FCC TEST REPORT

FCC ID: 2AMJR-W10TSW

Product	:	**TSW Steering Wheel**
Model Name	:	**TSW, W11, W12, W13**
Brand	:	**MOZA**
Report No.	:	**NCT24008104-1**

Prepared for

Shenzhen Gudsen Technology Co., Ltd.

Room 1903-1904, Building 3, Nanshan Zhiyuan Chongwen Park, No. 3370 Liuxian Avenue, Nanshan District, Shenzhen, China

Prepared by

Shenzhen Gudsen Technology Co., Ltd.

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1 TEST RESULT CERTIFICATION

Applicant's name	:	Shenzhen Gudsen Technology Co., Ltd.
Address	:	Room 1903-1904, Building 3, Nanshan Zhiyuan Chongwen Park, No. 3370 Liuxian Avenue, Nanshan District, Shenzhen, China
Manufacture's name	:	Shenzhen Gudsen Technology Co., Ltd.
Address	:	Room 1903-1904, Building 3, Nanshan Zhiyuan Chongwen Park, No. 3370 Liuxian Avenue, Nanshan District, Shenzhen, China
Product name	:	TSW Steering Wheel
Model name	:	TSW, W11, W12, W13
Standards	:	47 CFR Part 15.249
Test procedure	:	ANSI C63.10-2013
Test Date	:	2024-01-11 to 2024-01-30
Date of Issue	:	2024-01-11
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.

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Test Engineer:

Keven Wu / Engineer

Technical Manager:

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Contents

2 Test Summary

Test Items	Test Requirement	Result
Antenna requirement	47 CFR Part 15.203	PASS
Conducted Emission at AC power line	47 CFR 15.207(a)	PASS
Occupied Bandwidth	47 CFR 15.215(c)	PASS
Field strength of fundamental	47 CFR 15.249(a)	PASS
Band edge emissions (Radiated)	47 CFR 15.249(d)	PASS
Emissions in frequency bands (below 1GHz)	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)	PASS
Emissions in frequency bands (above 1GHz)	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)	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	:	TSW Steering Wheel
Model Name	:	TSW
Sample ID	:	24008104-1E-001#
Sample(s) Status:	:	Engineer sample
Additional model	:	W11, W12, W13
Difference	:	All the models are the same circuit and module, except the model name .
Operating frequency	:	2406-2470MHz
Numbers of Channel	:	65 channels
Antenna Type	:	PCB Antenna
Antenna Gain	:	2.16 dBi
Type of Modulation	:	GFSK
Power supply	:	Input: 12Vdc(Powered by base)
Accessories:		N/A
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 C63.10-2013 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 have been tested. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for test.

Channel List:

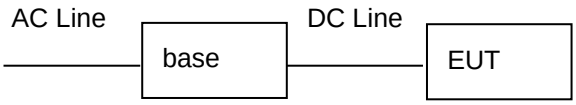
Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2406	17	2422	33	2438	51	2456
2	2407	18	2423	34	2439	52	2457
3	2408	19	2424	35	2440	53	2458
4	2409	20	2425	36	2441	54	2459
5	2410	21	2426	37	2442	55	2460
6	2411	22	2427	38	2443	56	2461
7	2412	23	2428	39	2444	57	2462
8	2413	24	2429	40	2445	58	2463
9	2414	25	2430	41	2446	59	2464
10	2415	26	2431	42	2447	60	2465
11	2416	27	2432	43	2448	61	2466
12	2417	28	2433	44	2449	62	2467
13	2418	29	2434	45	2450	63	2468

14	2419	30	2435	46	2451	64	2469
15	2420	31	2436	47	2452	65	2470
16	2421	32	2437	48	2453		

Channel	Frequency(MHz)
0	2406
33	2438
65	2470

4.3 Test Setup Configuration

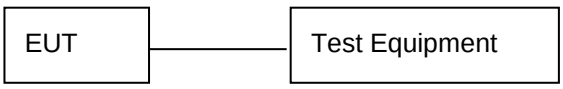
Conducted Emission



Radiated Emission(30MHz-1GHz)

Radiated Emission(above 1GHz)

Conducted Spurious



4.4 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.	

