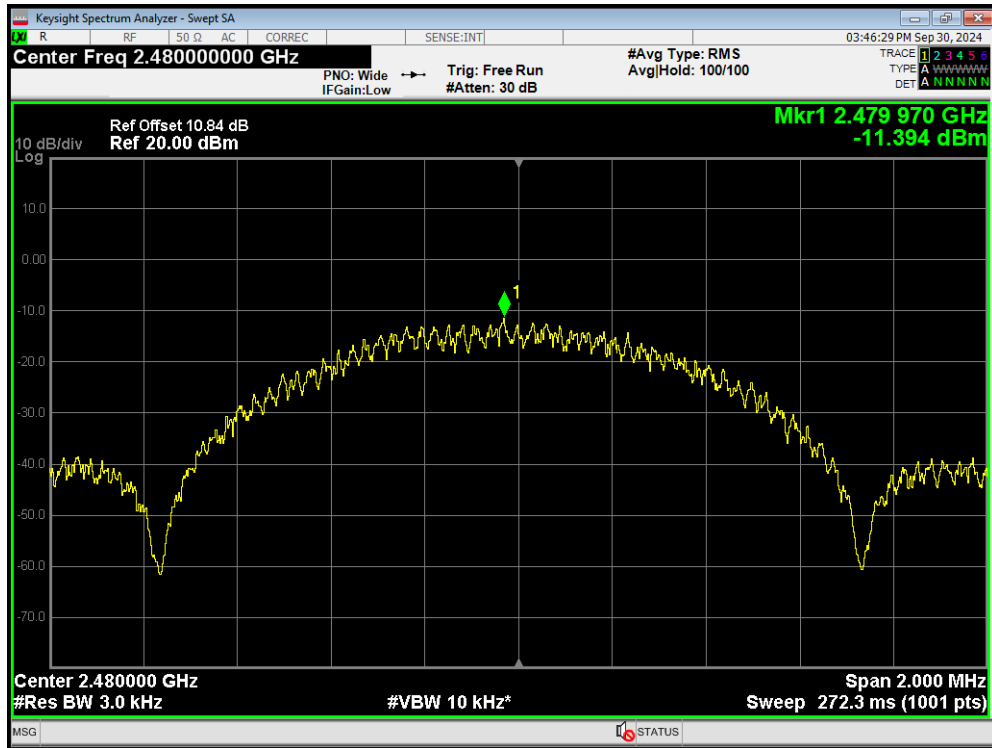
PSD Bluetooth LE (1M) 2402MHz



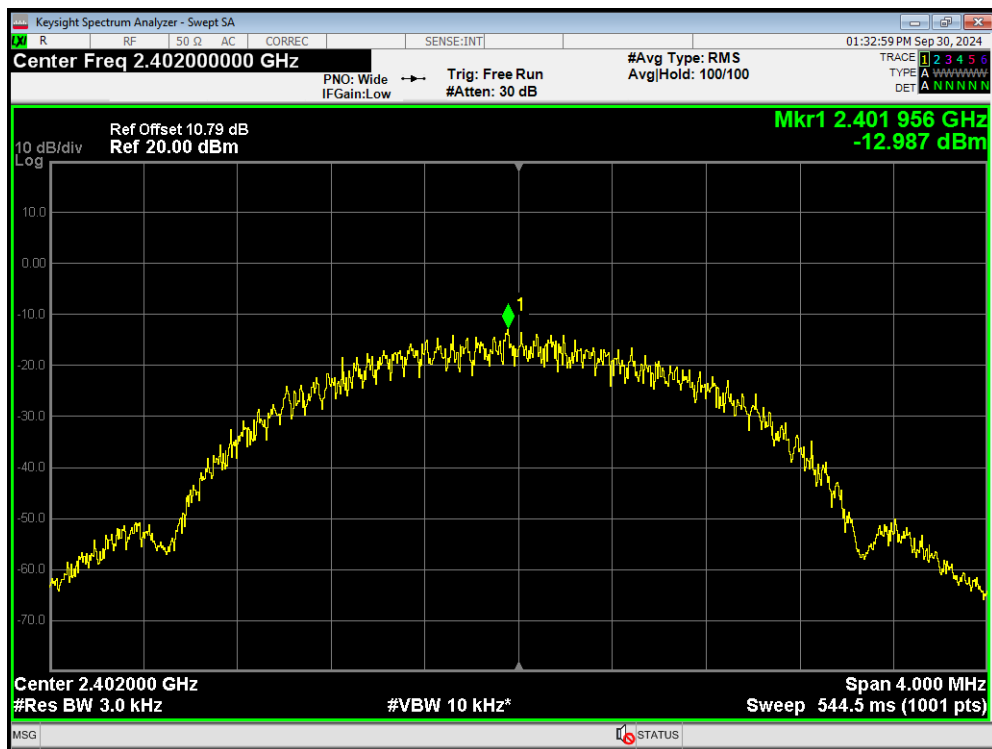
PSD Bluetooth LE (1M) 2440MHz



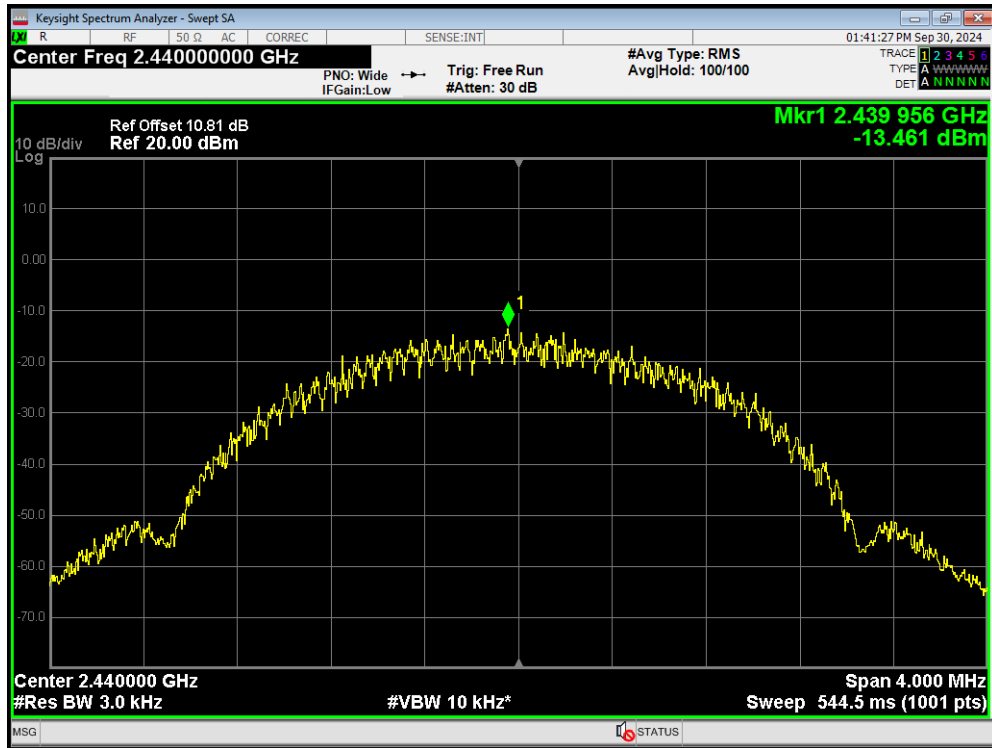
PSD Bluetooth LE (1M) 2480MHz



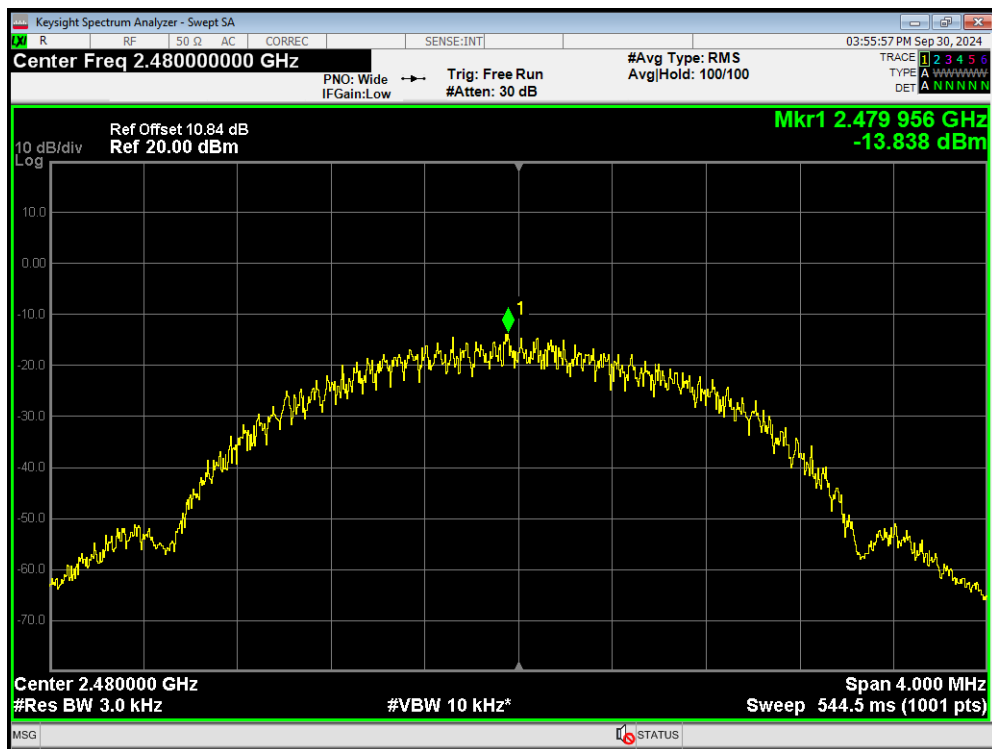
PSD Bluetooth LE (2M) 2402MHz



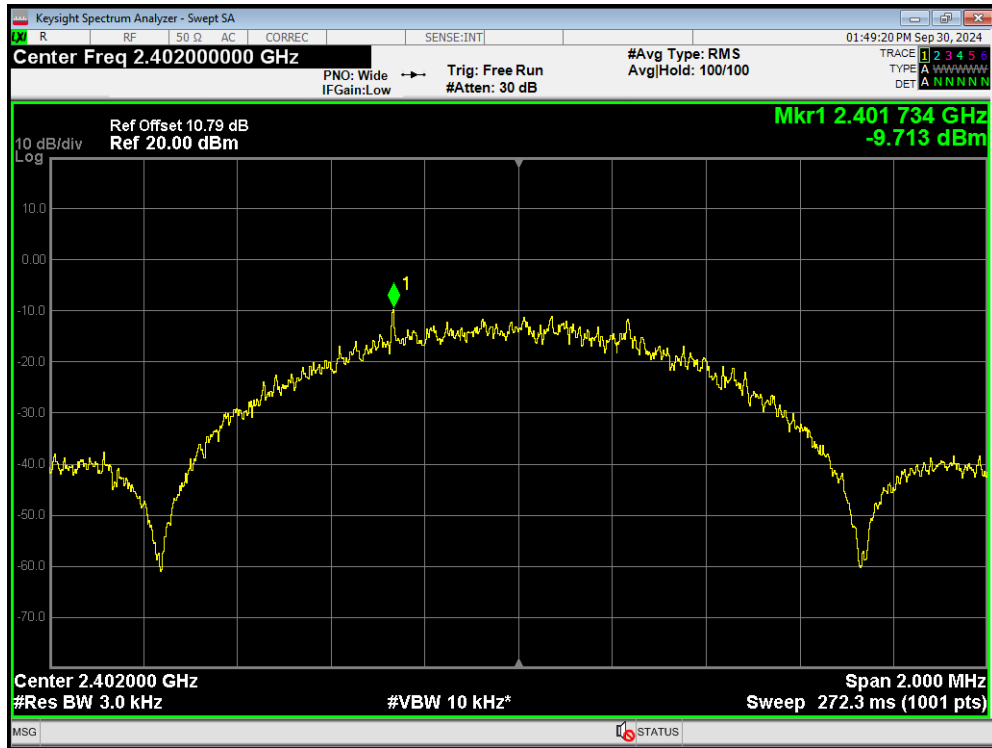
PSD Bluetooth LE (2M) 2440MHz



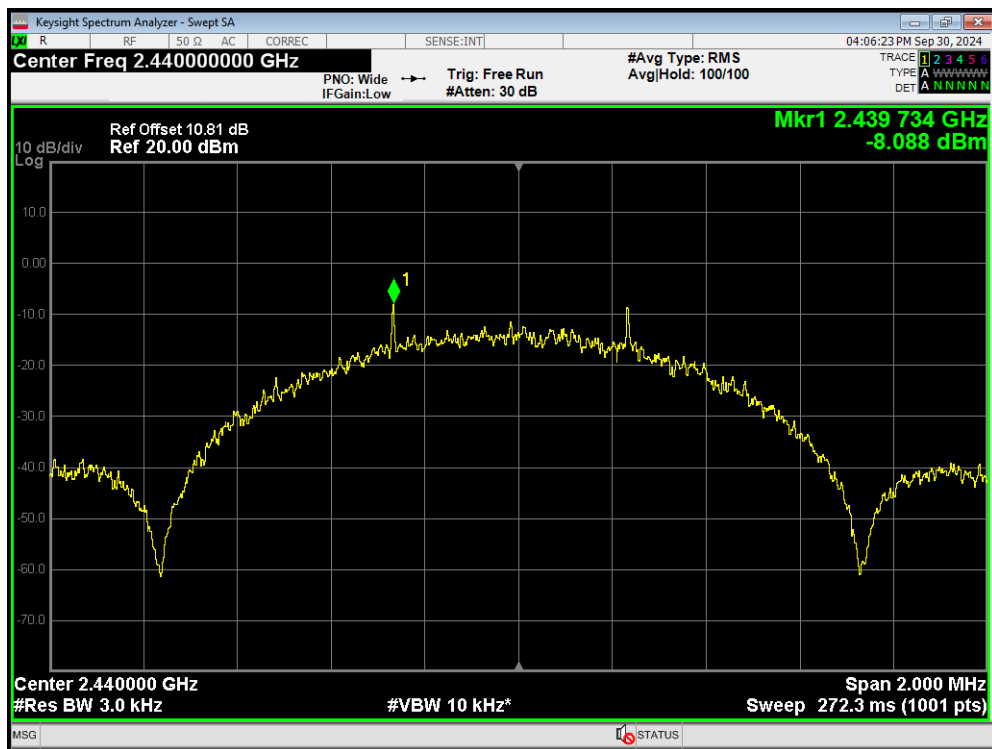
PSD Bluetooth LE (2M) 2480MHz



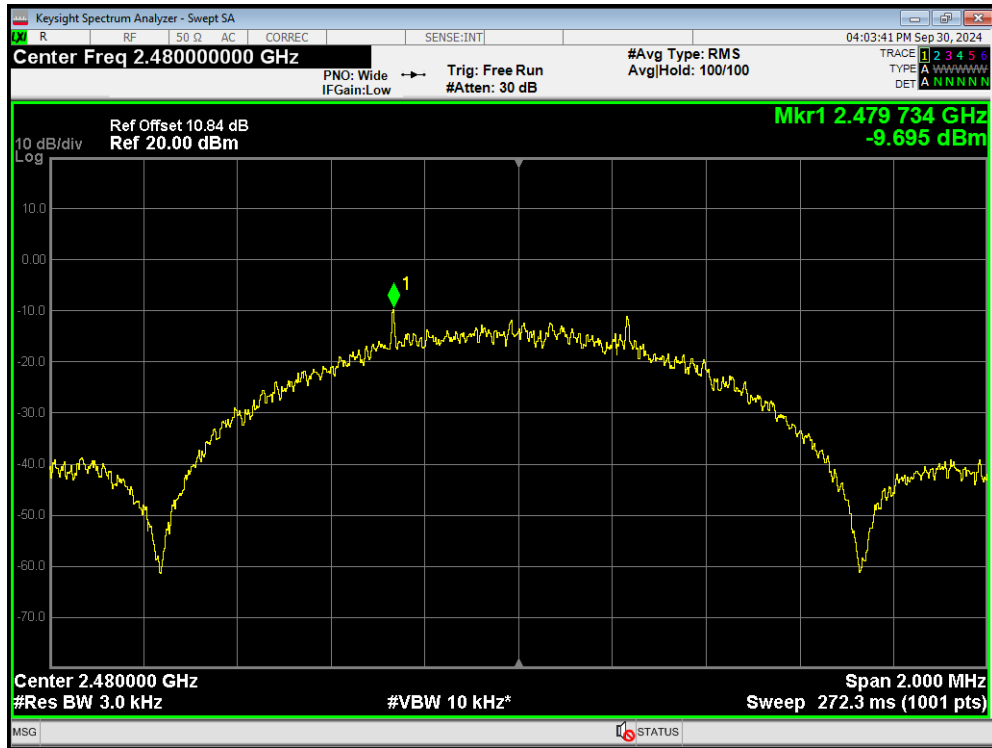
PSD Bluetooth LE (S=2) 2402MHz



