

RF TEST REPORT

Applicant	Aava Mobile Oy
FCC ID	2ABVH-INARI10E1
Product	10" Tablet Computer
Brand	AAVA
Model	INARI-E-10-WIG-1
Report No.	R2406A0726-R2
Issue Date	September 11, 2024

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 15C (2023)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	Frequency Hopping System	15.247 (g), (h)	PASS
2	Peak Power Output	15.247(b)(1)	PASS
3	99% Bandwidth and 20dB Bandwidth	15.247(a)(1) C63.10 6.9	PASS
4	Frequency Separation	15.247(a)(1)	PASS
5	Time of Occupancy (Dwell Time)	15.247(a)(1)(iii)	PASS
6	Band Edge Compliance	15.247(d)	PASS
7	Number of Hopping Frequency	15.247(a)(1)(iii)	PASS
8	Spurious RF Conducted Emissions	15.247(d)	PASS
9	Unwanted Emissions	15.247(d),15.205,15.209	PASS
10	Conducted Emissions	15.207	PASS
Date of Testing: June 24, 2024 ~ August 28, 2024			
Date of Sample Received: June 24, 2024			
<p>Note: PASS: The EUT complies with the essential requirements in the standard.</p> <p>FAIL: The EUT does not comply with the essential requirements in the standard.</p> <p>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.</p>			

1 Test Laboratory

1.1 Notes of the Test Report

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

1.2. Test facility

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

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

A2LA (Certificate Number: 3857.01)

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

1.3 Testing Location

Company: Eurofins TA Technology (Shanghai) Co., Ltd.
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City: Shanghai
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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	Aava Mobile Oy
Applicant address	Nahkatehtaankatu 2, FI-90130 Oulu, Finland
Manufacturer	Aava Mobile Oy
Manufacturer address	Nahkatehtaankatu 2, FI-90130 Oulu, Finland

2.2 General information

EUT Description			
Model	INARI-E-10-WIG-1		
SN	Conducted: XBBA2FC1700102 Radiated: XBBA2FC1700039		
Hardware Version	EV1		
Software Version	007		
Power Supply	Battery / AC adapter		
Antenna Type	Internal Antenna		
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)		
Antenna Gain	Antenna 1: 1.10 dBi Antenna 2: 2.60 dBi		
Test Mode(s)	Basic Rate	Enhanced Data Rate (EDR)	
Modulation Type	Frequency Hopping Spread Spectrum (FHSS)		
	GFSK	$\pi/4$ DQPSK	8DPSK
Packet Type (Maximum Payload)	DH5	2DH5	3DH5
Max. Output Power	8.48 dBm		
Operating Frequency Range(s)	2402-2480 MHz		
EUT Accessory			
Battery	Manufacturer: Shenzhen Guangwei Electronic Technology Co., Ltd. Model: AMME5260		
Note: 1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant.			

3 Applied Standards

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

Test standards:

FCC CFR47 Part 15C (2023) Radio Frequency Devices

ANSI C63.10-2013

Reference standard:

KDB 558074 D01 15.247 Meas Guidance v05r02

4 Information about the FHSS characteristics

4.1 Frequency Hopping System Requirement

Standard requirement:

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hop sets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(g):

According to Bluetooth Core Specification, the Bluetooth system transmits the packets with the pseudorandom hopping frequency with a continuous data and short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Bluetooth Core Specification, the Bluetooth system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

According to Bluetooth Core Specification, the Bluetooth system is designed not have the ability to coordinate with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.

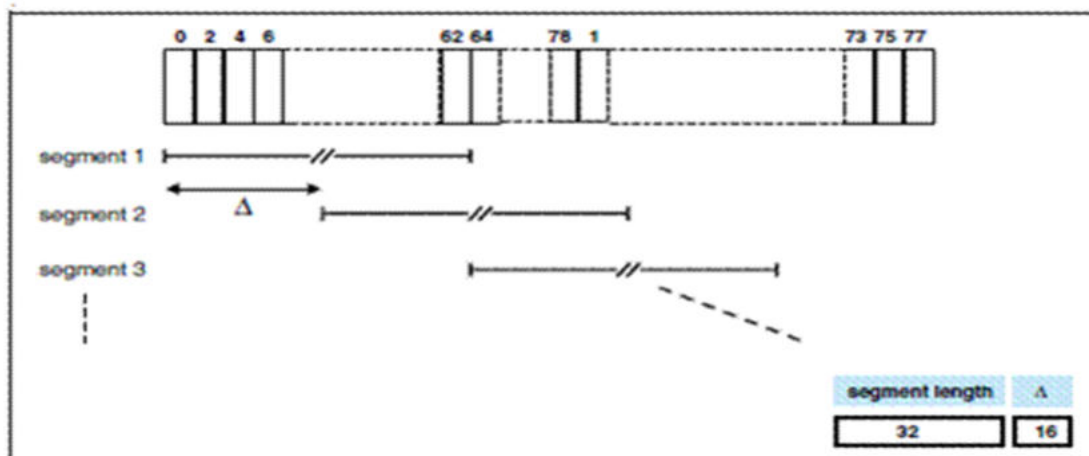
4.2 Pseudorandom Frequency Hopping Sequence

Frequency Hopping Systems. A spread spectrum system in which the carrier is modulated with the coded information in a conventional manner causing a conventional spreading of the RF energy about the frequency carrier. The frequency of the carrier is not fixed but changes at fixed intervals under the direction of a coded sequence. The wide RF bandwidth needed by such a system is not required by spreading of the RF energy about the carrier but rather to accommodate the range of frequencies to which the carrier frequency can hop. The test of a frequency hopping system is that the near term distribution of hops appears random, the long term distribution appears evenly distributed over the hop set, and sequential hops are randomly distributed in both direction and magnitude of change in the hop set.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH-enabled Bluetooth device will then communicate with other devices within its pioneer to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no impact on the bandwidth used.

The selection scheme chooses a segment of 32 hop frequencies spanning about 64 MHz and visits these hops in a pseudo-random order. Next, a different 32-hop segment is chosen, etc. In the page, master page response, slave page response, page scan, inquiry, inquiry response and inquiry scan hopping sequences, the same 32-hop segment is used all the time (the segment is selected by the address; different devices will have different paging segments).

When the basic channel hopping sequence is selected, the output constitutes a pseudo-random sequence that slides through the 79 hops. The principle is depicted in the figure below.



Hop selection scheme in CONNECTION state.

Pseudorandom Frequency Hopping Sequence Table as below:

Channel: 08, 24, 40, 56, 40, 56, 72, 09, 01, 09, 33, 41, 33, 41, 65, 73, 53, 69, 06, 22, 04, 20, 36, 52, 38, 46, 70, 78, 68, 76, 21, 29, 10, 26, 42, 58, 44, 60, 76, 13, 03, 11, 35, 43, 37, 45, 69, 77, 55, 71, 08, 24, 08, 24, 40, 56, 40, 48, 72, 01, 72, 01, 25, 33, 12, 28, 44, 60, 42, 58, 74, 11, 05, 13, 37, 45, etc.

Each frequency used equally on the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

4.3 Equal Hopping Frequency Use

All Bluetooth units participating in the Pico net are time and hop-synchronized to the channel. Each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event.

4.4 System Receiver Input Bandwidth

Each channel bandwidth is 1MHz. The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

4.5 Test Configuration

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 worst case was recorded.

Test Cases	Test Modes
Peak Power Output -Conducted	DH5/2DH5/3DH5
Occupied Bandwidth (20dB)	DH5/2DH5/3DH5
Frequency Separation	DH5/2DH5/3DH5
Time of Occupancy (Dwell Time)	DH5/2DH5/3DH5
Band Edge Compliance	DH5/2DH5/3DH5
Number of Hopping Frequency	DH5/2DH5/3DH5
Spurious RF Conducted Emissions	DH5/2DH5/3DH5
Unwanted Emission	DH5/2DH5/3DH5
Conducted Emission	DH5/2DH5/3DH5

5 Test Case Results

5.1 Peak Power Output

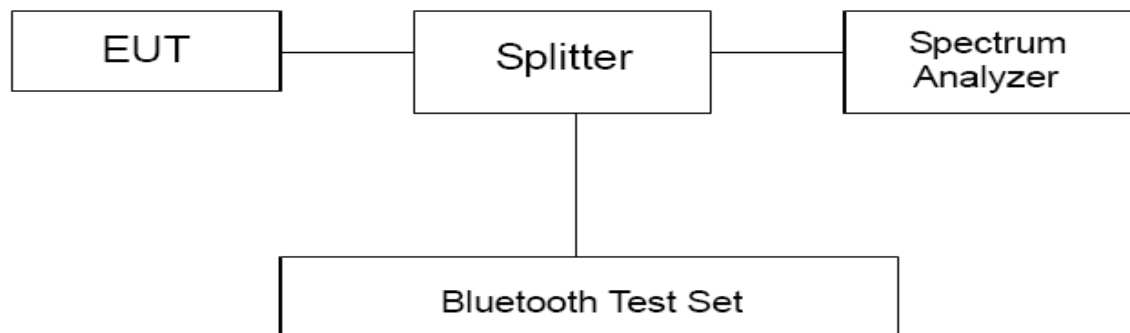
Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Methods of Measurement

During the process of the testing, The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. The EUT is controlled by the Bluetooth test set to ensure max power transmission with proper modulation. The peak detector is used. RBW is set to 2 MHz; VBW is set to 6 MHz. These measurements have been tested at following channels: 0, 39, and 78.

Test Setup



Limits

Rule Part 15.247 (b) (1) specifies that " For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts."

Peak Output Power	$\leq 125 \text{ mW (21dBm)}$
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Measurement Uncertainty

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

Test Results

Antenna 1

Bluetooth Power Index			
Channel	DH5	2DH5	3DH5
CH0	10.00	9.00	9.00
CH39	9.00	9.00	9.00
CH78	9.00	9.00	9.00

Channel	Frequency (MHz)	Peak Output Power (dBm)			Limit (dBm)	Conclusion
		DH5	2DH5	3DH5		
0	2402	8.32	8.21	8.25	21	PASS
39	2441	7.77	8.48	8.31	21	PASS
78	2480	6.45	7.22	7.64	21	PASS

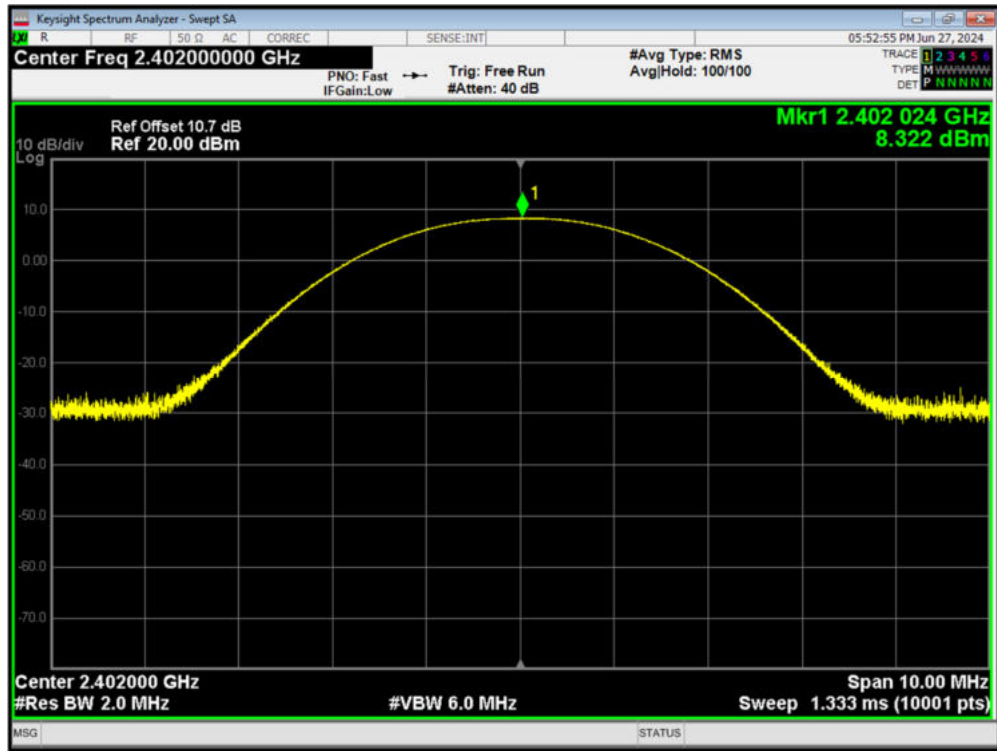
Antenna 2

Bluetooth Power Index			
Channel	DH5	2DH5	3DH5
CH0	10.00	9.00	9.00
CH39	9.00	9.00	9.00
CH78	9.00	9.00	9.00

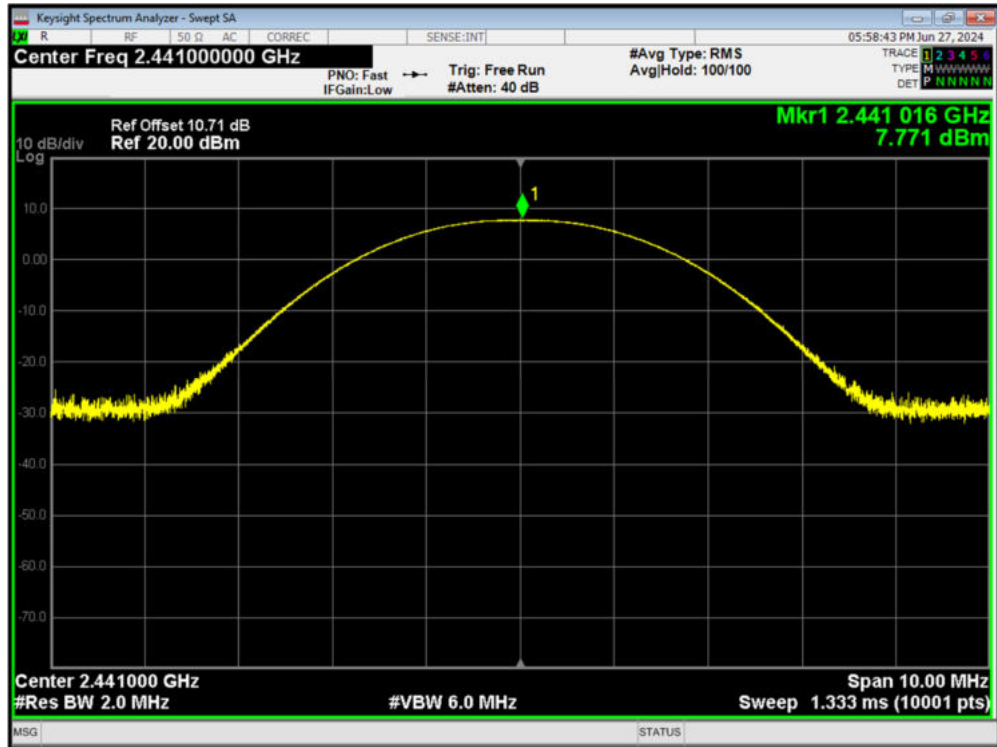
Channel	Frequency (MHz)	Peak Output Power (dBm)			Limit (dBm)	Conclusion
		DH5	2DH5	3DH5		
0	2402	8.28	7.90	8.32	21	PASS
39	2441	7.51	8.26	8.13	21	PASS
78	2480	6.52	7.20	7.75	21	PASS

