FCC TEST REPORT

FCC ID: 2BN8A-U01

Product	:	**Underwater Thruster**
Model Name	:	**U01, U2, U5, U92, U2 mini, U8, MU7, BM70, X1, X2, X3, U2 Pro, U4.8, U6, U7, U9, U9 Pro, U10, U11, U12, U13, U15, U18, U20, AQ1020, U22, U25, U30, U35, U40, U45, U50, U55, U60,U70, U80, U90, U100, U150, U200, U300, MU7 Pro, X5, X8, X10, X15, X20, X30, X40, X50, X60, X100, X200, UG500, T1, T5, T10, T20, T30, T40, T50, B965, BP1, BP5, BP8, BP10, BP15, BP20, BP25, BP30, BP35, BP40, BP45, BP50, BP80, BP100, BP200, BP1000, 4650, 2210, 3750, A4650, A5080, A3750, A2828, 2828, 70MAX, AQ70PRO, 2418, 5080, 5062,M100, M600, 0802, 0803, 0804, 0801**
Brand	:	**APISQUEEN®**
Report No.	:	**MAX250220110P01-R01**

Prepared for

Shenzhen Underwater Technology Co.,Ltd.

102, Building 8, Fufengda Company, East District, Baishixia Community, Fuyong Street, Bao'an District, Shenzhen, Guangdong Province, China

Prepared by

MAXLAB Testing Co.,Ltd.

1/F, Building B, Xinshidai GR Park,Shiyan Street, Bao'an District, Shenzhen,Guangdong, 518052, People’s Republic of China

1. TEST RESULT CERTIFICATION

Applicant's name	:	Shenzhen Underwater Technology Co.,Ltd.
Address	:	102, Building 8, Fufengda Company, East District, Baishixia Community, Fuyong Street, Bao'an District, Shenzhen, Guangdong Province, China
Manufacture's name	:	Shenzhen Underwater Technology Co.,Ltd.
Address	:	102, Building 8, Fufengda Company, East District, Baishixia Community, Fuyong Street, Bao'an District, Shenzhen, Guangdong Province, China
Product name	:	Underwater Thruster
Model name	:	U01, U2, U5, U92
Additional model	:	U2 mini, U8, MU7, BM70, X1, X2, X3, U2 Pro, U4.8, U6, U7, U9, U9 Pro, U10, U11,U12, U13, U15, U18, U20, AQ1020, U22, U25, U30, U35, U40, U45, U50, U55, U60,U70, U80, U90, U100, U150, U200, U300, MU7 Pro, X5, X8, X10,X15, X20, X30, X40, X50, X60, X100, X200, UG500, T1, T5, T10, T20, T30, T40, T50, B965, BP1, BP5, BP8, BP10, BP15, BP20, BP25, BP30, BP35, BP40, BP45, BP50, BP80, BP100, BP200, BP1000, 4650, 2210, 3750, A4650, A5080, A3750, A2828, 2828, 70MAX, AQ70PRO, 2418, 5080, 5062,M100, M600, 0802, 0803, 0804, 0801
Standards	:	FCC CFR47 Part 15 Section 15.247
Test procedure	:	ANSI C63.10:2020
Test Date	:	Mar. 03, 2025 to Mar. 24, 2025
Date of Issue	:	Mar. 24, 2025
Test Result	:	Pass

This device described above has been tested by MAXLAB, 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: Cindy zheng

Engineer/ Cindy Zheng

Technical Manager:

RF Manager/Vivian Jiang

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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	PASS
20dB 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.:	FCC-Registration No:562200 Designation Number: CN1338
	MAXLAB Testing Co., Ltd.has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.
	A2LA-Lab Cert.No:4707.01
	MAXLAB Testing Co, Ltd.has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.
	Industry Canada Registration Number.Is:11093A
	CAB identifier: CN0019
	The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.
Name of Firm:	MAXLAB Testing Co, Ltd.
Site Location:	1/F, Building B, Xinshidai GR Park, Shiyan Street, Bao'an District, Shenzhen, Guangdong, 518052, People's Republic of China

4. General Information

4.1. General Description of E.U.T.

Product Name	:	Underwater Thruster
Model Name	:	U01, U2, U5, U92
Sample ID	:	20250221Z-001#
Sample(s) Status:	:	Engineer sample
Additional model	:	U2 mini, U8, MU7, BM70, X1, X2, X3, U2 Pro, U4.8, U6, U7, U9, U9 Pro, U10, U11,U12, U13, U15, U18, U20, AQ1020, U22, U25, U30, U35, U40, U45, U50, U55, U60,U70, U80, U90, U100, U150, U200, U300, MU7 Pro, X5, X8, X10,X15, X20, X30, X40, X50, X60, X100, X200, UG500, T1, T5, T10, T20, T30, T40, T50, B965, BP1, BP5, BP8, BP10, BP15, BP20, BP25, BP30, BP35, BP40, BP45, BP50, BP80, BP100, BP200, BP1000, 4650, 2210, 3750, A4650, A5080, A3750, A2828, 2828, 70MAX, AQ70PRO, 2418, 5080, 5062,M100, M600, 0802, 0803, 0804, 0801
Difference	:	All models are the same except for model name and colour.
Operating frequency	:	2402-2480MHz
Numbers of Channel	:	79 channels
Antenna Type	:	Internal Antenna
Antenna Gain	:	2.98dBi
Type of Modulation	:	GFSK
Power supply	:	DC 3.7V From Battery; Charging input: DC 5V
Hardware Version	:	/
Software Version	:	/
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 have been tested. 79 Channels are provided by EUT. The 3 channels of lower, medium and higher were chosen for test.

