

TEST REPORT

Report No.: SHE23100101-02CE

Date: 2024-05-22

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Applicant : SKYTECH USA LLC.
Address of Applicant : INCORP SERVICES, INC. 3458 LAKESHORE DRIVE
TALLAHASSEE, FL 32312 US

Product Name : ALL IN ONE
Brand Name : STGsivir & STGSivir
Model Name : SIV0223
Sample Acquisition Method : Sent by Client
Sample No. : E23100101-02#01

FCC ID : 2BGCASIV0223

Standards : FCC CFR47 Part 15, Subpart C

Date of Receipt : 2023-11-03
Date of Test : 2023-11-17~ 2023-12-29
Date of Issue : 2024-05-22

Remark:

This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

Prepared by:



(Erik Yang)

Reviewed by:



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Approved by:



(Authorized signatory: Echo Mu)

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1 General Information

1.1 Testing Laboratory

Company Name	ICAS Testing Technology Service (Shanghai) Co., Ltd.
Address	No.1298, Pingan Road, Minhang District, Shanghai, China
Telephone	0086 21-51682999
Fax	0086 21-54711112
Homepage	www.icasiso.com

1.2 Details of Application

Applicant Company Name	SKYTECH USA LLC.
Address	INCORP SERVICES, INC. 3458 LAKESHORE DRIVE TALLAHASSEE, FL 32312 US
Contact Person	Hu yan
Telephone	001-647-8892-868
Email	yan.hu@astsys.com
Manufacturer Company Name	SKYTECH USA LLC.
Address	INCORP SERVICES, INC. 3458 LAKESHORE DRIVE TALLAHASSEE, FL 32312 US
Factory Company Name	SKYTECH USA LLC.
Address	INCORP SERVICES, INC. 3458 LAKESHORE DRIVE TALLAHASSEE, FL 32312 US

1.3 Details of EUT

Product Name	ALL IN ONE
Brand Name	STGSivir & STGSivir
Test Model Name	SIV0223
FCC ID	2BGCASIV0223
Mode of Operation	Bluetooth BR/EDR
Frequency Range	2400MHz ~ 2483.5MHz
Number of Channels	79 (at intervals of 1 MHz)
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Max RF Output Power	10.42dBm
Antenna Type	Internal Antenna
Antenna Gain	1.97dBi
Extreme Temperature Range	0°C ~ +70°C
Test Voltage	AC 100-240V 50/60Hz
Hardware Version	1.2
Software Version	2024.10.139.200_Drv_3.00.0044.L

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RF power setting in TEST_SW	Bluetooth RF Test Tool (RtlBluetooth MP.dll Version: 5.3.62 RTLBTAPP Version: 5.2.2.99)_Power level setting_ Default
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Note:

1. The above information was declared by the manufacture.
2. For more details, please refer to the User's manual of the EUT.

1.4 Test Methodology

47 CFR Part 15, Subpart C	Telecommunication-Radio Frequency Devices-Intentional Radiators
KDB Publication 558074 D01 v05r02	15.247 Meas Guidance.
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

1.5 Test Summary

Test Item	FCC Rules	Result
Antenna Requirement	FCC Part 15.247(b)(4), FCC Part 15.203	PASS
Maximum Conducted Peak Output Power	FCC Part 15.247(b)(1)	PASS
20dB Bandwidth and 99% Bandwidth	FCC Part 15.247(a)(1)	PASS
Conducted Spurious Emission & Authorized-band band-edge	FCC Part 15.247(d)	PASS
Radiated Emission	FCC Part 15.247(d), 15.205, 15.209	PASS
Band Edge (Restricted-band band-edge)	FCC Part 15.247(d), 15.205, 15.209	PASS
Hopping Frequency Separation	FCC Part 15.247(a)(1)	PASS
Number of Hopping Frequency	FCC Part 15.247(a)(1)(iii)	PASS
Time of Occupancy	FCC Part 15.247(a)(1)(iii)	PASS
Conducted Emission on AC Mains	FCC Part 15.207(a)	PASS

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2 Test Condition

2.1 Environmental conditions

Temperature (°C)	18-25
Humidity (%RH)	40-65
Barometric Pressure (mbar)	960-1060

2.2 Equipment List

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	Keysight	N9020B	MY59260184	2023-07-27	2024-07-26
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2023-06-08	2024-06-07
Signal Generator	Rohde & Schwarz	SMR27	100184	2023-07-27	2024-07-26
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2023-06-08	2024-06-07
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2023-06-08	2024-06-07
V-network	SCHWARZBECK	NSLK 8127	8127-902	2023-06-07	2024-06-06
Attenuator	SCHWARZBECK	VTSD 9561-FN	/	2023-06-06	2024-06-05
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2023-03-22	2025-03-21
Horn Antenna-18G	SCHWARZBECK	BBHA9120D	9120D-1775	2023-06-13	2025-06-12
Loop Antenna	SCHWARZBECK	FMZB 1513	N/A	2023-06-09	2024-06-08
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2023-06-18	2025-06-17
Broadband Preamplifier	SCHWARZBECK	BBV 9718	346	2023-06-08	2024-06-07
EMC chamber 9*6*6(L*W*H)	CHANGNING	966	N/A	2023-06-09	2025-06-08
Shielded Enclosure 8*5*4(L*W*H)	CHANGNING	854	N/A	2023-06-09	2025-06-08
Test Software	BL	BL410_E	Version:1.0.0.117	N/A	N/A
Test Software	BL	BL410_R	Version:2.1.1.409	N/A	N/A

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2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI. The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Parameter		Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB
Radiated Emission	9KHz – 30MHz	± 3.42 dB
	30 MHz – 1GHz	± 5.01 dB
	> 1GHz	± 5.21 dB
Conducted Emission on AC Mains	150kHz-30MHz	± 2.68 dB
Occupied Channel Bandwidth		± 5 %
Maximum Conducted Output Power		± 0.64 dB

