

TEST REPORT

Report No.: SHE23060104-02CE

Date: 2023-08-07

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Applicant : SIMCom Wireless Solutions Limited
Address of Applicant : SIMCom Headquarters Building, Building 3, No.289
Linhong Road, Changning District, Shanghai,China

Product Name : Wireless Data Module
Brand Name : SIMCom
Model No. : SIM8070
Sample No. : E23060104-01#02

FCC ID : 2AJYU-8XK0002

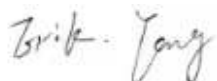
Standard : FCC CFR47 Part 15, Subpart C

Date of Receipt : 2022-07-07
Date of Test : 2023-07-13~ 2023-08-03
Date of Issue : 2023-08-07

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)

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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	SIMCom Wireless Solutions Limited
Address	SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai,China
Contact Person	Yongsheng Li
Telephone	+86 21 3252 3134
Email	yongsheng.li@simcom.com
Manufacturer Company Name	SIMCom Wireless Solutions Limited
Address	SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai,China
Factory Company Name	SIMCom Wireless Solutions Limited
Address	SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai,China

1.3 Details of EUT

Product Name	Wireless Data Module
Brand Name	SIMCom
Test Model No.	SIM8070
FCC ID	2AJYU-8XK0002
Mode of Operation	Bluetooth BR/EDR Version 5.0
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	10.84dBm
Antenna Type	External Antenna
Antenna Gain	4.01dBi
Extreme Temperature Range	-30°C ~ +75°C
Test Voltage	DC 3.8V
Hardware version	SIM8970CE_V1.02
Software version	SIM8070B01V01_A10

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RF power setting in TEST_SW	QRCT_Power level setting_ GFSK_ setting 9 QRCT_Power level setting_ $\pi/4$ -DQPSK_ setting 9 QRCT_Power level setting_ 8DPSK_ setting 9
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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), 15.203	PASS
Maximum Peak Output Power	FCC Part 15.247(b)(1)	PASS
20dB Bandwidth	FCC Part 15.247(a)(1)	PASS
Conducted Spurious Emission & Authorized-band band-edge	FCC Part 15.247(d)	PASS
Radiated Spurious 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 Date
Spectrum Analyzer	Keysight	N9020B	MY59260184	2022-08-02	2023-08-01
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2023-06-08	2024-06-07
Signal Generator	Rohde & Schwarz	SMR27	100184	2022-08-02	2023-08-01
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	2024-06-08
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

Equipment Calibration Date Updated:

Name of Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer	Keysight	N9020B	MY59260184	2023-07-27	2024-07-26
Signal Generator	Rohde & Schwarz	SMR27	100184	2023-07-27	2024-07-26

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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 expanded 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	± 5.00 dB
	> 1GHz	± 4.88 dB
Conducted Emission on AC Mains	150kHz-30MHz	± 2.68 dB
Occupied Channel Bandwidth		± 5 %
RF output power		± 0.6 dB

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3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software (EspRFTTestTool_v2.8) was control EUT work in continuous transmitter and receiver 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.
Laptop	Lenovo	TP00083A	N/A
SWITCHING POWER SUPPLY	N/A	P-050B-050200EU	N/A
EVB Debug Board 1	N/A	8PYA00-SIMCOM-EVB_V1.02	N/A
EVB Debug Board 2	N/A	8XK000-SIM8970-EVB I	N/A
USB Cable	N/A	N/A	1.00m Unshielded

3.3 Support Software

Description	Manufacturer	Software Name
Software	Qualcomm	QRCT Version 4.0.00166.0

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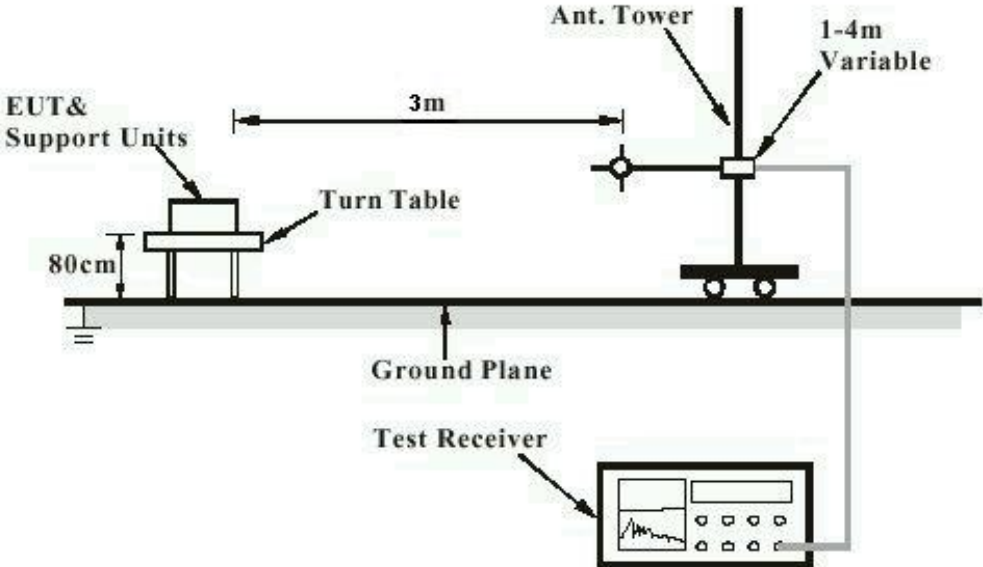
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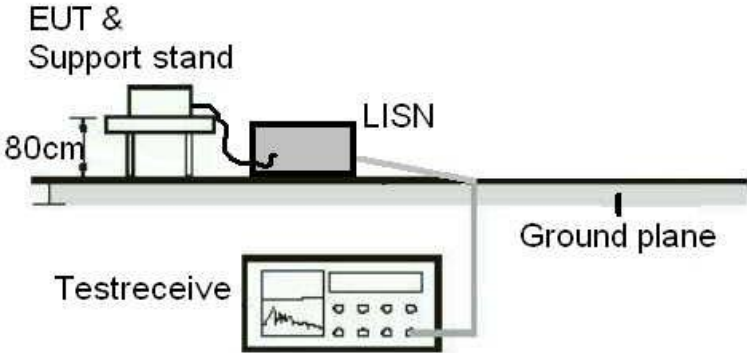
3.4 Test Setup Diagram

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



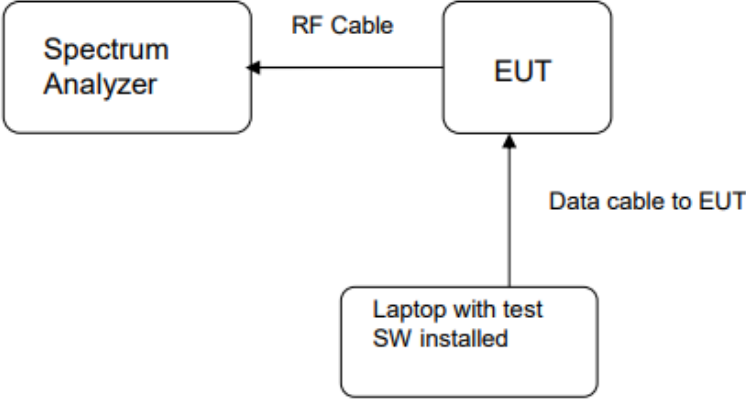
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Diagram of Measurement Configuration for Transmitter Test



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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 : The use of approved antennas only with directional gains that do not exceed 6dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 4.01dBi. The antenna is an external antenna with no possibility of replacement with a non-approved antenna by the end-user.