Channel List:

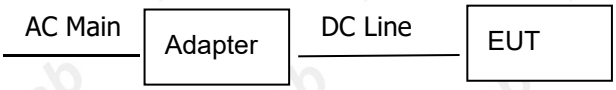
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	1	2403	2	2404	3	2405
4	2406	5	2407	6	2408	7	2409
8	2410	9	2411	10	2412	11	2413
12	2414	13	2415	14	2416	15	2417
16	2418	17	2419	18	2420	19	2421
20	2422	21	2423	22	2424	23	2425
24	2426	25	2427	26	2428	27	2429
28	2430	29	2431	30	2432	31	2433
32	2434	33	2435	34	2436	35	2437
36	2438	37	2439	38	2440	39	2441
40	2442	41	2443	42	2444	43	2445
44	2446	45	2447	46	2448	47	2449
48	2450	49	2451	50	2452	51	2453
52	2454	53	2455	54	2456	55	2457
56	2458	57	2459	58	2460	59	2461
60	2462	61	2463	62	2464	63	2465
64	2466	65	2467	66	2468	67	2469
68	2470	69	2471	70	2472	71	2473
72	2474	73	2475	74	2476	75	2477
76	2478	77	2479	78	2480	-	-

Test Channel

Channel	Frequency(MHz)
0	2402
39	2441
78	2480

4.3. Test Setup Configuration

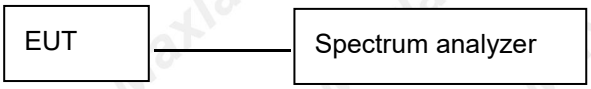
Conducted Emission



Radiated Emission

Radiated Spurious

Conducted Spurious



4.4. Test configuration

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	FCC_assist_1.0.2.2
Power level setup	0 dBm

5. Equipment During Test

5.1. Equipments List

Conducted Emission					
Test Equipment	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	MAX252	2024-10-27	2025-10-26
EMI Test Receiver	R&S	ESCI 7	MAX552	2024-10-27	2025-10-26
Coaxial Switch	ANRITSU CORP	MP59B	MAX225	2024-10-27	2025-10-26
ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	MAX226	2024-10-27	2025-10-26
Coaxial Cable	MAX	N/A	MAX227	N/A	N/A
Thermo meter	KTJ	TA328	MAX233	2024-10-27	2025-10-26
Absorbing clamp	Elektronik-Feinmechanik	MDS21	MAX229	2024-10-27	2025-10-26
LISN	R&S	ENV216	308	2024-10-27	2025-10-26
LISN	R&S	ENV216	314	2024-10-27	2025-10-26

Radiation Test equipment					
Test Equipment	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)*6.4(H)	MAX250	2024-10-27	2025-10-26
Control Room	ZhongYu Electron	6.2(L)*2.5(W)*2.4(H)	MAX251	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESU26	MAX203	2024-10-27	2025-10-26
BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	MAX214	2024-10-27	2025-10-26
Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	MAX208	2024-10-27	2025-10-26
Horn Antenna	ETS-LINDGREN	3160	MAX217	2024-10-27	2025-10-26
Coaxial Cable	MAX	N/A	MAX213	2024-10-27	2025-10-26
Coaxial Cable	MAX	N/A	MAX211	2024-10-27	2025-10-26
Coaxial cable	MAX	N/A	MAX210	2024-10-27	2025-10-26
Coaxial Cable	MAX	N/A	MAX212	2024-10-27	2025-10-26
Amplifier(100kHz-3GHz)	HP	8347A	MAX204	2024-10-27	2025-10-26
Amplifier(2GHz-20GHz)	HP	84722A	MAX206	2024-10-27	2025-10-26
Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	MAX218	2024-10-27	2025-10-26
Band filter	Amindeon	82346	MAX219	2024-10-27	2025-10-26
Power Meter	Anritsu	ML2495A	MAX540	2024-10-27	2025-10-26
Power Sensor	Anritsu	MA2411B	MAX541	2024-10-27	2025-10-26
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	MAX575	2024-10-27	2025-10-26
Splitter	Agilent	11636B	MAX237	2024-10-27	2025-10-26
Loop Antenna	ZHINAN	ZN30900A	MAX534	2024-10-27	2025-10-26
Breitband hornantenne	SCHWARZBECK	BBHA 9170	MAX579	2024-10-27	2025-10-26
Amplifier	TDK	PA-02-02	MAX574	2024-10-27	2025-10-26

