TEST REPORT

FCC ID: 2A3ZO-240455A

Product	:	**Wireless FM Transmitter Car Charger**
Model Name	:	**EAA2-240455A, GRFCC2000-BLK-T22-12, GRFCC2000-BLK, GRFCC2000**
Brand	:	**N/A**
Report No.	:	**NCT240514203E1-1**

Prepared for

Hong Kong Etech Groups Ltd.

16/F, Block C, 2nd Phase of Central Avenue, Haihong Industrial Area, Xixiang, Baoan, Shenzhen, China

Prepared by

Shenzhen NCT Testing Technology Co., Ltd.

A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People's Republic of China

TEL: 400-8868-419

FAX: 86-755-27790922

1 TEST RESULT CERTIFICATION

Applicant's name	:	Hong Kong Etech Groups Ltd.
Address	:	16/F, Block C, 2nd Phase of Central Avenue, Haihong Industrial Area, Xixiang, Baoan, Shenzhen, China
Manufacture's name	:	DONGGUAN QIAOSIKE DIGITAL TECHNOLOGY CO.,LTD
Address	:	GuangdongDongguan Lock F, Longxing Industrial Park, Hongjin Road, Lizhoujiao, Hongmei Town China
Product name	:	Wireless FM Transmitter Car Charger
Model name	:	EAA2-240455A, GRFCC2000-BLK-T22-12, GRFCC2000-BLK, GRFCC2000
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2020
Test Date	:	Dec. 12, 2024-Dec. 18, 2024
Date of Issue	:	Dec. 26, 2024
Test Result	:	Pass

This device described above has been tested by NCT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of NCT, this document may be altered or revised by NCT, personal only, and shall be noted in the revision of the document.

Test Engineer:

Keven Wu / Engineer

Technical Manager:

Henry Wang / Manager

Contents

Page

2 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
Band edge	15.247(d) 15.205(a)	PASS
Conduct Emission	15.207	N/A
20dB Bandwidth 99% Occupied Bandwidth	15.247(a)(1)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Frequency Separation	15.247(a)(1)	PASS
Number of Hopping Frequency	15.247(a)(1)(iii)	PASS
Dwell time	15.247(a)(1)(iii)	PASS
Antenna Requirement	15.203	PASS

Remark:

1. "N/A" denotes test is not applicable in this Test Report.

3 TEST FACILITY

Site Description

EMC Lab. : Accredited by CNAS, 2022-09-27

The certificate is valid until 2028.01.07

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)

The Certificate Registration Number is L8251

Designation Number: CN1347

Test Firm Registration Number: 894804

Accredited by A2LA, June 14, 2023

The Certificate Registration Number is 6837.01

Accredited by Industry Canada, November 09, 2018

The Conformity Assessment Body Identifier is CN0150

Company Number: 30806

Name of Firm : Shenzhen NCT Testing Technology Co., Ltd.

Site Location : A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan District, Shenzhen, People's Republic of China

4 General Information

4.1 General Description of E.U.T.

Product Name	:	Wireless FM Transmitter Car Charger
Model Name	:	EAA2-240455A
Sample ID	:	240514203#
Sample(s) Status	:	Engineer sample
series model	:	GRFCC2000-BLK-T22-12, GRFCC2000-BLK, GRFCC2000
Difference	:	All the models are the same circuit and module, except the model name.
Operating frequency	:	2402-2480MHz
Numbers of Channel	:	79 channels
Antenna Type	:	PCB Antenna
Antenna Gain	:	-0.68dBi
Type of Modulation	:	GFSK, Π/4-DQPSK,8DPSK
Power supply	:	Input: DC 12~24V Output: USB-A: 5Vdc, 3.1A; Type-C: 5Vdc, 3.1A
Hardware Version	:	V1.2
Software Version	:	V1.0
Remark：the Antenna gain is provided by customer from Antenna spec. and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.		

4.2 Channel List

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

The EUT has been associated with peripherals pursuant to ANSI C63.10-2020 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonics of the highest fundamental frequency or to 40 GHz, whichever is lower).

The EUT has been tested under TX operating condition.

This EUT is a FHSS system, were conducted to determine the final configuration from all possible combinations. We use software control the EUT, Let EUT hopping on and transmit with highest power, all the modes GFSK, Π/4-DQPSK, 8DPSK have been tested. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for test.

Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477

16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	-	-

Channel	Frequency(MHz)
0	2402
39	2441
78	2480

4.3 Test Setup Configuration

Conducted Emission

Radiated Emission(30MHz-1GHz)

Radiated Emission(above 1GHz)

Conducted Spurious

Test Mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

Test Software	BT_Tool
Power level setup	7

5 Equipment During Test

5.1 Equipments List

Conducted emission Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
944 Shielded Room	944 Room	/	EMToni	2022/5/31	2025/5/30
EMI Test Receiver	ESPI	101604	Rohde & Schwarz	2024/6/17	2025/6/16
LISN	ENV 216	102796	Rohde & Schwarz	2024/6/17	2025/6/16
LISN	VN1-13S	004023	CRANAGE	2024/6/17	2025/6/16
Cable	RG223-1500MM	NA	RG	2024/6/17	2025/6/16

Radiated emission & Radio Frequency Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
966 Shielded Room	966 Room	/	EMToni	2022/5/31	2025/5/30
EMI Test Receiver	ESCI	101178	Rohde & Schwarz	2024/6/17	2025/6/16
Amplifi（30MHz-1GHz）	BBV 9743 B	00374	SCHNWARZBECK	2024/6/17	2025/6/16
Bilog Antenna（30MHz-1GHz）	VULB9162	00473	SCHNWARZBECK	2023/3/19	2025/3/18
Horn antenna（1GHz-18GHz）	BBHA 9120 D	02622	SCHNWARZBECK	2023/3/19	2025/3/18
Pream plifier（1GHz-18GHz）	BBV 9718D	0024	SCHNWARZBECK	2024/6/17	2025/6/16
Spectrum Analyze（10Hz-40GHz）	FSV 40	100952	Rohde & Schwarz	2024/6/17	2025/6/16
Pream plifier（18GHz-40GHz）	BBV 9721	0056	SCHNWARZBECK	2024/6/17	2025/6/16
Double Ridge Guide Horn Antenna（18GHz-40GHz）	SAS-574	588	A.H.System	2023/3/19	2025/3/18
Loop Antenna (9KHz-30MHz)	FMZB 1513-60	00115	SCHNWARZBECK	2024/6/17	2025/6/16
Amplifier (9KHz-30MHz)	BBV 9745	00109	CHNWARZBECK	2024/6/17	2025/6/16

MXG Signal Analyzer	N9020A	MY50510202	Agilent	2024/6/17	2025/6/16
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2024/6/17	2025/6/16
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2024/6/17	2025/6/16
Power Sensor	TR1029-2	512364	Techoy	2024/6/17	2025/6/16
RF Swith	TR1029-1	512364	Techoy	2024/6/17	2025/6/16
Cable	DA800-4000MM	NA	DA	2024/6/17	2025/6/16
Cable	DA800-11000MM	NA	DA	2024/6/17	2025/6/16

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ-EMC	Ver.EMC-CON 3A1.1+
2	EMC radiation test system	FALA	EZ-EMC	Ver.FA-03A2 RE+
3	RF test system	TACHOY	RFTest	V1.0.0
4	RF communication test system	TACHOY	RFTest	V1.0.0

5.2 Measurement Uncertainty

Parameter	**Uncertainty**
RF output power, conducted	±1.0dB
Power Spectral Density, conducted	±2.2dB
Radio Frequency	± 1 x 10^{-6}
Bandwidth	± 1.5 x 10^{-6}
Time	±2%
Duty Cycle	±2%
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emissions (150kHz~30MHz)	±3.64dB
Radiated Emission(9KHz~30MHz)	±4.51dB
Radiated Emission(30MHz~1GHz)	±5.03dB
Radiated Emission(1GHz~25GHz)	±4.74dB

5.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Accumulator	CAMEL	55D23LX	N/A	Auxiliary

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

6 Conducted Emission

Test Requirement:	:	FCC CFR 47 Part 15 Section 15.207, RSS-Gen §8.8
Test Method:	:	ANSI C63.10:2020
Test Result:	:	PASS
Frequency Range:	:	150kHz to 30MHz
Class/Severity:	:	Class B
Detector:	:	Peak for pre-scan (9kHz Resolution Bandwidth)

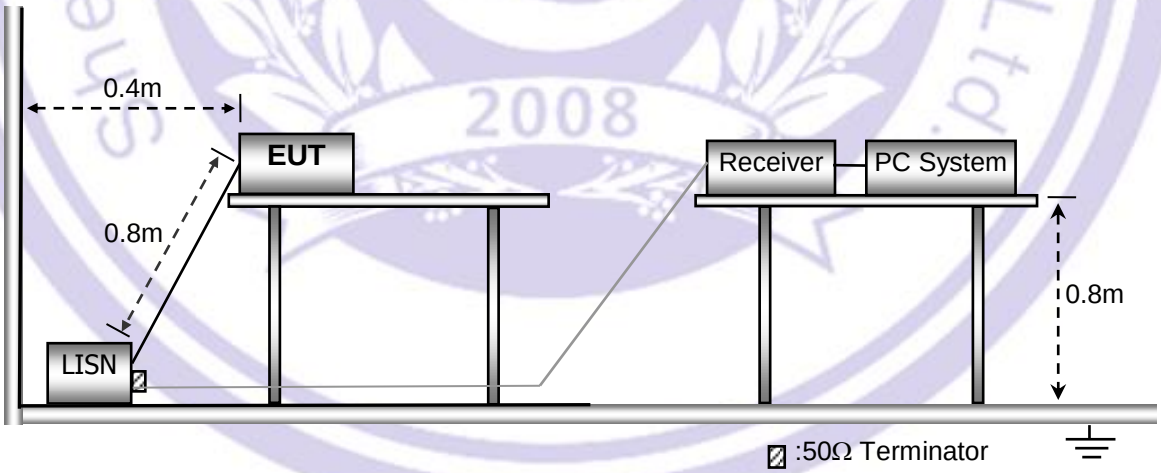
6.1 E.U.T. Operation

Operating Environment **:**

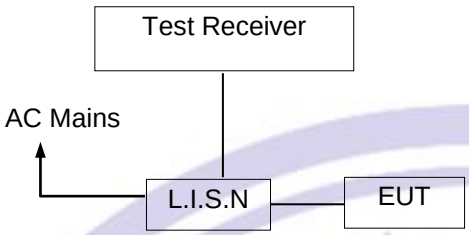
Temperature:	:	23.2°C
Humidity:	:	51 % RH
Atmospheric Pressure:	:	101.12 kPa
Test Voltage	:	DC 12V

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10: 2020



6.3 Test SET-UP (Block Diagram of Configuration)



6.4 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured was complete.

6.5 Conducted Emission Limit

Conducted Emission

Frequency(MHz)	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note:

1. The lower limit shall apply at the transition frequencies
2.The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

6.6 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.7 Conducted Emission Test Result

Note: Since the EUT is a DC input, therefore AC power line conducted emissions test is not required.