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3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software (Bluetooth RF Test Tool (RtlBluetooth MP.dll Version: 5.3.62 RTLBTAPP Version: 5.2.2.99)) was control EUT work in continuous transmitting mode. Select test channel as below:

Channel	Frequency
The lowest channel (CH0)	2402MHz
The middle channel (CH39)	2441MHz
The highest channel (CH78)	2480MHz

The basic operation modes are:

- A. On
1. BR/EDR mode

a. Transmitting

i. Low Channel

ii. Middle Channel

iii. High Channel

iv. Hopping mode

b. Receiving
2. Normal working with Bluetooth on
- B. Standby
- C. Off

3.2 Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model Name	Serial No.
AC/DC ADAPTER	Guangdong Mingxin Power Technologies Co., Ltd	MX120Z-19006300	MX120Z19006300
Mouse	Dell	MS116t1	CN-065K5F-LO300-248-0VP2
Keyboard	Dell	KB216P	CN-0M4W71-73826-6C801SQ-A02

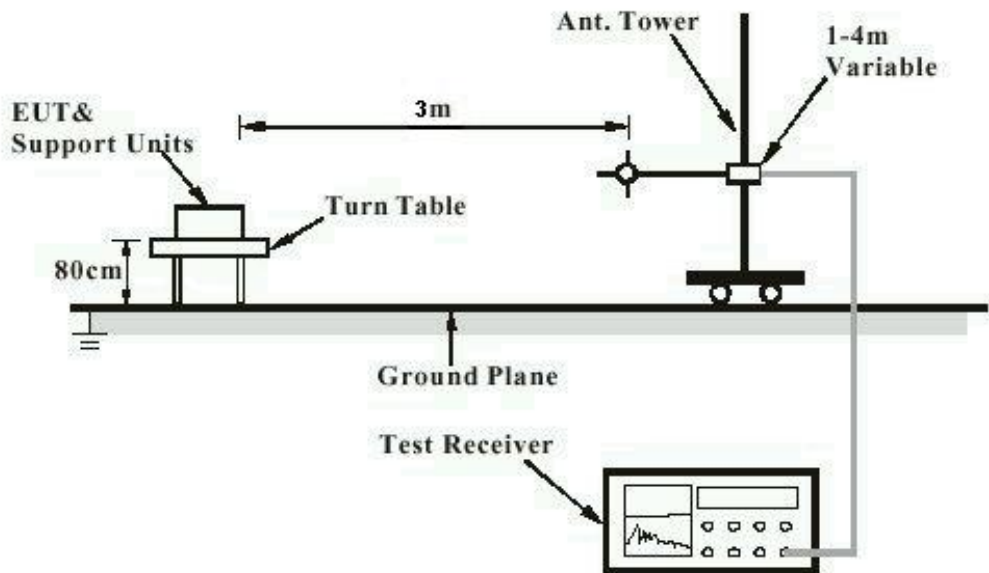
3.3 Support Software

Description	Manufacturer	Software Name
Software	N/A	Realtek 11ac 8821C PCIE WLAN MP Diagnostic Program 0.0007.00.20190801

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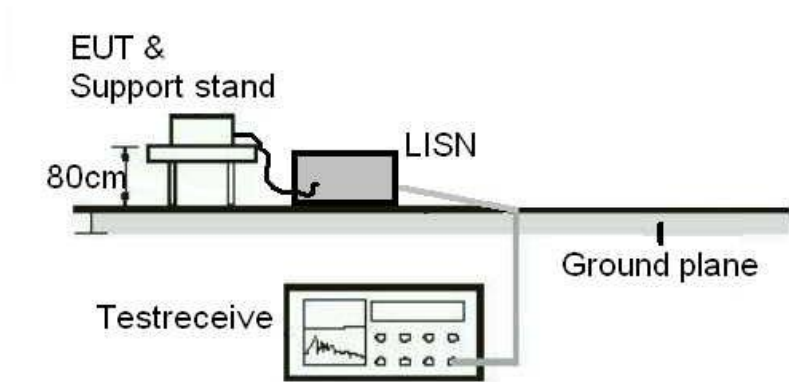
3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



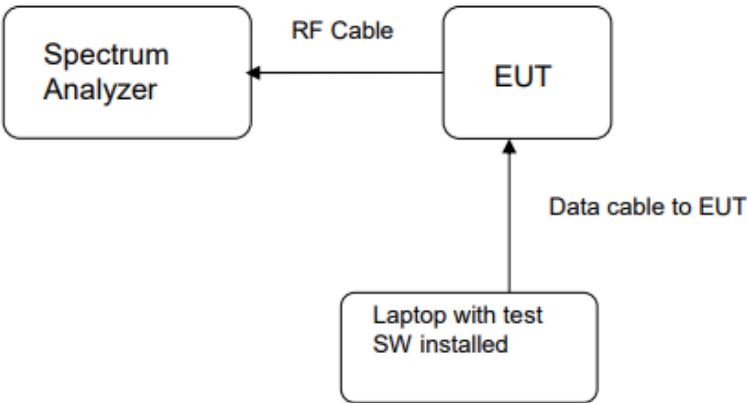
Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Configuration for Conduction Test



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Diagram of Measurement Configuration for Transmitter Test



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4 Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT:

PASS

Test standard	: FCC Part 15.247(b)(4), Part 15.203
Requirement	: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. In addition, If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 1.97dBi. The antenna is an internal antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

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4.1.2 Maximum Peak Output Power

RESULT:

PASS

Test standard : FCC Part 15.247(b)(1)