Amplifier	TDK	PA-02-03	MAX576	2024-10-27	2025-10-26
PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	MAX578	2024-10-27	2025-10-26

RF Conducted Test:					
Test Equipment	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
MXA Signal Analyzer	Agilent	N9020A	MAX566	2024-10-27	2025-10-26
EMI Test Receiver	R&S	ESCI 7	MAX552	2024-10-27	2025-10-26
Spectrum Analyzer	Agilent	E4440A	MAX533	2024-10-27	2025-10-26
MXG vector Signal Generator	Agilent	N5182A	MAX567	2024-10-27	2025-10-26
ESG Analog Signal Generator	Agilent	E4428C	MAX568	2024-10-27	2025-10-26
USB RF Power Sensor	DARE	RPR3006W	MAX569	2024-10-27	2025-10-26
RF Switch Box	Shongyi	RFSW3003328	MAX571	2024-10-27	2025-10-26
Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	MAX572	2024-10-27	2025-10-26

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	EZ	EZ-EMC	EMC-CON 3A1.1+
2	EMC radiation test system	EZ	EZ-EMC	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
Radiated Emission(25GHz~40GHz)	±3.38dB
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%	

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	Underwater Thruster	/	U01	/	EUT
E-2	QUICK CHARGE	HUAWEI	HW-090200CH0	B98787L5E00423	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
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)

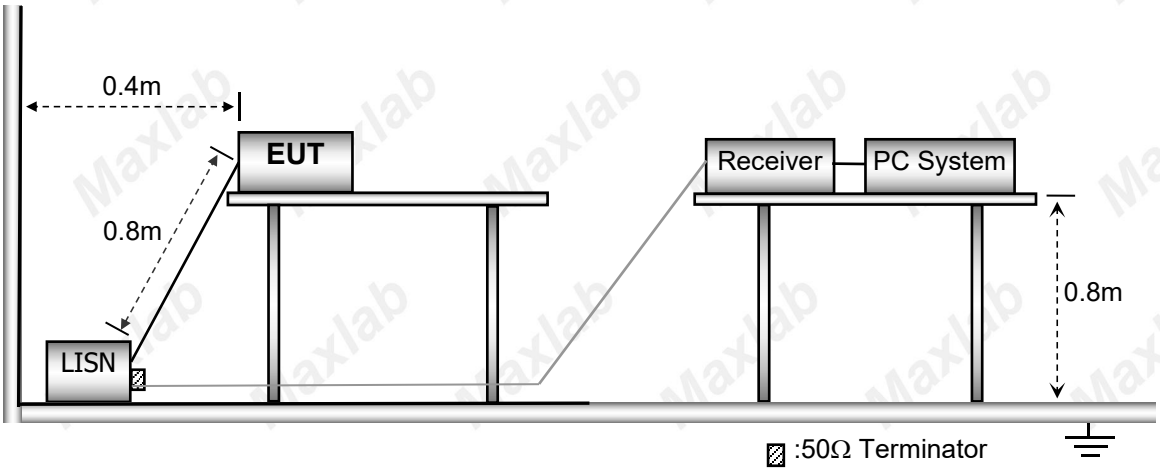
6.1. E.U.T. Operation

Operating Environment **:**

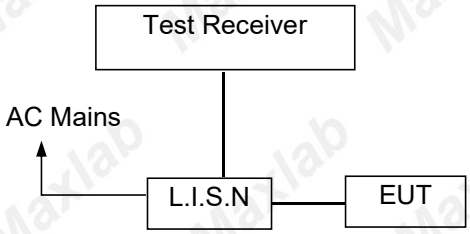
Temperature:	:	23.2°C
Humidity:	:	51 % RH
Atmospheric Pressure:	:	101.12 kPa
Test Voltage	:	AC 120V/60Hz

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.