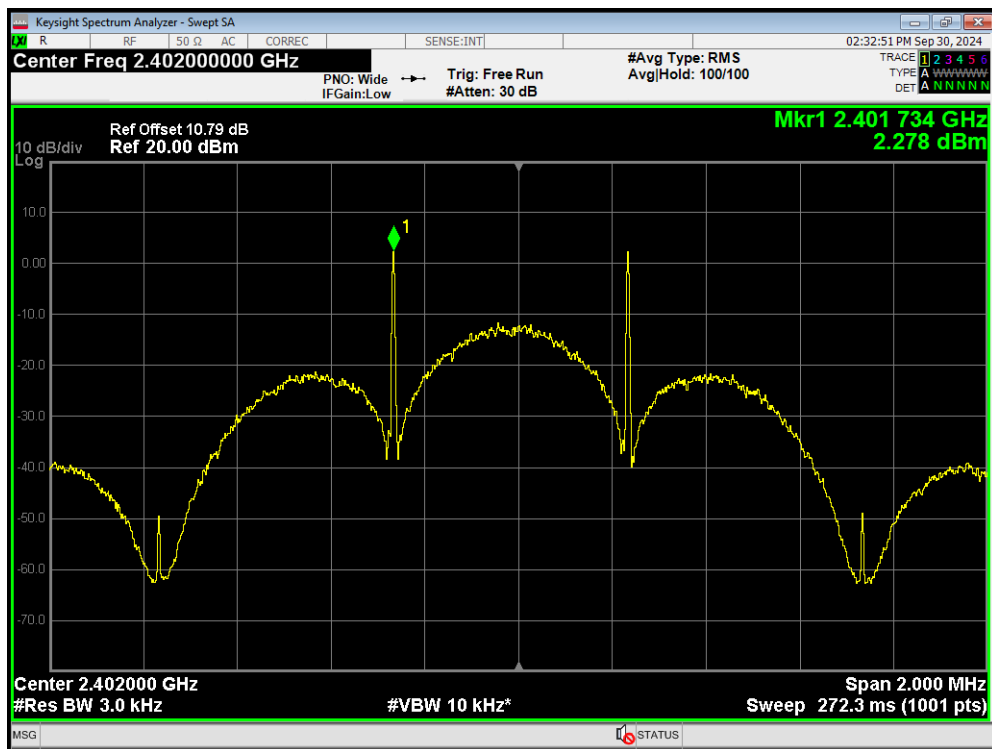
PSD Bluetooth LE (S=2) 2440MHz



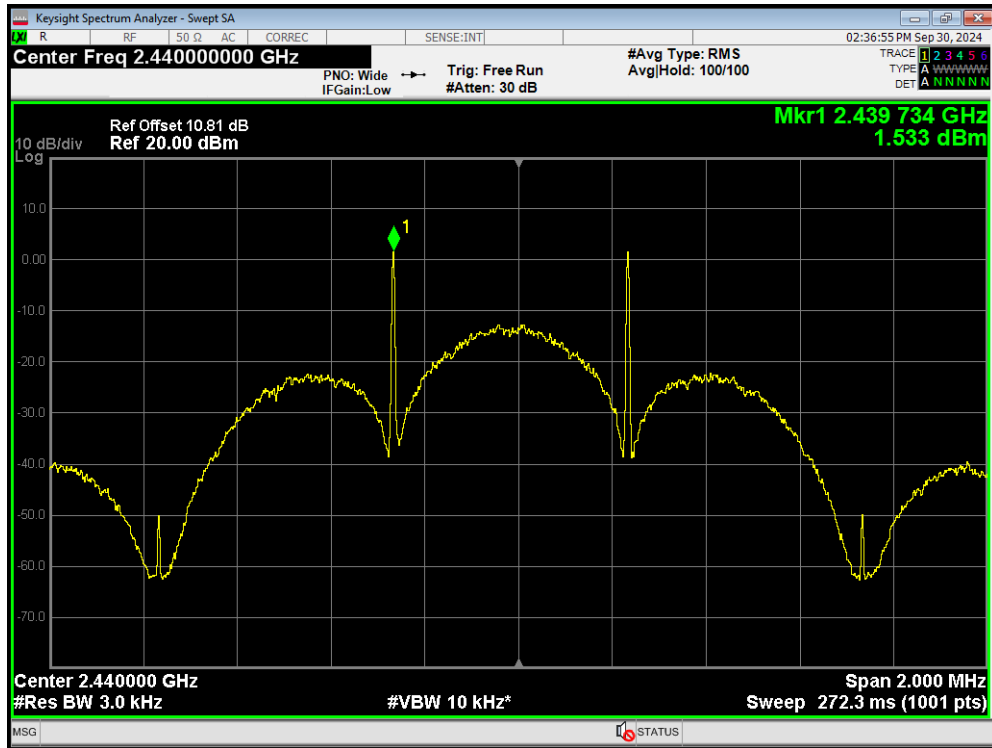
PSD Bluetooth LE (S=2) 2480MHz



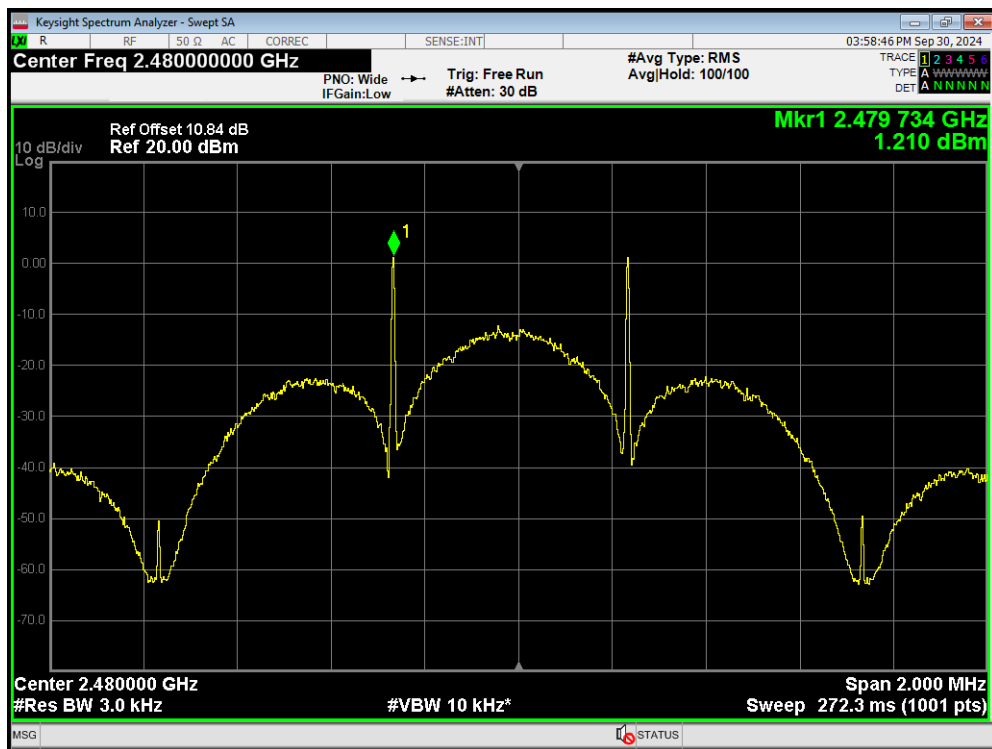
PSD Bluetooth LE (S=8) 2402MHz



PSD Bluetooth LE (S=8) 2440MHz



PSD Bluetooth LE (S=8) 2480MHz



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	9.13	-20.87
	2437	9.50	-20.50
	2462	9.45	-20.55
802.11g	2412	5.24	-24.76
	2437	5.62	-24.38
	2462	3.99	-26.01
802.11n HT20	2412	5.00	-25.00
	2437	4.42	-25.58
	2462	3.85	-26.15
Bluetooth (Low Energy)	2402	8.13	-21.87
