FCC Part 15C&RSS-247 TEST REPORT

FCC ID:2BRDB-S1

IC:34372-S1

Prepared for	:	Electrotec Audio Inc
Address	:	17835 Newhope Street, unit A, Fountain Valley, California, United States, 92708
Trade Name	:	SKAA
E.U.T	:	Stage One
Model Number	:	S1
Prepared by	:	Keyway Testing Technology(Guangdong) Co., Ltd.
Address	:	Room 2102, Building 6, Dongyi Intelligent Equipment New Energy Vehicle Park, No.30 of Tangxia District, Dongshen Road, Tangxia Town, Dongguan, 523710, People's Republic of China
		Tel: 86-769-87182258
		Fax: 86-769-87181058
Report No.	:	TR25010067-E-001
Date of Test:	:	Feb. 28, 2025 ~ Aug. 29, 2025
Date of Report	:	Aug. 29, 2025

Keyway Testing Technology (Guangdong) Co., Ltd.

Applicant:	Electrotec Audio Inc
Address:	17835 Newhope Street, unit A, Fountain Valley, California, United States, 92708
Manufacturer:	Eleven Engineering Inc
Address:	10150 - 100 Street, Suite 800 Edmonton, AB, Canada T5J 0P6
E.U.T:	Stage One
Model Number:	S1
Trade Name:	SKAA
Date of Receipt:	Feb. 28, 2025
Date of Test:	Feb. 28, 2025 ~ Aug. 29, 2025
Test Specification :	FCC CFR47 Part 15 Section 15.247 RSS-247 Issue 3: August 2023 ANSI C63.10:2013 RSS-GEN Issue5, Amendment 2, February,2021
Test Result:	The equipment under test was found to be compliance with the requirements of the standards applied. **Issue Date: Aug. 29, 2025**

Tested by:	Reviewed by:	Authorized by:
Jacob Ouyang	Billy Zeng	Cherry Chen
Jacob Ouyang /Engineer	Billy Zeng / Supervisor	Cherry Chen / Manager

Abbreviations: OK/P=passed fail/F=failed N/A=not applicable E.U.T=equipment under tested

This device described above has been tested by Keyway, 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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Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2025.8.29		Original

Contents

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2 Test Summary

Test Items	Test Requirement	Result
Conduct Emission	15.207 RSS-Gen 8.8	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d) RSS-Gen 8.9 RSS-Gen 8.10	PASS
Conducted Spurious Emission	15.247(d) RSS-247 5.5	PASS
Band edge	15.247(d) 15.205(a) RSS-247 5.5	PASS
6dB Bandwidth & 99% OCB	15.247(a)(2) RSS-247 [5.2(a)] RSS-GEN 6.7	PASS
Maximum Peak Output Power & E.I.R.P	15.247(b)(3) RSS-247.5.4(b)	PASS
Power Spectral Density	15.247(e) RSS-247 [5.2(b)]	PASS
Antenna Requirement	FCC part 15.203/15.247 (c) RSS-Gen 6.8	PASS

Remark:

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

2.1 Test Site

Lab Qualifications	:	Certificated by CMA Registration No.: 202319016955 Date of registration: July 23, 2024 Certificated by CNAS Registration No.: CNAS L5783 Date of registration: March 07, 2025 Certificated by A2LA Certificate Number:7404.01 Valild To: March 31.2027 FCC Designation No.: CN1412 Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules. ISED (Company No.: 33959) The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0186 Certificated by VCCI Member No.3498 R-20091:G-20277:966 Chamber 2 Below 1 G G-20277:966 Chamber 2 above 1 G C-20064:Conducted Emissions at Mains ports T-20120:Conducted Emissions at Wired network port Date of Valid until: Step. 19, 2027 Certificated by Nemko Registration No.: ELA 814 Date of registration: September 25, 2024 Certificated by UL Registration No.: 100567237 Date of registration: September 25, 2024
Name of Firm	:	Keyway Testing Technology(Guangdong) Co., Ltd.
Site Location	:	Room 2102, Building 6, Dongyi Intelligent Equipment New Energy Vehicle Park, No.30 of Tangxia District, Dongshen Road, Tangxia Town, Dongguan, 523710, People's Republic of China

3 General Information

3.1 General Description of E.U.T.

Product Name	:	Stage One
Model Name	:	S1
Sample ID	:	250106084
Sample(s) Status:	:	Engineer sample
Operating frequency	:	2402-2480MHz
Numbers of Channel	:	79 channels
Antenna Type	:	Internal Antenna 0
Antenna Gain	:	2.11dBi
Type of Modulation	:	GFSK
Power supply	:	DC 21.9V By Li-ion Battery(5200mAh) *2 Recharged By Adapter Output
Hardware Version	:	N/A
Software Version	:	N/A
Adapter Rating	:	Model: CQ120-2600480-E2 Input: AC 100-240V, 50/60Hz, 2.0A Max Output: DC 26.0V, 4.8A, 124.8W
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.		