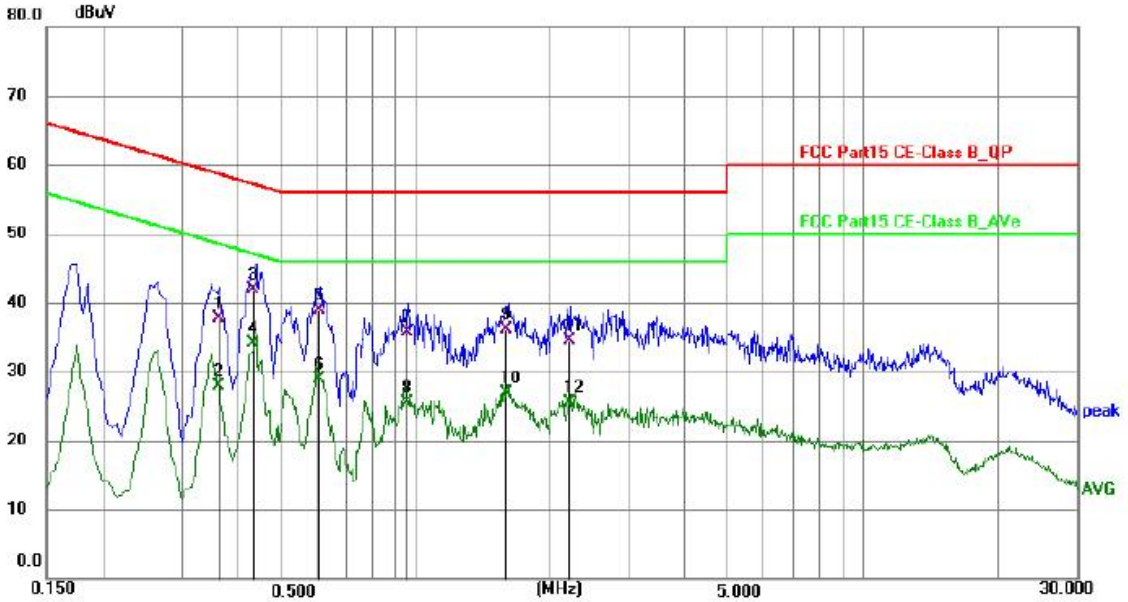
6.6. Measurement Description

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

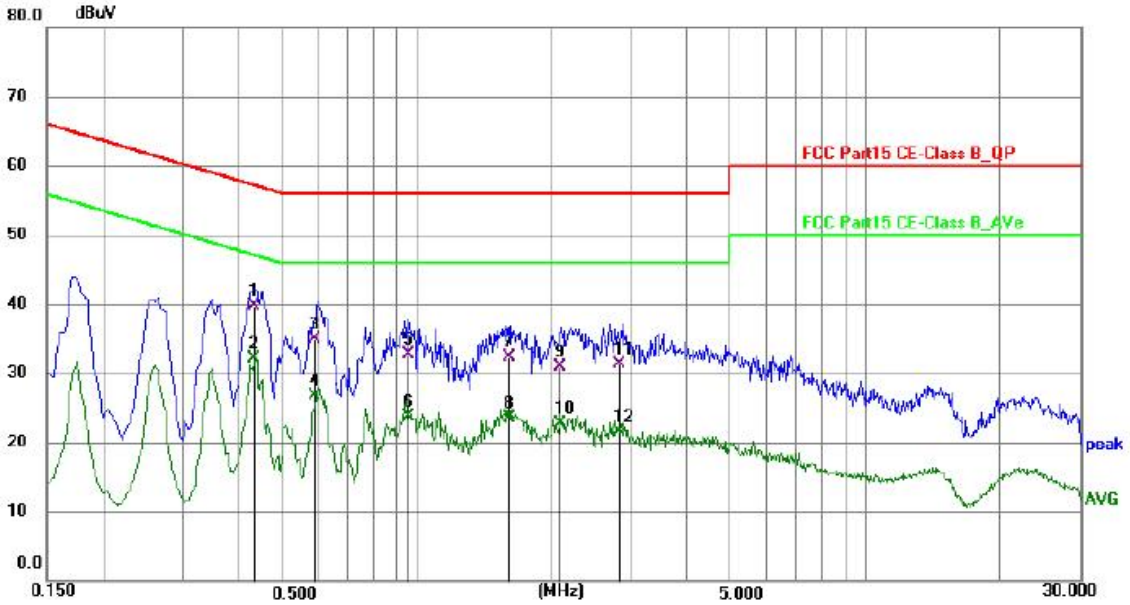
Pass.
Conducted emission at both 120V & 240V is assessed, and emission at 120V represents the worst case. All the modulation modes were tested the data of the worst mode (GFSK, Middle channel) are recorded in the following pages and the others modulation methods do not exceed the limits.

Temperature:	25 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	GFSK, Middle Channel



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.3647	18.22	19.49	37.71	58.62	-20.91	QP
2	0.3647	8.36	19.49	27.85	48.62	-20.77	AVG
3	0.4370	22.35	19.49	41.84	57.12	-15.28	QP
4 *	0.4370	14.64	19.49	34.13	47.12	-12.99	AVG
5	0.6128	19.40	19.49	38.89	56.00	-17.11	QP
6	0.6128	9.47	19.49	28.96	46.00	-17.04	AVG
7	0.9629	16.30	19.50	35.80	56.00	-20.20	QP
8	0.9629	5.91	19.50	25.41	46.00	-20.59	AVG
9	1.6006	16.64	19.52	36.16	56.00	-19.84	QP
10	1.6006	7.48	19.52	27.00	46.00	-19.00	AVG
11	2.2126	15.00	19.54	34.54	56.00	-21.46	QP
12	2.2126	6.05	19.54	25.59	46.00	-20.41	AVG

Temperature:	25 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	GFSK, Middle Channel



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.4363	20.14	19.49	39.63	57.13	-17.50	QP
2 *	0.4363	12.58	19.49	32.07	47.13	-15.06	AVG
3	0.5928	15.33	19.49	34.82	56.00	-21.18	QP
4	0.5928	7.23	19.49	26.72	46.00	-19.28	AVG
5	0.9627	13.15	19.51	32.66	56.00	-23.34	QP
6	0.9627	4.26	19.51	23.77	46.00	-22.23	AVG
7	1.6123	12.71	19.53	32.24	56.00	-23.76	QP
8	1.6123	3.95	19.53	23.48	46.00	-22.52	AVG
9	2.0945	11.45	19.55	31.00	56.00	-25.00	QP
10	2.0945	3.14	19.55	22.69	46.00	-23.31	AVG
11	2.8478	11.74	19.56	31.30	56.00	-24.70	QP
12	2.8478	1.91	19.56	21.47	46.00	-24.53	AVG