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. 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 : 24.9°C
Relative humidity : 51%

Table 1: Maximum Peak Output Power

Test Mode	Test Channel (MHz)	Peak Output Power Measurement Result		Limit (W)
		(dBm)	(mW)	
GFSK	2402	10.84	12.13	< 1
	2441	10.42	11.02	
	2480	9.91	9.79	
$\pi/4$ -DQPSK	2402	10.11	10.26	< 0.125
	2441	9.75	9.44	
	2480	9.45	8.81	
8-DPSK	2402	10.28	10.67	< 0.125
	2441	9.86	9.68	
	2480	9.55	9.02	

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

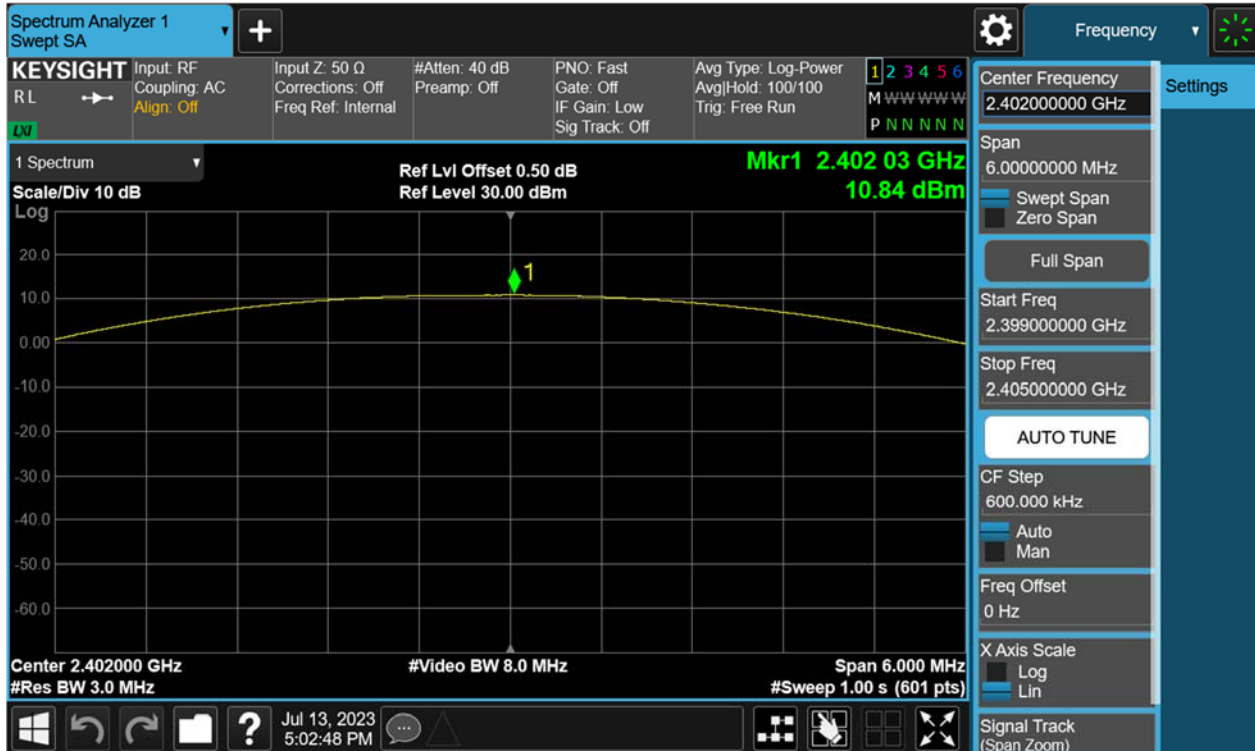


Figure 2: Maximum Peak Output Power, 2441MHz, GFSK



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

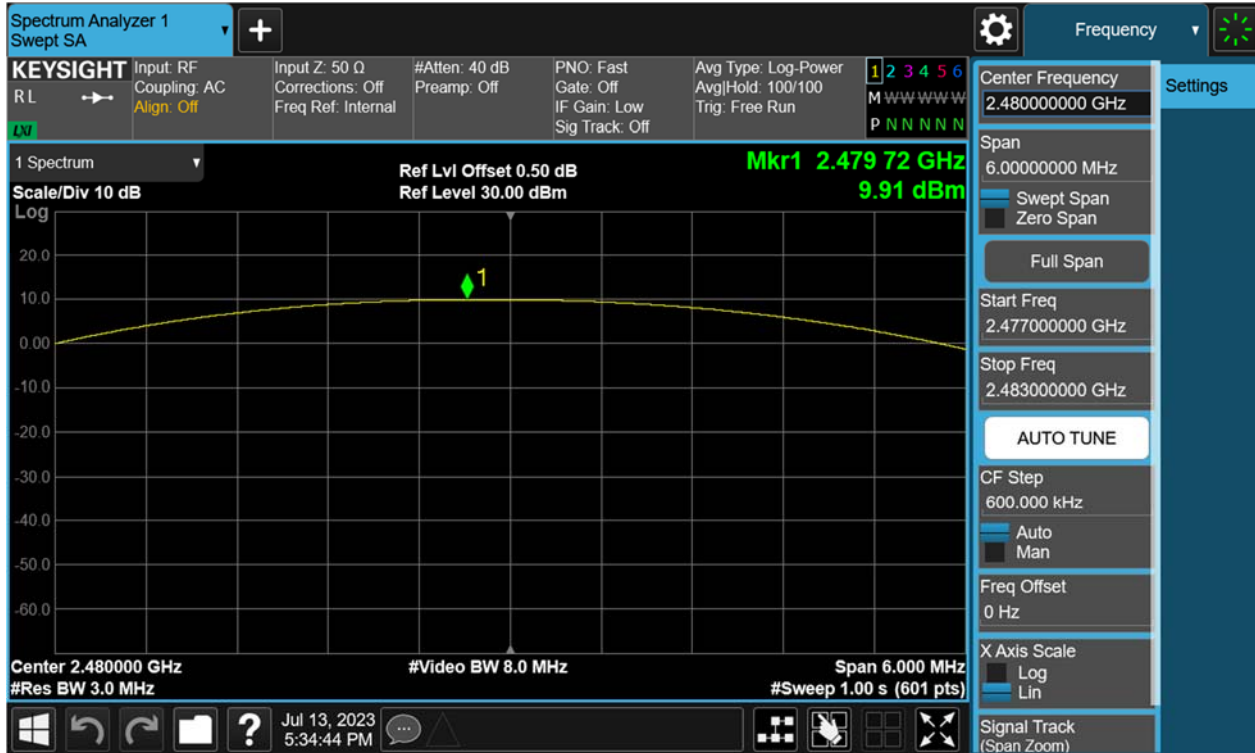


Figure 4: Maximum Peak Output Power, 2402MHz, $\pi/4$ -DQPSK



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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