Antenna 1

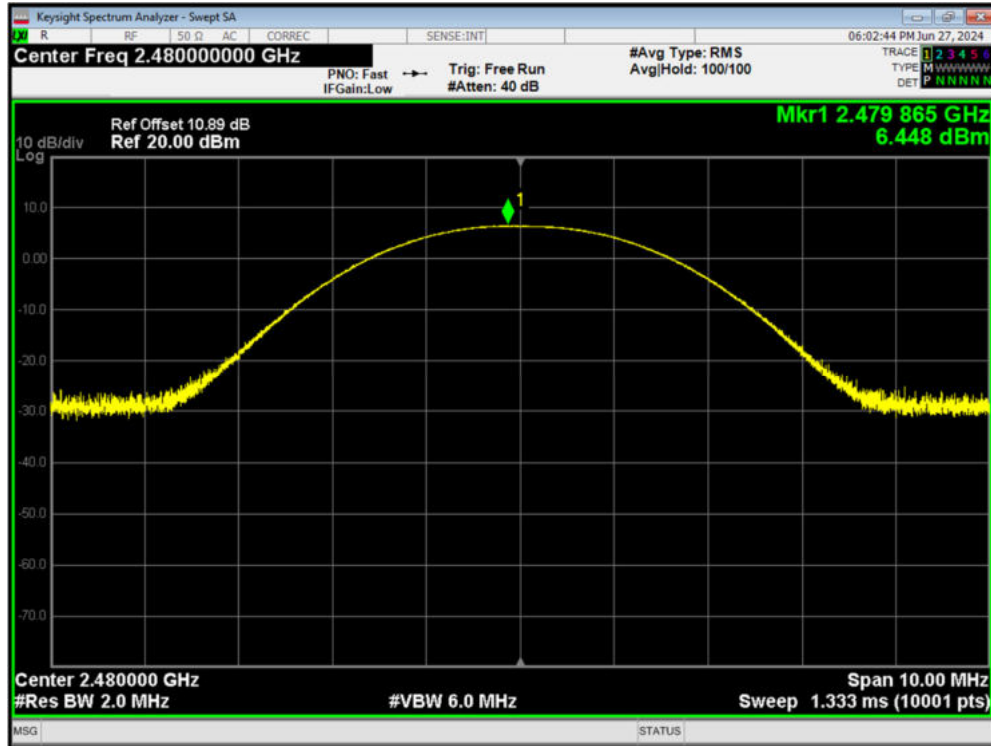
Power 1-DH5 2402MHz



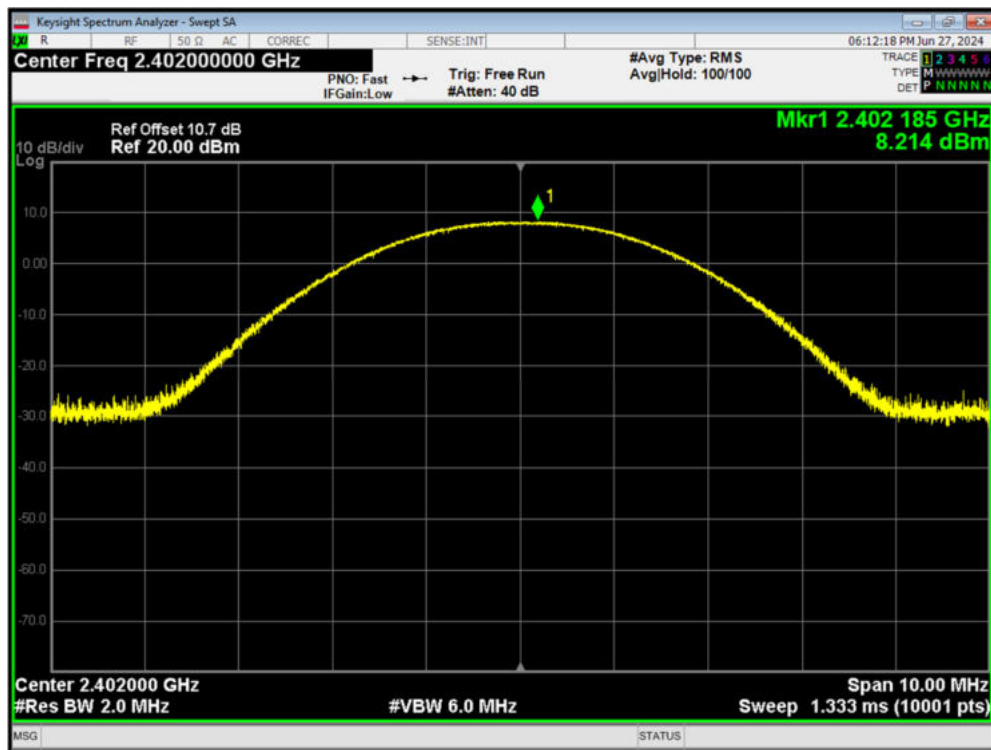
Power 1-DH5 2441MHz



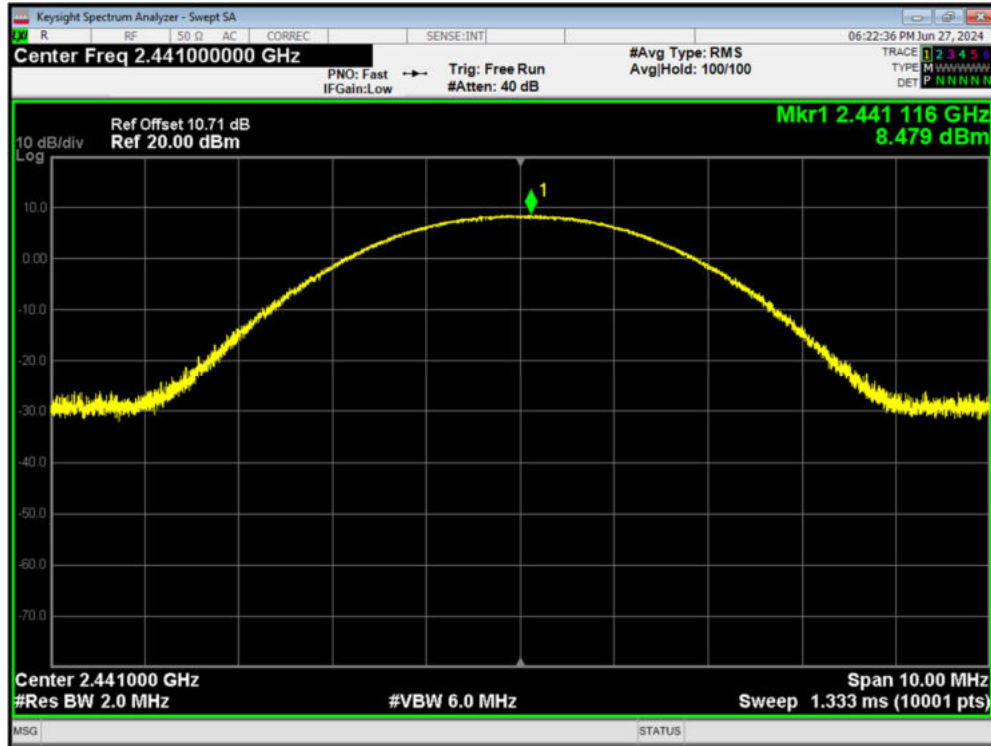
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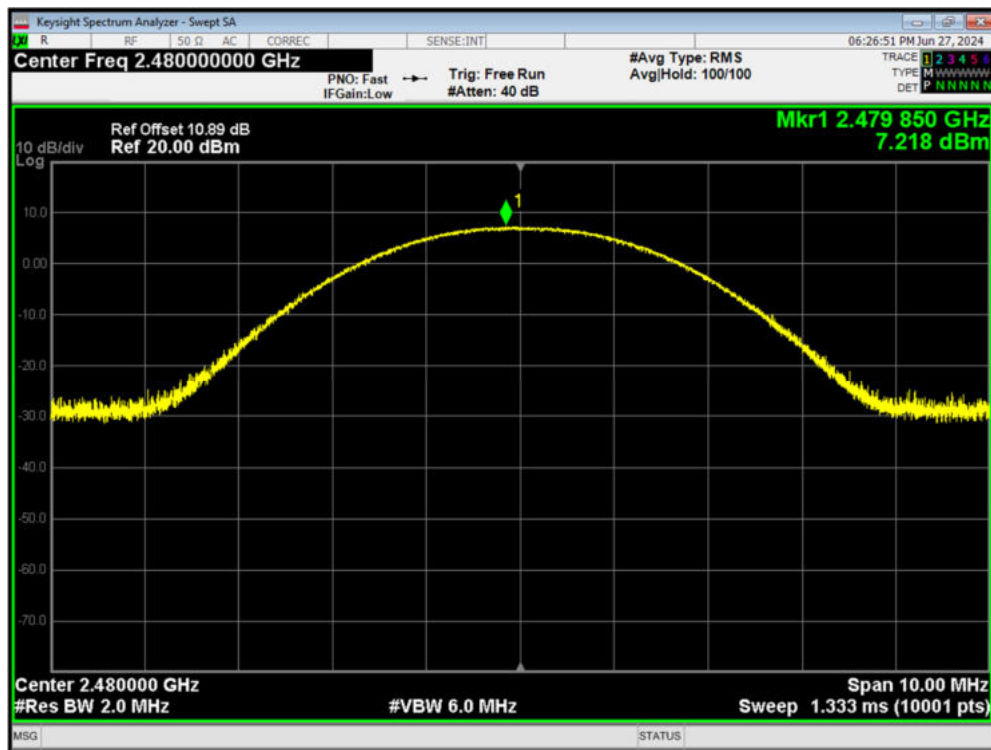
Power 2-DH5 2402MHz



