

FCC TEST REPORT

FCC ID: 2A0AF-BTS30

Report No. : SSP24010125-1E

Prepared For : TYLT, inc.

Product Name : Hydration Mug+Bluetooth Speaker

Model Name : SPKRMUG12W-T

FCC Rule : FCC Part 15.247

Date of Issue : 2024-02-02

Prepared By : Shenzhen CCUT Quality Technology Co., Ltd.



Shenzhen CCUT Quality Technology Co., Ltd.

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This test report is limited to the above client company and the product model only. It may not be duplicated
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Test Report Basic Information

Applicant:	TYLT, inc.
Address of Applicant:	685 Cochran St., Suite 200 Simi Valley, California 93065, United States
Manufacturer:	SHENZHEN KAIYUE CENTURY TECHNOLOGY CO., LTD
Address of Manufacturer:	4th Floor, Building B, No. 38, Huanli Road, Zhenmei Community, Xinhua Street, Guangming District, Shenzhen, Guangdong, China
Product Name:	Hydration Mug+Bluetooth Speaker
Brand Name:	TYLT
Main Model:	SPKRMUG12W-T
Series Models:	SPKRMUG12XX-Y
Test Standard:	FCC Part 15 Subpart C ANSI C63.10-2013
Date of Test	2024-01-18 to 2024-01-23
Test Result:	PASSED
Tested Engineer	 (Walker Wu)
Project Manager:	 (Lieber Ouyang)
Authorized Signatory:	 (Lahm Peng)
Note : This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen CCUT Quality Technology Co., Ltd.. All test data presented in this test report is only applicable to presented test sample.	



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Revision History

Revision	Issue Date	Description	Revised By
V1.0	2024-02-02	Initial Release	Lahm Peng

1. General Information

1.1 Product Information

Product Name:	Hydration Mug+Bluetooth Speaker
Trade Name:	TYLT
Main Model:	SPKRMUG12W-T
Series Models:	SPKRMUG12XX-Y
Rated Voltage:	DC 3.7V by battery, USB 5V charging
Battery:	DC 3.7V, 1900mAh
Hardware Version:	V1.0
Software Version:	V1.0
Note 1: The test data is gathered from a production sample, provided by the manufacturer.	
Note 2: The color of appearance and model name of series models listed are different from the main model, but the circuit and the electronic construction are the same, XX stands for color abbreviation, Y stands for abbreviation of customer name, declared by the manufacturer.	

Wireless Specification	
Wireless Standard:	Bluetooth BR/EDR
Operating Frequency:	2402MHz ~2480MHz
Number of Channel:	79
Channel Separation:	1MHz
Modulation:	GFSK, Pi/4 DQPSK, 8DPSK
Antenna Gain:	0dBi
Type of Antenna:	PCB Antenna
Type of Device:	☒ Portable Device ☐ Mobile Device ☐ Modular Device

1.2 Test Setup Information

List of Test Modes			
Test Mode	Description	Remark	
TM1	Lowest Channel	2402MHz(DH5/2DH5/3DH5)	
TM2	Middle Channel	2441MHz(DH5/2DH5/3DH5)	
TM3	Highest Channel	2480MHz(DH5/2DH5/3DH5)	
TM4	Hopping	2402MHz~2480MHz	
TM5	-	-	
List and Details of Auxiliary Cable			
Description	Length (cm)	Shielded/Unshielded	With/Without Ferrite
-	-	-	-
List and Details of Auxiliary Equipment			
Description	Manufacturer	Model	Serial Number
-	-	-	-
-	-	-	-

List of Channels							
No. of Channel	Frequency (MHz)	No. of Channel	Frequency (MHz)	No. of Channel	Frequency (MHz)	No. of Channel	Frequency (MHz)
01	2402	21	2422	41	2442	61	2462
02	2403	22	2423	42	2443	62	2463
03	2404	23	2424	43	2444	63	2464
04	2405	24	2425	44	2445	64	2465
05	2406	25	2426	45	2446	65	2466
~	~	~	~	~	~	~	~
16	2417	36	2437	56	2457	76	2477
17	2418	37	2438	57	2458	77	2478
18	2419	38	2439	58	2459	78	2479
19	2420	39	2440	59	2460	79	2480
20	2421	40	2441	60	2461		

1.3 Compliance Standards

Compliance Standards	
FCC Part 15 Subpart C	FEDERAL COMMUNICATIONS COMMISSION, RADIO FREQUENCY DEVICES, Intentional Radiators
All measurements contained in this report were conducted with all above standards	
According to standards for test methodology	
FCC Part 15 Subpart C	FEDERAL COMMUNICATIONS COMMISSION, RADIO FREQUENCY DEVICES, Intentional Radiators
ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Maintenance of compliance is the responsibility of the manufacturer or applicant. Any modification of the product, which result is lowering the emission, should be checked to ensure compliance has been maintained.	