RS21(V1.0.1)			
Mode	2406MHz	2438MHz	2470MHz
GFSK	DTF	DTF	DTF

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	2023/6/21	2024/6/20
LISN	ENV 216	102796	Rohde & Schwarz	2023/6/21	2024/6/20
LISN	VN1-13S	004023	CRANAGE	2023/6/21	2024/6/20
Cable	RG223-1500MM	NA	RG	2023/6/21	2024/6/20

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	2023/6/21	2024/6/20
Amplifi（30MHz-1GHz）	BBV 9743 B	00374	SCHNWARZBECK	2023/6/21	2024/6/20
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	2023/6/21	2024/6/20
Spectrum Analyze（10Hz-40GHz）	FSV 40	100952	Rohde & Schwarz	2023/6/21	2024/6/20
Pream plifier（18GHz-40GHz）	BBV 9721	0056	SCHNWARZBECK	2023/6/21	2024/6/20
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	2023/6/21	2024/6/20
Amplifier (9KHz-30MHz)	BBV 9745	00109	CHNWARZBECK	2023/6/21	2024/6/20

MXG Signal Analyzer	N9020A	MY50510202	Agilent	2023/6/21	2024/6/20
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2023/6/21	2024/6/20
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2023/6/21	2024/6/20
Power Sensor	TR1029-2	512364	Techoy	2023/6/21	2024/6/20
RF Swith	TR1029-1	512364	Techoy	2023/6/21	2024/6/20
Cable	DA800-4000MM	NA	DA	2023/6/21	2024/6/20
Cable	DA800-11000MM	NA	DA	2023/6/21	2024/6/20

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	AUDIX	e3	6.120718
2	EMC radiation test system	AUDIX	e3	6.120718
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
Bandwidth	± 1.5 x 10^{-6}
Temperature	±1°C
Humidity	±5%
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
/	/	/	/	/	/

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
Test Method:	:	ANSI C63.10:2013
Test Result:	:	PASS
Frequency Range:	:	150kHz to 30MHz
Class/Severity:	:	Class B
Detector:	:	Peak for pre-scan (9kHz Resolution Bandwidth)

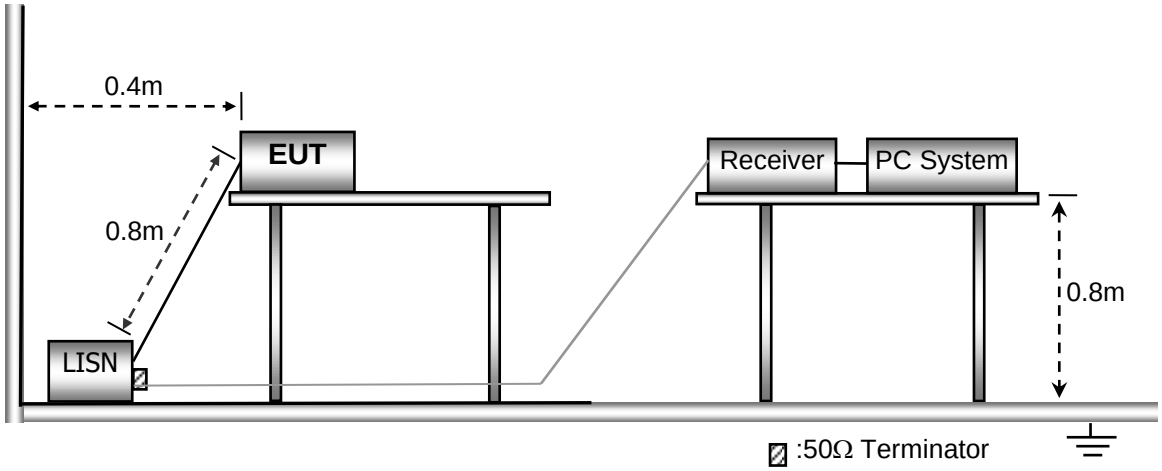
6.1 E.U.T. Operation

Operating Environment **:**

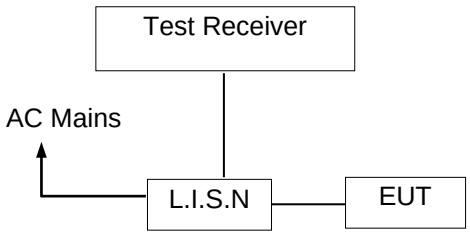
Temperature:	:	23.2°C
Humidity:	:	51 % RH
Atmospheric Pressure:	:	101.12 kPa
Test Voltage	:	AC 120V/60Hz

