



FCC TEST REPORT

FCC ID:2BWH3-X2

Product : Skimmer Robot
Model Name : X2-02-SJ
Brand : iGarden
Report No. : SZNTT26023337E1-2

Prepared for

Shenzhen Haixin Robot Technology Co., Ltd.

Room 909, Building 4, Phase II, Dongjiu Innovation Technology Park, No. 73 Xiali South Road, Xialilang Community, Nanwan Street, Longgang District, Shenzhen, China

Prepared by

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1 TEST RESULT CERTIFICATION

Applicant's name : Shenzhen Haixin Robot Technology Co., Ltd.
Address : Room 909, Building 4, Phase II, Dongjiu Innovation Technology Park, No. 73
Xiali South Road, Xialilang Community, Nanwan Street, Longgang District,
Shenzhen, China
Manufacture's name : FAIRLAND ISPACE LIMITED
Address : 19F ABCDE, China Energy Storage Building, No. 3099, South Keyuan Road,
High-tech Community, Yuehai Street, Nanshan District, Shenzhen, China
Product Name : Skimmer Robot
Model Name : X2-02-SJ
Additional model : X2-01-GN, X2-02-GN, X2-01-SJ
Standards : FCC CFR47 Part 15 Section 15.247
Test procedure : ANSI C63.10-2020
KDB 558074 D01 15.247 Meas Guidance v05r02
Date of test : Jun. 05, 2026 to Jun. 18, 2026
Date of Issue : Jun. 18, 2026
Test Result : Pass

This device described above has been tested by NTT, 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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Prepared by(Test Engineer):

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Approved(Manager):

Abel Yu



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2 Test Summary

Test Items	Test Requirement	Result
AC Power Line conducted emission	FCC part 15.207	PASS
Radiated Spurious Emissions	FCC part 15.205/15.209	PASS
Conducted Spurious Emission	FCC part 15. 247(d)	PASS
Band edge	FCC part 15.247(d)	PASS
6dB&99% Bandwidth	FCC part 15.247 (a)(2)	PASS
Maximum Peak Output Power	FCC part 15.247 (b)(3)	PASS
Power Spectral Density	FCC part 15.247 (e)	PASS
Antenna Requirement	FCC part 15.203/15.247 (b)(4)	PASS

Remark:

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



3 TEST FACILITY

Site Description

Designation Number: CN3446

EMC Lab.

: Test Firm Registration Number: 129414
Accredited by ANAB, Dec. 19, 2025
The Certificate Registration Number is AT-3446

Name of Firm

: Shenzhen NTT Testing Technology Co., Ltd.

Site Location

: 1B, Building 2, Factory Building & 103, Building 3, Factory Building, Dayang Industrial Park No.4, Industrial Avenue, Tangwei Community, Fuhai Sub-district, Bao'an District, Shenzhen City, China

4 General Information

4.1 General Description of E.U.T.

Product Name	:	Skimmer Robot
Model Name	:	X2-02-SJ
Additional model	:	X2-01-GN, X2-02-GN, X2-01-SJ
Difference	:	X2-02-SJ: Have a camera and app functionality. X2-01-SJ: Without app functionality but have a camera. X2-02-GN: Without a camera but have app functionality. X2-01-GN: Without a camera and app functionality.
Sample ID	:	SZNTT26023337E1-001#
Sample(s) Status:	:	Engineer sample
Operating frequency	:	2402-2480MHz
Numbers of Channel	:	40 channels
Type of Modulation	:	GFSK
Rate	:	1Mbps
Antenna Type	:	PCB Antenna
Antenna Gain	:	2.12 dBi
Power supply	:	1. DC 15V From Adapter 2. DC 7.4V From Lithium ion battery
Adapter information	:	Model:GMA18-150100-1A Input:100-240V~ 50-60Hz 1.0A Output:DC 15.0V= 1.0A, 15.0W
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 harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The details of test channels and bandwidth were for RF conductive measurement.

Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	14	2430	28	2458
01	2404	15	2432	29	2460
02	2406	16	2434	30	2462
03	2408	17	2436	31	2464
04	2410	18	2438	32	2466
05	2412	19	2440	33	2468
06	2414	20	2442	34	2470
07	2416	21	2444	35	2472
08	2418	22	2446	36	2474
09	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

Note:

1. Test of channel was included the lowest, middle and highest frequency in highest data rate and to perform the test, then record on this report.

Test Channel:

	Channel	Frequency(MHz)
Low Channel	0	2402
Mid Channel	19	2440
High Channel	39	2480

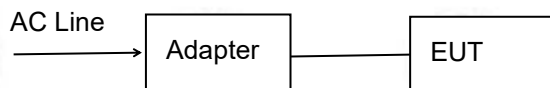


4.3 Test Setup Configuration

Conducted Emission



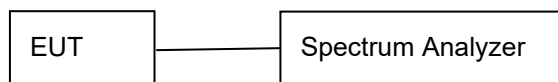
Radiated Emission



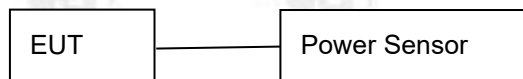
Radiated Spurious



RF Conducted Test



Conducted Output Power Test



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.	



