RF TEST REPORT

Applicant	Deer Management Systems LLC
FCC ID	2BBNQ-DFDCAM1
Product	Defend Cam
Brand	Tactacam
Model	Defend Cam Gen 1
Report No.	R2404A0397-R5
Issue Date	May 28, 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.

Zhu Chentao

Prepared by: Zhu Chentao

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

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 16, 2024 ~ May 7, 2024 Date of Sample Received: April 15, 2024			
Note: All indications of Pass/Fail in this report are opinions expressed by Eurofins TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

1. Test Laboratory

1.1. Notes of the Test Report

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

1.2. Test Facility

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

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

A2LA (Certificate Number: 3857.01)

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

1.3. Testing Location

Company:	Eurofins TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City:	Shanghai
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	Deer Management Systems LLC
Applicant address	1668 Jordan West Road Decorah Iowa United States
Manufacturer	Deer Management Systems LLC
Manufacturer address	1668 Jordan West Road Decorah Iowa United States

2.2. General Information

EUT Description	
Model	Defend Cam Gen 1
Lab internal SN	R2404A0397/S01
Hardware Version	P3
Software Version	1.0
Power Supply	Battery
Antenna Type	PCB Antenna
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)
Antenna Gain	Bluetooth LE Antenna: 2.98 dBi Wi-Fi 2.4G Antenna: 1.64 dBi
Additional Beamforming Gain	NA
Operating Frequency Range(s)	802.11b/g/n(HT20): 2412 ~ 2462 MHz 802.11n(HT40): 2422 ~ 2452 MHz Bluetooth LE V5.3: 2402 ~2480 MHz
Modulation Type	802.11b: DSSS 802.11g/n: OFDM Bluetooth LE: GFSK
Max. Output Power	Wi-Fi 2.4G: 12.99 dBm Bluetooth LE: 0.19 dBm
EUT Accessory	
Power supply 1	Dry battery: 2 * 6 AA Battery DC 9V
Power supply 2	Lithium battery: Manufacturer: EVE Energy CO., LTD. Model: B0900 DC 7.20V 37.44WAh
Note: 1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is	

declared by the applicant.
2. There is more than one Power supply, each one should be applied throughout the compliance test respectively, however, only Power supply 1 will be recorded in this report.

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.

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

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

Worst-case data rates are shown as following table.

Test Mode	Data Rate
Bluetooth (Low Energy)	1Mbps; 2Mbps
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

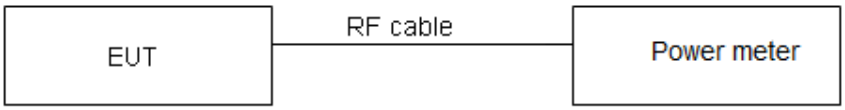
Ambient Condition

Temperature	Relative humidity
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	≤ 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	34	41	38	CH3	35
CH6	29	37	35	CH6	35
CH11	26	37	35	CH9	36

Power Index	
Channel	Bluetooth (Low Energy)
CH0	0
CH19	0
CH39	0

Test Mode	Duty cycle	Duty cycle correction Factor (dB)
802.11b	0.990	0.00
802.11g	0.942	0.26
802.11n HT20	0.918	0.37
802.11n HT40	0.930	0.31
Bluetooth LE (1M)	0.631	2.00
Bluetooth LE (2M)	0.334	4.76
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	12.99	12.99	30	PASS
	2437/CH 6	12.83	12.83	30	PASS
	2462/CH11	12.80	12.80	30	PASS
802.11g	2412/CH 1	10.71	10.97	30	PASS
	2437/CH 6	10.69	10.95	30	PASS
	2462/CH11	10.72	10.98	30	PASS
802.11n HT20	2412/CH 1	9.41	9.78	30	PASS
	2437/CH 6	9.55	9.92	30	PASS
	2462/CH11	9.60	9.97	30	PASS
802.11n HT40	2422/CH3	9.64	9.95	30	PASS
	2437/CH6	9.50	9.81	30	PASS
	2452/CH9	9.50	9.81	30	PASS
Bluetooth (Low Energy) (1M)	2402/CH0	-1.94	0.06	30	PASS
	2440/CH19	-1.87	0.13	30	PASS
	2480/CH39	-1.81	0.19	30	PASS
Bluetooth (Low Energy) (2M)	2402/CH0	-4.75	0.01	30	PASS
	2440/CH19	-4.66	0.11	30	PASS
	2480/CH39	-4.58	0.18	30	PASS
Note: Average Power with duty factor = Average Power Measured +Duty cycle correction factor					

5.2. 99% Bandwidth and 6dB Bandwidth

Ambient Condition

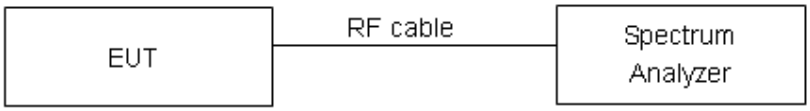
Temperature	Relative humidity
15°C ~ 35°C	20% ~ 80%

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

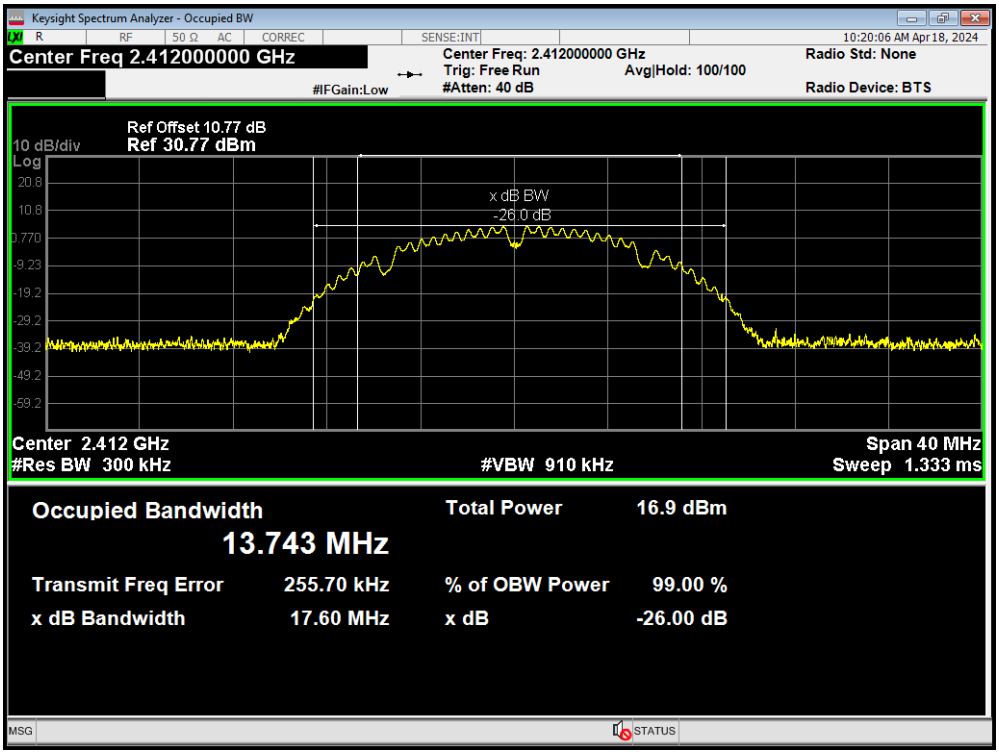
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 936 Hz.

Test Results:

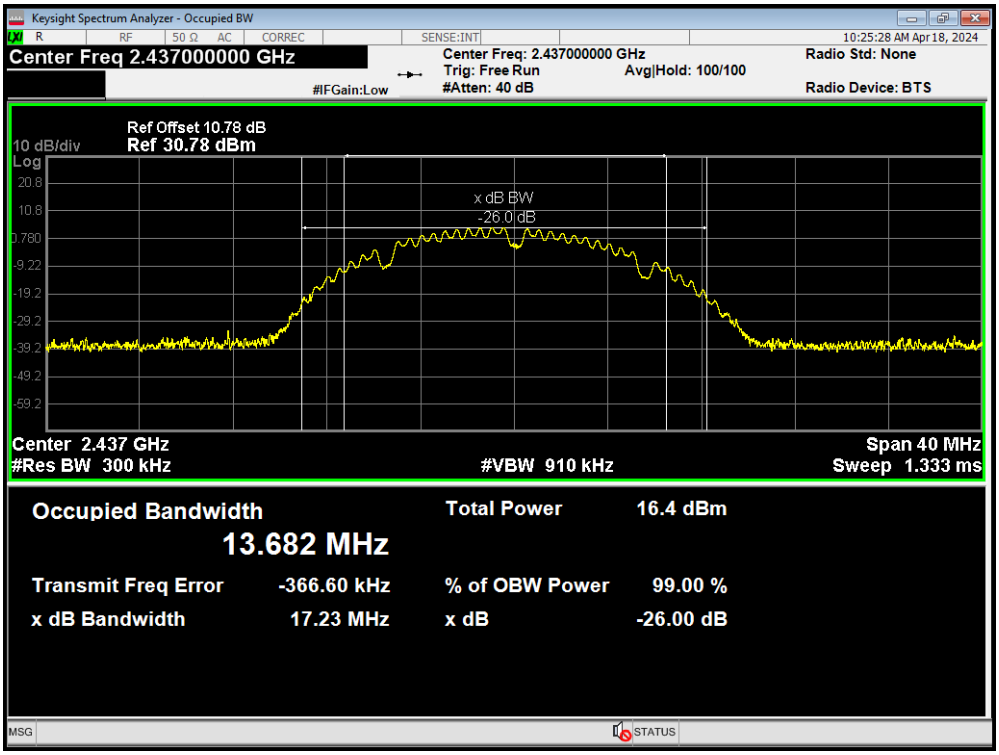
Test Mode	Carrier frequency (MHz)	99% bandwidth (MHz)	Minimum 6 dB bandwidth (MHz)	Limit (kHz)	Conclusion
802.11b	2412	13.743	8.546	500	PASS
	2437	13.682	8.544	500	PASS
	2462	13.018	7.523	500	PASS
802.11g	2412	16.994	16.432	500	PASS
	2437	16.930	15.834	500	PASS
	2462	16.460	15.445	500	PASS
802.11n HT20	2412	18.013	17.627	500	PASS
	2437	17.776	16.303	500	PASS
	2462	17.512	15.467	500	PASS
802.11n HT40	2422	35.833	25.086	500	PASS
	2437	36.251	33.753	500	PASS
	2452	36.224	35.078	500	PASS
Bluetooth (Low Energy) (1M)	2402	1.045	0.687	500	PASS
	2440	1.046	0.693	500	PASS
	2480	1.049	0.688	500	PASS
Bluetooth (Low Energy) (2M)	2402	2.050	1.119	500	PASS
	2440	2.049	1.100	500	PASS
	2480	2.058	1.128	500	PASS