	2440	7.40	-22.60

(1M)	2480	6.82	-23.18
Bluetooth (Low Energy) (2M)	2402	7.87	-22.13
	2440	5.22	-24.78
	2480	6.47	-23.53
Bluetooth (Low Energy) (S=2)	2402	8.89	-21.11
	2440	8.04	-21.96
	2480	7.44	-22.56
Bluetooth (Low Energy) (S=8)	2402	5.98	-24.02
	2440	5.40	-24.60
	2480	4.48	-25.52

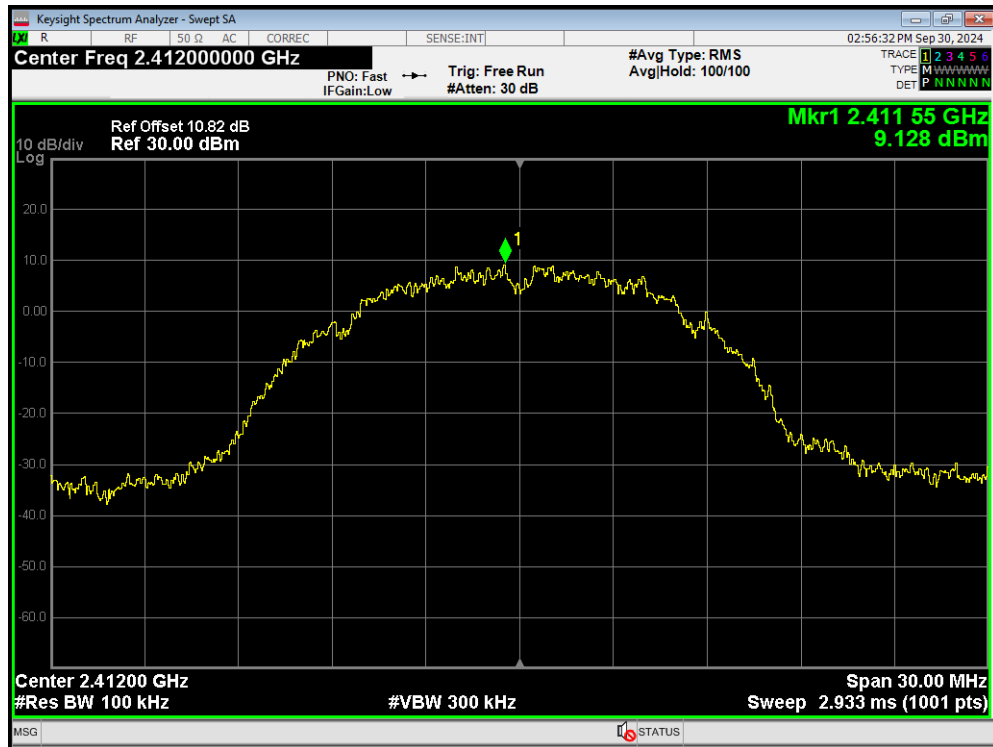
Measurement Uncertainty

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

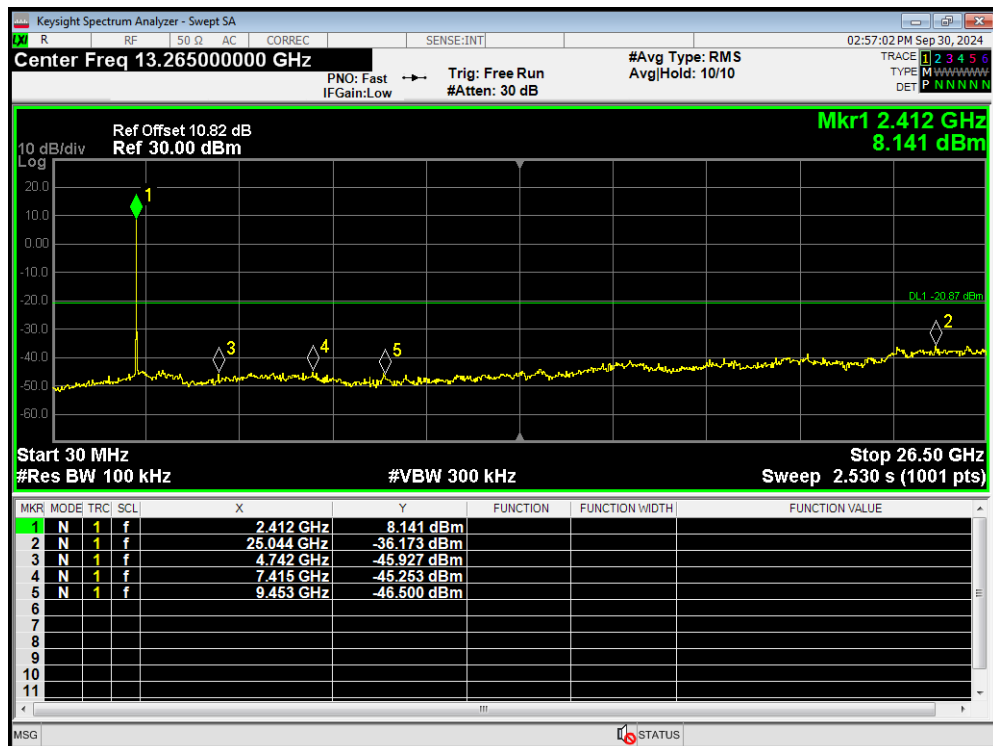
Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-26GHz	1.407 dB