1.4 Test Facilities

Laboratory Name:	Shenzhen CCUT Quality Technology Co., Ltd. 1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China
CNAS Laboratory No.:	L18863
A2LA Certificate No.:	6893.01
FCC Registration No:	583813
ISED Registration No.:	CN0164
All measurement facilities used to collect the measurement data are located at 1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China.	

1.5 List of Measurement Instruments

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Conducted Emissions					
AMN	ROHDE&SCHWARZ	ENV216	101097	2023-07-31	2024-07-30
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	100242	2023-07-31	2024-07-30
Radiated Emissions					
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	100154	2023-07-31	2024-07-30
Spectrum Analyzer	KEYSIGHT	N9020A	MY48030972	2023-07-31	2024-07-30
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40-N	101692	2023-07-31	2024-07-30
Amplifier	SCHWARZBECK	BBV 9743B	00251	2023-07-31	2024-07-30
Amplifier	HUABO	YXL0518-2.5-45	--	2023-07-31	2024-07-30
Amplifier	COM-MW	DLAN-18G-4G-02	10229104	2023-07-31	2024-07-30
Loop Antenna	DAZE	ZN30900C	21104	2023-08-07	2024-08-06
Broadband Antenna	SCHWARZBECK	VULB 9168	01320	2023-08-07	2024-08-06
Horn Antenna	SCHWARZBECK	BBHA 9120D	02553	2023-08-07	2024-08-06
Horn Antenna	COM-MW	ZLB7-18-40G-950	12221225	2023-08-07	2024-08-06
Conducted RF Testing					
RF Test System	MWRFTTest	MW100-RFCB	220418SQS-37	2023-07-31	2024-07-30
Spectrum Analyzer	KEYSIGHT	N9020A	ATO-90521	2023-07-31	2024-07-30

1.6 Measurement Uncertainty

Test Item	Conditions	Uncertainty
Conducted Emissions	9kHz ~ 30MHz	±1.64 dB
Radiated Emissions	9kHz ~ 30MHz	±2.88 dB
	30MHz ~ 1GHz	±3.32 dB
	1GHz ~ 18GHz	±3.50 dB
	18GHz ~ 40GHz	±3.66 dB
Conducted Output Power	9kHz ~ 26GHz	±0.50 dB
Occupied Bandwidth	9kHz ~ 26GHz	±4.0 %
Conducted Spurious Emission	9kHz ~ 26GHz	±1.32 dB

2. Summary of Test Results

FCC Rule	Description of Test Item	Result
FCC Part 15.209, 15.247(d)	Radiated Emissions	Passed
FCC Part 15.247(d)	Band-edge Emissions(Radiated)	Passed
Passed: The EUT complies with the essential requirements in the standard Failed: The EUT does not comply with the essential requirements in the standard N/A: Not applicable		

3. Radiated Emissions

3.1 Standard and Limit

According to §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)).

According to the rule FCC Part 15.209, Radiated emission limit for a wireless device as below:

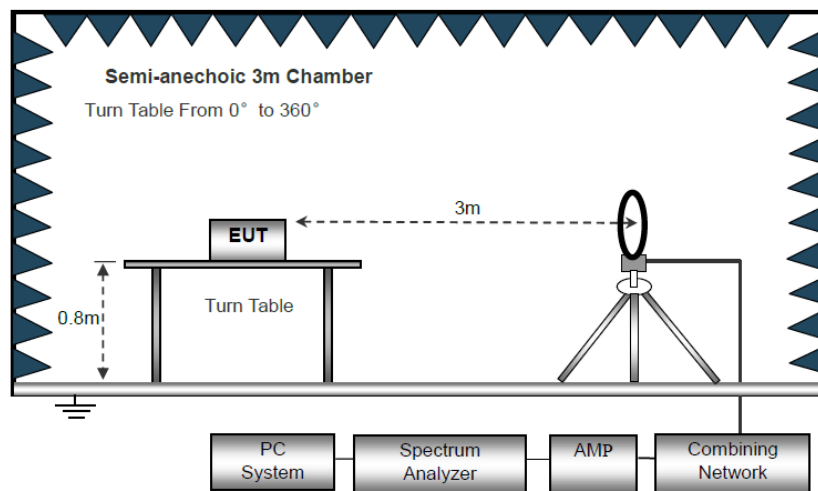
Frequency of emission (MHz)	Radiated emissions (3m)
	Quasi-peak (dBuV/m)
30-88	40
88-216	43.5
216-960	46
Above 960	54
Note: The more stringent limit applies at transition frequencies.	