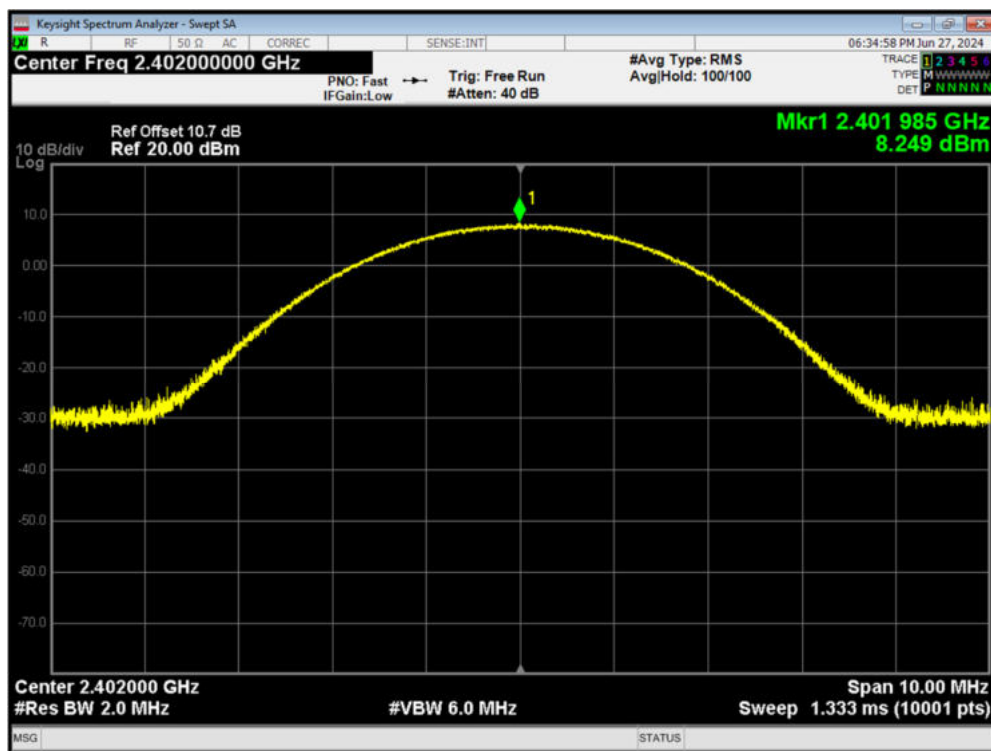
Power 2-DH5 2441MHz



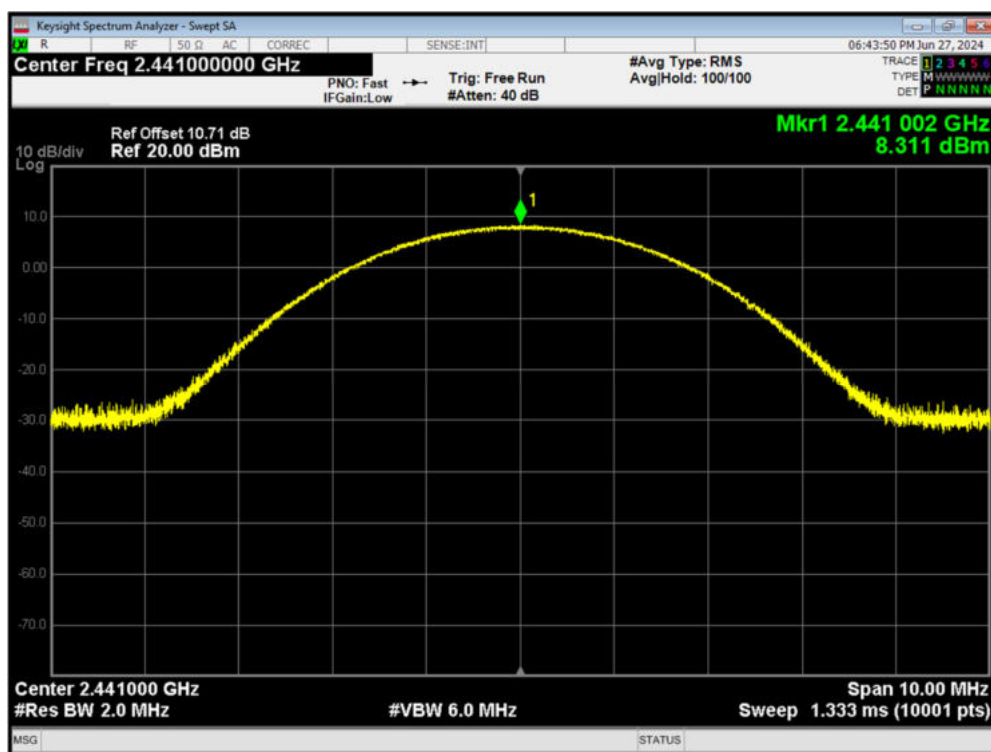
Power 2-DH5 2480MHz



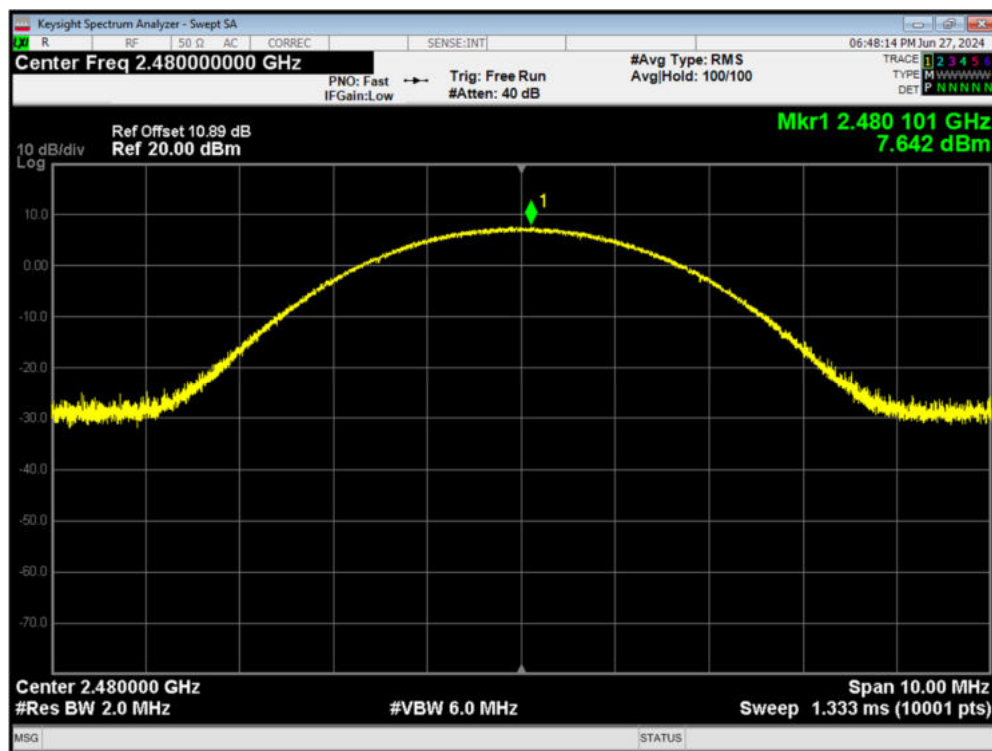
Power 3-DH5 2402MHz



Power 3-DH5 2441MHz

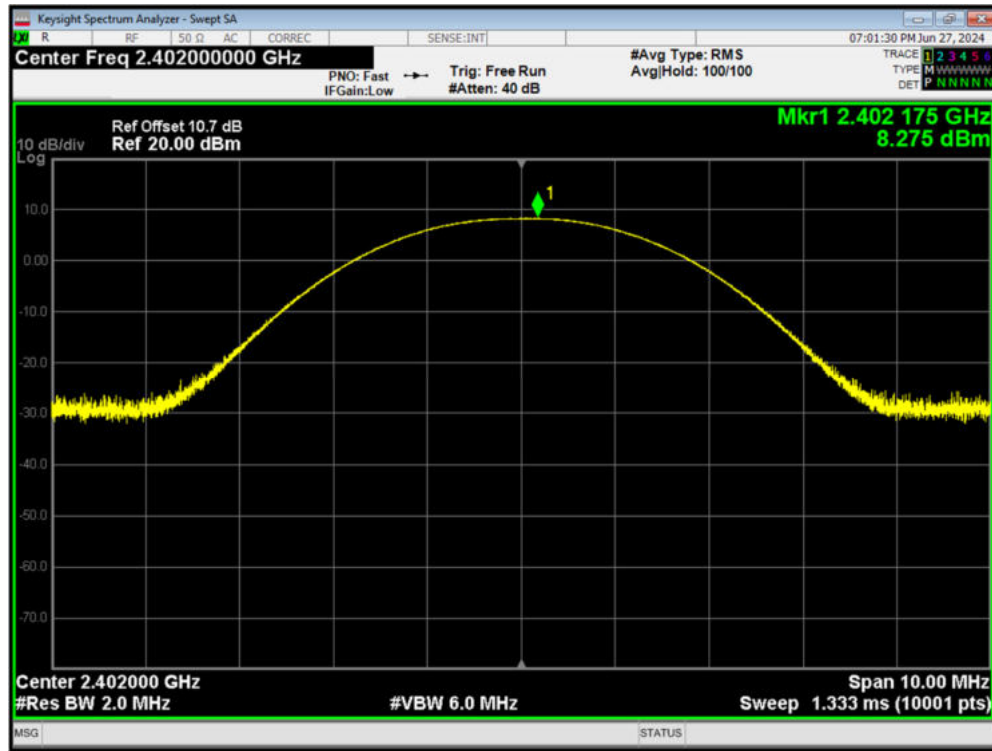


Power 3-DH5 2480MHz

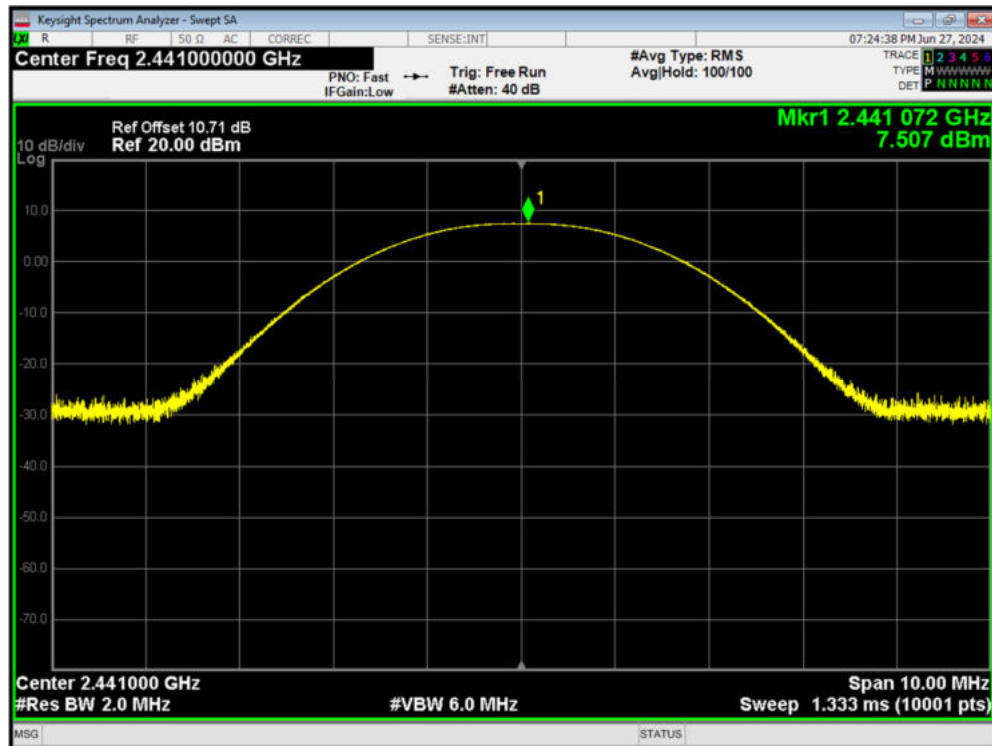


Antenna 2

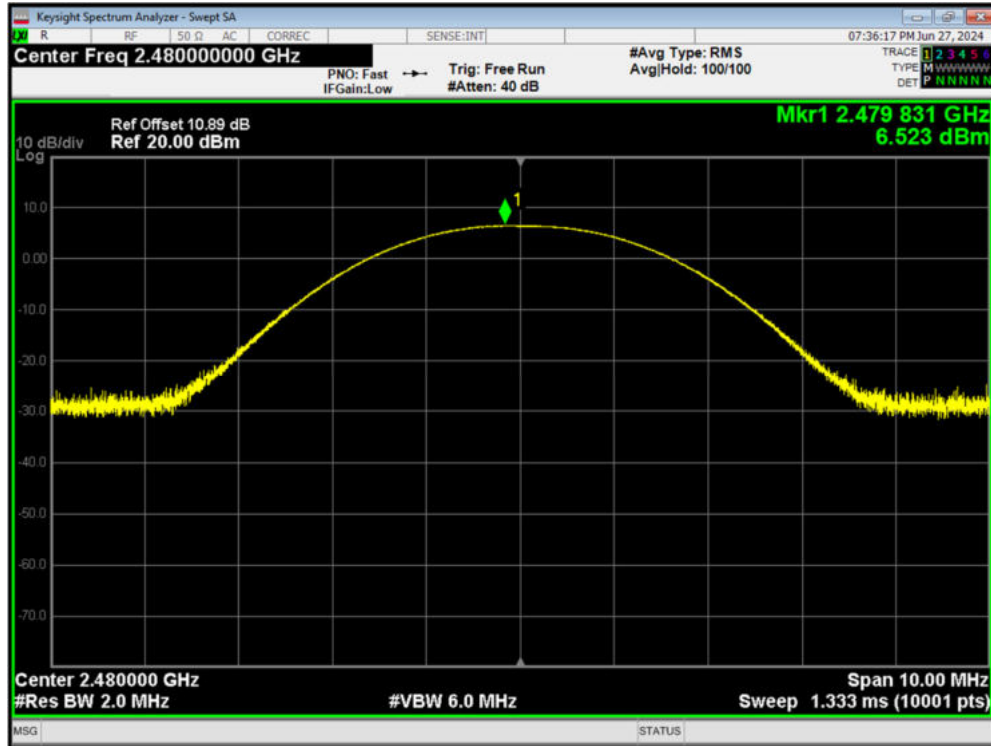
Power 1-DH5 2402MHz



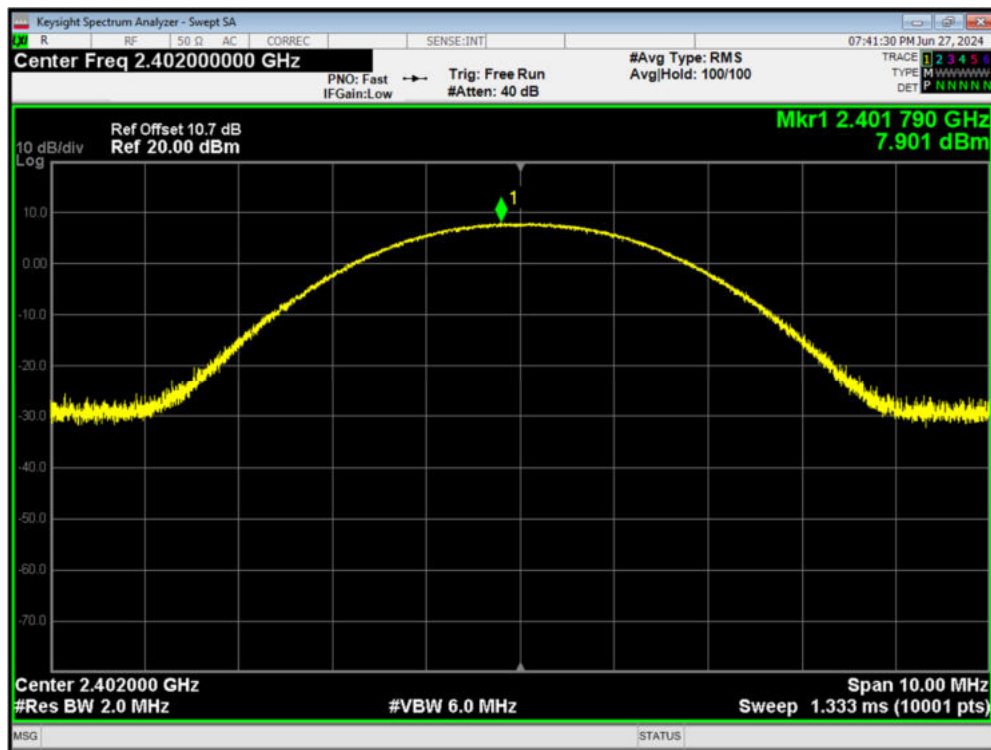
Power 1-DH5 2441MHz



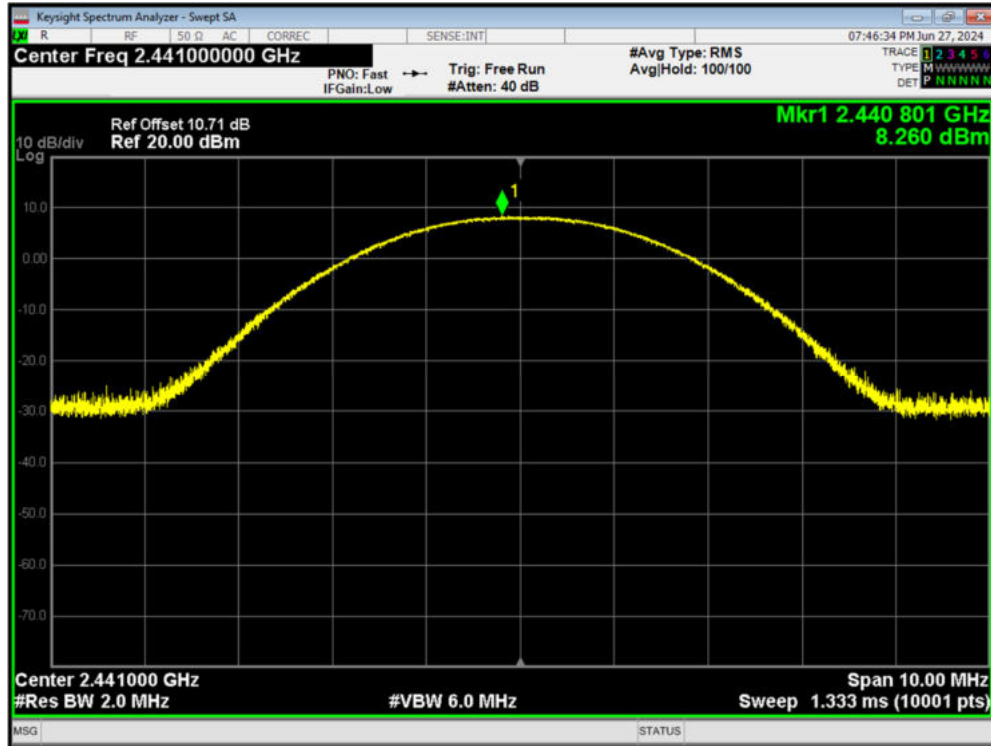
Power 1-DH5 2480MHz



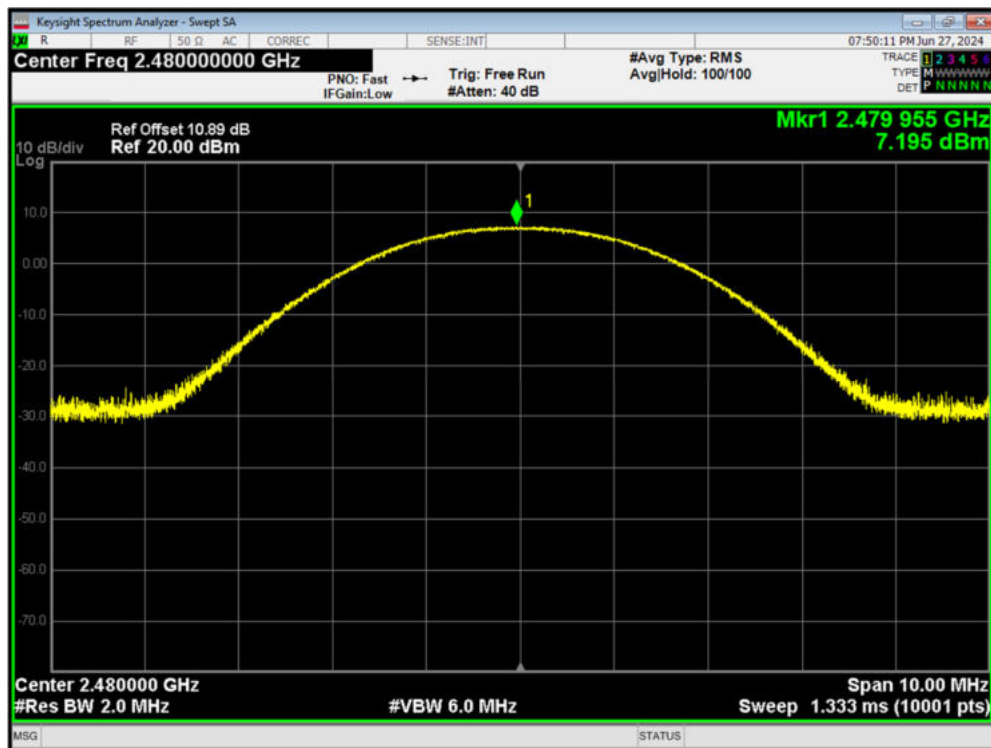
Power 2-DH5 2402MHz



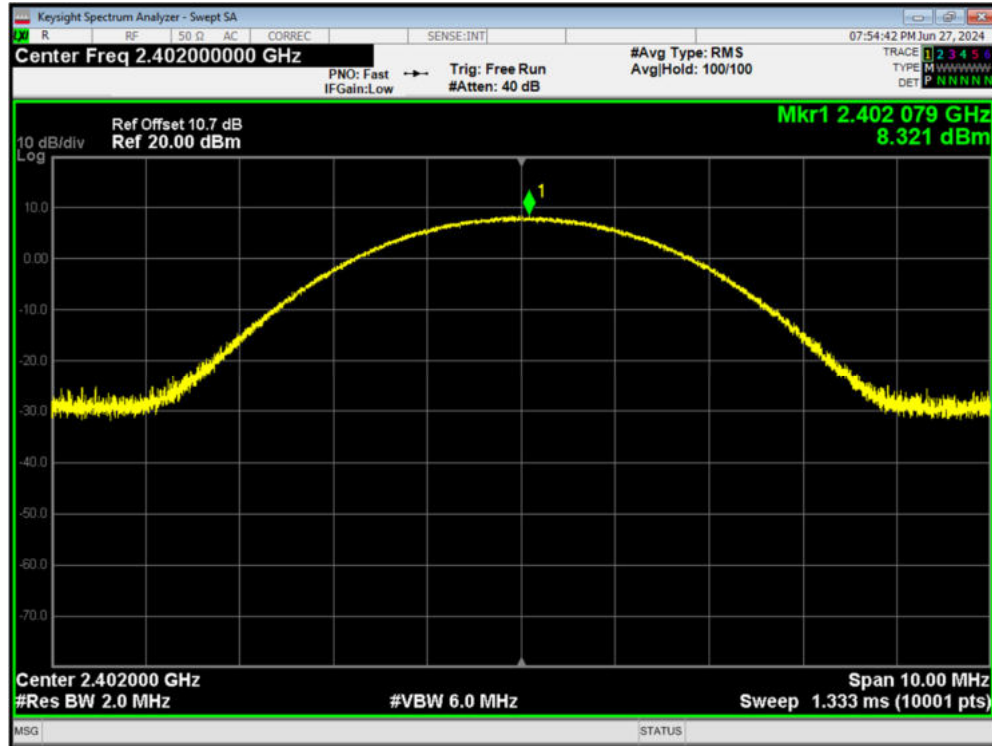
Power 2-DH5 2441MHz



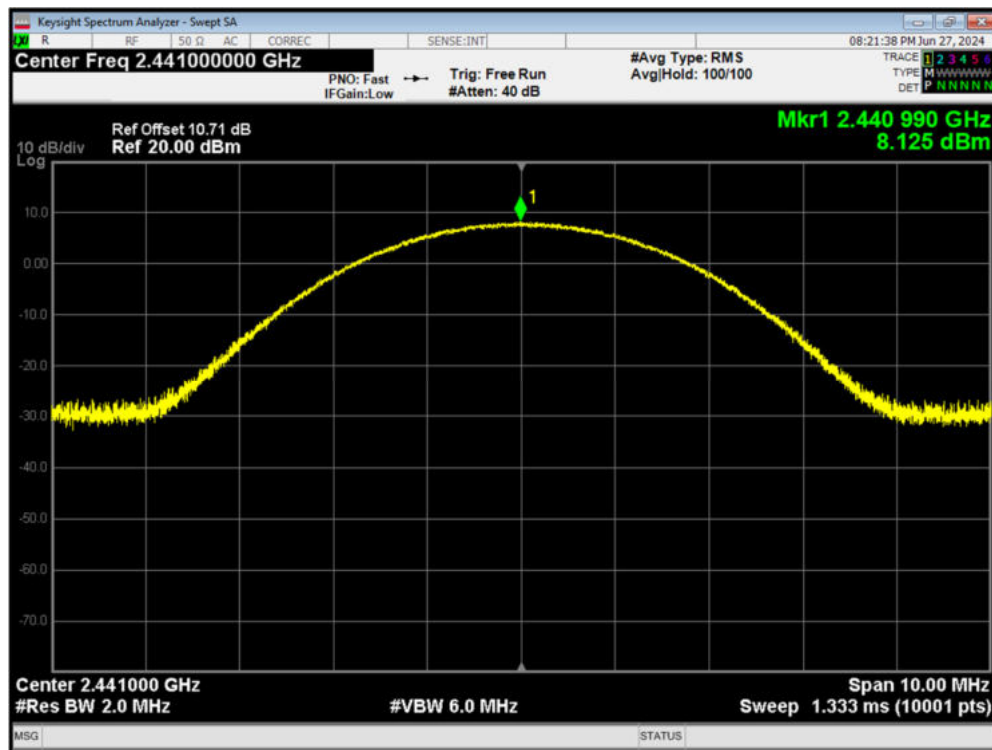
Power 2-DH5 2480MHz



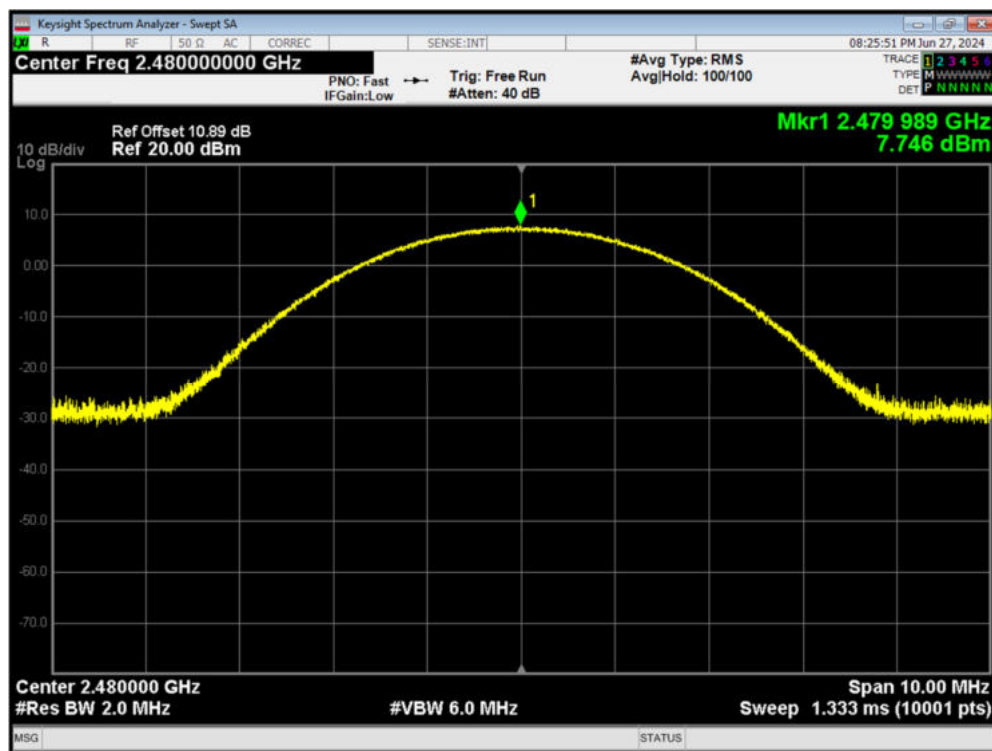
Power 3-DH5 2402MHz



Power 3-DH5 2441MHz



Power 3-DH5 2480MHz



5.2 99% Bandwidth and 20dB Bandwidth

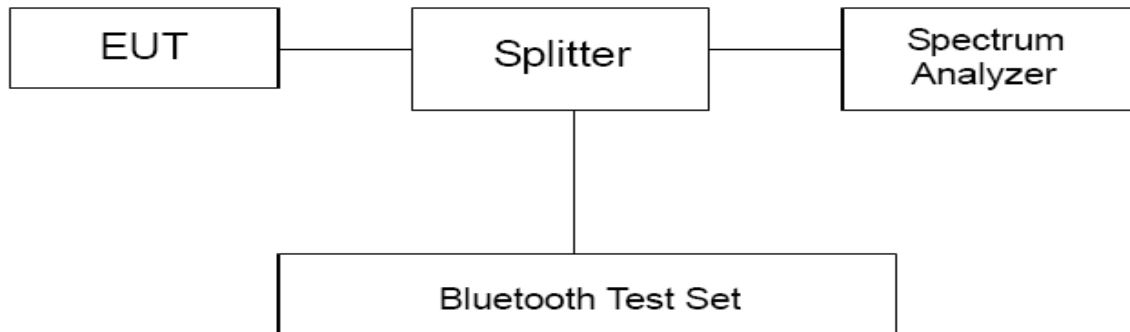
Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Method of Measurement