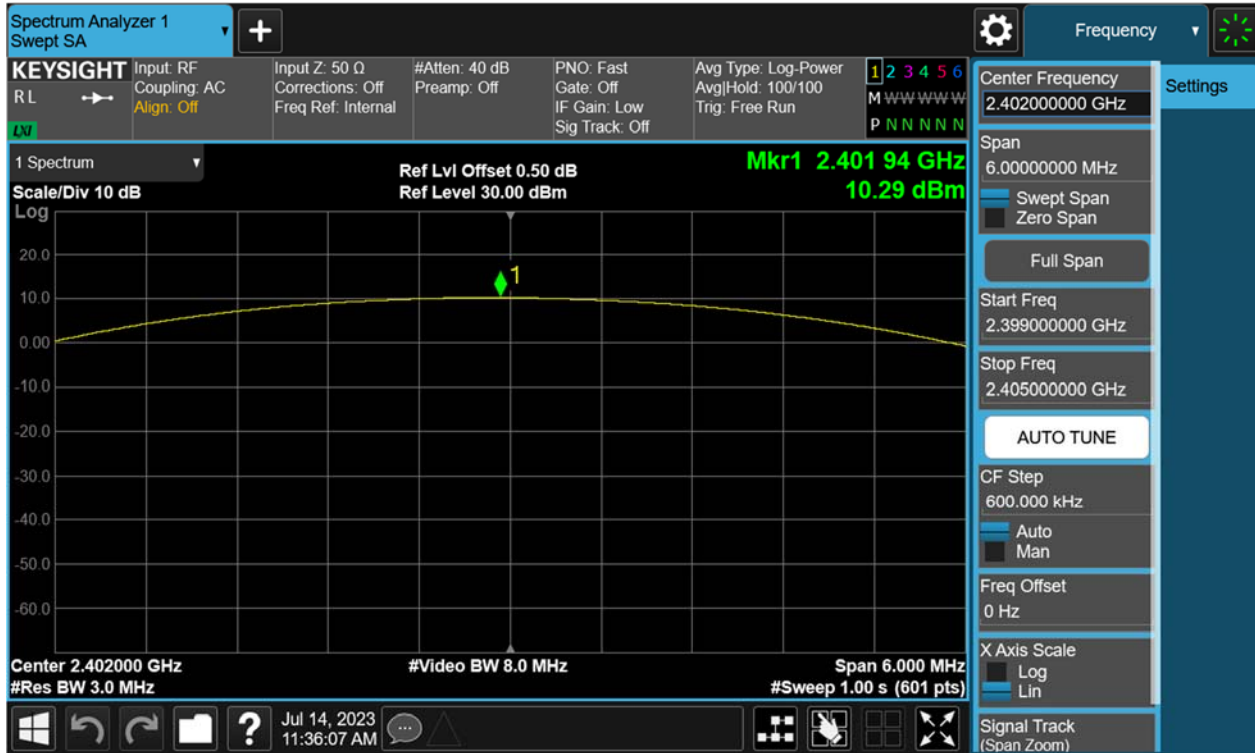


Figure 8: Maximum Peak Output Power, 2441MHz, 8-DPSK



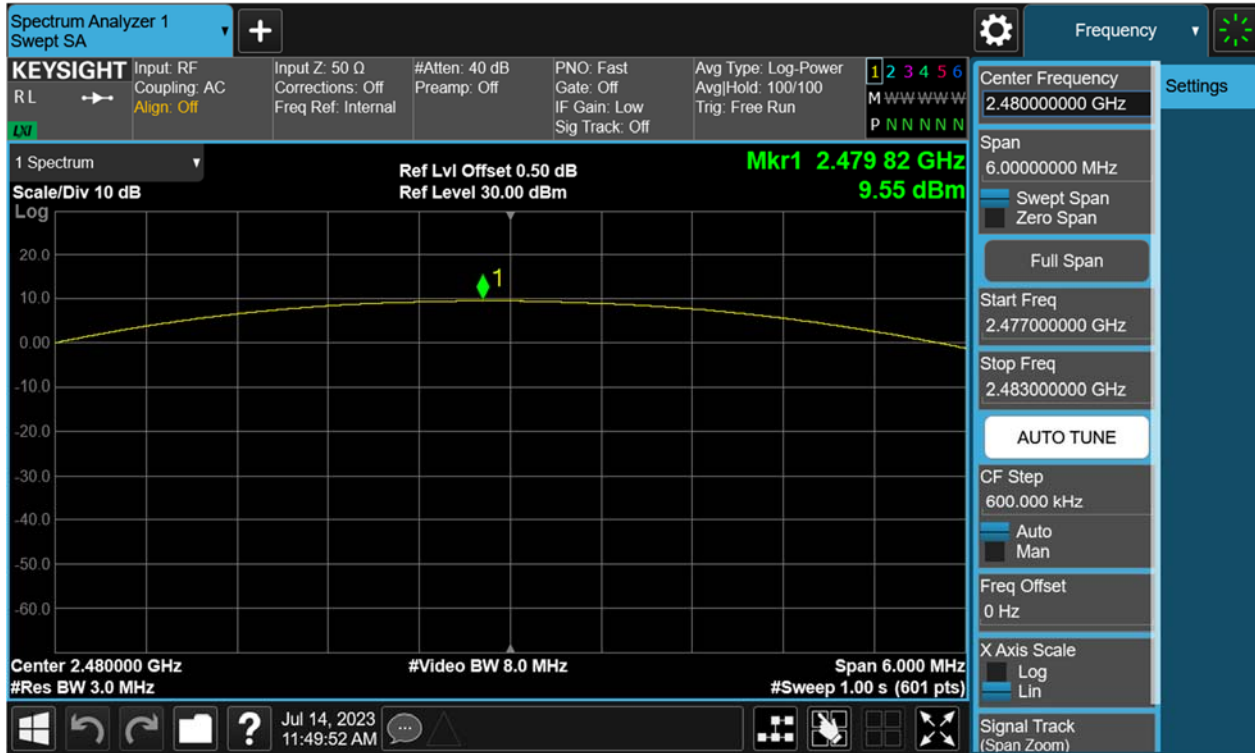
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Figure 9: Maximum Peak Output Power, 2480MHz, 8-DPSK



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4.1.3 20dB Bandwidth

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 : 24.9°C

Relative humidity : 51%

Table 2: 20dB Bandwidth

Test Mode	Test Channel (MHz)	20dB Bandwidth (MHz)
GFSK	2402	0.9423
	2441	0.9440
	2480	0.9426
$\pi/4$ -DQPSK	2402	1.2840
	2441	1.2860
	2480	1.2860
8-DPSK	2402	1.2960
	2441	1.2960
	2480	1.2960

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Figure 10: 20dB Bandwidth, 2402MHz, GFSK

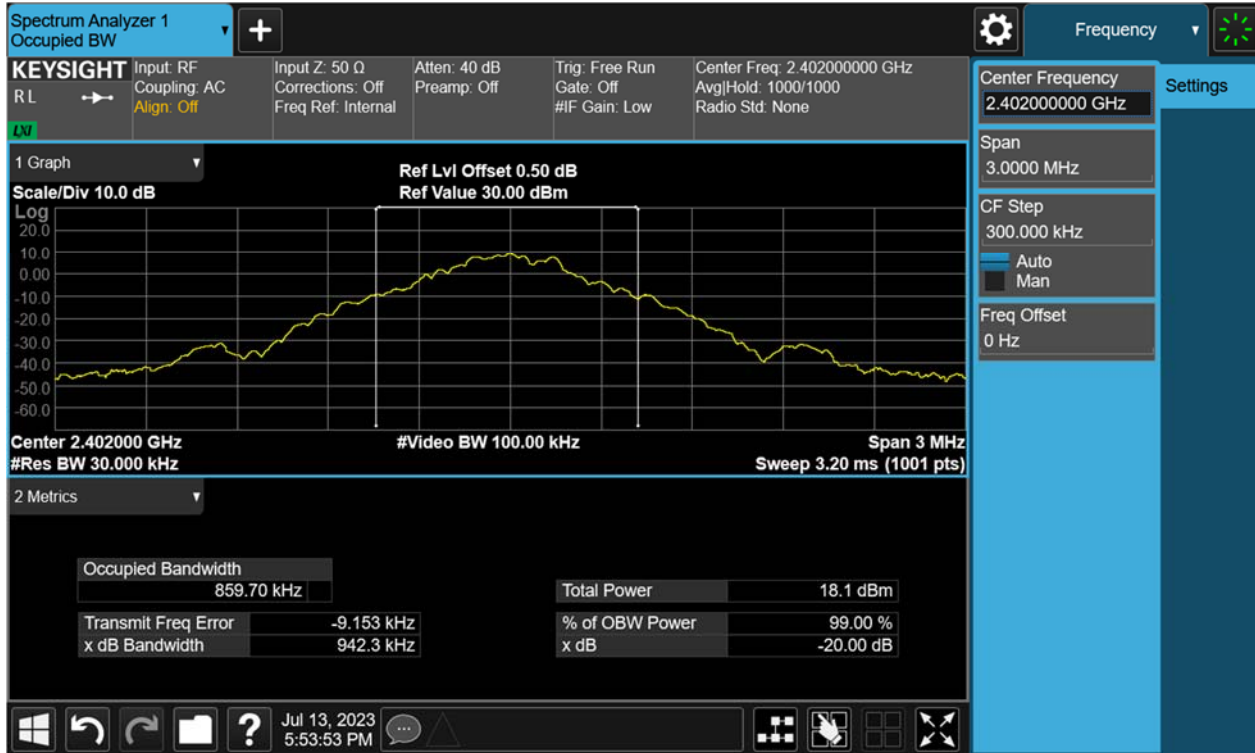
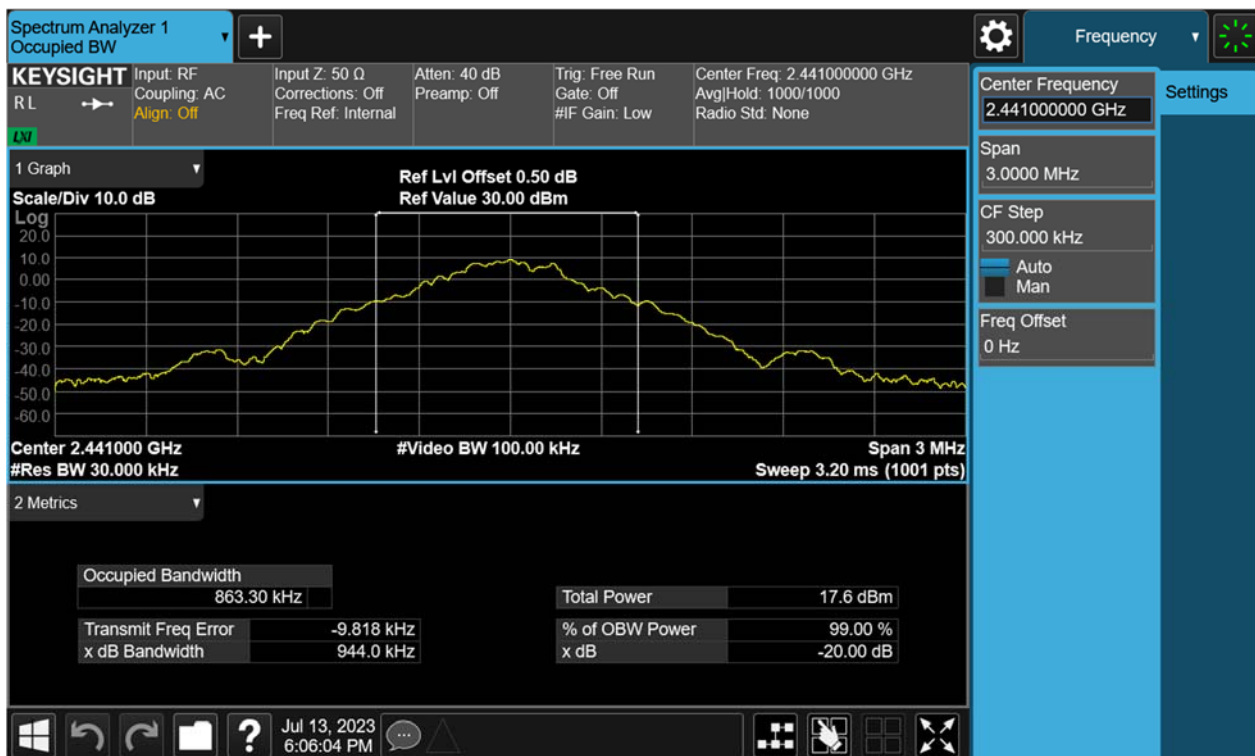


