

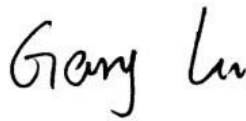
TEST REPORT

Applicant : Renqiu Zhengmai Electric Appliance Co., Ltd.
Address : Xin'anzhuang Village, Liangzhao Town, Renqiu City, Hebei Province, China
Manufacturer : Renqiu Zhengmai Electric Appliance Co., Ltd.
Address : Xin'anzhuang Village, Liangzhao Town, Renqiu City, Hebei Province, China
Product Name : Controller
Model Number : ZM8009, ZM8012, ZM8001, ZM8002, ZM8003, ZM8006, ZM8008, ZM8010, ZM8011, ZM8013, ZM8015, ZM8016, ZM8017, ZM8018, ZM8019, ZM-1, ZM-2, ZM-3
Trademark : /
FCC ID : 2BYCE-ZMKG2
Test Date : Aug. 27, 2026 to Sep. 11, 2026
Date of Report : Sep. 11, 2026
Test Result : 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 Standard requirements. And it is applicable only to the tested sample identified in the report.

Test Procedure Used:

Standards : FCC CFR Title 47 Part 15 Subpart C Section 15.247
ANSI C63.10-2020+Cor 1+2023

Prepared by(Test Engineer):
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Approved(Manager):
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Approved(Manager):
Abel Yu





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1. General Information

1.1. Description of Device (EUT)

EUT Name : Controller
 Model No. : ZM8009, ZM8012, ZM8001, ZM8002, ZM8003, ZM8006, ZM8008, ZM8010, ZM8011, ZM8013, ZM8015, ZM8016, ZM8017, ZM8018, ZM8019, ZM-1, ZM-2, ZM-3
 Model Difference : /
 Power supply : DC 5V
 Operation frequency : 2402-2480MHz
 Modulation : GFSK
 Antenna Type : PCB antenna, Maximum Gain is 0dBi
 Intend use environment : Residential, commercial and light industrial environment

1.2. 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		

1.3.Summary of test result

RF PART		
Test Items	Test Requirement	Result
Antenna requirement	FCC part 15.203/15.247 (c)	PASS
AC Power Line Conducted Emission	FCC part 15.207	PASS
Conducted Peak Output Power	FCC part 15.247 (b)(3)	PASS
Channel Bandwidth& 99% OCB	FCC part 15.247 (a)(2)	PASS
Power Spectral Density	FCC part 15.247 (e)	PASS
Band Edge	FCC part 15.247(d)	PASS
Spurious Emission	FCC part 15.205/15.209	PASS
Remark: N/A is an abbreviation for Not Applicable. Measurement Uncertainty is not taken into account for conformity statement		

1.4.Special Accessories and Auxiliary Equipment

Description	Manufacturer	Model No.	Hardware Version	Software Version
Adapter	XIAOMI	A319-050100 U-CN1	/	/

1.5.Test mode

The special RF test software was used to control EUT work in Continuous BLE TX mode, and select test channel, wireless mode.

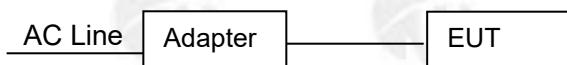
Test mode	Low channel	Middle channel	High channel
GFSK	2402MHz	2440MHz	2482MHz
Note: Only the worst Data DH5 Record in the report			

1.6. 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	EspRFTTestTool_v4.7
Power level setup	0 dBm

1.7.Block Diagram

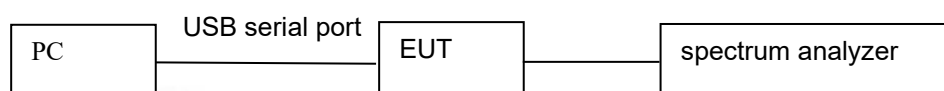
Conducted Emission



Radiated Emission



RF Conducted Test



1.8.Test Conditions

Category	Normal Conditions	Extreme Conditions
Temperature range	15-35℃	N/A
Humidity range	20-75%	N/A
Pressure range	86-106kPa	N/A
Power supply	DC 5V from adapter	N/A
Note: N/A is an abbreviation for Not Applicable.		

1.9.Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for radio frequency	$\pm 7 \times 10^{-8}$	
Conducted Emissions (150kHz~30MHz)	$\pm 3.64\text{dB}$	
Radiated Emission(9KHz~30MHz)	$\pm 4.51\text{dB}$	
Radiated Emission(30MHz~1GHz)	$\pm 5.03\text{dB}$	
Radiated Emission(1GHz~6GHz)	$\pm 3.92\text{dB}$	
Radiated Emission(6GHz~18GHz)	$\pm 4.33\text{dB}$	
Radiated Emission(18GHz~40GHz)	$\pm 3.38\text{dB}$	
Uncertainty for conducted RF Power	$\pm 0.20\text{dB}$	
Conducted spurious emissions	$\pm 0.24\text{dB}$	
Uncertainty for temperature	0.6℃	
Uncertainty for humidity	1%	
Bandwidth	$\pm 1.5 \times 10^{-6}$	
Time	$\pm 2\%$	
Duty Cycle	$\pm 2\%$	
Remark: The coverage Factor (k=2), and measurement Uncertainty for a level of Confidence of 95%		

1.10.Test Facility

Site Description		
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
FCC Designation Number	:	CN3446
FCC Test Firm Registration Number	:	129414