Remark:

Margin = Limit – Level, Correct Factor = Cable lose + LISN insertion loss, Level= Reading + Correct factor

7. Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247

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

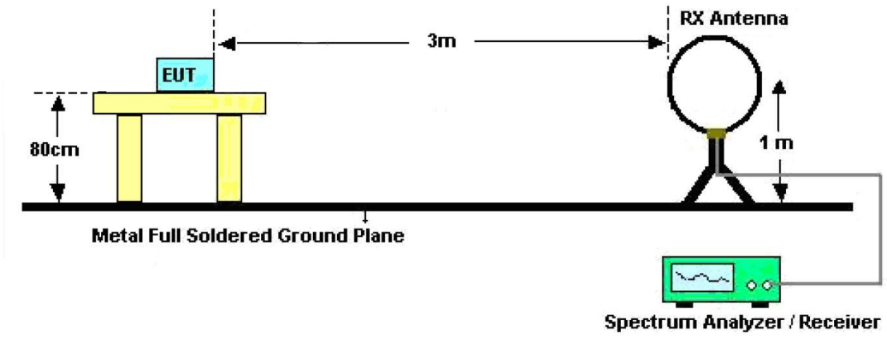
Atmospheric Pressure : 101.3kPa

Test Voltage : AC 120V60Hz

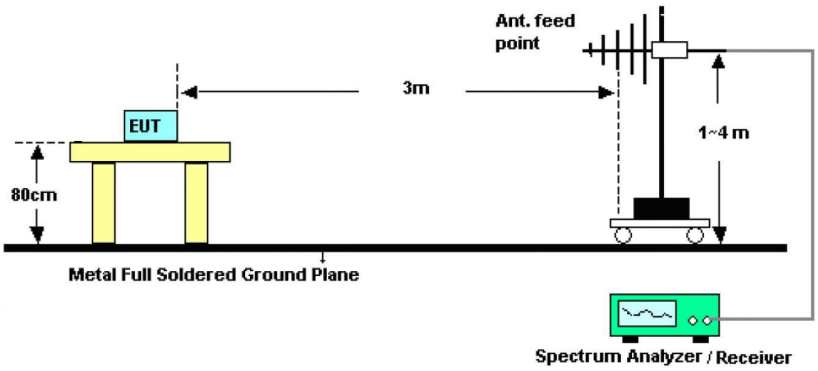
7.2. Test Setup

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

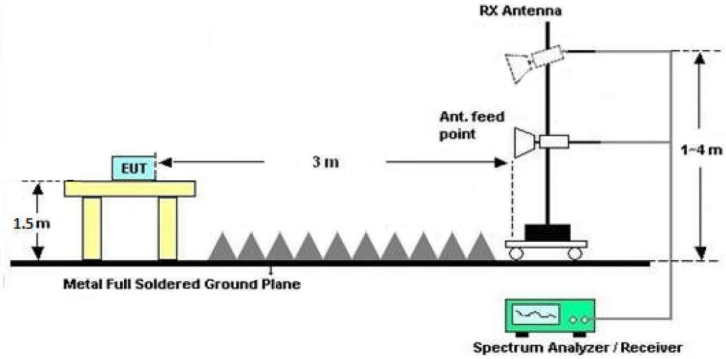
The test setup for emission measurement below 30MHz.



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:

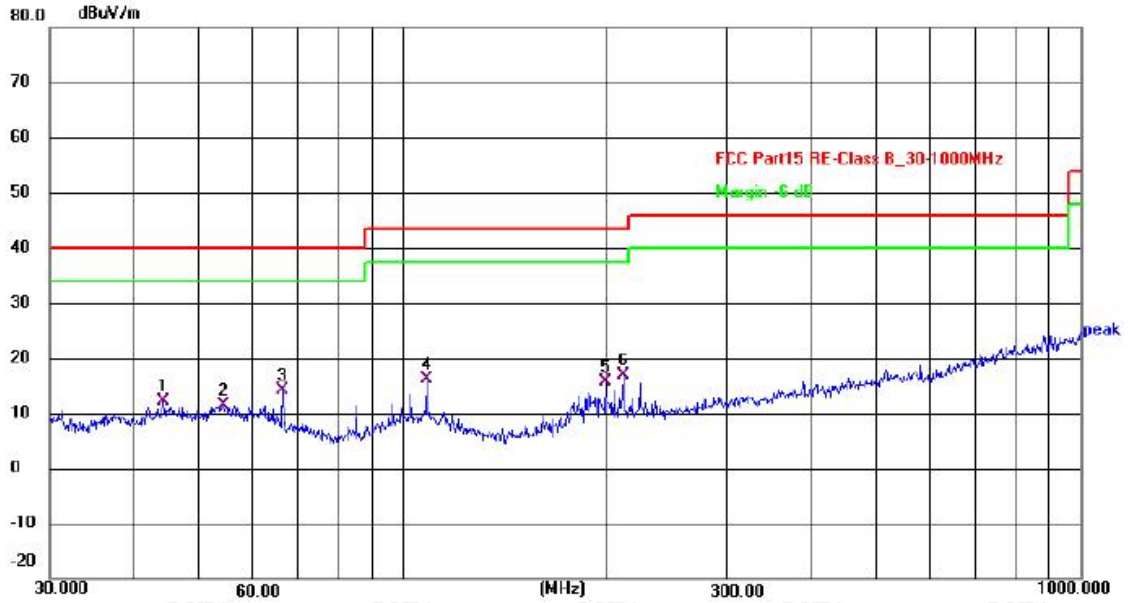
The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