Figure 11: 20dB Bandwidth, 2441MHz, GFSK



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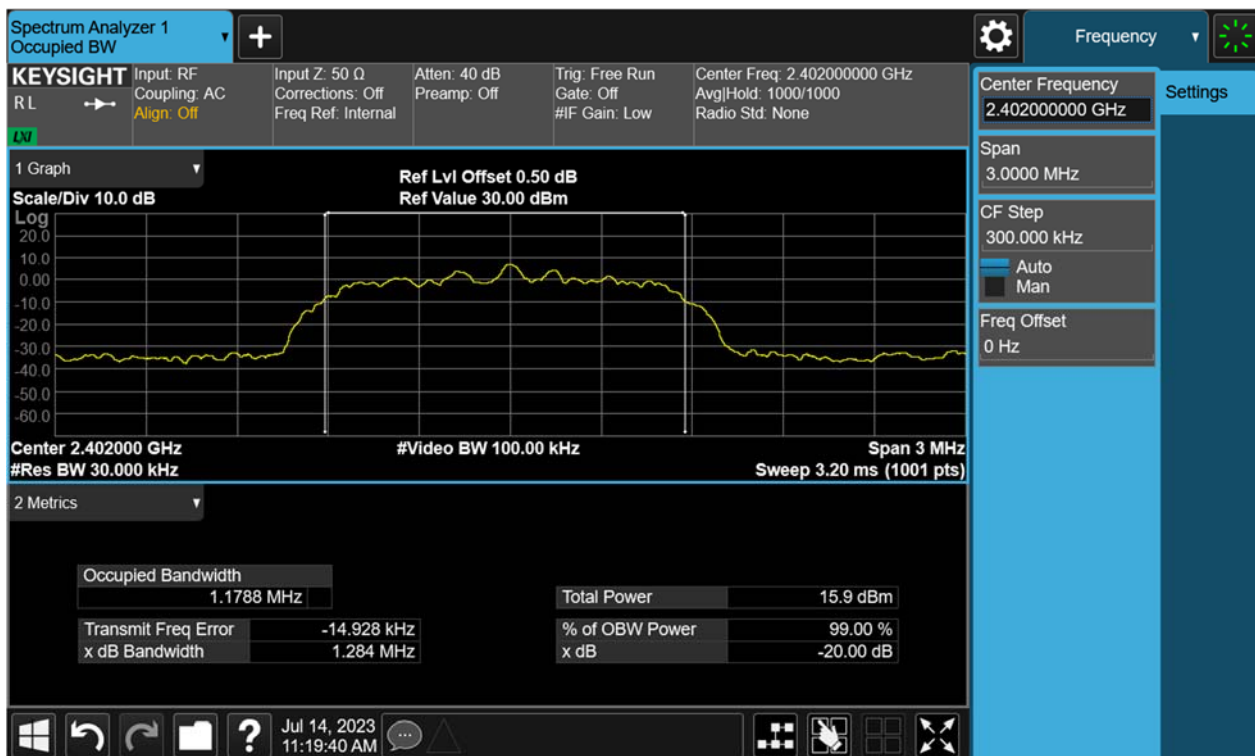
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Figure 12: 20dB Bandwidth, 2480MHz, GFSK