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	HSRCE944	/	HTEC	2025/4/30	2028/4/29
EMI Test Receiver	ESPI	/	RS	2025/9/8	2026/9/7
LISN	NNLK 8129	00603	Schwarzbeck	2025/9/8	2026/9/7
LISN	NNHV 8123-400	00694	Schwarzbeck	2025/9/8	2026/9/7
LISN	NNHV 8123-400	00680	Schwarzbeck	2025/9/8	2026/9/7
Cable	RG223-1500MM	NA	RG	2025/9/8	2026/9/7

Radiated emission & Radio Frequency Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
966 Shielded Room	966 Room	/	EMToni	2025/7/24	2028/7/23
EMI Test Receiver	ESCI	101018	RS	2025/9/8	2026/9/7
Amplifier (30MHz-1GHz)	BBV 9718D	00042	SCHWARZBECK	2025/9/8	2026/9/7
Bilog Antenna (30MHz-1GHz)	VULB9168	1858	SCHWARZBECK	2025/9/9	2026/9/8
Horn antenna (1GHz-18GHz)	BBHA 9120 D	02622	SCHWARZBECK	2025/9/9	2026/9/8
Preamplifier (1GHz-18GHz)	BBV 9718D	0024	SCHWARZBECK	2025/9/8	2026/9/7
Spectrum Analyzer (10Hz-40GHz)	FSV 40	100952	Rohde & Schwarz	2025/9/8	2026/9/7
Preamplifier (18GHz-40GHz)	BBV 9721	0056	SCHWARZBECK	2025/9/8	2026/9/7
Double Ridge Guide Horn Antenna (18GHz-40GHz)	SAS-574	588	A.H.System	2025/9/8	2026/9/7
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHWARZBECK	2025/9/8	2026/9/7
Amplifier (9KHz-30MHz)	CVP 9222 C	00109	SCHWARZBECK	2025/9/8	2026/9/7



MXG Signal Analyzer	N9020A	MY50510202	Agilent	2025/9/8	2026/9/7
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2025/9/8	2026/9/7
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2025/9/8	2026/9/7
Power Sensor	TR1029-2	512364	Techoy	2025/9/8	2026/9/7
RF Swith	TR1029-1	512364	Techoy	2025/9/8	2026/9/7
Cable	DA800-4000MM	NA	DA	2025/9/8	2026/9/7
Cable	DA800-11000MM	NA	DA	2025/9/8	2026/9/7

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	Tonscend	TS+	V5.0.0
2	EMC radiation test system	Tonscend	TS+	V5.0.0
3	RF test system	Tonscend	JS1120	V3.5.39
4	RSE test system	Tonscend	JS36-RSE	V5.0.0



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
Remark:When making a conformity declaration based on test results for regulations/standards or specifications,the default is to use Clause 4.2.1of ILAC-G8:09/2019 and the guidelines on decision rules and conformity declaration in IEC Guide 115:2023.	

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	Skimmer Robot	N/A	X2-01-SJ	N/A	EUT
E-2	Skimmer Robot	N/A	X2-02-SJ	N/A	EUT

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

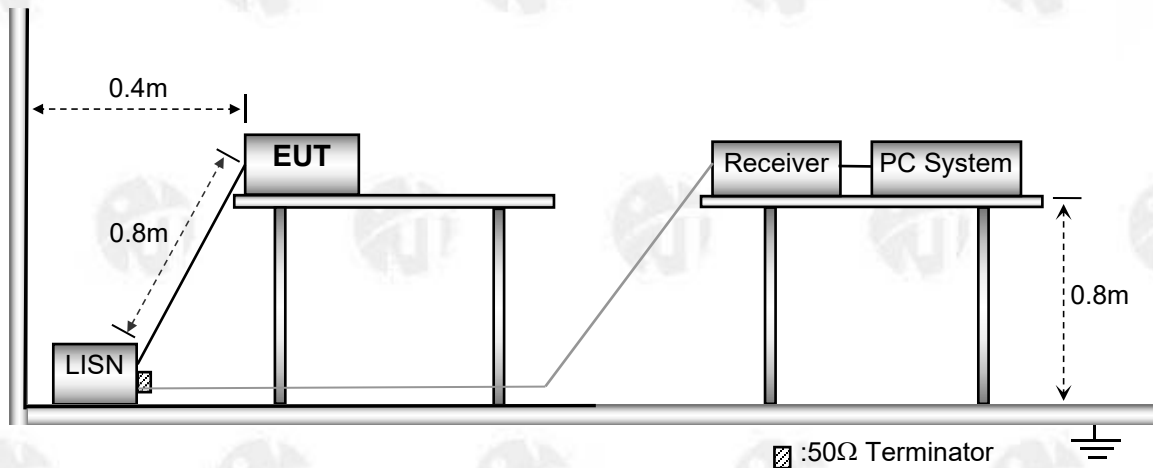
6.1 E.U.T. Operation

Operating Environment :

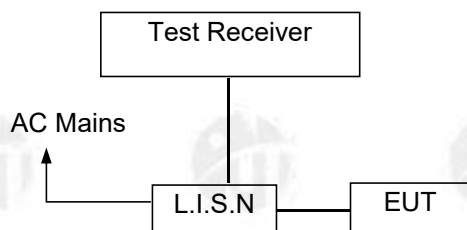
Temperature	: 26 °C
Humidity	: 54 % RH
Atmospheric Pressure	: 101kPa

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10-2020+Cor 1+2023.



6.3 Test SET-UP (Block Diagram of Configuration)





6.4 Measurement Procedure

1. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
4. LISN at least 80 cm from nearest part of EUT chassis.
5. For the actual test configuration, please refer to the related Item - EUT Test Photos.

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.

