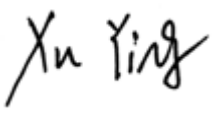
RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd.
FCC ID	XMR2023FCS940R
Product	Wi-Fi & Bluetooth Module
Brand	Quectel
Model	FCS940R
Report No.	R2303A0354-R1
Issue Date	May 15, 2023

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



Prepared by: Xu Ying

Approved by: Xu Kai

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TABLE OF CONTENT

Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	Maximum output power	15.247(b)(3)	PASS
2	99% Bandwidth and 6dB Bandwidth	15.247(a)(2) C63.10 6.9	PASS
3	Power spectral density	15.247(e)	PASS
4	Band Edge	15.247(d)	PASS
5	Spurious RF Conducted Emissions	15.247(d)	PASS
6	Unwanted Emissions	15.247(d),15.205,15.209	PASS
7	Conducted Emissions	15.207	PASS
Date of Testing: April 11, 2023 ~ May 11, 2023 Date of Sample Received: April 10, 2023			
Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

1. Test Laboratory

1.1. Notes of the Test Report

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

1.2. Test Facility

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

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

A2LA (Certificate Number: 3857.01)

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

1.3. Testing Location

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

2. General Description of Equipment Under Test

2.1. Applicant and Manufacturer Information

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

2.2. General Information

EUT Description	
Model	FCS940R
SN	E1N23BH11000061
Hardware Version	R1.0
Software Version	NA
Power Supply	External power supply
Antenna Type	External Antenna
Antenna Connector	SMA Male (Center Pin) (meet with the standard FCC Part 15.203 requirement)
additional beamforming gain	NA
Operating Frequency Range(s)	802.11b/g/n(HT20: 2412 ~ 2462 MHz 802.11n(HT40): 2422 ~ 2452 MHz Bluetooth LE V4.2: 2402 ~2480 MHz
Modulation Type	802.11b: DSSS 802.11g/n(HT20/HT40): OFDM Bluetooth LE: GFSK
Max. Output Power	Wi-Fi 2.4G: 18.85 dBm Bluetooth LE: 6.50 dBm
Auxiliary test equipment	
Antenna	Manufacturer: Quectel Wireless Solutions Co., Ltd. Model: YE0038AA Brand: Quectel Antenna Gain: 0.73dBi
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.	

3. Applied Standards

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

Test standards:

FCC CFR47 Part 15C (2022) Radio Frequency Devices

ANSI C63.10-2013

Reference standard:

KDB 558074 D01 15.247 Meas Guidance v05r02

4. Test Configuration

Test Mode

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

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

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

Worst-case data rates are shown as following table.

Test Mode	Data Rate
Bluetooth(Low Energy)	1Mbps
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0

5. Test Case Results

5.1. Maximum output power

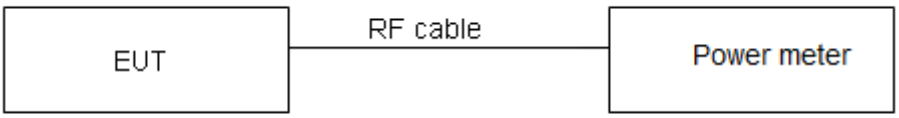
Ambient Condition

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

Methods of Measurement

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

Test Setup



Limits

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

Average Output Power	≤ 1W (30dBm)

Measurement Uncertainty

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

Test Results

Power Index					
Channel	**802.11b**	**802.11g**	**802.11n HT20**	**Channel**	**802.11n HT40**
CH1	45	43	41	**CH3**	37
CH2	/	49	49	**CH4**	39
CH3	/	53	/	**CH5**	43
CH4	/	54	/	**CH6**	42
CH6	44	53	48	**CH7**	40
CH8	/	53	/	**CH8**	35
CH9	/	51	/	**CH9**	30
CH10	/	49	47	**/**	/
CH11	43	40	36	**/**	/
Bluetooth LE	0x21				

Test Mode	Duty cycle	Duty cycle correction Factor(dB)
802.11b	0.99	0.00
802.11g	0.97	0.13
802.11n HT20	0.92	0.35
802.11n HT40	0.92	0.35
Bluetooth LE	0.63	2.00
Note: when Duty cycle⩾0.98, Duty cycle correction Factor not required.		

Test Mode	Carrier frequency (MHz))/ Channel	Average Power Measured (dBm)	Average Power with duty factor (dBm)	Limit (dBm)	Conclusion
802.11b	2412/CH1	17.97	17.97	30	PASS
	2437/CH6	18.08	18.08	30	PASS
	2462/CH11	17.75	17.75	30	PASS
802.11g	2412/CH1	13.82	13.95	30	PASS
	2417/CH2	16.83	16.96	30	PASS
	2422/CH3	18.44	18.57	30	PASS
	2427/CH4	18.72	18.85	30	PASS
	2437/CH6	17.72	17.85	30	PASS
	2447/CH8	18.35	18.48	30	PASS
	2452/CH9	17.65	17.78	30	PASS
	2457/CH10	16.77	16.90	30	PASS
	2462/CH11	12.53	12.66	30	PASS
802.11n HT20	2412/CH1	12.73	13.08	30	PASS
	2417/CH2	16.56	16.91	30	PASS
	2437/CH6	15.65	16.00	30	PASS
	2457/CH10	15.86	16.21	30	PASS
	2462/CH11	11.13	11.48	30	PASS
802.11n HT40	2422/CH3	10.99	11.34	30	PASS
	2427/CH4	11.71	12.06	30	PASS
	2432/CH5	13.71	14.06	30	PASS
	2437/CH6	13.47	13.82	30	PASS
	2442/CH7	12.41	12.76	30	PASS
	2447/CH8	10.36	10.71	30	PASS
	2452/CH9	7.93	8.28	30	PASS
Bluetooth (Low Energy)	2402/CH0	4.27	6.26	30	PASS
	2440/CH19	4.50	6.50	30	PASS
	2480/CH39	4.31	6.31	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

5.2. 99% Bandwidth and 6dB Bandwidth

Ambient Condition

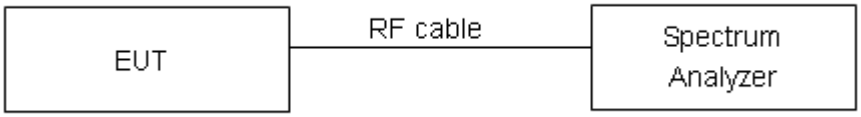
Temperature	Relative humidity
20°C ~25°C	45%~50%

Method of Measurement

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

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

Test Setup



Limits

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

minimum 6 dB bandwidth	≥ 500 kHz

Measurement Uncertainty

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

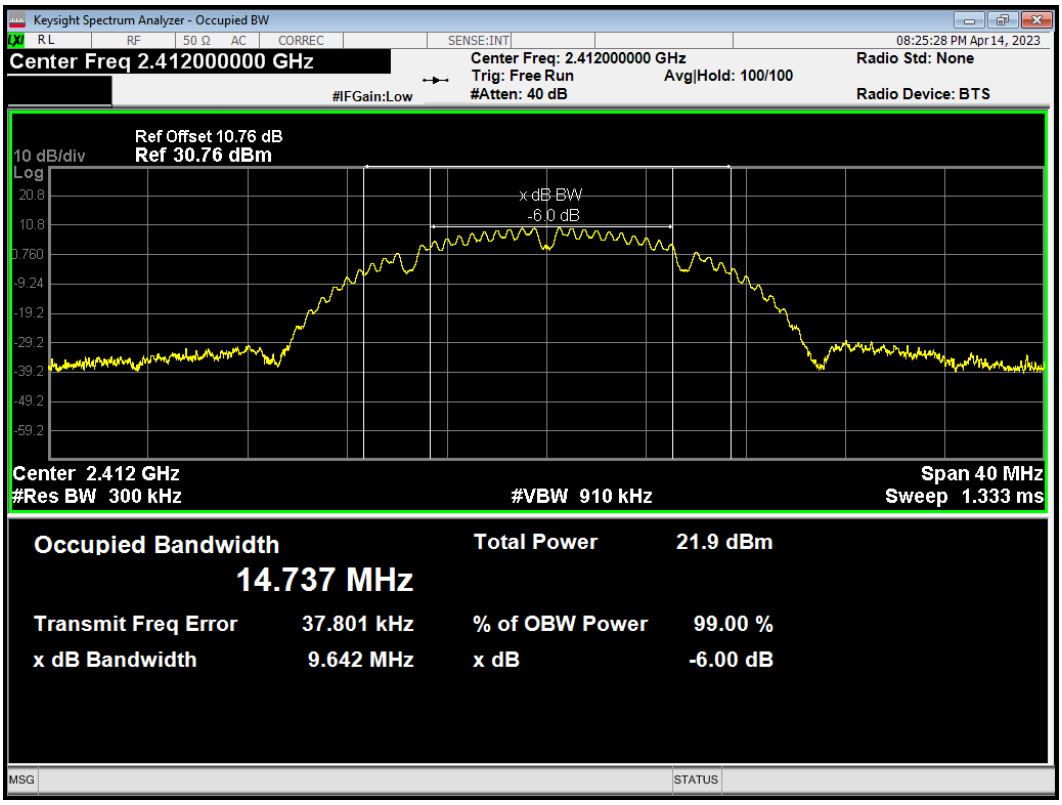
Test Results:

Test Mode	Carrier frequency (MHz))/ Channel	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11b	2412/CH1	14.737	9.53	500	PASS
	2437/CH6	14.742	9.06	500	PASS
	2462/CH11	14.772	8.60	500	PASS
802.11g	2412/CH1	16.945	16.28	500	PASS
	2417/CH2	16.799	16.30	500	PASS
	2422/CH3	16.865	16.35	500	PASS
	2427/CH4	17.027	16.26	500	PASS
	2437/CH6	16.909	16.39	500	PASS
	2447/CH8	16.917	16.33	500	PASS
	2452/CH9	16.802	16.31	500	PASS
	2457/CH10	16.736	16.32	500	PASS
	2462/CH11	16.692	16.32	500	PASS
802.11n HT20	2412/CH1	17.775	16.91	500	PASS
	2417/CH2	17.840	16.93	500	PASS
	2437/CH6	17.901	17.28	500	PASS
	2457/CH10	17.799	17.31	500	PASS
	2462/CH11	17.812	16.29	500	PASS
802.11n HT40	2422/CH3	35.871	34.64	500	PASS
	2427/CH4	35.872	35.36	500	PASS
	2432/CH5	35.845	35.61	500	PASS
	2437/CH6	35.903	35.30	500	PASS
	2442/CH7	35.825	35.32	500	PASS
	2447/CH8	35.842	35.06	500	PASS
	2452/CH9	35.887	35.32	500	PASS
Bluetooth (Low Energy)	2402/CH0	1.041	0.73	500	PASS
	2440/CH19	1.046	0.69	500	PASS
	2480/CH39	1.043	0.70	500	PASS

99%bandwidth

Wi-Fi 2.4G

OBW 802.11b 2412MHz



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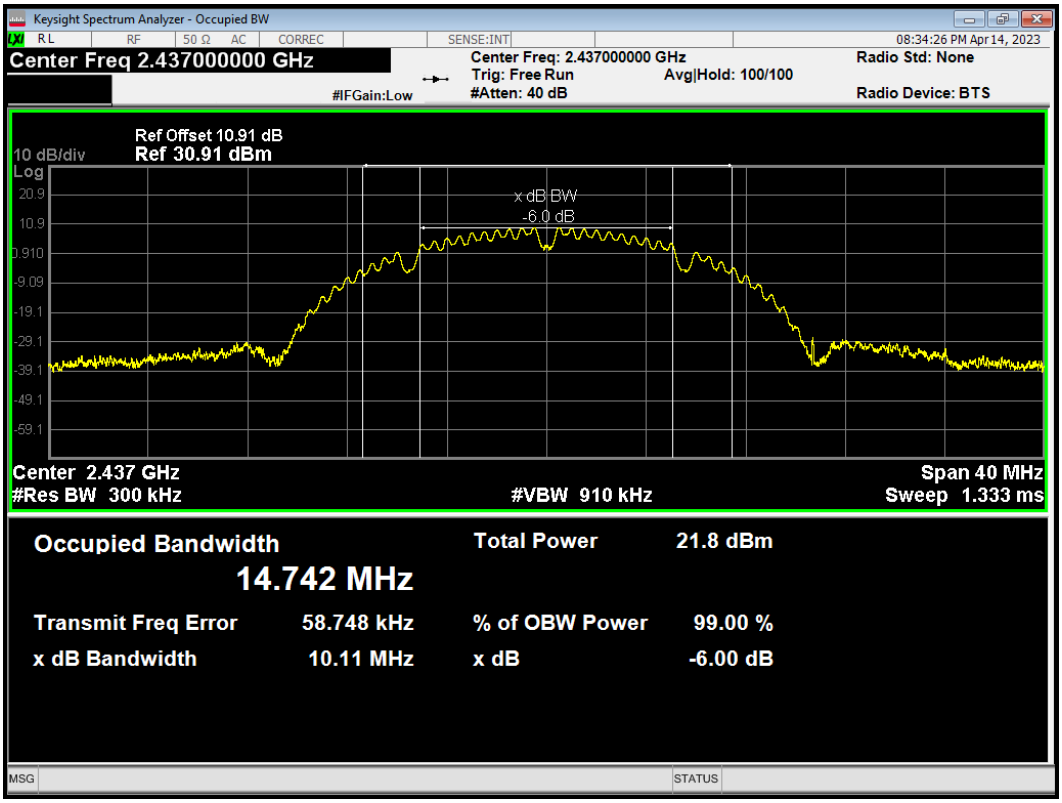
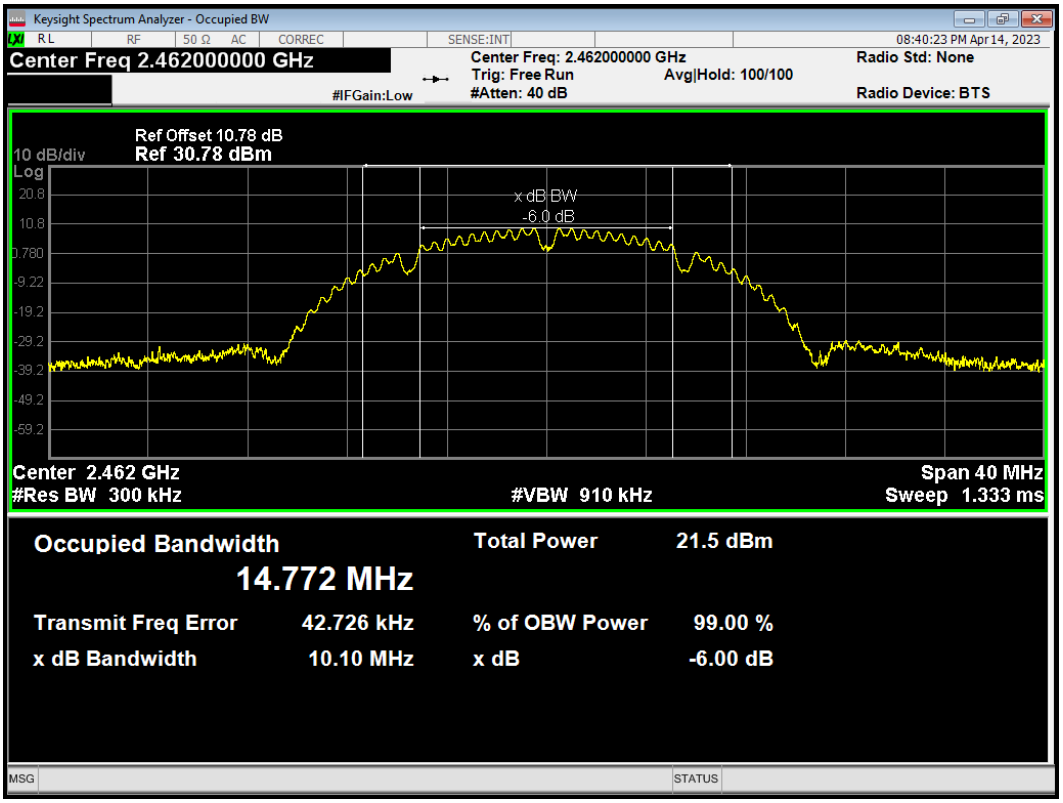
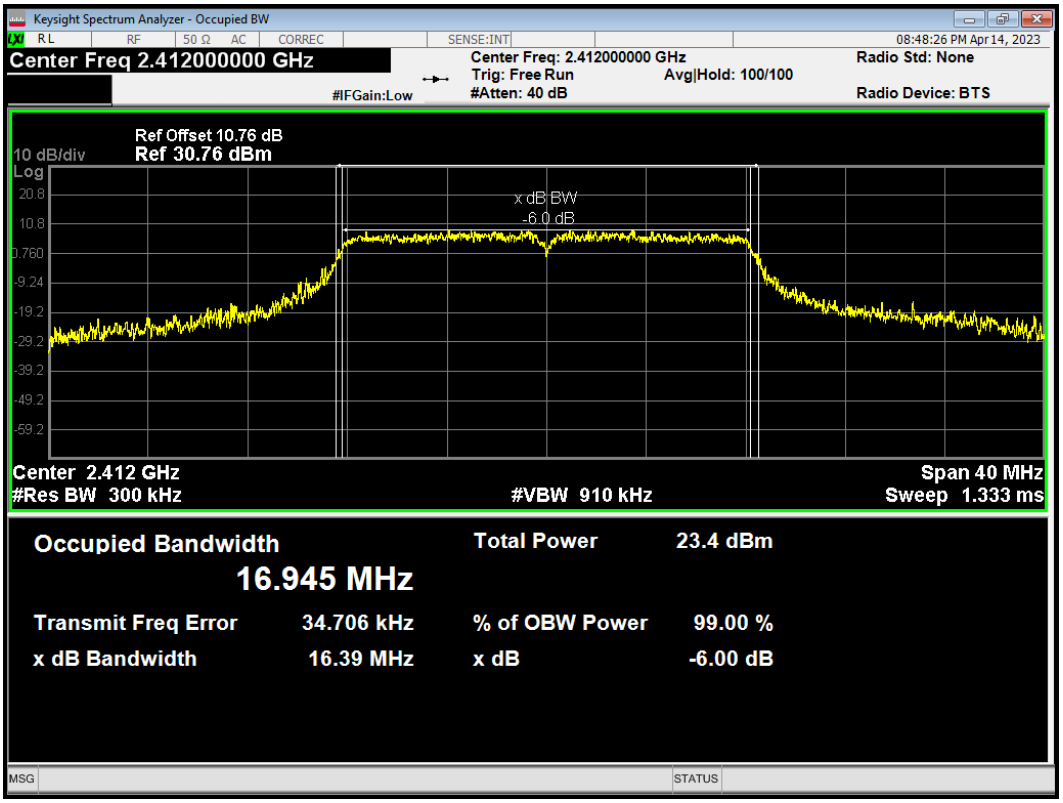


OBW 802.11b 2462MHz



OBW 802.11g 2412MHz



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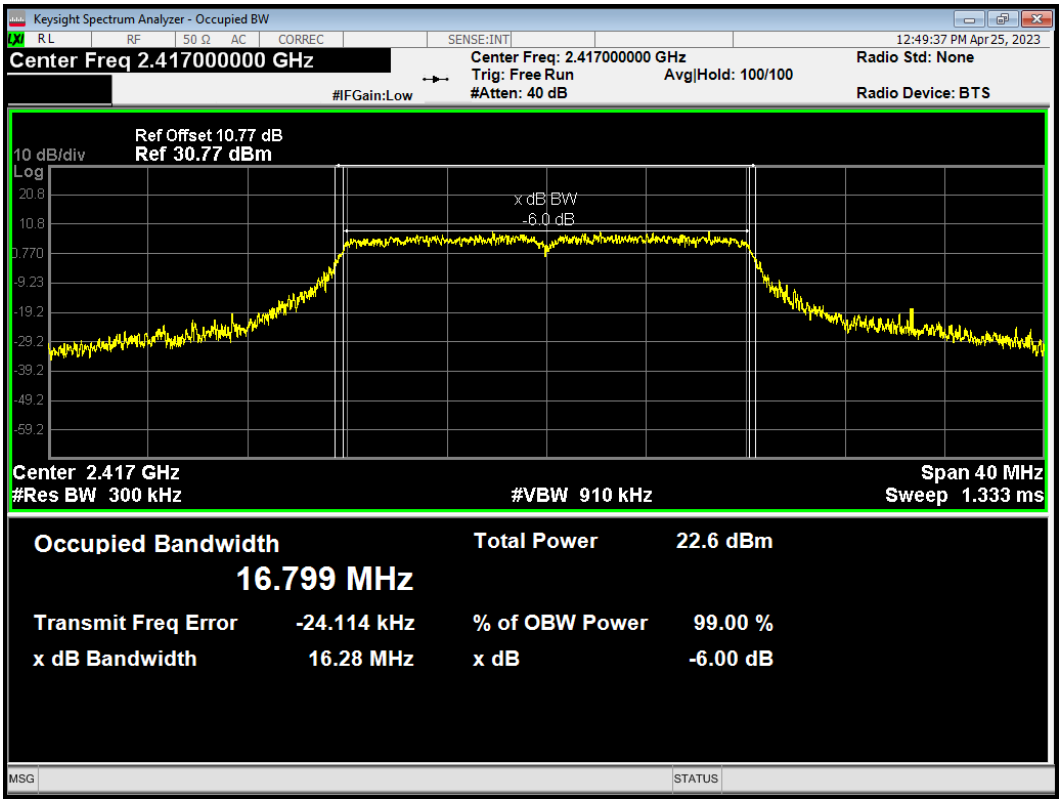

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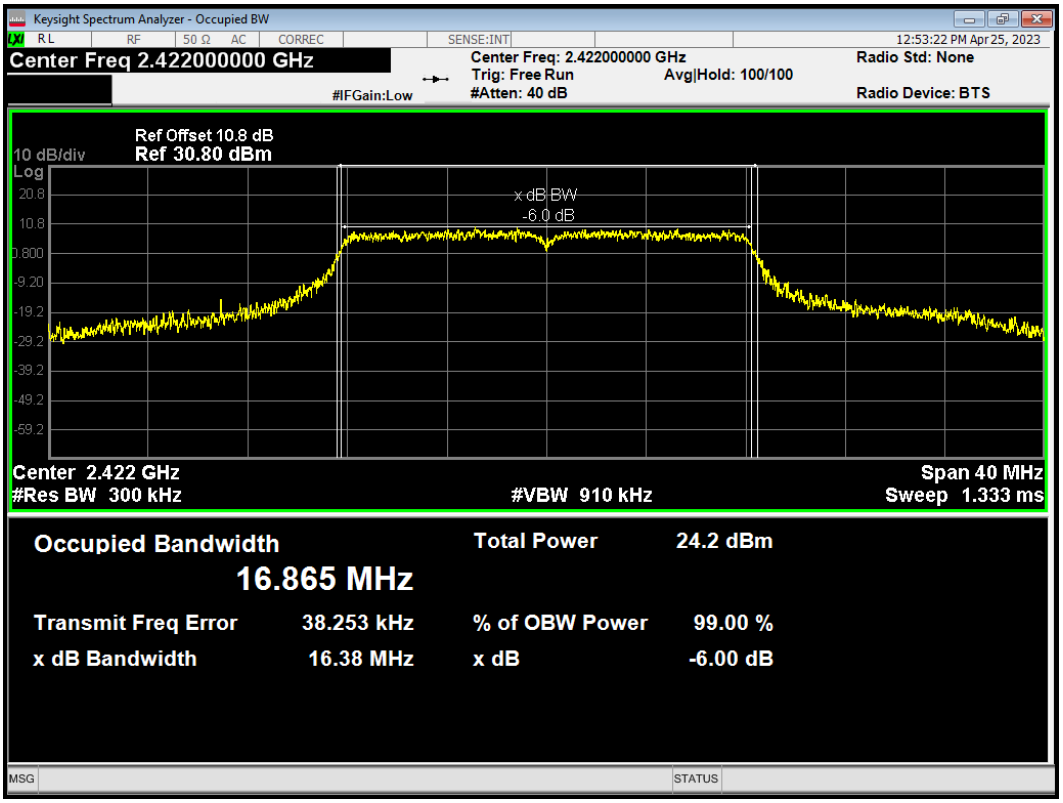

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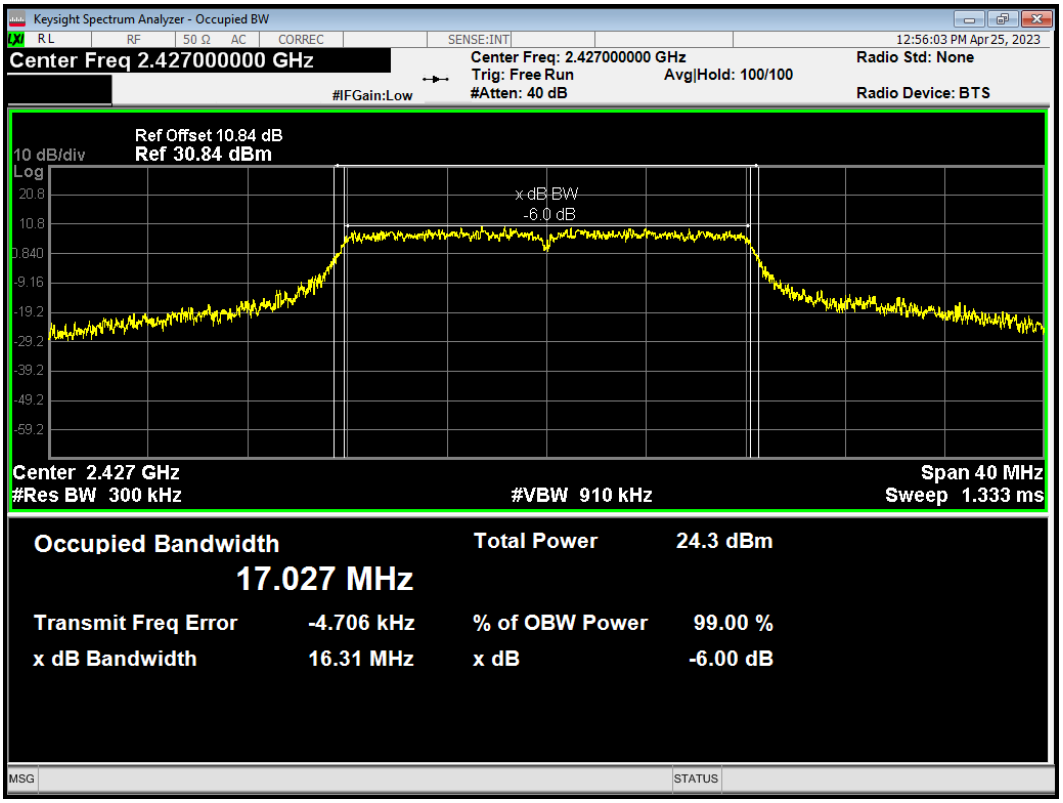
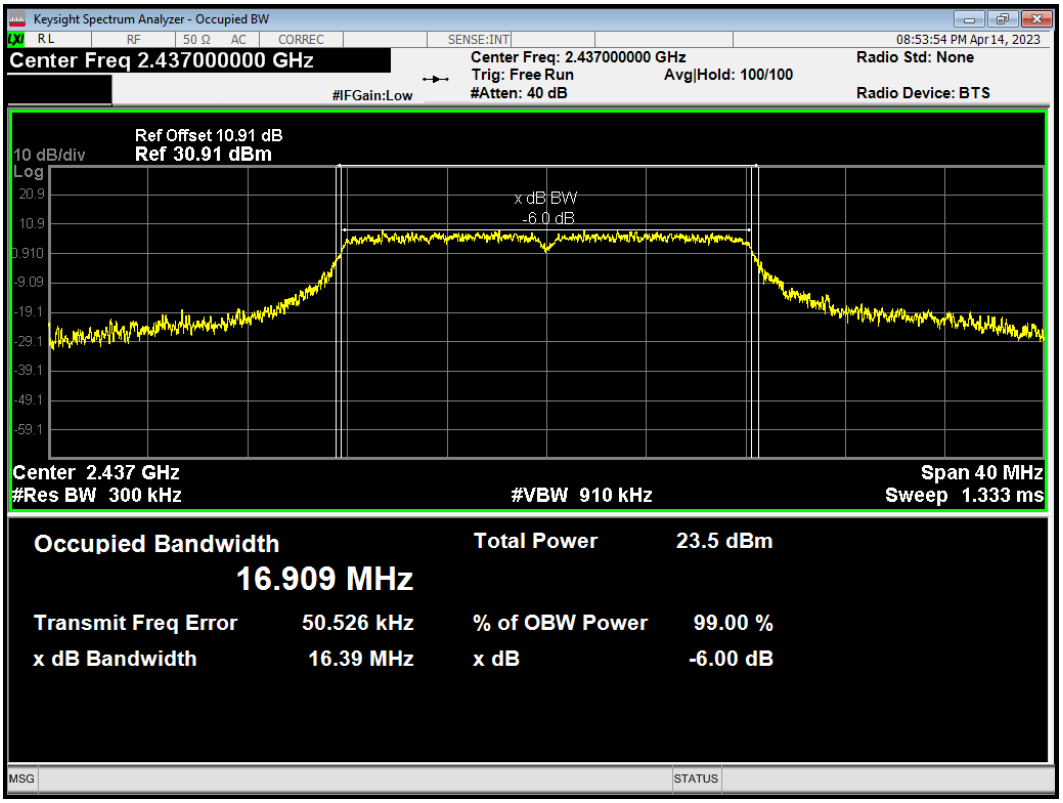


OBW 802.11g 2437MHz



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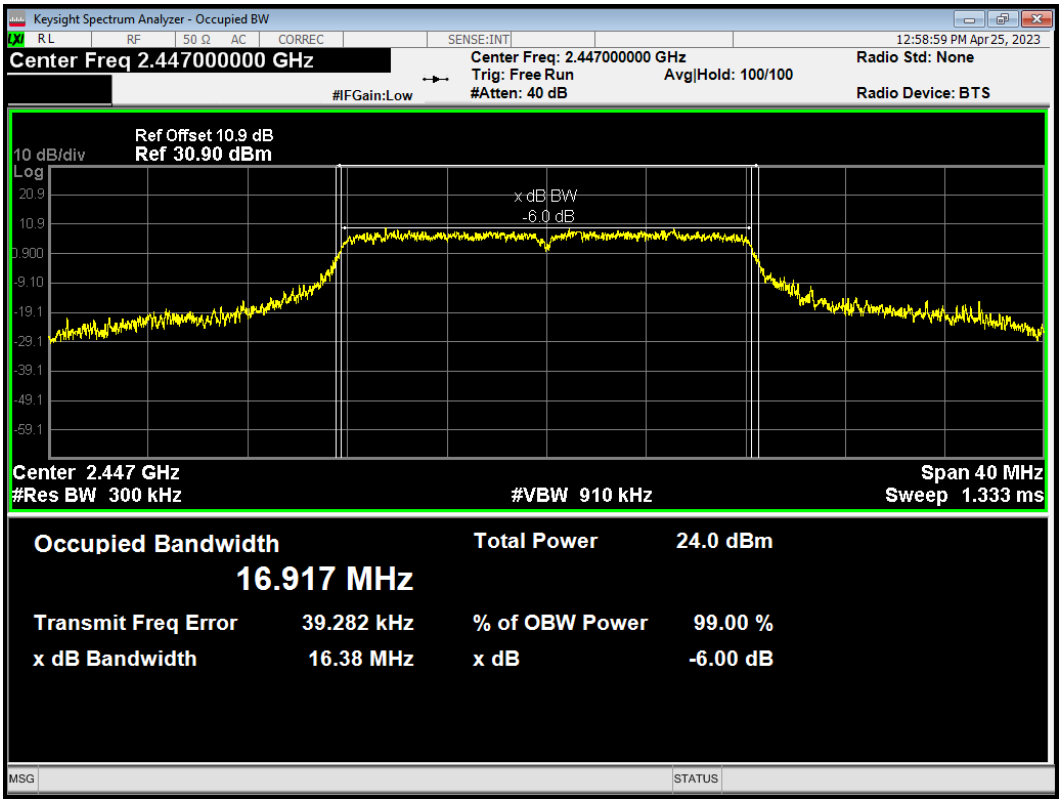

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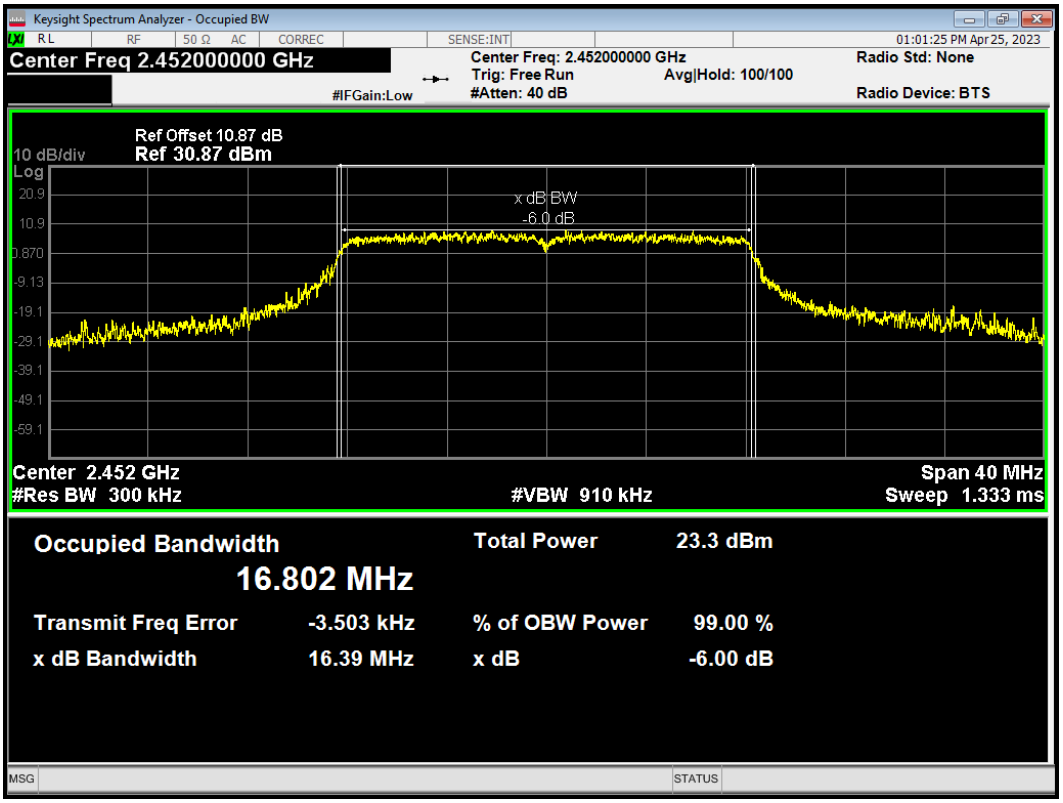
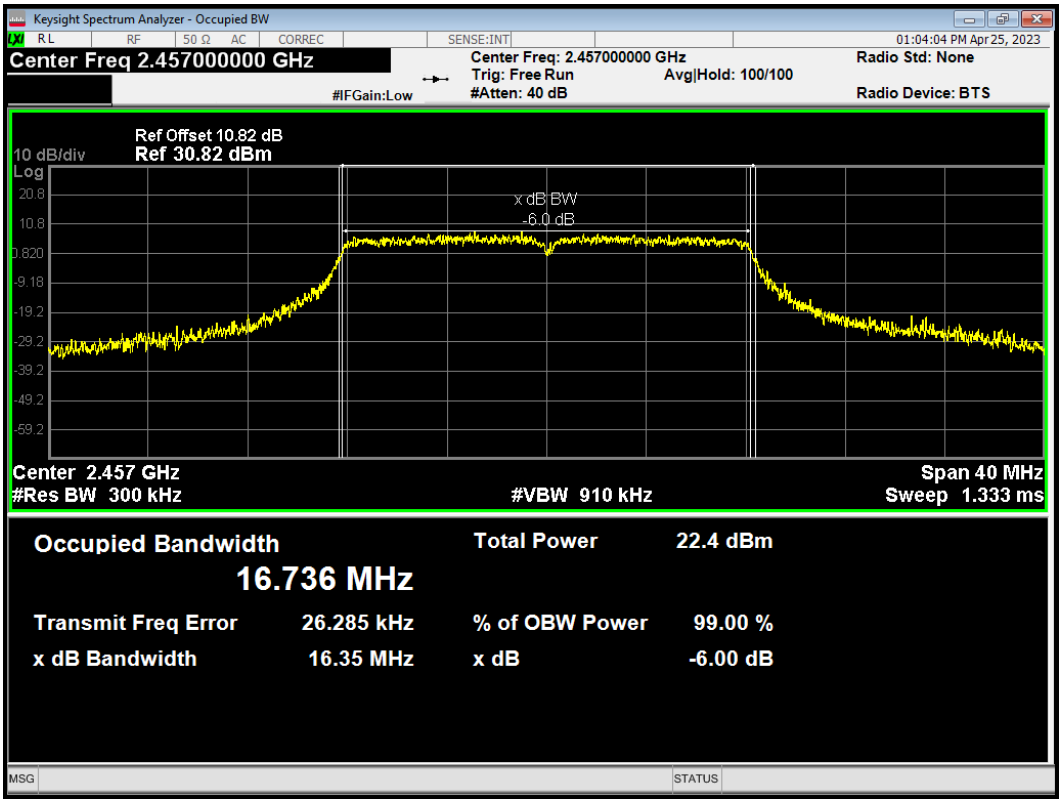
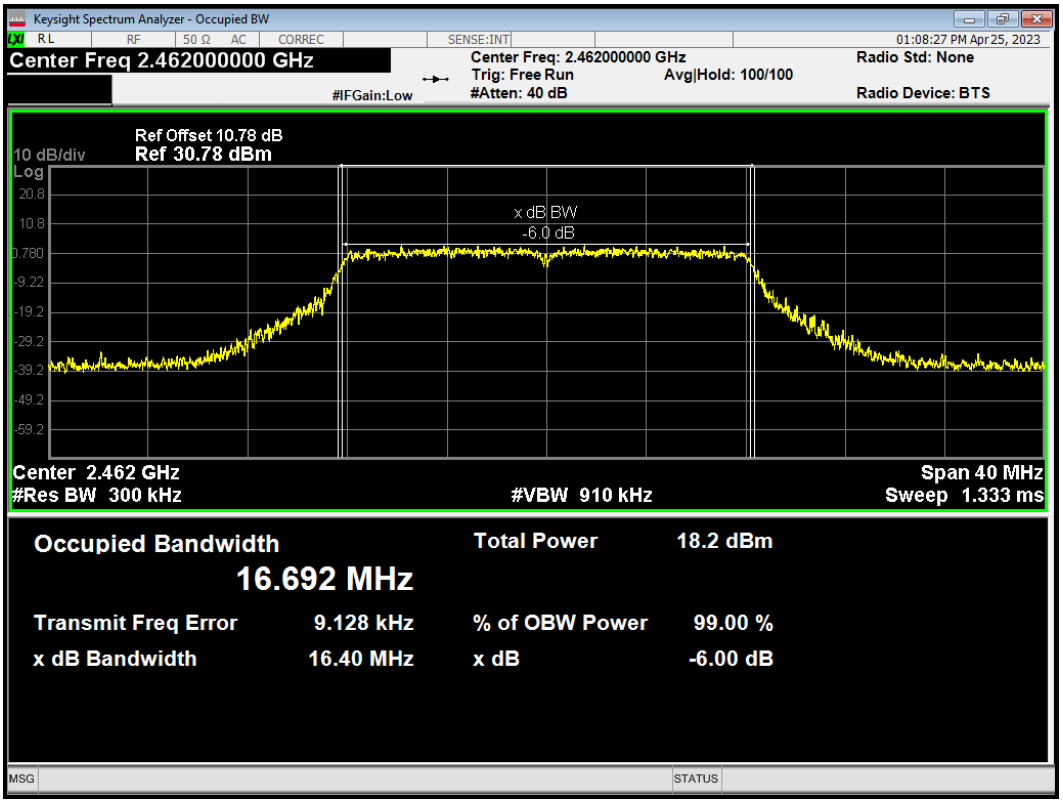


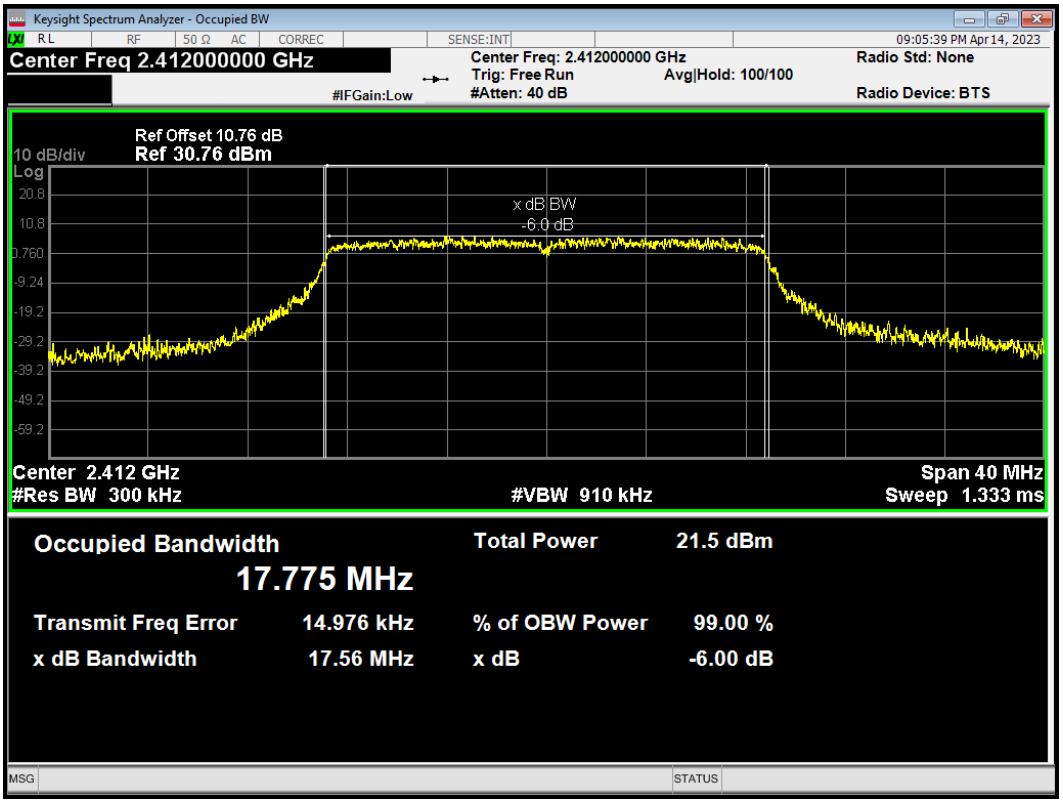
OBW 802.11g 2457MHz



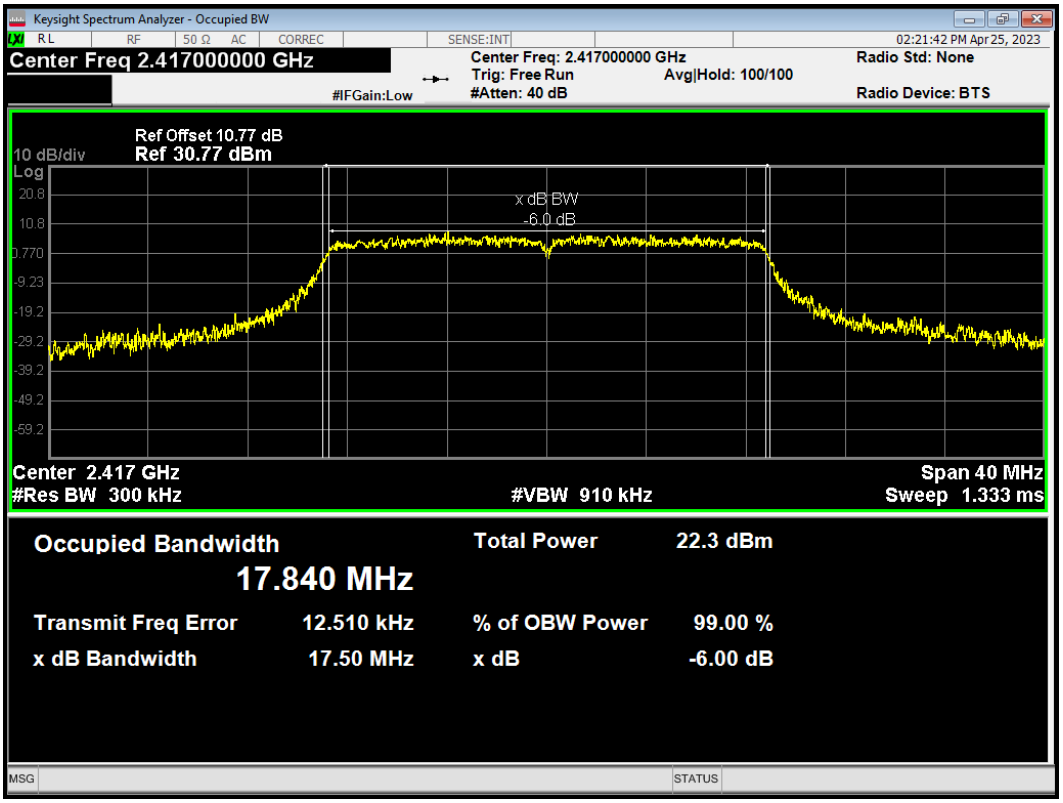
OBW 802.11g 2462MHz



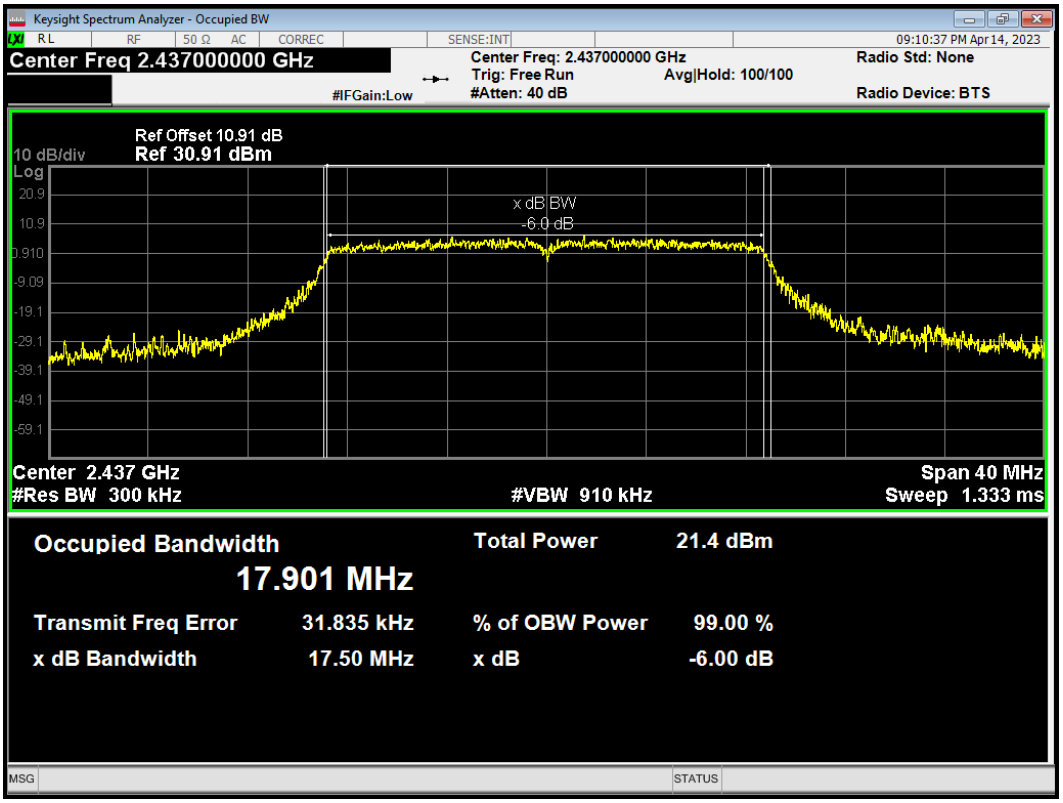
OBW 802.11n (HT20) 2412MHz



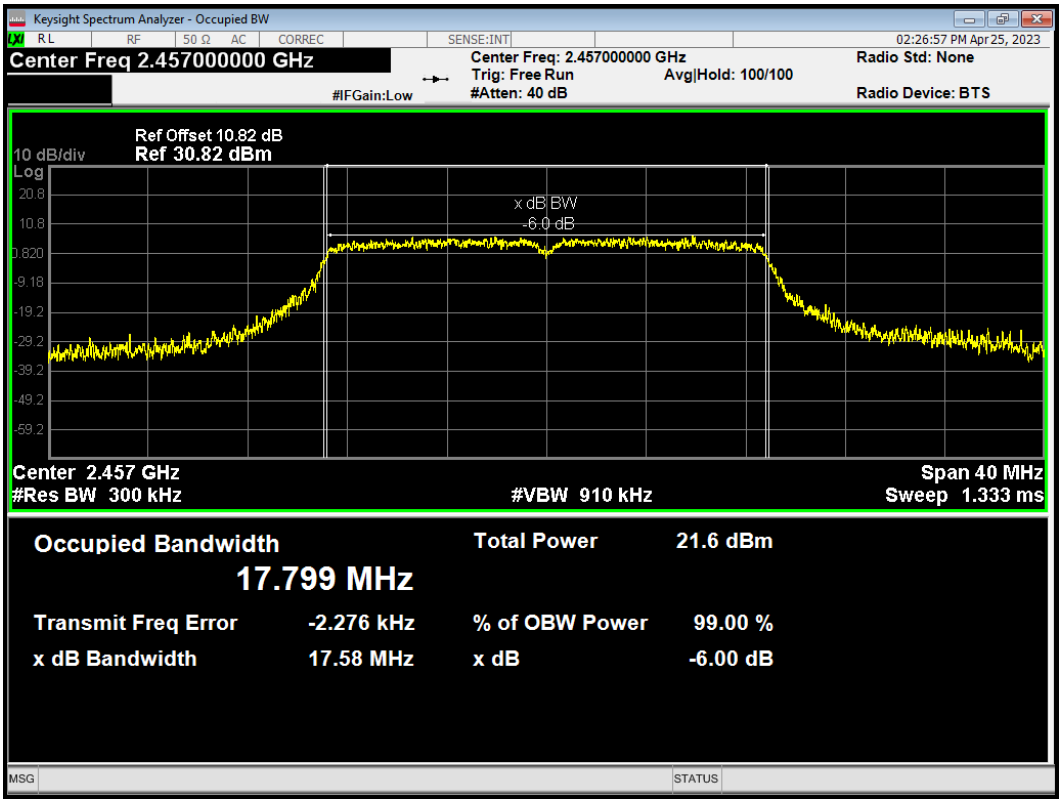
OBW 802.11n (HT20) 2417MHz



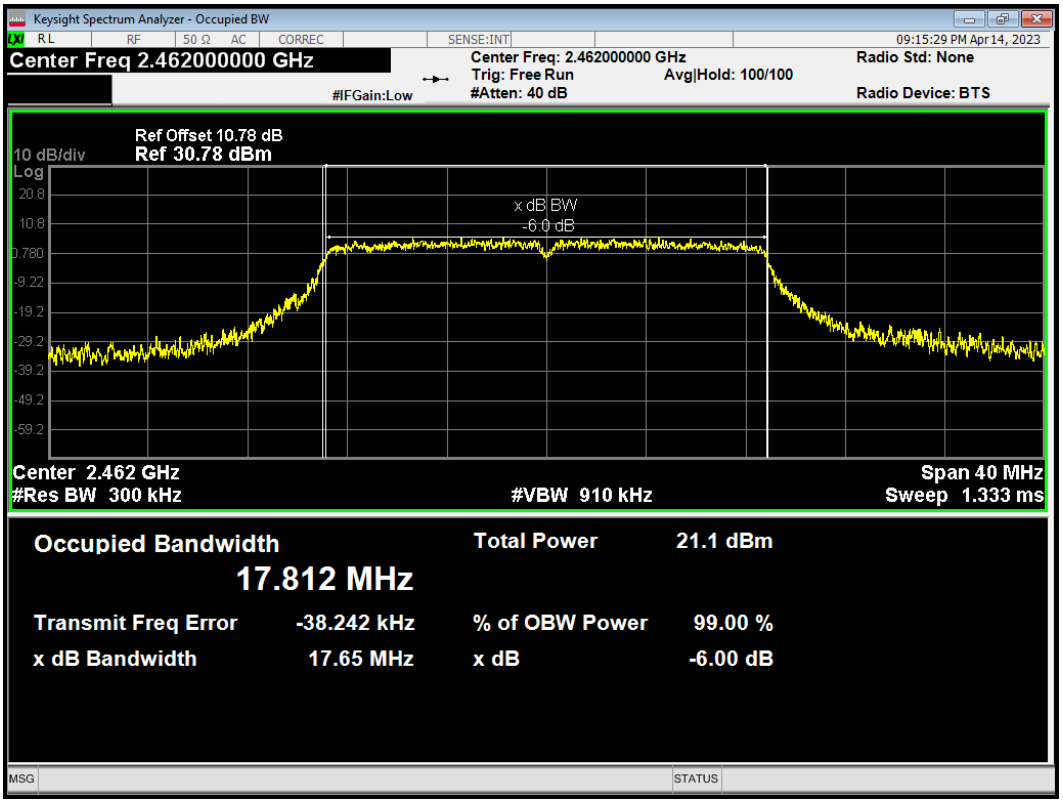
OBW 802.11n (HT20) 2437MHz



OBW 802.11n (HT20) 2457MHz



OBW 802.11n (HT20) 2462MHz



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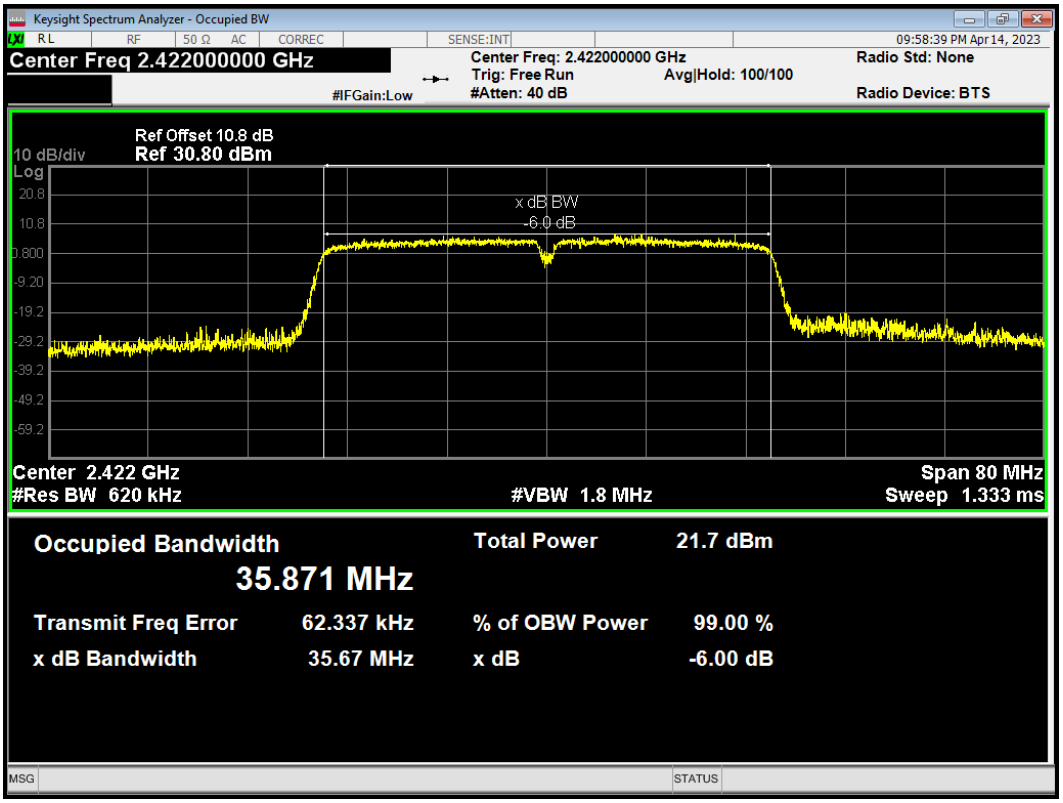

