

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 1 of 55

Applicant : Home Tech Innovation, Inc
Address of Applicant : 1035 Cambridge St, Suite 11A, Cambridge, MA 02141

Product Name : Suvie Starch Cooker
Model No. : S020S
Sample No. : E21100025-01#01
E21100025-02#01
FCC ID : 2AT2K-S020S

Standards : FCC CFR47 Part 15, Subpart C

Date of Receipt : 2021-10-25
Date of Test : 2021-10-28 ~ 2021-11-08
Date of Issue : 2021-11-08

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:

Jennifer Zhou
(Jennifer Zhou)

Reviewed by:

Oliver Xiang
(Oliver Xiang)

Approved by:

Guoyou Chi
(Authorized signatory: Guoyou Chi)

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 2 of 55

Contents

1	GENERAL INFORMATION	3
1.1	TESTING LABORATORY	3
1.2	DETAILS OF APPLICATION	3
1.3	DETAILS OF EUT	3
1.4	TEST METHODOLOGY	4
1.5	TEST SUMMARY	5
2	TEST CONDITION	6
2.1	ENVIRONMENTAL CONDITIONS	6
2.2	EQUIPMENT LIST	6
2.3	MEASUREMENT UNCERTAINTY	6
3	TEST SET-UP AND OPERATION MODES	8
3.1	DETAILS OF TEST MODE	8
3.2	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	8
3.3	SUPPORT SOFTWARE	8
3.4	TEST SETUP DIAGRAM	9
4	TEST RESULTS	11
4.1	TRANSMITTER REQUIREMENT & TEST SUITES	11
4.1.1	<i>Antenna Requirement</i>	11
4.1.2	<i>Maximum Conducted Output Power</i>	12
4.1.3	<i>20dB Bandwidth and 99% Bandwidth</i>	19
4.1.4	<i>Conducted Spurious Emission & Authorized-band band-edge</i>	23
4.1.5	<i>Radiated Spurious Emission</i>	40
4.1.6	<i>Band Edge (Restricted-band band-edge)</i>	41
4.1.7	<i>Hopping Frequency Separation</i>	42
4.1.8	<i>Number of Hopping Frequency</i>	44
4.1.9	<i>Time of Occupancy</i>	46
4.2	MAINS EMISSIONS	50
4.2.1	<i>Conducted Emission on AC Mains</i>	50
5	APPENDIXES	53
5.1	PHOTOGRAPHS OF THE SAMPLE	53
5.2	SET-UP FOR CONDUCTED EMISSIONS	54
5.3	SET-UP FOR CONDUCTED RF TEST AT ANTENNA PORT	54
5.4	SET-UP FOR SPURIOUS EMISSIONS BELOW 1GHz	55
5.5	SET-UP FOR SPURIOUS EMISSIONS ABOVE 1GHz	55

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 3 of 55

1 General Information

1.1 Testing Laboratory

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

1.2 Details of Application

Applicant Company Name	Home Tech Innovation, Inc
Address	1035 Cambridge St, Suite 11A, Cambridge, MA 02141
Contact Person	Kevin Incorvia
Telephone	+1 617 800 5336
Email	kincorvia@suvie.com
Manufacturer Company Name	Home Tech Innovation, Inc
Address	1035 Cambridge St, Suite 11A, Cambridge, MA 02141

1.3 Details of EUT

Product Name	Suvie Starch Cooker
Brand Name	Suvie
Test Model No.	S020S
FCC ID	2AT2K-S020S
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
Antenna Type	Internal Antenna
Antenna Gain	3.42dBi
Test Voltage	AC 120V
Hardware version	S020S1.0.1
Software version	fw
RF power setting in TEST SW	ESP

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 4 of 55

1.4 Test Methodology

47 CFR Part 15, Subpart C (10-1-16 Edition)	Miscellaneous Wireless Communications Services
KDB Publication 558074 D01 v05r02	Part 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.

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 5 of 55

1.5 Test Summary

Test Item	FCC Rules	Result
Antenna Requirement	FCC Part 15.247(b)(4), Part 15.203	PASS
Maximum Conducted 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 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

Note(s):

$\pi/4$ -DQPSK is the EDR 2M rate mode, 8-DPSK is the EDR 3M rate mode. The consistency of test results in $\pi/4$ -DQPSK and 8-DPSK is very high. So we chose 8-DPSK as a typical representative to appear on the report. Another we will show all the modes on the RF output power test item.

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 6 of 55

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	2021-08-17	2022-08-16
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2021-06-10	2022-06-09
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2021-06-10	2022-06-09
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2021-06-10	2022-06-09
V-network	SCHWARZBEC K	NSLK 8127	8127-902	2021-06-10	2022-06-09
Wideband Radio Communication Tester	Rohde & Schwarz	CMW 500	100687	2021-08-13	2022-08-12
Broadband Antenna	SCHWARZBEC K	VULB9163	9163-1037	2021-06-08	2022-06-07
Horn Antenna-18G	SCHWARZBEC K	BBHA9120D	9120D-1775	2021-06-08	2022-06-07
Loop Antenna	SCHWARZBEC K	FMZB 1513	N/A	2020-11-23	2021-11-22
Horn Antenna-40G	YINGLIAN	LB-180400-KF	N/A	2021-06-12	2022-06-11
EMC chamber 9*6*6 (L*W*H)	CHANGNING	966	N/A	2020-06-09	2023-06-08
Shielded Enclosure 8*5*4 (L*W*H)	CHANGNING	854	N/A	2020-06-09	2023-06-08
Test Software	BL	BL410_E	N/A	N/A	N/A
Test Software	BL	BL410_R	N/A	N/A	N/A

2.3 Measurement Uncertainty

Parameter	Frequency	Uncertainty
Antenna Port Conducted Emission	< 1GHz	± 1.5 dB
	> 1GHz	± 1.5 dB

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 7 of 55

Radiated Emission	30 MHz – 1 GHz	± 3 dB
	> 1GHz	± 3 dB
Conducted Emission on AC Mains	9 kHz to 30 MHz	± 1.96 dB

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 8 of 55

3 Test Set-up and Operation Modes

3.1 Details of Test Mode

Using test software 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 No.	Serial No.
Laptop	Lenovo	TP00083A	N/A

3.3 Support Software

Description	Manufacturer	Software Name
Software	N/A	ESP

TEST REPORT

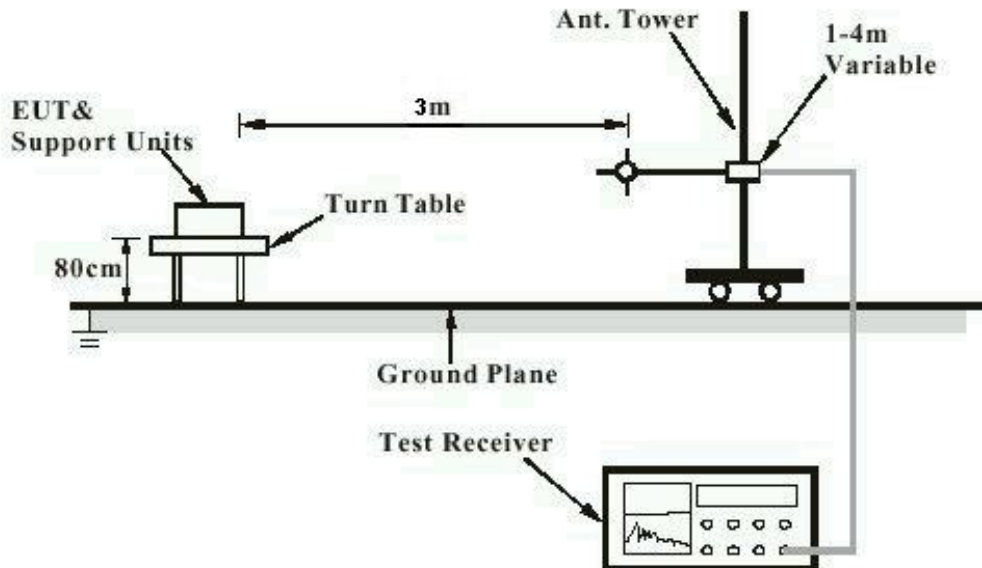
Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 9 of 55

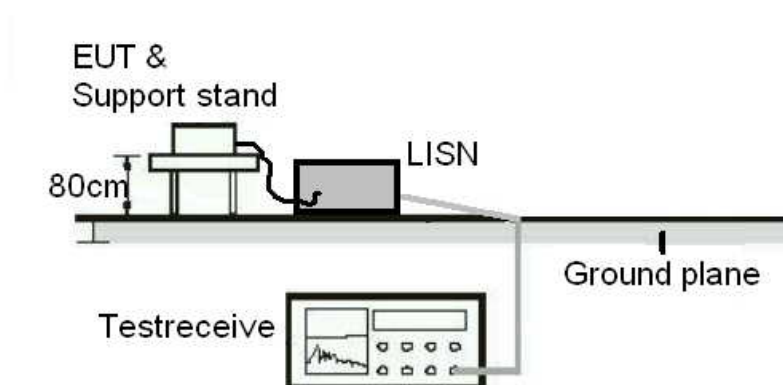
3.4 Test Setup Diagram

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 Equipment Configuration for Conduction Measurement