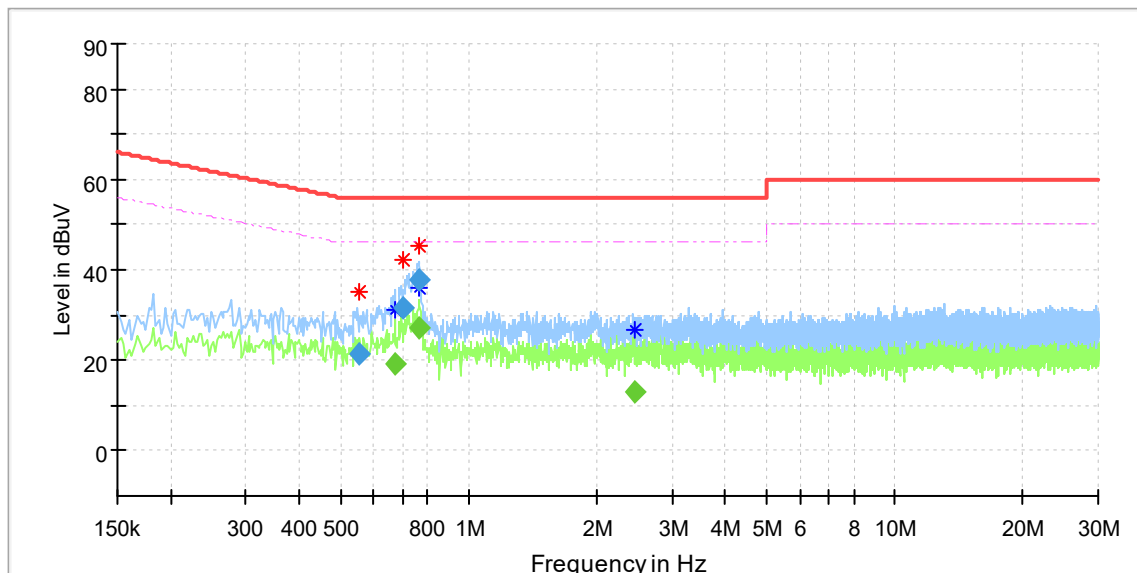
6.7 Conducted Emission Test Result

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 (BLE 1M, Lowest channel) are recorded in the following pages and the others modulation methods do not exceed the limits.



Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	L
Test Voltage :	DC 15V From Adapter	Mode Name:	X2-02-SJ



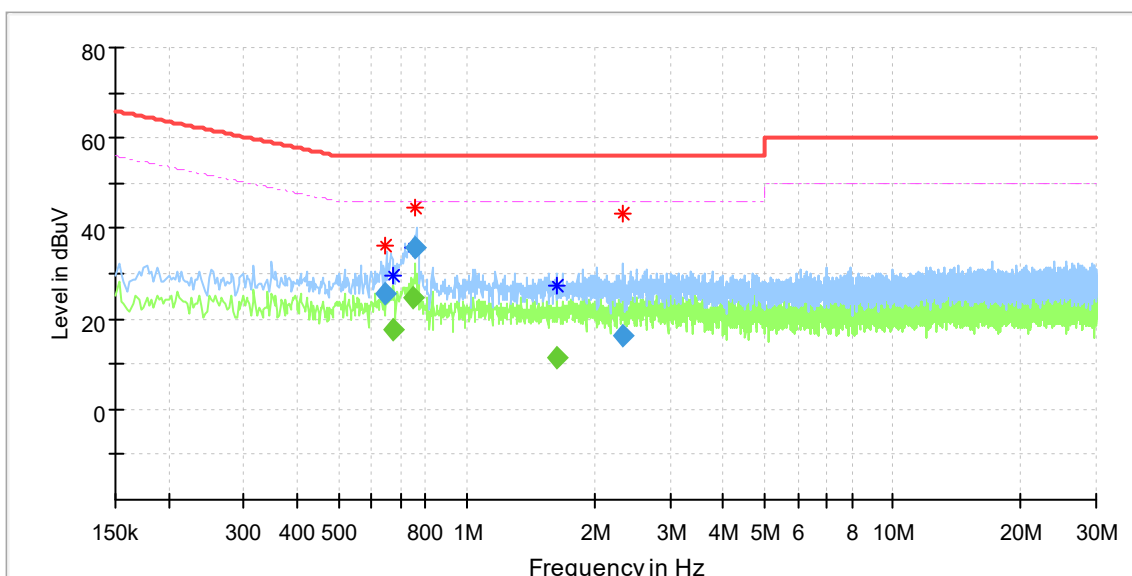
Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Corr. (dB)
0.551	21.5	---	56.0	34.5	20.1
0.669	---	19.2	46.0	26.8	20.1
0.699	31.4	---	56.0	24.6	20.1
0.763	---	27.3	46.0	18.7	20.1
0.765	37.9	---	56.0	18.1	20.1
2.446	---	13.1	46.0	32.9	20.6

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. Correct Factor = Insertion loss of LISN + Cable loss.
4. Level = Reading level + Correct Factor.
5. Margin= Level - Limit



Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	N
Test Voltage :	DC 15V From Adapter	Mode Name:	X2-02-SJ



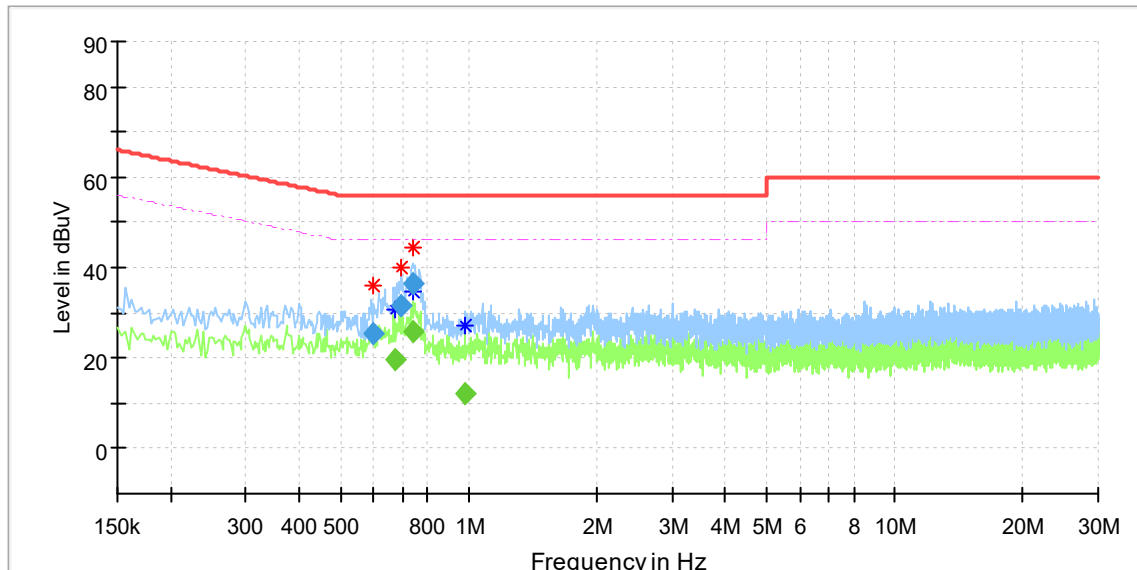
Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Corr. (dB)
0.645	25.5	---	56.0	30.5	20.1
0.675	---	17.7	46.0	28.3	20.1
0.753	---	24.9	46.0	21.1	20.1
0.759	35.5	---	56.0	20.5	20.1
1.622	---	11.3	46.0	34.7	20.1
2.324	16.1	---	56.0	39.9	20.4