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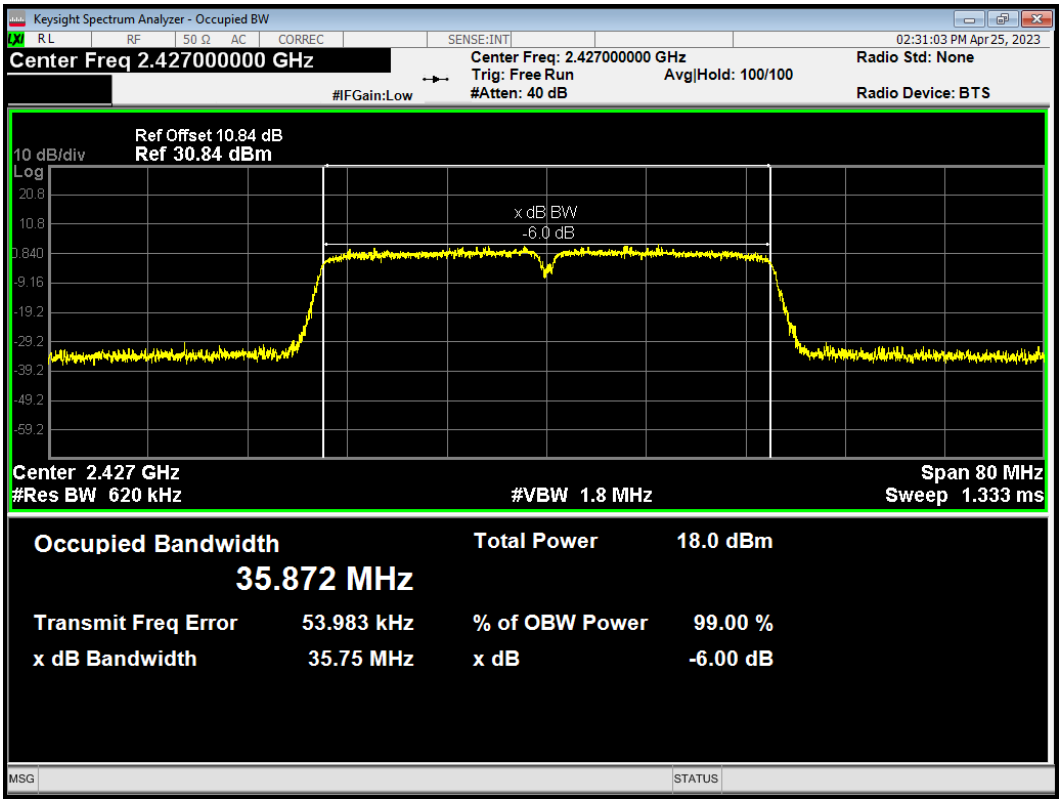

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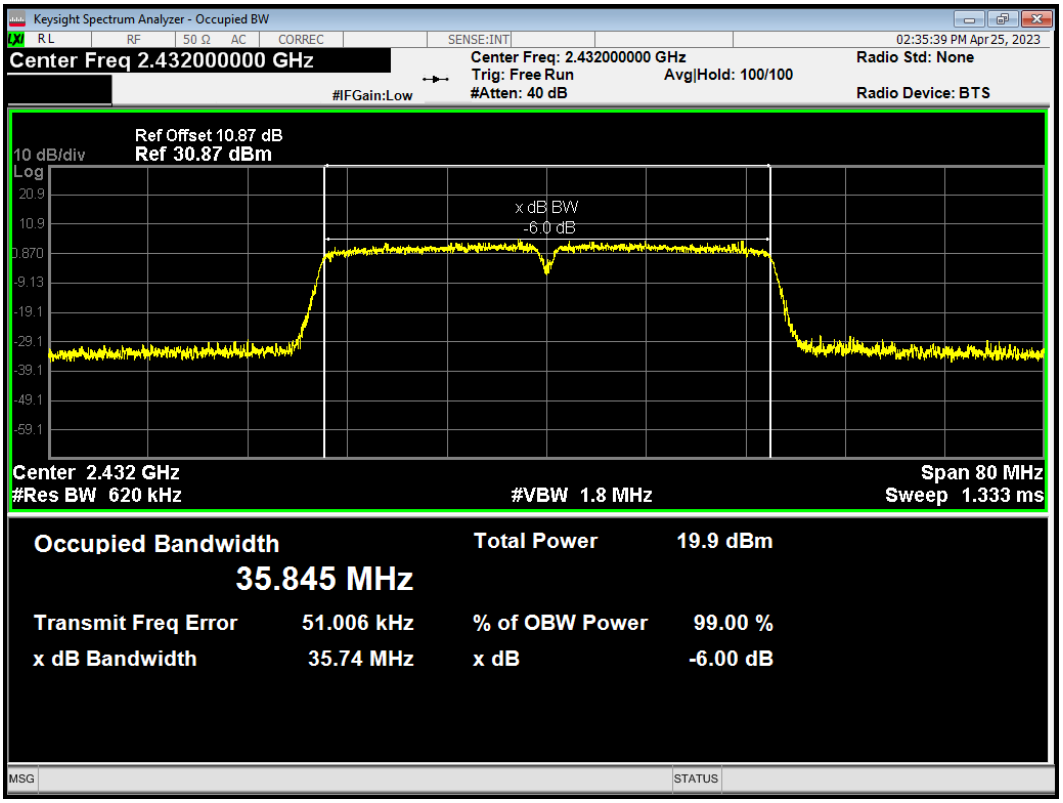
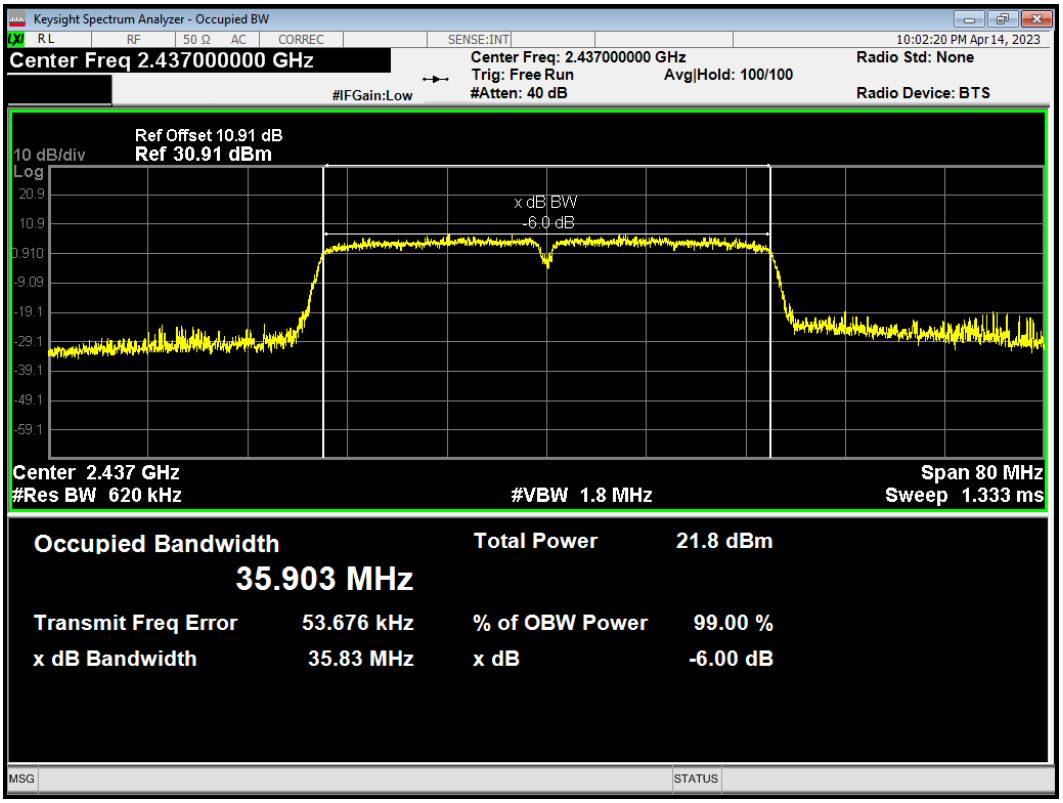


OBW 802.11n (HT40) 2437MHz



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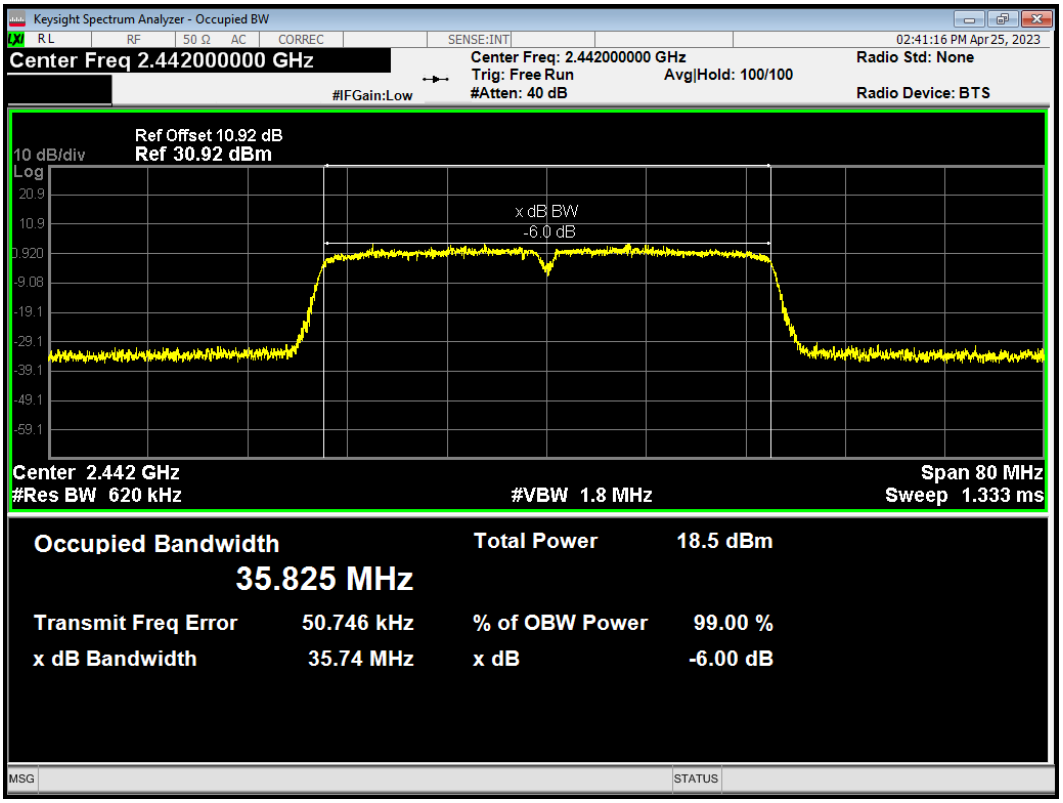

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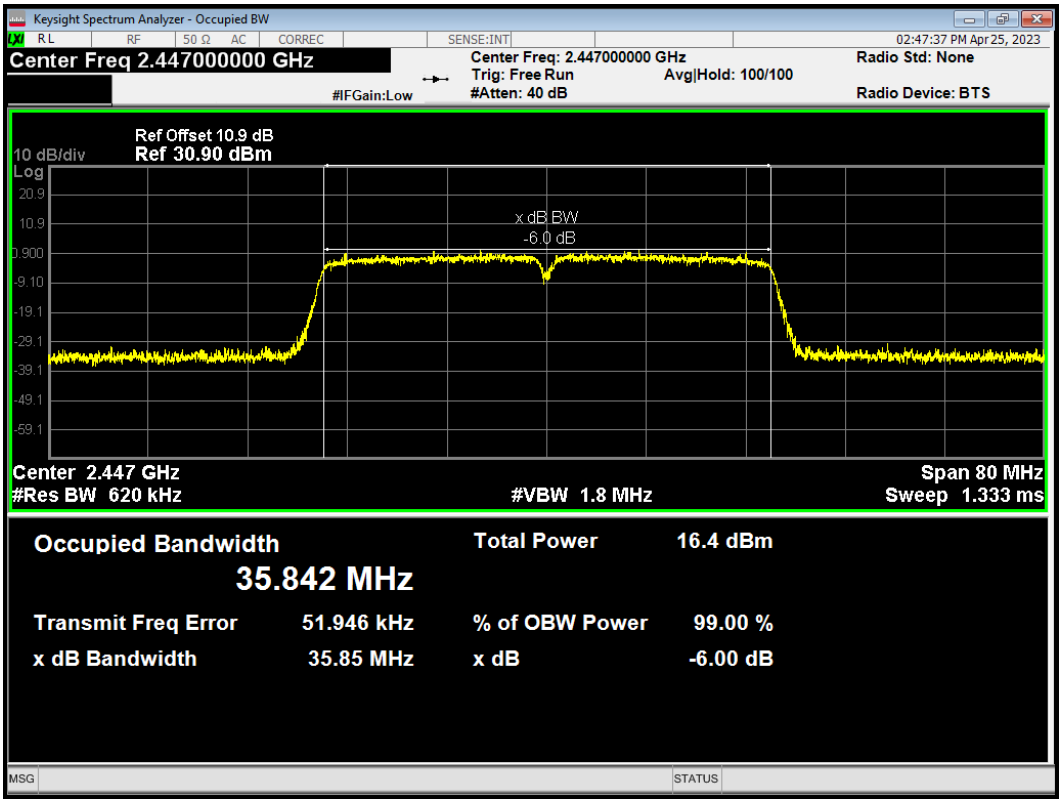
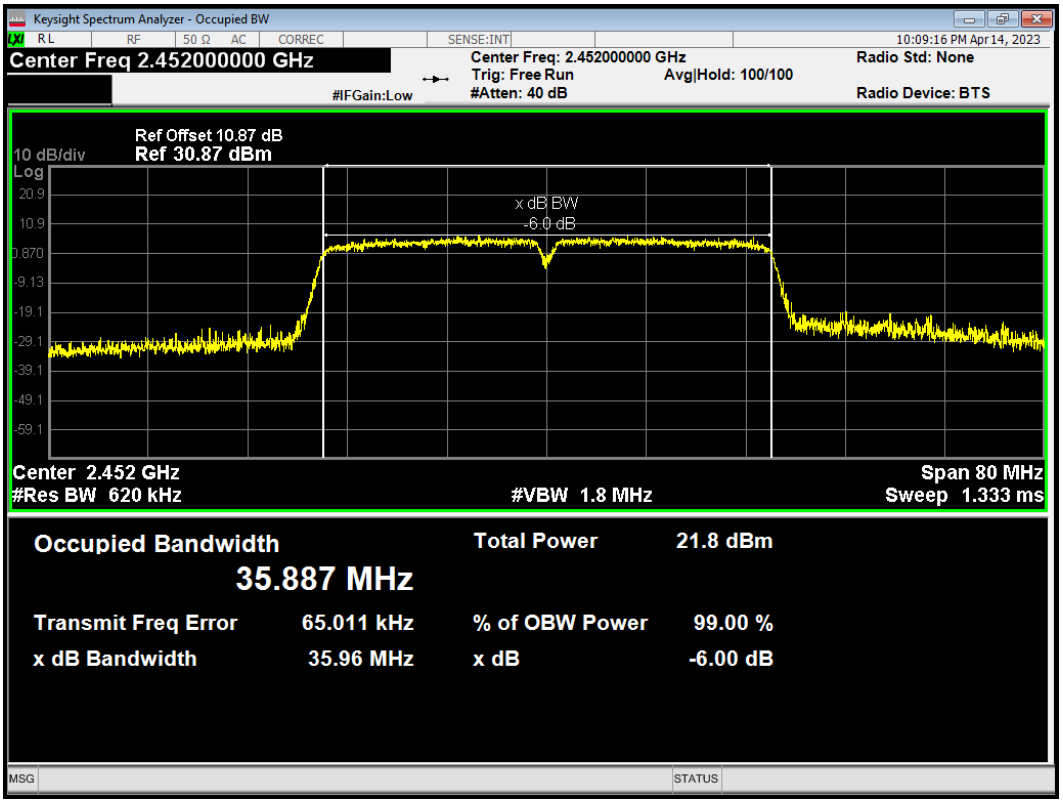
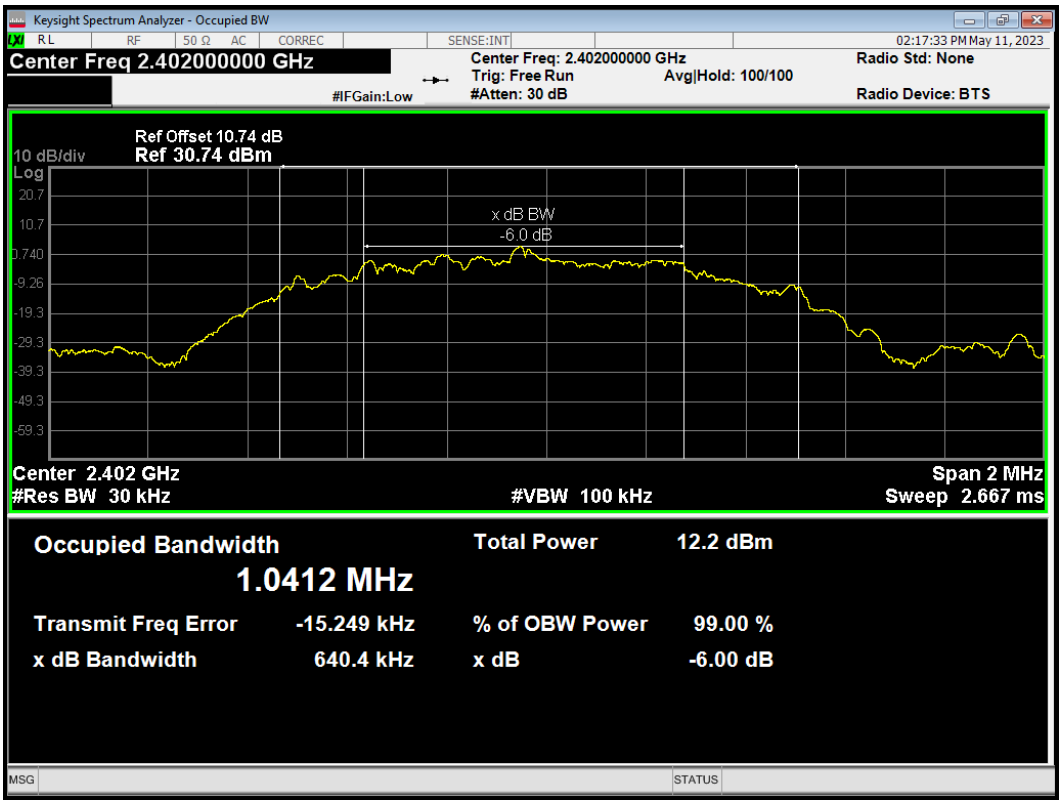


OBW 802.11n (HT40) 2452MHz



Bluetooth LE

OBW BLE 2402MHz



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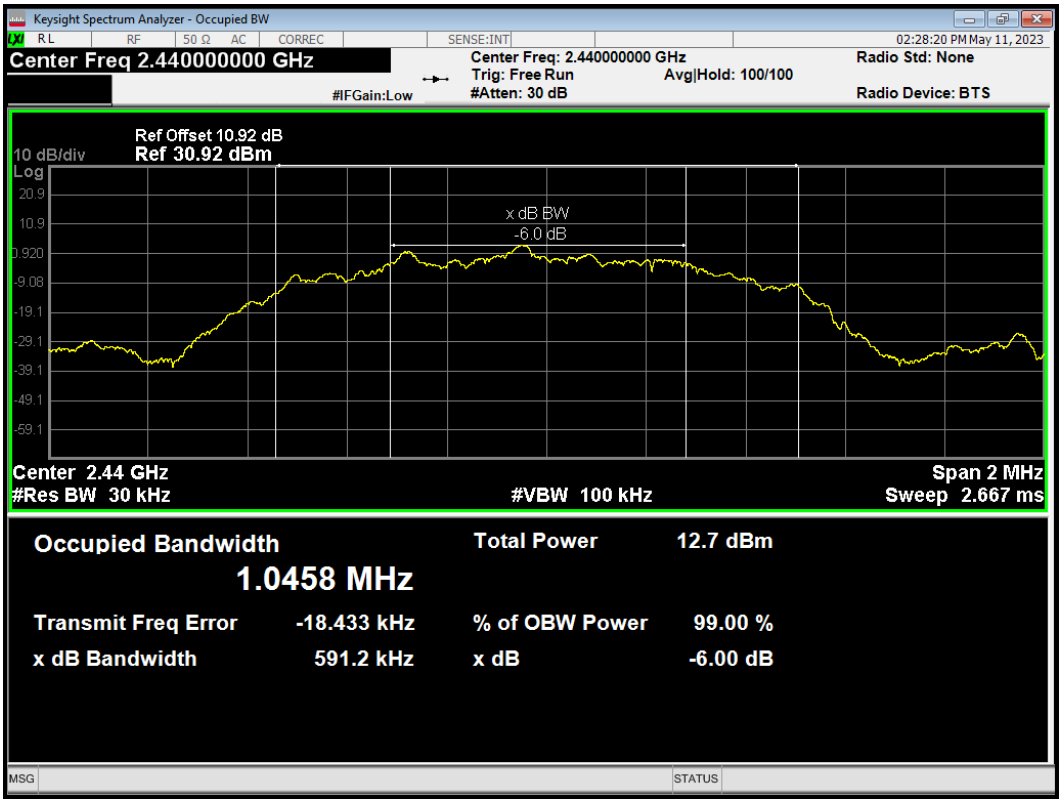

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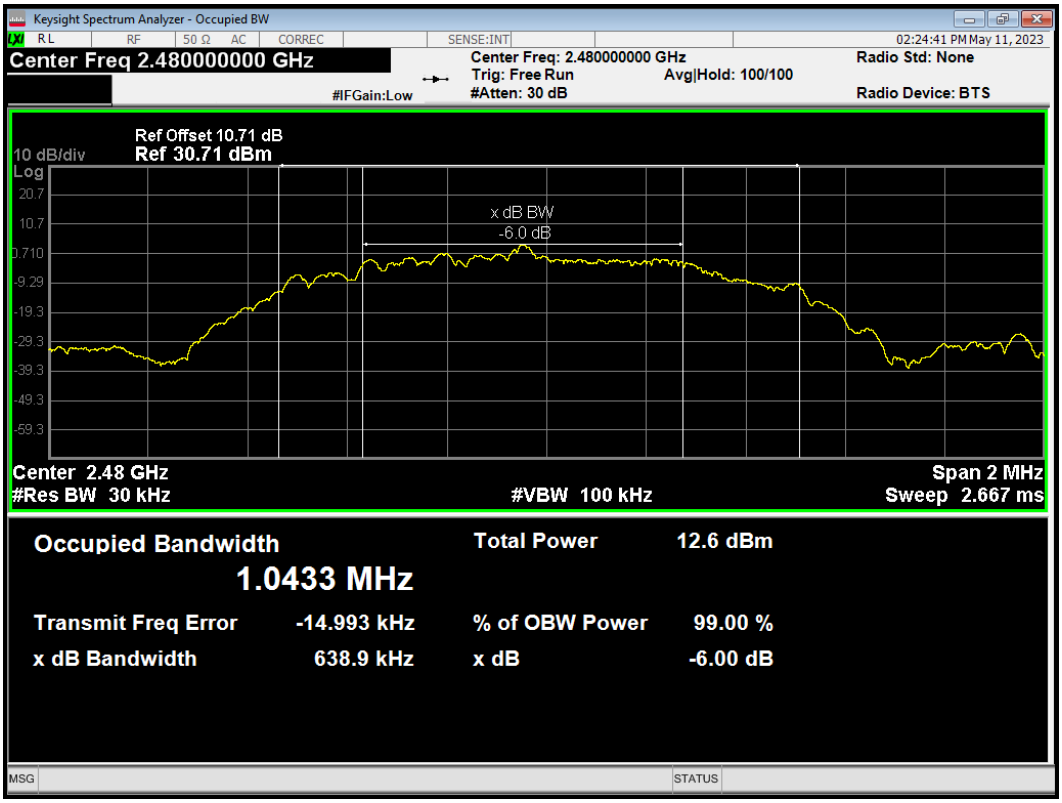
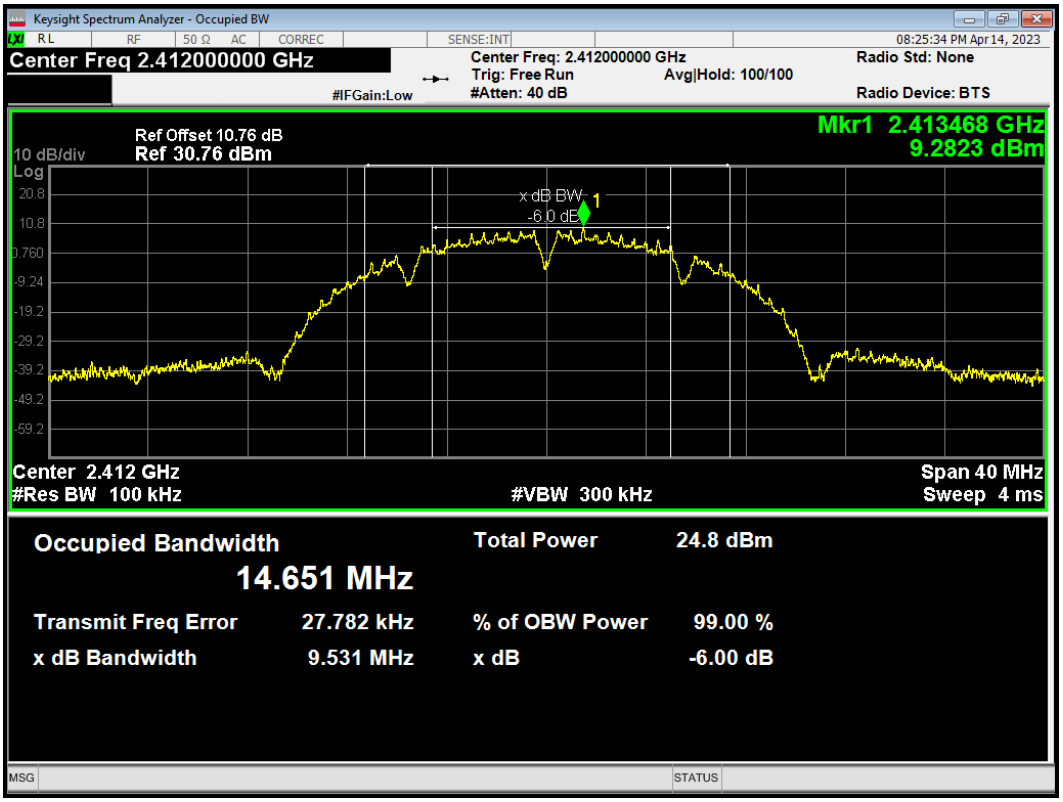


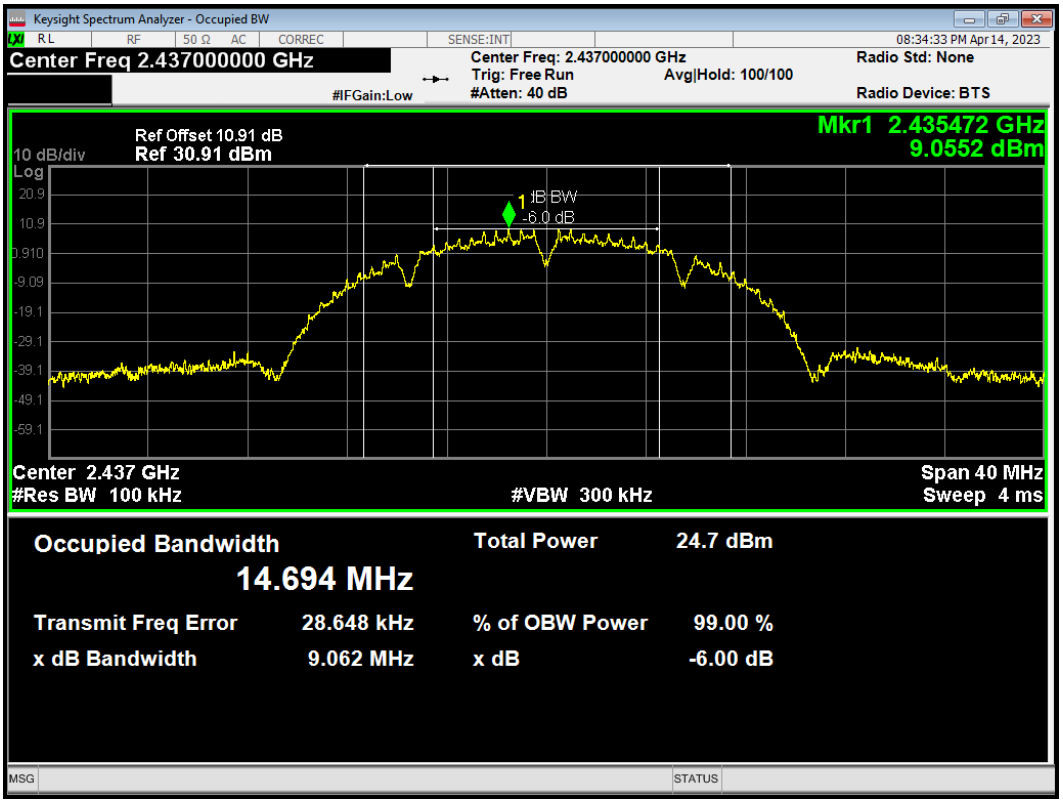
6 dB bandwidth

Wi-Fi 2.4G

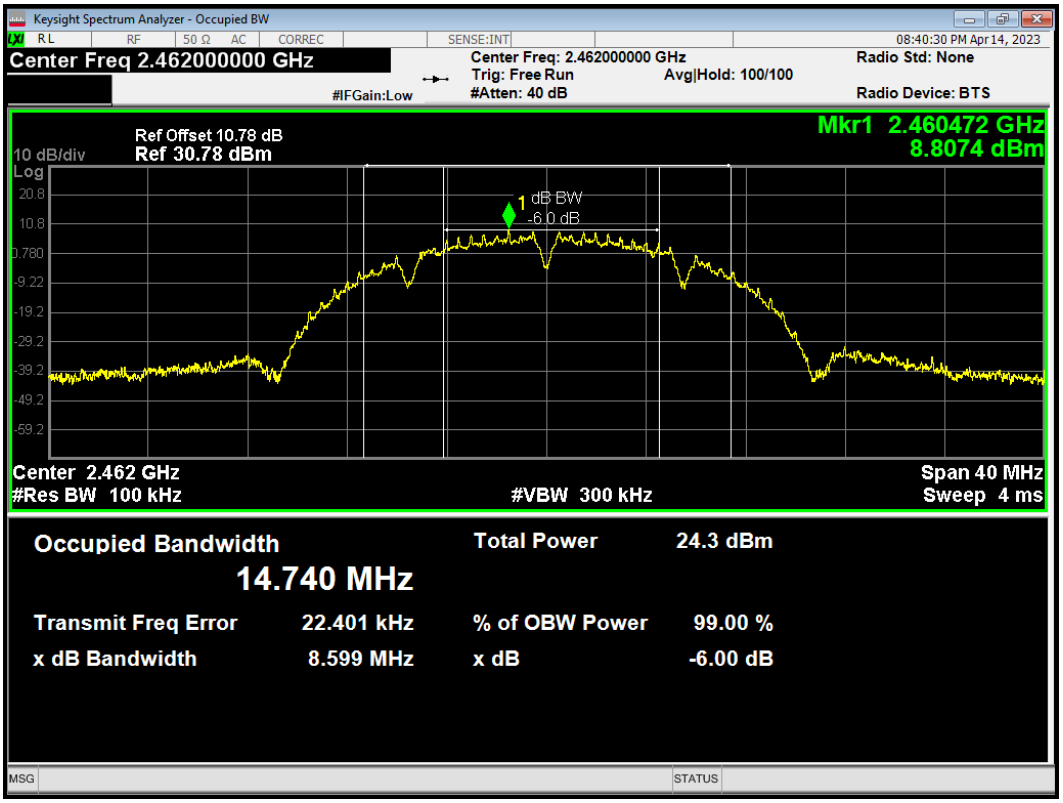
-6dB Bandwidth 802.11b 2412MHz



-6dB Bandwidth 802.11b 2437MHz



-6dB Bandwidth 802.11b 2462MHz



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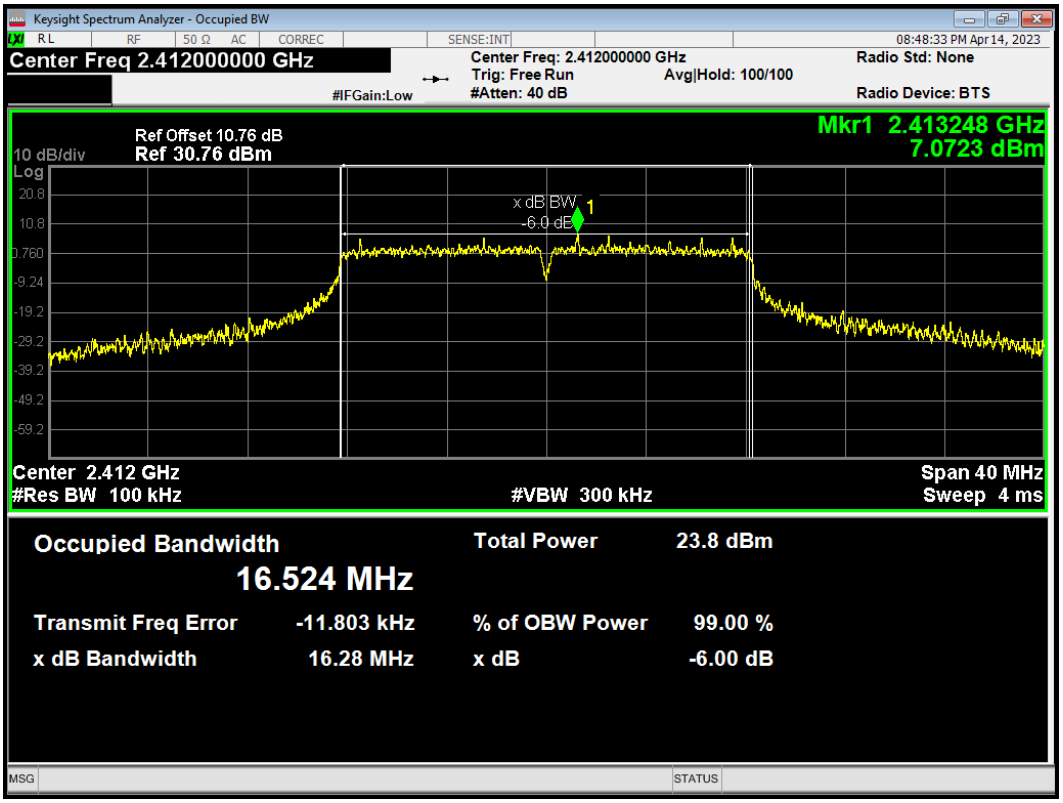
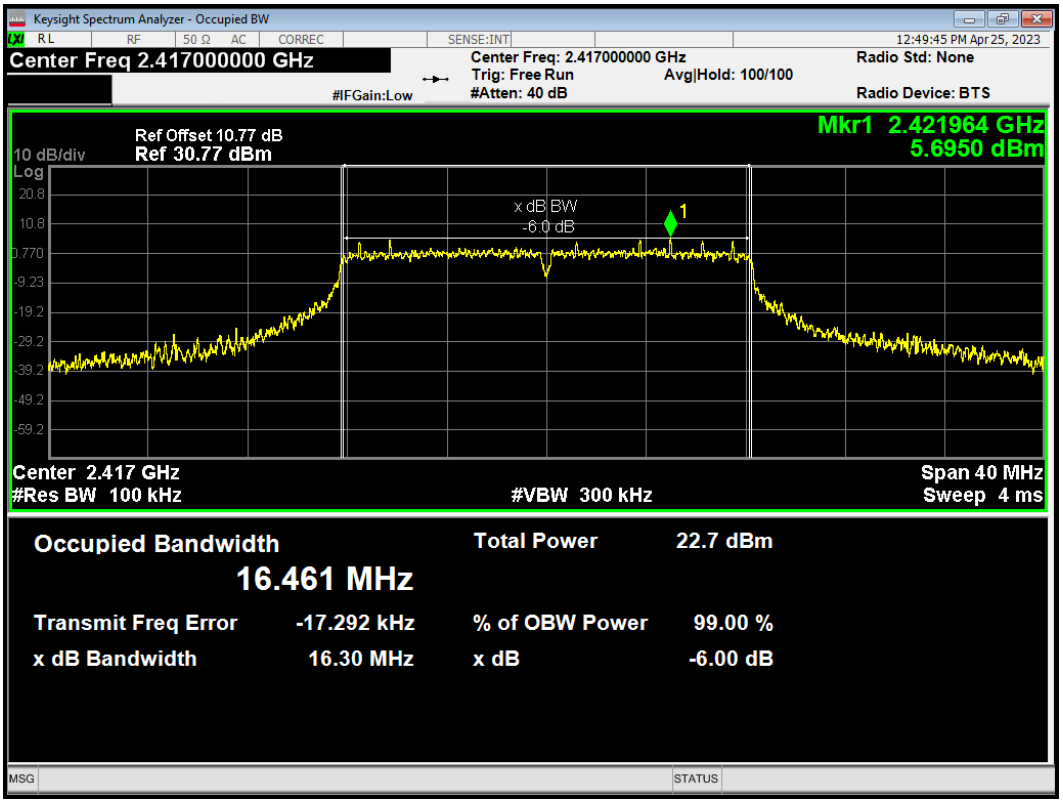


-6dB Bandwidth 802.11g 2417MHz



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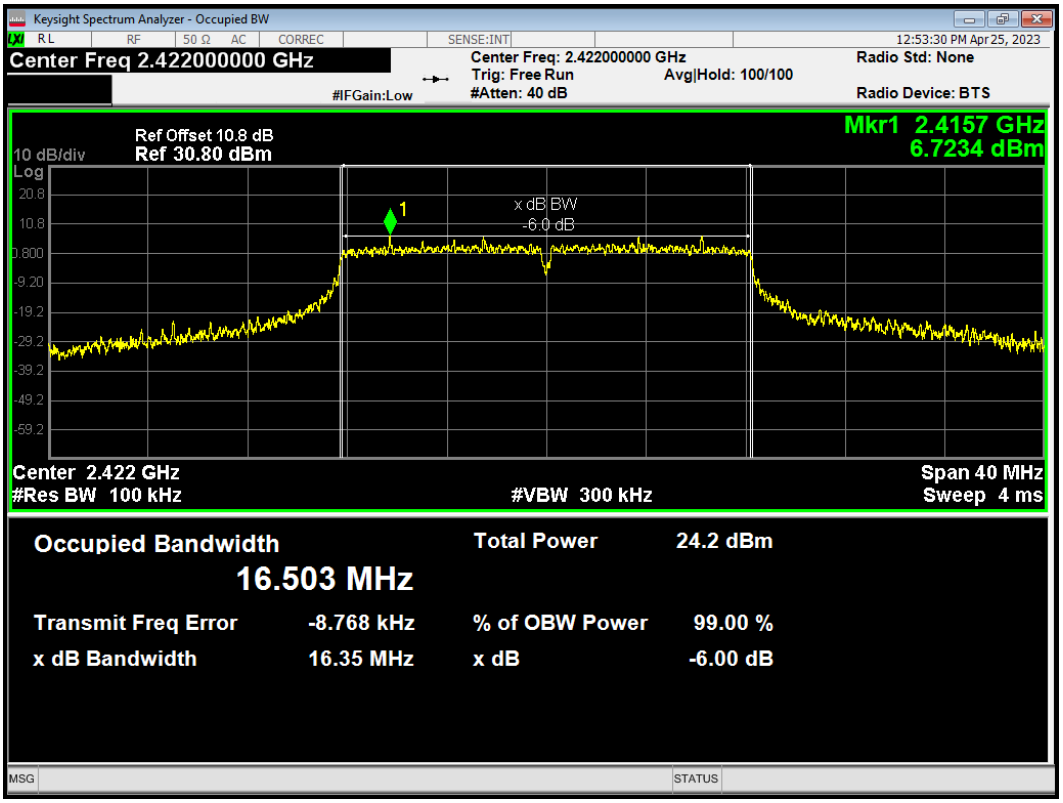

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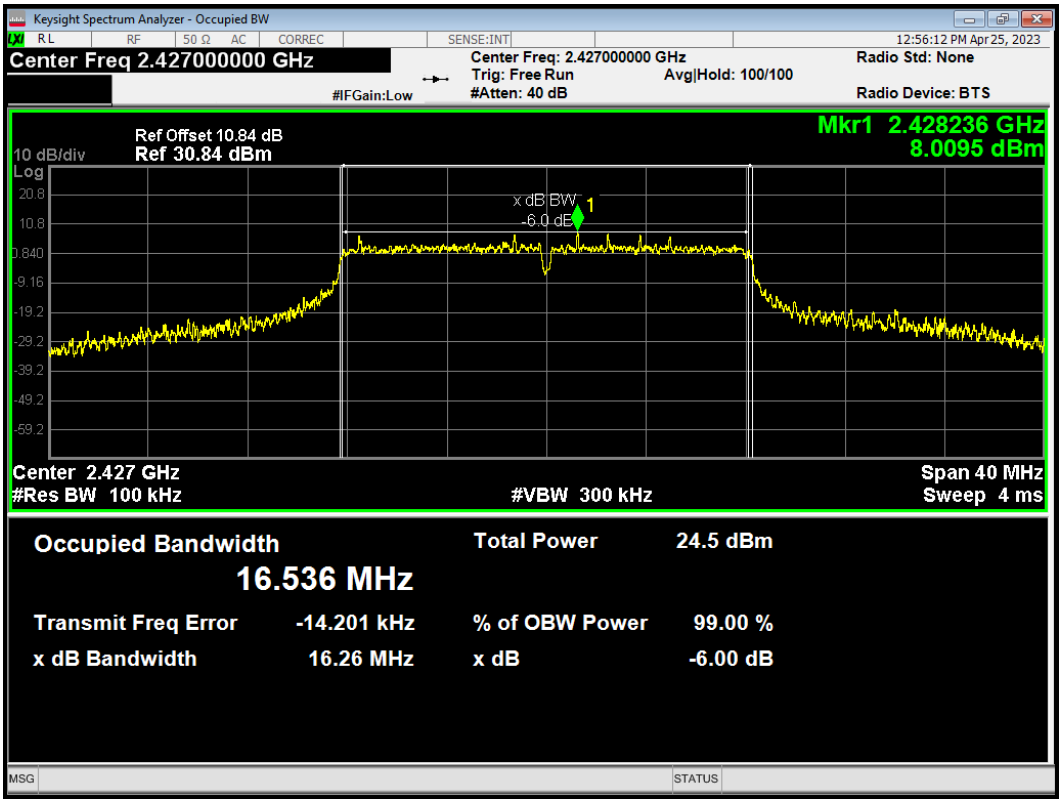
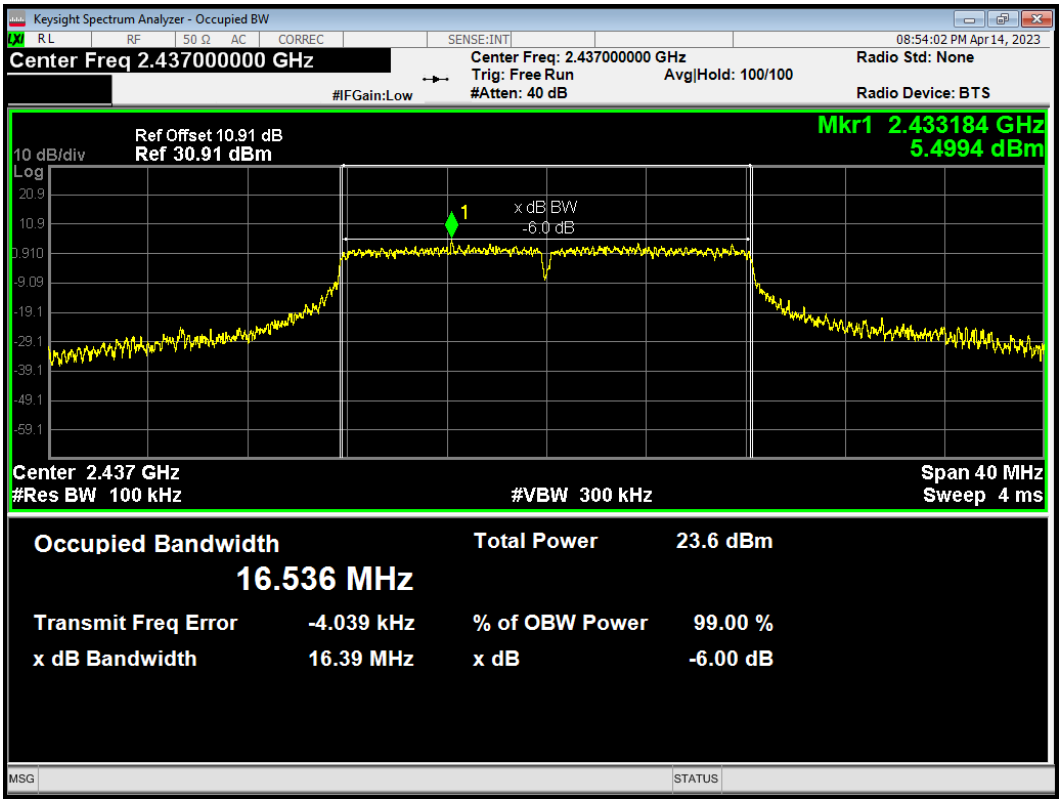
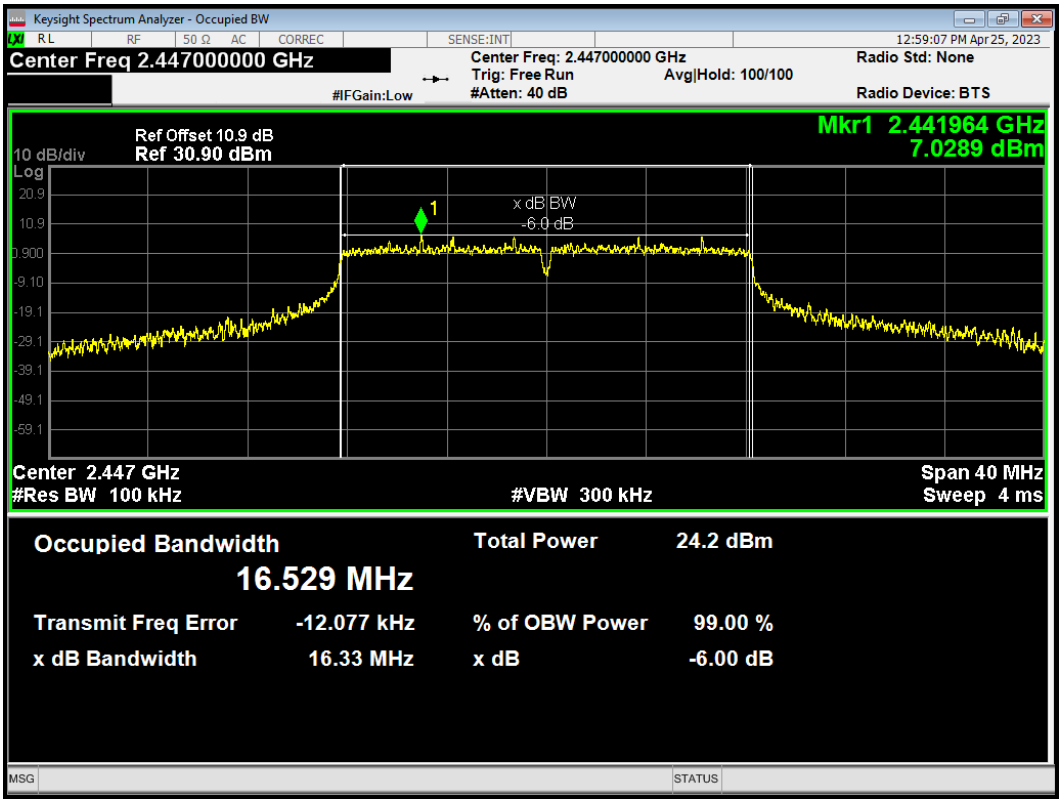


