TEST REPORT

Applicant	:	SIMCom Wireless Solutions Limited
Address of Applicant	:	SIMCom Headquarters Building, Building 3, No.289 Linhong Road, Changning District, Shanghai,China
Product Name	:	Wi-Fi & BT Module
Brand Name	:	SIMCom
Model Name	:	W58
Sample Acquisition Method	:	Sent by Client
Sample No.	:	E22110054-01#05 E22110054-01#08
FCC ID	:	2AJYU-8PYA00C
ISED Number	:	23761-8PYA010
Standards	:	FCC CFR47 Part 15, Subpart C RSS-Gen (Issue 5, Amd.2-Feb 2021) RSS-247 (Issue 2, February 2017)
Date of Receipt	:	2023-02-15
Date of Test	:	2023-03-13 ~ 2023-04-17
Date of Issue	:	2023-04-18

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: (Jennifer Zhou) Approved by: (Authorized signatory: Guoyou Chi)

TEST REPORT

Contents

1 General Information

1.1 Testing Laboratory

ISED CAB identifier #	CN0081
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	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	Wi-Fi & BT Module
Brand Name	SIMCom
Test Model Name	W58
FCC ID	2AJYU-8PYA00C
ISED Number	23761-8PYA010
Mode of Operation	Bluetooth BR/EDR Version 4.0
Frequency Range	2402MHz ~ 24830MHz
Number of Channels	79 (at intervals of 1 MHz)
Modulation Type	GFSK, π/4-DQPSK, 8-DPSK
Antenna Type	External Antenna
Antenna Gain	2.97dBi
Extreme Temperature Range	-40℃~ +85℃
Test Voltage	DC 3.3V

Hardware version	W58_V2.02_PCB
Software version	LE20B01V04SIM7600G22_MIFI2
Test SW Version	BL410_R; BL410_E
RF power setting in TEST SW	QRCT_Power level setting_Default

Note:

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

Channel List

Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2.402GHz	27	2.429GHz	54	2.456GHz
1	2.403GHz	28	2.430GHz	55	2.457GHz
2	2.404GHz	29	2.431GHz	56	2.458GHz
3	2.405GHz	30	2.432GHz	57	2.459GHz
4	2.406GHz	31	2.433GHz	58	2.460GHz
5	2.407GHz	32	2.434GHz	59	2.461GHz
6	2.408GHz	33	2.435GHz	60	2.462GHz
7	2.409GHz	34	2.436GHz	61	2.463GHz
8	2.410GHz	35	2.437GHz	62	2.464GHz
9	2.411GHz	36	2.438GHz	63	2.465GHz
10	2.412GHz	37	2.439GHz	64	2.466GHz
11	2.413GHz	38	2.440GHz	65	2.467GHz
12	2.414GHz	39	2.441GHz	66	2.468GHz
13	2.415GHz	40	2.442GHz	67	2.469GHz
14	2.416GHz	41	2.443GHz	68	2.470GHz
15	2.417GHz	42	2.444GHz	69	2.471GHz
16	2.418GHz	43	2.445GHz	70	2.472GHz
17	2.419GHz	44	2.446GHz	71	2.473GHz
18	2.420GHz	45	2.447GHz	72	2.474GHz
19	2.421GHz	46	2.448GHz	73	2.475GHz
20	2.422GHz	47	2.449GHz	74	2.476GHz
21	2.423GHz	48	2.450GHz	75	2.477GHz
22	2.424GHz	49	2.451GHz	76	2.478GHz
23	2.425GHz	50	2.452GHz	77	2.479GHz
24	2.426GHz	51	2.453GHz	78	2.480GHz
25	2.427GHz	52	2.454GHz		
26	2.428GHz	53	2.455GHz		

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.
RSS-Gen (Issue 5, Amd.2-Feb 2021)	General Requirements for Compliance of Radio Apparatus
RSS-247 (Issue 2, February 2017)	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
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	ISED Rules	Result
Antenna Requirement	FCC Part 15.247(b)(4), FCC Part 15.203	RSS-247 5.4(f), RSS-GEN 6.8	PASS
Maximum Conducted Peak Output Power and E.I.R.P	FCC Part 15.247(b)(1)	RSS-247 5.1(b)	PASS
20dB Bandwidth and 99% Bandwidth	FCC Part 15.247(a)(1)	RSS-247 5.1(a), RSS-Gen 6.7	PASS
Conducted Spurious Emission & Authorized-band band-edge	FCC Part 15.247(d)	RSS-247 5.5	PASS
Radiated Emission	FCC Part 15.247(d), 15.205, 15.209	RSS-GEN 8.9	PASS
Band Edge (Restricted-band band-edge)	FCC Part 15.247(d), 15.205, 15.209	RSS-GEN 8.10	PASS
Hopping Frequency Separation	FCC Part 15.247(a)(1)	RSS-247 5.1(b)	PASS
Number of Hopping Frequency	FCC Part 15.247(a)(1)(iii)	RSS-247 5.1(d)	PASS
Time of Occupancy	FCC Part 15.247(a)(1)(iii)	RSS-247 5.1(d)	PASS
Conducted Emission on AC Mains	FCC Part 15.207(a)	RSS-Gen 8.8	PASS

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	2022-08-02	2023-08-01
Spectrum Analyzer	Keysight	N9020A	MY54101709	2022-08-02	2023-08-01
Spectrum Analyzer	Rohde & Schwarz	FSV40N	101450	2022-06-10	2023-06-09
Signal Generator	Rohde & Schwarz	SMR27	100184	2022-08-02	2023-08-01
EMI Test Receiver	Rohde & Schwarz	ESR 7	101911	2022-06-10	2023-06-09
EMI Test Receiver	Rohde & Schwarz	ESPI3	100173	2022-06-10	2023-06-09
V-network	SCHWARZBECK	NSLK8127	8127-902	2022-06-10	2023-06-09
Broadband Antenna	SCHWARZBECK	VULB9163	9163-1037	2021-06-08	2023-06-07
Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1775	2021-06-08	2023-06-07
Loop Antenna	SCHWARZBECK	FMZB 1513	/	2022-06-10	2023-06-09
Broadband Preamplifier	SCHWARZBECK	BBV 9718	346	2022-06-10	2023-06-09
EMC chamber 9*6*6（L*W*H)	CHANGNING	966	N/A	2022-06-10	2023-06-09
Shielded Enclosure 8*5*4（L*W*H)	CHANGNING	854	N/A	2022-06-10	2023-06-09
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

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 ±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 95.45%.

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 %

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

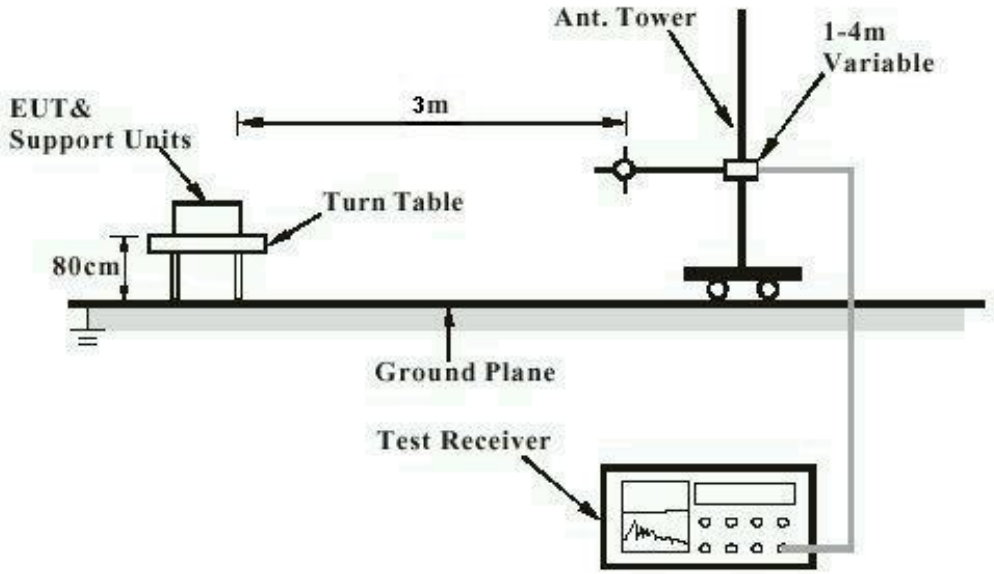
Description	Manufacturer	Model Name	Serial No.
Laptop	Lenovo	TP00083A	PF-0PRDGN 17/03
Adapter	Something High Electric(Xiamen) Company Inc.	P-050B-050200EU	N/A
EVB Debug Board	SIMCom	8PYA00-SIMCOM-EVB_V1.02	N/A
USB Cable	SIMCom	N/A	1.00m Unshielded

3.3 Support Software

Description	Manufacturer	Software Name
Software	Qualcomm	QRCT Version 4.0.00166.0

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

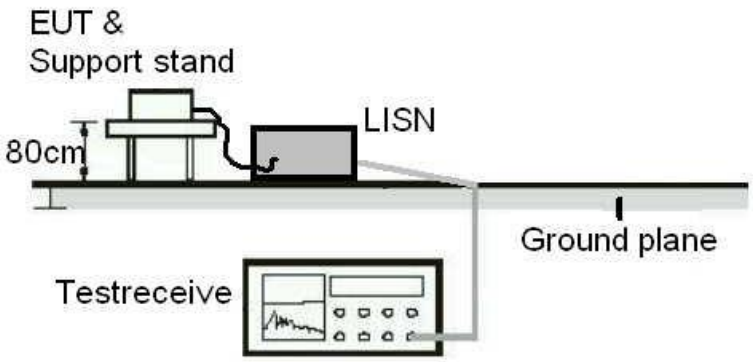
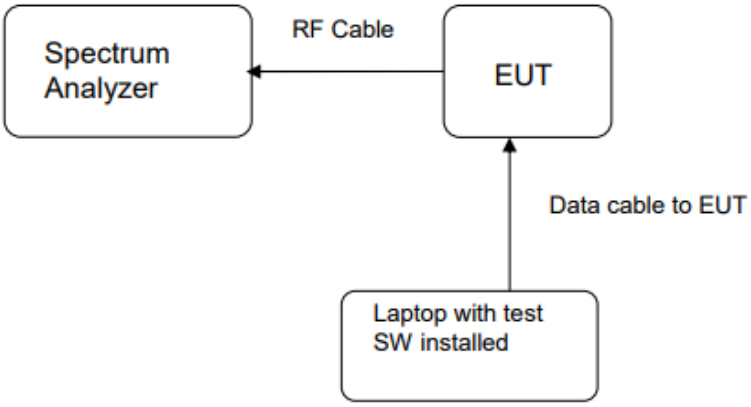


Diagram of Measurement Configuration for Transmitter Test



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 RSS-247 5.4(f), RSS-GEN 6.8
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 2.97dBi. The antenna is external 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.

4.1.2 Maximum Conducted Peak Output Power and E.I.R.P

RESULT: **PASS**

Test standard : FCC Part 15.247(b)(1), RSS-247 5.1(b)
Requirement : ANSI C63.10-2013 clause 7.8.5,
KDB 558074 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 : 57%

Table 1: Maximum Conducted Peak Output Power

Test Mode	Test Channel (MHz)	Measured Peak Output Power		Limit (W)
		(dBm)	(mW)	
GFSK	2402	6.323	4.288	< 1
	2441	8.076	6.421	
	2480	6.652	4.626	
π/4-DQPSK	2402	5.415	3.479	< 0.125
	2441	7.104	5.133	
	2480	5.650	3.673	
8-DPSK	2402	5.669	3.689	< 0.125
	2441	7.450	5.559	
	2480	5.947	3.933	

Table 2: E.I.R.P

Test Mode	Test Channel (MHz)	E.I.R.P		Limit (W)
		(dBm)	(mW)	
GFSK	2402	9.293	8.498	< 4
	2441	11.046	12.723	
	2480	9.622	9.166	
π/4-DQPSK	2402	8.385	6.894	
	2441	10.074	10.172	
	2480	8.620	7.278	
8-DPSK	2402	8.639	7.310	
	2441	10.420	11.015	
	2480	8.917	7.793	

Note: The antenna gain is 2.97dBi

Figure 1:The plots of Maximum Conducted Peak Output Power, 2402MHz, GFSK

Figure 2: The plots of Maximum Conducted Peak Output Power, 2441MHz, GFSK

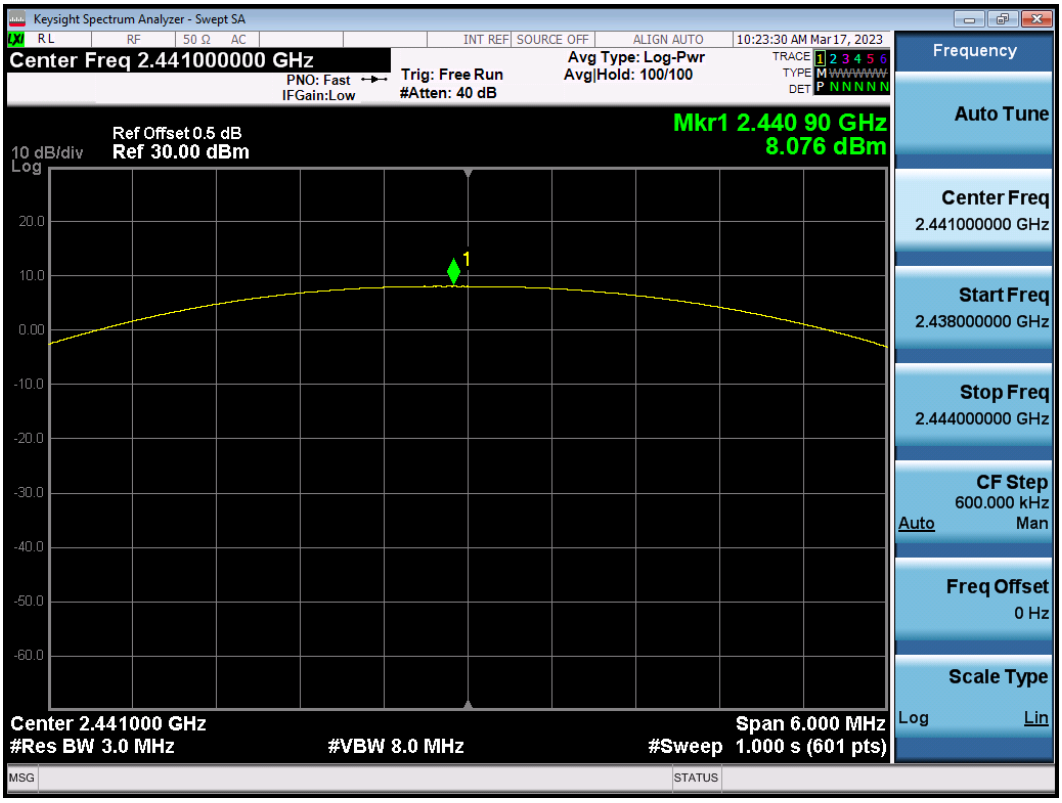


Figure 3: The plots of Maximum Conducted Peak Output Power, 2480MHz, GFSK

Figure 4: The plots of Maximum Conducted Peak Output Power, 2402MHz, π/4-DQPSK

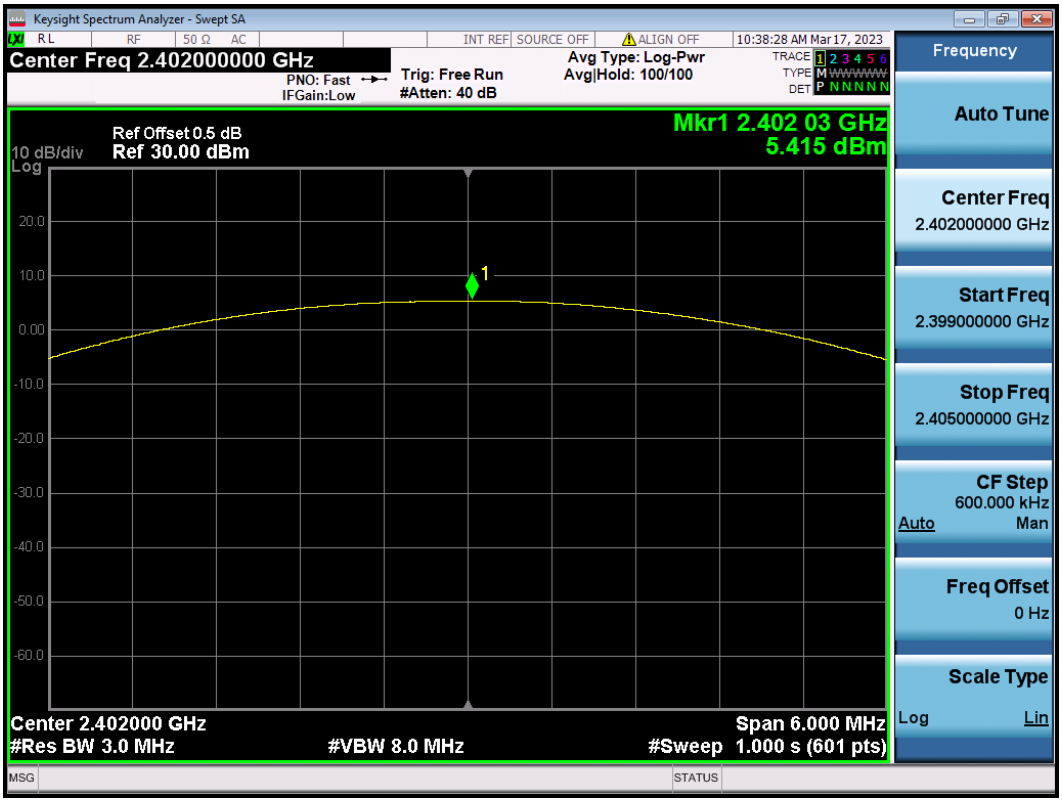


Figure 5: The plots of Maximum Conducted Peak Output Power, 2441MHz, π/4-DQPSK

Figure 6: The plots of Maximum Conducted Peak Output Power, 2480MHz, π/4-DQPSK

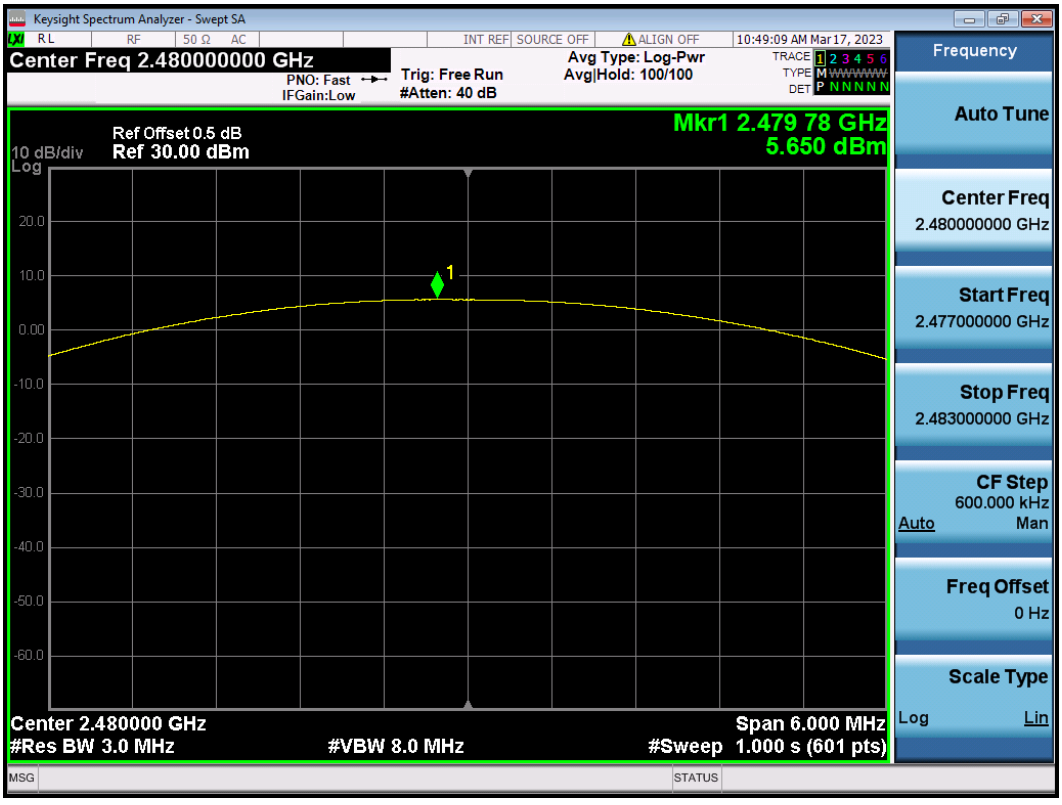


Figure 7: The plots of Maximum Conducted Peak Output Power, 2402MHz, 8-DPSK

Figure 8: The plots of Maximum Conducted Peak Output Power, 2441MHz, 8-DPSK

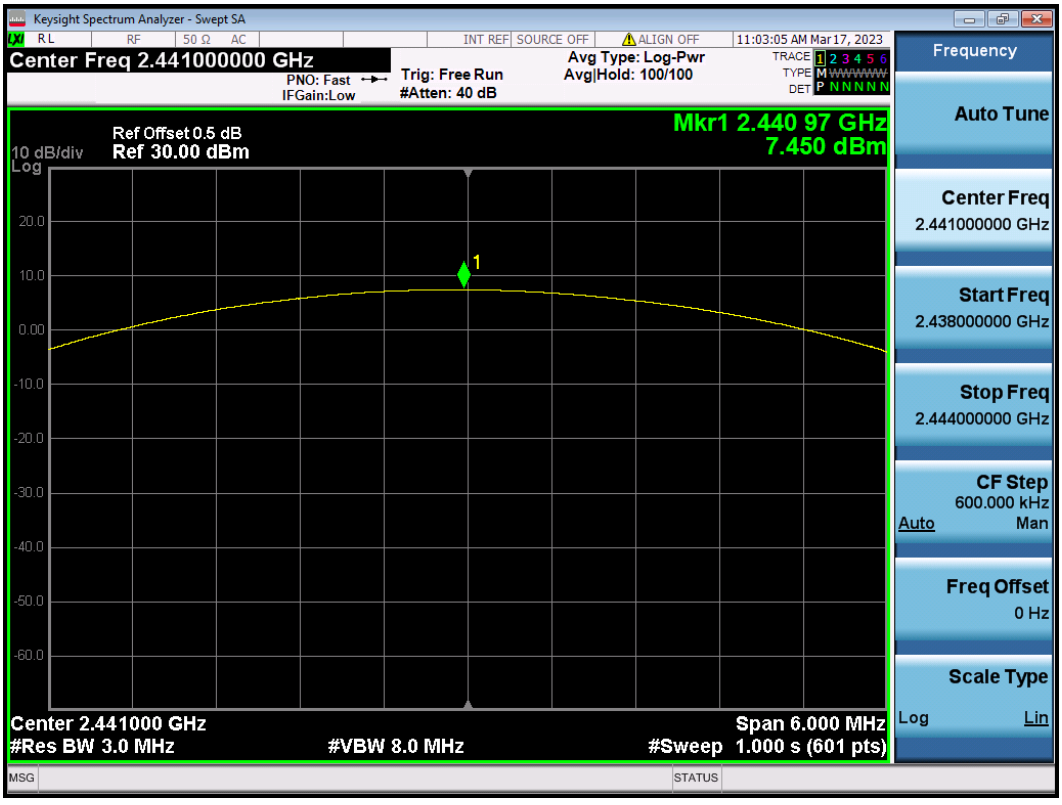
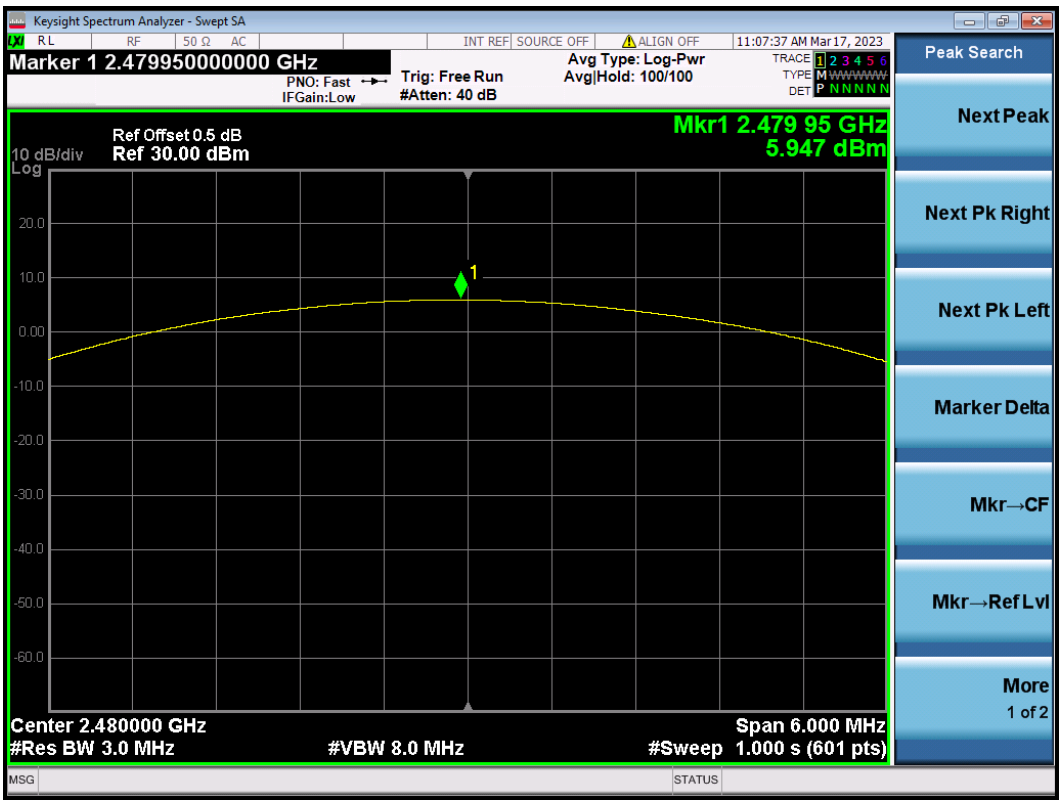


Figure 9: The plots of Maximum Conducted Peak Output Power, 2480MHz, 8-DPSK



4.1.3 20dB Bandwidth and 99% Bandwidth

RESULT: **PASS**

Test standard	:	FCC Part 15.247(a)(1), RSS-247 5.1(a), RSS-Gen 6.7
Requirement	:	ANSI C63.10-2013 clause 7.8.7
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	:	57%

Table 3: 20dB Bandwidth and 99% Bandwidth

Test Mode	Test Channel (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
GFSK	2402	0.9586	0.9006
	2441	0.9590	0.9022
	2480	0.9583	0.9016
π/4-DQPSK	2402	1.2820	1.1780
	2441	1.2820	1.1762
	2480	1.2820	1.1749
8-DPSK	2402	1.2940	1.1801
	2441	1.2950	1.1813
	2480	1.2930	1.1819

