



# FCC Part 15C Test Report

## FCC ID: 2AVSW-AAE1

Applicant: DongGuan ZEAPON Technology Co., Ltd.

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Manufacturer: DongGuan ZEAPON Technology Co., Ltd.

Address: Room 301 ,Building 7 ,No. 26 ,Jinqu Road ,Wanjiang District ,Dongguan City ,Guangdong Province,China

EUT: Micro 3 Slider Motor

Trade Mark: ZEAPON

Model Number: AA-E1, AA-E2

Date of Receipt: Sep. 08, 2022

Test Date: Sep. 08, 2022 - Sep. 20, 2022

Date of Report: Sep. 20, 2022

Prepared By: Shenzhen DL Testing Technology Co., Ltd.

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Applicable Standards: FCC PART 15 C 15.247  
ANSI C63.10:2013

Test Result: Pass

Report Number: DL-20220919024E

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*This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.*



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## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.205	Band Edge Emission	PASS	
15.247(b)(1)	Average Output Power	PASS	
15.247(a)(2)	6dB Bandwidth	PASS	
15.247(d)	Power Spectral Density	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

### 1.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$  providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 2.56\text{dB}$
2	RF power,conducted	$\pm 0.42\text{dB}$
3	Spurious emissions,conducted	$\pm 2.76\text{dB}$
4	All emissions,radiated(<1G)	$\pm 3.65\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$



## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Micro 3 Slider Motor
Trademark	ZEAPON
Model No.:	AA-E1, AA-E2
Model Difference	All samples are the same except the model name, so we prepare " AA-E1 " for test only.
Operation Frequency:	2402~2480 MHz
Channel numbers:	40 Channels
Channel separation:	2MHz
Modulation technology:	GFSK
BT Version:	V5.1
Antenna Type:	Internal Antenna
Antenna gain:	2 dBi

Note:

- 1.For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.The EUT's all information provided by client.



2. Channel List

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	11	2422	21	2442
02	2404	12	2424	22	2444
03	2406	13	2426	23	2446
~	~	~	~	~	~
09	2418	19	2438	20	2440
10	2420	20	2440	40	2480

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

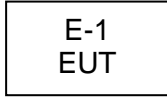
Pretest Mode	Description
Mode 1	CH01
Mode 2	CH20
Mode 3	CH40
Mode 4	Link Mode
For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode
For Radiated Emission	
Final Test Mode	Description
Mode 1	CH01
Mode 2	CH20
Mode 3	CH40
Mode 4	Link Mode

Note: 1. The measurements are performed at the highest, middle, lowest available channels.  
2. During the test, the duty cycle >98%, 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.

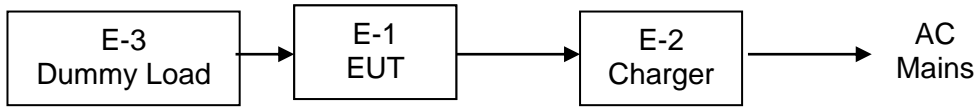


**2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED**

Radiated Spurious Emission Test



Conducted Spurious Emission Test



**2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)**

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	Model/Type No.	Series No.	Note
E-1	Smart Switch	AA-E1	N/A	EUT
E-2	Charger	CD137		Input:AC 100-240V 50/60Hz 0.5A Output: DC5V/3A, 9V/2.2A, 12V/1.67A

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

**2.5 TABLE OF PARAMETERS OF TEST SOFTWARE SETTING**

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the end product.

Test software Version	Test program: ToolboxSmartSnippets Toolbox v5.0.12.2786		
Mode	2402 MHz	2440 MHz	2480 MHz
Max output power parameters setting of software	0	0	0

**2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS**

Radiation test, Band-edge test and 6db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4408B	MY50140780	Nov. 06, 2021	Nov. 05, 2022
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 06, 2021	Nov. 05, 2022
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 06, 2021	Nov. 05, 2022
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 06, 2021	Nov. 05, 2022
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 06, 2021	Nov. 05, 2022
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 06, 2021	Nov. 05, 2022
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 06, 2021	Nov. 05, 2022
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 06, 2021	Nov. 05, 2022
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 06, 2021	Nov. 05, 2022
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 06, 2021	Nov. 05, 2022
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 06, 2021	Nov. 05, 2022
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 06, 2021	Nov. 05, 2022
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 06, 2021	Nov. 05, 2022
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 06, 2021	Nov. 05, 2022
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 06, 2021	Nov. 05, 2022
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 06, 2021	Nov. 05, 2022

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Nov. 25, 2019	Nov. 24, 2022
2	EMI Receiver	R&S	ESR	101421	Nov. 06, 2021	Nov. 05, 2022
3	LISN	R&S	ENV216	102417	Nov. 06, 2021	Nov. 05, 2022
4	843 Cable 1#	ChengYu	CE Cable	001	Nov. 06, 2021	Nov. 05, 2022

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMCC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMCC	FA-03A2
3	RF test system	MAIWEI	MTS8310	2.0.0.0
4	RF communication test system	MAIWEI	MTS8200	2.0.0.0