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10: 2013



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

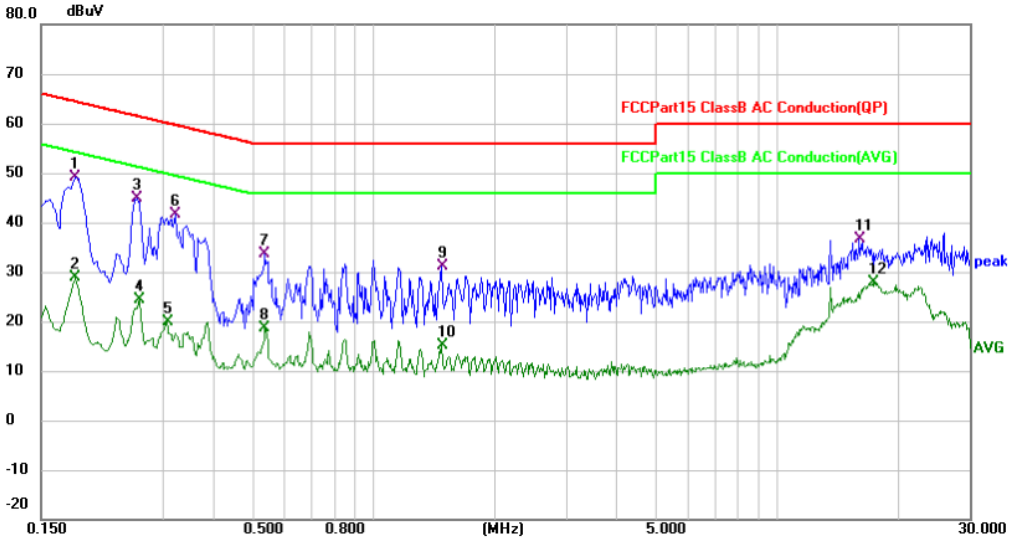
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.7 Conducted Emission Test Result

Pass

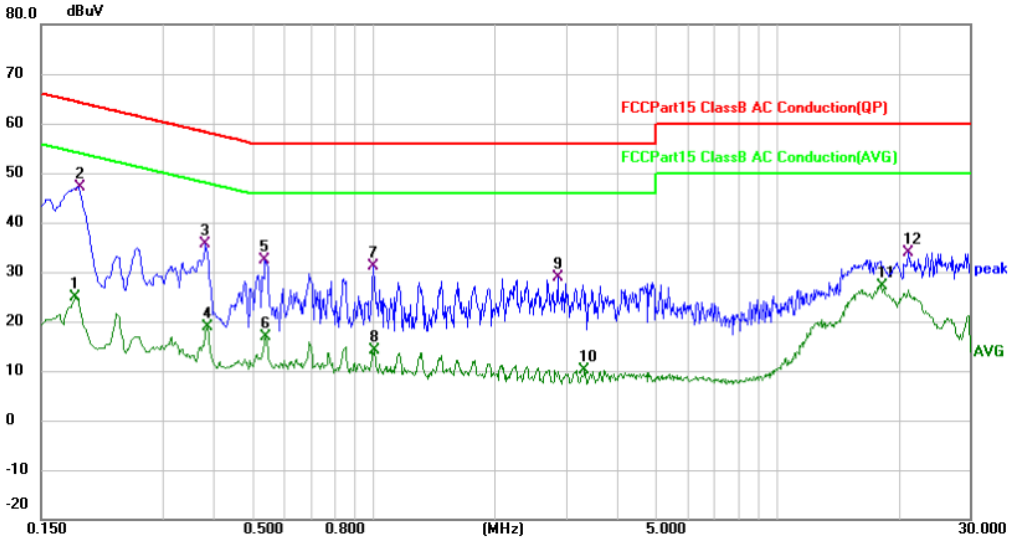
Conducted emission at both 120V & 240V is assessed, and emission at 120V represents the worst case. All the modulation modes were tested the data of the worst mode (GFSK) are recorded in the following pages and the others modulation methods do not exceed the limits.

Line: Line / CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1819	38.09	11.10	49.19	64.40	-15.21	QP	
2		0.1819	17.74	11.10	28.84	54.40	-25.56	AVG	
3		0.2580	33.57	11.25	44.82	61.50	-16.68	QP	
4		0.2620	13.61	10.73	24.34	51.37	-27.03	AVG	
5		0.3060	9.18	10.73	19.91	50.08	-30.17	AVG	
6		0.3220	30.94	10.73	41.67	59.66	-17.99	QP	
7		0.5380	22.98	10.72	33.70	56.00	-22.30	QP	
8		0.5380	7.93	10.72	18.65	46.00	-27.35	AVG	
9		1.4740	20.41	10.76	31.17	56.00	-24.83	QP	
10		1.4740	4.37	10.76	15.13	46.00	-30.87	AVG	
11		16.0140	25.14	11.47	36.61	60.00	-23.39	QP	
12		17.3540	16.42	11.53	27.95	50.00	-22.05	AVG	

Line: Neutral / CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1819	13.77	11.12	24.89	54.40	-29.51	AVG	
2	*	0.1860	36.02	11.14	47.16	64.21	-17.05	QP	
3		0.3820	24.99	10.74	35.73	58.24	-22.51	QP	
4		0.3860	8.06	10.74	18.80	48.15	-29.35	AVG	
5		0.5380	21.70	10.74	32.44	56.00	-23.56	QP	
6		0.5420	6.09	10.74	16.83	46.00	-29.17	AVG	
7		1.0020	20.36	10.76	31.12	56.00	-24.88	QP	
8		1.0060	3.46	10.76	14.22	46.00	-31.78	AVG	
9		2.8660	18.08	10.81	28.89	56.00	-27.11	QP	
10		3.3420	-0.66	10.83	10.17	46.00	-35.83	AVG	
11		18.1940	15.57	11.56	27.13	50.00	-22.87	AVG	
12		21.1980	22.13	11.66	33.79	60.00	-26.21	QP	