99%bandwidth

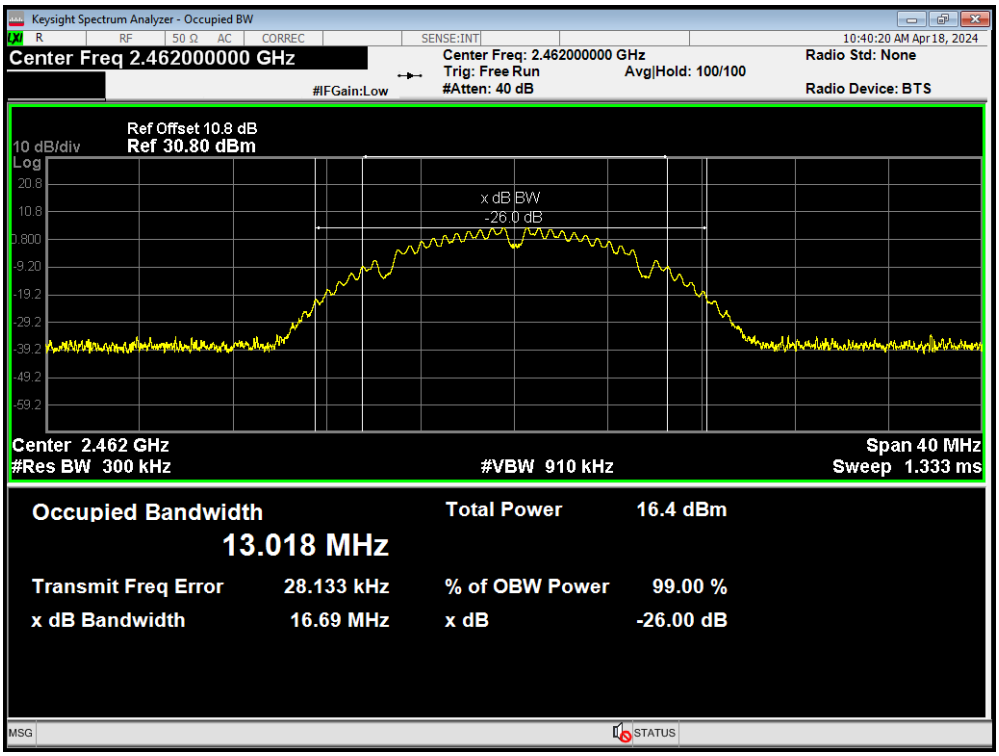
OBW 802.11b 2412MHz



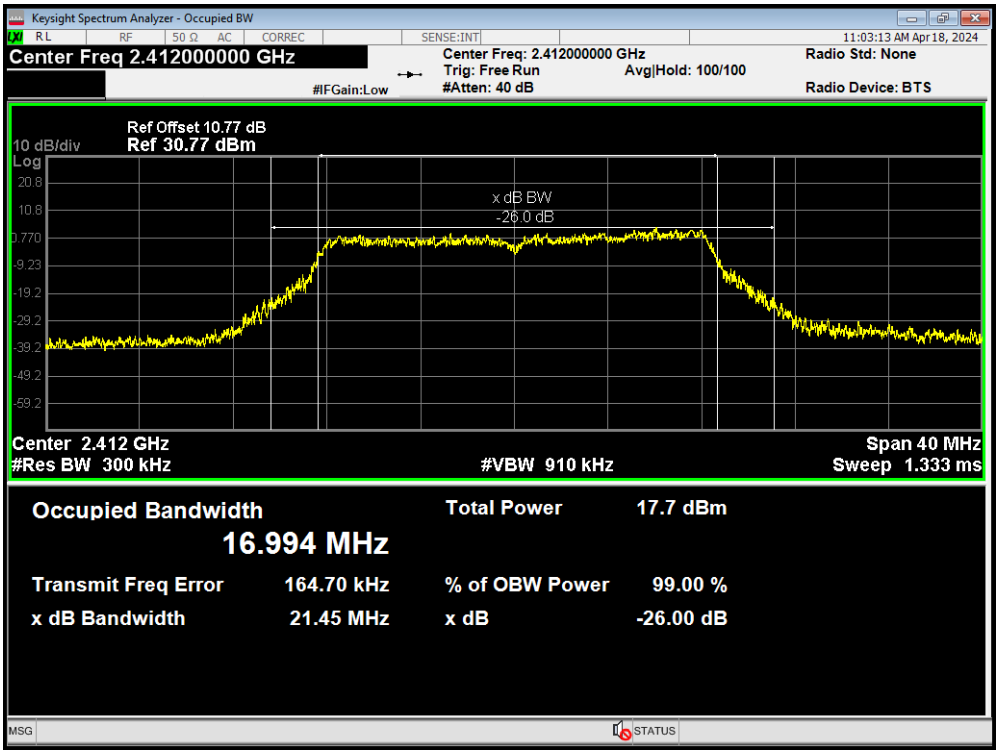
OBW 802.11b 2437MHz



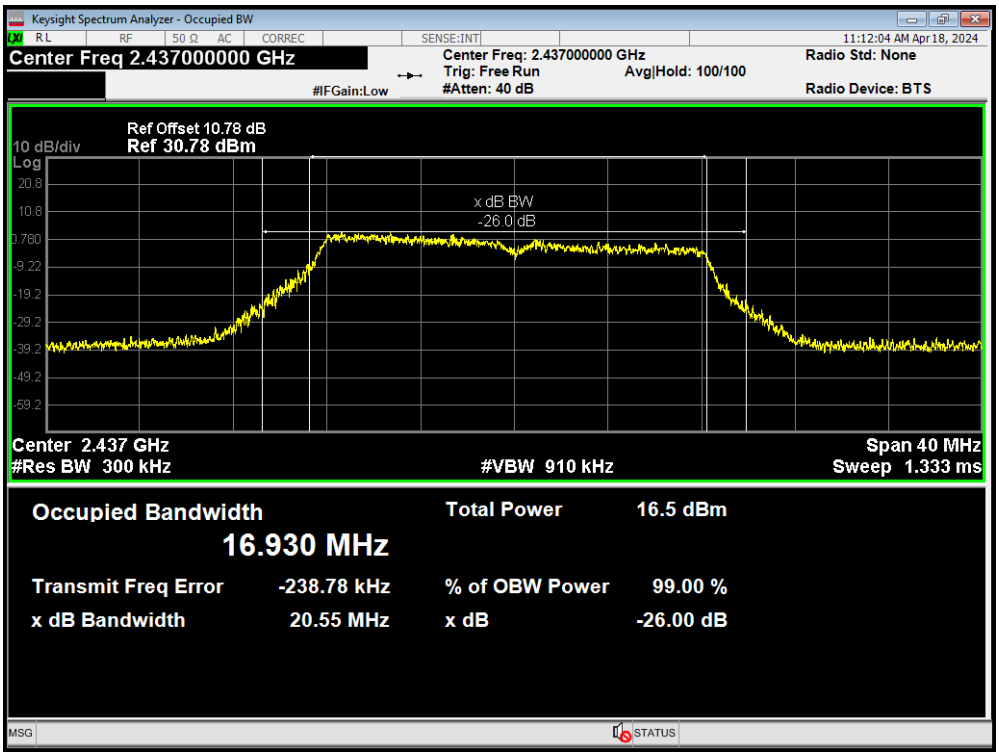
OBW 802.11b 2462MHz



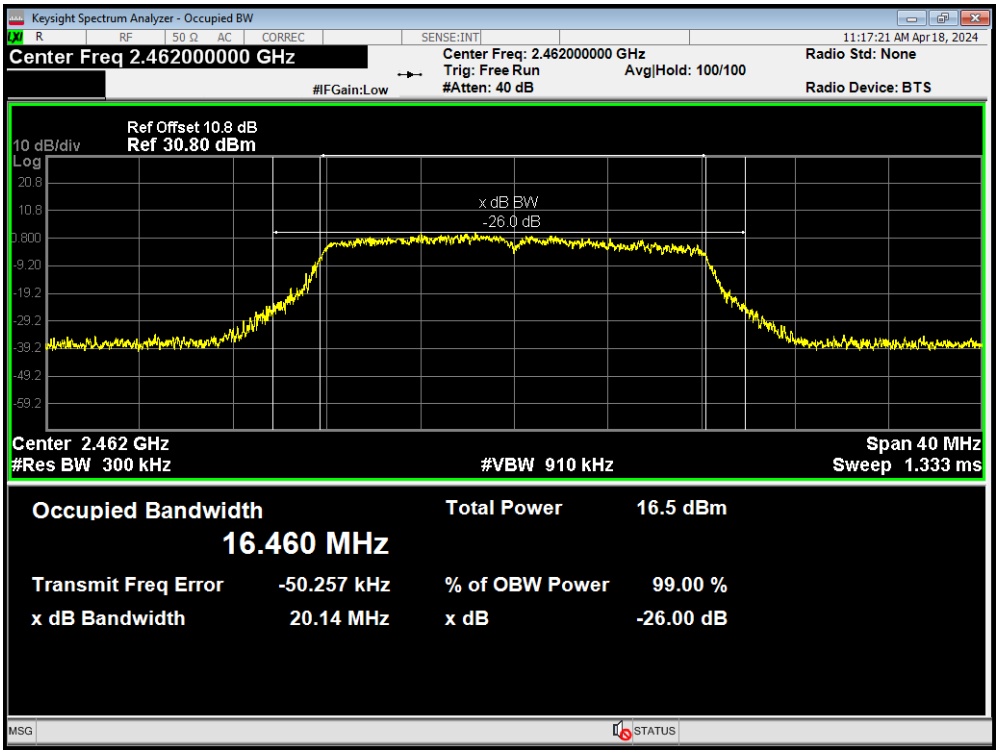
OBW 802.11g 2412MHz



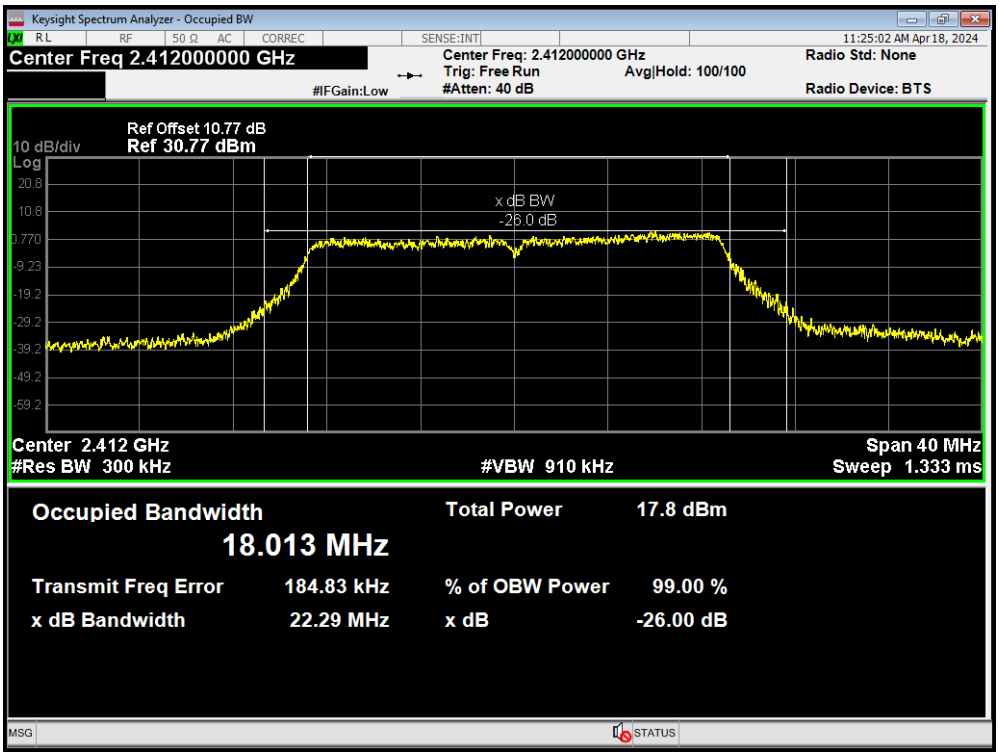
OBW 802.11g 2437MHz



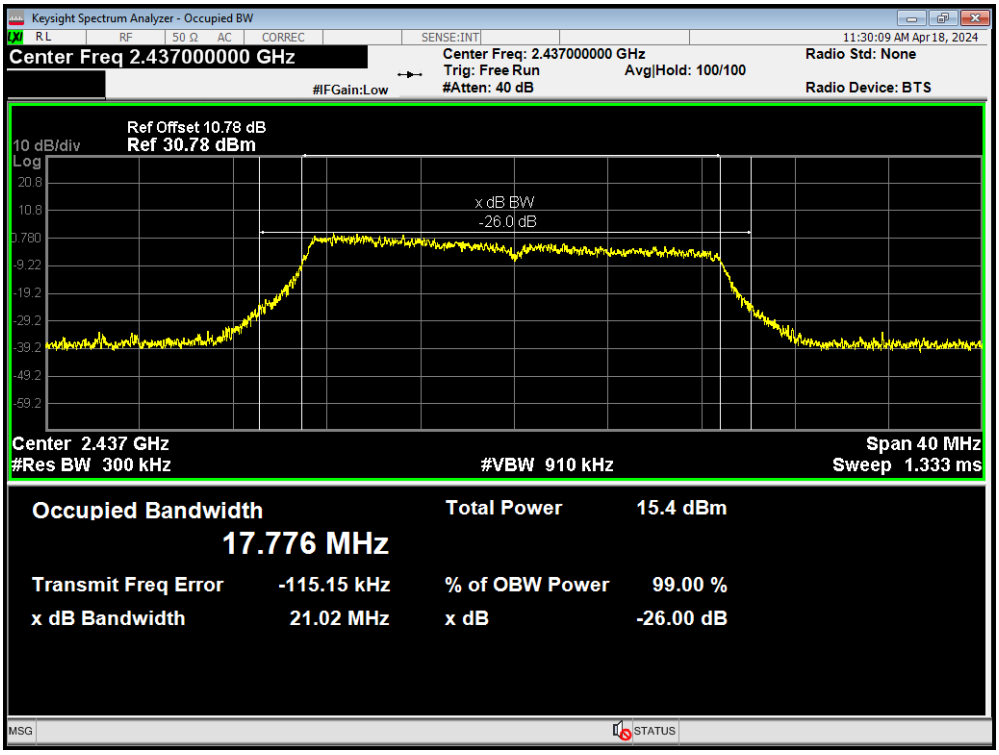
OBW 802.11g 2462MHz



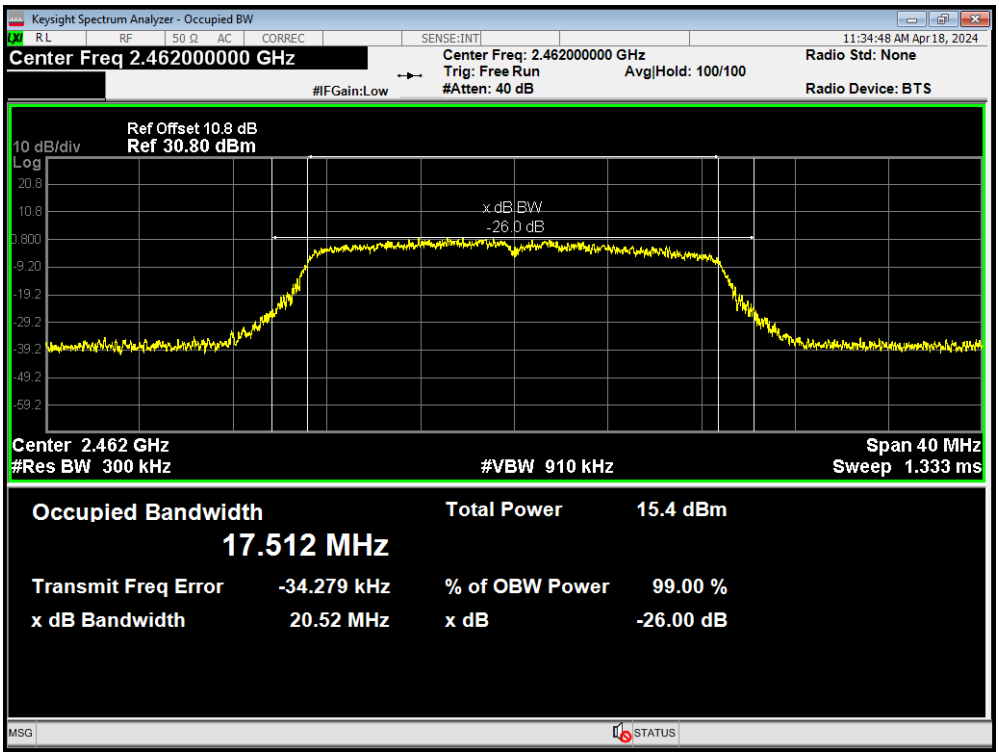
OBW 802.11n(HT20) 2412MHz



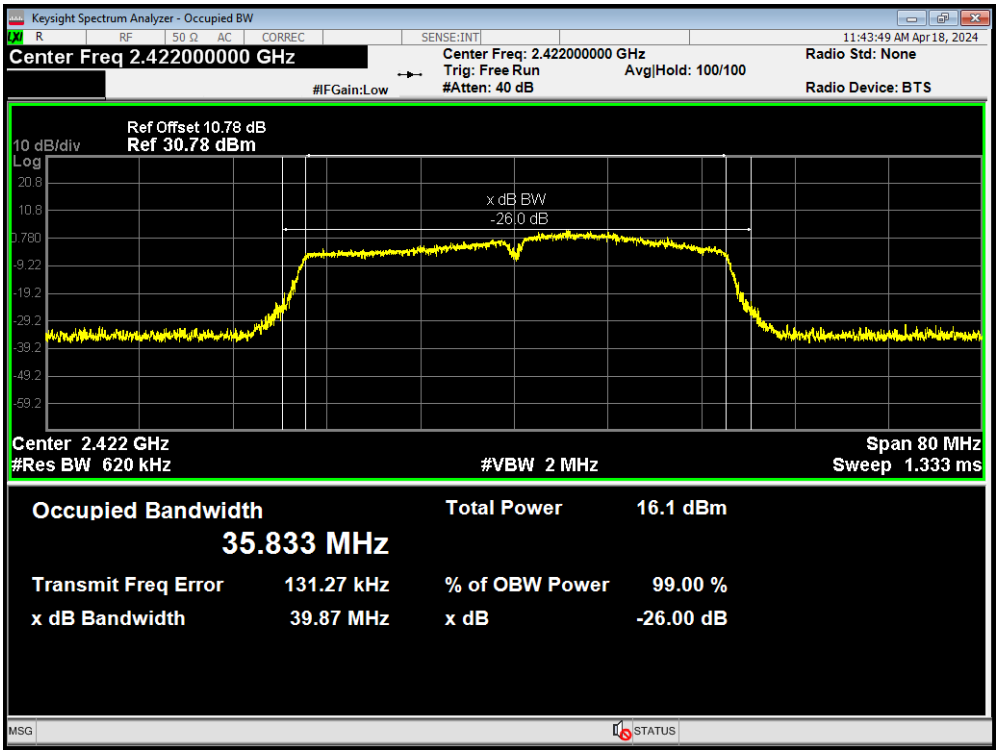
OBW 802.11n(HT20) 2437MHz



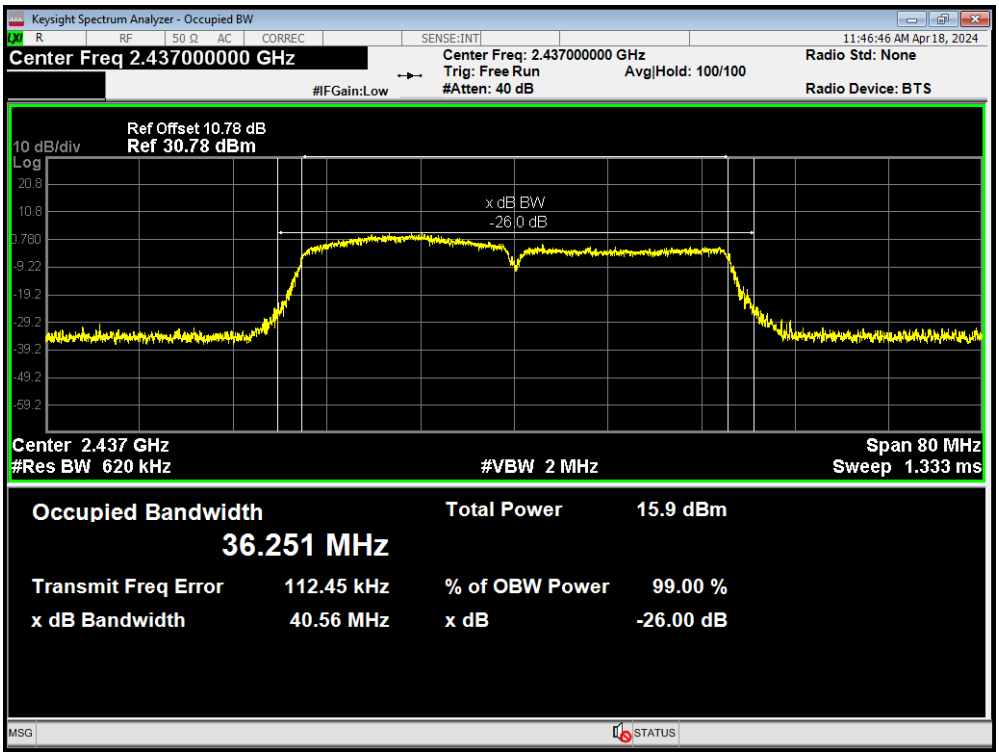
OBW 802.11n(HT20) 2462MHz



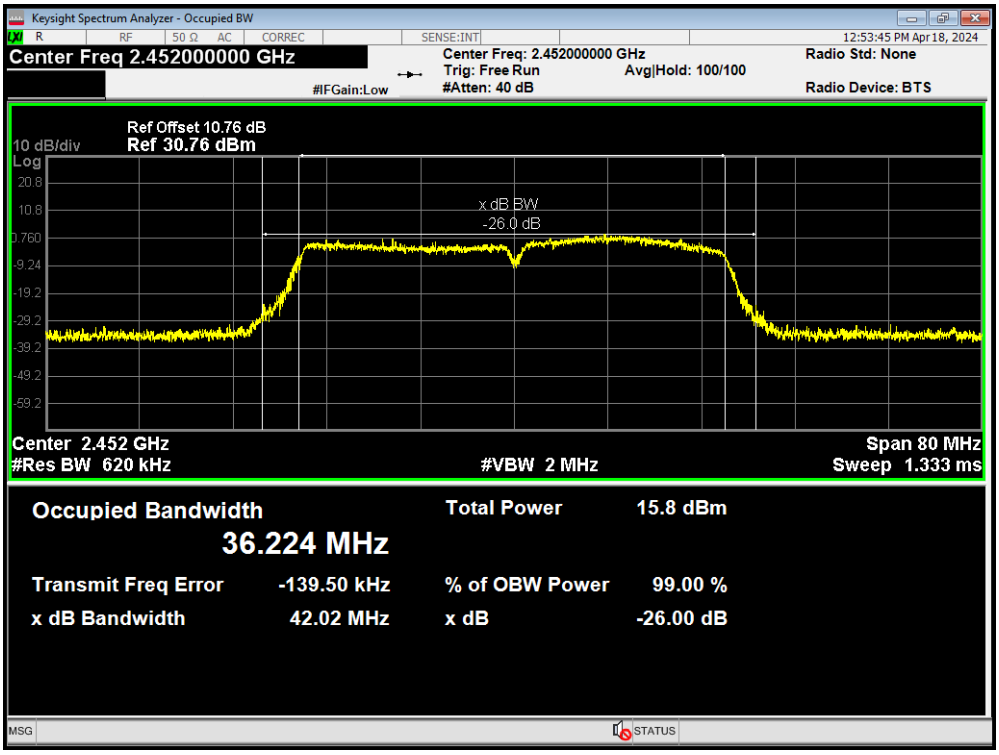
OBW 802.11n(HT40) 2422MHz



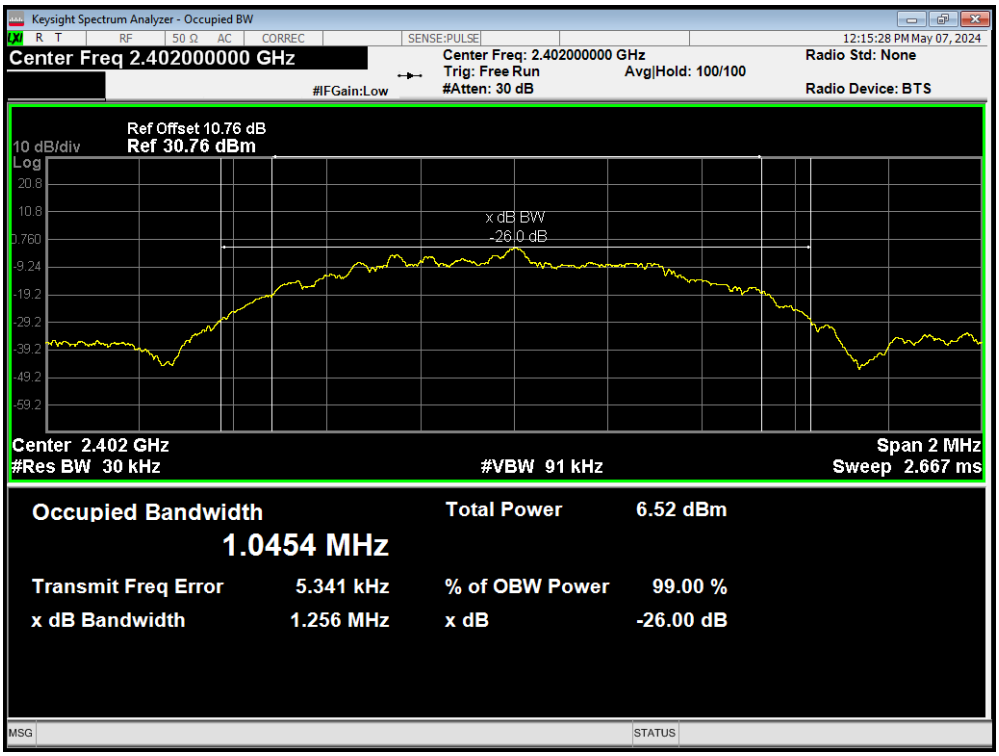
OBW 802.11n(HT40) 2437MHz



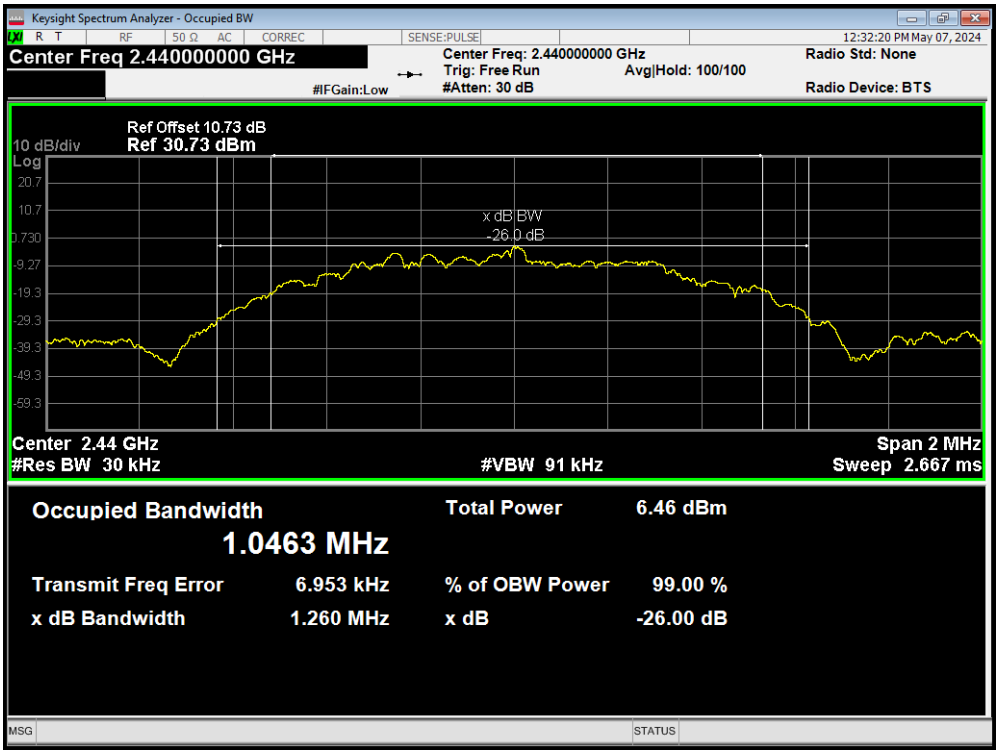
OBW 802.11n(HT40) 2452MHz



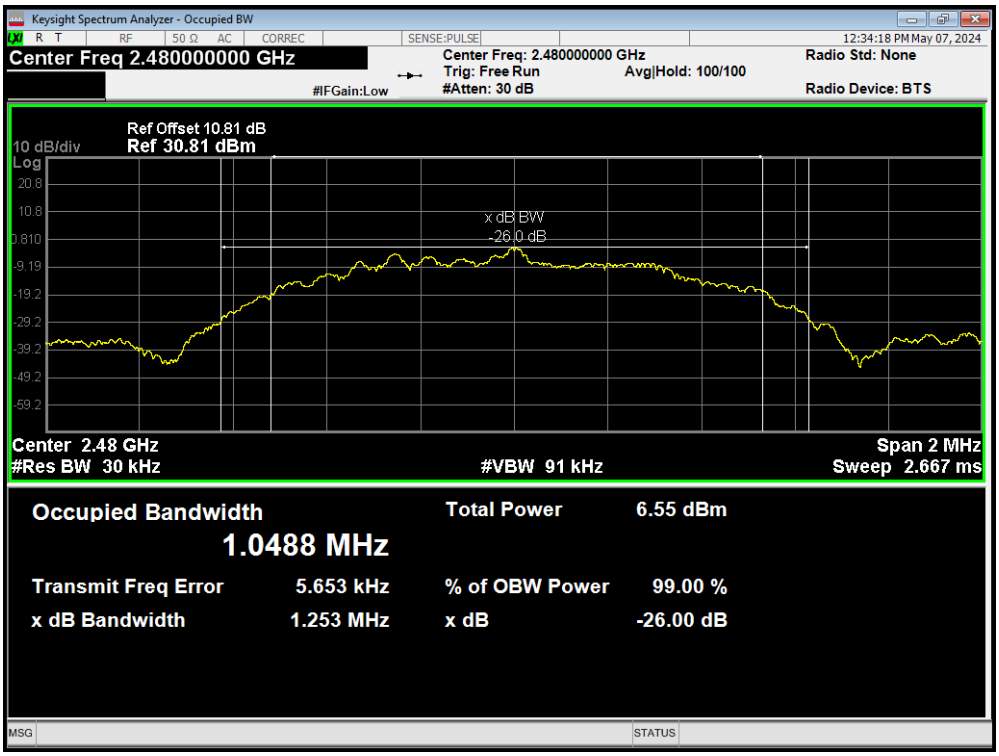
OBW BLE(1M) 2402MHz



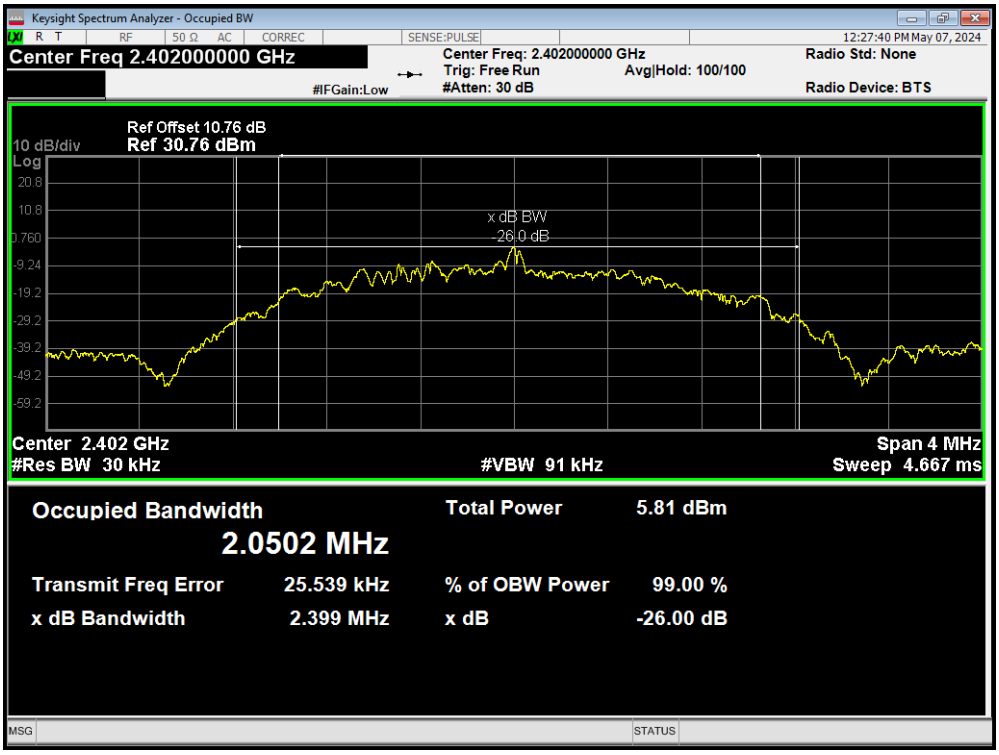
OBW BLE(1M) 2440MHz



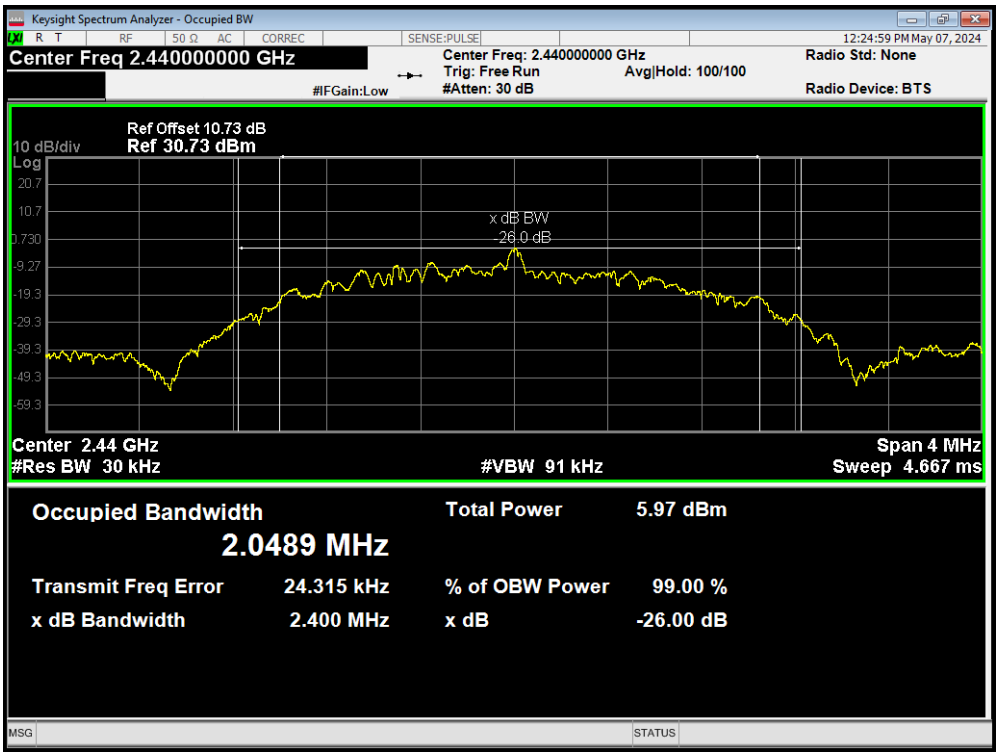
OBW BLE(1M) 2480MHz



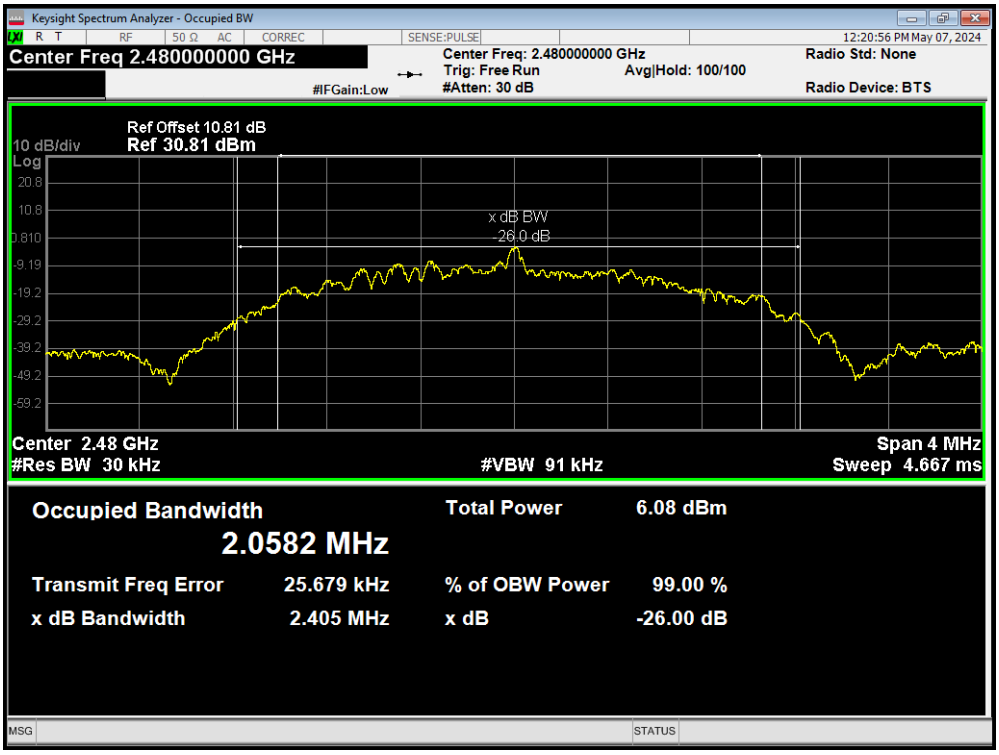
OBW BLE(1M)(2M) 2402MHz



OBW BLE(2M) 2440MHz

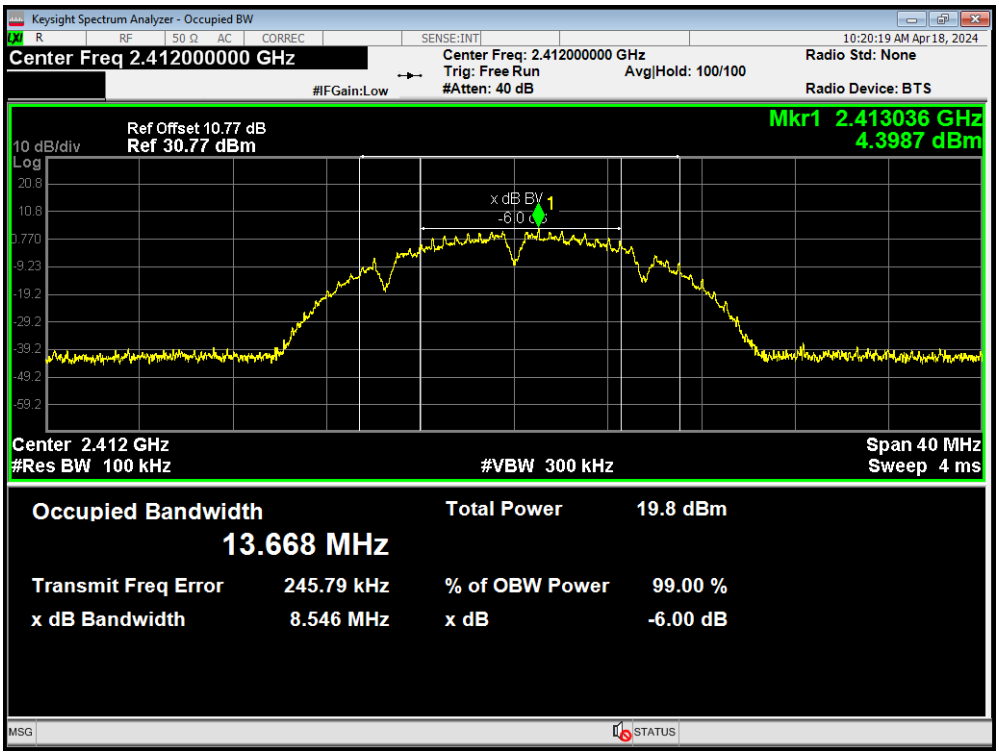


OBW BLE(2M) 2480MHz

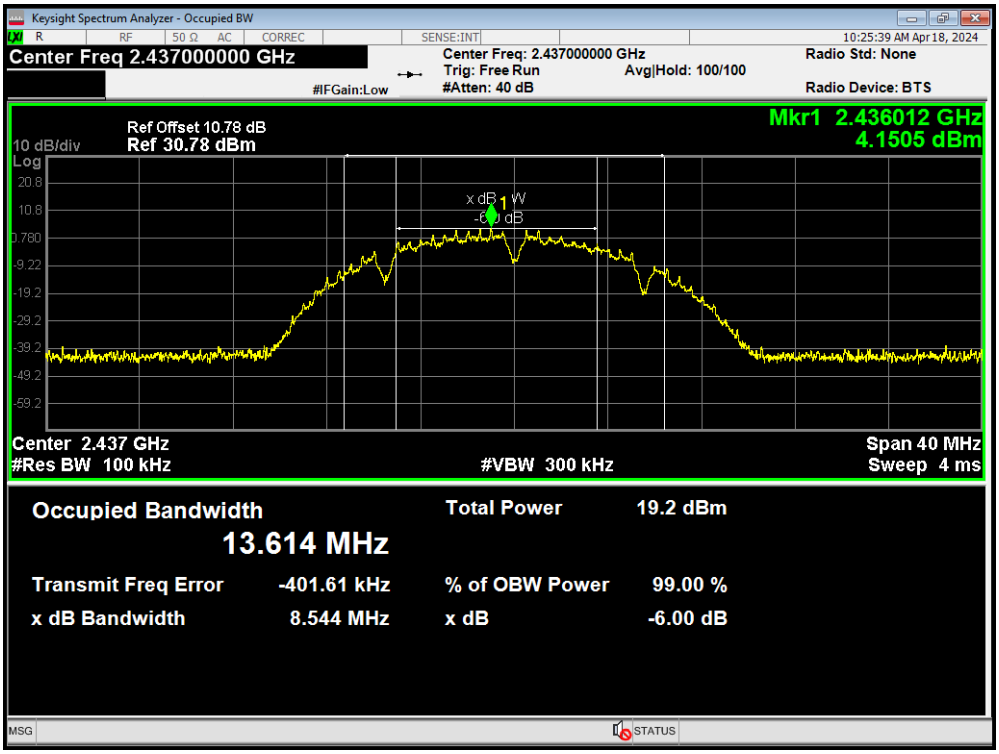


6 dB bandwidth

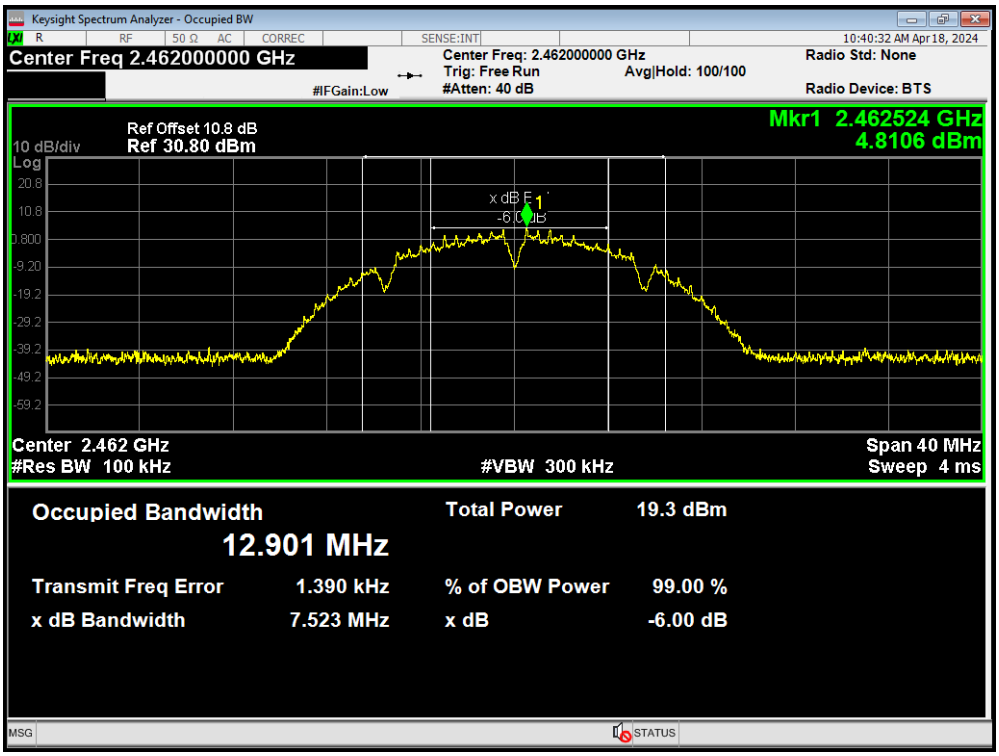
-6dB Bandwidth 802.11b 2412MHz



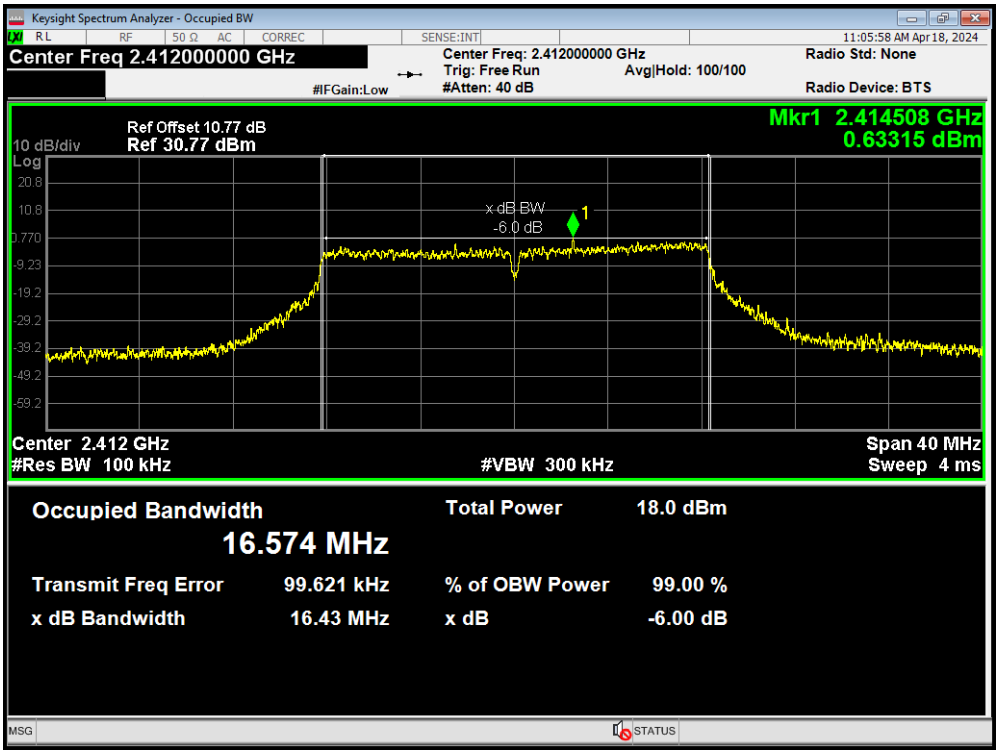
-6dB Bandwidth 802.11b 2437MHz



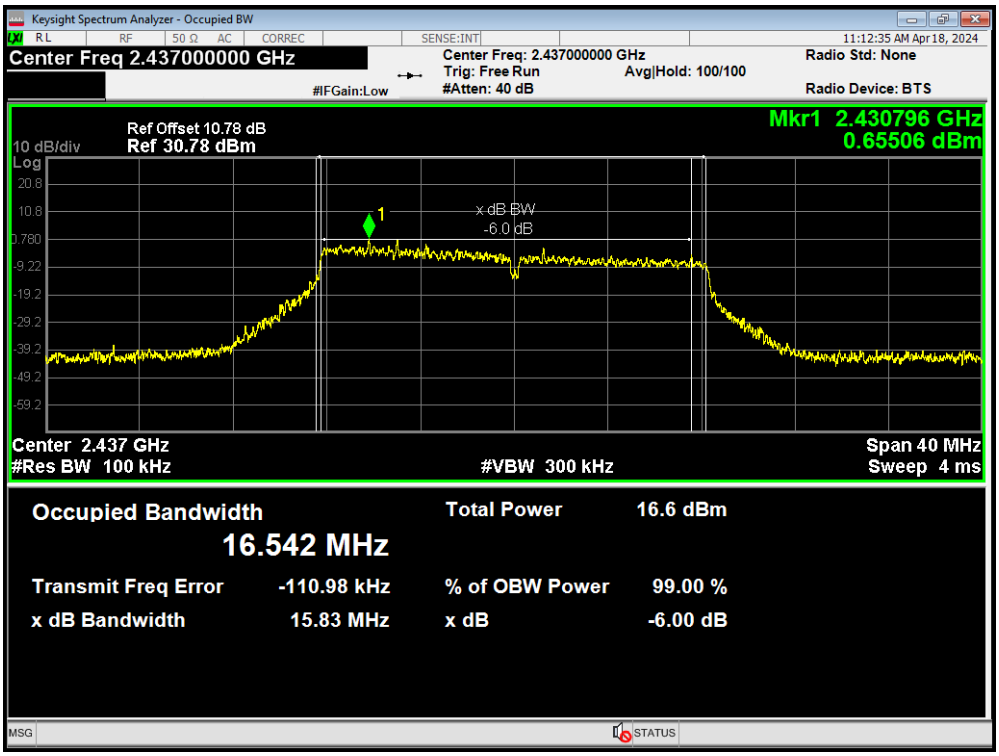
-6dB Bandwidth 802.11b 2462MHz



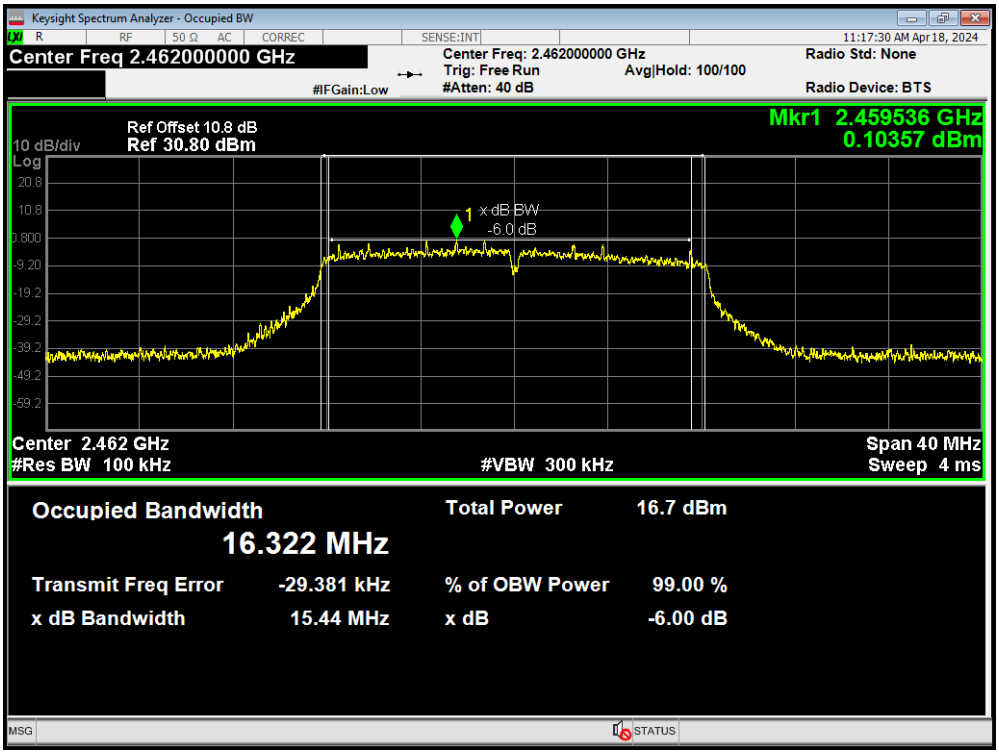
-6dB Bandwidth 802.11g 2412MHz