Test Results:

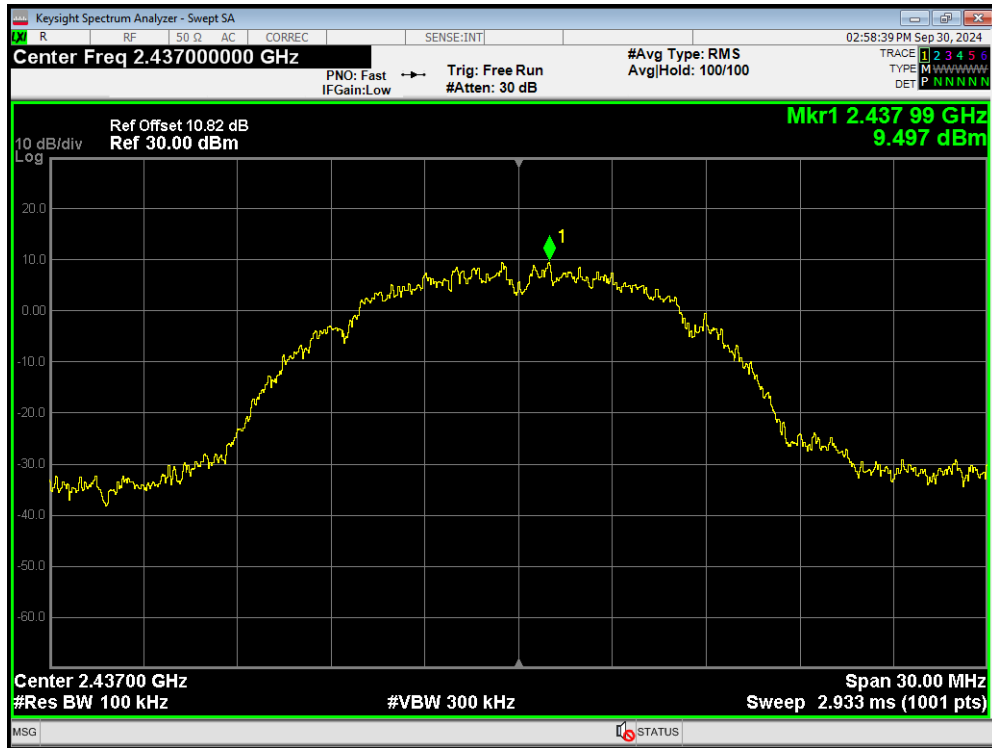
Tx. Spurious 802.11b 2412MHz Ref



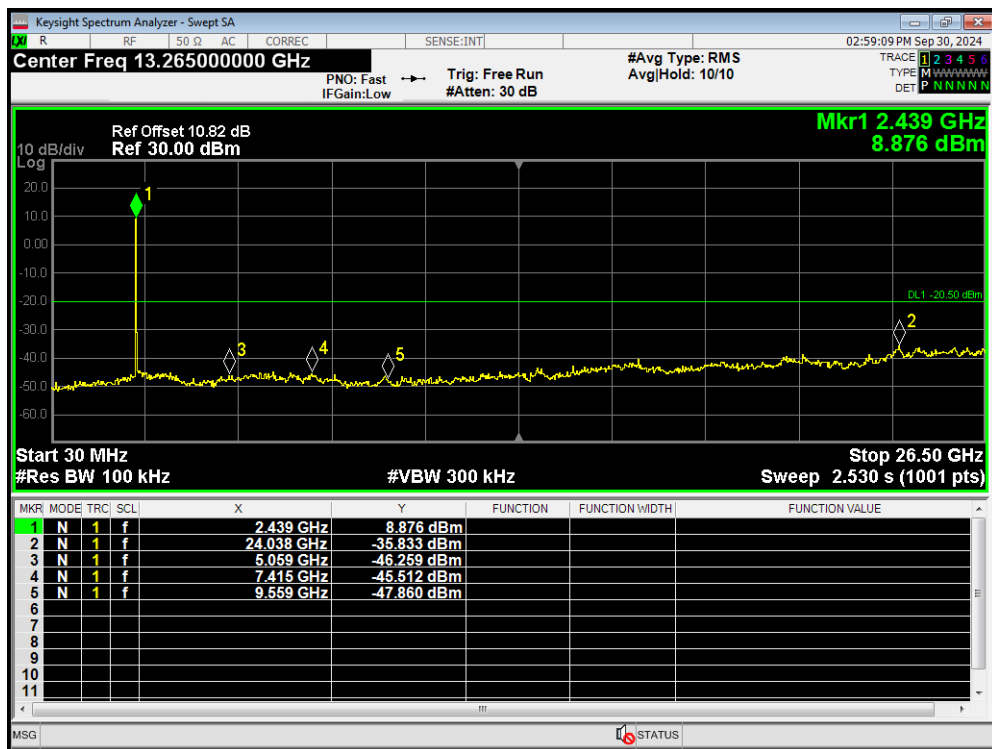
Tx. Spurious 802.11b 2412MHz Emission



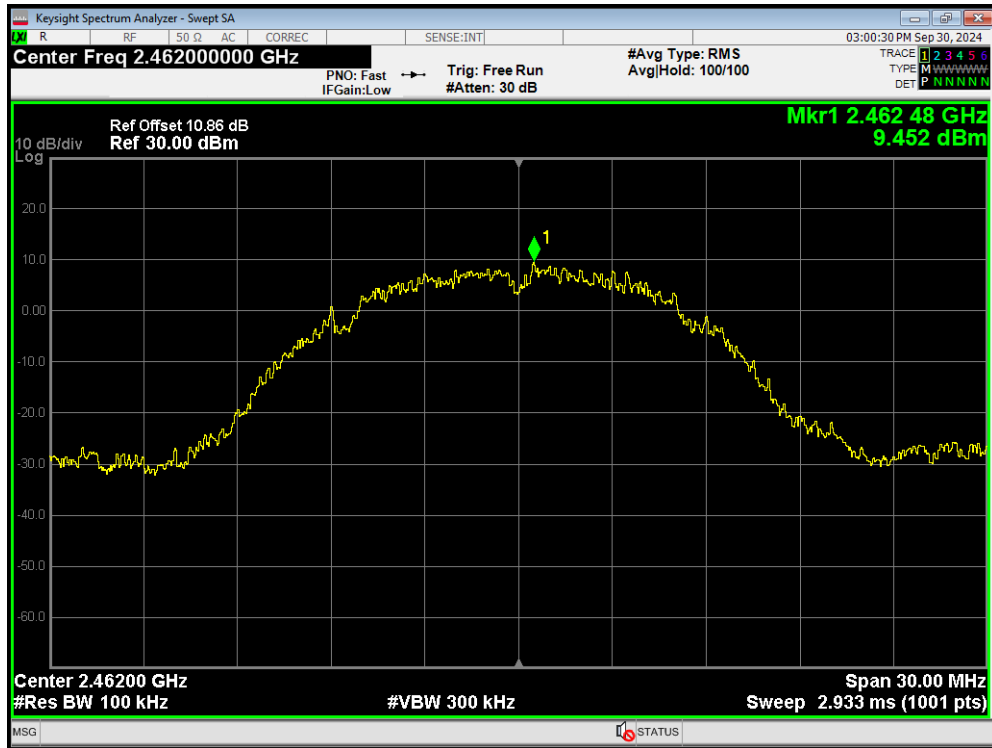
Tx. Spurious 802.11b 2437MHz Ref



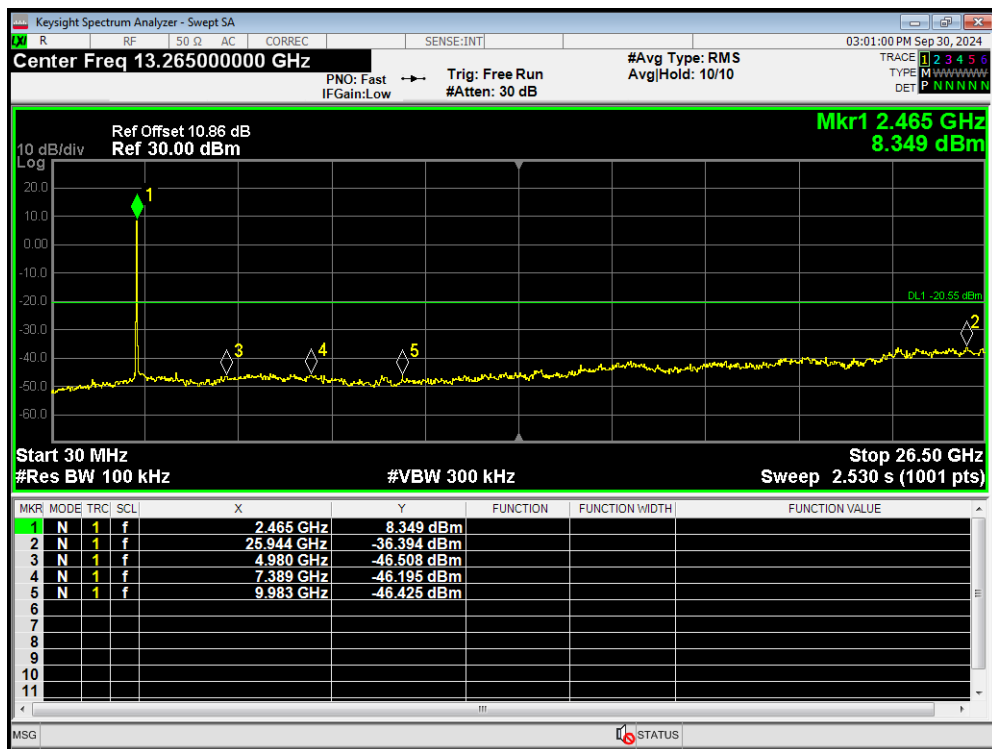