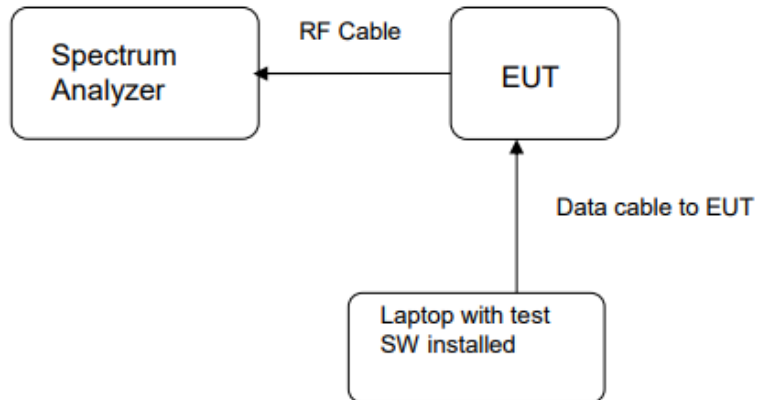
TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 10 of 55

Diagram of Measurement Equipment Configuration for Transmitter Measurement



TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 11 of 55

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 3.42dBi. 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.

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 12 of 55

4.1.2 Maximum Conducted Output Power

RESULT:

PASS

Test standard : FCC Part 15.247(b)(1)
Requirement : ANSI C63.10-2013
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 50%

Table 1: Maximum Conducted Output Power

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(mW)	
GFSK	2402	-0.73	0.85	≤ 1
	2441	-0.89	0.81	
	2480	-1.39	0.73	
$\pi/4$ -DQPSK	2402	1.58	1.44	≤ 0.125
	2441	1.39	1.38	
	2480	0.86	1.22	
8-DPSK	2402	1.14	1.30	≤ 0.125
	2441	1.19	1.32	
	2480	0.72	1.18	

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 13 of 55

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



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



TEST REPORT

Report No.: SHE21100025-02BE

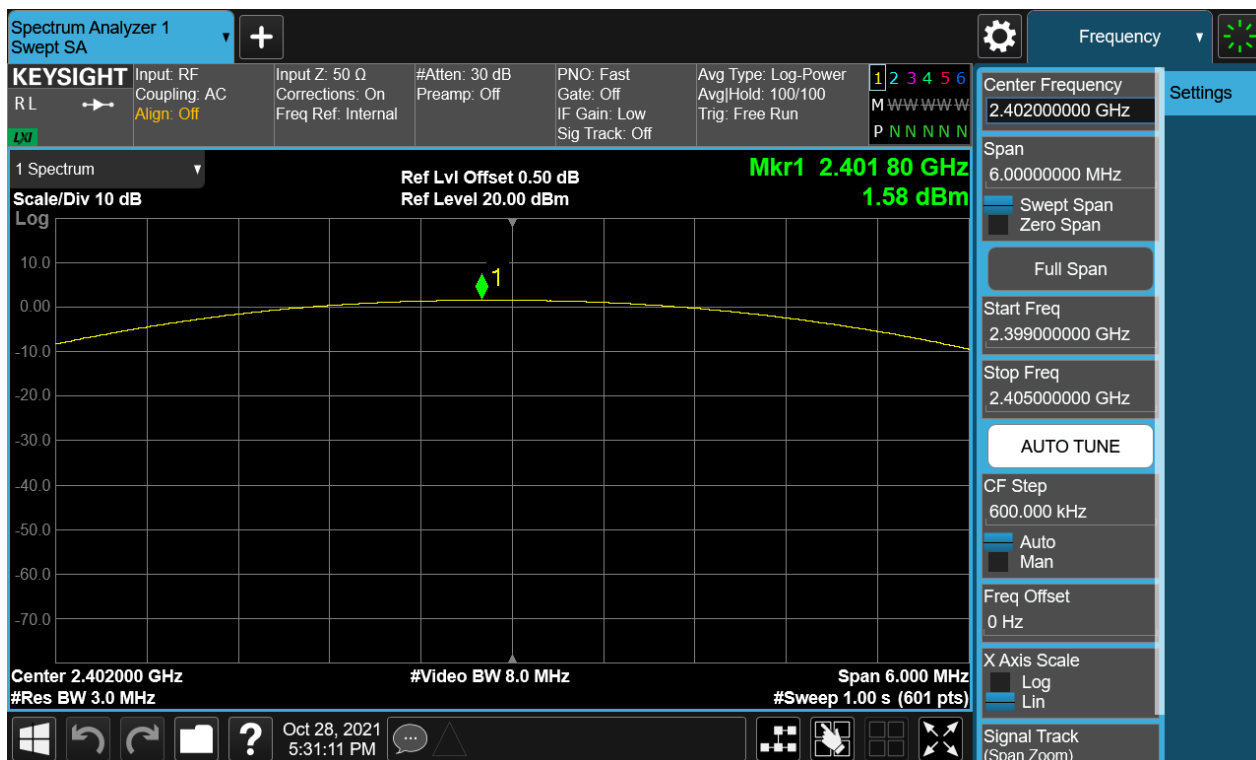
Date: 2021-11-08

Page 14 of 55

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



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



TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 15 of 55

Figure 5: Maximum Conducted Output Power, 2441MHz, π /4-DQPSK



Figure 6: Maximum Conducted Output Power, 2480MHz, π /4-DQPSK

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 16 of 55



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



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

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 17 of 55

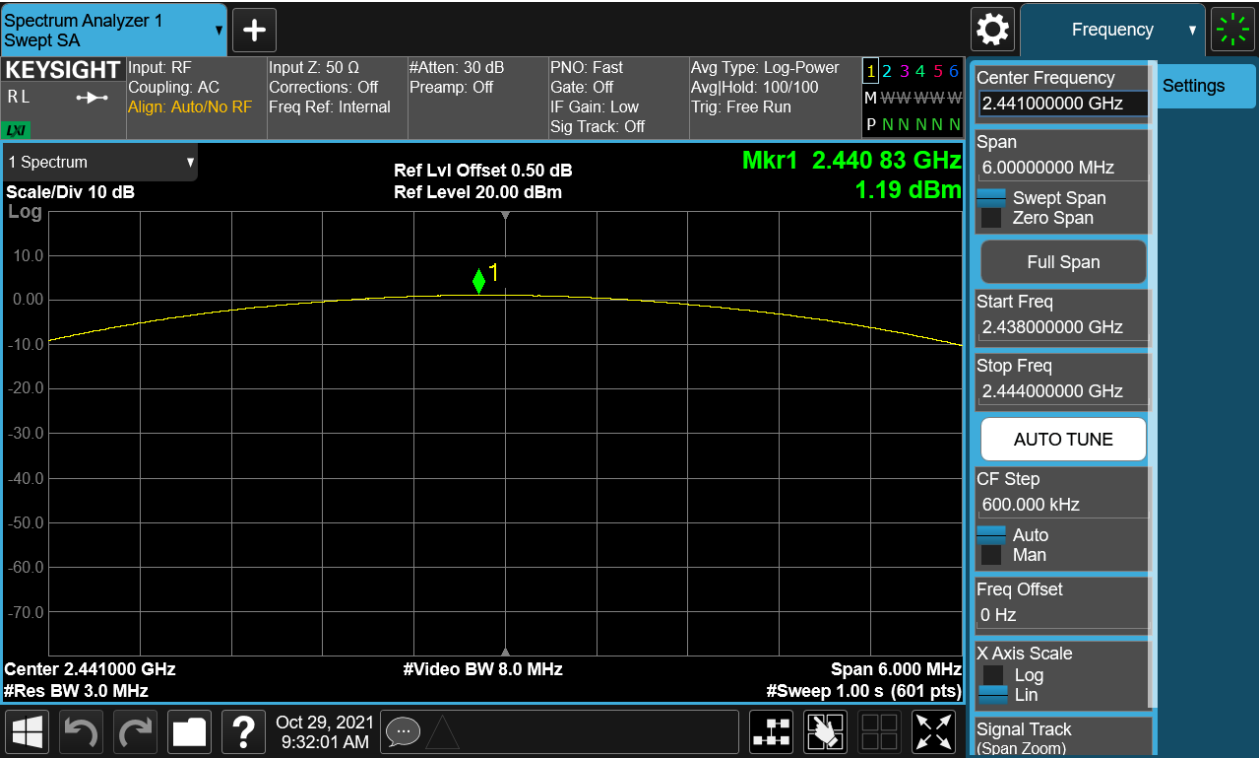


Figure 9: Maximum Conducted Output Power, 2480MHz, 8-DPSK

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 18 of 55



TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 19 of 55

4.1.3 20dB Bandwidth and 99% Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.247(a)(1)
Requirement : ANSI C63.10-2013
Kind of test site : Shielded room