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

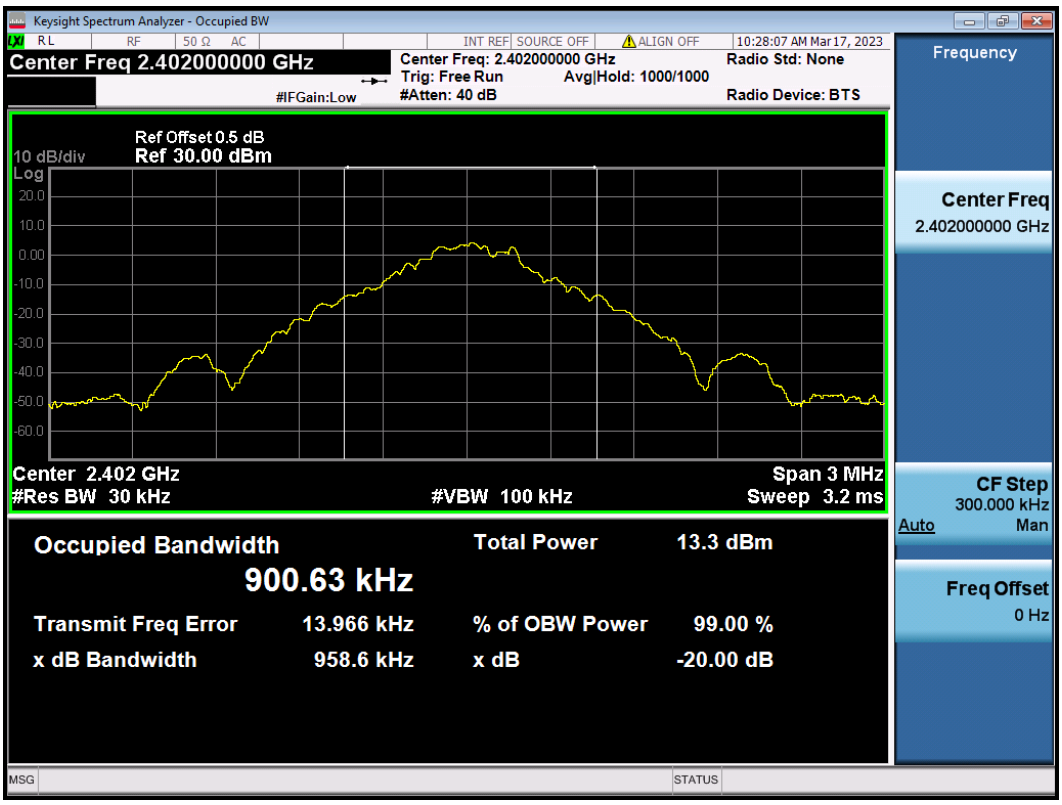


Figure 11: The plots of 20dB Bandwidth and 99% Bandwidth, 2441MHz, GFSK

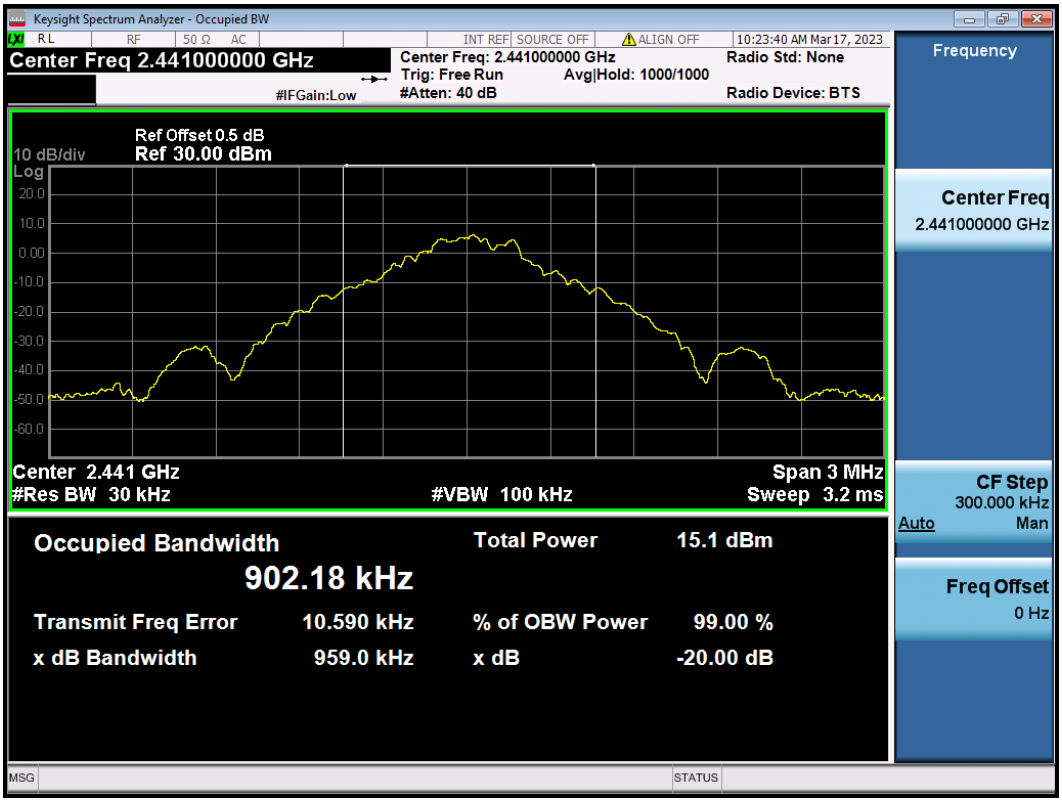


Figure 12: The plots of 20dB Bandwidth and 99% Bandwidth, 2480MHz, GFSK

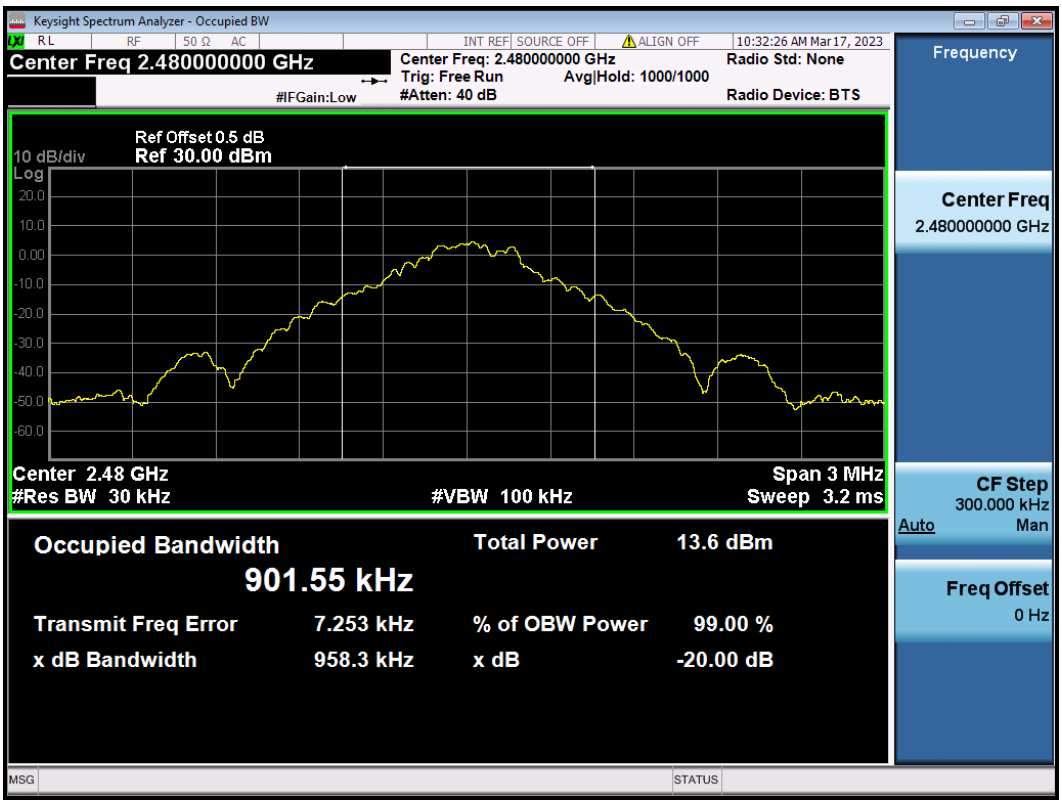


Figure 13: The plots of 20dB Bandwidth and 99% Bandwidth, 2402MHz, π/4-DQPSK

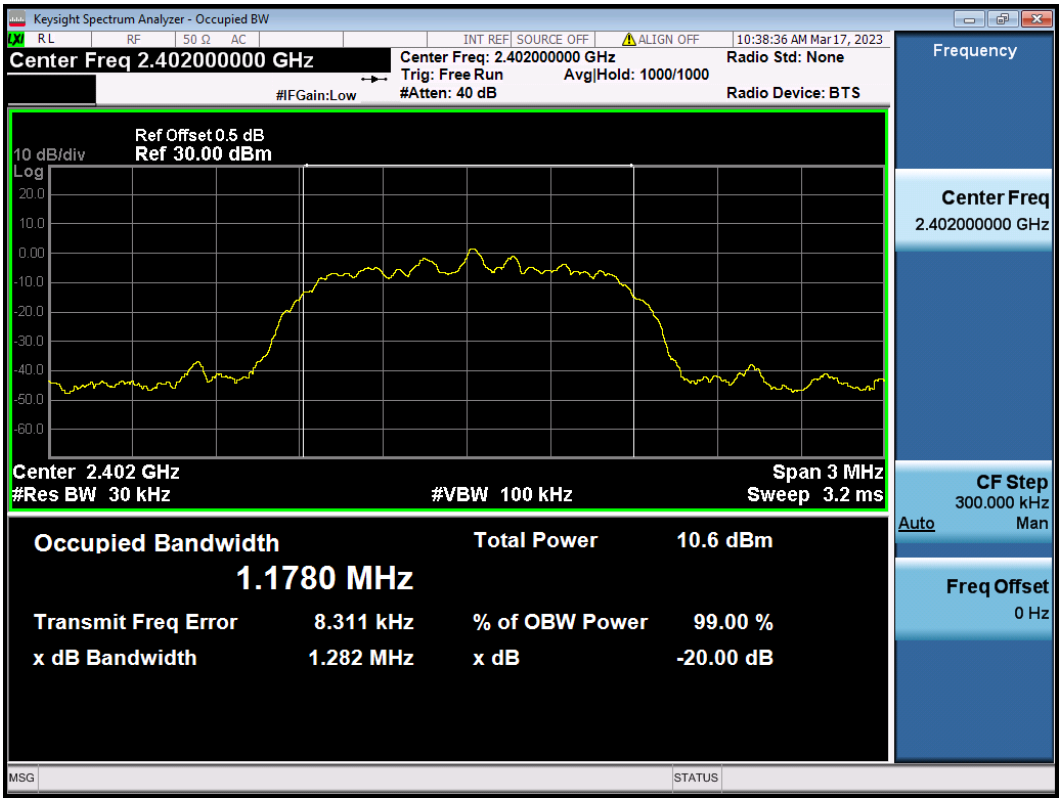


Figure 14: The plots of 20dB Bandwidth and 99% Bandwidth, 2441MHz, π/4-DQPSK

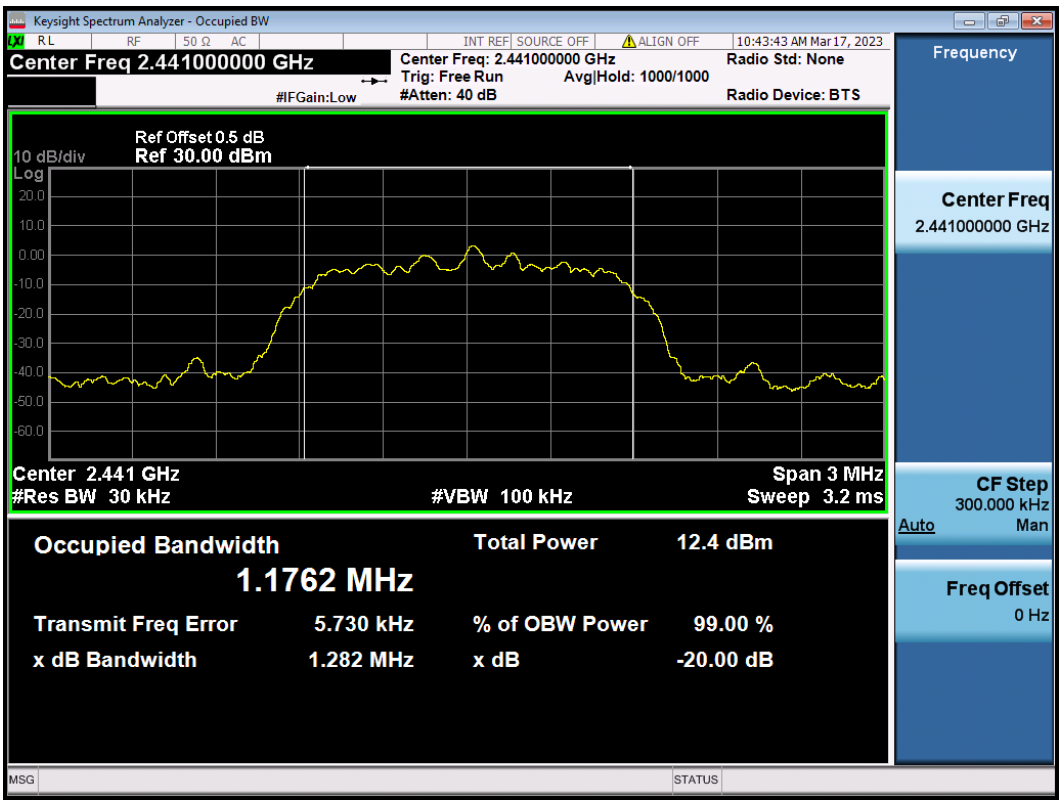


Figure 15: The plots of 20dB Bandwidth and 99% Bandwidth, 2480MHz, π/4-DQPSK

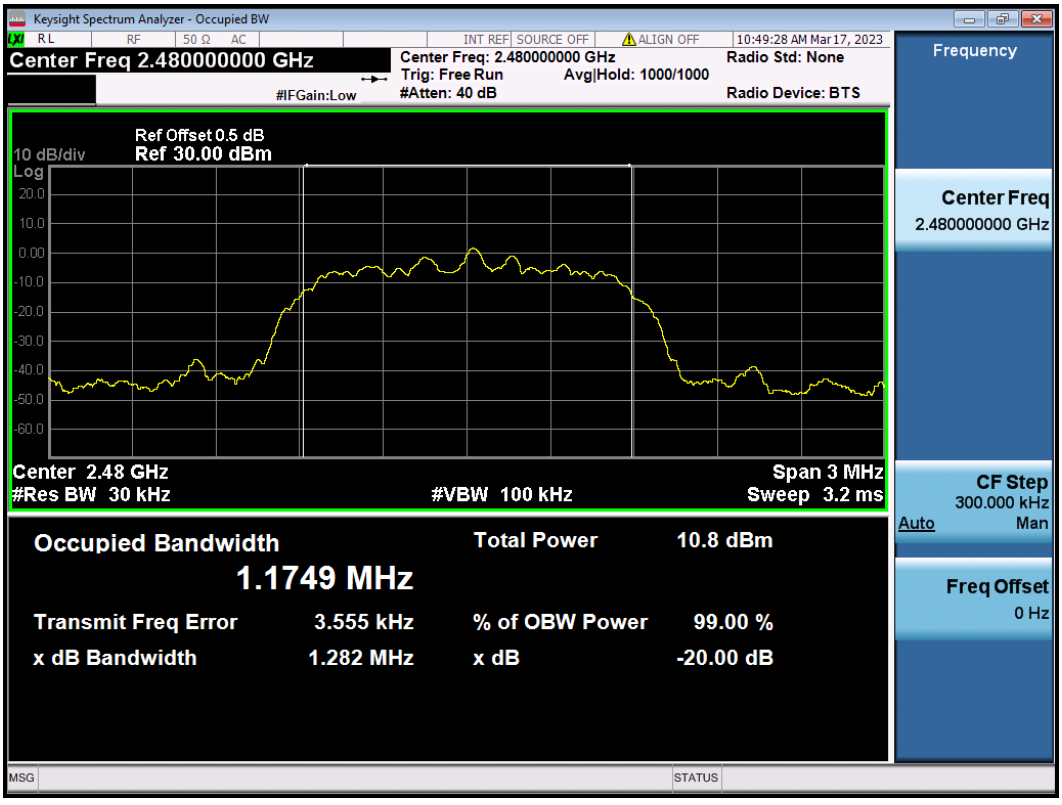


Figure 16: The plots of 20dB Bandwidth and 99% Bandwidth, 2402MHz, 8-DPSK

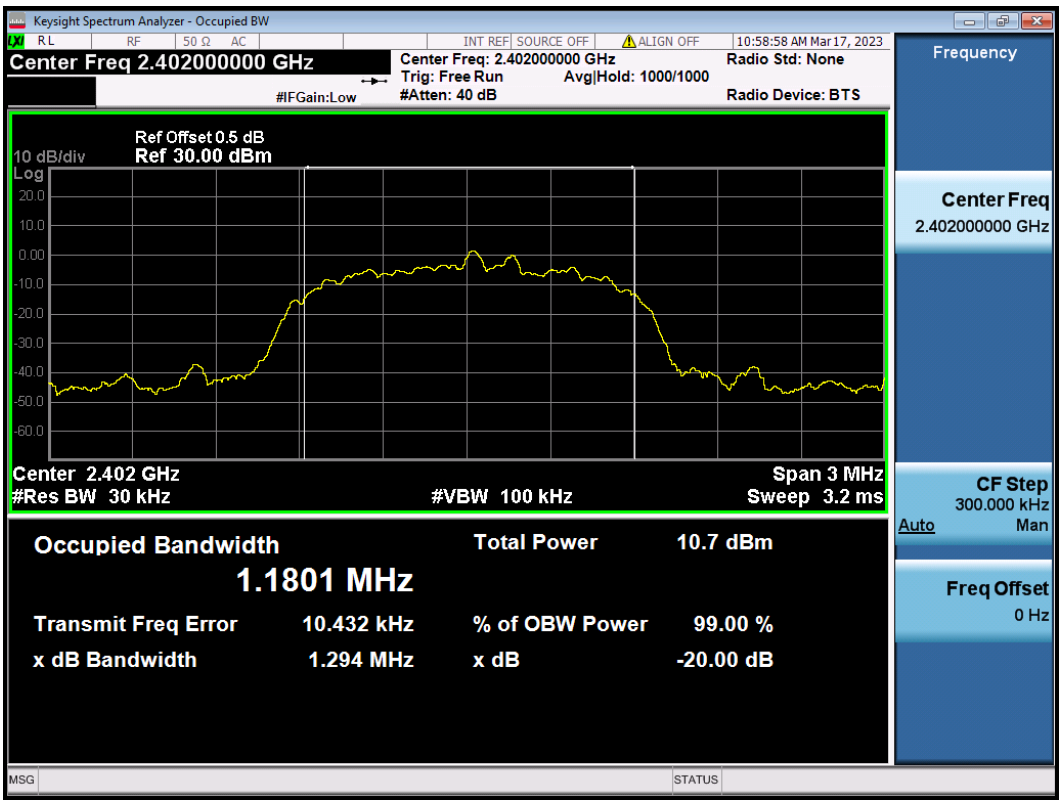


Figure 17: The plots of 20dB Bandwidth and 99% Bandwidth, 2441MHz, 8-DPSK

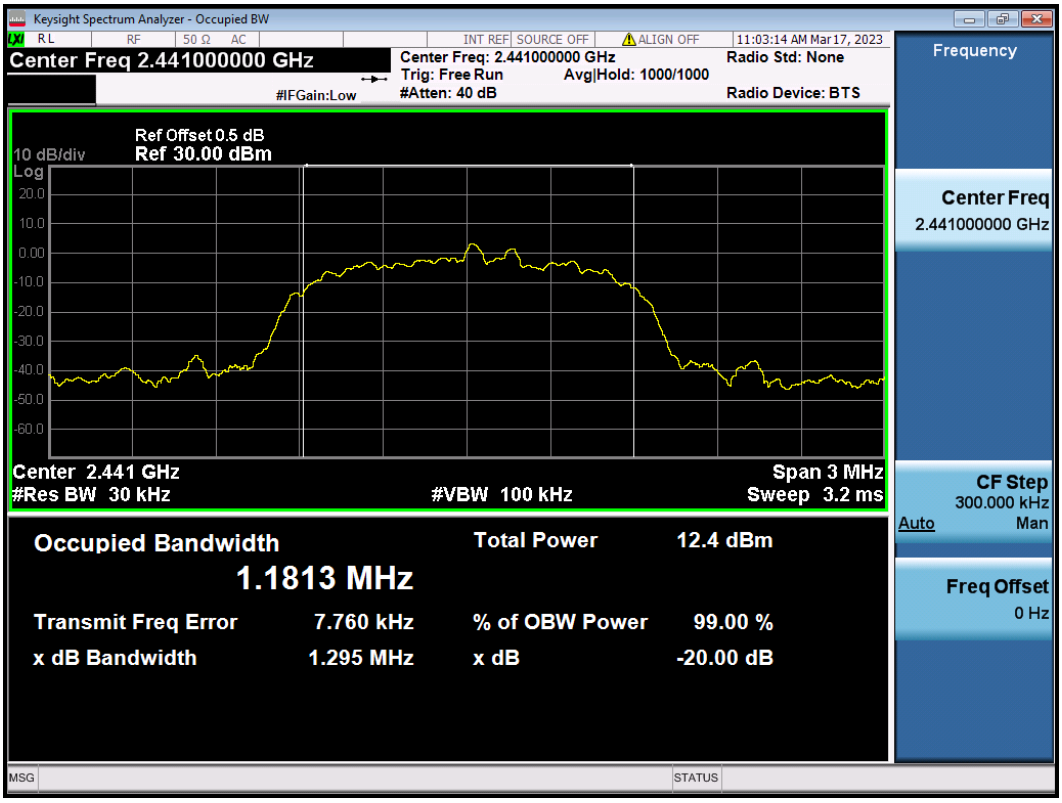
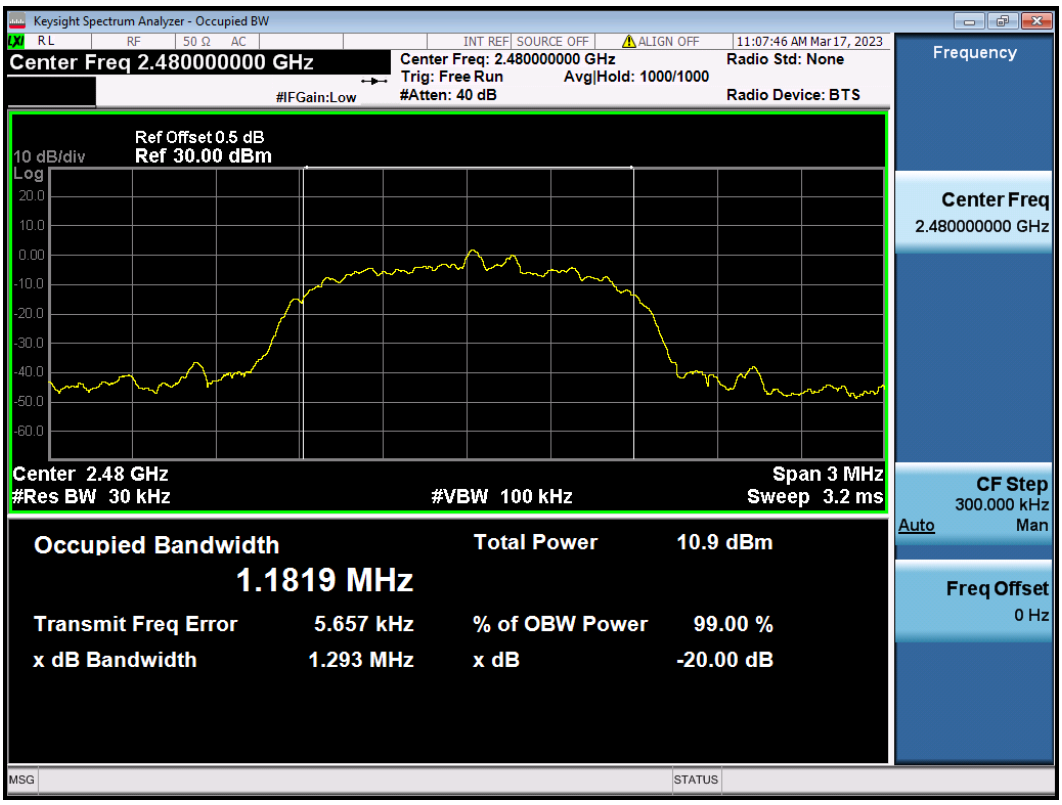


Figure 18: The plots of 20dB Bandwidth and 99% Bandwidth, 2480MHz, 8-DPSK



4.1.4 Conducted Spurious Emission & Authorized-band band-edge

RESULT: **PASS**

Test standard	:	FCC Part 15.247(d), RSS-247 5.5
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	:	57%

For details refer to following test plot.

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

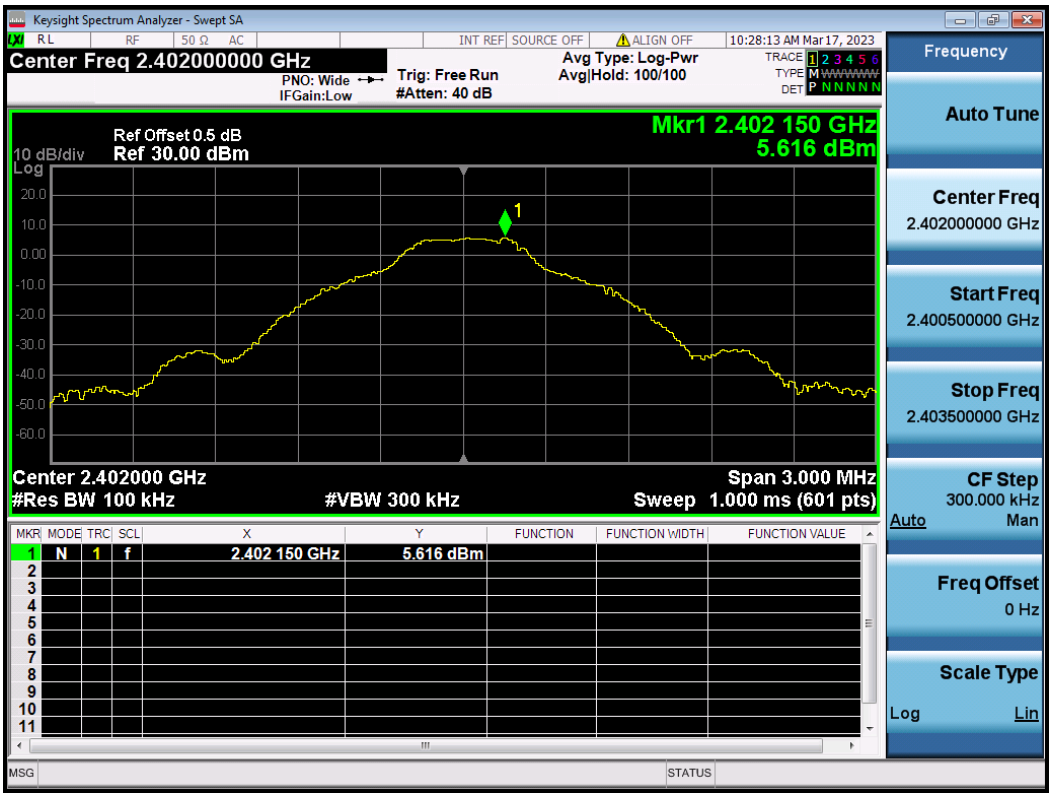


Figure 20: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, GFSK Band Edge

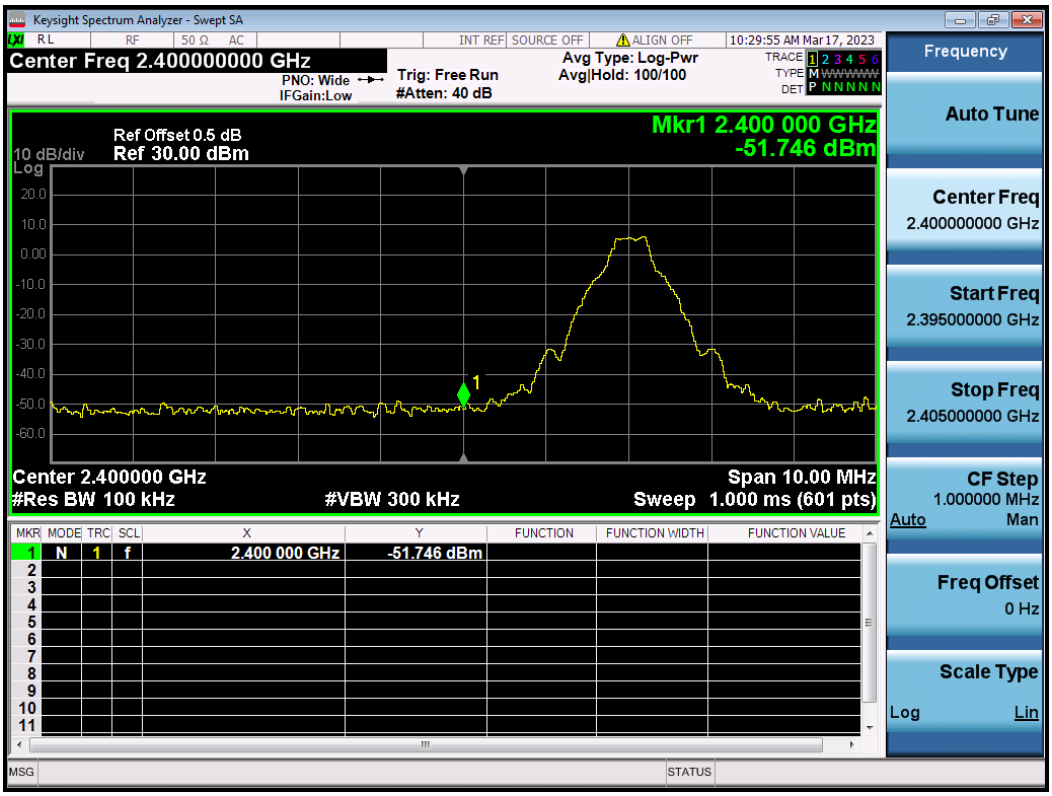


Figure 21: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, GFSK
Conducted spurious emissions 30MHz-3GHz

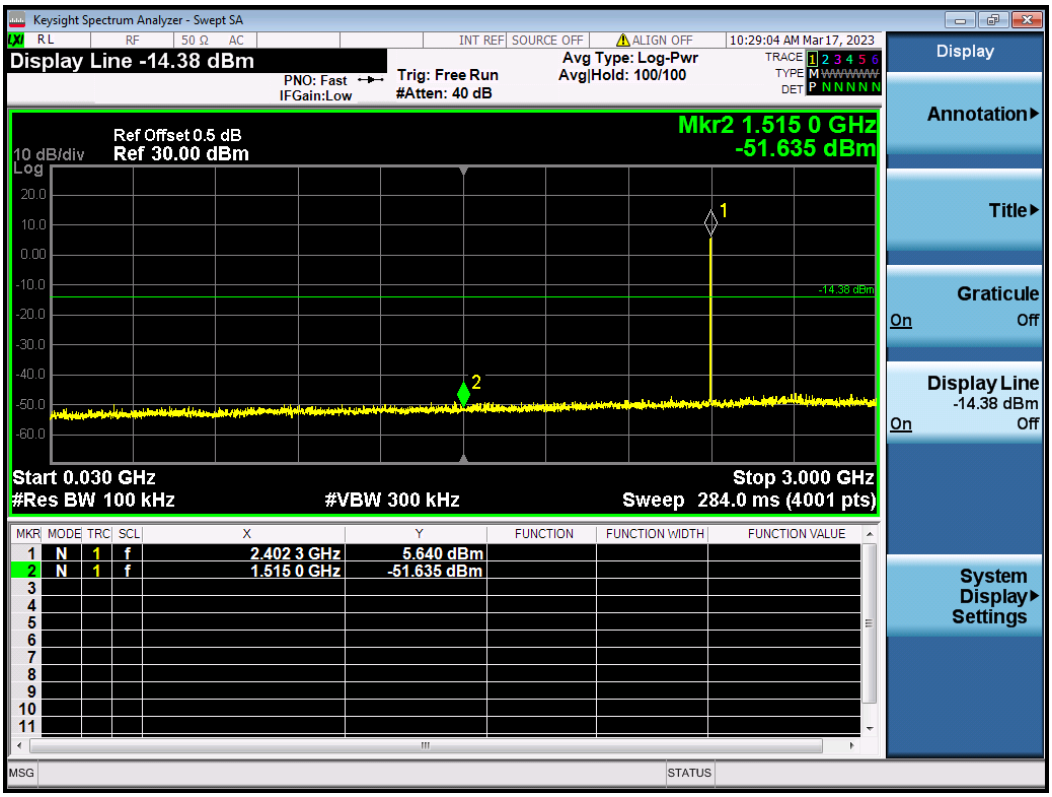


Figure 22: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, GFSK
Conducted spurious emissions 3GHz-25GHz

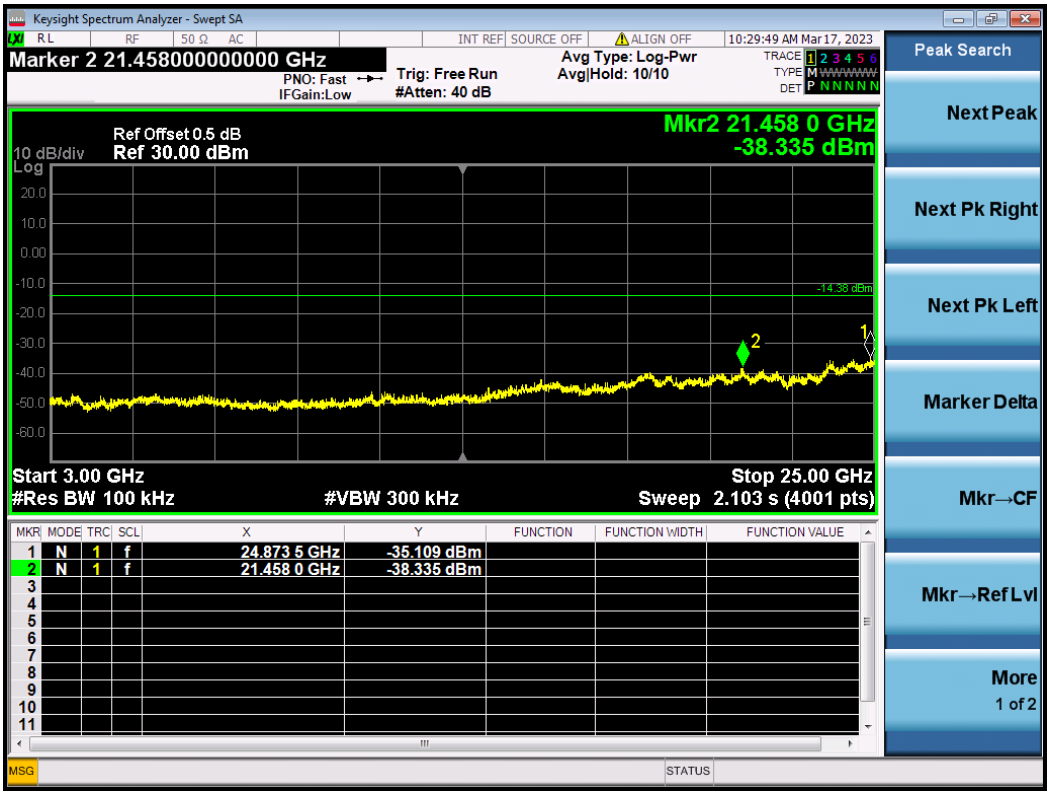


Figure 23: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, GFSK Carrier Level

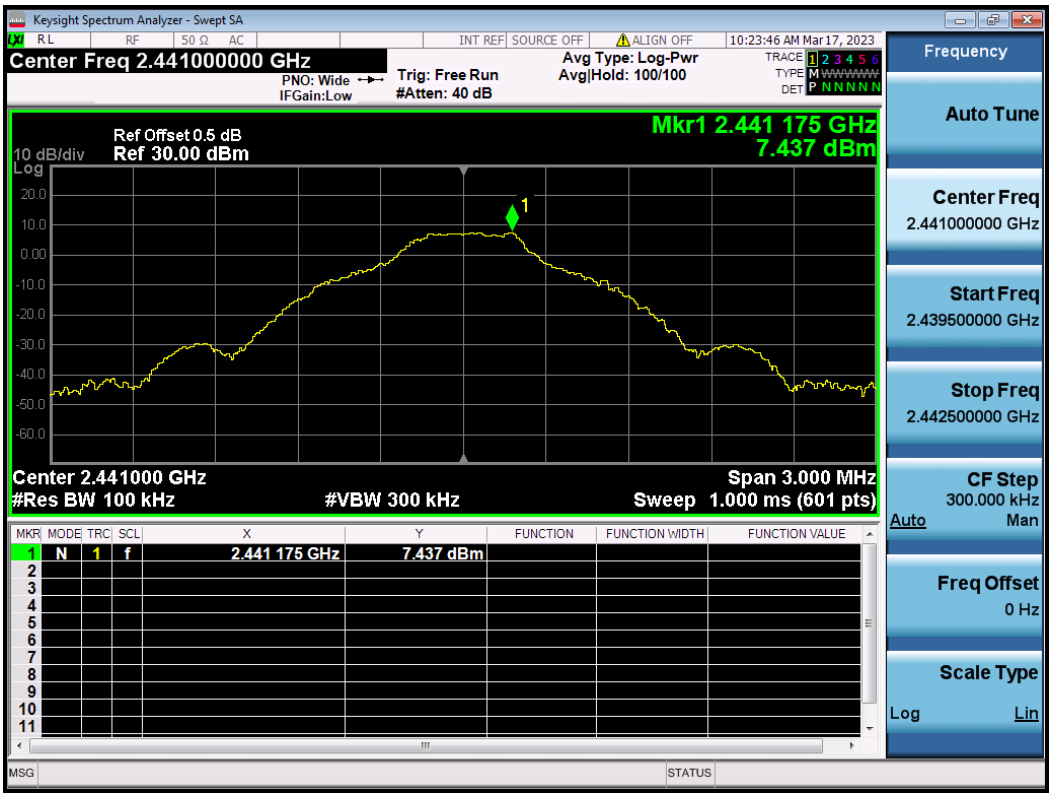


Figure 24: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, GFSK Conducted spurious emissions 30MHz-3GHz