Requirement : ANSI C63.10-2013, Clause 7.8.5
KDB 558074 D01 v05r02, Clause 2.2

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 23.4°C

Relative humidity : 56%

Table 1: Maximum Peak Output Power

Test Mode	Test Channel (MHz)	Peak Output Power Measurement Result		Limit (W)
		(dBm)	(mW)	
GFSK	2402	5.63	3.66	< 1
	2441	6.63	4.60	
	2480	8.21	6.62	
$\pi/4$ -DQPSK	2402	7.61	5.77	< 0.125
	2441	8.61	7.26	
	2480	10.01	10.02	
8-DPSK	2402	7.96	6.25	< 0.125
	2441	8.96	7.87	
	2480	10.42	11.02	

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Figure 1: Maximum Peak Output Power, 2402MHz, GFSK

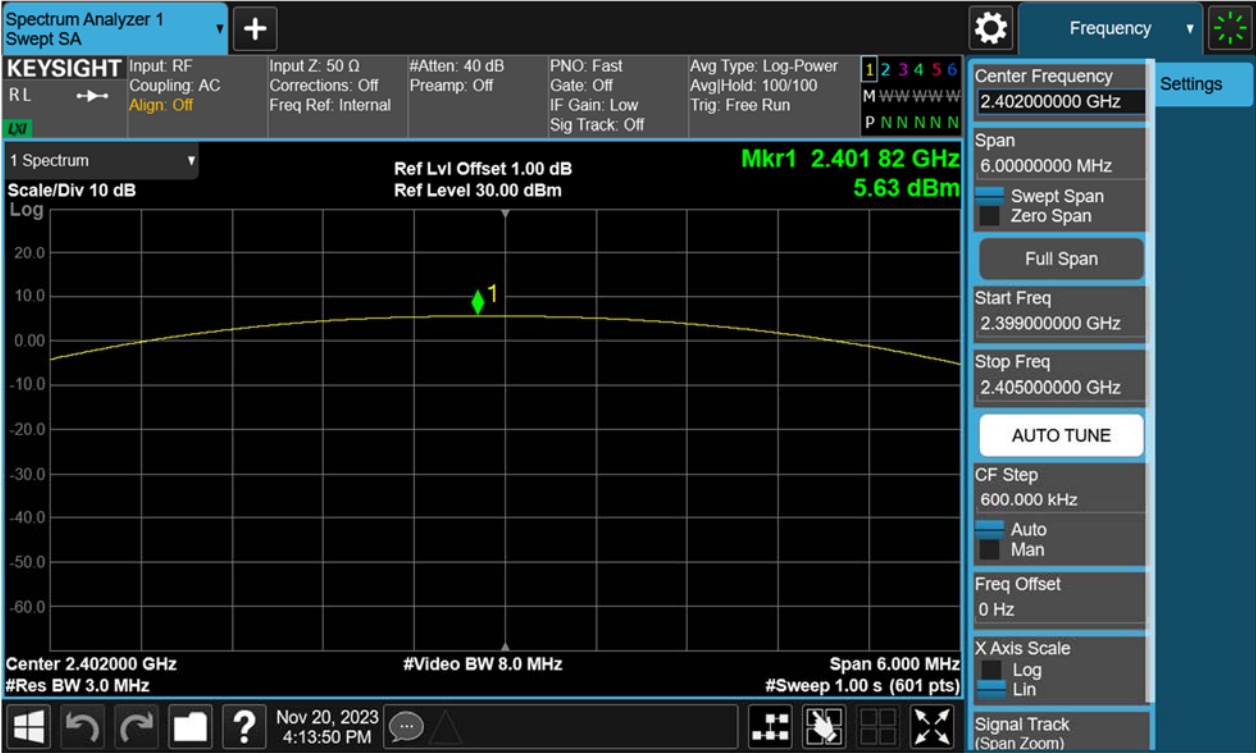


Figure 2: Maximum Peak Output Power, 2441MHz, GFSK



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Figure 3: Maximum Peak Output Power, 2480MHz, GFSK



Figure 4: Maximum Peak Output Power, 2402MHz, $\pi/4$ -DQPSK



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Figure 5: Maximum Peak Output Power, 2441MHz, $\pi/4$ -DQPSK



Figure 6: Maximum Peak Output Power, 2480MHz, $\pi/4$ -DQPSK



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Figure 7: Maximum Peak Output Power, 2402MHz, 8-DPSK



Figure 8: Maximum Peak Output Power, 2441MHz, 8-DPSK



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Figure 9: Maximum Peak Output Power, 2480MHz, 8-DPSK



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4.1.3 20dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.247(a)(1)

Requirement : ANSI C63.10-2013, Clause 7.8.7
KDB 558074 D01 v05r02, Clause 2.2

Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 23.4°C

Relative humidity : 56%

Table 2: 20dB Bandwidth and 99% Bandwidth

Test Mode	Test Channel (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
GFSK	2402	0.9607	0.8646
	2441	0.9611	0.8640
	2480	0.9589	0.8622
π /4-DQPSK	2402	1.2280	1.1417
	2441	1.2300	1.1413
	2480	1.2580	1.1456
8-DPSK	2402	1.2690	1.1484
	2441	1.2730	1.1510
	2480	1.2720	1.1532

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Figure 10: 20dB Bandwidth and 99% Bandwidth, 2402MHz, GFSK



Figure 11: 20dB Bandwidth and 99% Bandwidth, 2441MHz, GFSK



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Figure 12: 20dB Bandwidth and 99% Bandwidth, 2480MHz, GFSK