Test setup

Test Channel : Low/Middle/High
Operation Mode : A.1.a
Ambient temperature : 25°C
Relative humidity : 50%

Table 2: 20dB Bandwidth and 99% Bandwidth

Test Mode	Test Channel (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
GFSK	2402	0.940	0.826
	2441	0.943	0.824
	2480	0.938	0.824
8-DPSK	2402	1.309	1.177
	2441	1.307	1.176
	2480	1.308	1.177

TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 20 of 55

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

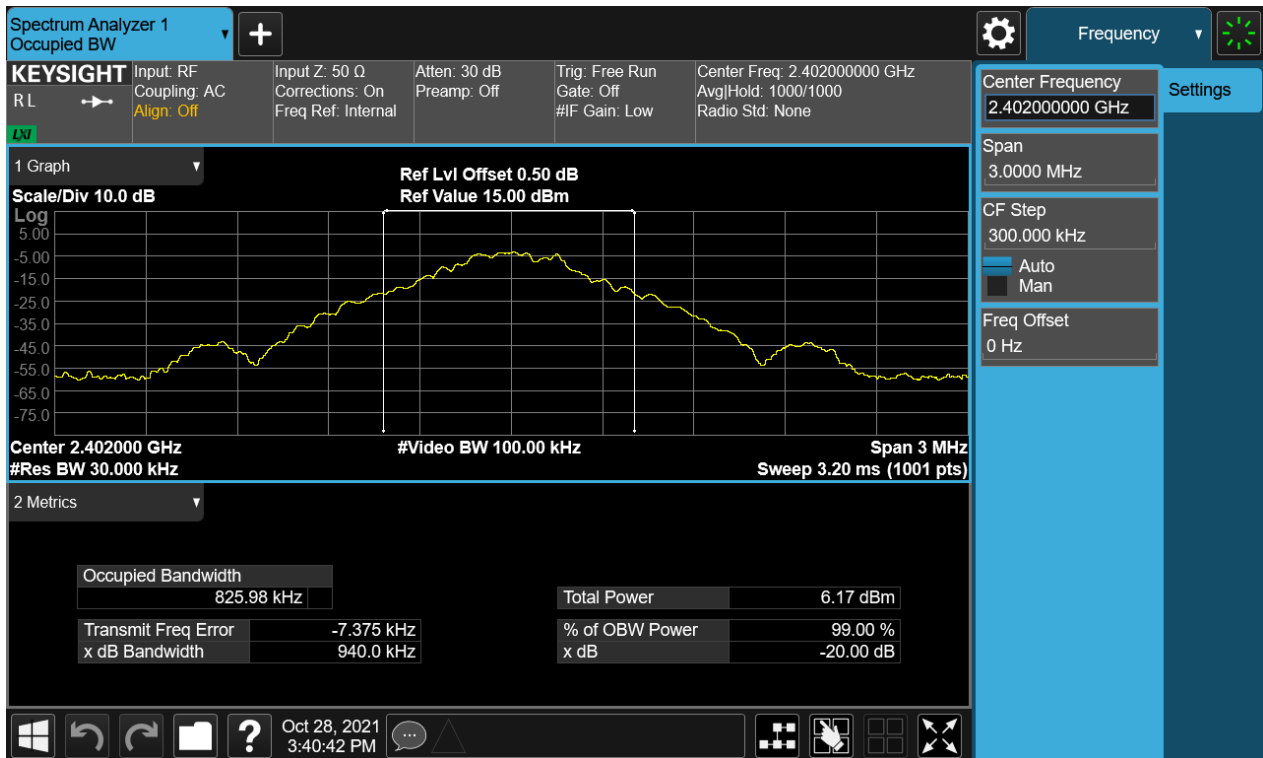
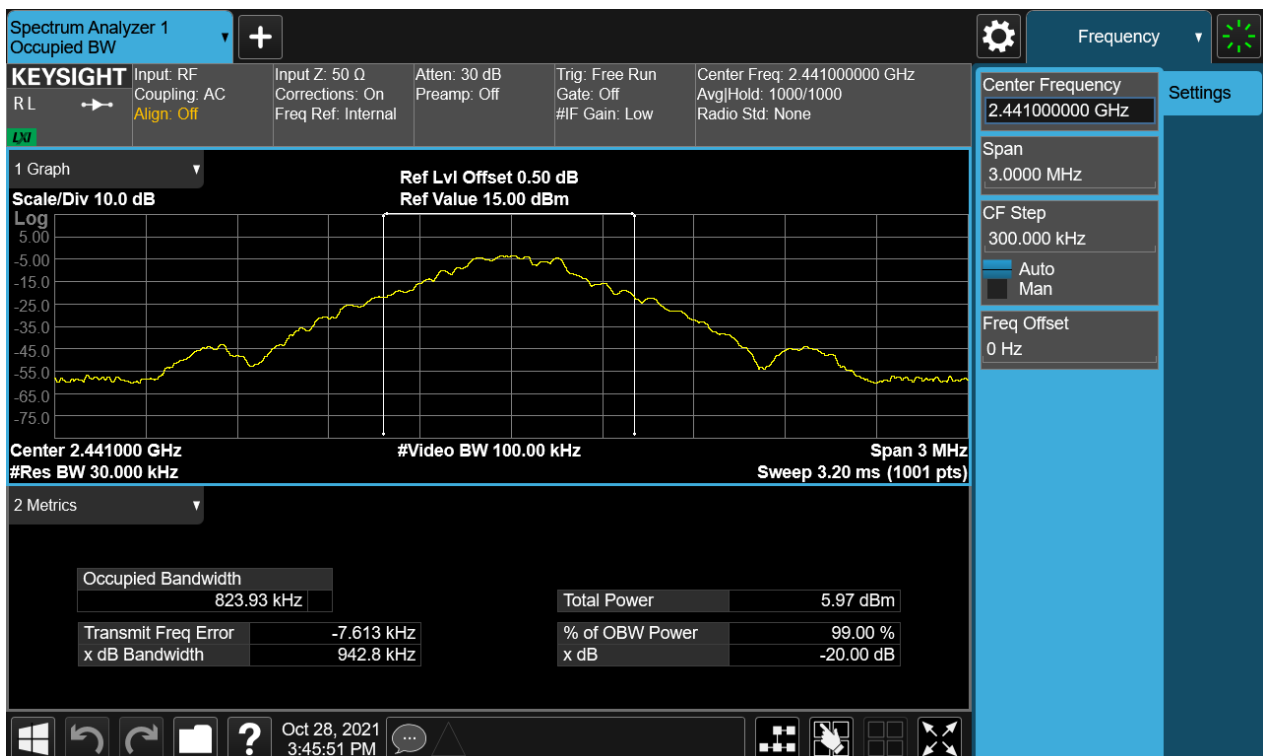