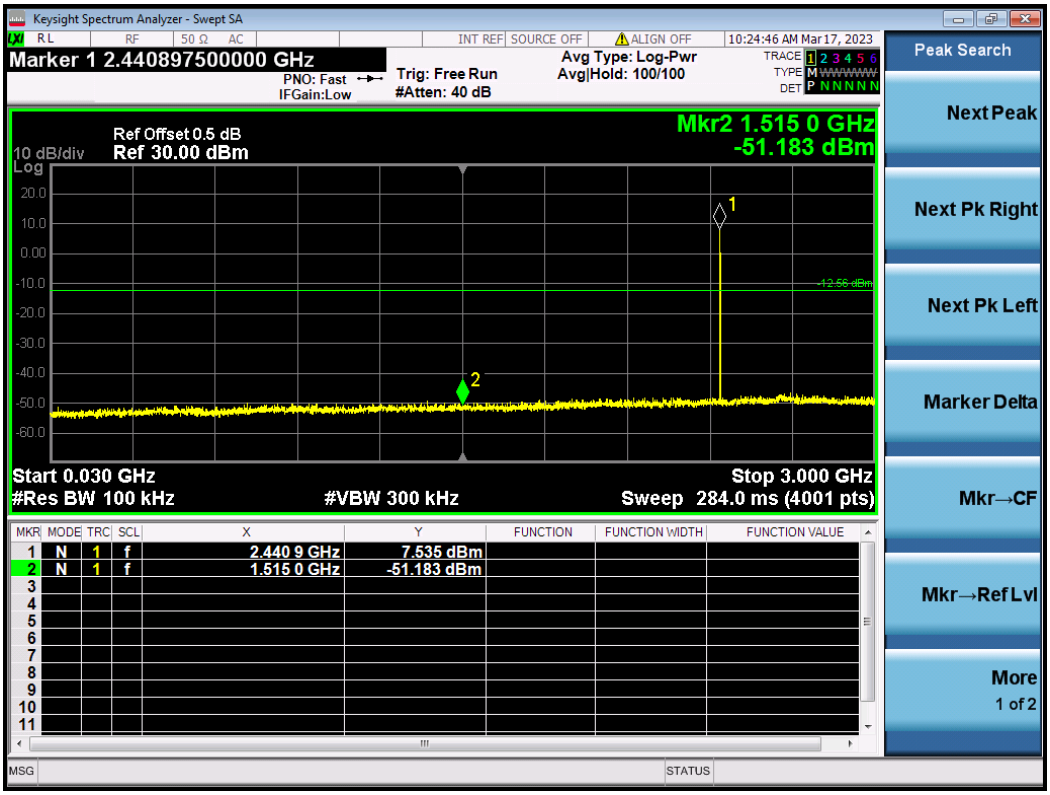


Figure 25: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, GFSK
Conducted spurious emissions 3GHz-25GHz

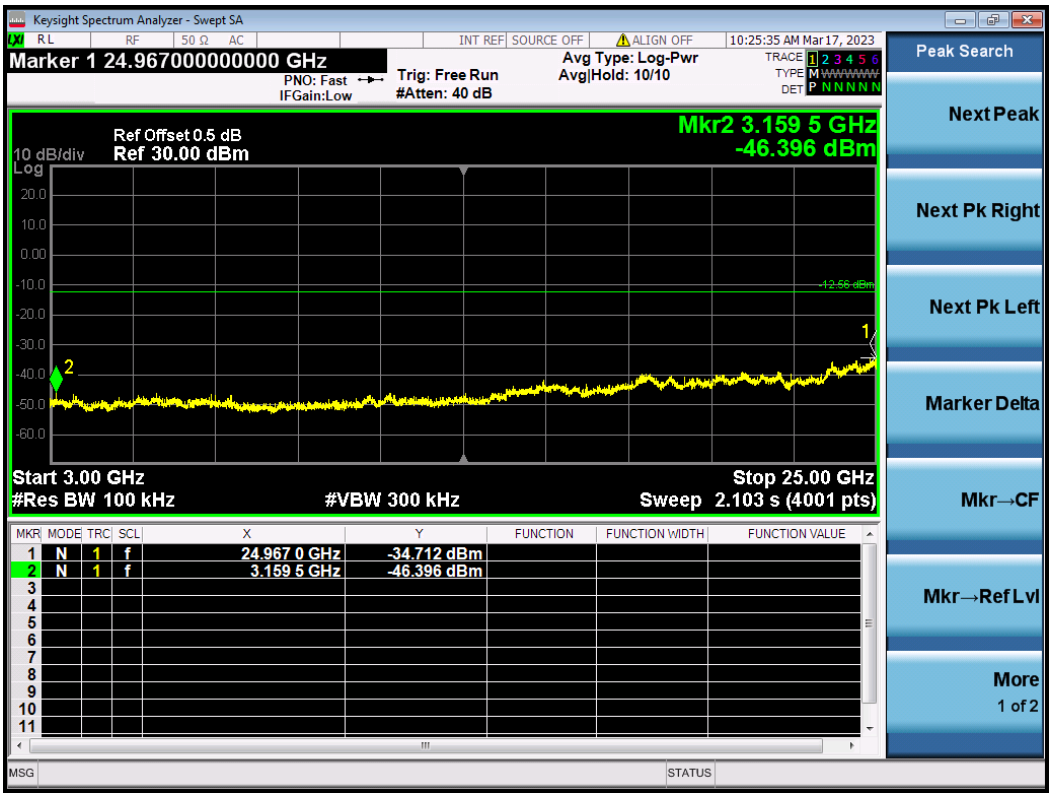


Figure 26: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, GFSK
Carrier Level

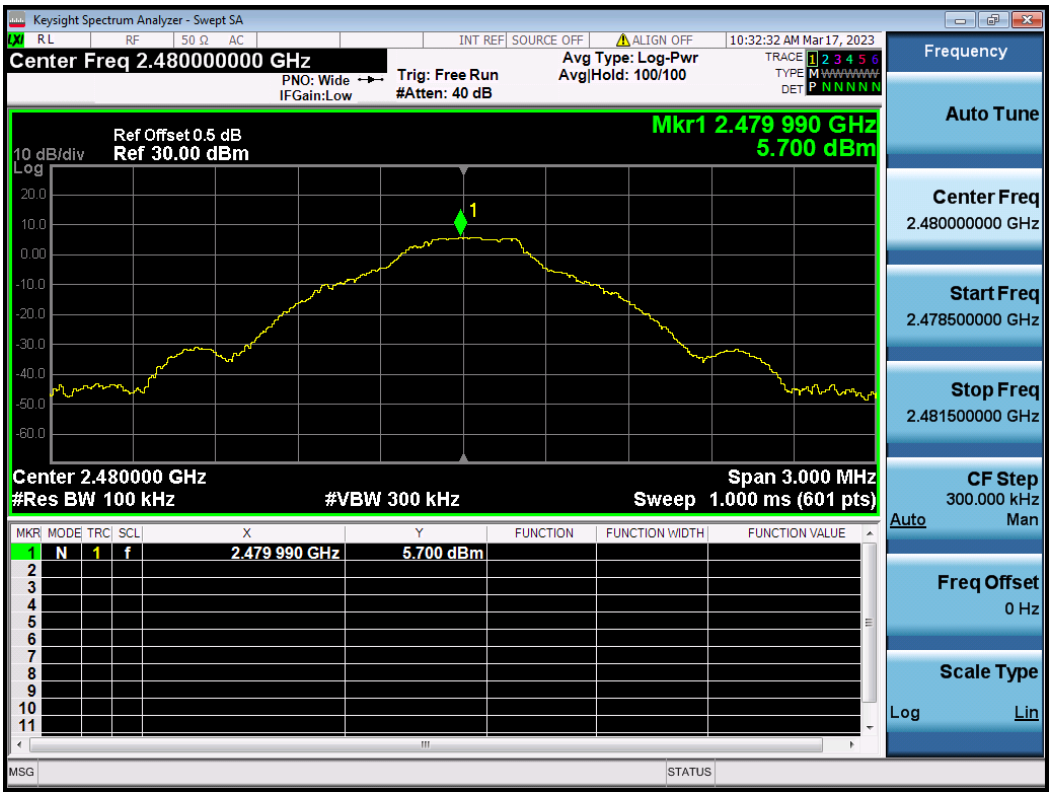


Figure 27: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, GFSK Band Edge

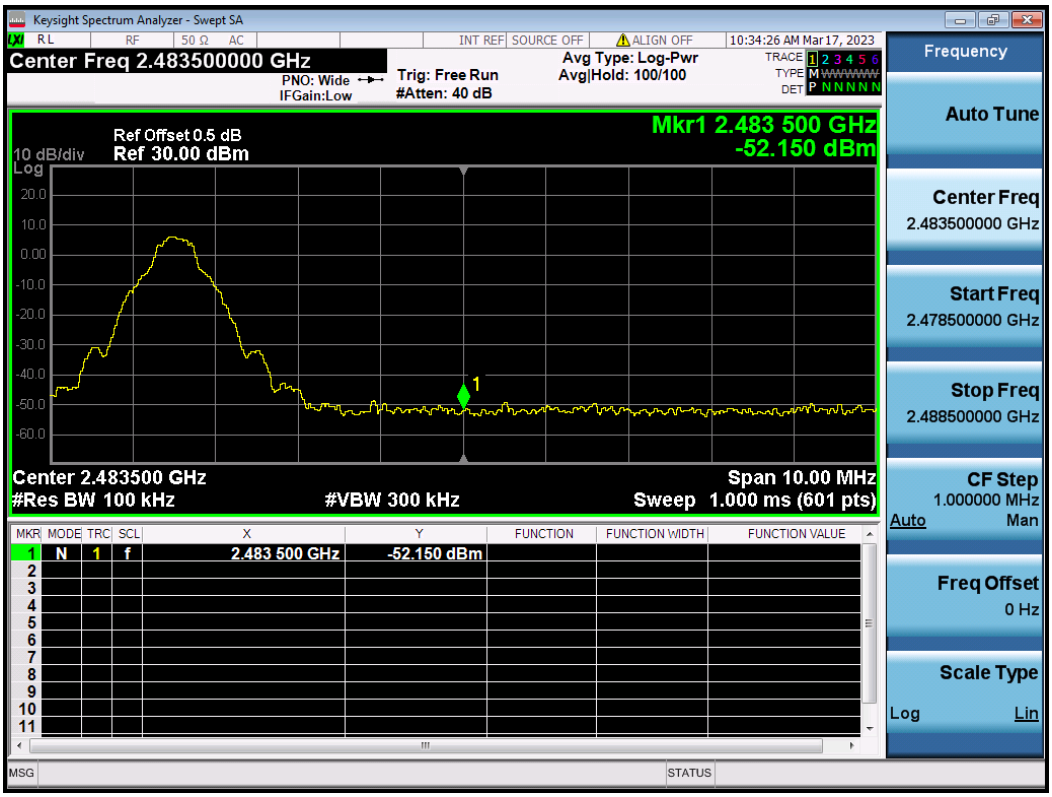


Figure 28: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, GFSK

Conducted spurious emissions 30MHz-3GHz

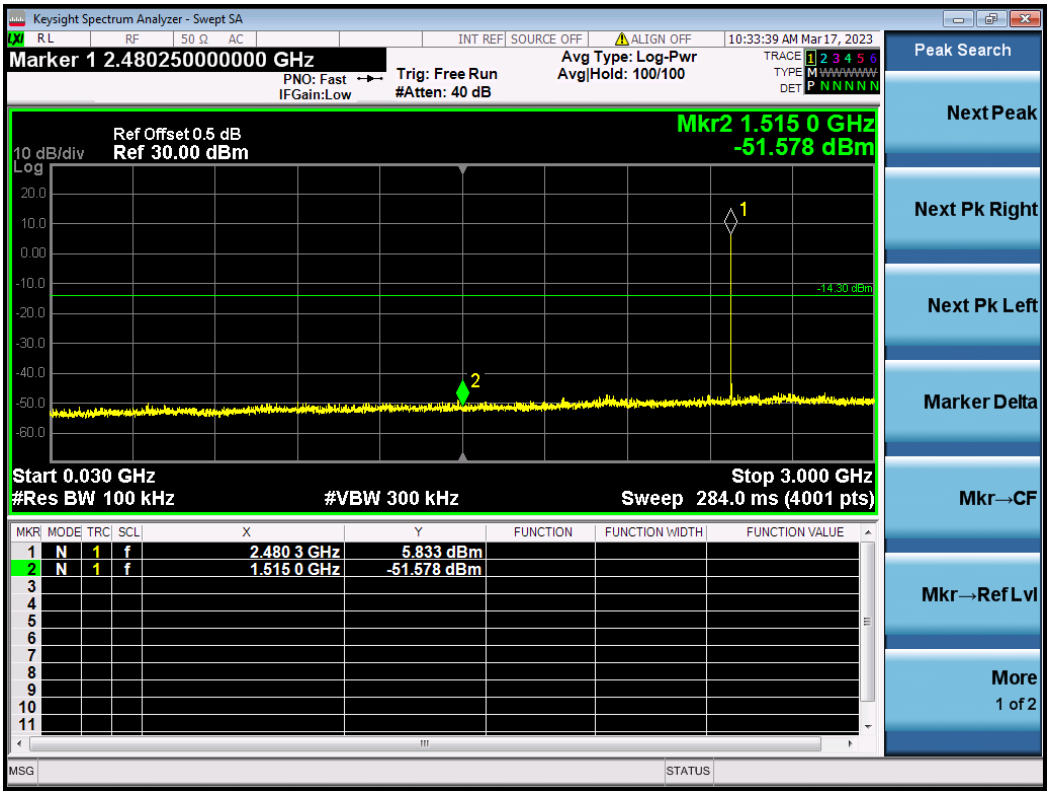


Figure 29: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, GFSK

Conducted spurious emissions 3GHz-25GHz

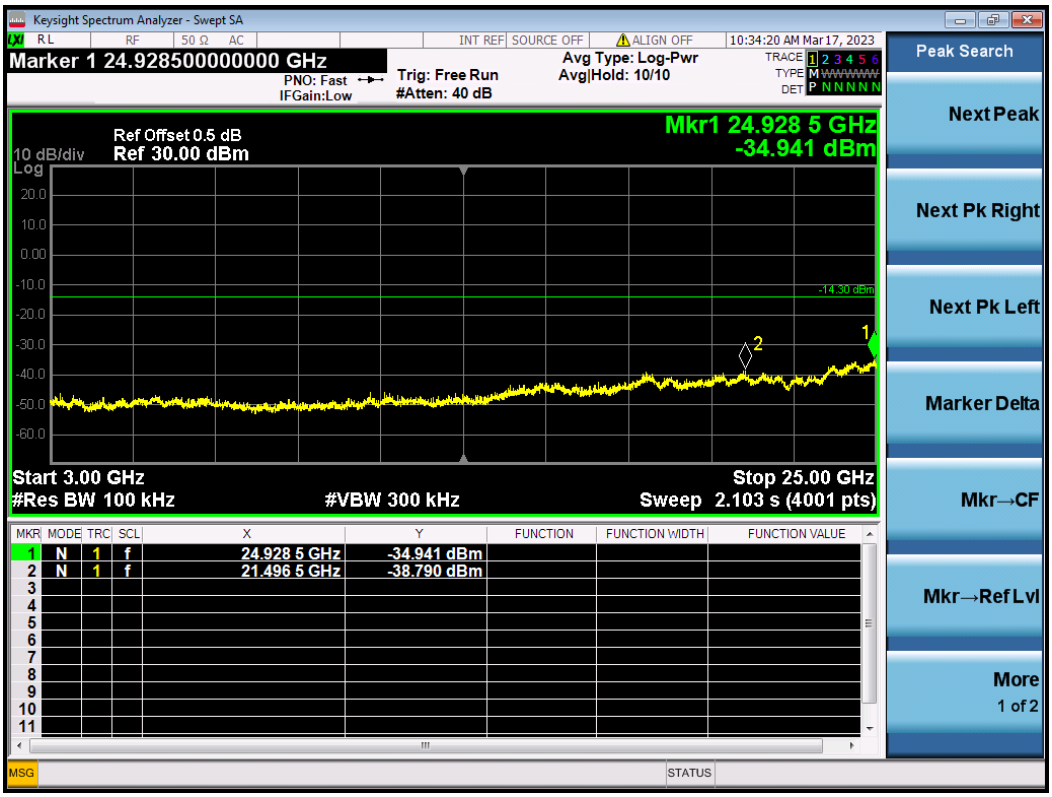


Figure 20: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, π/4-DQPSK

Carrier Level

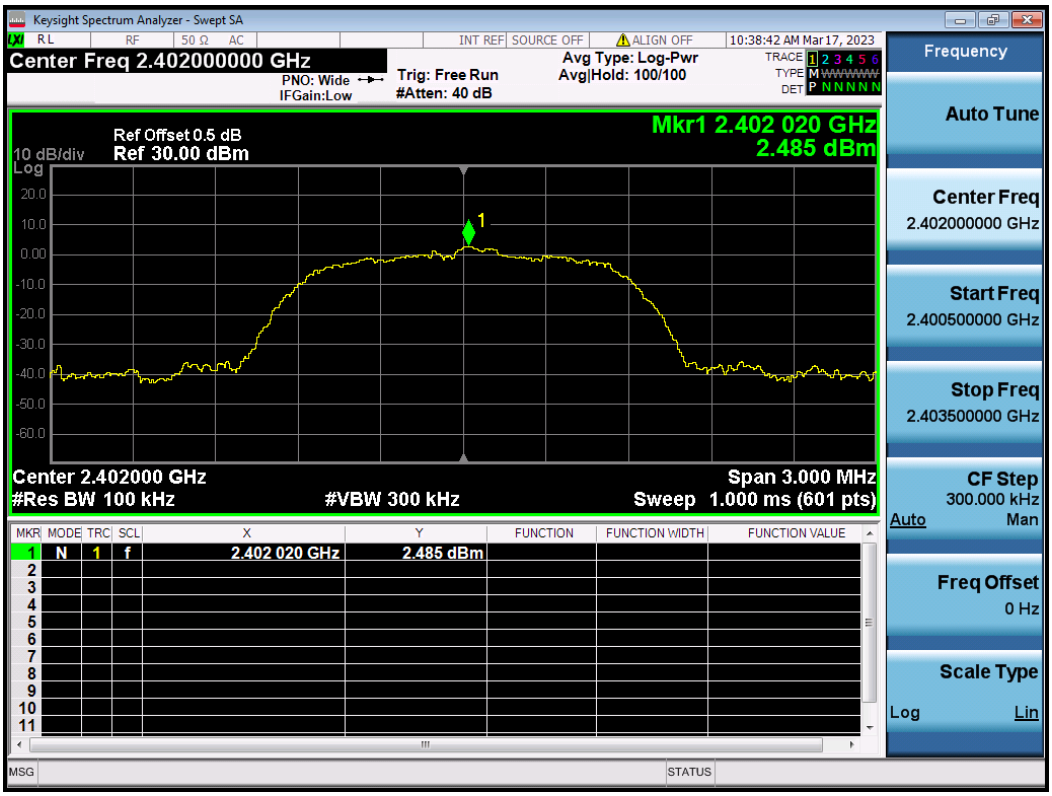


Figure 21: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, π/4-DQPSK Band Edge

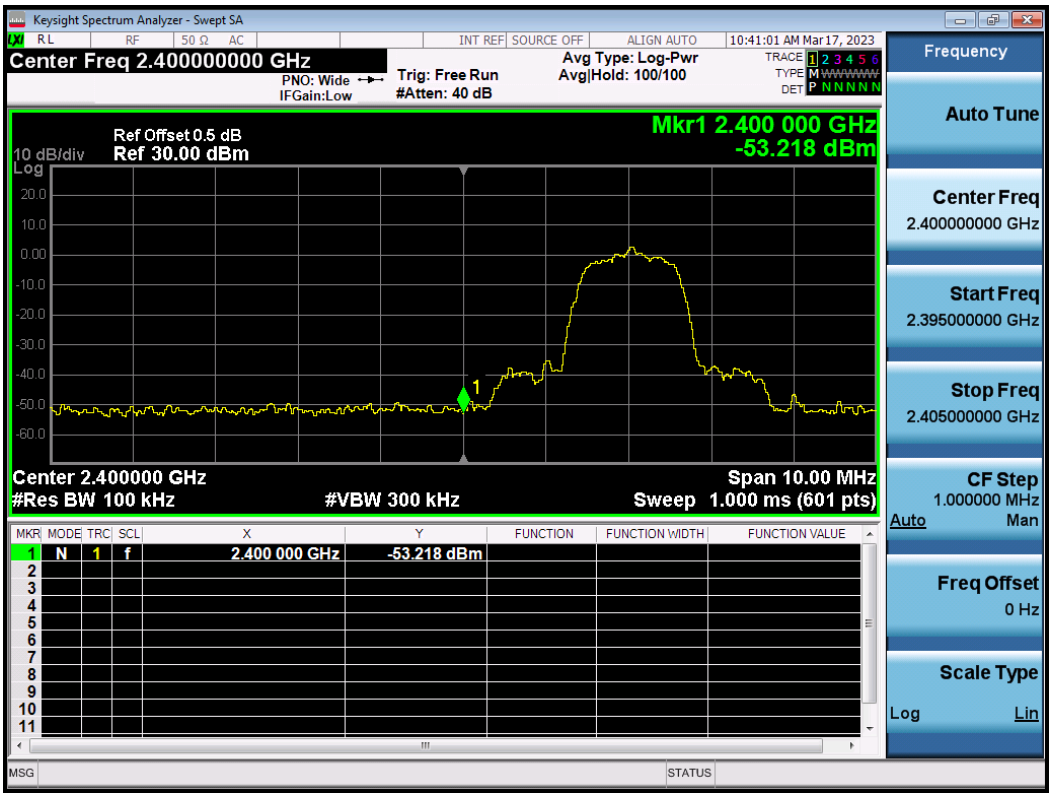


Figure 22: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, π/4-DQPSK Conducted spurious emissions 30MHz-3GHz

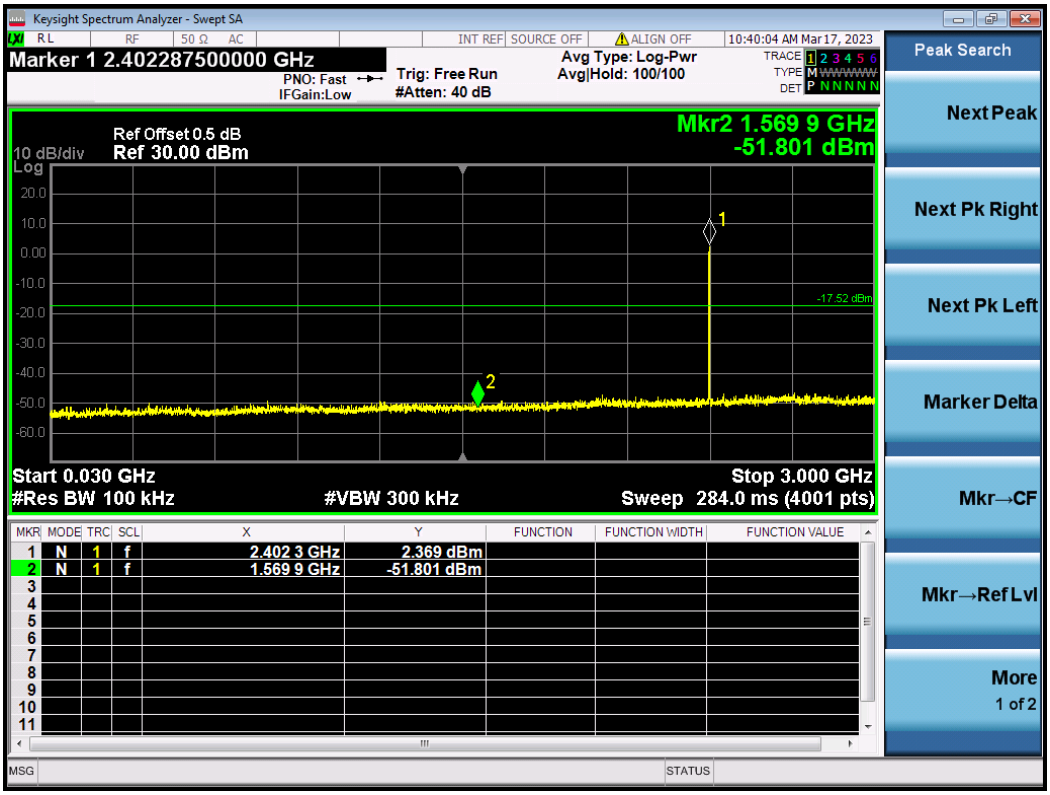


Figure 23: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, π/4-DQPSK

Conducted spurious emissions 3GHz-25GHz

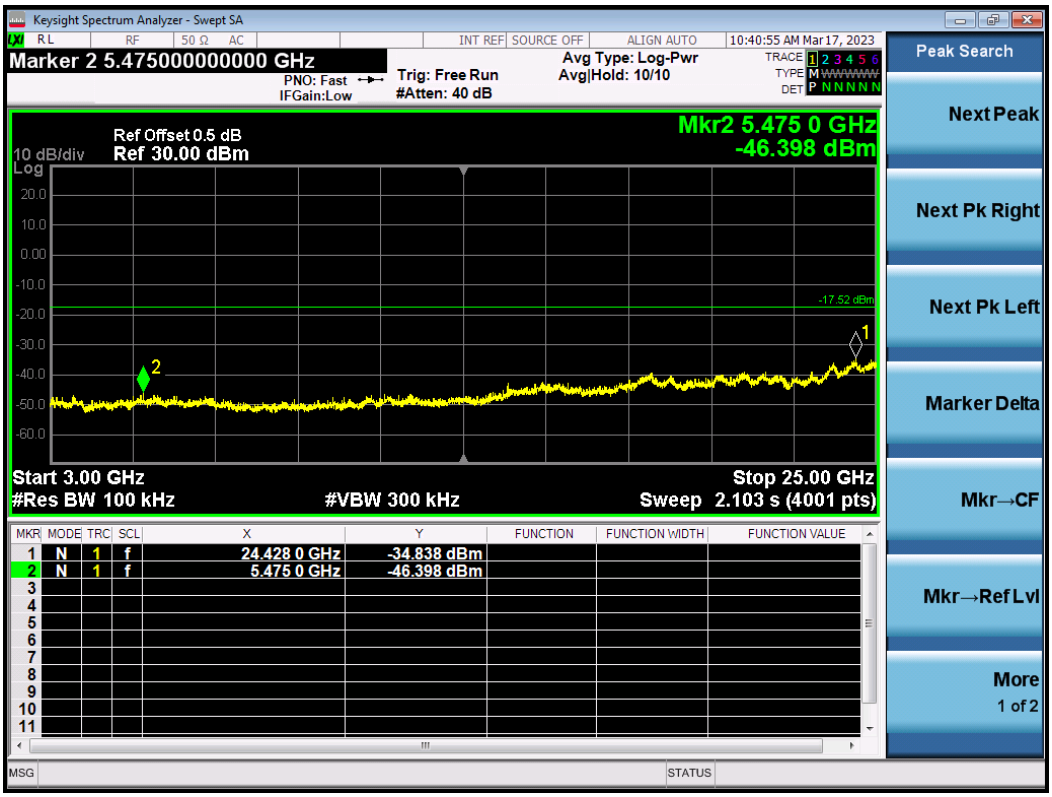


Figure 24: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, π/4-DQPSK

Carrier Level

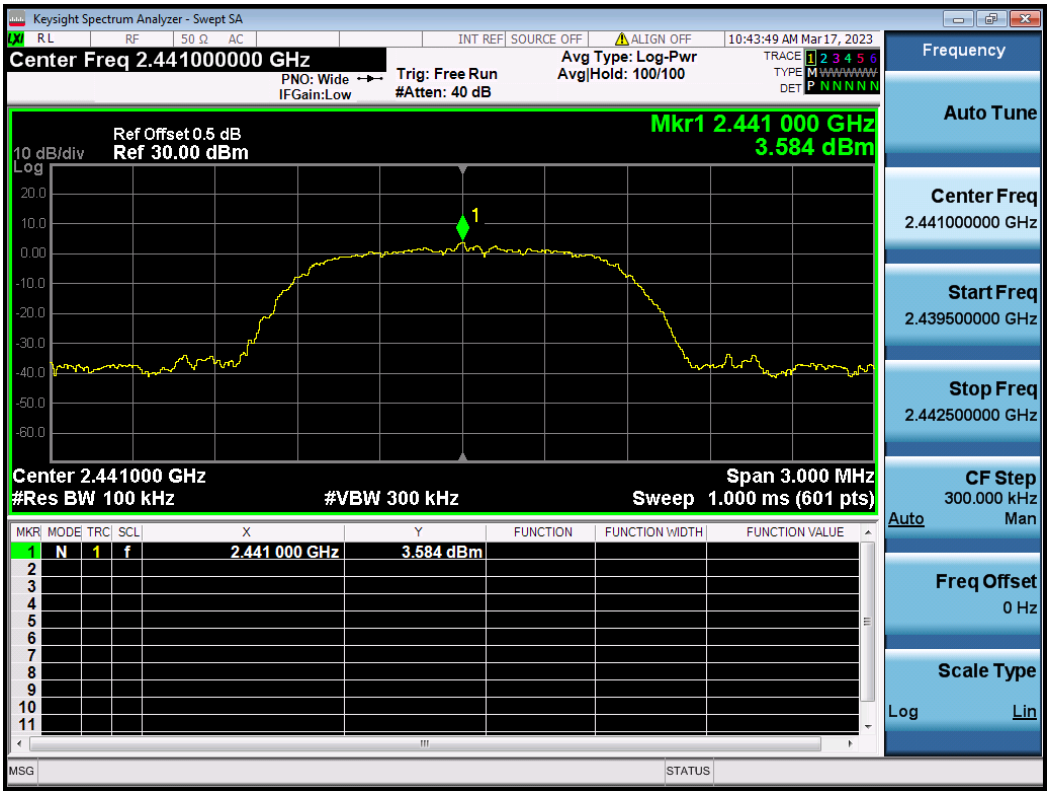


Figure 25: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, π/4-DQPSK

Conducted spurious emissions 30MHz-3GHz

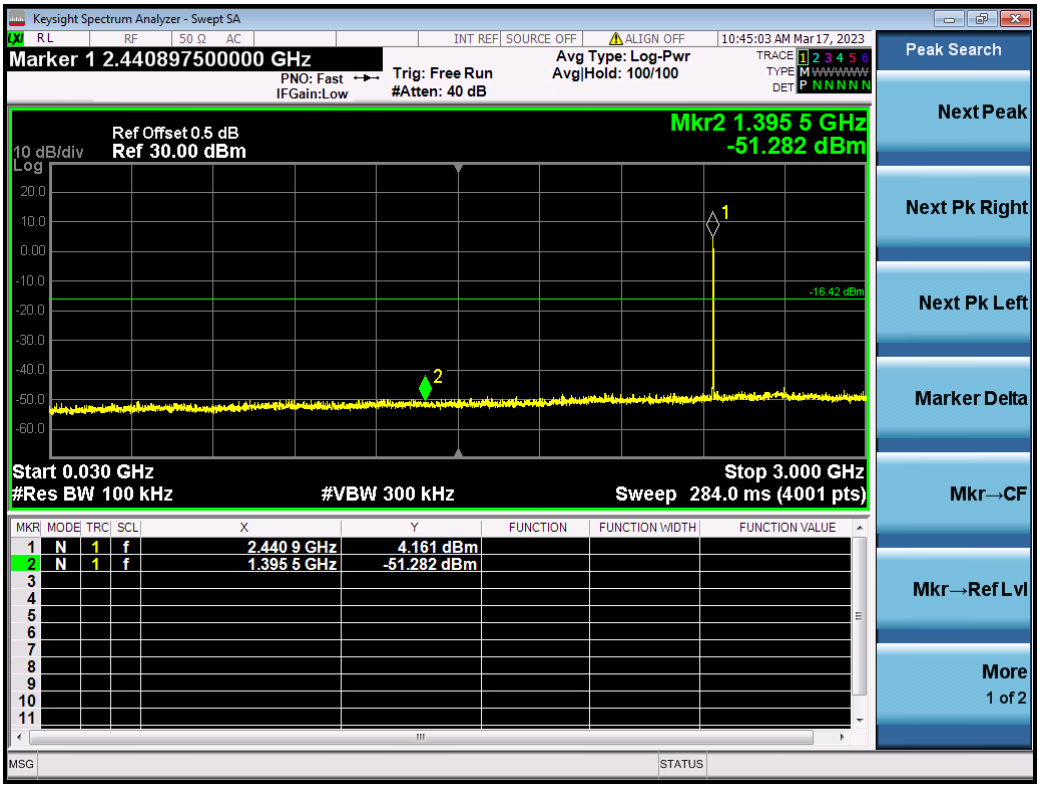


Figure 26: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, π/4-DQPSK

Conducted spurious emissions 3GHz-25GHz

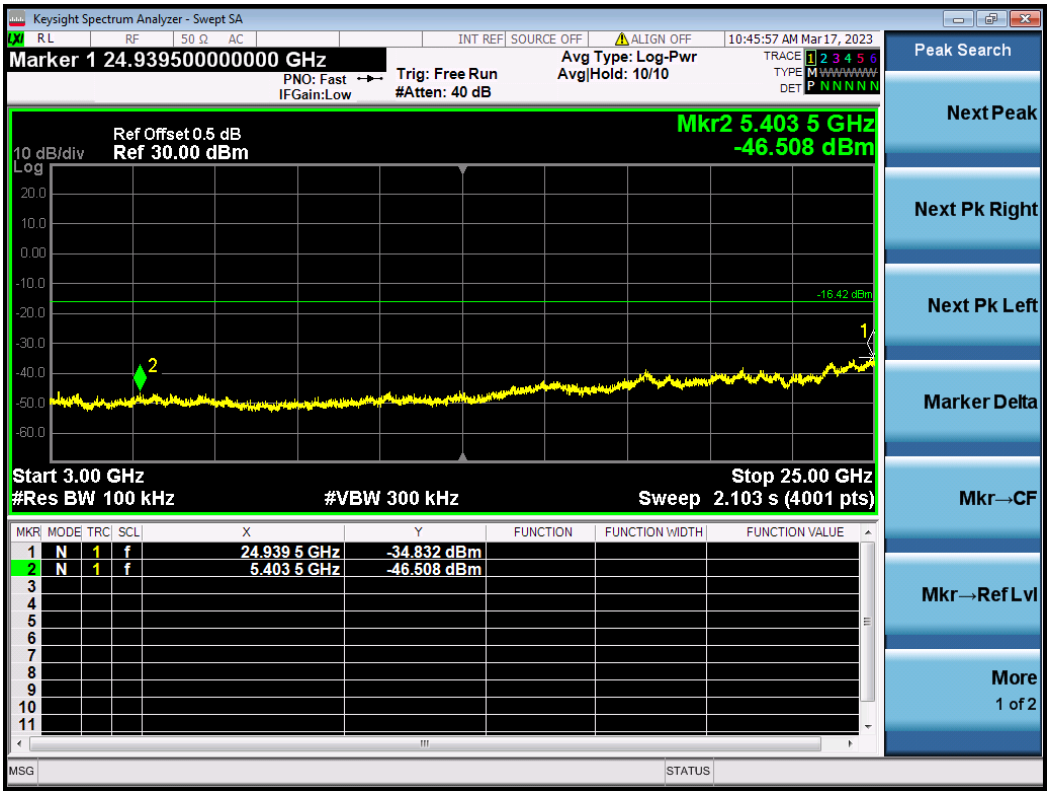


Figure 37: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, π/4-DQPSK Carrier Level