-6dB Bandwidth 802.11g 2437MHz



-6dB Bandwidth 802.11g 2447MHz



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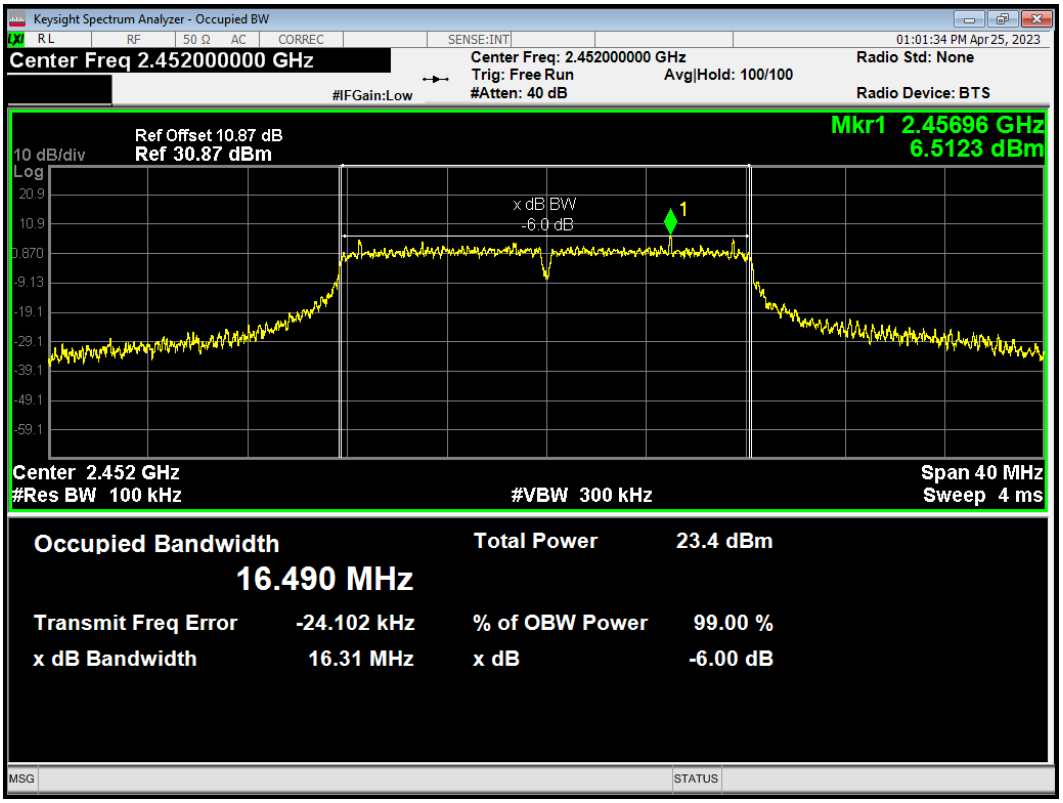
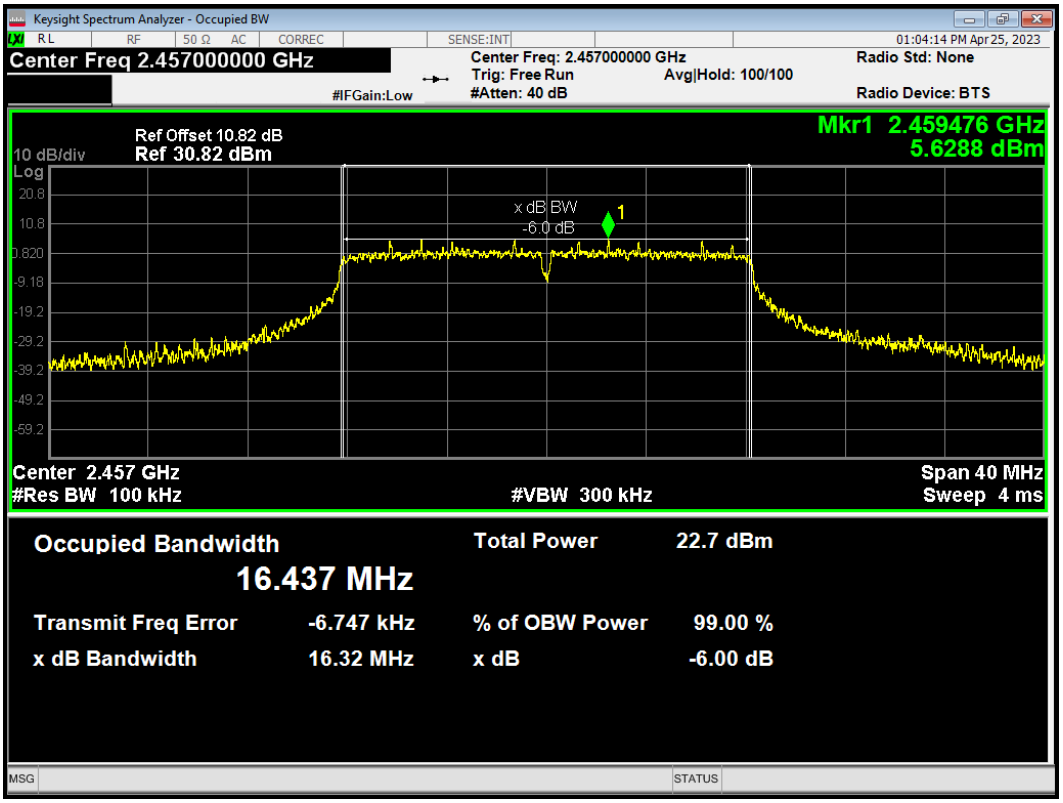
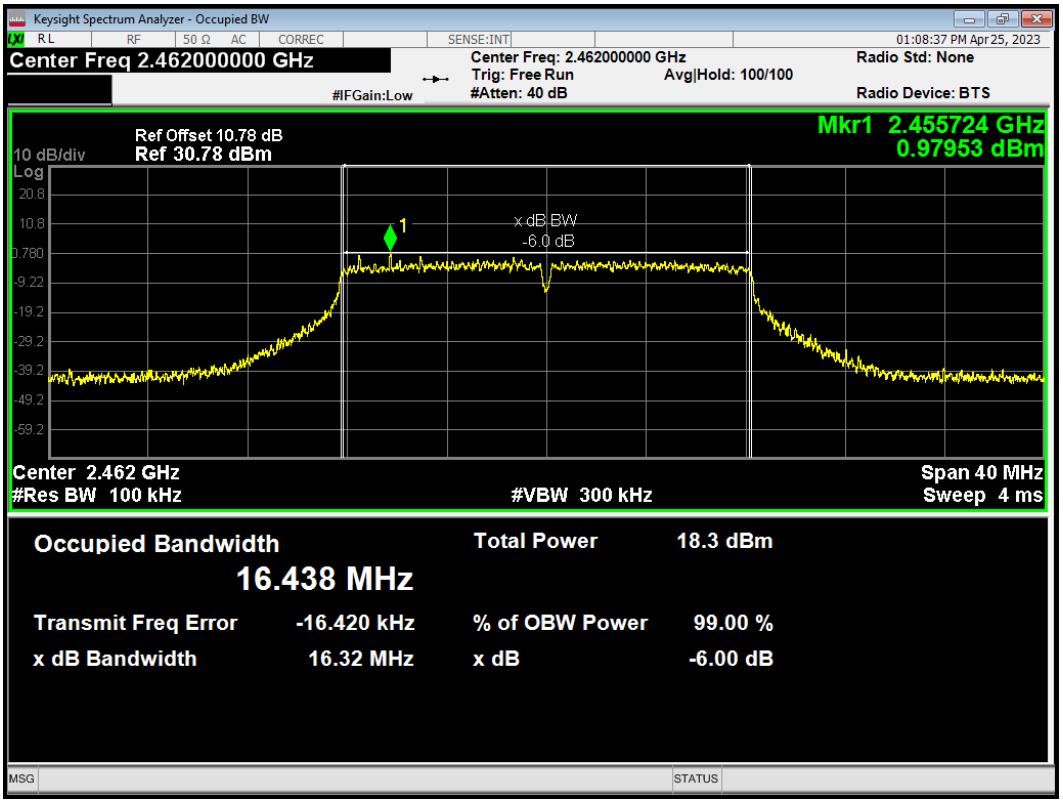


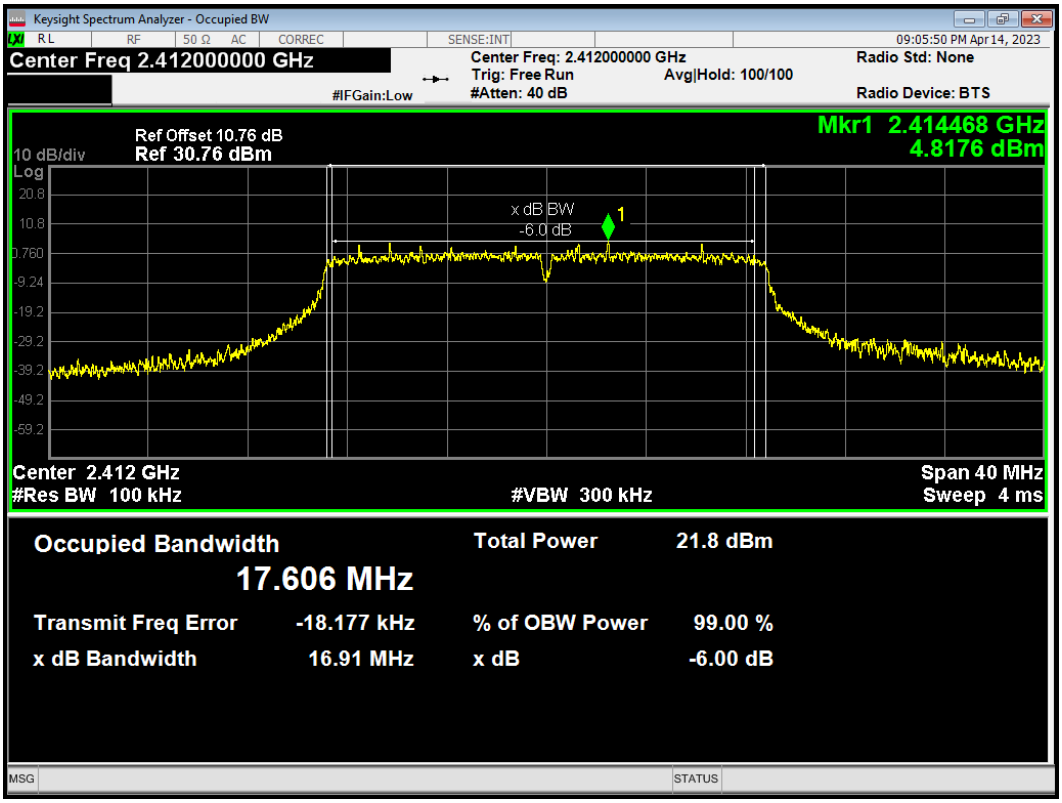
-6dB Bandwidth 802.11g 2457MHz



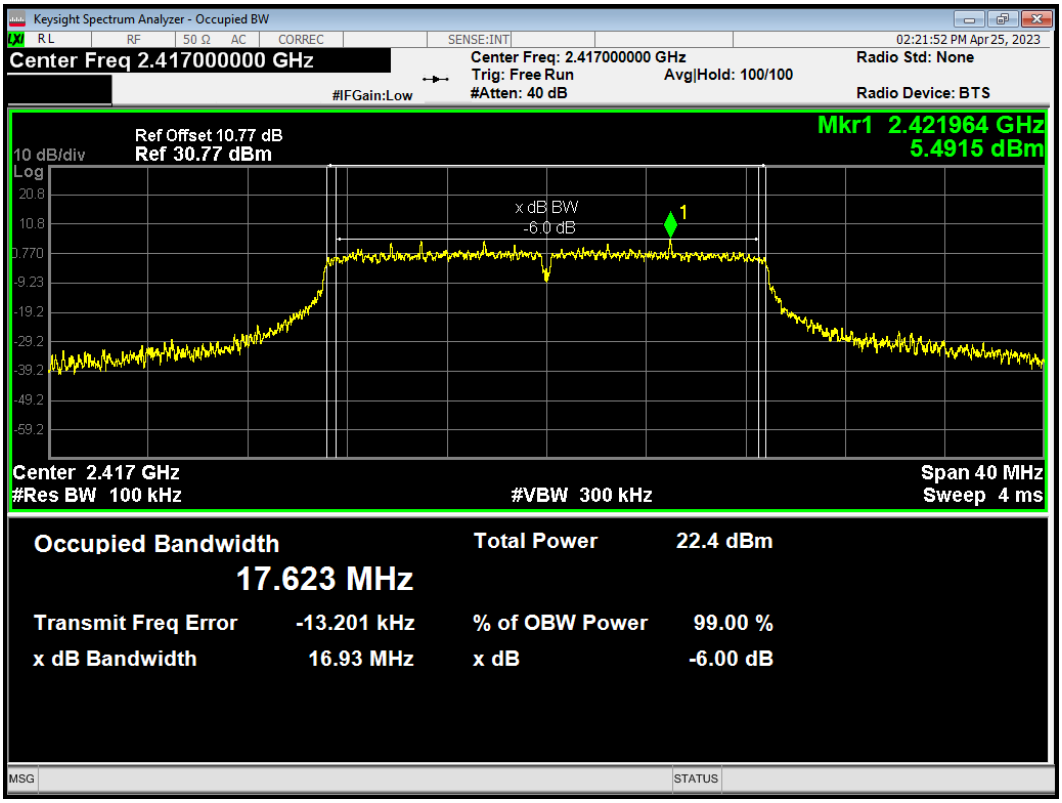
-6dB Bandwidth 802.11g 2462MHz



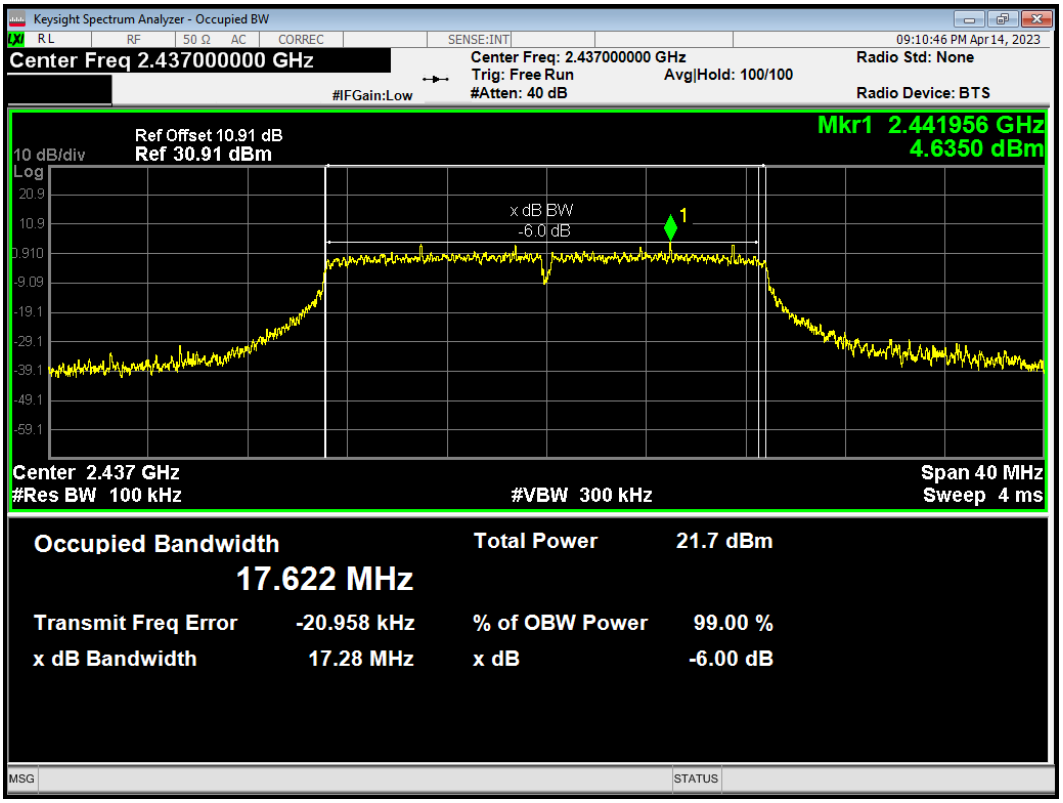
-6dB Bandwidth 802.11n (HT20) 2412MHz



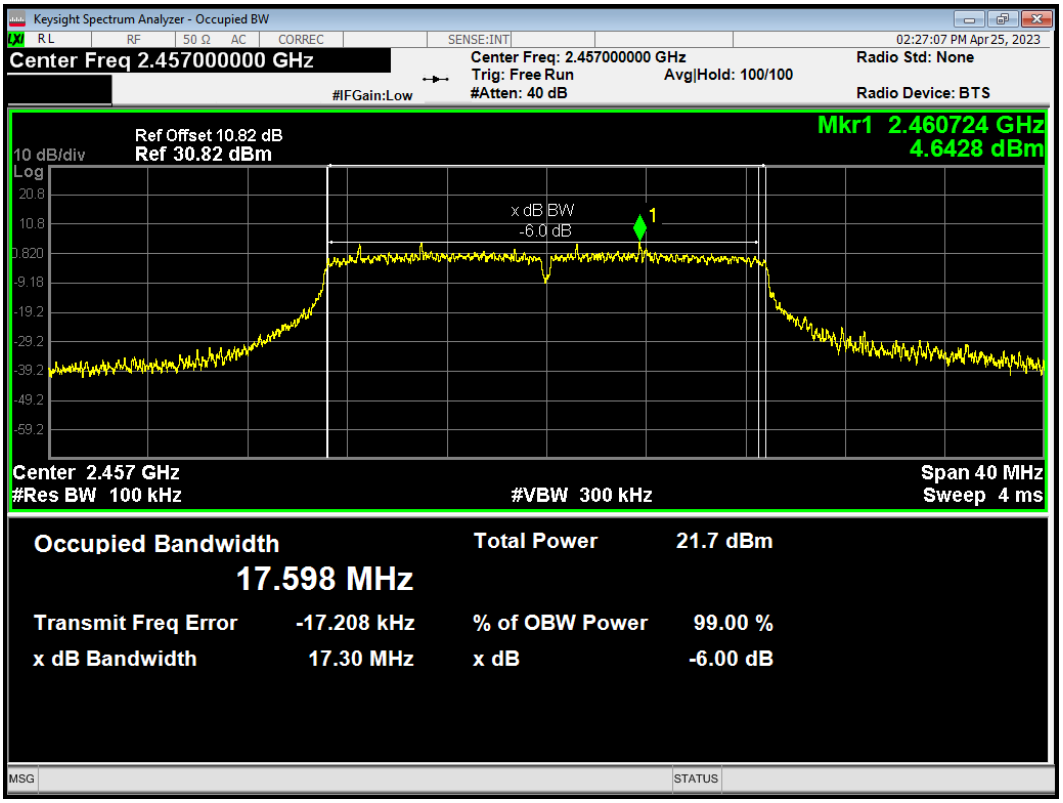
-6dB Bandwidth 802.11n(HT20) 2417MHz



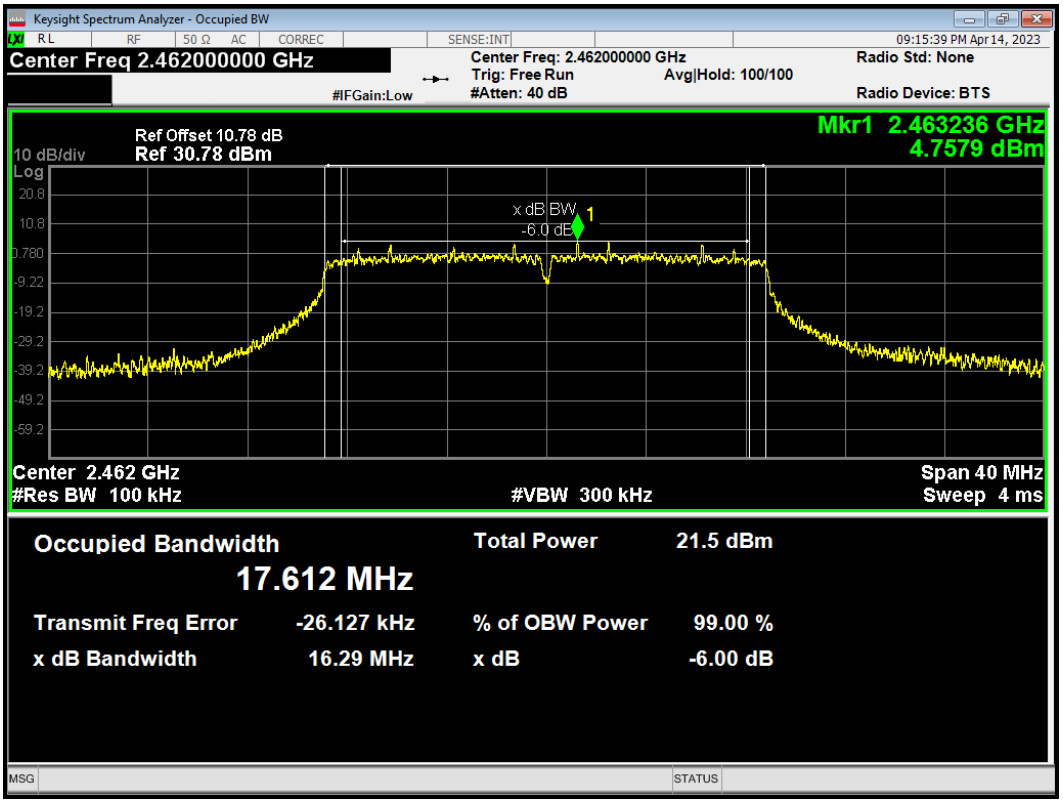
-6dB Bandwidth 802.11n (HT20) 2437MHz



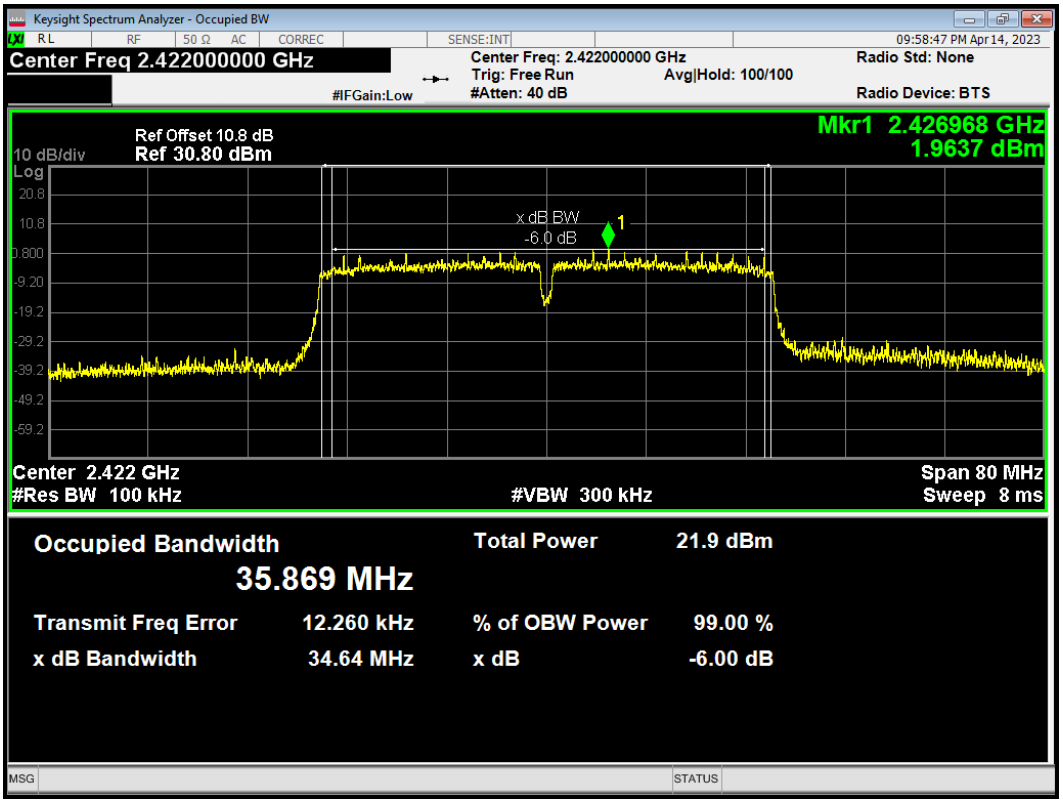
-6dB Bandwidth 802.11n(HT20) 2457MHz



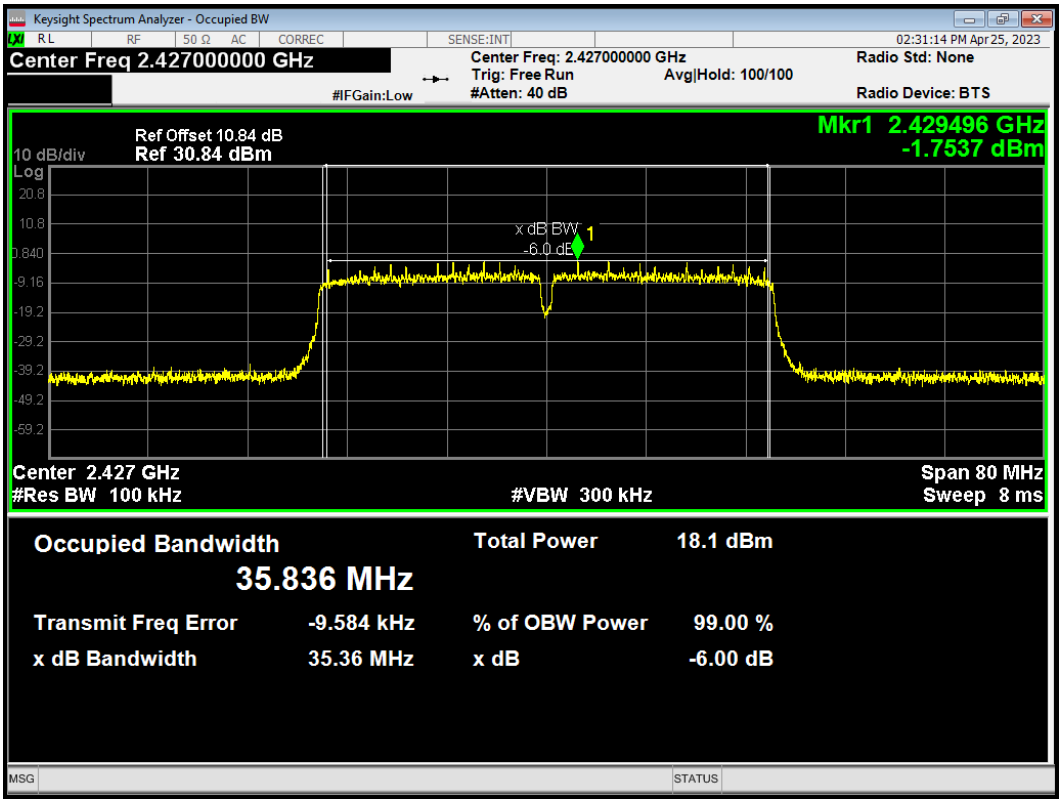
-6dB Bandwidth 802.11n (HT20) 2462MHz



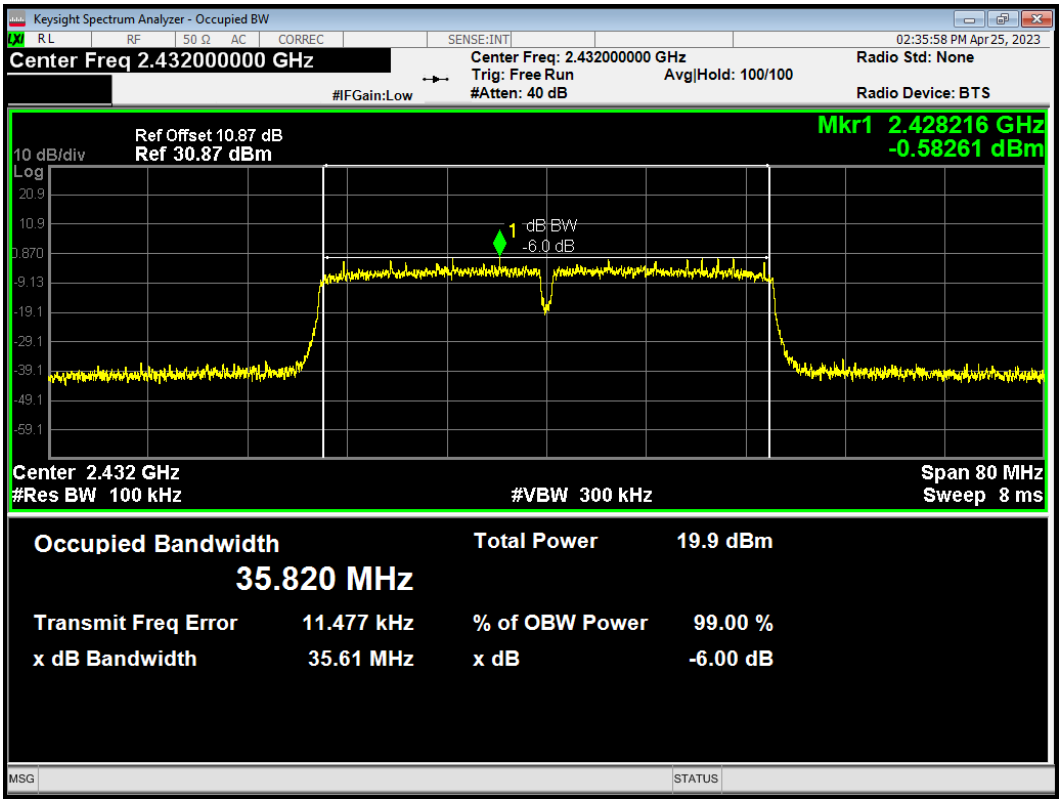
-6dB Bandwidth 802.11n (HT40) 2422MHz



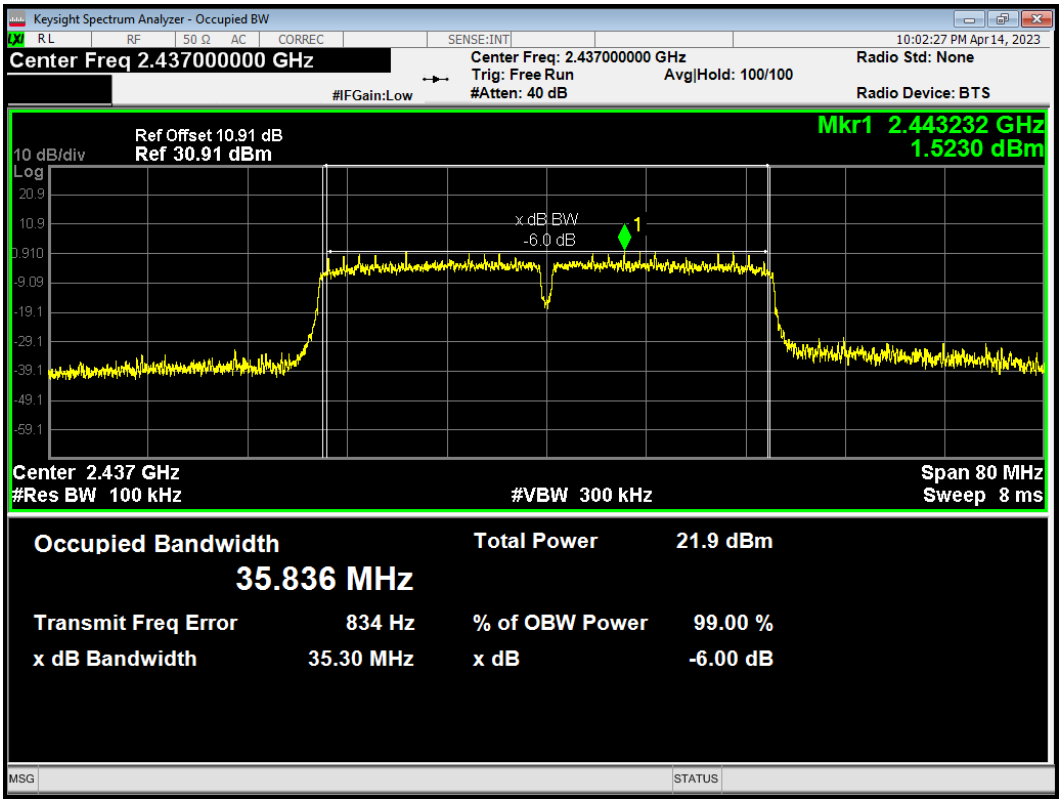
-6dB Bandwidth 802.11n (HT40) 2427MHz



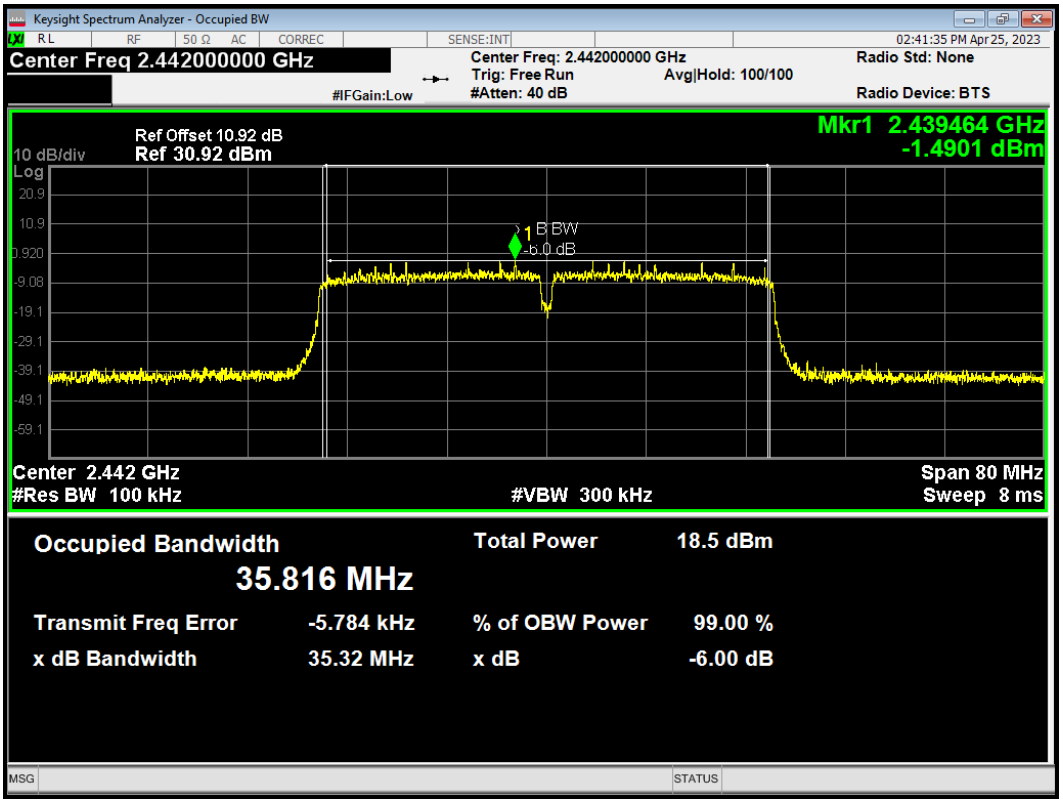
-6dB Bandwidth 802.11n (HT40) 2432MHz



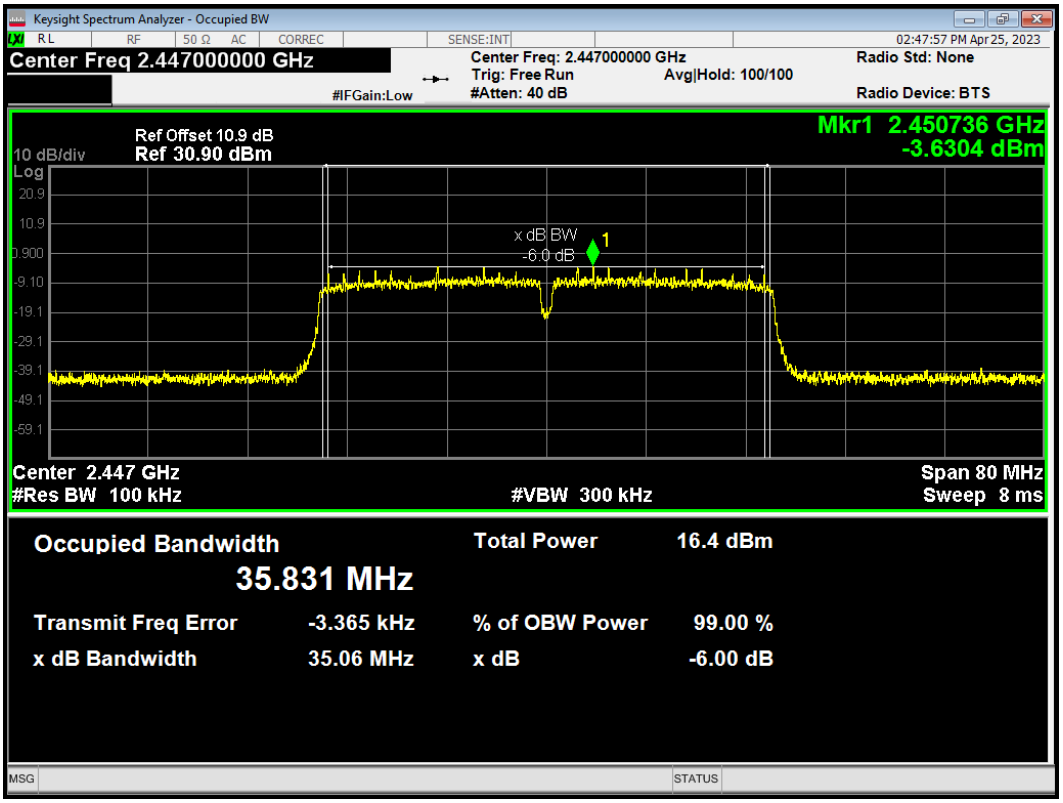
-6dB Bandwidth 802.11n (HT40) 2437MHz



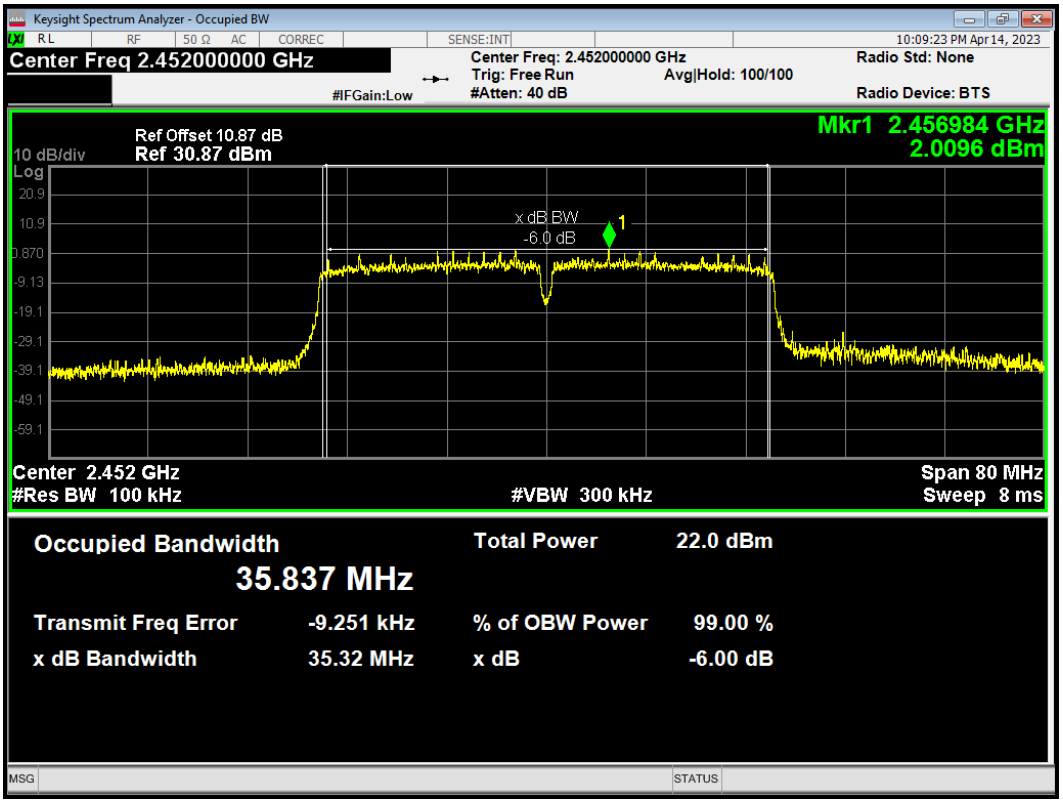
-6dB Bandwidth 802.11n (HT40) 2442MHz



-6dB Bandwidth 802.11n (HT40) 2447MHz

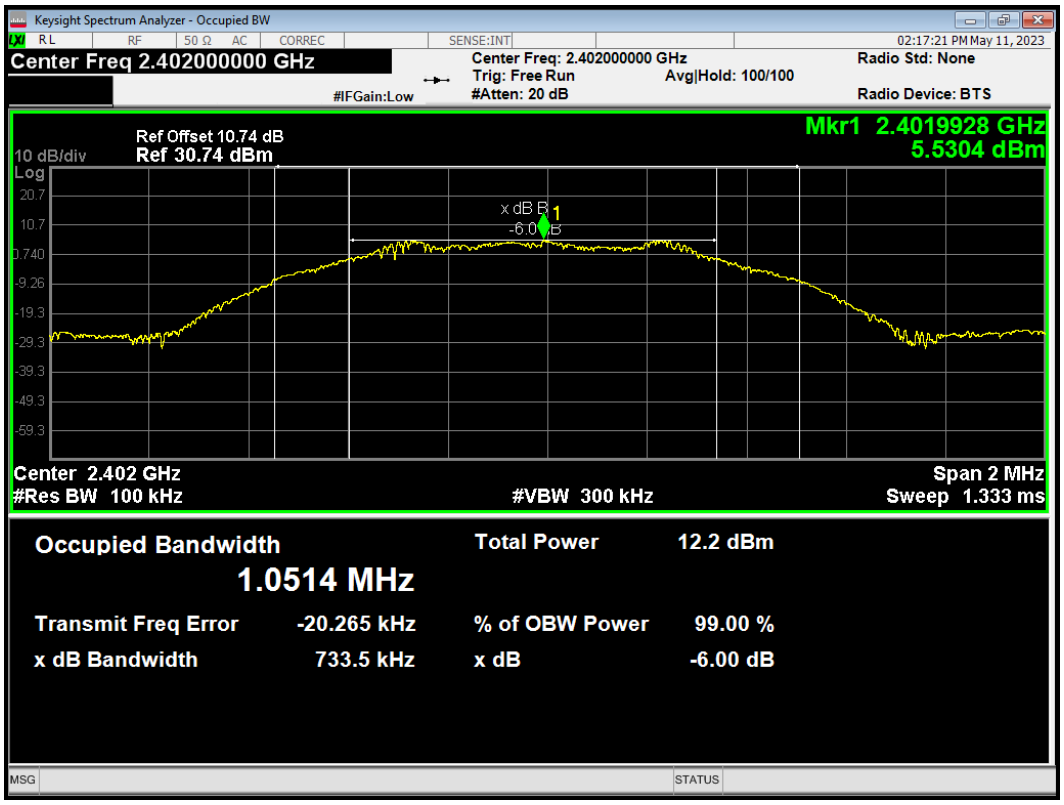


-6dB Bandwidth 802.11n (HT40) 2452MHz

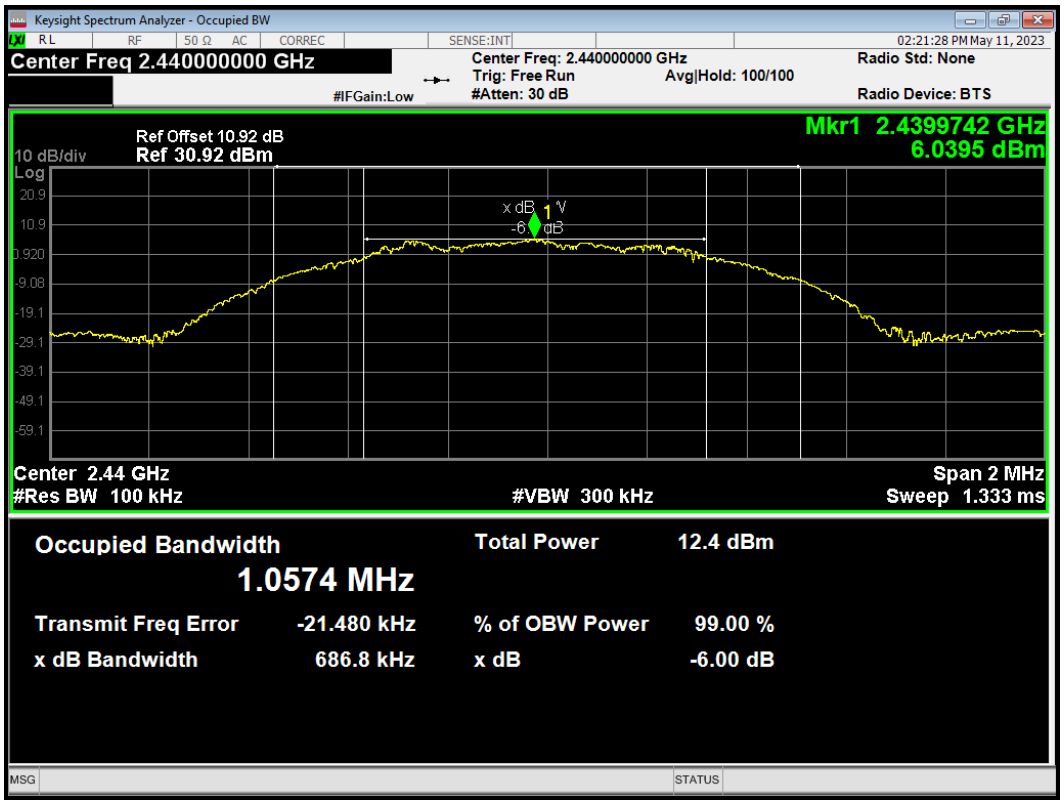


Bluetooth LE

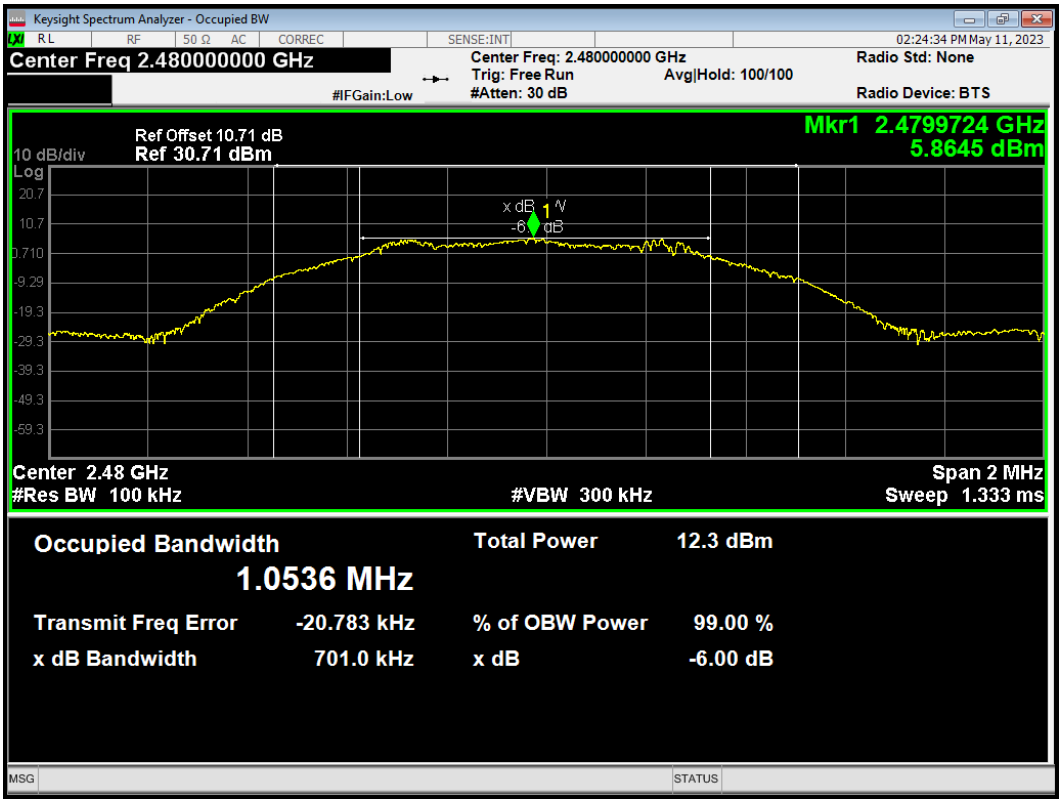
-6dB Bandwidth BLE 2402MHz



-6dB Bandwidth BLE 2440MHz



-6dB Bandwidth BLE 2480MHz



5.3. Band Edge

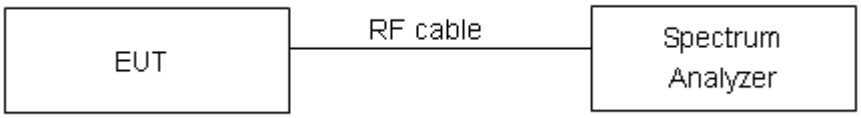
Ambient Condition

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

Method of Measurement

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

Test Setup



Limits

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

Measurement Uncertainty

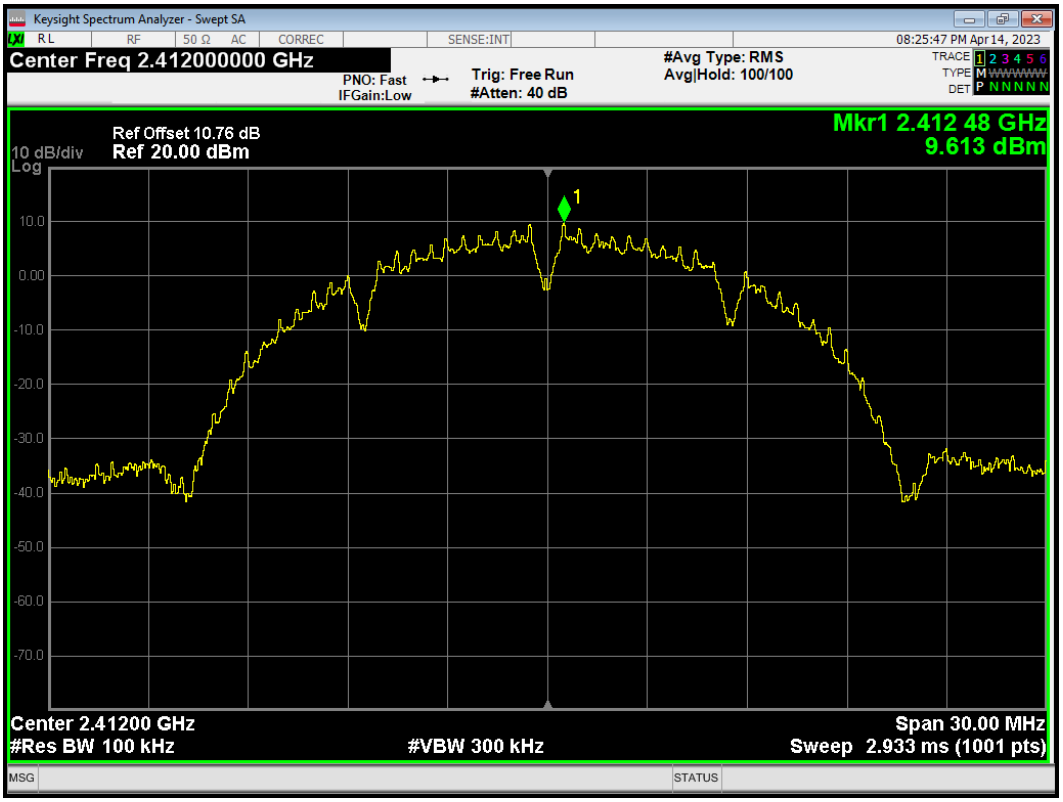
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
2GHz-3GHz	1.407 dB