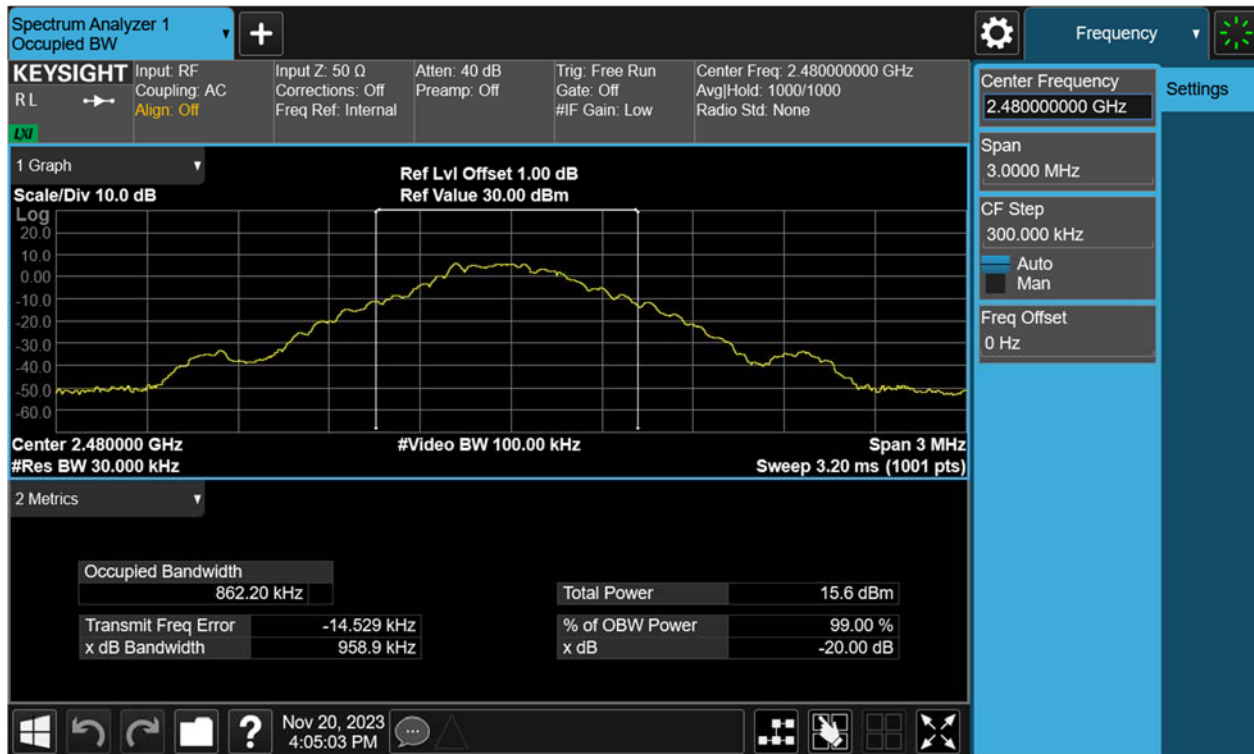
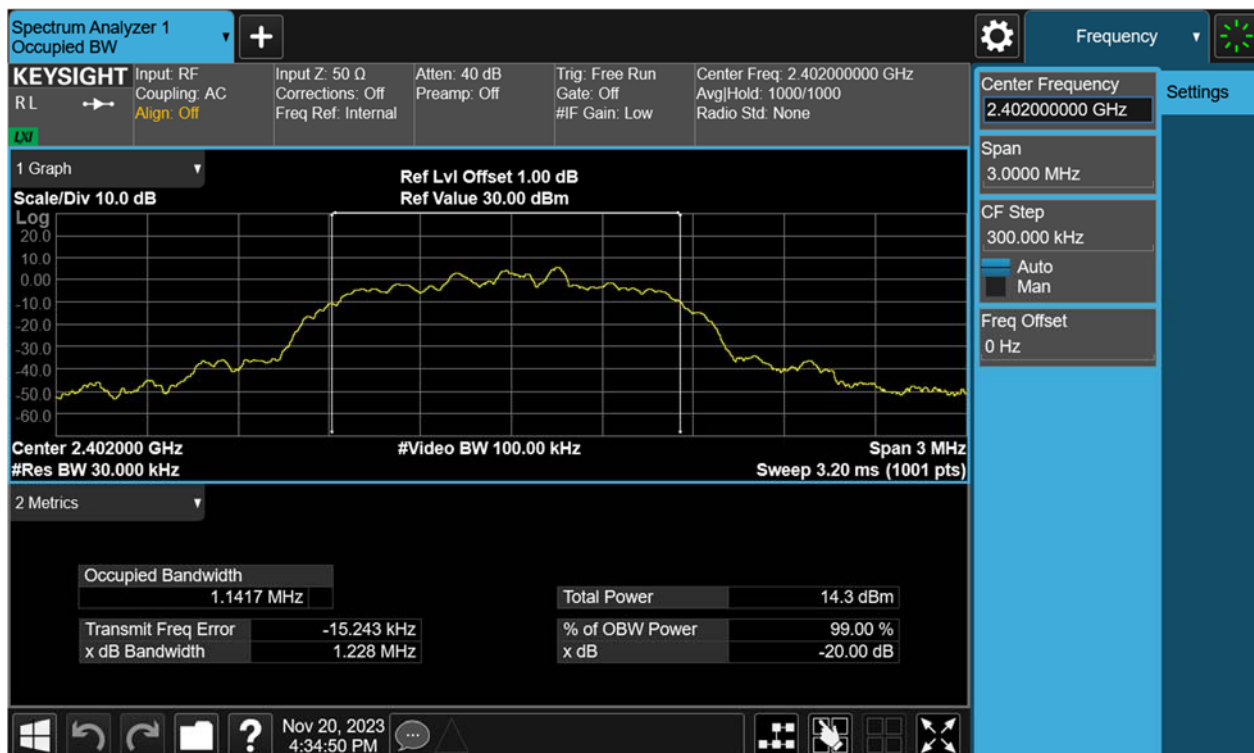