Notes:
1.An initial pre-scan was performed on the line and neutral lines with peak detector.
2.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3.Mesurement Level = Reading level + Correct Factor

7 Radiated Spurious Emissions

Test Requirement	:	FCC CFR47 Part 15 Section 15.209
Test Method	:	ANSI C63.10:2013
Test Result	:	PASS
Measurement Distance	:	3m
Limit	:	See the follow table

Except as provided in paragraph (b)of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

7.1 EUT Operation

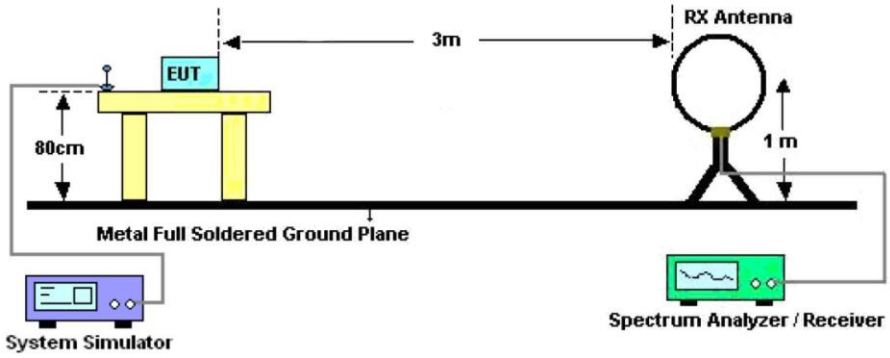
Operating Environment :

Temperature	:	25 °C
Humidity	:	59% RH
Atmospheric Pressure	:	99 kPa
Test Voltage	:	DC 3.7V

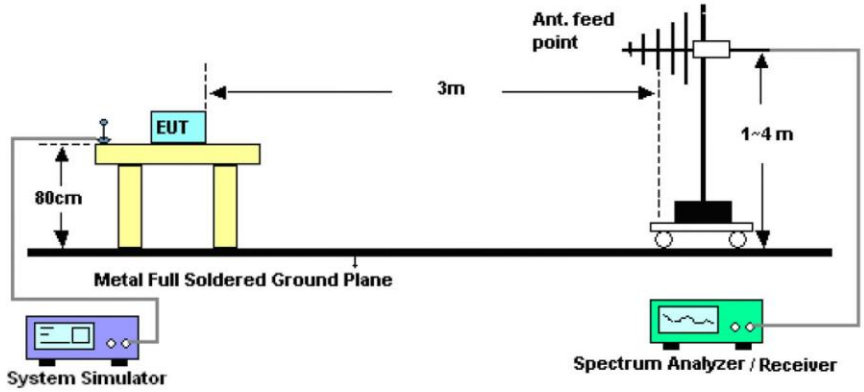
7.2 Test Setup

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

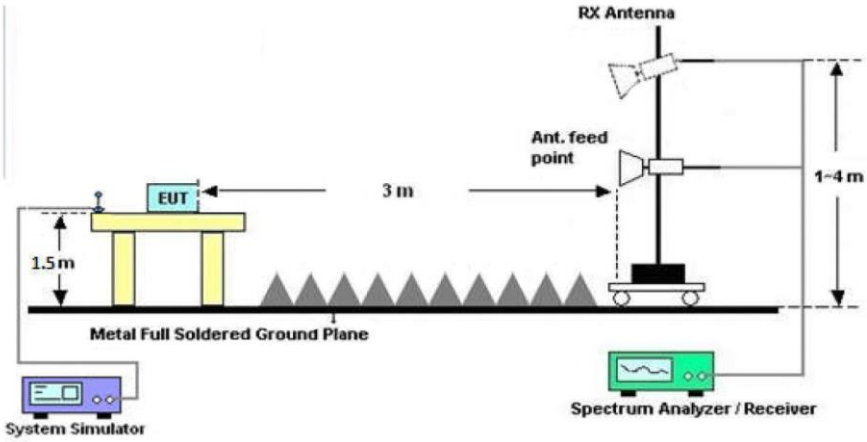
The test setup for emission measurement below 30MHz.



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 C63.10-2013.

