FCC Part 15C Test Report
FCC ID:2BBSX-Q1

Applicant:	Shenzhen Zhiqu Robot Technology Co., LTD
Address:	Room 308, Building 4, No.48 Kangzheng Road, Danzhitou Community, Nanwan Street, Longgang District, Shenzhen, China
Manufacturer:	Shenzhen Zhiqu Robot Technology Co., LTD
Address:	Room 308, Building 4, No.48 Kangzheng Road, Danzhitou Community, Nanwan Street, Longgang District, Shenzhen, China
EUT:	Pocket Massager
Trade Mark:	N/A
Model Number:	Q1
Date of Receipt:	June 17, 2023
Test Date:	June 17, 2023 - June 25, 2023
Date of Report:	June 26, 2023
Prepared By:	BTF Testing Lab (Shenzhen) Co., Ltd.
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Applicable Standards:	ANSI C63.10:2013 FCC PART 15 C 15.231
Test Result:	Pass
Report Number:	BTF230718R00801

Project Engineer:	Elma.yang
EMC Manager:	Ryan.CJ

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 BTF Testing Lab (Shenzhen) Co., Ltd.

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.231) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.209,15.231b	Fundamental &Radiated Spurious Emission Measurement	PASS	
15.231a	Dwell time	PASS	
15.215	20dB Bandwidth	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** ± **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** %.

No.	Item	Uncertainty
1	Conducted Emission Test	±2.56dB
2	RF power,conducted	±0.42dB
3	Spurious emissions,conducted	±2.76dB
4	All emissions,radiated(<1G)	±3.65dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Pocket Massager
Trademark:	N/A
Model No.:	Q1
Sample No.:	N/A
Model Difference:	N/A
Sample No.:	BTF230718R00801#
Operation Frequency:	433.92MHz
Channel numbers:	1 Channel
Modulation technology:	ASK
Antenna Type:	Internal Antenna
Antenna gain:	0dBi
Power supply:	DC 5V/1A from Adapter (Only Charger) DC 3.7V from Battery
Battery information	602535 DC 3.7V 500mAh

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.

2.2 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	Charging
Mode 2	TX Mode

Conducted Emission	
Final Test Mode	Description
Mode 1	Charging

Radiated Emission	
Final Test Mode	Description
Mode 2	TX Mode

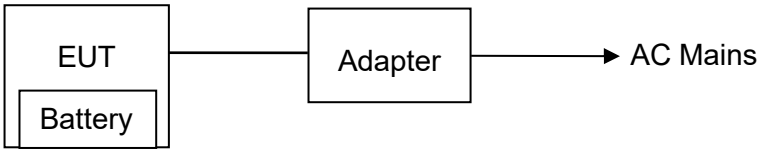
Note: Press buttons on the EUT can transmit 433.92MHz control signal.
The EUT just transmits signal one time when you press the button, whether you release at once or not. If you want to transmit again, you must release the button and press the button again.

Note:

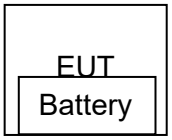
(1) New battery is used during the test.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated 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
1	Pocket Massager	Q1	N/A	EUT
2	Adapter	GAT-0501000U	N/A	AE

Item	Shielded Type	Ferrite Core	Length	Note
C1	No	No	No	No

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

None.

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation test, Band-edge test and 20db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4408B	MY50140780	Nov. 05, 2022	Nov. 04, 2023
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Nov. 05, 2022	Nov. 04, 2023
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Nov. 05, 2022	Nov. 04, 2023
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Nov. 05, 2022	Nov. 04, 2023
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Nov. 05, 2022	Nov. 04, 2023
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Nov. 05, 2022	Nov. 04, 2023
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Nov. 05, 2022	Nov. 04, 2023
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Nov. 05, 2022	Nov. 04, 2023
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Nov. 05, 2022	Nov. 04, 2023
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Nov. 05, 2022	Nov. 04, 2023
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Nov. 05, 2022	Nov. 04, 2023
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Nov. 05, 2022	Nov. 04, 2023
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Nov. 05, 2022	Nov. 04, 2023
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Nov. 05, 2022	Nov. 04, 2023
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Nov. 05, 2022	Nov. 04, 2023
16	D.C. Power Supply	LongWei	PS-305D	010964729	Nov. 05, 2022	Nov. 04, 2023

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Sep. 20, 2022	Sep. 19, 2023
2	EMI Receiver	R&S	ESR	101421	Nov. 05, 2022	Nov. 04, 2023
3	LISN	Schwarzbeck	NNLK 8128	5089	Nov. 05, 2022	Nov. 04, 2023
4	843 Cable 1#	ChengYu	CE Cable	001	Nov. 05, 2022	Nov. 04, 2023

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMC	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.