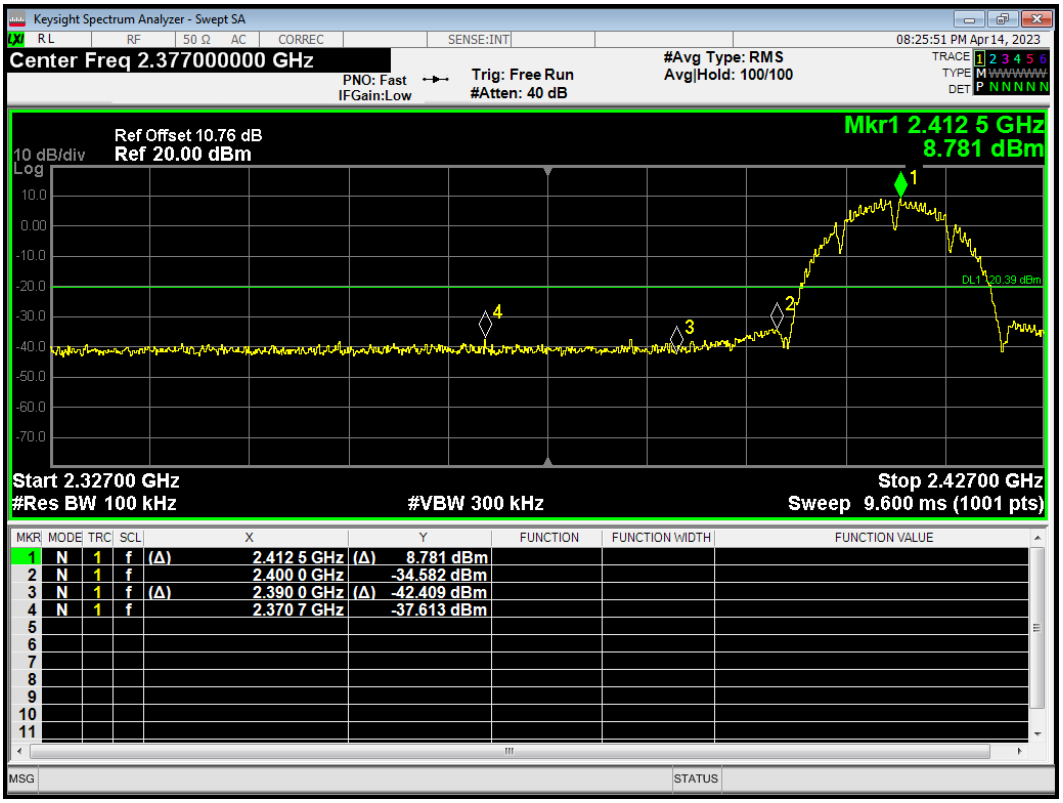
Test Results: PASS

Wi-Fi 2.4G

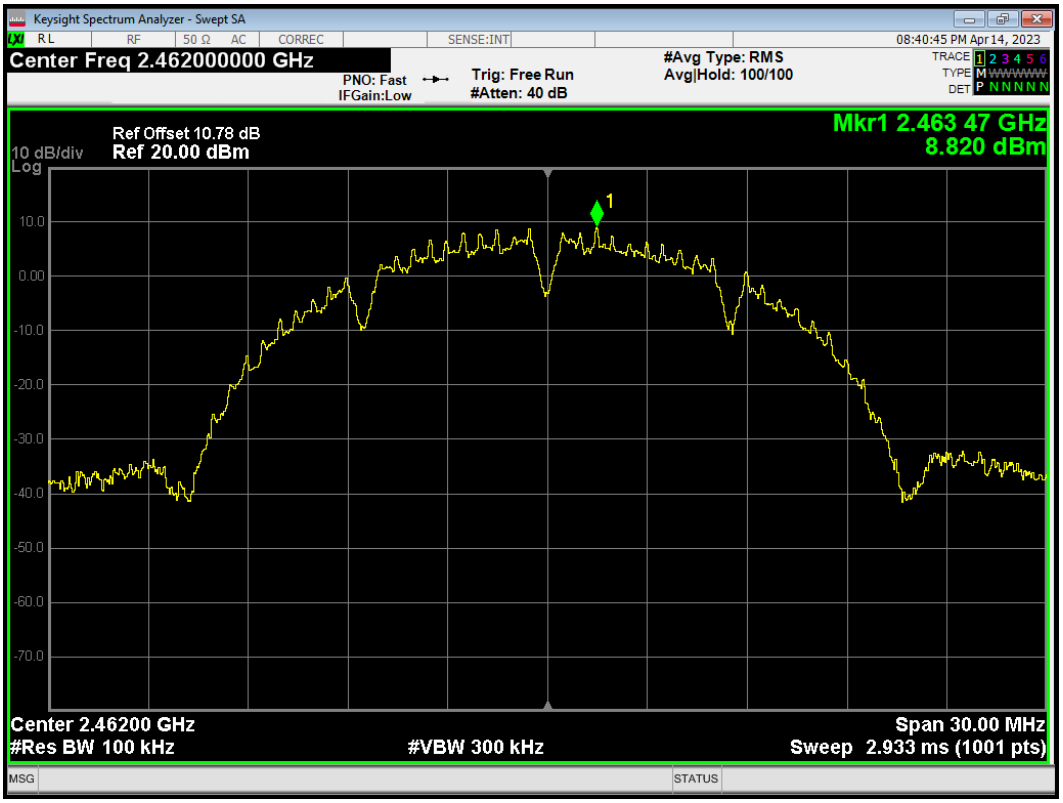
Band Edge 802.11b 2412MHz Ref



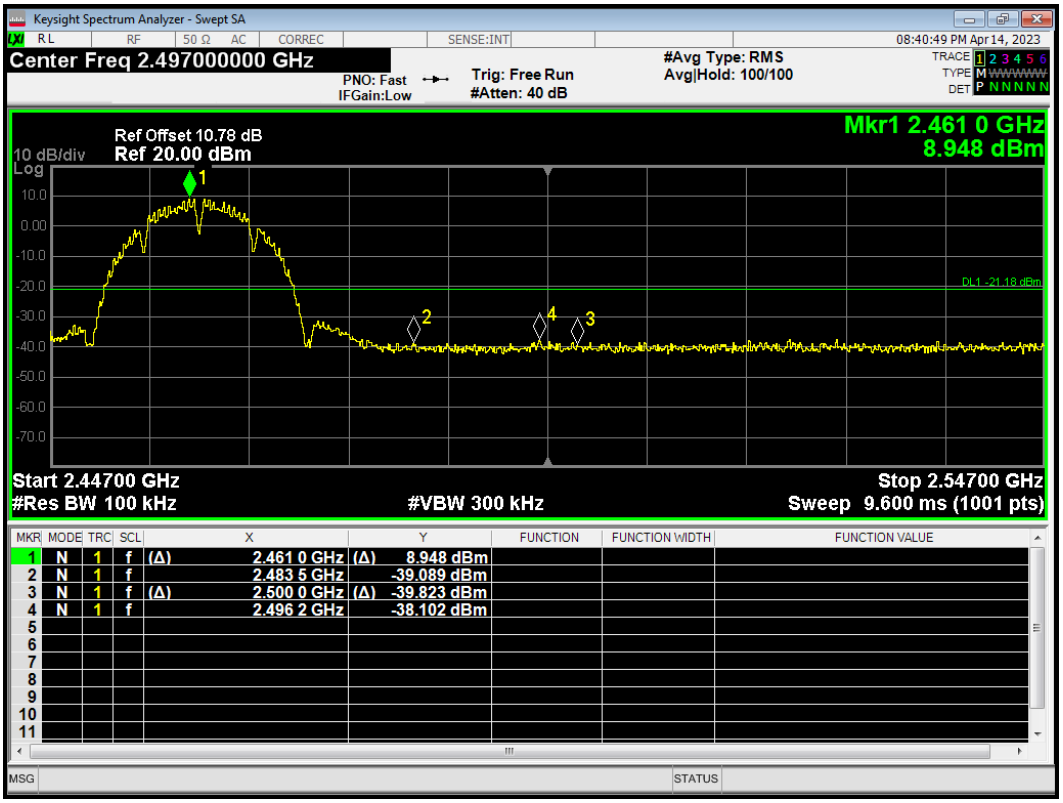
Band Edge 802.11b 2412MHz Emission



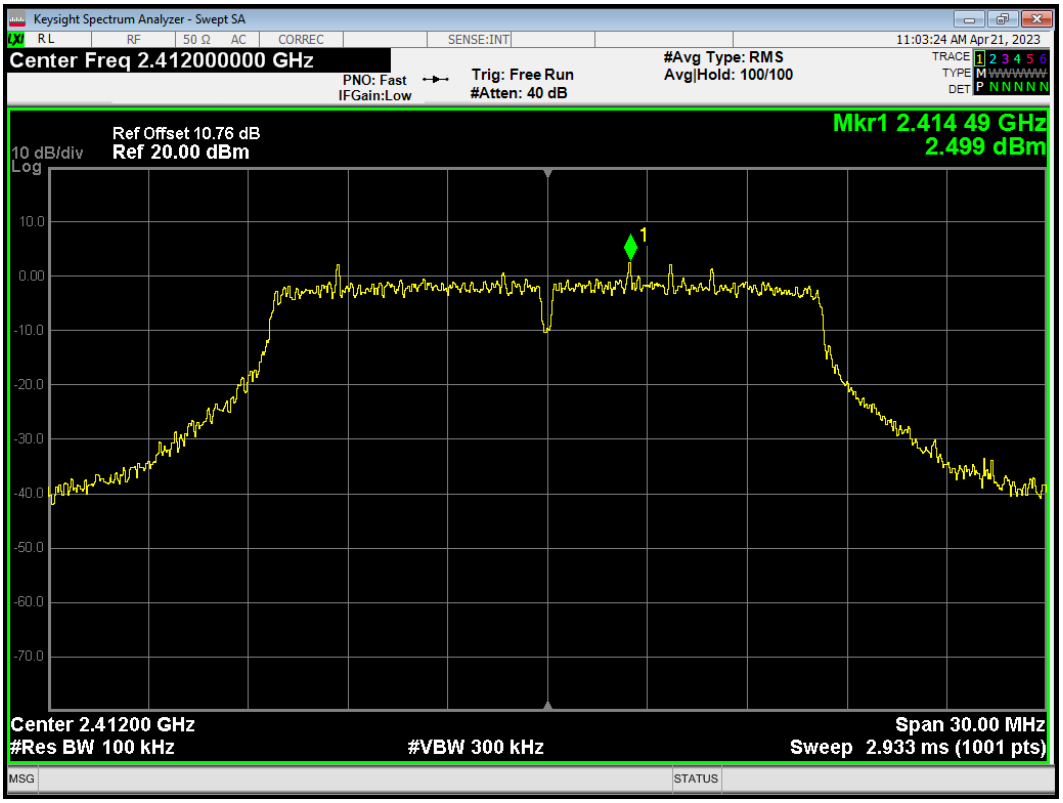
Band Edge 802.11b 2462MHz Ref



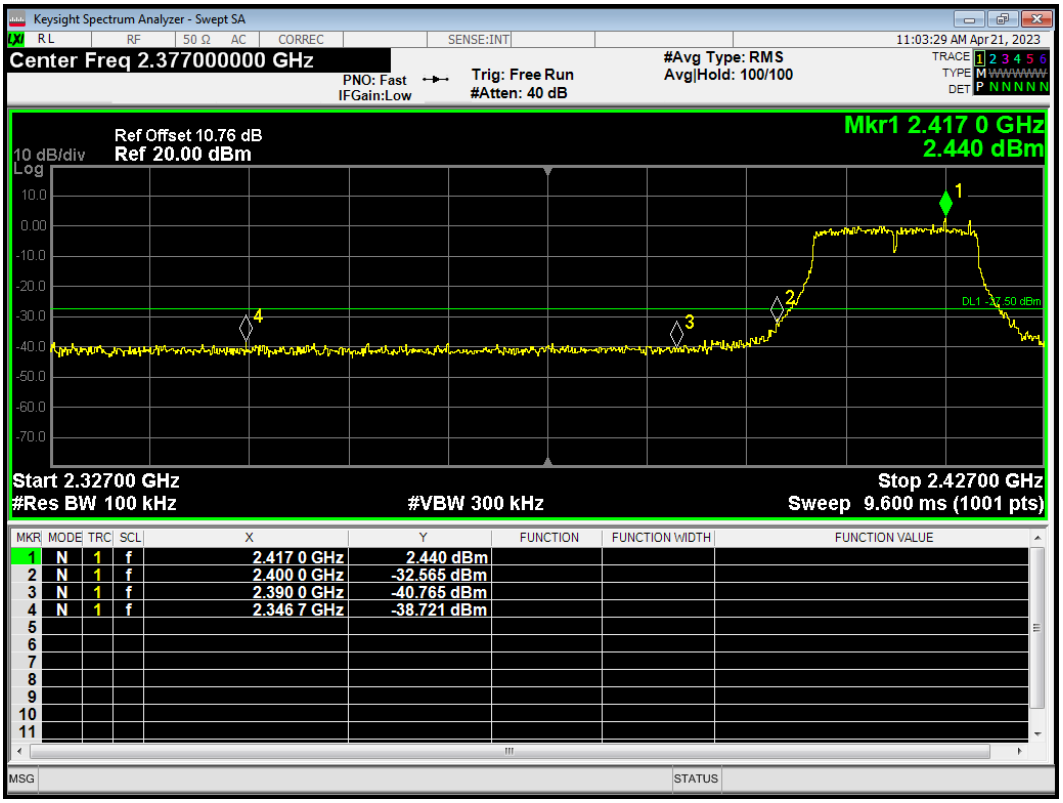
Band Edge 802.11b 2462MHz Emission



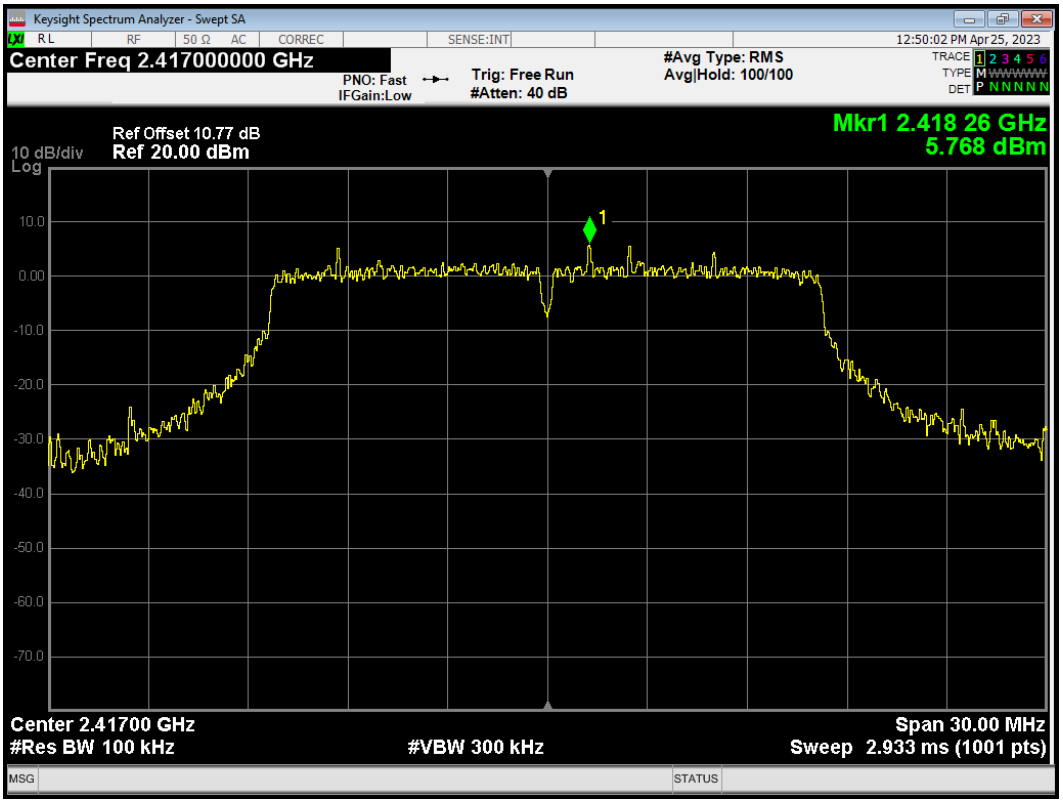
Band Edge 802.11g 2412MHz Ref



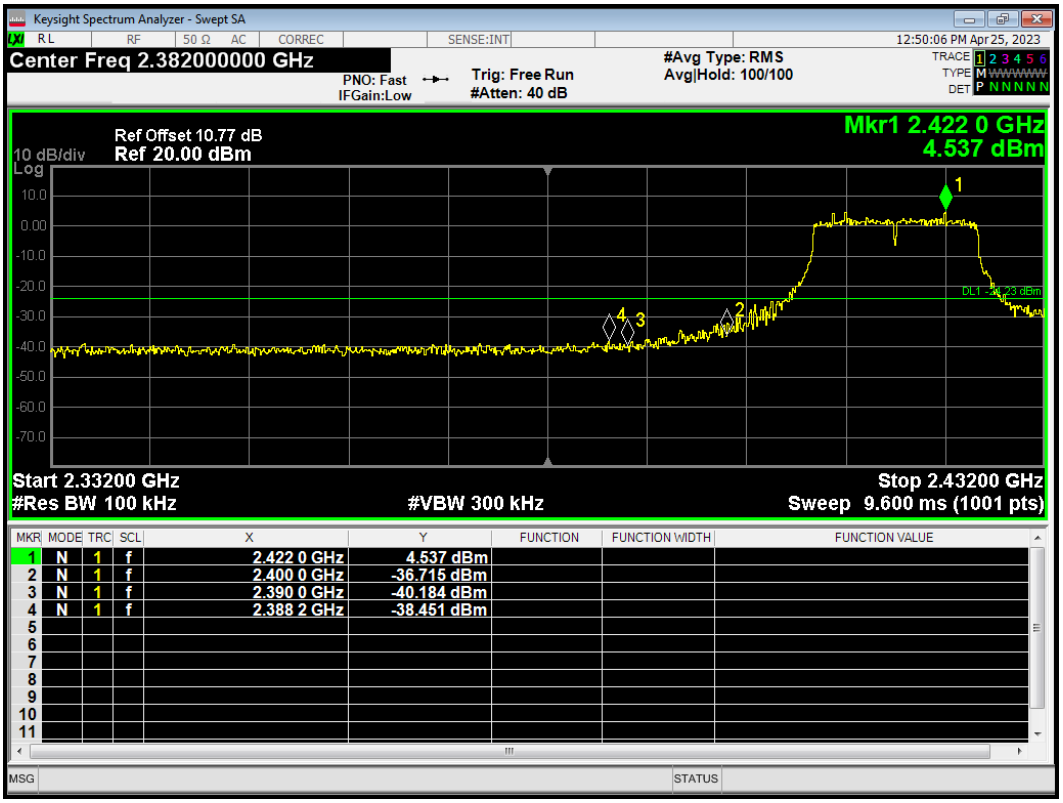
Band Edge 802.11g 2412MHz Emission



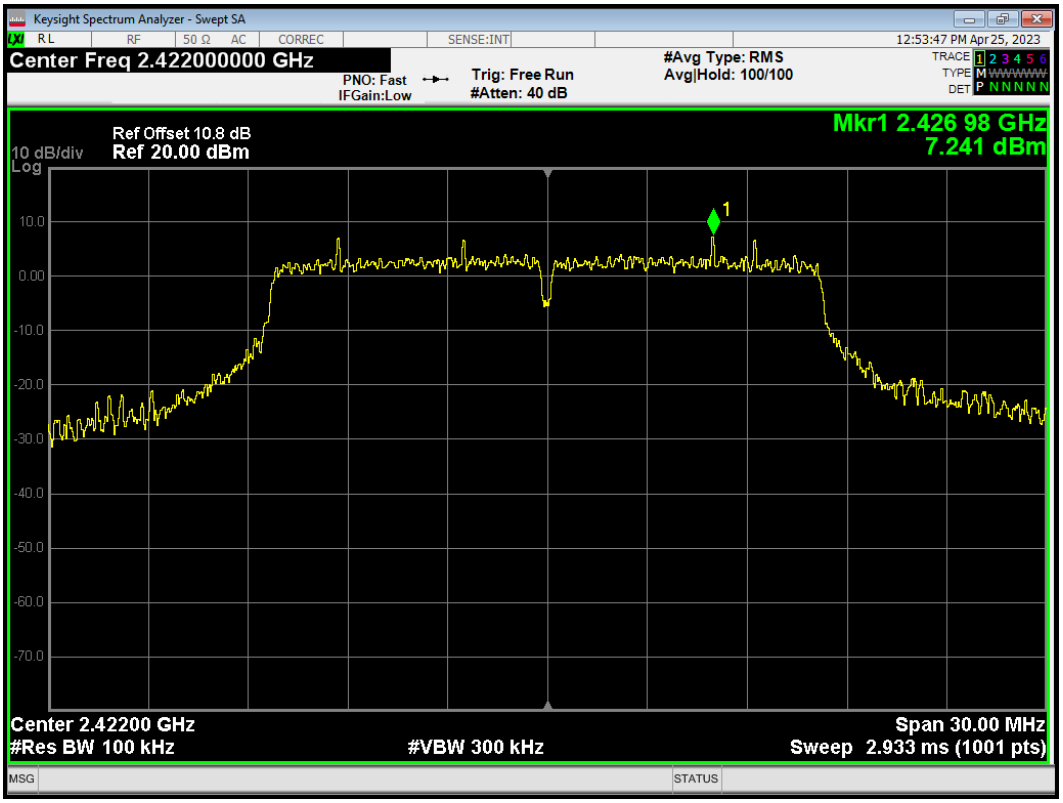
Band Edge 802.11g 2417MHz Ref



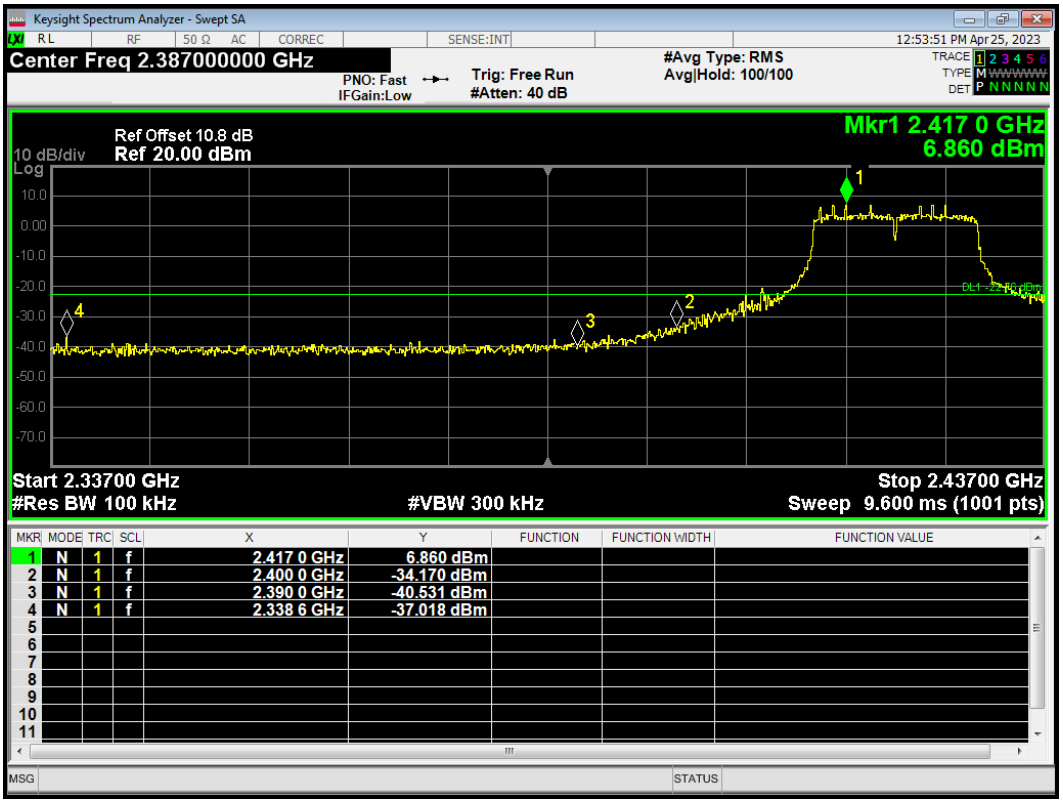
Band Edge 802.11g 2417MHz Emission



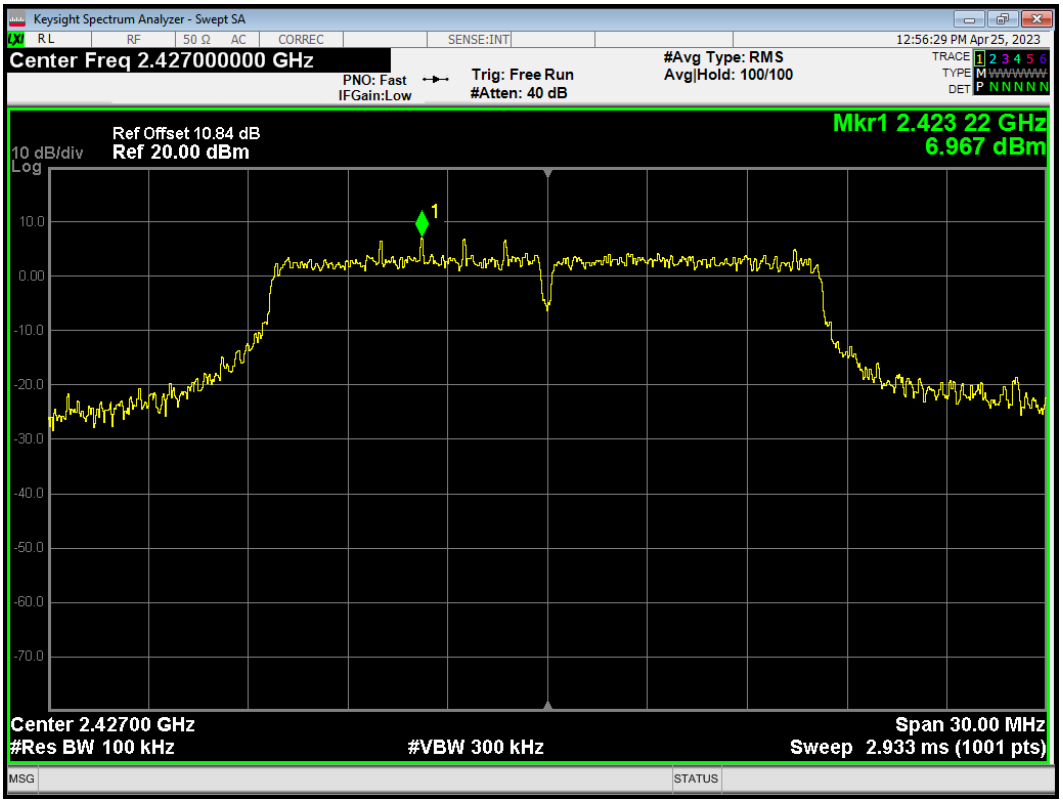
Band Edge 802.11g 2422MHz Ref



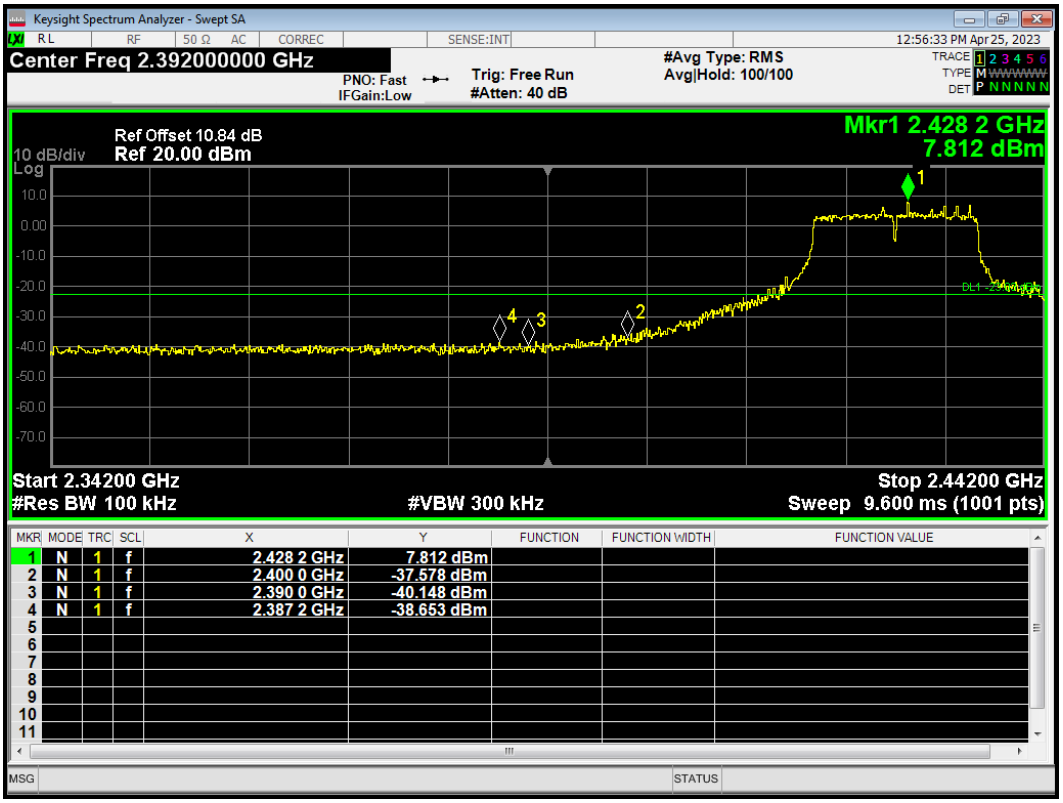
Band Edge 802.11g 2422MHz Emission



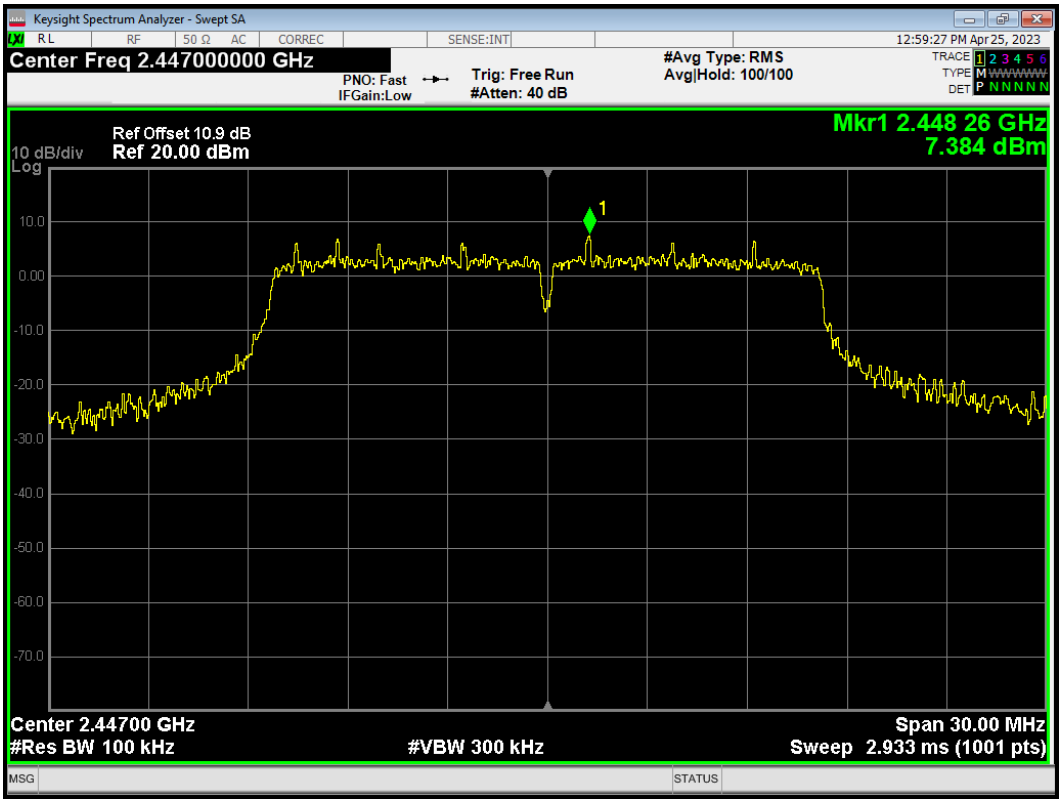
Band Edge 802.11g 2427MHz Ref



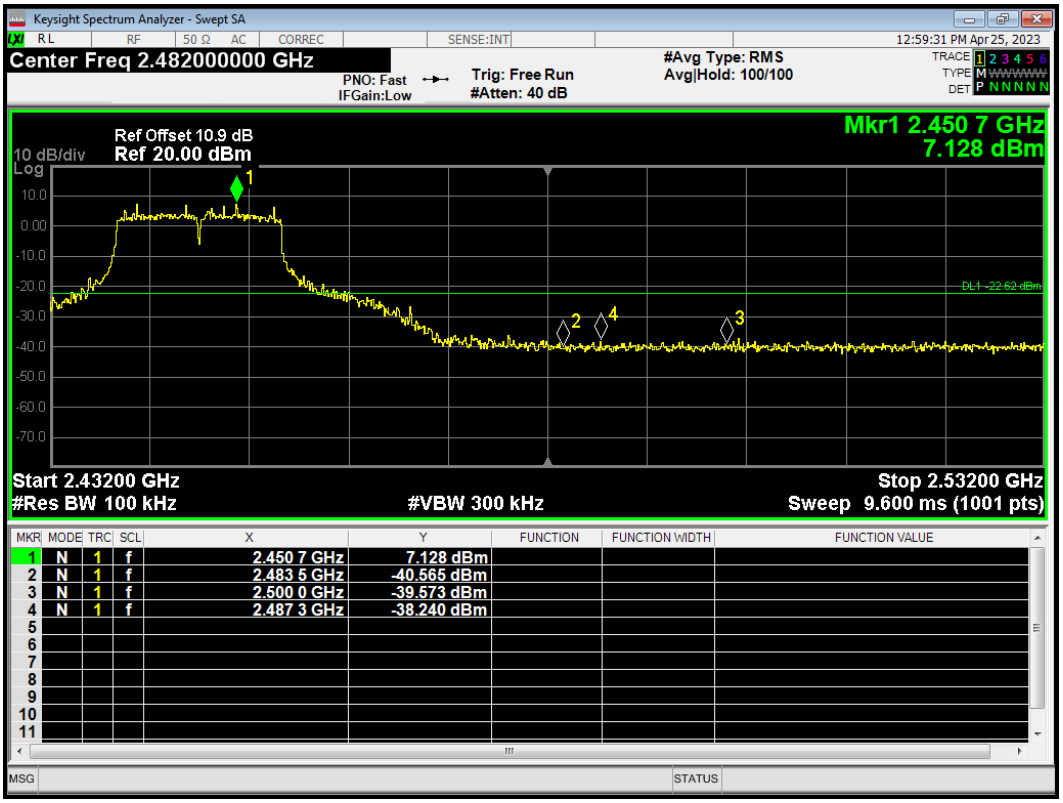
Band Edge 802.11g 2427MHz Emission



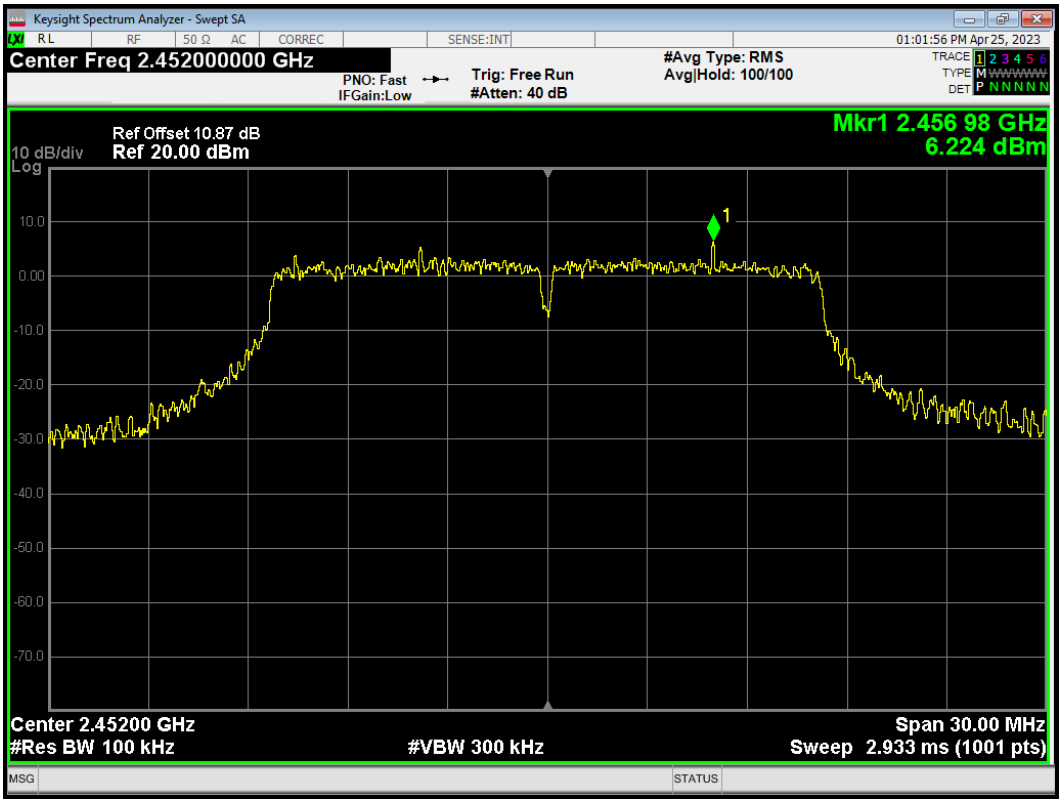
Band Edge 802.11g 2447MHz Ref



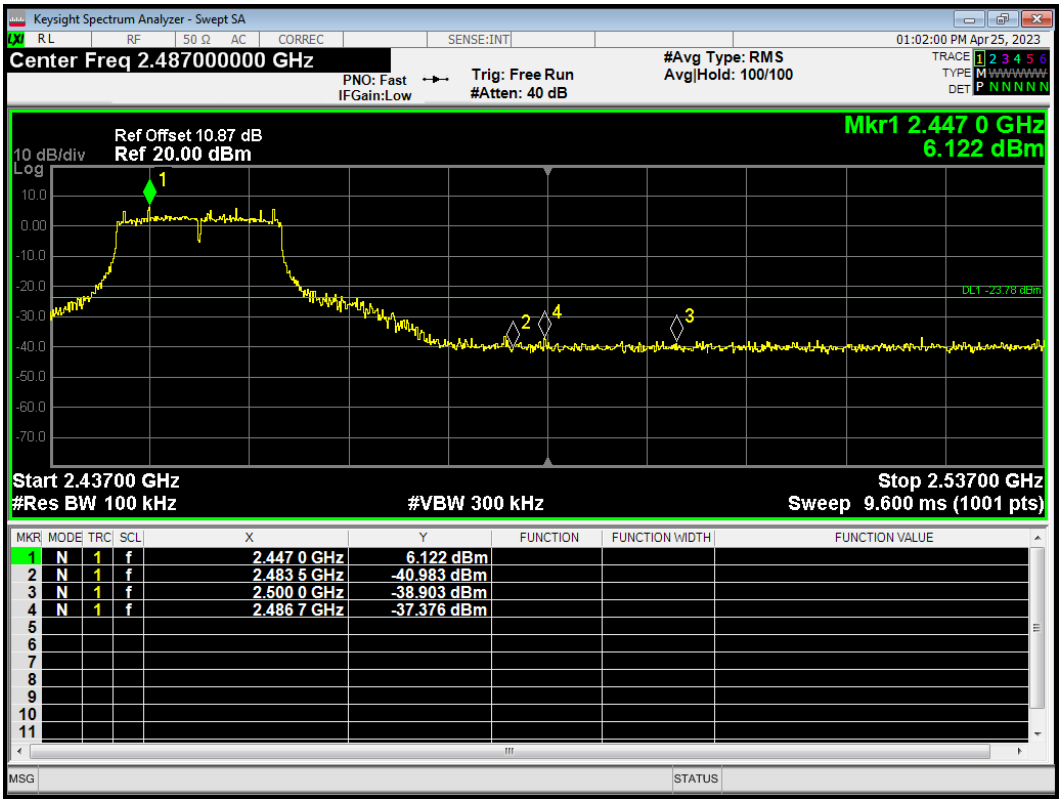
Band Edge 802.11g 2447MHz Emission



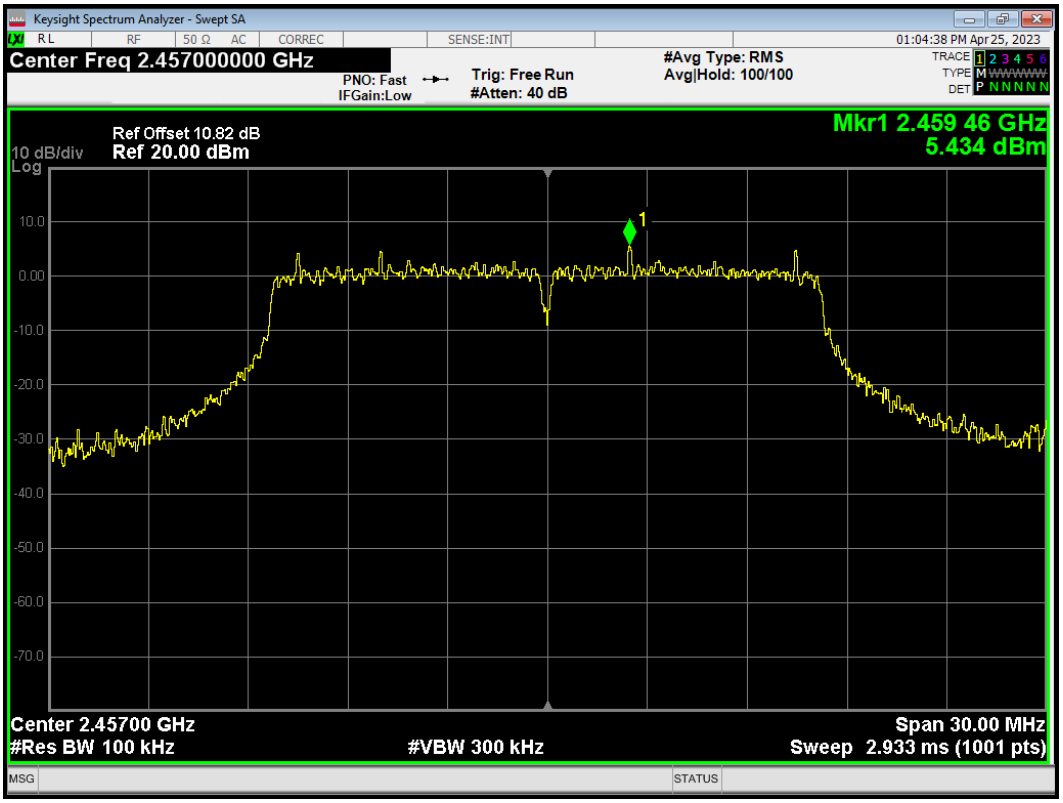
Band Edge 802.11g 2452MHz Ref



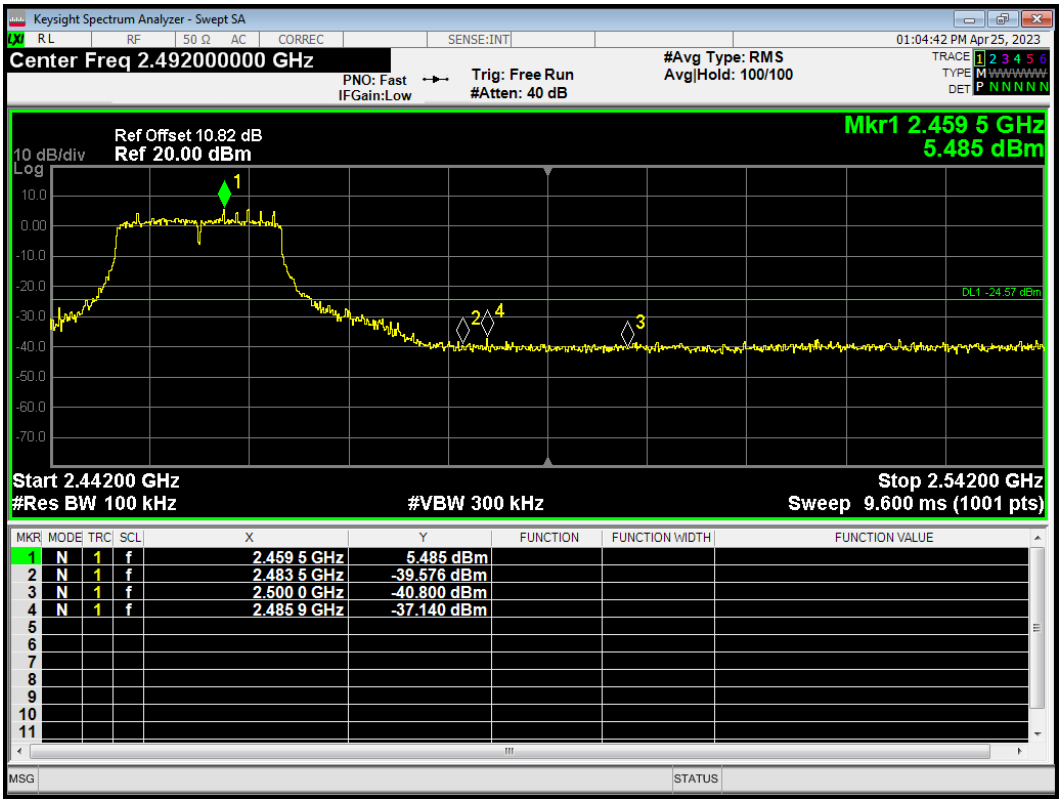
Band Edge 802.11g 2452MHz Emission



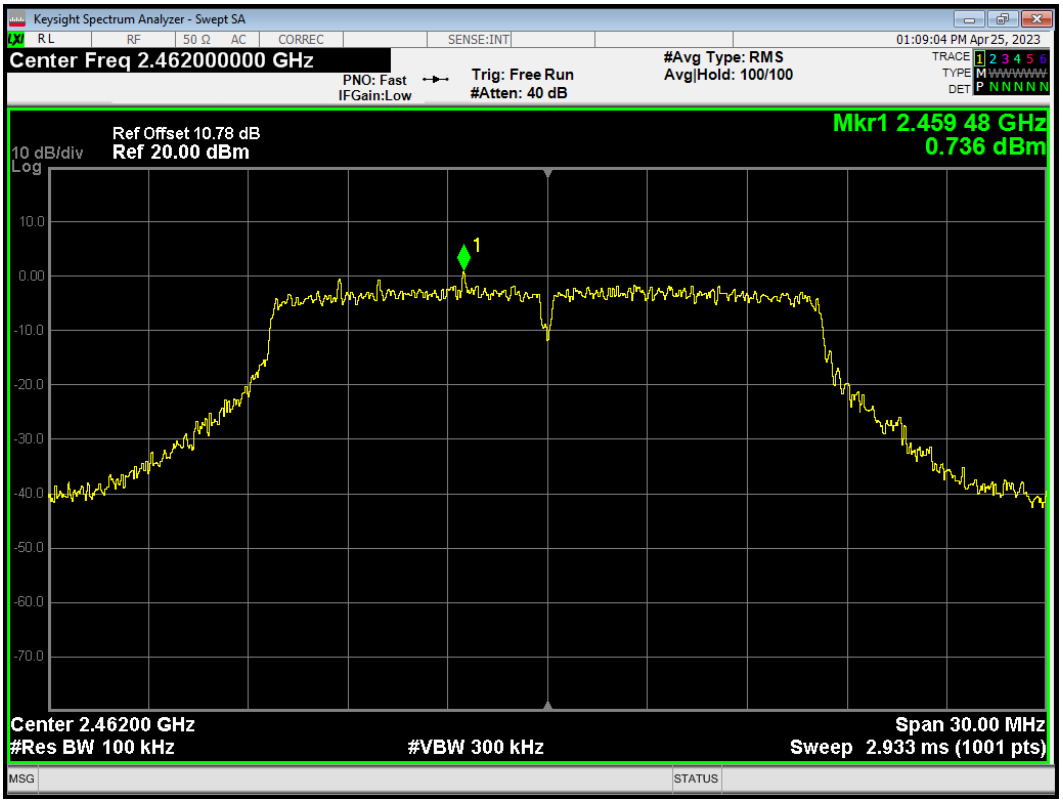
Band Edge 802.11g 2457MHz Ref



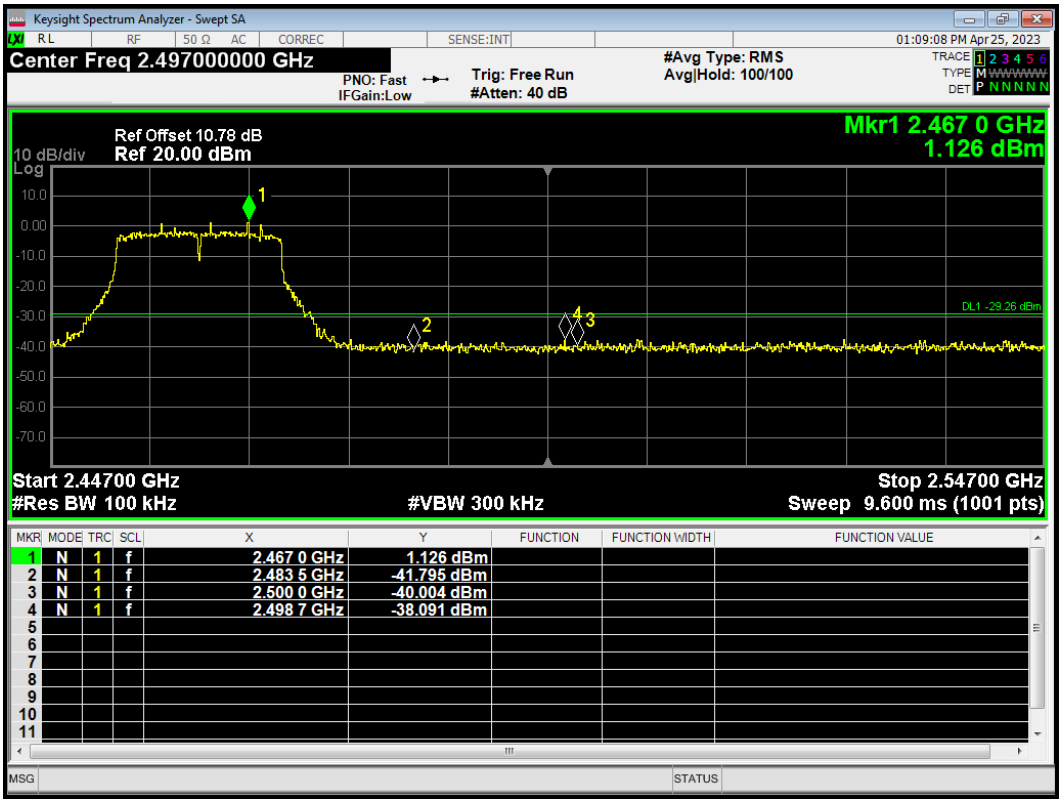
Band Edge 802.11g 2457MHz Emission



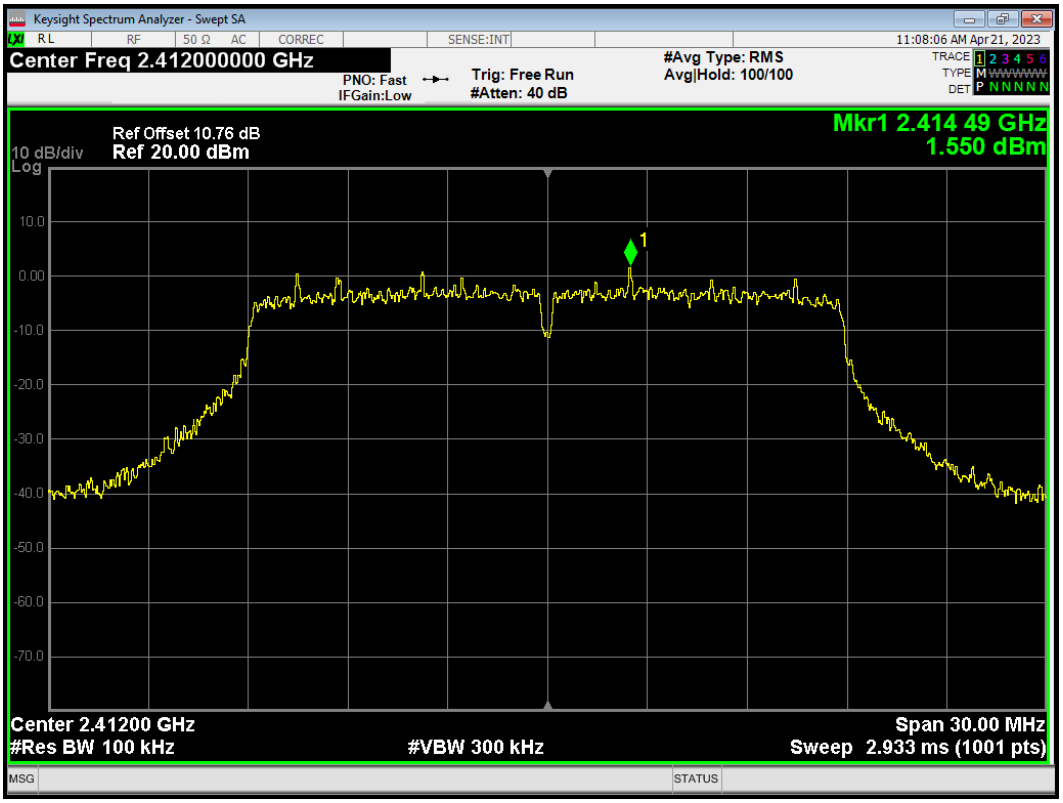
Band Edge 802.11g 2462MHz Ref



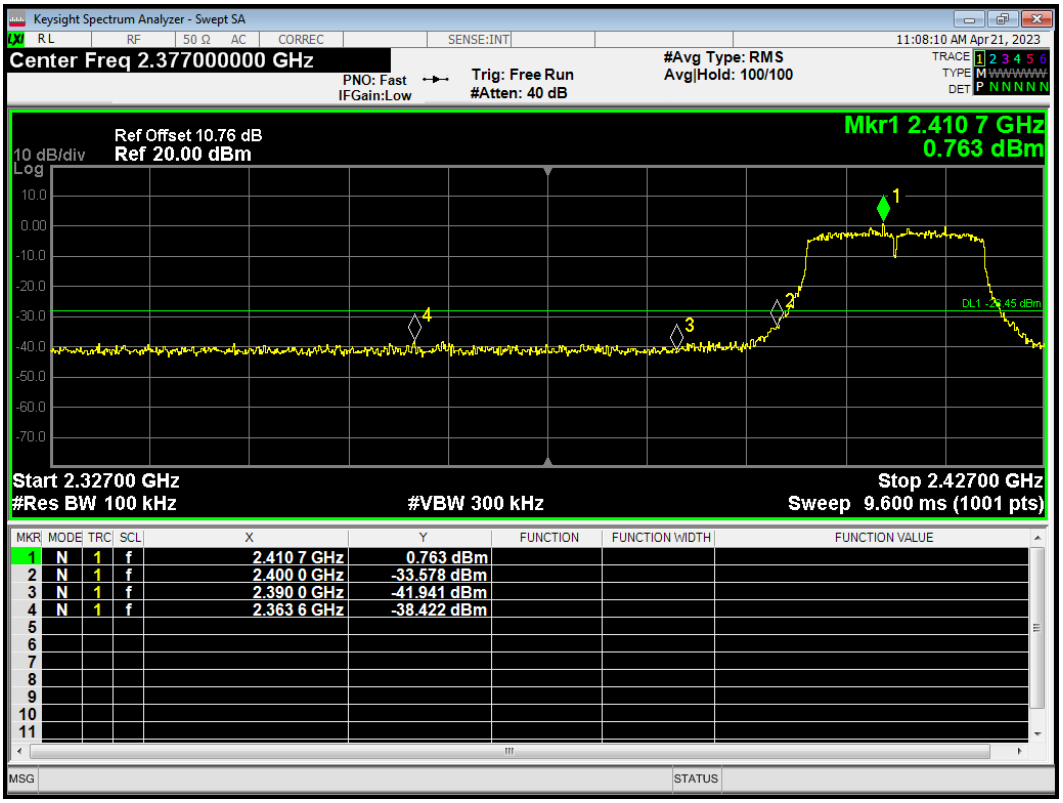
Band Edge 802.11g 2462MHz Emission



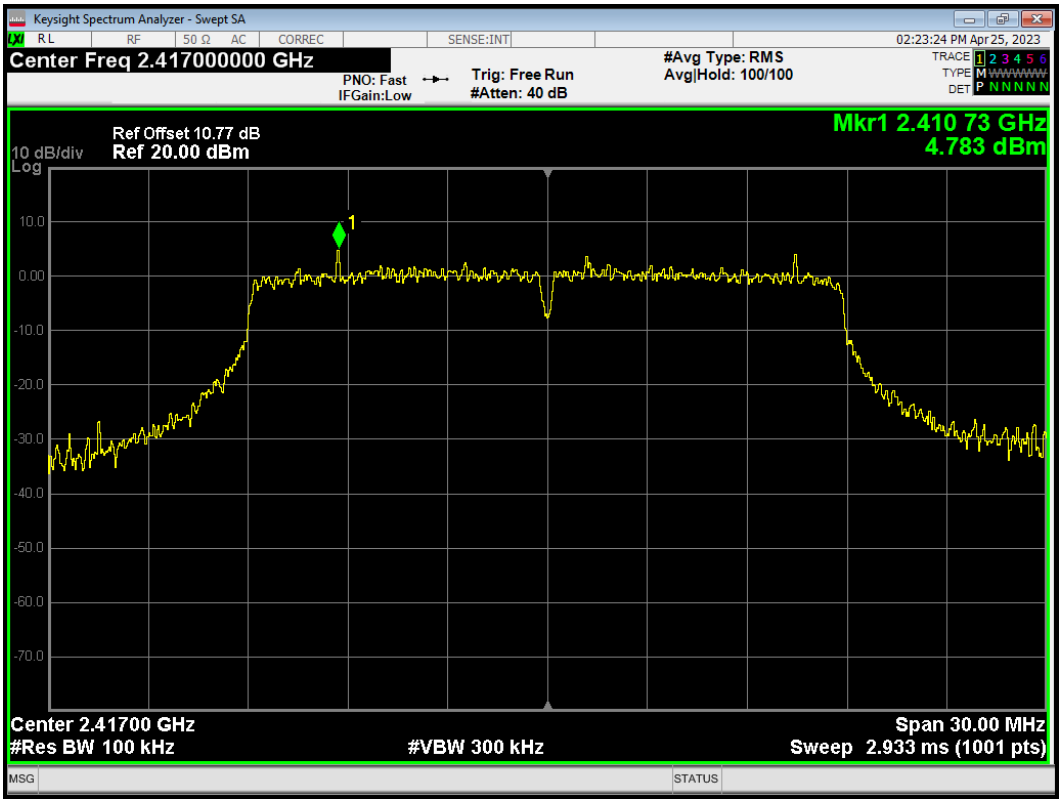
Band Edge 802.11n (HT20) 2412MHz Ref



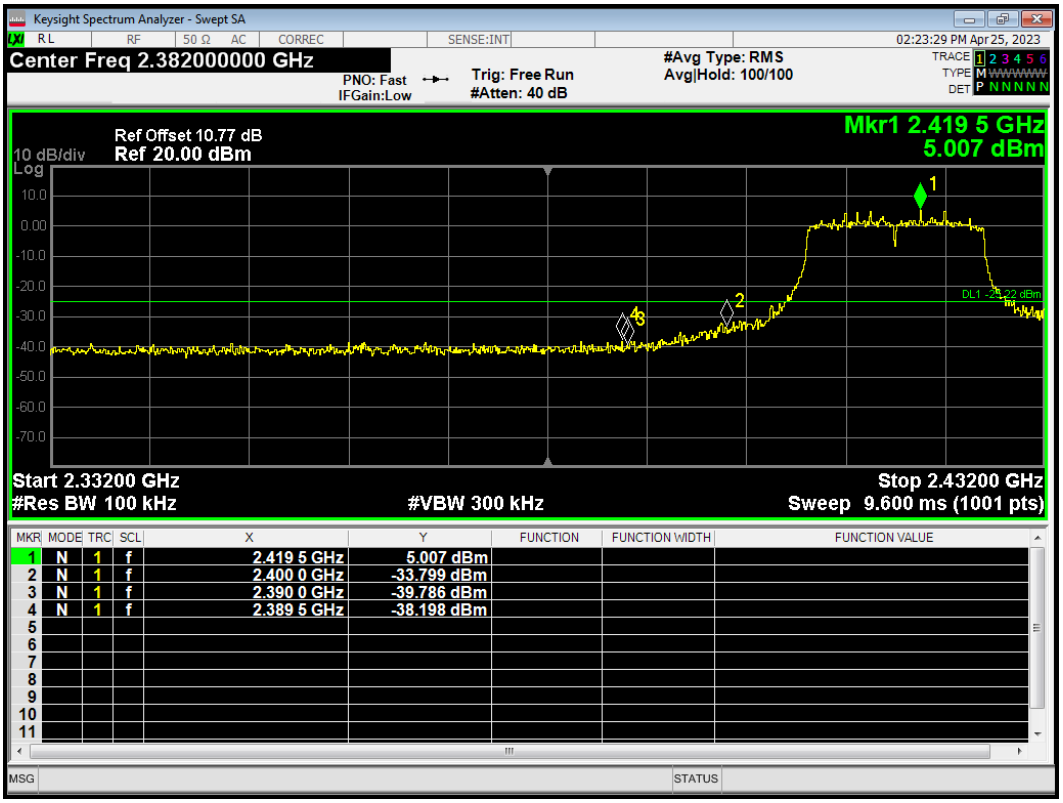
Band Edge 802.11n (HT20) 2412MHz Emission