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

Test Frequency: 30MHz ~ 1GHz

Please refer to the following test plots,Low Channel (2402MHz) Worst case GFSK for record::

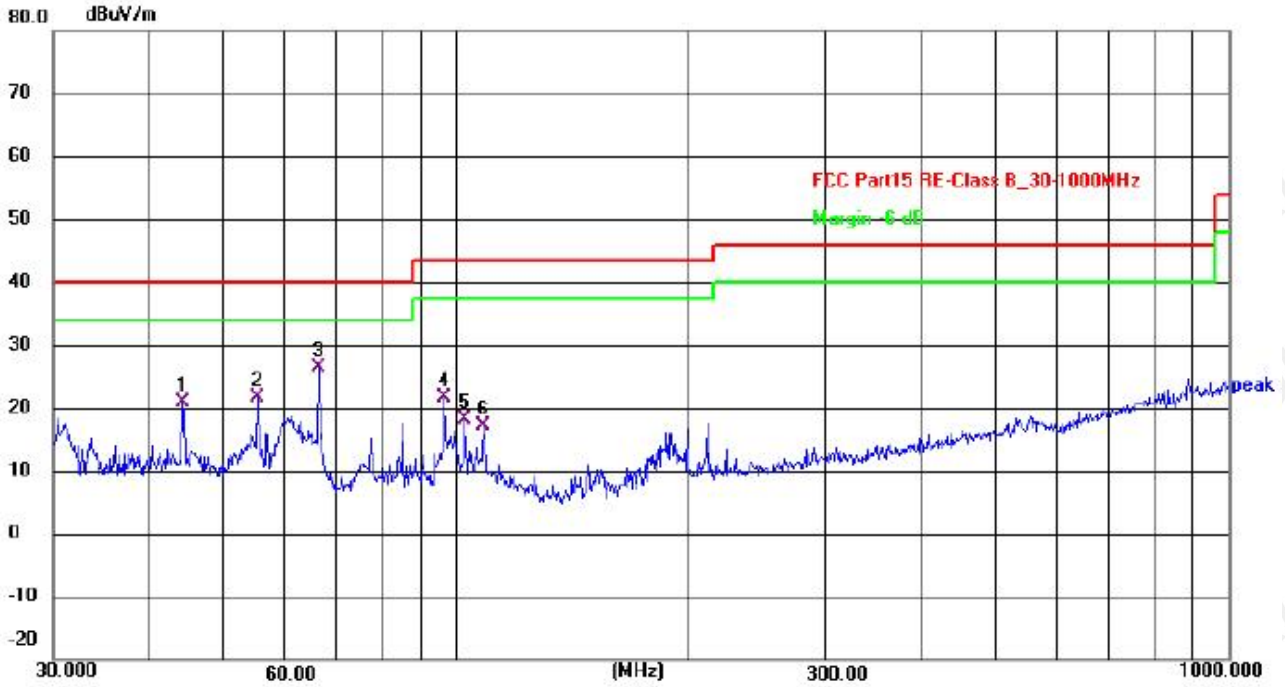
Temperature:	25 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	Horizontal
Test Voltage :	DC 3.7V	Test Mode:	GFSK, Low Channel



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	44.1202	26.51	-14.45	12.06	40.00	-27.94	QP
2	54.2610	25.88	-14.55	11.33	40.00	-28.67	QP
3	66.2662	31.08	-16.95	14.13	40.00	-25.87	QP
4	108.2667	31.79	-15.71	16.08	43.50	-27.42	QP
5	198.5880	32.08	-16.50	15.58	43.50	-27.92	QP
6	210.7860	32.76	-16.00	16.76	43.50	-26.74	QP

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

Temperature:	25 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	Vertical
Test Voltage :	DC 3.7V	Test Mode:	GFSK, Low Channel



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	44.1202	35.32	-14.45	20.87	40.00	-19.13	QP
2	55.2207	36.39	-14.64	21.75	40.00	-18.25	QP
3	66.2662	43.31	-16.95	26.36	40.00	-13.64	QP
4	96.4362	38.34	-16.73	21.61	43.50	-21.89	QP
5	102.3597	34.00	-15.84	18.16	43.50	-25.34	QP
6	108.2667	32.91	-15.71	17.20	43.50	-26.30	QP