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:

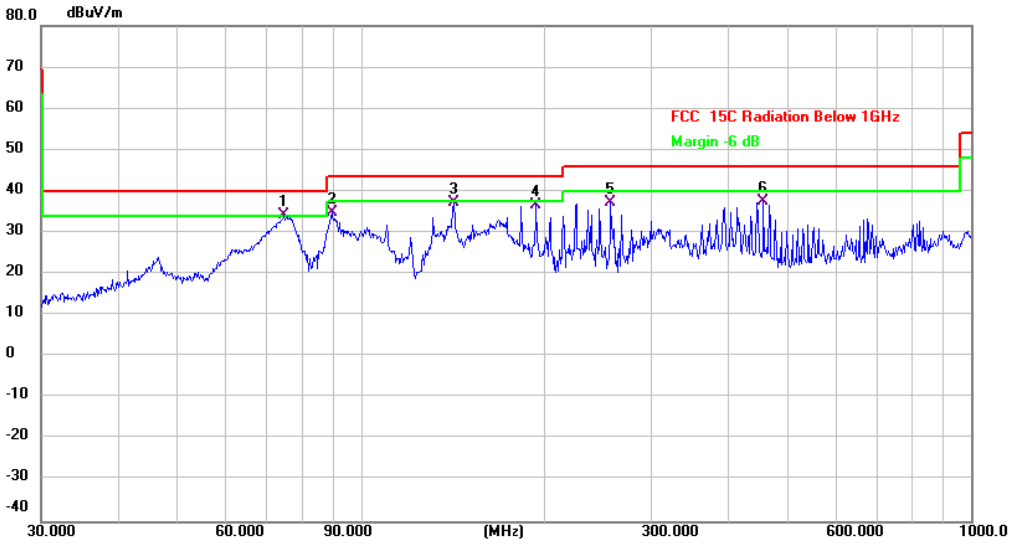
The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

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

Test Frequency: 30MHz ~ 1GHz

Please refer to the following test plots,High Channel (2470MHz) worst case GFSK for record:

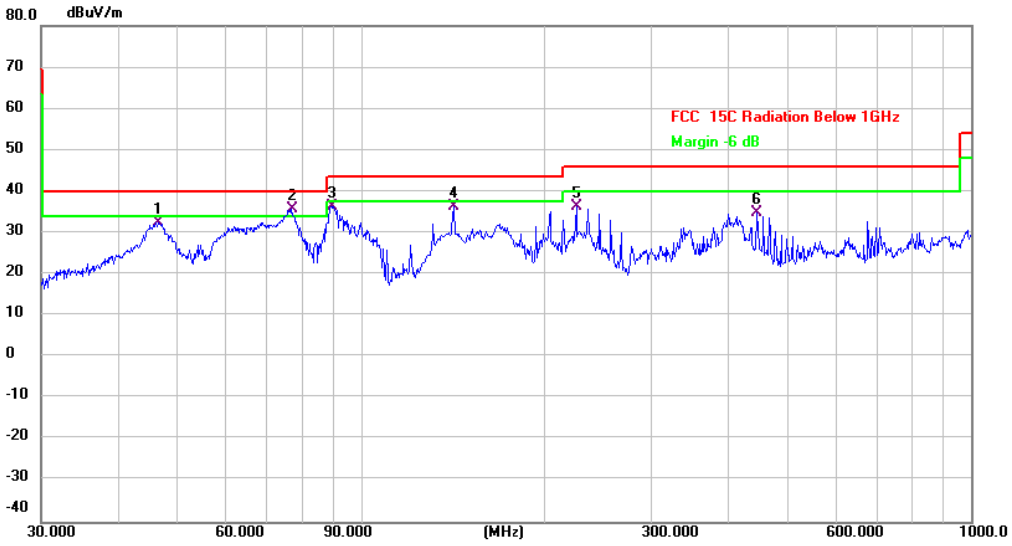
Test plot for Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	74.9191	46.76	-12.42	34.34	40.00	-5.66	QP	
2		89.5899	46.74	-11.92	34.82	43.50	-8.68	QP	
3		141.8262	47.04	-9.75	37.29	43.50	-6.21	QP	
4		194.4533	46.13	-9.33	36.80	43.50	-6.70	QP	
5		257.4221	44.82	-7.47	37.35	46.00	-8.65	QP	
6		457.5072	41.67	-4.05	37.62	46.00	-8.38	QP	

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

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		46.6662	39.86	-7.35	32.51	40.00	-7.49	QP	
2	*	77.0504	48.55	-12.84	35.71	40.00	-4.29	QP	
3		89.9046	48.35	-11.92	36.43	43.50	-7.07	QP	
4		141.8262	45.99	-9.75	36.24	43.50	-7.26	QP	
5		226.0994	44.65	-8.21	36.44	46.00	-9.56	QP	
6		446.4139	38.94	-4.22	34.72	46.00	-11.28	QP	

Remark:Emission Level=Reading+Cable Loss+ANT Factor-AMP Factor

Note:

The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported. All modes of operation of the EUT were investigated, and only the worst-case results are reported. There were no emissions found below 30MHz within 20dB of the limit.