### 3. EMC EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

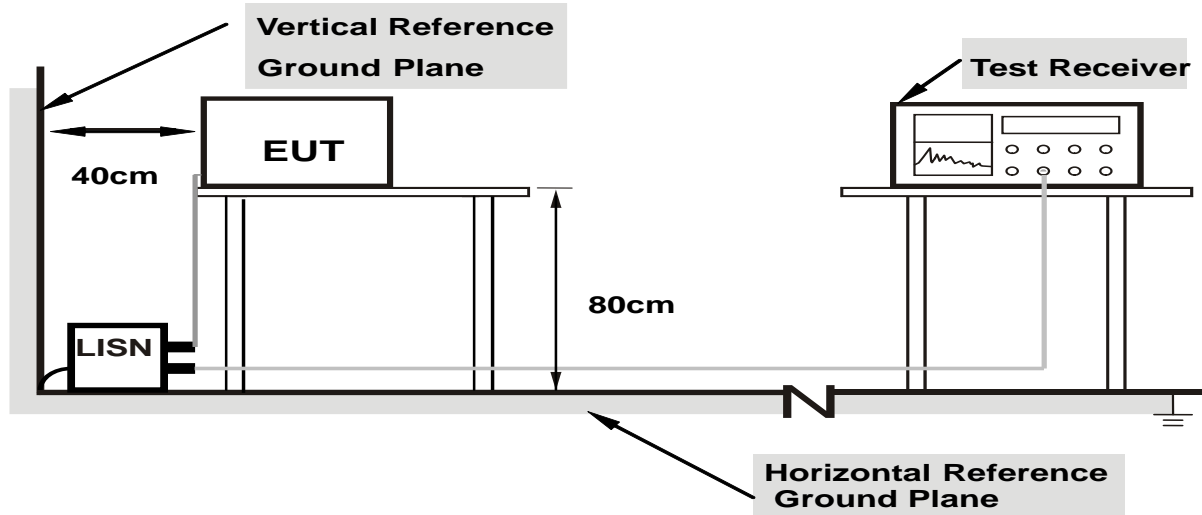
##### 3.1.2 TEST PROCEDURE

- a. 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.
- b. 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.
- c. 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.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

##### 3.1.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.1.4 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 cm from other units and other metal planes**

### 3.1.5 EUT OPERATING CONDITIONS

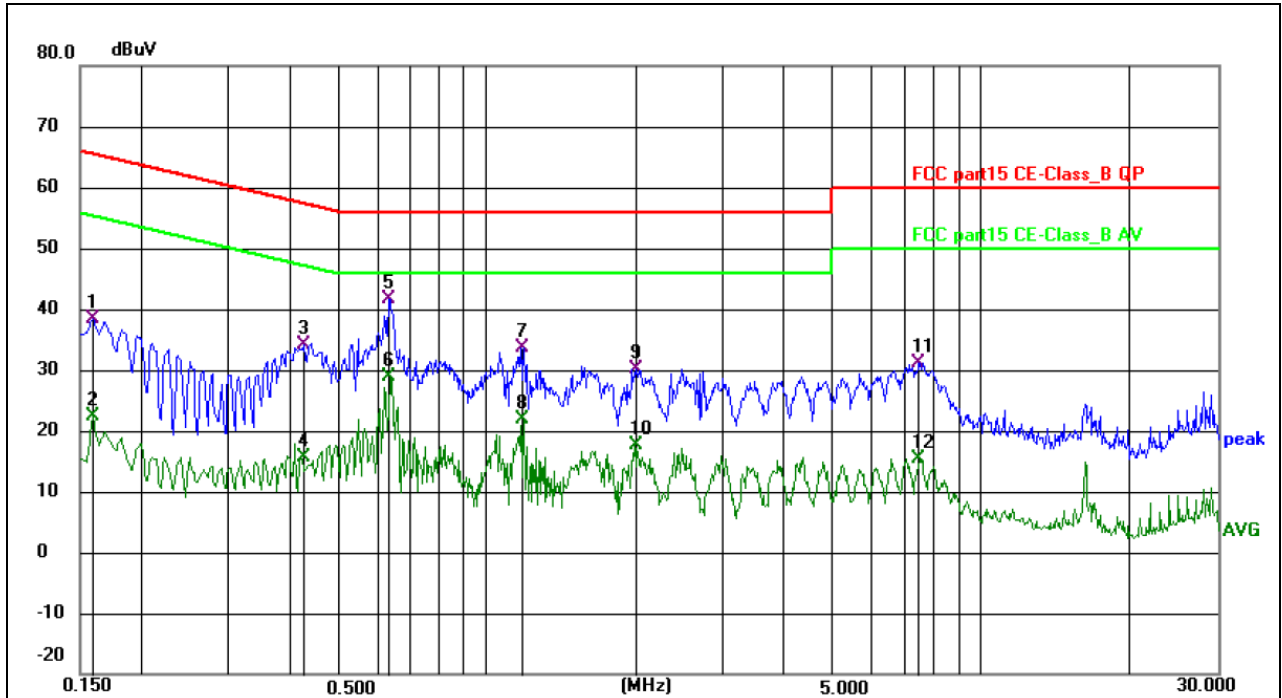
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.

### 3.1.6 TEST RESULTS



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



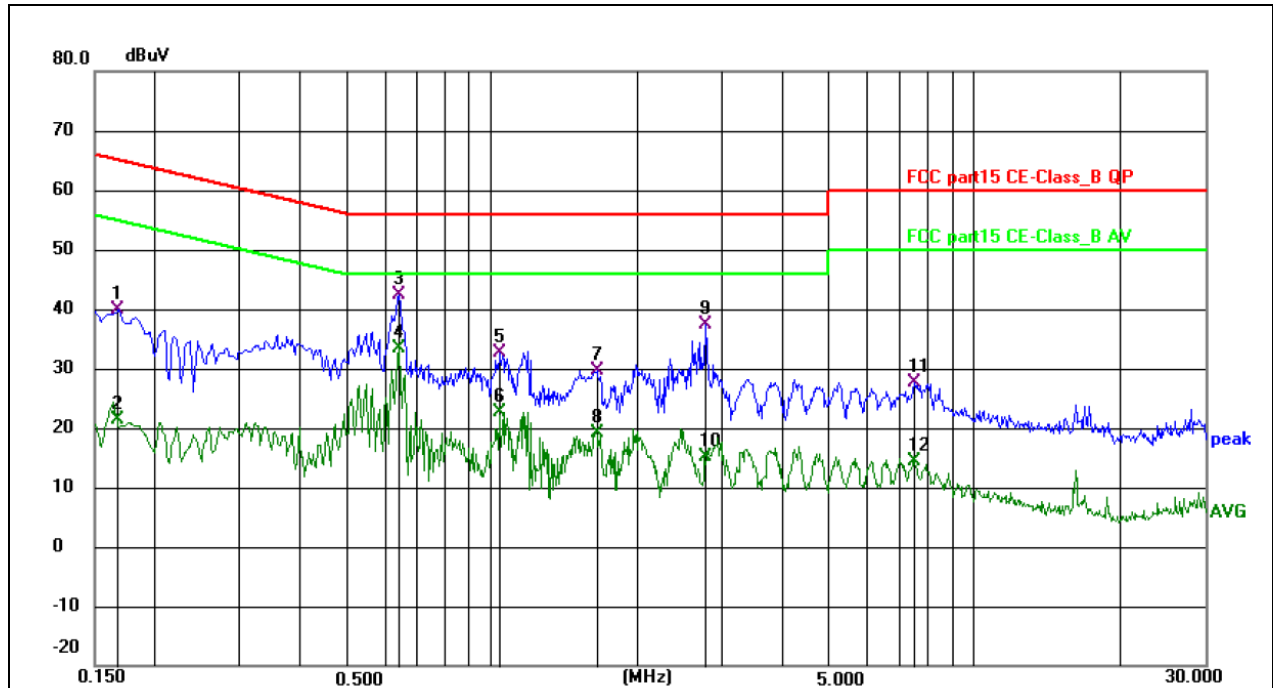
Remark:

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.159000	28.19	10.31	38.50	65.52	-27.02	QP	P	
2	0.159000	12.05	10.31	22.36	55.52	-33.16	AVG	P	
3	0.424400	24.90	9.15	34.05	57.36	-23.31	QP	P	
4	0.424400	6.52	9.15	15.67	47.36	-31.69	AVG	P	
5 *	0.631400	32.38	9.34	41.72	56.00	-14.28	QP	P	
6	0.631400	19.58	9.34	28.92	46.00	-17.08	AVG	P	
7	1.184900	24.27	9.39	33.66	56.00	-22.34	QP	P	
8	1.184900	12.48	9.39	21.87	46.00	-24.13	AVG	P	
9	1.995000	20.15	9.87	30.02	56.00	-25.98	QP	P	
10	1.995000	7.87	9.87	17.74	46.00	-28.26	AVG	P	
11	7.480500	21.43	9.76	31.19	60.00	-28.81	QP	P	
12	7.480500	5.62	9.76	15.38	50.00	-34.62	AVG	P	



Temperature:	25 °C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



Remark:

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

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.167600	30.00	9.82	39.82	65.08	-25.26	QP	P	
2	0.167600	11.58	9.82	21.40	55.08	-33.68	AVG	P	
3	0.640500	33.23	9.23	42.46	56.00	-13.54	QP	P	
4 *	0.640500	24.13	9.23	33.36	46.00	-12.64	AVG	P	
5	1.041000	23.27	9.43	32.70	56.00	-23.30	QP	P	
6	1.041000	13.11	9.43	22.54	46.00	-23.46	AVG	P	
7	1.653000	20.02	9.68	29.70	56.00	-26.30	QP	P	
8	1.653000	9.49	9.68	19.17	46.00	-26.83	AVG	P	
9	2.769000	27.57	9.82	37.39	56.00	-18.61	QP	P	
10	2.769000	5.25	9.82	15.07	46.00	-30.93	AVG	P	
11	7.489500	17.73	9.89	27.62	60.00	-32.38	QP	P	
12	7.489500	4.47	9.89	14.36	50.00	-35.64	AVG	P	



**3.2 RADIATED EMISSION MEASUREMENT**

**3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)**

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
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

### 3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 0.8 metre( Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel, the middle channel, the Highest channel

Note:

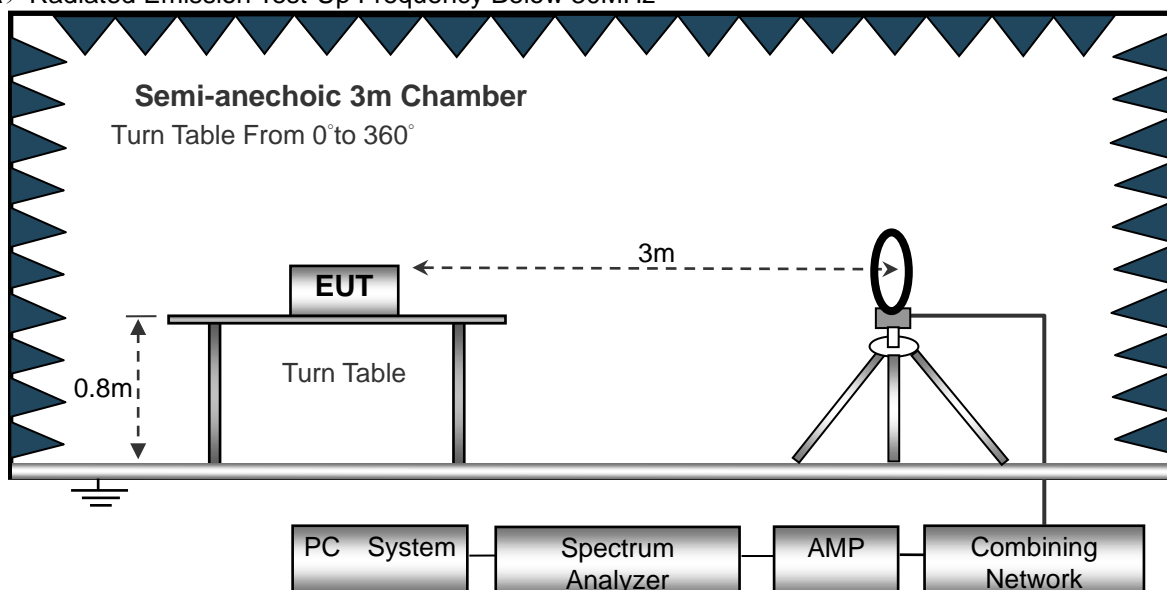
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