3.2 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 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		

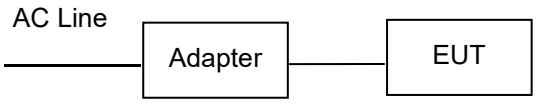
Note:

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.

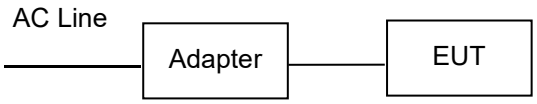
Channel	Frequency(MHz)
0	2402
19	2440
39	2480

3.3 Test Setup Configuration

Conducted Emission



Radiated Emission



Conducted Spurious

3.4 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. For battery operated equipment, the equipment tests shall be performed using a new battery. So the report just shows that condition's data.	

Test Software	FrequencyTool_v0.3.2
Power level setup	10dBm

4 Equipment During Test

4.1 Equipments List

Equipment	Manufacturer	Model No.	Serial No.	Date of Cal.	Valid until
For conducted emission at the mains terminals and signal port test 944 Shielded Room					
Test Software	FARAD	EZ-EMC Ver.FARAD-3A1+	KWET-089	/	/
EMI Test Receiver	Rohde&Schwarz	ESCI	101156	Apr 14, 25	Apr 13, 26
ArtificialMains Network	Rohde&Schwarz	ENV216	101314	Mar 05, 25	Mar 04, 26
RF Cable	FUJIKURA	3D-2W	KWET-030	Apr 14, 25	Apr 13, 26
Socket	Gongniu	KWET-003A1	KWET-003A1	Feb 21, 25	Feb 20, 26
For radiated emission test (30MHz-1GHz)966 Chamber 2					
Test Software	FARAD	EZ-EMC Ver.FARAD-3A1+	KWET-087	/	/
EMI Test Receiver	Rohde&Schwarz	ESCI	101178	Apr 14, 25	Apr 13, 26
TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00829	May 10, 25	May 09, 26
3m Semi-anechoic Chamber	YIHENDIANZI	966	YH-KW-966-02	Mar 08, 24	Mar 07, 26
RF Cable	EMC Instruments	EMCCFD400-NM-NM-2000	240307	Apr 14, 25	Apr 13, 26
RF Cable	EMC Instruments	EMCCFD400-NM-NM-9000	240309	Apr 14, 25	Apr 13, 26
For radiated emission test (Above 1GHz)966 Chamber 2					
Test Software	FARAD	EZ-EMC Ver.FARAD-3A1+	KWET-087	/	/
EMI Test Receiver	Rohde&Schwarz	ESCI	101178	Apr 14, 25	Apr 13, 26
Spectrum Analyzer	Agilent	N9020A	MY56070279	Apr 14, 25	Apr 13, 26
Spectrum analyzer	R&S	FSV 40	101059	Nov 06, 24	Nov 05, 25

Horn Antenna	DAZE	ZN30701	11003	Jul 27, 25	Jul 26, 26
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	1368	May 16, 25	May 15, 26
Signal Amplifier	WCS Technology	DLNA-18000-40000	KWET-138	Apr 19, 25	Apr 18, 26
3m anechoic Chamber	YIHENDIANZI	966	YH-KW-966-02	Mar 07, 25	Mar 06, 29
RF Cable(1G-18GHz)	EMC Instruments	EMC105-SM-SM-1000	240301	Apr 14, 25	Apr 13, 26
RF Cable(1G-18GHz)	EMC Instruments	EMC105-SM-SM-2000	240302	Apr 14, 25	Apr 13, 26
RF Cable(1G-18GHz)	EMC Instruments	EMC105-SM-SM-9000	240303	Apr 14, 25	Apr 13, 26
RF Cable(18G-40GHz)	WCS Technology	CA360P-29M29M-1M	W2415130001	Apr 14, 25	Apr 13, 26
RF Cable(18G-40GHz)	WCS Technology	CA360P-29M29M-9M	W2415110001	Apr 14, 25	Apr 13, 26
For conducted emission test（RF）					
MXG Signal Analyzer	Agilent	N9020A	MY56070279	Apr 14, 25	Apr 13, 26
RF SWITCH BOX	CSKJ	SMU-1003	KWET-047	Apr 14, 25	Apr 13, 26
Attenuator	R&S	ESH3-Z2	102696	Apr 14, 25	Apr 13, 26
Power meter	YOKOKAWA	WY210	27D528405	Apr 14, 25	Apr 13, 26
RF sma cable	Keysight	ULC-1m-SMSM+	1623	May 15, 25	May 14, 26
RF sma cable	Keysight	ULC-1m-SMSM+	1623	May 15, 25	May 14, 26
RF sma cable	Keysight	ULC-1.5FT-SMSM+	1623	May 15, 25	May 14, 26
RF sma cable	Keysight	ULC-1.5FT-SMSM+	1623	May 15, 25	May 14, 26
Coupler	Keysight	ZHDC-10-63-S+	SF331801603	May 15, 25	May 14, 26
Test Software	CSKJ	CS-305X	KWET-149	/	/