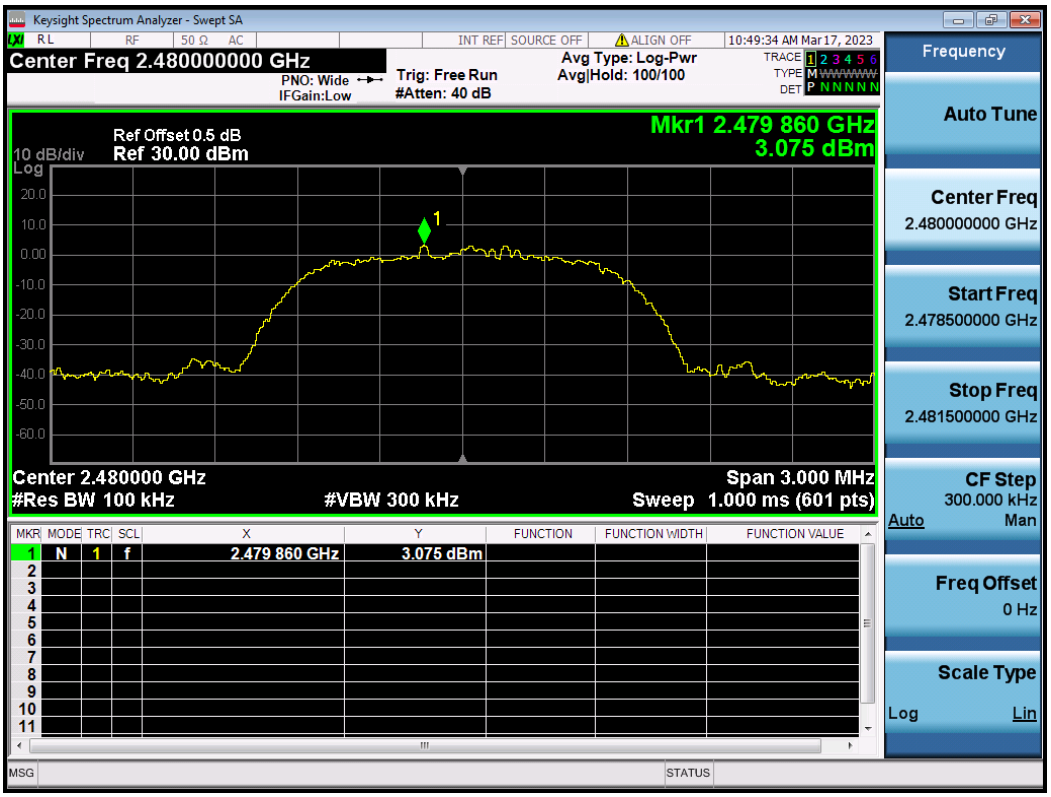


Figure 38: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, π/4-DQPSK Band Edge

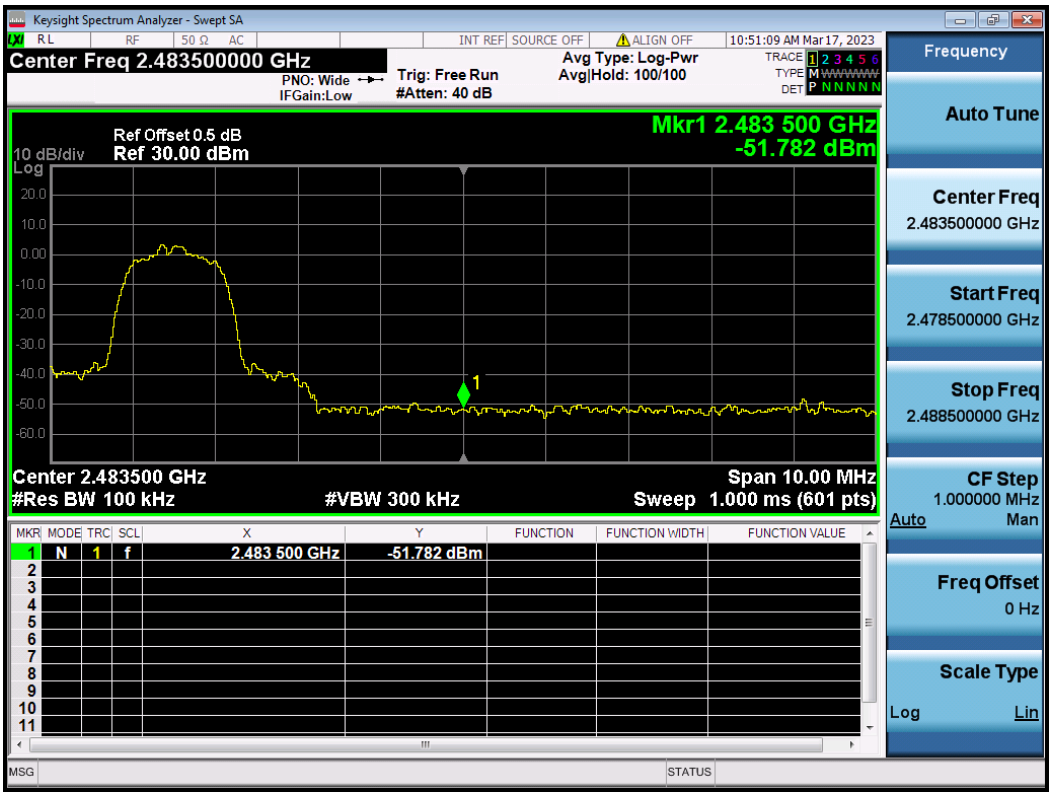


Figure 39: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, π/4-DQPSK

Conducted spurious emissions 30MHz-3GHz

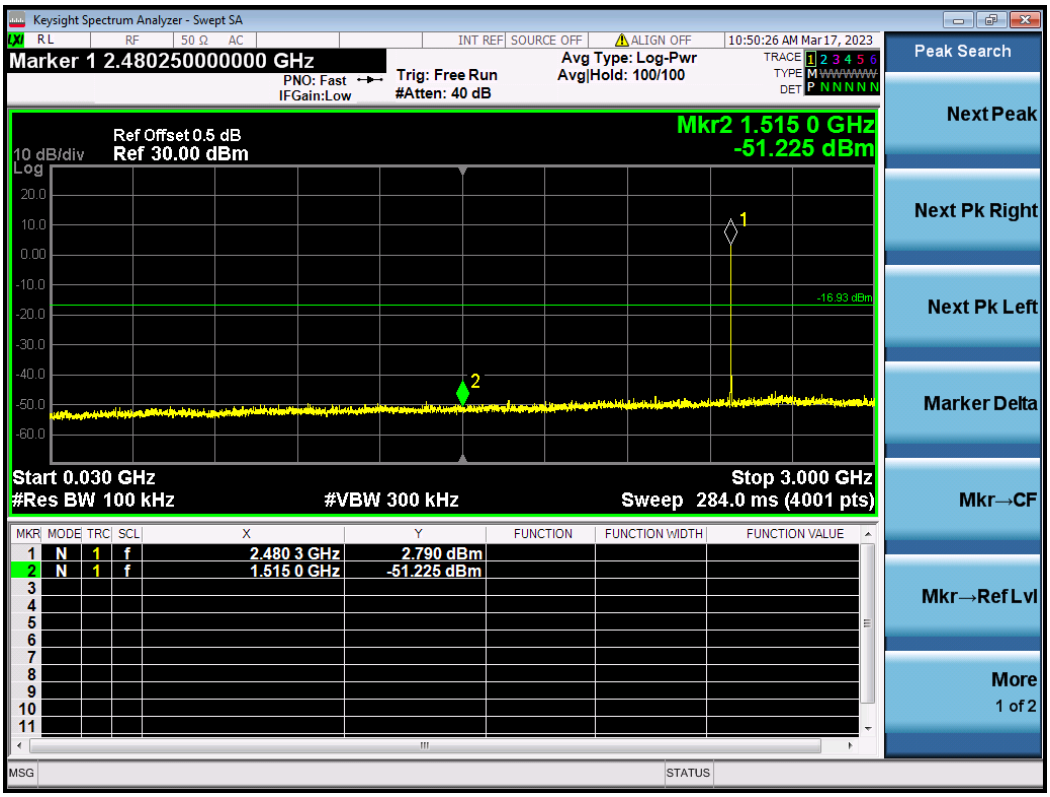


Figure 40: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, π/4-DQPSK

Conducted spurious emissions 3GHz-25GHz

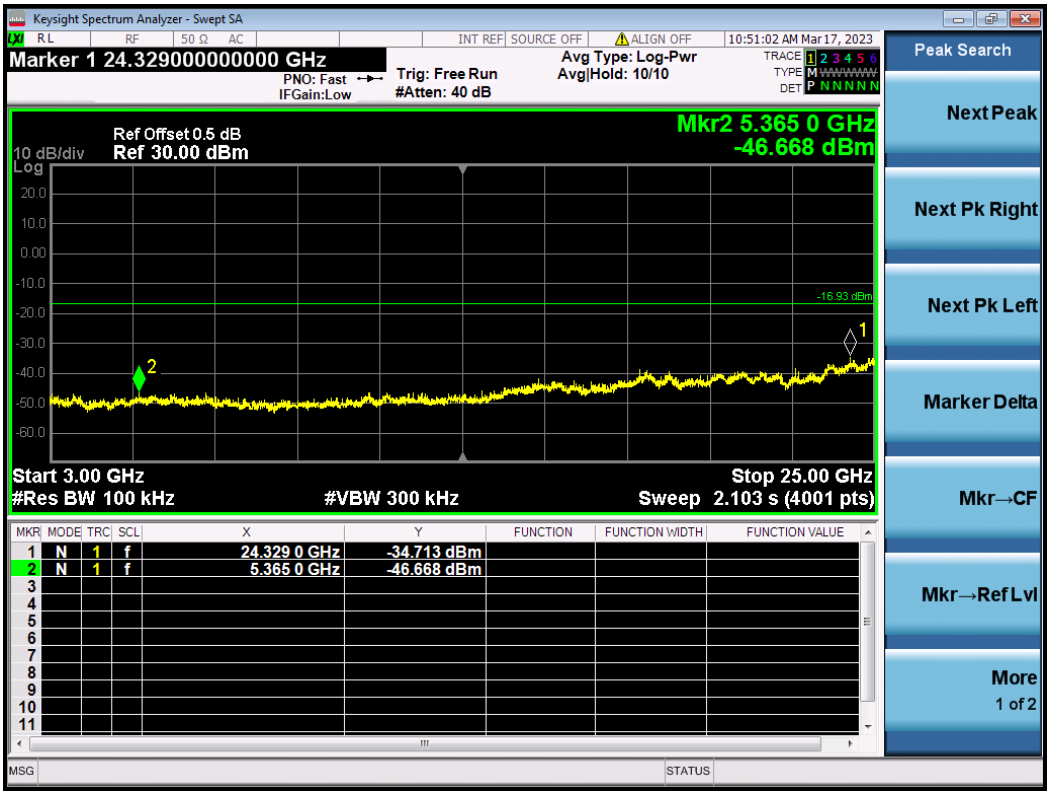


Figure 41: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, 8-DPSK Carrier Level

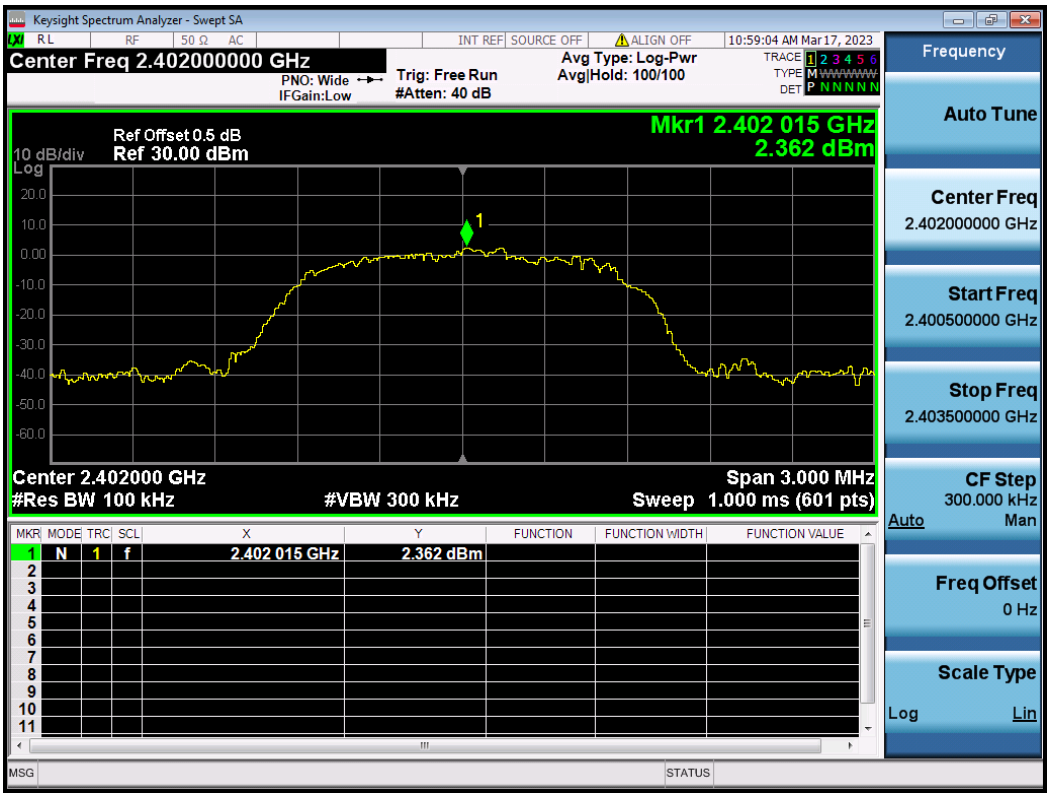


Figure 42: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, 8-DPSK Band Edge

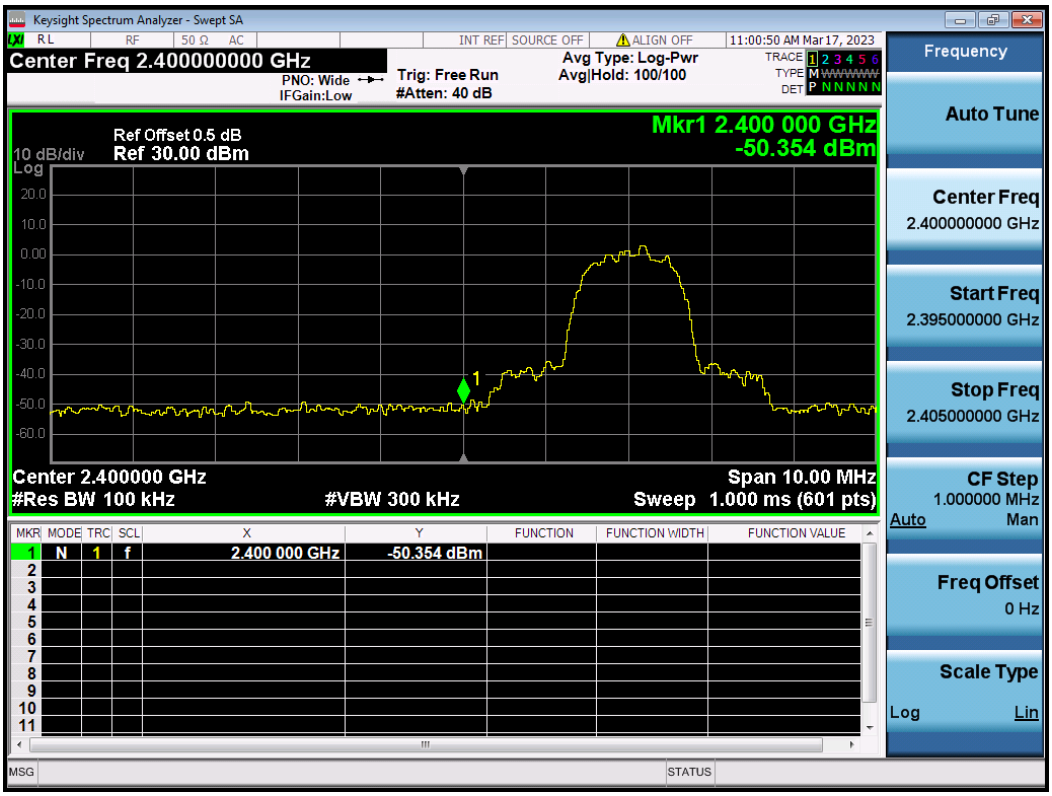


Figure 43: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, 8-DPSK

Conducted spurious emissions 30MHz-3GHz

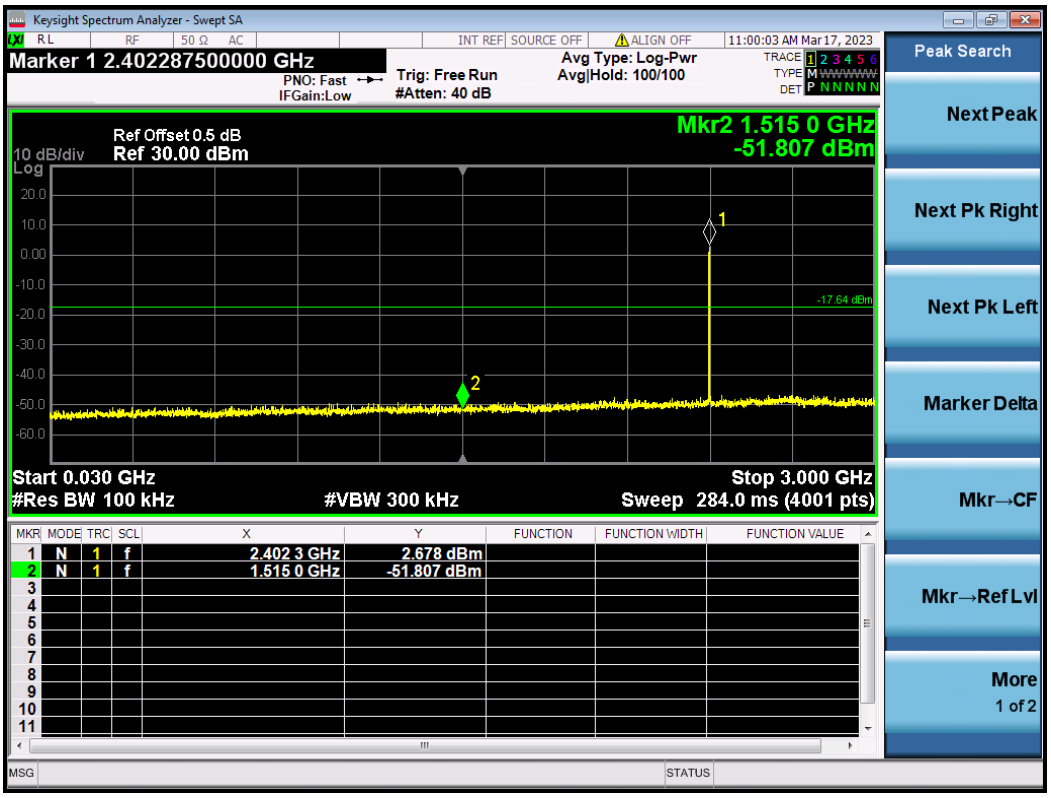


Figure 44: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, 8-DPSK

Conducted spurious emissions 3GHz-25GHz

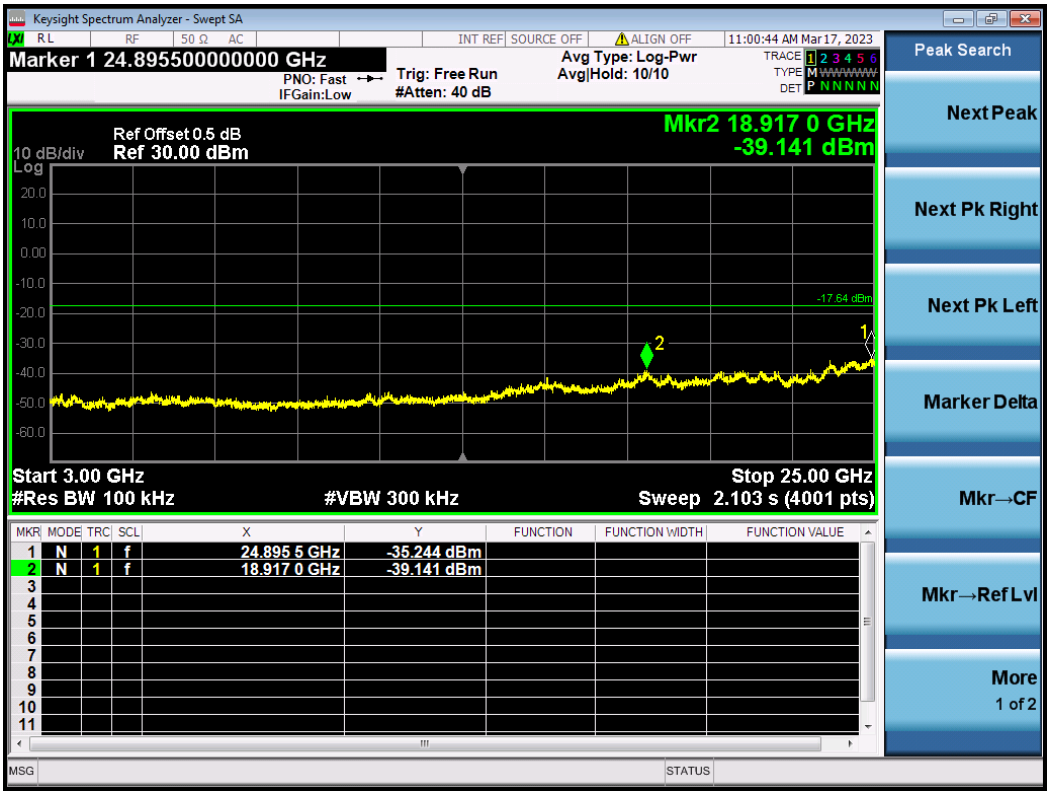


Figure 45: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, 8-DPSK Carrier Level

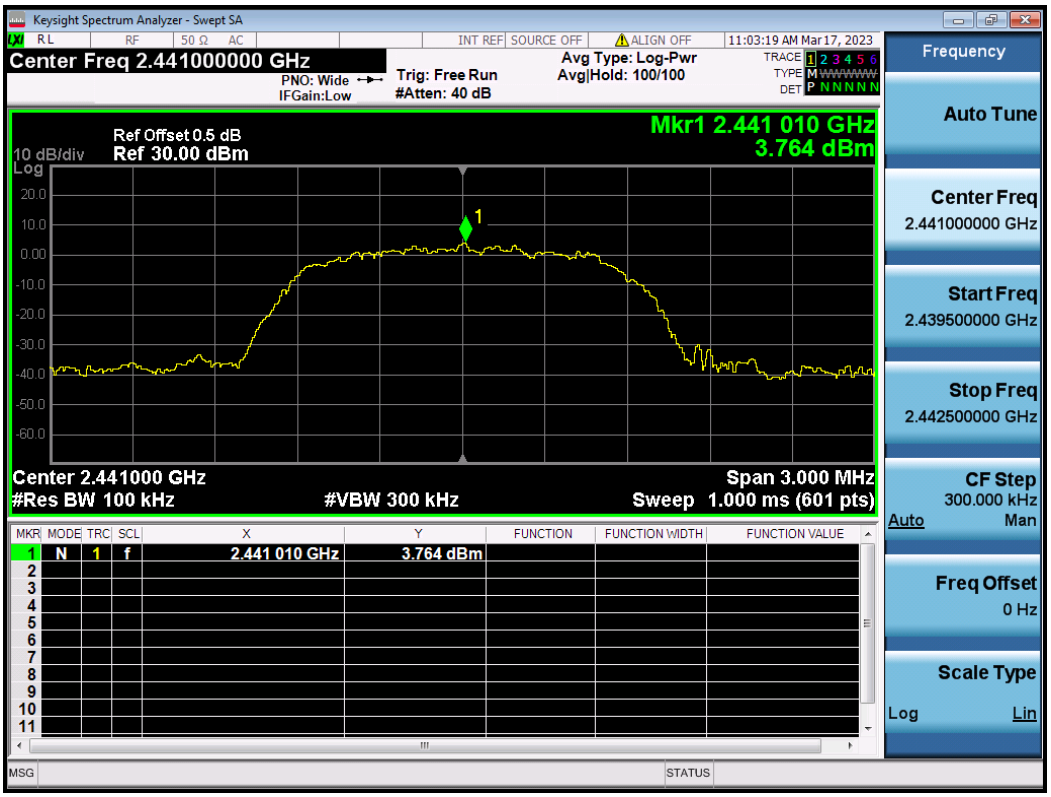


Figure 46: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, 8-DPSK Conducted spurious emissions 30MHz-3GHz

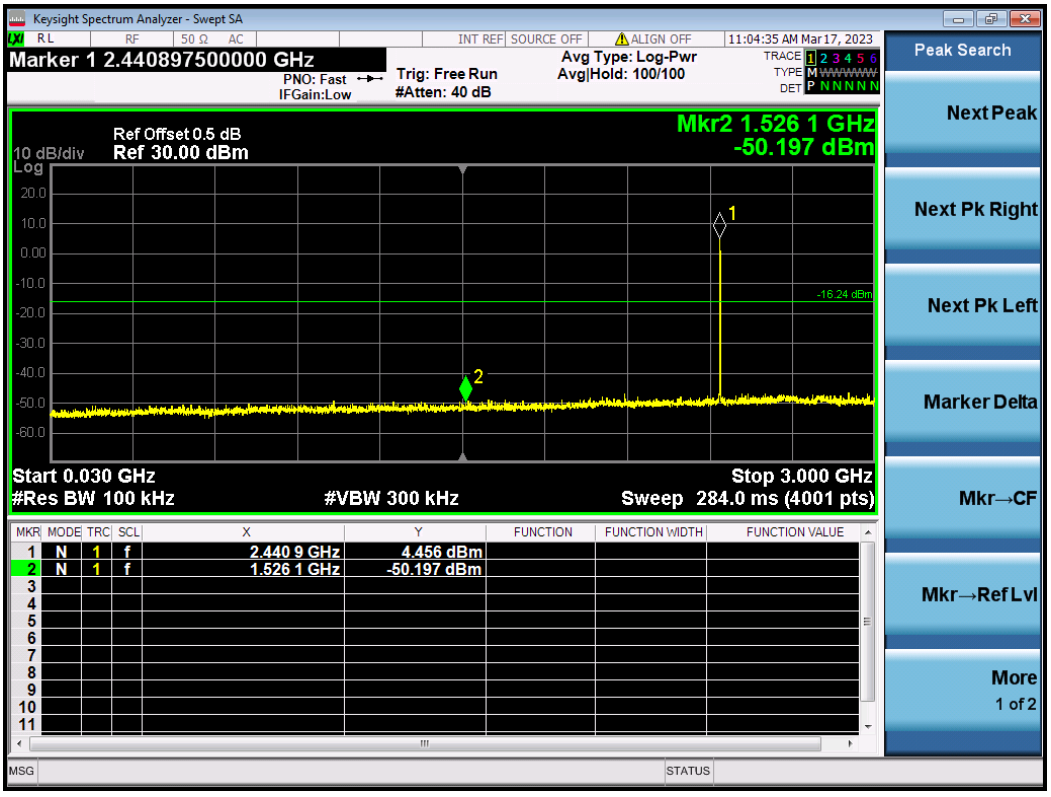


Figure 47: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2441MHz, 8-DPSK

Conducted spurious emissions 3GHz-25GHz

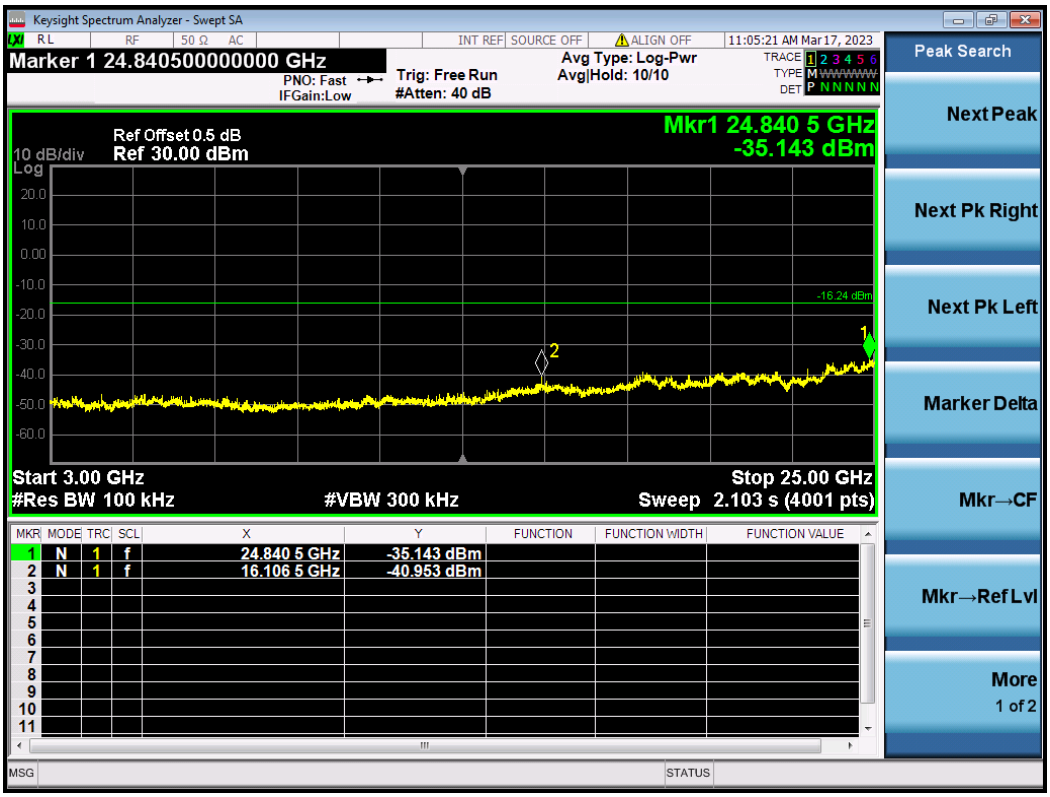


Figure 48: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, 8-DPSK

Carrier Level

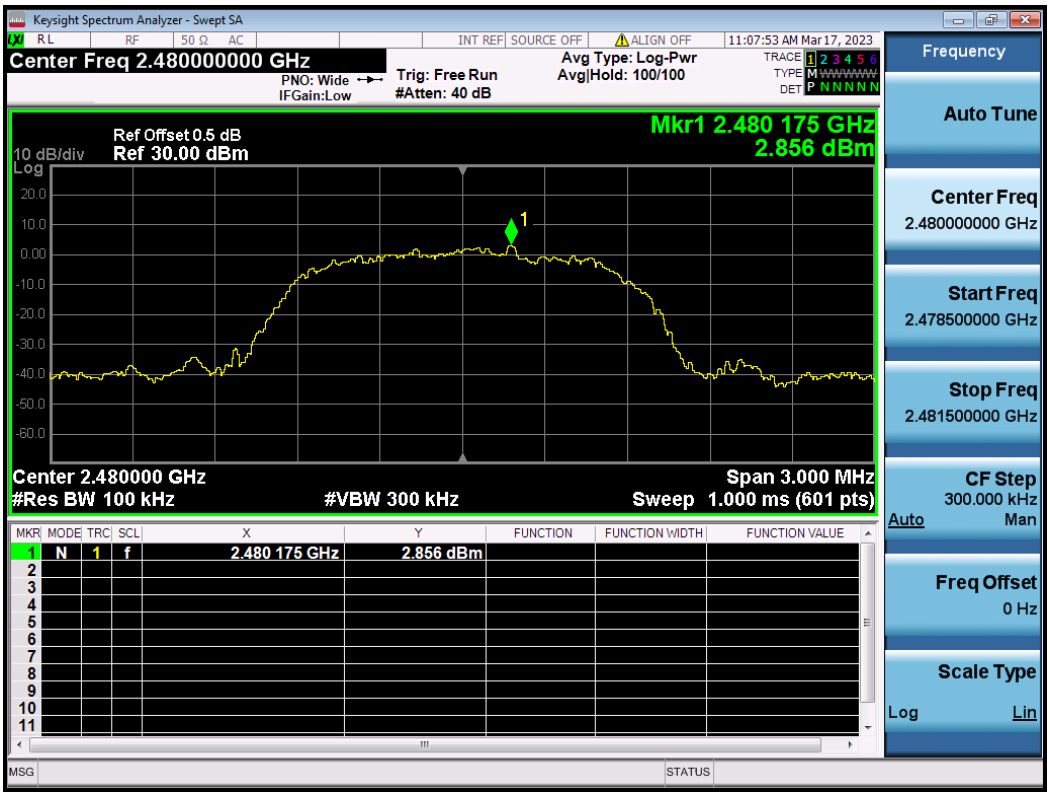


Figure 49: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, 8-DPSK Band Edge