1.11.Test Equipment

Conducted Test Site

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	2026/9/8	2027/9/7
LISN	NNLK 8129	00603	Schwarzbeck	2026/9/8	2027/9/7
LISN	NNHV 8123-400	00694	Schwarzbeck	2026/9/8	2027/9/7
LISN	NNHV 8123-400	00680	Schwarzbeck	2026/9/8	2027/9/7
Cable	RG223-1500MM	NA	RG	2026/9/8	2027/9/7

Radiated Test Site(Below 1G and Above 1G)&RF Test Site

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	2026/9/8	2027/9/7
Amplifi (30MHz-1GHz)	BBV 9718D	00042	SCHWARZBECK	2026/9/8	2027/9/7
Bilog Antenna (30MHz-1GHz)	VULB9168	1858	SCHWARZBECK	2026/9/9	2027/9/8
Horn antenna (1GHz-18GHz)	BBHA 9120 D	02622	SCHWARZBECK	2026/9/9	2027/9/8
Pream plifier (1GHz-18GHz)	BBV 9718D	0024	SCHWARZBECK	2026/9/8	2027/9/7
Spectrum Analyze (10Hz-40GHz)	FSV 40	100952	Rohde & Schwarz	2026/9/8	2027/9/7

Pream plifier (18GHz-40GHz)	BBV 9721	0056	SCHWARZBECK	2026/9/8	2027/9/7
Double Ridge Guide Horn Antenna (18GHz-40GHz)	SAS-574	588	A.H.System	2026/9/8	2027/9/7
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHWARZBECK	2026/9/8	2027/9/7
Amplifier (9KHz-30MHz)	CVP 9222 C	00109	SCHWARZBECK	2026/9/8	2027/9/7
MXG Signal Analyzer	N9020A	MY50510202	Agilent	2026/9/8	2027/9/7
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2026/9/8	2027/9/7
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2026/9/8	2027/9/7
Power Sensor	TR1029-2	512364	Techoy	2026/9/8	2027/9/7
RF Swith	TR1029-1	512364	Techoy	2026/9/8	2027/9/7
Cable	DA800- 4000MM	NA	DA	2026/9/8	2027/9/7
Cable	DA800- 11000MM	NA	DA	2026/9/8	2027/9/7

Test software

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

2. Conducted emission at the mains terminals test

2.1.Limit

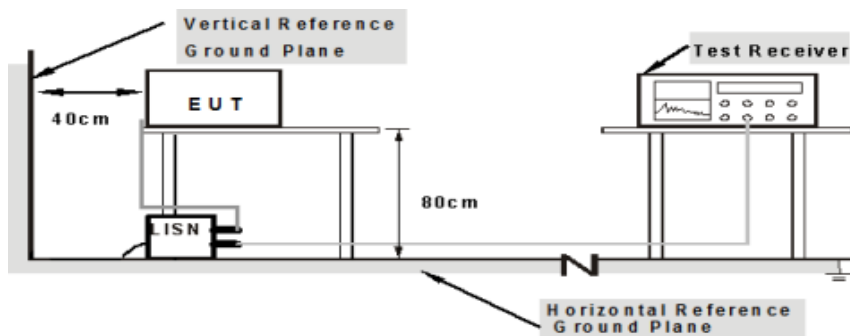
Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10-2020+Cor 1+2023
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

2.2.Test Setup



Note: 1.Support units were connected to second LISN.

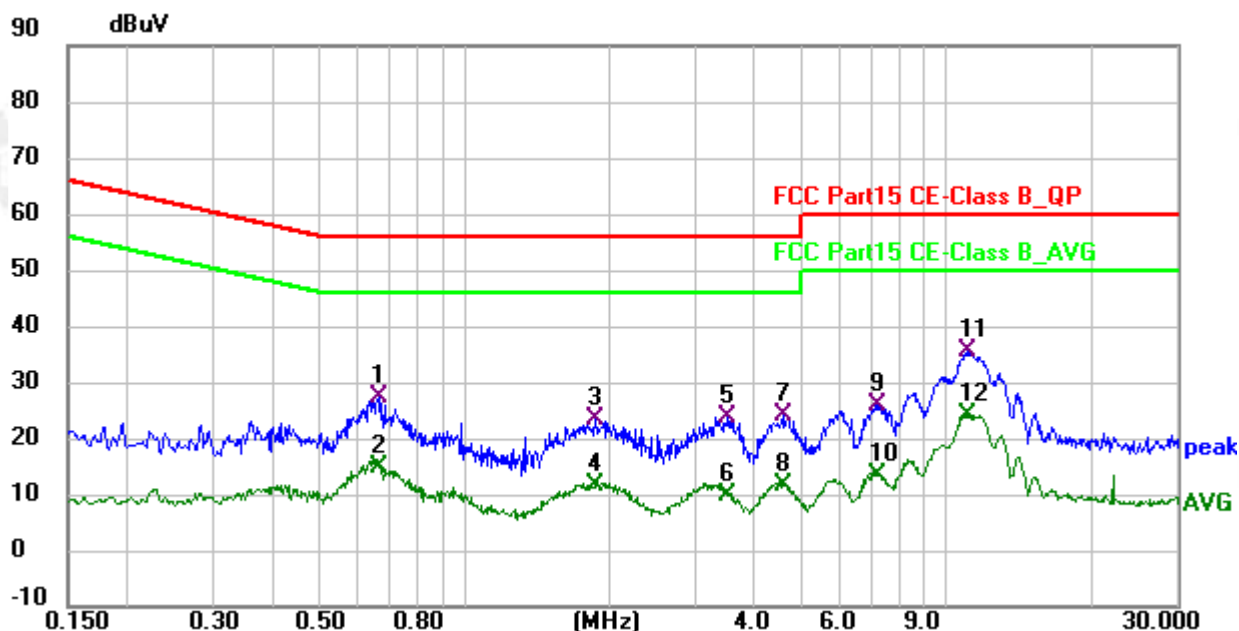
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

2.3.Test 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.