4.2 Measurement Uncertainty

The reported uncertainty of measurement **y** ± **U**,where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**,providing a level of confidence of approximately **95** %。

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}
Duty Cycle	±2%
Spurious emissions,conducted	±0.21dB
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

4.3 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	Stage One	N/A	S1	N/A	EUT
E-2	Notebook	lenovo	B40-80	MP07F6JD	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.

5 Conducted Emission

Test Requirement	:	FCC CFR 47 Part 15 Section 15.207&RSS-Gen 8.8
Test Method	:	ANSI C63.10: 2013 and RSS-Gen
Test Result	:	PASS
Frequency Range	:	150kHz to 30MHz
Class/Severity	:	Class B

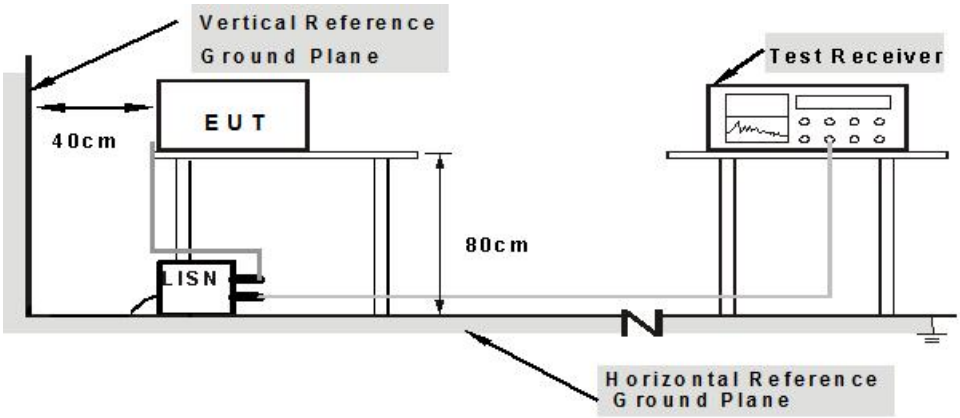
5.1 E.U.T. Operation

Operating Environment :

Temperature:	:	23.5°C
Humidity:	:	54 % RH
Atmospheric Pressure:	:	101.12 kPa
Test Voltage	:	AC 120V/60Hz

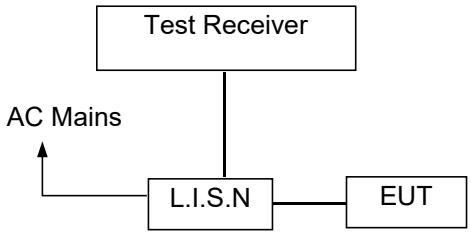
5.2 EUT Setup

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



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

5.3 Test SET-UP (Block Diagram of Configuration)



5.4 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.

5.5 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.

5.6 Measurement Description

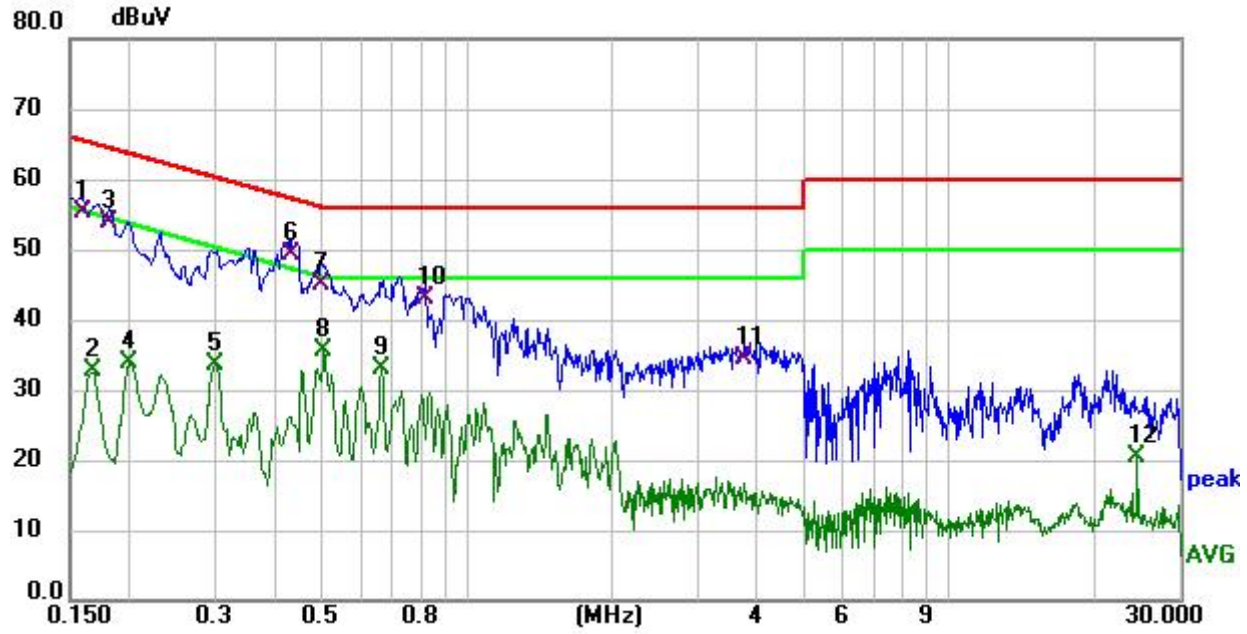
The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.7 Conducted Emission Test Result