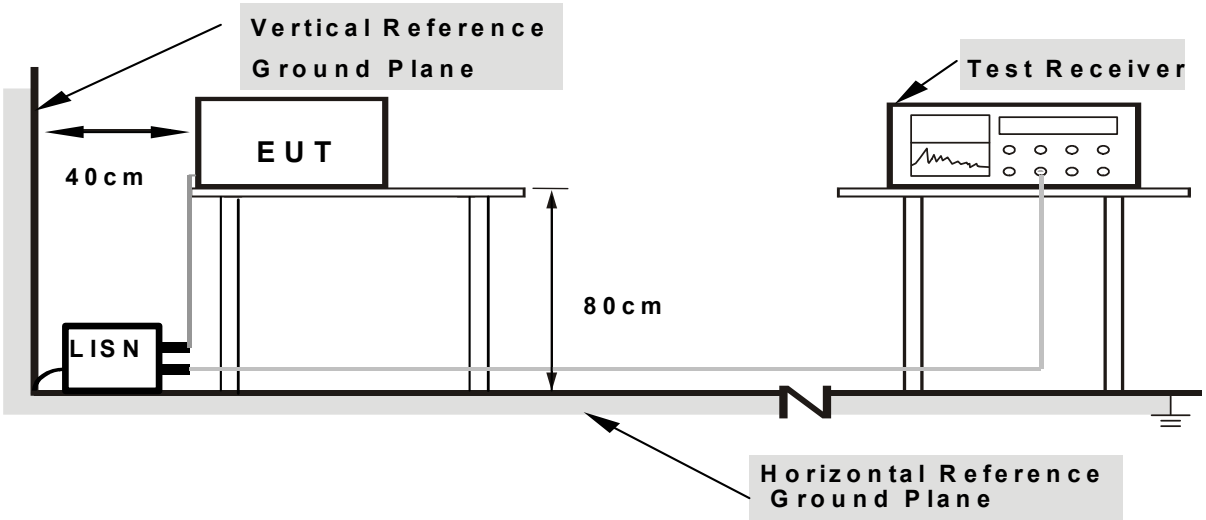
d. LISN at least 80 cm from nearest part of EUT chassis.