Tx. Spurious 802.11b 2437MHz Emission



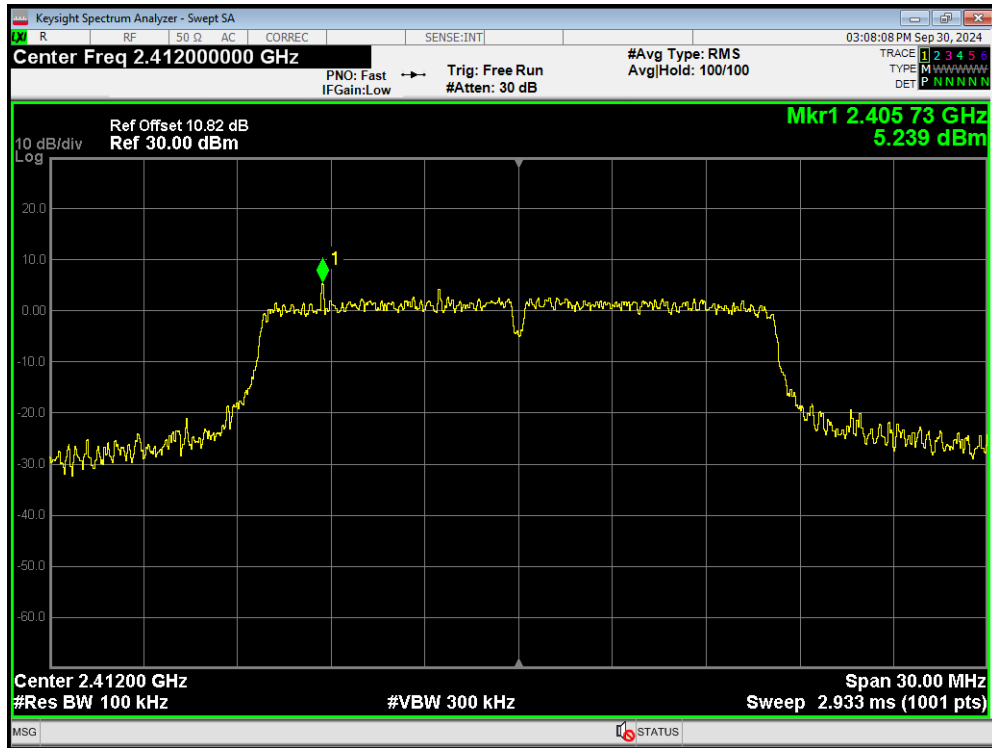
Tx. Spurious 802.11b 2462MHz Ref



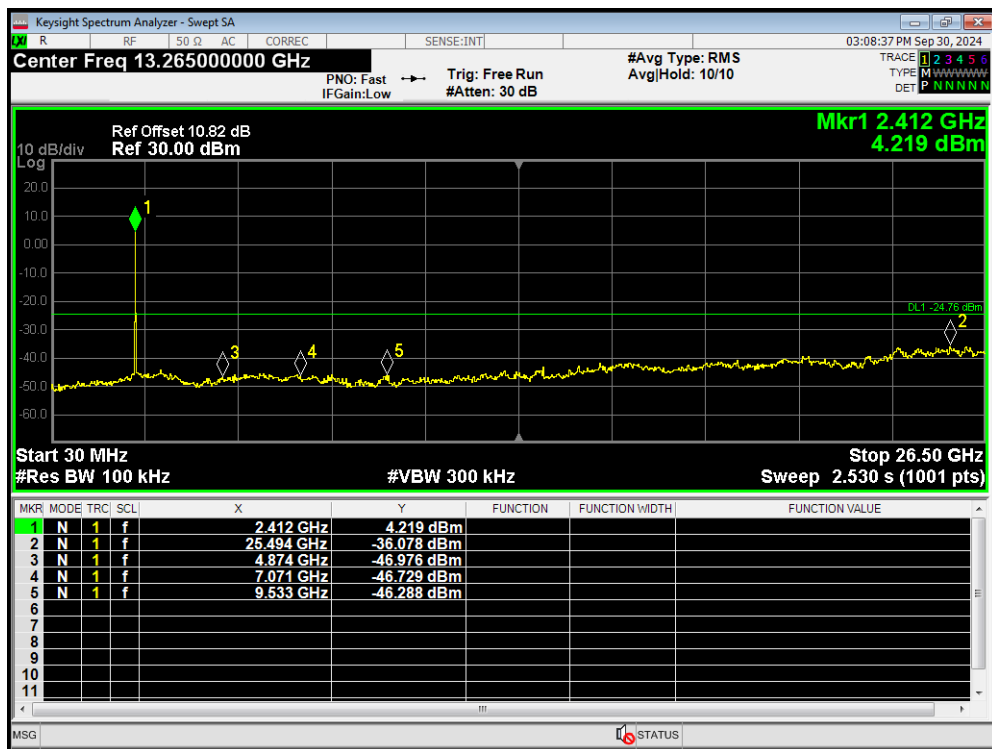
Tx. Spurious 802.11b 2462MHz Emission



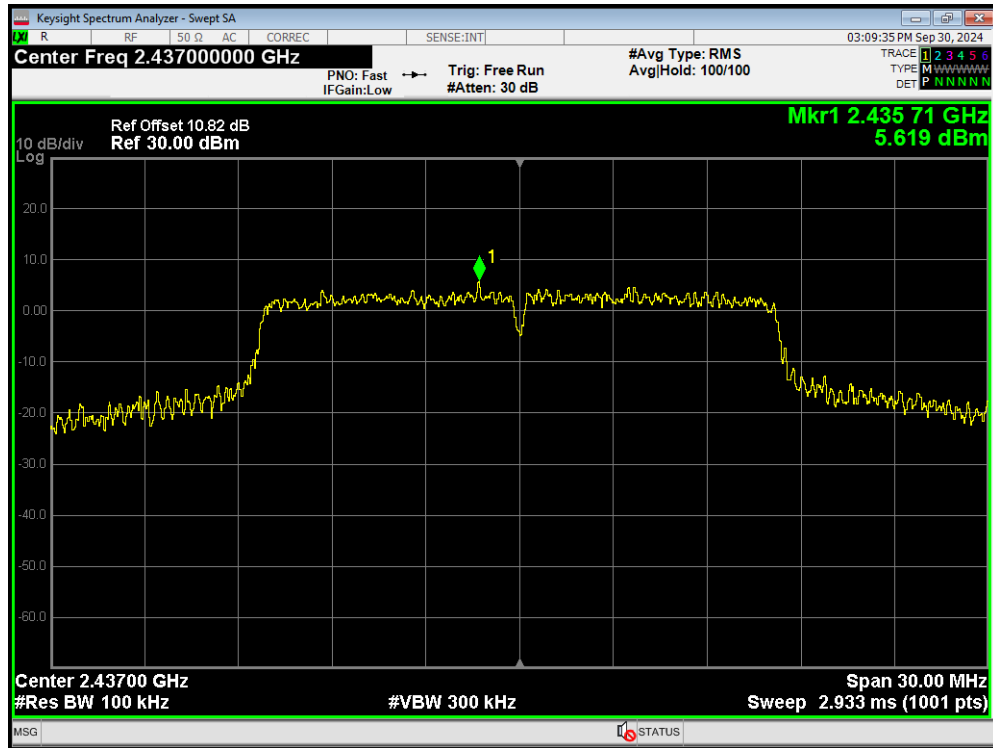
Tx. Spurious 802.11g 2412MHz Ref