### 3.2.3 DEVIATION FROM TEST STANDARD

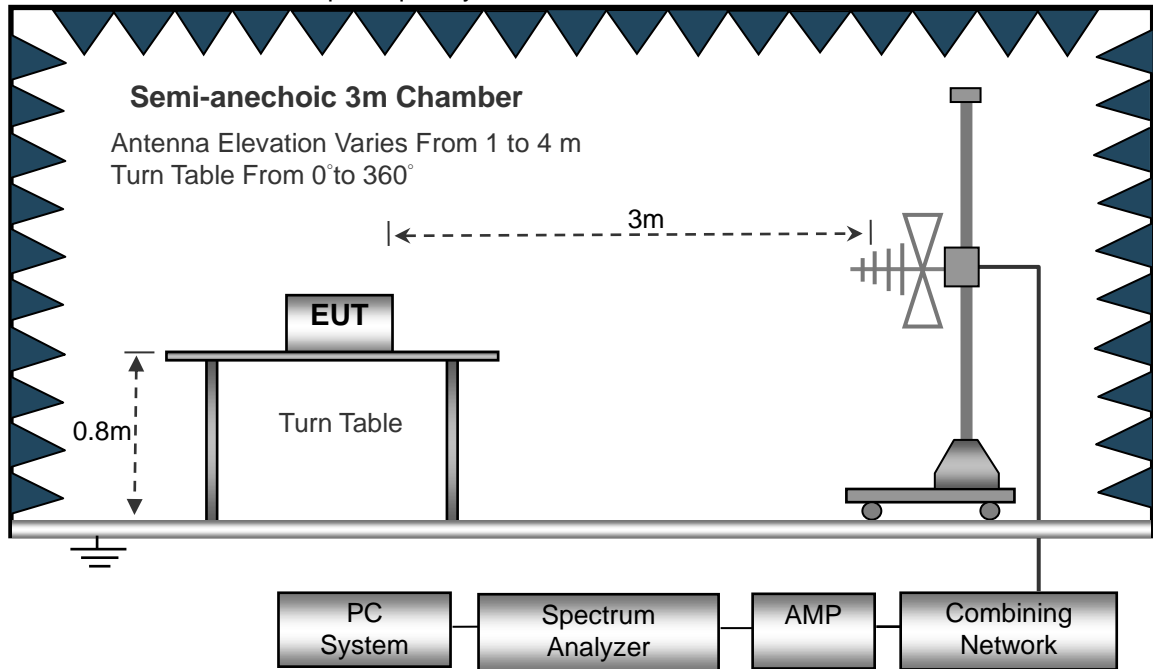
No deviation

### 3.2.4 TEST SETUP

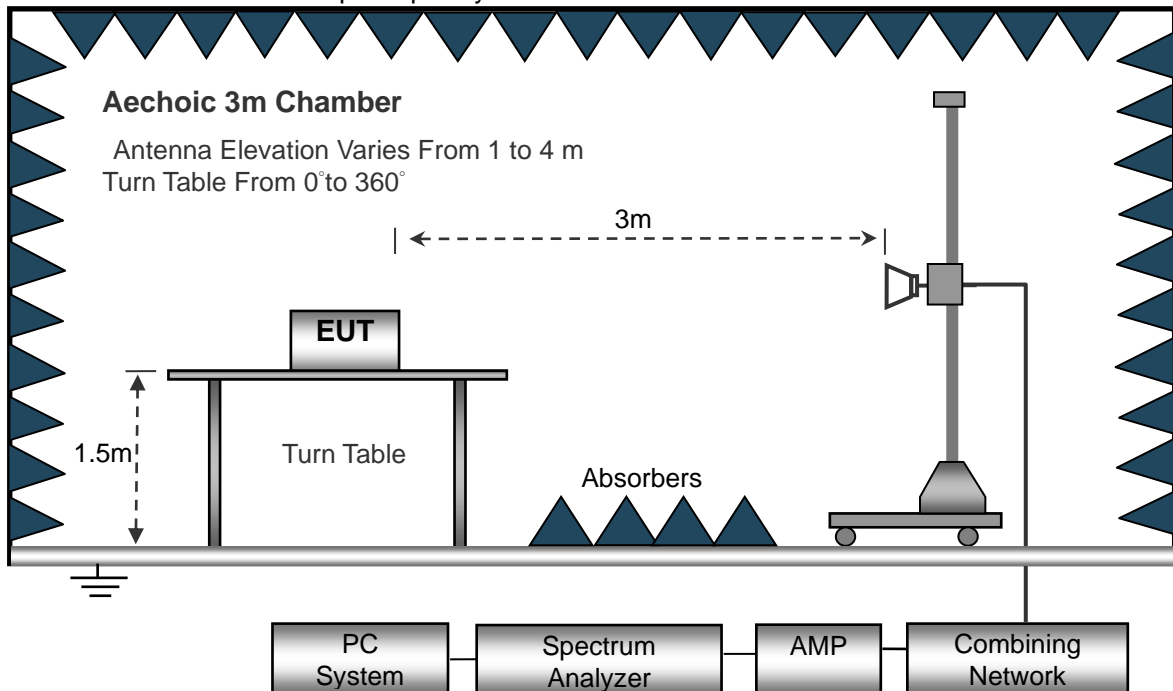
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



**3.2.5 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

**3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)**

Temperature:	20°C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	Mode 4	Polarization :	--

Freq. (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	State P/F
--	--	--	--	PASS
--	--	--	--	PASS

**NOTE:**

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

Distance extrapolation factor =  $40 \log(\text{specific distance}/\text{test distance})$ (dB);