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

DEVIATION FROM TEST STANDARD

No deviation

3.1.3 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

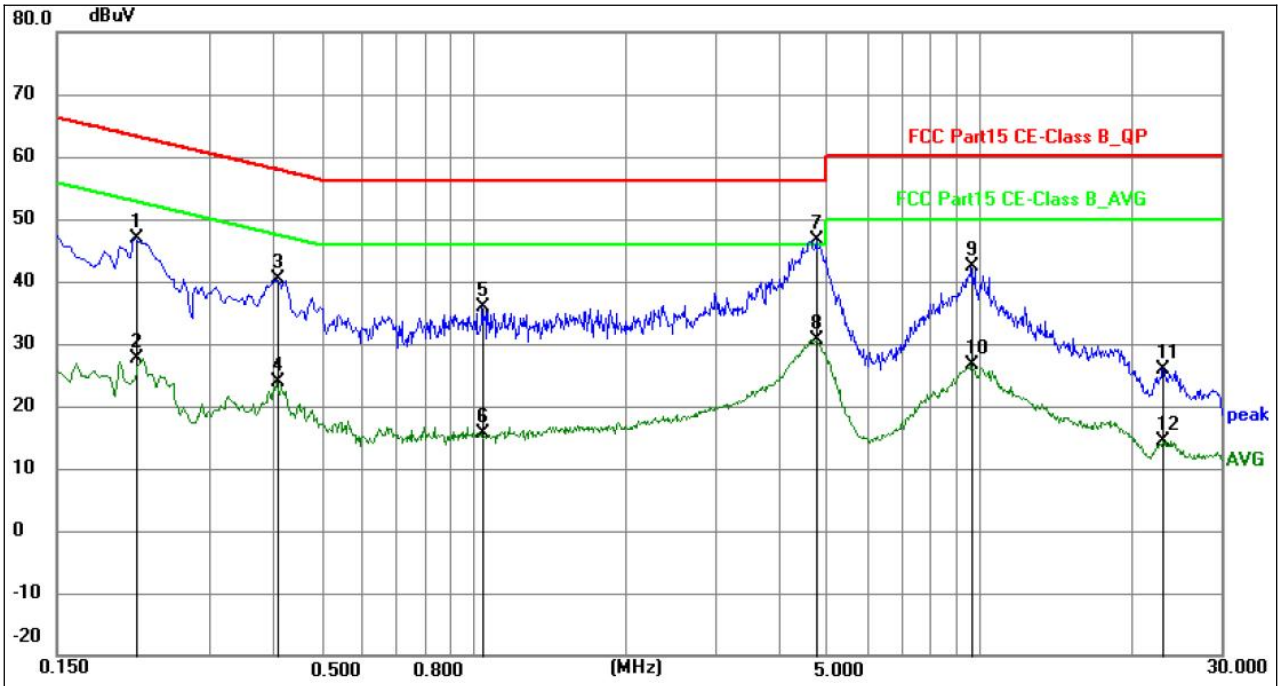
3.1.4 EUT OPERATING CONDITIONS

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.

3.1.5 TEST RESULTS

Note: 1. The mode 1 was tested at AC 120V and 240V, only the worst result of AC 120V was reported.

Temperature:	25 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage:	AC 120V/60Hz		
Test Mode:	Mode 1		

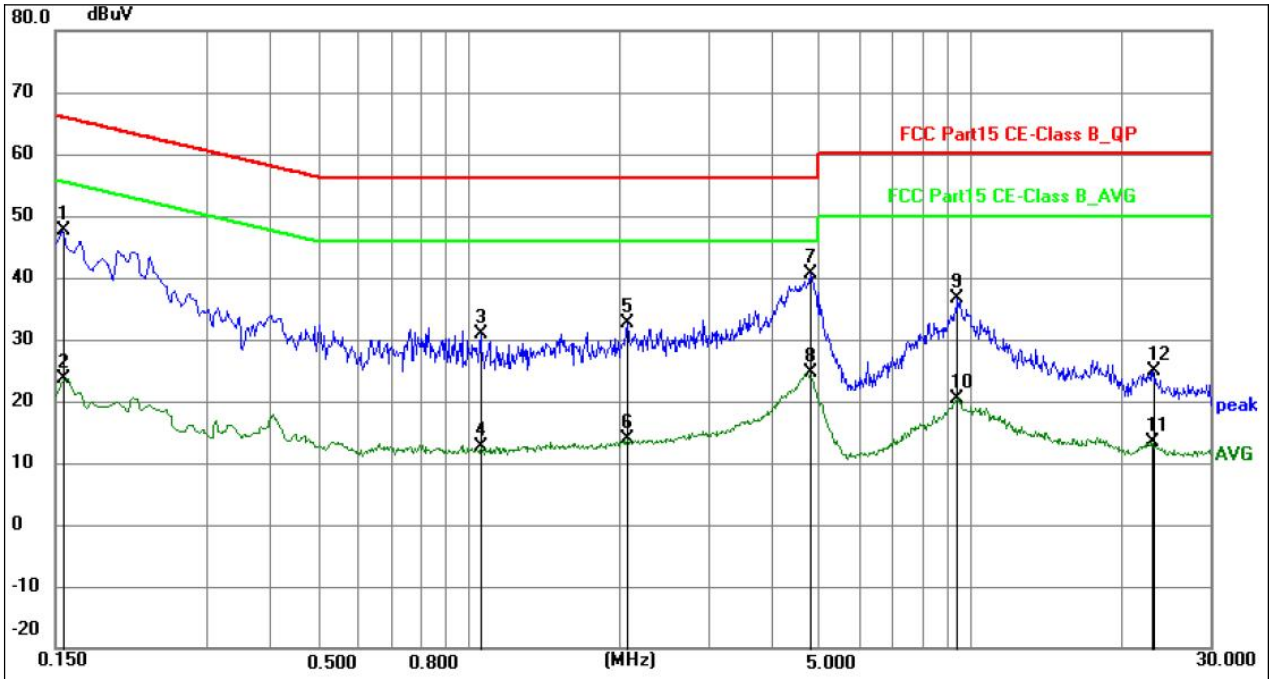


Remark:

Margin = Limit – Level

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2130	36.59	10.31	46.90	63.09	16.19	QP
2	0.2130	17.42	10.31	27.73	53.09	25.36	AVG
3	0.4065	30.14	10.33	40.47	57.72	17.25	QP
4	0.4065	13.65	10.33	23.98	47.72	23.74	AVG
5	1.0410	25.46	10.37	35.83	56.00	20.17	QP
6	1.0410	5.19	10.37	15.56	46.00	30.44	AVG
7 *	4.7670	36.25	10.47	46.72	56.00	9.28	QP
8	4.7670	20.26	10.47	30.73	46.00	15.27	AVG
9	9.6305	31.81	10.56	42.37	60.00	17.63	QP
10	9.6305	16.16	10.56	26.72	50.00	23.28	AVG
11	22.9285	15.21	10.77	25.98	60.00	34.02	QP
12	22.9285	3.67	10.77	14.44	50.00	35.56	AVG

Temperature:	25 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage:	AC 120V/60Hz		
Test Mode:	Mode 1		



Remark:
Margin = Limit – Level

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1545	37.34	10.32	47.66	65.75	18.09	QP
2	0.1545	13.42	10.32	23.74	55.75	32.01	AVG
3	1.0545	20.42	10.37	30.79	56.00	25.21	QP
4	1.0545	2.18	10.37	12.55	46.00	33.45	AVG
5	2.0670	22.31	10.39	32.70	56.00	23.30	QP
6	2.0670	3.49	10.39	13.88	46.00	32.12	AVG
7 *	4.8029	30.06	10.47	40.53	56.00	15.47	QP
8	4.8029	14.14	10.47	24.61	46.00	21.39	AVG
9	9.4145	26.05	10.56	36.61	60.00	23.39	QP
10	9.4145	9.85	10.56	20.41	50.00	29.59	AVG
11	23.0140	2.53	10.78	13.31	50.00	36.69	AVG
12	23.1040	14.03	10.78	24.81	60.00	35.19	QP

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.

Frequency (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

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
40.66-40.70 MHz	2250	225
70-130 MHz	1250	125
130-174 MHz	1250-3750**	1250-375**
174-260 MHz	3750	375
260-470 MHz	3750-12500**	3750-1250**
Above 470 MHz	12500	1250

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, μV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

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).

Receiver setup:

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

3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic 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 (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.
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.

Above 1GHz test procedure as below:

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

   Note:

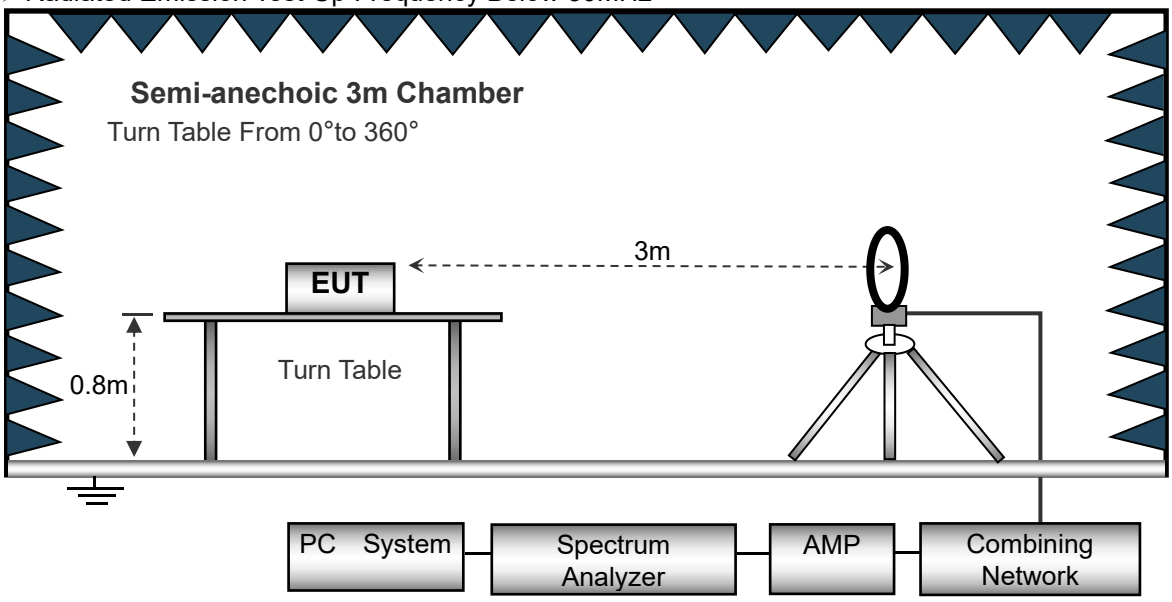
   Both horizontal and vertical antenna polarities were tested
   and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