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

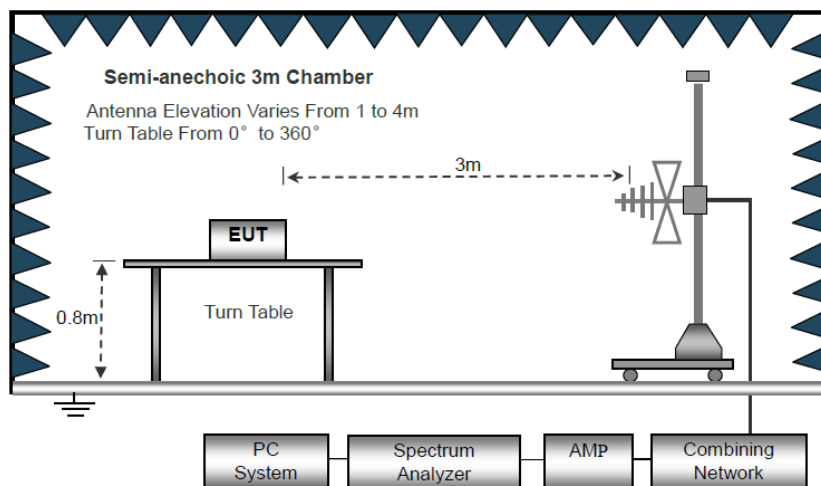
Note: Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

3.2 Test Procedure

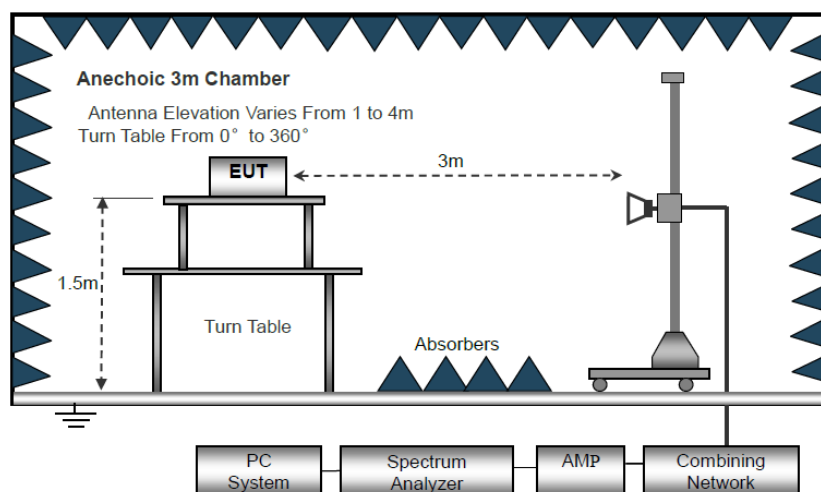
Test is conducting under the description of ANSI C63.10 - 2013 section 6.3 to 6.6.



Block Diagram of Radiated Emission Below 30MHz



Block Diagram of Radiated Emission From 30MHz to 1GHz



Block Diagram of Radiated Emission Above 1GHz

- a) The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range below 1GHz, and 1.5m above ground plane for test frequency range above 1GHz.
- b) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- c) Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for $f \geq 1\text{GHz}$, 100 kHz for $f < 1\text{GHz}$, 10kHz for $f < 30\text{MHz}$
VBW $\geq$ RBW, Sweep = auto
Detector function = peak
Trace = max hold
- d) Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- e) The peak level, once corrected, must comply with the limit specified in Section 15.209. Set the RBW = 1MHz, VBW = 10Hz, Detector = PK for AV value, while maintaining all of the other instrument settings.
- f) For the actual test configuration, please refer to the related item - EUT test photos.