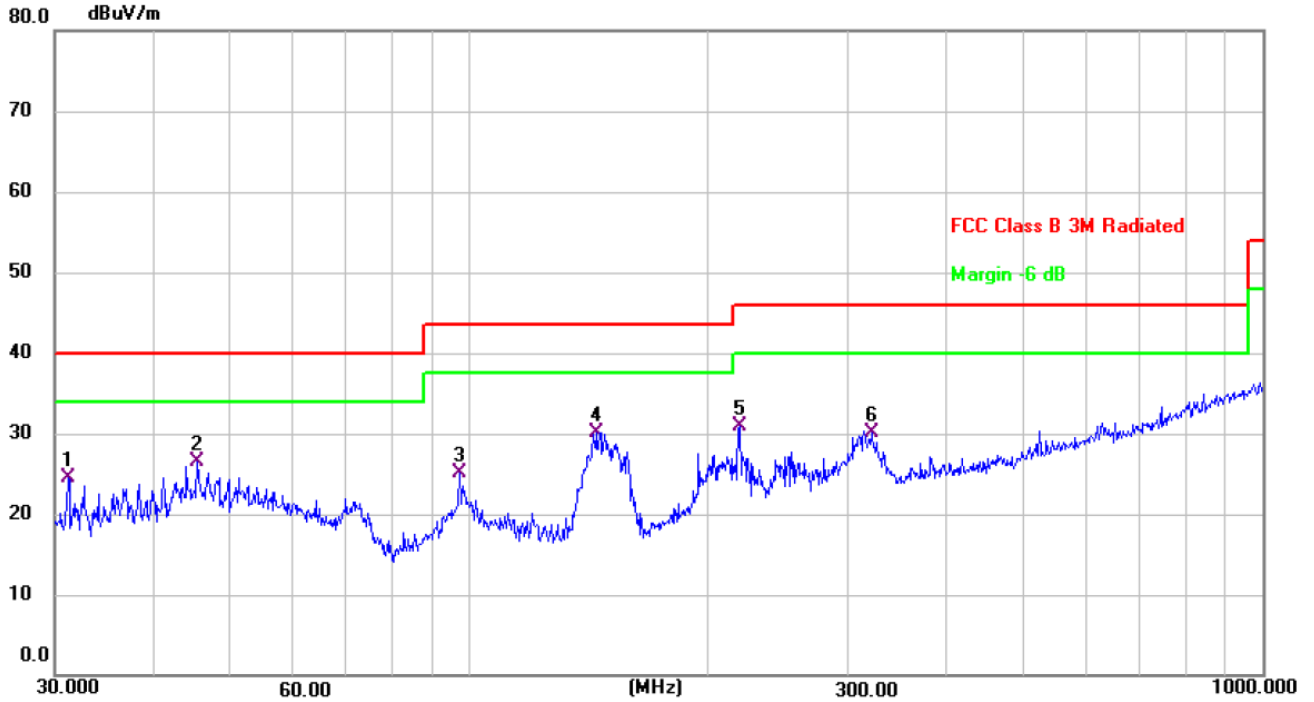
Limit line = specific limits(dBuv) + distance extrapolation factor.





**3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)**

Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 4		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	31.1798	39.29	-14.75	24.54	40.00	-15.46	QP
2	45.3755	38.59	-12.05	26.54	40.00	-13.46	QP
3	97.1148	39.12	-14.03	25.09	43.50	-18.41	QP
4 *	144.8418	46.42	-16.24	30.18	43.50	-13.32	QP
5	219.0753	43.04	-12.23	30.81	46.00	-15.19	QP
6	321.0608	39.86	-9.73	30.13	46.00	-15.87	QP

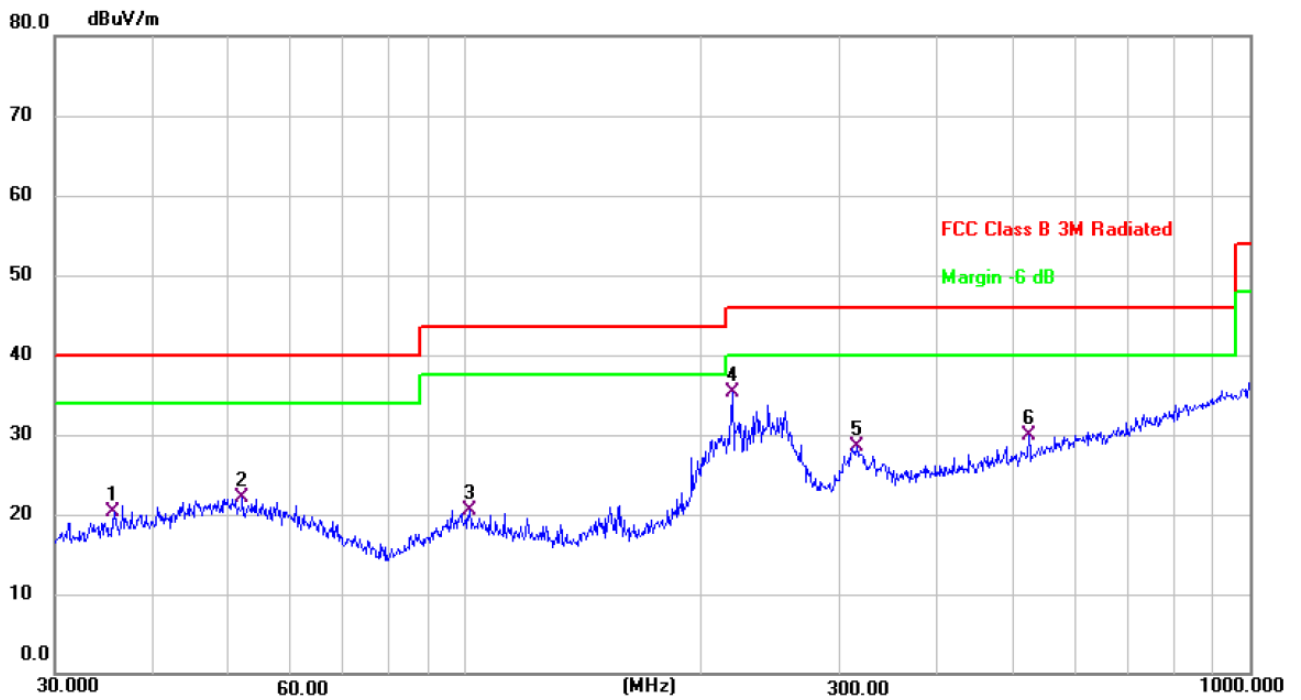
Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

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



Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
Test Voltage :	AC 120V/60Hz		
Test Mode :	Mode 4		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	35.7490	34.04	-13.73	20.31	40.00	-19.69	QP
2	52.0251	33.78	-11.63	22.15	40.00	-17.85	QP
3	101.2885	34.09	-13.63	20.46	43.50	-23.04	QP
4 *	219.0753	47.59	-12.23	35.36	46.00	-10.64	QP
5	315.4808	38.30	-9.82	28.48	46.00	-17.52	QP
6	522.7180	36.09	-6.20	29.89	46.00	-16.11	QP