Notes:

2. 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. Correct Factor = Insertion loss of LISN + Cable loss.
4. Level = Reading level + Correct Factor.
5. Margin= Level - Limit



Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	L
Test Voltage :	DC 15V From Adapter	Mode Name:	X2-01-SJ



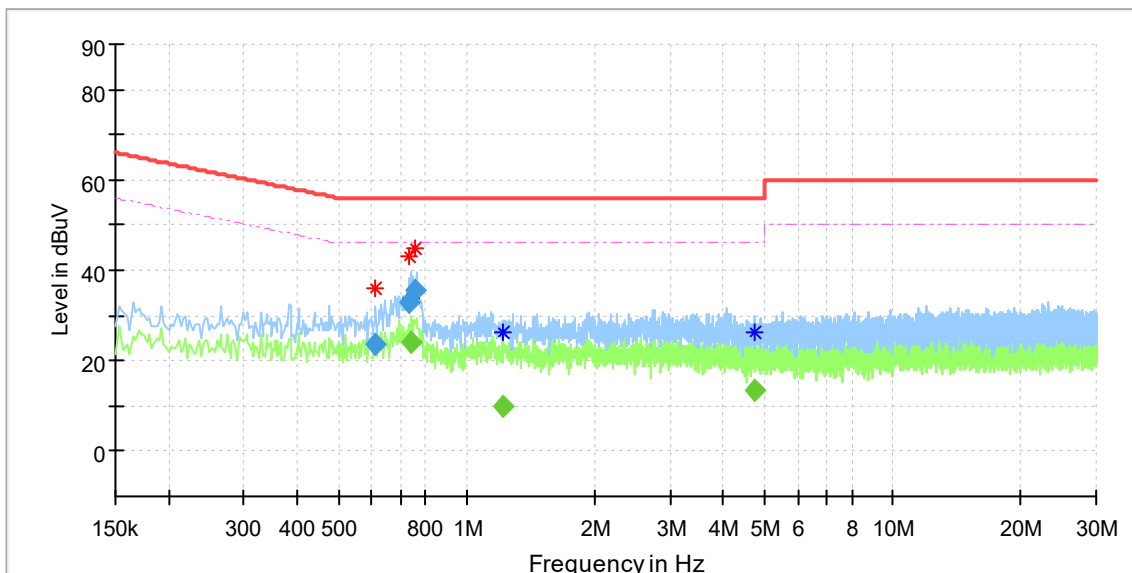
Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Corr. (dB)
0.595	25.4	---	56.0	30.6	20.1
0.671	---	19.6	46.0	26.4	20.1
0.696	31.6	---	56.0	24.4	20.1
0.738	36.3	---	56.0	19.7	20.1
0.738	---	25.7	46.0	20.3	20.1
0.977	---	12.1	46.0	33.9	20.1

Notes:

3. 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. Correct Factor = Insertion loss of LISN + Cable loss.
4. Level = Reading level + Correct Factor.
5. Margin= Level - Limit



Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	N
Test Voltage :	DC 15V From Adapter	Mode Name:	X2-01-SJ



Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Corr. (dB)
0.611	23.8	---	56.0	32.2	20.1
0.734	32.9	---	56.0	23.1	20.1
0.744	---	23.9	46.0	22.1	20.1
0.758	35.5	---	56.0	20.5	20.1
1.213	---	9.8	46.0	36.2	20.1
4.752	---	13.2	46.0	32.8	20.1

Notes:

4. 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. Correct Factor = Insertion loss of LISN + Cable loss.
4. Level = Reading level + Correct Factor.
5. Margin= Level - Limit



7 Radiated Spurious Emissions

Test Requirement : FCC CFR47 Part 15 Section 15.209 & 15.247
 Test Method : ANSI C63.10-2020+Cor 1+2023
 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

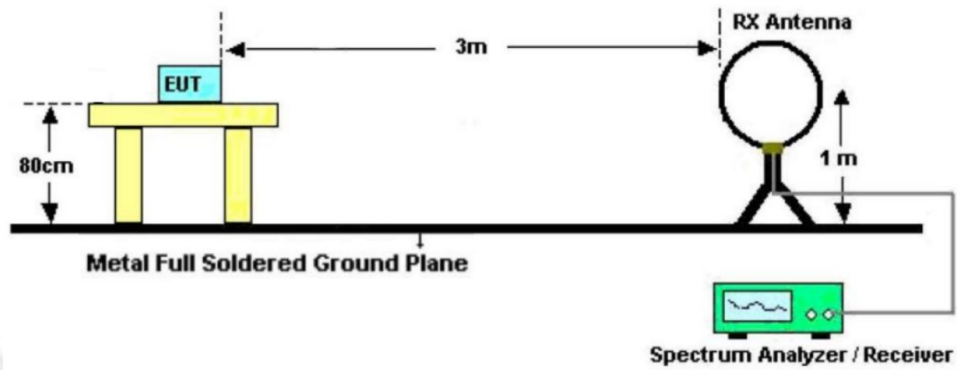
Operating Environment :