Pass

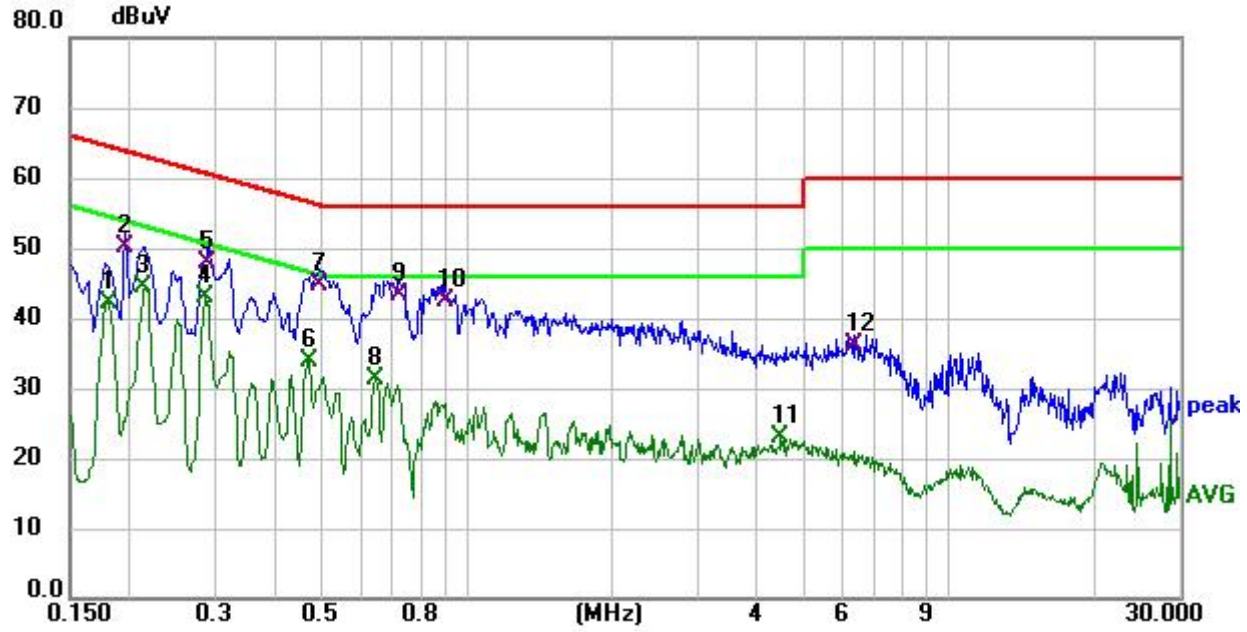
Conducted emission at both 120V & 240V is assessed, and emission at 120V represents the worst case. All the modulation modes were tested the data of the worst mode (GFSK 2LE) are recorded in the following pages and the others modulation methods do not exceed the limits.