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

Test Frequency 1GHz-25GHz

GFSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel:2402MHz									
V	4804.00	48.95	34.12	5.03	32.39	52.25	74.00	-21.75	Pk
V	4804.00	39.56	34.12	5.03	32.39	42.86	54.00	-11.14	AV
V	7206.00	45.14	32.54	6.29	35.86	54.75	74.00	-19.25	Pk
V	7206.00	37.72	32.54	6.29	35.86	47.33	54.00	-6.67	AV
V	9608.00	46.09	32.98	7.55	38.40	59.06	74.00	-14.94	Pk
V	9608.00	34.70	32.98	7.55	38.40	47.67	54.00	-6.33	AV
V	12010.00	45.21	32.09	8.93	39.00	61.05	74.00	-12.95	Pk
V	12010.00	32.17	32.09	8.93	39.00	48.01	54.00	-5.99	AV
H	4804.00	47.27	34.12	5.03	32.39	50.57	74.00	-23.43	Pk
H	4804.00	39.82	34.12	5.03	32.39	43.12	54.00	-10.88	AV
H	7206.00	47.68	32.54	6.29	35.86	57.29	74.00	-16.71	Pk
H	7206.00	36.21	32.54	6.29	35.86	45.82	54.00	-8.18	AV
H	9608.00	46.10	32.98	7.55	38.40	59.07	74.00	-14.93	Pk
H	9608.00	32.26	32.98	7.55	38.40	45.23	54.00	-8.77	AV
H	12010.00	38.78	32.09	8.93	39.00	54.62	74.00	-19.38	Pk
H	12010.00	26.78	32.09	8.93	39.00	42.62	54.00	-11.38	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Middle Channel:2441MHz									
V	4882.00	47.42	34.07	5.09	32.59	51.03	74.00	-22.97	Pk
V	4882.00	35.85	34.07	5.09	32.59	39.46	54.00	-14.54	AV
V	7323.00	46.34	32.63	6.34	35.96	56.01	74.00	-17.99	Pk
V	7323.00	34.24	32.63	6.34	35.96	43.91	54.00	-10.09	AV
V	9764.00	38.58	32.92	7.59	38.40	51.65	74.00	-22.35	Pk
V	9764.00	27.23	32.92	7.59	38.40	40.30	54.00	-13.70	AV
V	12205.00	38.66	31.96	8.88	39.04	54.62	74.00	-19.38	Pk
V	12205.00	27.74	31.96	8.88	39.04	43.70	54.00	-10.30	AV
H	4882.00	49.63	34.07	5.09	32.59	53.24	74.00	-20.76	Pk
H	4882.00	39.58	34.07	5.09	32.59	43.19	54.00	-10.81	AV
H	7323.00	44.66	32.63	6.34	35.96	54.33	74.00	-19.67	Pk
H	7323.00	31.58	32.63	6.34	35.96	41.25	54.00	-12.75	AV
H	9764.00	38.41	32.92	7.59	38.40	51.48	74.00	-22.52	Pk
H	9764.00	27.30	32.92	7.59	38.40	40.37	54.00	-13.63	AV
H	12205.00	39.71	31.96	8.88	39.04	55.67	74.00	-18.33	Pk
H	12205.00	28.35	31.96	8.88	39.04	44.31	54.00	-9.69	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
High Channel:2480MHz									
V	4960.00	46.19	34.02	5.15	32.80	50.12	74.00	-23.88	Pk
V	4960.00	35.77	34.02	5.15	32.80	39.70	54.00	-14.30	AV
V	7440.00	44.72	32.71	6.40	36.05	54.46	74.00	-19.54	Pk
V	7440.00	31.11	32.71	6.40	36.05	40.85	54.00	-13.15	AV
V	9920.00	42.43	32.86	7.62	38.40	55.59	74.00	-18.41	Pk
V	9920.00	29.18	32.86	7.62	38.40	42.34	54.00	-11.66	AV
V	12400.00	40.85	31.82	8.84	39.08	56.95	74.00	-17.05	Pk
V	12400.00	26.56	31.82	8.84	39.08	42.66	54.00	-11.34	AV
H	4960.00	49.42	34.02	5.15	32.80	53.35	74.00	-20.65	Pk
H	4960.00	38.49	34.02	5.15	32.80	42.42	54.00	-11.58	AV
H	7440.00	47.11	32.71	6.40	36.05	56.85	74.00	-17.15	Pk
H	7440.00	32.87	32.71	6.40	36.05	42.61	54.00	-11.39	AV
H	9920.00	40.96	32.86	7.62	38.40	54.12	74.00	-19.88	Pk
H	9920.00	31.21	32.86	7.62	38.40	44.37	54.00	-9.63	AV
H	12400.00	38.56	31.82	8.84	39.08	54.66	74.00	-19.34	Pk
H	12400.00	29.53	31.82	8.84	39.08	45.63	54.00	-8.37	AV