Temperature : 26 °C
 Humidity : 54 % RH
 Atmospheric Pressure : 101kPa

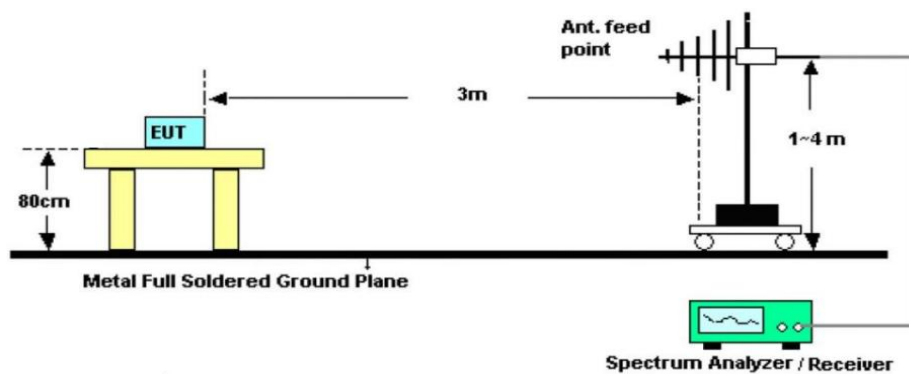
7.2 Test Setup

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

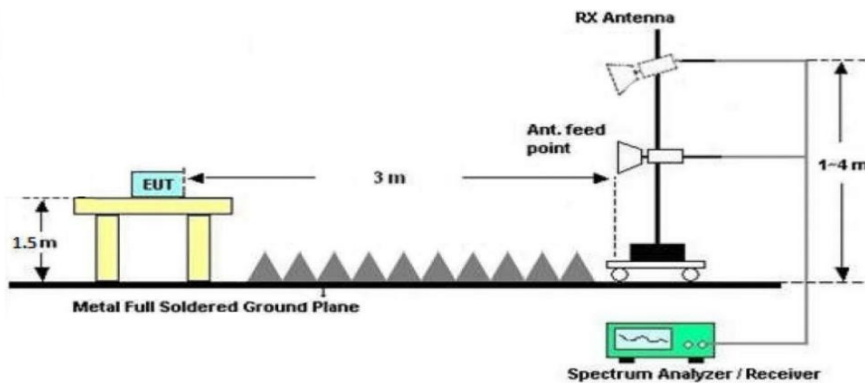
The test setup for emission measurement below 30MHz



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

	Frequency	Detector	RBW	VBW	Remark
Receiver Setup	Below 30MHz	--	10kHz	10kHz	--
	30MHz ~ 1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		AV	1MHz	3MHz	Average Value

7.4 Test Procedure

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10-2020+Cor 1+2023.
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 analyzer 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.
8. 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.



For Average Measurement:

VBW=10Hz, when duty cycle is no less than 98 percent.

VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



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 = $40\log(\text{Specific distance} / \text{test distance})$ (dB);
Limit line = Specific limits (dBuV) + distance extrapolation factor.

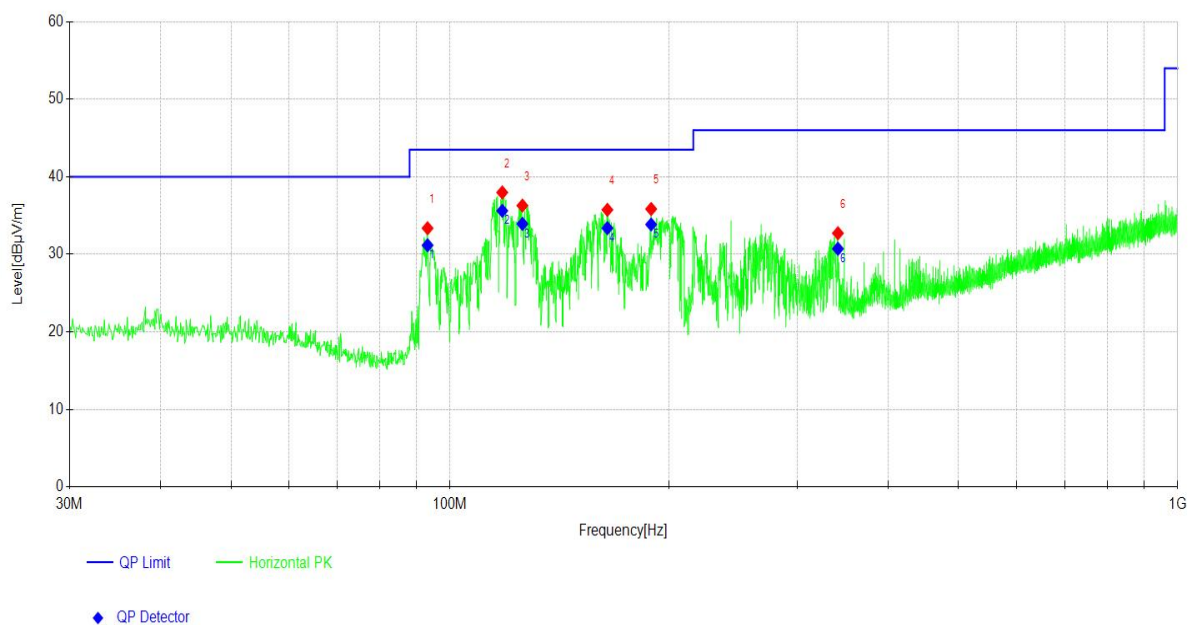
Test Frequency: 30MHz ~ 1GHz

Pass.

Please refer to the following test plots for the worst test mode (BLE 1M, Lowest Channel).