2.4.Test Result

Conducted Emission At The Mains Terminals Test Data			
Temperature:	21.4°C	Relative Humidity:	53.3%
Pressure:	1008hPa	Phase:	Line
Test Voltage :	DC 5V from Adapter Input AC 120V/60Hz		



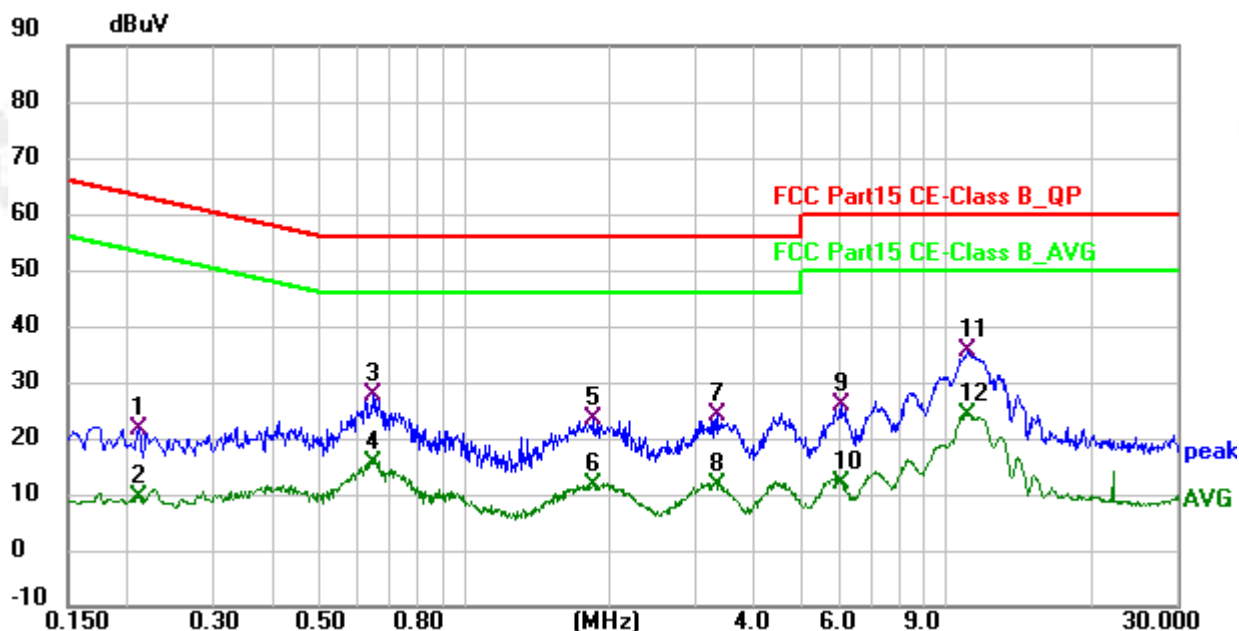
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.6580	17.22	10.14	27.36	56.00	-28.64	QP	P
2	0.6580	4.83	10.14	14.97	46.00	-31.03	AVG	P
3	1.8660	13.32	10.07	23.39	56.00	-32.61	QP	P
4	1.8660	1.41	10.07	11.48	46.00	-34.52	AVG	P
5	3.4940	13.40	10.25	23.65	56.00	-32.35	QP	P
6	3.4940	-0.41	10.25	9.84	46.00	-36.16	AVG	P
7	4.5580	13.92	10.26	24.18	56.00	-31.82	QP	P
8	4.5580	1.43	10.26	11.69	46.00	-34.31	AVG	P
9	7.1380	14.26	11.70	25.96	60.00	-34.04	QP	P
10	7.1380	1.80	11.70	13.50	50.00	-36.50	AVG	P
11 *	11.0300	21.68	13.76	35.44	60.00	-24.56	QP	P
12	11.0300	10.28	13.76	24.04	50.00	-25.96	AVG	P

Note:

1. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
2. Margin = Reading level + Correct Factor – Limit

Conducted Emission At The Mains Terminals Test Data

Temperature:	21.4°C	Relative Humidity:	53.3%
Pressure:	1008hPa	Phase:	Neutral
Test Voltage :	DC 5V from Adapter Input AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.2100	11.62	10.15	21.77	63.21	-41.44	QP	P
2	0.2100	-0.59	10.15	9.56	53.21	-43.65	AVG	P
3	0.6419	17.67	10.11	27.78	56.00	-28.22	QP	P
4	0.6419	5.60	10.11	15.71	46.00	-30.29	AVG	P
5	1.8340	13.45	10.00	23.45	56.00	-32.55	QP	P
6	1.8340	1.49	10.00	11.49	46.00	-34.51	AVG	P
7	3.3220	13.71	10.26	23.97	56.00	-32.03	QP	P
8	3.3220	1.52	10.26	11.78	46.00	-34.22	AVG	P
9	5.9940	14.99	10.96	25.95	60.00	-34.05	QP	P
10	5.9940	1.11	10.96	12.07	50.00	-37.93	AVG	P
11 *	11.0260	21.69	13.68	35.37	60.00	-24.63	QP	P
12	11.0260	10.35	13.68	24.03	50.00	-25.97	AVG	P

Note:

1. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
2. Margin = Reading level + Correct Factor - Limit