7 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247, RSS-Gen §6.13

Test Method : ANSI C63.10:2020

Test Result : PASS

Measurement Distance : 3m

Limit : See the follow table

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment :

Temperature : 24.5 °C

Humidity : 55.5% RH

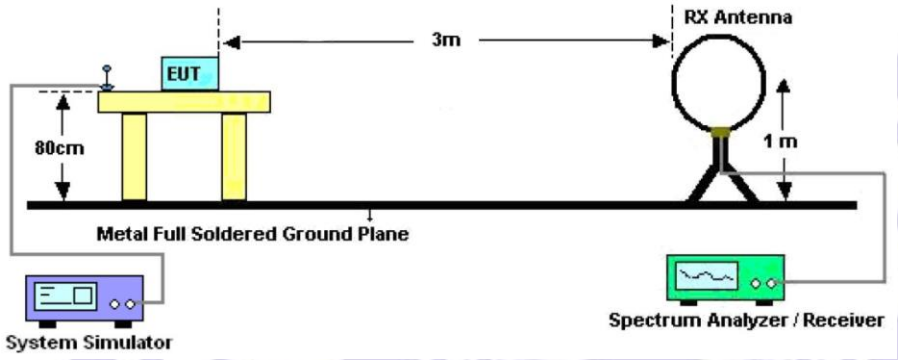
Atmospheric Pressure : 101.3kPa

Test Voltage : DC 12V

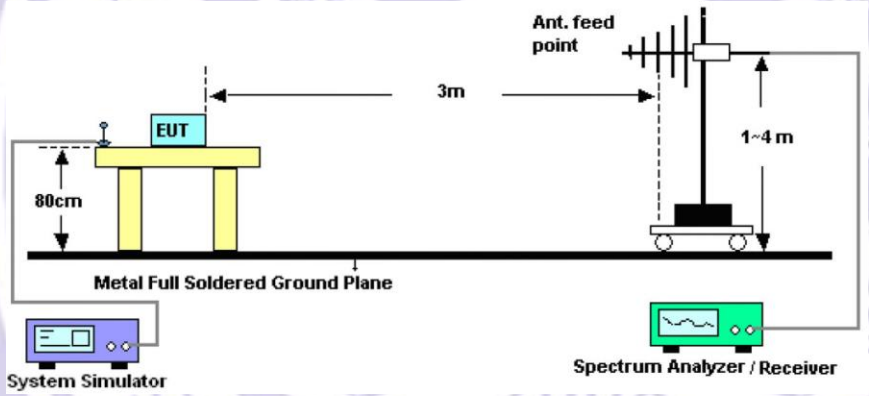
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site

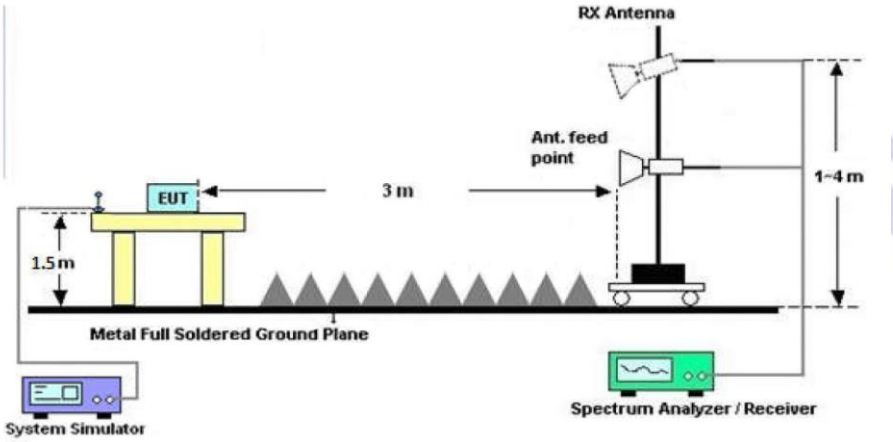
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

7.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2020.

2. Below 1000MHz, The EUT was placed on a turn table which is 0.8m above ground plane. And above 1000MHz, The EUT was placed on a styrofoam table which is 1.5m above ground plane.

3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (From 1m to 4m) and turntable (from 0 degree to 360 degree) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.

5. Set to the maximum power setting and enable the EUT transmit continuously.

6. Final measurement (Above 1GHz): The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1MHz. The measurement will be performed in horizontal and vertical polarization of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 degree to 360 degree in order to have the antenna inside the cone of radiation.

7. Test Procedure of measurement (For Above 1GHz):

1) Monitor the frequency range at horizontal polarization and move the antenna over all sides of the EUT(if necessary move the EUT to another orthogonal axis).

2) Change the antenna polarization and repeat 1) with vertical polarization.

3) Make a hardcopy of the spectrum.

4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

5) Change the analyser mode to Clear/ Write and found the cone of emission.

6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3m and the antenna will be still inside the cone of emission.

7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarization and azimuth and the peak and average detector, which causes the maximum emission.

8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.5 Summary of Test Results

Test Frequency: 9KHz-30MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

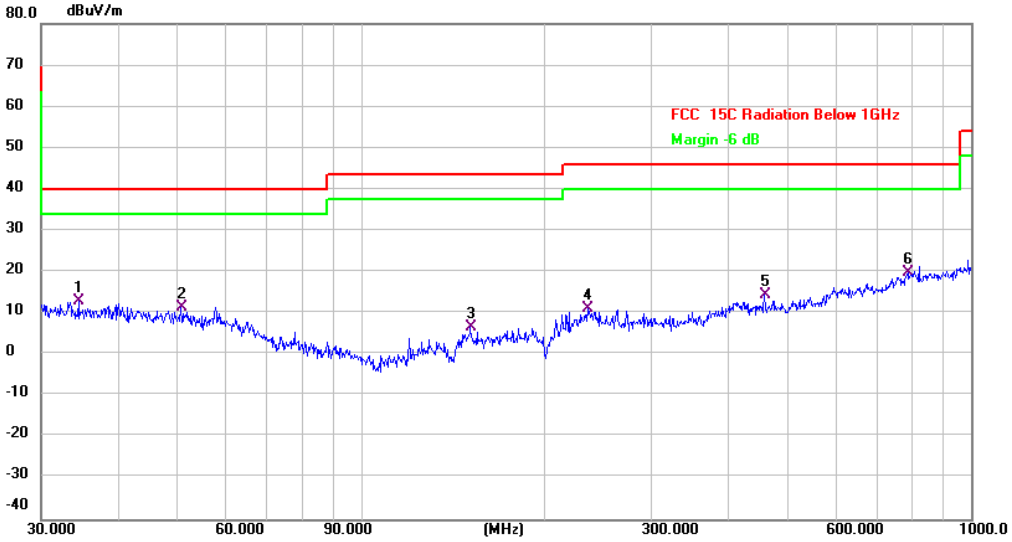
The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

Test Frequency: 30MHz ~ 1GHz

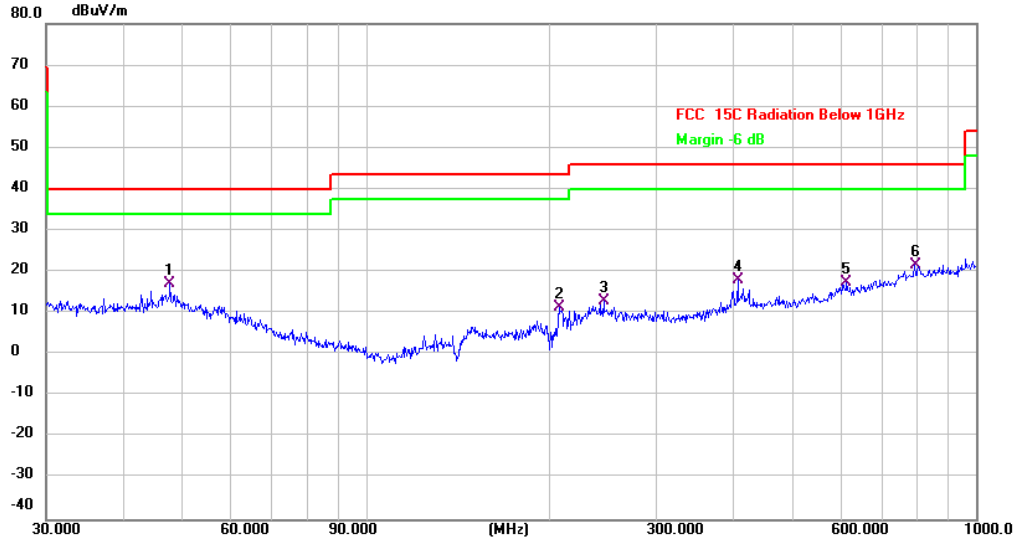
All modulation modes were tested and only the worst 8DPSK modulation data was recorded in the report

Test plot for Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		34.5173	27.37	-14.43	12.94	40.00	-27.06	QP	
2		50.7637	27.13	-15.62	11.51	40.00	-28.49	QP	
3		151.0666	27.00	-20.23	6.77	43.50	-36.73	QP	
4		235.8164	25.91	-14.63	11.28	46.00	-34.72	QP	
5		459.1144	28.85	-14.34	14.51	46.00	-31.49	QP	
6	*	787.8513	26.86	-7.05	19.81	46.00	-26.19	QP	

Test plot for Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	47.8260	39.76	-22.69	17.07	40.00	-22.93	QP	
2		207.8501	34.20	-22.71	11.49	43.50	-32.01	QP	
3		245.9509	31.33	-18.52	12.81	46.00	-33.19	QP	
4		407.5145	31.93	-13.90	18.03	46.00	-27.97	QP	
5		614.2142	28.80	-11.22	17.58	46.00	-28.42	QP	
6		793.3960	29.34	-7.63	21.71	46.00	-24.29	QP	

Remark: Measure- ment = Reading Level + Correct Factor

Test Frequency 1GHz-25GHz

All modulation modes were tested and only the worst modulation data was recorded in the report

π/4-DQPSK

Polarization: Horizontal / CH: 00

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4804.000	44.83	0.53	45.36	74.00	-28.64	peak
2		4804.000	39.62	0.53	40.15	54.00	-13.85	AVG
3		7206.000	42.19	7.90	50.09	74.00	-23.91	peak
4		7206.000	37.49	7.90	45.39	54.00	-8.61	AVG
5		9608.000	45.10	8.85	53.95	74.00	-20.05	peak
6	*	9608.000	39.42	8.85	48.27	54.00	-5.73	AVG

Polarization: Vertical / CH: 00

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4804.000	43.47	0.53	44.00	74.00	-30.00	peak
2		4804.000	39.59	0.53	40.12	54.00	-13.88	AVG
3		7206.000	43.10	7.90	51.00	74.00	-23.00	peak
4		7206.000	38.42	7.90	46.32	54.00	-7.68	AVG
5		9608.000	45.30	8.85	54.15	74.00	-19.85	peak
6	*	9608.000	39.44	8.85	48.29	54.00	-5.71	AVG

Polarization: Horizontal / CH: 39

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4882.000	43.35	0.57	43.92	74.00	-30.08	peak
2		4882.000	39.58	0.57	40.15	54.00	-13.85	AVG
3		7323.000	42.61	7.57	50.18	74.00	-23.82	peak
4		7323.000	38.74	7.57	46.31	54.00	-7.69	AVG
5		9764.000	43.29	9.33	52.62	74.00	-21.38	peak
6	*	9764.000	37.86	9.33	47.19	54.00	-6.81	AVG

Polarization: Vertical / CH: 39

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4882.000	44.04	0.57	44.61	74.00	-29.39	peak
2		4882.000	39.58	0.57	40.15	54.00	-13.85	AVG
3		7323.000	42.67	7.57	50.24	74.00	-23.76	peak
4		7323.000	38.72	7.57	46.29	54.00	-7.71	AVG
5		9764.000	43.41	9.33	52.74	74.00	-21.26	peak
6	*	9764.000	37.86	9.33	47.19	54.00	-6.81	AVG

Polarization: Horizontal / CH: 78

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	45.43	0.66	46.09	74.00	-27.91	peak
2		4960.000	39.49	0.66	40.15	54.00	-13.85	AVG
3		7440.000	43.41	7.94	51.35	74.00	-22.65	peak
4		7440.000	37.34	7.94	45.28	54.00	-8.72	AVG
5		9920.000	44.55	9.69	54.24	74.00	-19.76	peak
6	*	9920.000	37.57	9.69	47.26	54.00	-6.74	AVG

Polarization: Vertical / CH: 78

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	44.36	0.66	45.02	74.00	-28.98	peak
2		4960.000	39.49	0.66	40.15	54.00	-13.85	AVG
3		7440.000	43.32	7.94	51.26	74.00	-22.74	peak
4		7440.000	38.33	7.94	46.27	54.00	-7.73	AVG
5		9920.000	46.13	9.69	55.82	74.00	-18.18	peak
6	*	9920.000	40.46	9.69	50.15	54.00	-3.85	AVG

Note: 1. All other emissions more than 30dB below the limit.