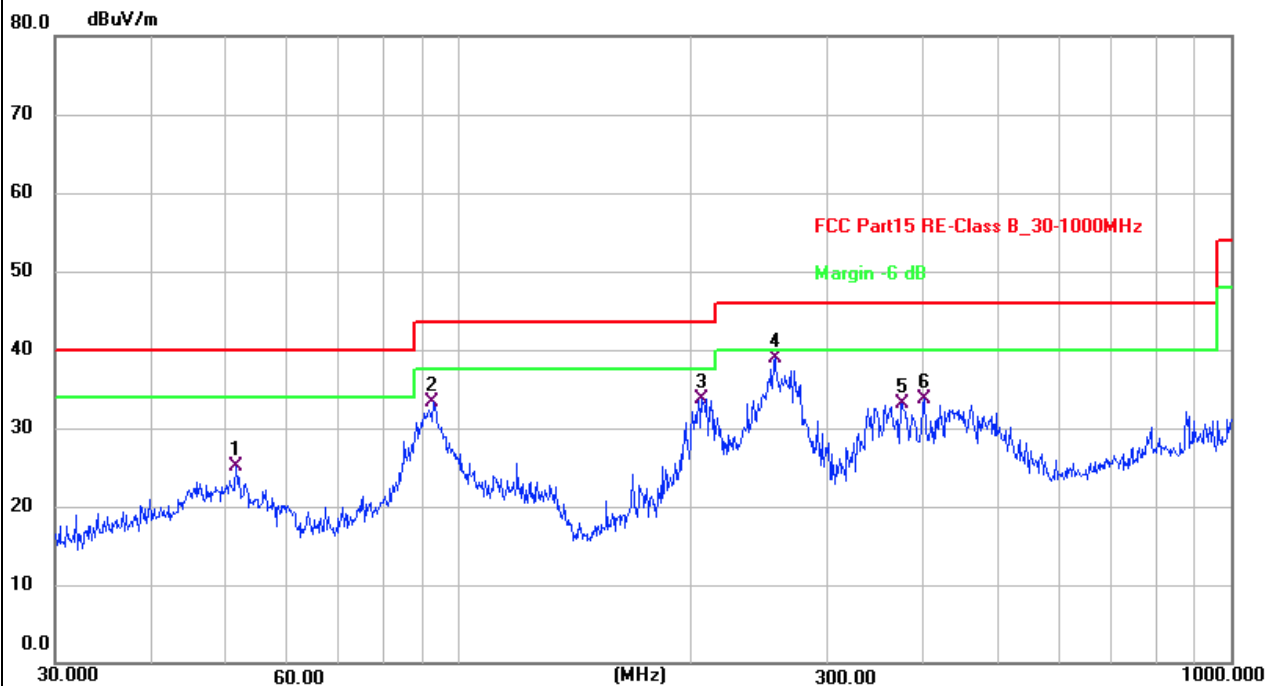
3.3 Test Data and Results

Based on all tested data, the EUT complied with the FCC Part 15.247 standard limit for a wireless device, and with the worst case GFSK_2402MHz as below:

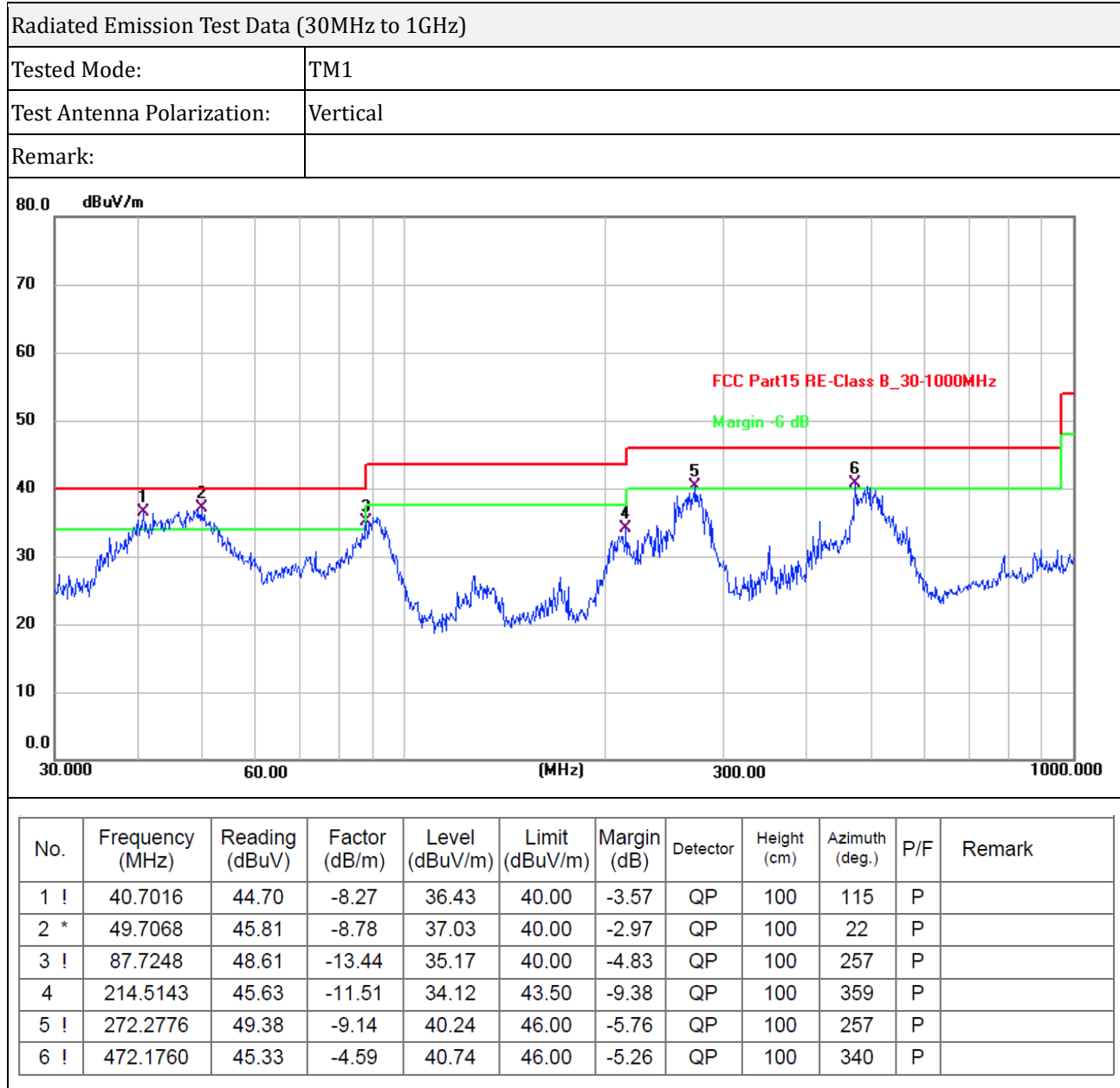
Remark: Level = Reading + Factor, Margin = Level - Limit

Radiated Emission Test Data (30MHz to 1GHz)

Tested Mode:	TM1
Test Antenna Polarization:	Horizontal
Remark:	



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	51.4807	34.08	-8.92	25.16	40.00	-14.84	QP	100	247	P	
2	92.7871	46.47	-13.23	33.24	43.50	-10.26	QP	100	351	P	
3	206.3976	45.52	-11.80	33.72	43.50	-9.78	QP	100	340	P	
4 *	256.5211	48.64	-9.68	38.96	46.00	-7.04	QP	100	31	P	
5	374.6225	39.98	-6.94	33.04	46.00	-12.96	QP	100	0	P	
6	400.4319	39.64	-5.86	33.78	46.00	-12.22	QP	100	0	P	



Radiated Emission Test Data (Above 1GHz)							
Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	PK/AV
Lowest Channel GFSK (2402MHz)							
4804	75.41	-14.72	60.69	74	-13.31	H	PK
4804	61.09	-14.72	46.37	54	-7.63	H	AV
7206	65.13	-8.41	56.72	74	-17.28	H	PK
7206	46.23	-8.41	37.82	54	-16.18	H	AV
4804	74.78	-14.72	60.06	74	-13.94	V	PK
4804	58.86	-14.72	44.14	54	-9.86	V	AV
7206	64.12	-8.41	55.71	74	-18.29	V	PK
7206	48.24	-8.41	39.83	54	-14.17	V	AV
Middle Channel GFSK (2441MHz)							
4882	75.67	-14.64	61.03	74	-12.97	H	PK
4882	61.24	-14.64	46.6	54	-7.4	H	AV
7323	63.77	-8.28	55.49	74	-18.51	H	PK
7323	45.93	-8.28	37.65	54	-16.35	H	AV
4882	73.69	-14.64	59.05	74	-14.95	V	PK
4882	58.77	-14.64	44.13	54	-9.87	V	AV
7323	63.05	-8.28	54.77	74	-19.23	V	PK
7323	50.24	-8.28	41.96	54	-12.04	V	AV
Highest Channel GFSK (2480MHz)							
4960	76.42	-14.53	61.89	74	-12.11	H	PK
4960	61.95	-14.53	47.42	54	-6.58	H	AV
7440	64.75	-8.13	56.62	74	-17.38	H	PK
7440	45.9	-8.13	37.77	54	-16.23	H	AV
4960	75.2	-14.53	60.67	74	-13.33	V	PK
4960	59	-14.53	44.47	54	-9.53	V	AV
7440	63.63	-8.13	55.5	74	-18.5	V	PK
7440	46.68	-8.13	38.55	54	-15.45	V	AV

Note 1: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Note 2: Testing is carried out with frequency rang 9kHz to the tenth harmonics. The measurements greater than 20dB below the limit from 9kHz to 30MHz.