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 30kHz and VBW is set to 100kHz on spectrum analyzer. -20dB occupied bandwidths are recorded.

Test Setup



Limits

No specific occupied bandwidth requirements in part 15.247(a) (1).

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

Antenna 1

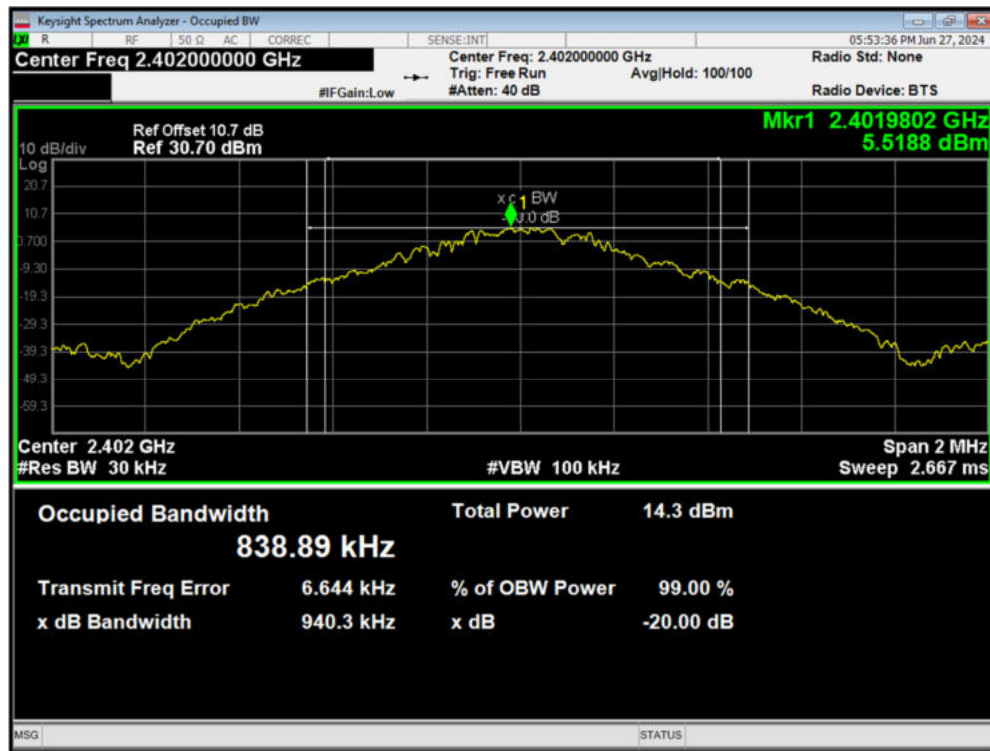
Test Mode		Channel	Frequency (MHz)	99% bandwidth (MHz)	20dB Bandwidth (MHz)
Bluetooth	DH5	0	2402	0.839	0.940
		39	2441	0.836	0.930
		78	2480	0.838	0.939
	2DH5	0	2402	1.185	1.283
		39	2441	1.188	1.282
		78	2480	1.180	1.301
	3DH5	0	2402	1.191	1.302
		39	2441	1.197	1.291
		78	2480	1.193	1.290

Antenna 2

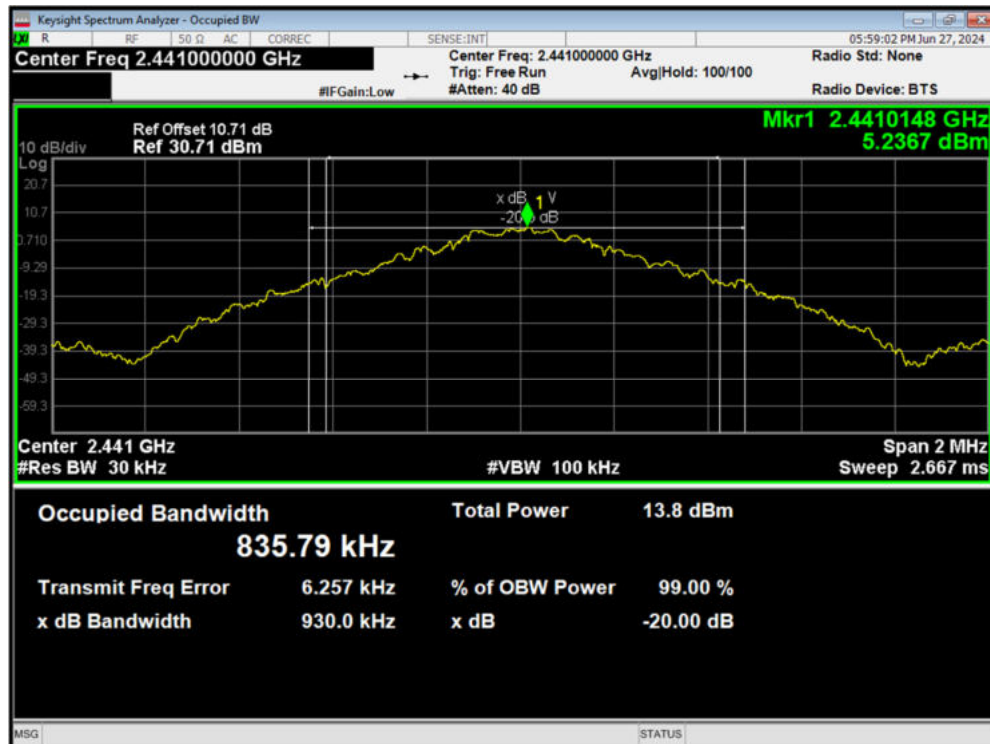
Test Mode		Channel	Frequency (MHz)	99% bandwidth (MHz)	20dB Bandwidth (MHz)
Bluetooth	DH5	0	2402	0.855	0.920
		39	2441	0.861	0.961
		78	2480	0.829	0.925
	2DH5	0	2402	1.823	1.280
		39	2441	1.196	1.346
		78	2480	1.195	1.327
	3DH5	0	2402	1.197	1.311
		39	2441	1.202	1.301
		78	2480	1.196	1.301