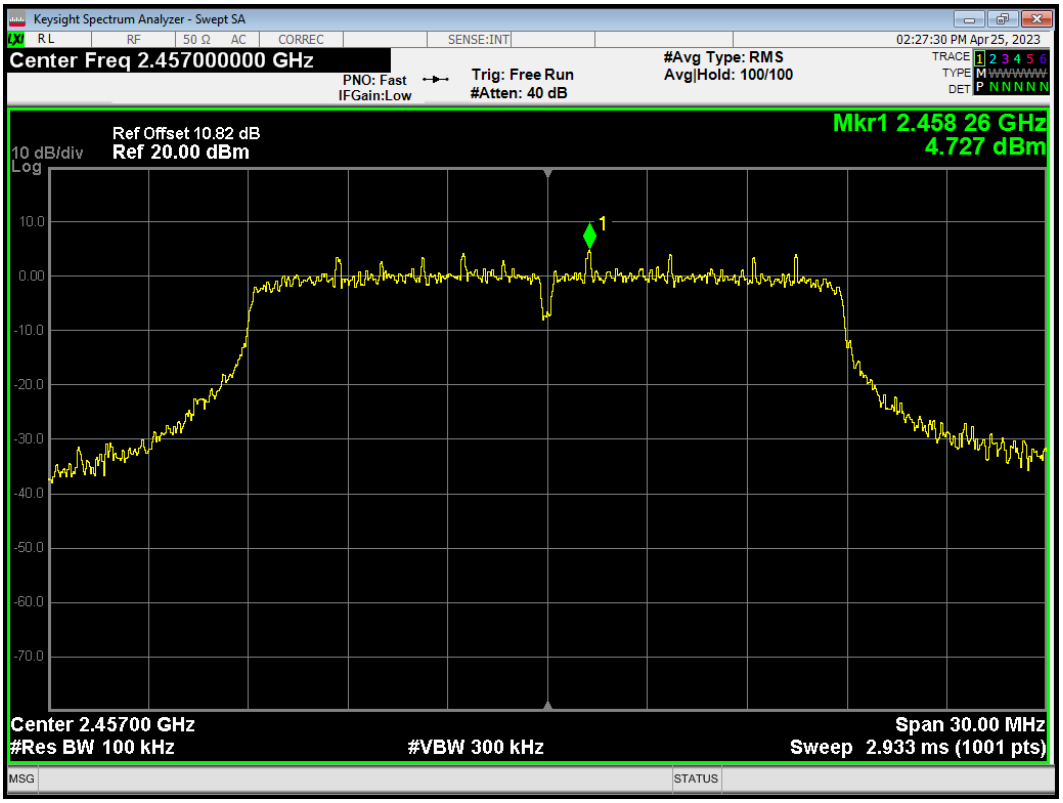
Band Edge 802.11n (HT20) 2417MHz Ref



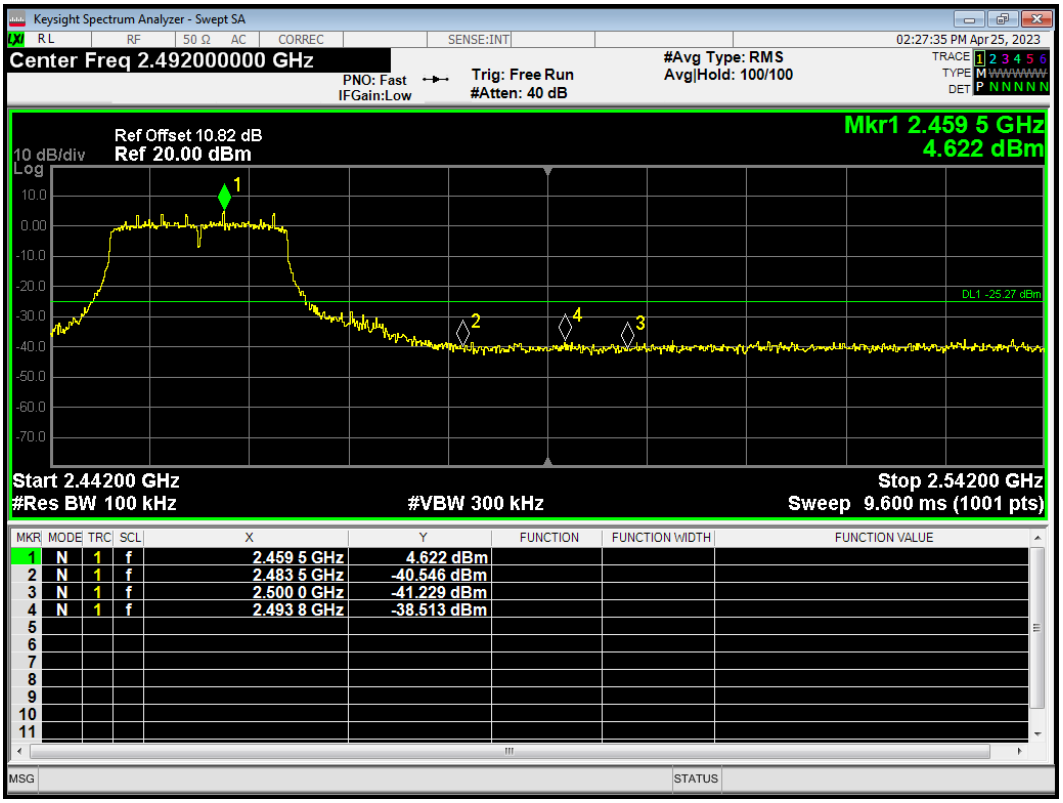
Band Edge 802.11n (HT20) 2417MHz Emission



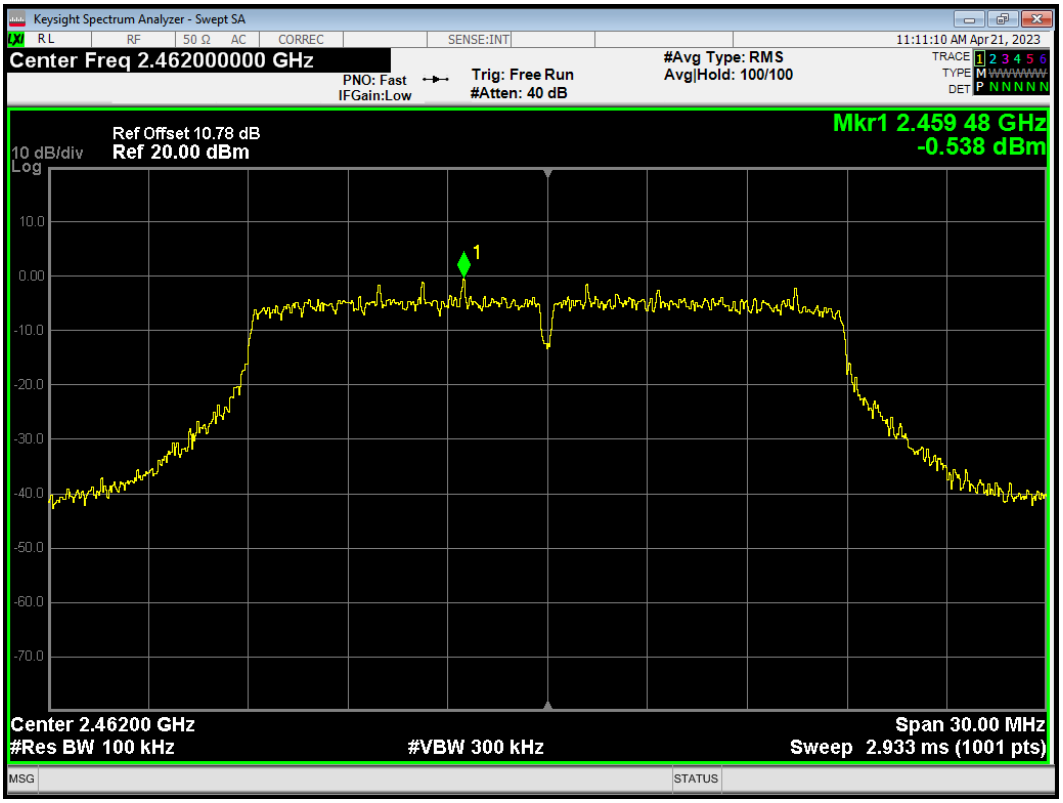
Band Edge 802.11n (HT20) 2457MHz Ref



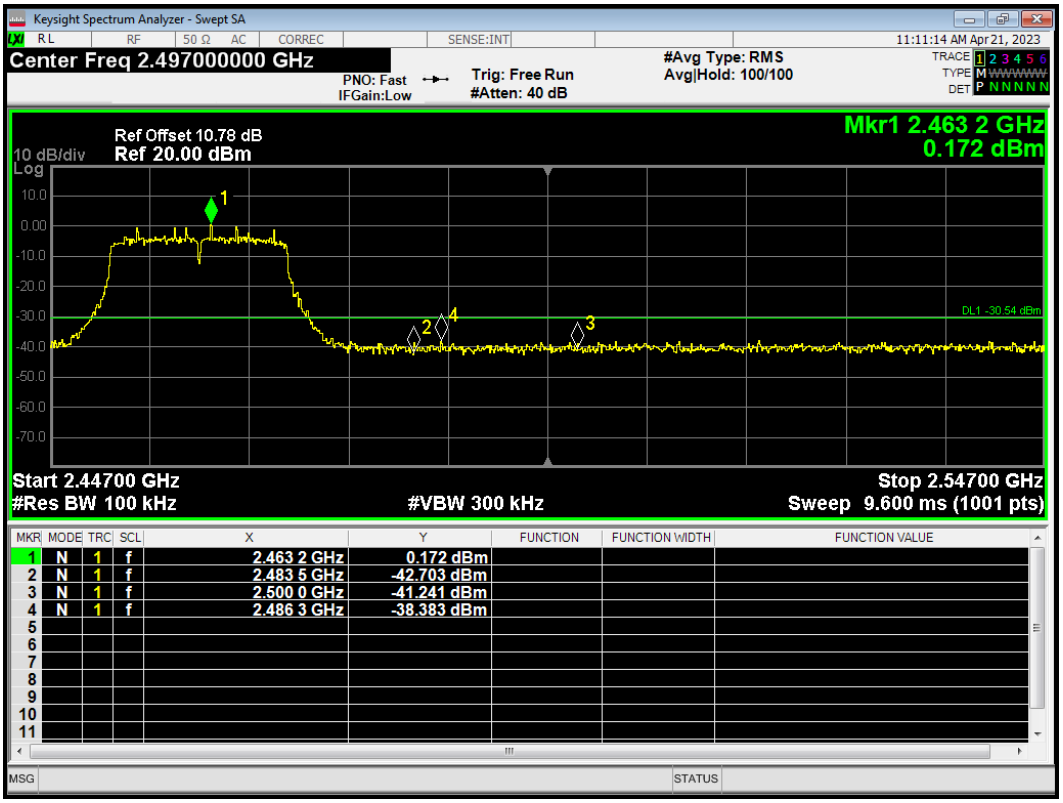
Band Edge 802.11n (HT20) 2457MHz Emission



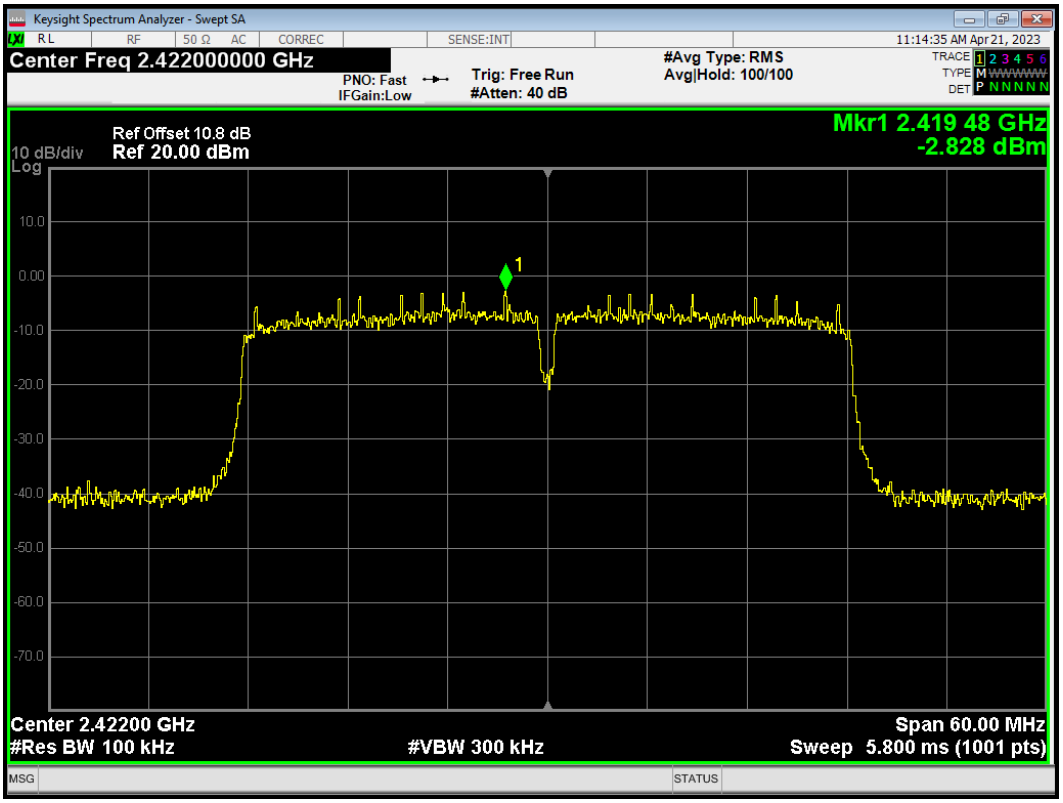
Band Edge 802.11n (HT20) 2462MHz Ref



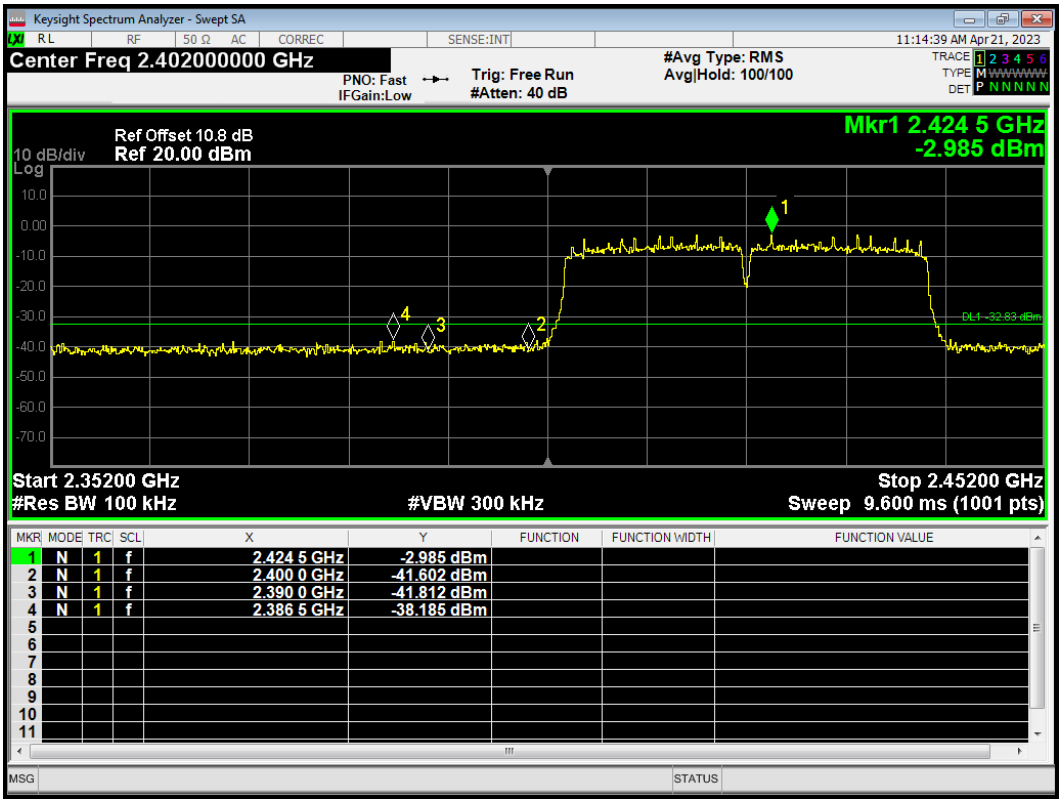
Band Edge 802.11n (HT20) 2462MHz Emission



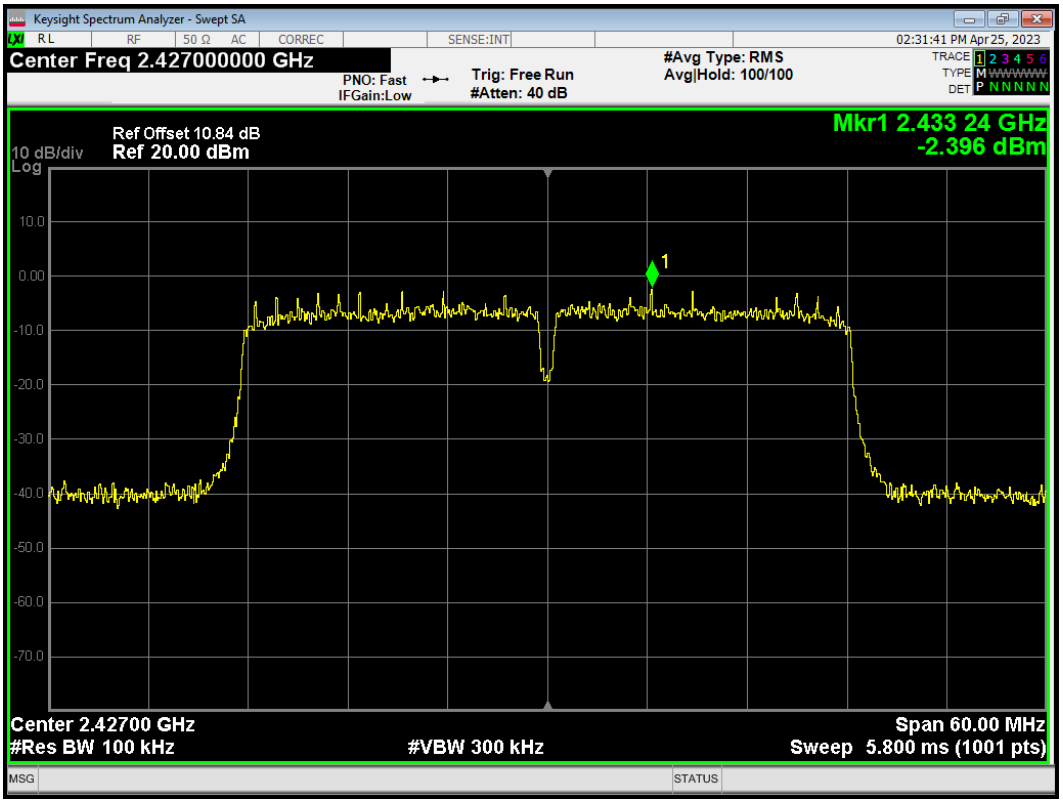
Band Edge 802.11n (HT40) 2422MHz Ref



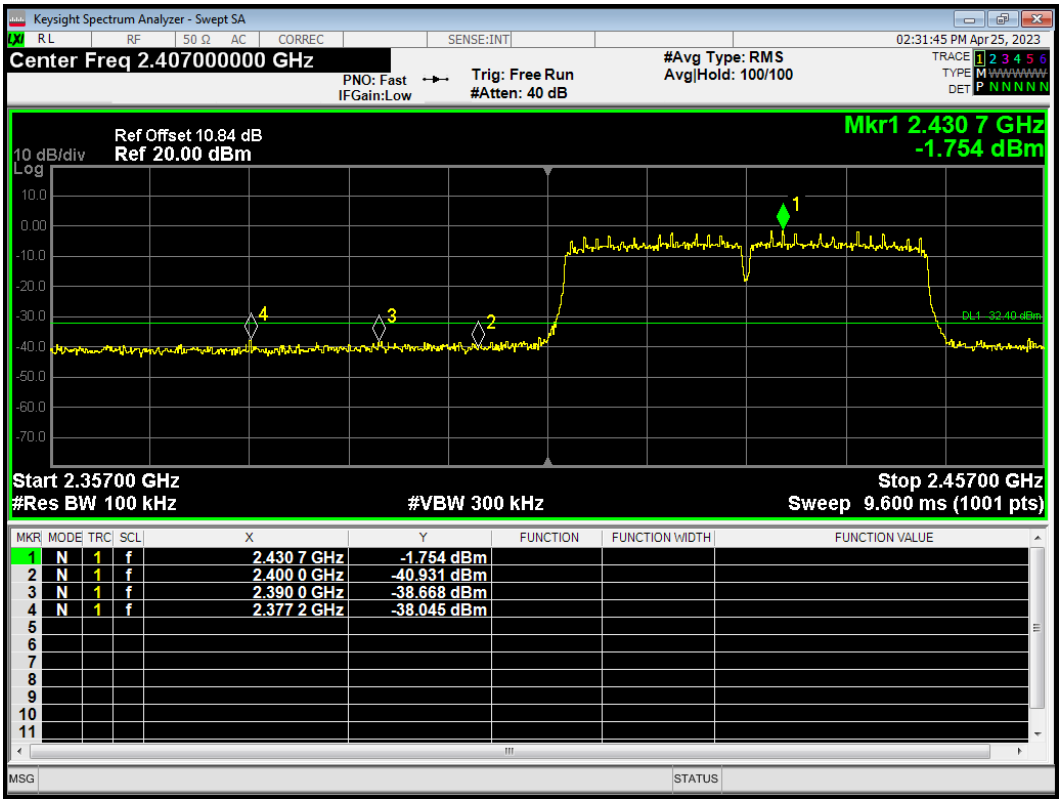
Band Edge 802.11n (HT40) 2422MHz Emission



Band Edge 802.11n (HT40) 2427MHz Ref

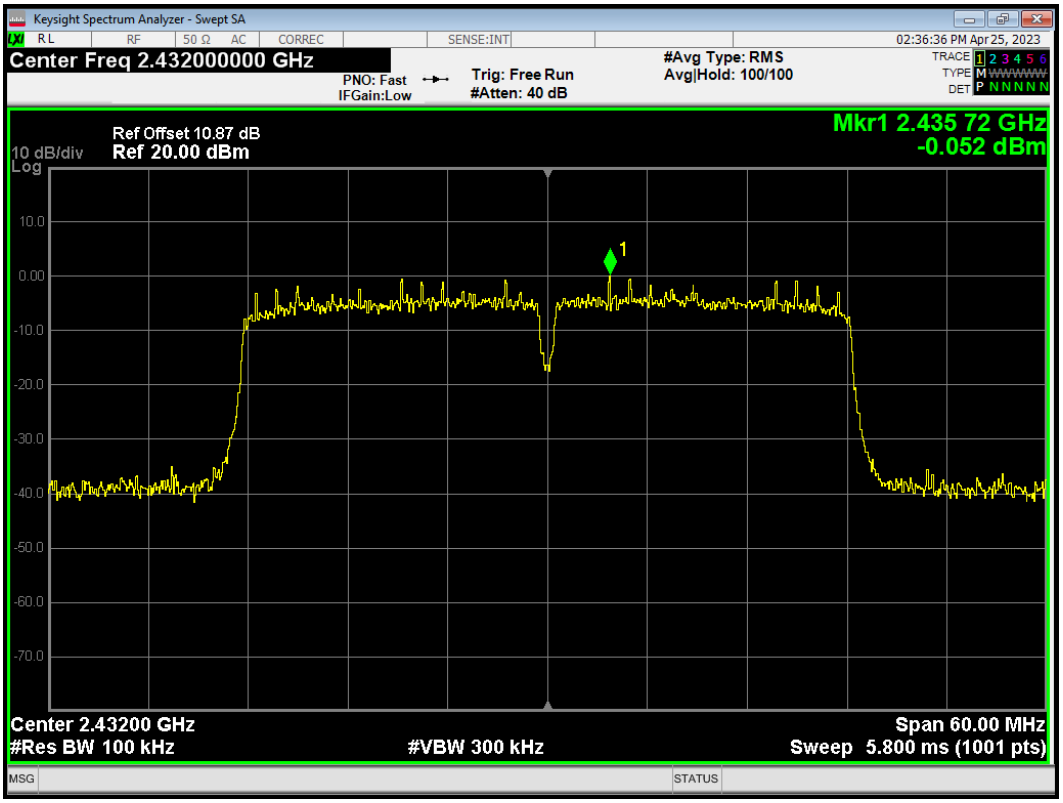


Band Edge 802.11n (HT40) 2427MHz Emission

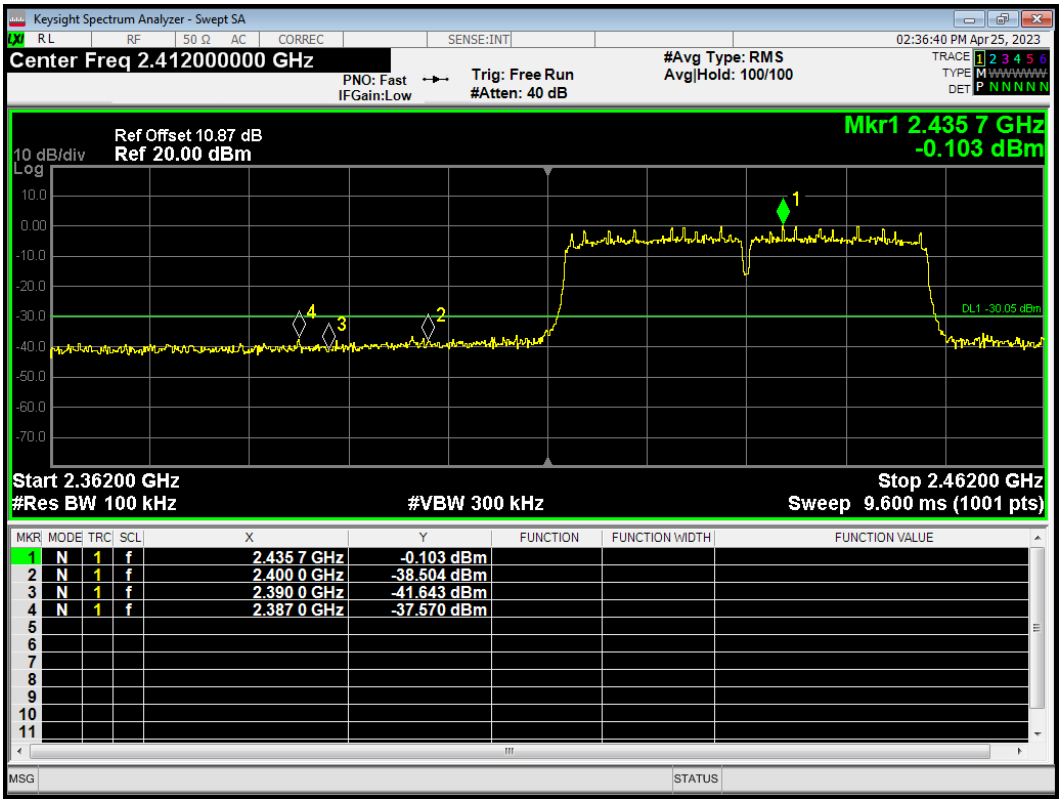


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.430 7 GHz	-1.754 dBm			
2	N	1	f	2.400 0 GHz	-40.931 dBm			
3	N	1	f	2.390 0 GHz	-38.668 dBm			
4	N	1	f	2.377 2 GHz	-38.045 dBm			

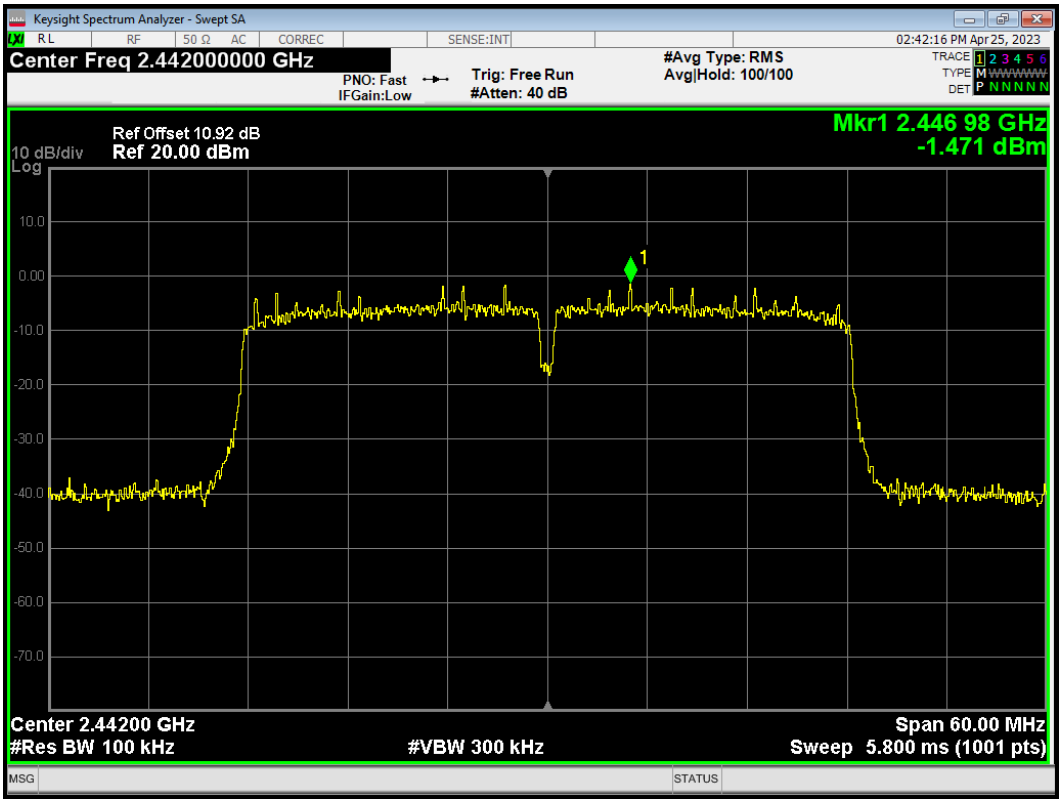
Band Edge 802.11n (HT40) 2432MHz Ref



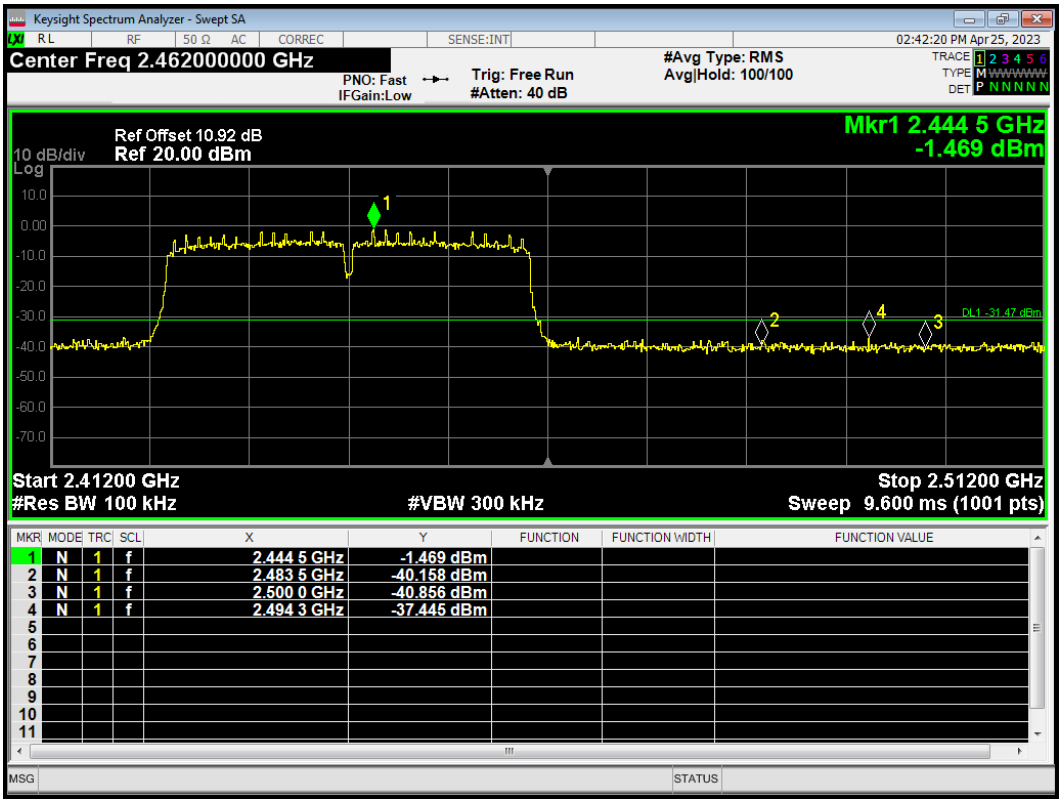
Band Edge 802.11n (HT40) 2432MHz Emission



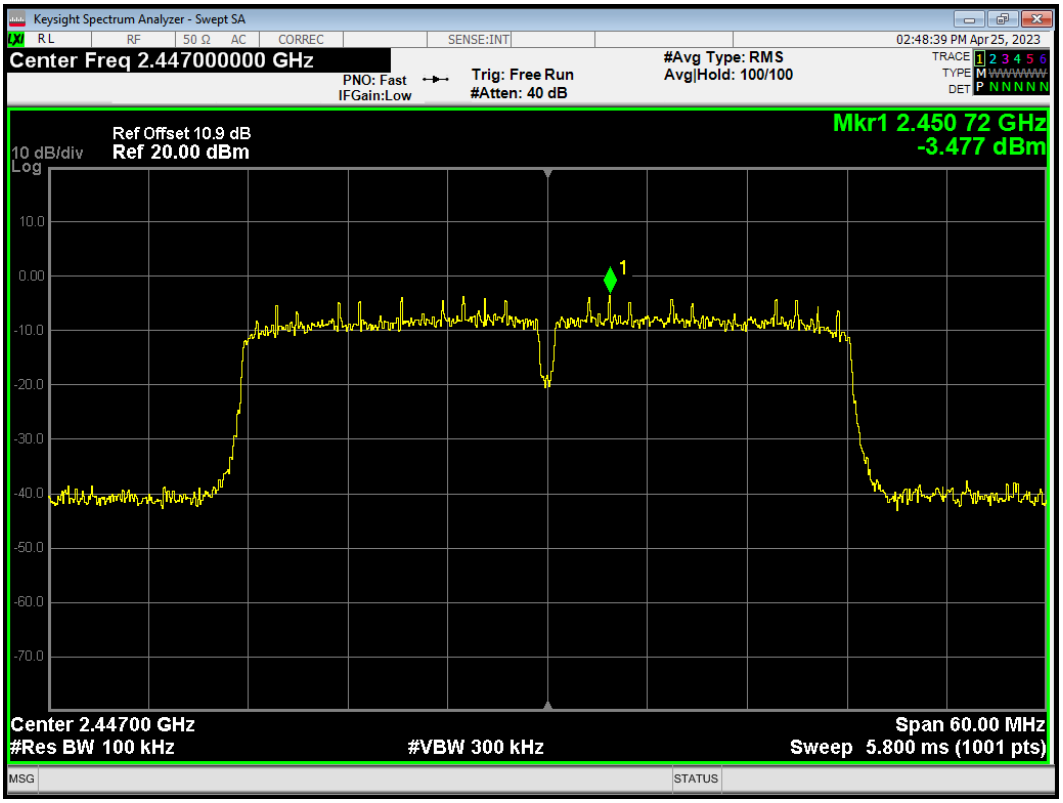
Band Edge 802.11n (HT40) 2442MHz Ref



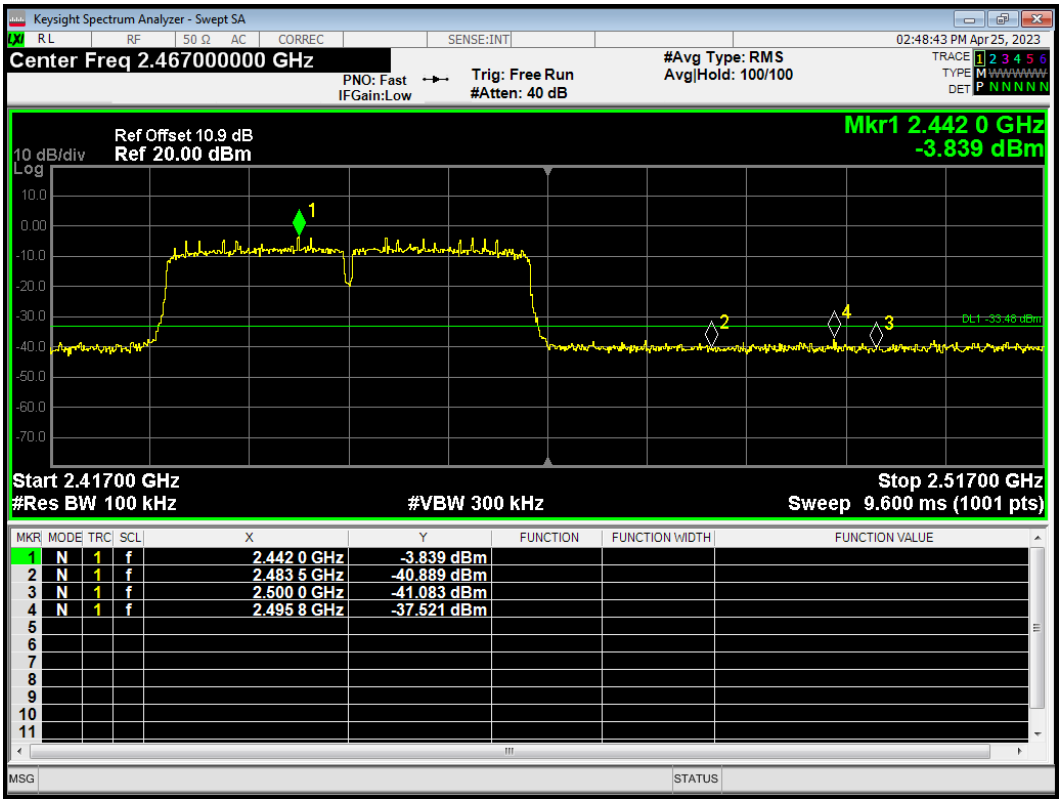
Band Edge 802.11n (HT40) 2442MHz Emission



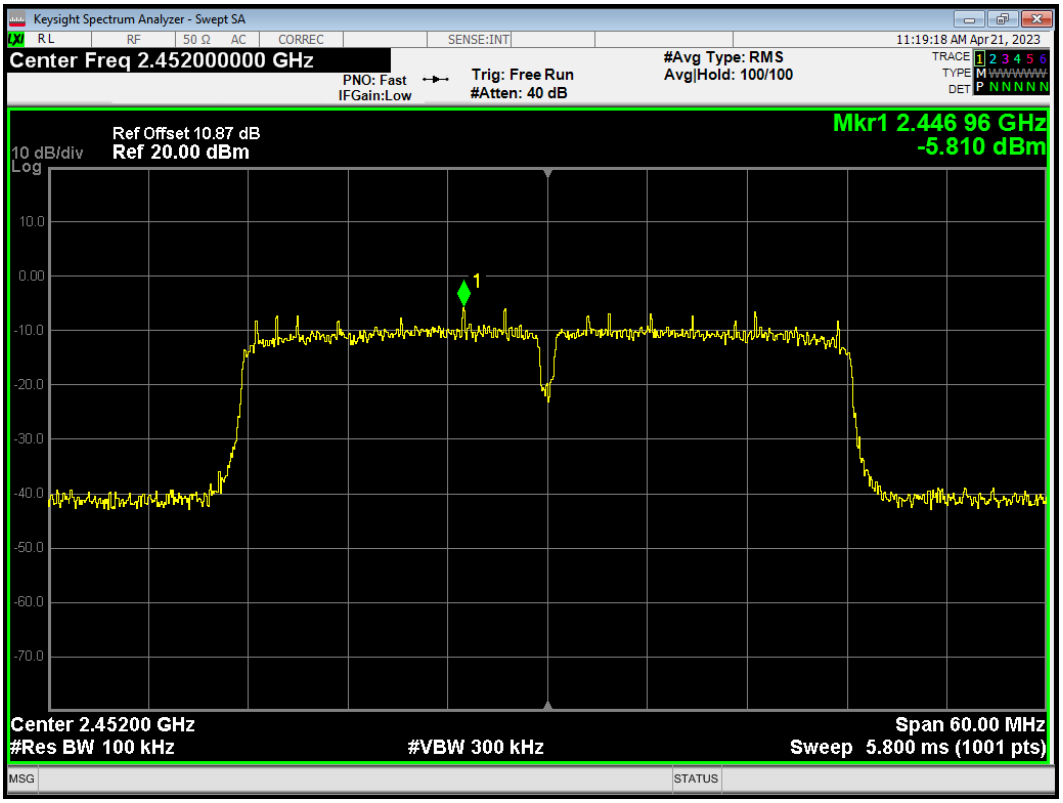
Band Edge 802.11n (HT40) 2447MHz Ref



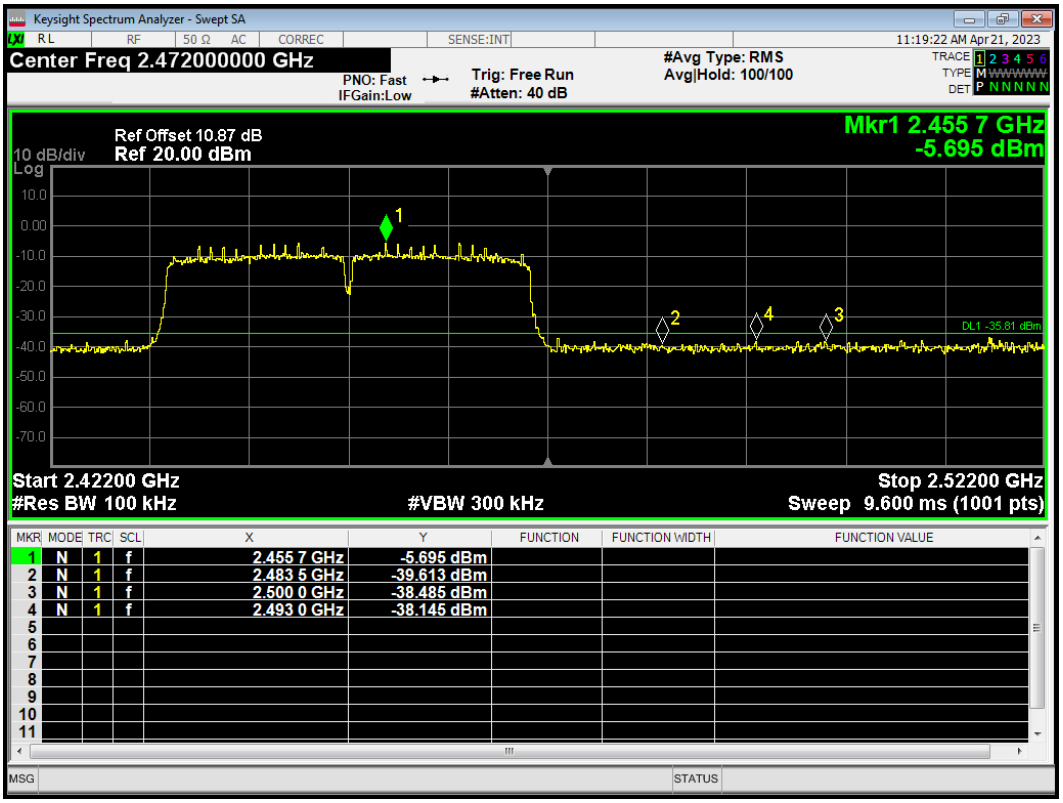
Band Edge 802.11n (HT40) 2447MHz Emission



Band Edge 802.11n (HT40) 2452MHz Ref

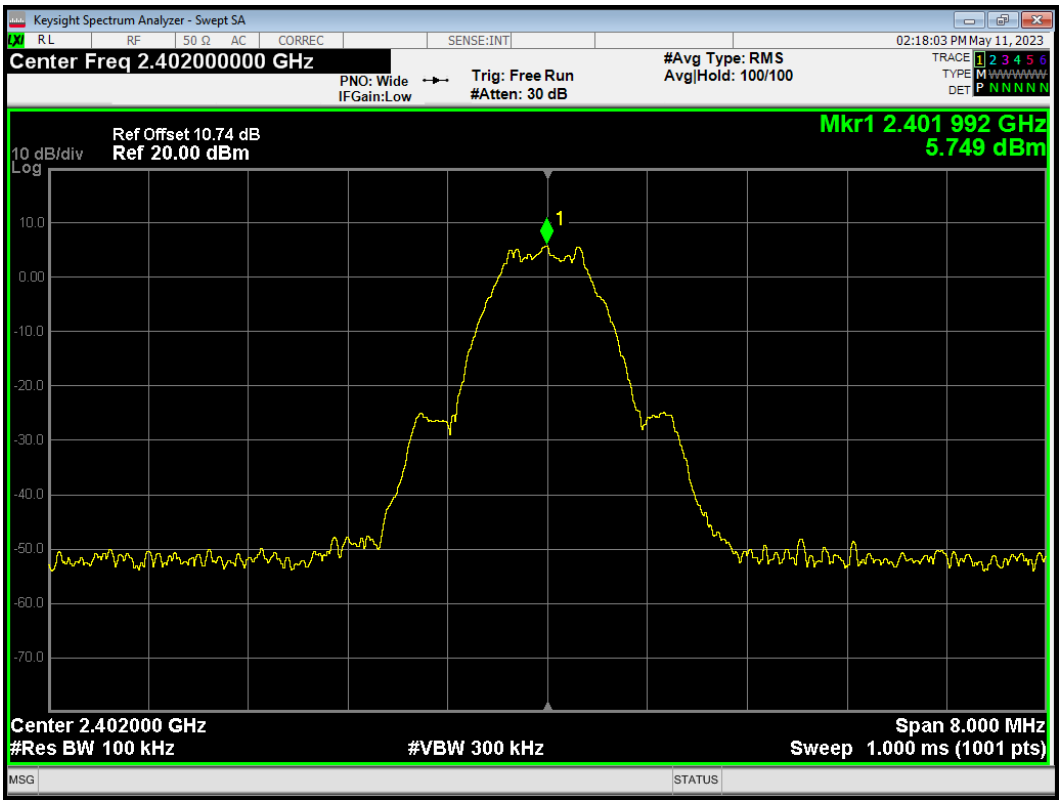


Band Edge 802.11n (HT40) 2452MHz Emission

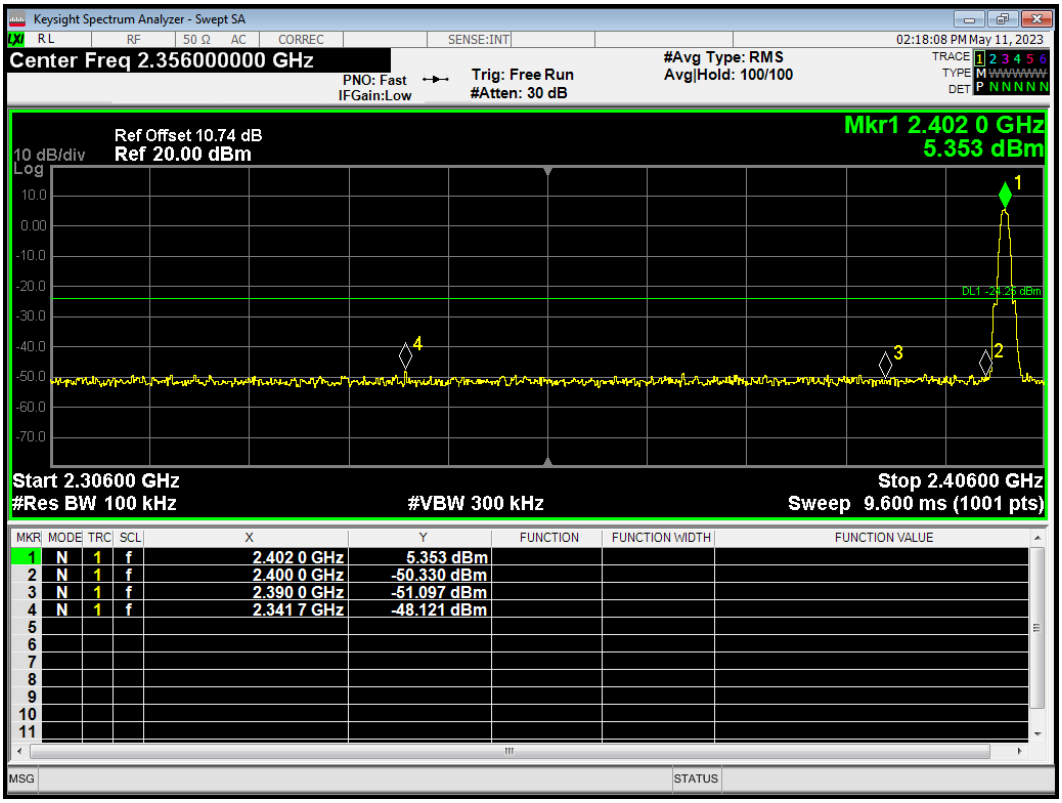


Bluetooth LE

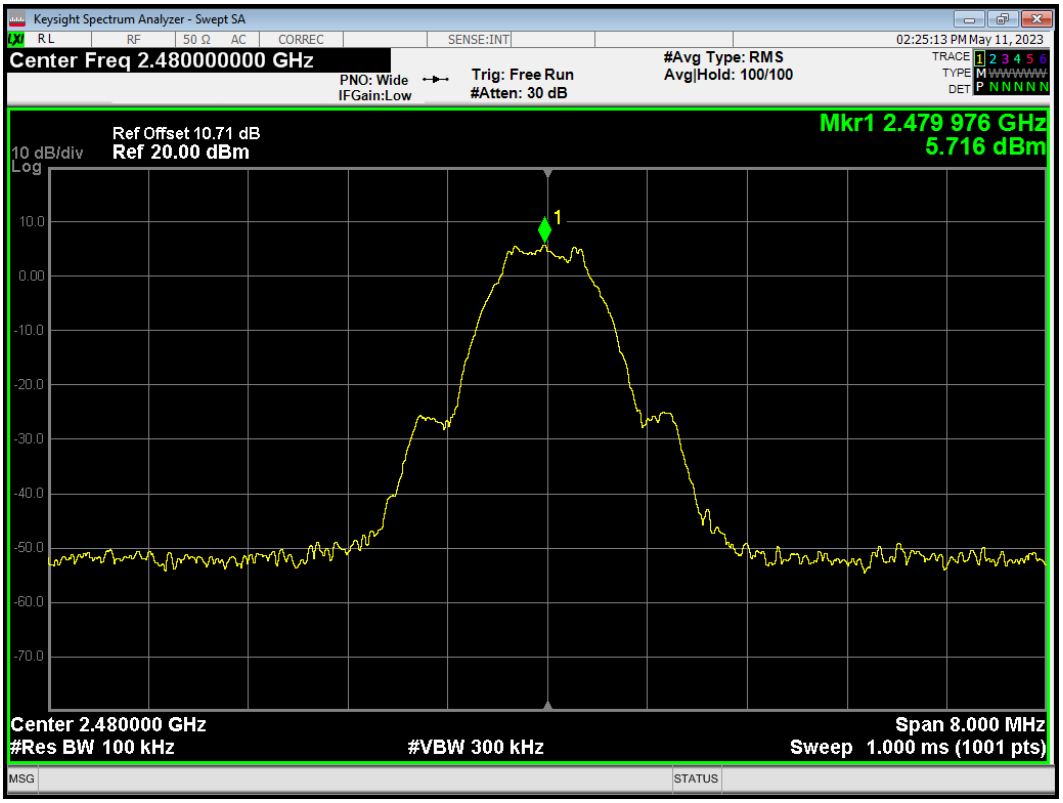
Band Edge BLE 2402MHz Ref



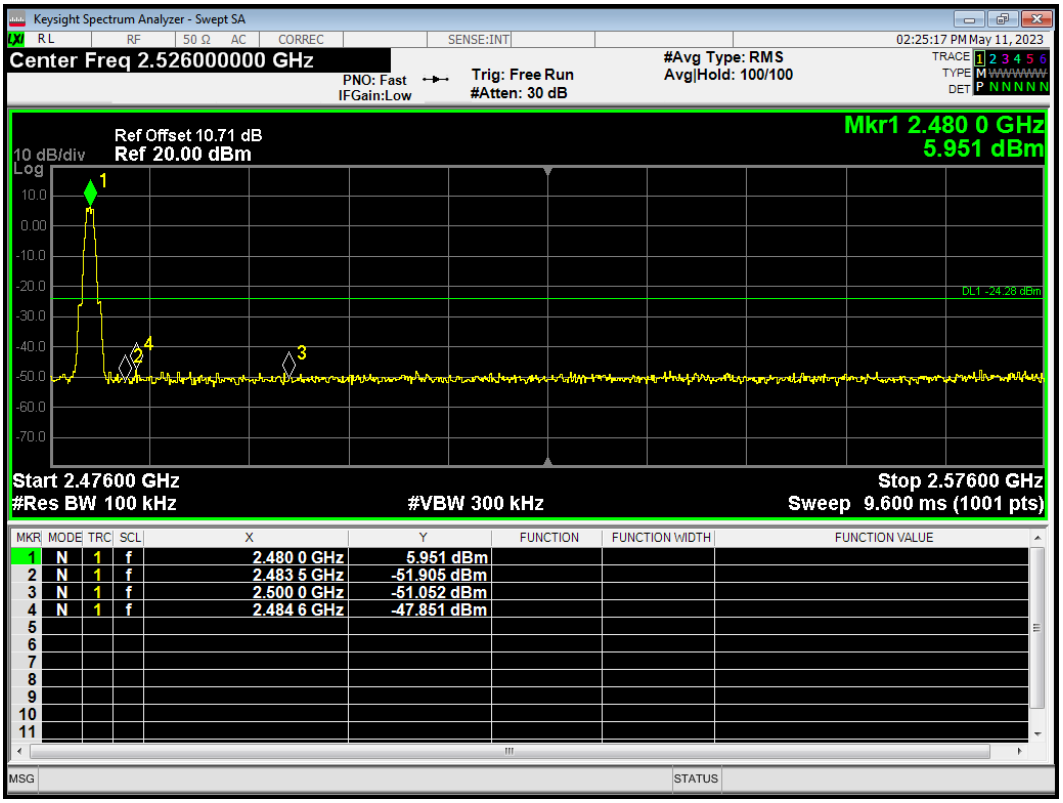
Band Edge BLE 2402MHz Emission



Band Edge BLE 2480MHz Ref



Band Edge BLE 2480MHz Emission



5.4. Power Spectral Density

Ambient Condition

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

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”

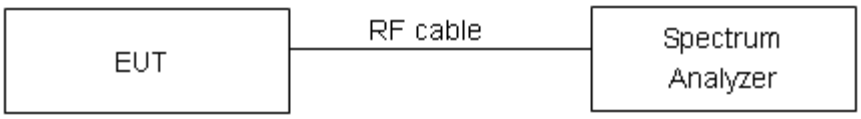
j) Employ trace averaging (rms) mode over a minimum of 100 traces

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)

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.