2. Measure- ment = Reading Level + Correct Factor,
Over = Emission Level - Limit

Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

All modulation modes were tested and only the worst modulation data was recorded in the report

Polarization: Horizontal / CH: 2402

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	48.23	-4.83	43.40	74.00	-30.60	peak
2		2310.000	37.93	-4.83	33.10	54.00	-20.90	AVG
3		2390.000	49.09	-4.31	44.78	74.00	-29.22	peak
4	*	2390.000	39.21	-4.31	34.90	54.00	-19.10	AVG

Polarization: Vertical / CH: 2402

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	47.95	-4.83	43.12	74.00	-30.88	peak
2		2310.000	38.03	-4.83	33.20	54.00	-20.80	AVG
3		2390.000	48.45	-4.31	44.14	74.00	-29.86	peak
4	*	2390.000	38.08	-4.31	33.77	54.00	-20.23	AVG

Polarization: Horizontal / CH: 2480

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	52.69	-4.21	48.48	74.00	-25.52	peak
2	*	2483.500	43.10	-4.21	38.89	54.00	-15.11	AVG
3		2500.000	48.56	-4.10	44.46	74.00	-29.54	peak
4		2500.000	38.87	-4.10	34.77	54.00	-19.23	AVG

Polarization: Vertical / CH: 2480

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	49.58	-4.21	45.37	74.00	-28.63	peak
2	*	2483.500	39.50	-4.21	35.29	54.00	-18.71	AVG
3		2500.000	48.73	-4.10	44.63	74.00	-29.37	peak
4		2500.000	38.20	-4.10	34.10	54.00	-19.90	AVG

Remark:

1. Measure- ment = Reading Level + Correct Factor,
Over = Emission Level - Limit

8 Maximum Peak Output Power Test

8.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(3), RSS-247 § 5.4(b)& RSS-Gen§6.12
Test Limit	For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

8.2 Test Setup

8.3 Test Procedure

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

8.4 Test Data

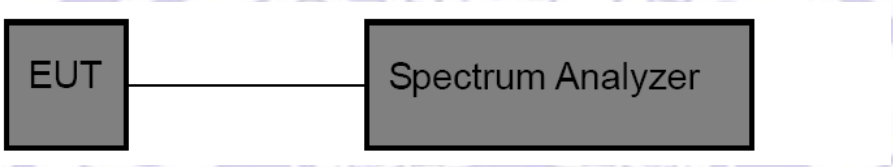
Please see the attachment for data.

9 20DB Occupy Bandwidth Test

9.1 Test Standard

Test Standard	FCC Part15 C Section 15.247 (a)(1), RSS-247 §5.1&RSS-Gen§6.7

9.2 Test Setup



9.3 Test Procedure

For 20dB Bandwidth Measurement

Using the following spectrum analyzer settings:

1. Span= approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel.

2. Set the RBW = 30 kHz.

3. Set the VBW = 100 kHz.

4. Sweep time = auto couple.

5. Detector function = peak.

6. Trace mode = max hold.

7. Allow trace to fully stabilize.

For 99% Bandwidth Measurement

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 1%-5% OBW, VBW ≥ 3RBW

9.4 Test Data

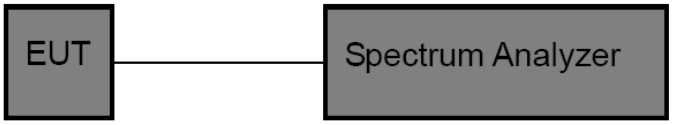
Please see the attachment for data.

10 Carrier Frequency Separation Test

10.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1), RSS-247 §5.1(4)
Test Limit	>25KHz or >two-thirds of the 20 dB bandwidth

10.2 Test Setup



10.3 Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer settings:

1. Span= Wide enough to capture the peaks of two adjacent channels
2. Set the RBW = 30 kHz.
3. Set the VBW = 100 kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

10.4 Test Data

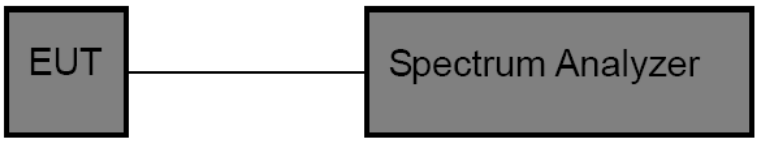
Please see the attachment for data.

11 Number of Hopping Channel Test

11.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1), RSS-247 §5.1
Test Limit	>15 channels

11.2 Test Setup



11.3 Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer setting:

1. Span= the frequency band of operation
2. Set the RBW = 100kHz.
3. Set the VBW = 300kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

11.4 Test Data

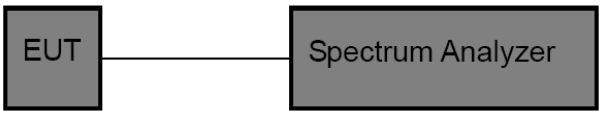
Please see the attachment for data.

12 Dwell Time Test

12.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1), RSS-247 §5.1
Test Limit	0.4 sec

12.2 Test Setup



12.3 Test Procedure

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span= zero span, centered on a hopping channel
2. Set the RBW = 1 MHz.
3. Set the VBW = 1 MHz.
4. Sweep time = as necessary to capture the entire dwell time per hopping channel.
5. Detector function = peak.
6. Trace mode = clear write.
7. Allow trace to fully stabilize.

12.4 Test Data

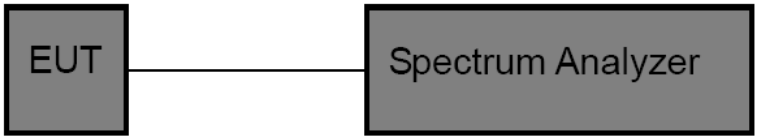
Please see the attachment for data.

13 100kHz Bandwidth of Frequency Band Edge Requirement

13.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d), RSS-247 §5.5
Test Limit	in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

13.2 Test Setup



13.3 Test Procedure

The EUT must have its hopping/Non-hopping function enabled. Using the following spectrum analyzer setting:

1. Set the RBW = 100kHz.

2. Set the VBW = 300kHz.

3. Sweep time = auto couple.

4. Detector function = peak.

5. Trace mode = max hold.

6. Allow trace to fully stabilize.

13.4 Test Data

Please see the attachment for data.

14 Antenna Requirement

14.1 Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /247(c), RSS-GEN section 6.8
Requirement	1) 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, 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. 2) 15.247(c) (1)(i) requirement: Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Test Standard	RSS-GEN section 6.8
Requirement	According to RSS-GEN section 6.8 The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list. For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below). When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer. The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested. For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location: This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

14.2 Antenna Connected Construction

The antenna is Internal Antenna which permanently attached, and the best case gain of the antenna is -0.68dBi. It complies with the standard requirement.

15 TEST SETUP & EUT PHOTOGRAPH

Please see the attachment for details.

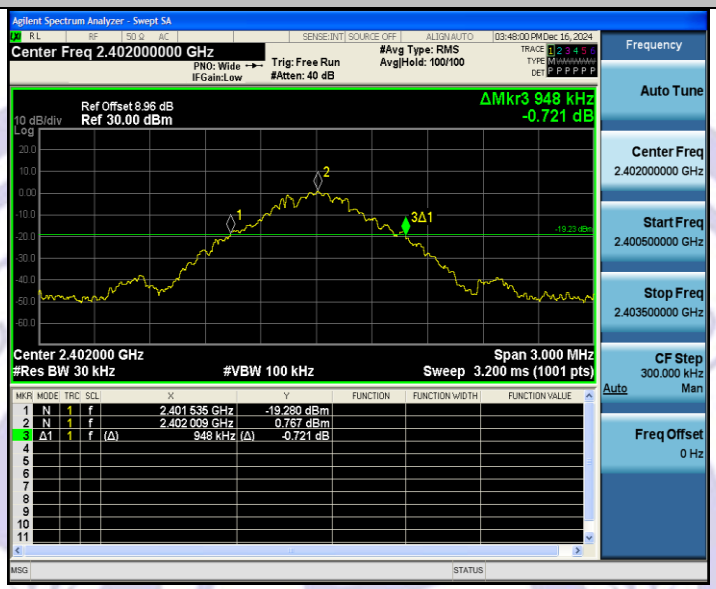
Appendix

Appendix A: 20dB Emission Bandwidth

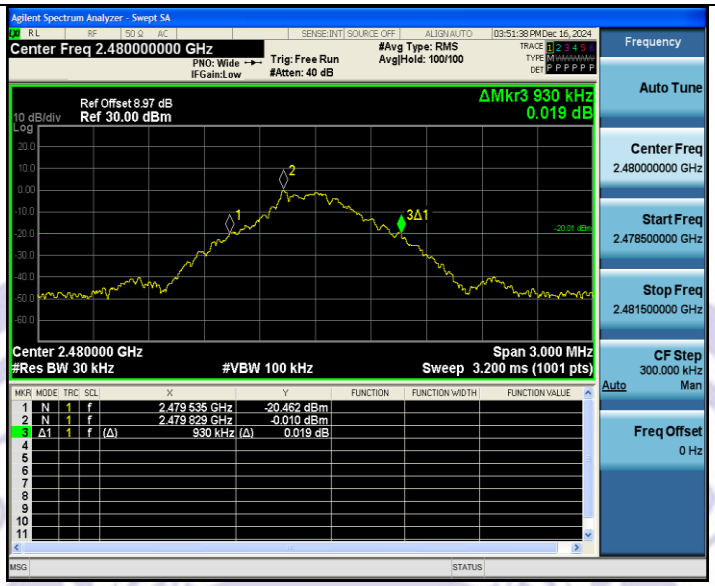
Test Result

Test Mode	Antenna	Frequency [MHz]	20db EBW [MHz]
DH5	Ant1	2402	0.948
		2441	0.936
		2480	0.930
2DH5	Ant1	2402	1.326
		2441	1.320
		2480	1.323
3DH5	Ant1	2402	1.302
		2441	1.305
		2480	1.299