Channel: Model:	2LE High S1	Phase :	L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.159	45.18	10.12	55.30	65.52	-10.22	QP	P	
2	0.168	22.51	10.09	32.60	55.06	-22.46	AVG	P	
3	0.181	43.67	10.06	53.73	64.44	-10.71	QP	P	
4	0.200	23.94	10.01	33.95	53.61	-19.66	AVG	P	
5	0.298	23.76	9.95	33.71	50.30	-16.59	AVG	P	
6 *	0.429	39.45	9.96	49.41	57.27	-7.86	QP	P	
7	0.499	34.98	10.00	44.98	56.02	-11.04	QP	P	
8	0.505	25.49	10.01	35.50	46.00	-10.50	AVG	P	
9	0.663	22.87	10.10	32.97	46.00	-13.03	AVG	P	
10	0.825	32.52	10.34	42.86	56.00	-13.14	QP	P	
11	3.763	24.31	10.23	34.54	56.00	-21.46	QP	P	
12	24.575	9.69	10.83	20.52	50.00	-29.48	AVG	P	

Channel:	2LE High	Phase :	N
Model:	S1		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.181	32.02	10.08	42.10	54.44	-12.34	AVG	P	
2	0.195	40.01	10.02	50.03	63.83	-13.80	QP	P	
3	0.213	34.56	9.99	44.55	53.09	-8.54	AVG	P	
4 *	0.285	33.11	9.98	43.09	50.67	-7.58	AVG	P	
5	0.289	37.84	9.98	47.82	60.55	-12.73	QP	P	
6	0.469	23.84	10.12	33.96	46.53	-12.57	AVG	P	
7	0.492	34.61	10.14	44.75	56.13	-11.38	QP	P	
8	0.649	21.17	10.21	31.38	46.00	-14.62	AVG	P	
9	0.726	33.18	10.23	43.41	56.00	-12.59	QP	P	
10	0.901	32.28	10.29	42.57	56.00	-13.43	QP	P	
11	4.474	12.61	10.29	22.90	46.00	-23.10	AVG	P	
12	6.325	25.67	10.39	36.06	60.00	-23.94	QP	P	

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

6 Radiated Spurious Emissions

Test Requirement	:	FCC CFR47 Part 15 Section 15.209 & 15.247 RSS-Gen 8.9, RSS-Gen 8.10
Test Method	:	ANSI C63.10:2013 and RSS-Gen
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	$20\log^{(500)}$

ISED

Frequency (MHz)	Magnetic field strength (H-Field) (μA/m)	Measurement distance (m)
0.009 ~ 0.490	6.37/F (F in kHz)	300
0.490 ~ 1.705	63.7/F (F in kHz)	30
1.705 ~ 30	0.08	30
Frequency (MHz)	Field strength (μV/m at 3 metres)	
30 ~ 88	100	
88 ~ 216	150	
216 ~ 960	200	
Above 960	500	

6.1 EUT Operation

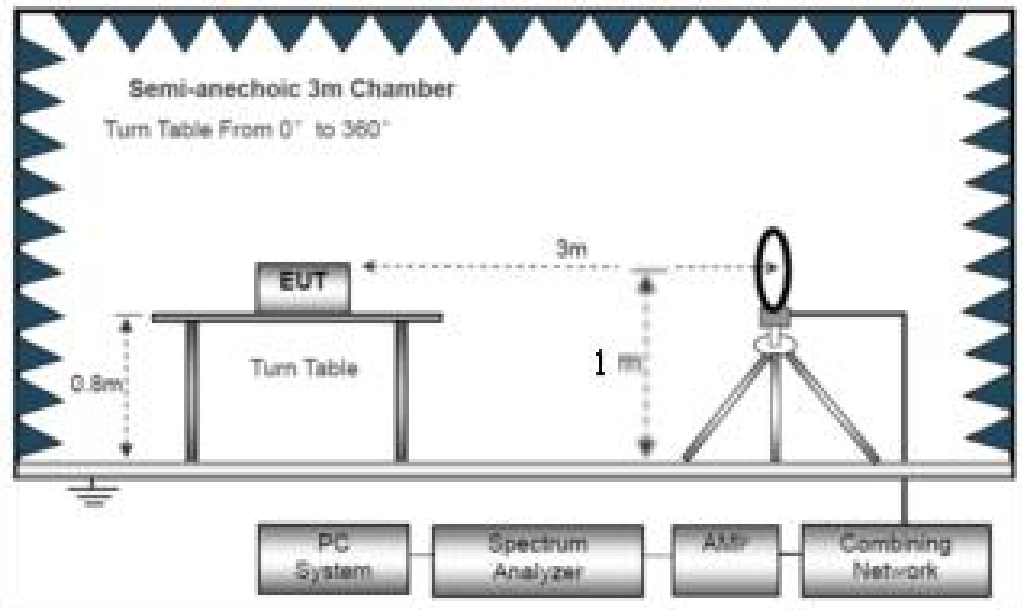
Operating Environment :

Temperature	:	26 °C
Humidity	:	54% RH
Atmospheric Pressure	:	101.3kPa
Test Voltage	:	AC 120V60Hz