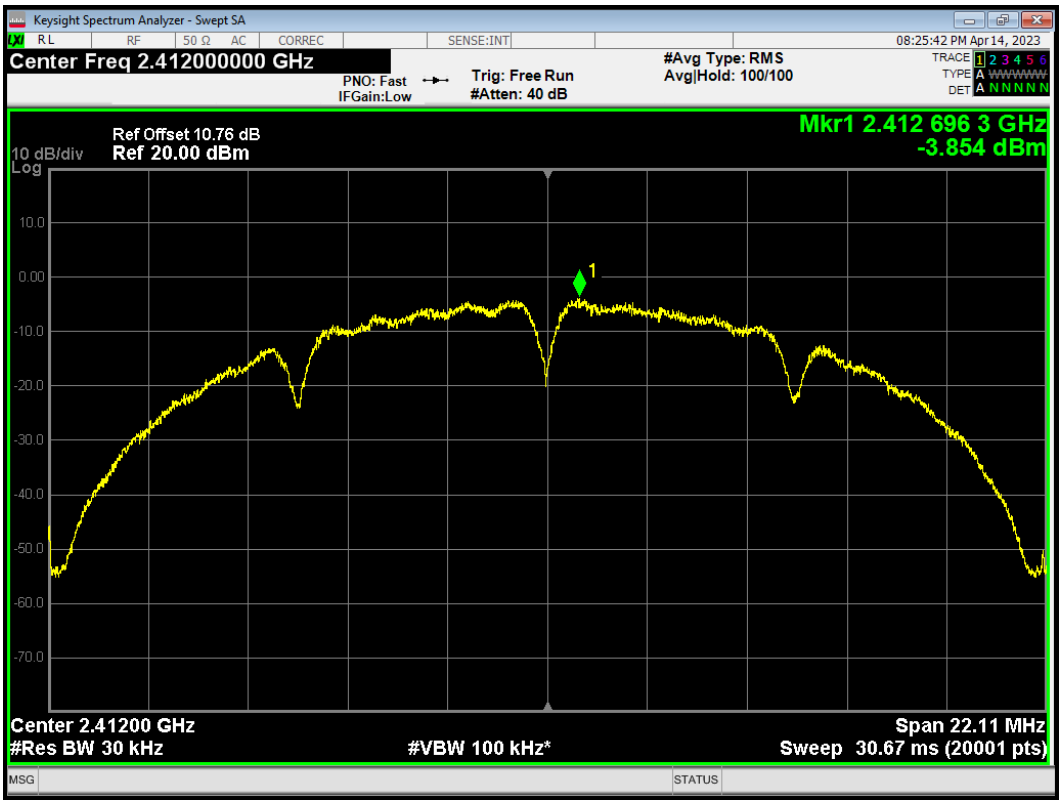
Test Results:

Test Mode	Carrier frequency (MHz))/ Channel	Read Value (dBm / 30kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
802.11b	2412/CH1	-3.85	-13.85	8	PASS
	2437/CH6	-3.86	-13.86	8	PASS
	2462/CH11	-4.44	-14.44	8	PASS
802.11g	2412/CH1	-10.33	-20.20	8	PASS
	2417/CH2	-7.56	-17.43	8	PASS
	2422/CH3	-5.79	-15.66	8	PASS
	2427/CH4	-5.7	-15.57	8	PASS
	2437/CH6	-6.61	-16.48	8	PASS
	2447/CH8	-6.27	-16.14	8	PASS
	2452/CH9	-6.71	-16.58	8	PASS
	2457/CH10	-6.98	-16.85	8	PASS
	2462/CH11	-11.33	-21.20	8	PASS
802.11n HT20	2412/CH1	-11.89	-21.54	8	PASS
	2417/CH2	-8.13	-17.78	8	PASS
	2437/CH6	-8.64	-18.29	8	PASS
	2457/CH10	-7.79	-17.44	8	PASS
	2462/CH11	-13.17	-22.82	8	PASS
802.11n HT40	2422/CH3	-14.4	-24.05	8	PASS
	2427/CH4	-14.95	-24.60	8	PASS
	2432/CH5	-13.26	-22.91	8	PASS
	2437/CH6	-12.66	-22.31	8	PASS
	2442/CH7	-14.52	-24.17	8	PASS
	2447/CH8	-16.56	-26.21	8	PASS
	2452/CH9	-18.55	-28.20	8	PASS
Note: Power Spectral Density (dBm/3kHz) =Read Value+Duty cycle correction factor + 10*log10(3 / 30)					

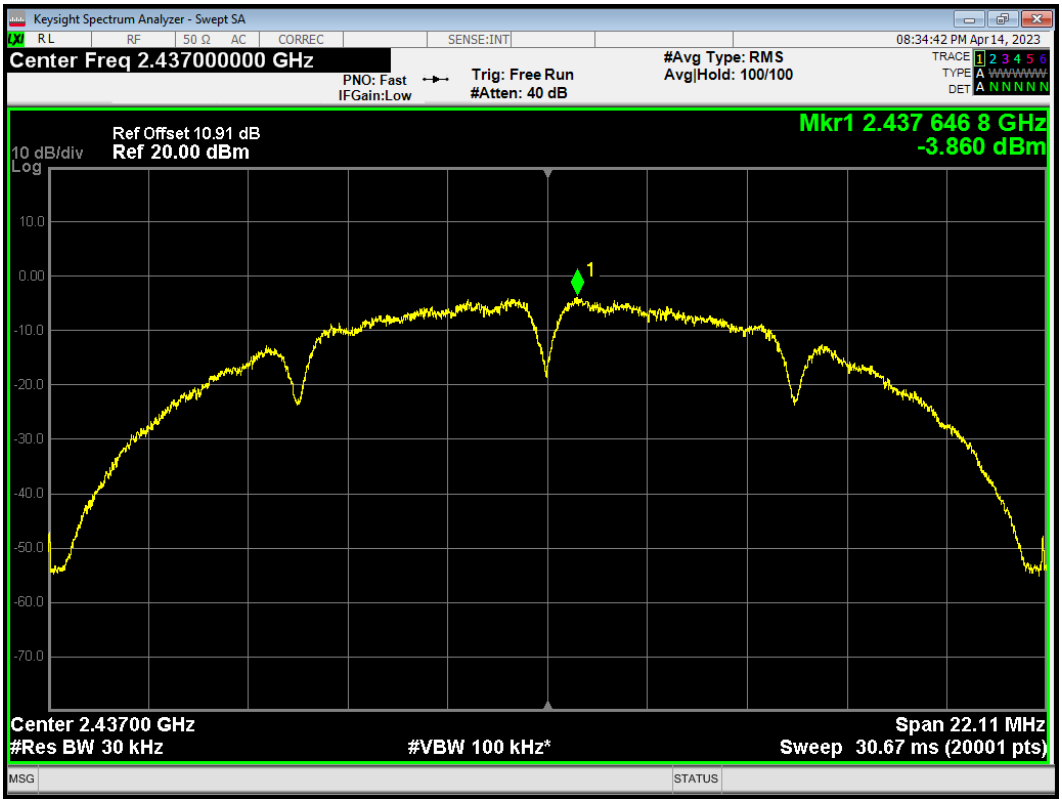
Test Mode	Carrier frequency (MHz))/ Channel	Read Value (dBm / 3kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
Bluetooth (Low Energy)	2402/CH0	-13.55	-11.55	8	PASS
	2440/CH19	-12.20	-10.20	8	PASS
	2480/CH39	-14.34	-12.34	8	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

Wi-Fi 2.4G

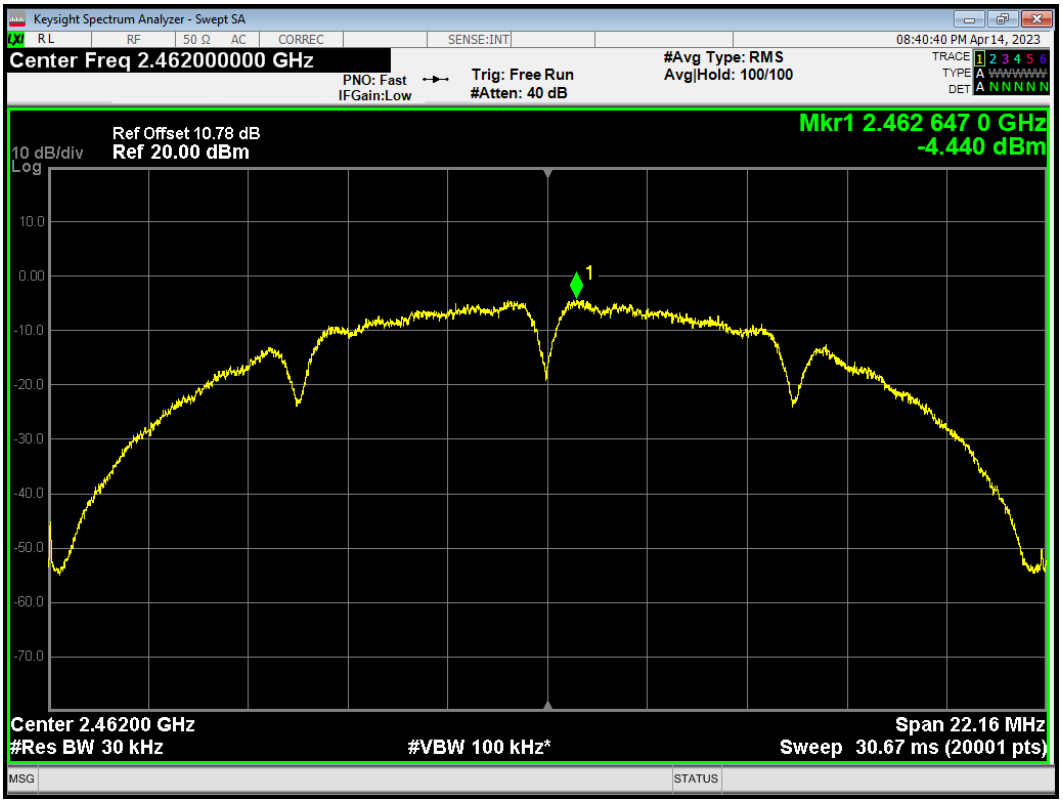
PSD 802.11b 2412MHz



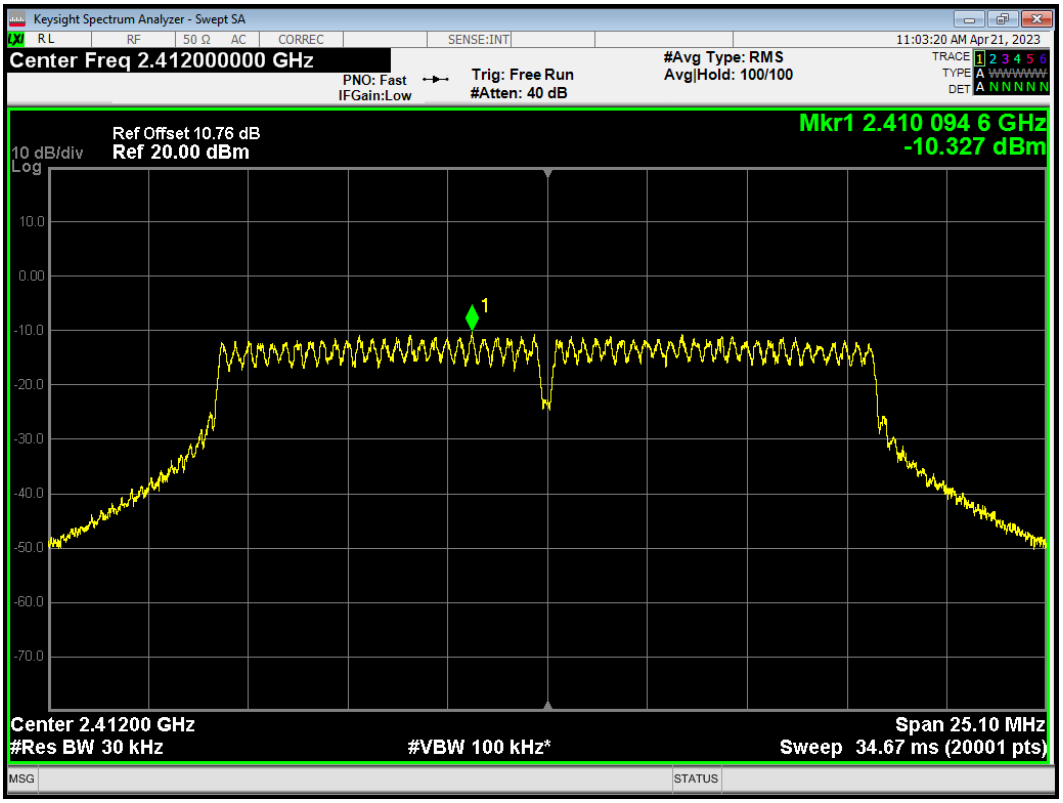
PSD 802.11b 2437MHz



PSD 802.11b 2462MHz



PSD 802.11g 2412MHz



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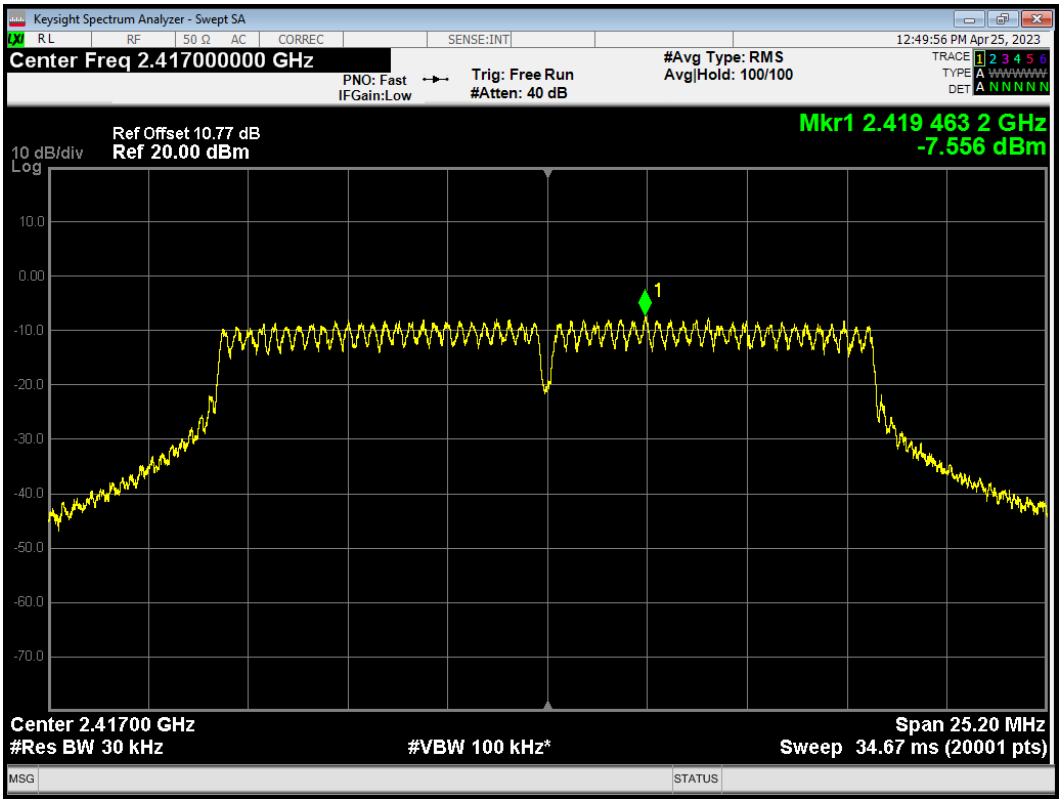

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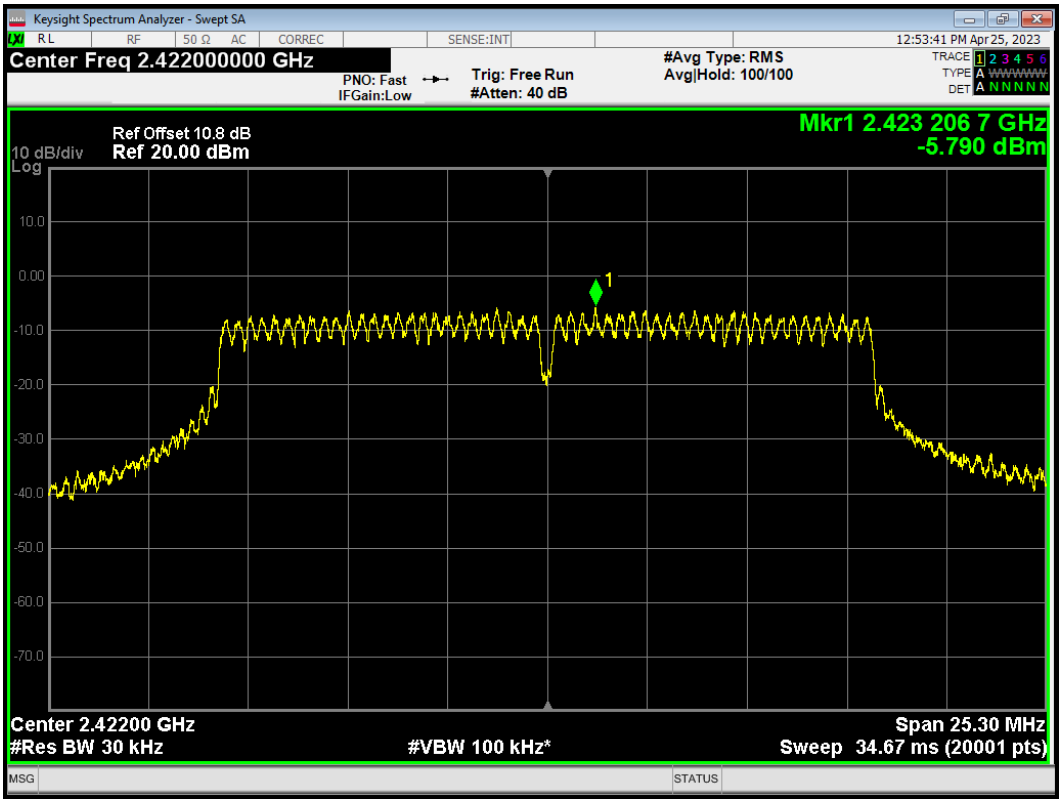

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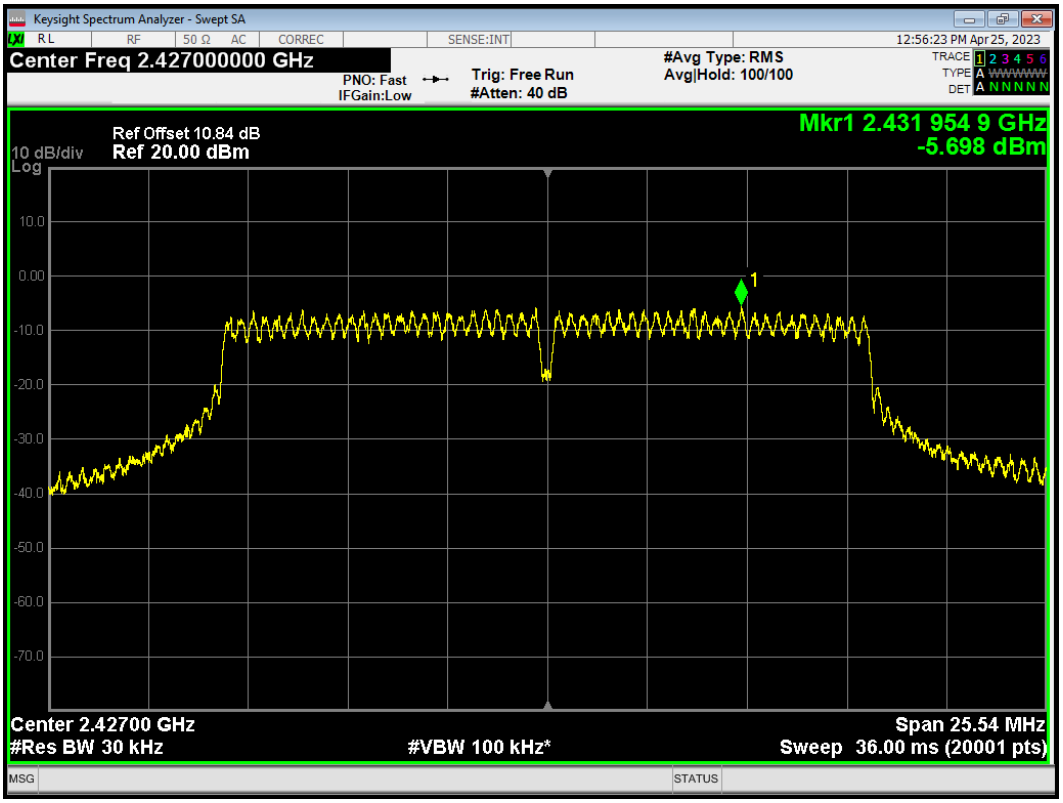
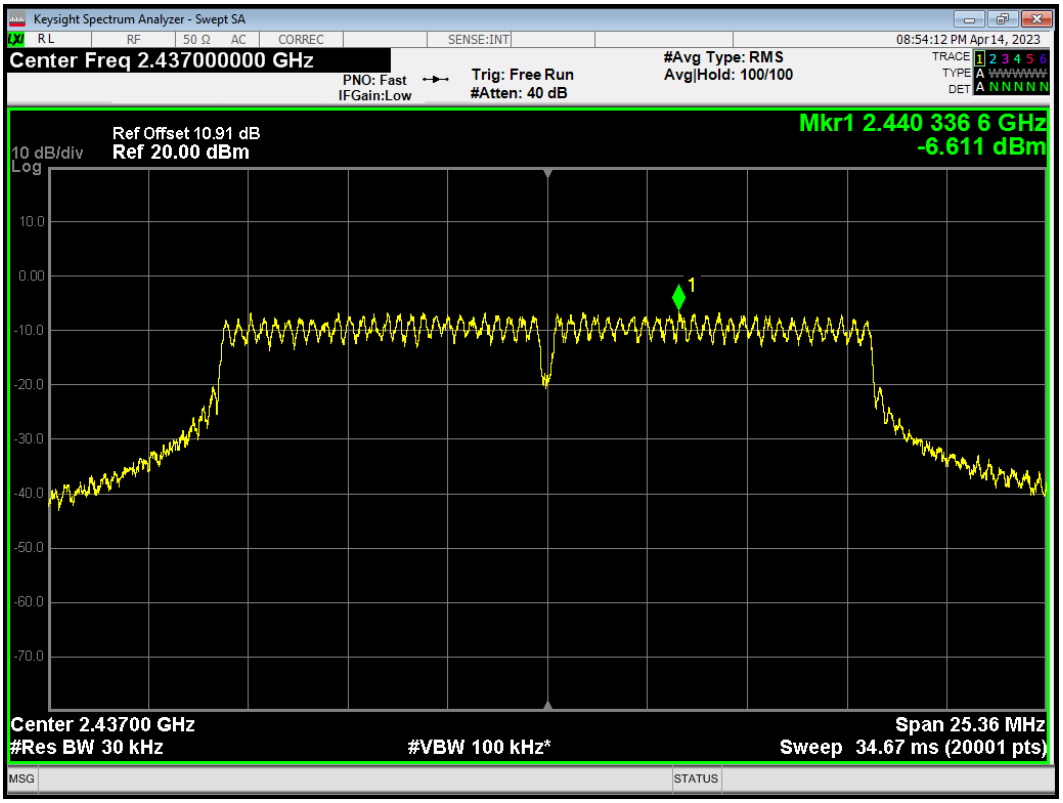
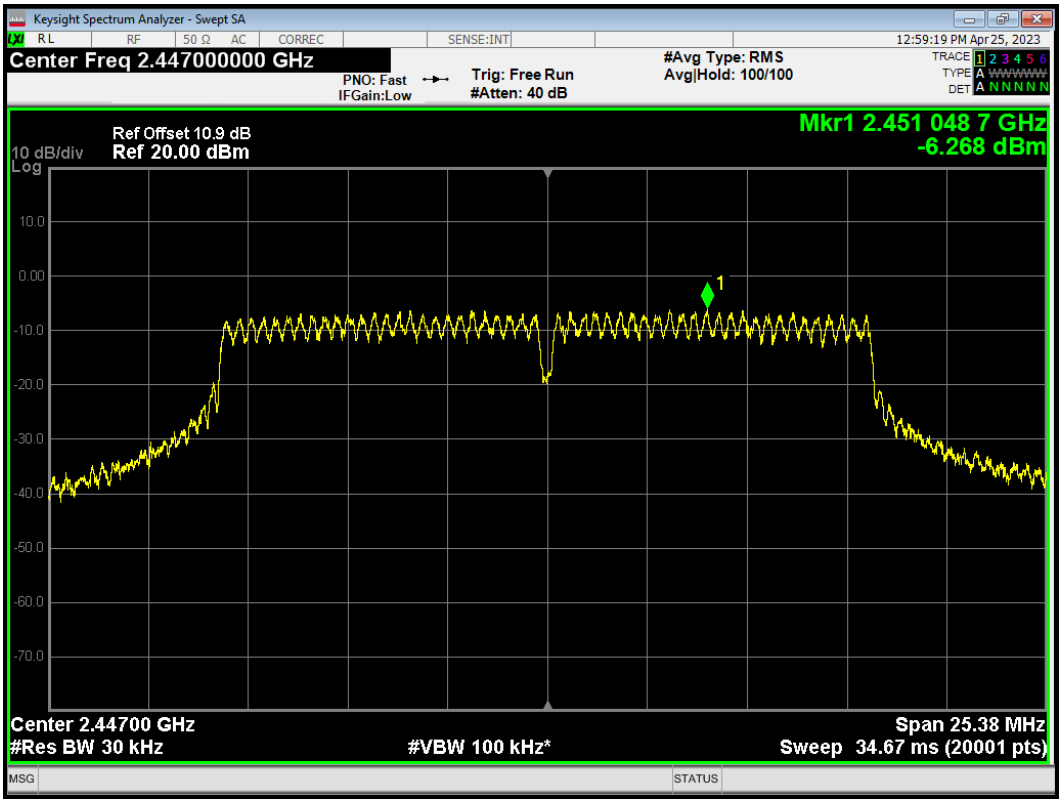


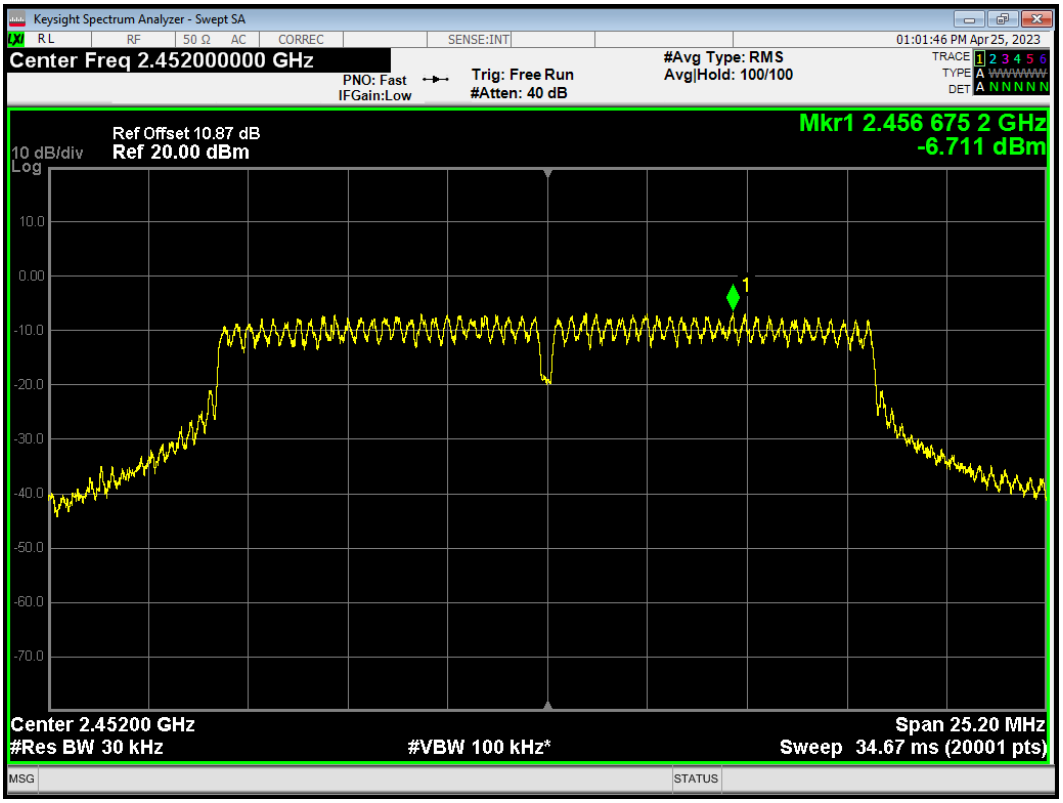
PSD 802.11g 2437MHz



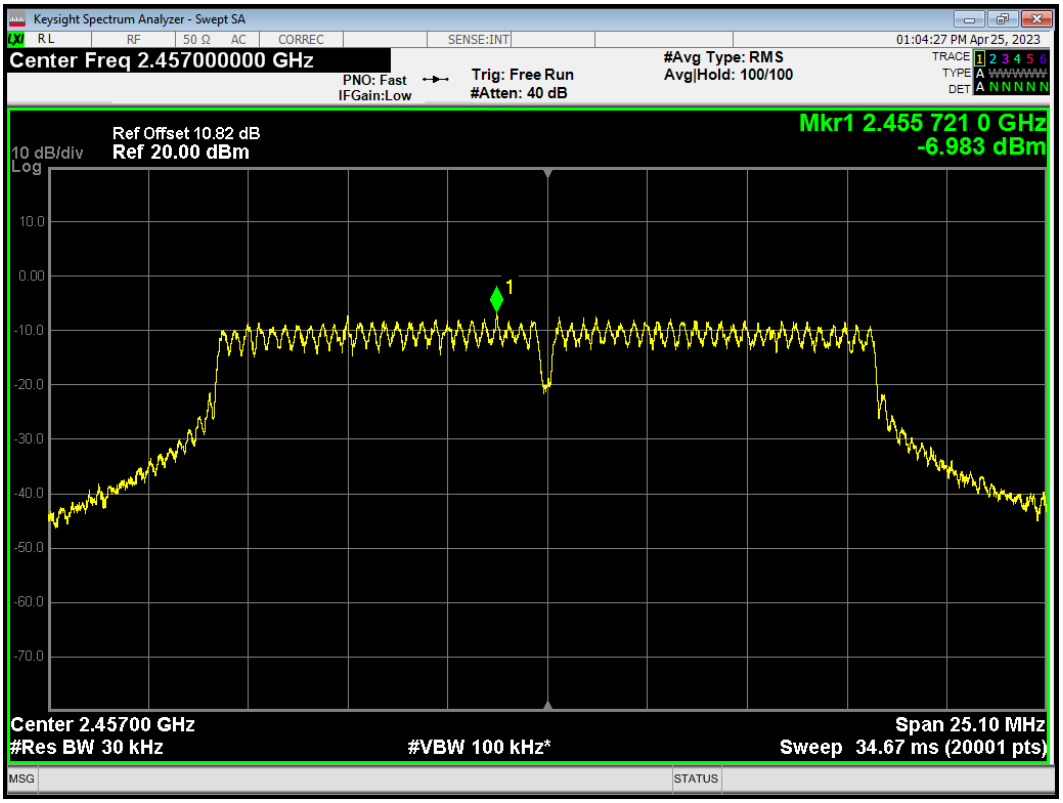
PSD 802.11g 2447MHz



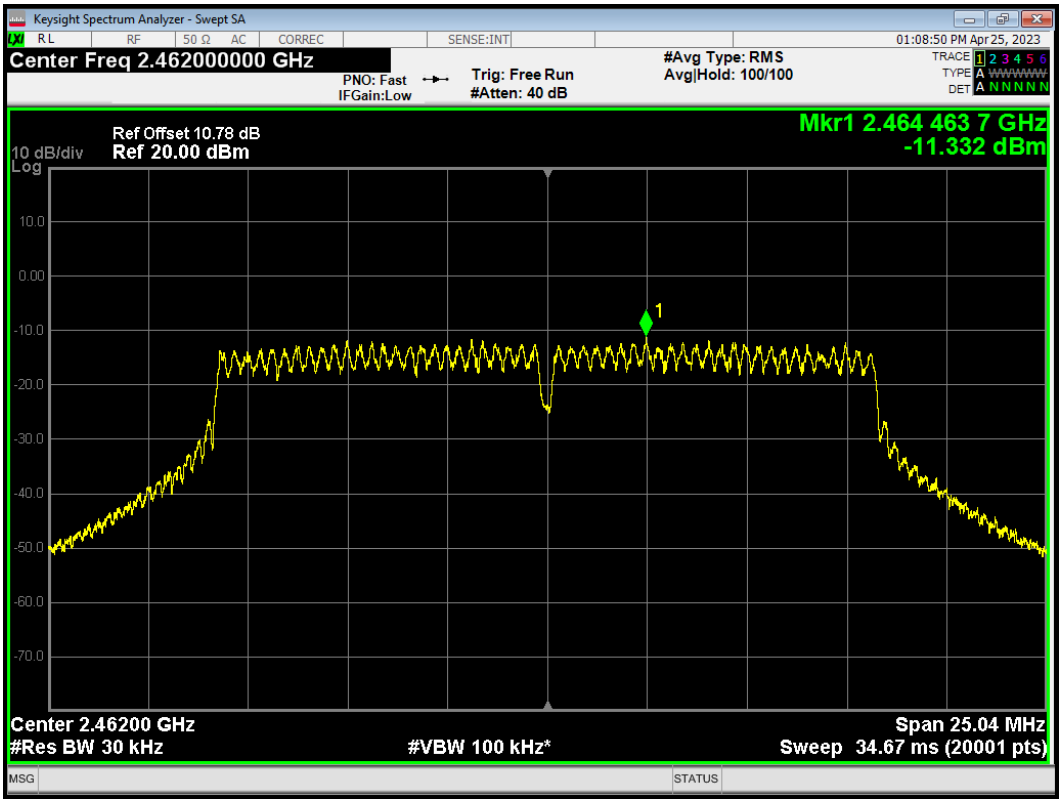
PSD 802.11g 2452MHz



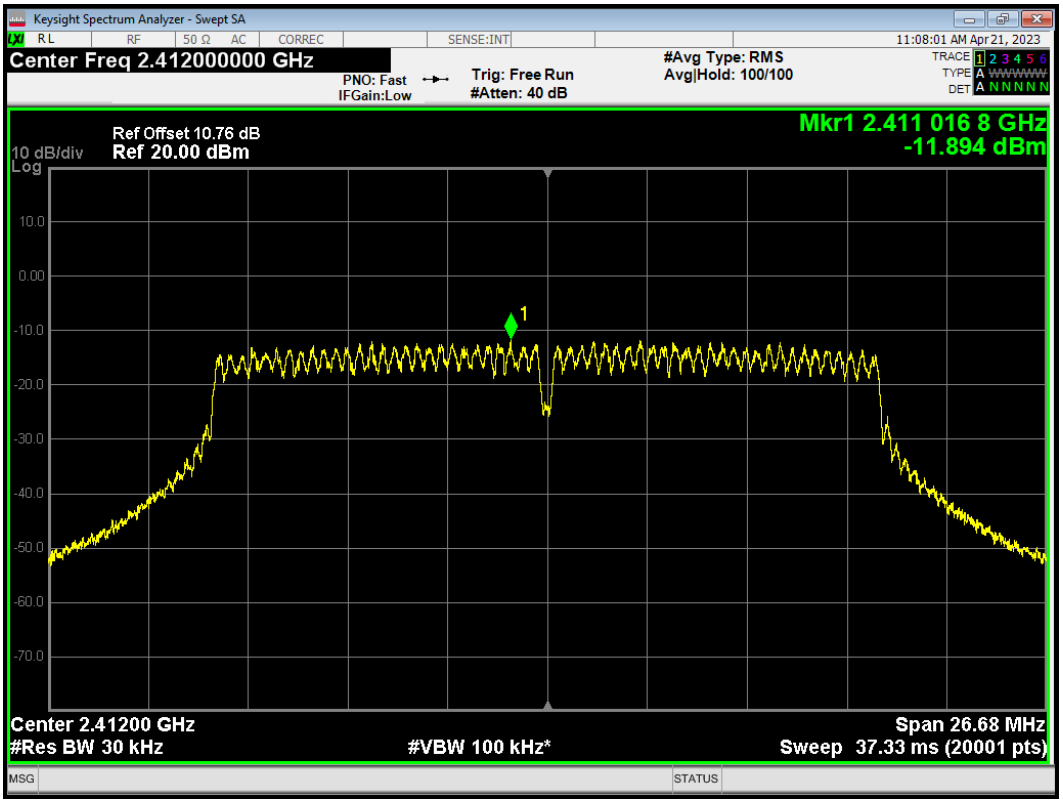
PSD 802.11g 2457MHz



PSD 802.11g 2462MHz



PSD 802.11n (HT20) 2412MHz



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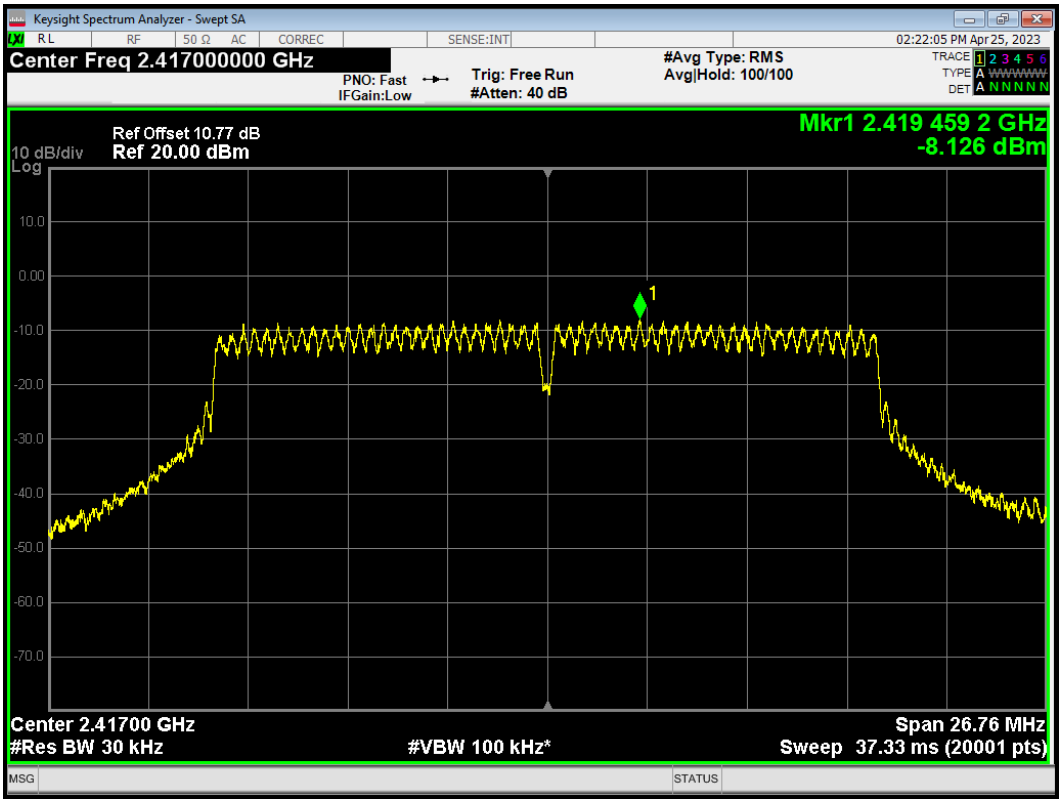
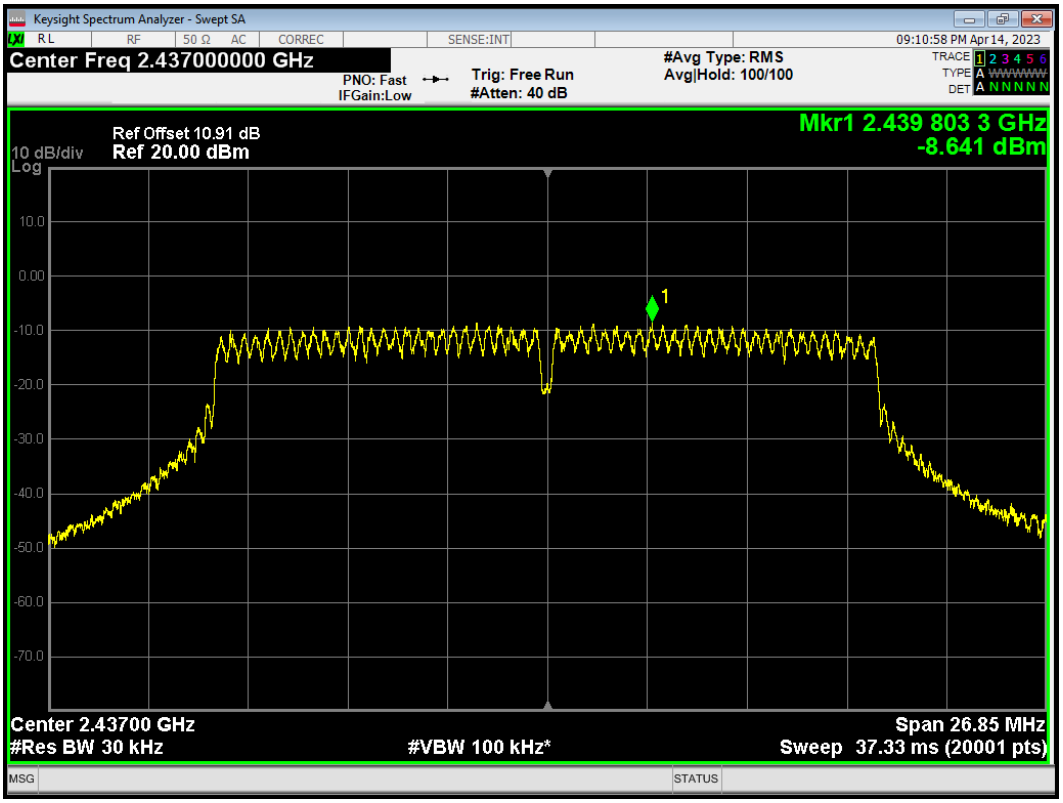
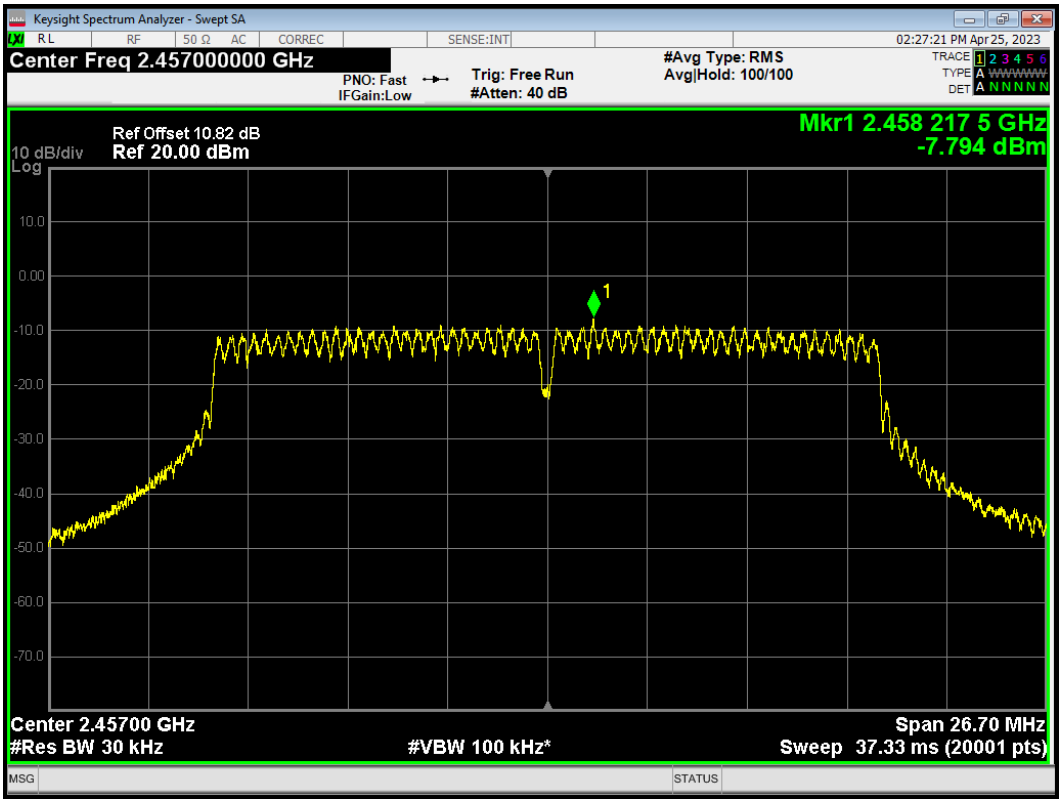