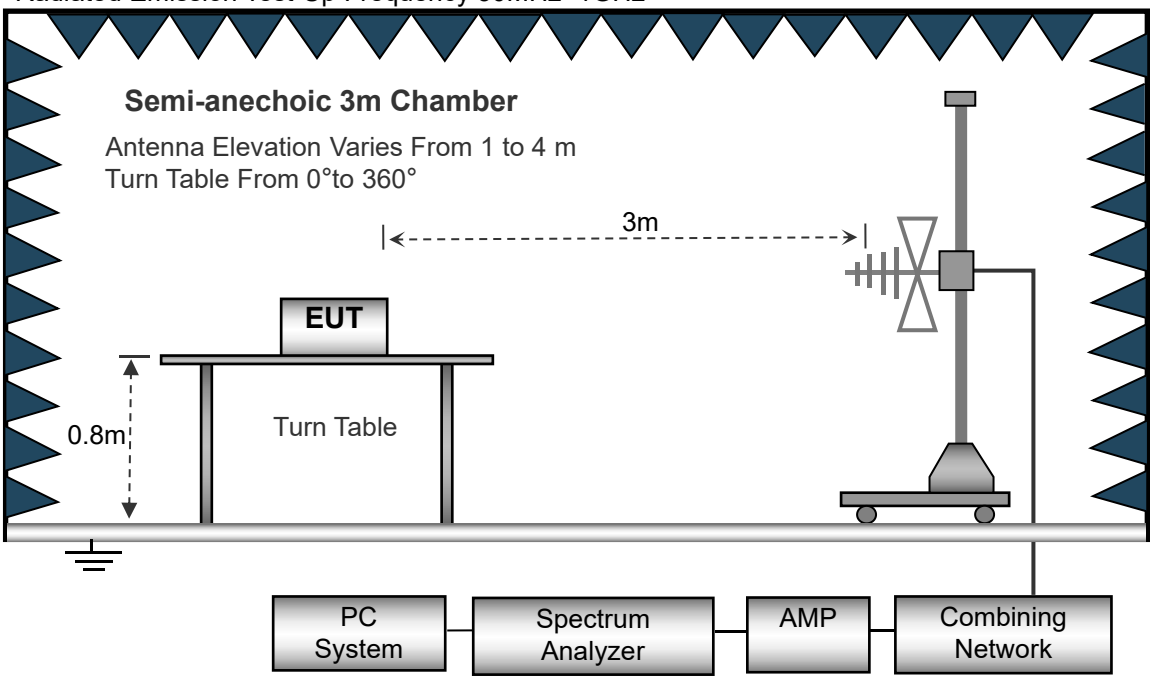
No deviation

3.2.4 TEST SETUP

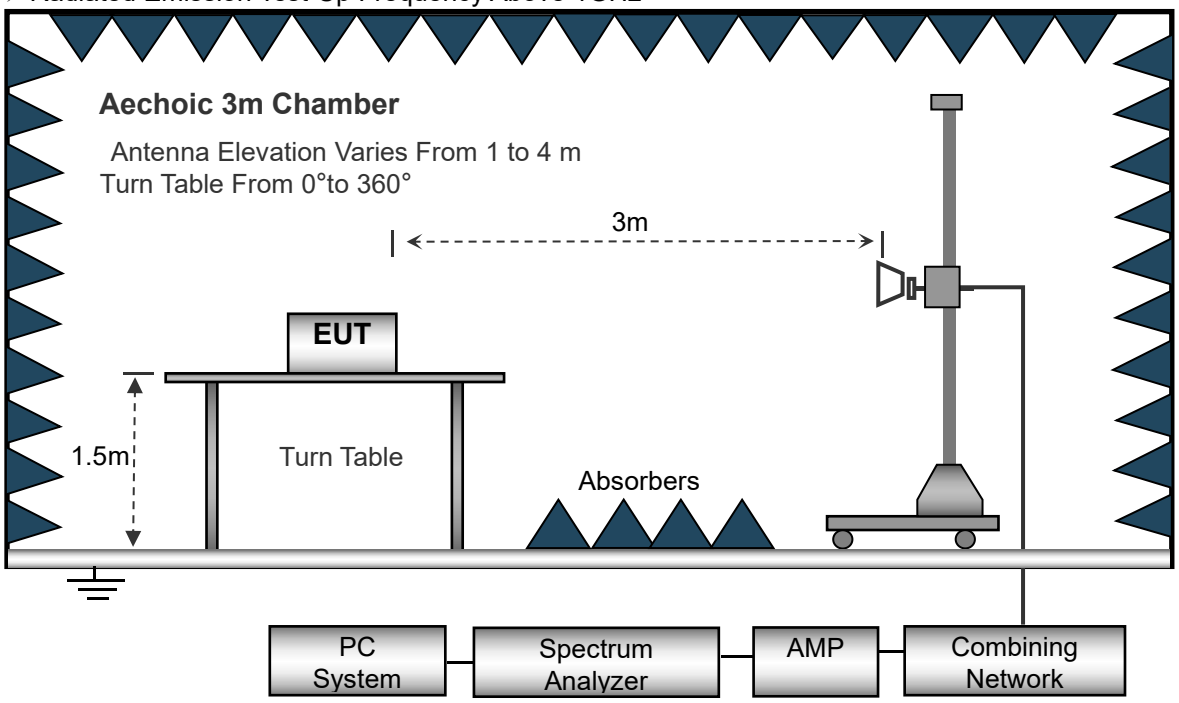
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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℃	Relative Humidtity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 3V
Test Mode :	Mode 1	Polarization :	--