Test Frequency 1GHz-25GHz

GFSK

Polarization: Horizontal / 2406 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4812.000	56.55	-7.41	49.14	74.00	-24.86	peak
2		4812.000	50.61	-7.41	43.20	54.00	-10.80	AVG
3		7218.000	47.55	0.88	48.43	74.00	-25.57	peak
4		7218.000	41.50	0.88	42.38	54.00	-11.62	AVG
5		9624.000	49.17	2.23	51.40	74.00	-22.60	peak
6	*	9624.000	42.99	2.23	45.22	54.00	-8.78	AVG

Polarization: Vertical / 2406 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4812.000	59.49	-7.41	52.08	74.00	-21.92	peak
2	*	4812.000	53.76	-7.41	46.35	54.00	-7.65	AVG
3		7218.000	47.22	0.88	48.10	74.00	-25.90	peak
4		7218.000	41.57	0.88	42.45	54.00	-11.55	AVG
5		9624.000	49.16	2.23	51.39	74.00	-22.61	peak
6		9624.000	43.16	2.23	45.39	54.00	-8.61	AVG

Polarization: Horizontal / 2438 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4867.000	59.51	-7.45	52.06	74.00	-21.94	peak
2	*	4876.000	53.77	-7.45	46.32	54.00	-7.68	AVG
3		7314.000	47.78	0.73	48.51	74.00	-25.49	peak
4		7314.000	41.54	0.73	42.27	54.00	-11.73	AVG
5		9752.000	48.91	3.07	51.98	74.00	-22.02	peak
6		9752.000	42.61	3.07	45.68	54.00	-8.32	AVG

Polarization: Vertical / 2438 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4876.000	58.61	-7.45	51.16	74.00	-22.84	peak
2	*	4876.000	52.72	-7.45	45.27	54.00	-8.73	AVG
3		7314.000	48.29	0.73	49.02	74.00	-24.98	peak
4		7314.000	42.39	0.73	43.12	54.00	-10.88	AVG
5		9752.000	48.12	3.07	51.19	74.00	-22.81	peak
6		9752.000	41.94	3.07	45.01	54.00	-8.99	AVG

Polarization: Horizontal / 2470 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4940.000	60.80	-7.33	53.47	74.00	-20.53	peak
2	*	4940.000	54.68	-7.33	47.35	54.00	-6.65	AVG
3		7410.000	46.93	1.06	47.99	74.00	-26.01	peak
4		7410.000	40.19	1.06	41.25	54.00	-12.75	AVG
5		9880.000	48.01	2.95	50.96	74.00	-23.04	peak
6		9880.000	41.89	2.95	44.84	54.00	-9.16	AVG

Polarization: Vertical / 2470 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4940.000	58.61	-7.33	51.28	74.00	-22.72	peak
2	*	4940.000	52.65	-7.33	45.32	54.00	-8.68	AVG
3		7410.000	47.36	1.06	48.42	74.00	-25.58	peak
4		7410.000	41.06	1.06	42.12	54.00	-11.88	AVG
5		9880.000	47.56	2.95	50.51	74.00	-23.49	peak
6		9880.000	41.42	2.95	44.37	54.00	-9.63	AVG

Note: 1. The testing has been conformed to 10*2480MHz=24800MHz.

2. All other emissions more than 30dB below the limit.

3. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor
   Margin=Emission Level-Limit

4. All the modes have tested and recorded the worst mode(GFSK) in the report. Test frequency are from 1GHz to 25GHz, the amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.

Field strength of fundamental

Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
2406	H	94.24	114	PK	PASS
2406	H	93.17	94	AV	PASS
2406	V	89.70	114	PK	PASS
2406	V	88.93	94	AV	PASS

Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
2438	H	94.12	114	PK	PASS
2438	H	91.18	94	AV	PASS
2438	V	92.43	114	PK	PASS
2438	V	91.34	94	AV	PASS

Frequency	Ant. Polarization	Emission level	Limits	Detector	Result
(MHz)	H / V	dBμV/m	dBμV/m		
2470	H	92.78	114	PK	PASS
2470	H	92.00	94	AV	PASS
2470	V	95.12	114	PK	PASS
2470	V	93.57	94	AV	PASS

Note: The field strength of emissions in this band shall not exceed 50 millivolts/meter.