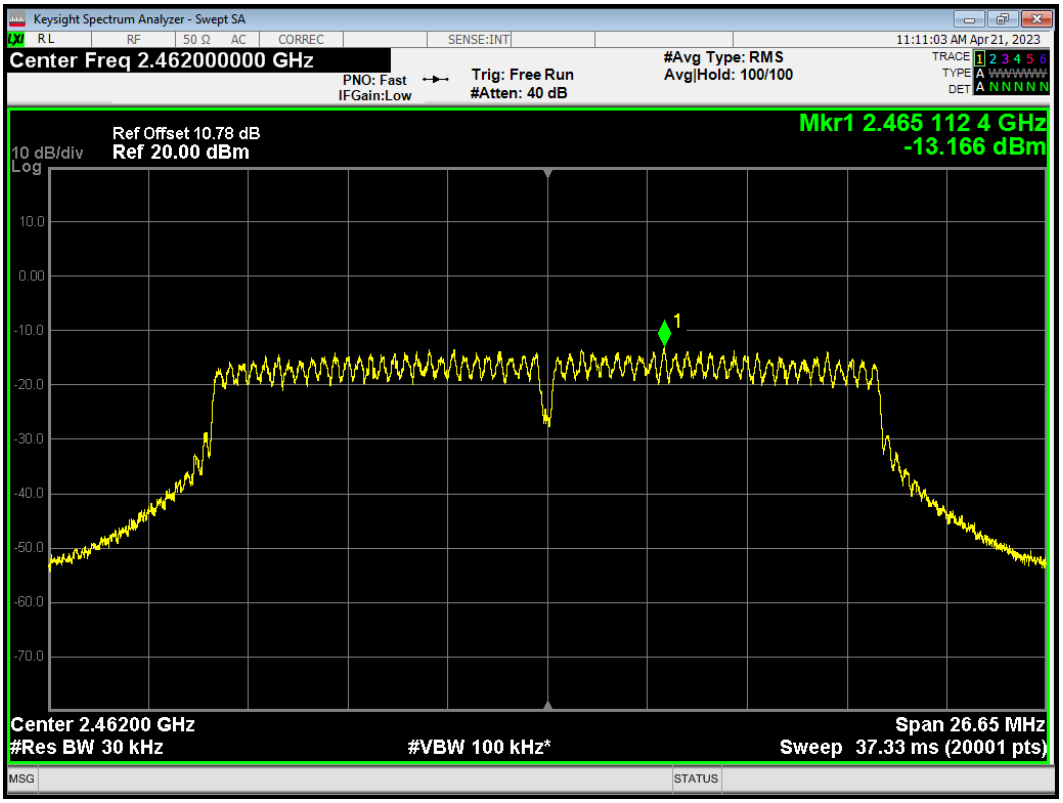
PSD 802.11n (HT20) 2437MHz



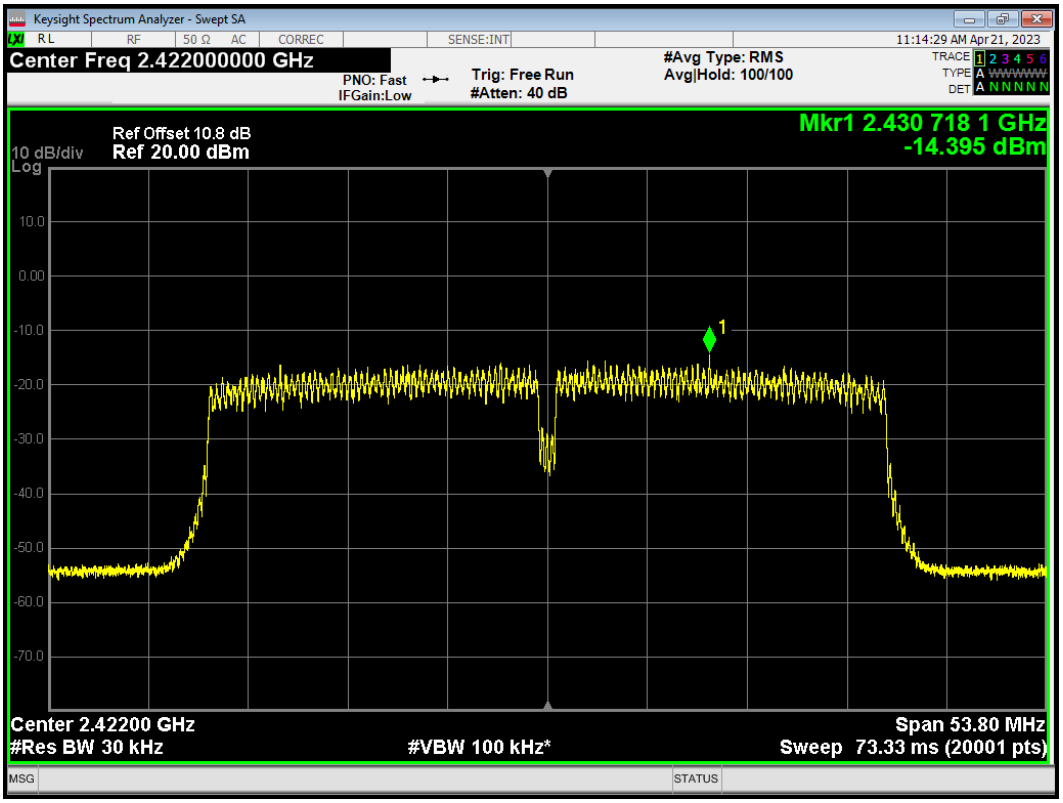
PSD 802.11n (HT20) 2457MHz



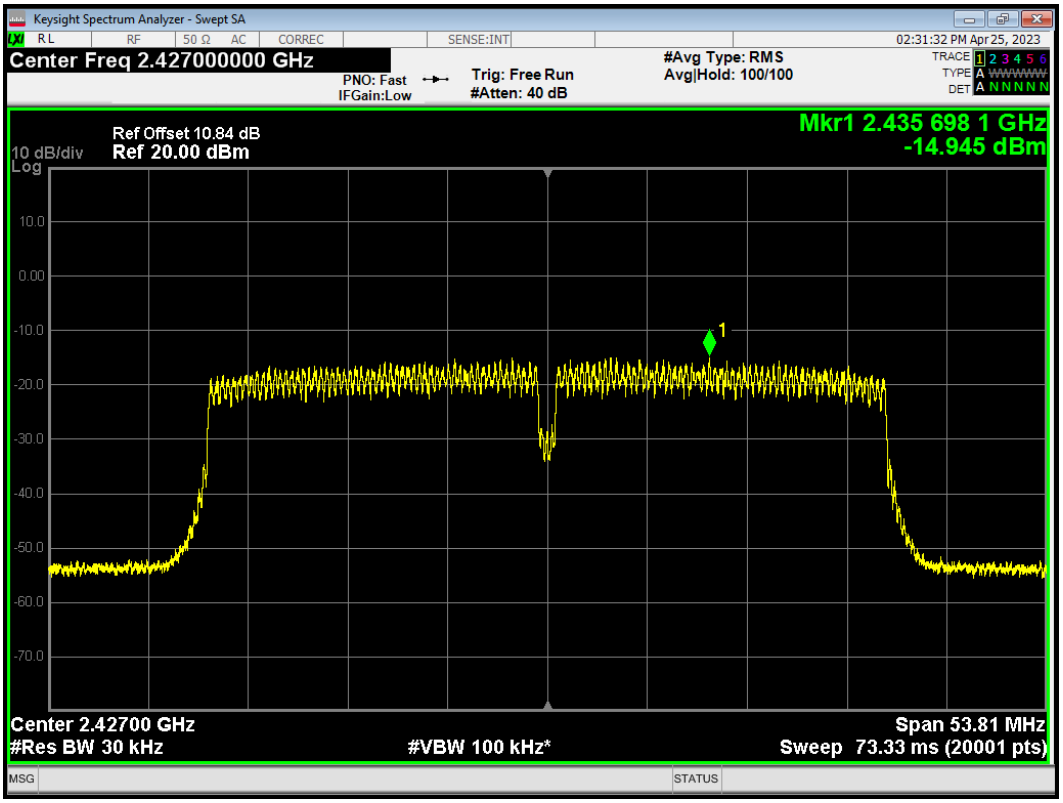
PSD 802.11n (HT20) 2462MHz



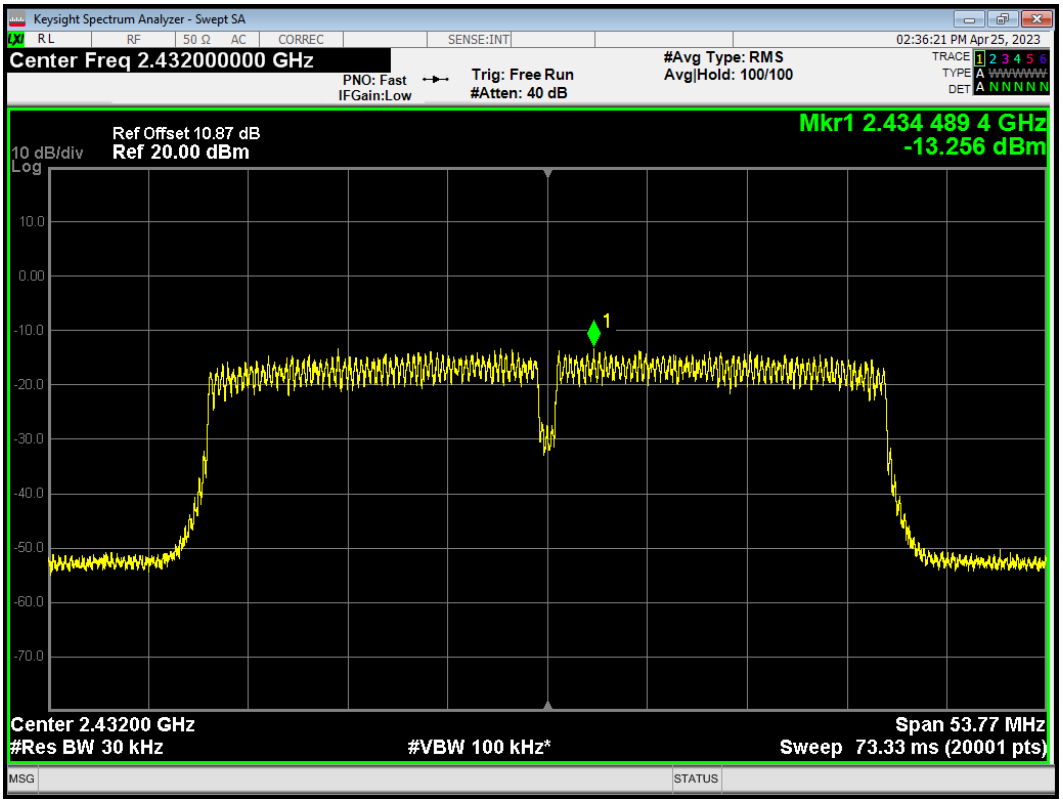
PSD 802.11n (HT40) 2422MHz



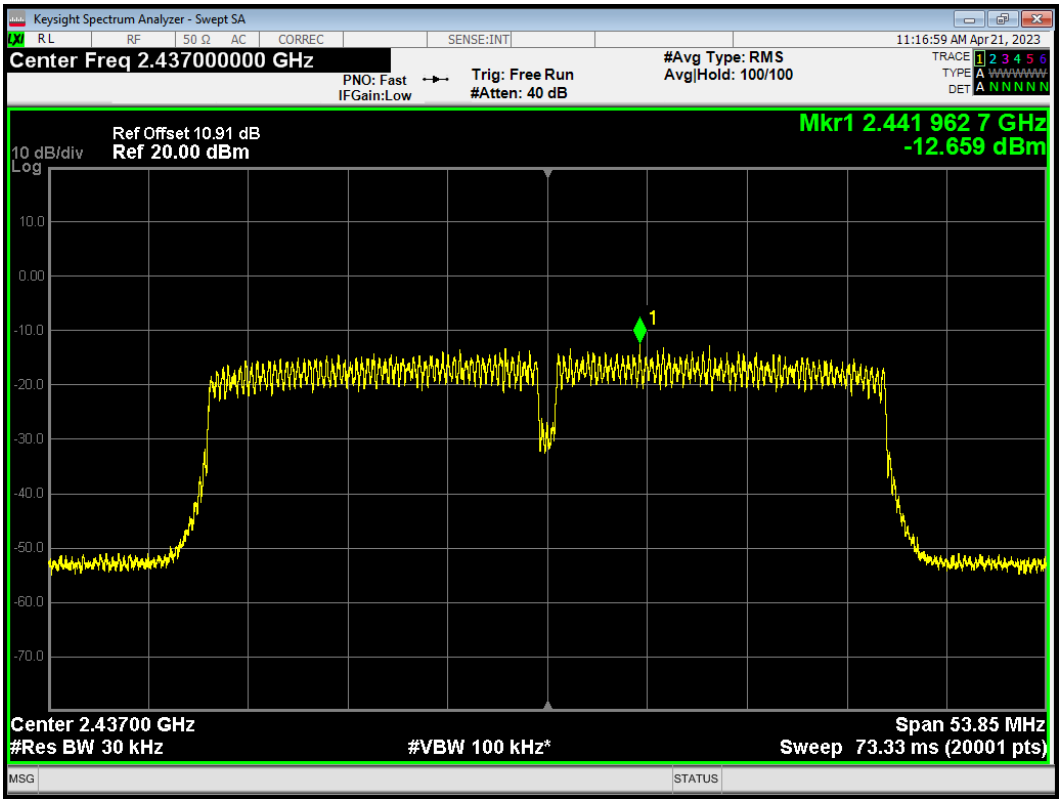
PSD 802.11n (HT40) 2427MHz



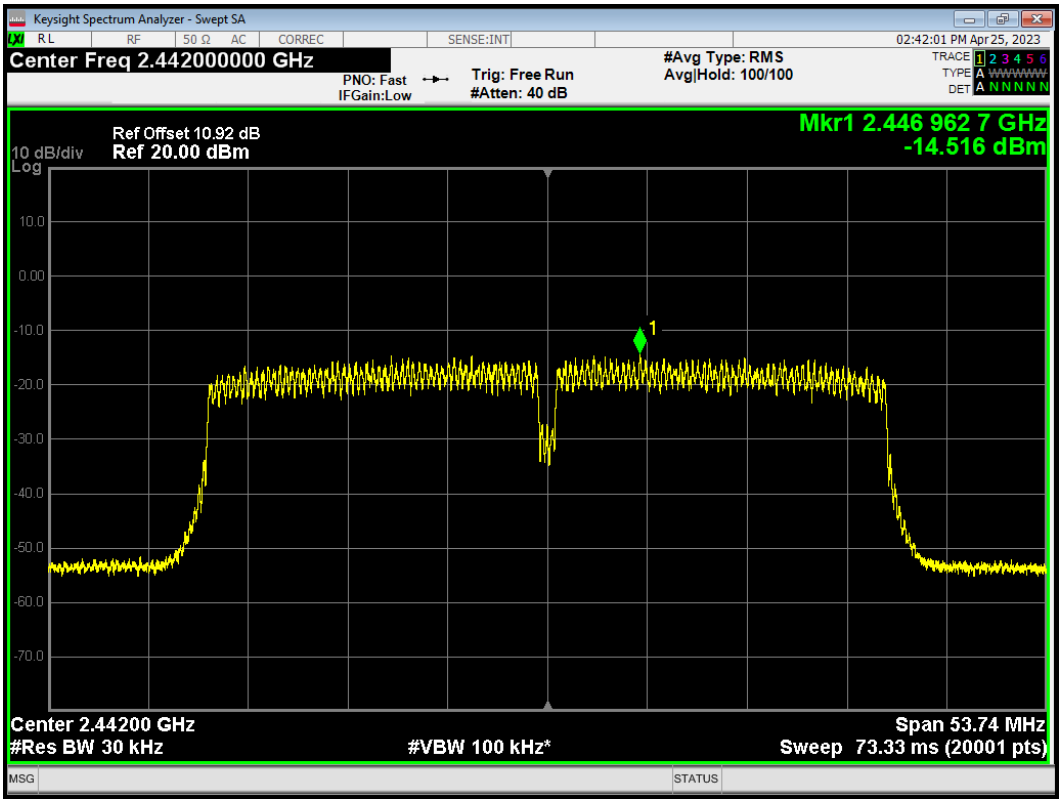
PSD 802.11n (HT40) 2432MHz



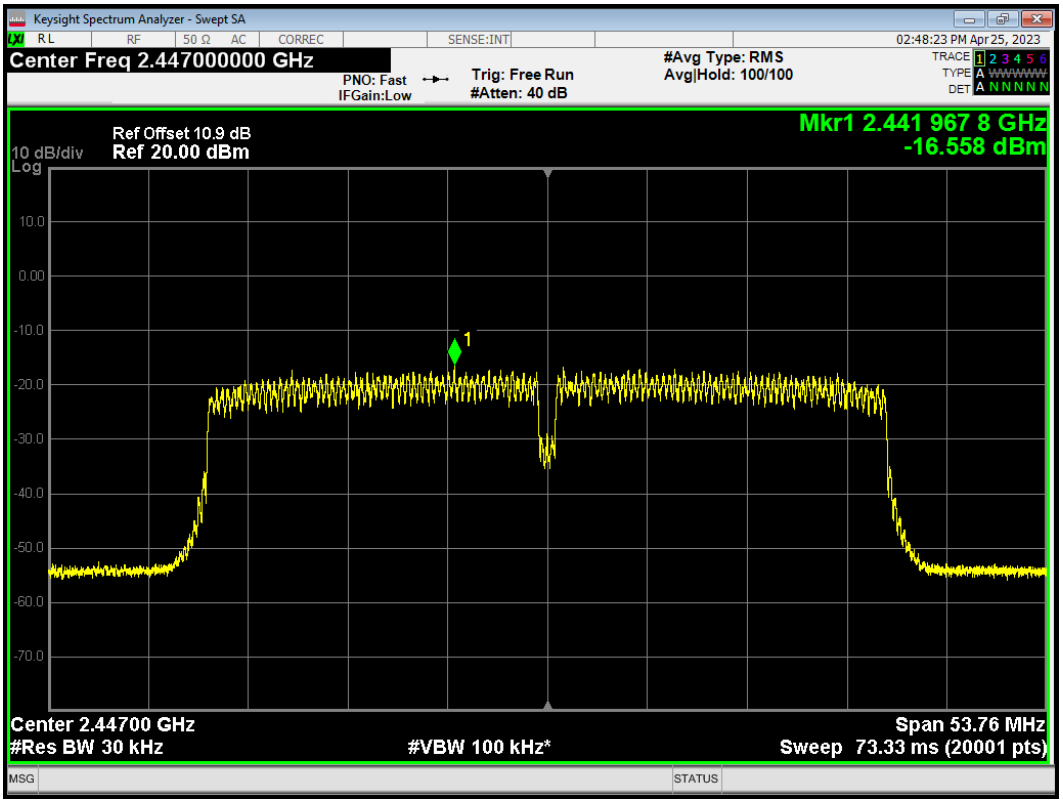
PSD 802.11n (HT40) 2437MHz



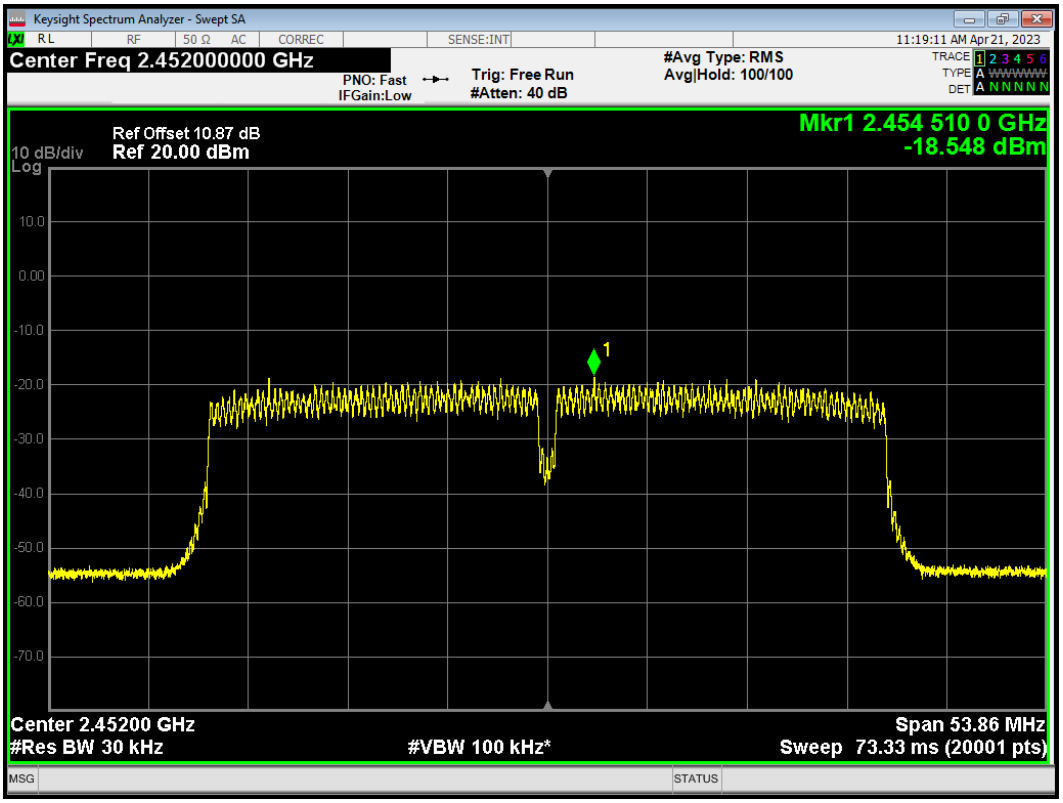
PSD 802.11n (HT40) 2442MHz



PSD 802.11n (HT40) 2447MHz

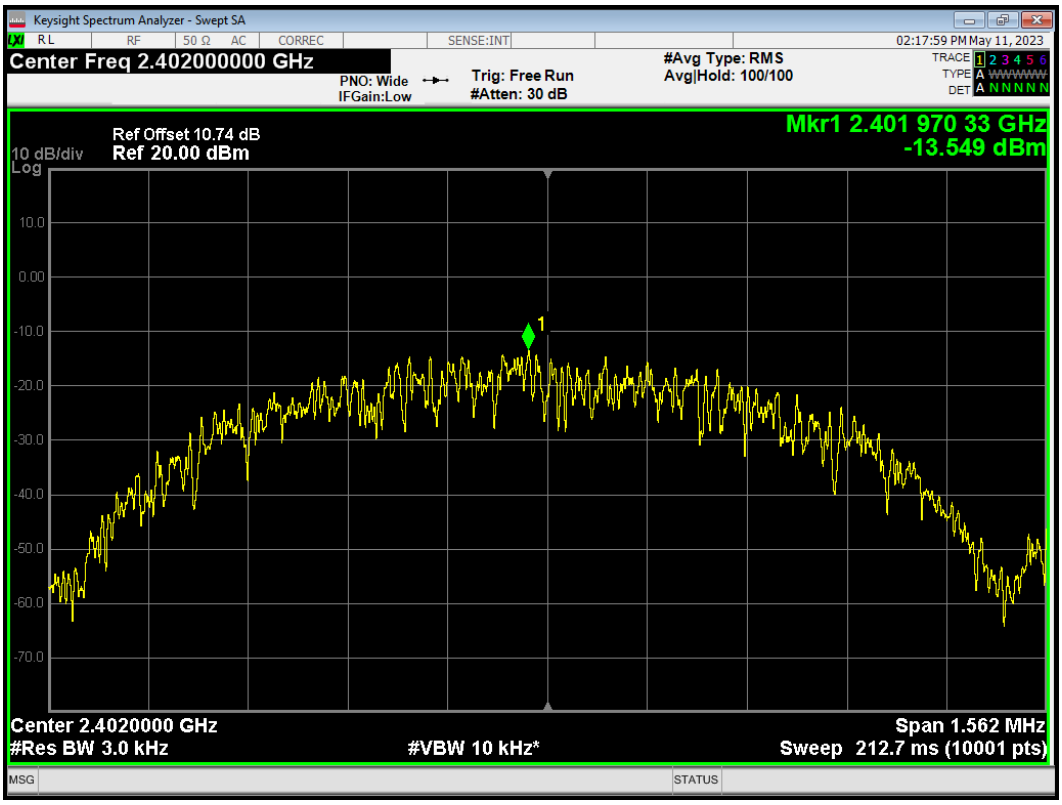


PSD 802.11n (HT40) 2452MHz

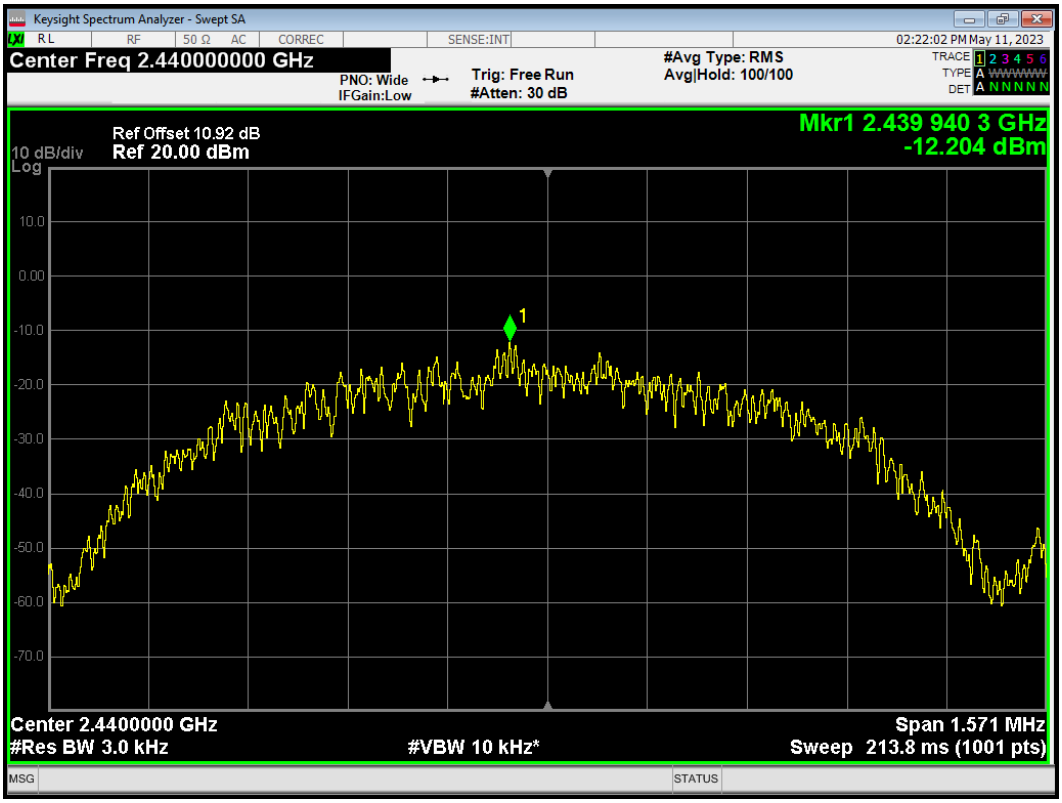


Bluetooth LE

PSD BLE 2402MHz



PSD BLE 2440MHz



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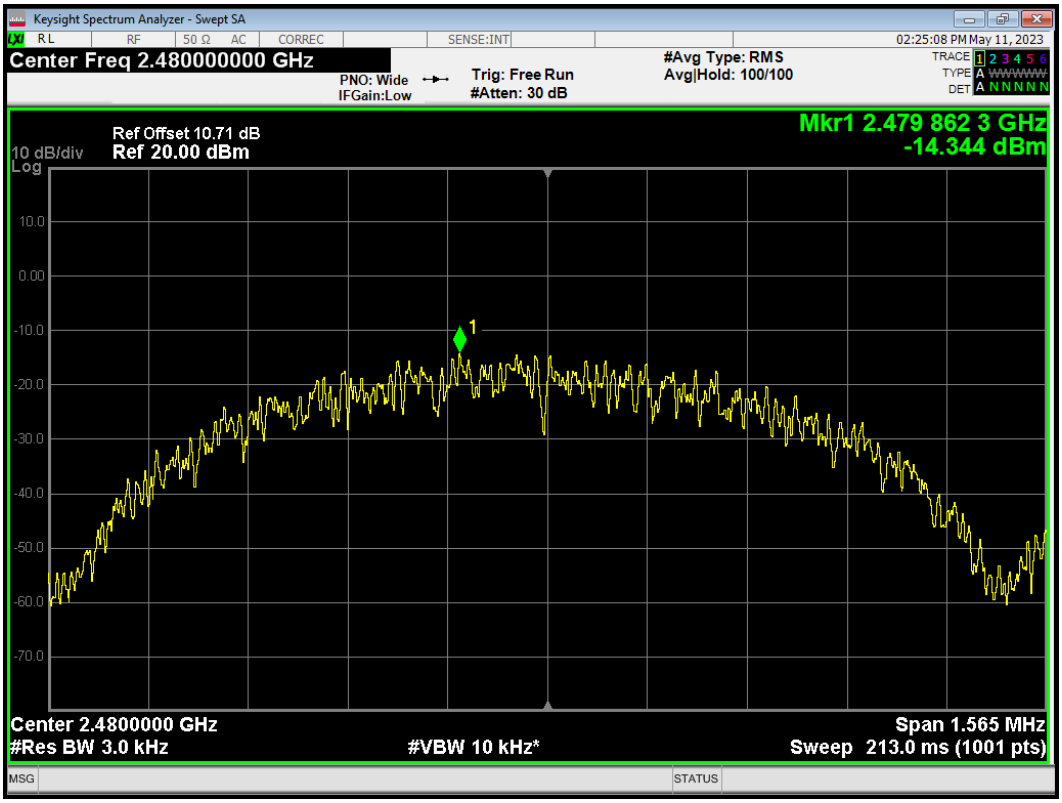


5.5. Spurious RF Conducted Emissions

Ambient Condition

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

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 ATUO.
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))/ Channel	Reference value (dBm)	Limit
802.11b	2412/CH1	9.28	-20.72
	2437/CH6	8.98	-21.02
	2462/CH11	8.92	-21.08
802.11g	2412/CH1	1.51	-28.49
	2417/CH2	4.82	-25.18
	2422/CH3	6.52	-23.48
	2427/CH4	7.28	-22.72
	2437/CH6	6.87	-23.13
	2447/CH8	6.96	-23.04
	2452/CH9	6.41	-23.59
	2457/CH10	5.35	-24.65

	2462/CH11	1.47	-28.53
802.11n HT20	2412/CH1	1.56	-28.44
	2417/CH2	4.82	-25.18
	2437/CH6	4.37	-25.63
	2457/CH10	4.98	-25.02
	2462/CH11	-0.31	-30.31
802.11n HT40	2422/CH3	-2.96	-32.96
	2427/CH4	-2.02	-32.02
	2432/CH5	-0.37	-30.37
	2437/CH6	-0.45	-30.45
	2442/CH7	-2.03	-32.03
	2447/CH8	-3.78	-33.78
	2452/CH9	-6.10	-36.10
Bluetooth (Low Energy)	2402/CH0	5.78	-24.22
	2440/CH19	5.99	-24.01
	2480/CH39	5.82	-24.18

Measurement Uncertainty

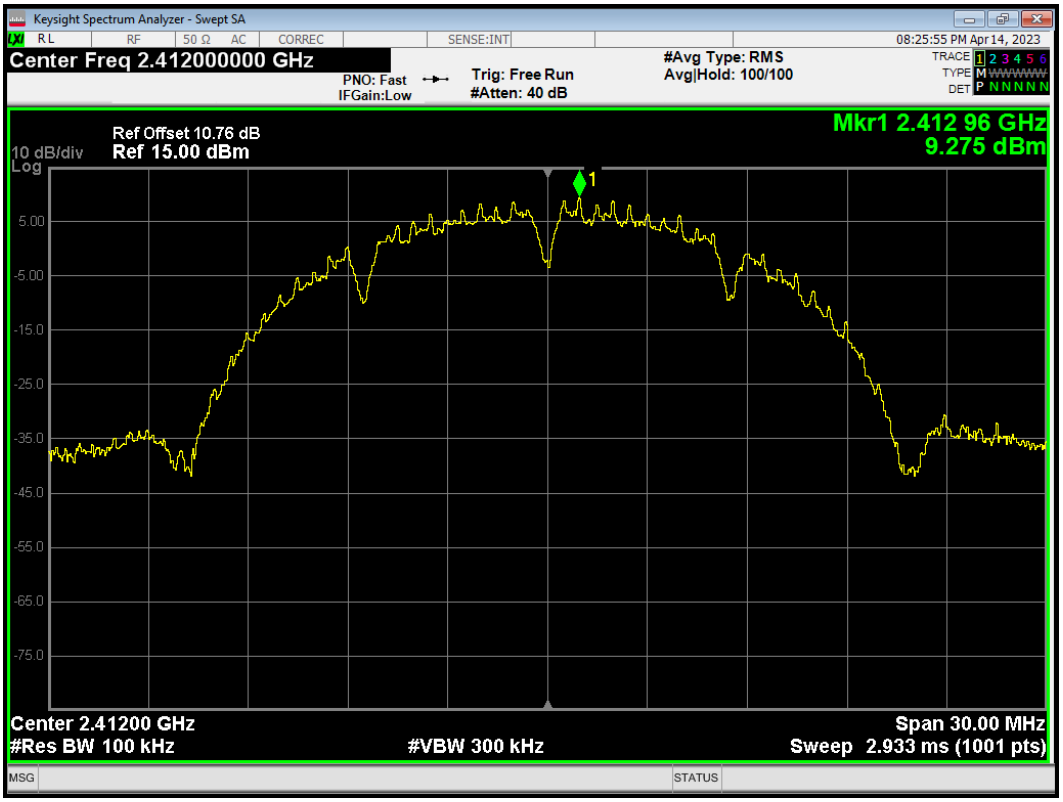
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

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

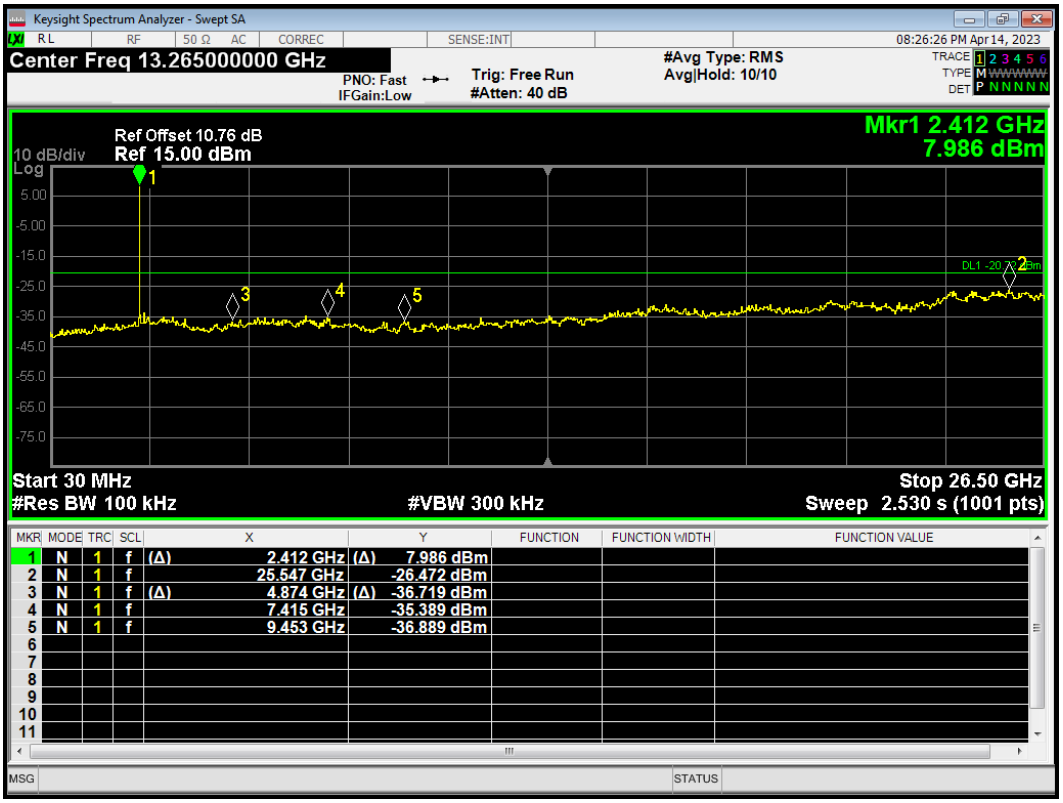
Test Results:

Wi-Fi 2.4G

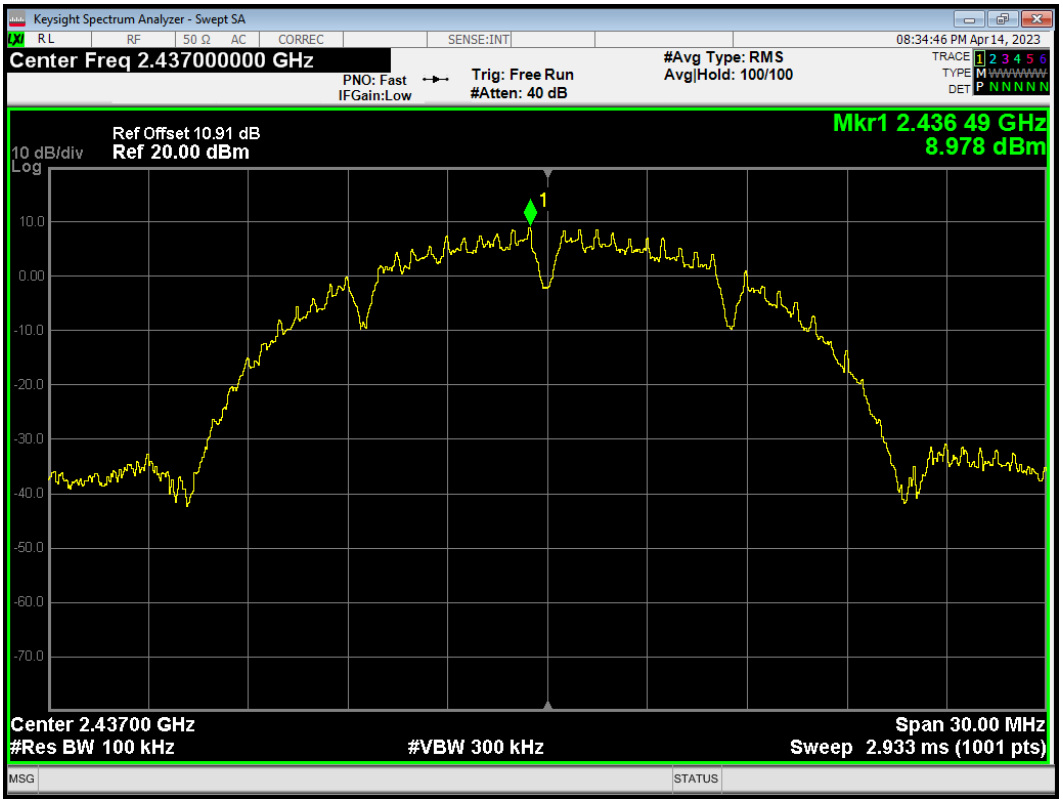
Tx. Spurious 802.11b 2412MHz Ref



Tx. Spurious 802.11b 2412MHz Emission



Tx. Spurious 802.11b 2437MHz Ref



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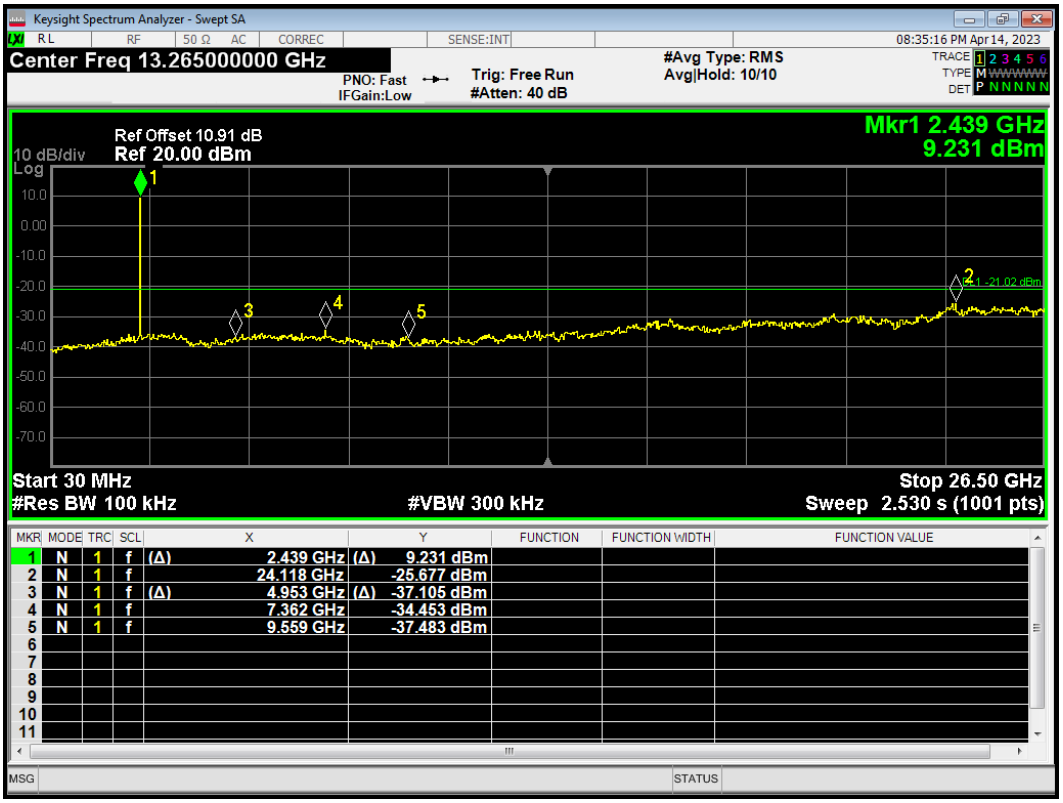

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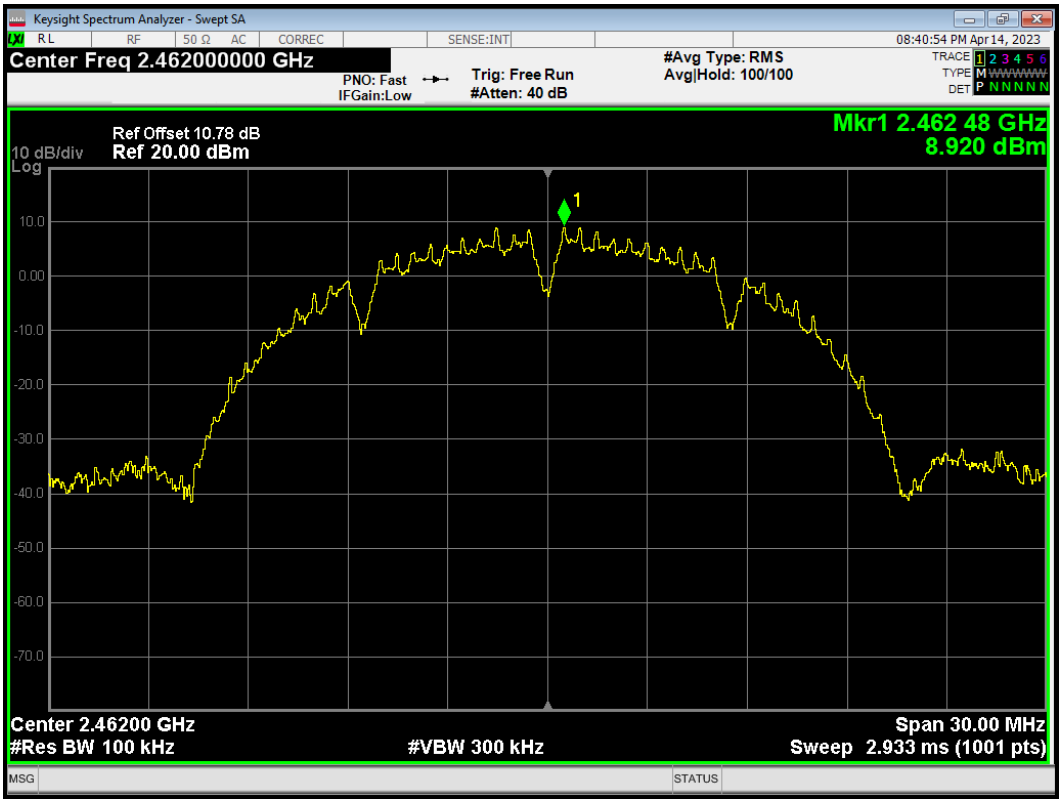

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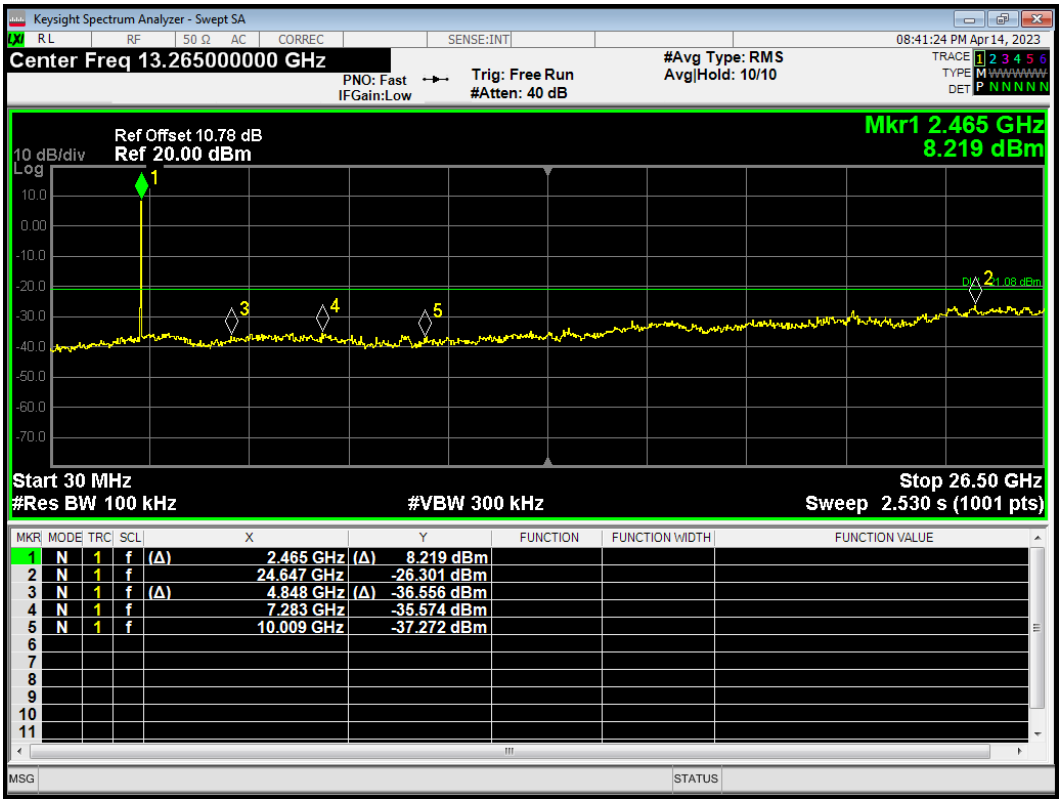

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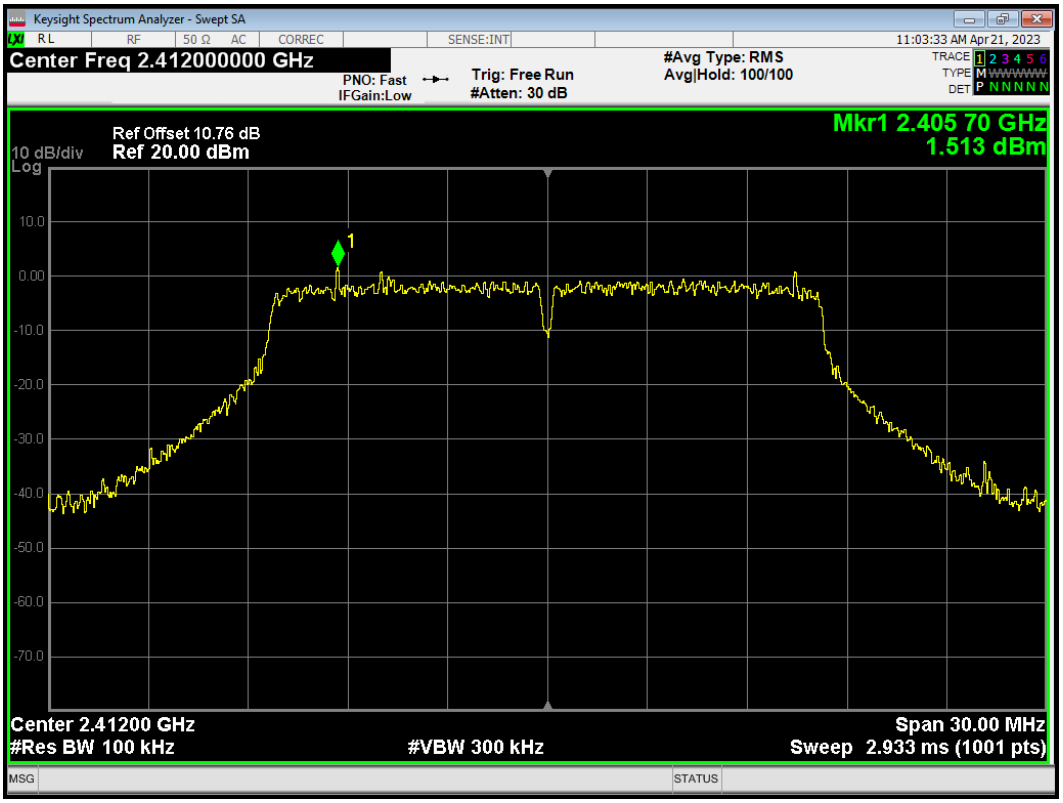

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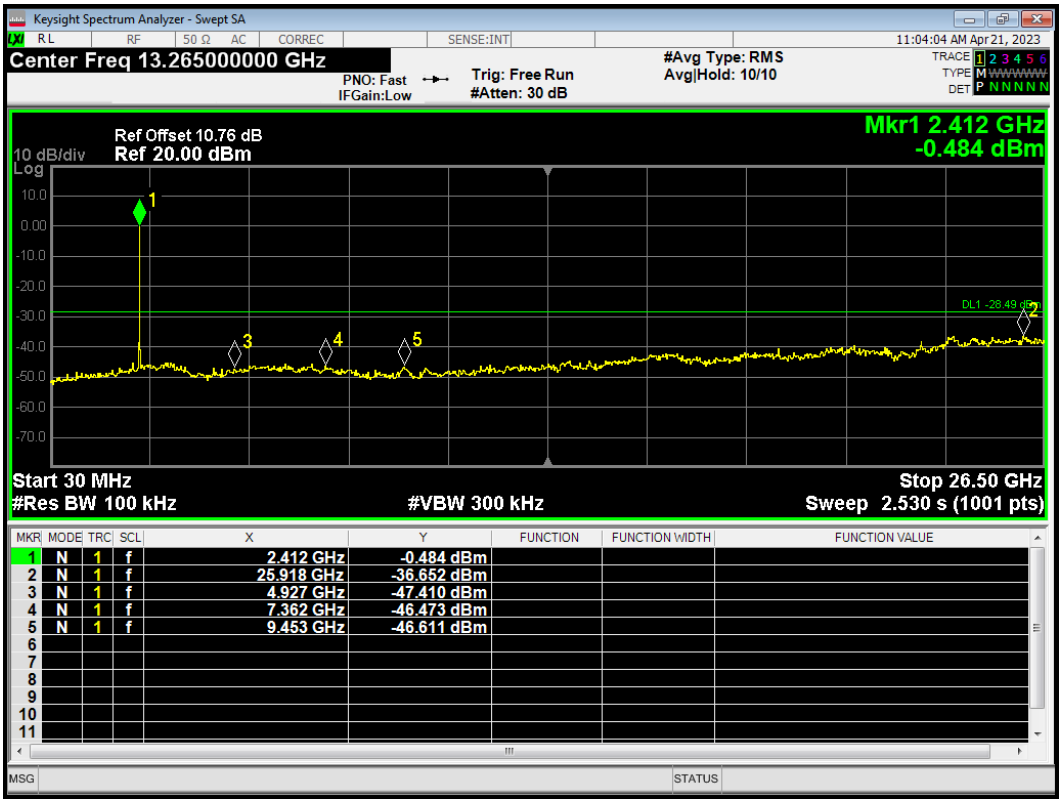

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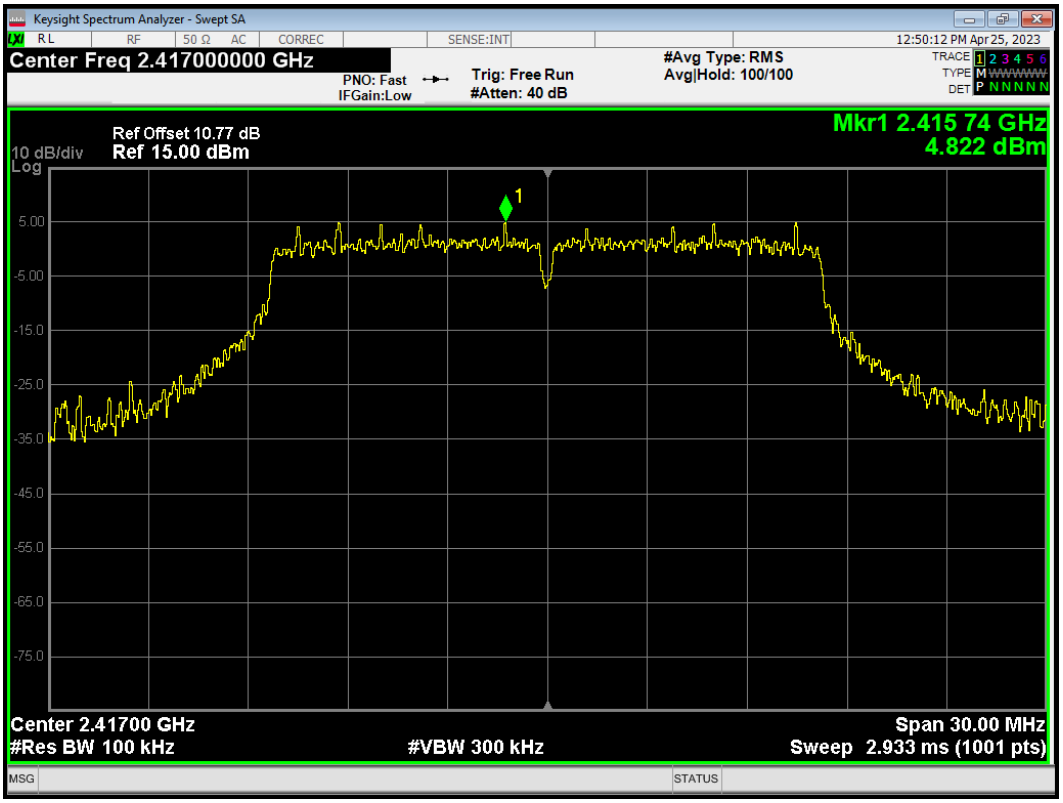

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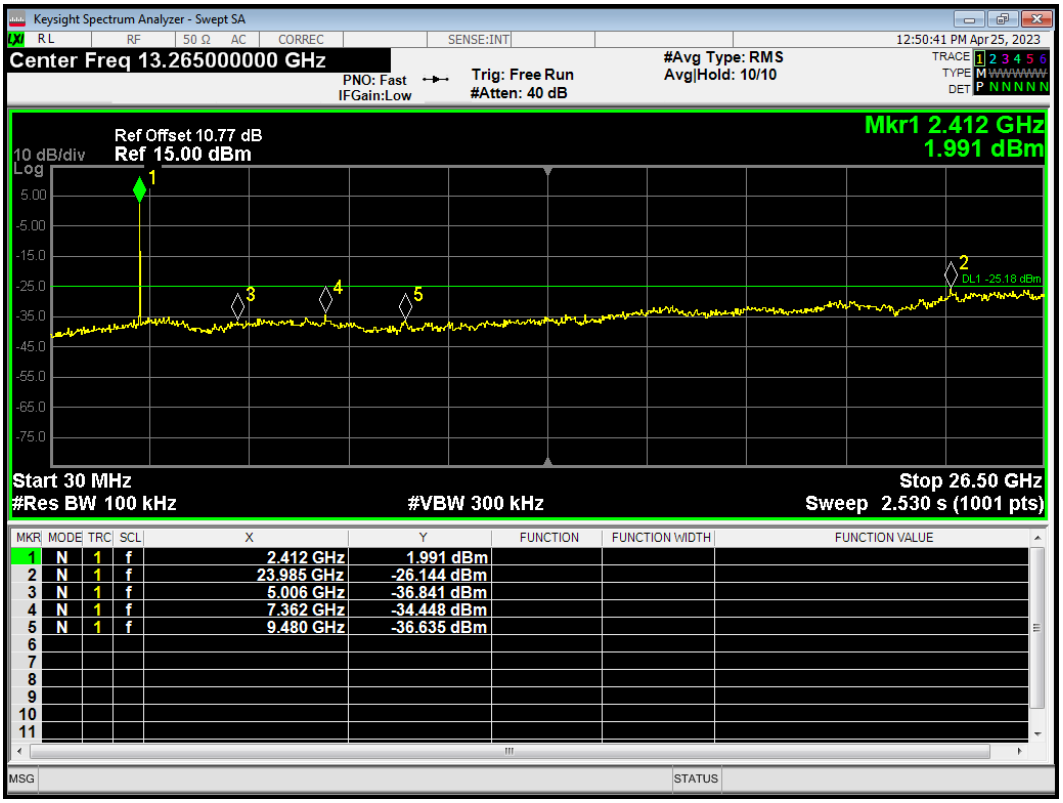

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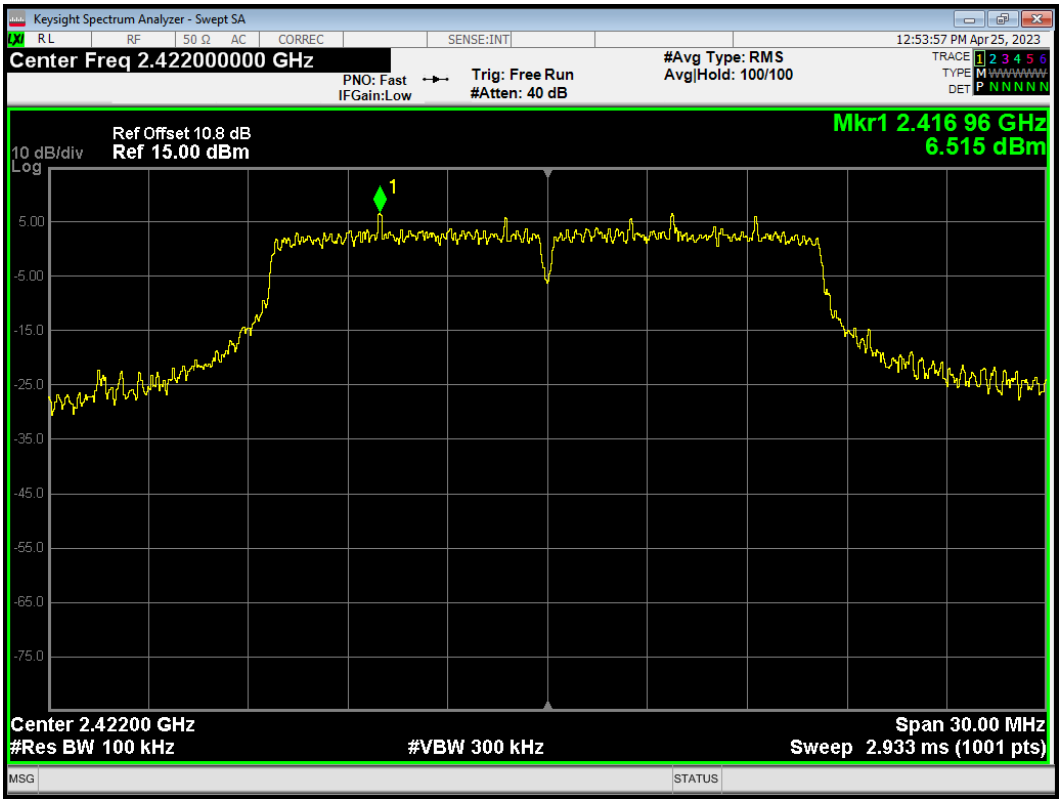