Figure 50: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, 8-DPSK

Conducted spurious emissions 30MHz-3GHz

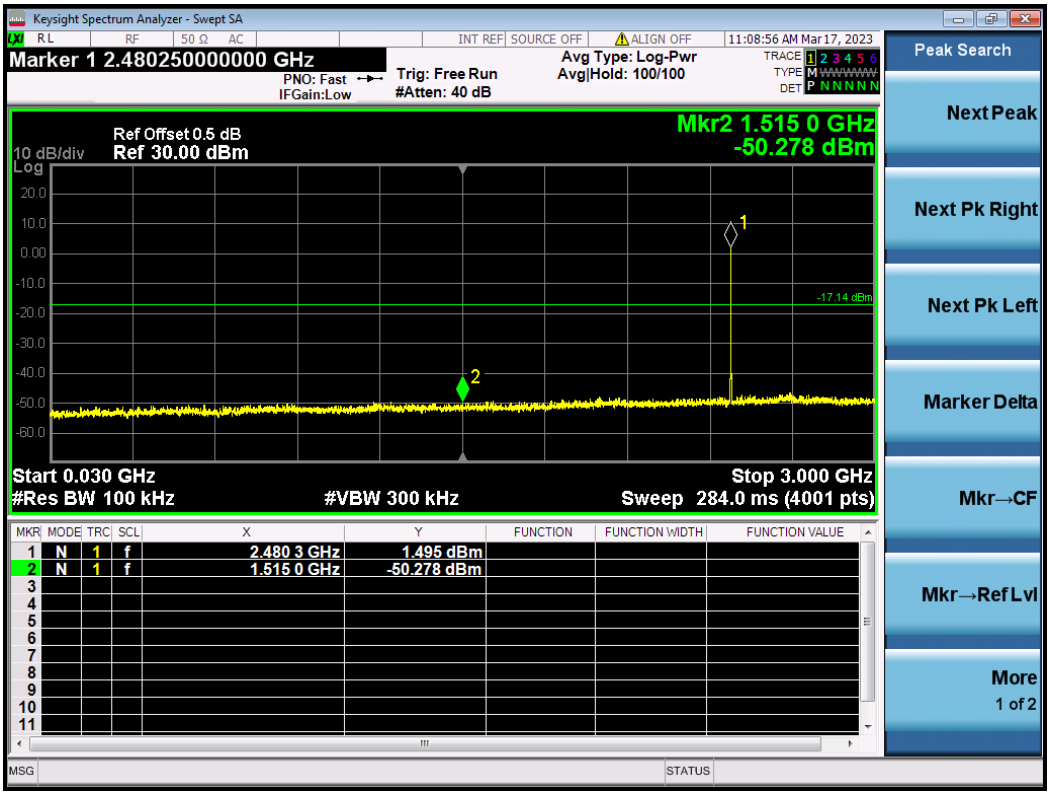


Figure 51: The plots of Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, 8-DPSK

Conducted spurious emissions 3GHz-25GHz

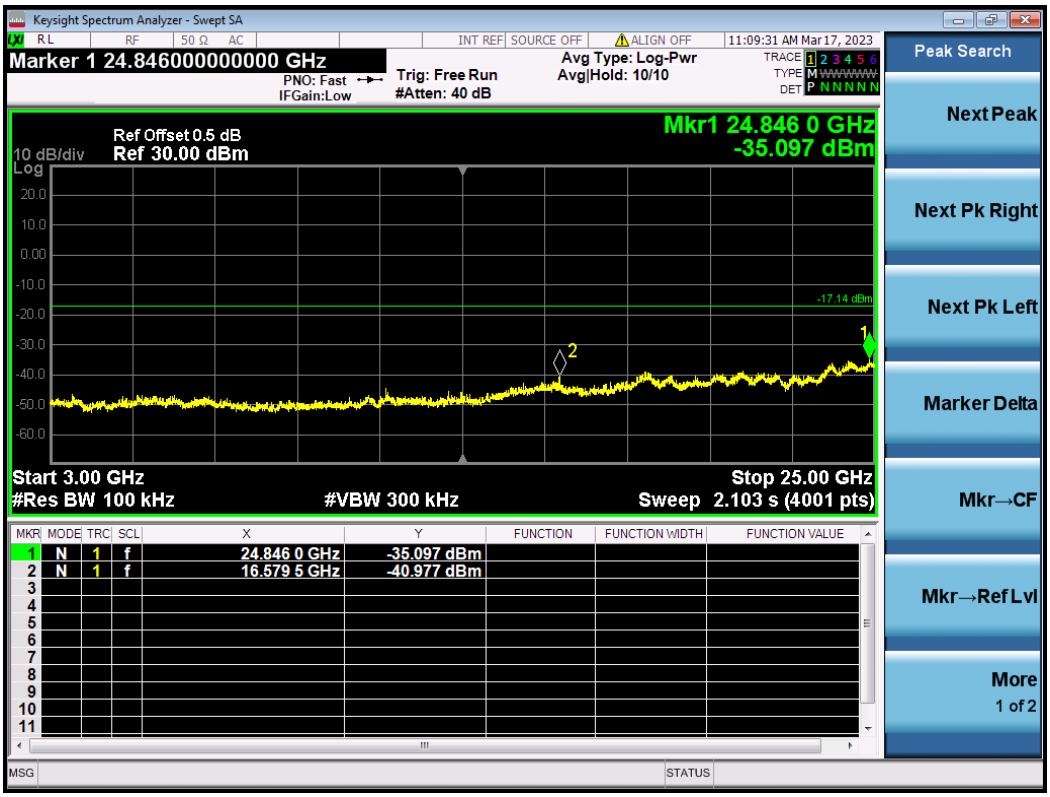


Figure 52: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, GFSK Carrier Level

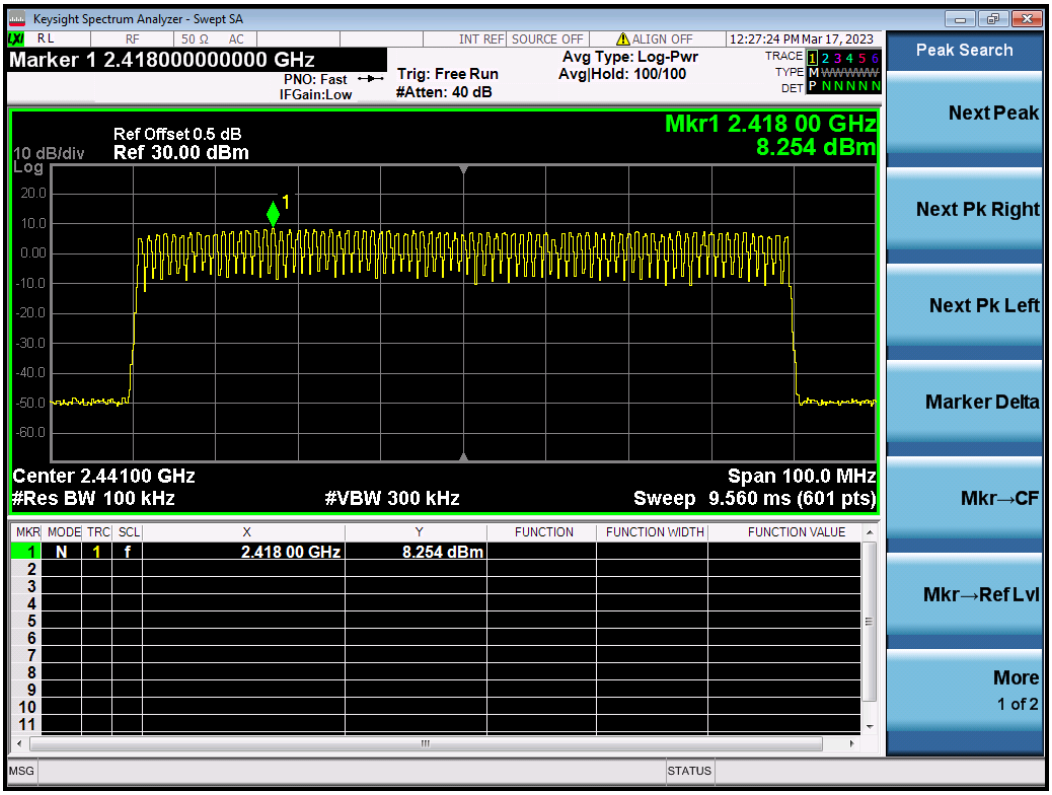


Figure 53: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, GFSK Band Edge (Low)

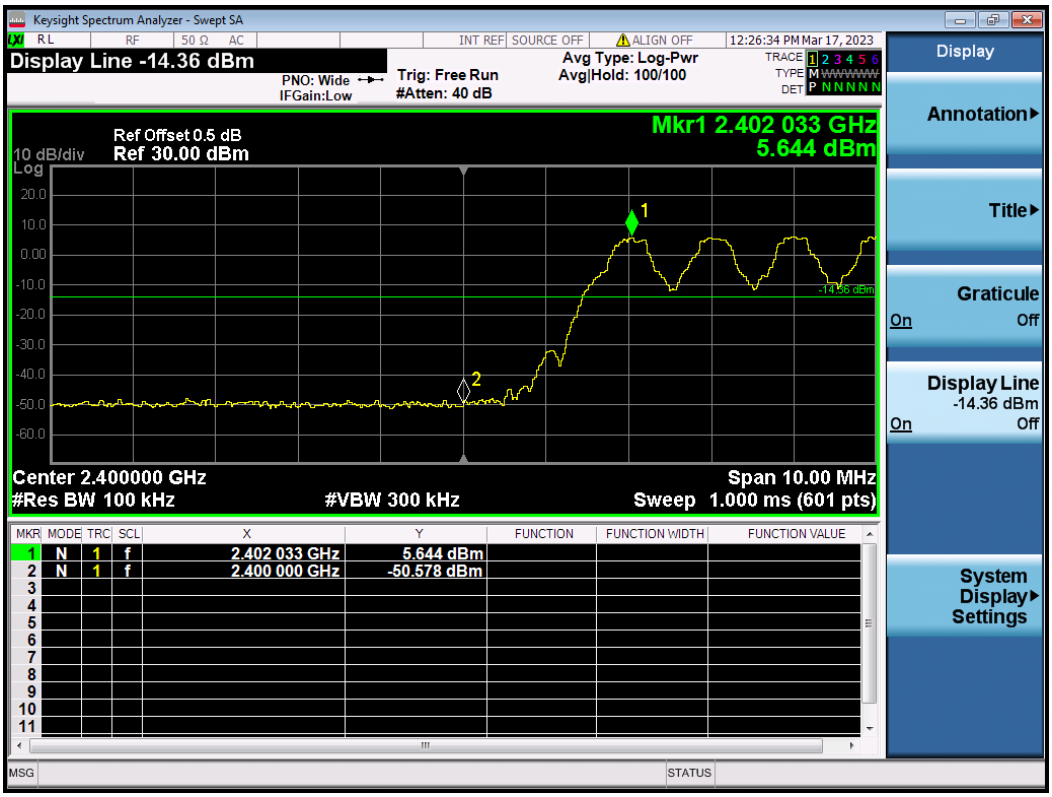


Figure 54: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, GFSK Band Edge (High)

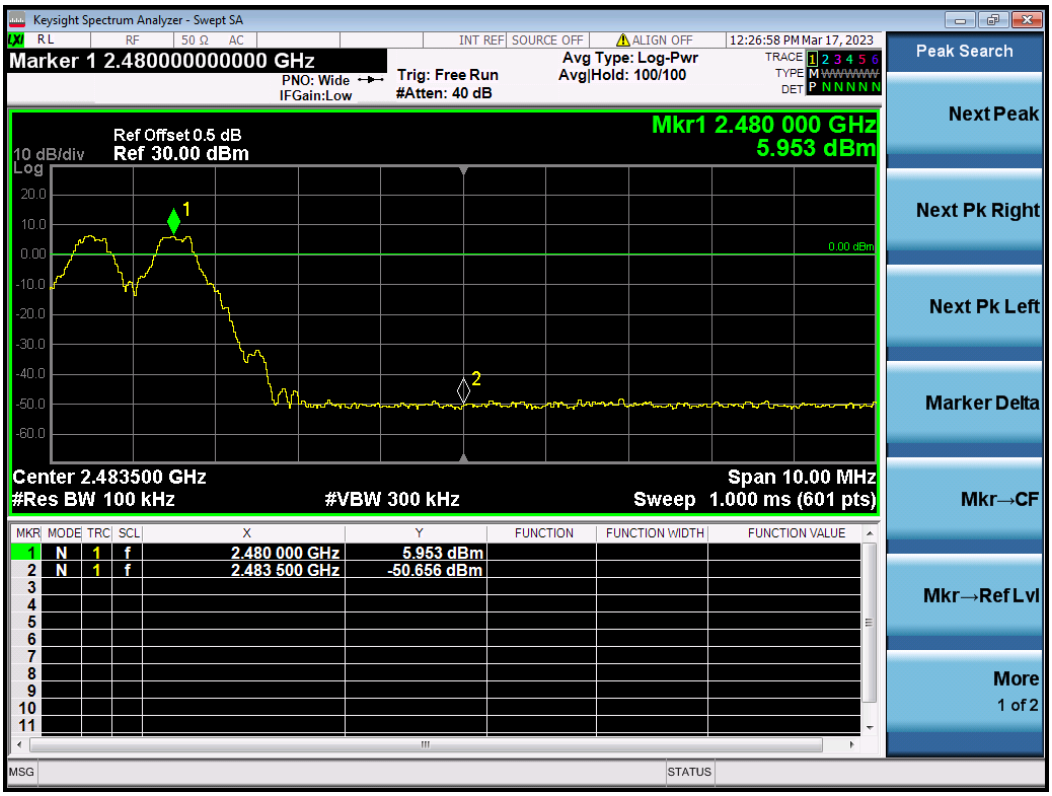


Figure 55: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, GFSK

Conducted spurious emissions 30MHz-3GHz

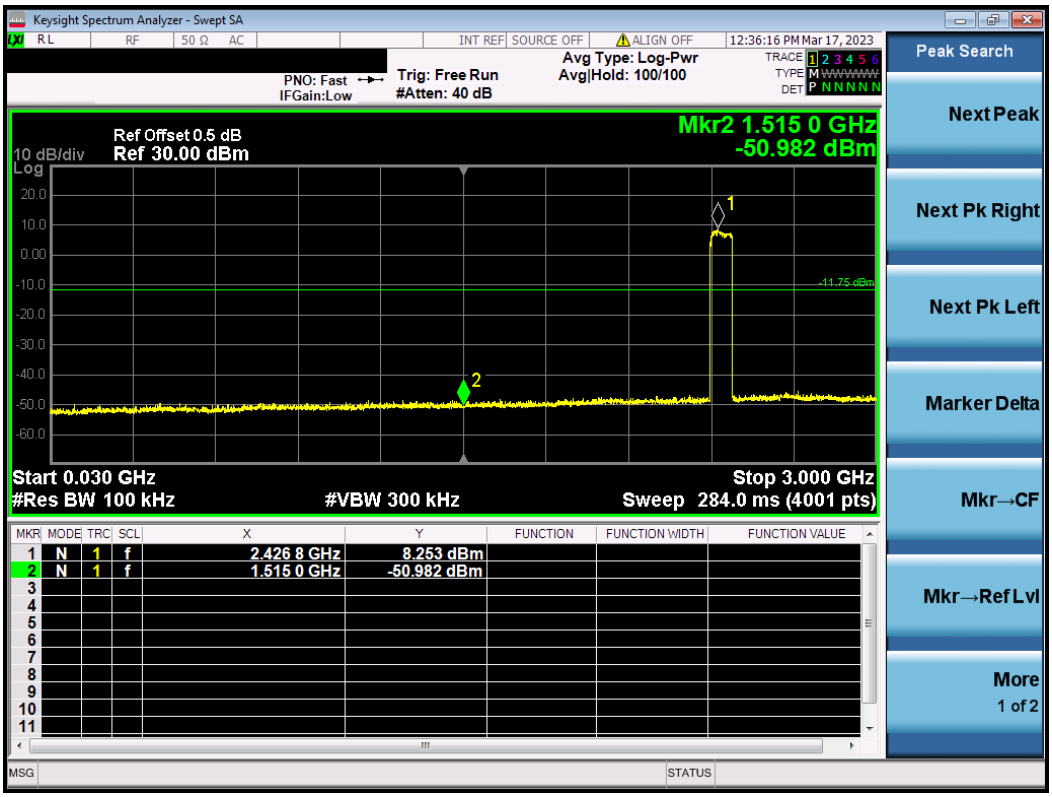


Figure 56: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, GFSK

Conducted spurious emissions 3GHz-25GHz

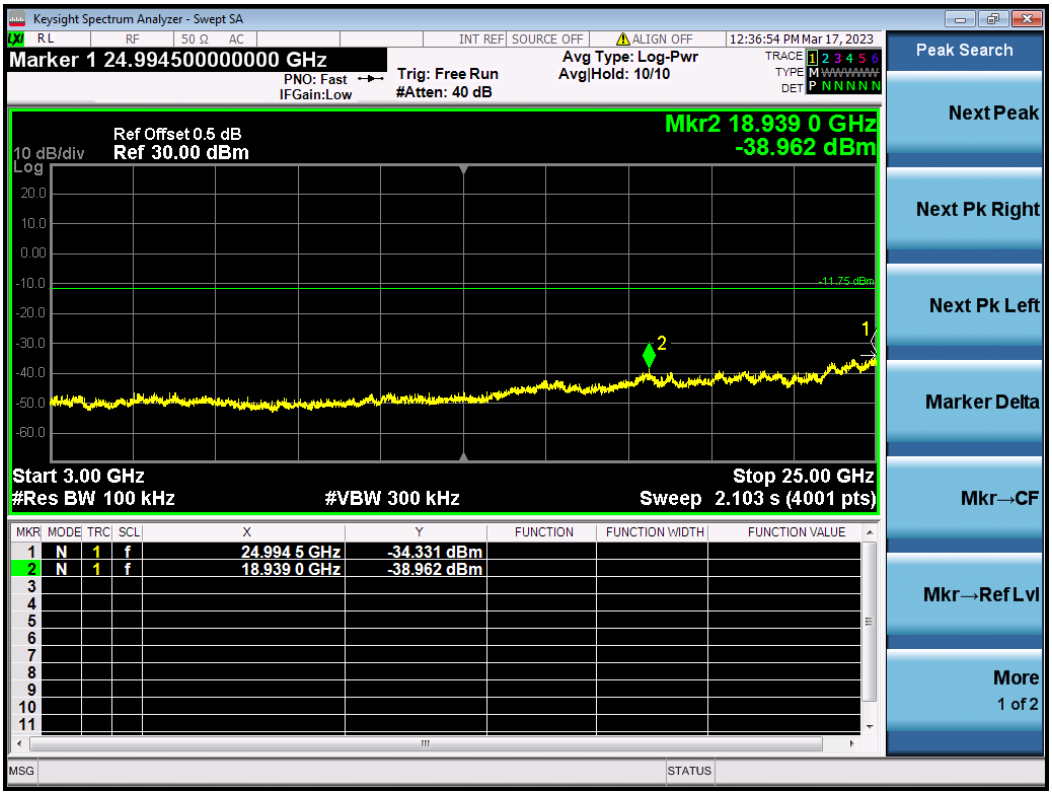


Figure 57: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, π/4-DQPSK , Carrier Level

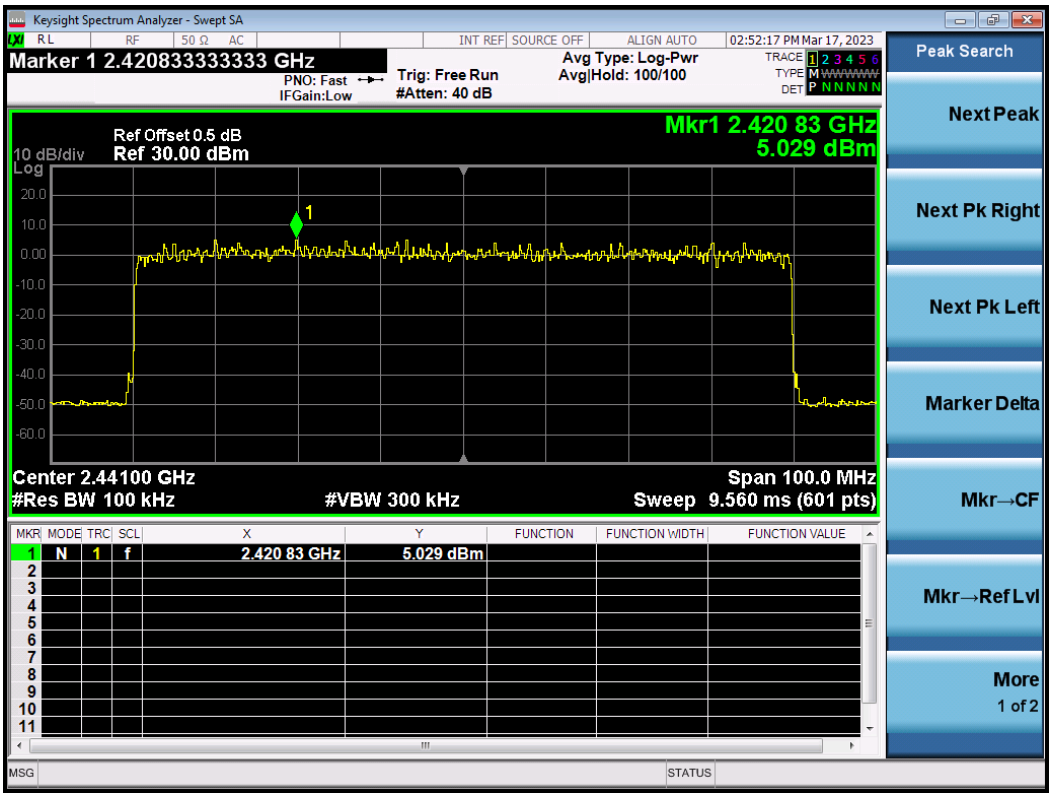


Figure 58: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, π/4-DQPSK, Band Edge (Low)

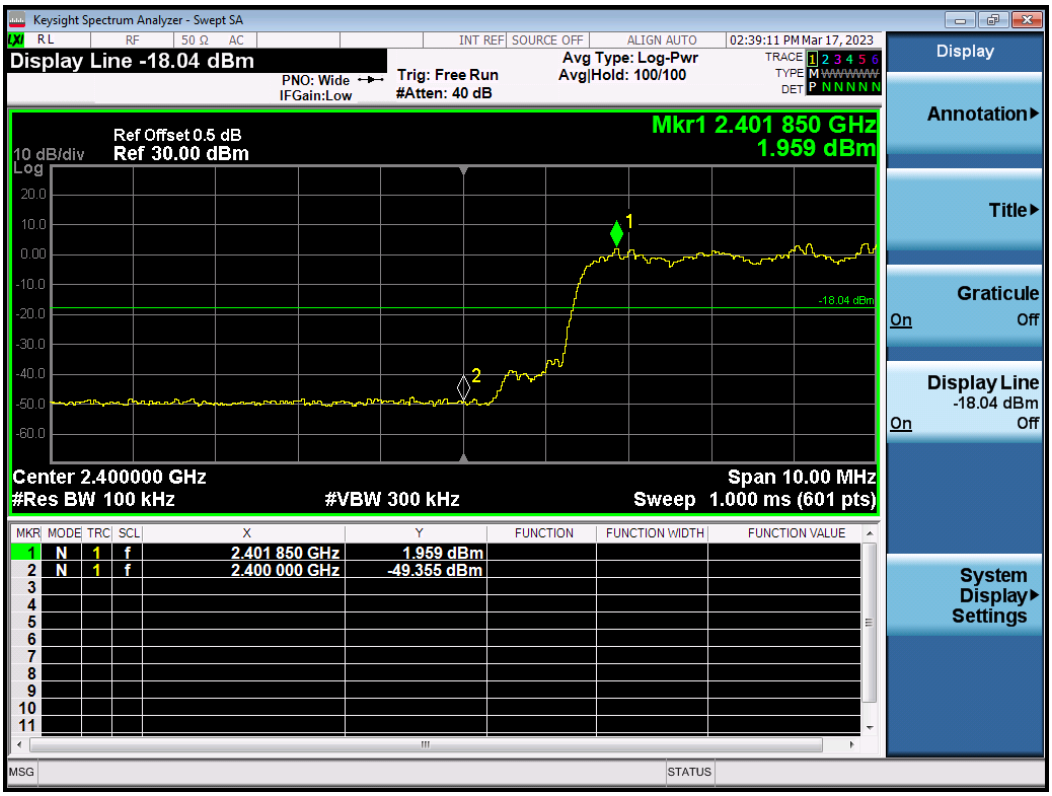


Figure 59: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, π/4-DQPSK, Band Edge (High)

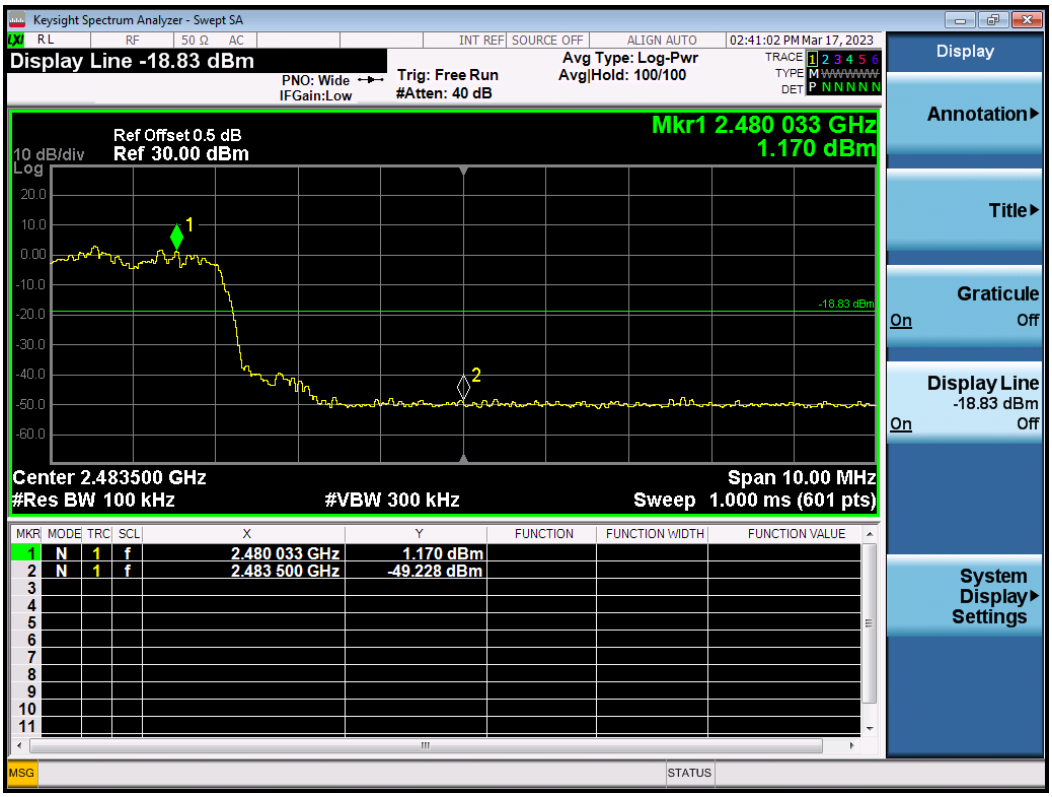


Figure 60: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, π/4-DQPSK, Conducted spurious emissions 30MHz-3GHz

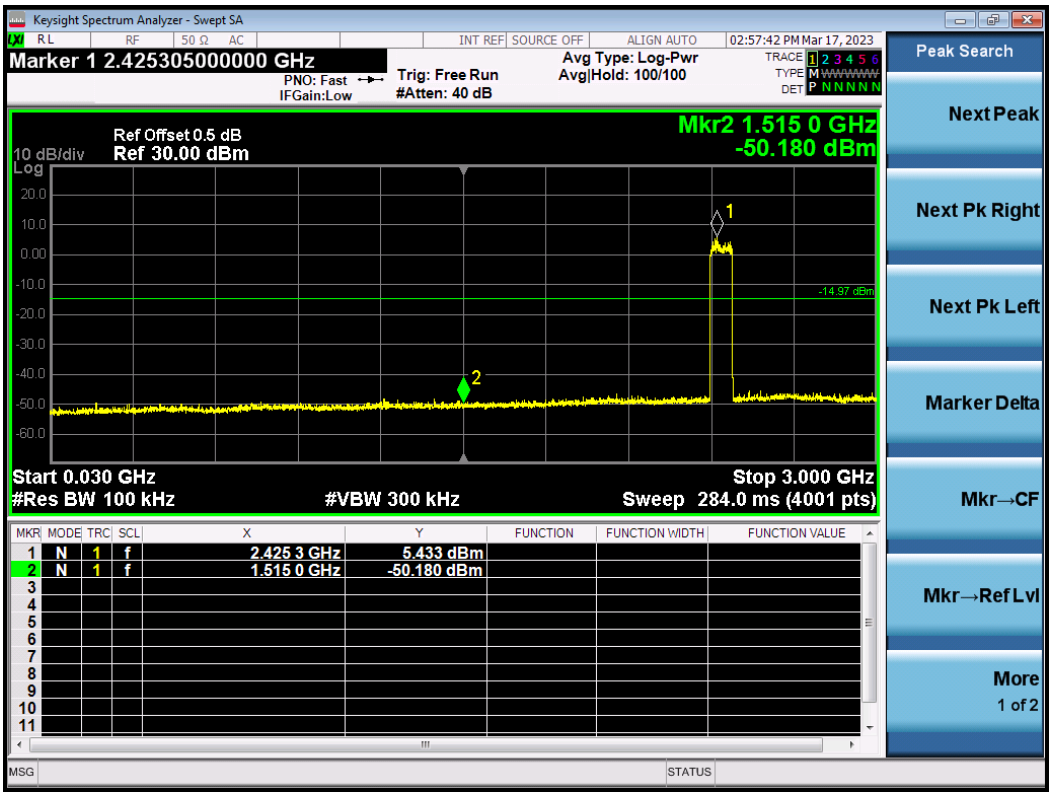


Figure 61: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, π/4-DQPSK, Conducted spurious emissions 3GHz-25GHz