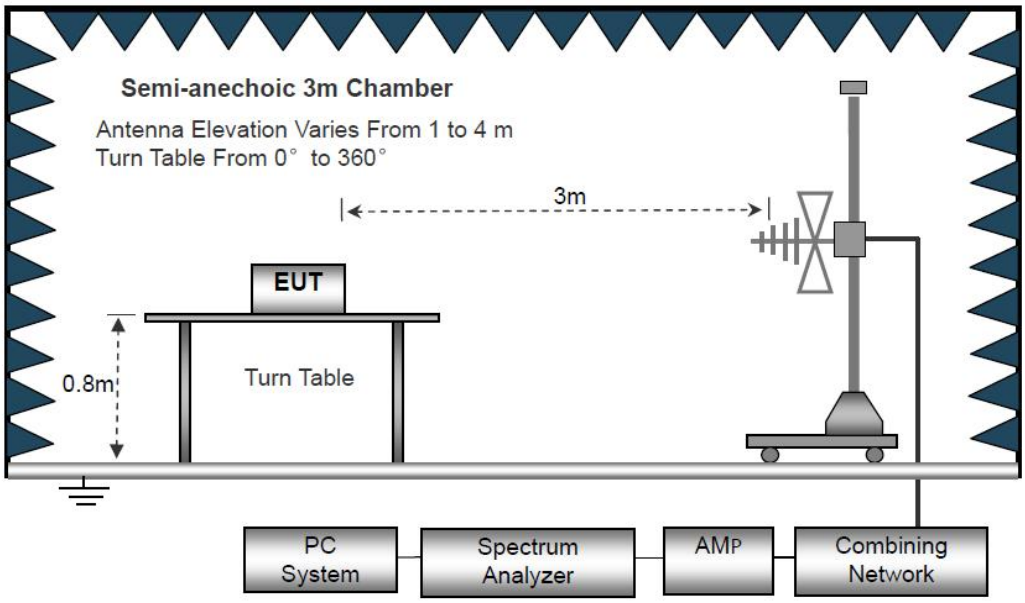
6.2 Test Setup

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

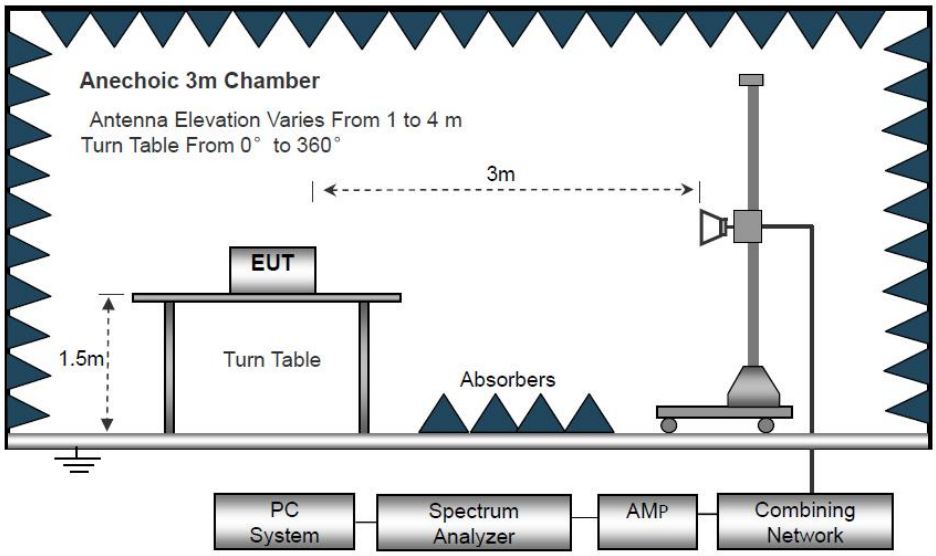
The test setup for emission measurement below 30MHz



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



The test setup for emission measurement above 1 GHz



6.3 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

6.4 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.

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.

6.5 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

Pass.

Please refer to the following test plots for the worst test mode (GFSK (2LE CH39: 2480MHz)).

Model:	S1

Test plot for Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	57.999	12.19	13.20	25.39	40.00	-14.61	QP			P	
2	102.001	22.02	10.86	32.88	43.50	-10.62	QP			P	
3 *	147.921	18.63	15.09	33.72	43.50	-9.78	QP			P	
4	175.036	19.74	12.40	32.14	43.50	-11.36	QP			P	
5	237.476	23.01	11.73	34.74	46.00	-11.26	QP			P	
6	297.224	18.69	13.57	32.26	46.00	-13.74	QP			P	

Remark:Emission Level=Reading+Factor

Model:	S1

Test plot for Vertical

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	42.600	19.35	13.18	32.53	40.00	-7.47	QP			P	
2	50.057	19.05	12.77	31.82	40.00	-8.18	QP			P	
3	98.142	23.64	10.07	33.71	43.50	-9.79	QP			P	
4	157.559	19.34	14.43	33.77	43.50	-9.73	QP			P	
5	199.286	23.71	11.24	34.95	43.50	-8.55	QP			P	
6	298.268	22.68	13.59	36.27	46.00	-9.73	QP			P	

Remark:Emission Level=Reading+Factor

Please refer to the following test plots for the worst test mode (GFSK 2LE).