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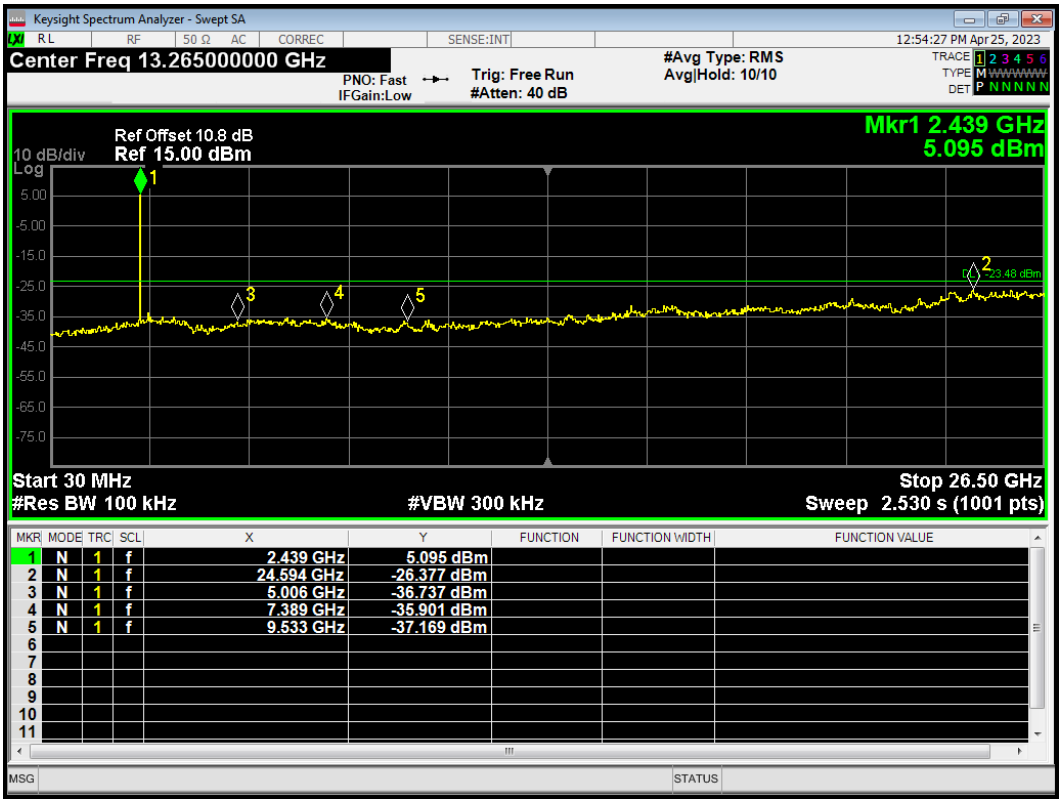

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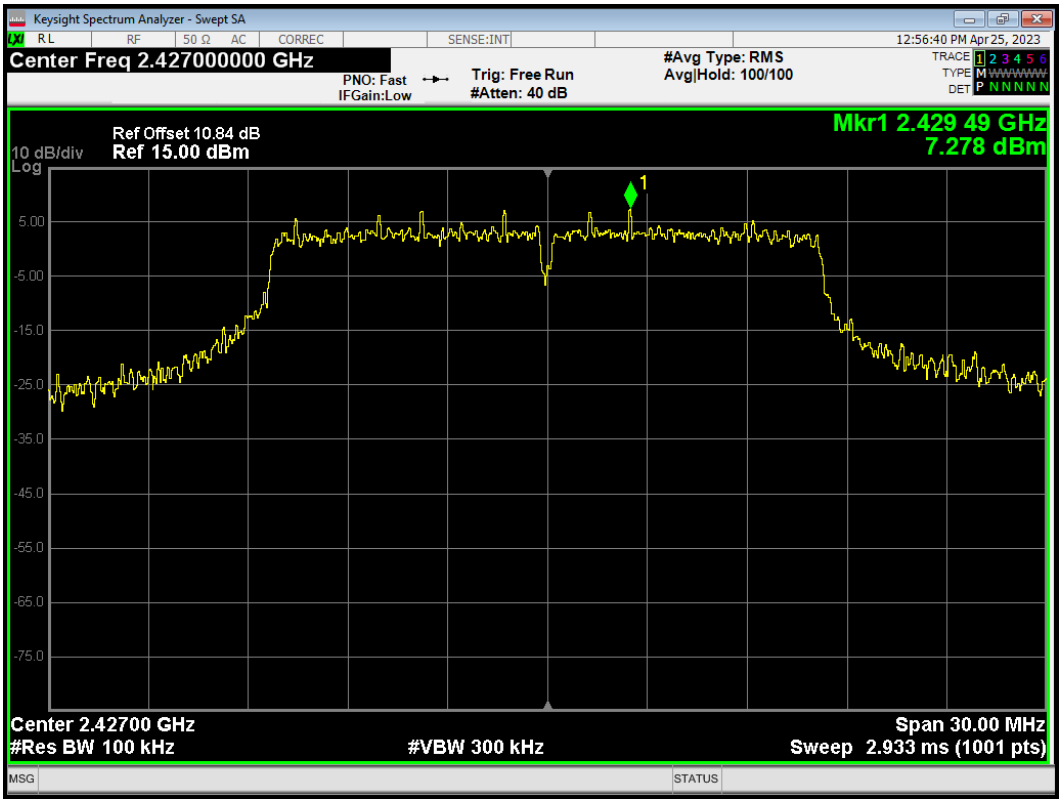

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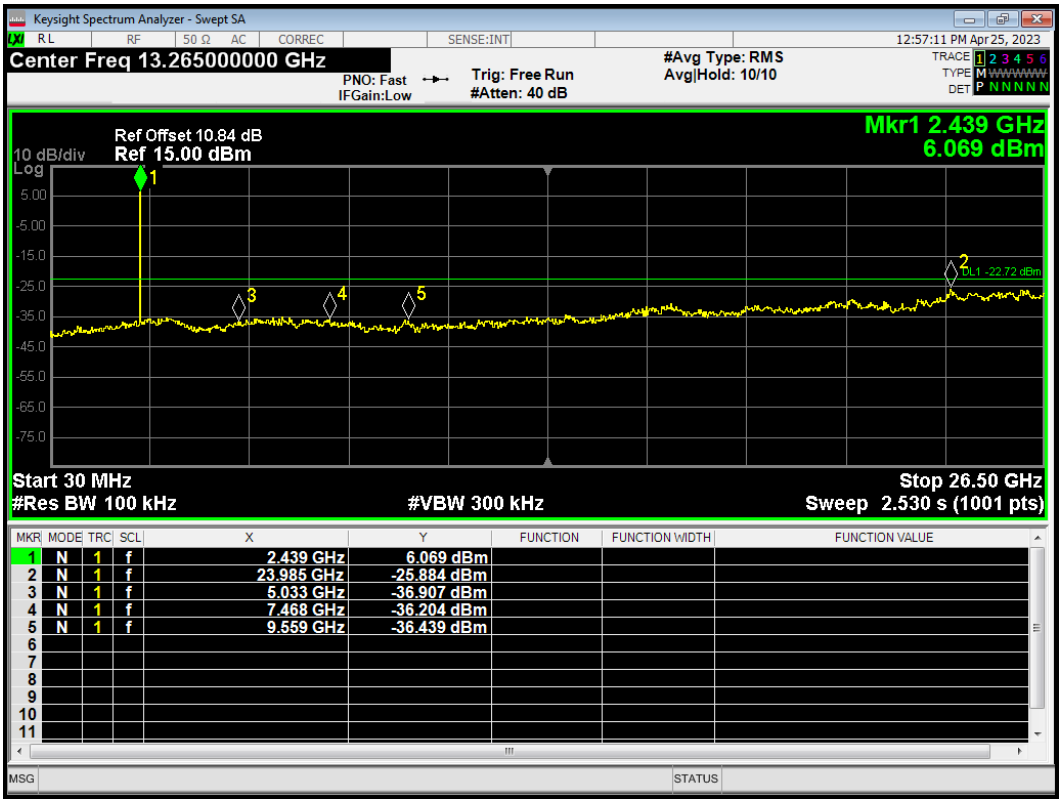

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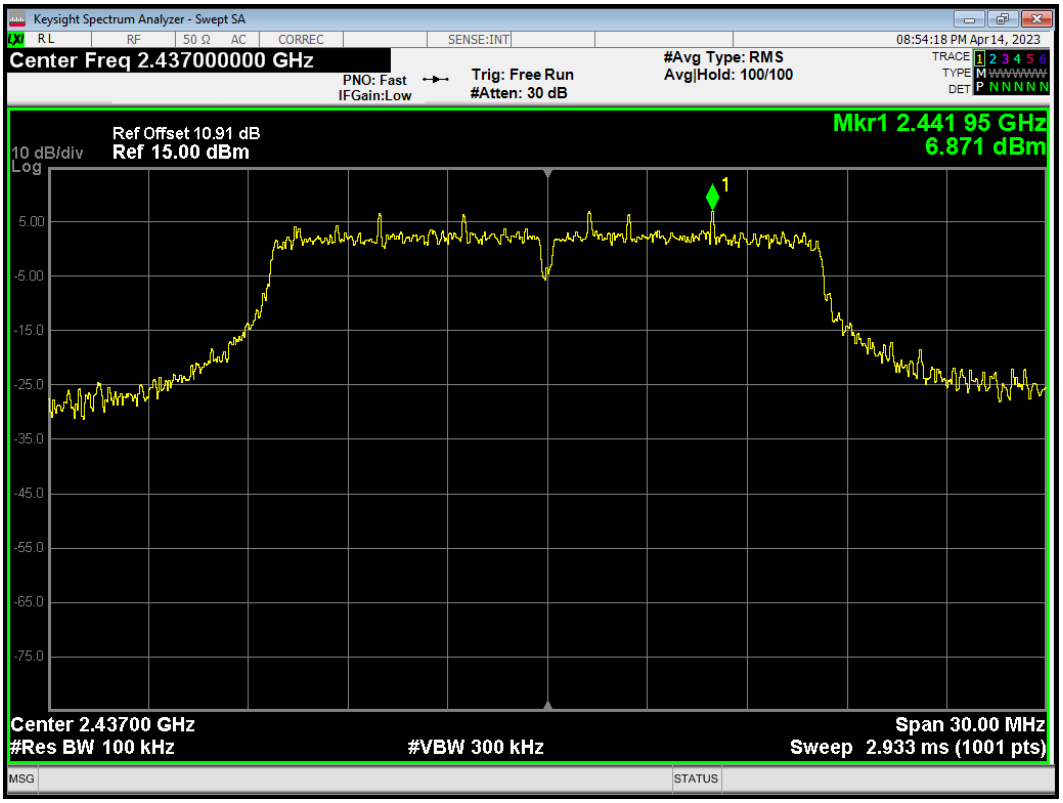

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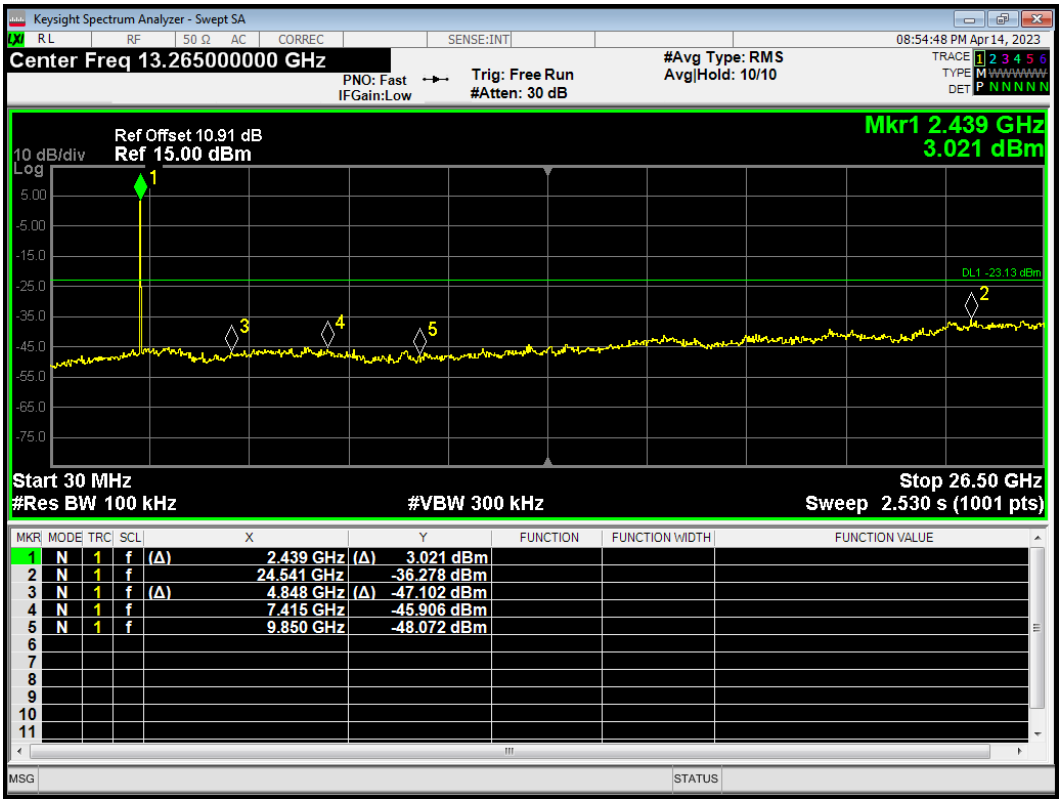

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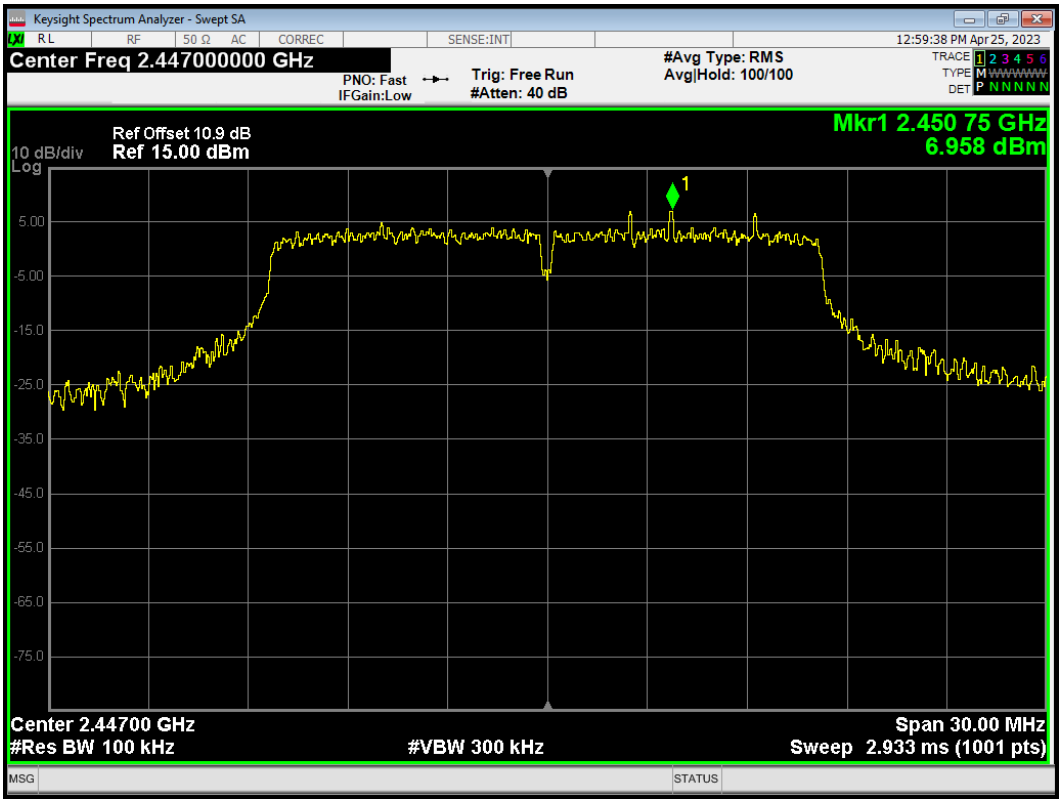

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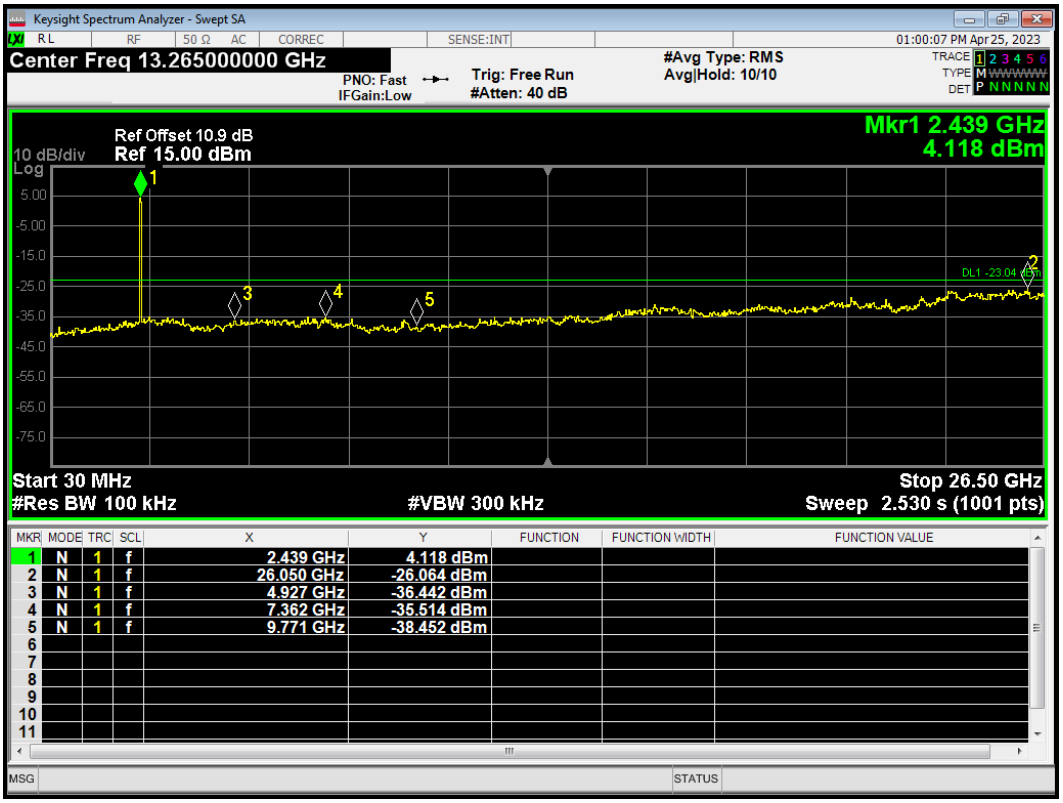

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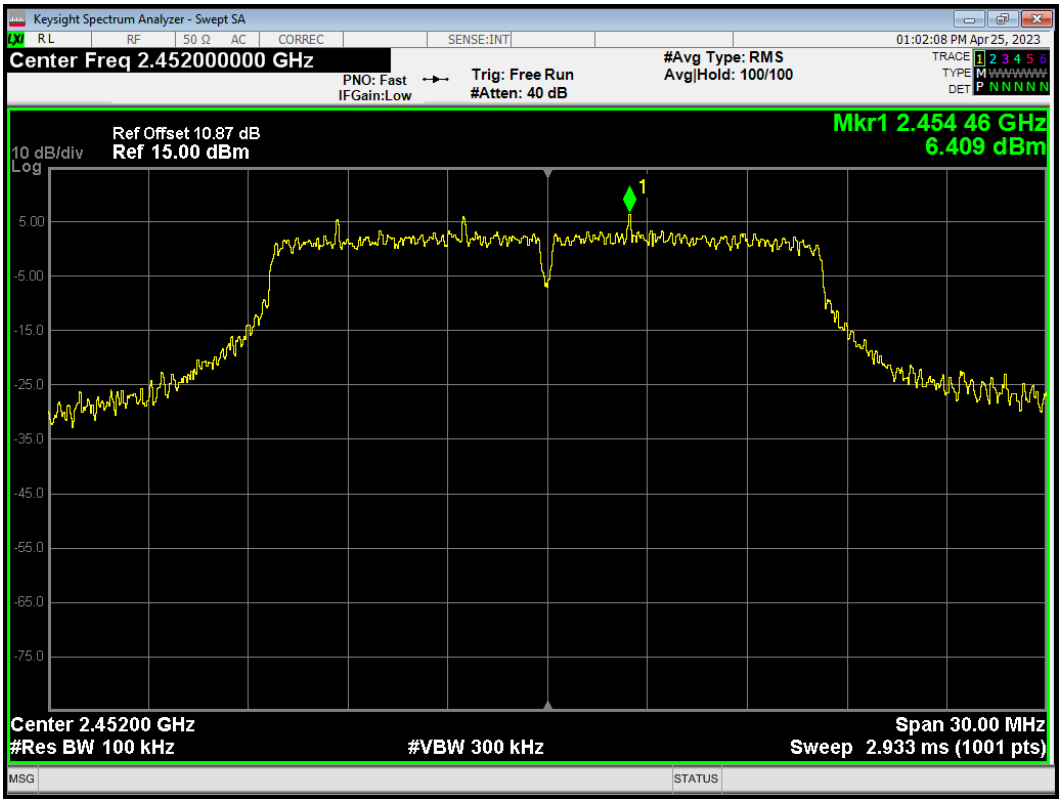

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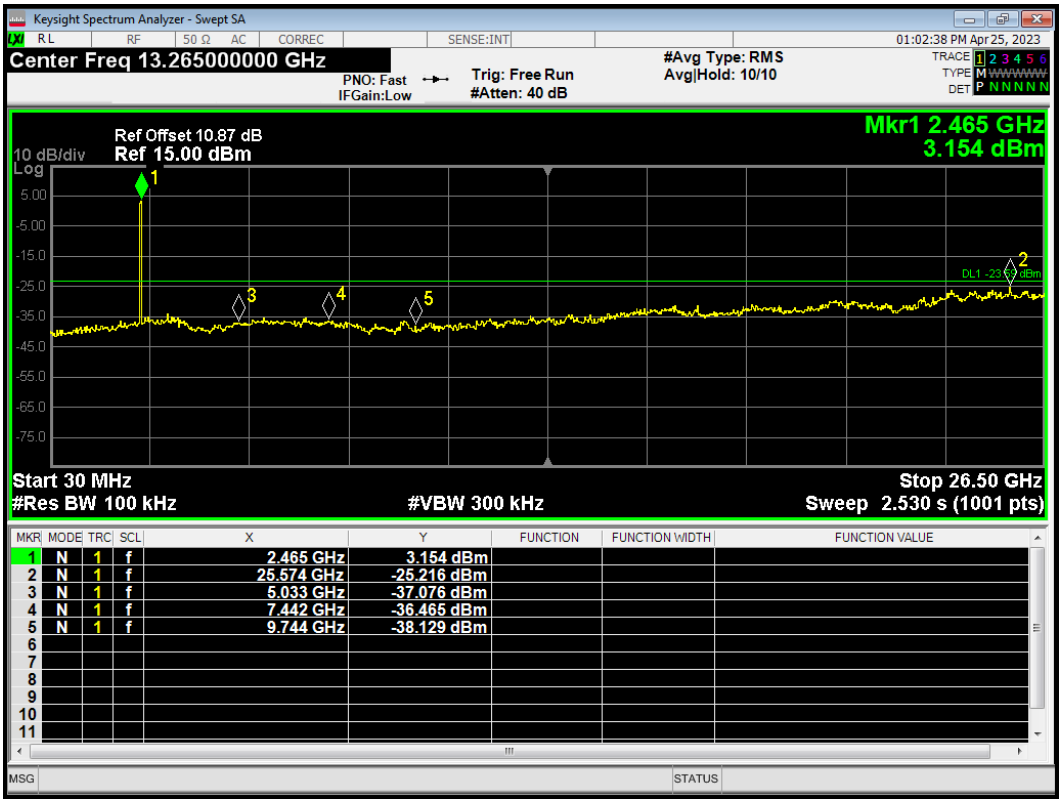

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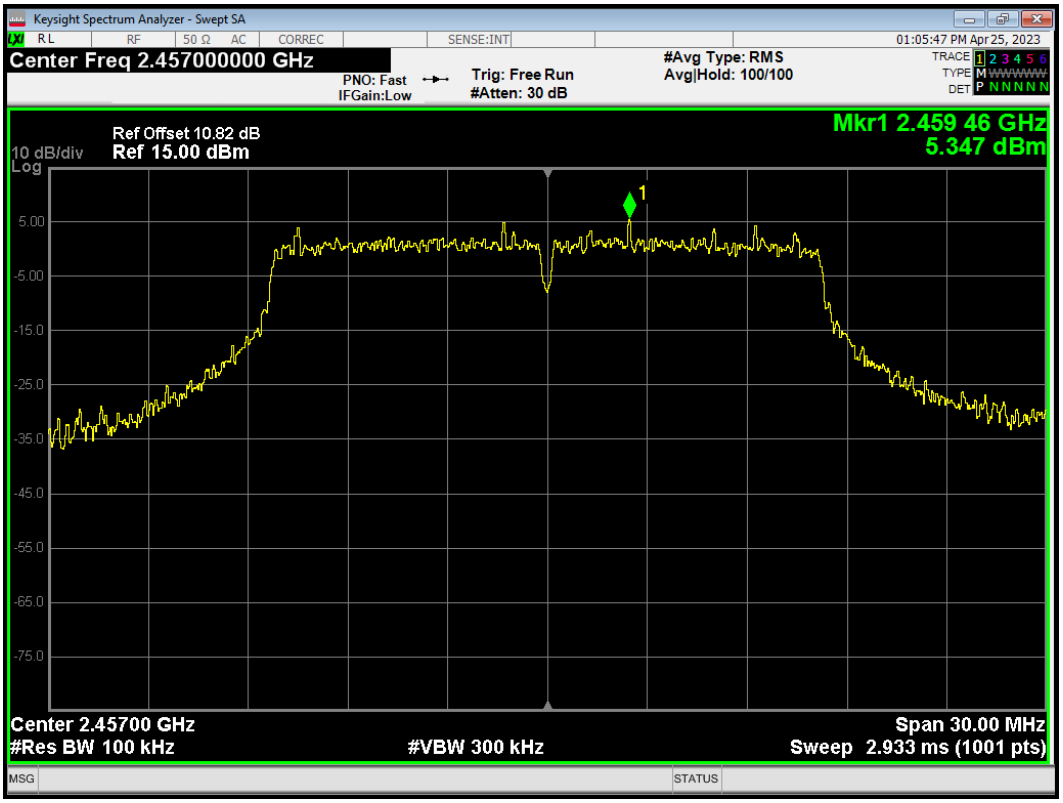

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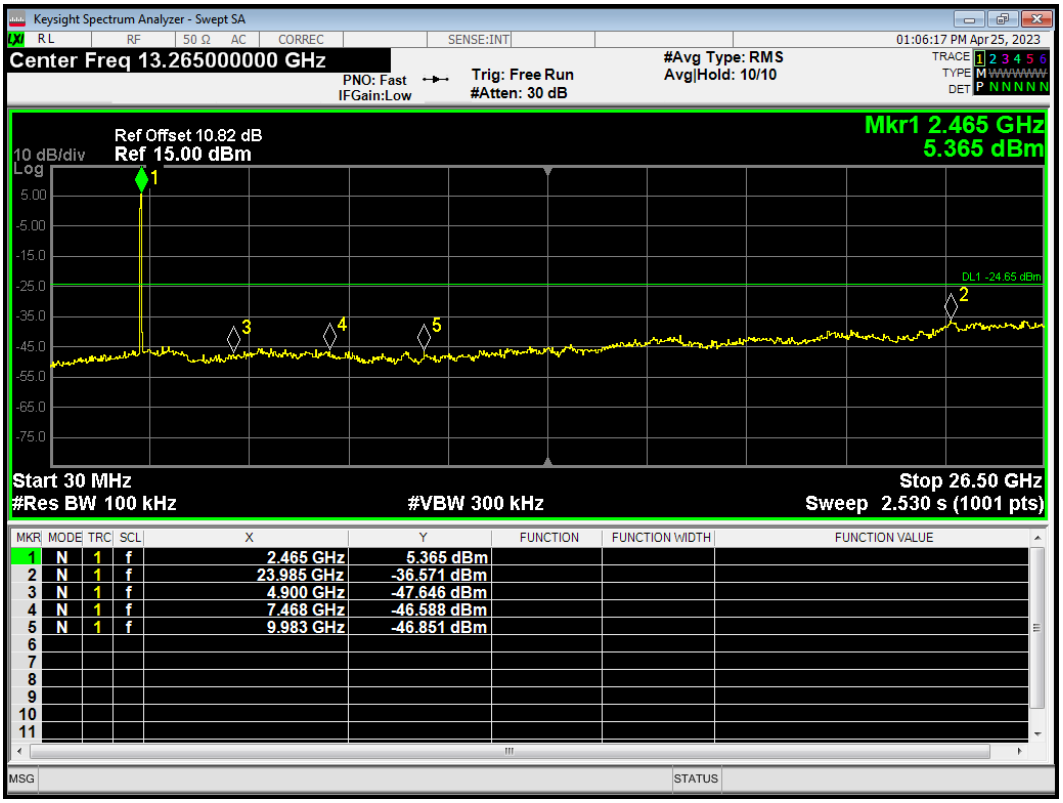

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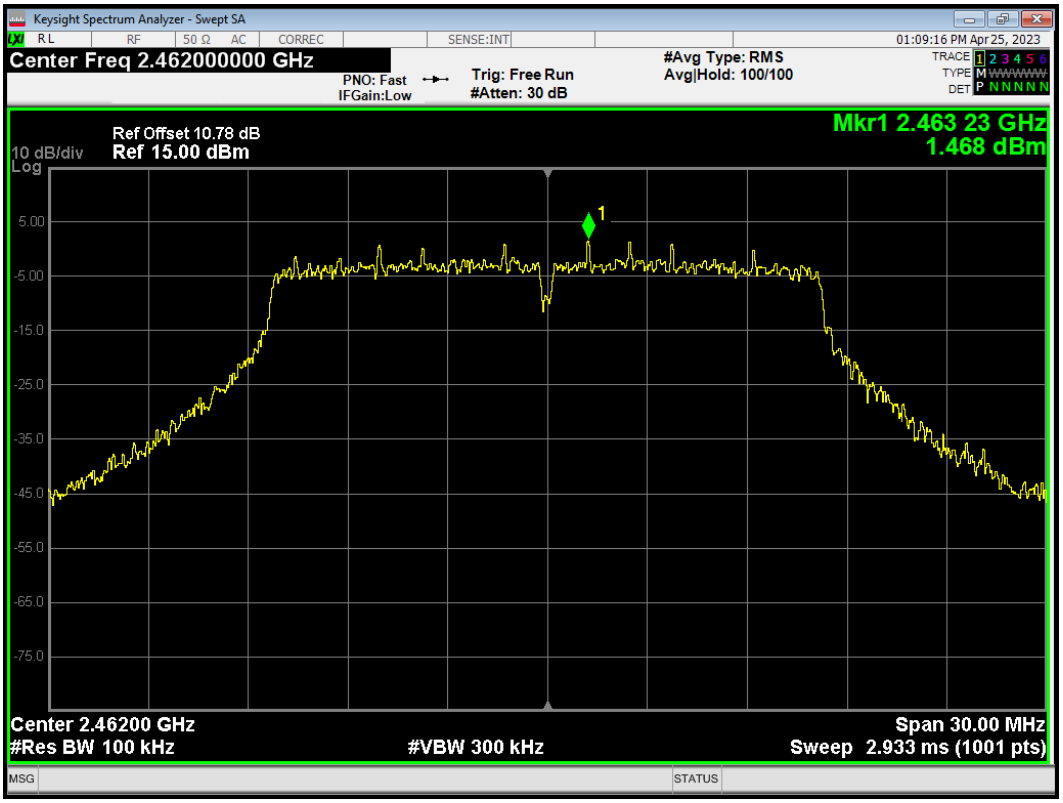

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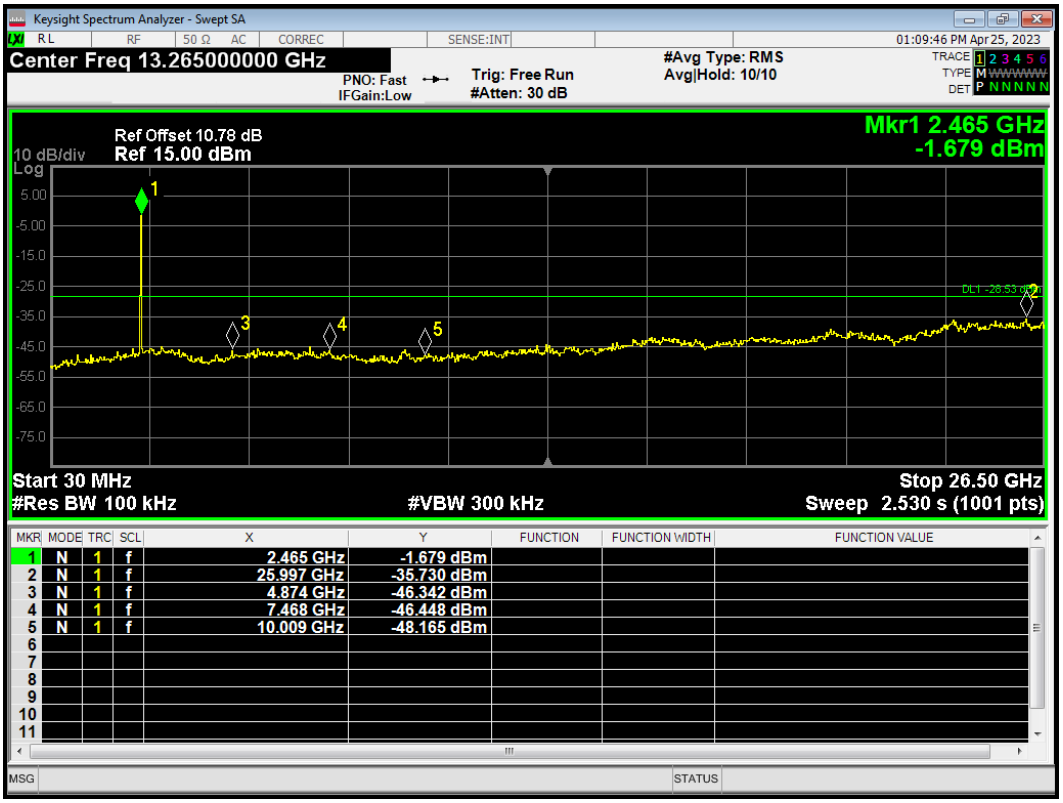

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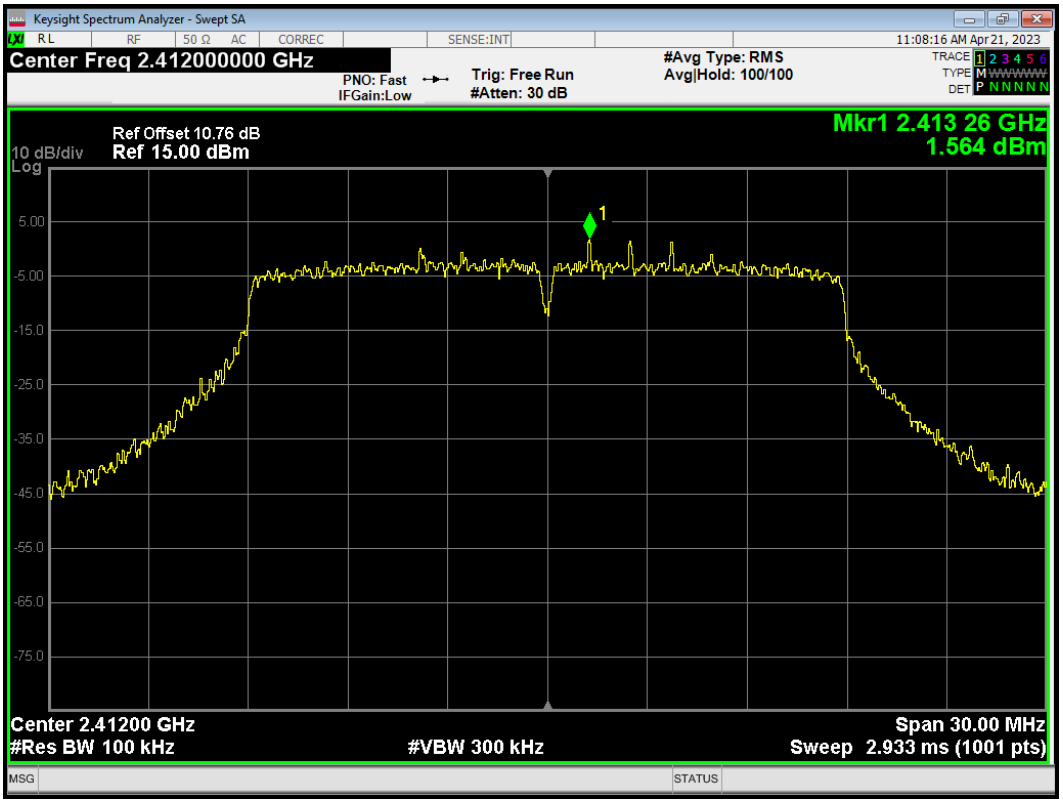

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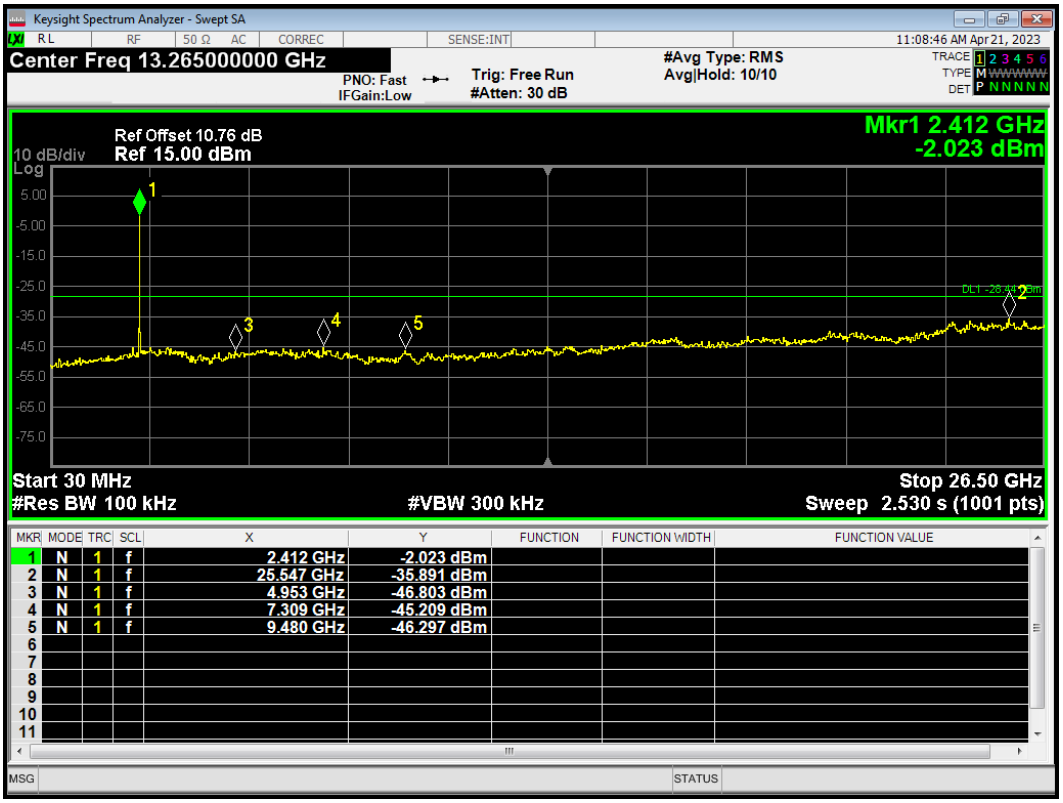

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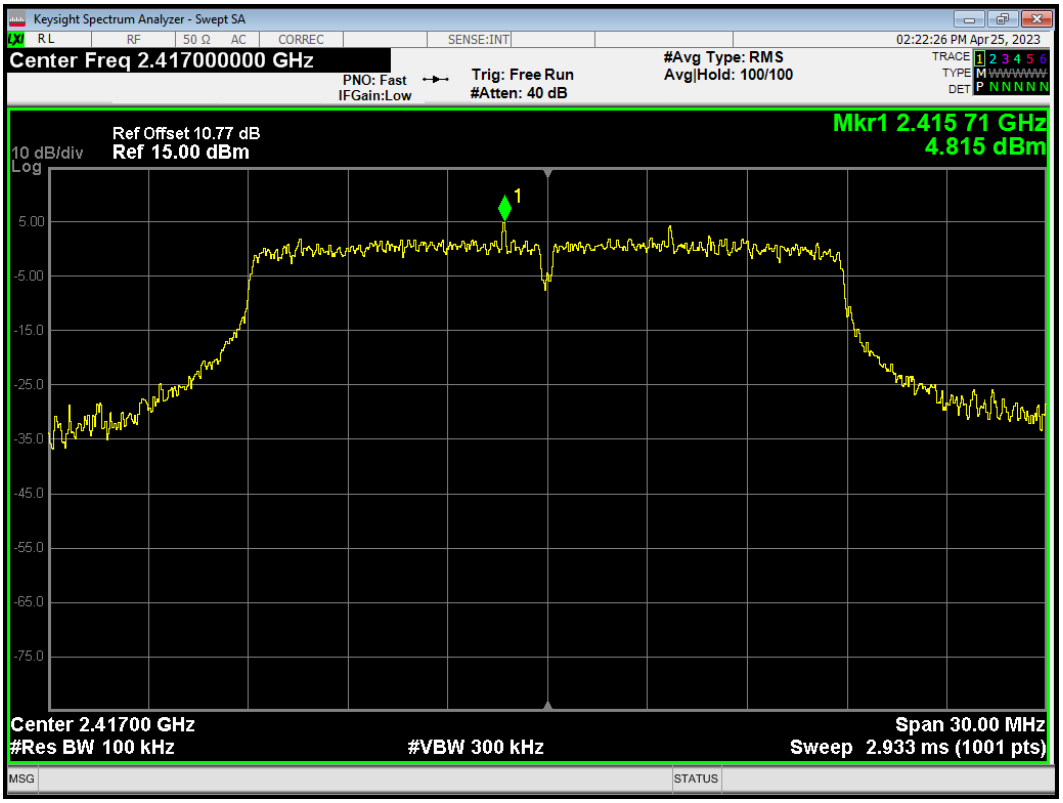

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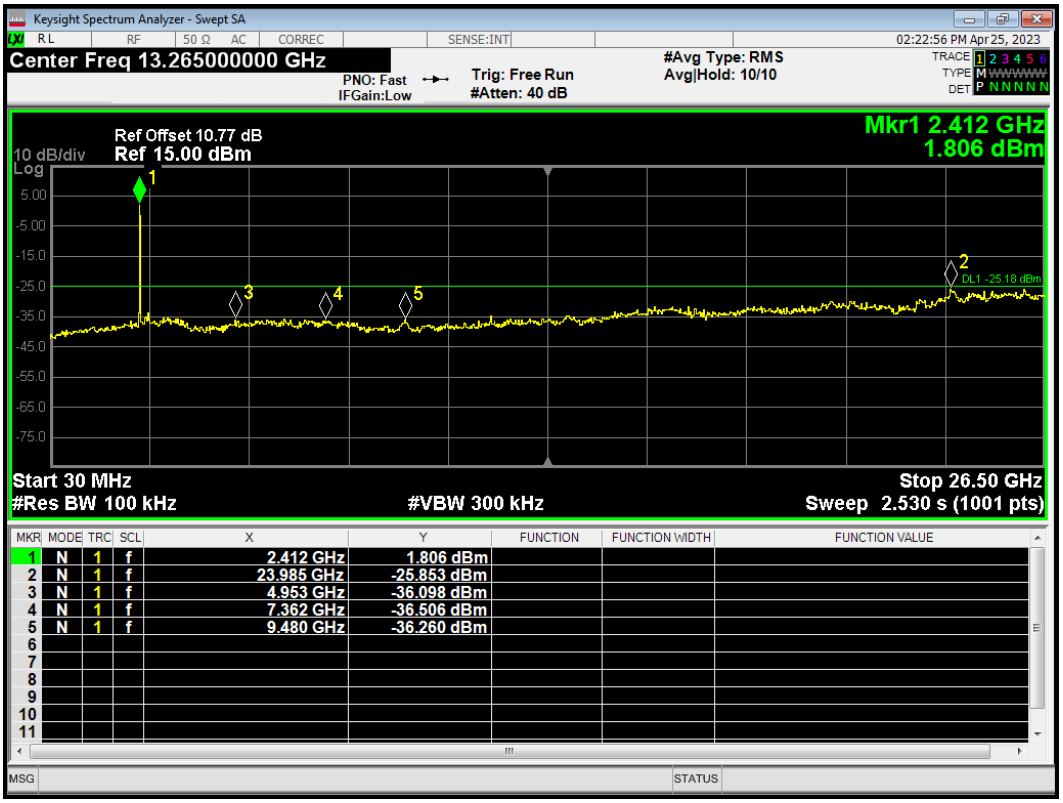

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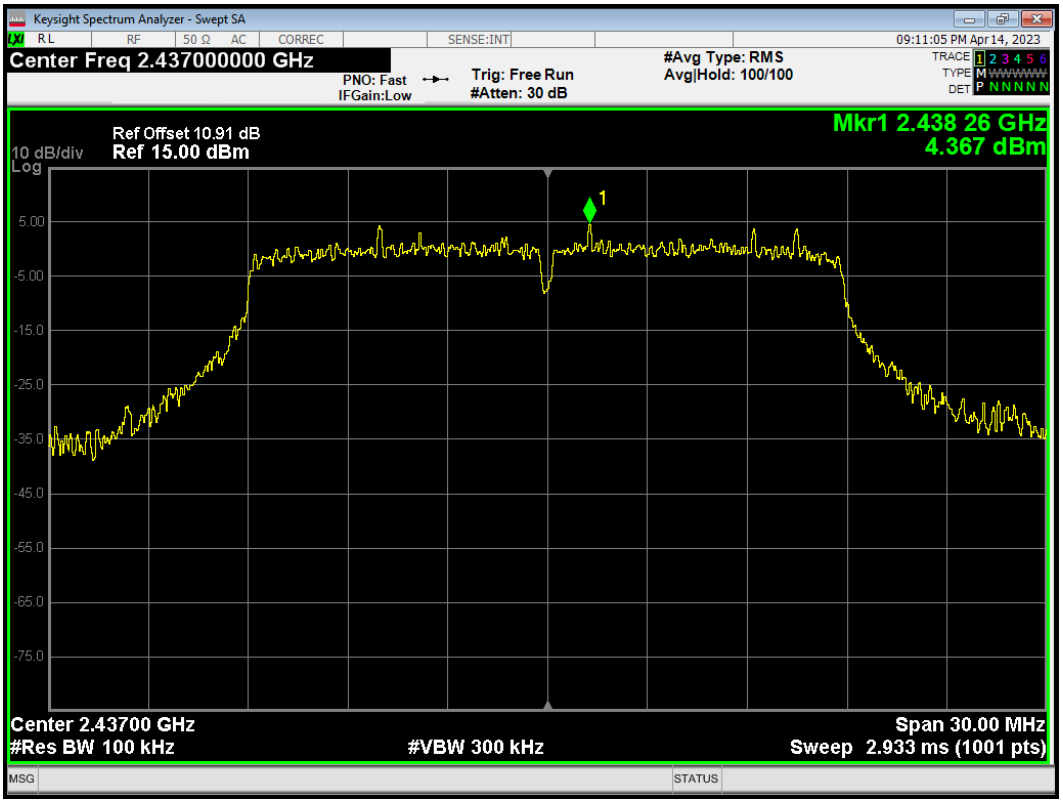

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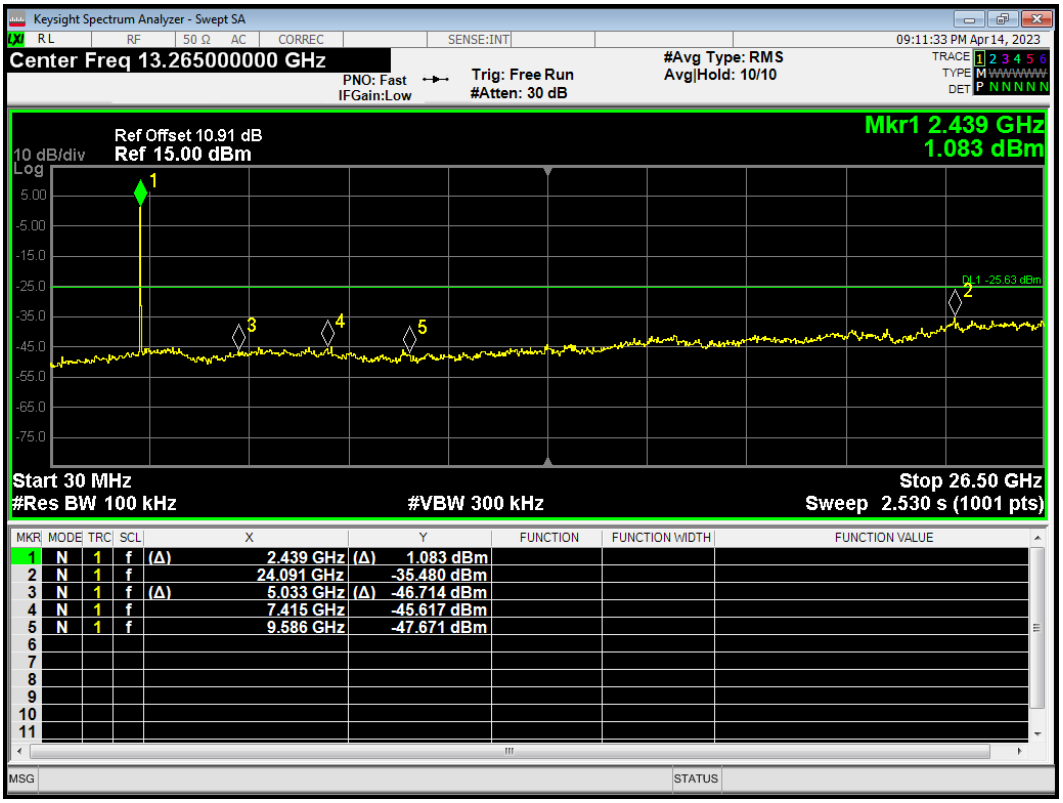

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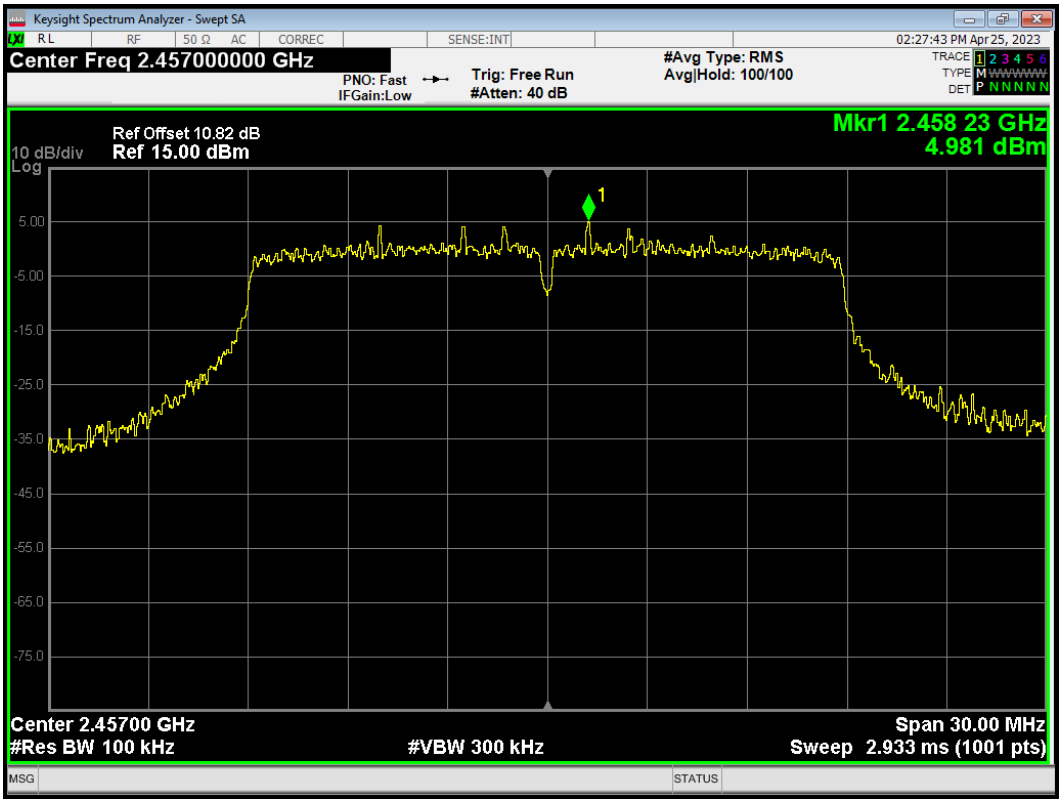

Tx. Spurious 802.11n (HT20) 2457MHz Emission