Figure 11: 20dB Bandwidth and 99% Bandwidth, 2441MHz, GFSK



TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 21 of 55

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

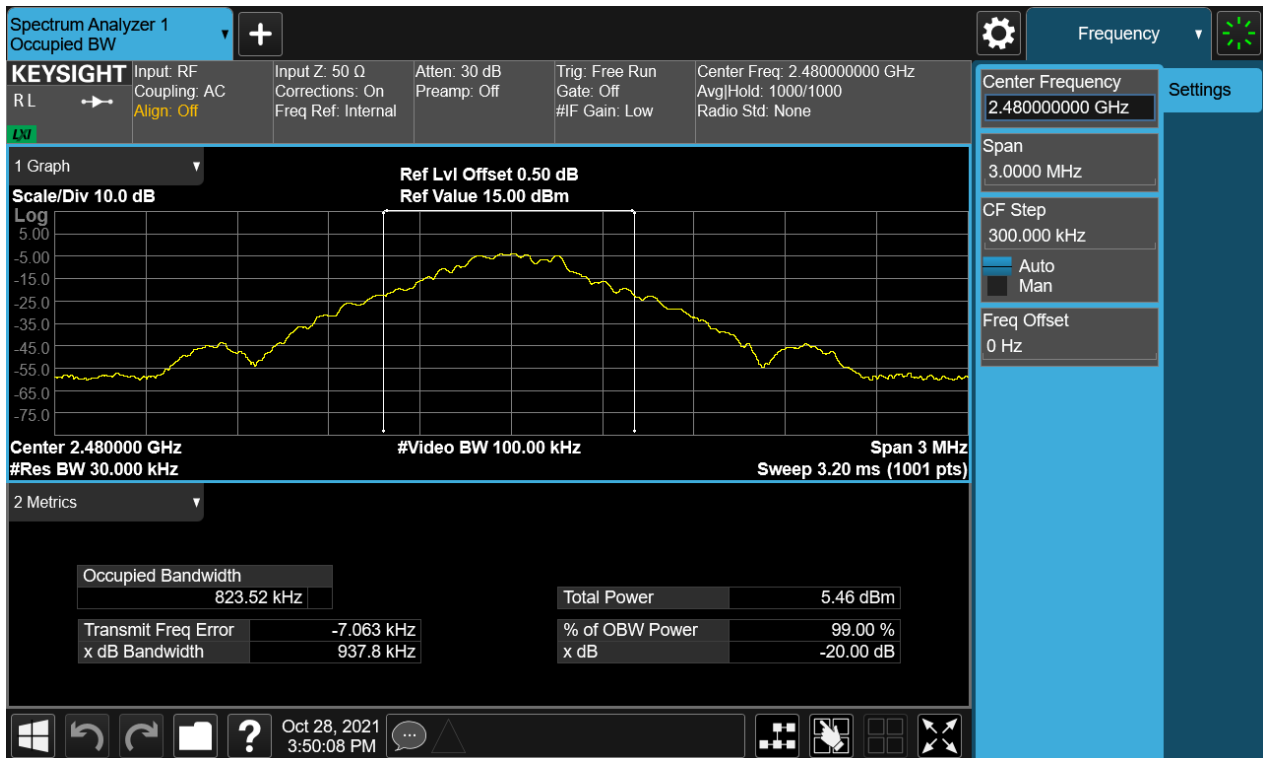
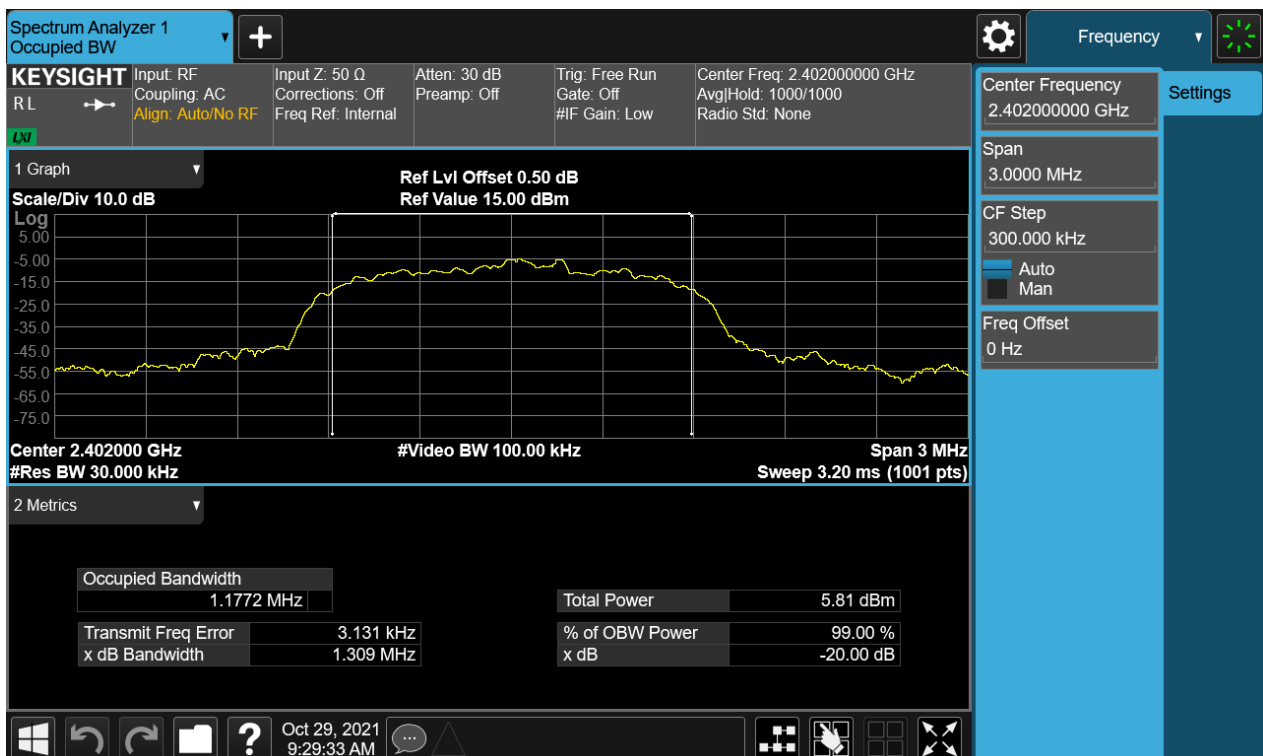


Figure 13: 20dB Bandwidth and 99% Bandwidth, 2402MHz, 8-DPSK



TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 22 of 55

Figure 14: 20dB Bandwidth and 99% Bandwidth, 2441MHz, 8-DPSK

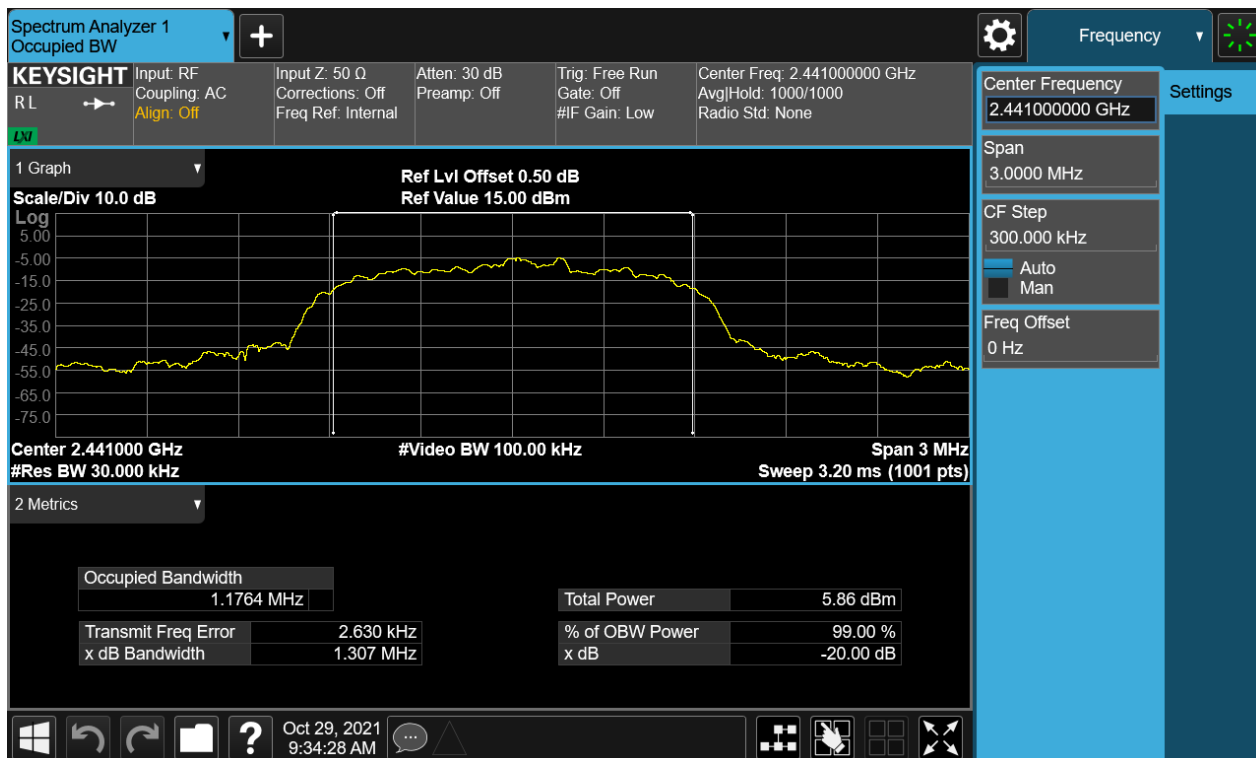


Figure 15: 20dB Bandwidth and 99% Bandwidth, 2480MHz, 8-DPSK



TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 23 of 55

4.1.4 Conducted Spurious Emission & Authorized-band band-edge

RESULT:

PASS

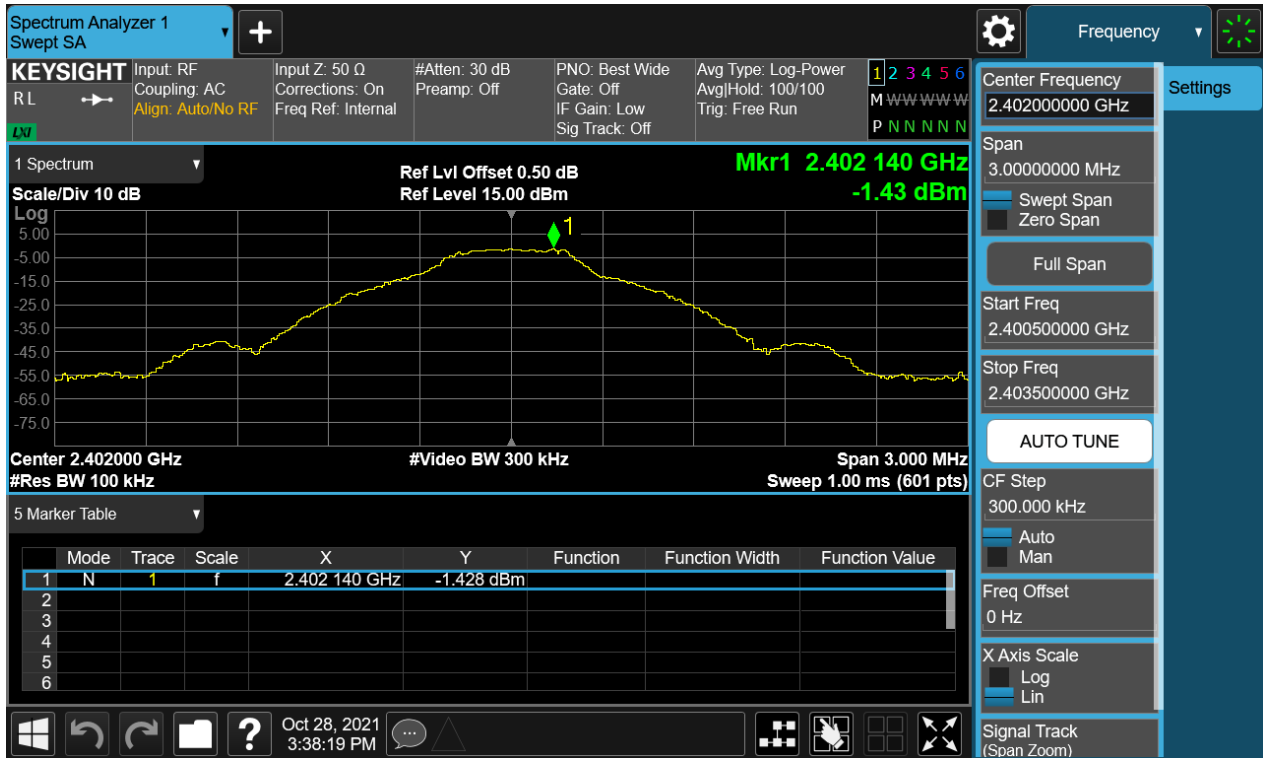
Test standard	: FCC Part 15.247(d)
Requirement	: ANSI C63.10-2013
Kind of test site	: Shielded room

Test setup

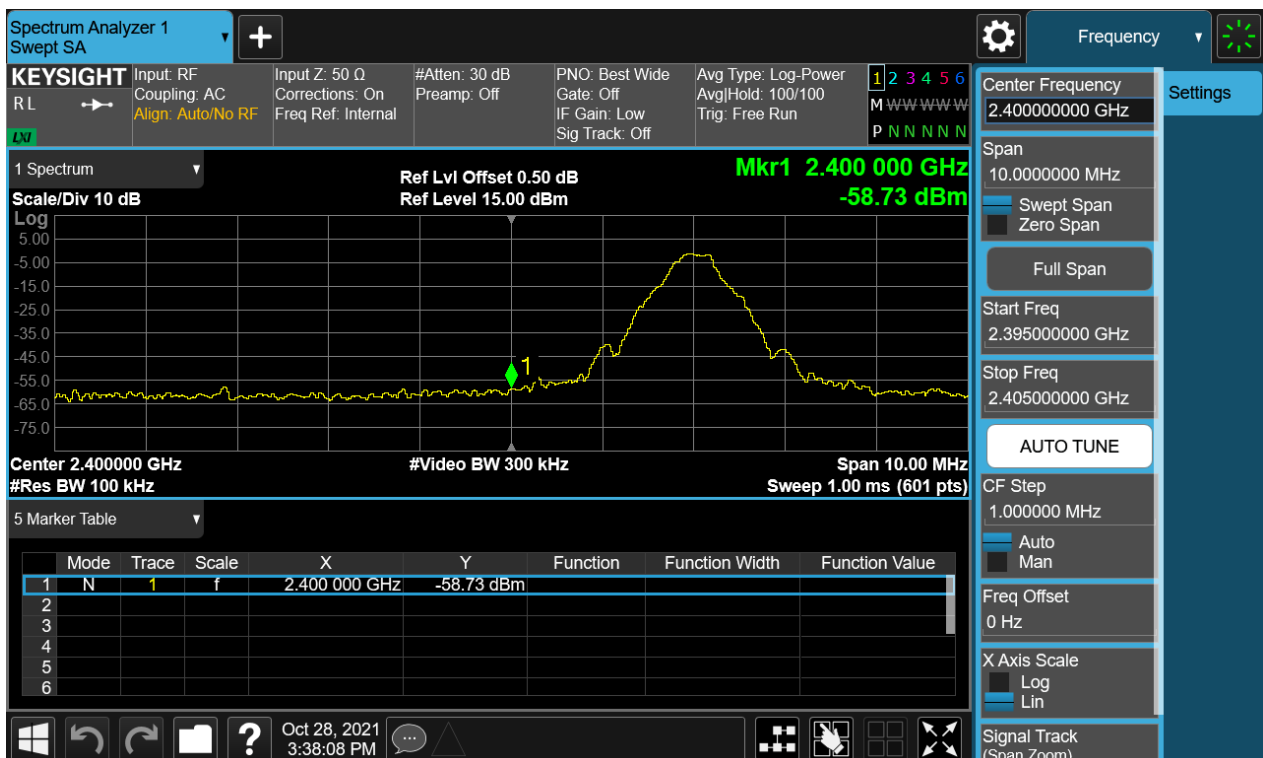
Test Channel	: Low/Middle/High for spurious, Low/High for Band Edge
Operation Mode	: A.1.a
Ambient temperature	: 25°C
Relative humidity	: 50%

For details refer to following test plot.

Figure 16: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, GFSK
Carrier Level