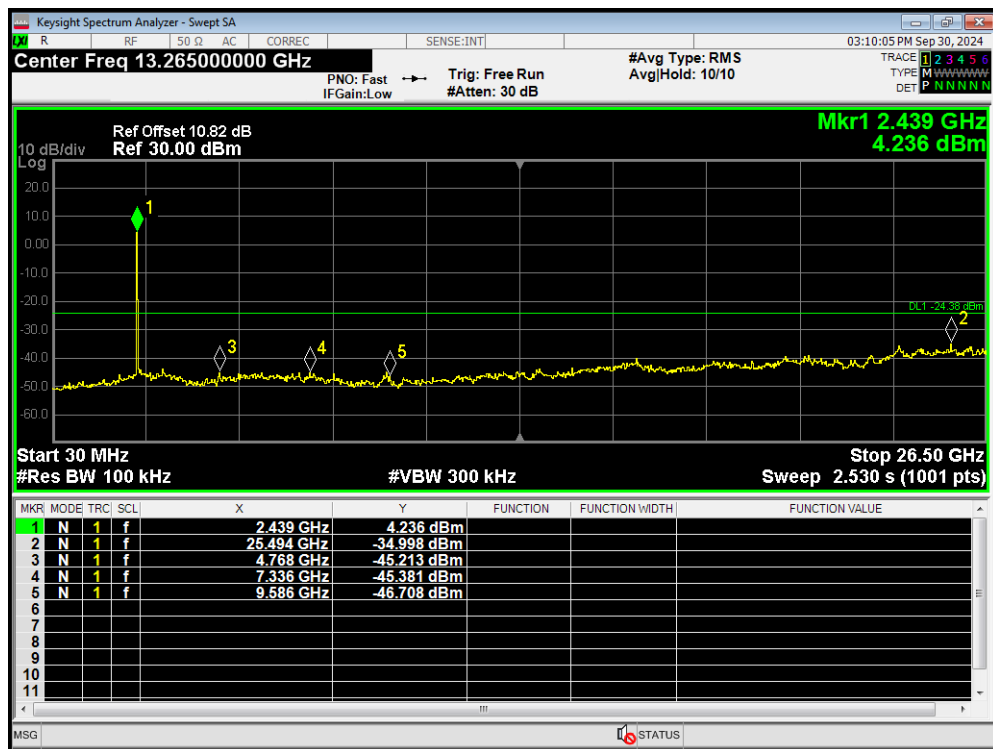
Tx. Spurious 802.11g 2412MHz Emission



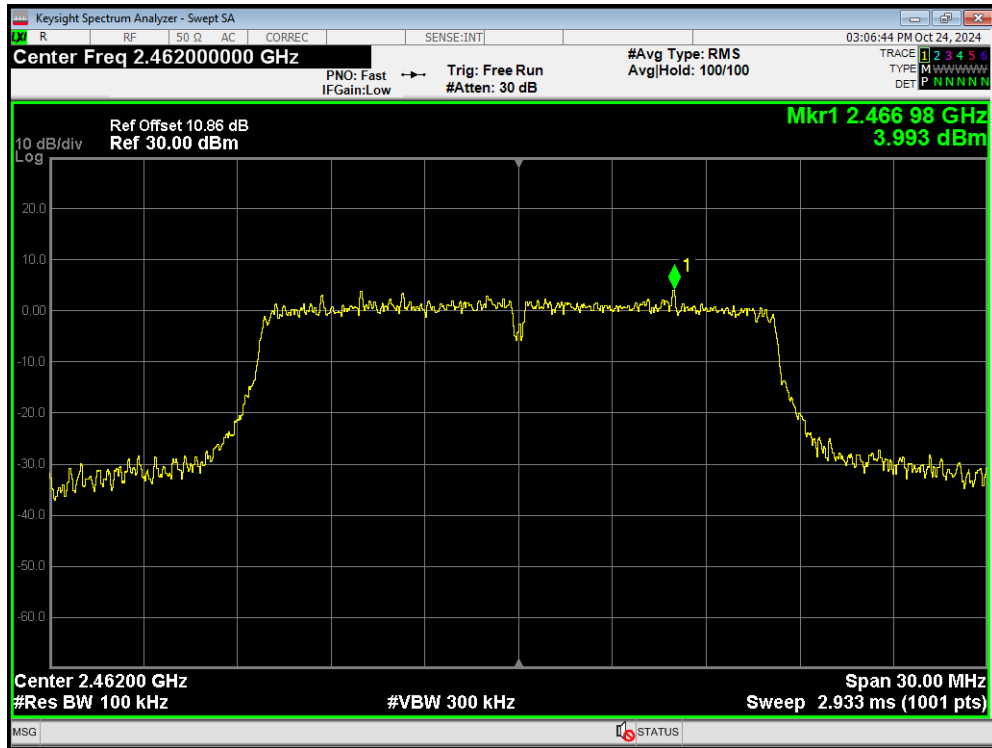
Tx. Spurious 802.11g 2437MHz Ref



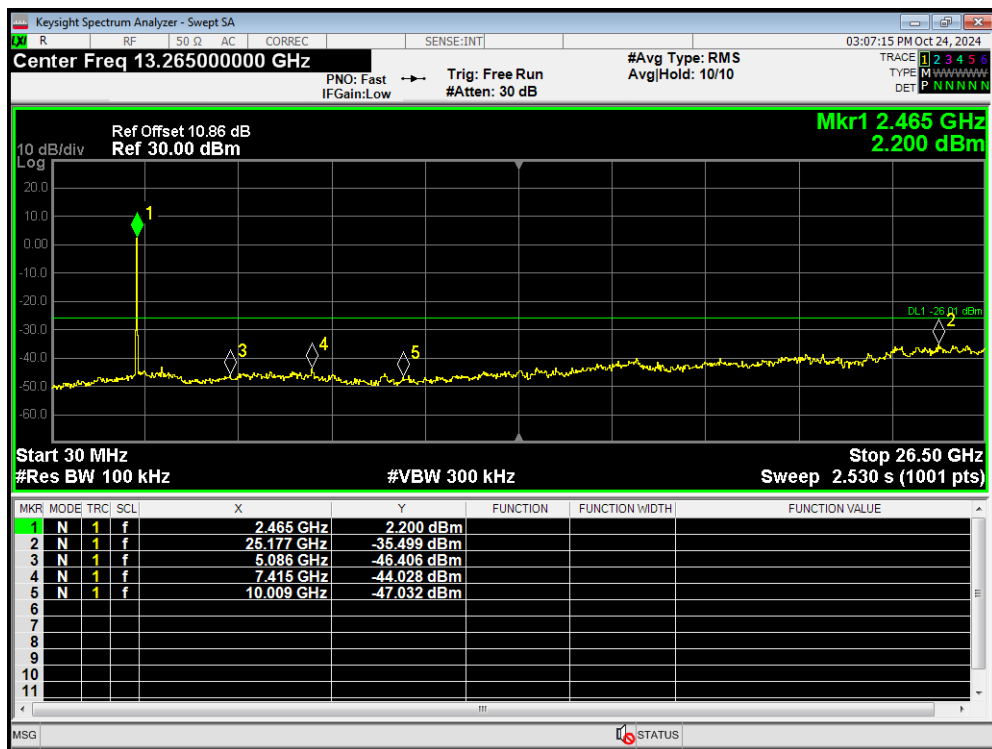
Tx. Spurious 802.11g 2437MHz Emission



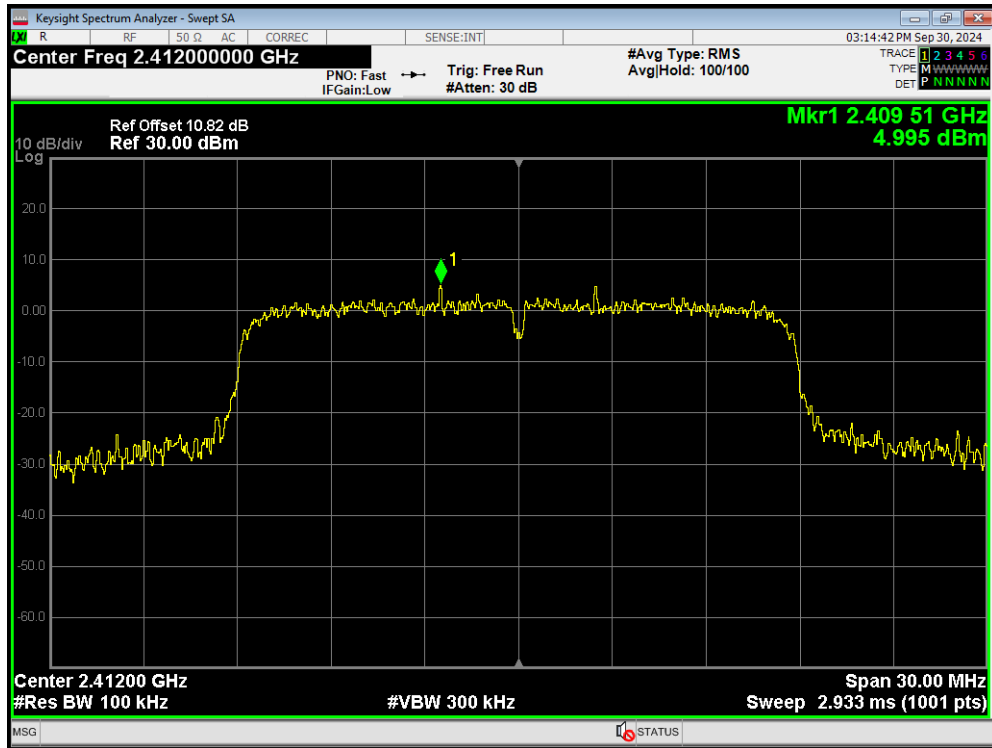