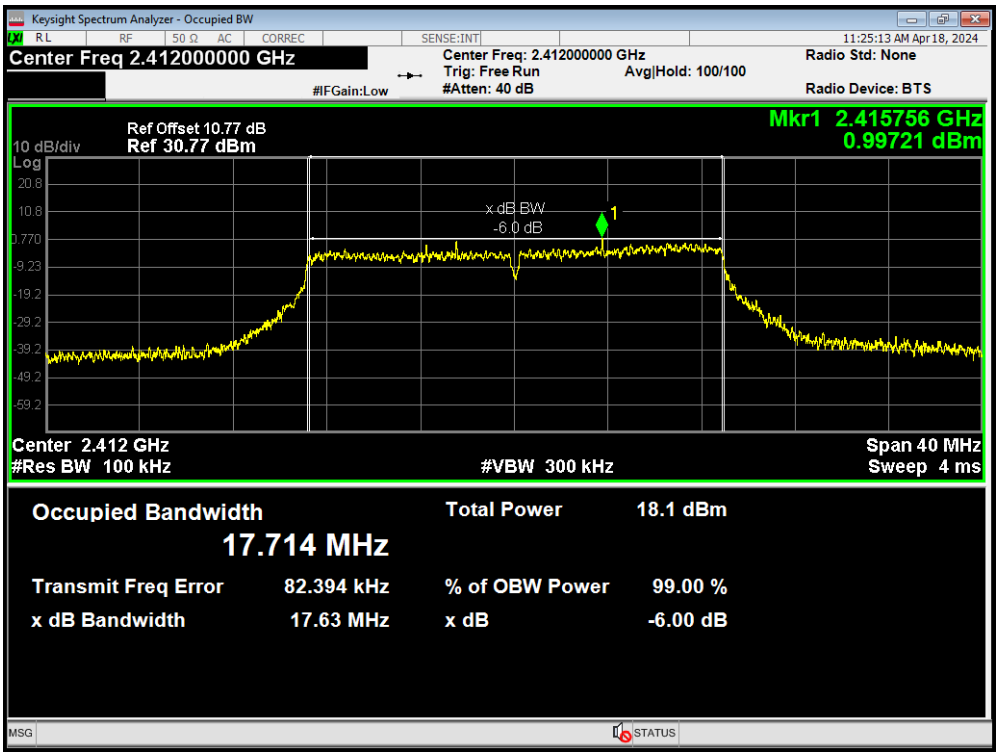
-6dB Bandwidth 802.11g 2437MHz



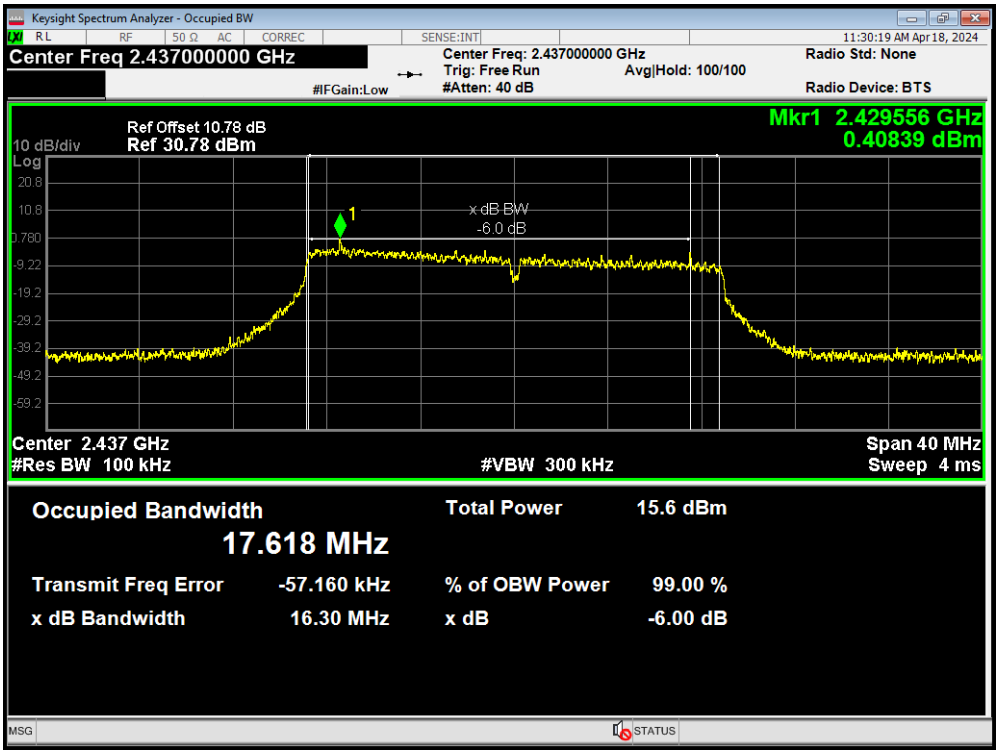
-6dB Bandwidth 802.11g 2462MHz



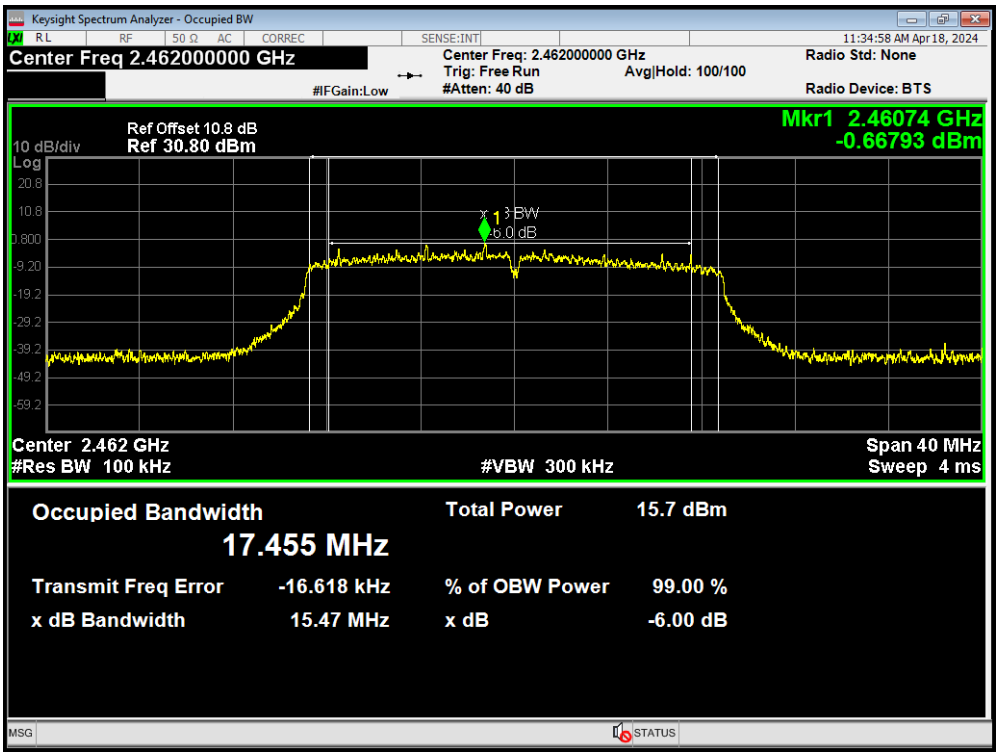
-6dB Bandwidth 802.11n(HT20) 2412MHz



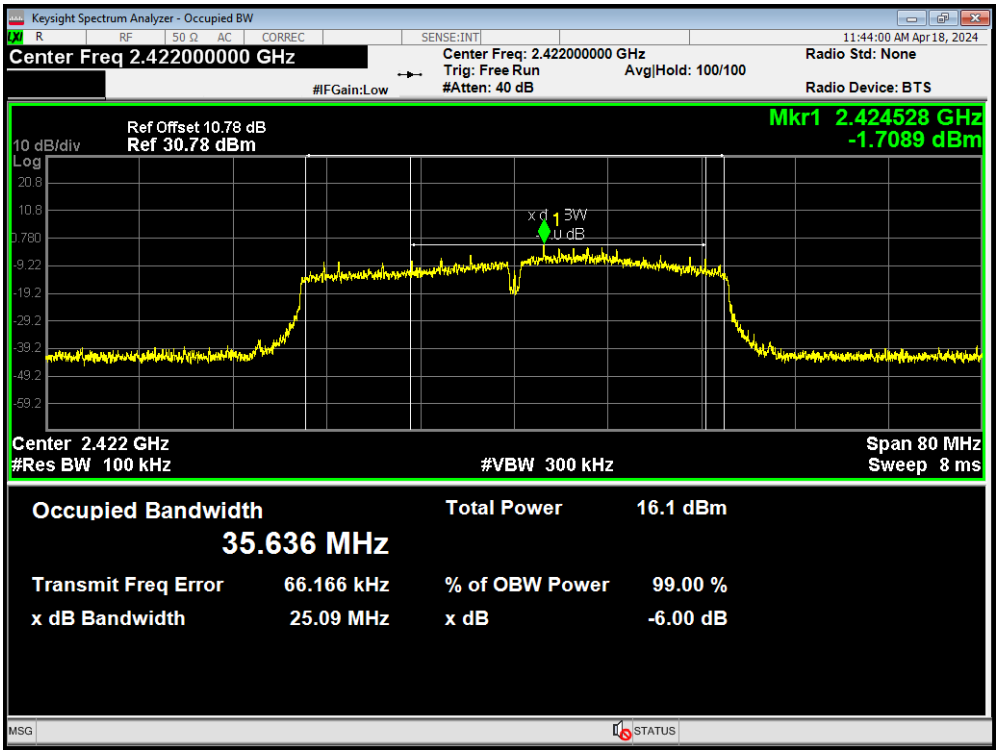
-6dB Bandwidth 802.11n(HT20) 2437MHz



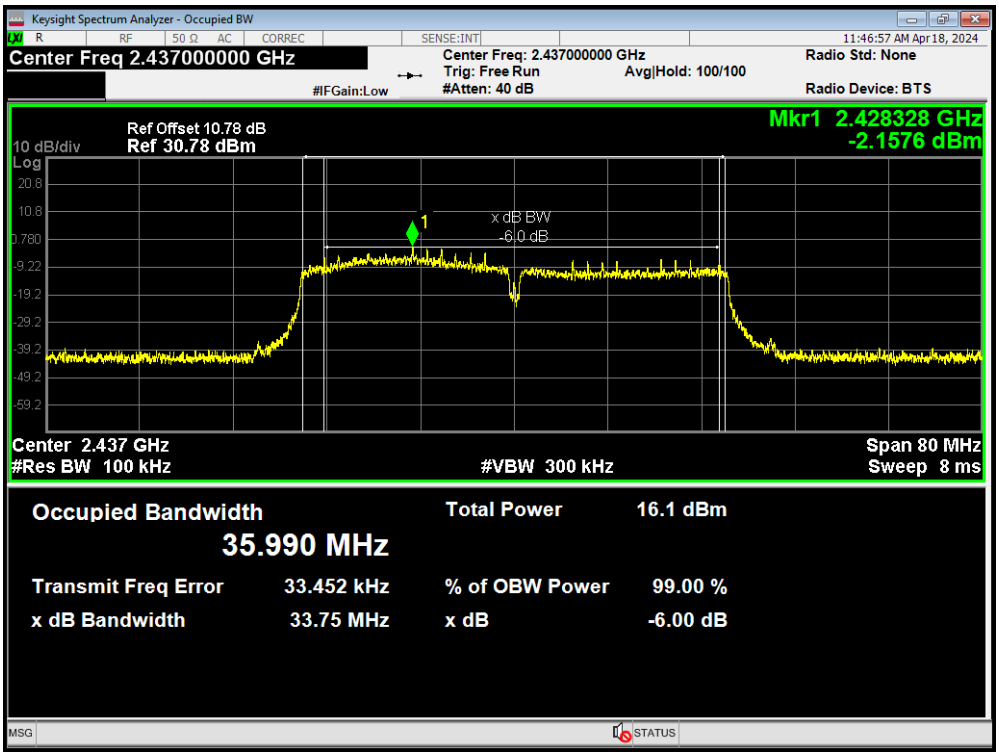
-6dB Bandwidth 802.11n(HT20) 2462MHz



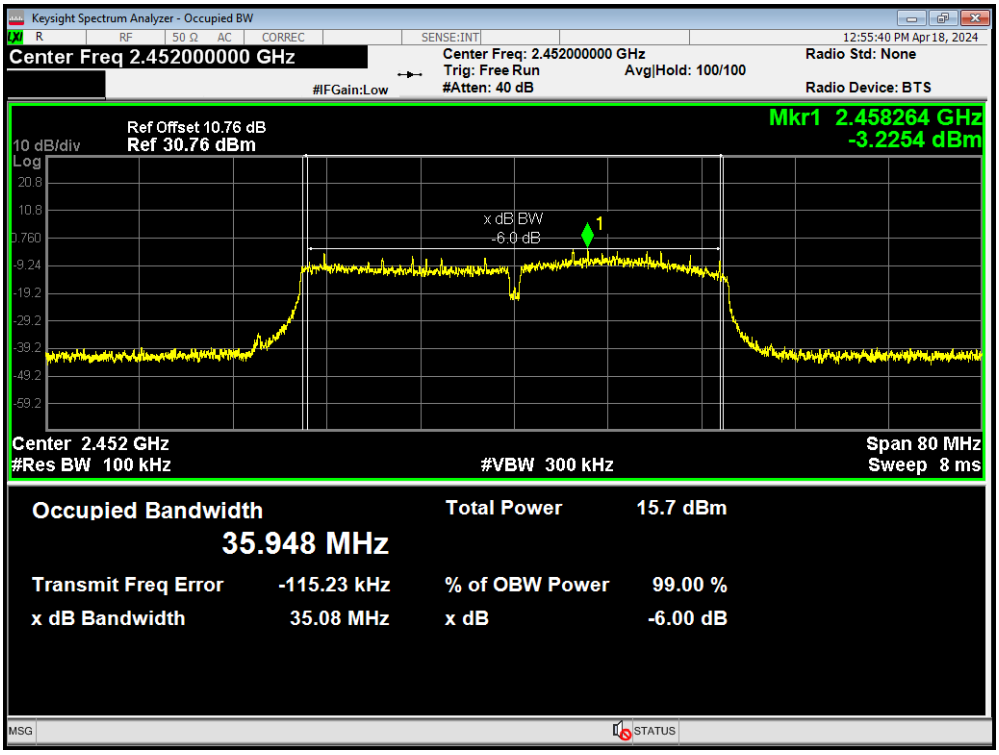
-6dB Bandwidth 802.11n(HT40) 2422MHz



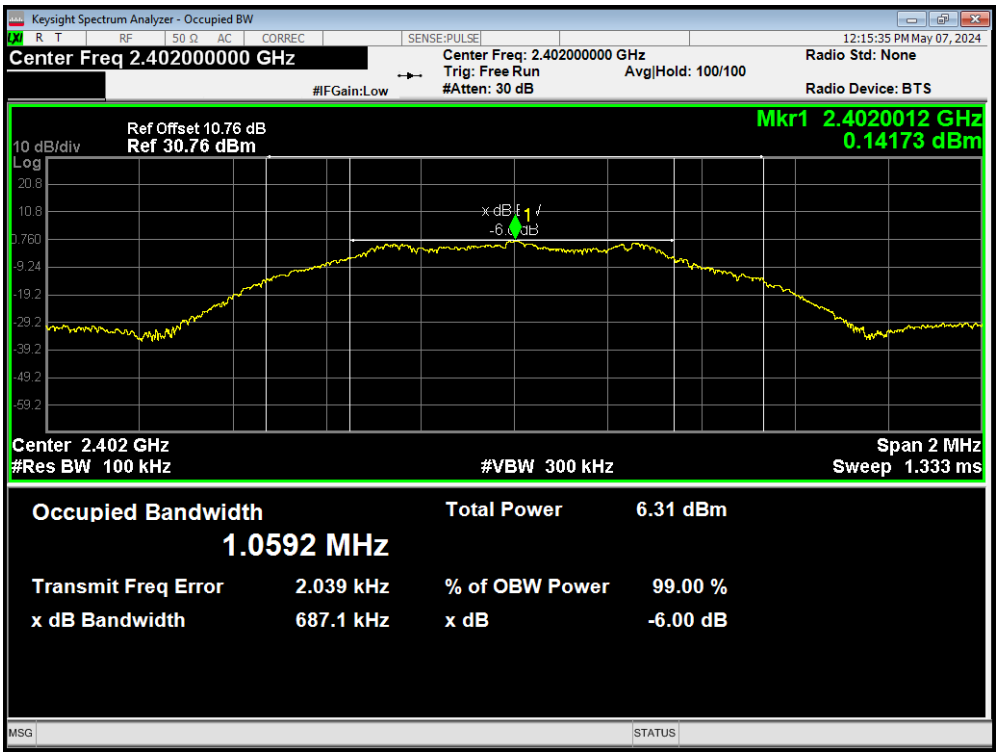
-6dB Bandwidth 802.11n(HT40) 2437MHz



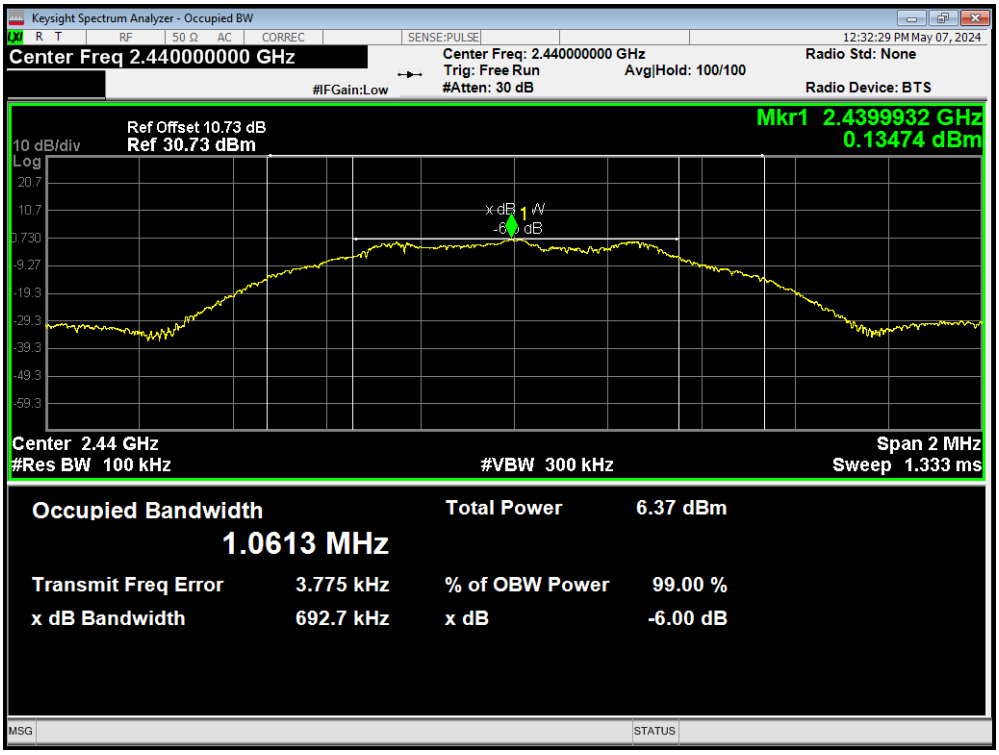
-6dB Bandwidth 802.11n(HT40) 2452MHz



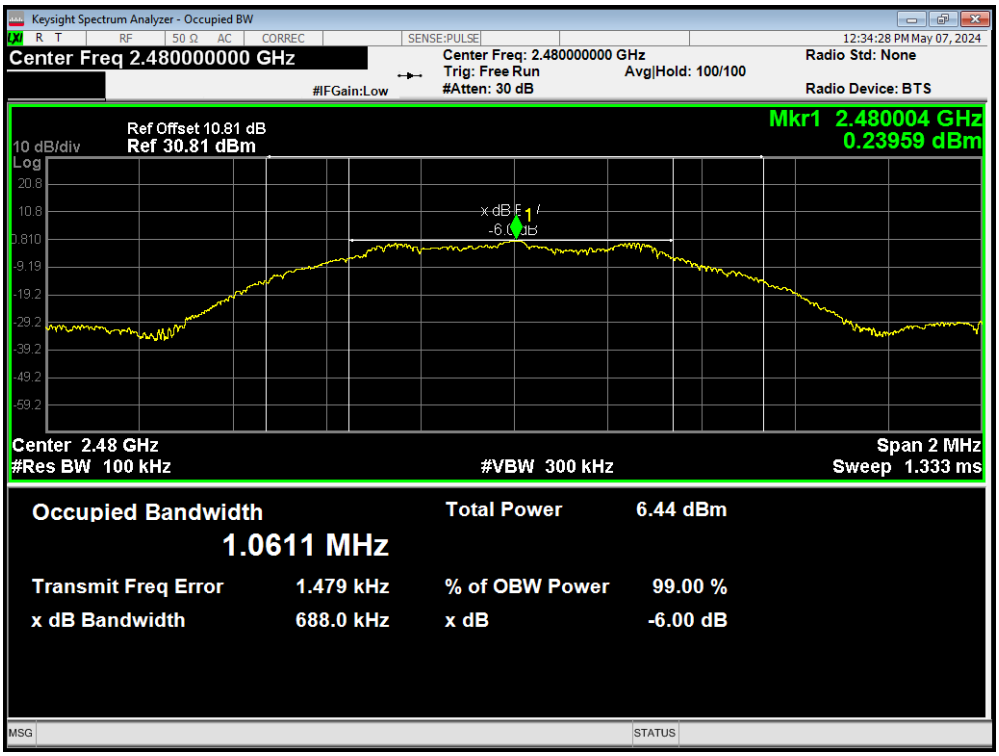
-6dB Bandwidth BLE(1M) 2402MHz



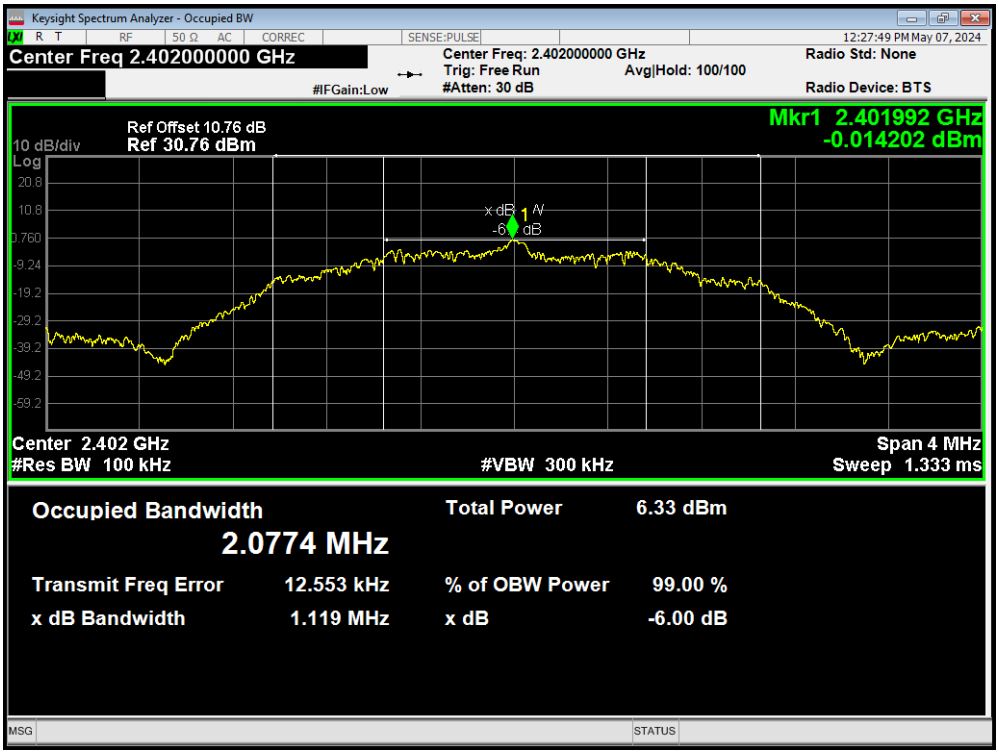
-6dB Bandwidth BLE(1M) 2440MHz



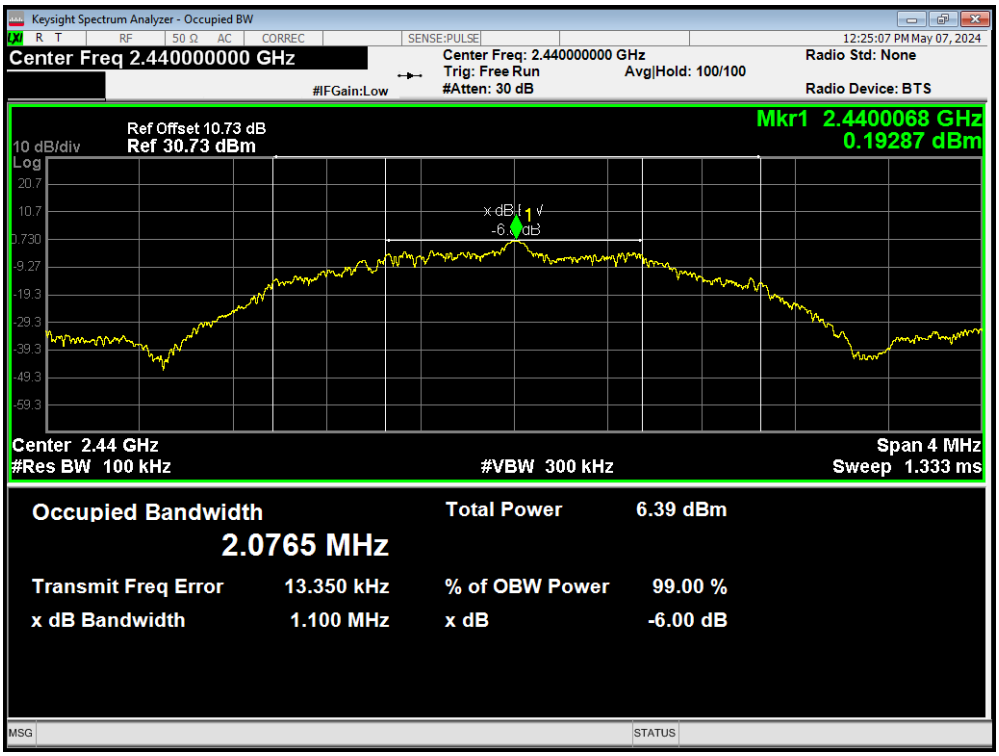
-6dB Bandwidth BLE(1M) 2480MHz



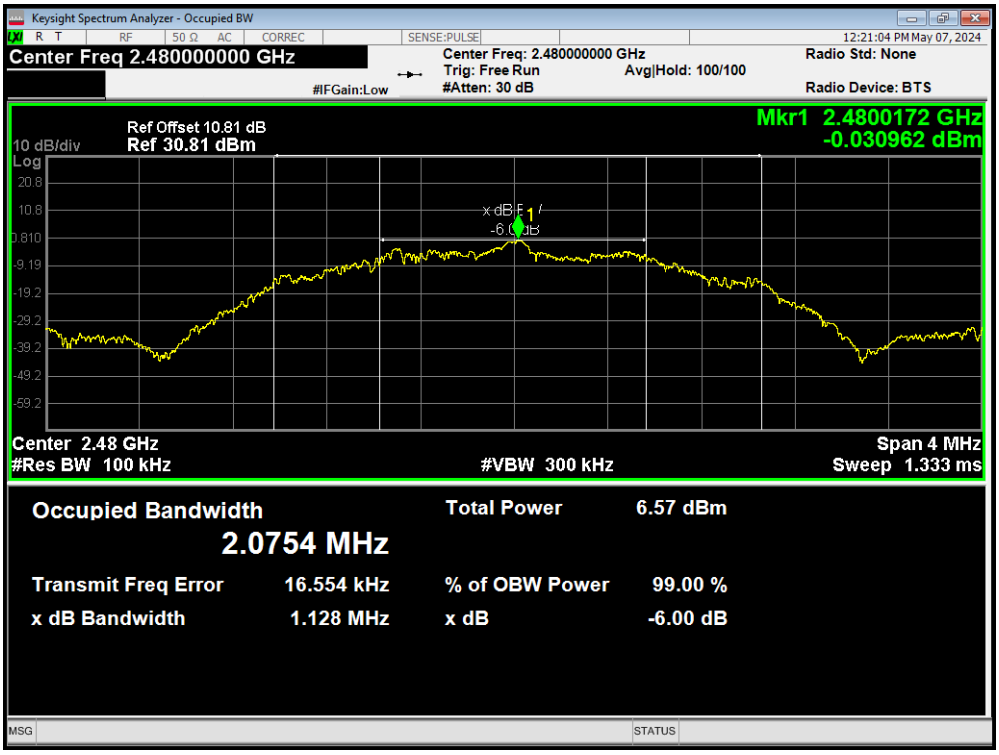
-6dB Bandwidth BLE(2M) 2402MHz



-6dB Bandwidth BLE(2M) 2440MHz



-6dB Bandwidth BLE(2M) 2480MHz



5.3. Band Edge

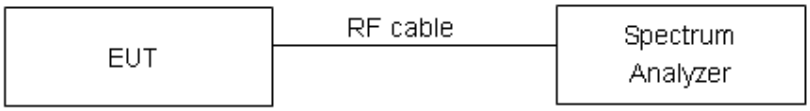
Ambient Condition

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

Method of Measurement

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

Test Setup



Limits

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

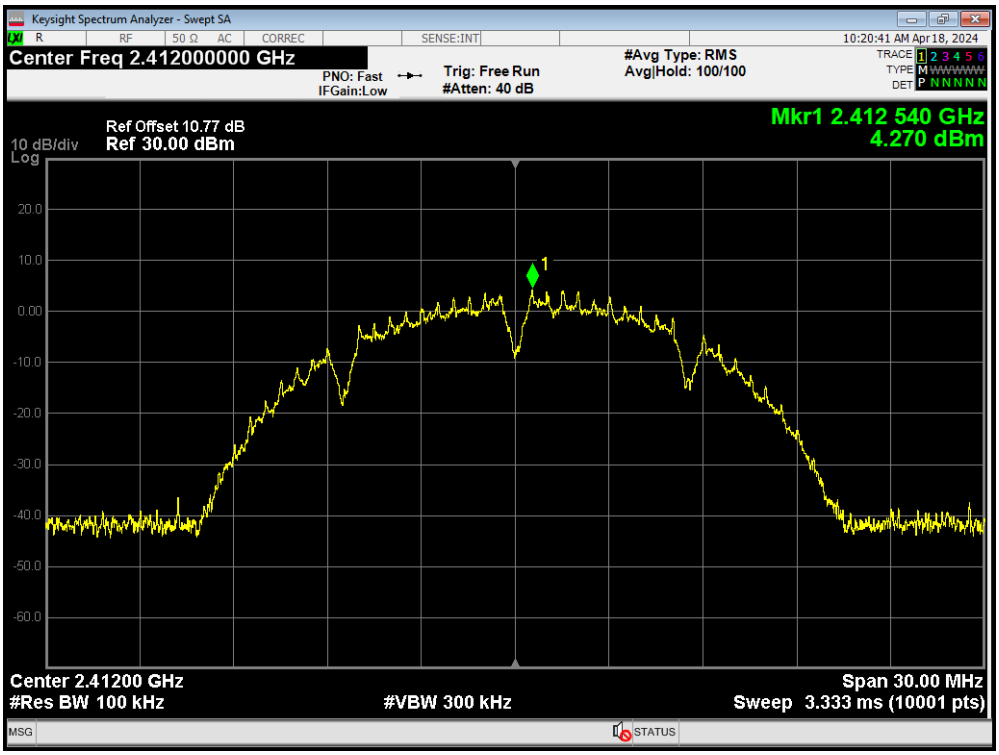
Measurement Uncertainty

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

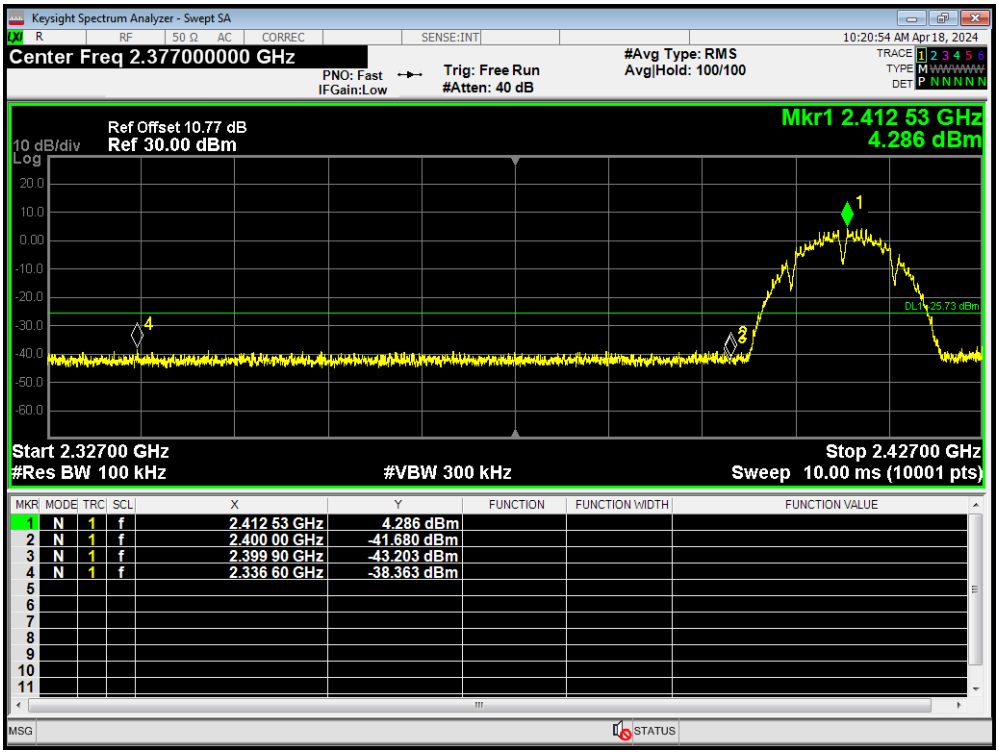
Frequency	Uncertainty
2GHz-3GHz	1.407 dB