Band Edge



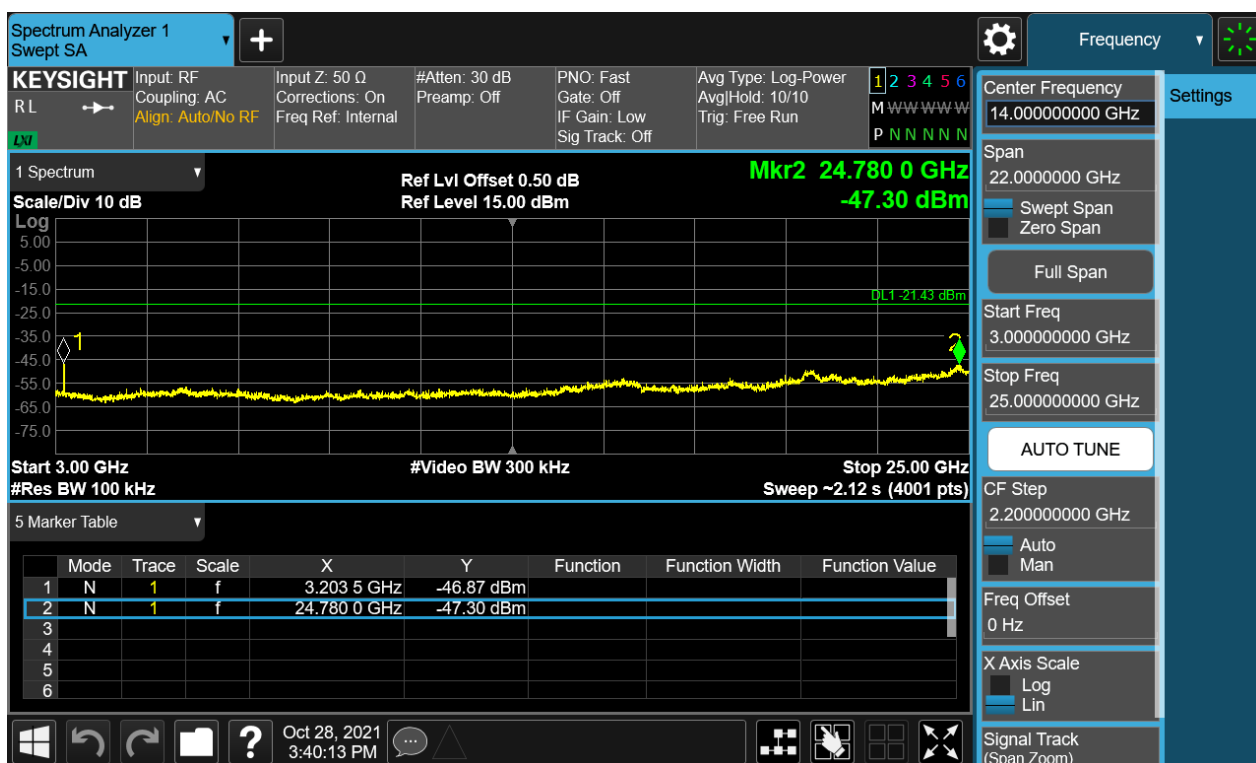
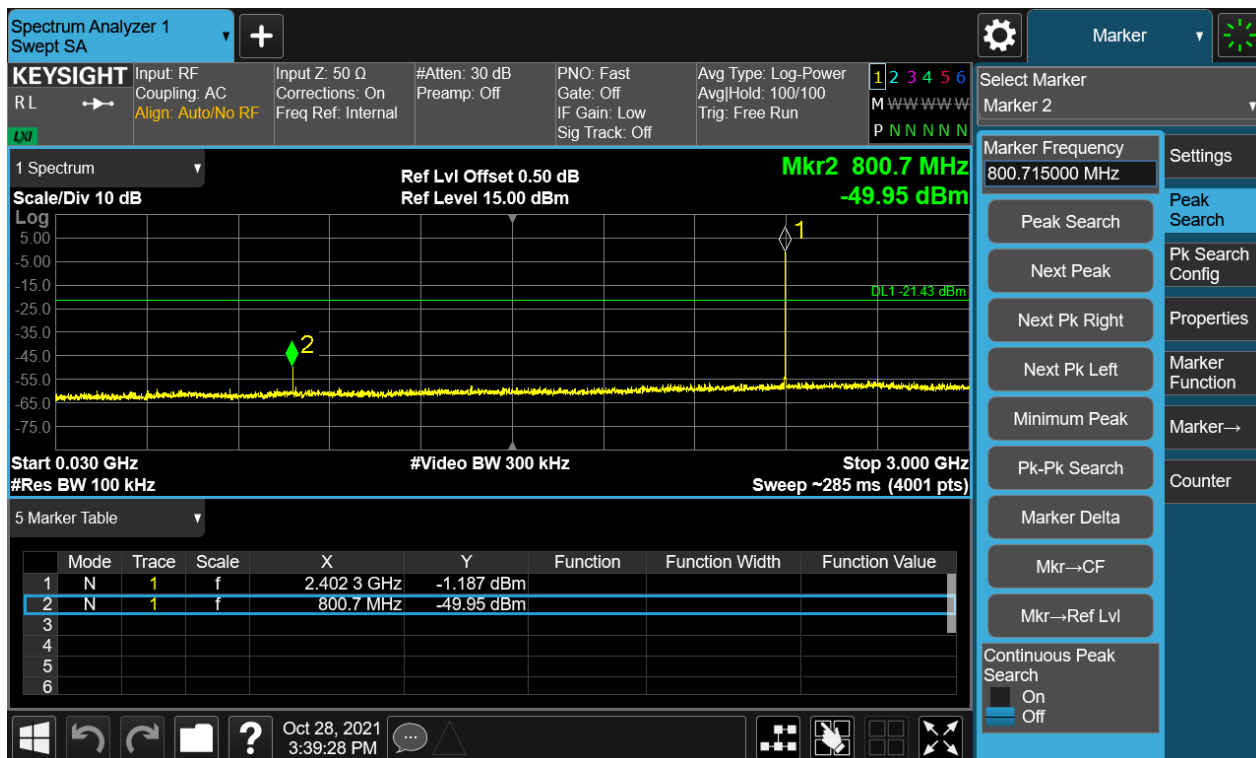
TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 25 of 55

Conducted spurious emissions 30MHz-25GHz



TEST REPORT

Report No.: SHE21100025-02BE

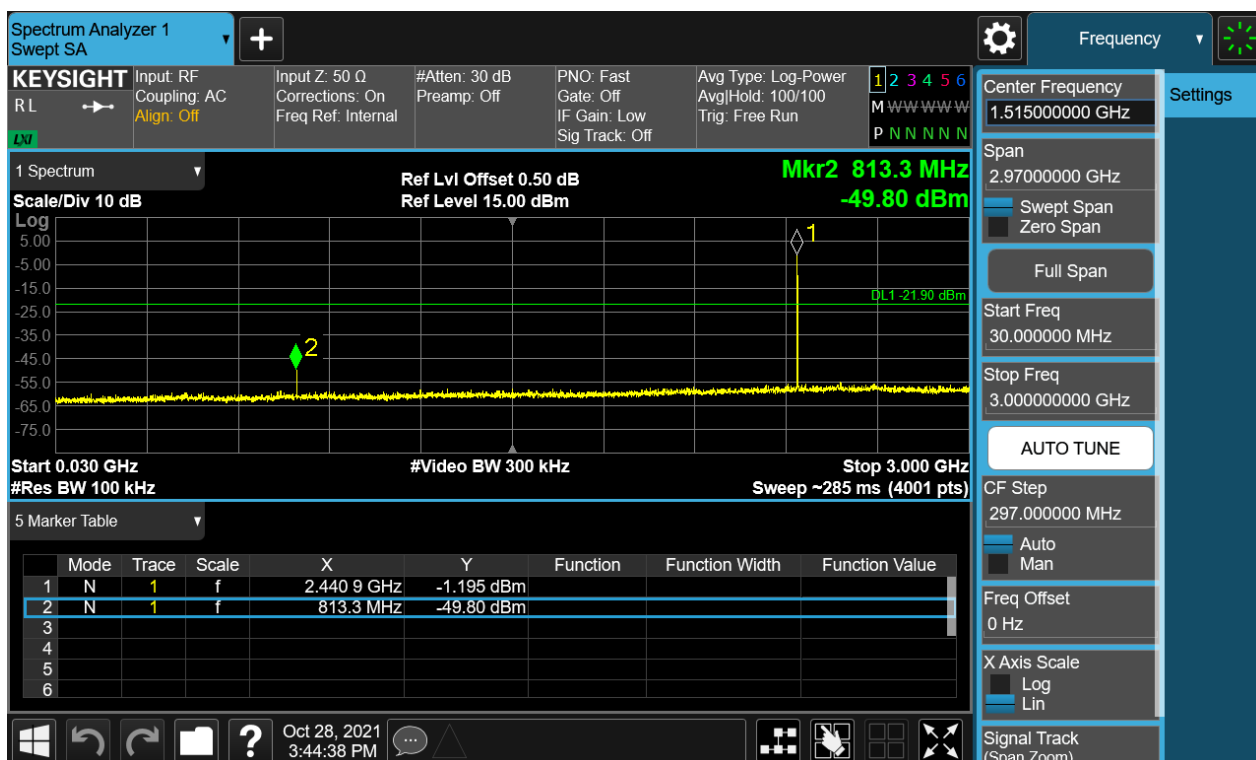
Date: 2021-11-08

Page 26 of 55

Figure 17: Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, GFSK
Carrier Level