Figure 13: 20dB Bandwidth and 99% Bandwidth, 2402MHz, $\pi/4$ -DQPSK



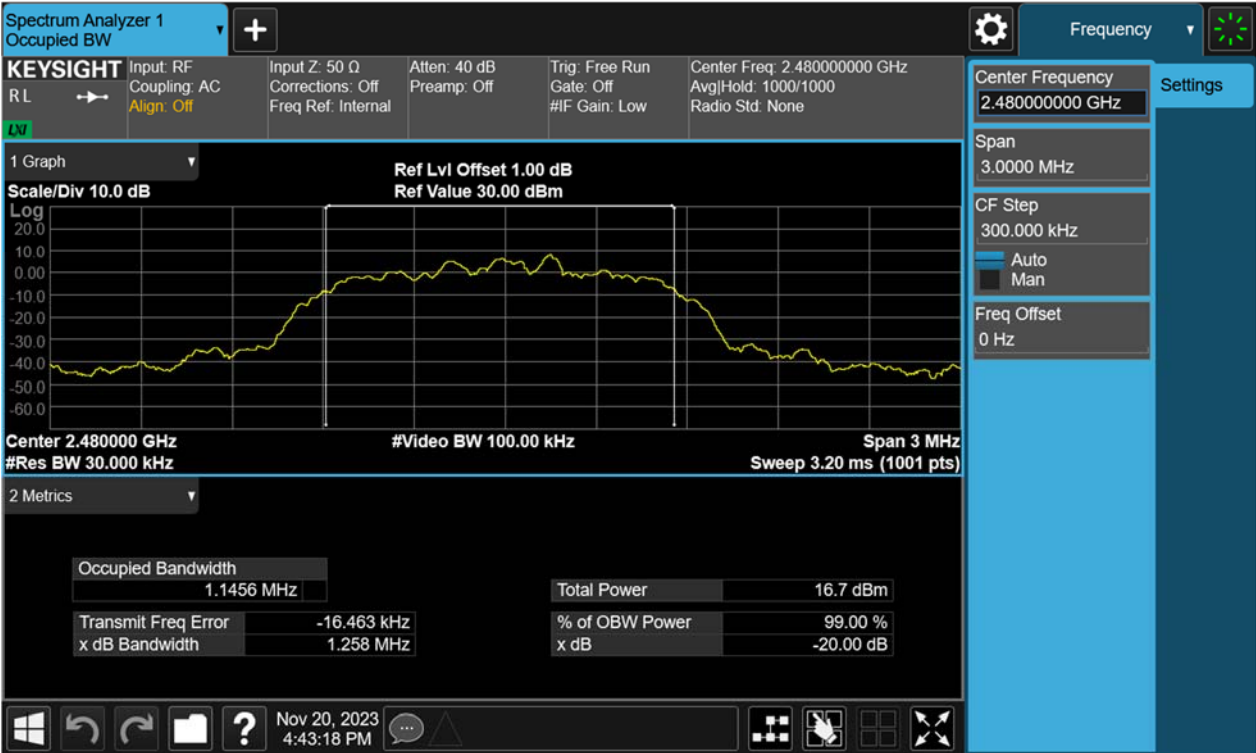
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Figure 14: 20dB Bandwidth and 99% Bandwidth, 2441MHz, $\pi/4$ -DQPSK



Figure 15: 20dB Bandwidth and 99% Bandwidth, 2480MHz, $\pi/4$ -DQPSK



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Figure 16: 20dB Bandwidth and 99% Bandwidth, 2402MHz, 8-DPSK



Figure 17: 20dB Bandwidth and 99% Bandwidth, 2441MHz, 8-DPSK



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Figure 18: 20dB Bandwidth and 99% Bandwidth, 2480MHz, 8-DPSK



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4.1.4 Conducted Spurious Emission & Authorized-band band-edge

RESULT:

PASS

Test standard	: FCC Part 15.247(d)
Requirement	: ANSI C63.10-2013, Clause 7.8.8
Kind of test site	: Shielded room

Test setup

Test Channel	: Low/Middle/High for spurious, Low/High for Band Edge
Operation Mode	: A.1.a
Ambient temperature	: 23.4°C
Relative humidity	: 56%

For details refer to following test plot.

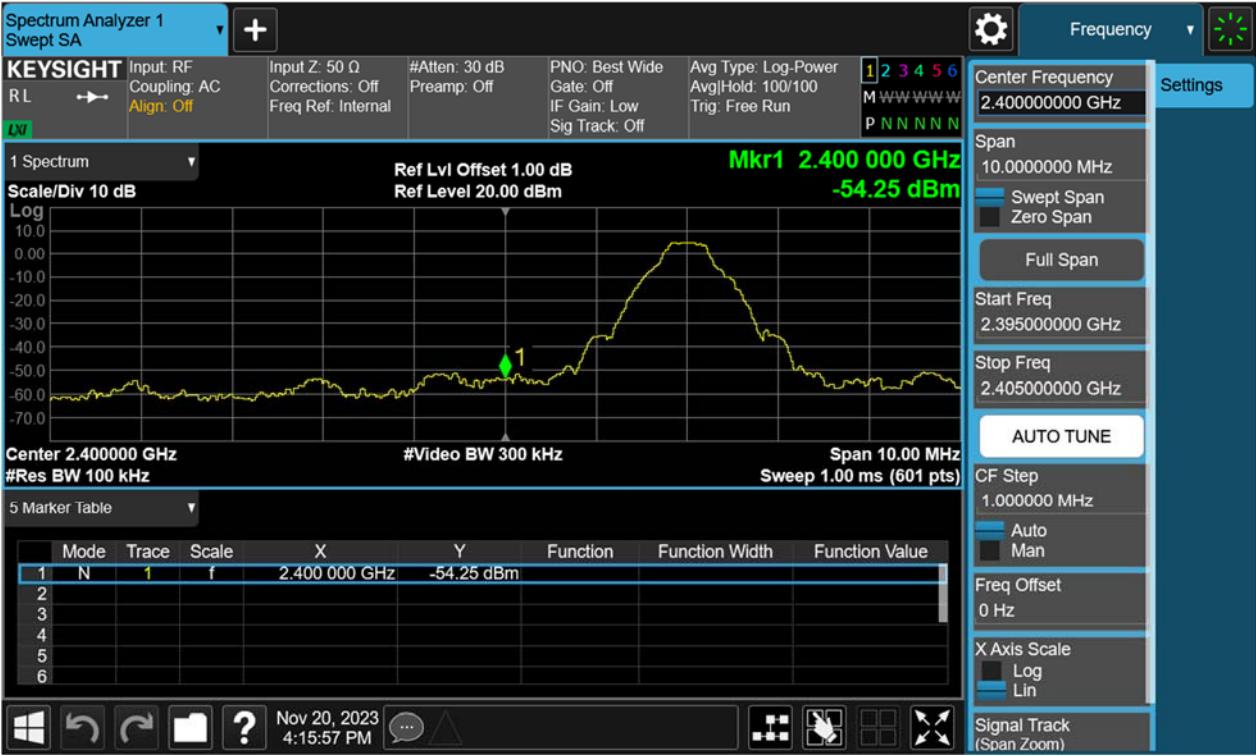
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Figure 19: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, GFSK Carrier Level