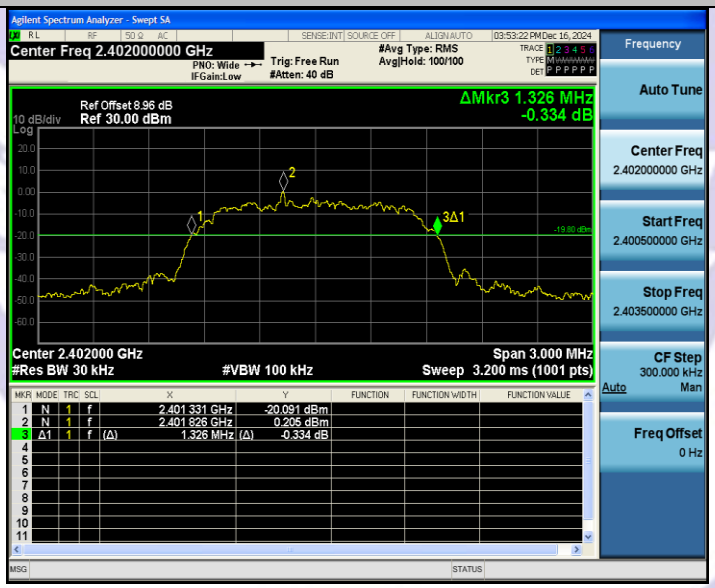
Test Graphs

DH5_Ant1_2402

DH5_Ant1_2441

DH5_Ant1_2480

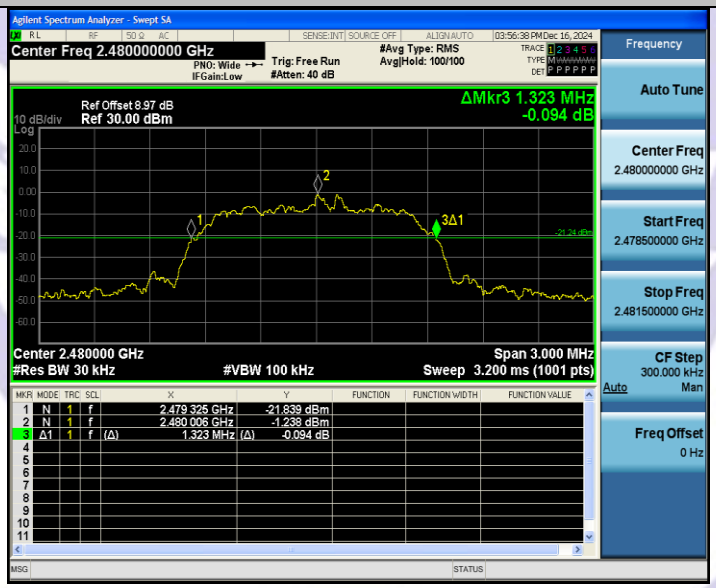


2DH5_Ant1_2402



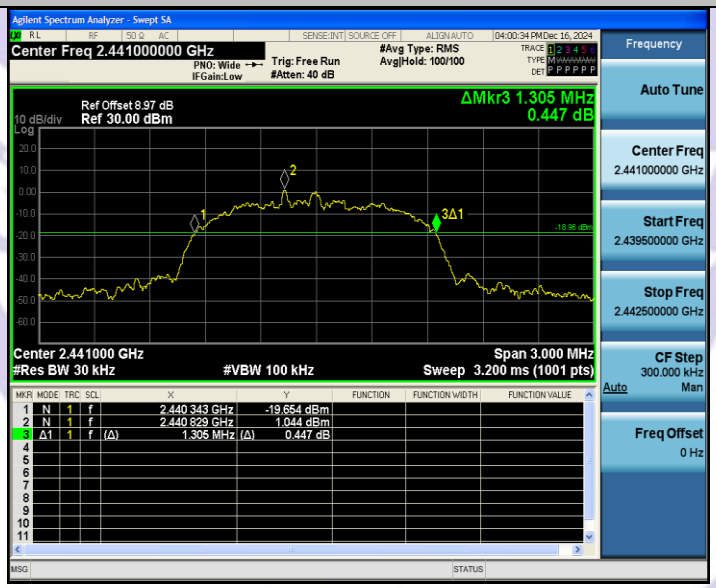
2DH5_Ant1_2441

2DH5_Ant1_2480



3DH5_Ant1_2402

3DH5_Ant1_2441



3DH5_Ant1_2480

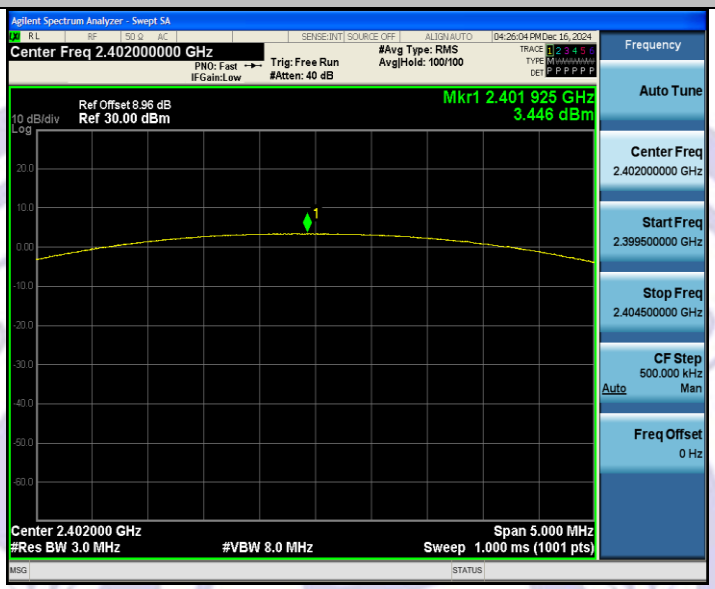
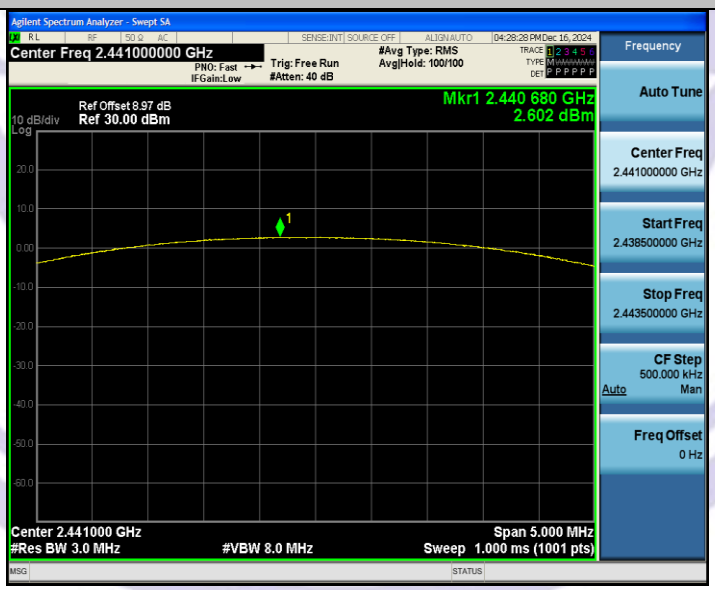

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
04:02:08 PM Dec 16, 2024
Ref Offset 8.97 dB
10 dB/div
Log
Ref 30.00 dBm
ΔMkr3 1.299 MHz
-0.356 dB
Center 2.480000 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3.000 MHz
Sweep 3.200 ms (1001 pts)
1 N 1 f 2.479 349 GHz -20.753 dBm
2 N 1 f 2.479 823 GHz -0.600 dBm
3 Δ1 1 f (Δ) 1.299 MHz (Δ) -0.356 dB
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.481500000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz

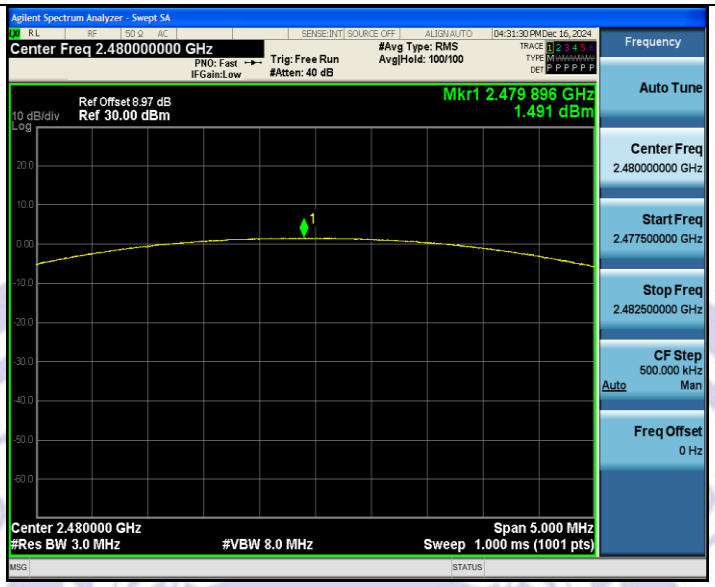
Appendix B: Maximum conducted output power

Test Result Peak

Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	3.45	≤30	PASS
		2441	2.60	≤30	PASS
		2480	1.49	≤30	PASS
2DH5	Ant1	2402	5.39	≤20.97	PASS
		2441	4.66	≤20.97	PASS
		2480	3.07	≤20.97	PASS
3DH5	Ant1	2402	5.88	≤20.97	PASS
		2441	5.09	≤20.97	PASS
		2480	3.73	≤20.97	PASS