Test Frequency 1GHz-25GHz:

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	52.55	34.12	5.03	32.39	55.85	74	-18.15	Pk
V	4804	42.15	34.12	5.03	32.39	45.45	54	-8.55	AV
V	7206	44.41	32.54	6.29	35.86	54.02	74	-19.98	Pk
V	7206	32.90	32.54	6.29	35.86	42.51	54	-11.49	AV
V	9608	40.85	32.98	7.55	38.4	53.82	74	-20.18	Pk
V	9608	31.32	32.98	7.55	38.4	44.29	54	-9.71	AV
V	12010	36.45	32.09	8.93	39	52.29	74	-21.71	Pk
V	12010	28.75	32.09	8.93	39	44.59	54	-9.41	AV
H	4804	51.90	34.12	5.03	32.39	55.20	74	-18.80	Pk
H	4804	41.71	34.12	5.03	32.39	45.01	54	-8.99	AV
H	7206	42.89	32.54	6.29	35.86	52.50	74	-21.50	Pk
H	7206	32.70	32.54	6.29	35.86	42.31	54	-11.69	AV
H	9608	40.98	32.98	7.55	38.4	53.95	74	-20.05	Pk
H	9608	31.07	32.98	7.55	38.4	44.04	54	-9.96	AV
H	12010	39.61	32.09	8.93	39	55.45	74	-18.55	Pk
H	12010	31.01	32.09	8.93	39	46.85	54	-7.15	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:2440MHz									
V	4880	50.04	34.07	5.09	32.59	53.65	74	-20.35	Pk
V	4880	40.57	34.07	5.09	32.59	44.18	54	-9.82	AV
V	7320	41.81	32.63	6.34	35.96	51.48	74	-22.52	Pk
V	7320	30.48	32.63	6.34	35.96	40.15	54	-13.85	AV
V	9760	40.27	32.92	7.59	38.4	53.34	74	-20.66	Pk
V	9760	32.15	32.92	7.59	38.4	45.22	54	-8.78	AV
V	12200	38.79	31.96	8.88	39.04	54.75	74	-19.25	Pk
V	12200	29.49	31.96	8.88	39.04	45.45	54	-8.55	AV
H	4880	52.09	34.07	5.09	32.59	55.70	74	-18.30	Pk
H	4880	42.85	34.07	5.09	32.59	46.46	54	-7.54	AV
H	7320	41.94	32.63	6.34	35.96	51.61	74	-22.39	Pk
H	7320	34.29	32.63	6.34	35.96	43.96	54	-10.04	AV
H	9760	40.41	32.92	7.59	38.4	53.48	74	-20.52	Pk
H	9760	32.32	32.92	7.59	38.4	45.39	54	-8.61	AV
H	12200	39.11	31.96	8.88	39.04	55.07	74	-18.93	Pk
H	12200	28.99	31.96	8.88	39.04	44.95	54	-9.05	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	52.68	34.02	5.15	32.8	56.61	74	-17.39	Pk
V	4960	40.50	34.02	5.15	32.8	44.43	54	-9.57	AV
V	7440	39.73	32.71	6.4	36.05	49.47	74	-24.53	Pk
V	7440	34.91	32.71	6.4	36.05	44.65	54	-9.35	AV
V	9920	42.12	32.86	7.62	38.4	55.28	74	-18.72	Pk
V	9920	33.11	32.86	7.62	38.4	46.27	54	-7.73	AV
V	12400	40.57	31.82	8.84	39.08	56.67	74	-17.33	Pk
V	12400	29.86	31.82	8.84	39.08	45.96	54	-8.04	AV
H	4960	52.97	34.02	5.15	32.8	56.90	74	-17.10	Pk
H	4960	40.90	34.02	5.15	32.8	44.83	54	-9.17	AV
H	7440	44.47	32.71	6.4	36.05	54.21	74	-19.79	Pk
H	7440	33.54	32.71	6.4	36.05	43.28	54	-10.72	AV
H	9920	40.29	32.86	7.62	38.4	53.45	74	-20.55	Pk
H	9920	31.44	32.86	7.62	38.4	44.60	54	-9.40	AV
H	12400	39.59	31.82	8.84	39.08	55.69	74	-18.31	Pk
H	12400	27.80	31.82	8.84	39.08	43.90	54	-10.10	AV

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

Margin= Emission Level - Limit

2. If peak below the average limit, the average emission was no test.

3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Please refer to the following test plots for the worst test mode (GFSK 2LE).