Band Edge



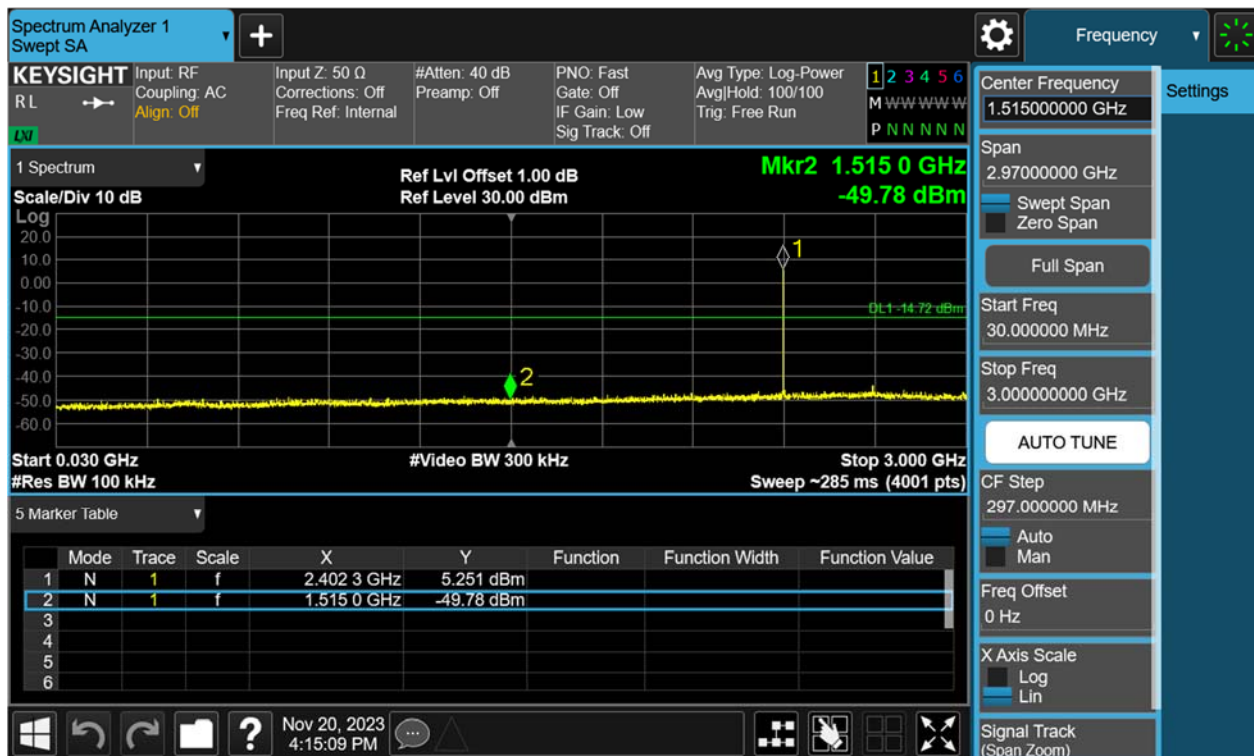
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Conducted spurious emissions 30MHz-25GHz