Test Graphs

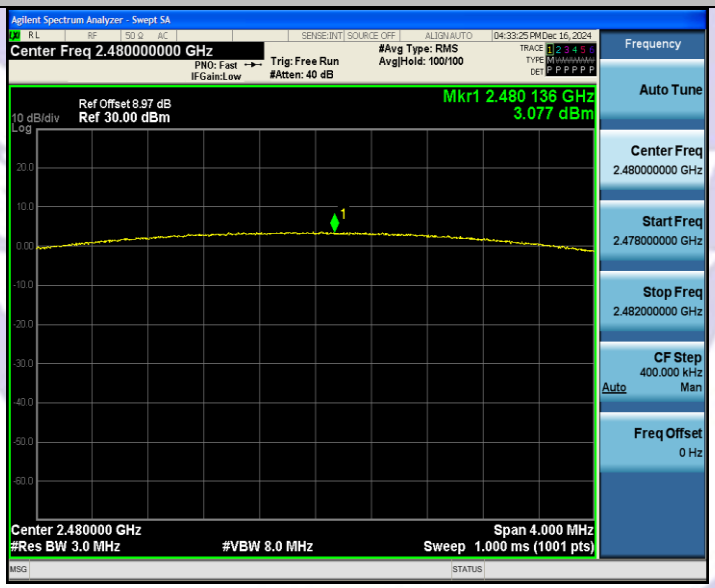
DH5_Ant1_2402

DH5_Ant1_2441

DH5_Ant1_2480



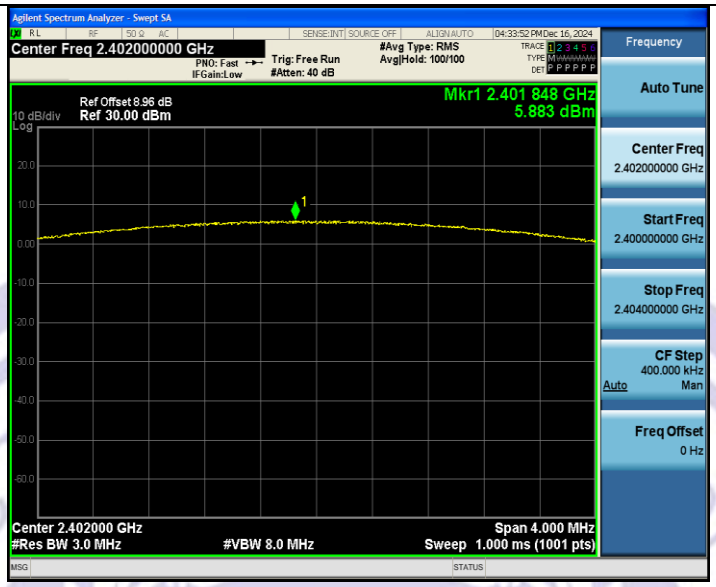
2DH5_Ant1_2402

2DH5_Ant1_2441

2DH5_Ant1_2480

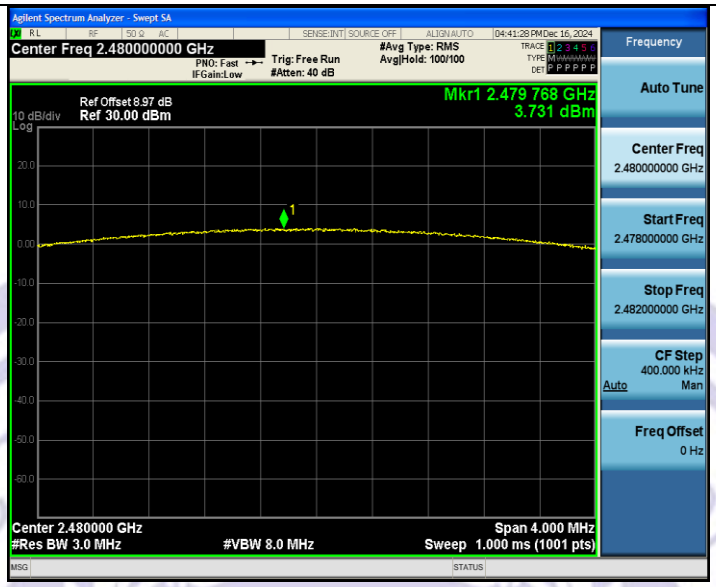


3DH5_Ant1_2402



3DH5_Ant1_2441

3DH5_Ant1_2480

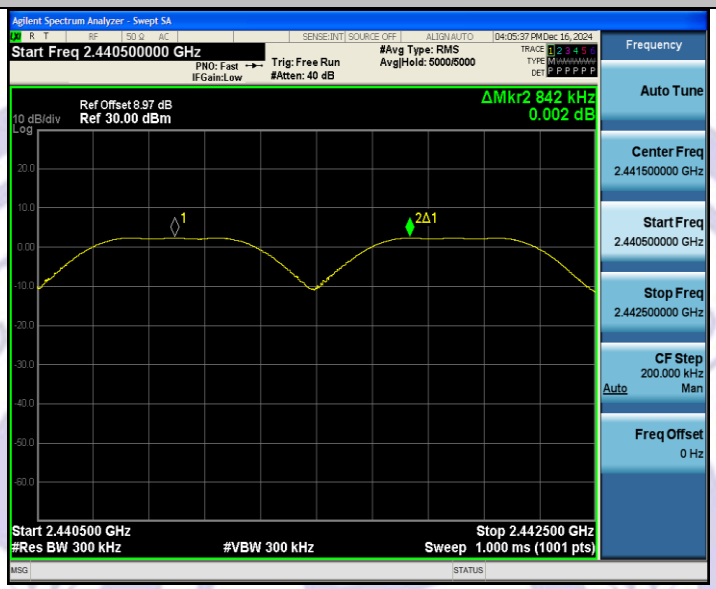
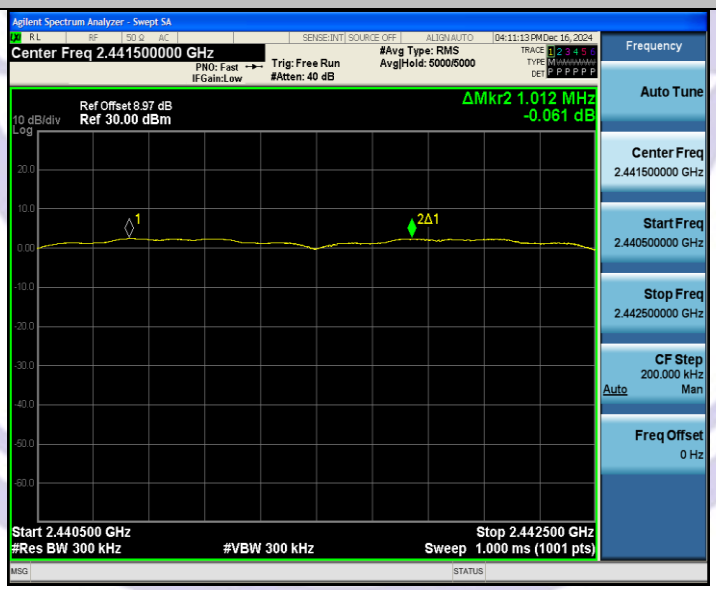

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 100/100
04:41:28 PM Dec 16, 2024
Ref Offset 8.97 dB
10 dB/div
Ref 30.00 dBm
Log
Mkr1 2.479 768 GHz
3.731 dBm
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 4.000 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478000000 GHz
Stop Freq
2.482000000 GHz
CF Step
400.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

Appendix C: Carrier frequency separation

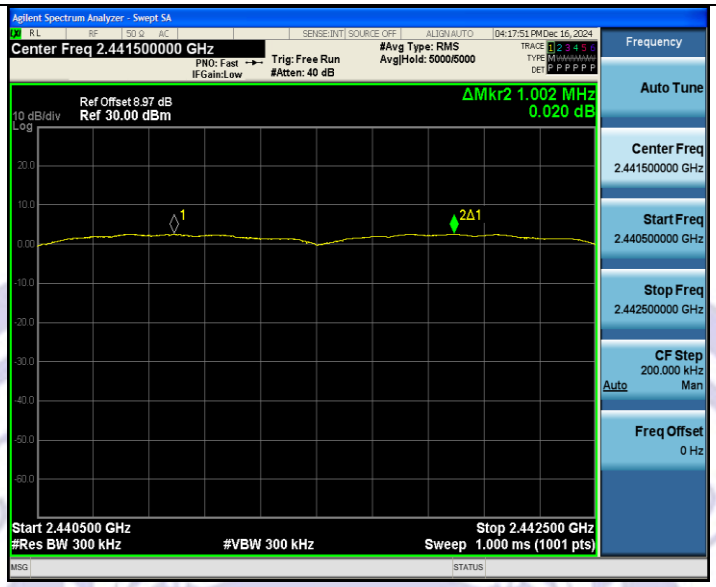
Test Result

Test Mode	Antenna	Frequency [MHz]	Result [MHz]	Limit [MHz]	Verdict
DH5	Ant1	Hop	0.842	≥0.632	PASS
2DH5	Ant1	Hop	1.012	≥0.884	PASS
3DH5	Ant1	Hop	1.002	≥0.870	PASS

Test Graphs

DH5_Ant1_Hop

2DH5_Ant1_Hop

3DH5_Ant1_Hop

Hotline: 400-8868-419 Fax: 86-755-27790922 http://www.ncttesting.cn


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441500000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
Avg|Hold: 5000/5000
04:17:51 PM Dec 16, 2024
Ref Offset 8.97 dB
10 dB/div
Ref 30.00 dBm
ΔMkr2 1.002 MHz
0.020 dB
Start 2.440500 GHz
#Res BW 300 kHz
#VBW 300 kHz
Stop 2.442500 GHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.441500000 GHz
Start Freq
2.440500000 GHz
Stop Freq
2.442500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

Appendix D: Time of occupancy

Test Result

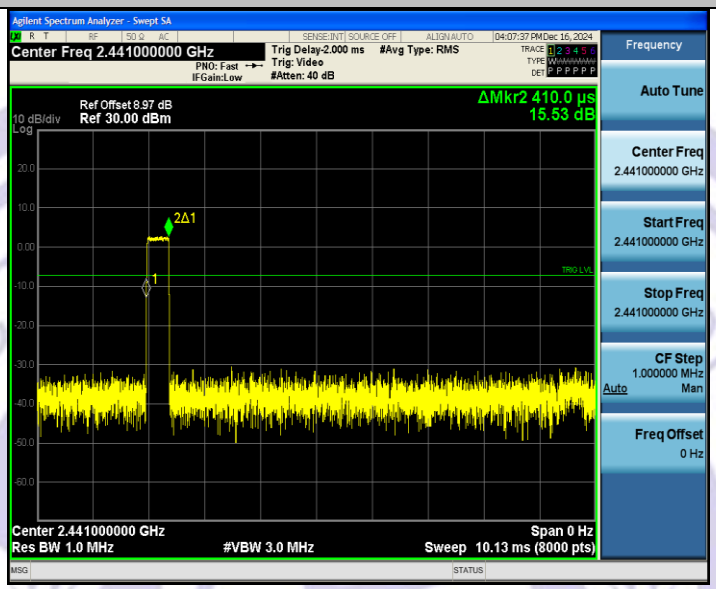
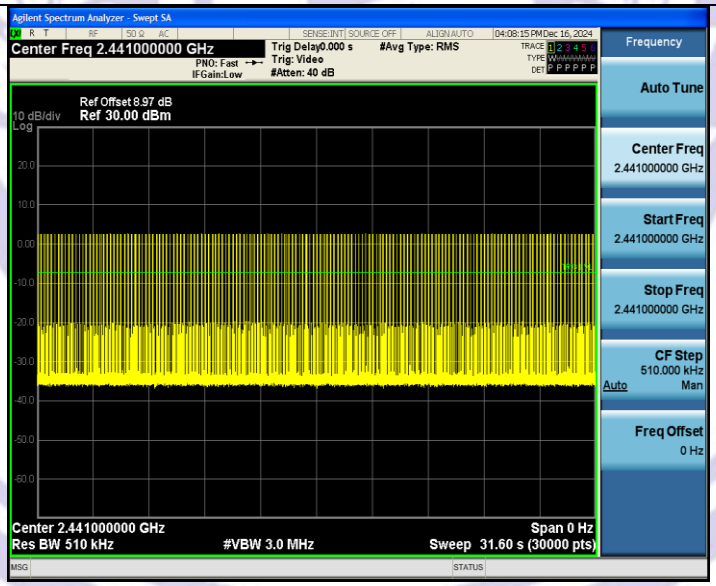
Test Mode	Antenna	Frequency [MHz]	BurstWidth [ms]	Hops in 31.6s [Num]	Result [s]	Limit [s]	Verdict
DH1	Ant1	Hop	0.410	319	0.131	≤0.4	PASS
DH3	Ant1	Hop	1.667	162	0.27	≤0.4	PASS
DH5	Ant1	Hop	2.915	113	0.329	≤0.4	PASS
2DH1	Ant1	Hop	0.421	319	0.134	≤0.4	PASS
2DH3	Ant1	Hop	1.672	170	0.284	≤0.4	PASS
2DH5	Ant1	Hop	2.920	94	0.274	≤0.4	PASS
3DH1	Ant1	Hop	0.421	319	0.134	≤0.4	PASS
3DH3	Ant1	Hop	1.671	169	0.282	≤0.4	PASS
3DH5	Ant1	Hop	2.922	108	0.316	≤0.4	PASS

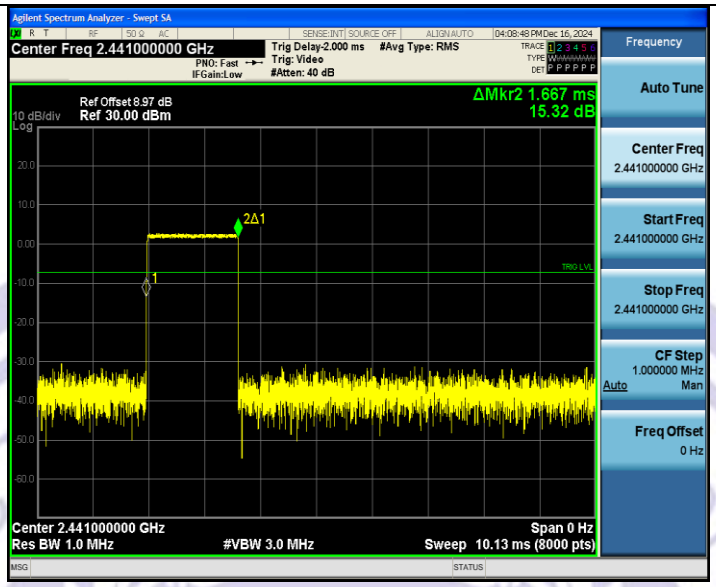
Notes:

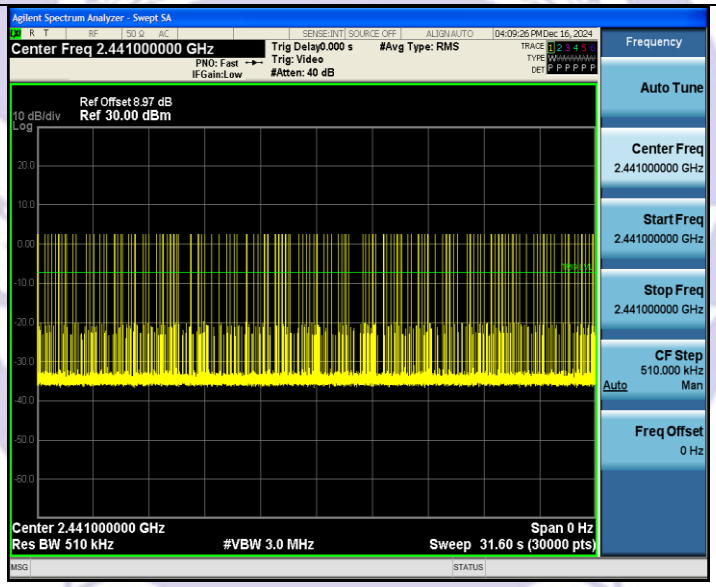
1. Period time = 0.4s * 79 = 31.6s

2. Result (Time of occupancy) = BurstWidth[ms] * Hops in 31.6s [Num]

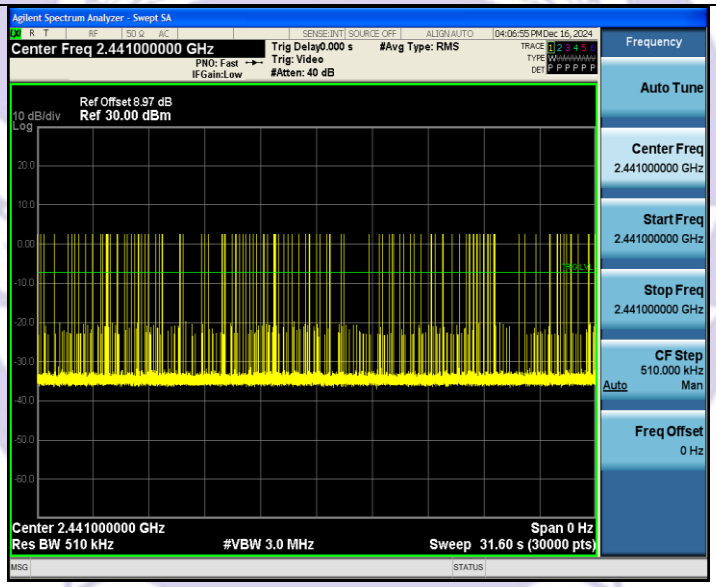
Test Graphs

DH1_Ant1_Hop


DH3_Ant1_Hop

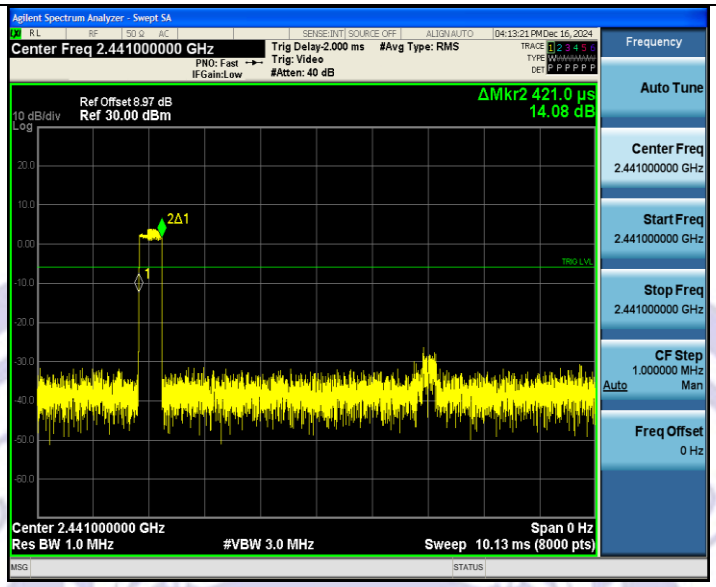

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-2.000 ms
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
04:08:48 PM Dec 16, 2024
Ref Offset 8.97 dB
10 dB/div
Ref 30.00 dBm
ΔMkr2 1.667 ms
15.32 dB
2Δ1
1
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.13 ms (8000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

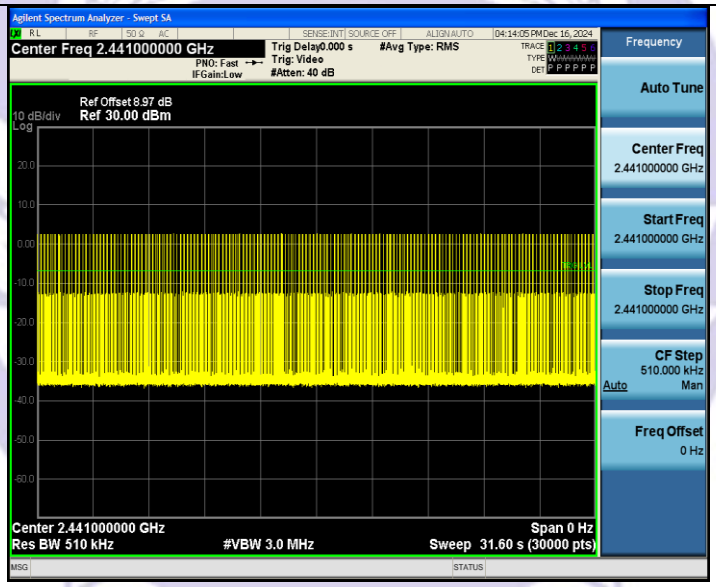

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
04:09:26 PM Dec 16, 2024
Ref Offset 8.97 dB
10 dB/div
Ref 30.00 dBm
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 31.60 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