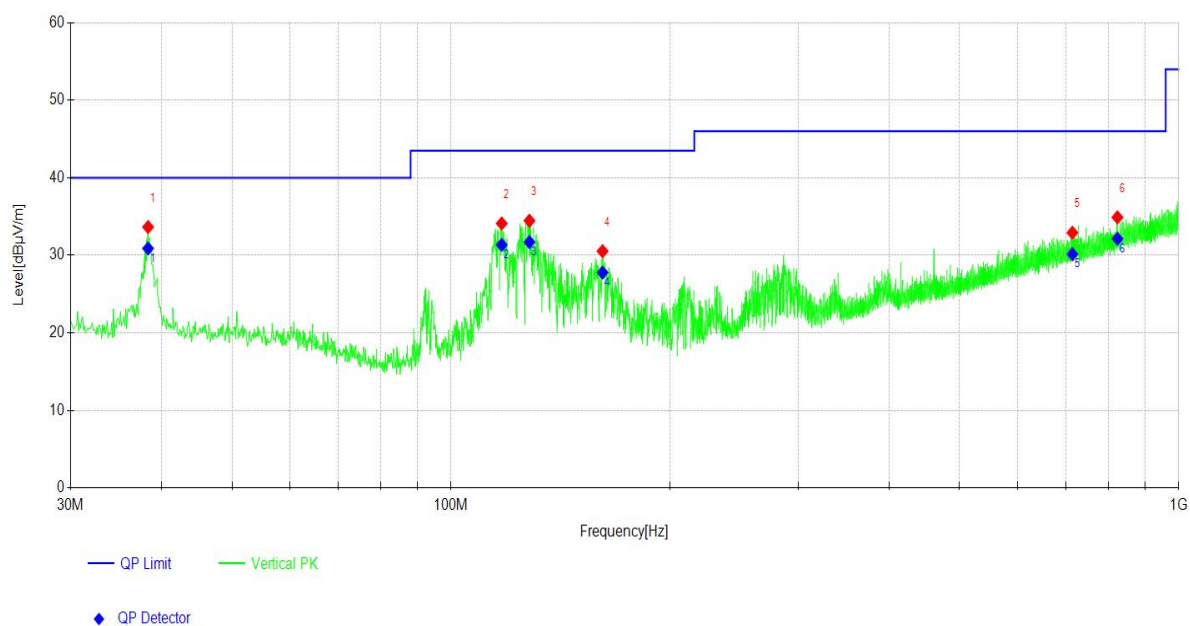
Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	DC 15V From Adapter	Mode Name:	X2-02-SJ



NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector
1	93.153	14.50	16.67	31.17	43.50	12.33	QP
2	117.988	16.42	19.20	35.62	43.50	7.88	QP
3	125.749	14.22	19.71	33.93	43.50	9.57	QP
4	164.552	12.22	21.16	33.38	43.50	10.12	QP
5	188.999	15.72	18.13	33.85	43.50	9.65	QP
6	341.304	8.97	21.75	30.72	46.00	15.28	QP



Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 15V From Adapter	Mode Name:	X2-02-SJ



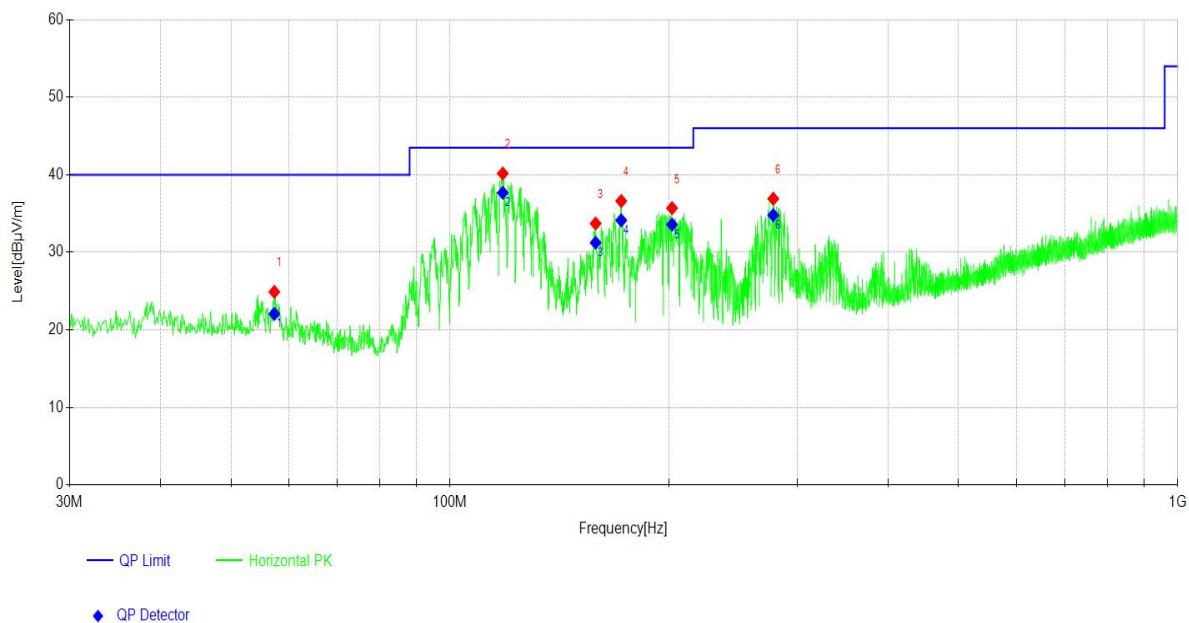
NO.	Freq. [MHz]	Reaading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector
1	38.343	10.32	20.57	30.89	40.00	9.11	QP
2	117.406	12.21	19.14	31.35	43.50	12.15	QP
3	128.174	11.84	19.87	31.71	43.50	11.79	QP
4	161.545	6.38	21.40	27.78	43.50	15.72	QP
5	714.500	1.41	28.75	30.16	46.00	15.84	QP
6	823.927	2.04	30.10	32.14	46.00	13.86	QP

Remark: Emission Level = Reading + Cable Loss + ANT Factor - Pre-amplifier.