Radiated Spurious Emissions

2.5.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247
 Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018;
 ANSI C63.10-2020+Cor 1+2023
 Test Result: PASS
 Measurement Distance: 3m

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

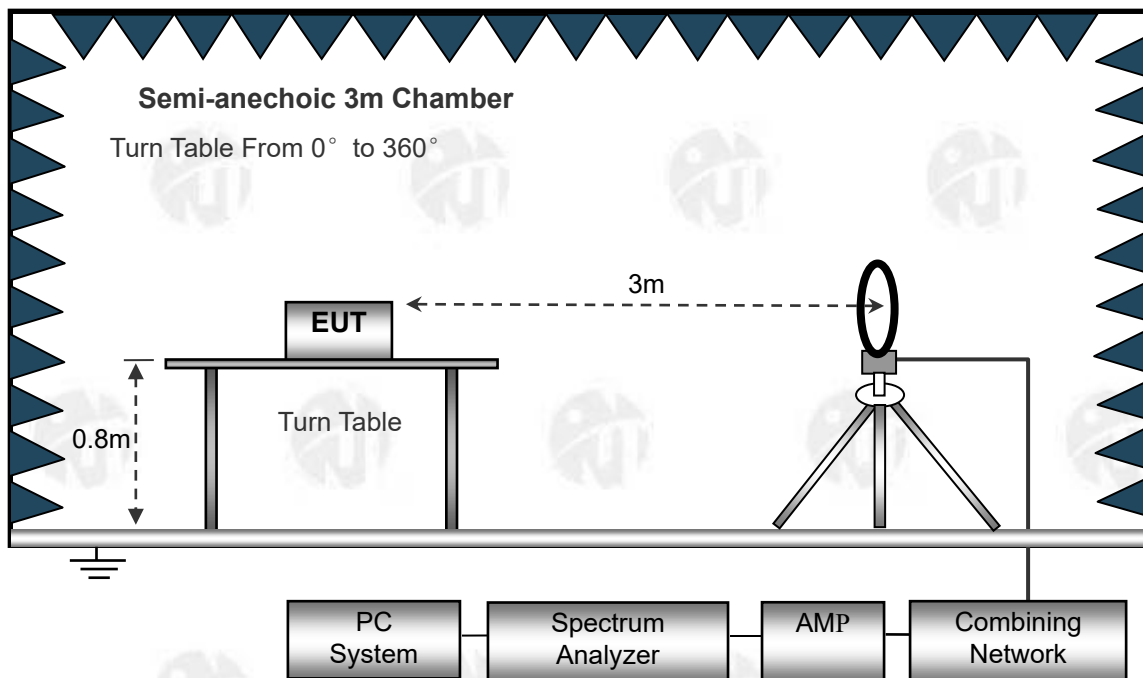
Limit:

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

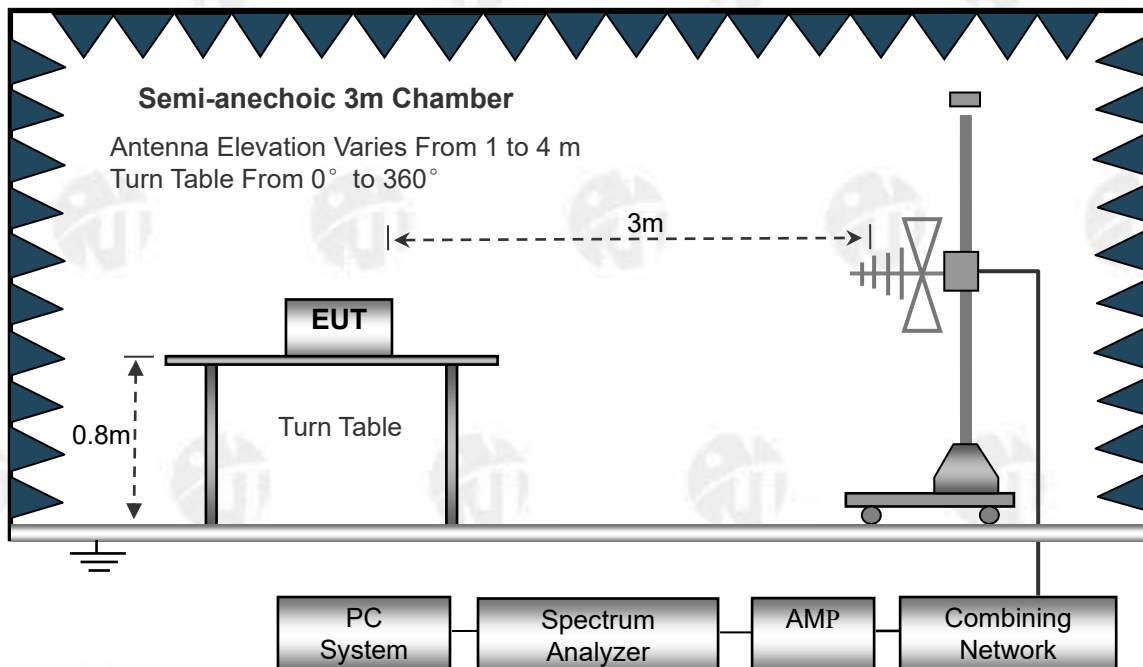
2.6.Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