Conducted spurious emissions 30MHz-25GHz



TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 27 of 55

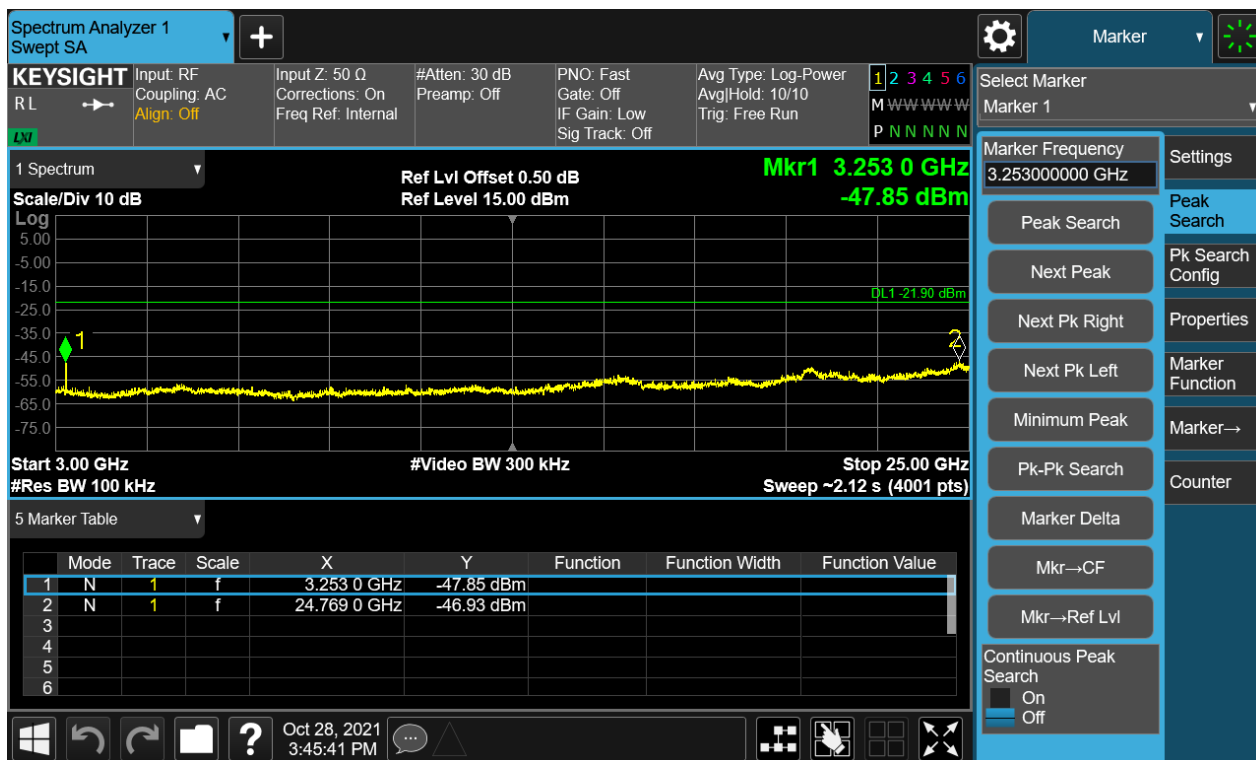
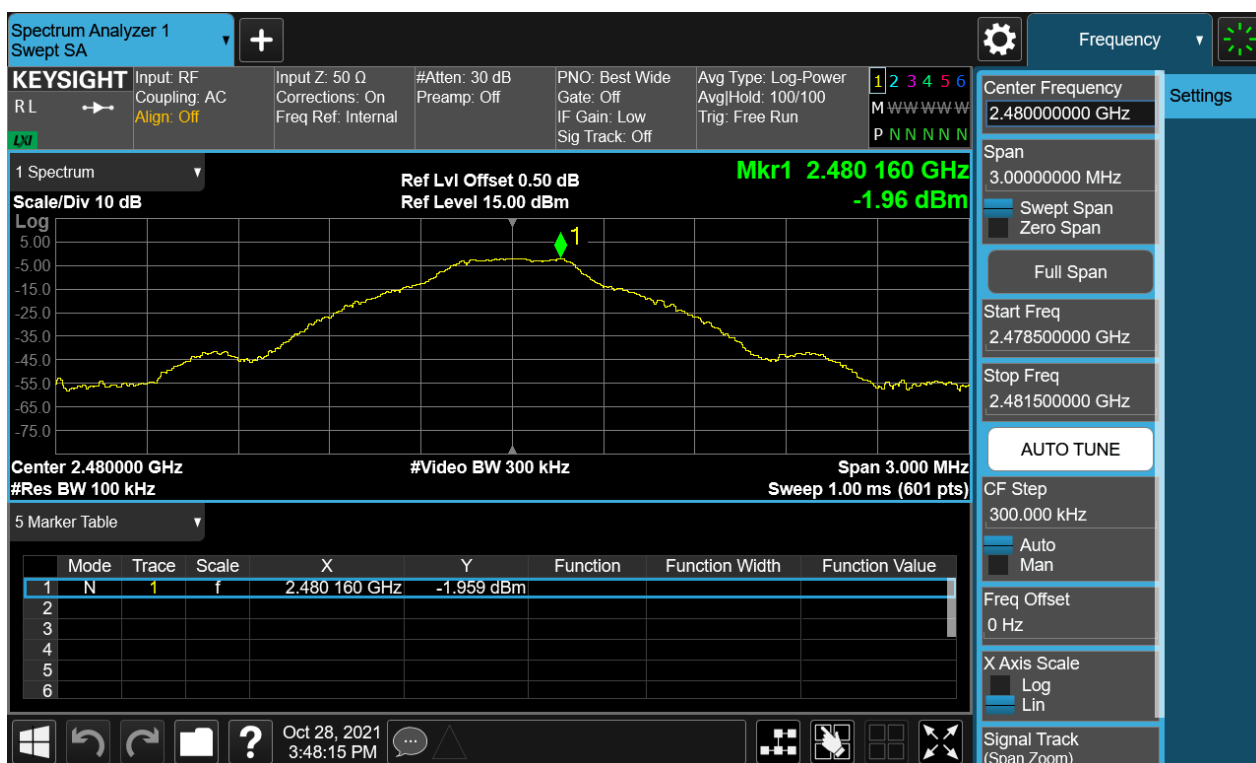


Figure 18: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, GFSK Carrier Level