Tx. Spurious 802.11g 2462MHz Ref



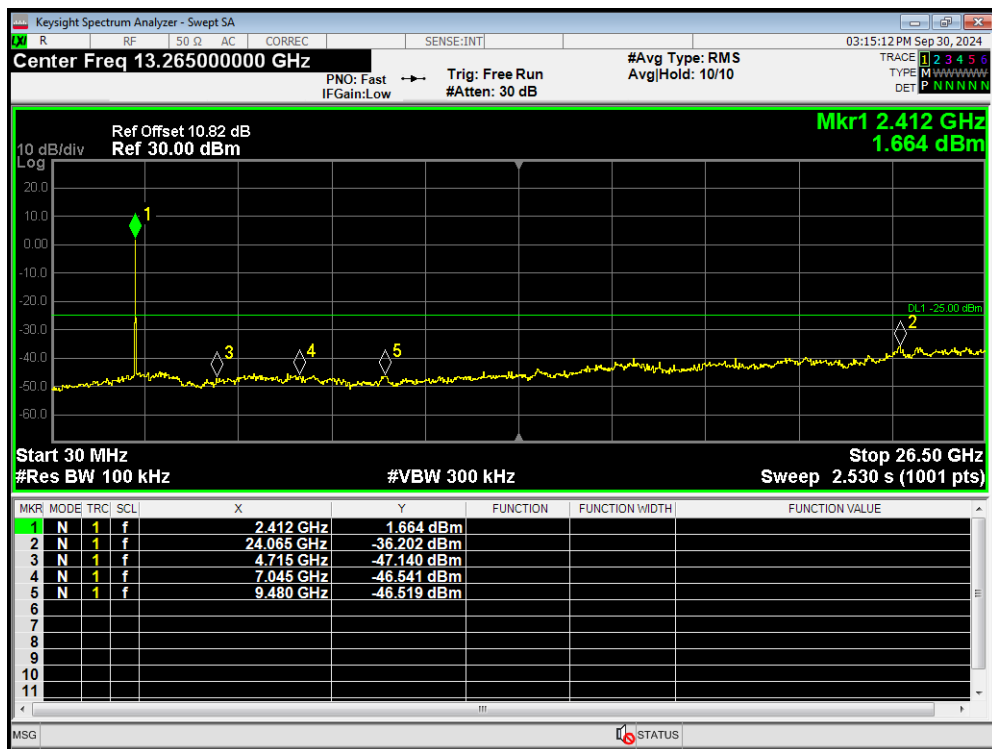
Tx. Spurious 802.11g 2462MHz Emission



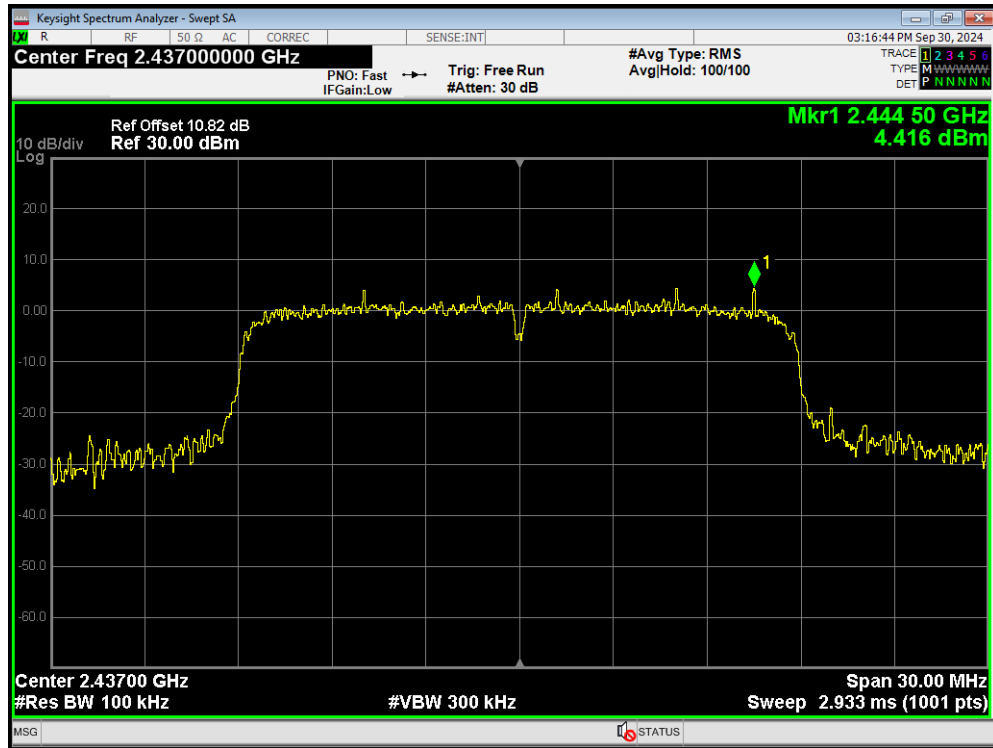
Tx. Spurious 802.11n(HT20) 2412MHz Ref



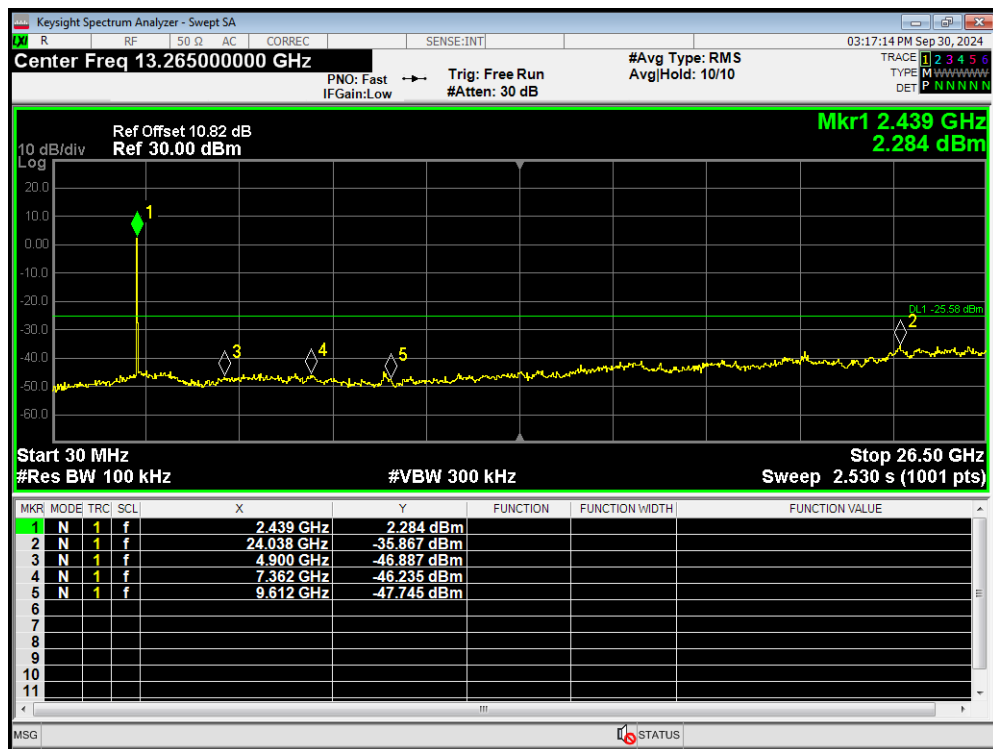
Tx. Spurious 802.11n(HT20) 2412MHz Emission