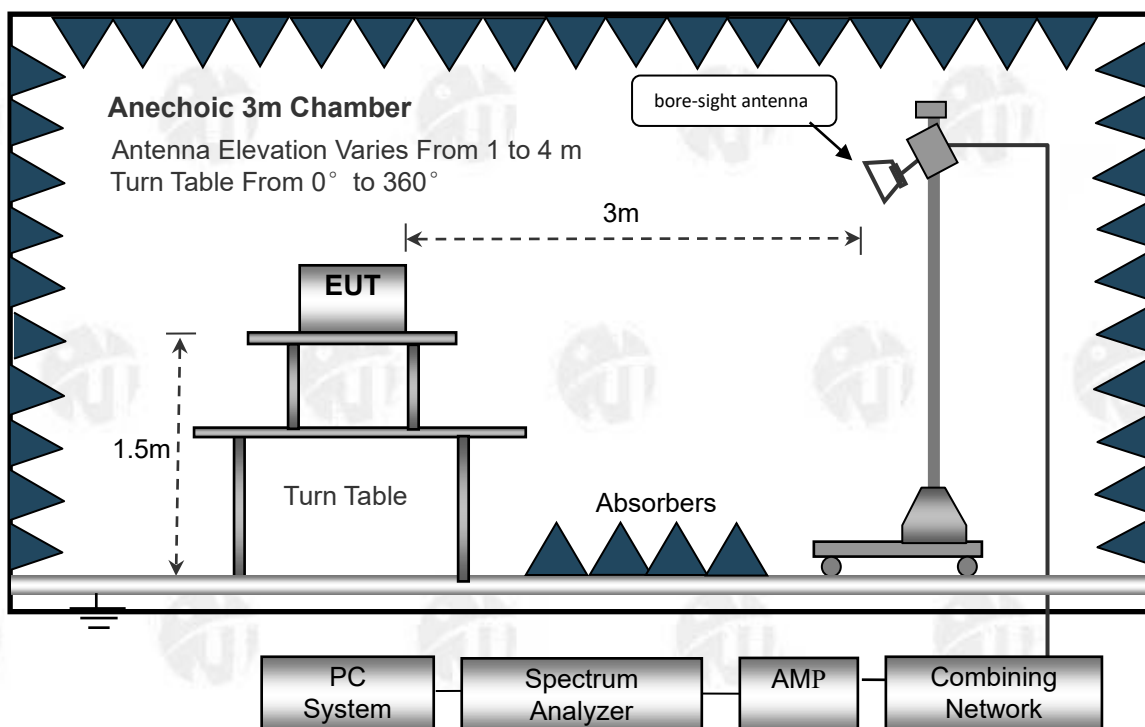
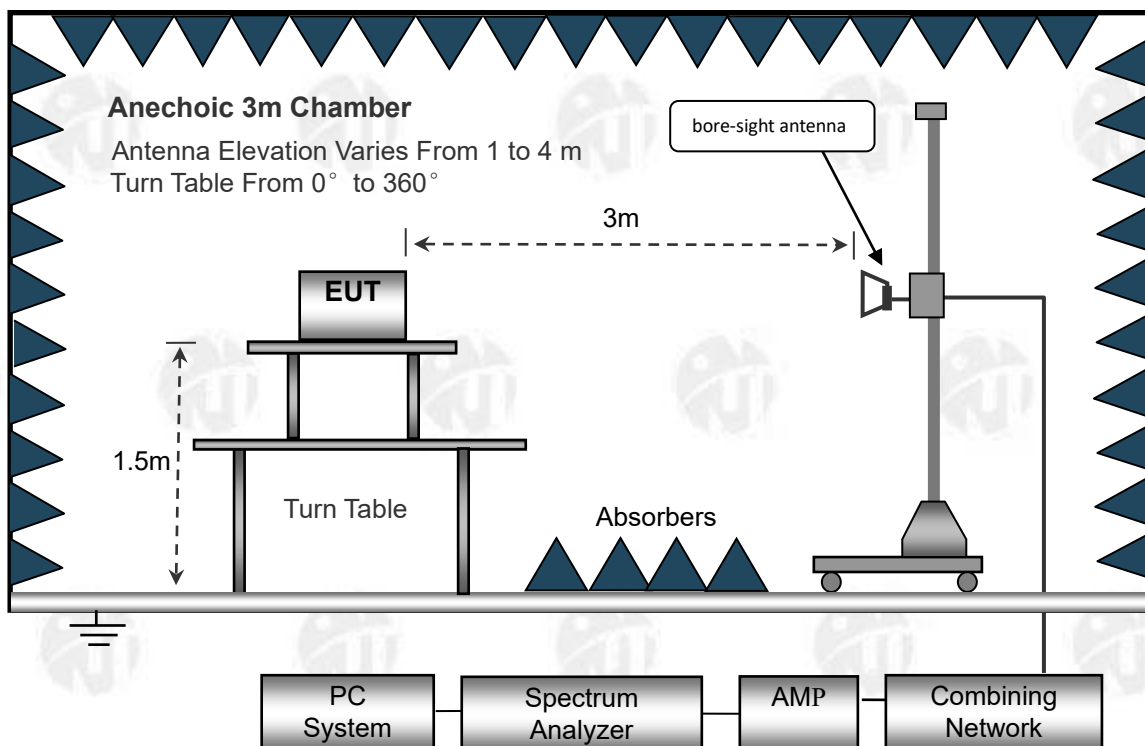
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.





2.7.Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in Z axis,so the worst data were shown as follow.
8. A 2.4GHz high - pass filter is used during radiated emissions above 1GHz measurement.