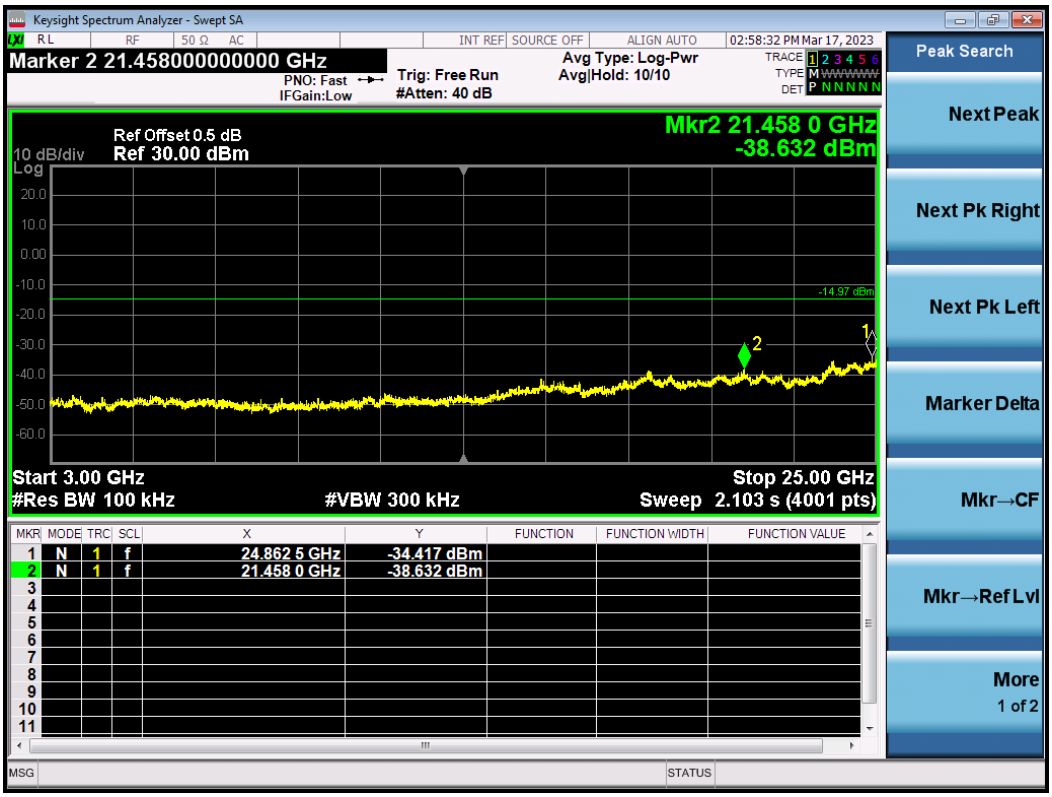


Figure 62: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, 8-DPSK Carrier Level

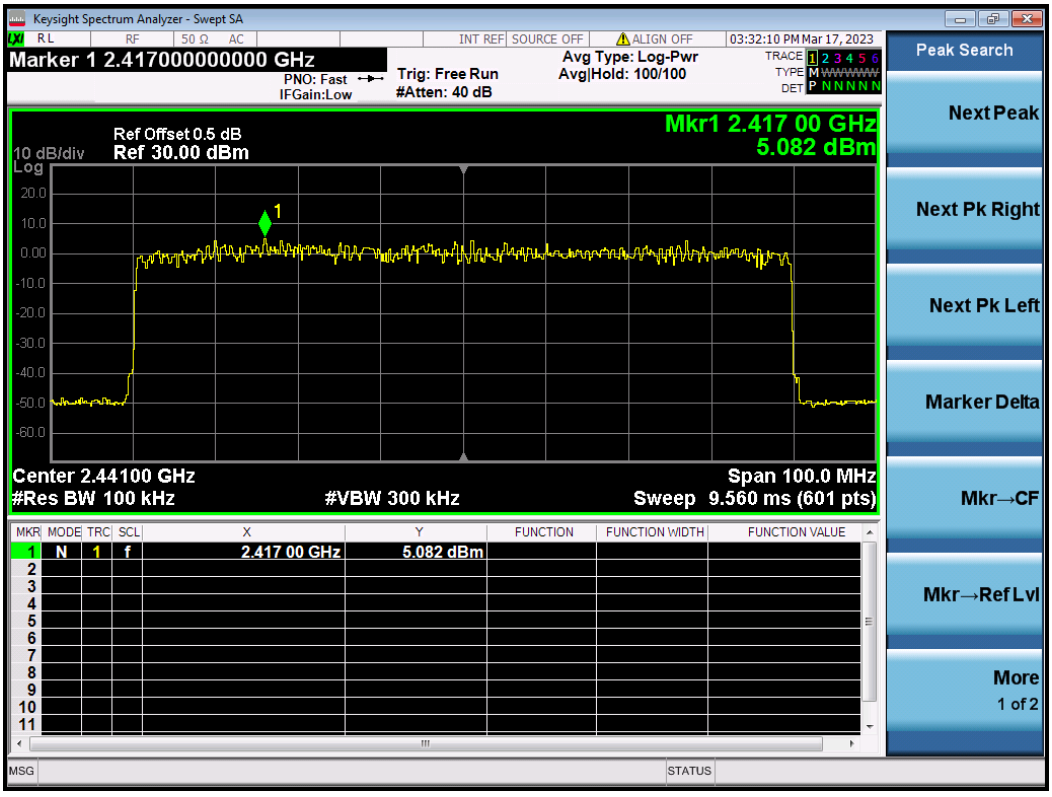


Figure 63: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, 8-DPSK Band Edge (Low)

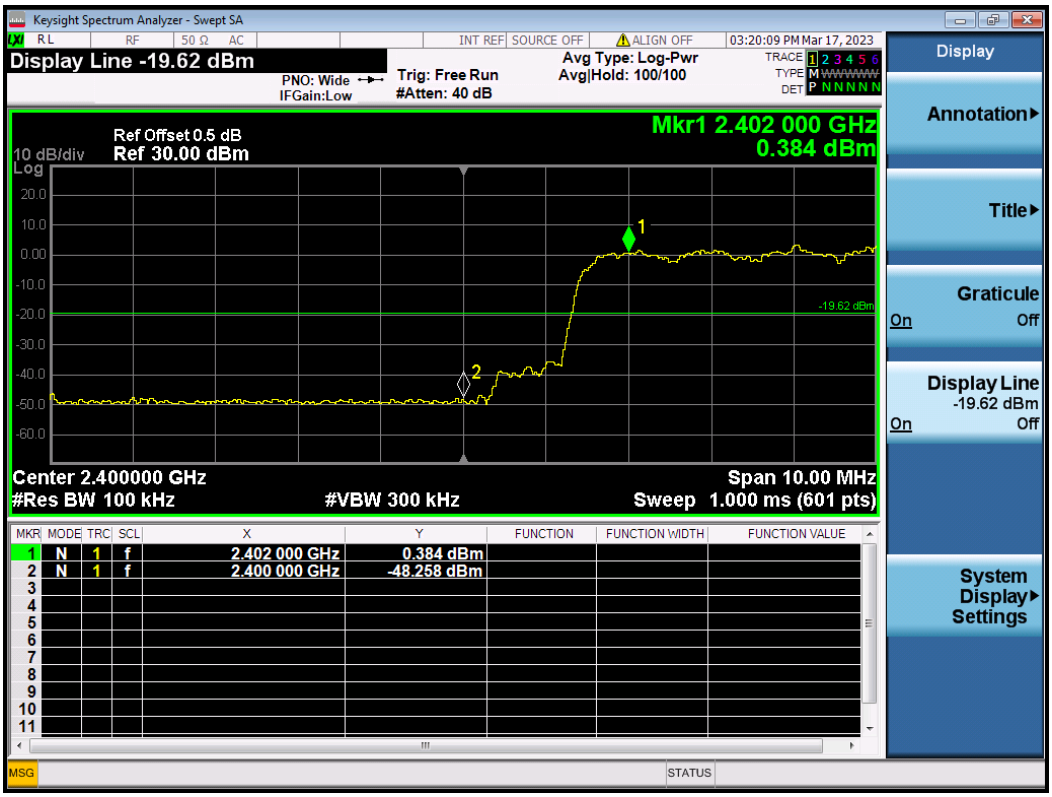


Figure 64: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, 8-DPSK Band Edge (High)

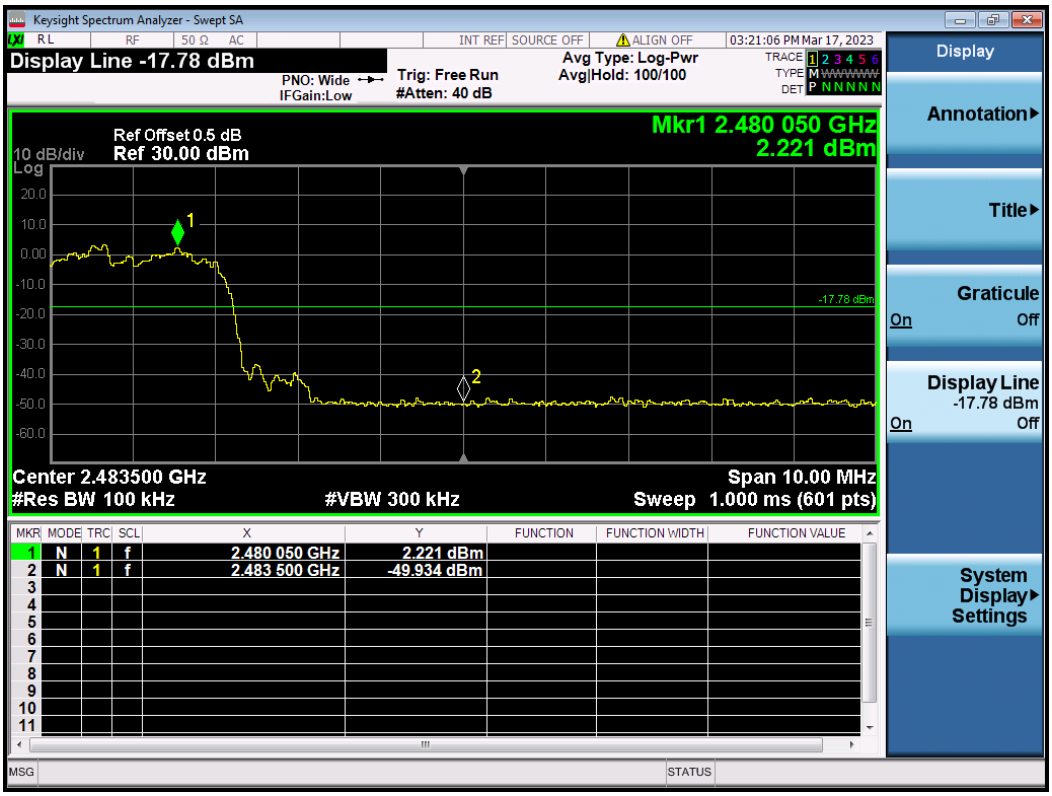


Figure 65: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, 8-DPSK

Conducted spurious emissions 30MHz-3GHz

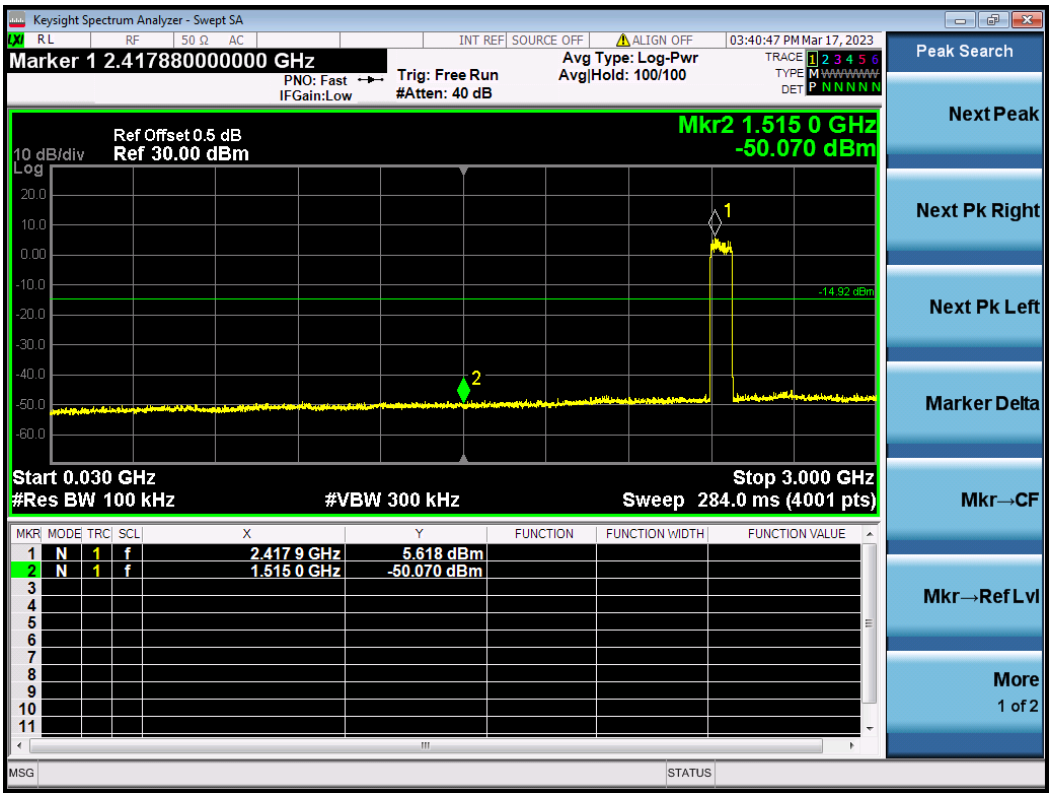
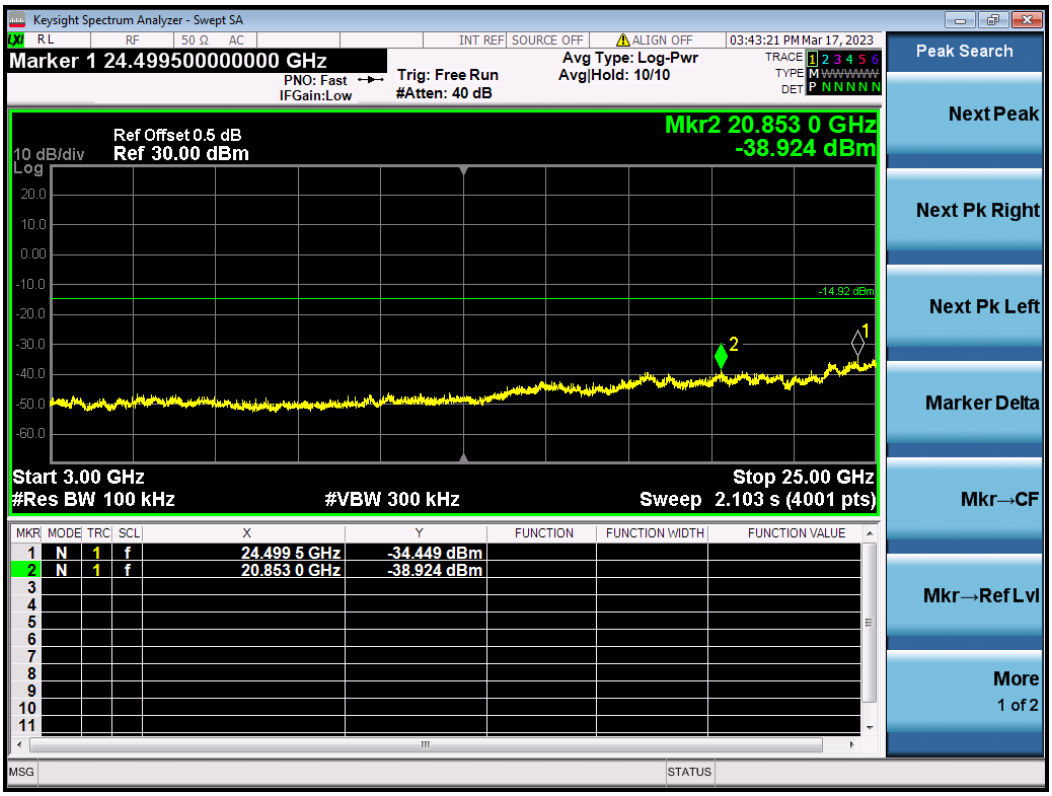


Figure 66: The plots of Conducted Spurious Emission & Authorized-band band-edge, Hopping Mode, 8-DPSK

Conducted spurious emissions 3GHz-25GHz



4.1.5 Radiated Emission

RESULT: **PASS**

Test standard	:	FCC Part 15.247(d), 15.205, 15.209 RSS-GEN 8.9
Requirement	:	ANSI C63.10-2013
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/Middle/High/Hopping
Operation Mode	:	A.1.a
Ambient temperature	:	25°C
Relative humidity	:	53%

Notes

Test plots please refer to the annex document "SHE22110054-02BE DATA BDEDR-TX EXHIBIT A".

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. All test modes had been pre-tested, but only the GFSK-hopping mode of below 1 GHz is the worst case and recorded in the report.
4. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

4.1.6 Band Edge (Restricted-band band-edge)

RESULT: **PASS**

Test standard	:	FCC Part 15.247(d), 15.205, 15.209 RSS-GEN 8.10
Requirement	:	ANSI C63.10-2013
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/High/Hopping
Operation Mode	:	A.1
Ambient temperature	:	25°C
Relative humidity	:	53%

Notes

Test plots please refer to the annex document "SHE22110054-02BE DATA BDEDR-TX EXHIBIT A".

4.1.7 Hopping Frequency Separation

RESULT: **PASS**

Test standard : FCC Part 15.247(a)(1), RSS-247 5.1(b)
Requirement : ANSI C63.10-2013 clause 7.8.2
KDB 558074 clause 2.2
Kind of test site : Shielded room

Test setup

Test Channel : Hopping
Operation Mode : A.1.a.iv
Ambient temperature : 24.9°C
Relative humidity : 57%

Table 4: Hopping Frequency Separation

Mode	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
GFSK	2441	0.995	≥ 25kHz or two-thirds of 20dB bandwidth
π/4-DQPSK	2441	1.085	
8-DPSK	2441	1.015	

*Note: The systems operate with an output power no greater than 125mW.

Figure 27: The plots of Hopping Frequency Separation, Hopping Mode, GFSK

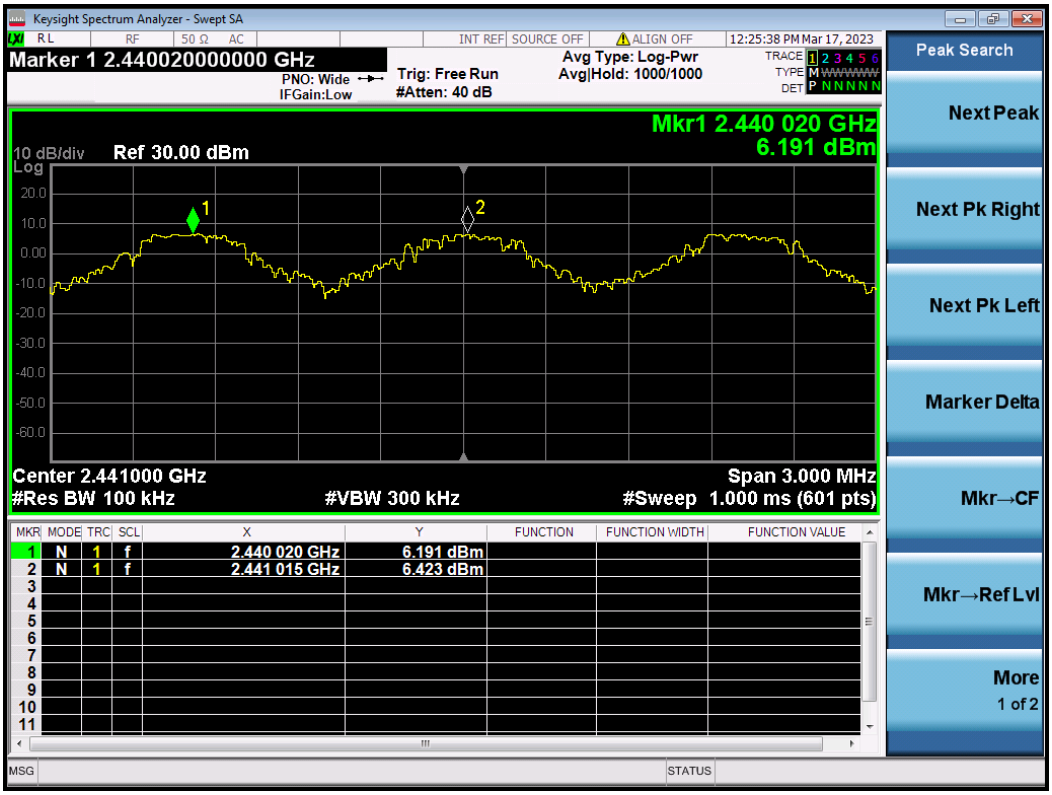


Figure 68: The plots of Hopping Frequency Separation, Hopping Mode, π/4-DQPSK

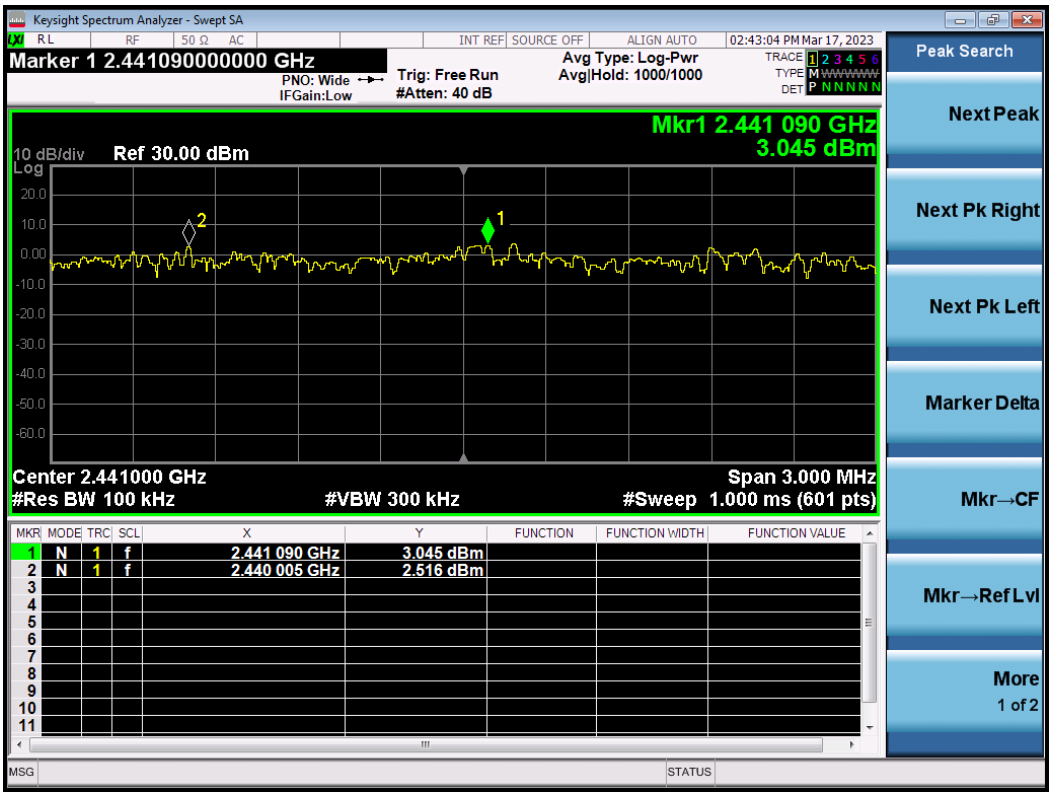
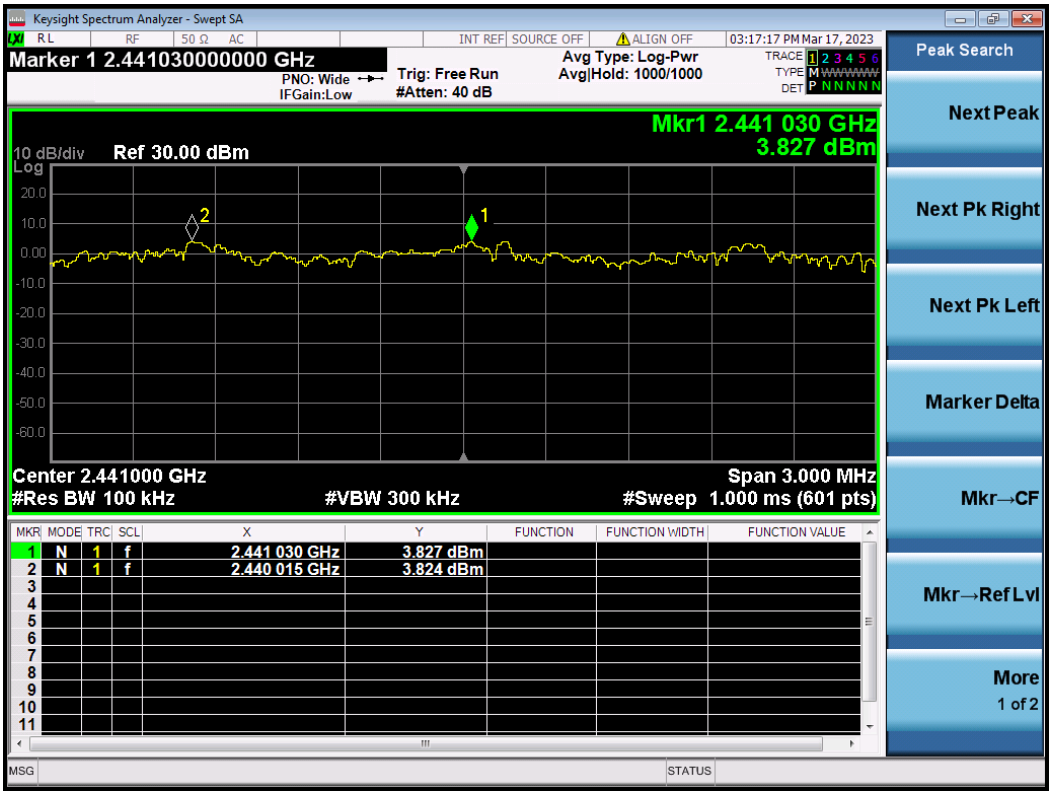


Figure 69: The plots of Hopping Frequency Separation, Hopping Mode, 8-DPSK



4.1.8 Number of Hopping Frequency

RESULT: **PASS**

Test standard	:	FCC Part 15.247(a)(1)(iii), RSS-247 5.1(d)
Requirement	:	ANSI C63.10-2013 clause 7.8.3 KDB 558074 clause 2.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Hopping
Operation Mode	:	A.1.a.iv
Ambient temperature	:	24.9°C
Relative humidity	:	57%

Table 5: Number of Hopping Frequency

Mode	Frequency Range	Measured Quantity of Hopping Channel	Limit
GFSK	2400 – 2483.5	79	≥15
π/4-DQPSK	2400 – 2483.5	79	≥15
8-DPSK	2400 – 2483.5	79	≥15

Figure 70: The plots of Number of Hopping Frequency, Hopping Mode, GFSK

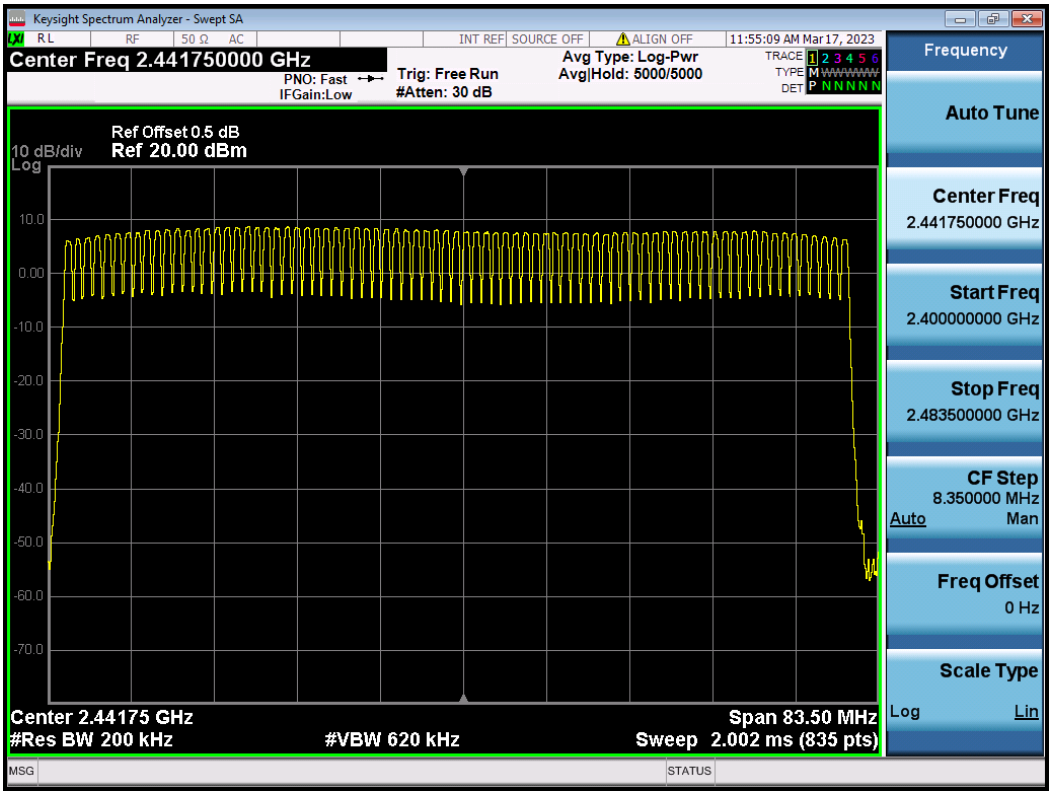


Figure 71: The plots of Number of Hopping Frequency, Hopping Mode, π/4-DQPSK

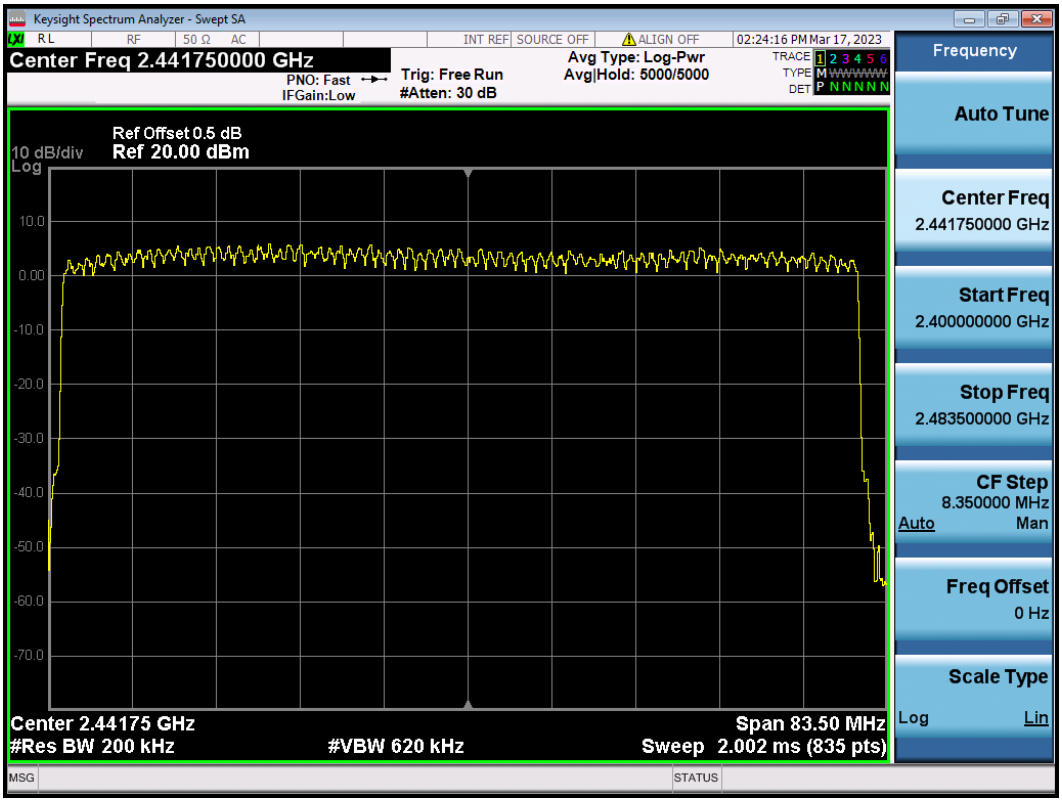
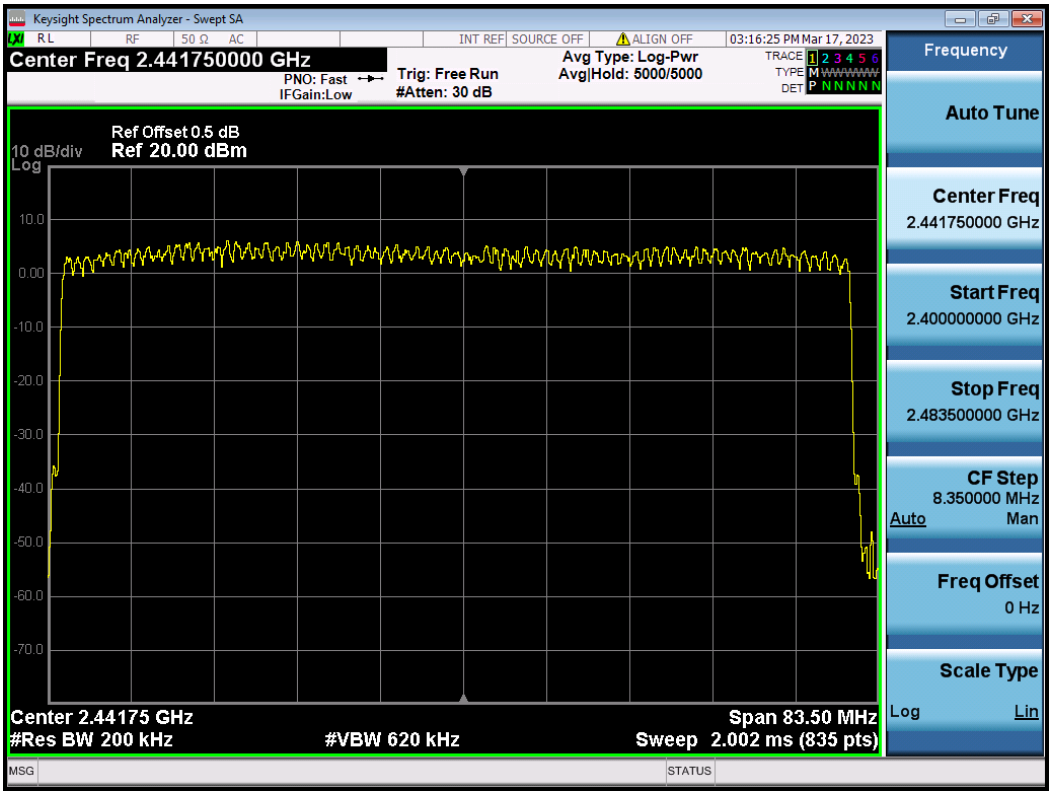