TEST REPORT

Report No.: SHE21100025-02BE

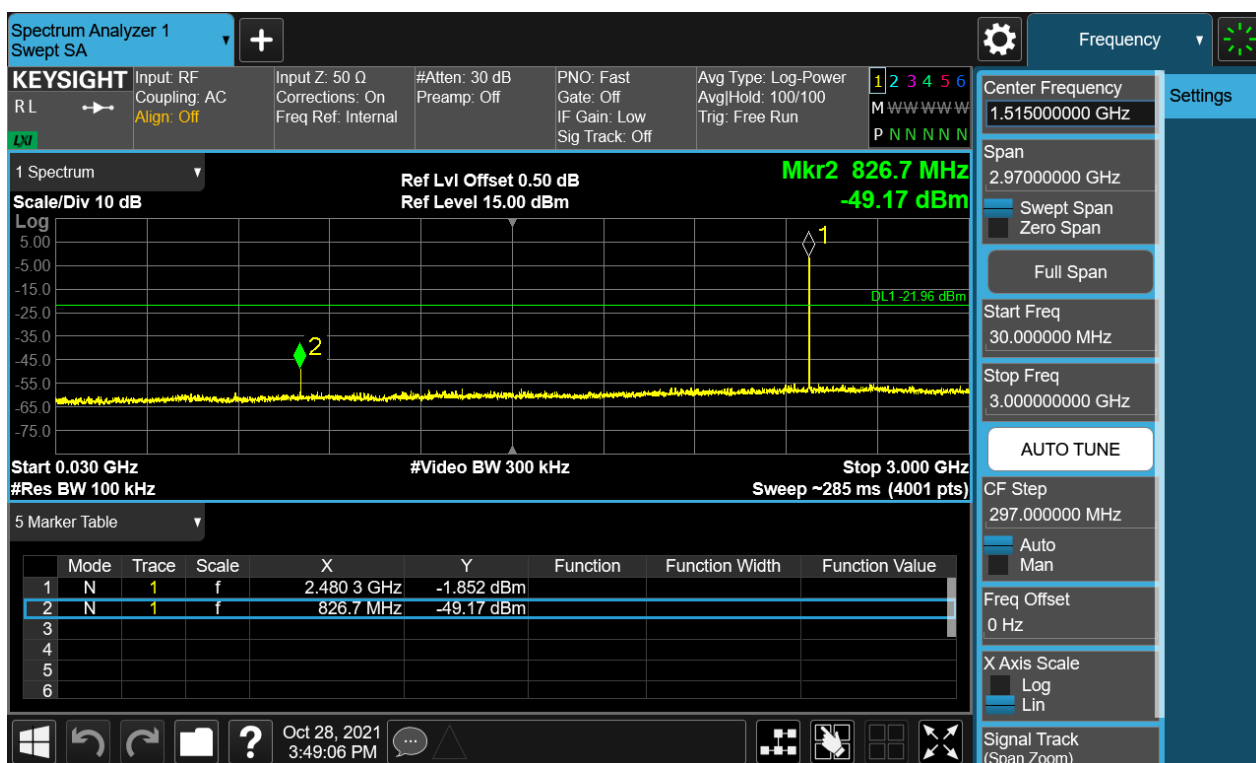
Date: 2021-11-08

Page 28 of 55

Band Edge



Conducted spurious emissions 30MHz-25GHz



TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 29 of 55

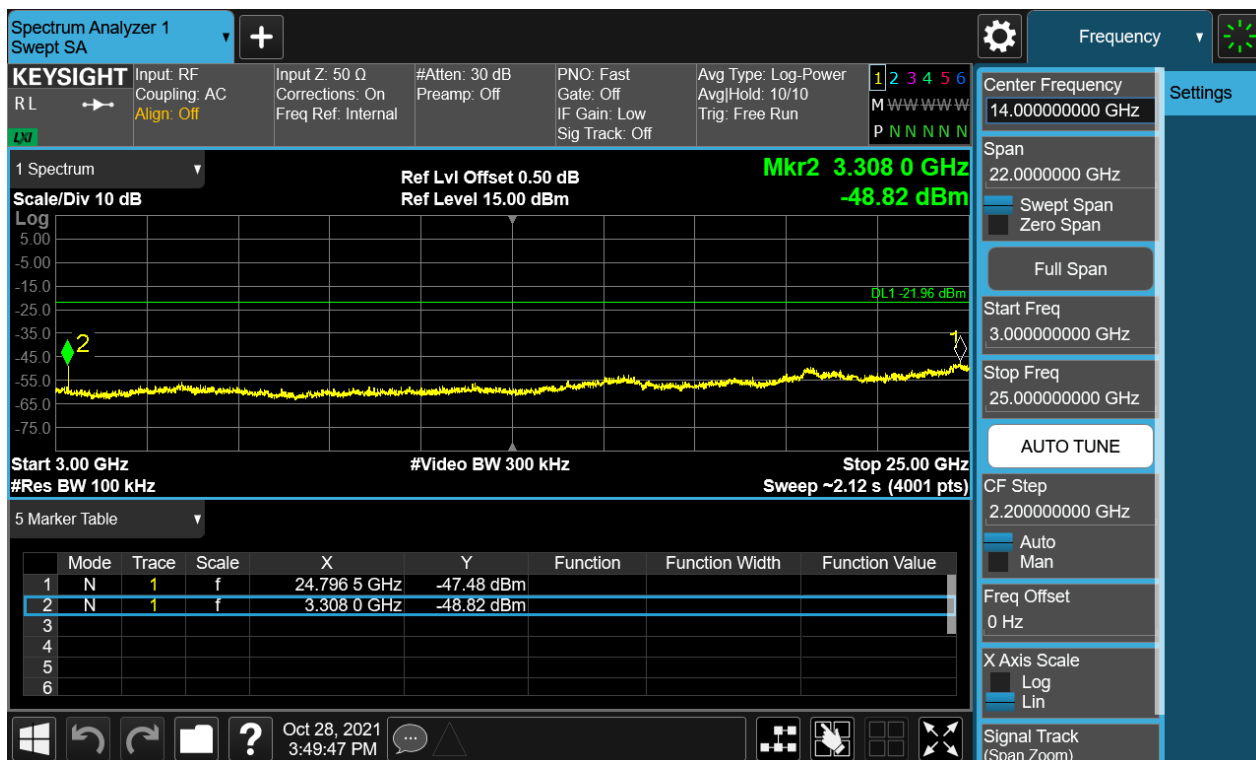
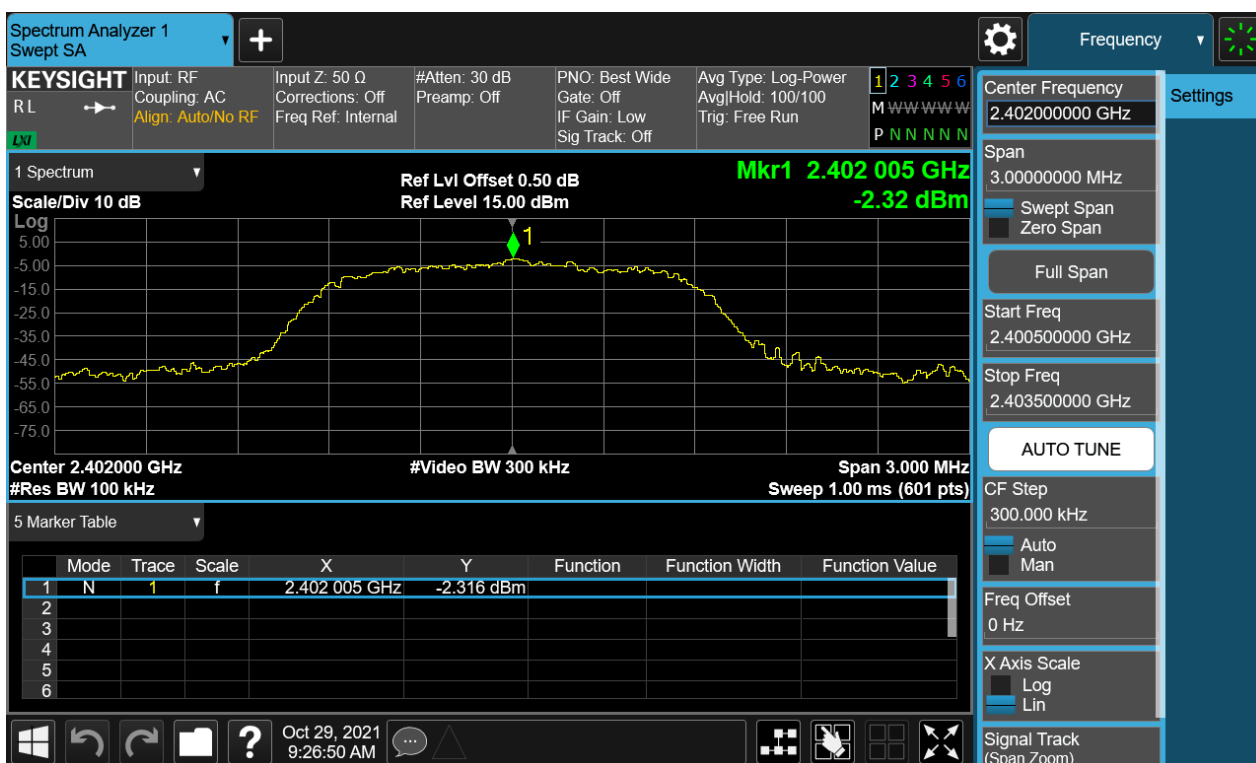


Figure 19: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, 8-DPSK Carrier Level



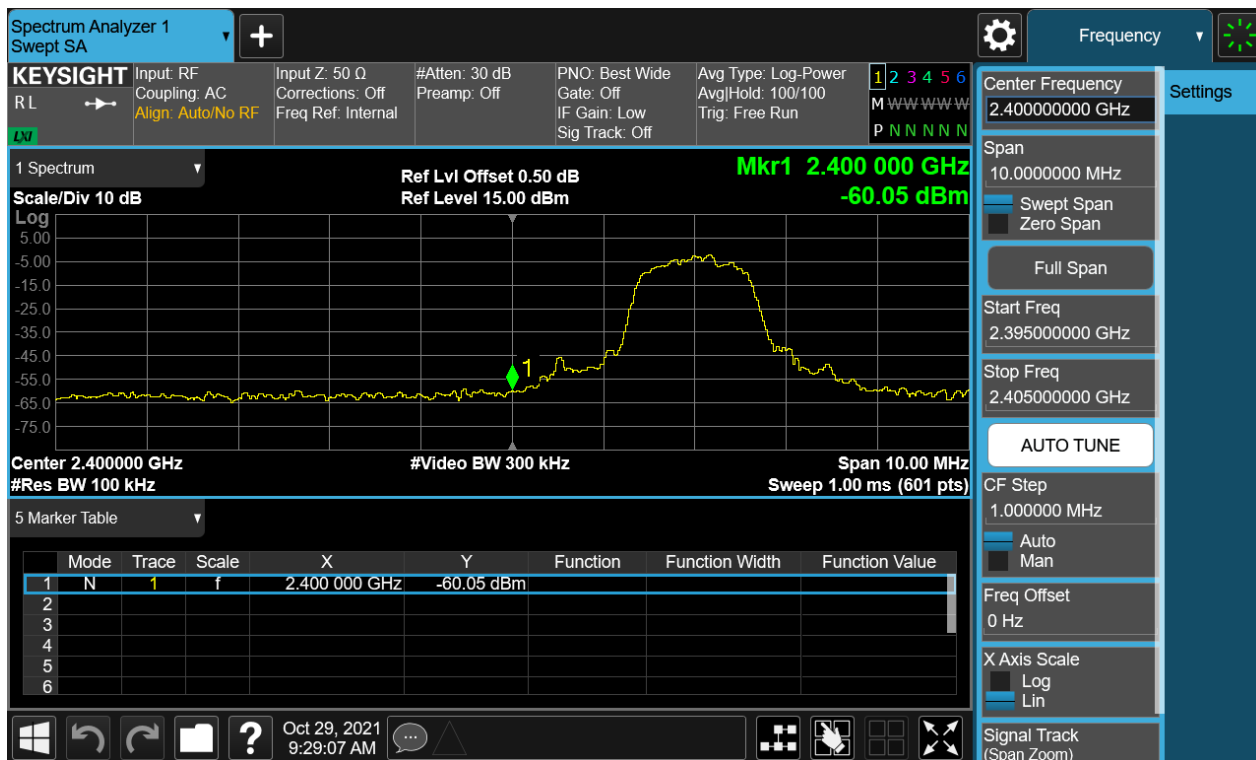
TEST REPORT

Report No.: SHE21100025-02BE

Date: 2021-11-08

Page 30 of 55

Band Edge



Conducted spurious emissions 30MHz-25GHz