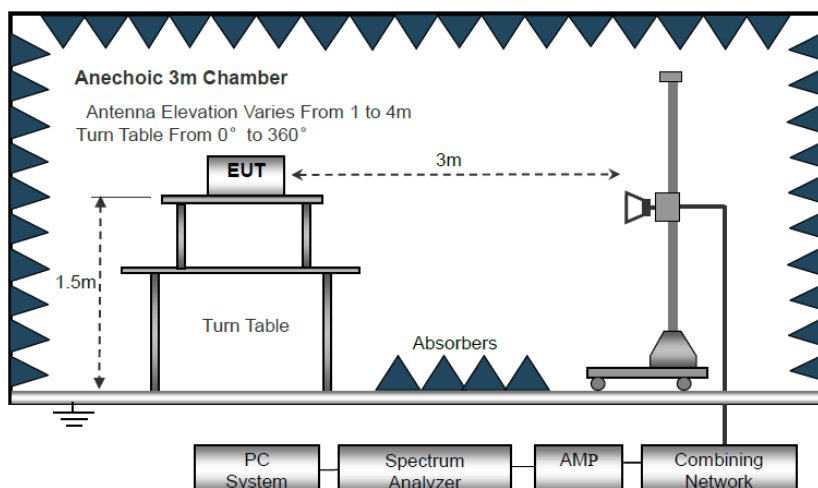
4. Band-edge Emissions(Radiated)

4.1 Standard and Limit

According to §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)).

4.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.3 to 6.6 and section 6.10.



Test Setup Block Diagram

As the radiated emissions testing, set the Lowest and Highest Transmitting Channel, observed the outside band of 2310MHz to 2400MHz and 2483.5MHz to 2500MHz, than mark the higher-level emission for comparing with the FCC rules.

4.3 Test Data and Results

Based on all tested data, the EUT complied with the FCC Part 15.247 standard limit, and with the worst case GFSK as below:

Test Mode	Frequency	Limit	Result
	MHz	dBuV/dBc	
Lowest	2310.00	<54 dBuV	Pass
	2390.00	<54 dBuV	Pass
	2400.00	>30 dBc	Pass
Highest	2483.50	<54 dBuV	Pass
	2500.00	<54 dBuV	Pass

Radiated Emission Test Data (Band edge emissions)							
Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	PK/AV
Lowest Channel GFSK (2402MHz)							
2310	65.1	-21.34	43.76	74	-30.24	H	PK
2310	49.55	-21.34	28.21	54	-25.79	H	AV
2390	64.56	-20.96	43.6	74	-30.4	H	PK
2390	52.74	-20.96	31.78	54	-22.22	H	AV
2400	69.31	-20.91	48.4	74	-25.6	H	PK
2400	56.42	-20.91	35.51	54	-18.49	H	AV
2310	65.5	-21.34	44.16	74	-29.84	V	PK
2310	49.13	-21.34	27.79	54	-26.21	V	AV
2390	66.04	-20.96	45.08	74	-28.92	V	PK
2390	49.56	-20.96	28.6	54	-25.4	V	AV
2400	72.48	-20.91	51.57	74	-22.43	V	PK
2400	56.5	-20.91	35.59	54	-18.41	V	AV
Highest Channel GFSK (2480MHz)							
2483.50	72.8	-20.51	52.29	74	-21.71	H	PK
2483.50	53.76	-20.51	33.25	54	-20.75	H	AV
2500	67.89	-20.43	47.46	74	-26.54	H	PK
2500	49.67	-20.43	29.24	54	-24.76	H	AV
2483.50	71.38	-20.51	50.87	74	-23.13	V	PK
2483.50	52.8	-20.51	32.29	54	-21.71	V	AV
2500	65.79	-20.43	45.36	74	-28.64	V	PK
2500	49.52	-20.43	29.09	54	-24.91	V	AV

Remark: Level = Reading + Factor; Margin = Level - Limit

***** END OF REPORT *****