Figure 72: The plots of Number of Hopping Frequency, Hopping Mode, 8-DPSK



4.1.9 Time of Occupancy

RESULT: **PASS**

Test standard : FCC Part 15.247(a)(1)(iii), RSS-247 5.1(d)
Requirement : ANSI C63.10-2013 clause 7.8.4,
KDB 558074 clause 2.2
Kind of test site : Shielded room

Test setup

Test Channel : Middle
Operation Mode : A.1.a
Ambient temperature : 24.9°C
Relative humidity : 57%

Table 6: Time of Occupancy

Mode	Packet Type	Pulse Time (ms)	Total of Dwell (ms)	Limit (s)
GFSK	DH1	0.4033	129.056	0.4
	DH3	1.6650	266.400	0.4
	DH5	2.9330	312.854	0.4
π/4-DQPSK	DH1	0.4083	130.656	0.4
	DH3	1.6700	267.200	0.4
	DH5	2.9270	312.214	0.4
8-DPSK	DH1	0.4067	130.144	0.4
	DH3	1.6700	267.200	0.4
	DH5	2.9200	311.467	0.4

Note:
For DH1 package type:
Total of Dwell = Pulse Time*(1600/2)/Number of Hopping Frequency*Period
Period = 0.4* Number of Hopping Frequency
For DH3 package type:
Total of Dwell = Pulse Time*(1600/4)/Number of Hopping Frequency*Period
Period = 0.4* Number of Hopping Frequency
For DH5 package type:
Total of Dwell = Pulse Time*(1600/6)/Number of Hopping Frequency*Period
Period = 0.4* Number of Hopping Frequency

Figure 73: The plots of Time of Occupancy, 2441MHz, GFSK DH1

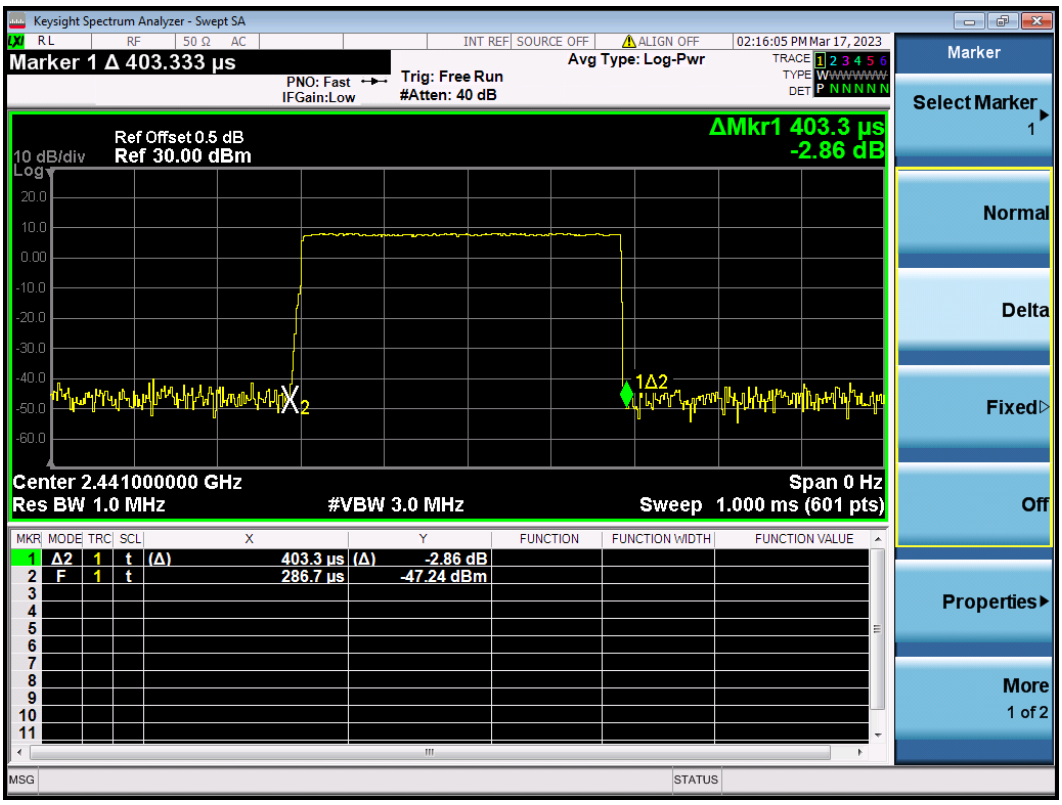


Figure 74: The plots of Time of Occupancy, 2441MHz, GFSK DH3

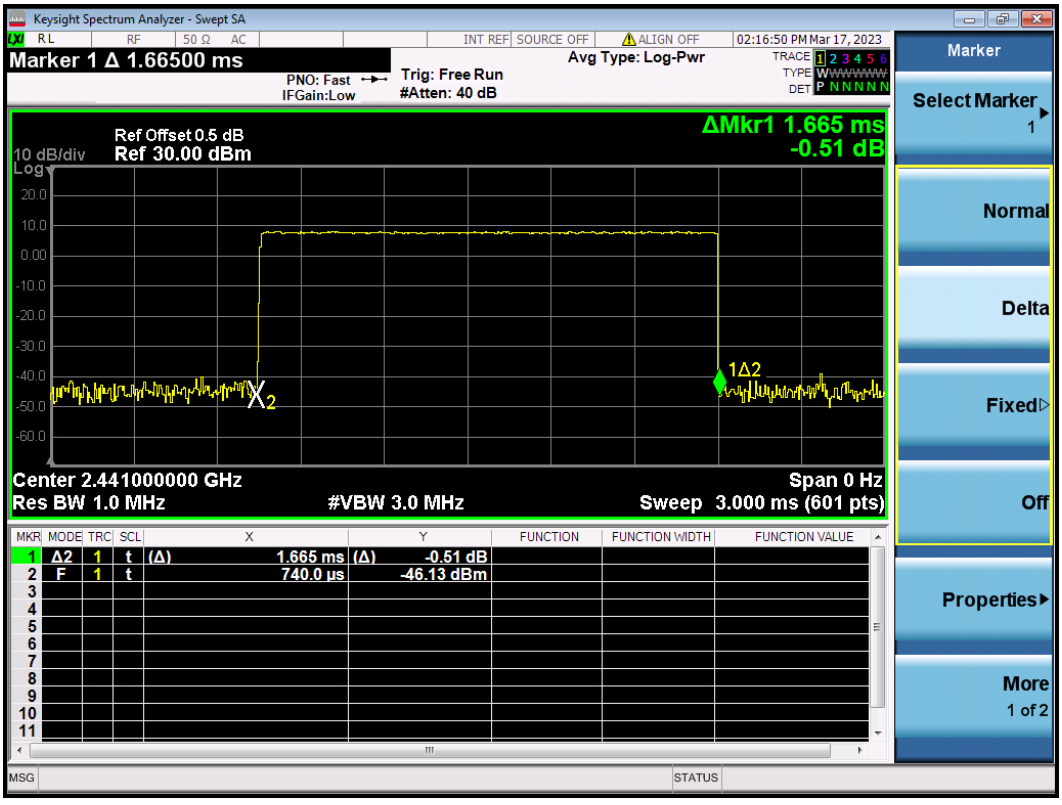


Figure 75: The plots of Time of Occupancy, 2441MHz, GFSK DH5

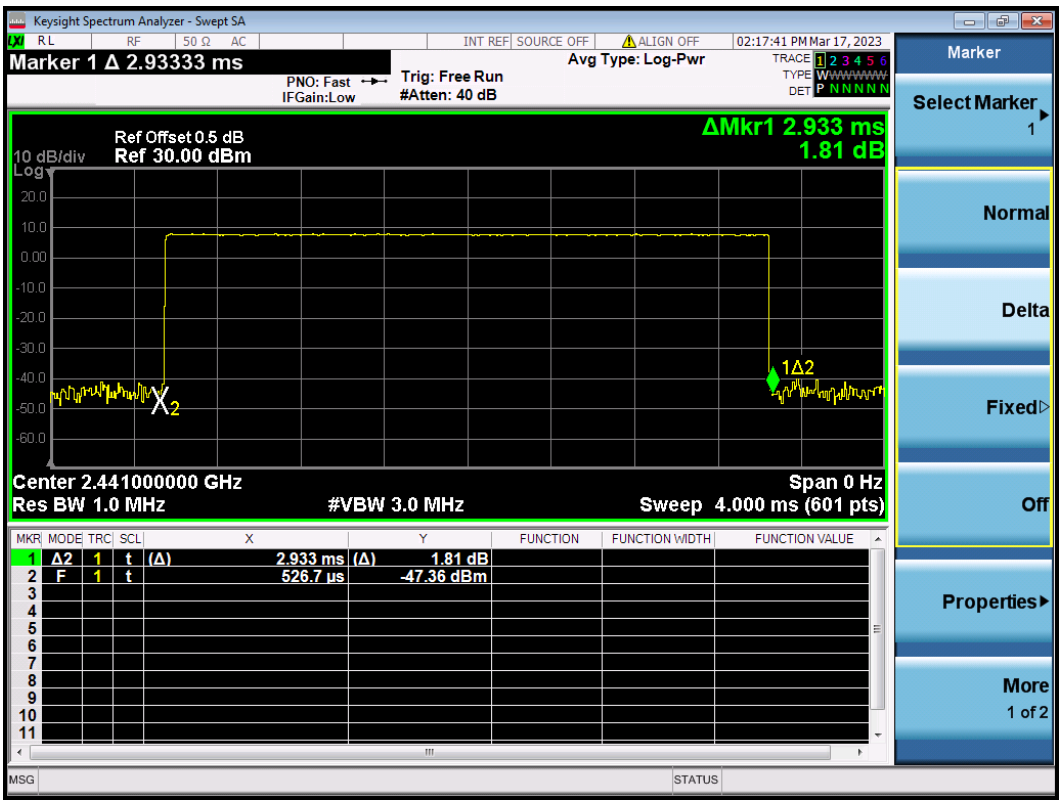


Figure 76: The plots of Time of Occupancy, 2441MHz, π/4-DQPSK DH1

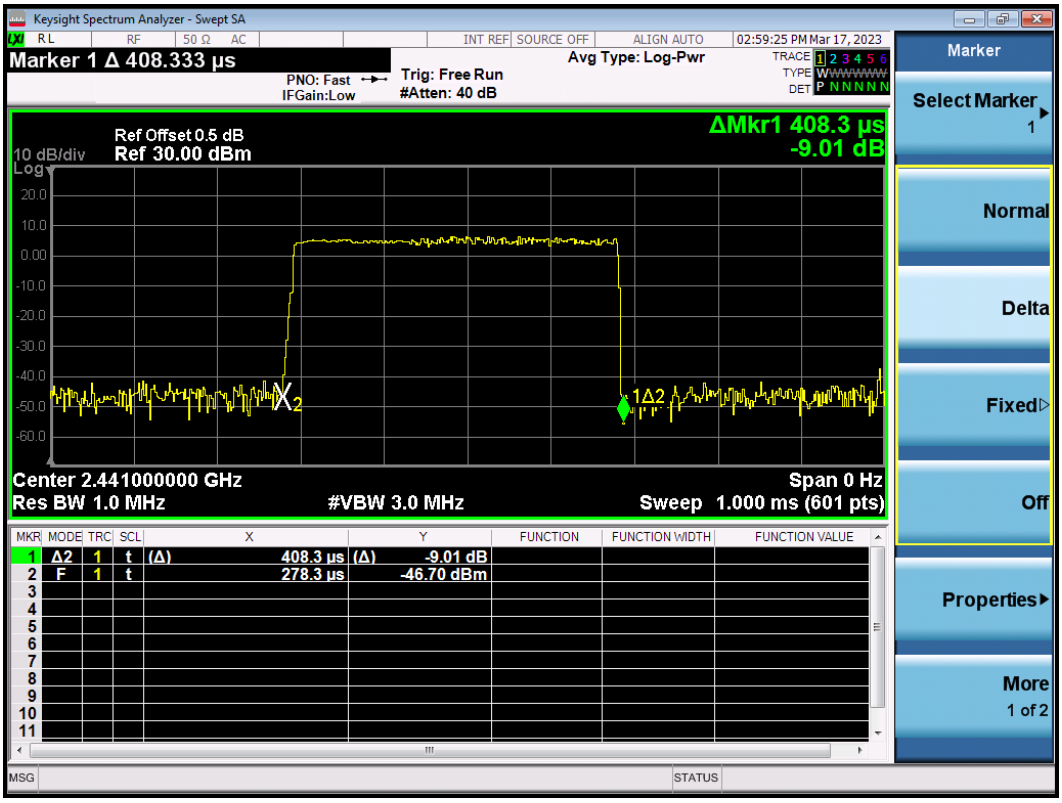


Figure 77: The plots of Time of Occupancy, 2441MHz, π/4-DQPSK DH3

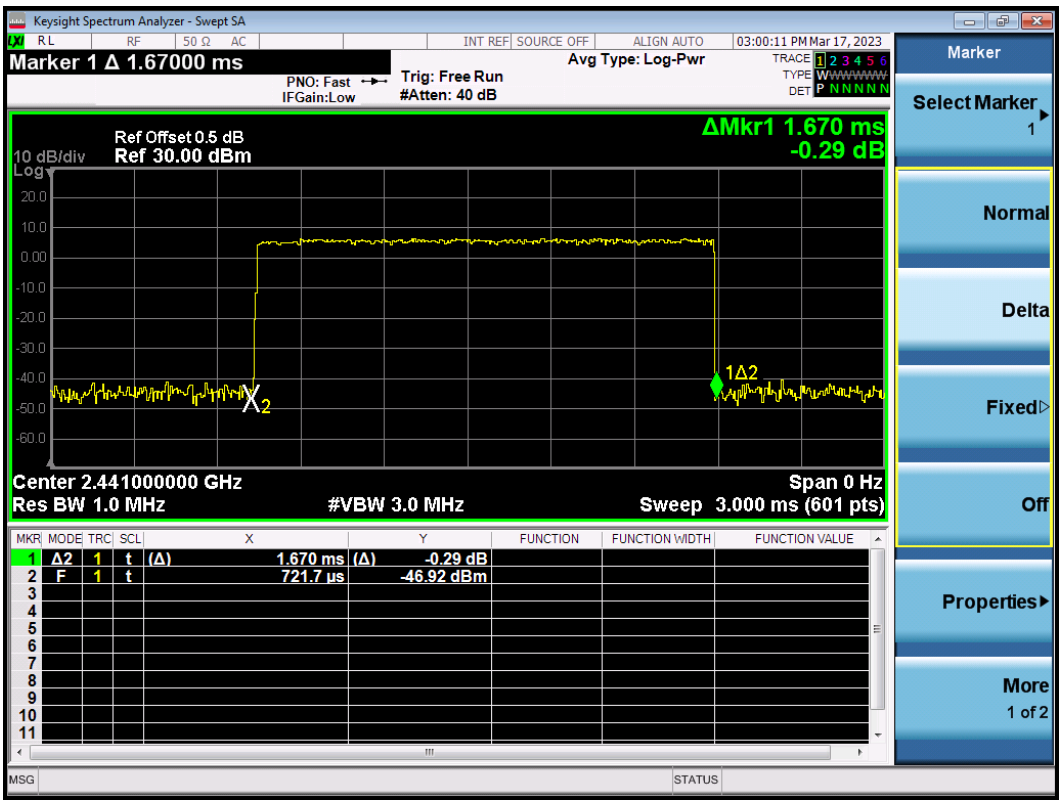


Figure 78: The plots of Time of Occupancy, 2441MHz, π/4-DQPSK DH5

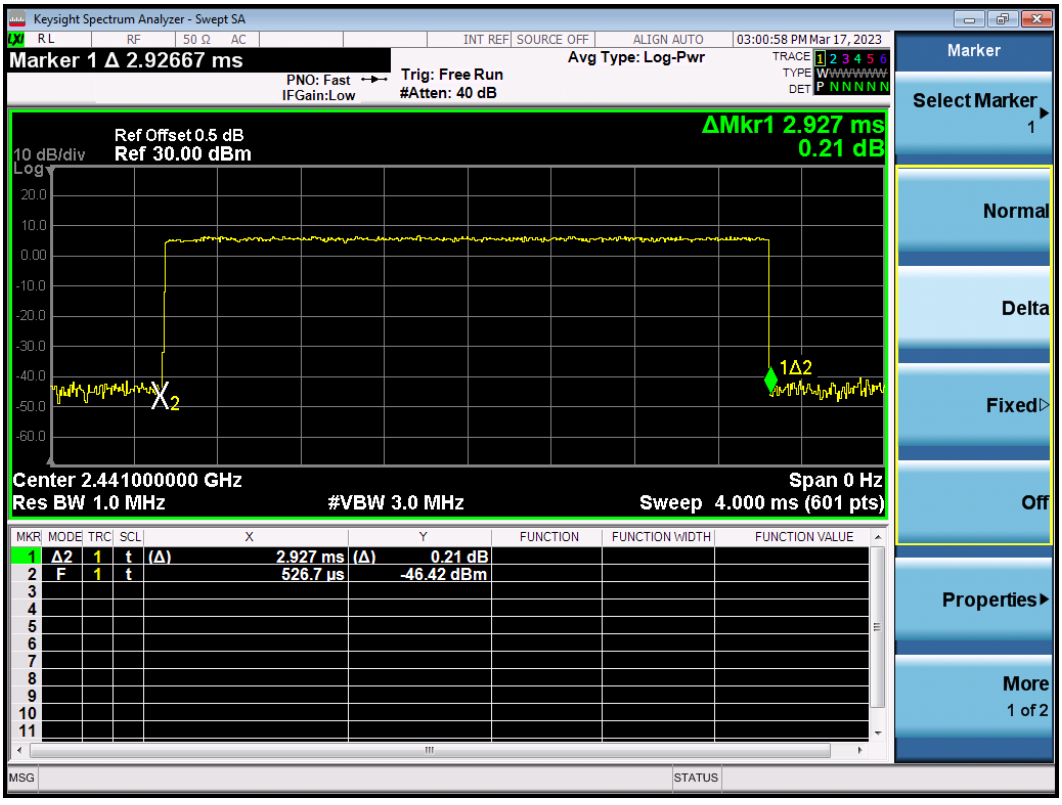


Figure 79: The plots of Time of Occupancy, 2441MHz, 8-DPSK DH1

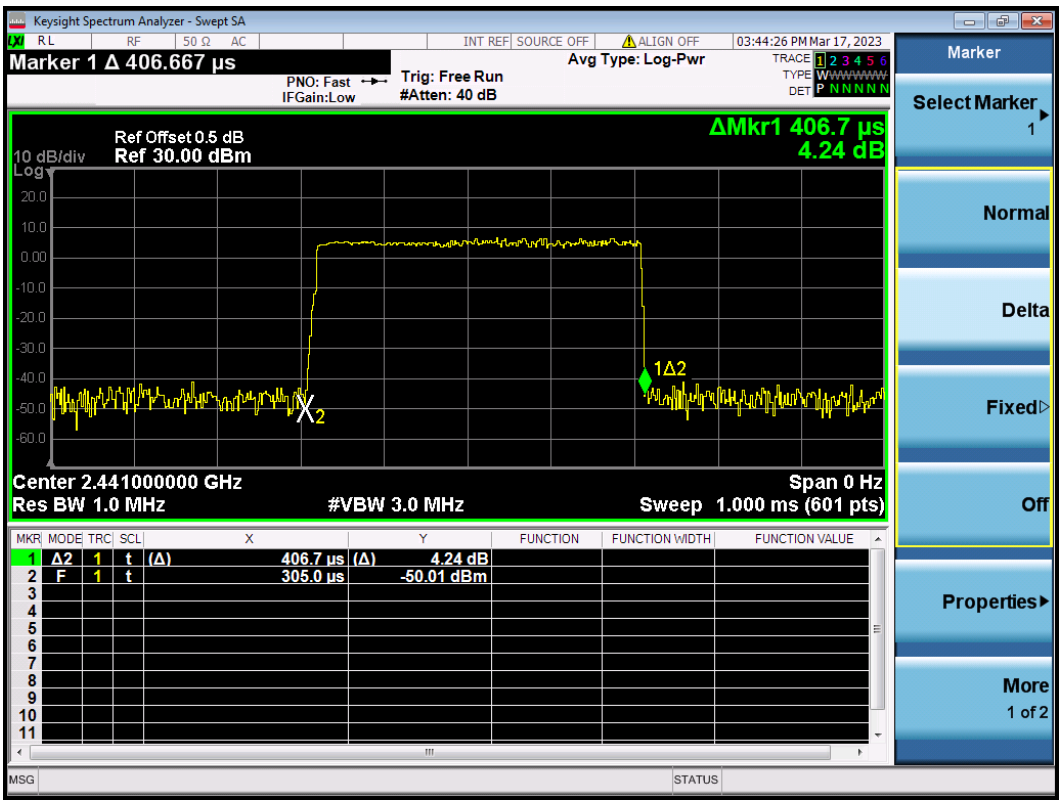


Figure 80: The plots of Time of Occupancy, 2441MHz, 8-DPSK DH3

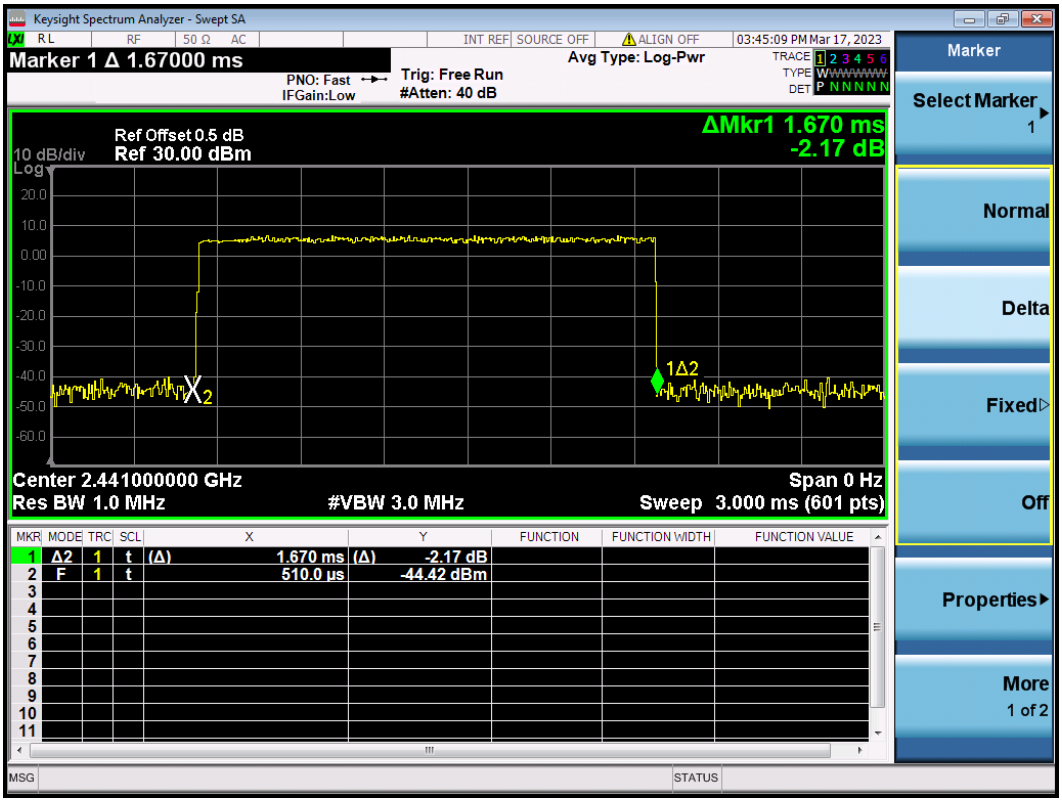
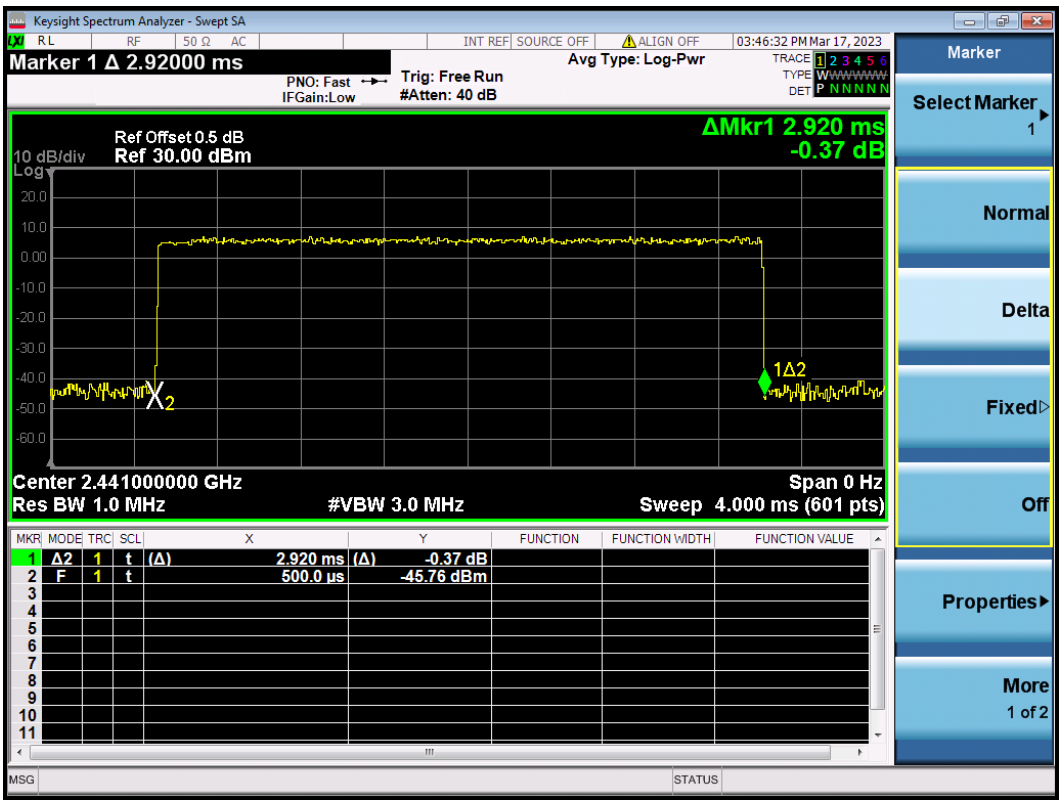


Figure 81: The plots of Time of Occupancy, 2441MHz, 8-DPSK DH5



4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT: **PASS**

Test standard	:	FCC Part 15.207(a), RSS-Gen 8.8
Requirement	:	ANSI C63.10-2013 clause 6.2
Kind of test site	:	Shielded room

Test setup

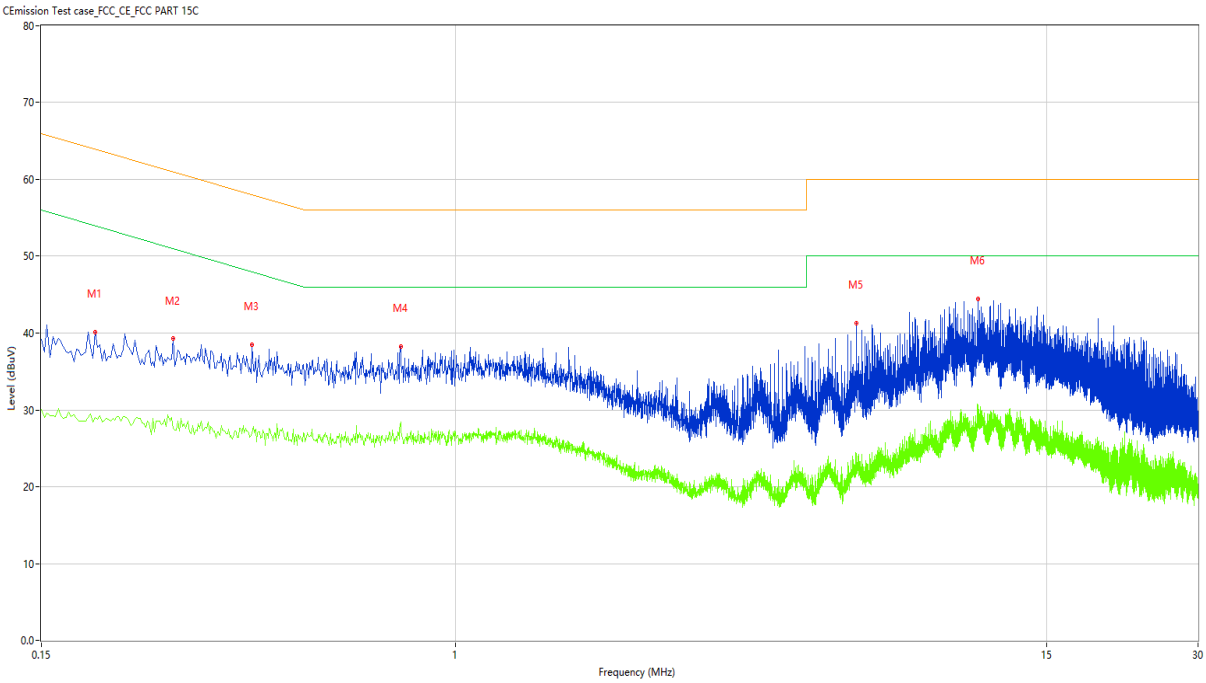
Input Voltage	:	which received AC 120V, 60Hz Power
Operation Mode	:	A.1.a
Earthing	:	Not Connected
Ambient temperature	:	23.5°C
Relative humidity	:	41%

For details refer to following test plot.