Antenna 1

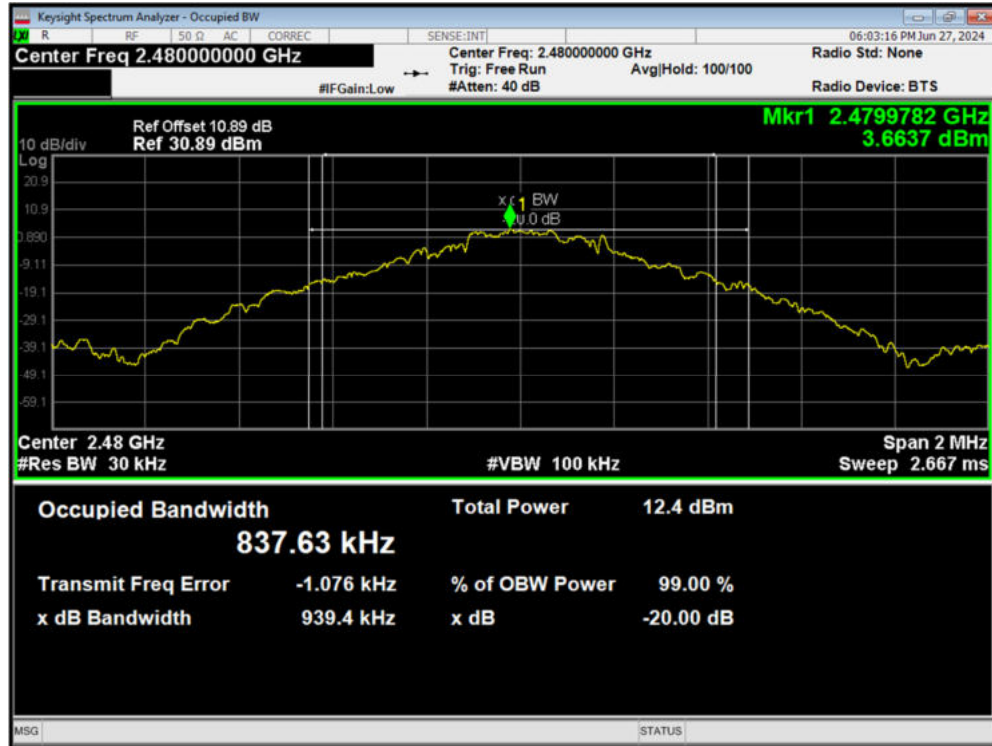
-20dB Bandwidth 1-DH5 2402MHz



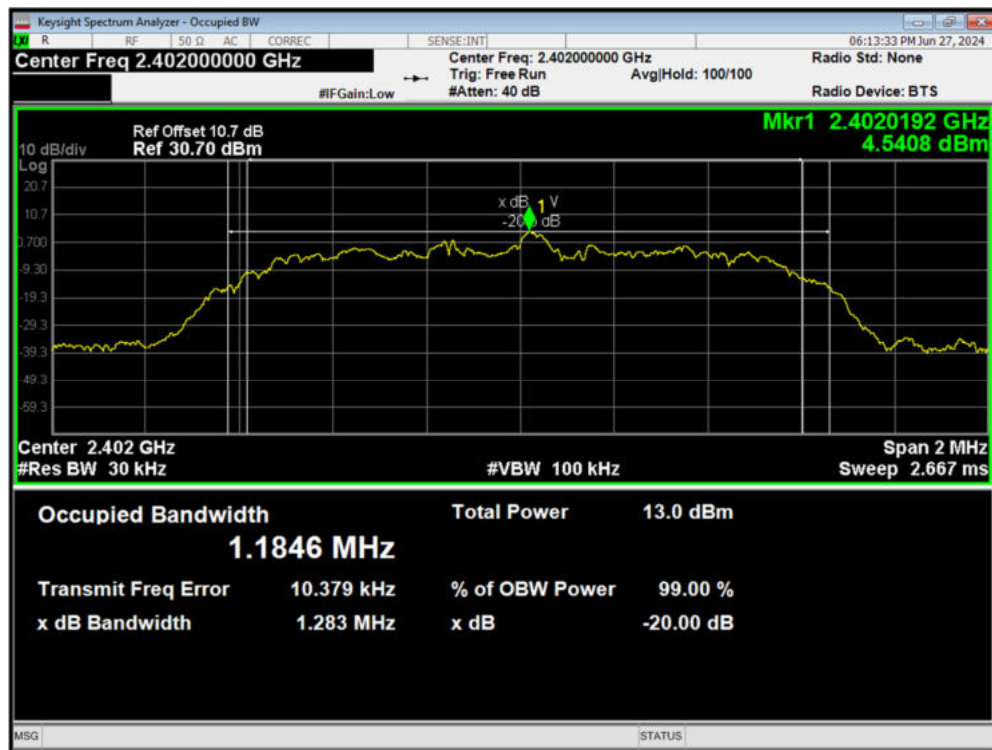
-20dB Bandwidth 1-DH5 2441MHz



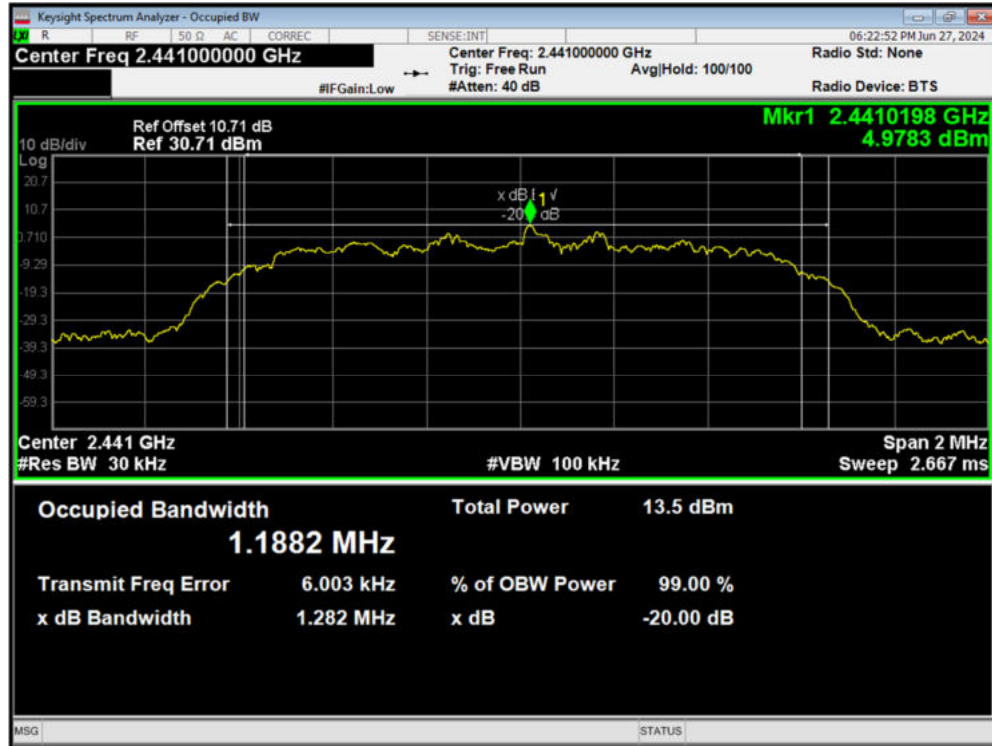
-20dB Bandwidth 1-DH5 2480MHz



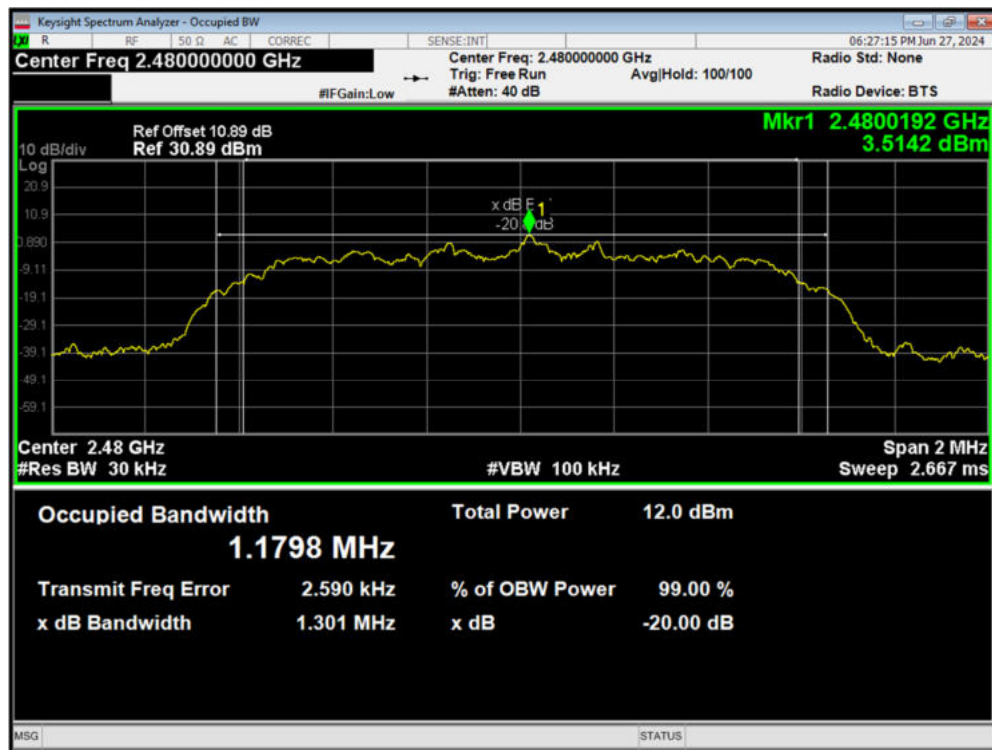
-20dB Bandwidth 2-DH5 2402MHz



-20dB Bandwidth 2-DH5 2441MHz



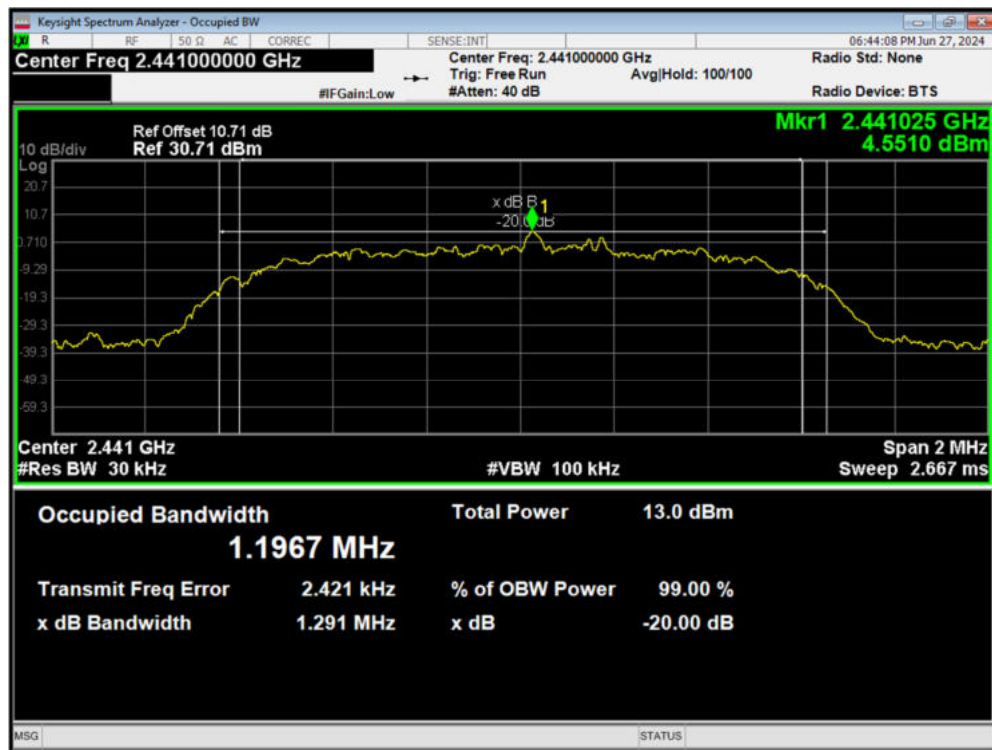
-20dB Bandwidth 2-DH5 2480MHz



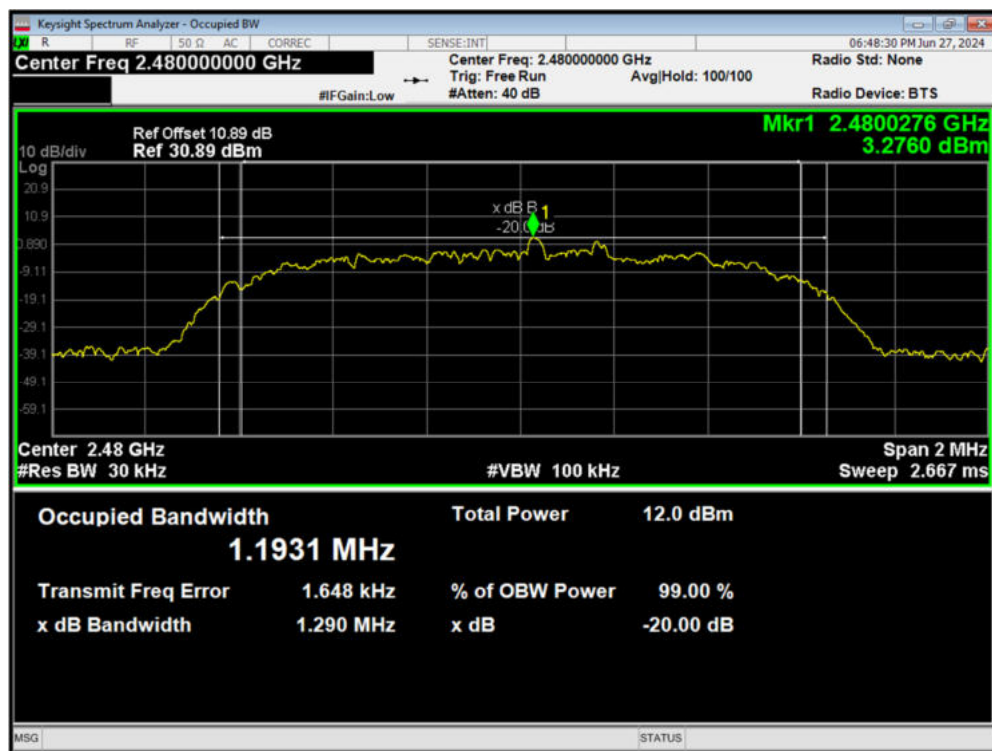
-20dB Bandwidth 3-DH5 2402MHz



-20dB Bandwidth 3-DH5 2441MHz

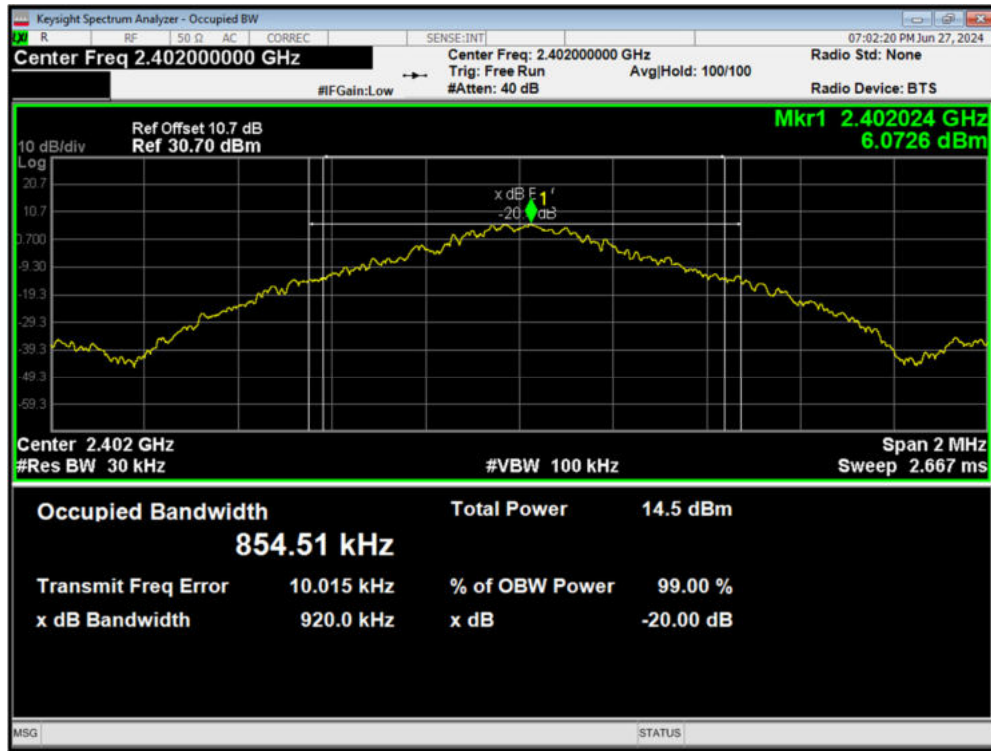


-20dB Bandwidth 3-DH5 2480MHz

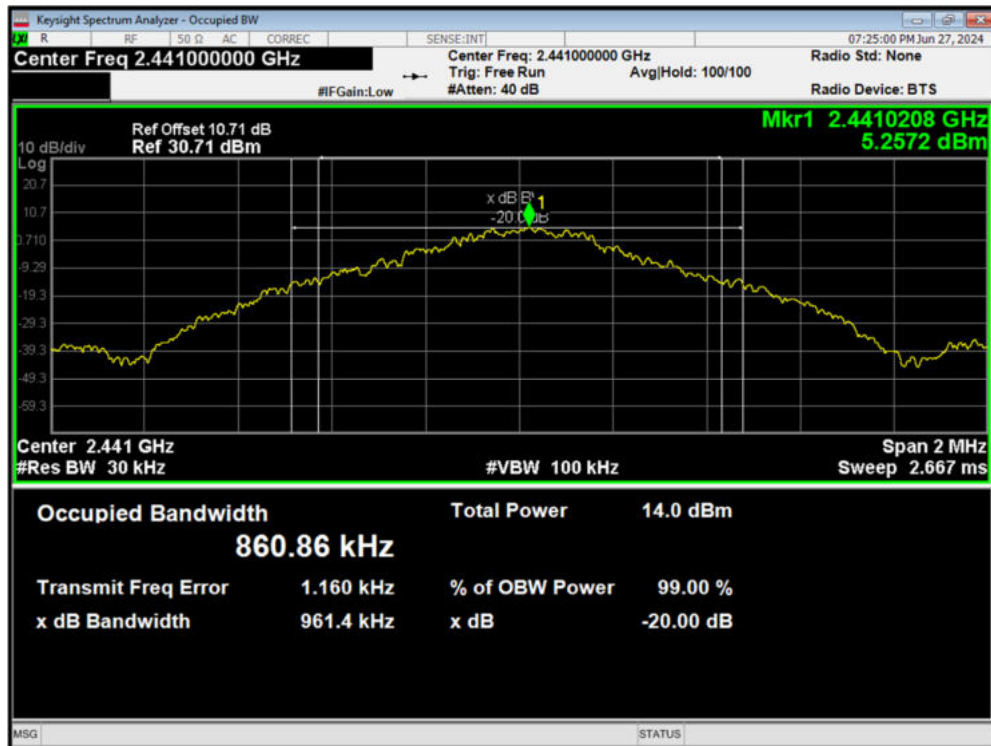


Antenna 2

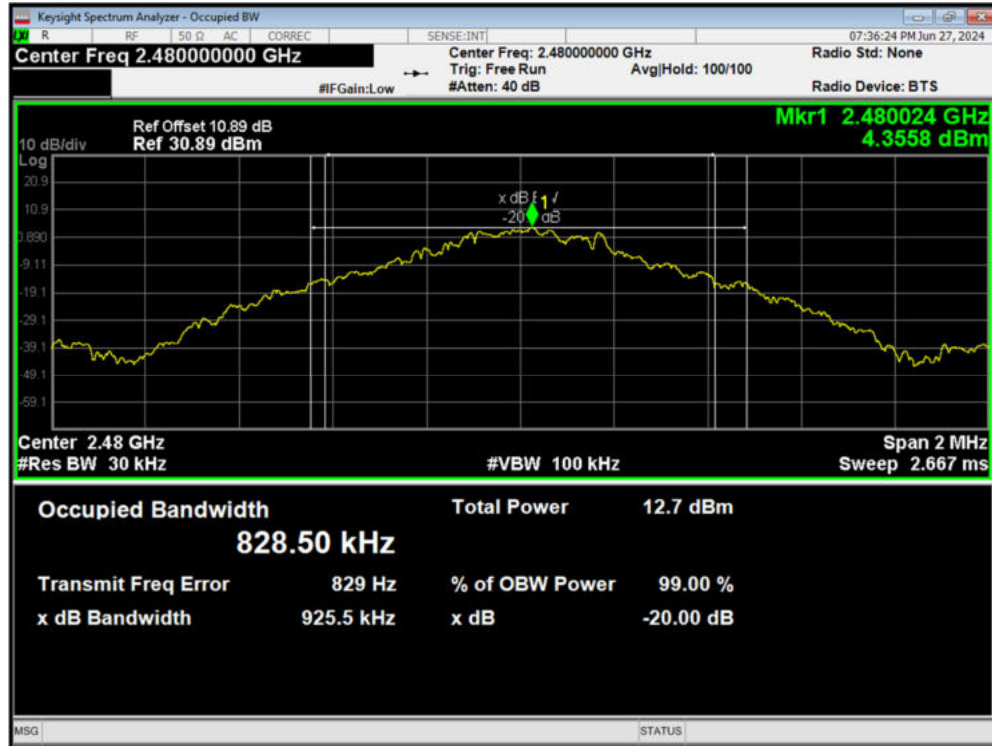
-20dB Bandwidth 1-DH5 2402MHz



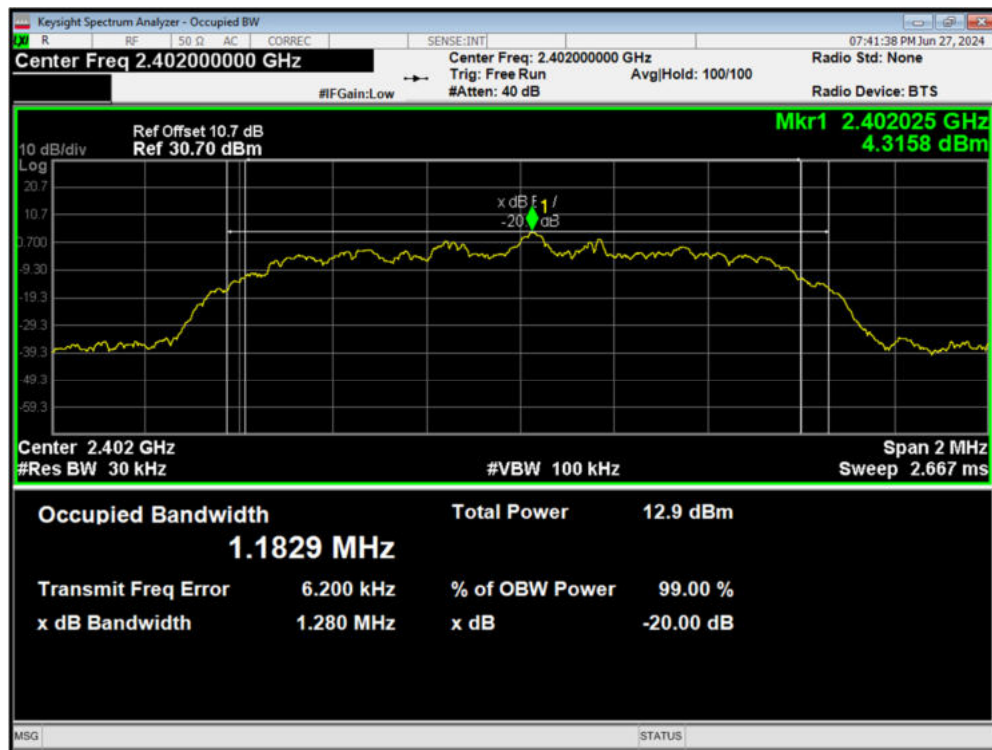
-20dB Bandwidth 1-DH5 2441MHz



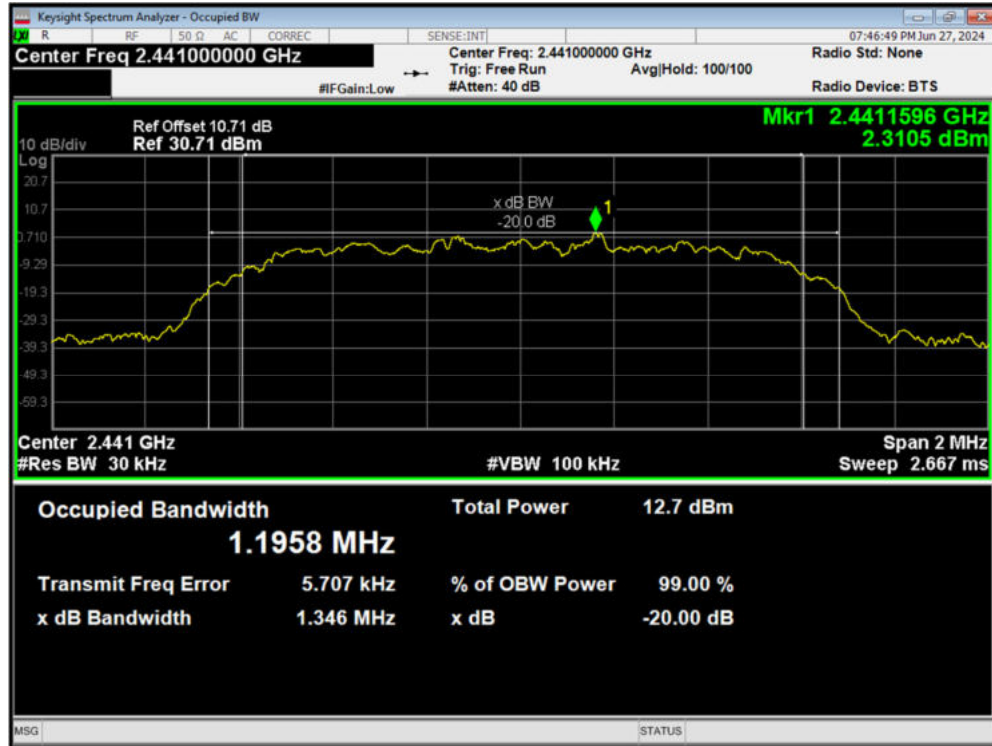
-20dB Bandwidth 1-DH5 2480MHz



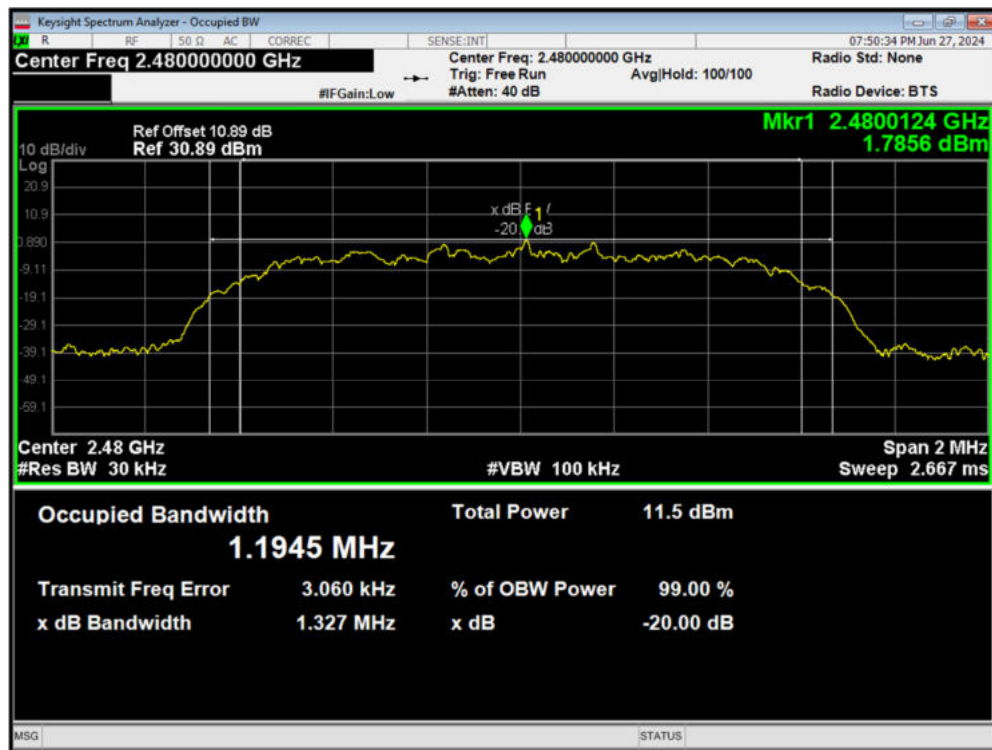
-20dB Bandwidth 2-DH5 2402MHz



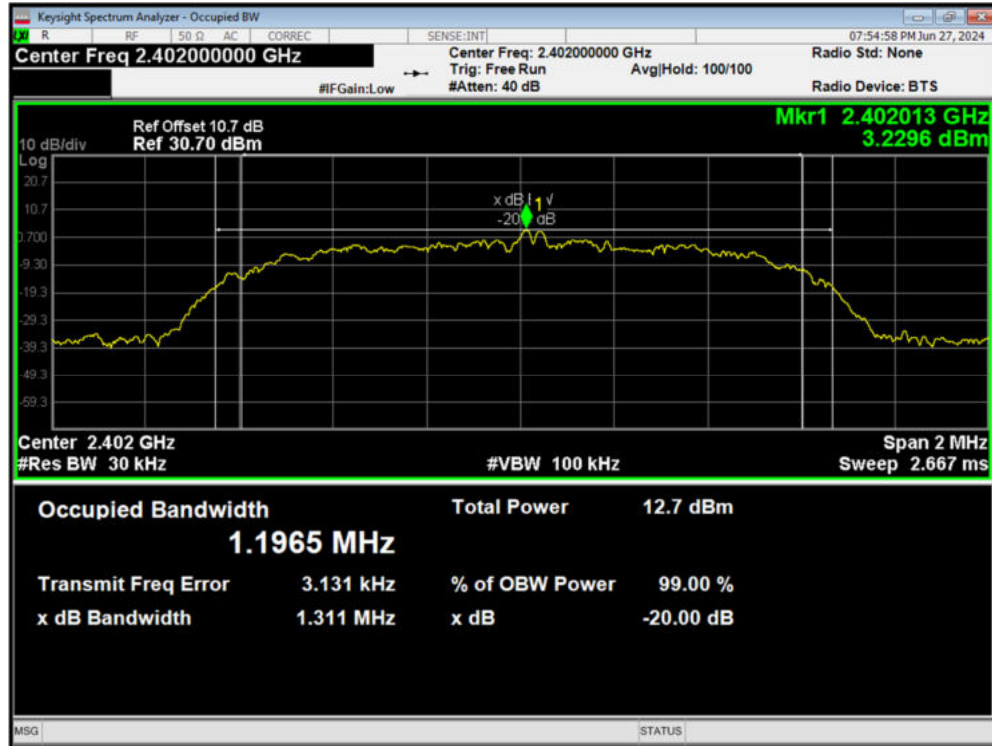
-20dB Bandwidth 2-DH5 2441MHz



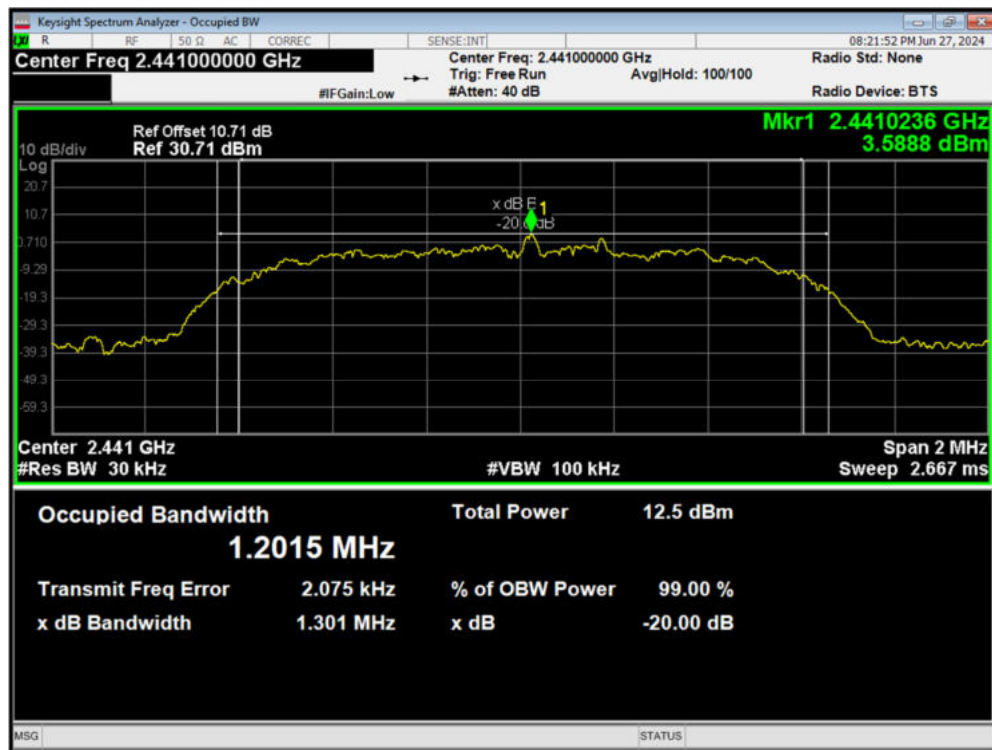
-20dB Bandwidth 2-DH5 2480MHz



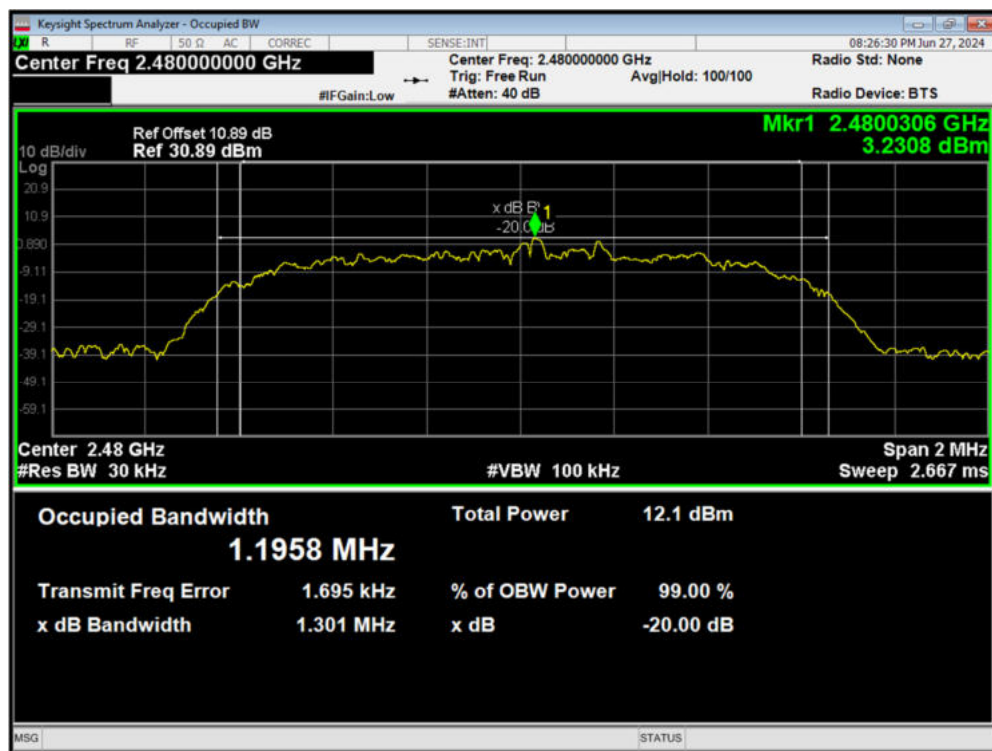
-20dB Bandwidth 3-DH5 2402MHz



-20dB Bandwidth 3-DH5 2441MHz



-20dB Bandwidth 3-DH5 2480MHz



5.3 Frequency Separation

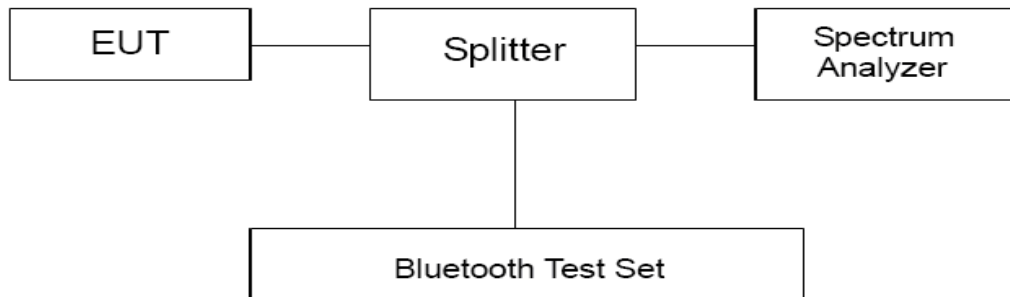
Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Method of Measurement