Remark:

Correct Factor = Cable loss + Antenna factor – Preamplifier;

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



**3.2.8 TEST RESULTS (1GHZ~25GHZ)**

802.11b

Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
<b>operation frequency:2402</b>									
V	4804	64.93	50.65	6.88	31.29	52.45	74.00	-21.55	PK
V	4804	53.24	50.65	6.88	31.29	40.76	54.00	-13.24	AV
V	7206	63.71	49.98	7.16	36.63	57.52	74.00	-16.48	PK
V	7206	44.42	49.98	7.16	36.63	38.23	54.00	-15.77	AV
V	16087	46.80	51.53	11.34	41.52	48.13	74.00	-25.87	PK
H	4804	63.92	50.65	6.88	31.29	51.44	74.00	-22.56	PK
H	4804	53.27	50.65	6.88	31.29	40.79	54.00	-13.21	AV
H	7206	67.10	49.98	7.16	36.63	60.91	74.00	-13.09	PK
H	7206	43.81	49.98	7.16	36.63	37.62	54.00	-16.38	AV
H	16087	46.50	51.53	11.34	41.52	47.83	74.00	-26.17	PK
<b>operation frequency:2440</b>									
V	4880	65.15	50.67	6.89	31.38	52.75	74.00	-21.25	PK
V	4880	53.80	50.67	6.89	31.38	41.40	54.00	-12.60	AV
V	7320	66.92	50.02	7.24	36.63	60.77	74.00	-13.23	PK
V	7320	44.92	50.02	7.24	36.63	38.77	54.00	-15.23	AV
V	16087	46.77	51.53	11.34	41.52	48.10	74.00	-25.90	PK
H	4880	64.06	50.67	6.89	31.38	51.66	74.00	-22.34	PK
H	4880	53.24	50.67	6.89	31.38	40.84	54.00	-13.16	AV
H	7320	66.84	50.02	7.24	36.63	60.69	74.00	-13.31	PK
H	7320	45.89	50.02	7.24	36.63	39.74	54.00	-14.26	AV
H	16087	46.67	51.53	11.34	41.52	48.00	74.00	-26.00	PK
<b>operation frequency:2480</b>									
V	4960	66.13	50.79	6.83	31.36	53.53	74.00	-20.47	PK
V	4960	53.53	50.79	6.83	31.36	40.93	54.00	-13.07	AV
V	7440	67.01	50.11	7.25	36.58	60.73	74.00	-13.27	PK
V	7440	44.44	50.11	7.25	36.58	38.16	54.00	-15.84	AV
V	16087	47.43	51.53	11.34	41.52	48.76	74.00	-25.24	PK
H	4960	64.88	50.81	6.89	31.42	52.38	74.00	-21.62	PK
H	4960	53.59	50.81	6.89	31.42	41.09	54.00	-12.91	AV
H	7440	64.65	50.72	7.36	36.78	58.07	74.00	-15.93	PK
H	7440	46.74	50.72	7.36	36.78	40.16	54.00	-13.84	AV
H	16087	47.73	51.53	11.34	41.52	49.06	74.00	-24.94	PK

**Remark:**

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.



For Conducted  
Please see annex.



3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.205

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 0.1 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

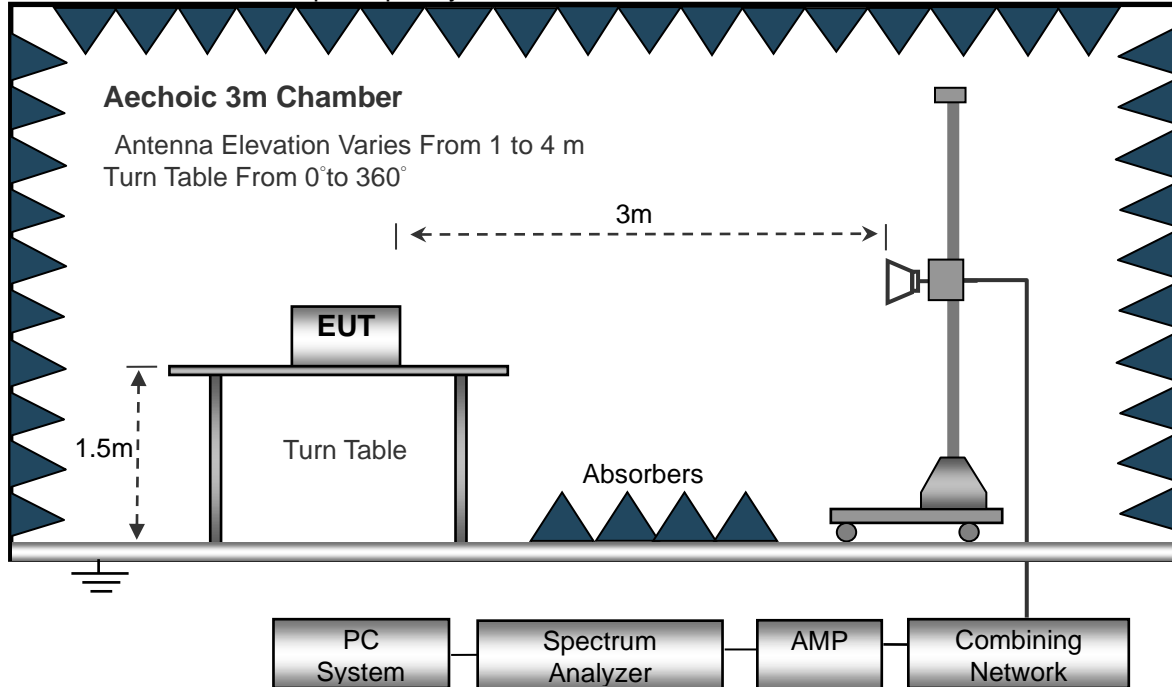
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