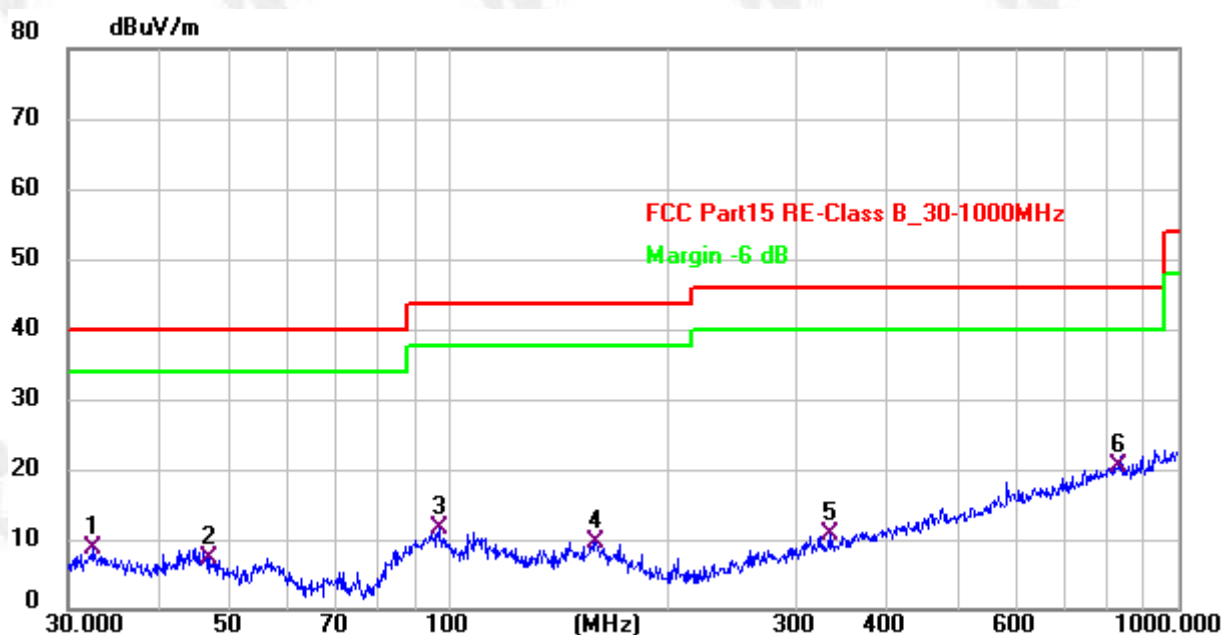
2.8.Test Result

Test Frequency: 9KHz~30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 1GHz

Radiation Emission Test Data			
Temperature:	25.1℃	Relative Humidity:	56%
Pressure:	1008hPa	Phase:	Horizontal
Test Voltage :	DC 5V from Adapter Input AC 120V/60Hz	Test Mode:	GFSK(CH00)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F
1	32.5197	36.26	-27.50	8.76	40.00	-31.24	QP	200	89	P
2	46.8302	34.40	-27.17	7.23	40.00	-32.77	QP	100	153	P
3	96.7750	40.75	-29.08	11.67	43.50	-31.83	QP	100	169	P
4	158.6677	34.54	-24.85	9.69	43.50	-33.81	QP	200	241	P
5	332.5187	34.39	-23.80	10.59	46.00	-35.41	QP	200	108	P
6 *	830.4001	33.41	-12.90	20.51	46.00	-25.49	QP	100	322	P

Note:

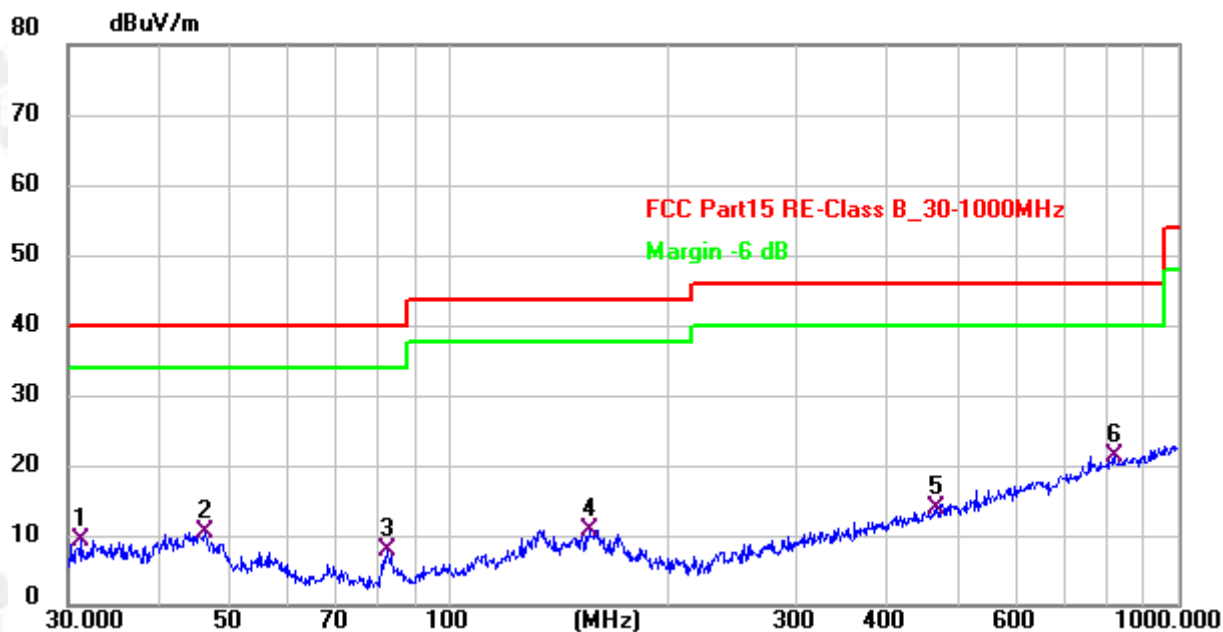
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