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)	Margin(dB)	Detector Type	Result
GFSK		Low Channel: 2402MHz									
	H	2390	56.86	35.17	3.48	27.49	52.66	74	-21.34	PK	PASS
	H	2390	48.05	35.17	3.48	27.49	43.85	54	-10.15	AV	PASS
	H	2400	58.13	35.16	3.49	27.52	53.98	74	-20.02	PK	PASS
	H	2400	44.68	35.16	3.49	27.52	40.53	54	-13.47	AV	PASS
	V	2390	56.35	35.17	3.48	27.49	52.15	74	-21.85	PK	PASS
	V	2390	47.09	35.17	3.48	27.49	42.89	54	-11.11	AV	PASS
	V	2400	55.06	35.16	3.49	27.52	50.91	74	-23.09	PK	PASS
	V	2400	44.98	35.16	3.49	27.52	40.83	54	-13.17	AV	PASS
		High Channel: 2480MHz									
	H	2483.5	56.82	35.11	3.56	27.75	53.02	74	-20.98	PK	PASS
	H	2483.5	44.38	35.11	3.56	27.75	40.58	54	-13.42	AV	PASS
	H	2500	56.04	35.1	3.57	27.8	52.31	74	-21.69	PK	PASS
	H	2500	47.27	35.1	3.57	27.8	43.54	54	-10.46	AV	PASS
	V	2483.5	55.59	35.11	3.56	27.75	51.79	74	-22.21	PK	PASS
	V	2483.5	46.86	35.11	3.56	27.75	43.06	54	-10.94	AV	PASS
	V	2500	54.53	35.1	3.57	27.8	50.80	74	-23.2	PK	PASS
	V	2500	46.00	35.1	3.57	27.8	42.27	54	-11.73	AV	PASS

Remark:

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

7 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)). RSS-247 5.5
Test Method	:	ANSI C63.10:2013 and RSS-Gen
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 RMS 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)). RSS-247 5.5 In any 100 kHz bandwidth outside the frequency band in which the spread spectrum device, digitally modulated device, or hybrid system is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 6.3.2, the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

7.1 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 = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold

7.2 Test Result

Please see the appendix IV Bluetooth_(Bluetooth Low Energy)_Test data.

8 6dB Bandwidth Measurement & 99% OCB Test

Test Requirement	:	FCC CFR47 Part 15 Section 15.247 (a)(2)&RSS-247[5.2(a)]&RSS-GEN 6.7
Test Method	:	ANSI C63.10:2013 and RSS-Gen
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. For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

8.1 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 = 100kHz, VBW = 300kHz(For 6dB bandwidth)
3. Set the spectrum analyzer: RBW = 20kHz, VBW = 62kHz(For LE 99% bandwidth)
4. Set the spectrum analyzer: RBW = 30kHz, VBW = 91kHz(For 2LE 99% bandwidth)

8.2 Test Result

Please see the appendix IV Bluetooth_(Bluetooth Low Energy)_Test data.

9 Maximum Peak Output Power

Test Requirement	:	FCC CFR47 Part 15 Section 15.247 (b)(3)&RSS-247 5.4(b)
Test Method	:	ANSI C63.10:2013 and RSS-Gen
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. The e.i.r.p. shall not exceed 4 W

9.1 Test Procedure

1. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

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

3. Measure the conducted output power and record the results in the test report.

9.2 Test Result

Please see the appendix IV Bluetooth_(Bluetooth Low Energy)_Test data.

10 Power Spectral density

Test Requirement	:	FCC CFR47 Part 15 Section 15.247 (e)&RSS-247 [6.3.1(b)]
Test Method	:	ANSI C63.10:2013 and RSS-Gen
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. RSS-247 [6.3.1(b)] the transmitter power spectral density conducted from the transmitter to the antenna(s) shall not be greater than 8 dBm/3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 6.3.2 The power spectral density shall be determined using the same method as is used to determine the maximum conducted output power.

10.1 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 = 9.1kHz , 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.

10.2 Test Result

Please see the appendix IV Bluetooth_(Bluetooth Low Energy)_Test data.

11 Antenna Application

11.1 Antenna Requirement

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

RSS-Gen 6.8

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device’s antenna shall be stated, based on a measurement or on data from the antenna’s manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

11.2 Result

The antenna is Internal Antenna 0 which permanently attached, and the best case gain of the antenna is 2.11dBi. It complies with the standard requirement.

12 APPENDIX I -- TEST SETUP PHOTOGRAPH

Please see the attachment for details.

13 APPENDIX II -- EUT PHOTOGRAPH

Please see the attachment for details.

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