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



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

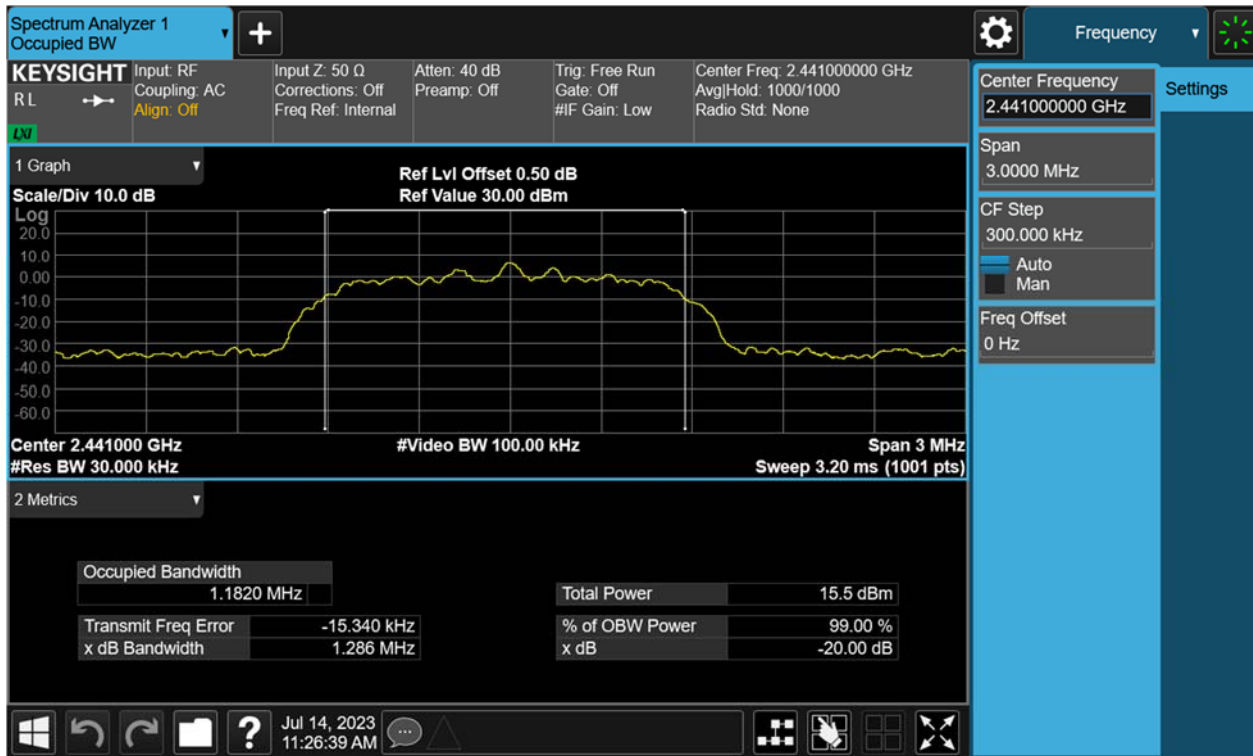


Figure 15: 20dB Bandwidth, 2480MHz, $\pi/4$ -DQPSK



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

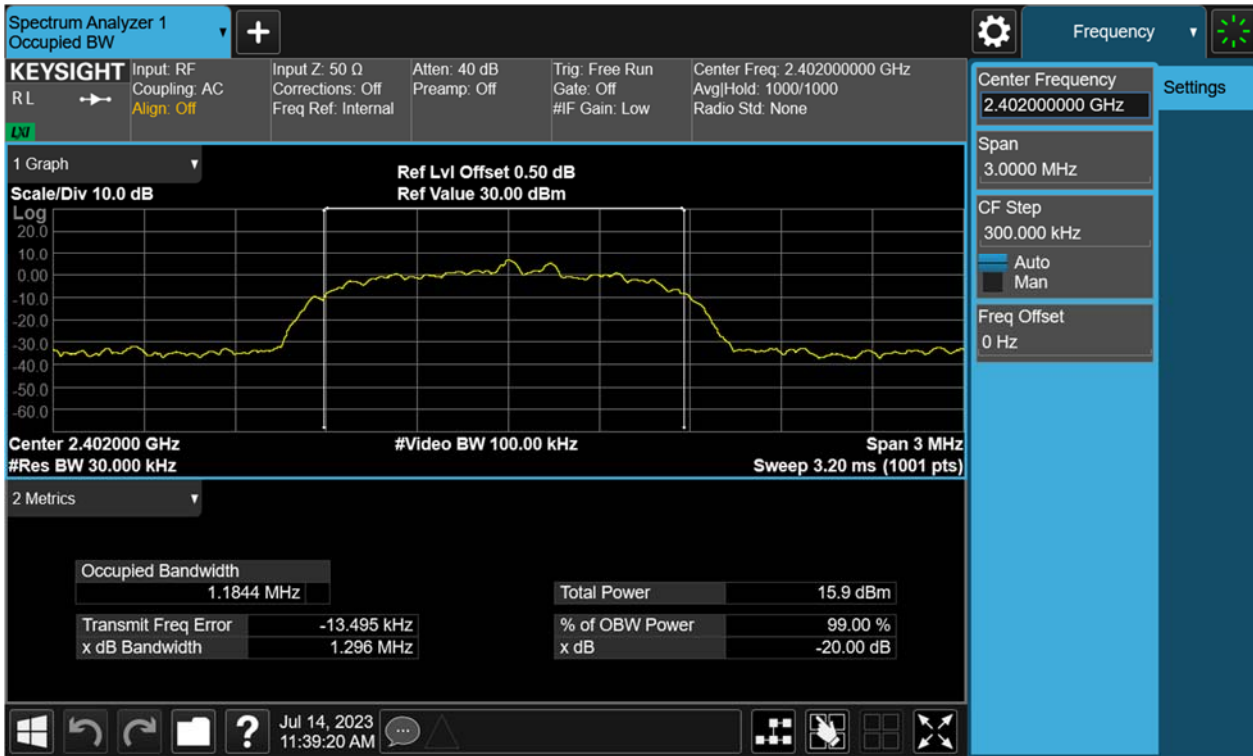
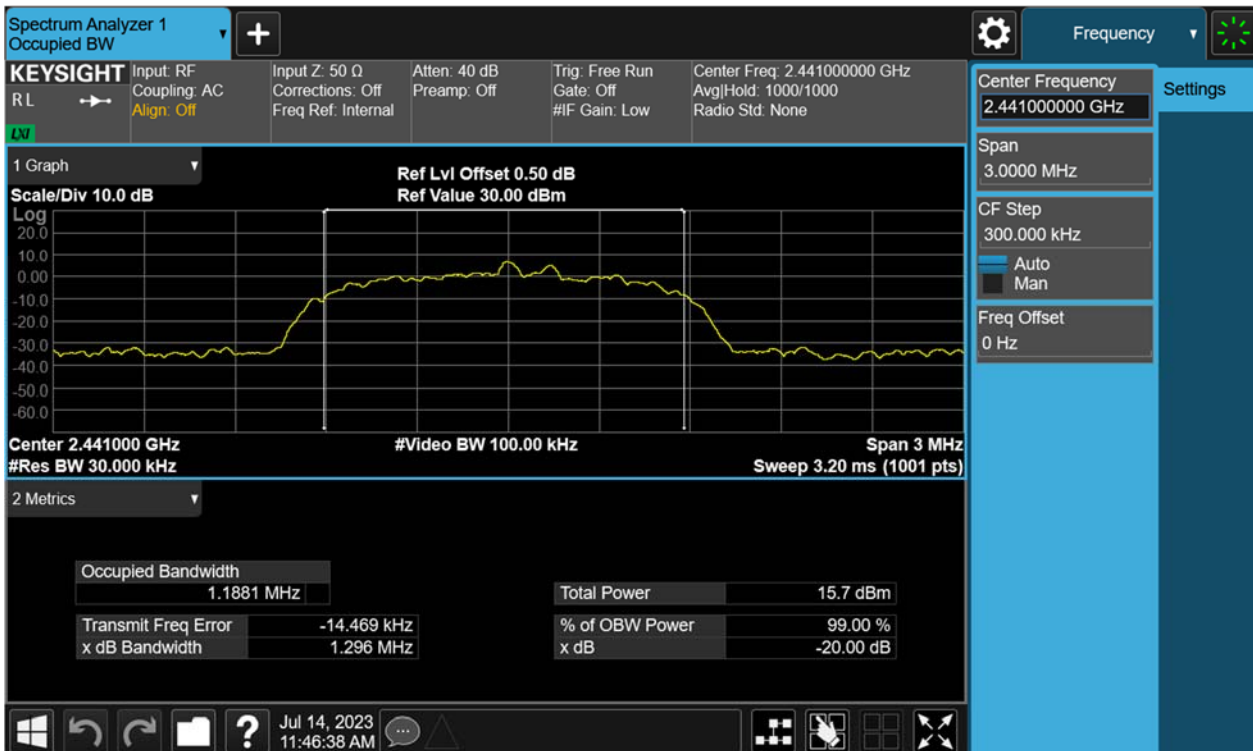


Figure 17: 20dB Bandwidth, 2441MHz, 8-DPSK



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Figure 18: 20dB 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 : 24.9°C

Relative humidity : 51%

For details refer to following test plot.