Margin=Emission Level-Limit

2. All the modes have tested and recorded the worst mode(GFSK) in the report

Radiation Emission Test Data			
Temperature:	25.1°C	Relative Humidity:	56%
Pressure:	1008hPa	Phase :	Vertical
Test Voltage :	DC 5V from Adapter Input AC 120V/60Hz	Test Mode:	GFSK(CH00)



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F
1	31.2892	36.98	-27.58	9.40	40.00	-30.60	QP	100	277	P
2	46.3402	37.63	-27.13	10.50	40.00	-29.50	QP	200	270	P
3	82.3588	38.33	-30.33	8.00	40.00	-32.00	QP	200	156	P
4	155.9100	35.57	-24.85	10.72	43.50	-32.78	QP	100	124	P
5	465.5994	33.84	-20.04	13.80	46.00	-32.20	QP	200	35	P
6 *	818.8340	34.35	-13.01	21.34	46.00	-24.66	QP	100	171	P

Note:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

Margin=Emission Level-Limit

2. All the modes have tested and recorded the worst mode(GFSK) in the report

1GHz~25GHz

Polar (H/V)	Frequency	Meter Reading	Pre-ampli fier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel:2402MHz									
V	4804	40.65	34.12	5.03	32.39	43.95	74	-30.05	Pk
V	4804	41.23	34.12	5.03	32.39	44.53	54	-9.47	AV
V	7206	40.23	32.54	6.29	35.86	49.84	74	-24.16	Pk
V	7206	40.12	32.54	6.29	35.86	49.73	54	-4.27	AV
V	9608	49.65	32.98	7.55	38.4	62.62	74	-11.38	Pk
V	9608	35.26	32.98	7.55	38.4	48.23	54	-5.77	AV
V	12010	44.36	32.09	8.93	39	60.2	74	-13.8	Pk
V	12010	30.12	32.09	8.93	39	45.96	54	-8.04	AV
H	4804	45.26	34.12	5.03	32.39	48.56	74	-25.44	Pk
H	4804	39.65	34.12	5.03	32.39	42.95	54	-11.05	AV
H	7206	40.36	32.54	6.29	35.86	49.97	74	-24.03	Pk
H	7206	35.02	32.54	6.29	35.86	44.63	54	-9.37	AV
H	9608	35.26	32.98	7.55	38.4	48.23	74	-25.77	Pk
H	9608	30.69	32.98	7.55	38.4	43.66	54	-10.34	AV
H	12010	40.35	32.09	8.93	39	56.19	74	-17.81	Pk
H	12010	30.21	32.09	8.93	39	46.05	54	-7.95	AV

Polar (H/V)	Frequency	Meter Reading	Pre-ampli fier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Middle Channel:2440MHz									
V	4880	40.35	30.55	5.77	24.66	40.23	74	-33.77	Pk
V	4880	36.25	30.55	5.77	24.66	36.13	54	-17.87	AV
V	7320	40.21	30.33	6.32	24.55	40.75	74	-33.25	Pk
V	7320	35.26	30.33	6.32	24.55	35.80	54	-18.20	AV
V	9760	41.36	30.85	7.45	24.69	42.65	74	-31.35	Pk
V	9760	32.12	30.85	7.45	24.69	33.41	54	-20.59	AV
V	12200	43.68	31.02	8.99	25.57	47.22	74	-26.78	Pk
V	12200	34.25	31.02	8.99	25.57	37.79	54	-16.21	AV
H	4880	39.68	30.55	5.77	24.66	39.56	74	-34.44	Pk
H	4880	40.36	30.55	5.77	24.66	40.24	54	-13.76	AV
H	7320	40.37	30.33	6.32	24.55	40.91	74	-33.09	Pk
H	7320	36.35	30.33	6.32	24.55	36.89	54	-17.11	AV
H	9760	40.32	30.85	7.45	24.69	41.61	74	-32.39	Pk
H	9760	40.39	30.85	7.45	24.69	41.68	54	-12.32	AV
H	12200	40.36	31.02	8.99	25.57	43.90	74	-30.10	Pk
H	12200	35.64	31.02	8.99	25.57	39.18	54	-11.92	AV

Polar (H/V)	Frequency	Meter Reading	Pre-ampli fier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
High Channel:2480MHz									
V	4960	49.65	30.55	5.77	24.66	49.53	74	-24.47	Pk
V	4960	38.64	30.55	5.77	24.66	38.52	54	-15.48	AV
V	7440	40.12	30.33	6.32	24.55	40.66	74	-33.34	Pk
V	7440	35.32	30.33	6.32	24.55	35.86	54	-18.14	AV
V	9920	46.37	30.85	7.45	24.69	47.66	74	-26.34	Pk
V	9920	35.17	30.85	7.45	24.69	36.46	54	-17.54	AV
V	12400	40.38	31.02	8.99	25.57	43.92	74	-30.08	Pk
V	12400	35.64	31.02	8.99	25.57	39.18	54	-14.82	AV
H	4960	40.31	30.55	5.77	24.66	40.19	74	-33.81	Pk
H	4960	37.98	30.55	5.77	24.66	37.86	54	-16.14	AV
H	7440	40.36	30.33	6.32	24.55	40.90	74	-33.10	Pk
H	7440	38.98	30.33	6.32	24.55	39.52	54	-14.48	AV
H	9920	40.37	30.85	7.45	24.69	41.66	74	-32.34	Pk
H	9920	36.37	30.85	7.45	24.69	37.66	54	-16.34	AV
H	12400	37.02	31.02	8.99	25.57	40.56	74	-33.44	Pk
H	12400	40.36	31.02	8.99	25.57	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.