Spurious Emission in Restricted Band

GFSK

Polarization: Horizontal / 2406 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	54.71	-12.83	41.88	74.00	-32.12	peak
2		2310.000	44.58	-12.83	31.75	54.00	-22.25	AVG
3		2390.000	56.47	-12.42	44.05	74.00	-29.95	peak
4		2390.000	43.85	-12.42	31.43	54.00	-22.57	AVG
5		2400.000	63.57	-12.37	51.20	74.00	-22.80	peak
6	*	2400.000	45.67	-12.37	33.30	54.00	-20.70	AVG

Polarization: Vertical / 2406 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	52.71	-12.83	39.88	74.00	-34.12	peak
2		2310.000	42.58	-12.83	29.75	54.00	-24.25	AVG
3		2390.000	54.47	-12.42	42.05	74.00	-31.95	peak
4		2390.000	42.17	-12.42	29.75	54.00	-24.25	AVG
5		2400.000	60.07	-12.37	47.70	74.00	-26.30	peak
6	*	2400.000	42.64	-12.37	30.27	54.00	-23.73	AVG

Polarization: Horizontal /2470 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	56.10	-12.44	43.66	74.00	-30.34	peak
2		2483.500	41.51	-12.44	29.07	54.00	-24.93	AVG
3		2500.000	54.16	-12.35	41.81	74.00	-32.19	peak
4		2500.000	42.09	-12.35	29.74	54.00	-24.26	AVG

Polarization: Vertical / 2470 MHz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
3		2483.500	60.24	-12.44	47.80	74.00	-26.20	peak
4		2483.500	41.82	-12.44	29.38	54.00	-24.62	AVG
5		2500.000	55.65	-12.35	43.30	74.00	-30.70	peak
6		2500.000	42.05	-12.35	29.70	54.00	-24.30	AVG

Note:
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit

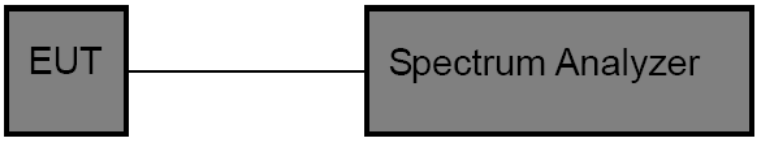
2.The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.

8 20DB Occupy Bandwidth Test

8.1 Test Standard

Test Standard	FCC Part15 C Section 15.215(c)

8.2 Test Setup



8.3 Test Procedure

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.

8.4 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)
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.

14.2 Antenna Connected Construction

The antenna is PCB Antenna which permanently attached, and the best case gain of the antenna is 2.16 dBi. It complies with the standard requirement.