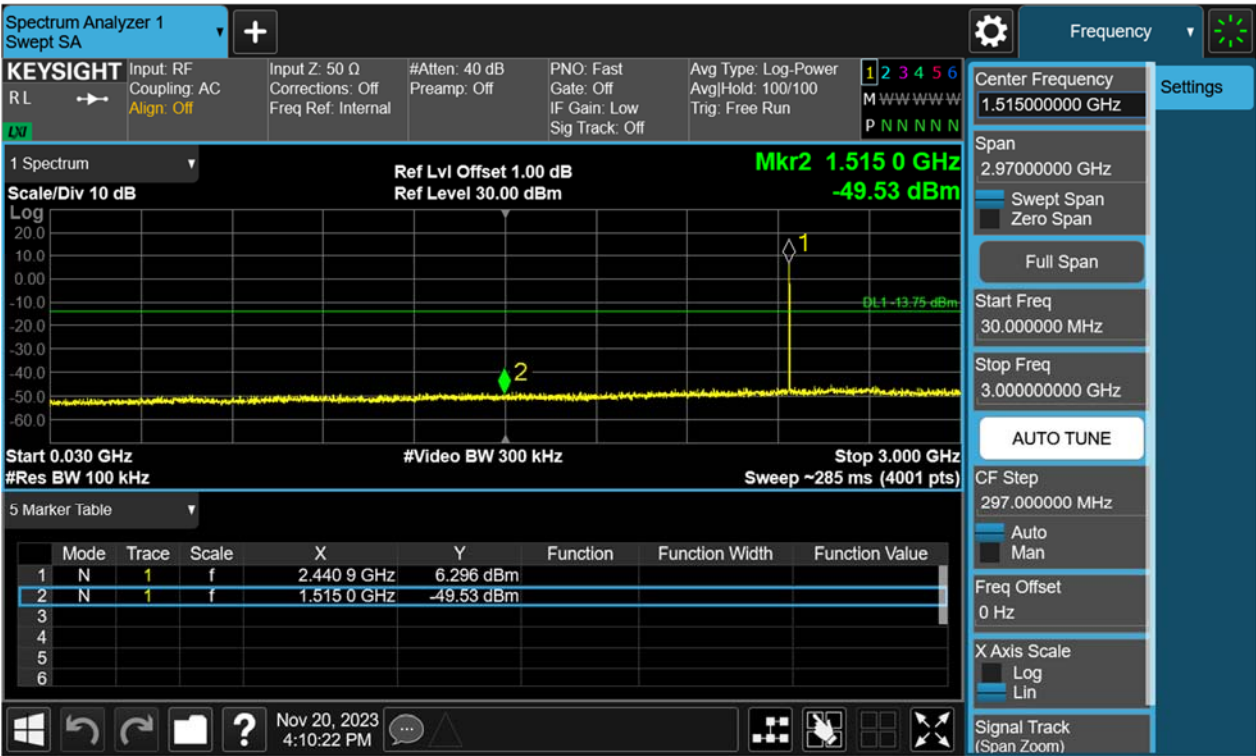
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Figure 20: Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, GFSK Carrier Level



Conducted spurious emissions 30MHz-25GHz



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Figure 21: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, GFSK Carrier Level



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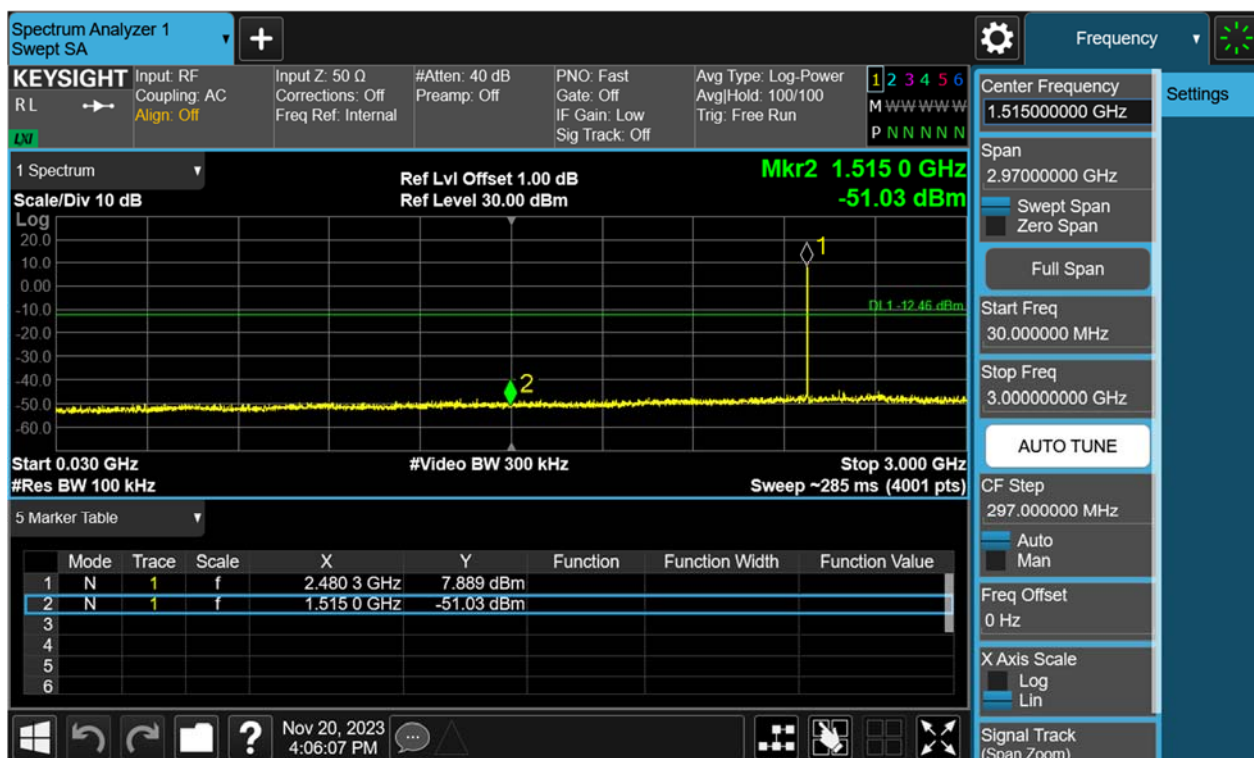
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Band Edge