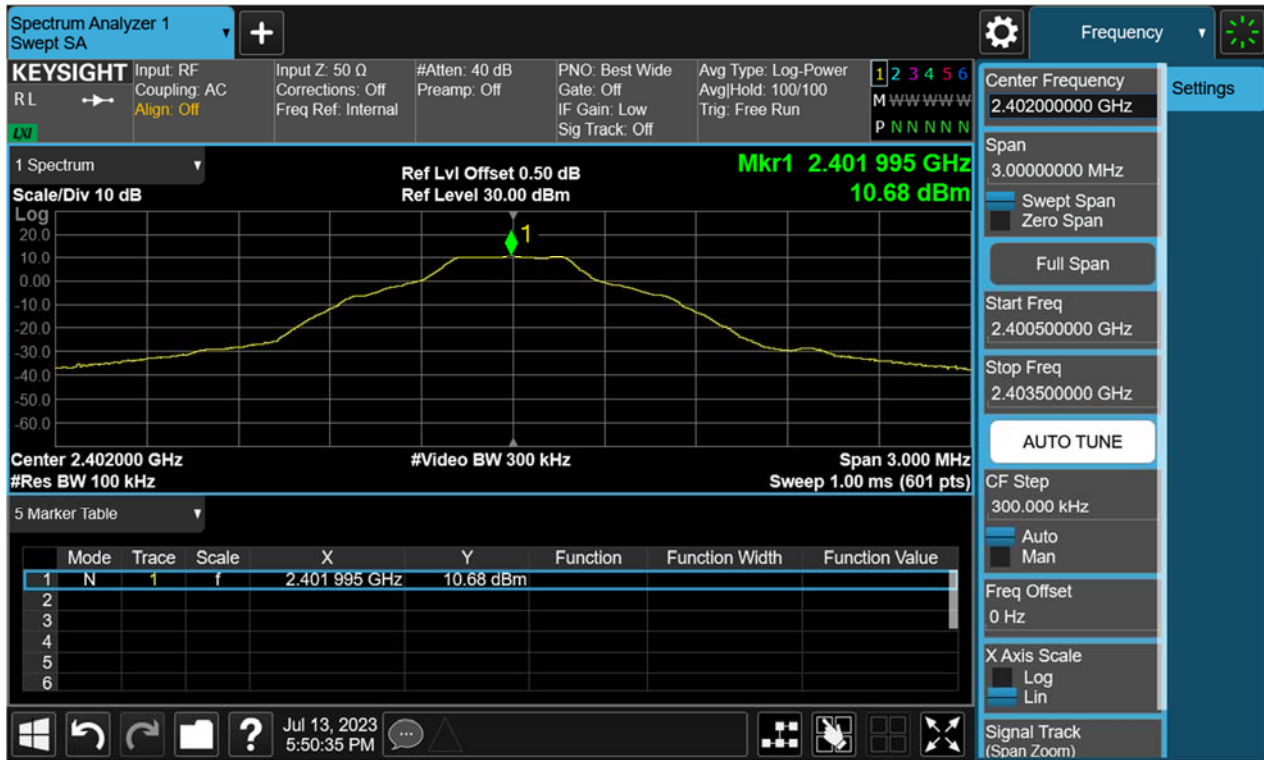
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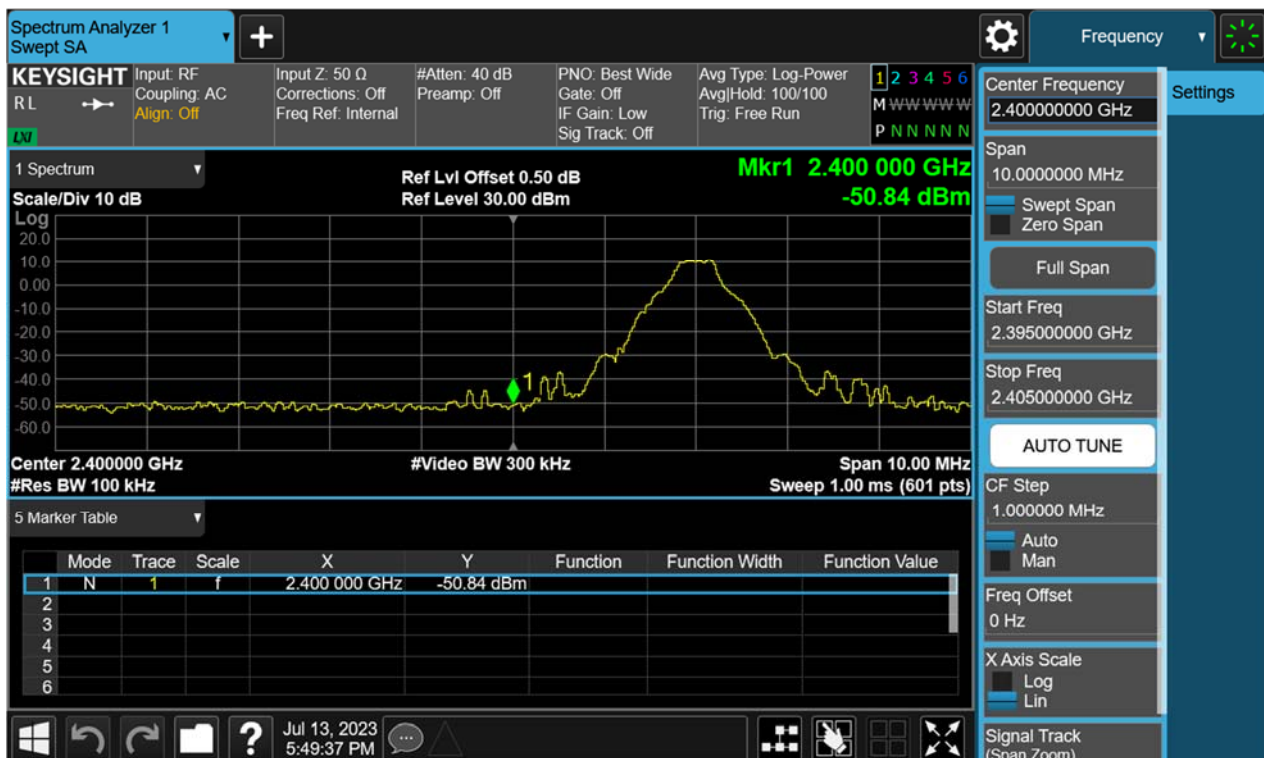
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Figure 19: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, GFSK Carrier Level



Band Edge



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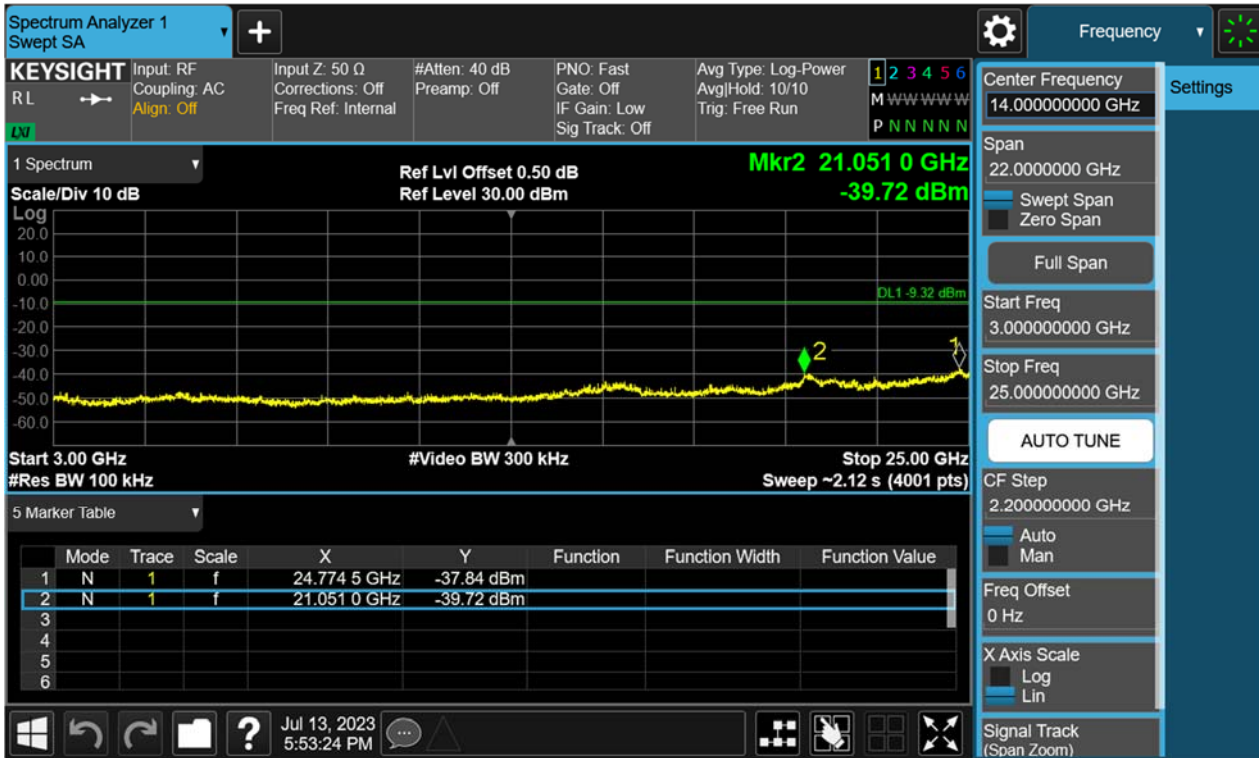
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Conducted spurious emissions 30MHz-25GHz