### 3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



## 3.3.6 TEST RESULT

Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
<b>operation frequency:2402</b>									
V	2390	75.54	52.12	2.73	27.38	54.53	74.00	-19.47	PK
V	2390	64.68	52.12	2.73	27.38	43.52	54.00	-10.48	AV
V	2400	75.37	52.16	2.78	27.41	54.39	74.00	-19.61	PK
V	2400	63.72	52.16	2.78	27.41	42.59	54.00	-11.41	AV
H	2390	75.39	52.12	2.73	27.38	54.37	74.00	-19.63	PK
H	2390	64.57	52.12	2.73	27.38	43.41	54.00	-10.59	AV
H	2400	75.65	52.16	2.78	27.41	54.68	74.00	-19.32	PK
H	2400	64.86	52.16	2.78	27.41	43.74	54.00	-10.26	AV

Polar (H/V)	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
<b>operation frequency:2480</b>									
V	2483.5	75.66	52.23	2.86	27.44	54.73	74.00	-19.27	PK
V	2483.5	64.88	52.23	2.86	27.44	43.80	54.00	-10.20	AV
V	2500	75.49	52.26	2.88	27.49	54.59	74.00	-19.41	PK
V	2500	63.40	52.26	2.88	27.49	42.35	54.00	-11.65	AV
H	2483.5	75.17	52.23	2.86	27.44	54.23	74.00	-19.77	PK
H	2483.5	64.50	52.23	2.86	27.44	43.42	54.00	-10.58	AV
H	2500	75.25	52.26	2.88	27.49	54.35	74.00	-19.65	PK
H	2500	64.42	52.26	2.88	27.49	43.38	54.00	-10.62	AV

**Remark:**

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.



### 3.4 CONDUCTED BAND EDGE EMISSION MEASUREMENT

<b>Test Requirement:</b>	FCC Part15 C Section 15.247 (d)
<b>Test Method:</b>	KDB558074 D0115.247 Meas Guidance v05r02

#### 3.4.1 APPLICABLE STANDARD

in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in15.209(a).

#### 3.4.2 TEST PROCEDURE

Using the following spectrum analyzer setting:

Set the RBW = 100KHz.

Set the VBW = 300KHz.

Sweep time = auto couple.

Detector function = peak.

Trace mode = max hold.

Allow trace to fully stabilize.

#### 3.4.3 DEVIATION FROM STANDARD

No deviation.

#### 3.4.4 TEST SETUP



#### 3.4.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

#### 3.4.6 TEST RESULTS

Please see annex.





4. AVERAGE OUTPUT POWER

4.1 APPLIED PROCEDURES / LIMIT

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

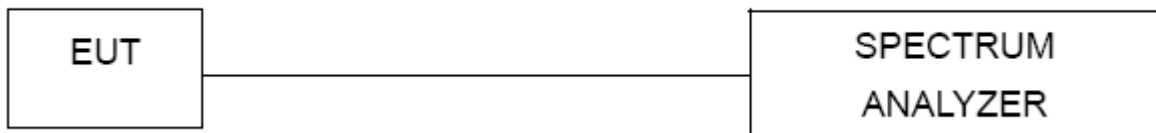
4.1.1 TEST PROCEDURE

- a.The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b.Set span to at least 1.5 times the OBW.
- c.Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.
- d.Set VBW ≥ [3 × RBW].
- e.Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
- f.Sweep time = auto.
- g.Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- h.If transmit duty cycle < 98%, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”
- i.Trace average at least 100 traces in power averaging (rms) mode.
- j.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.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

Please see annex.



5. POWER SPECTRAL DENSITY TEST

5.1 APPLIED PROCEDURES / LIMIT

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

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	RBW ≥ 3kHz
VB	VBW ≥ 3RBW
Detector	power averaging (rms) or sample detector (when rms not available)
Trace	Max Hold
Sweep Time	Auto

5.1.1 TEST PROCEDURE

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

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

Please see annex.



6. 6DB BANDWIDTH TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range(MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW)  $\geq$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

Please see annex.



## **7. ANTENNA REQUIREMENT**

### **7.1 STANDARD REQUIREMENT**

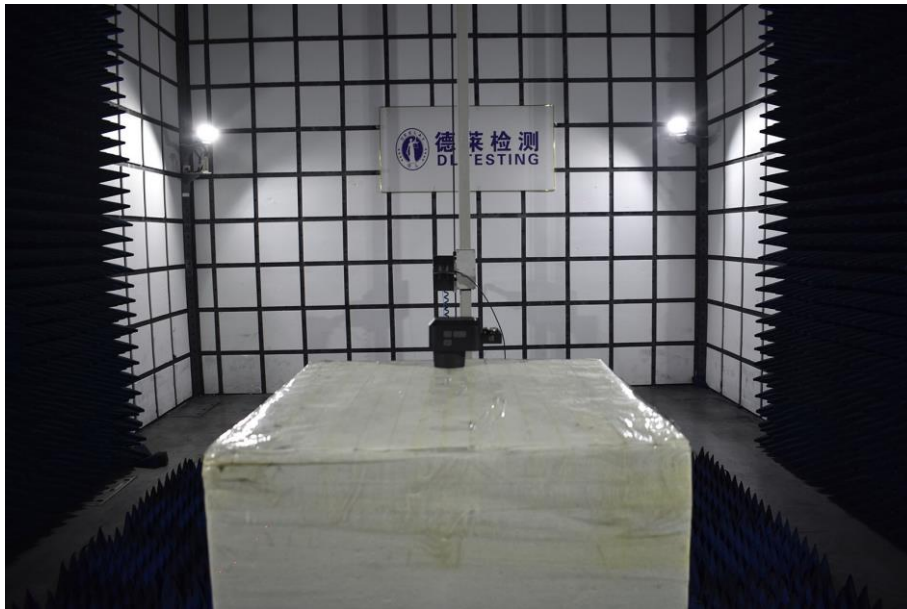
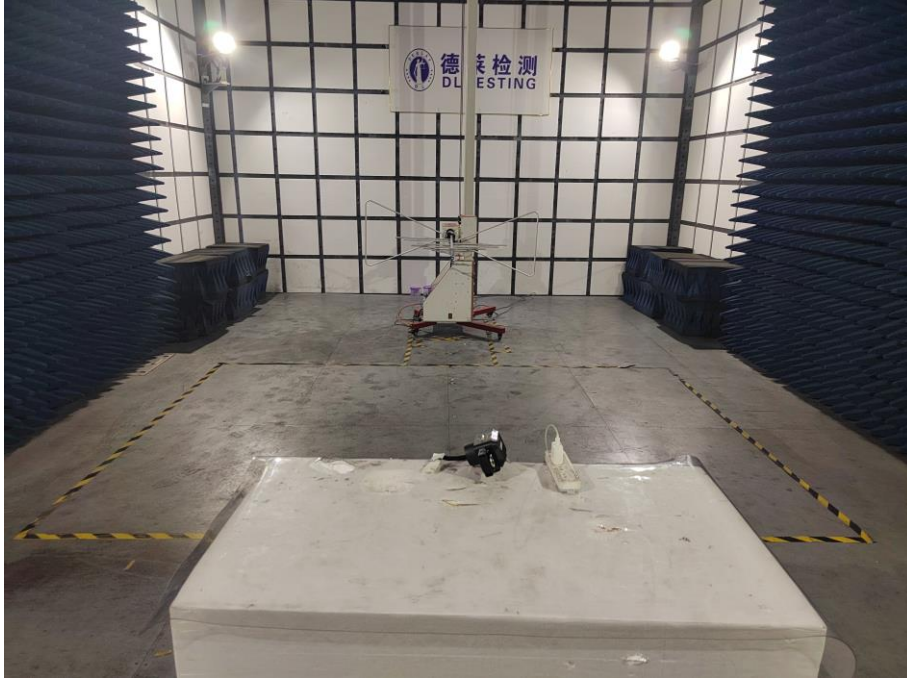
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### **7.2 EUT ANTENNA**