Note:

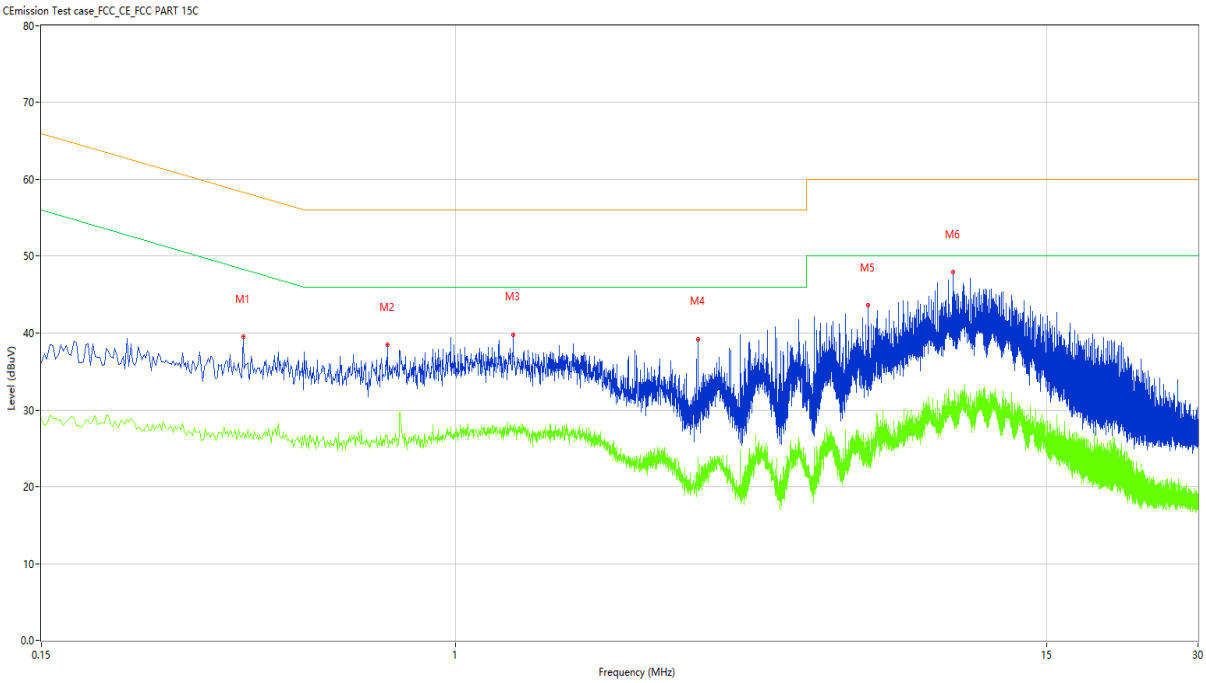
The all configurations were tested respectively, but only the worst configuration (GFSK, hopping) shown here.

Figure 82: Conducted Emission on AC Mains, L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.192	40.15	10.18	63.95	23.80	Peak	L	Pass
1**	0.192	29.01	10.18	53.95	24.94	AV	L	Pass
2	0.274	39.25	10.23	61.00	21.75	Peak	L	Pass
2**	0.274	27.62	10.23	51.00	23.38	AV	L	Pass
3	0.394	38.49	10.23	57.98	19.49	Peak	L	Pass
3**	0.394	26.99	10.23	47.98	20.99	AV	L	Pass
4	0.778	38.24	10.19	56.00	17.76	Peak	L	Pass
4**	0.778	28.39	10.19	46.00	17.61	AV	L	Pass
5	6.266	41.31	10.40	60.00	18.69	Peak	L	Pass
5**	6.266	24.38	10.40	50.00	25.62	AV	L	Pass
6	10.950	44.47	10.54	60.00	15.53	Peak	L	Pass
6**	10.950	28.68	10.54	50.00	21.32	AV	L	Pass

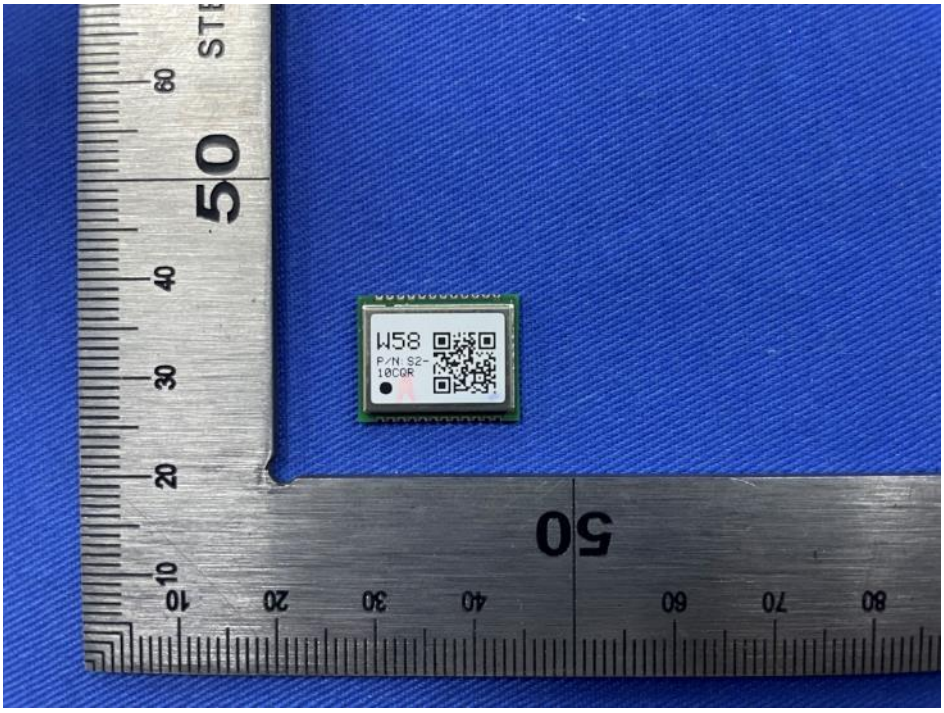
Figure 83: Conducted Emission on AC Mains, N Phase



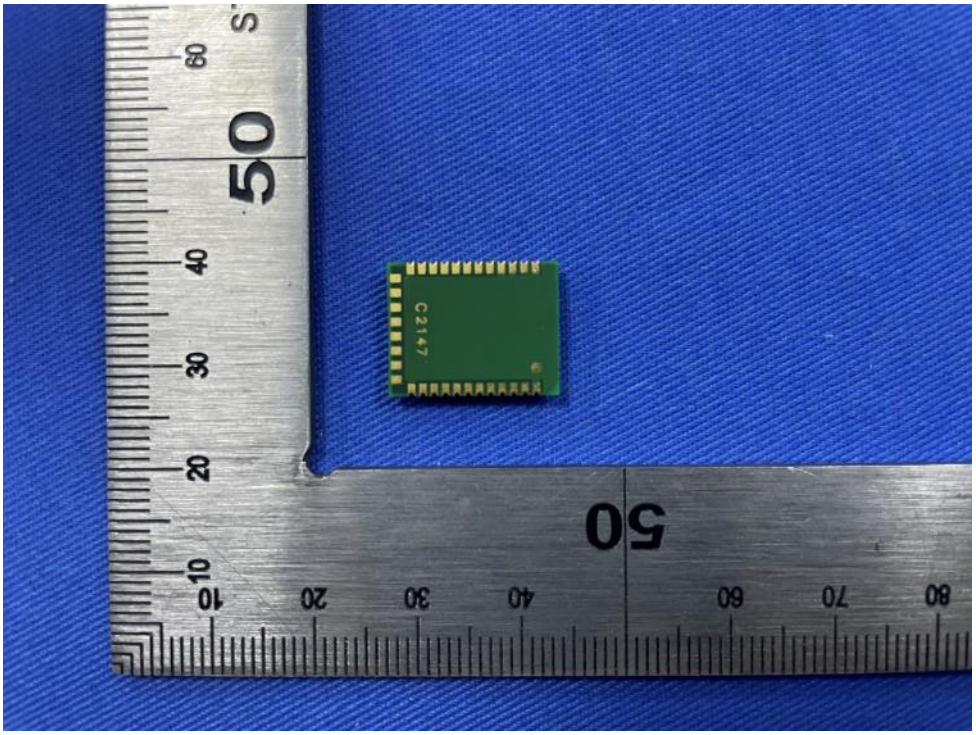
No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Margin (dB)	Detector	Line	Verdict
1	0.378	39.47	10.26	58.32	18.85	Peak	N	Pass
1**	0.378	27.02	10.26	48.32	21.30	AV	N	Pass
2	0.732	38.43	10.34	56.00	17.57	Peak	N	Pass
2**	0.732	26.70	10.34	46.00	19.30	AV	N	Pass
3	1.302	39.80	10.21	56.00	16.20	Peak	N	Pass
3**	1.302	28.00	10.21	46.00	18.00	AV	N	Pass
4	3.036	39.21	10.18	56.00	16.79	Peak	N	Pass
4**	3.036	23.72	10.18	46.00	22.28	AV	N	Pass
5	6.620	43.57	10.34	60.00	16.43	Peak	N	Pass
5**	6.620	26.81	10.34	50.00	23.19	AV	N	Pass
6	9.754	47.91	10.39	60.00	12.09	Peak	N	Pass
6**	9.754	31.07	10.39	50.00	18.93	AV	N	Pass

5 Appendixes

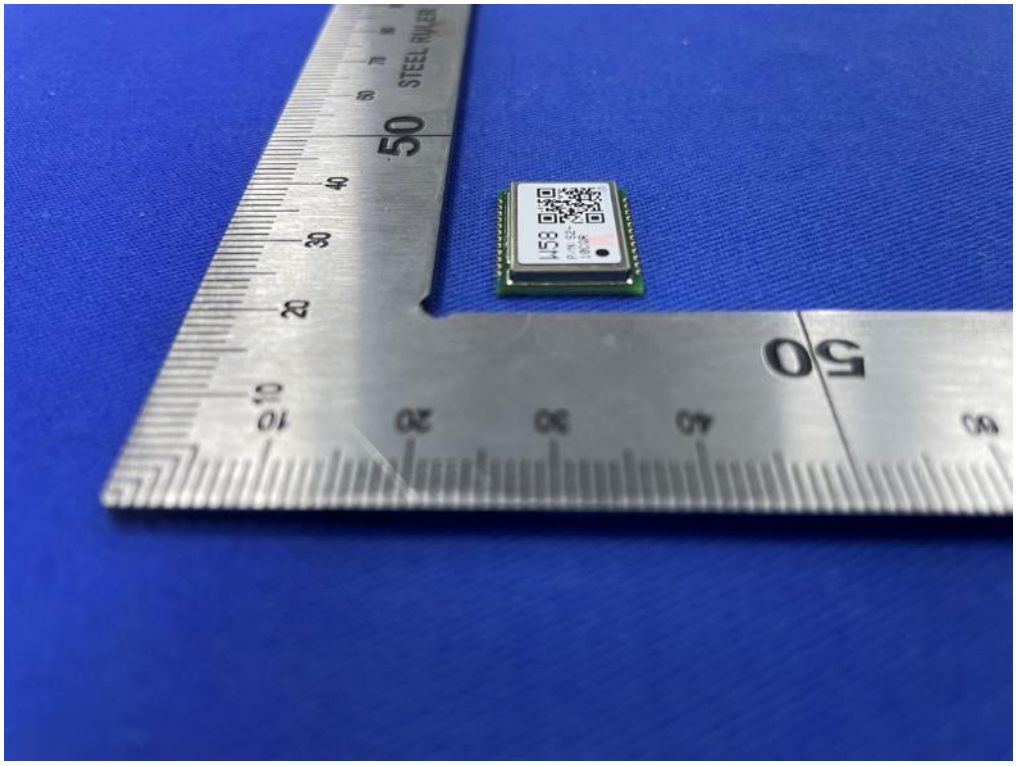
5.1 Photographs of the Sample



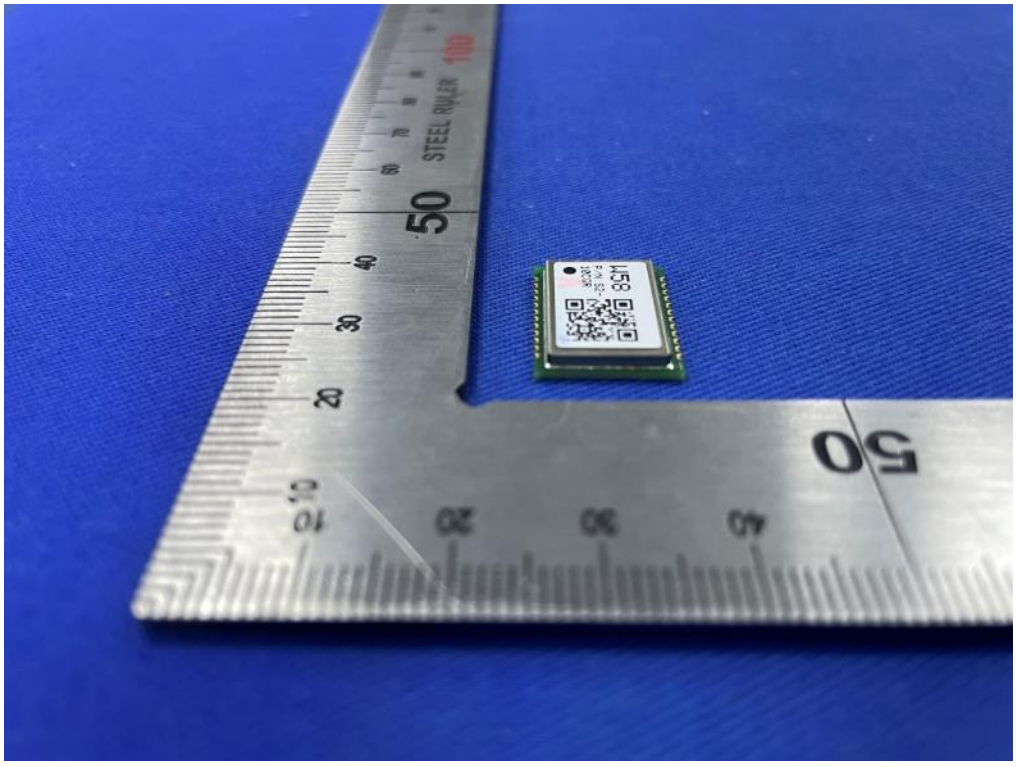
Front of the sample



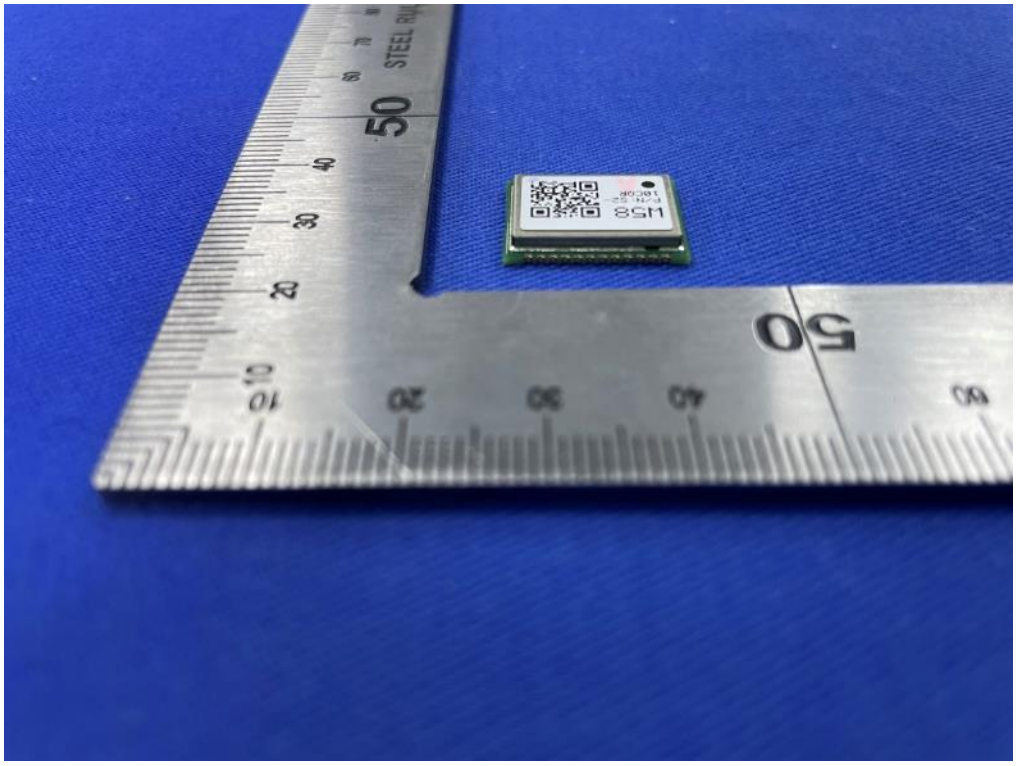
Rear of the sample



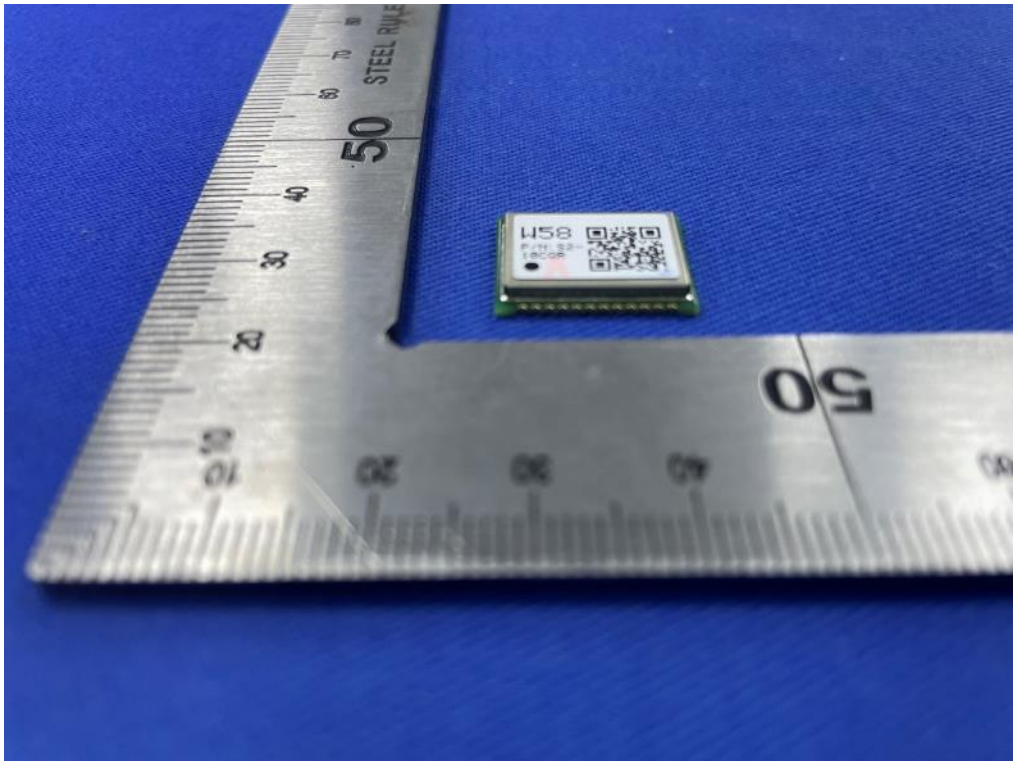
Left of the sample



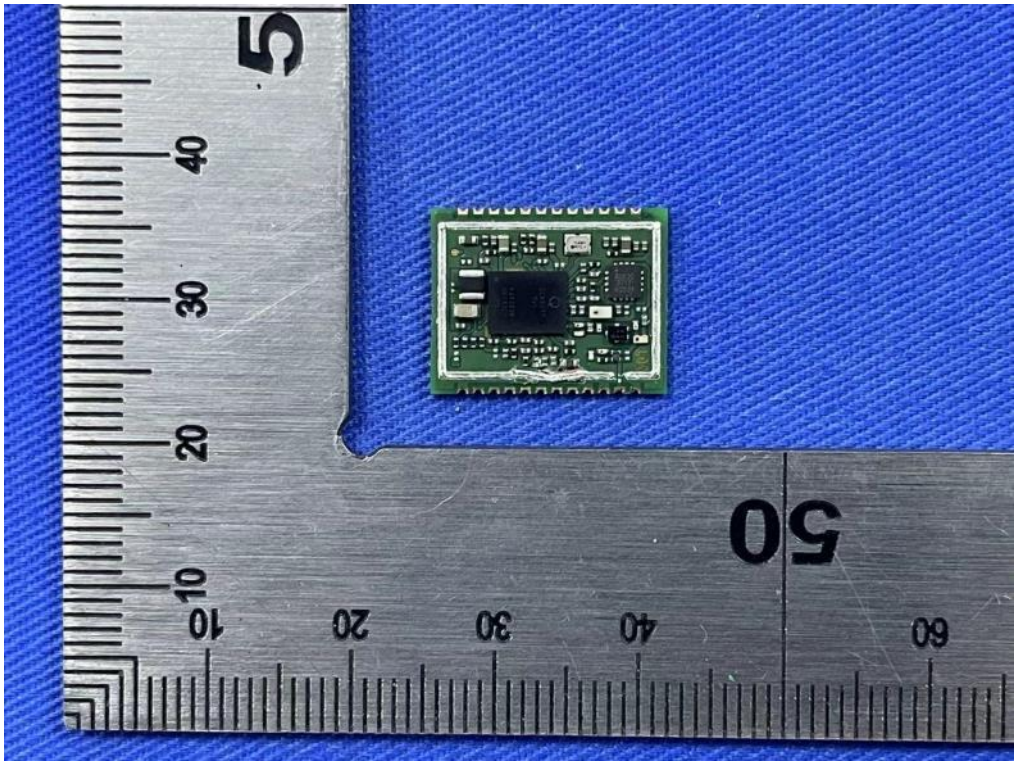
Right of the sample



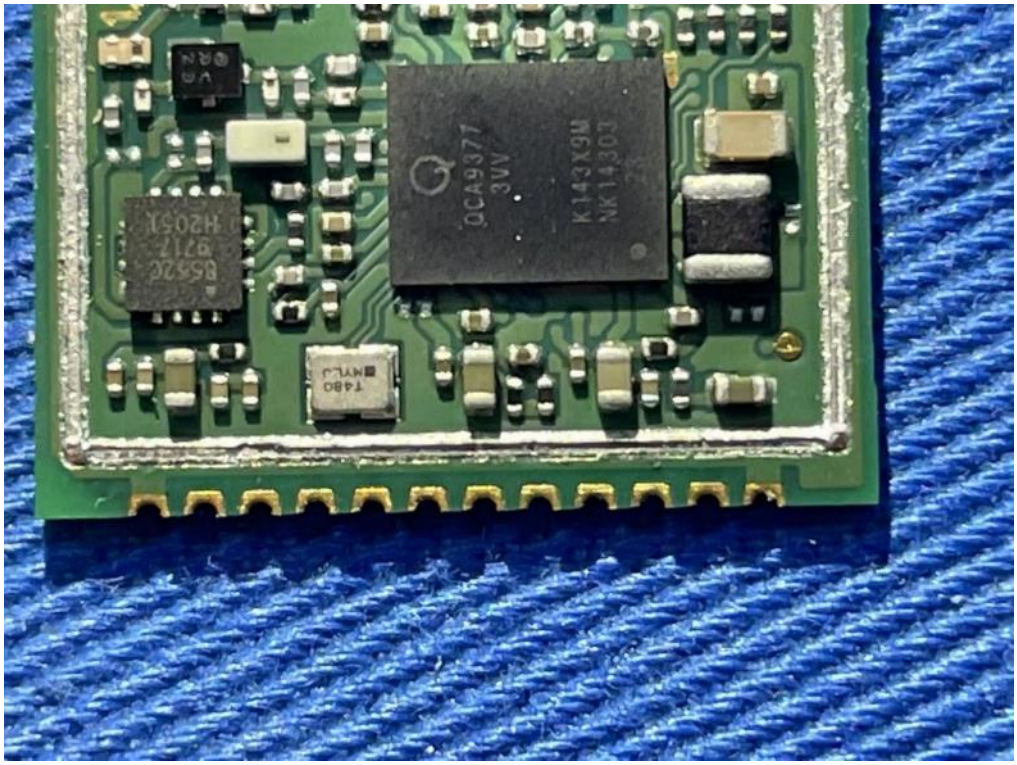
Top of the sample



Bottom of the sample



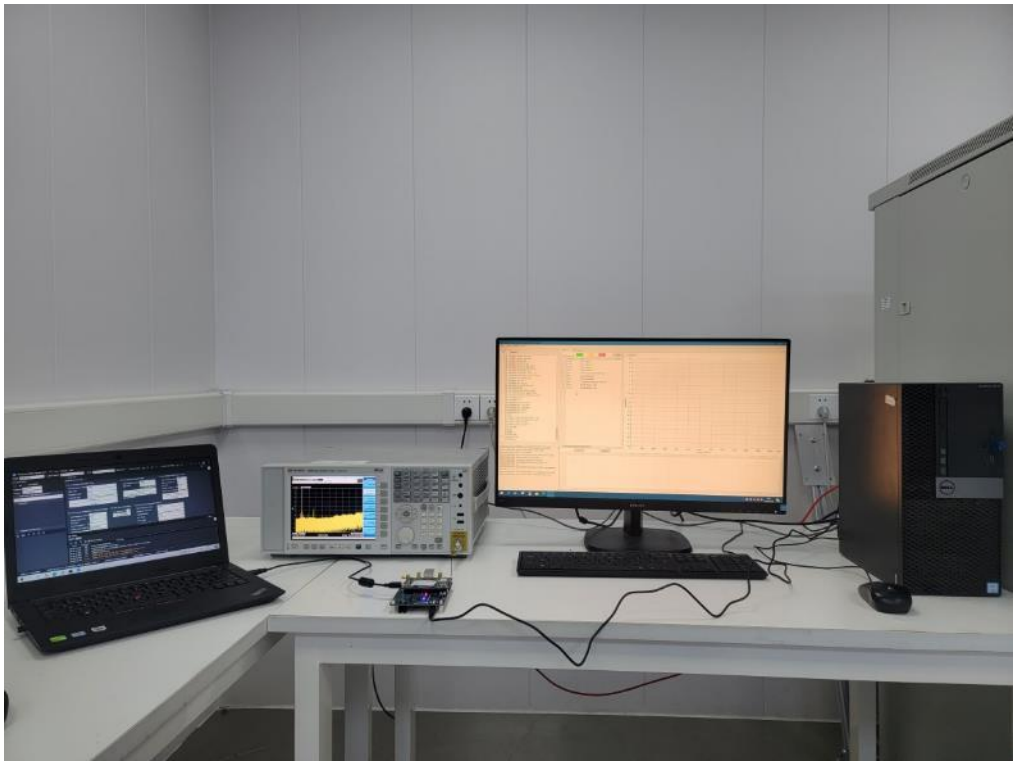
Internal-1 of the sample



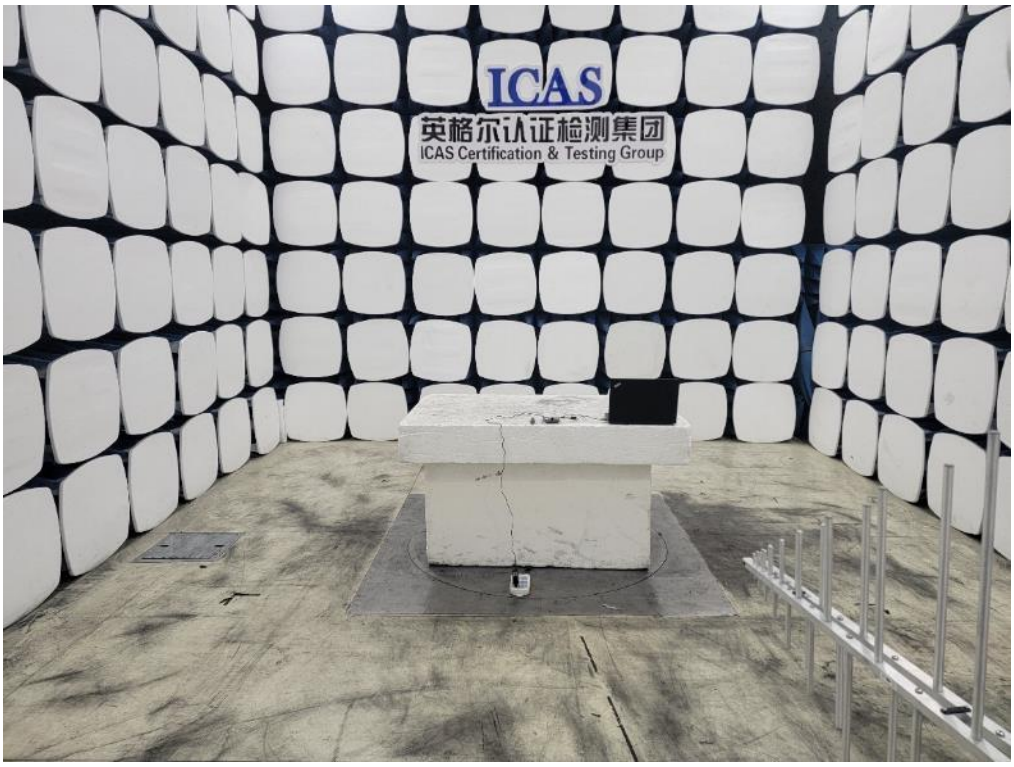
Internal-2 of the sample

5.2 Set-up for Conducted Emissions

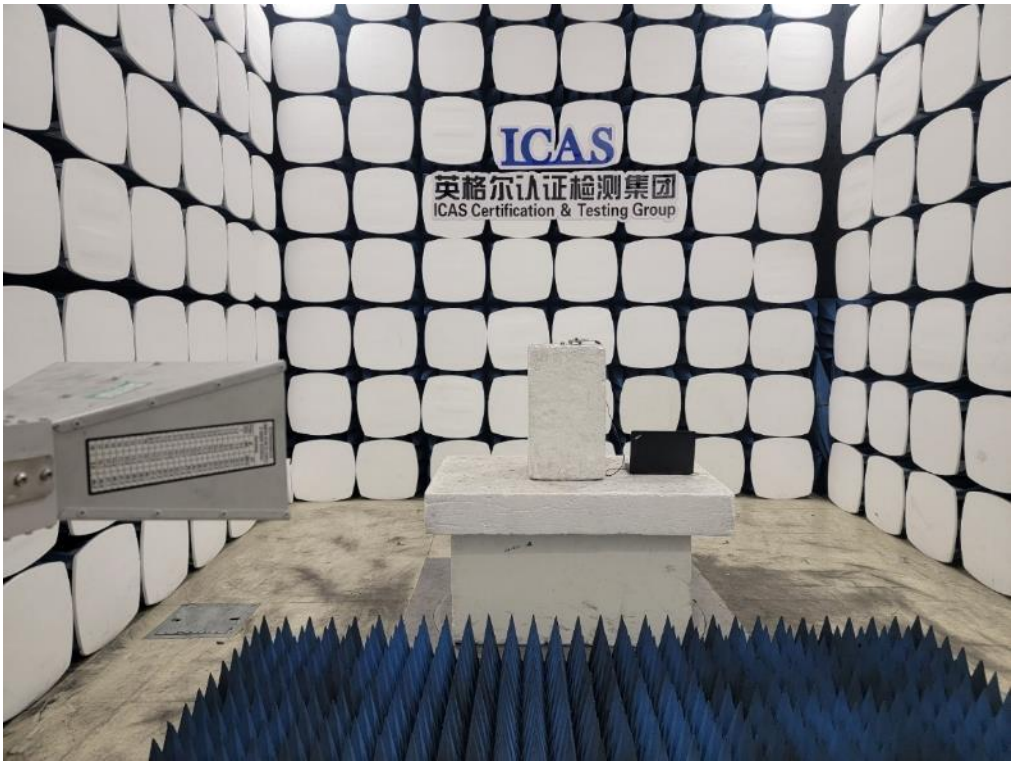
5.3 Set-up for Conducted RF test at Antenna Port



5.4 Set-up for Spurious Emissions below 1GHz



5.5 Set-up for Spurious Emissions above 1GHz



End of the report