The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss. RBW is set to 30 kHz and VBW is set to 100 kHz on spectrum analyzer. Set EUT on Hopping on mode.

Test setup



Limits

Rule Part 15.247(a)(1) specifies that “Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. ”

Note: The value of two-thirds of 20 dB bandwidth is always greater than 25 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:

Antenna 1

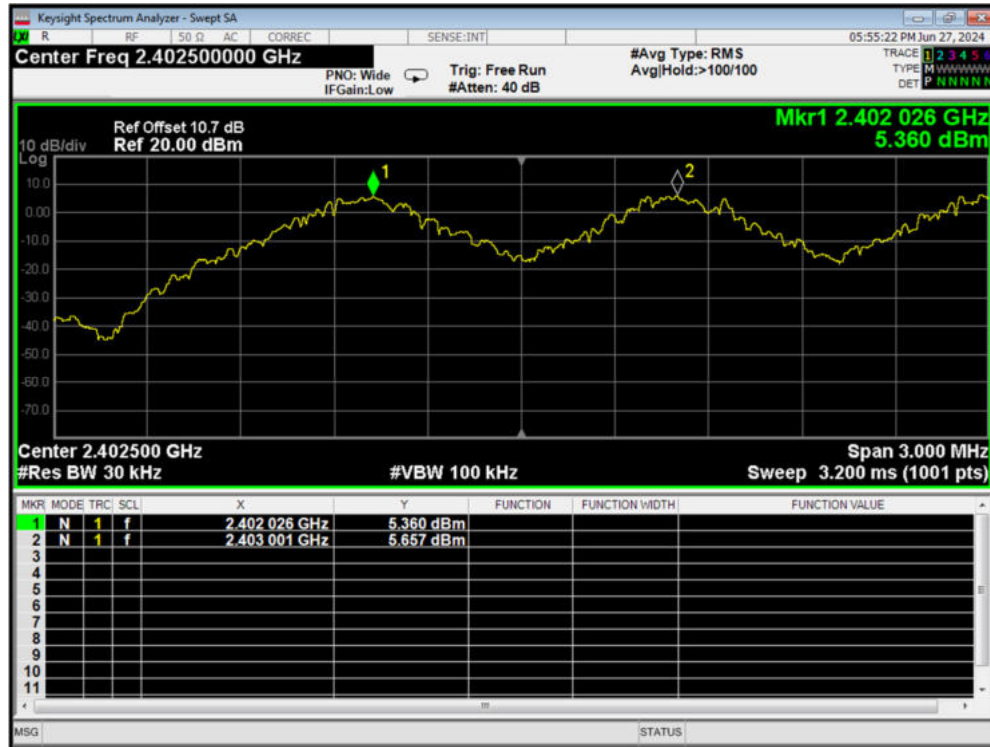
Test Mode	Carrier frequency (MHz)	Carrier frequency separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Conclusion
DH5	2402	0.970	0.940	0.627	PASS
	2441	1.050	0.930	0.620	PASS
	2480	1.060	0.939	0.626	PASS
2DH5	2402	1.000	1.283	0.855	PASS
	2441	1.020	1.282	0.855	PASS
	2480	0.990	1.301	0.867	PASS
3DH5	2402	1.010	1.302	0.868	PASS
	2441	0.970	1.291	0.861	PASS
	2480	0.990	1.290	0.860	PASS
Note: The limit is two-thirds of 20 dB bandwidth.					

Antenna 2

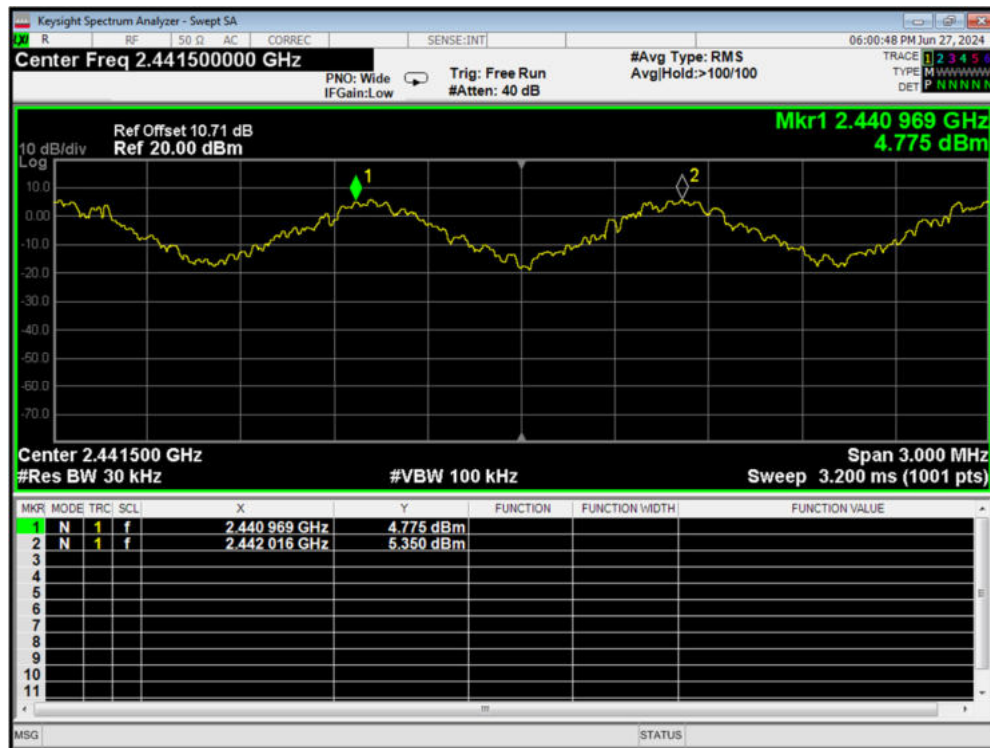
Test Mode	Carrier frequency (MHz)	Carrier frequency separation (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Conclusion
DH5	2402	1.020	0.920	0.613	PASS
	2441	1.000	0.961	0.641	PASS
	2480	1.000	0.925	0.617	PASS
2DH5	2402	1.330	1.280	0.853	PASS
	2441	1.000	1.346	0.897	PASS
	2480	0.990	1.327	0.885	PASS
3DH5	2402	0.970	1.311	0.874	PASS
	2441	0.880	1.301	0.867	PASS
	2480	0.870	1.301	0.867	PASS
Note: The limit is two-thirds of 20 dB bandwidth.					