DH5_Ant1_Hop

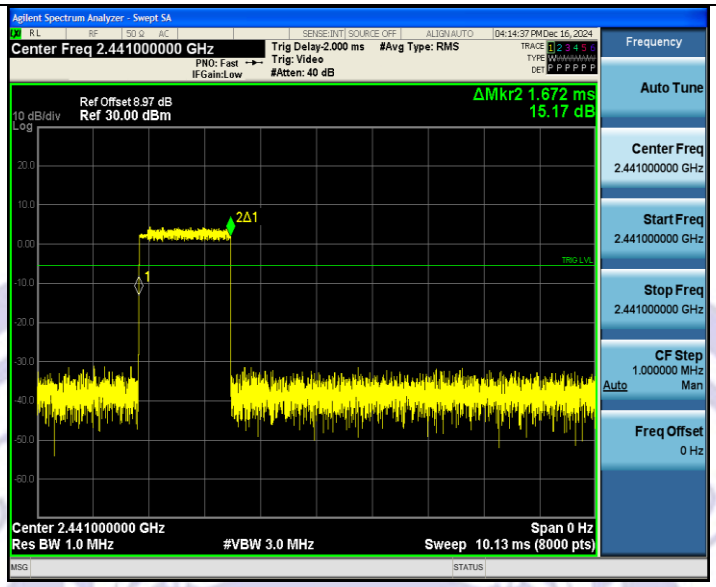


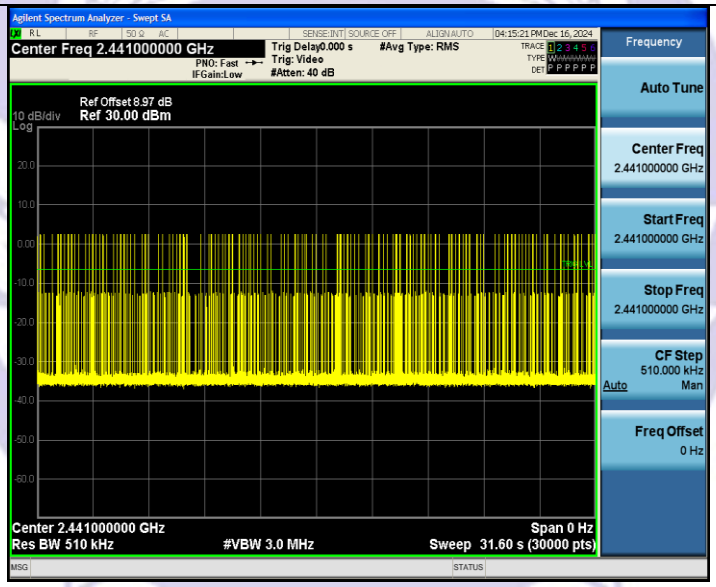
2DH1_Ant1_Hop



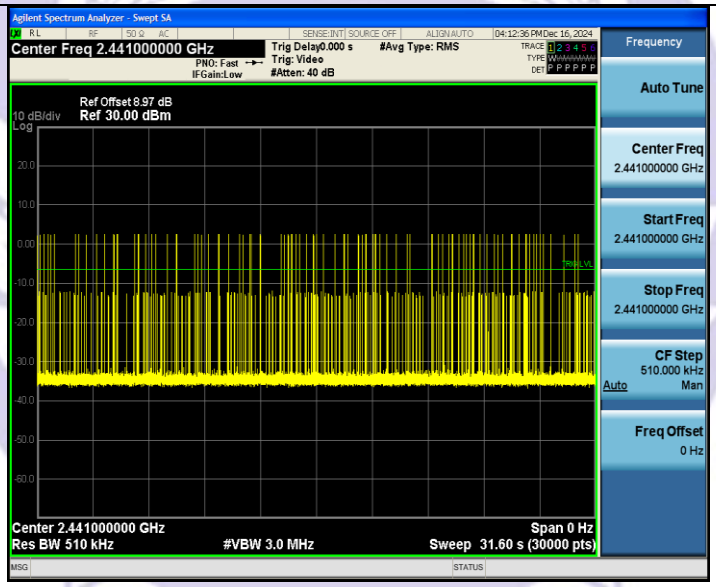


2DH3_Ant1_Hop

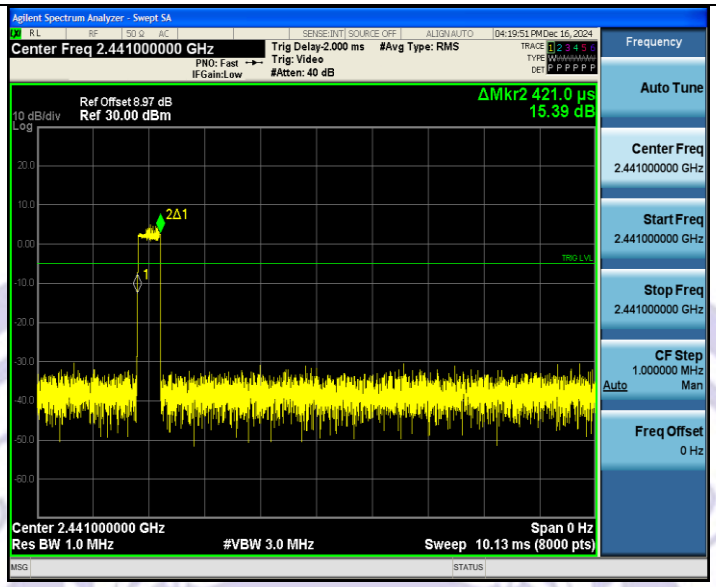


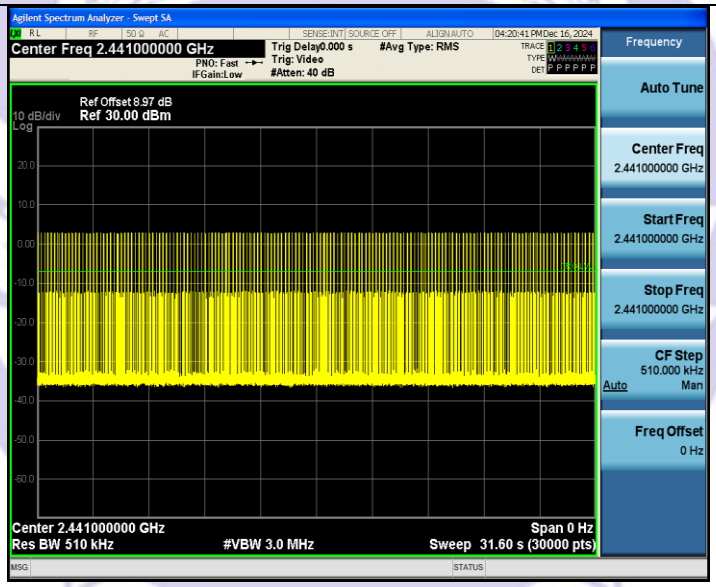


2DH5_Ant1_Hop

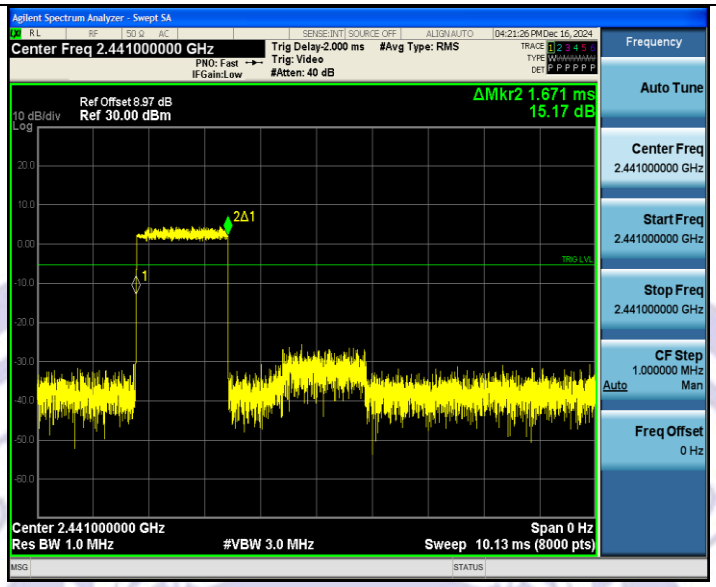


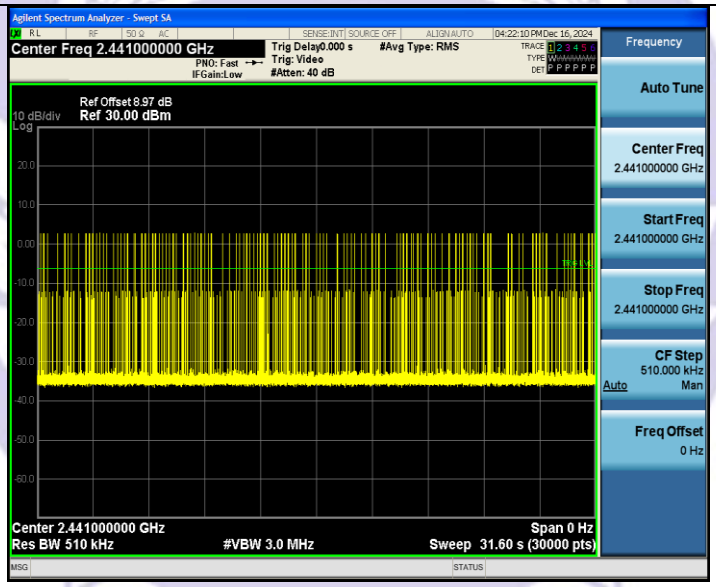
3DH1_Ant1_Hop



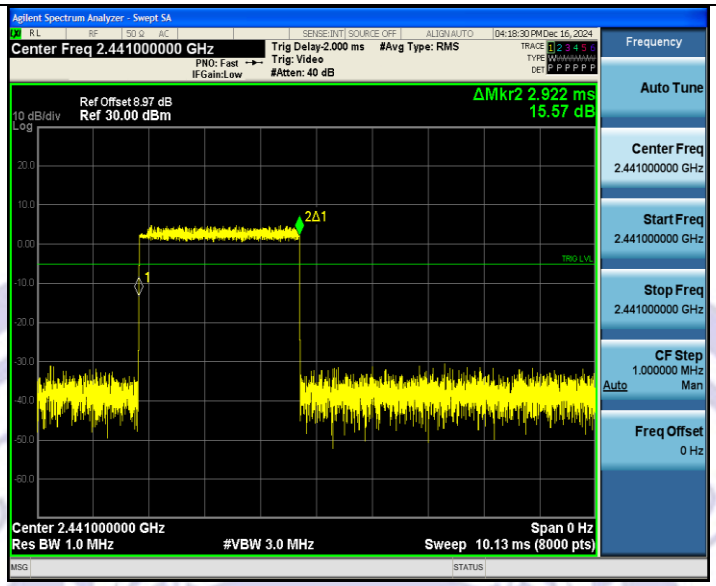


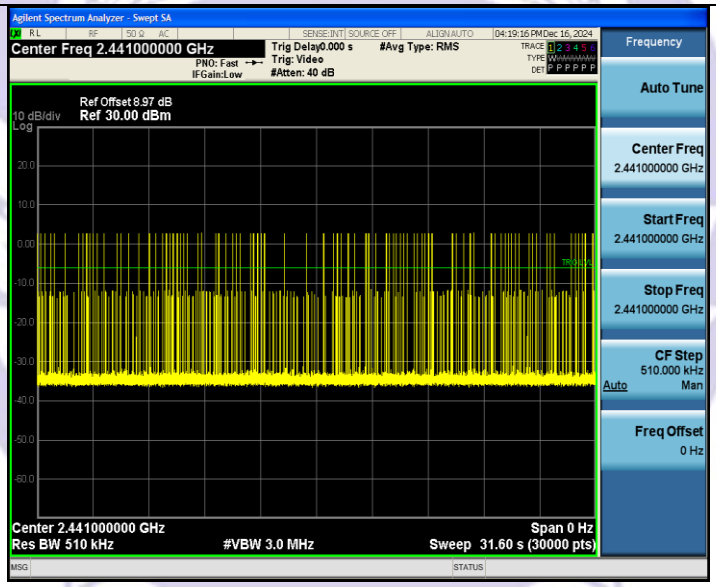
3DH3_Ant1_Hop





3DH5_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay-2.000 ms
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
04:18:30 PM Dec 16, 2024
Ref Offset 8.97 dB
10 dB/div
Ref 30.00 dBm
ΔMkr2 2.922 ms
15.57 dB
Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 10.13 ms (8000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

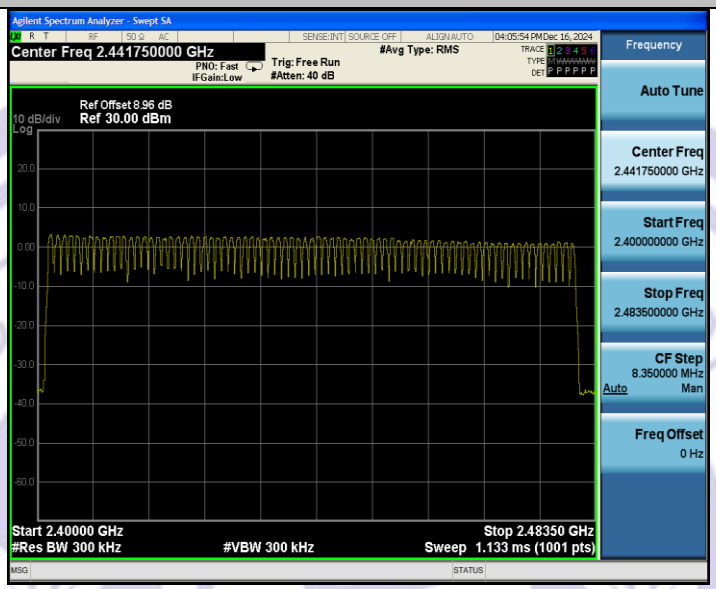
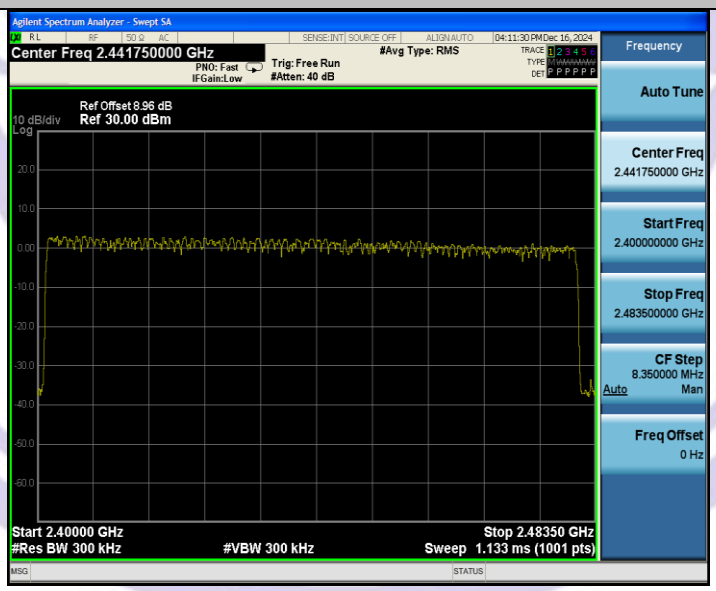

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Fast
IFGain:Low
Trig Delay0.000 s
Trig: Video
#Avg Type: RMS
#Atten: 40 dB
04:19:16 PM Dec 16, 2024
Ref Offset 8.97 dB
10 dB/div
Ref 30.00 dBm
Center 2.441000000 GHz
Res BW 510 kHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 31.60 s (30000 pts)
Frequency
Auto Tune
Center Freq
2.441000000 GHz
Start Freq
2.441000000 GHz
Stop Freq
2.441000000 GHz
CF Step
510.000 kHz
Auto
Man
Freq Offset
0 Hz

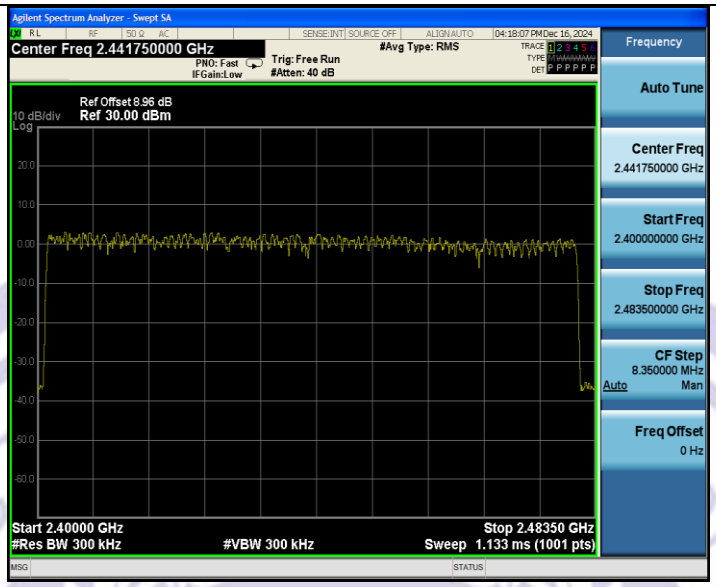
Appendix E: Number of hopping channels

Test Result

Test Mode	Antenna	Frequency [MHz]	Result [Num]	Limit [Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