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

	Polar (H/V)	Frequenc y (MHz)	Meter Reading (dBuV)	Pre- amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV /m)	Margi n (dB)	Detec tor Type
GFSK	Low Channel: 2402MHz									
	H	2390	50.12	35.17	3.48	27.49	45.92	74	-28.08	PK
	H	2390	40.54	35.17	3.48	27.49	36.34	54	-17.66	AV
	H	2400	50.36	35.16	3.49	27.52	46.21	74	-27.79	PK
	H	2400	46.35	35.16	3.49	27.52	42.20	54	-11.80	AV
	V	2390	48.52	35.17	3.48	27.49	44.32	74	-29.68	PK
	V	2390	49.37	35.17	3.48	27.49	45.17	54	-8.83	AV
	V	2400	50.23	35.16	3.49	27.52	46.08	74	-27.92	PK
	V	2400	40.31	35.16	3.49	27.52	36.16	54	-17.84	AV
	High Channel: 2480MHz									
	H	2483.5	45.36	35.11	3.56	27.75	41.56	74	-32.44	PK
	H	2483.5	42.35	35.11	3.56	27.75	45.88	54	-8.12	AV
	H	2500	57.14	35.10	3.57	27.8	52.63	74	-21.37	PK
	H	2500	50.38	35.10	3.57	27.8	38.62	54	-15.38	AV
	V	2483.5	57.89	35.11	3.56	27.75	52.52	74	-21.48	PK
	V	2483.5	45.68	35.11	3.56	27.75	43.74	54	-10.26	AV
	V	2500	56.47	35.10	3.57	27.8	57.52	74	-16.48	PK
	V	2500	36.98	35.10	3.57	27.8	36.81	54	-17.19	AV
Remark: 1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit										

3. Conducted Spurious Emissions

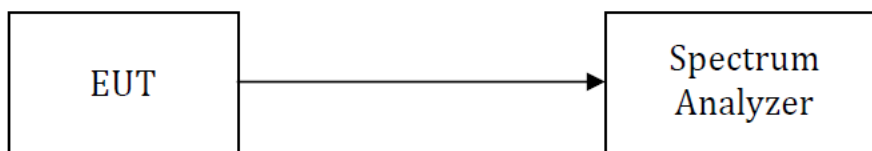
3.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247
Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018;
ANSI C63.10-2020+Cor 1+2023
Test Result: PASS

Limit:

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 Section 15.209(a) is not required. 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)).

3.2.Test Setup



3.3.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:
 - 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 × 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.

3.4.Test Result

Please see the attachment for data.

4. Band Edge Measurement

4.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018;

ANSI C63.10-2020+Cor 1+2023

Test Limit: Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band 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)).

Test Mode: Transmitting

4.2.Test setup



4.3.Test Procedure

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.

4.4.Test Result

Please see the attachment for data.

5. -6 dB Bandwidth and 99% Bandwidth Measurement

5.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018; ANSI C63.10-2020+Cor 1+2023

5.2.Test Setup



5.3.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

5.4.Test Result

Please see the attachment for data.

6. Maximum Peak Output Power

6.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018;
 ANSI C63.10-2020+Cor 1+2023

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.2.Test Setup



6.3.Test Procedure

KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018

section 8.3.1.1 (For BLE)

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- Set the RBW $\geq$ DTS bandwidth.
- Set VBW ≥ 3 RBW.
- Set span $\geq 3 \times$ RBW
- Sweep time = auto couple.
- Detector = peak.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use peak marker function to determine the peak amplitude level.

section 8.3.1.2 (For WIFI)

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

- Set the RBW = 1% to 5% of the OBW, not to exceed 1 MHz..
- Set the VBW $\geq 3 \times$ RBW
- Set the span $\geq 1.5 \times$ OBW.
- Detector = RMS.
- Sweep time = auto couple.
- trigger = free run..
- Number of points in sweep $\geq [2 \times \text{span} / \text{RBW}]$. (This gives bin-to-bin spacing $\geq \text{RBW} / 2$, so that narrowband signals are not lost between frequency bins.)
- Trace average at least 100 traces in power averaging (rms) mode.
- Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.



6.4.Test Result

Please see the attachment for data.

7. Power Spectral density

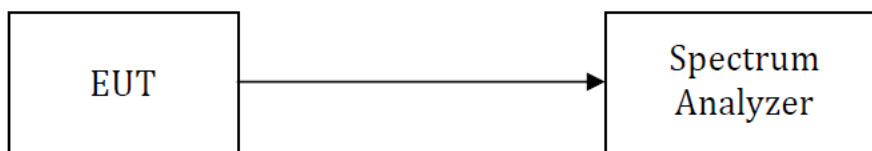
7.1.Limit

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 15.247 Meas Guidance v05 August 24, 2018; ANSI C63.10-2020+Cor 1+2023

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8dBm/3kHz	2400-2483.5	PASS

7.2.Test Setup



7.3.Test Procedure

KDB 558074 D01 DTS Meas Guidance v04 April 5, 2017 section 10.2

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.

7.4.Test Result

Please see the attachment for data.



8. Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has an integrated antenna fulfill the requirement of this section.

This product has an PCB antenna, and the maximum antenna gain is 0dBi, fulfill the requirement of this section.



9. TEST SETUP & EUT PHOTOGRAPH

Please see the attachment for details.

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