Test Results: PASS

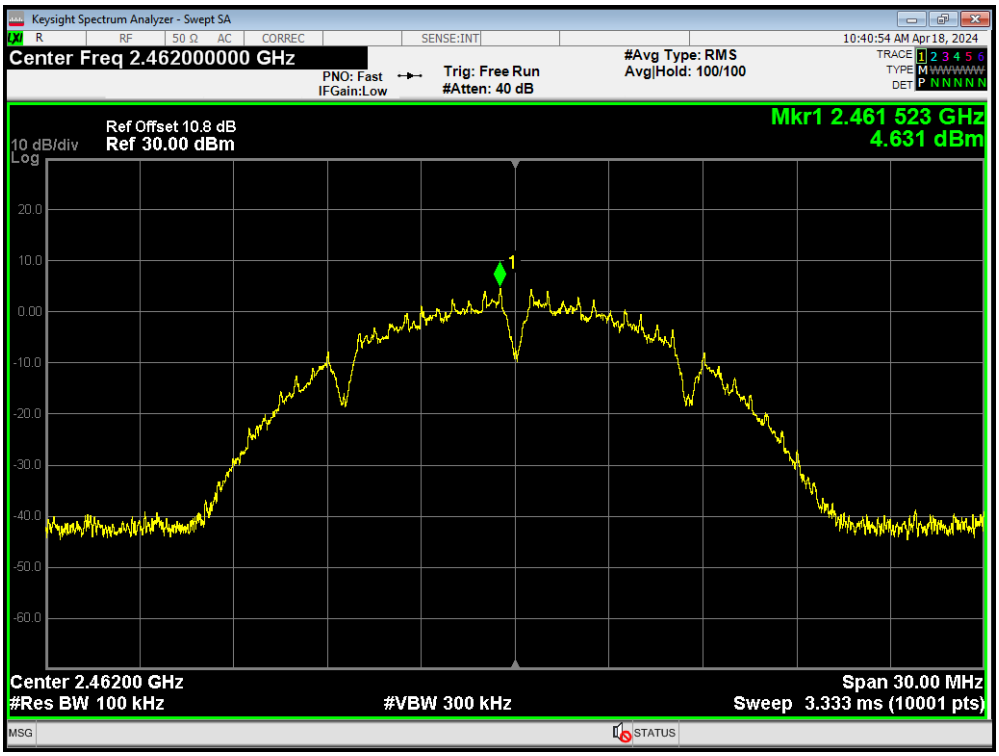
Band Edge 802.11b 2412MHz Ref



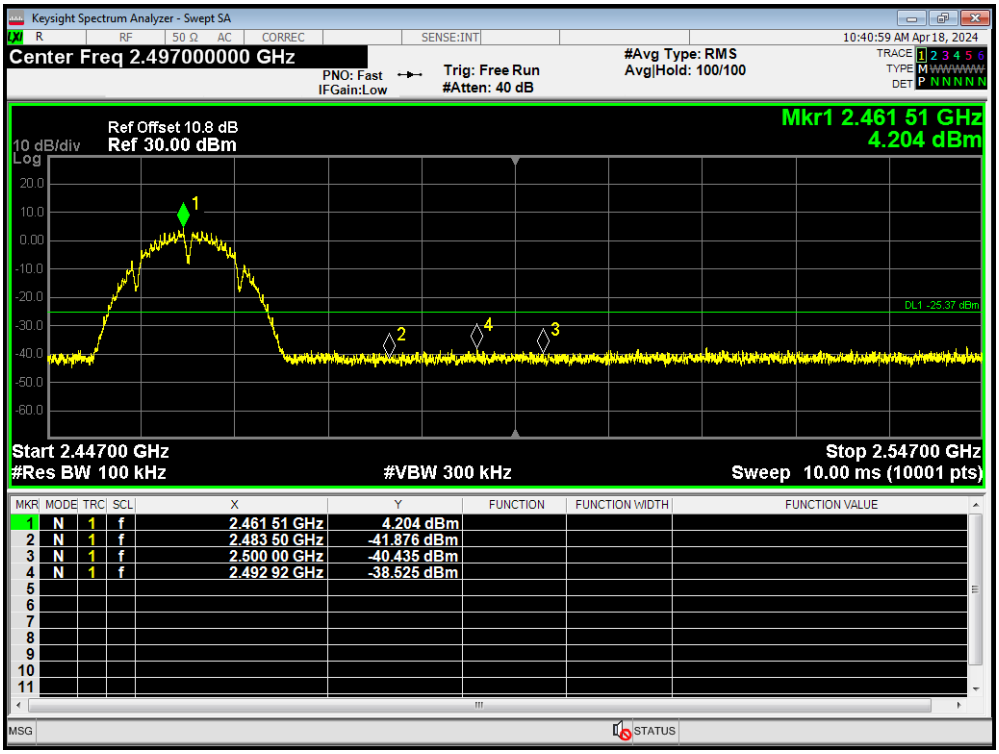
Band Edge 802.11b 2412MHz Emission



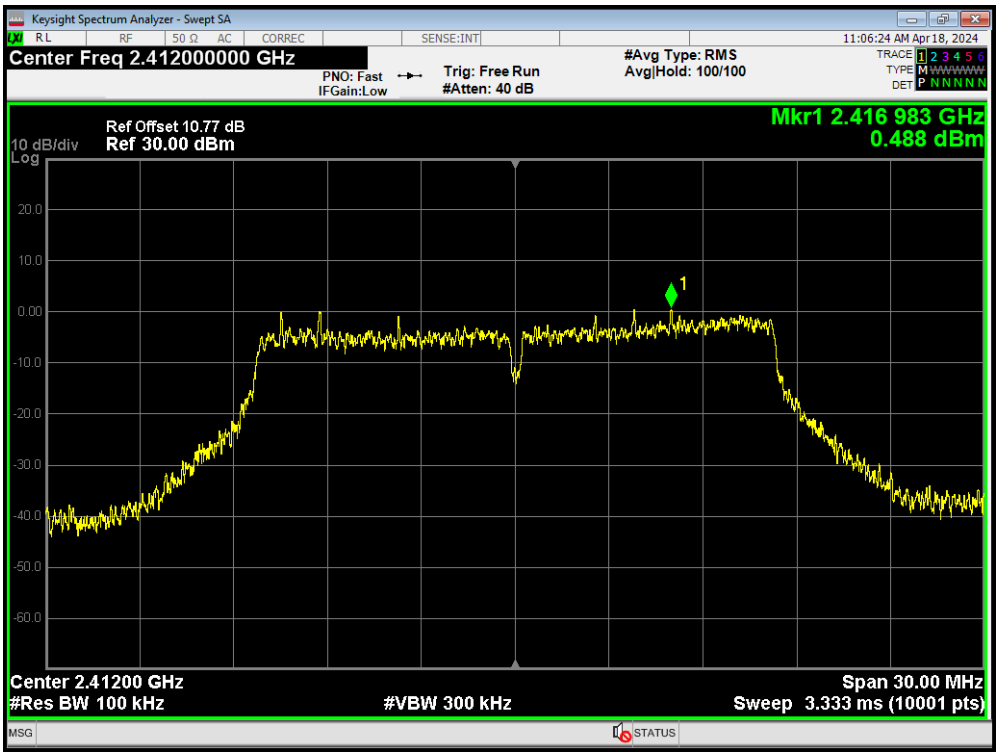
Band Edge 802.11b 2462MHz Ref



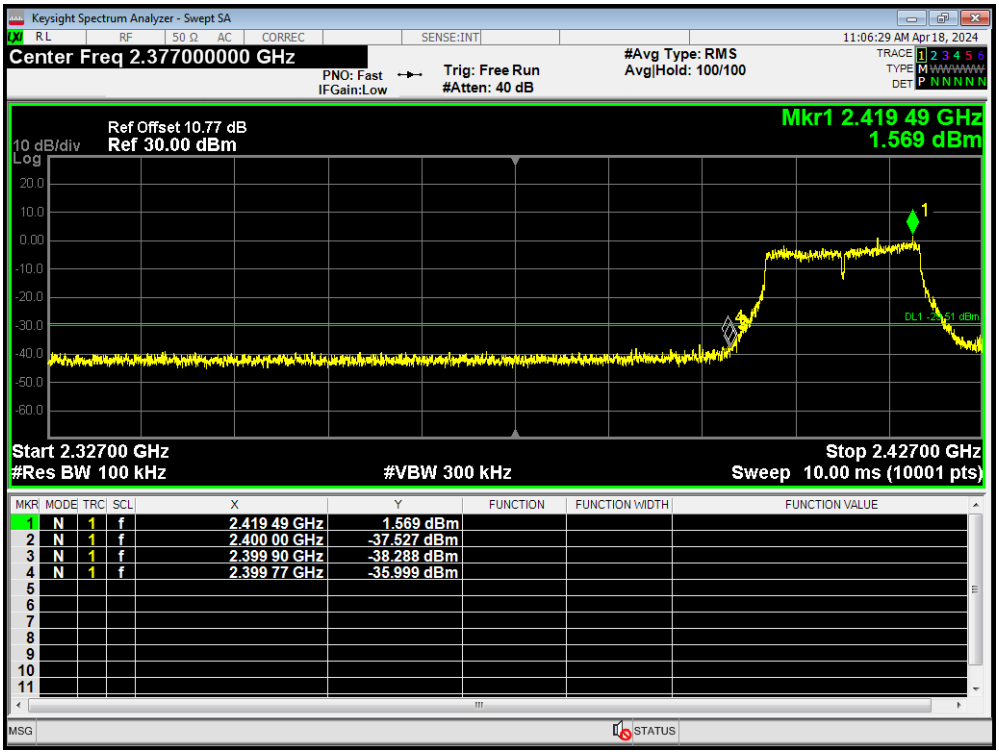
Band Edge 802.11b 2462MHz Emission



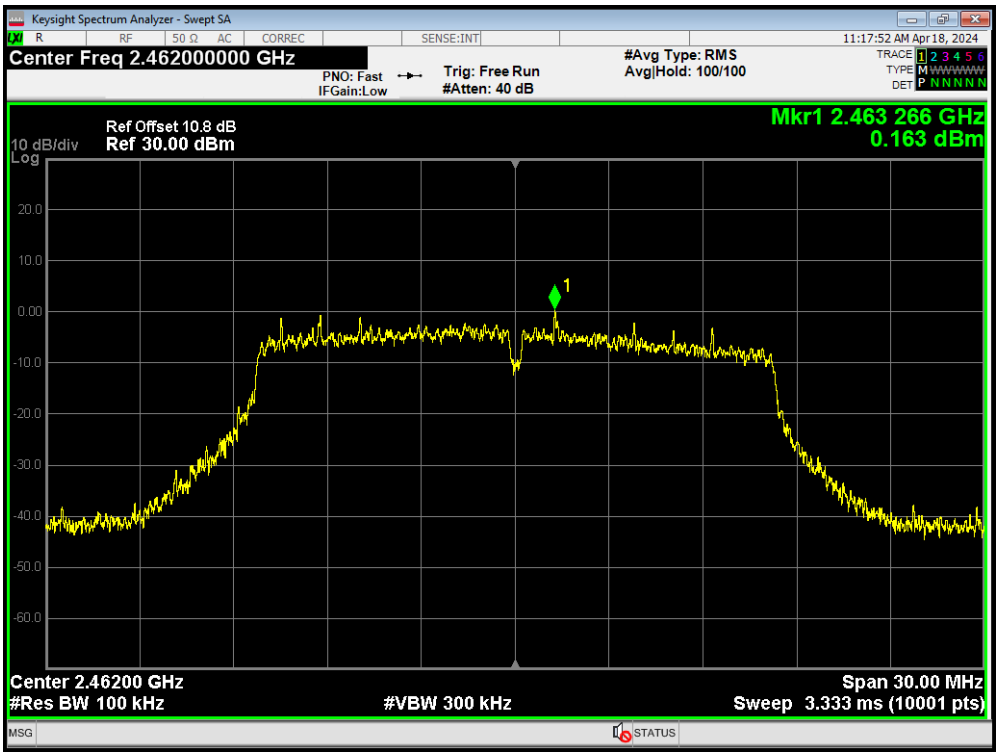
Band Edge 802.11g 2412MHz Ref



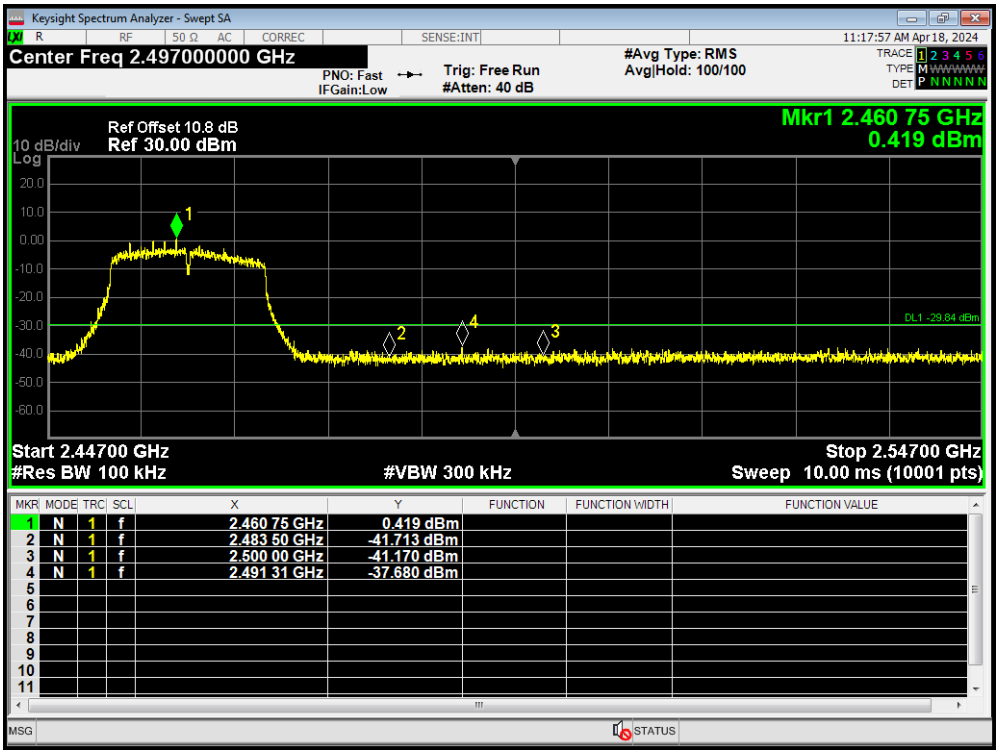
Band Edge 802.11g 2412MHz Emission



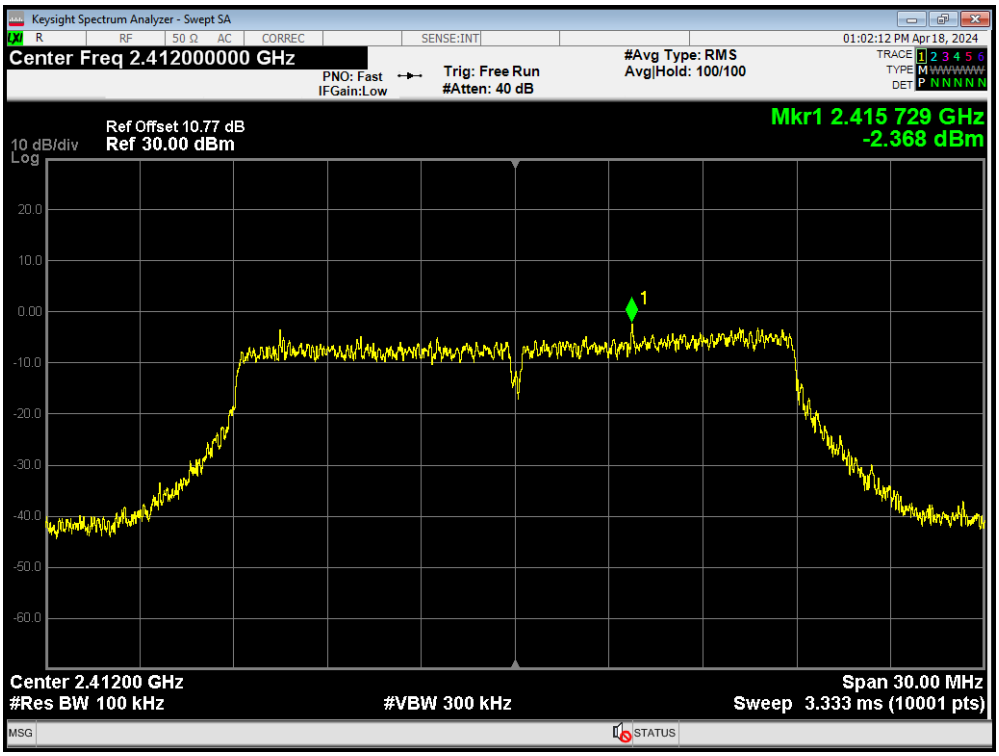
Band Edge 802.11g 2462MHz Ref



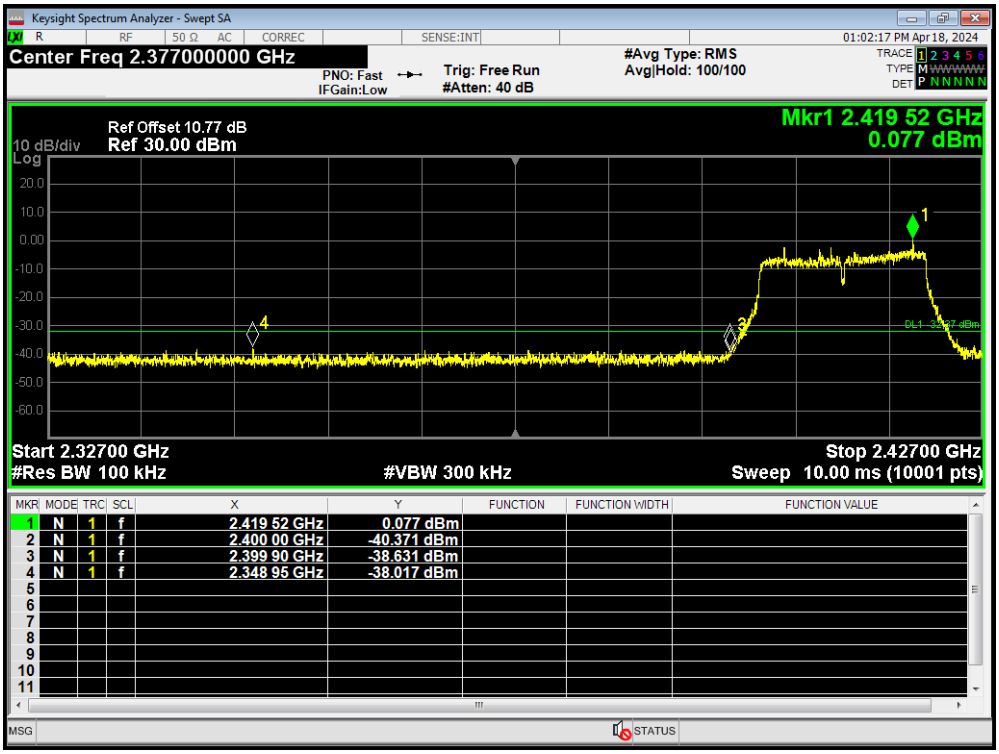
Band Edge 802.11g 2462MHz Emission



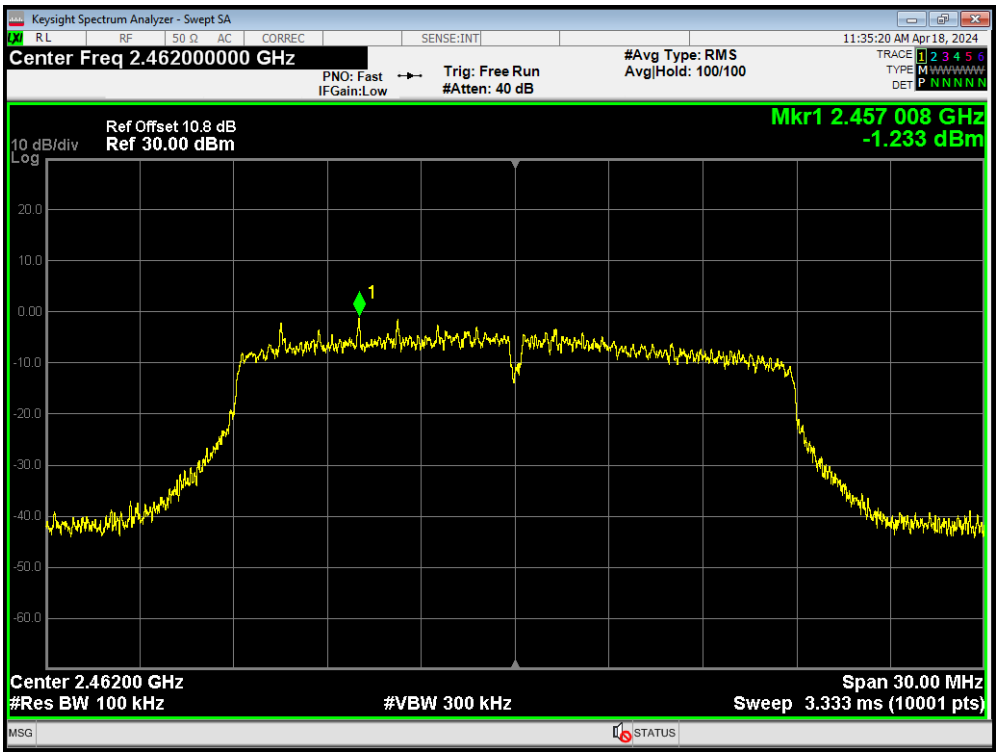
Band Edge 802.11n(HT20) 2412MHz Ref



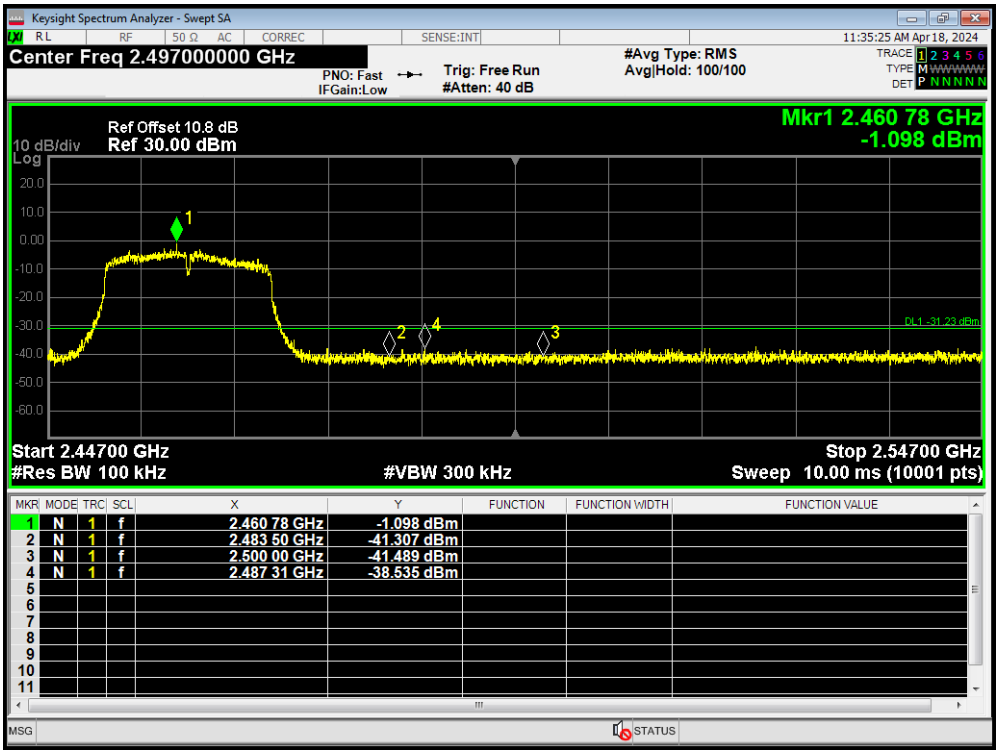
Band Edge 802.11n(HT20) 2412MHz Emission



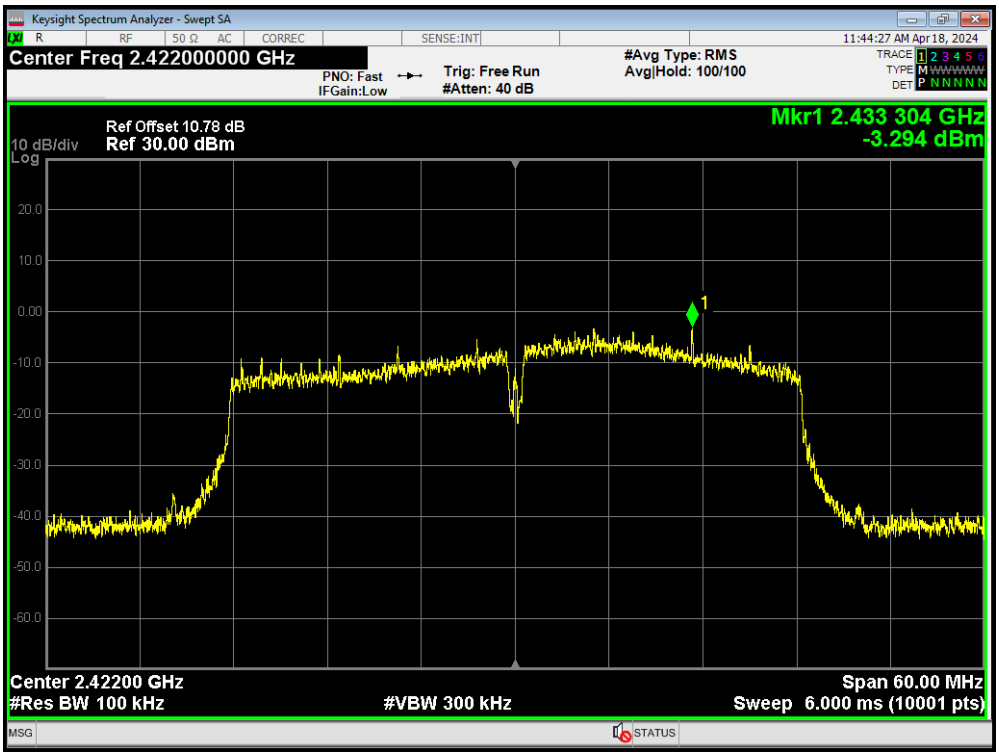
Band Edge 802.11n(HT20) 2462MHz Ref



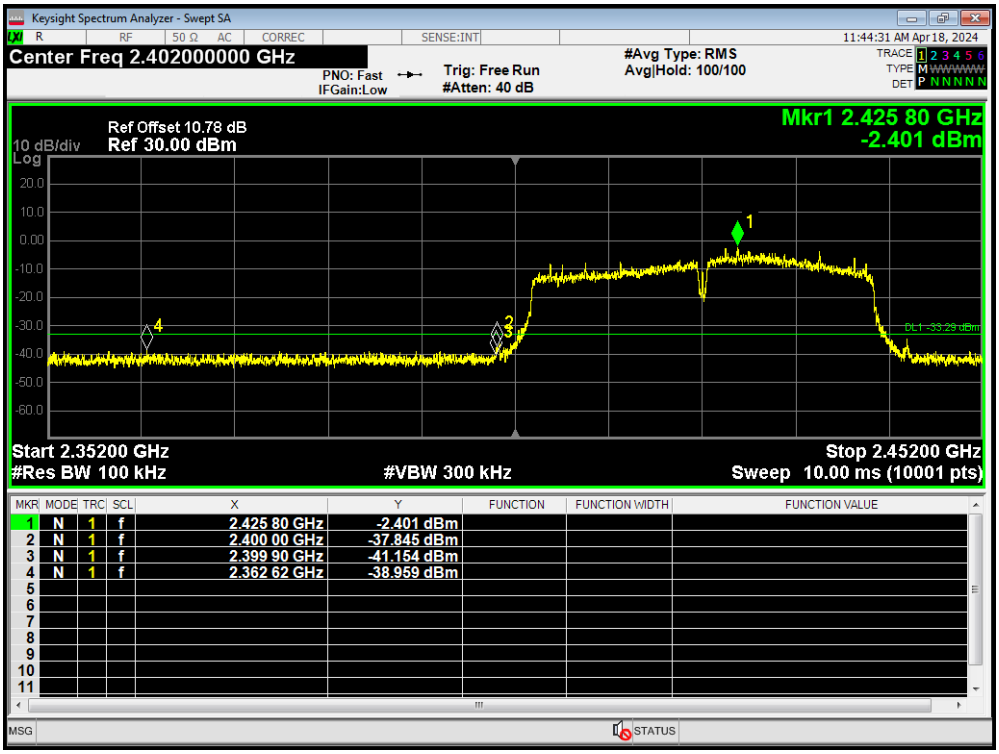
Band Edge 802.11n(HT20) 2462MHz Emission



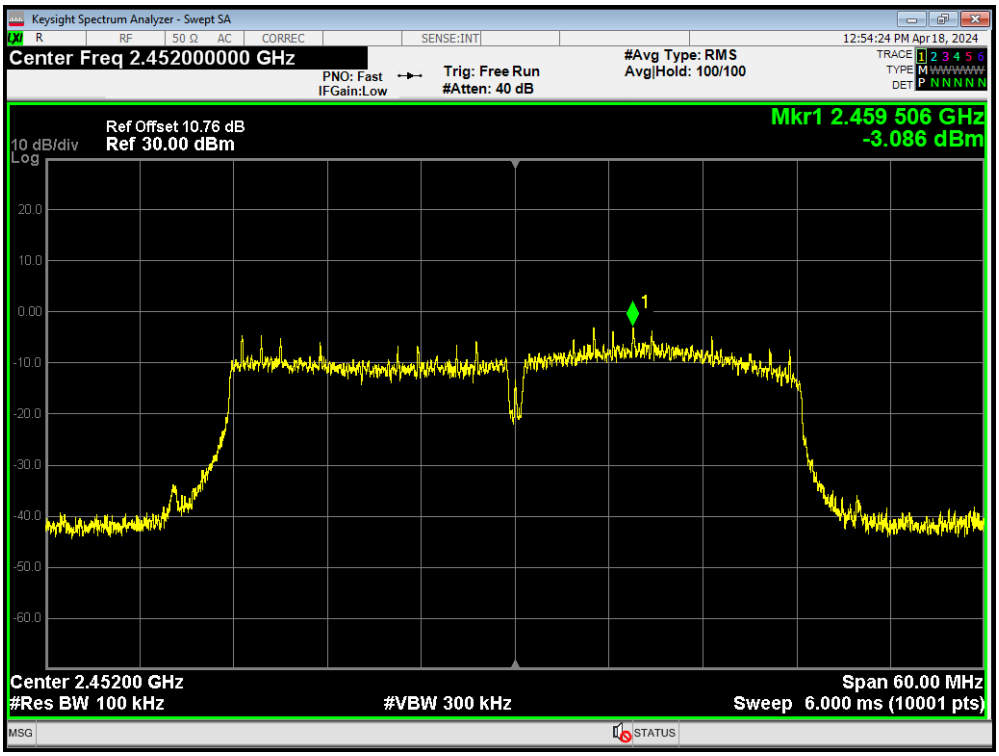
Band Edge 802.11n(HT40) 2422MHz Ref



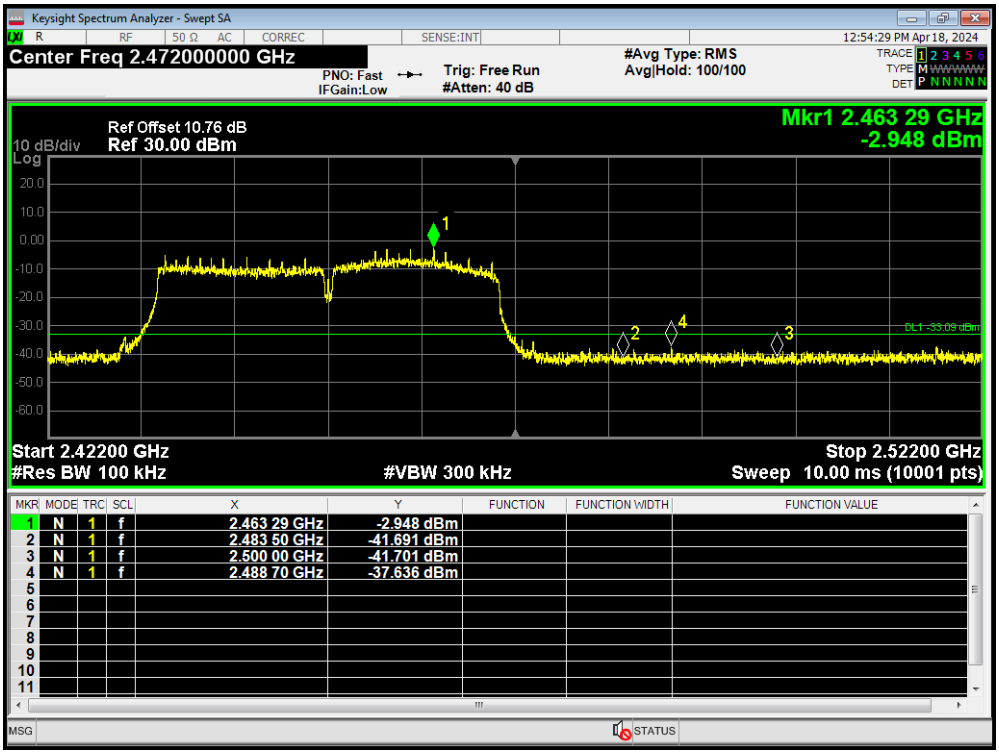
Band Edge 802.11n(HT40) 2422MHz Emission