Test Graphs

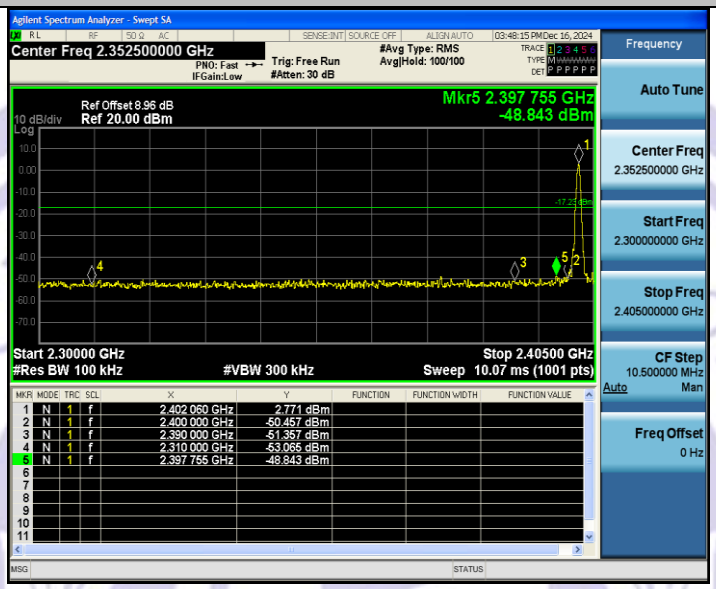
DH5_Ant1_Hop

2DH5_Ant1_Hop

3DH5_Ant1_Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 40 dB
#Avg Type: RMS
04:18:07 PM Dec 16, 2024
Ref Offset 8.96 dB
10 dB/div
Log
Ref 30.00 dBm
Start 2.40000 GHz
#Res BW 300 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 1.133 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.441750000 GHz
Start Freq
2.400000000 GHz
Stop Freq
2.483500000 GHz
CF Step
8.350000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

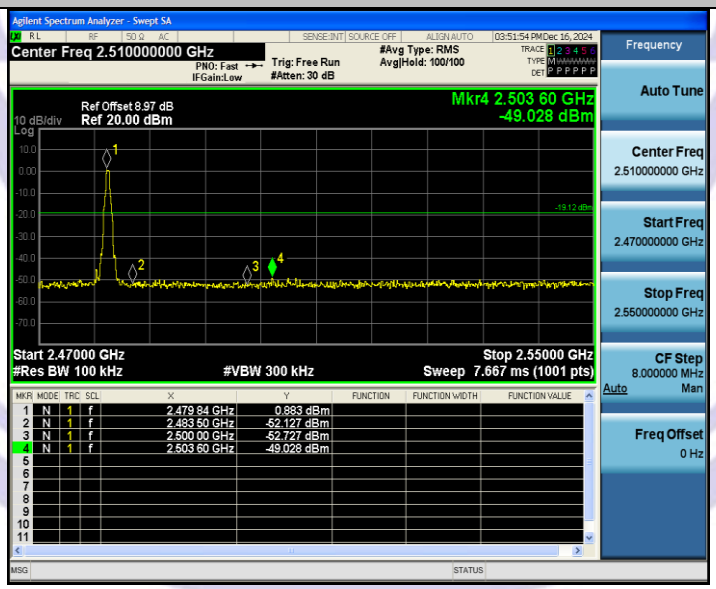
Appendix F: Band edge measurements

Test Graphs

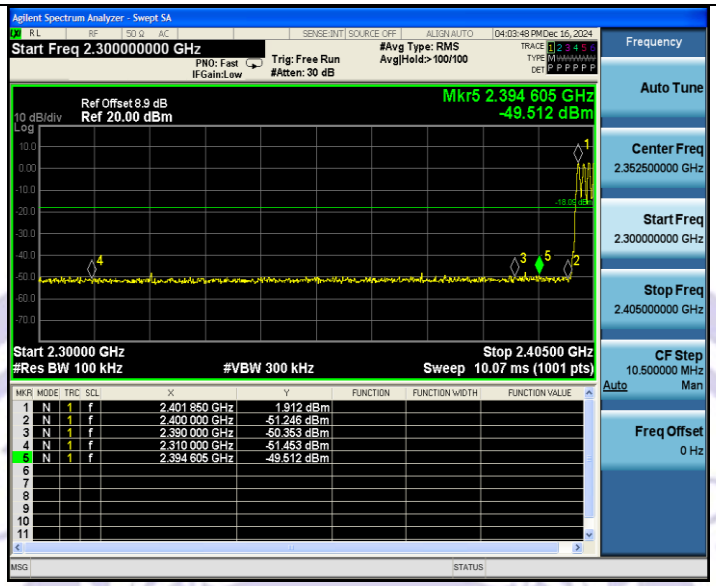
DH5_Ant1_Low_2402



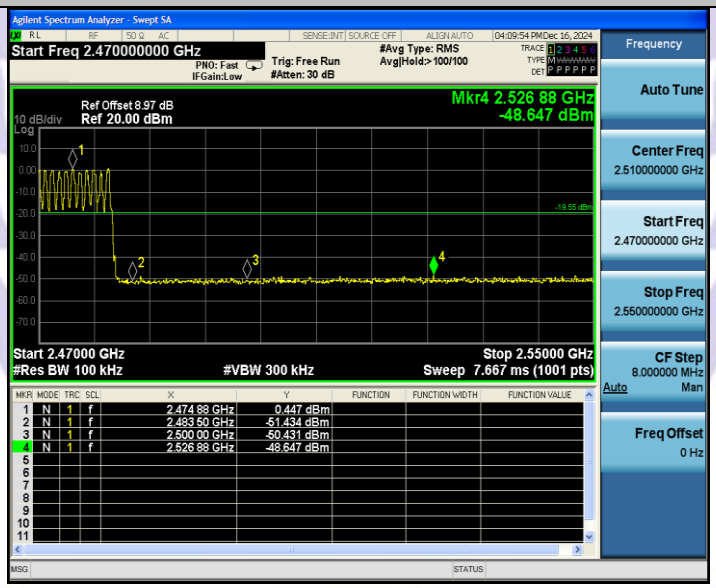
DH5_Ant1_High_2480



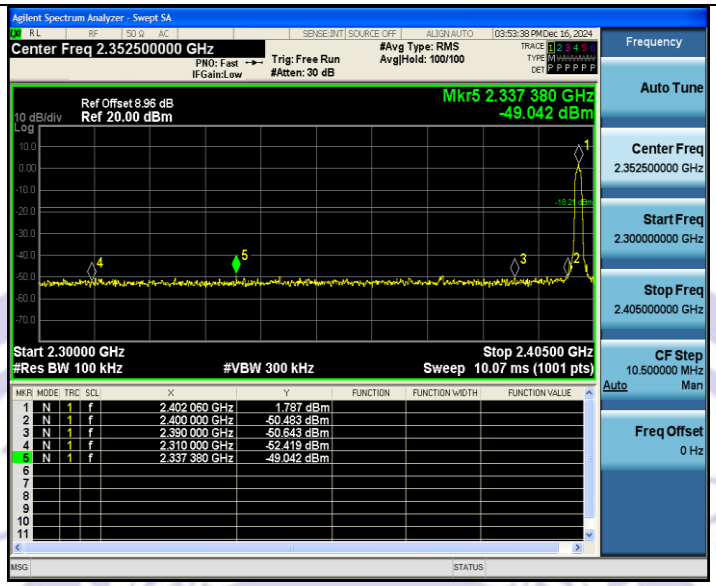
DH5_Ant1_Low_Hop_2402



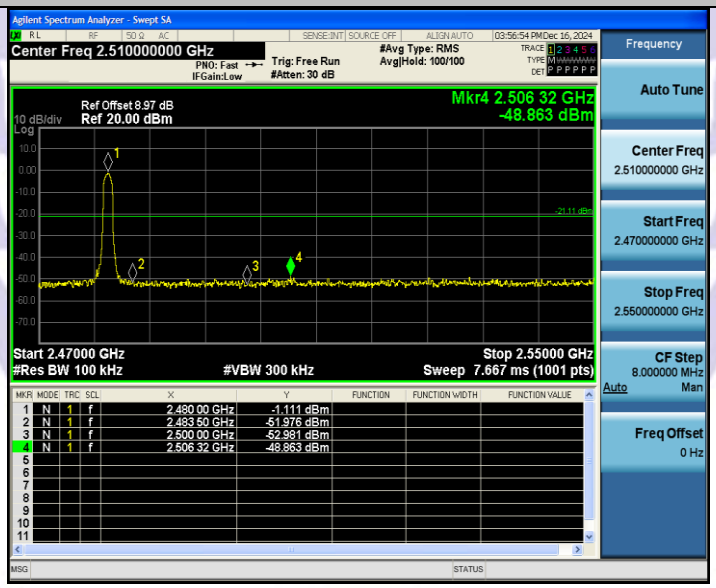
DH5_Ant1_High_Hop_2480



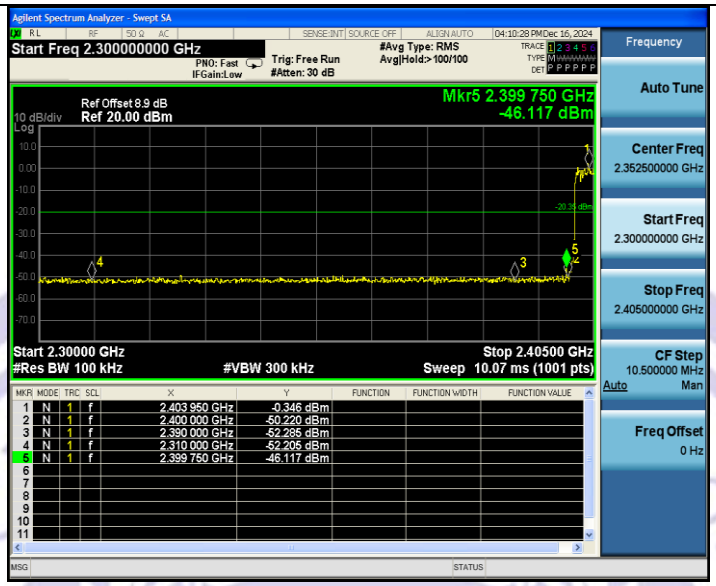
2DH5_Ant1_Low_2402



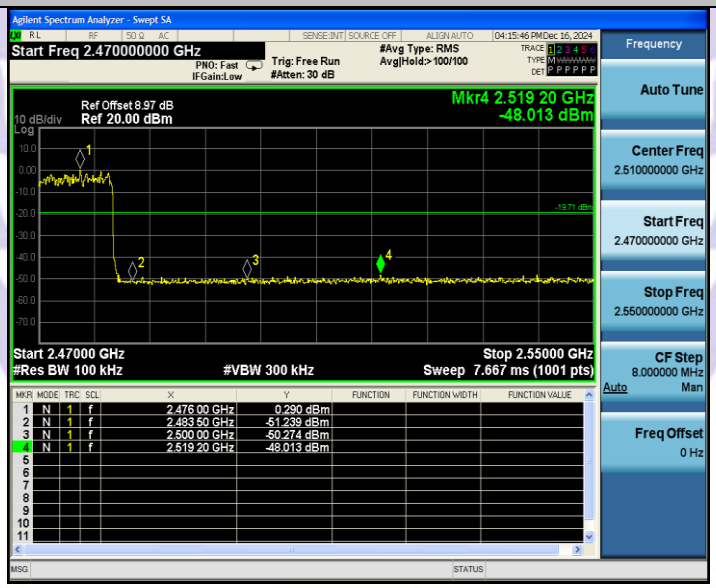
2DH5_Ant1_High_2480



2DH5_Ant1_Low_Hop_2402



2DH5_Ant1_High_Hop_2480



3DH5_Ant1_Low_2402