Margin = Emission Level - Limit



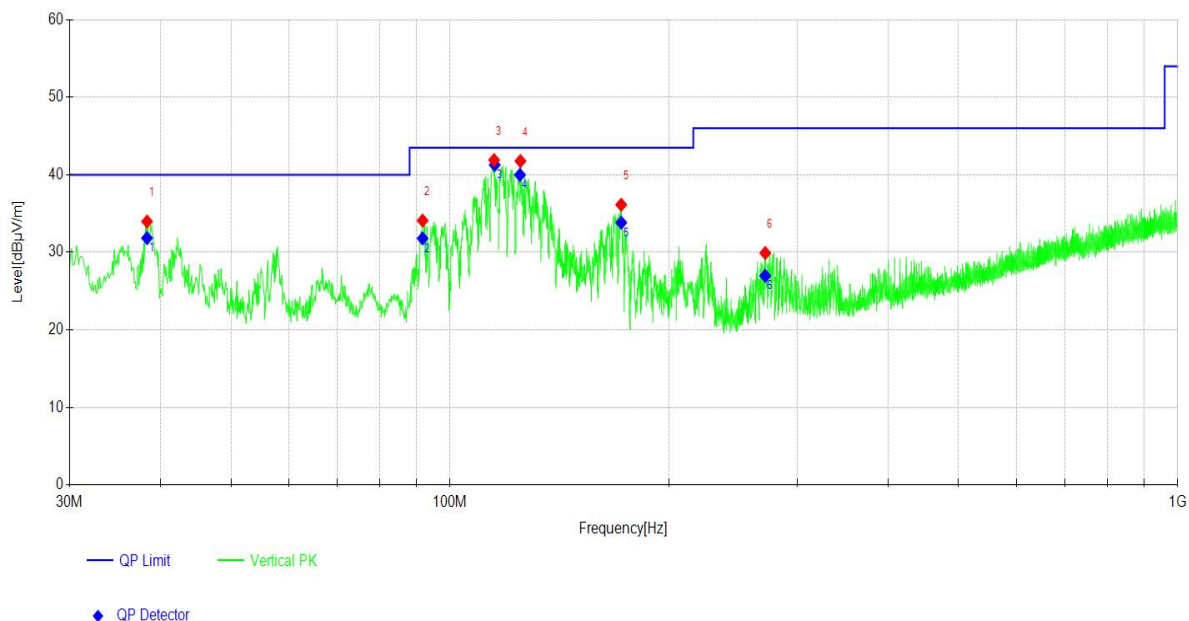
Temperature:	26℃	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	DC 15V From Adapter	Mode Name:	X2-01-SJ



NO.	Freq. [MHz]	Reading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector
1	57.357	2.27	19.80	22.07	40.00	17.93	QP
2	118.182	18.46	19.22	37.68	43.50	5.82	QP
3	158.538	9.75	21.49	31.24	43.50	12.26	QP
4	171.925	13.77	20.36	34.13	43.50	9.37	QP
5	201.901	16.09	17.49	33.58	43.50	9.92	QP
6	278.151	14.60	20.19	34.79	46.00	11.21	QP



Temperature:	26℃	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	DC 15V From Adapter	Mode Name:	X2-01-SJ



NO.	Freq. [MHz]	Reaading [dBμV]	Factor [dB/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector
1	38.343	11.27	20.57	31.84	40.00	8.16	QP
2	91.698	15.26	16.53	31.79	43.50	11.71	QP
3	115.190	22.49	18.79	41.28	43.50	2.22	QP
4	124.793	20.35	19.63	39.98	43.50	3.52	QP
5	171.925	13.47	20.36	33.83	43.50	9.67	QP
6	271.166	7.08	19.89	26.97	46.00	19.03	QP

Remark:Emission Level=Reading+Cable Loss+ANT Factor- Pre-amplifier.

Margin= Emission Level - Limit



Test Frequency 1GHz-25GHz

BLE 1M

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel:2402MHz							
H	4804.00	44.11	9.11	53.22	74.00	20.78	PK
H	4804.00	37.97	9.11	47.08	54.00	6.92	AV
H	7206.00	22.49	9.62	32.11	54.00	21.89	AV
H	7206.00	29.59	9.62	39.21	74.00	34.79	PK
H	9608.00	30.18	9.76	39.94	74.00	34.06	PK
H	9608.00	22.28	9.76	32.04	54.00	21.96	AV
V	4804.00	41.81	9.11	50.92	74.00	23.08	PK
V	4804.00	35.56	9.11	44.67	54.00	9.33	AV
V	7206.00	24.23	9.62	33.85	54.00	20.15	AV
V	7206.00	30.94	9.62	40.56	74.00	33.44	PK
V	9608.00	28.67	9.76	38.43	74.00	35.57	PK
V	9608.00	20.94	9.76	30.70	54.00	23.30	AV



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
Middle Channel:2440MHz							
H	4880.00	44.26	9.53	53.79	74.00	20.21	PK
H	4880.00	38.81	9.53	48.34	54.00	5.66	AV
H	7320.00	23.98	9.48	33.46	54.00	20.54	AV
H	7320.00	31.44	9.48	40.92	74.00	33.08	PK
H	9760.00	29.27	10.48	39.75	74.00	34.25	PK
H	9760.00	21.37	10.48	31.85	54.00	22.15	AV
V	4880.00	41.54	9.53	51.07	74.00	22.93	PK
V	4880.00	36.12	9.53	45.65	54.00	8.35	AV
V	7320.00	21.37	9.48	30.85	54.00	23.15	AV
V	7320.00	29.63	9.48	39.11	74.00	34.89	PK
V	9760.00	29.27	10.48	39.75	74.00	34.25	PK
V	9760.00	21.21	10.48	31.69	54.00	22.31	AV



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
High Channel:2480MHz							
H	4960.00	46.23	9.78	56.01	74.00	17.99	PK
H	4960.00	40.08	9.78	49.86	54.00	4.14	AV
H	7440.00	27.68	8.93	36.61	54.00	17.39	AV
H	7440.00	34.36	8.93	43.29	74.00	30.71	PK
H	9920.00	28.10	11.06	39.16	74.00	34.84	PK
H	9920.00	20.63	11.06	31.69	54.00	22.31	AV
V	4960.00	43.53	9.78	53.31	74.00	20.69	PK
V	4960.00	36.39	9.78	46.17	54.00	7.83	AV
V	7440.00	31.69	8.93	40.62	74.00	33.38	PK
V	7440.00	23.85	8.93	32.78	54.00	21.22	AV
V	9920.00	29.21	11.06	40.27	74.00	33.73	PK
V	9920.00	20.93	11.06	31.99	54.00	22.01	AV

Note: 1. The testing has been conformed to $10 \times 2480\text{MHz} = 24800\text{MHz}$.