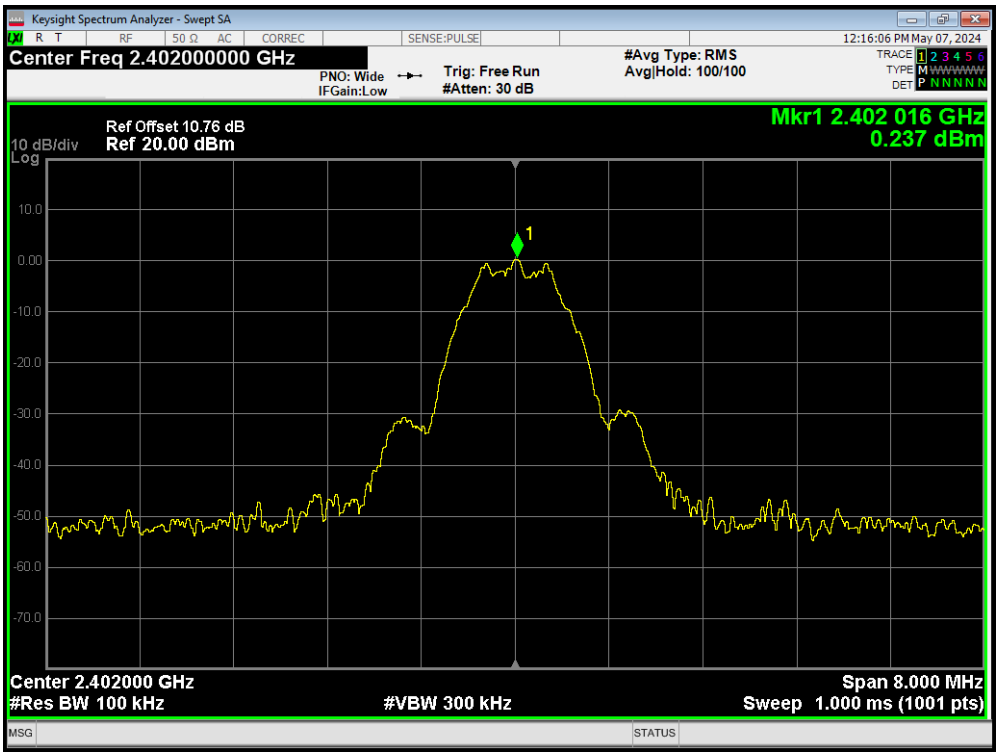
Band Edge 802.11n(HT40) 2452MHz Ref



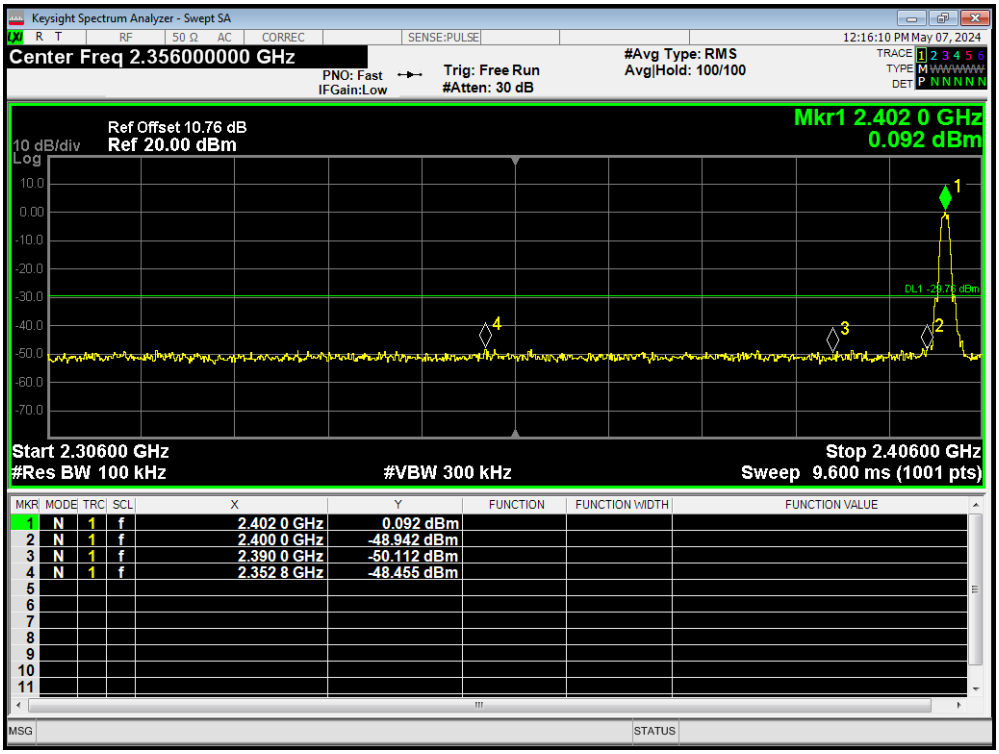
Band Edge 802.11n(HT40) 2452MHz Emission



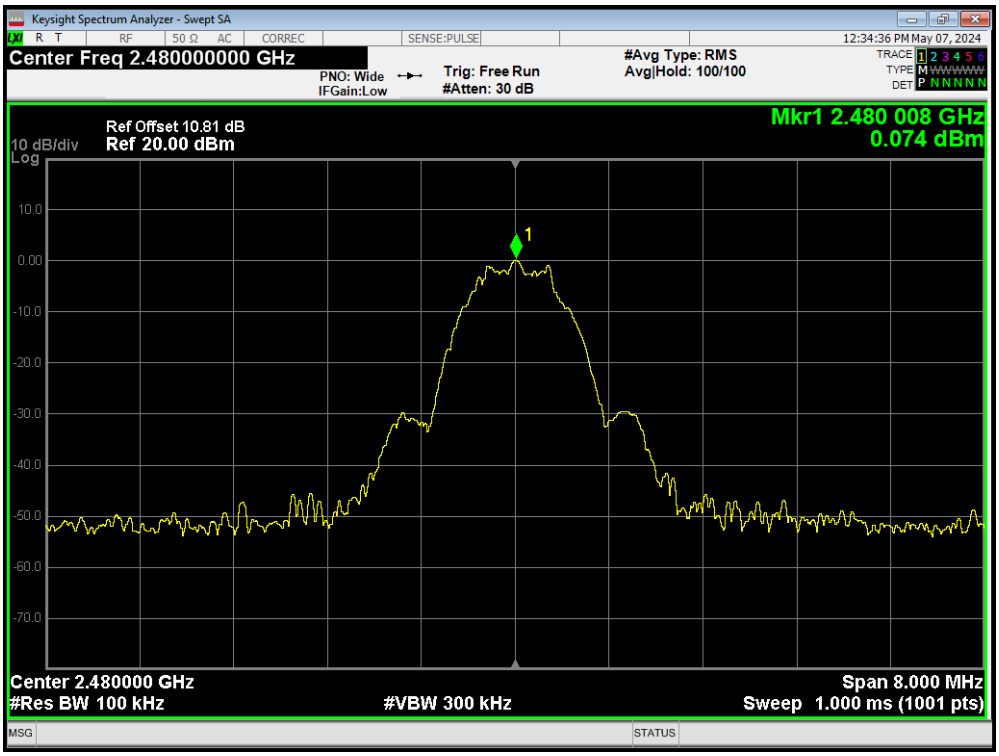
Band Edge BLE(1M) 2402MHz Ref



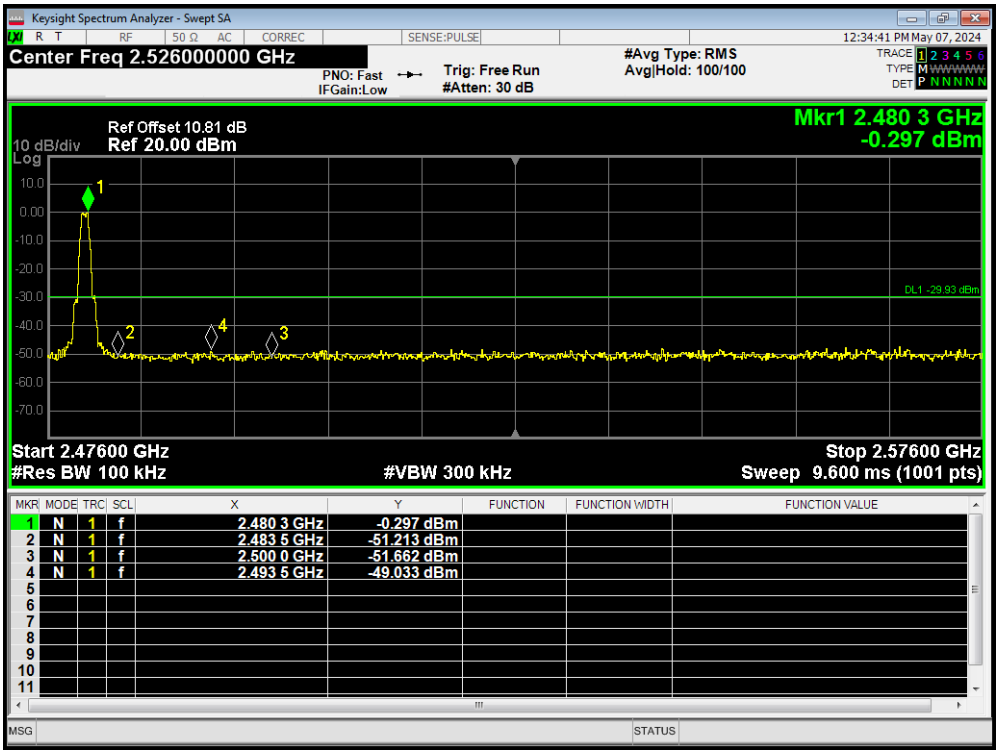
Band Edge BLE(1M) 2402MHz Emission



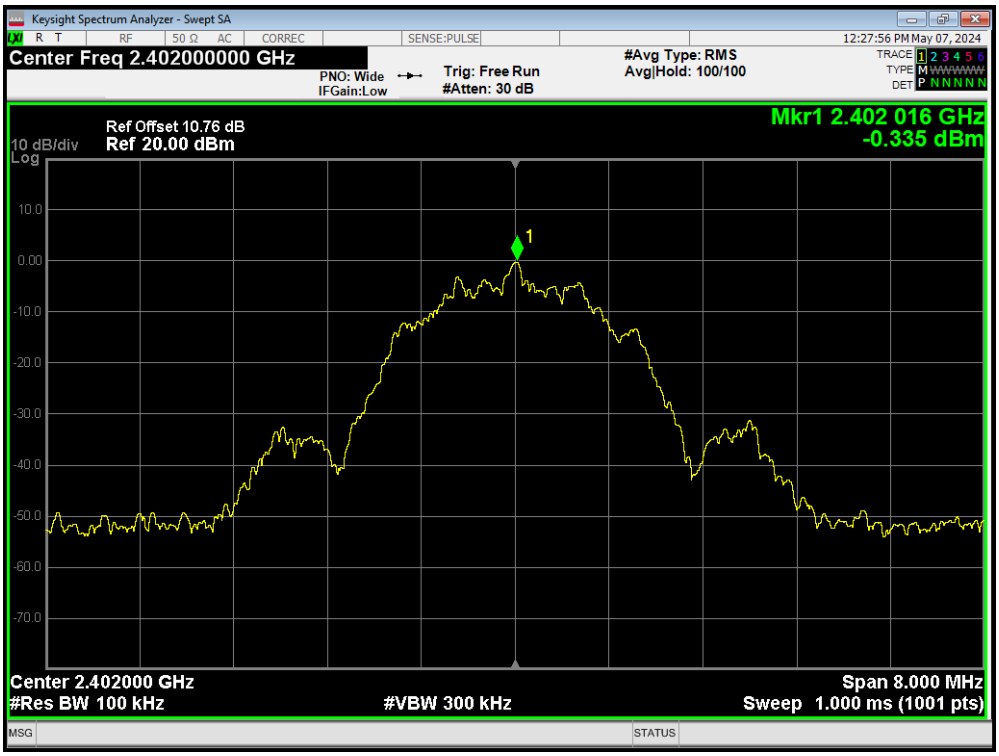
Band Edge BLE(1M) 2480MHz Ref



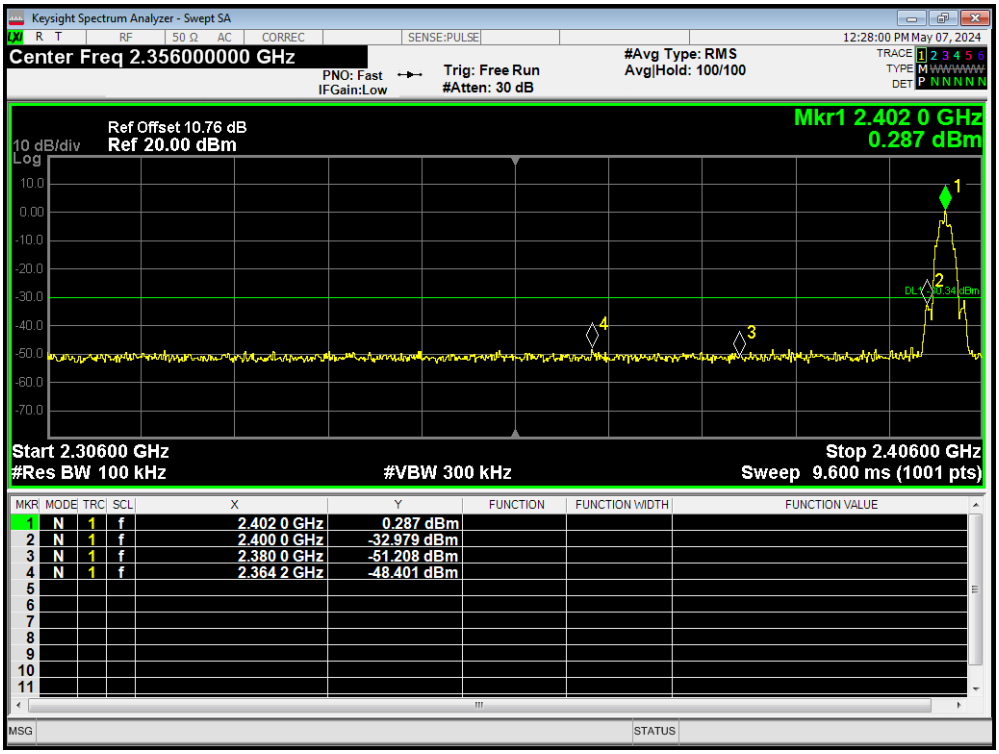
Band Edge BLE(1M) 2480MHz Emission



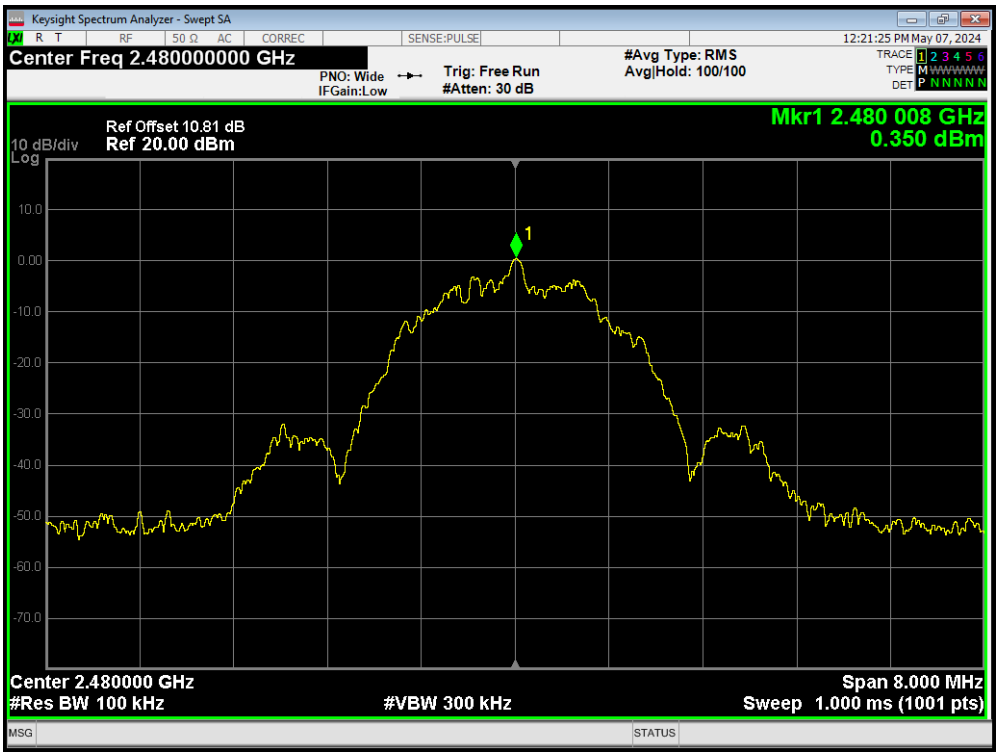
Band Edge BLE(2M) 2402MHz Ref



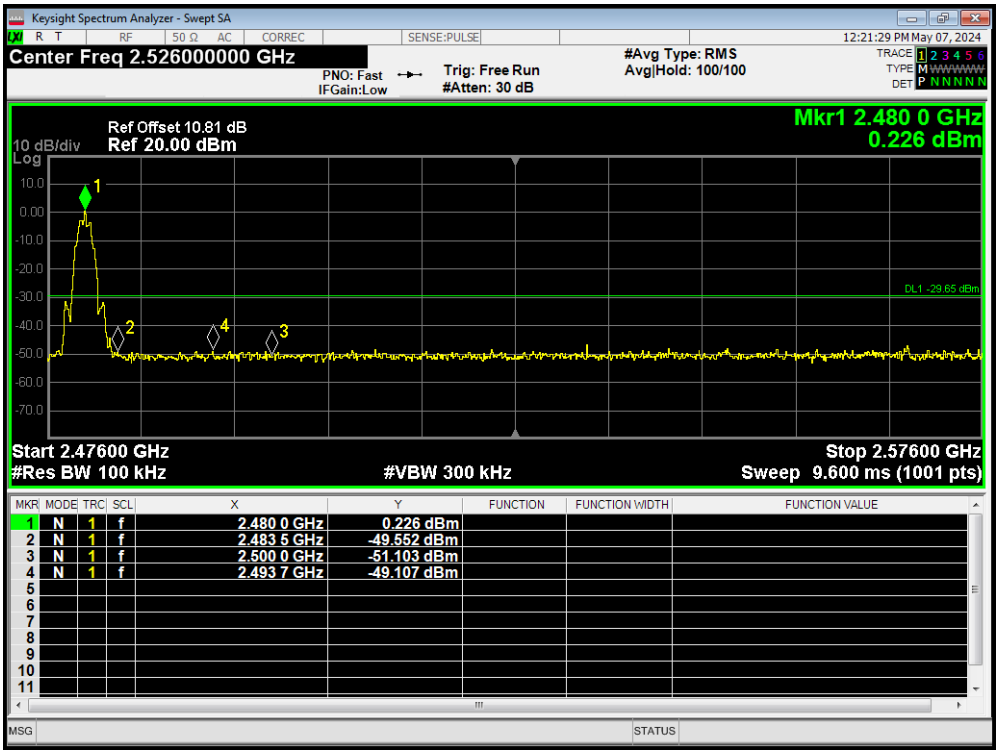
Band Edge BLE(2M) 2402MHz Emission



Band Edge BLE(2M) 2480MHz Ref



Band Edge BLE(2M) 2480MHz Emission



5.4. Power Spectral Density

Ambient Condition

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

Method of Measurement

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

Method AVGPSD-1 was used for this test.

a) Set instrument center frequency to DTS channel center frequency

b) Set span to at least 1.5 times the OBW

c) Set RBW to:3kHz≤RBW≤100kHz

d) Set VBW≥[3x RBW]

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

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

g) Sweep time auto couple

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

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

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

Method AVGPSD-2 was used for this test.

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

b) Set instrument center frequency to DTS channel center frequency

c) Set span to at least 1.5 times the OBW

d) Set RBW to:3kHz≤RBW≤100kHz

e) Set VBW≥[3x RBW]

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

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

h) Sweep time =auto couple

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

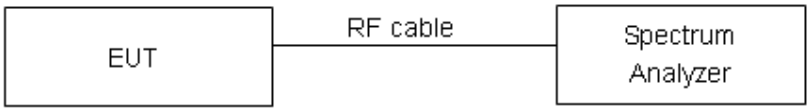
j) Employ trace averaging (rms) mode over a minimum of 100 traces

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

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

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

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

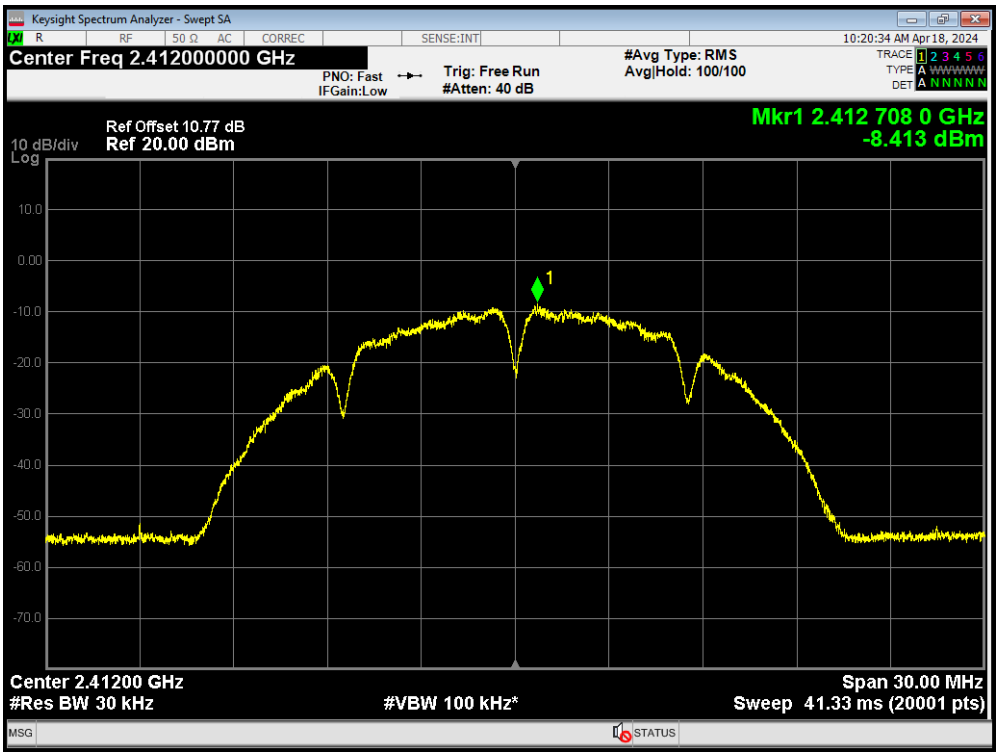
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.75dB.

Test Results:

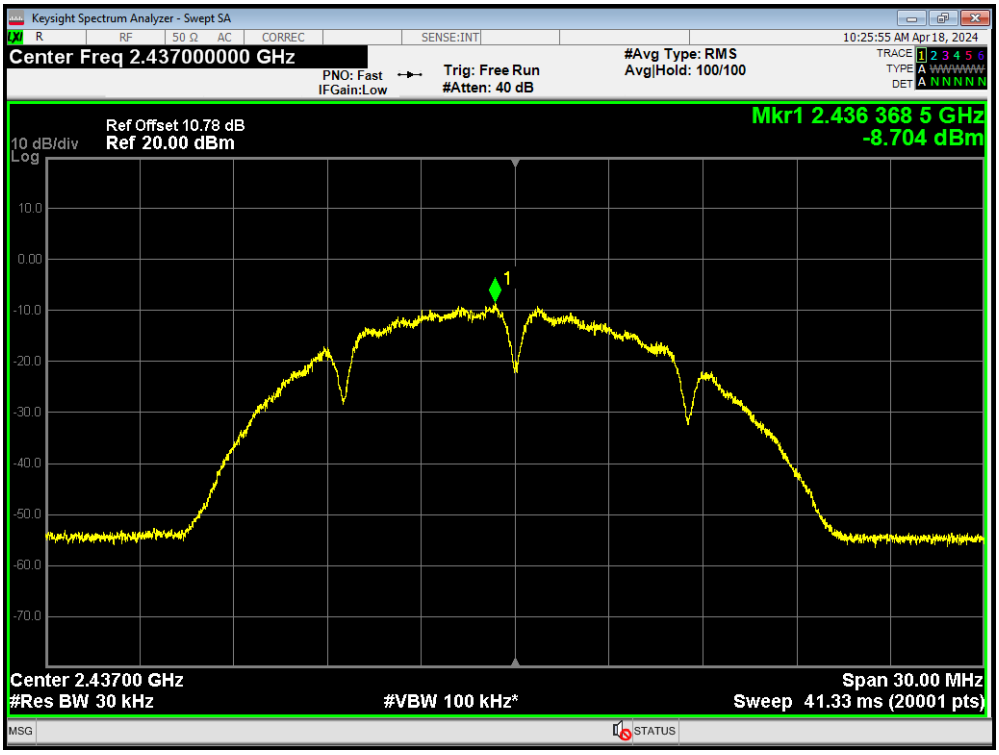
Test Mode	Carrier frequency (MHz) / Channel	Read Value (dBm / 30kHz)	Power Spectral Density (dBm / 3kHz)	Limit (dBm / 3kHz)	Conclusion
802.11b	2412/CH 1	-8.41	-18.41	8	PASS
	2437/CH 6	-8.70	-18.70	8	PASS
	2462/CH11	-8.69	-18.69	8	PASS
802.11g	2412/CH 1	-12.29	-22.03	8	PASS
	2437/CH 6	-11.68	-21.42	8	PASS
	2462/CH11	-12.22	-21.96	8	PASS
802.11n HT20	2412/CH 1	-13.66	-23.29	8	PASS
	2437/CH 6	-12.54	-22.17	8	PASS
	2462/CH11	-12.53	-22.16	8	PASS
802.11n HT40	2422/CH3	-15.29	-24.98	8	PASS
	2437/CH6	-15.03	-24.72	8	PASS
	2452/CH9	-16.00	-25.69	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	-20.10	-18.10	8	PASS
	2440/CH19	-19.72	-17.72	8	PASS
	2480/CH39	-19.78	-17.78	8	PASS
Bluetooth (Low Energy) (2M)	2402/CH0	-23.63	-18.87	8	PASS
	2440/CH19	-23.50	-18.74	8	PASS
	2480/CH39	-23.36	-18.60	8	PASS
Note: Power Spectral Density =Read Value+Duty cycle correction factor					