Antenna 1

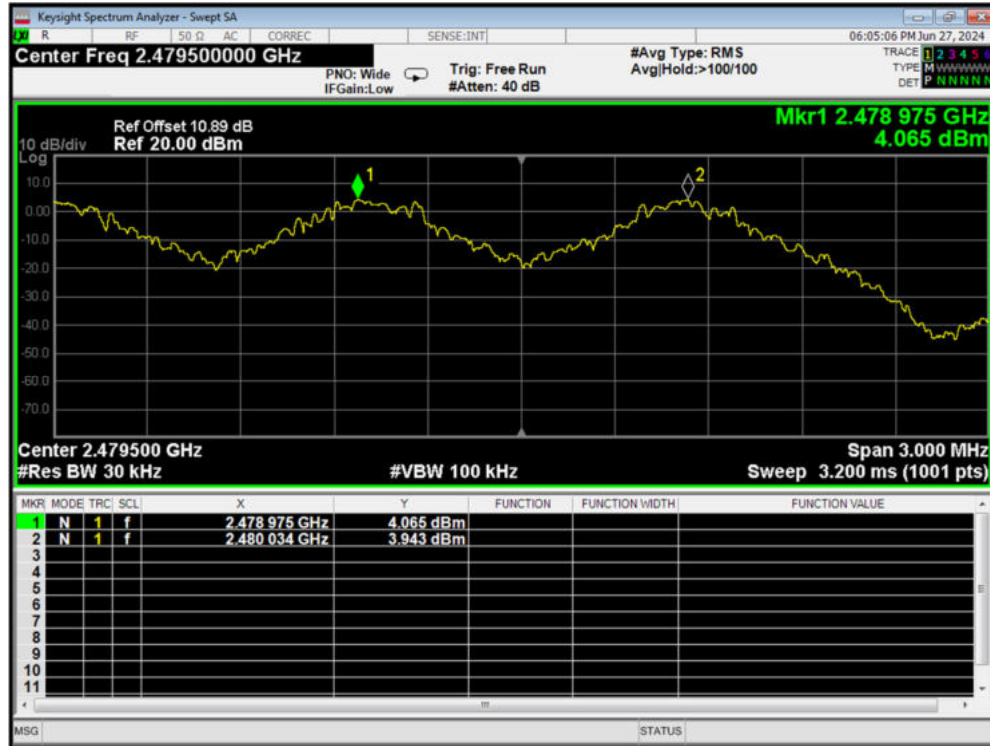
CFS 1-DH5 2402MHz



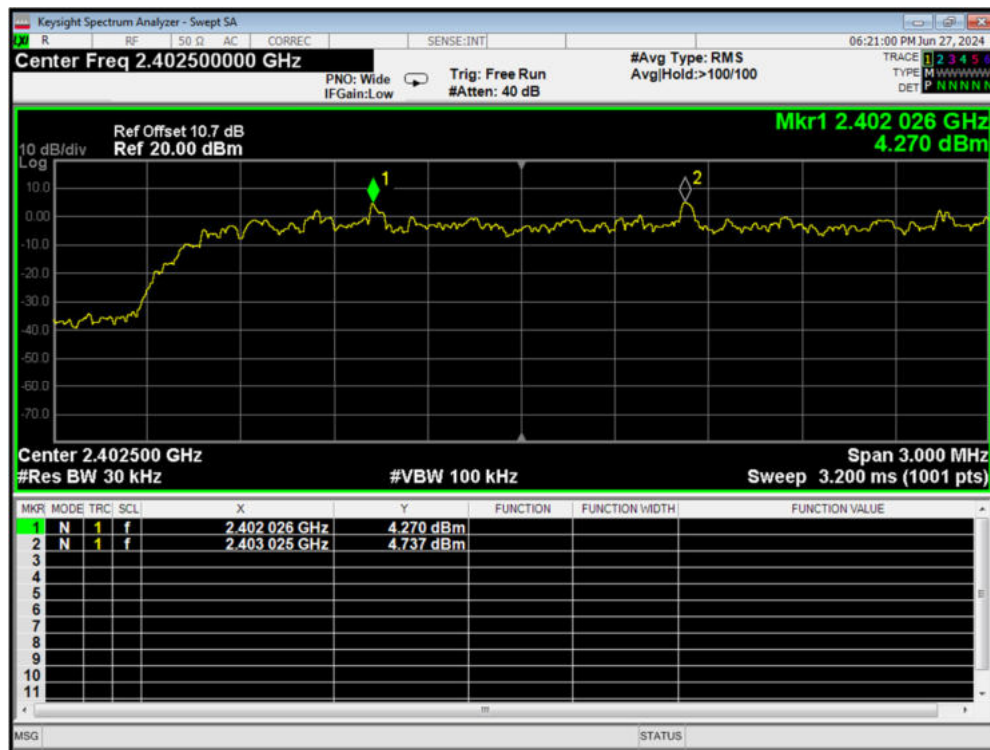
CFS 1-DH5 2441MHz



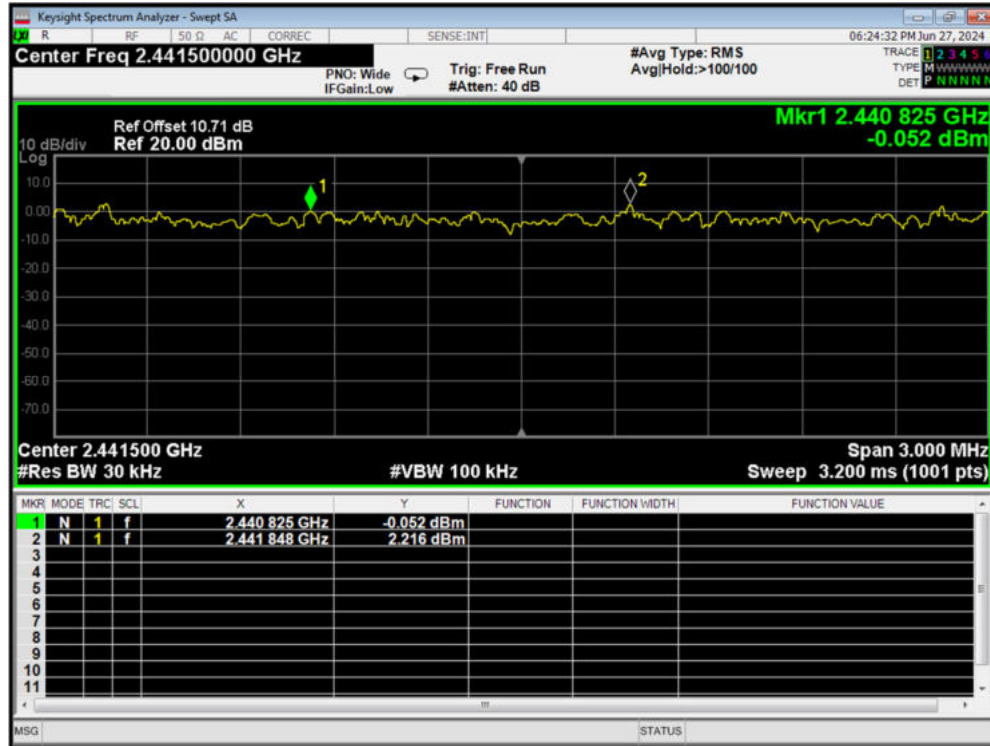
CFS 1-DH5 2480MHz



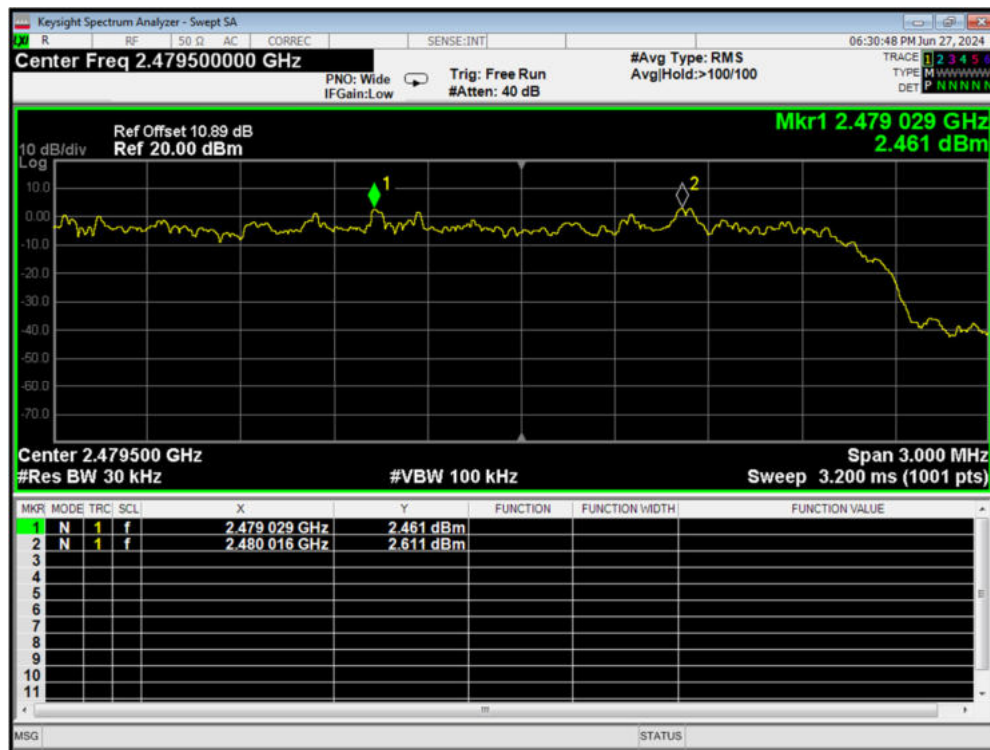
CFS 2-DH5 2402MHz



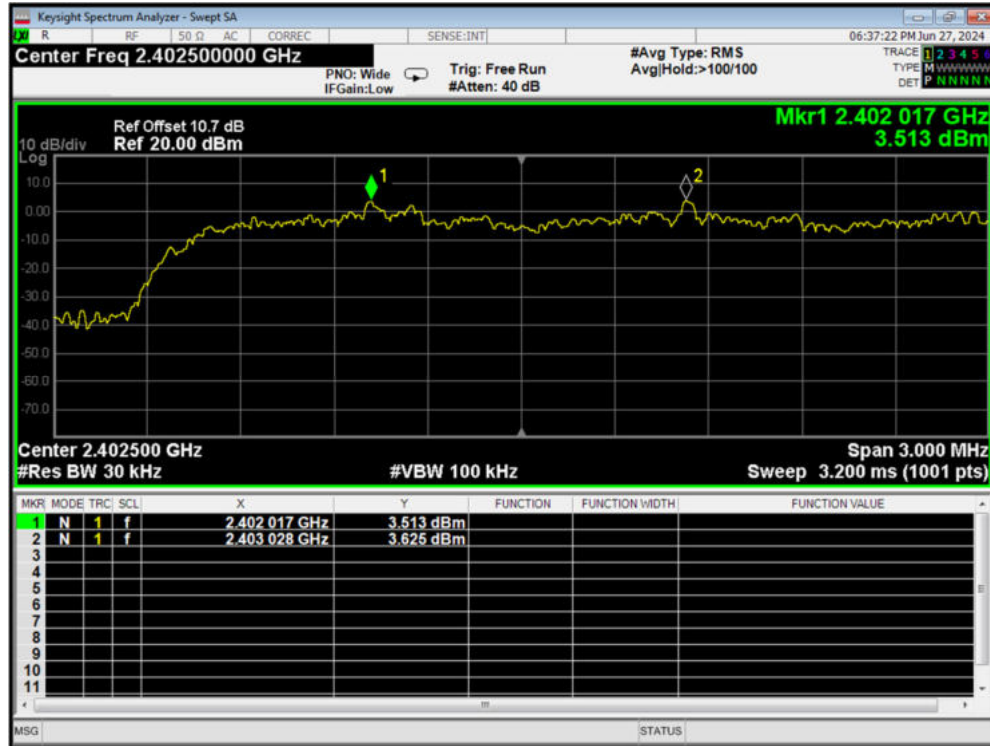
CFS 2-DH5 2441MHz



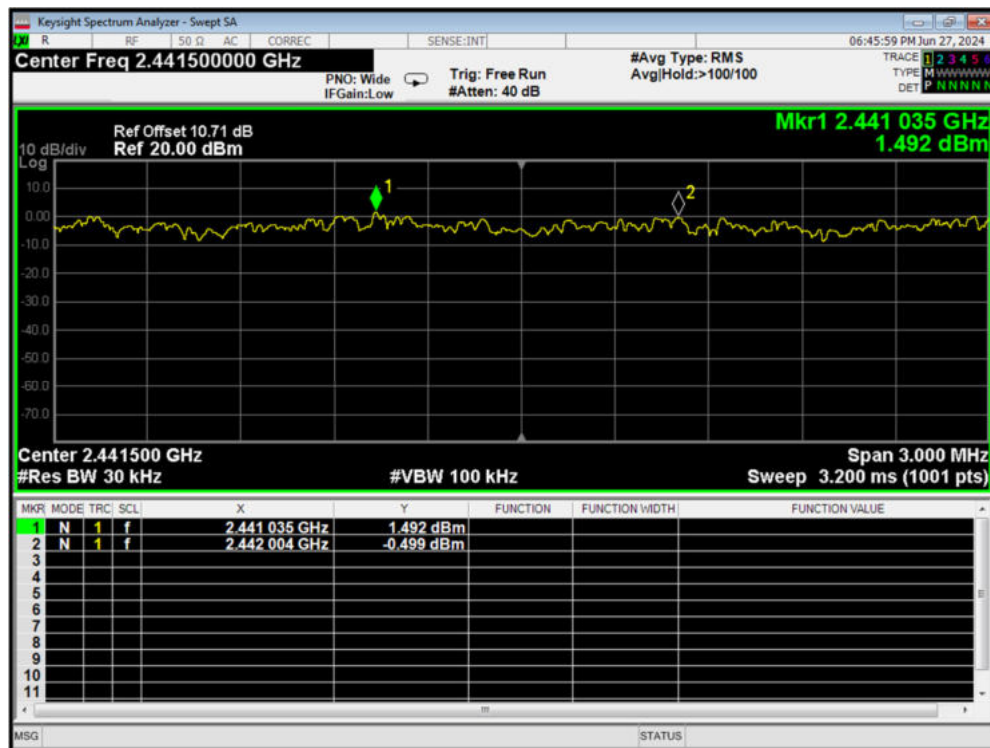
CFS 2-DH5 2480MHz



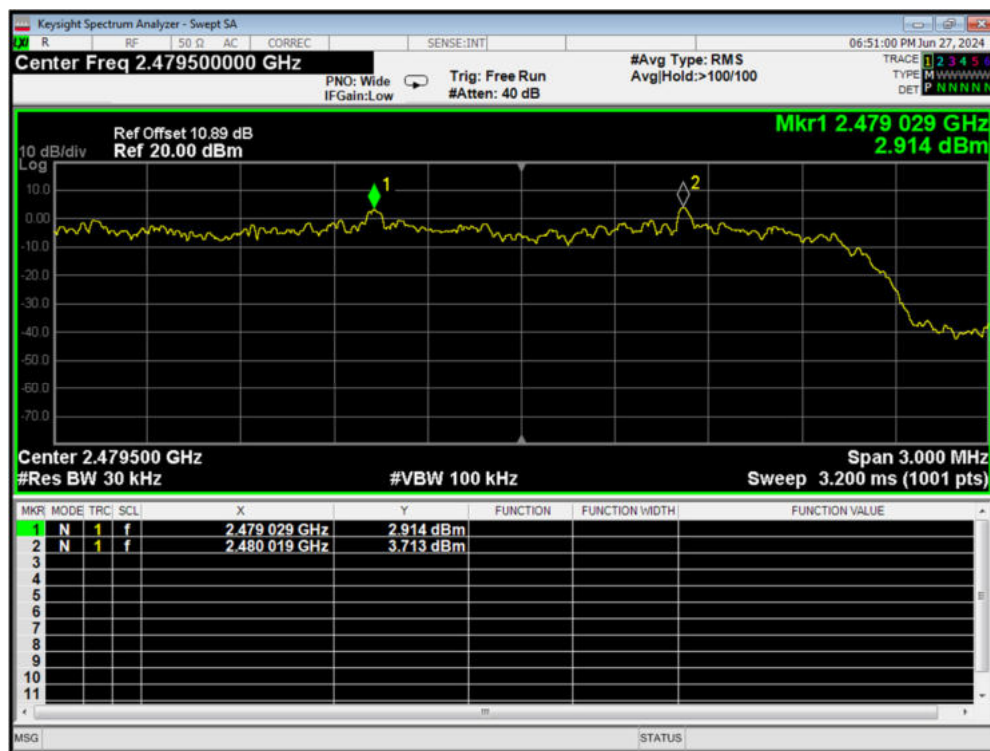
CFS 3-DH5 2402MHz



CFS 3-DH5 2441MHz