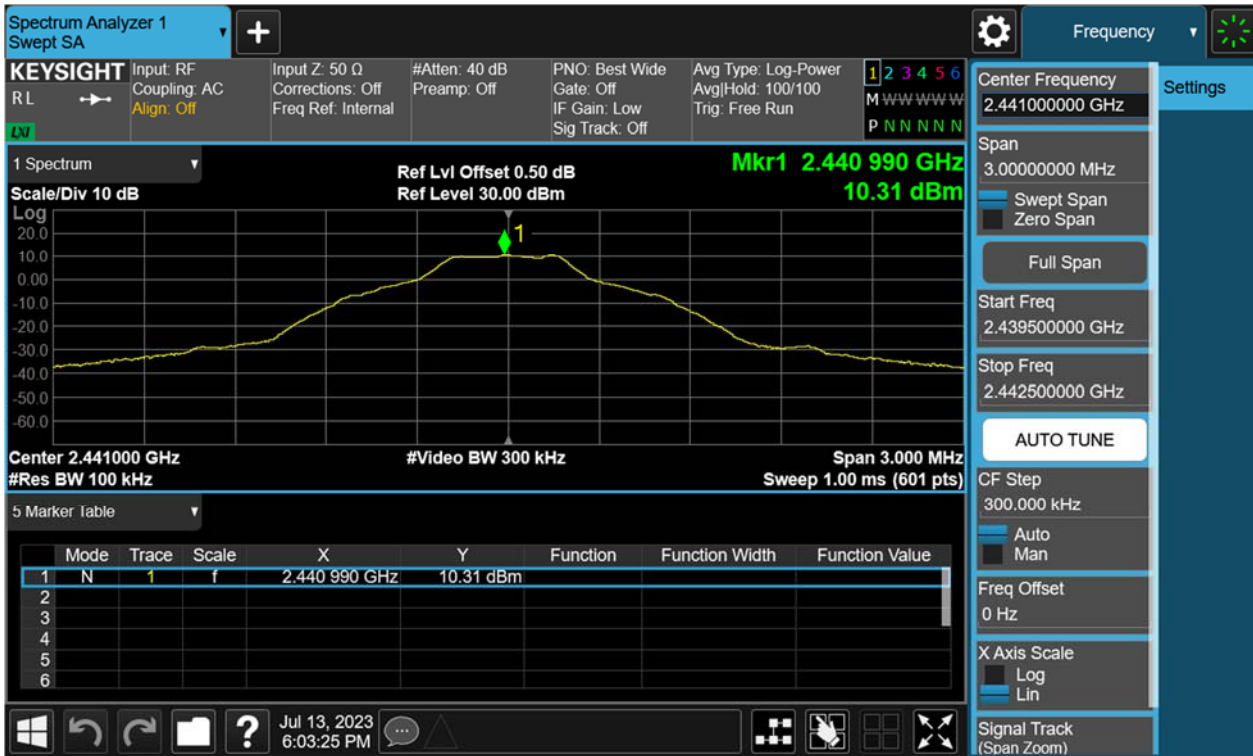
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Figure 20: Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, GFSK Carrier Level



Conducted spurious emissions 30MHz-25GHz



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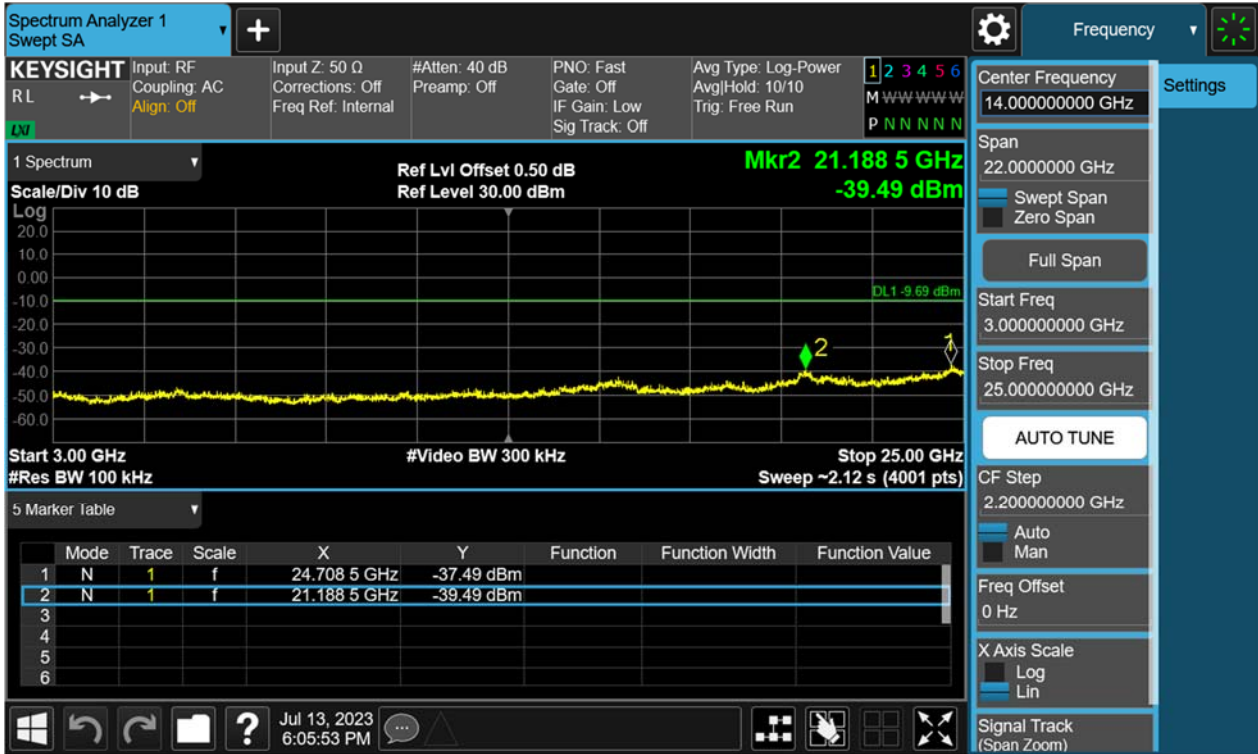
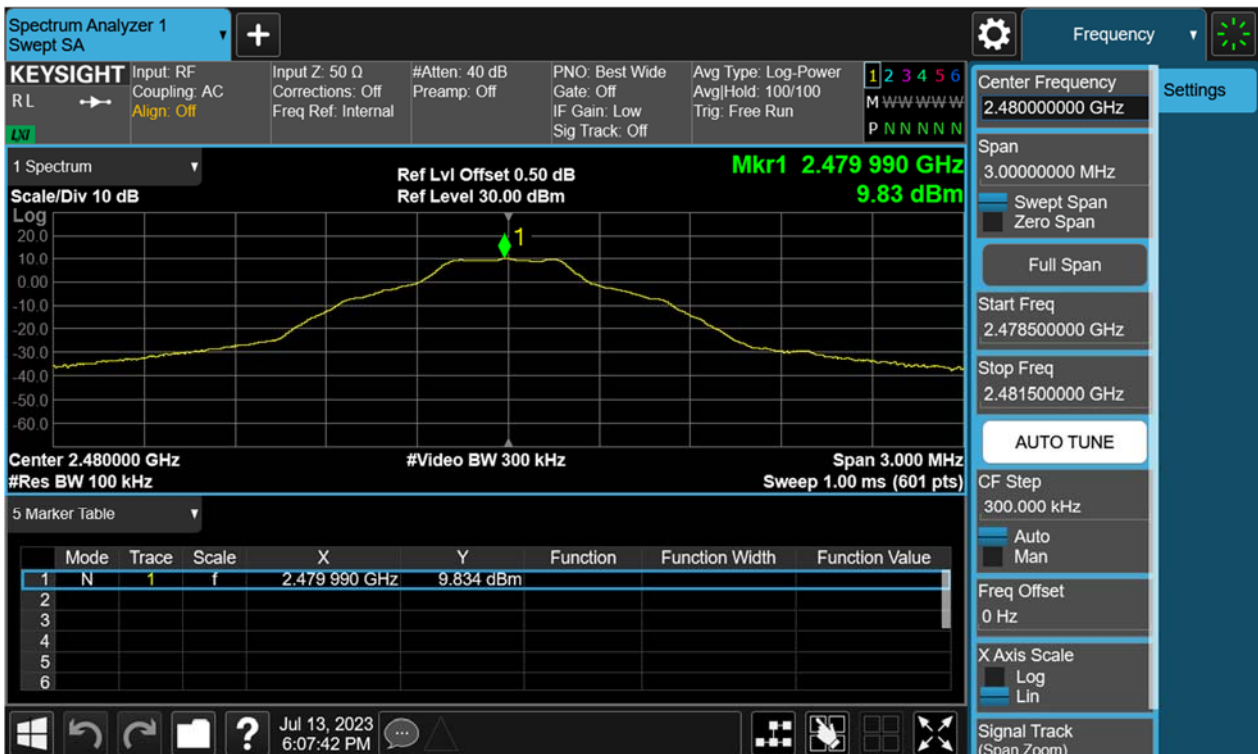