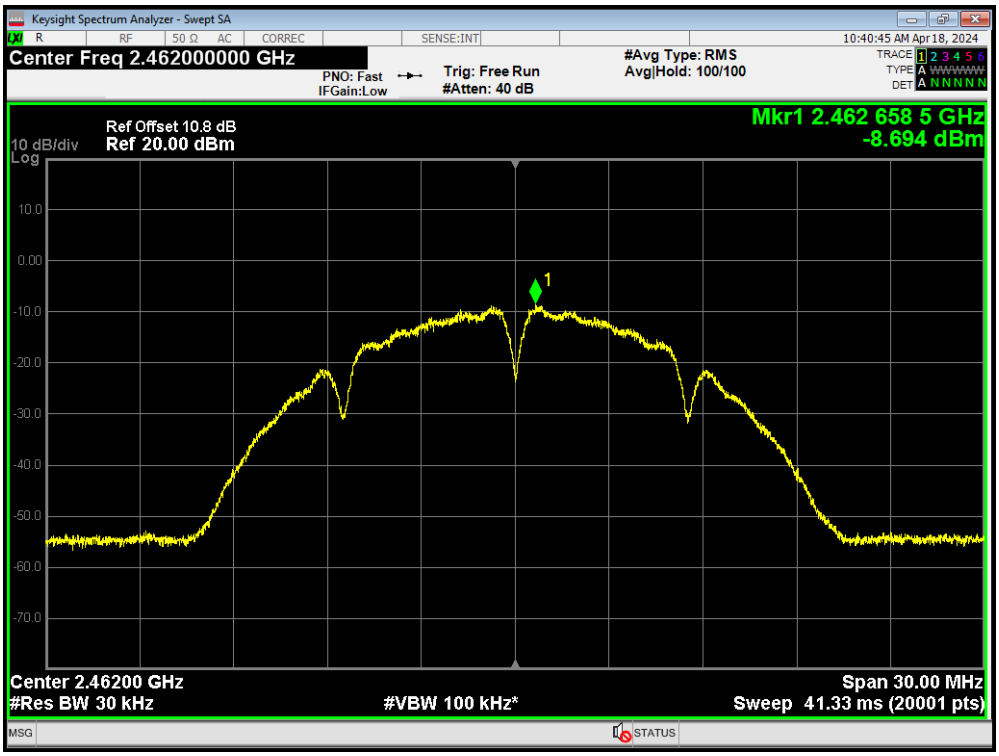
PSD 802.11b 2412MHz



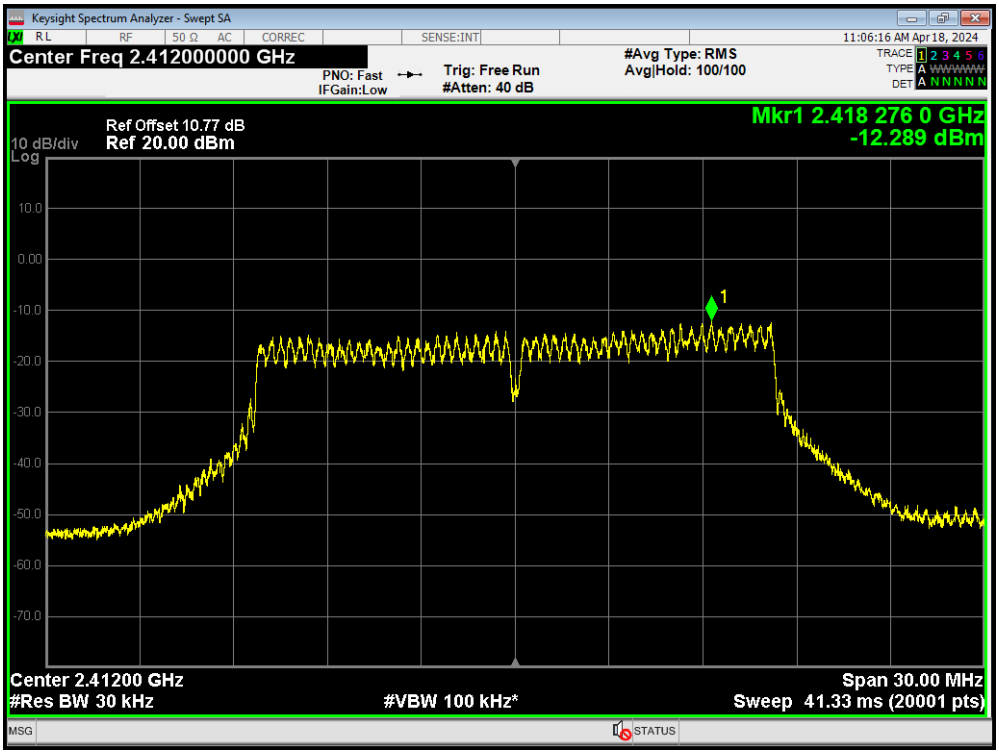
PSD 802.11b 2437MHz



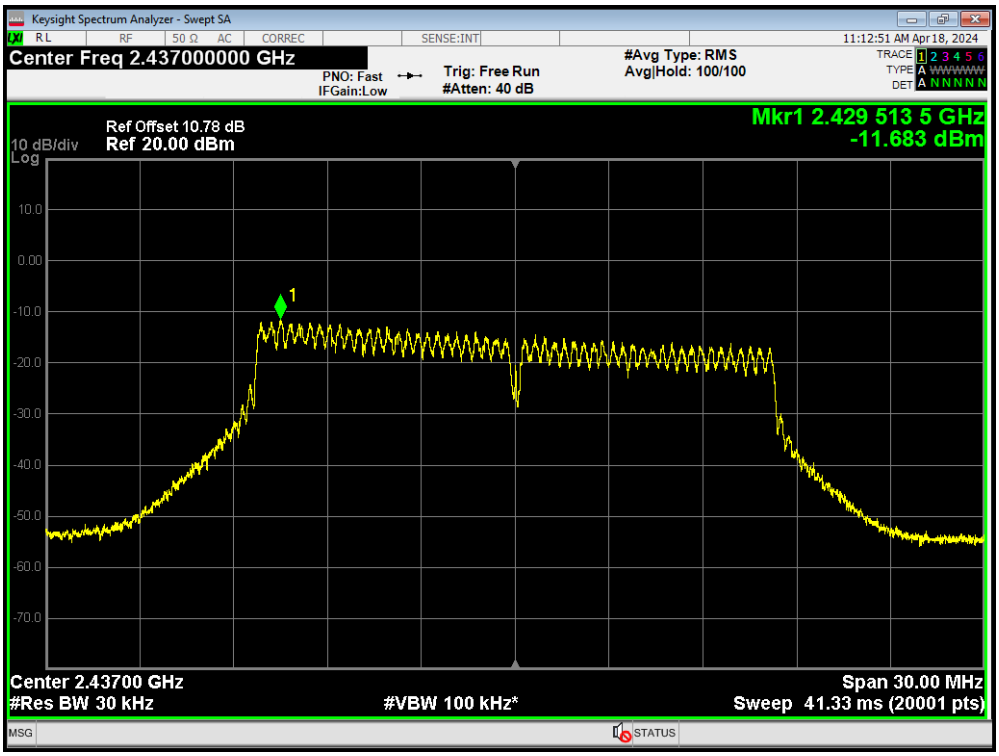
PSD 802.11b 2462MHz



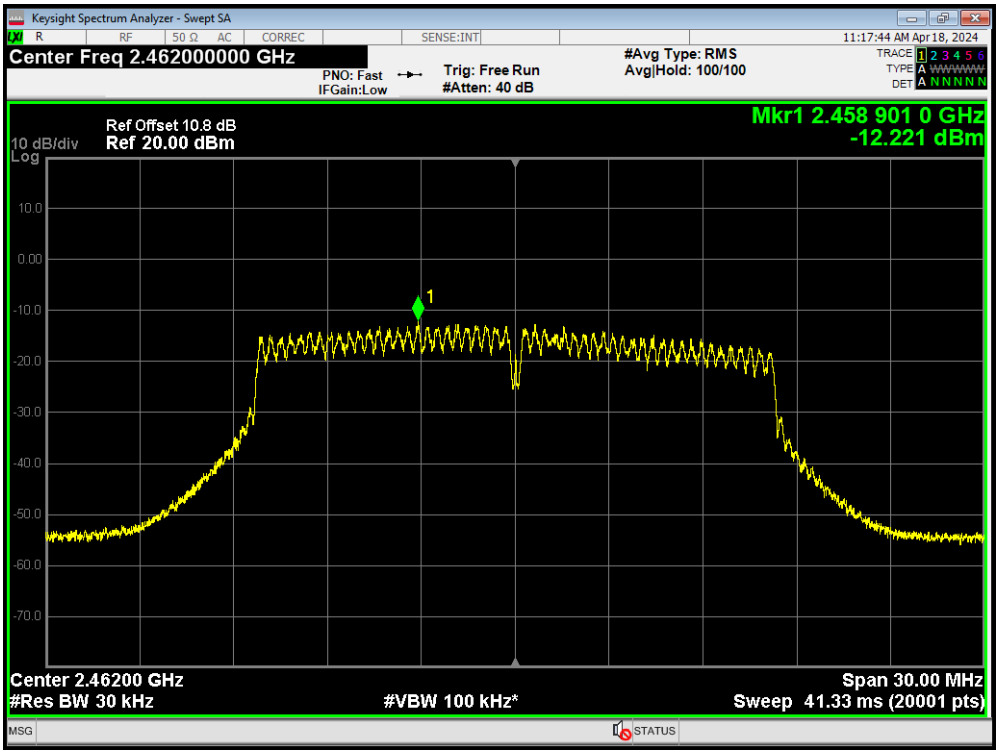
PSD 802.11g 2412MHz



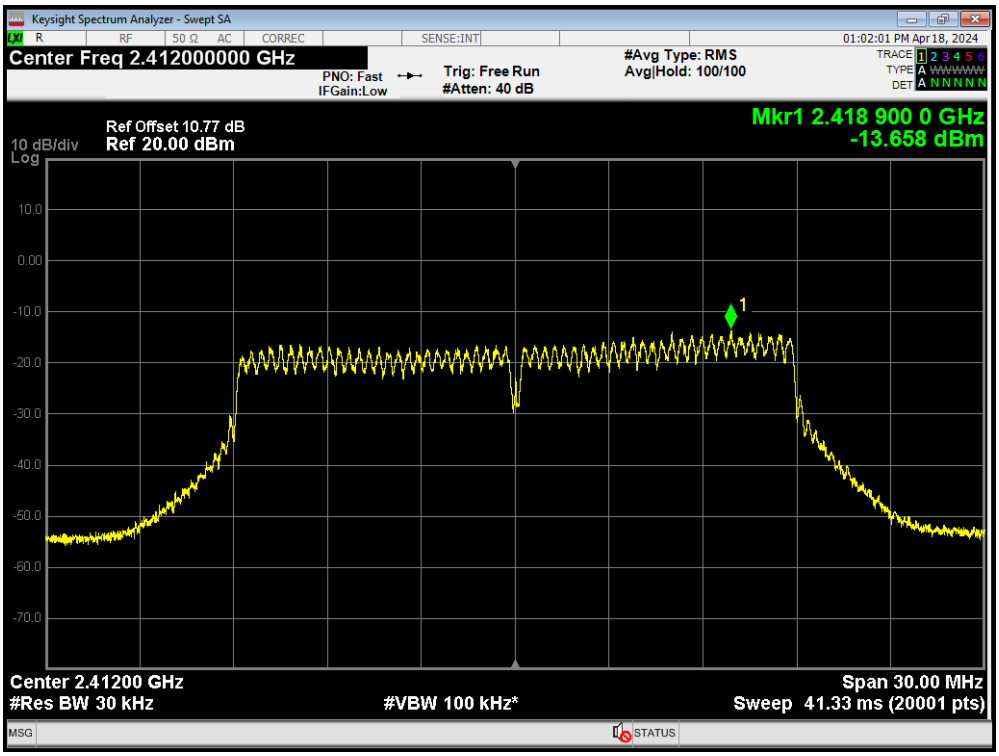
PSD 802.11g 2437MHz



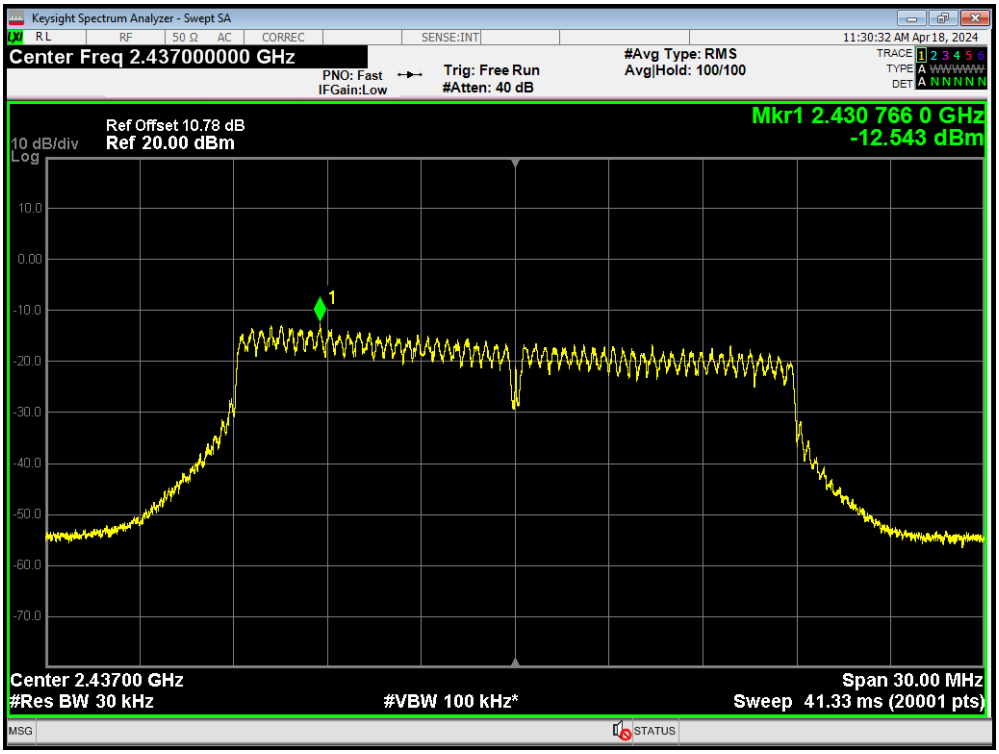
PSD 802.11g 2462MHz



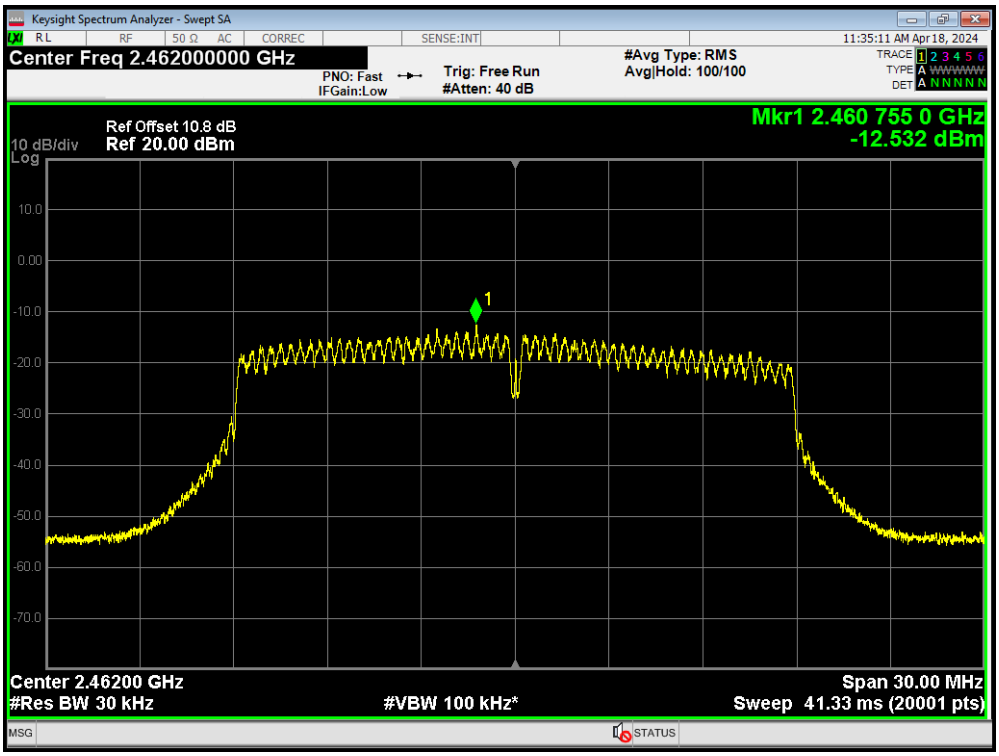
PSD 802.11n(HT20) 2412MHz



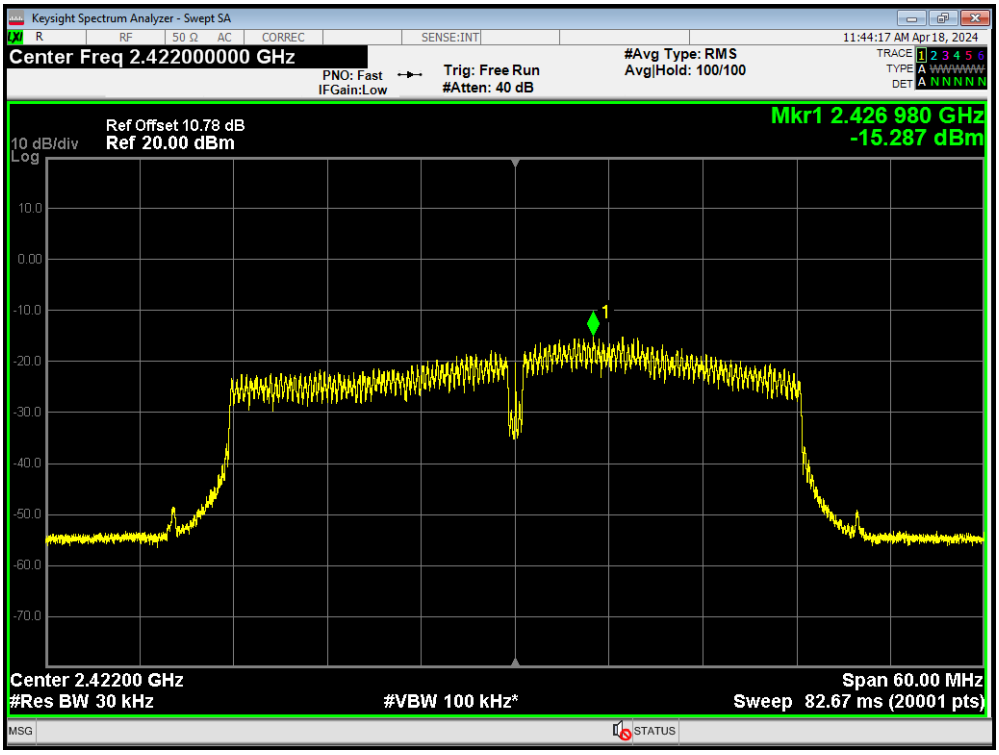
PSD 802.11n(HT20) 2437MHz



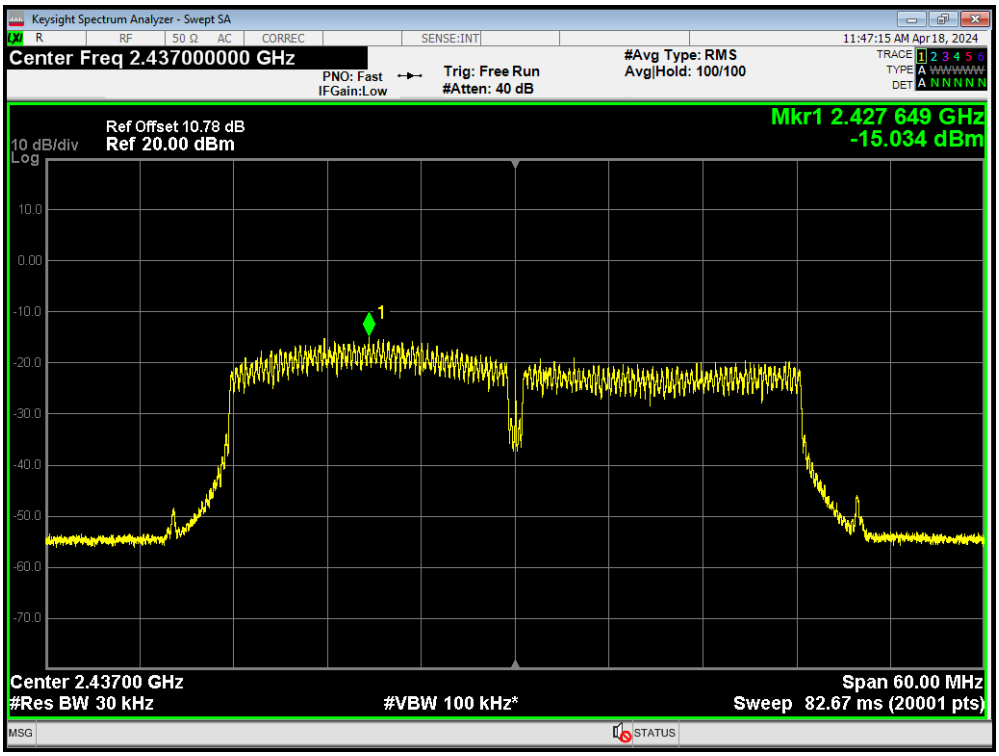
PSD 802.11n(HT20) 2462MHz



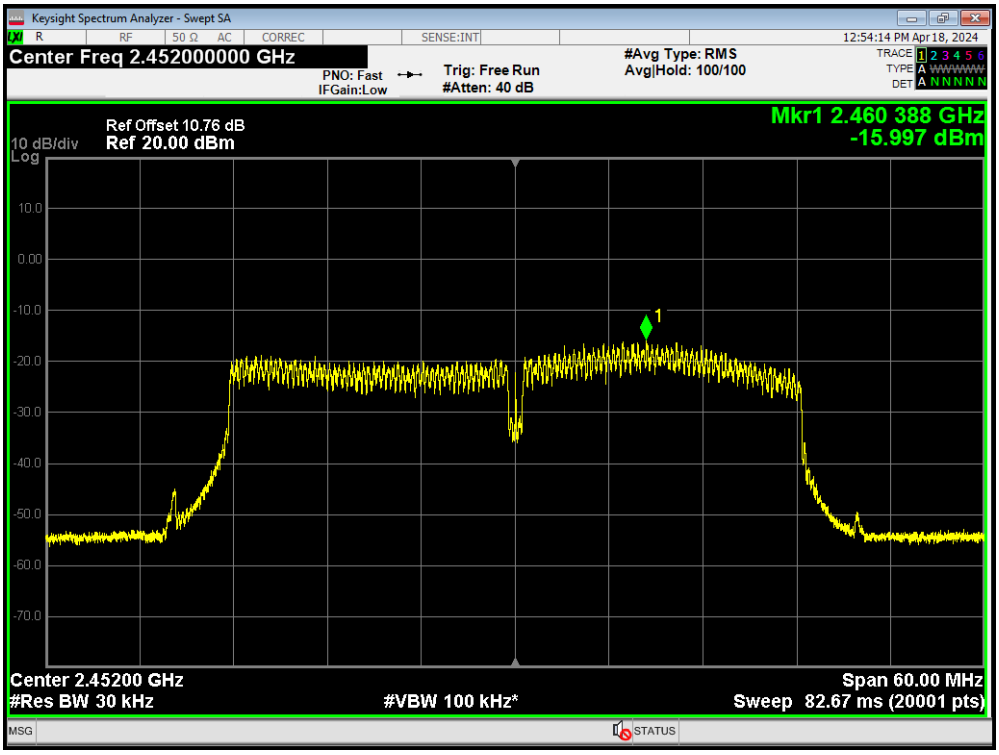
PSD 802.11n(HT40) 2422MHz



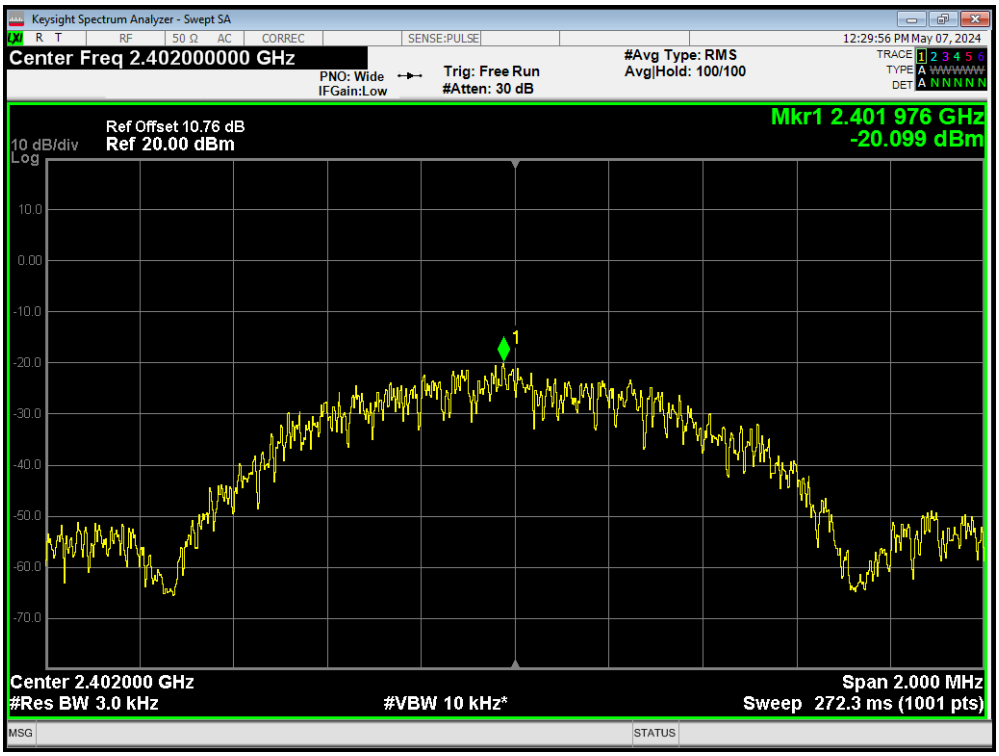
PSD 802.11n(HT40) 2437MHz



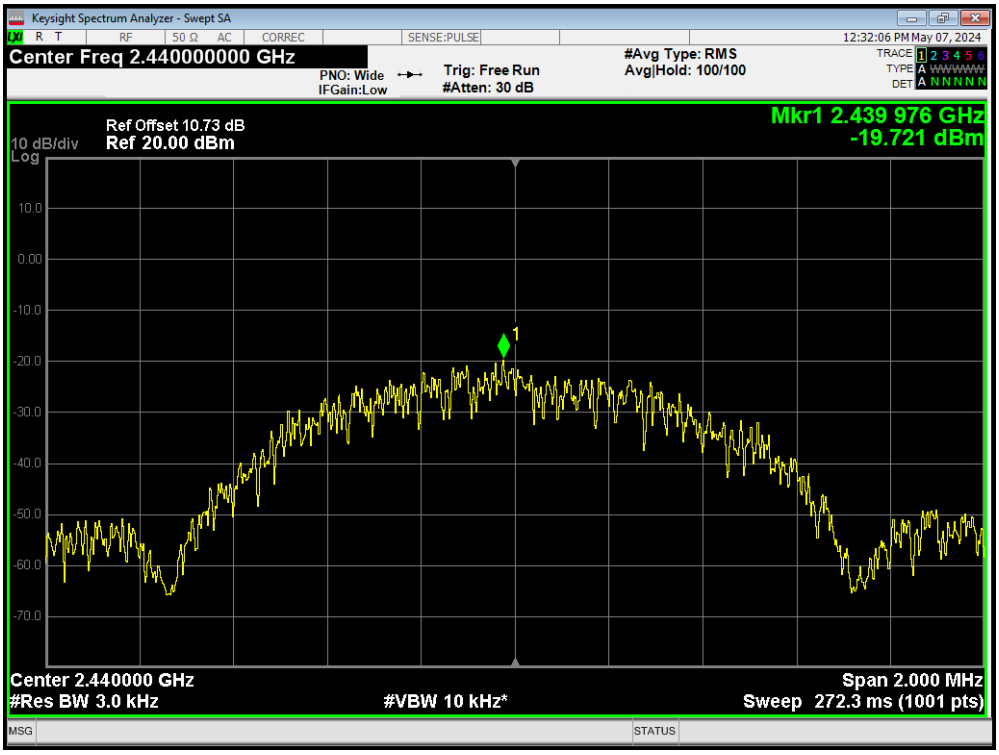
PSD 802.11n(HT40) 2452MHz



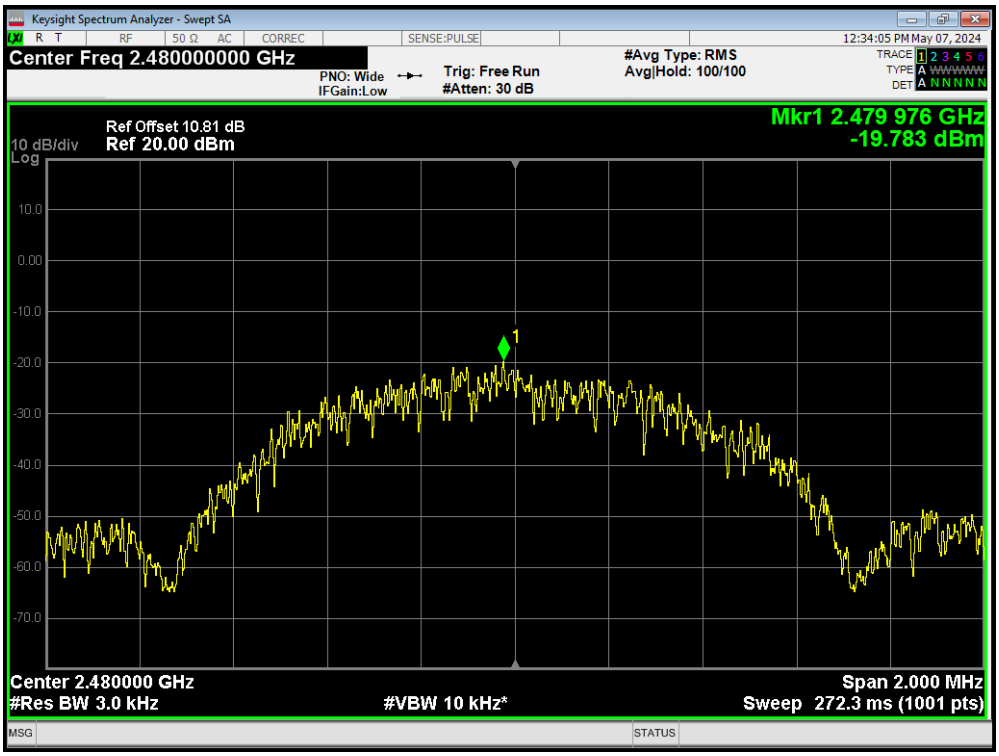
PSD BLE(1M) 2402MHz



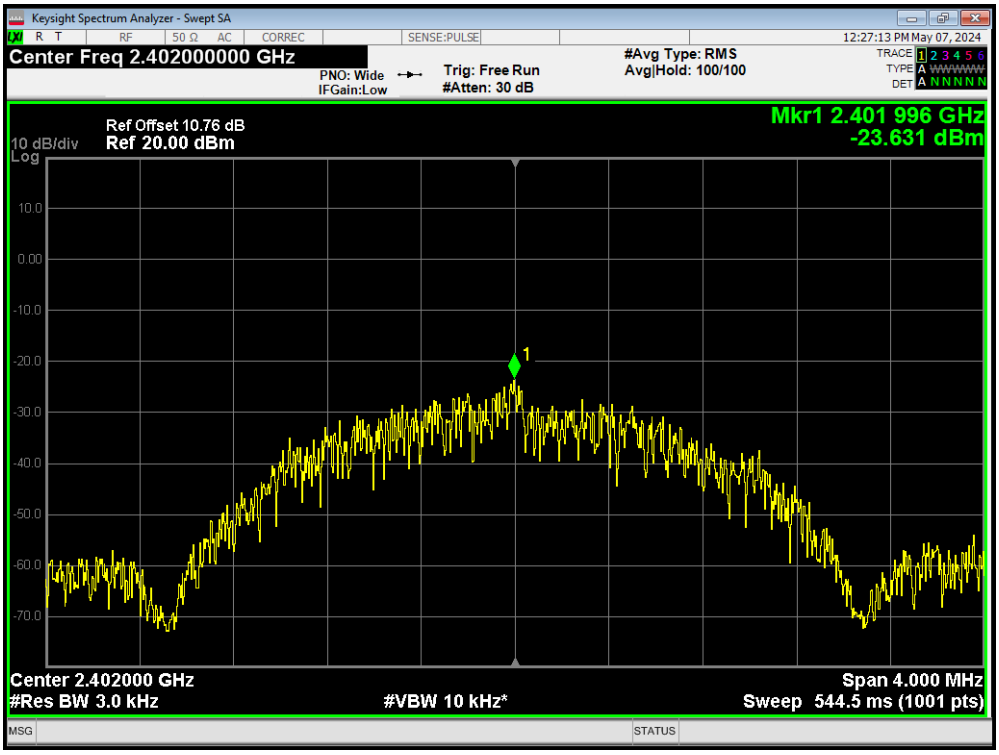
PSD BLE(1M) 2440MHz



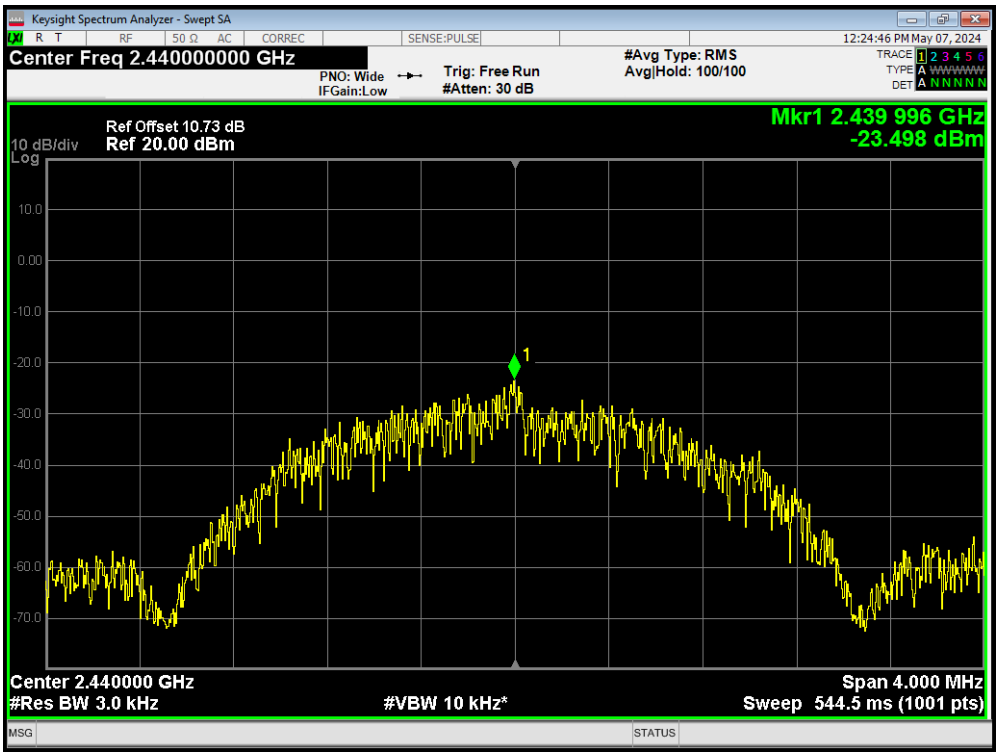
PSD BLE(1M) 2480MHz



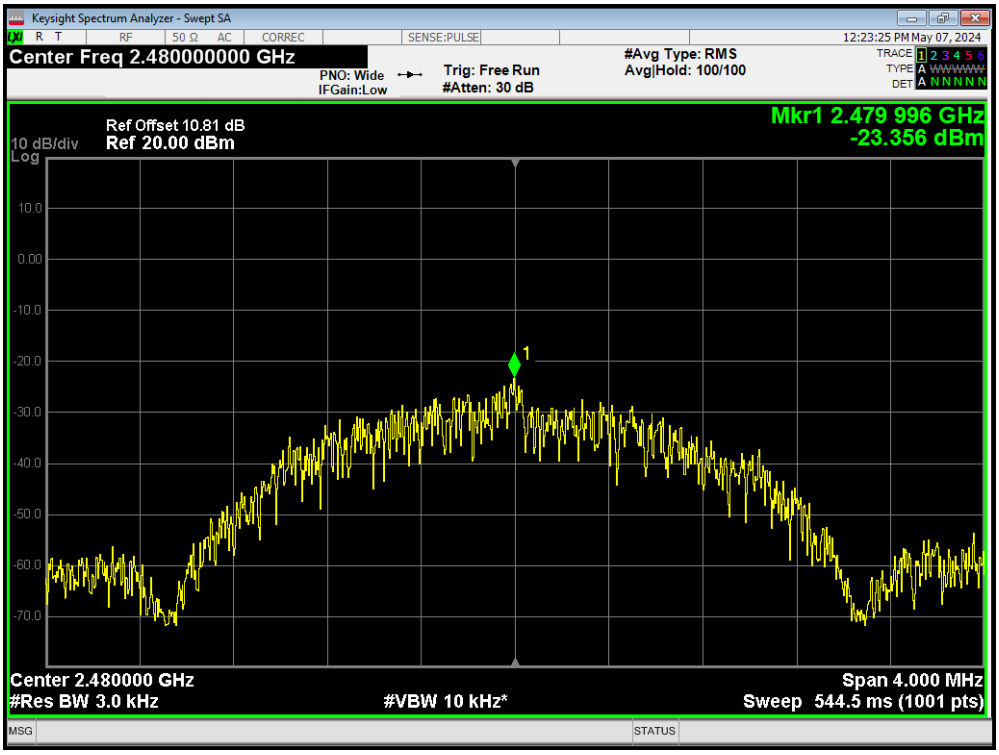
PSD BLE (2M) 2402MHz



PSD BLE(2M) 2440MHz



PSD BLE(2M) 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	4.550	-25.45
	2437	4.060	-25.94
	2462	4.290	-25.71
802.11g	2412	1.730	-28.27
	2437	1.000	-29.00
	2462	0.410	-29.59
802.11n HT20	2412	-0.500	-30.50
	2437	-0.030	-30.03
	2462	-1.120	-31.12
802.11n HT40	2422	-2.260	-32.26
	2437	-2.190	-32.19

	2452	-3.310	-33.31
Bluetooth (Low Energy) (1M)	2402	-0.010	-30.01
	2440	0.140	-29.86
	2480	0.180	-29.82
Bluetooth (Low Energy) (2M)	2402	0.150	-29.85
	2440	0.160	-29.84
	2480	0.280	-29.72

Measurement Uncertainty

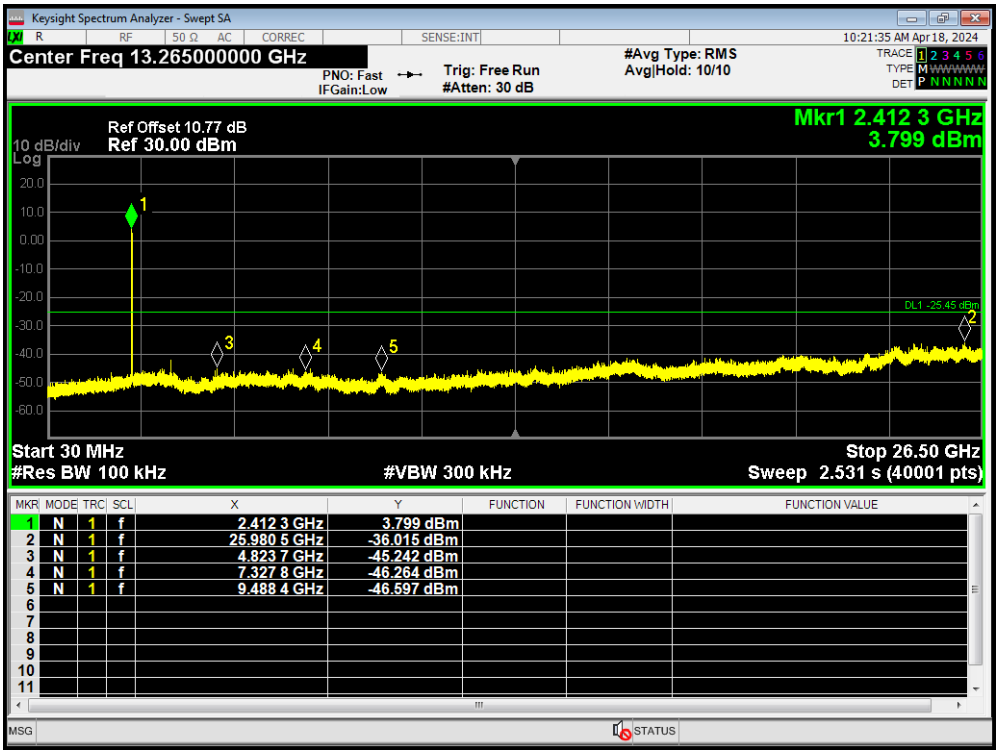
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