Appendix

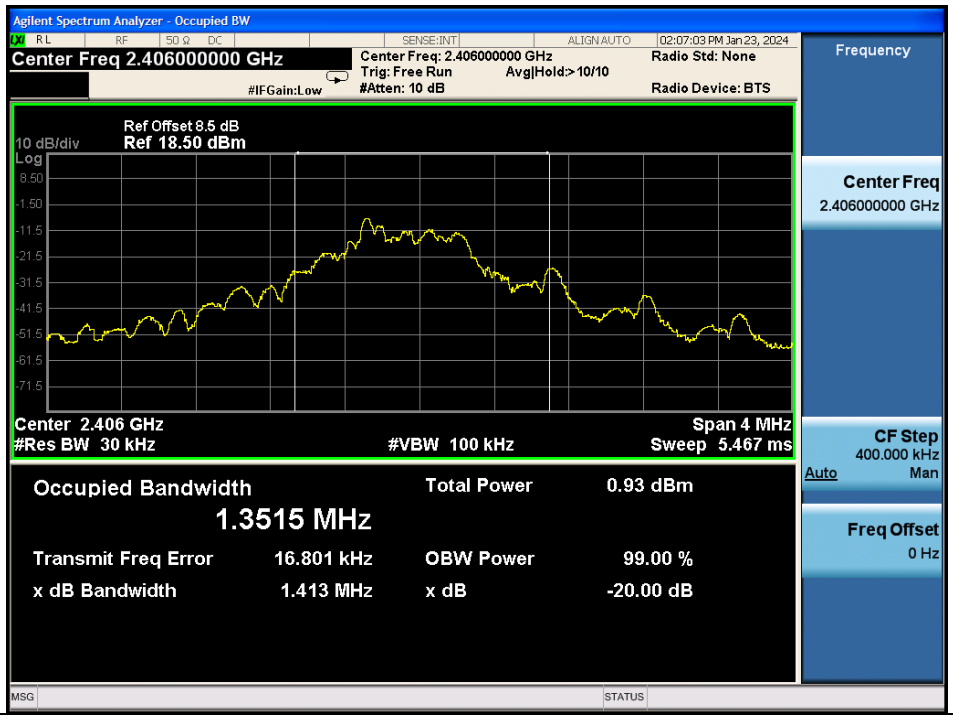
Appendix A: 6.1 Occupied Bandwidth

Test Result

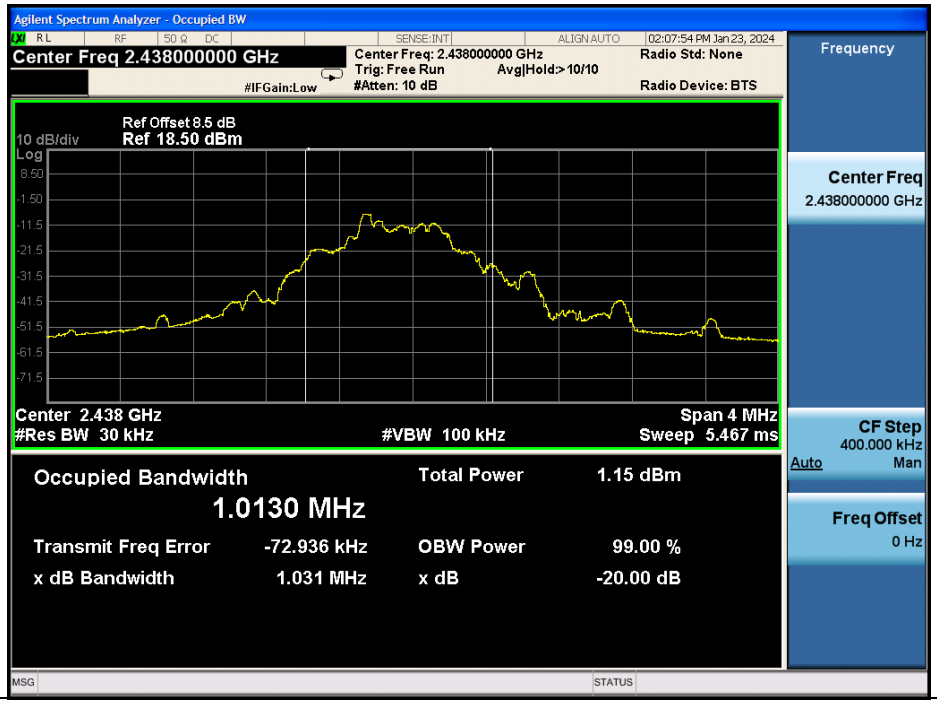
Test Mode	Antenna	Frequency [MHz]	20db EBW [MHz]
Mode1	Ant1	2406	1.413
Mode1	Ant1	2438	1.031
Mode	Ant1	2470	0.9015

Test plots

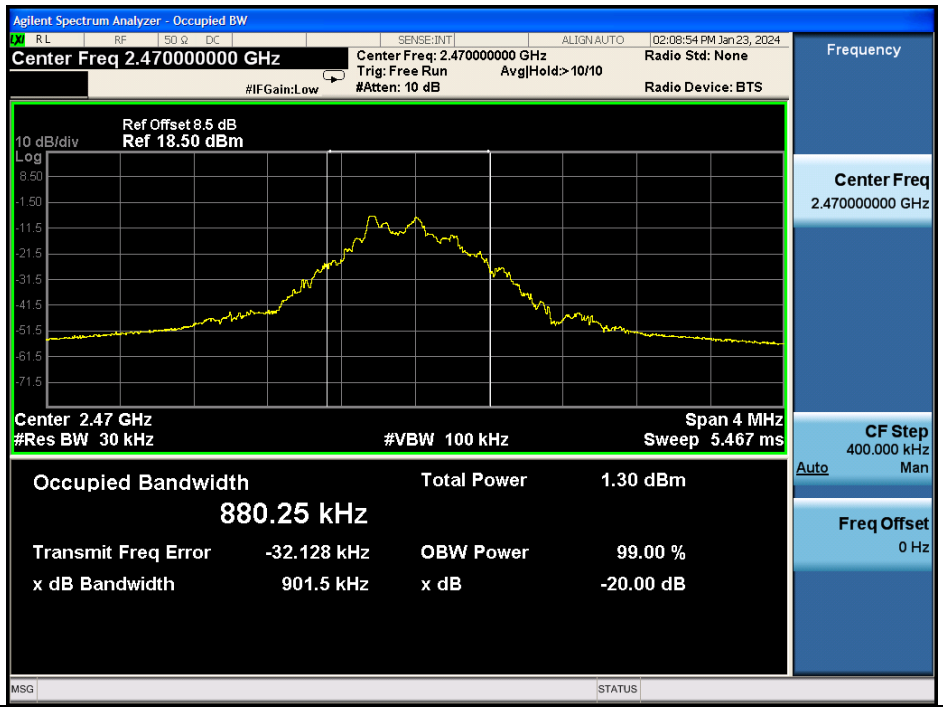
2406MHz



2438MHz



2470MHz



Photographs of the test setup

Refer to Appendix - Test Setup Photos

Photographs of the EUT

Refer to Appendix - EUT Photos

----End of Report----