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

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

	Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Detector Type	Result
GFSK	Low Channel: 2402MHz									
	H	2390.00	57.54	35.17	3.48	27.49	53.34	74.00	PK	PASS
	H	2390.00	49.94	35.17	3.48	27.49	45.74	54.00	AV	PASS
	H	2400.00	60.22	35.16	3.49	27.52	56.07	74.00	PK	PASS
	H	2400.00	49.42	35.16	3.49	27.52	45.27	54.00	AV	PASS
	V	2390.00	58.36	35.17	3.48	27.49	54.16	74.00	PK	PASS
	V	2390.00	50.05	35.17	3.48	27.49	45.85	54.00	AV	PASS
	V	2400.00	59.55	35.16	3.49	27.52	55.40	74.00	PK	PASS
	V	2400.00	49.50	35.16	3.49	27.52	45.35	54.00	AV	PASS
	High Channel: 2480MHz									
	H	2483.50	57.78	35.11	3.56	27.75	53.98	74.00	PK	PASS
	H	2483.50	48.93	35.11	3.56	27.75	45.13	54.00	AV	PASS
	H	2500.00	59.53	35.10	3.57	27.80	55.80	74.00	PK	PASS
	H	2500.00	49.56	35.10	3.57	27.80	45.83	54.00	AV	PASS
	V	2483.50	58.89	35.11	3.56	27.75	55.09	74.00	PK	PASS
	V	2483.50	50.23	35.11	3.56	27.75	46.43	54.00	AV	PASS
	V	2500.00	58.85	35.10	3.57	27.80	55.12	74.00	PK	PASS
	V	2500.00	49.31	35.10	3.57	27.80	45.58	54.00	AV	PASS

Remark:

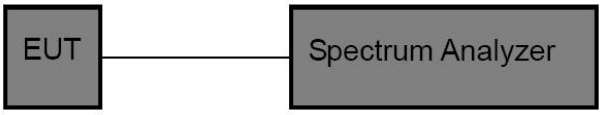
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit

8. Maximum Peak Output Power Test

8.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(3)
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

1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above,

2. Spectrum Setting:

   RBW > the 20 dB bandwidth of the emission being measured

   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

   VBW ≥ RBW

   Sweep = auto

   Detector function = peak

   Trace = max hold

8.4. Test Data

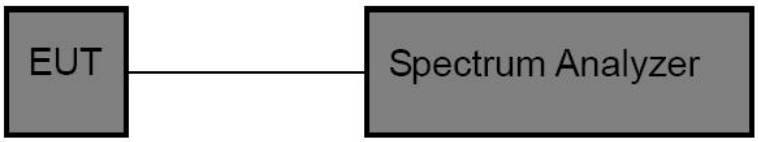
Please see the attachment for data.

9. 20DB Occupy Bandwidth Test

9.1. Test Standard

Test Standard	FCC Part15 C Section 15.247 (a)(1)

9.2. Test Setup



9.3. 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.

9.4. Test Data

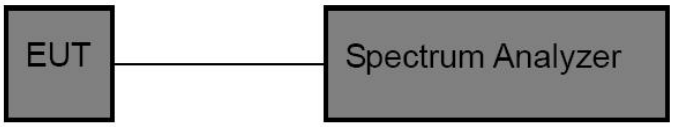
Please see the attachment for data.

10. Carrier Frequency Separation Test

10.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
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 = 300 kHz.
3. Set the VBW = 1MHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

10.4. Test Data

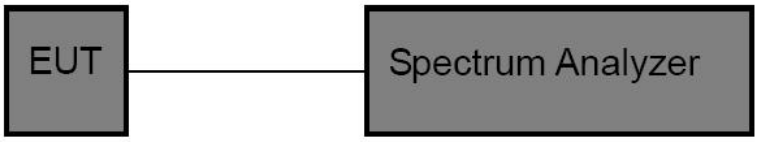
Please see the attachment for data.

11. Number of Hopping Channel Test

11.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
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

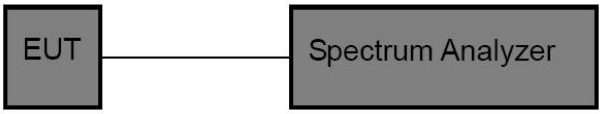
Please see the attachment for data.

12. Dwell Time Test

12.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
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

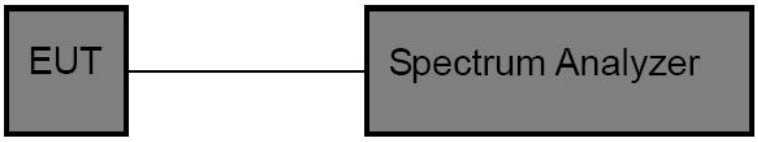
Please see the attachment for data.

13. 100kHz Bandwidth of Frequency Band Edge Requirement

13.1 Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d)
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)
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.

14.2 Antenna Connected Construction

The antenna is Internal Antenna which permanently attached, and the best case gain of the antenna is 2.98dBi. It complies with the standard requirement.

15. TEST SETUP & EUT PHOTOGRAPH

Please see the attachment for details.

---------- End of Report ----------