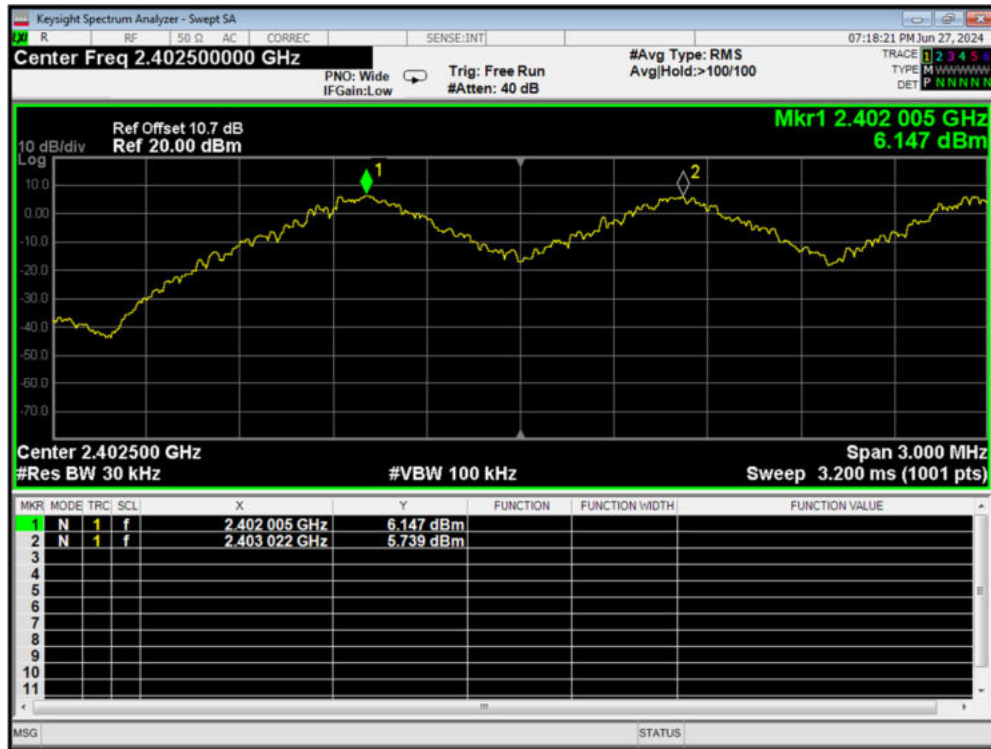


CFS 3-DH5 2480MHz

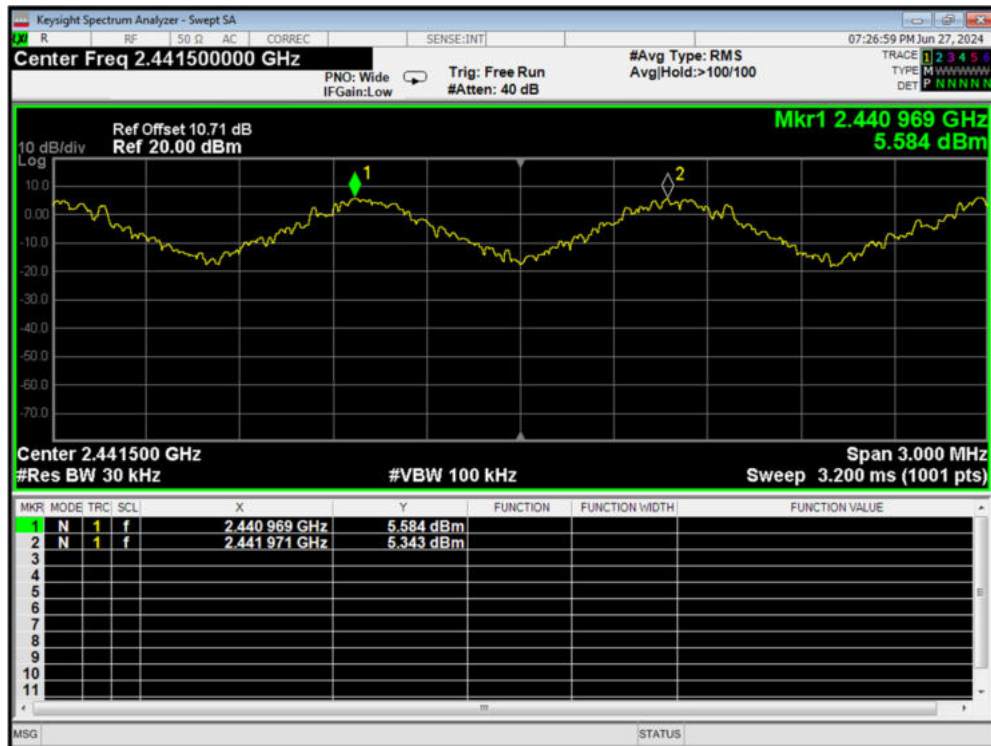


Antenna 2

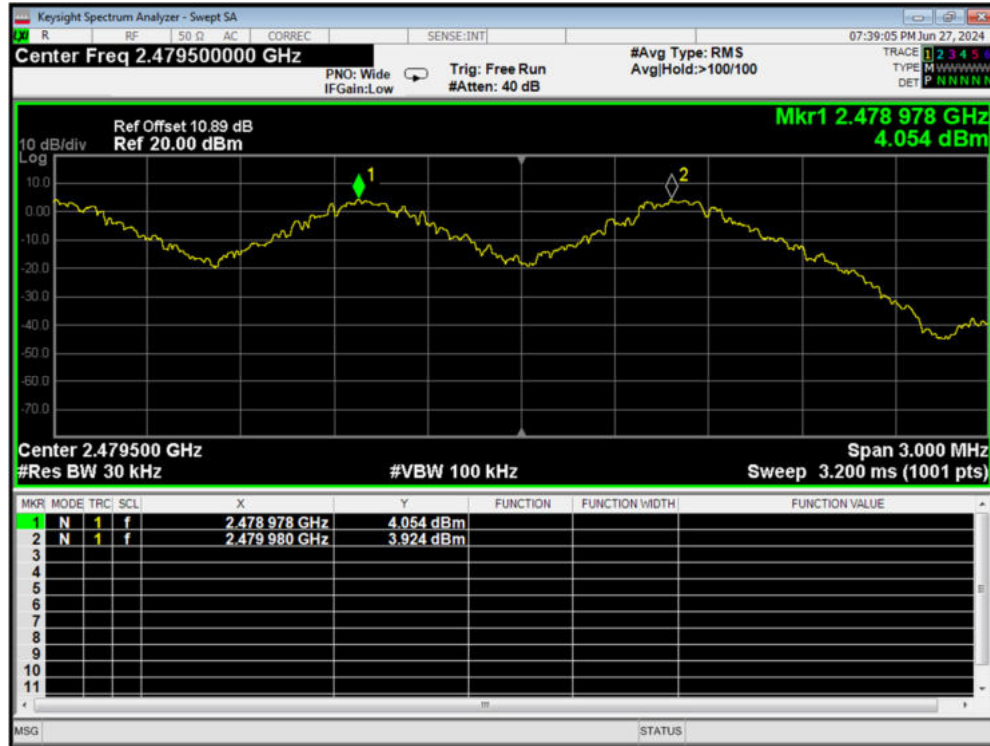
CFS 1-DH5 2402MHz



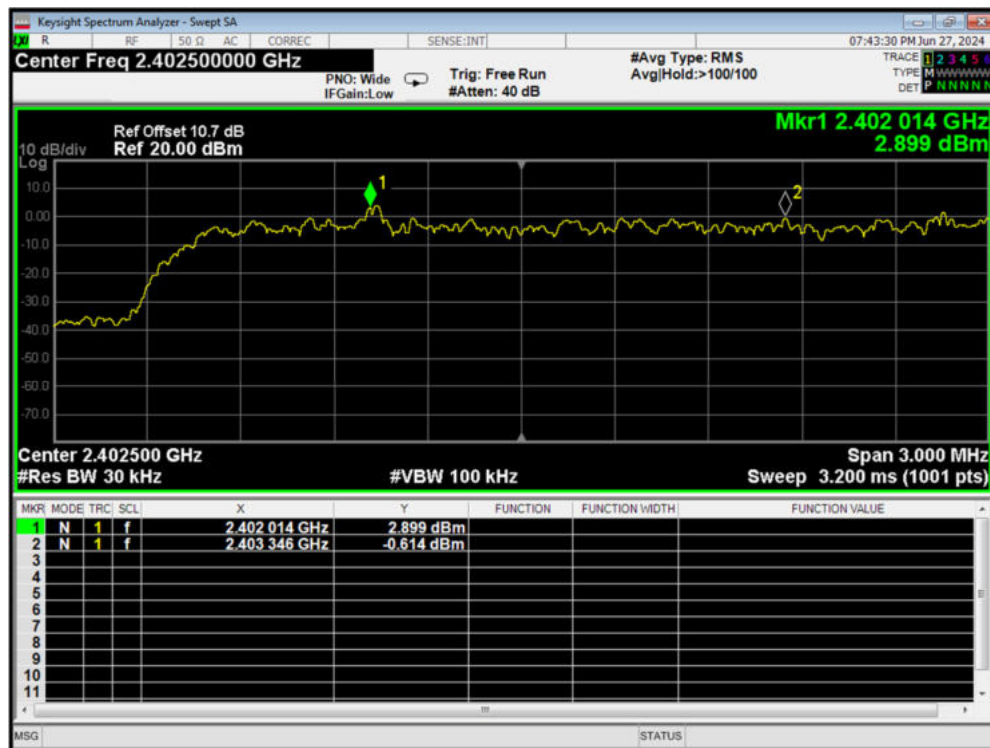
CFS 1-DH5 2441MHz



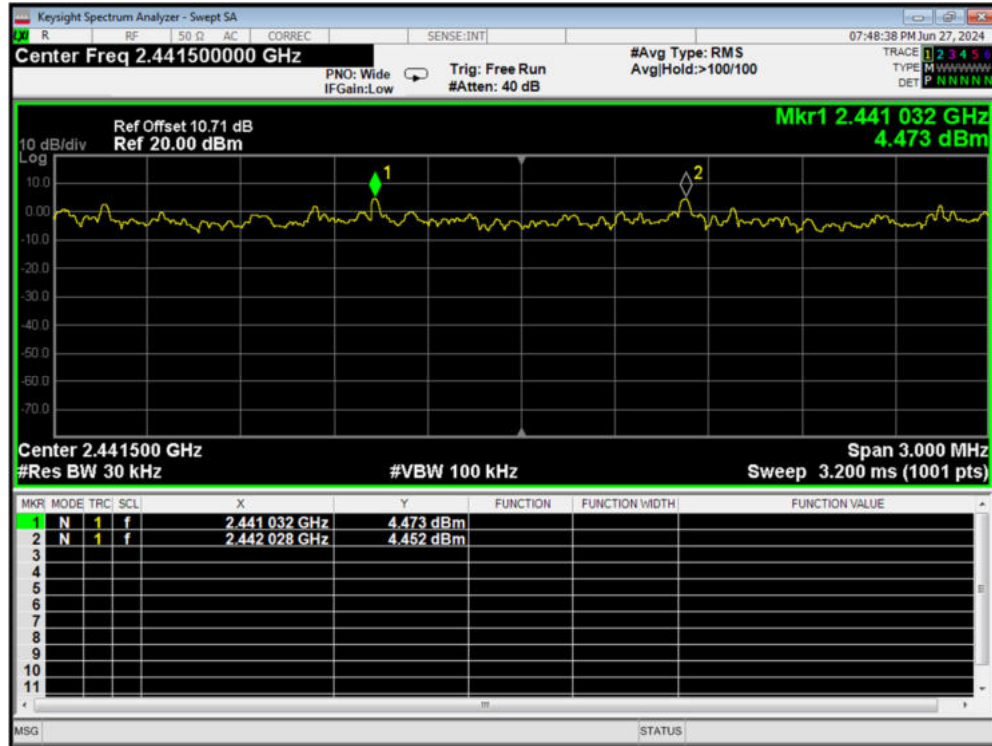
CFS 1-DH5 2480MHz



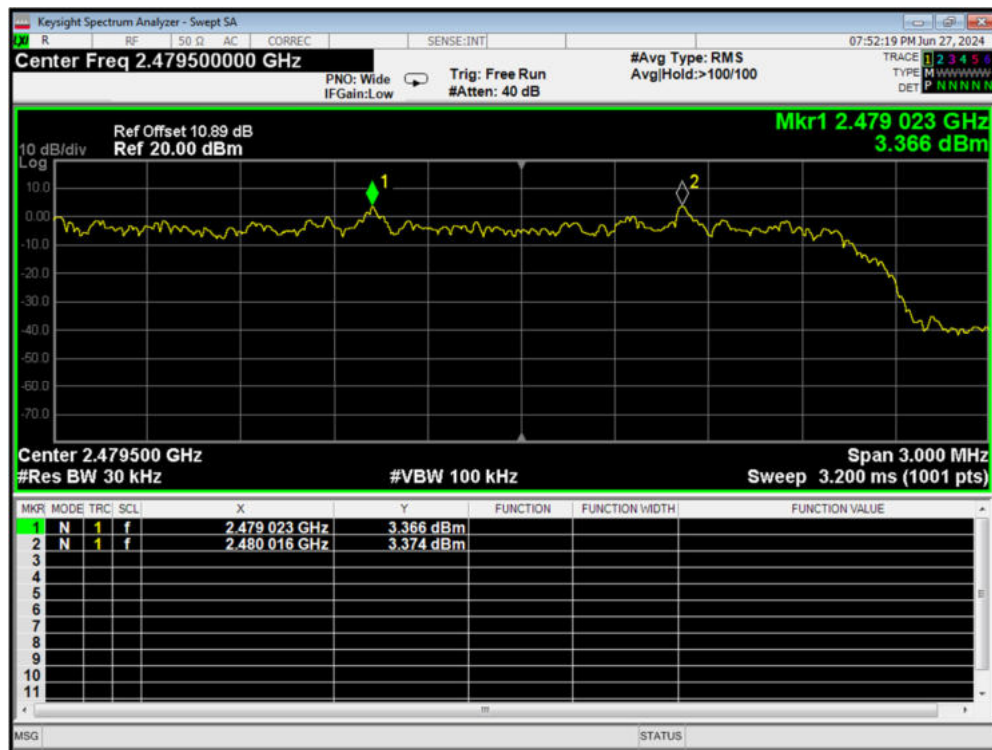
CFS 2-DH5 2402MHz



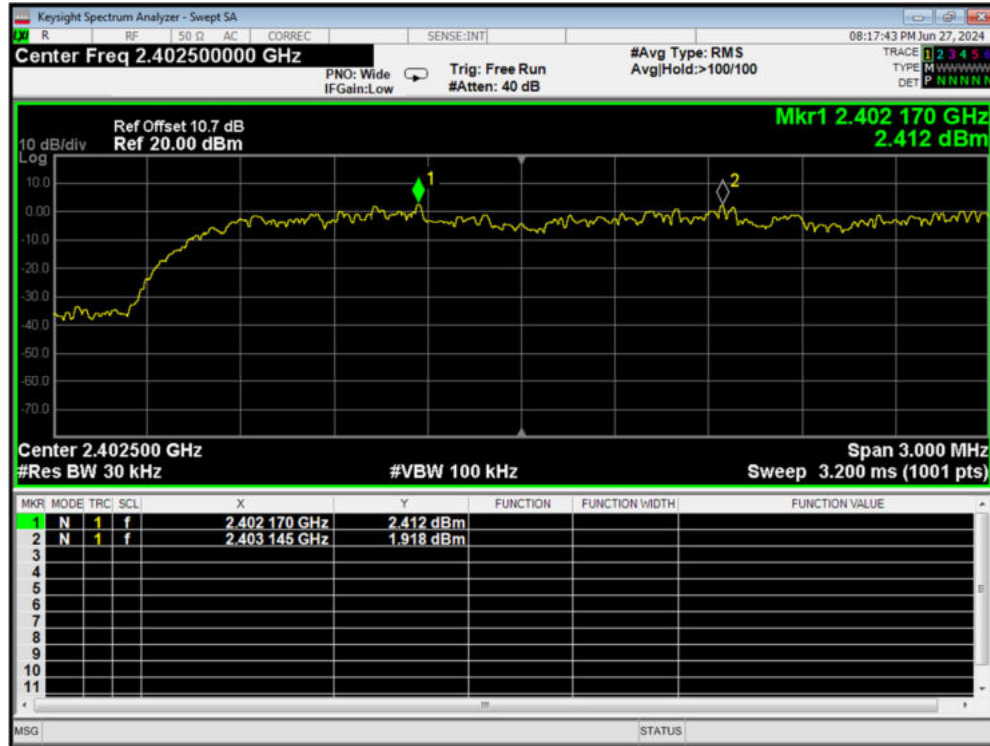
CFS 2-DH5 2441MHz



CFS 2-DH5 2480MHz



CFS 3-DH5 2402MHz



CFS 3-DH5 2441MHz