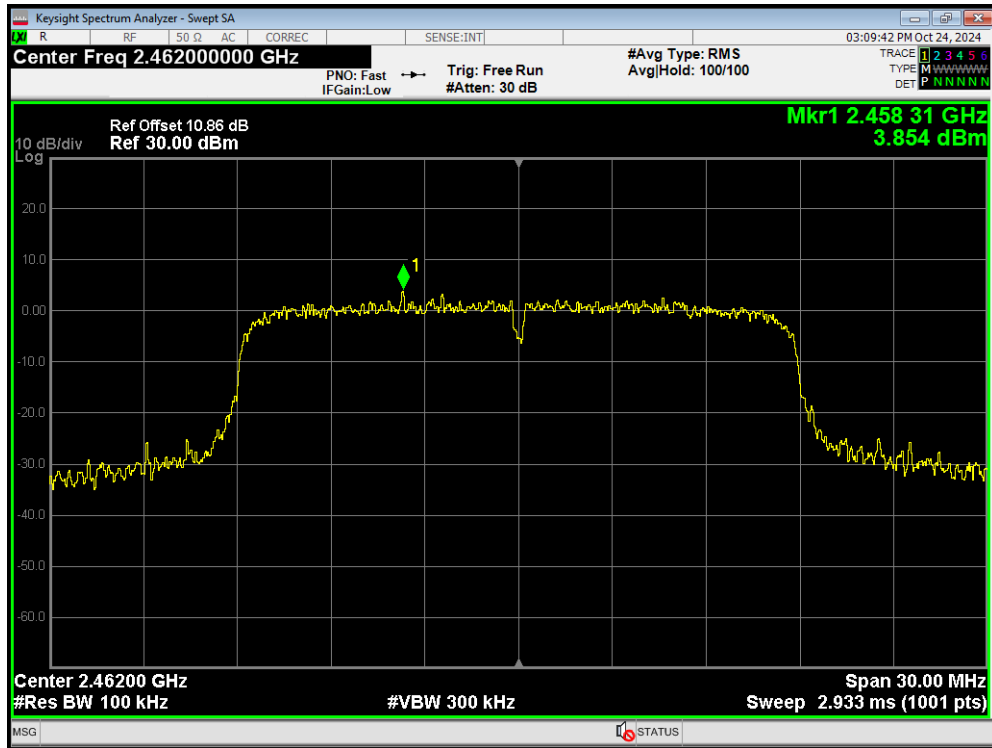
Tx. Spurious 802.11n(HT20) 2437MHz Ref



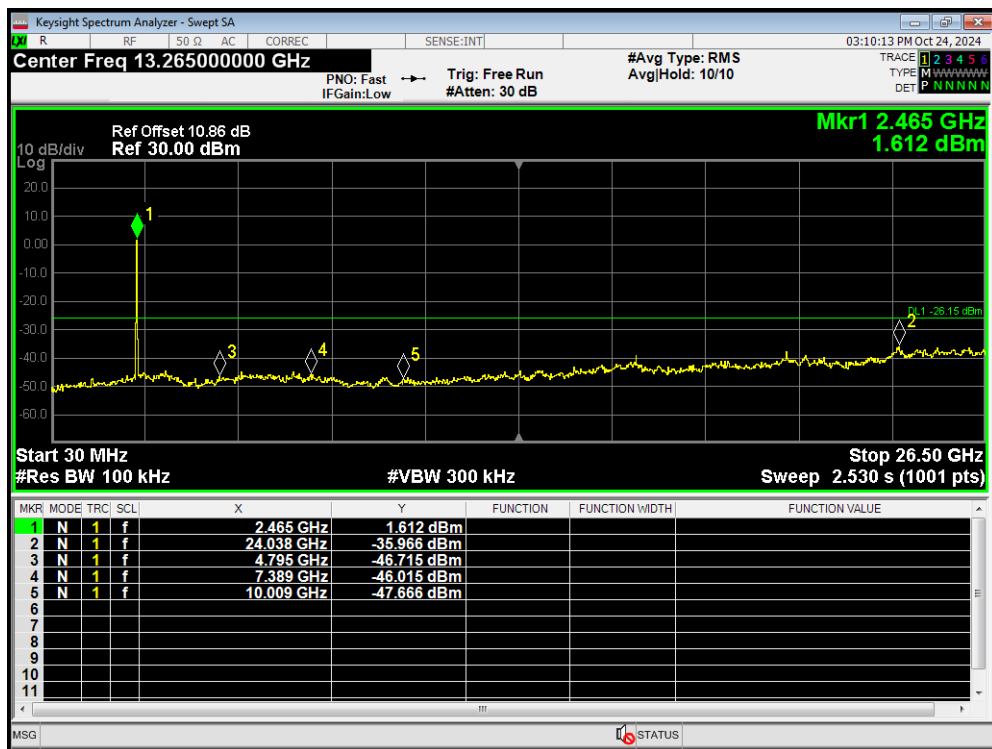
Tx. Spurious 802.11n(HT20) 2437MHz Emission



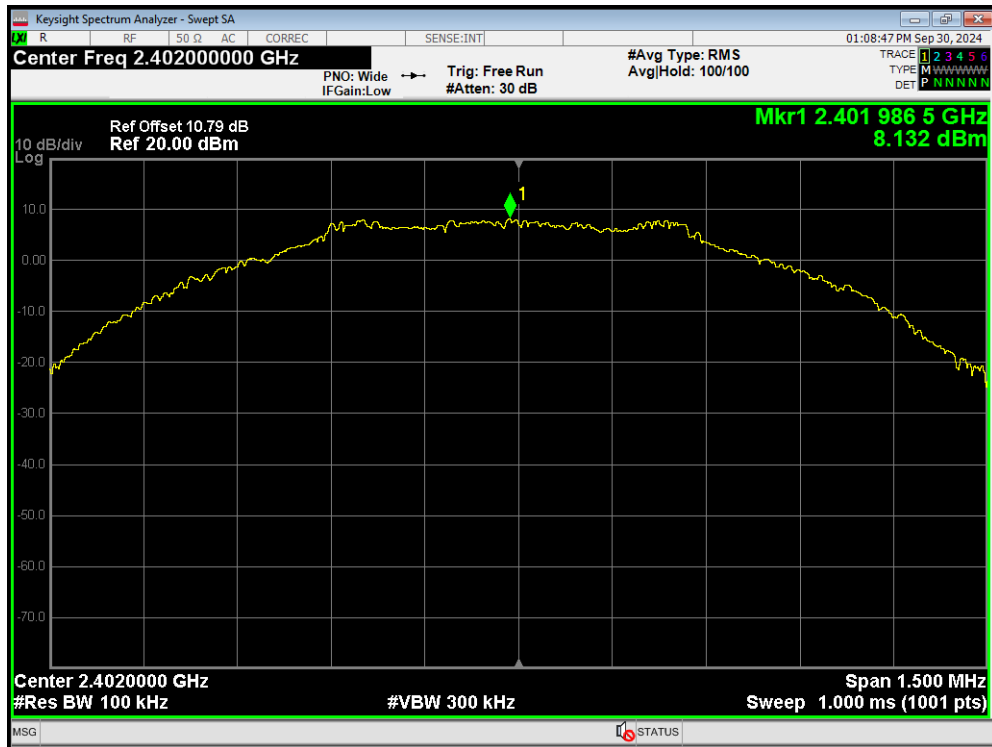
Tx. Spurious 802.11n(HT20) 2462MHz Ref



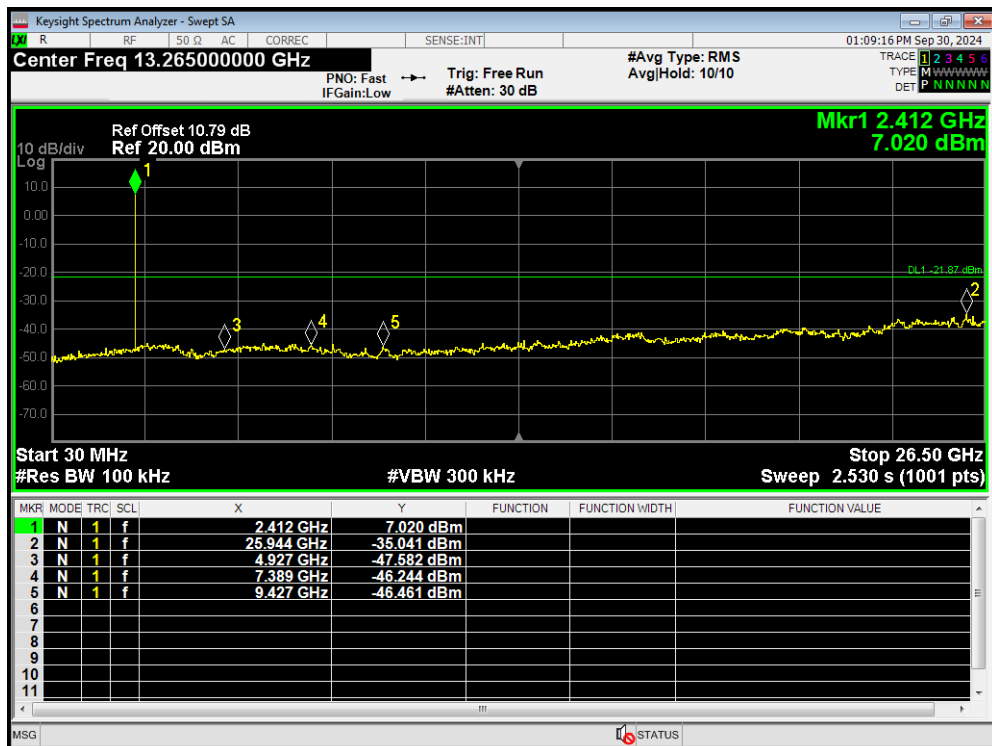
Tx. Spurious 802.11n(HT20) 2462MHz Emission



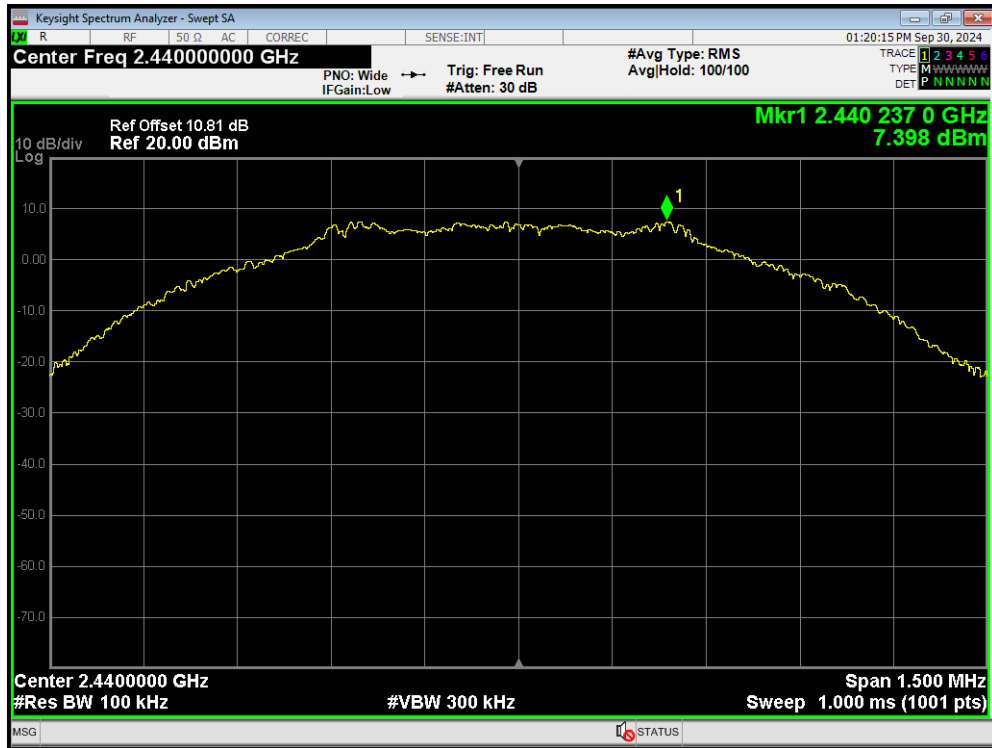
Tx. Spurious Bluetooth LE (1M) 2402MHz Ref



Tx. Spurious Bluetooth LE (1M) 2402MHz Emission



Tx. Spurious Bluetooth LE (1M) 2440MHz Ref



Tx. Spurious Bluetooth LE (1M) 2440MHz Emission