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

Test Results:

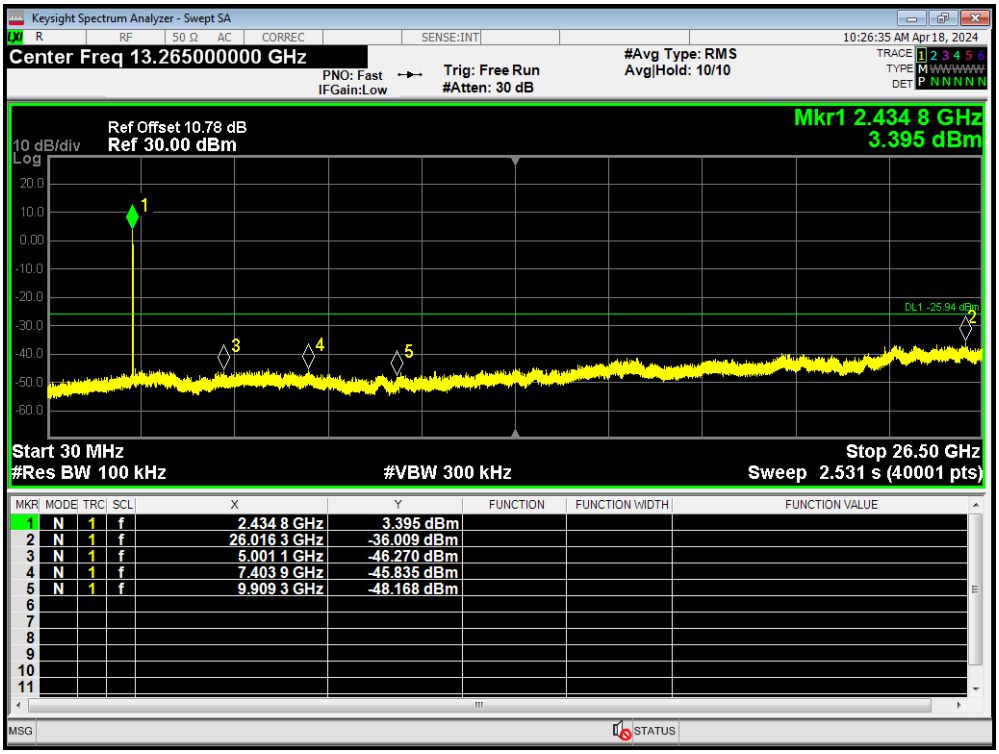
Tx. Spurious 802.11b 2412MHz Ref

Tx. Spurious 802.11b 2412MHz Emission



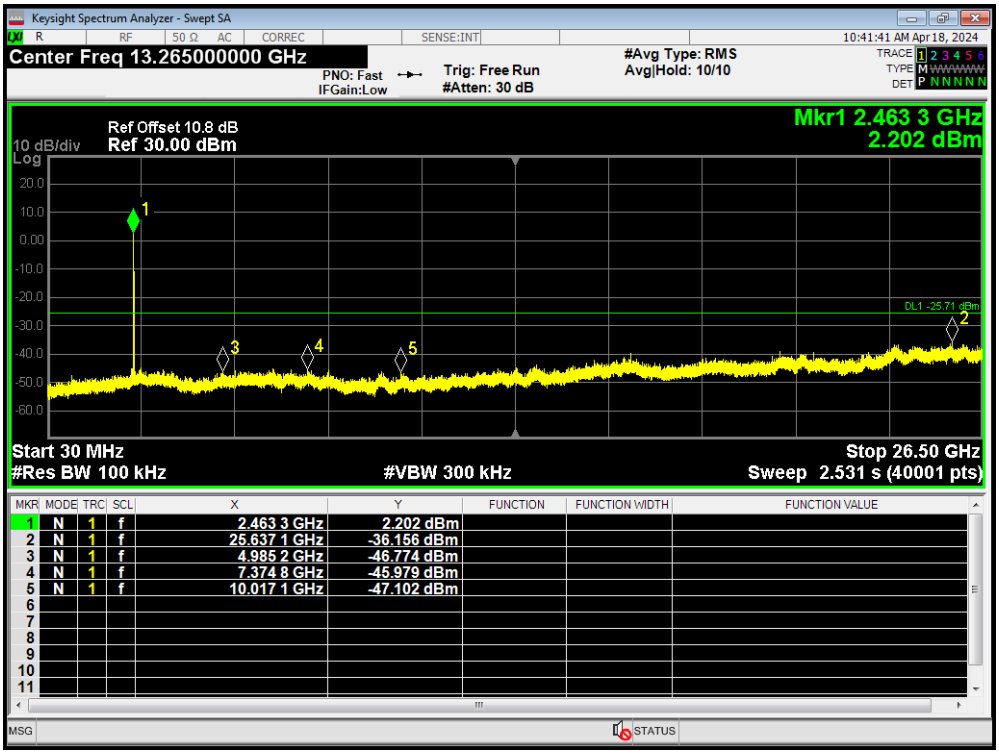
Tx. Spurious 802.11b 2437MHz Ref

Tx. Spurious 802.11b 2437MHz Emission

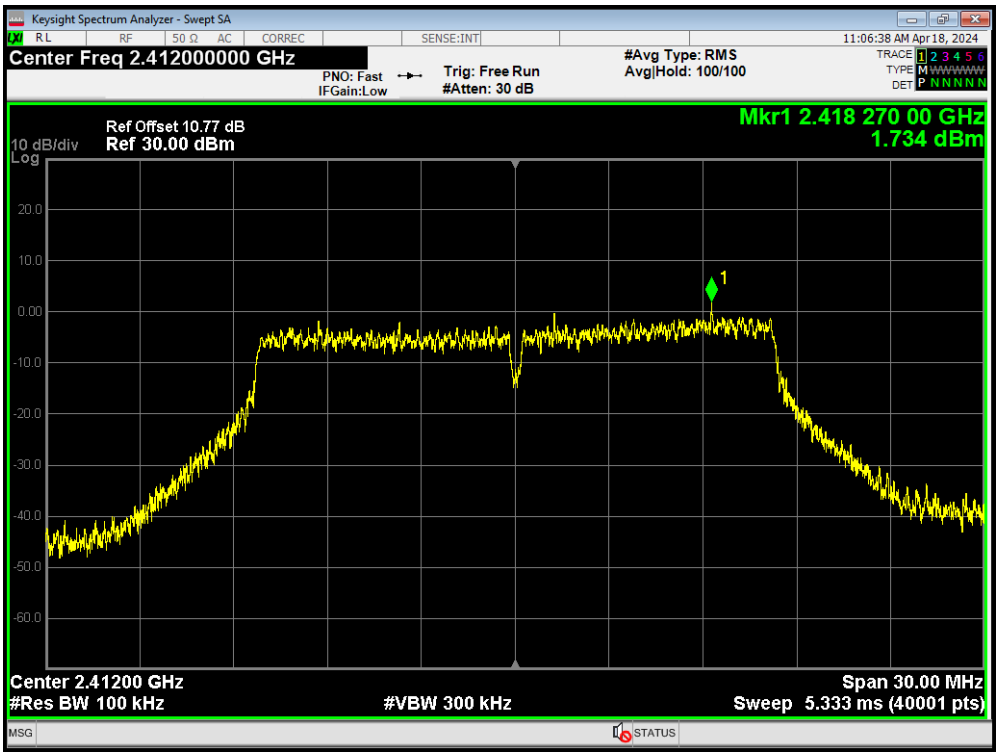


Tx. Spurious 802.11b 2462MHz Ref

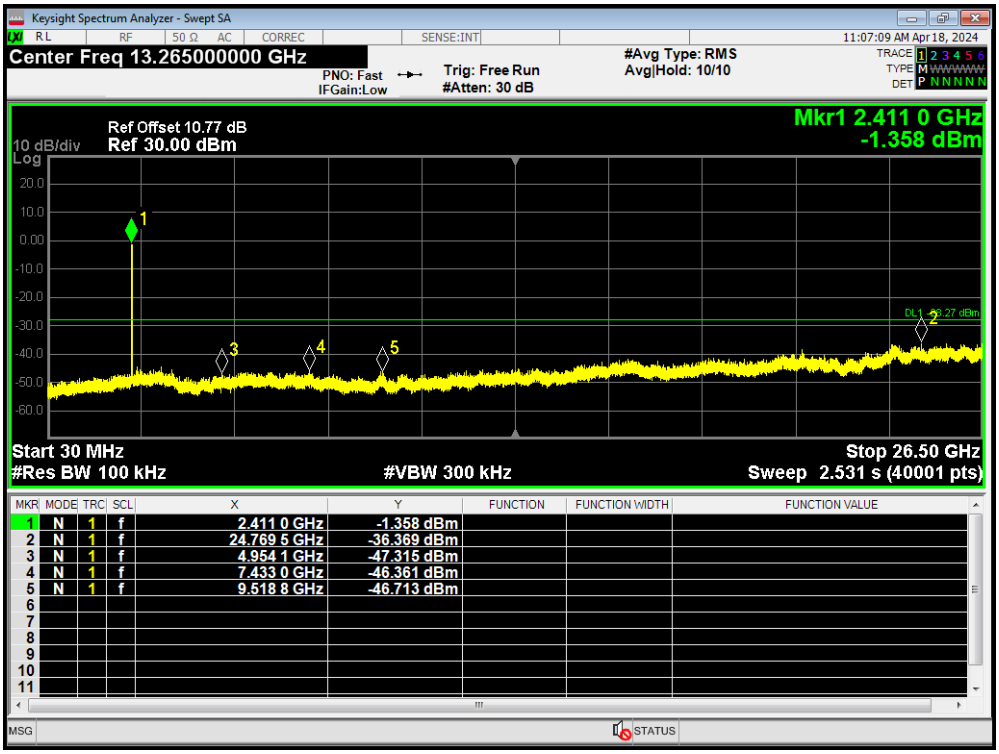
Tx. Spurious 802.11b 2462MHz Emission



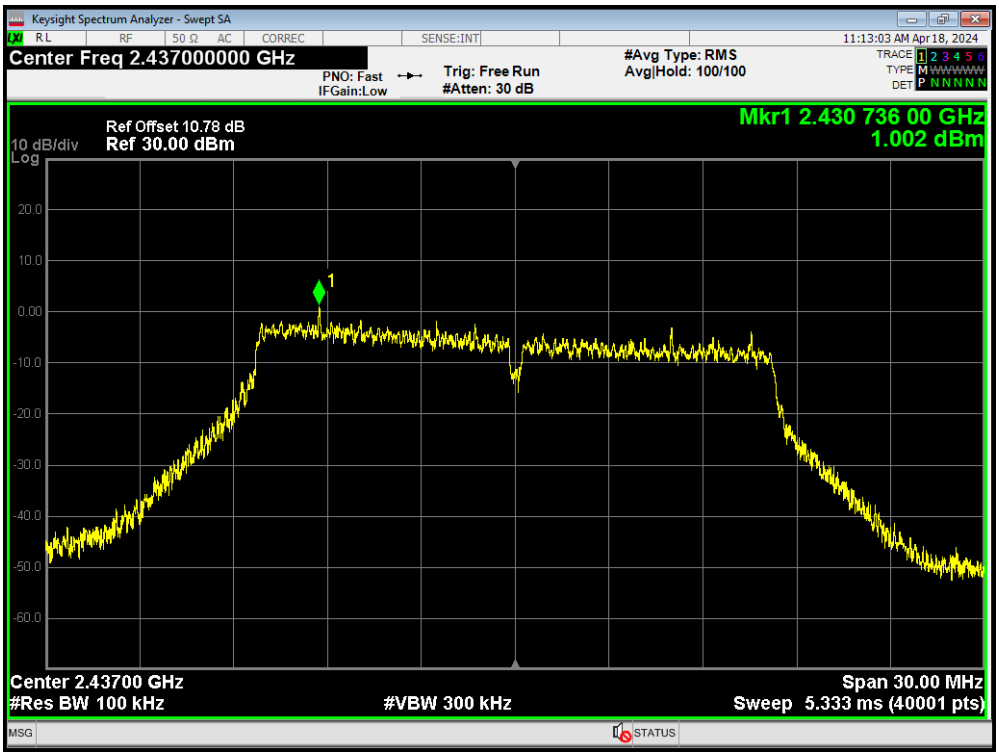
Tx. Spurious 802.11g 2412MHz Ref



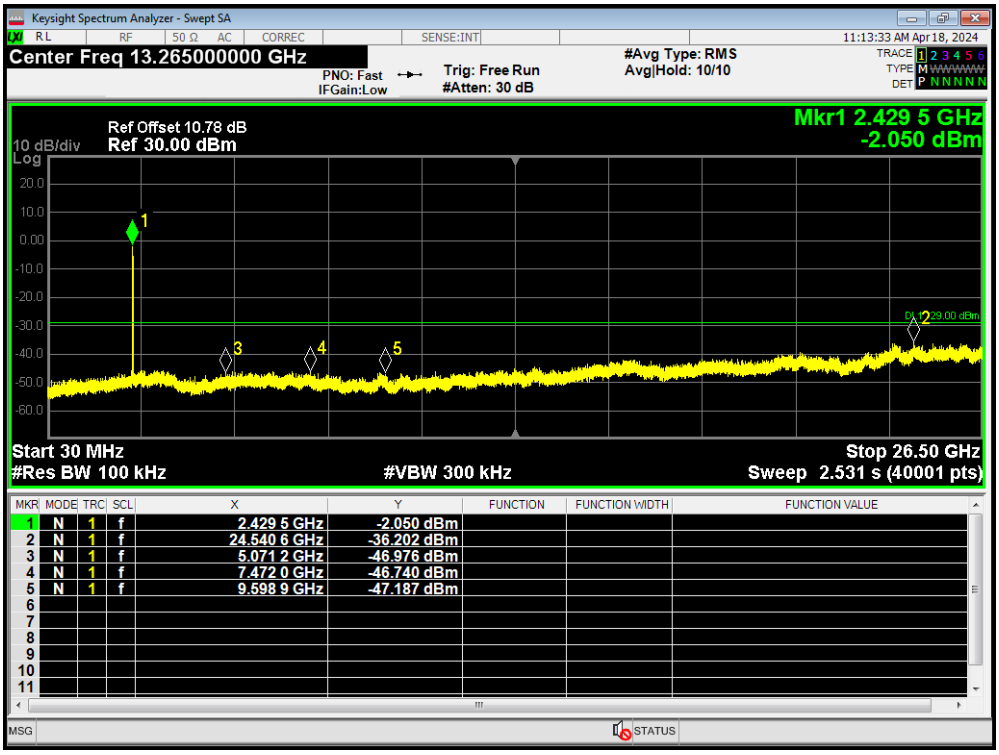
Tx. Spurious 802.11g 2412MHz Emission



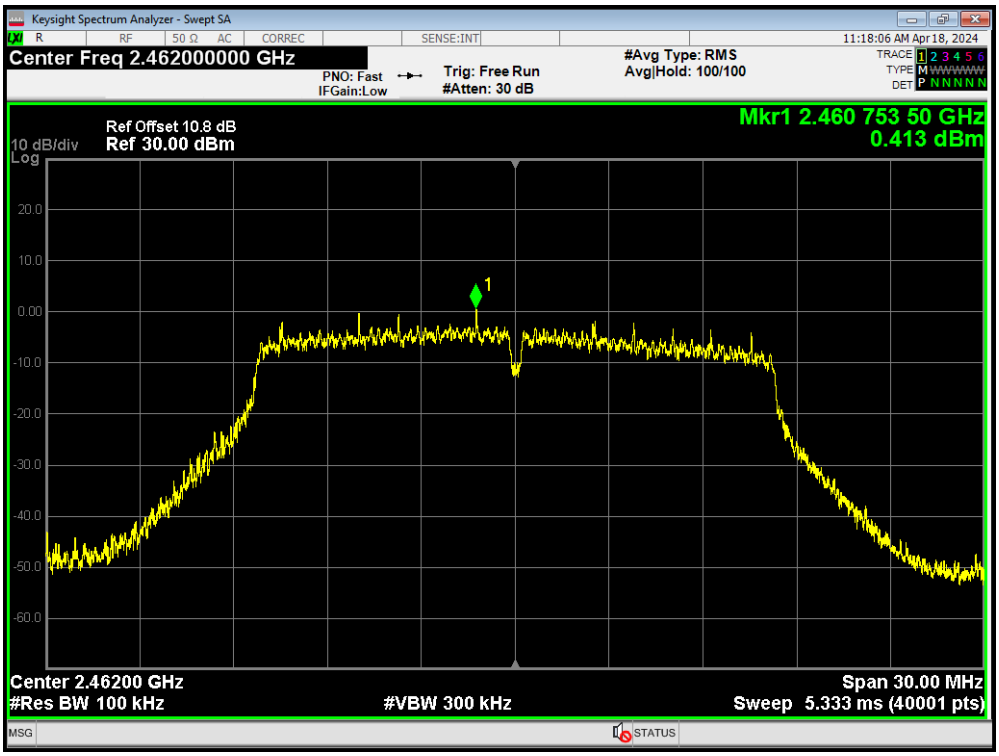
Tx. Spurious 802.11g 2437MHz Ref



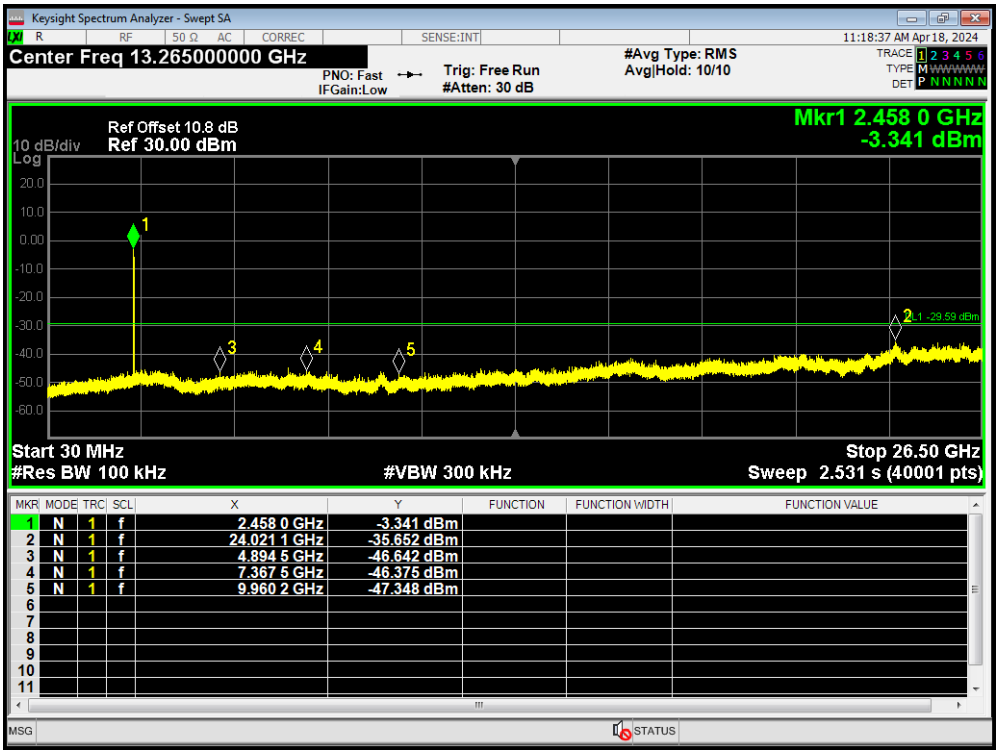
Tx. Spurious 802.11g 2437MHz Emission



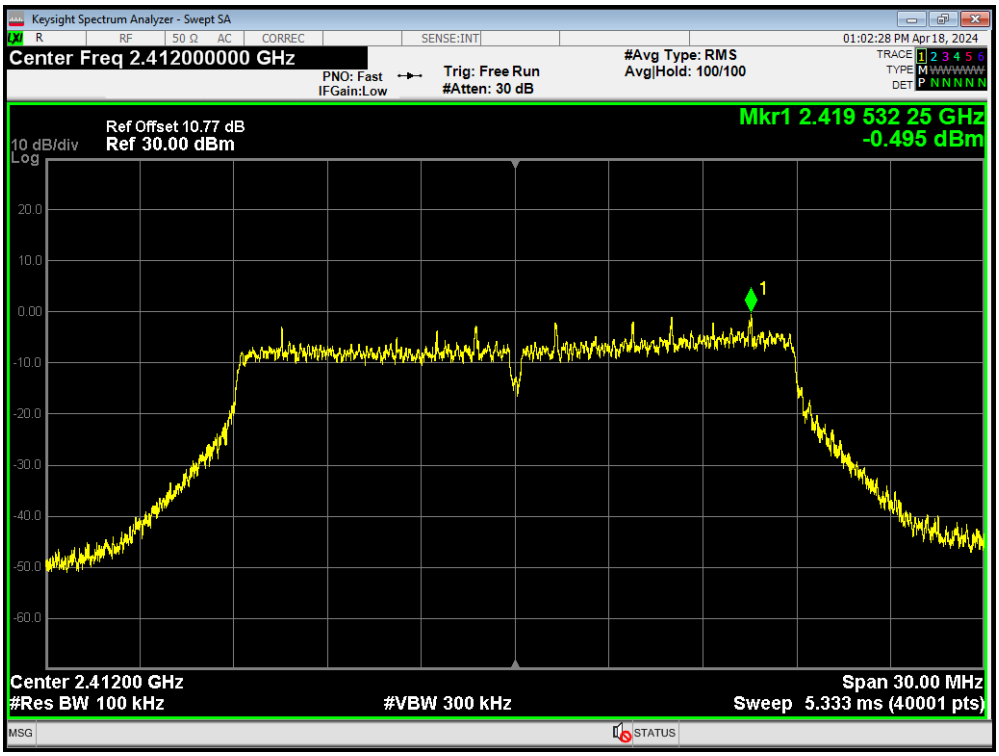
Tx. Spurious 802.11g 2462MHz Ref



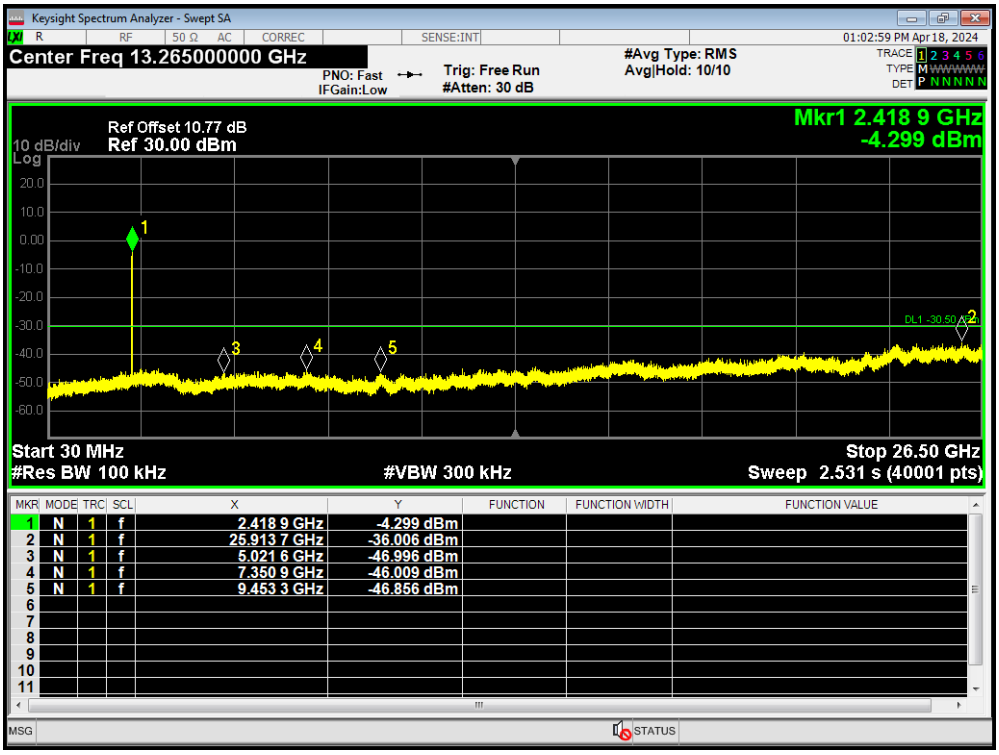
Tx. Spurious 802.11g 2462MHz Emission



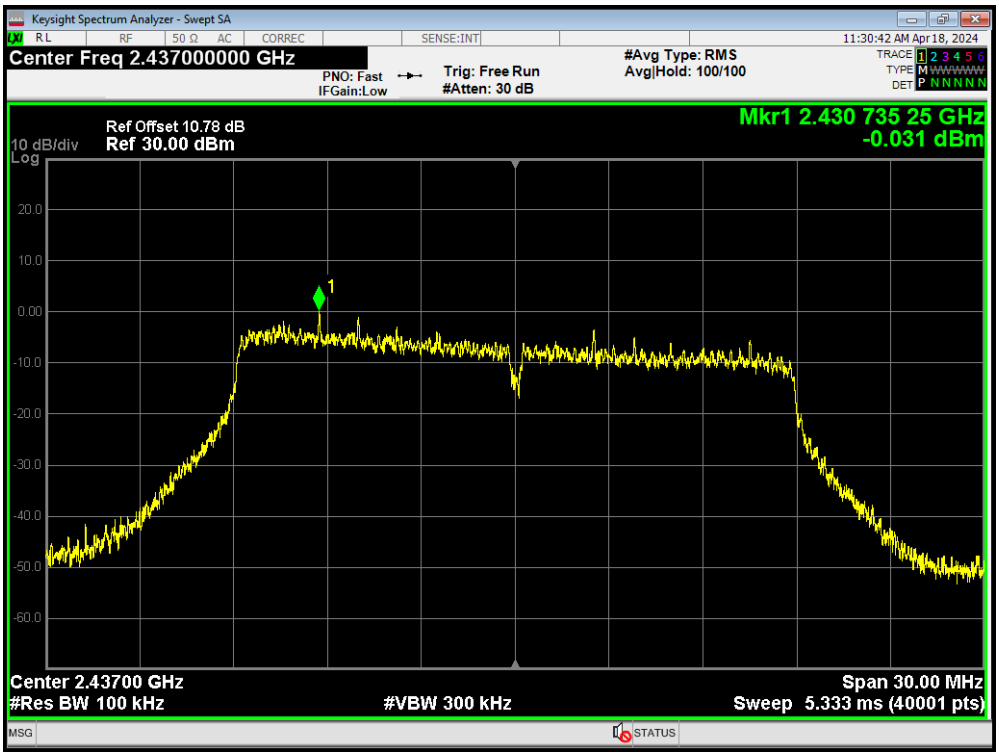
Tx. Spurious 802.11n(HT20) 2412MHz Ref



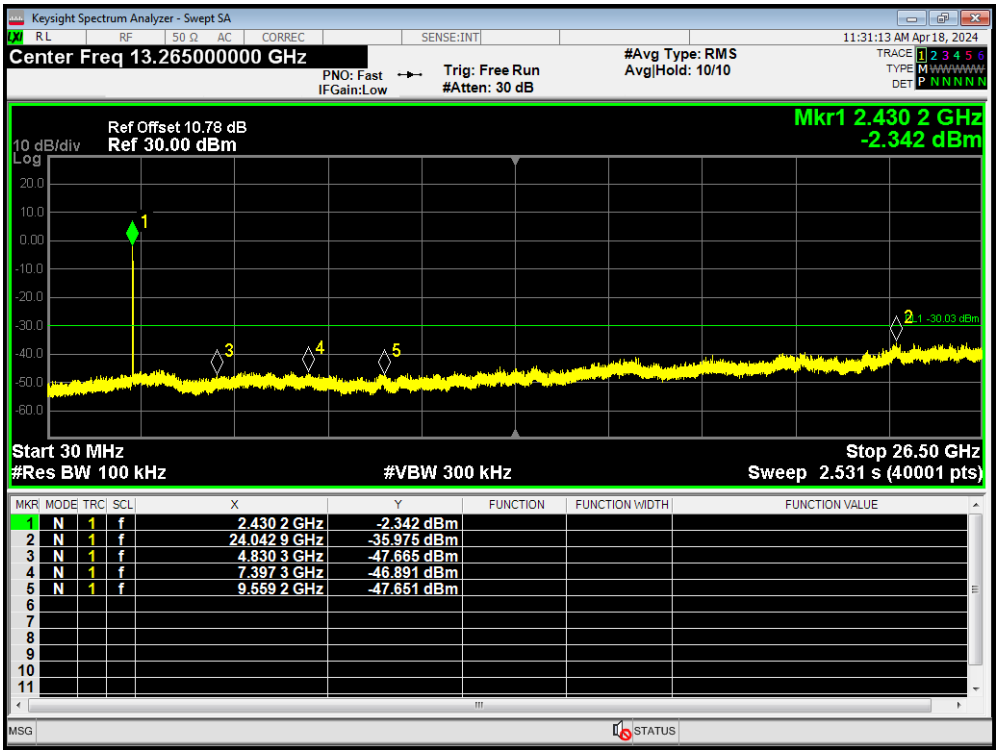
Tx. Spurious 802.11n(HT20) 2412MHz Emission



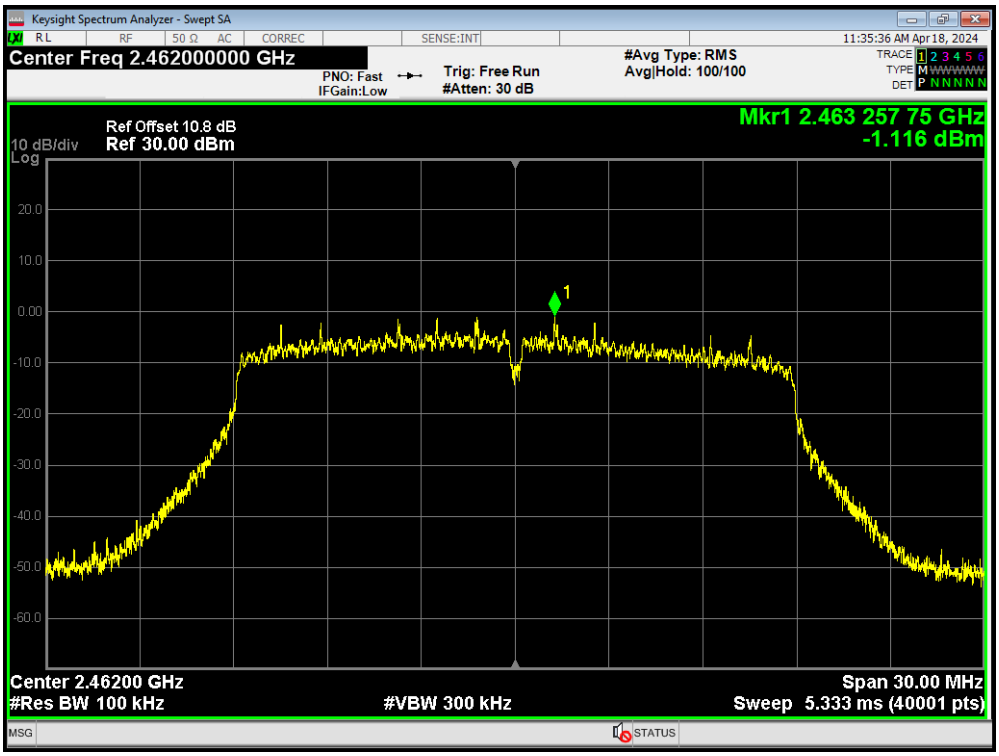
Tx. Spurious 802.11n(HT20) 2437MHz Ref



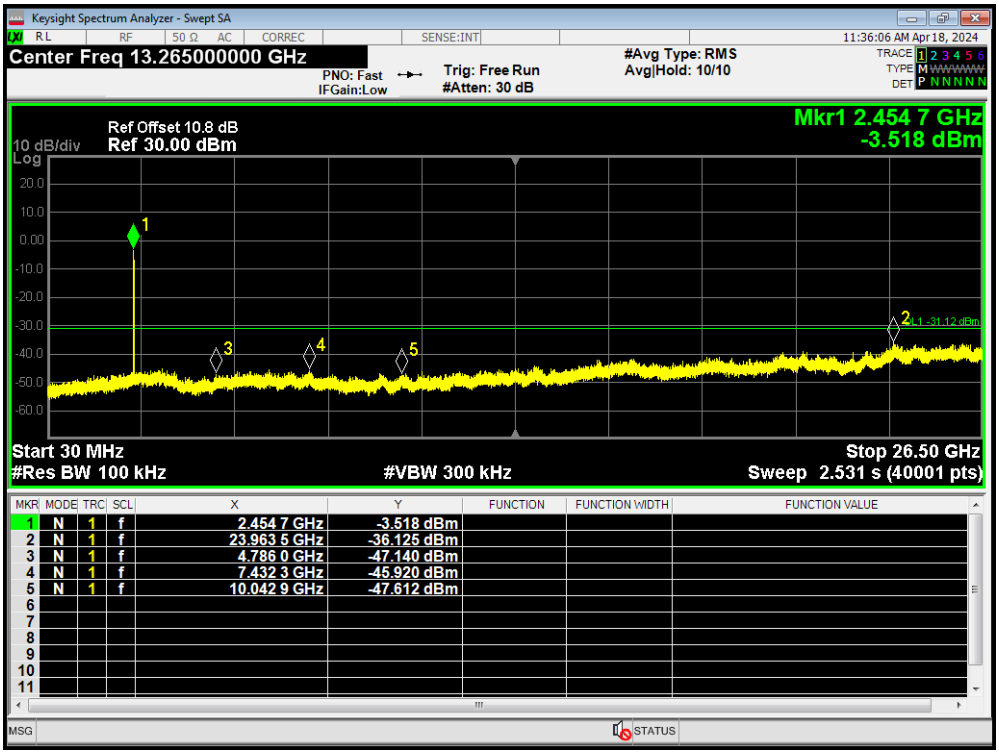
Tx. Spurious 802.11n(HT20) 2437MHz Emission