Conducted spurious emissions 30MHz-25GHz

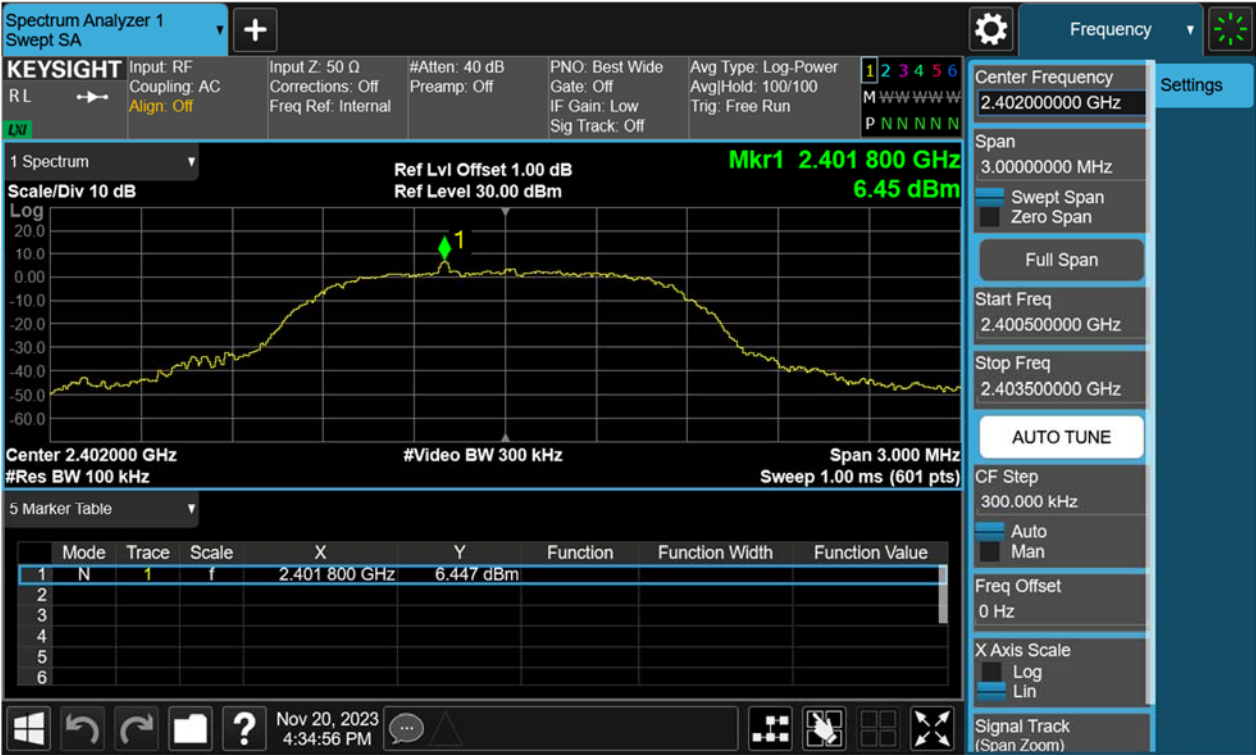


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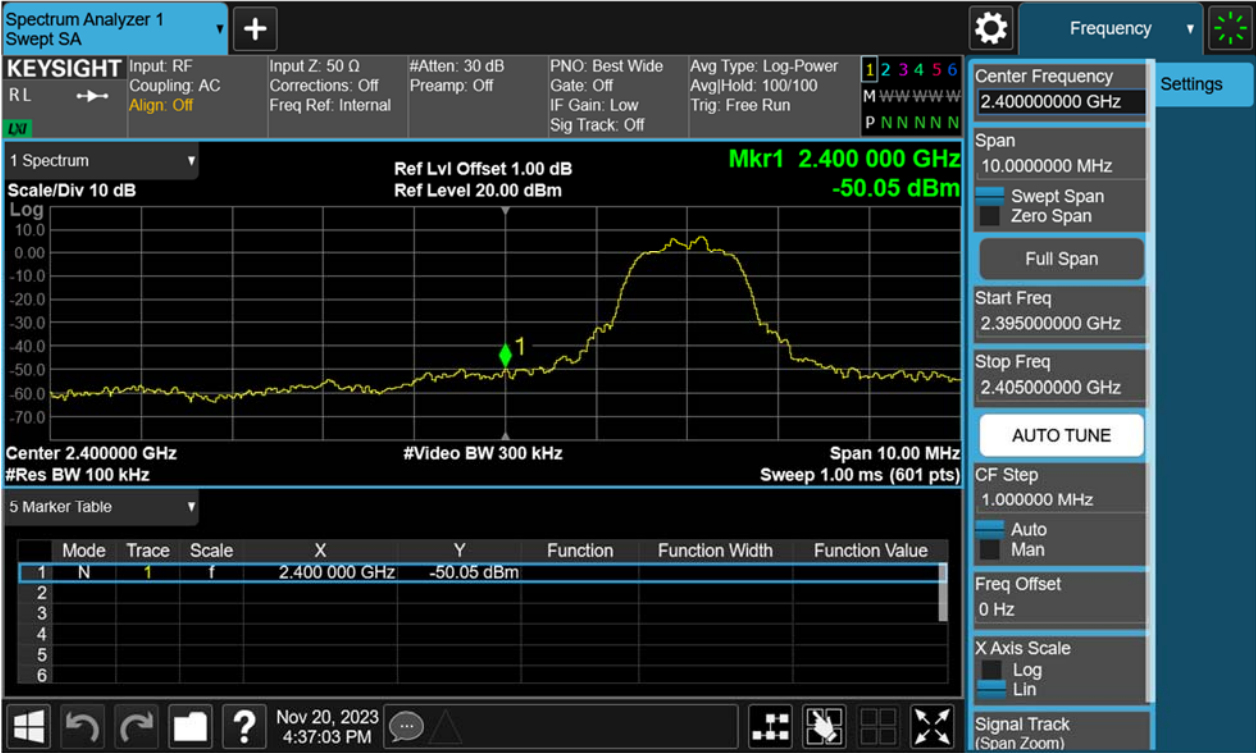
Figure 22: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, $\pi/4$ -DQPSK Carrier Level



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Band Edge



Conducted spurious emissions 30MHz-25GHz