Figure 21: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, GFSK Carrier Level



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Band Edge



Conducted spurious emissions 30MHz-25GHz



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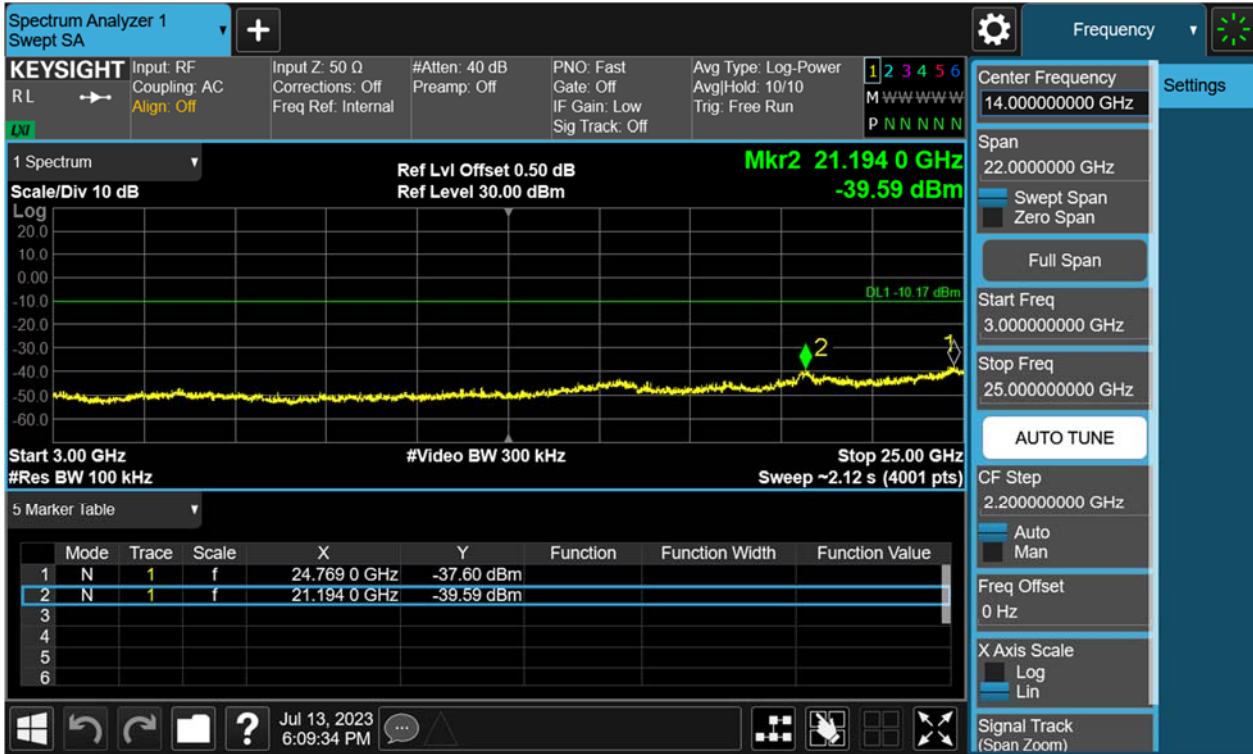
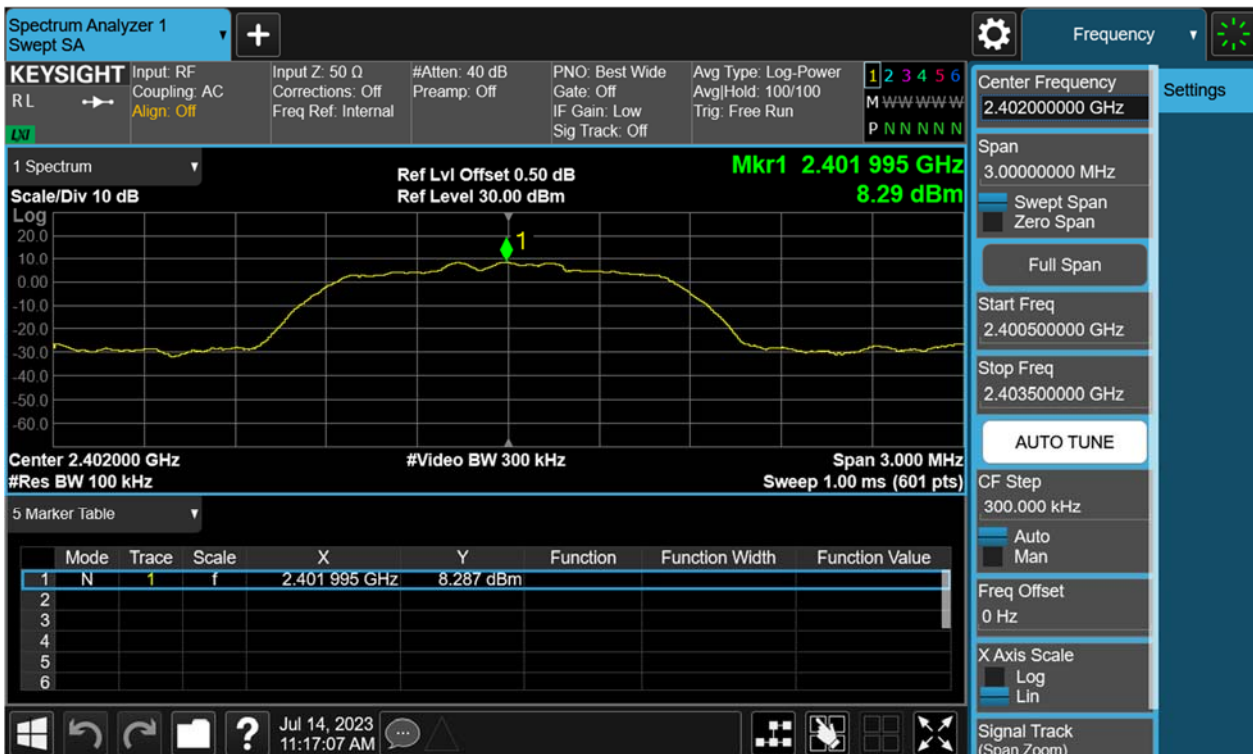


Figure 22: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, $\pi/4$ -DQPSK Carrier Level



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Band Edge



Conducted spurious emissions 30MHz-25GHz