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)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type
BLE 1M	Low Channel: 2402MHz							
	H	2349.51	49.02	-1.59	47.43	74.00	26.57	PK
	H	2349.95	41.63	-1.59	40.04	54.00	13.96	AV
	H	2390.00	37.73	-1.33	36.40	54.00	17.60	AV
	H	2390.00	47.00	-1.33	45.67	74.00	28.33	PK
	H	2401.76	97.45	-1.27	96.18			PK
	H	2401.85	96.75	-1.27	95.48			AV
	V	2351.16	49.46	-1.58	47.88	74.00	26.12	PK
	V	2356.07	39.42	-1.55	37.87	54.00	16.13	AV
	V	2390.00	47.44	-1.33	46.11	74.00	27.89	PK
	V	2390.00	37.79	-1.33	36.46	54.00	17.54	AV
	V	2401.72	92.66	-1.27	91.39			PK
	V	2401.91	91.81	-1.27	90.54			AV
	High Channel: 2480MHz							
	H	2479.84	89.02	-1.93	87.09			AV
	H	2480.22	89.82	-1.93	87.89			PK
	H	2483.50	36.50	-1.93	34.57	54.00	19.43	AV
	H	2483.50	44.79	-1.93	42.86	74.00	31.14	PK
	H	2489.65	46.44	-1.92	44.52	74.00	29.48	PK
	H	2491.92	37.12	-1.91	35.21	54.00	18.79	AV
	V	2479.96	84.73	-1.93	82.80			AV
	V	2480.20	85.51	-1.93	83.58			PK
	V	2483.50	43.57	-1.93	41.64	74.00	32.36	PK
	V	2483.50	36.35	-1.93	34.42	54.00	19.58	AV
	V	2494.63	37.20	-1.91	35.29	54.00	18.71	AV
	V	2494.68	46.92	-1.91	45.01	74.00	28.99	PK



Remark:

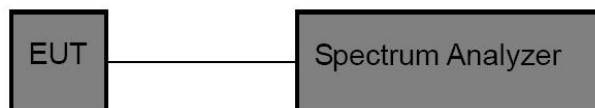
1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit



8 Conduct Band Edge And Spurious Emissions Measurement

Test Requirement	: Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method	: ANSI C63.10-2020+Cor 1+2023
Test Limit	: Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the Radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of AV averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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) (see §15.205(c)).

8.1 Test Setup



8.2 Test Procedure

For Spurious Emissions:

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:
 - a) Set instrument center frequency to DTS channel center frequency.
 - b) Set the span to _ 1.5 times the DTS bandwidth.
 - c) Set the RBW = 100 kHz.
 - d) Set the VBW = $[3 \times \text{RBW}]$.
 - e) Detector = peak.
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum PSD level.



Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

For Band Edge:

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

8.3 Test Result

Please see the Appendix for the BLE data



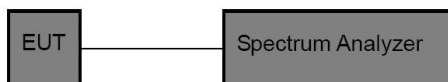
9 -6dB Bandwidth and 99% Bandwidth Measurement

Test Requirement : FCC CFR47 Part 15 Section 15.247

Test Method : ANSI C63.10-2020+Cor 1+2023

Test Limit : Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

9.1 Test Setup



9.2 Test Procedure

For 6dB Bandwidth Measurement

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., $RBW = 100\text{ kHz}$, $VBW > 3 \times RBW$, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq 6\text{ dB}$.
3. The steps for the first option are as follows:
 - a. Set RBW shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.
 - b. Set the $VBW[3 \times RBW]$.
 - c. Detector = peak
 - d. Trace mode = max-hold.
 - e. Sweep = No faster than coupled (auto) time.
 - f. Allow the trace to stabilize.
 - g. Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "-6 dB down amplitude". If a marker is below this "-6 dB down amplitude" value, then it shall be as close as possible to this value.

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: $RBW = 1\%-5\% \text{ OBW}$, $VBW \geq 3RBW$

9.3 Test Result

Please see the Appendix for the BLE data



10 Maximum Peak Output Power

Test Requirement	:	FCC CFR47 Part 15 Section 15.247
Test Method	:	ANSI C63.10-2020+Cor 1+2023
Test Limit	:	Regulation 15.247 (b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

10.1 Test Setup



10.2 Test Procedure

The testing follows ANSI C63.10 Section 11.9.1.2 Method PKPM1

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 use a fast responding diode detector.

10.3 Test Result

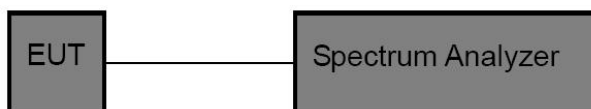
Please see the Appendix for the BLE data



11 Power Spectral density

Test Requirement	: FCC CFR47 Part 15 Section 15.247
Test Method	: ANSI C63.10-2020+Cor 1+2023
Test Limit	: Regulation 15.247(f) The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

11.1 Test Setup



11.2 Test Procedure

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 = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

11.3 Test Result

Please see the Appendix for the BLE data



12 Antenna Application

12.1 Antenna Requirement

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.

15.247(b)(4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

12.2 Result

The antenna is PCB Antenna, the Max gain of the antennas is 2.12 dBi, reference to the attachment for details.



13 Test Setup Photos and EUT Photos

Please see the attachment for details.

*******THE END REPORT*******