The EUT antenna is internal antenna, It comply with the standard requirement.

### 8. TEST SEUUP PHOTO

#### Radiated Measurement Photos

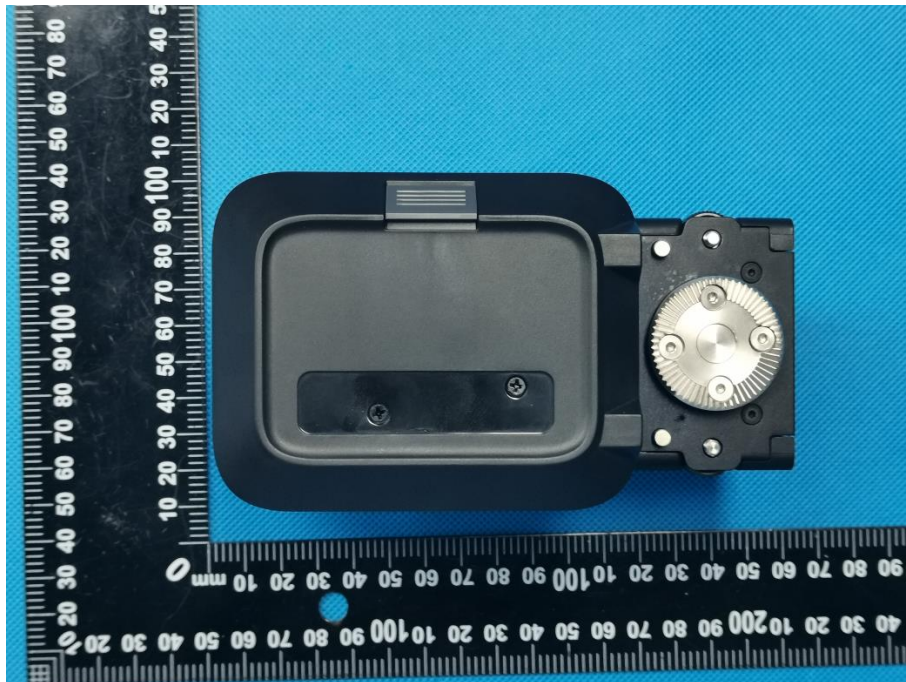


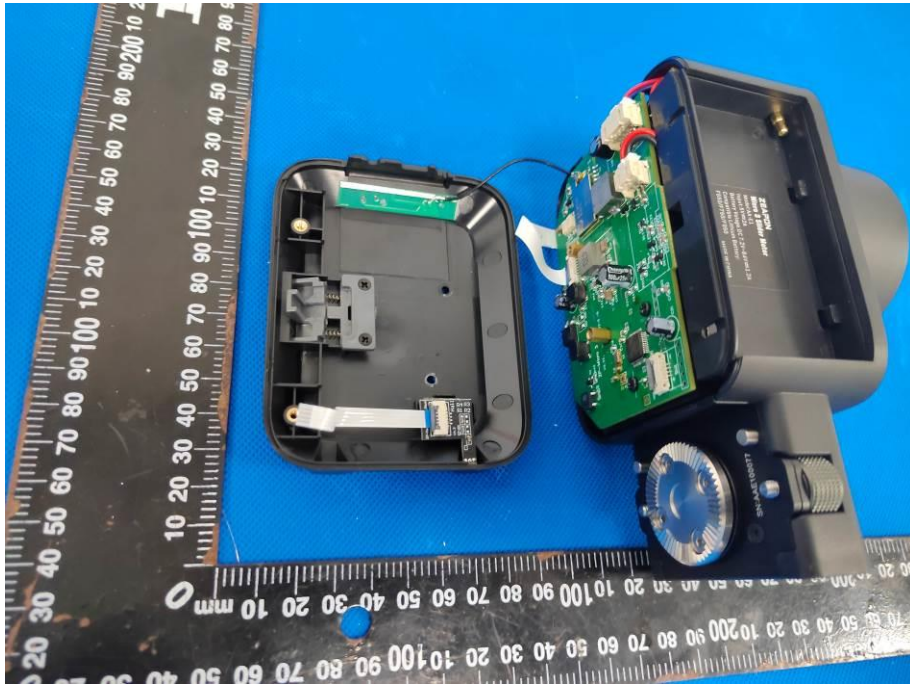


**Conducted Measurement Photos**



### 9. EUT PHOTO





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