Tx. Spurious 802.11n(HT20) 2462MHz Ref

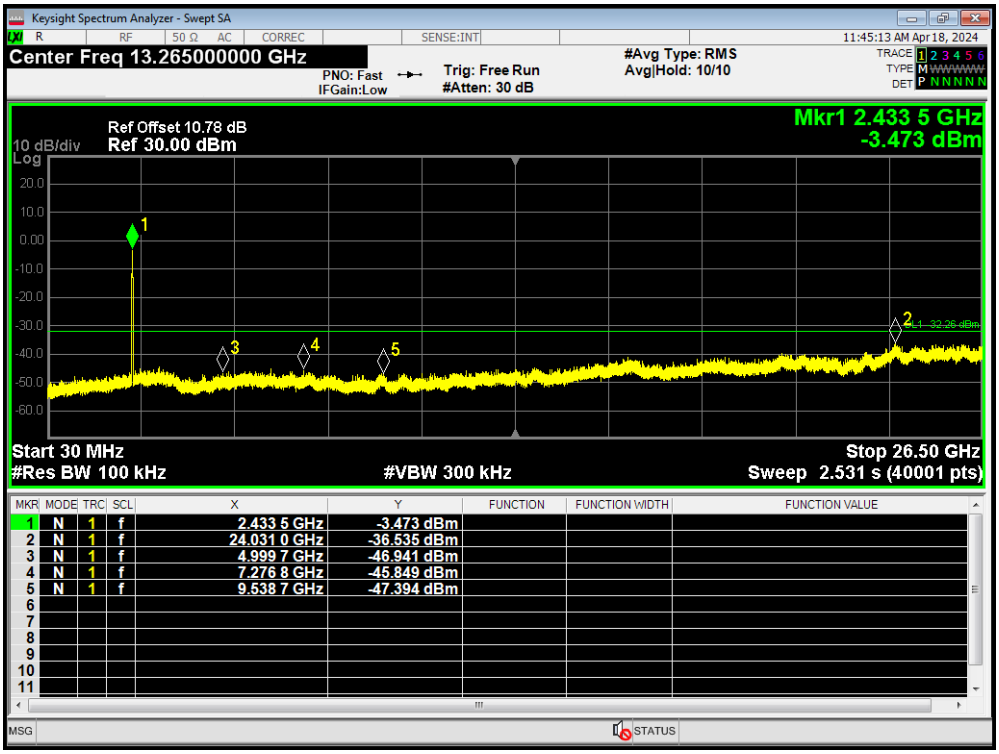


Tx. Spurious 802.11n(HT20) 2462MHz Emission



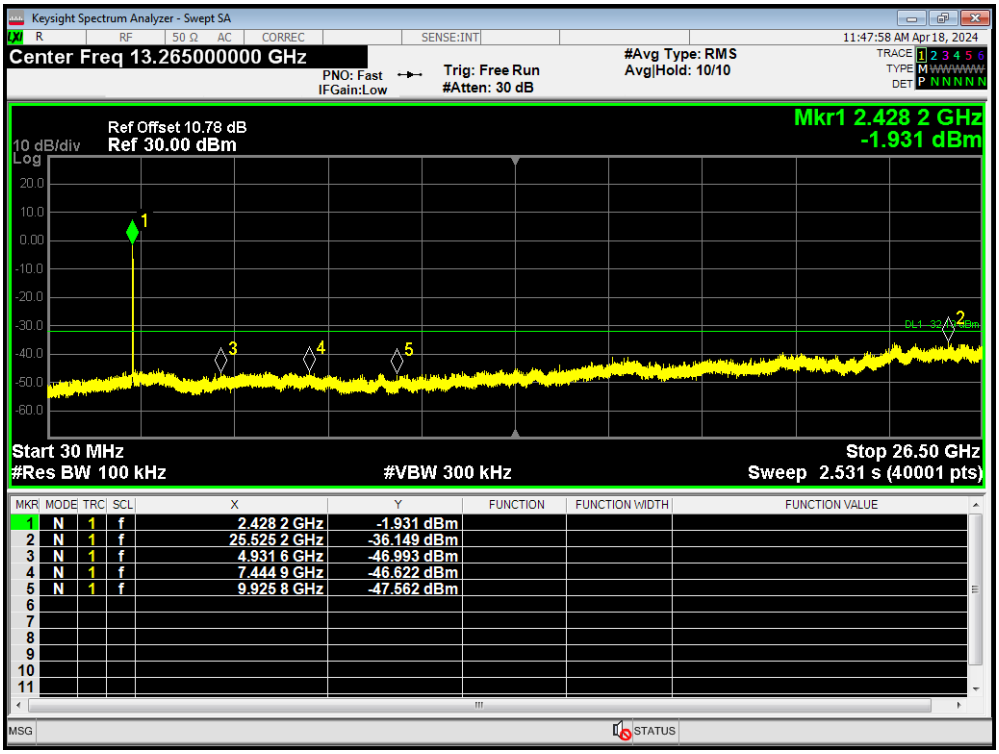
Tx. Spurious 802.11n(HT40) 2422MHz Ref

Tx. Spurious 802.11n(HT40) 2422MHz Emission

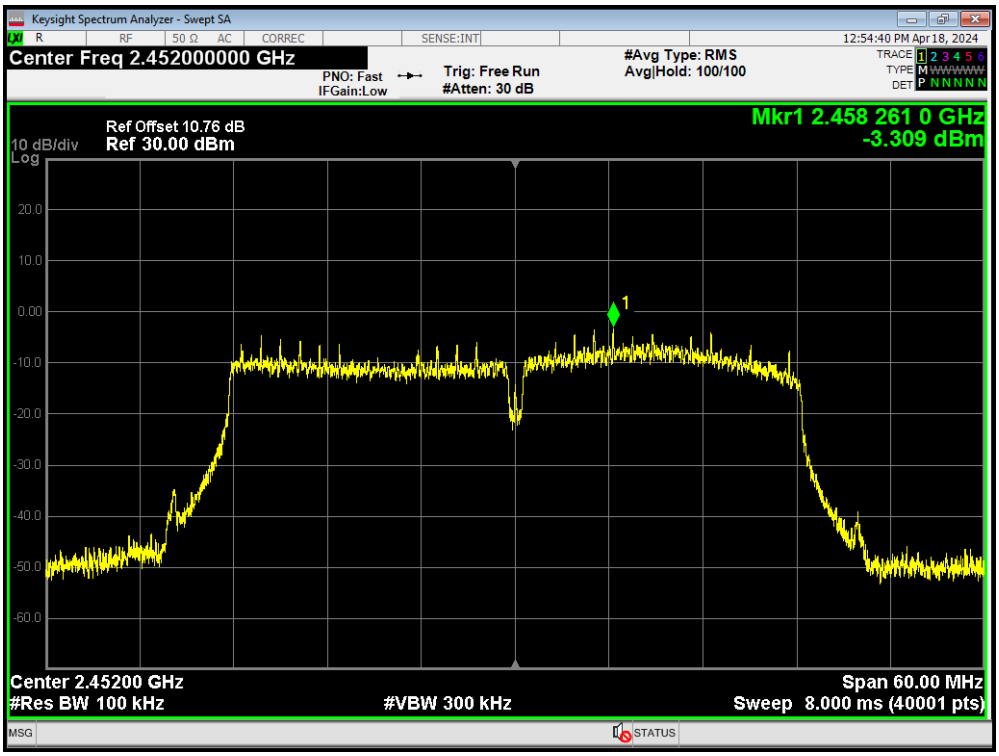


Tx. Spurious 802.11n(HT40) 2437MHz Ref

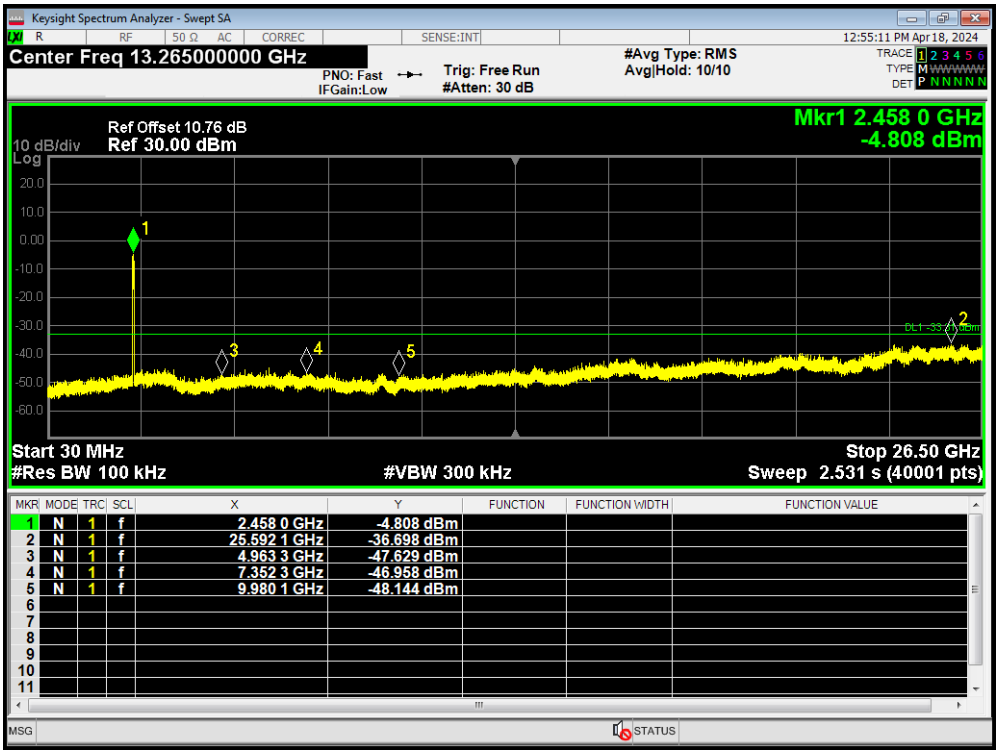
Tx. Spurious 802.11n(HT40) 2437MHz Emission



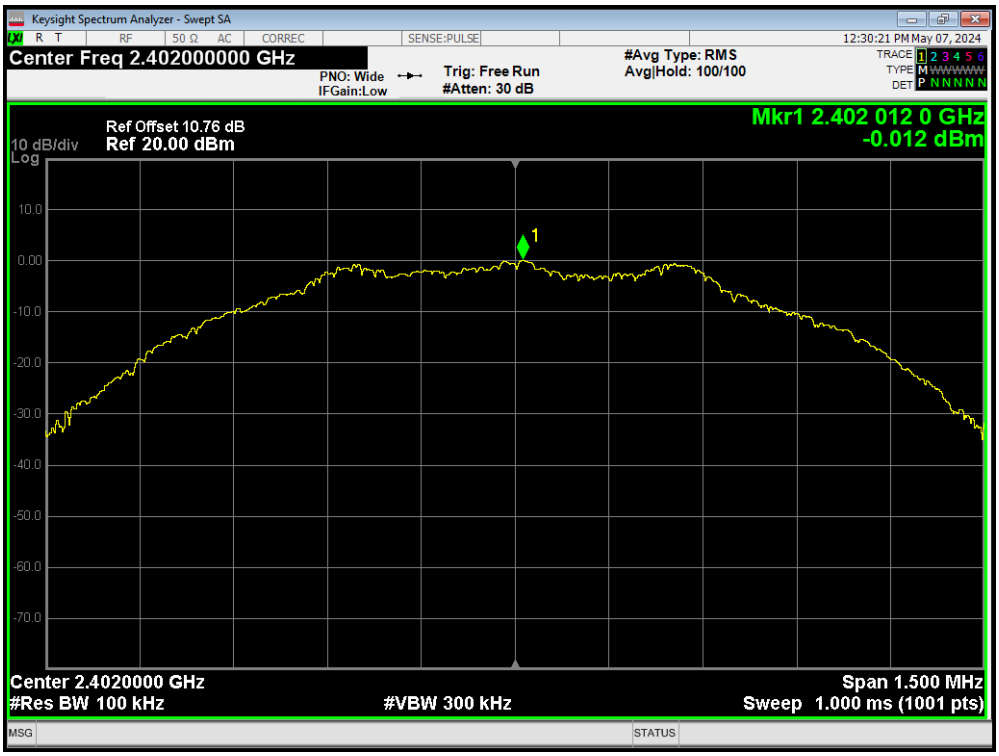
Tx. Spurious 802.11n(HT40) 2452MHz Ref



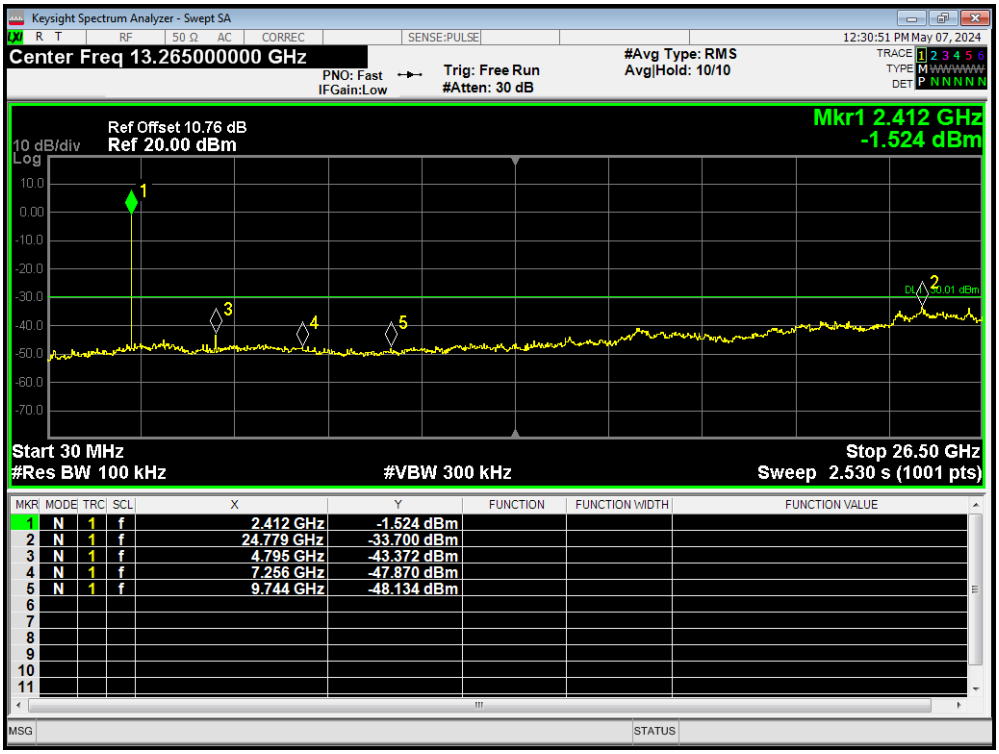
Tx. Spurious 802.11n(HT40) 2452MHz Emission



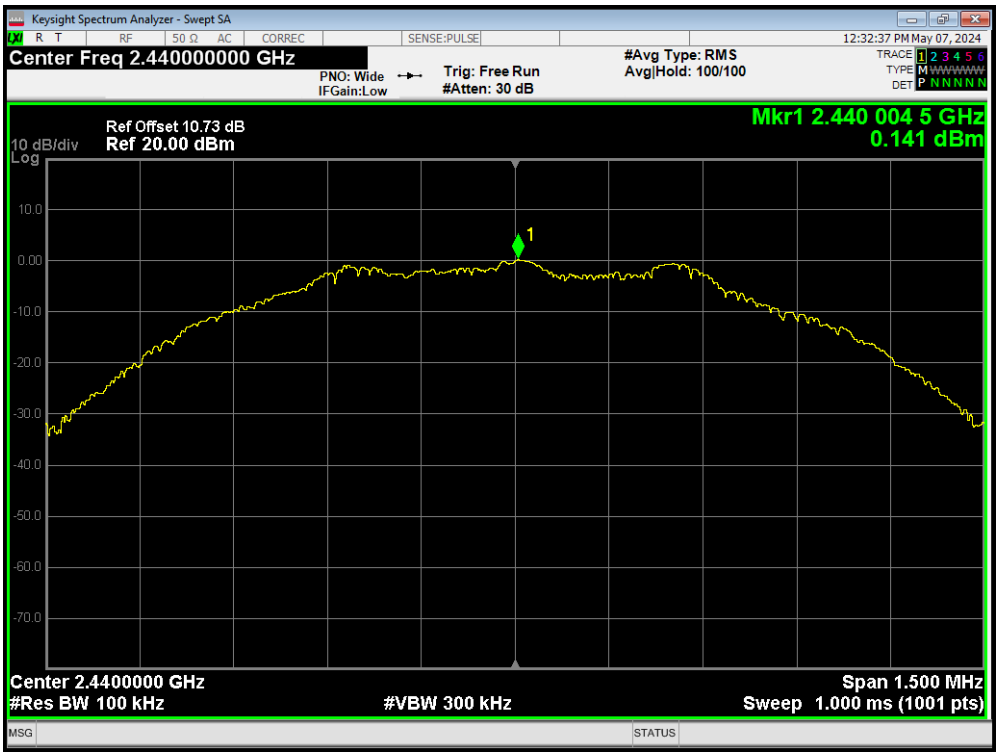
Tx. Spurious BLE(1M) 2402MHz Ref



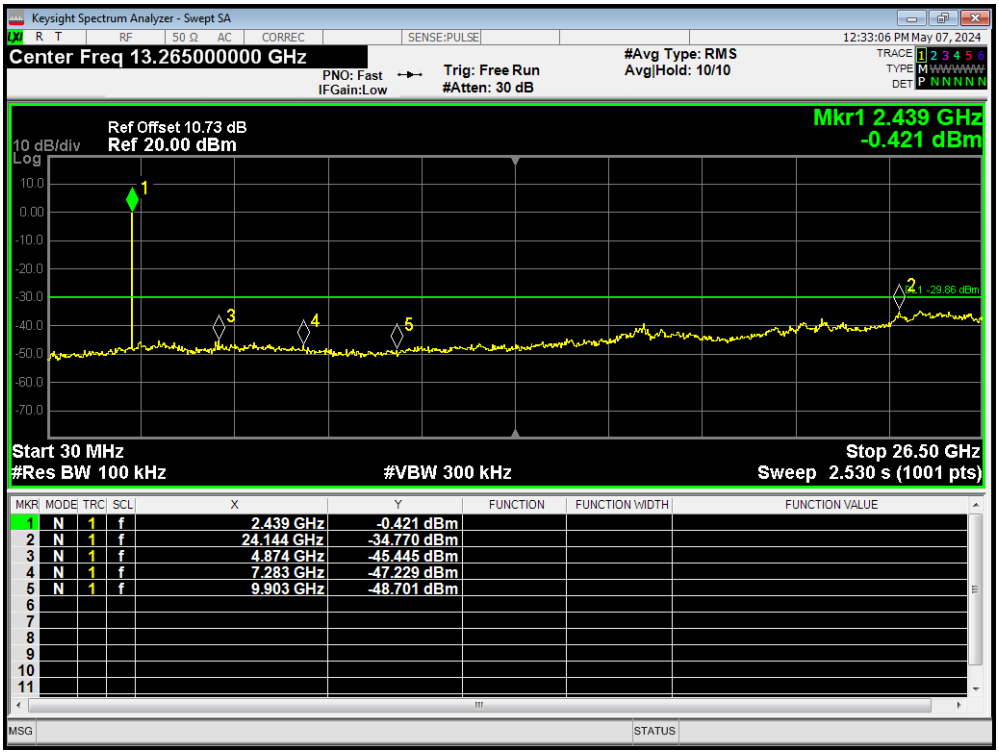
Tx. Spurious BLE(1M) 2402MHz Emission



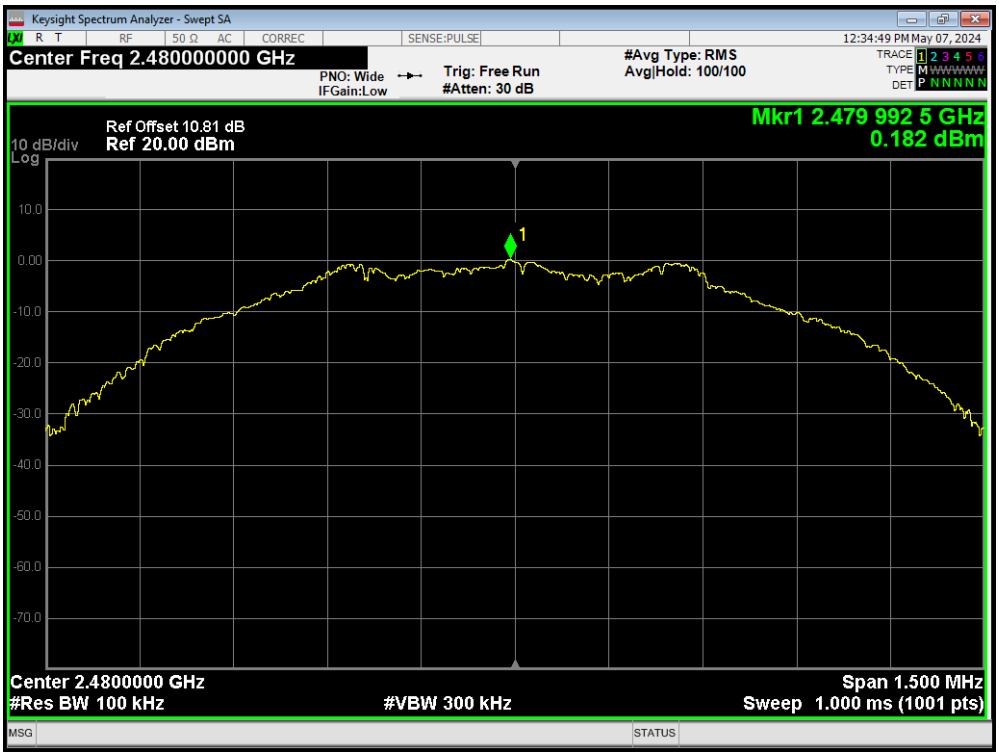
Tx. Spurious BLE(1M) 2440MHz Ref



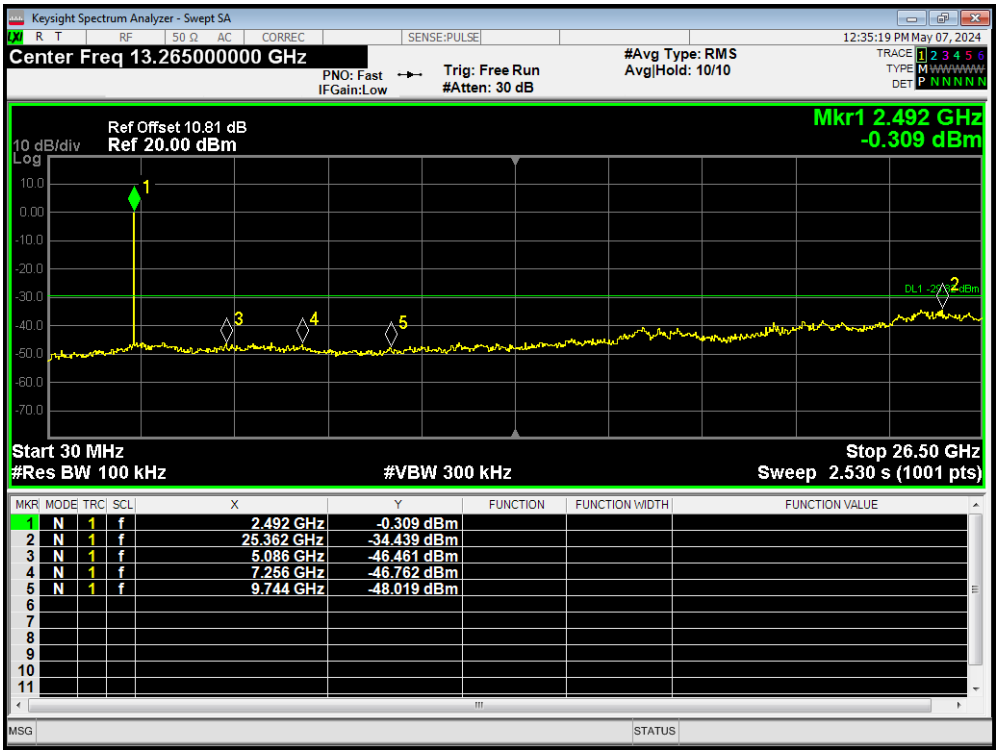
Tx. Spurious BLE(1M) 2440MHz Emission



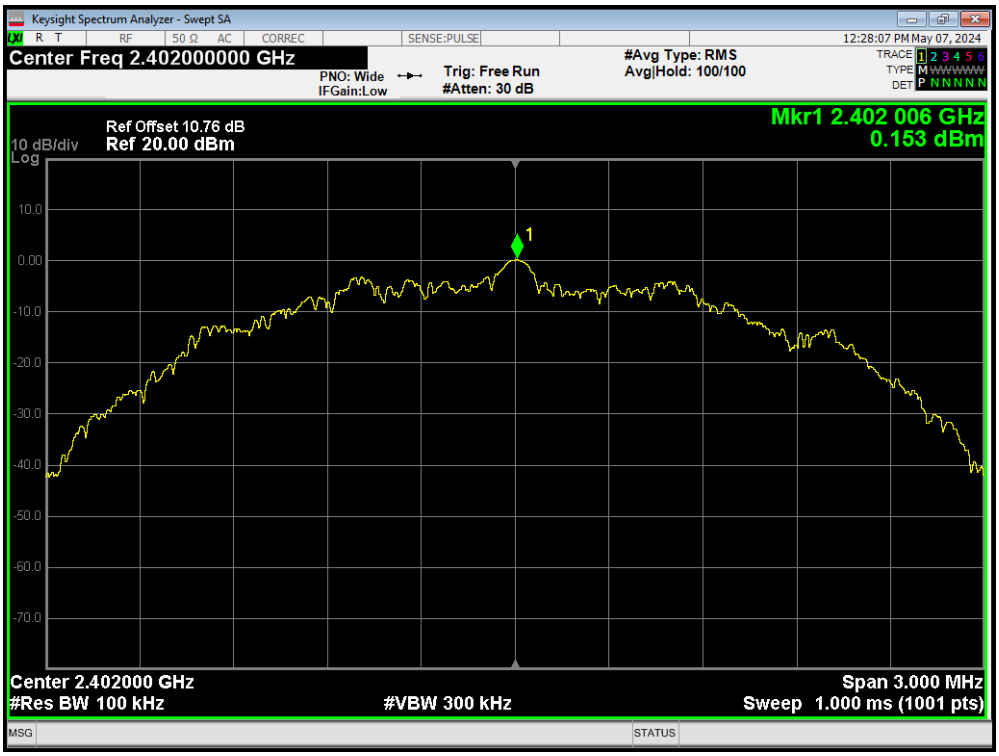
Tx. Spurious BLE(1M) 2480MHz Ref



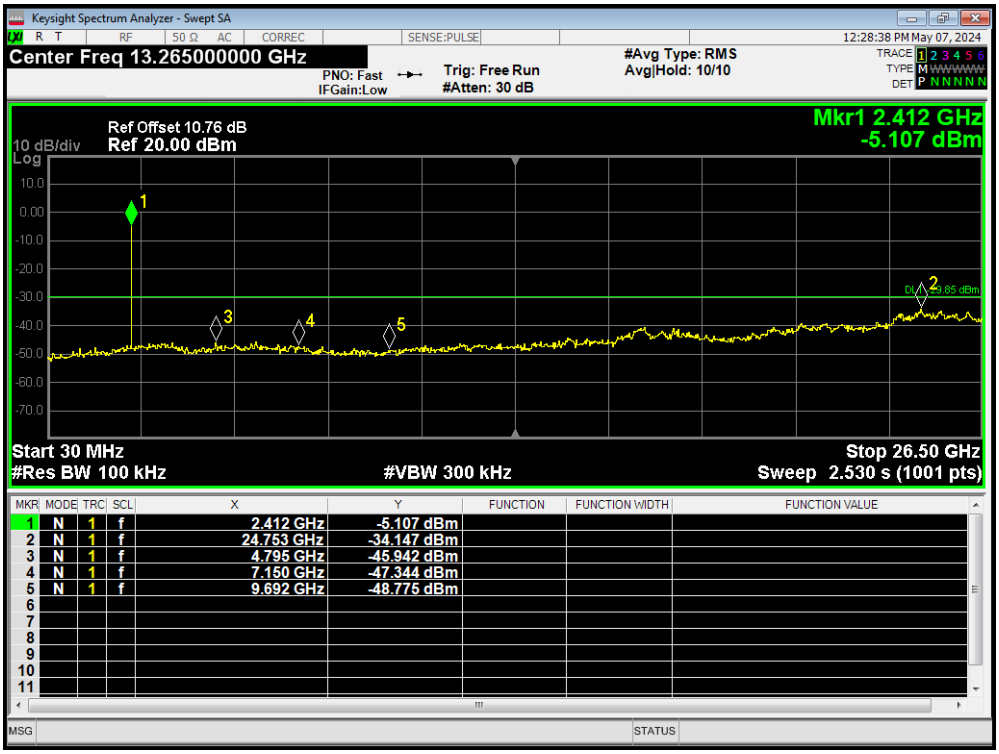
Tx. Spurious BLE(1M) 2480MHz Emission



Tx. Spurious BLE(2M) 2402MHz Ref

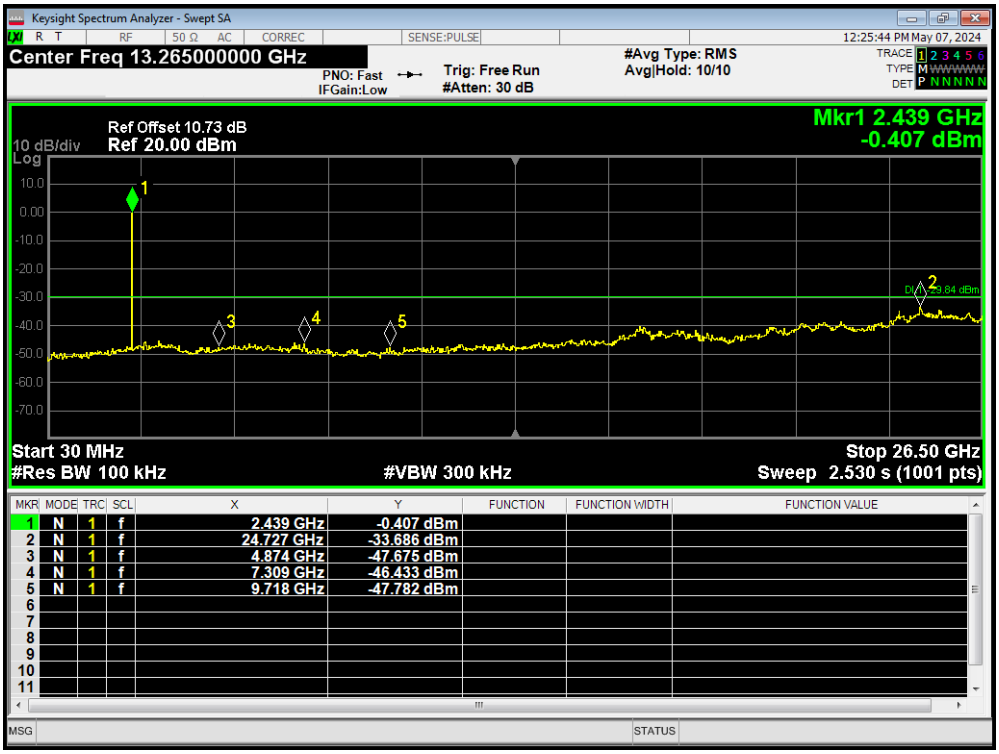


Tx. Spurious BLE(2M) 2402MHz Emission



Tx. Spurious BLE(2M) 2440MHz Ref

Tx. Spurious BLE(2M) 2440MHz Emission



Tx. Spurious BLE(2M) 2480MHz Ref

Tx. Spurious BLE(2M) 2480MHz Emission