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

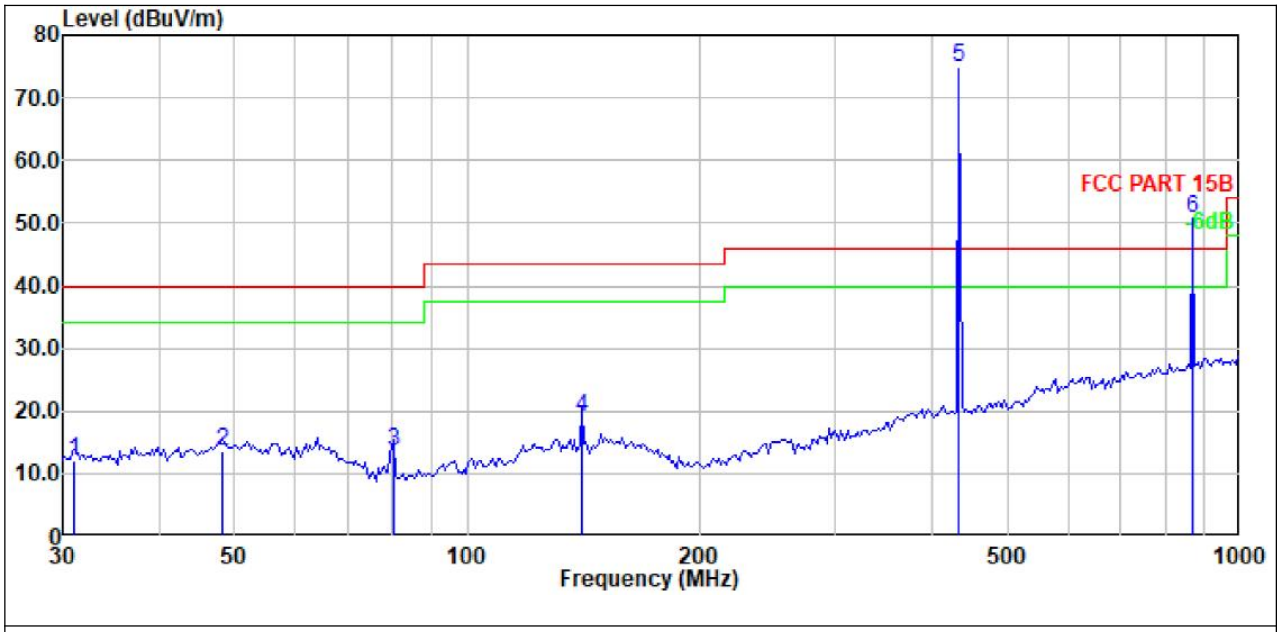
NOTE:

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 (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

Note: All modes were Pre tested, and only the worst mode 2 was reported in the report.

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 3.7V		
Test Mode :	Mode 2		



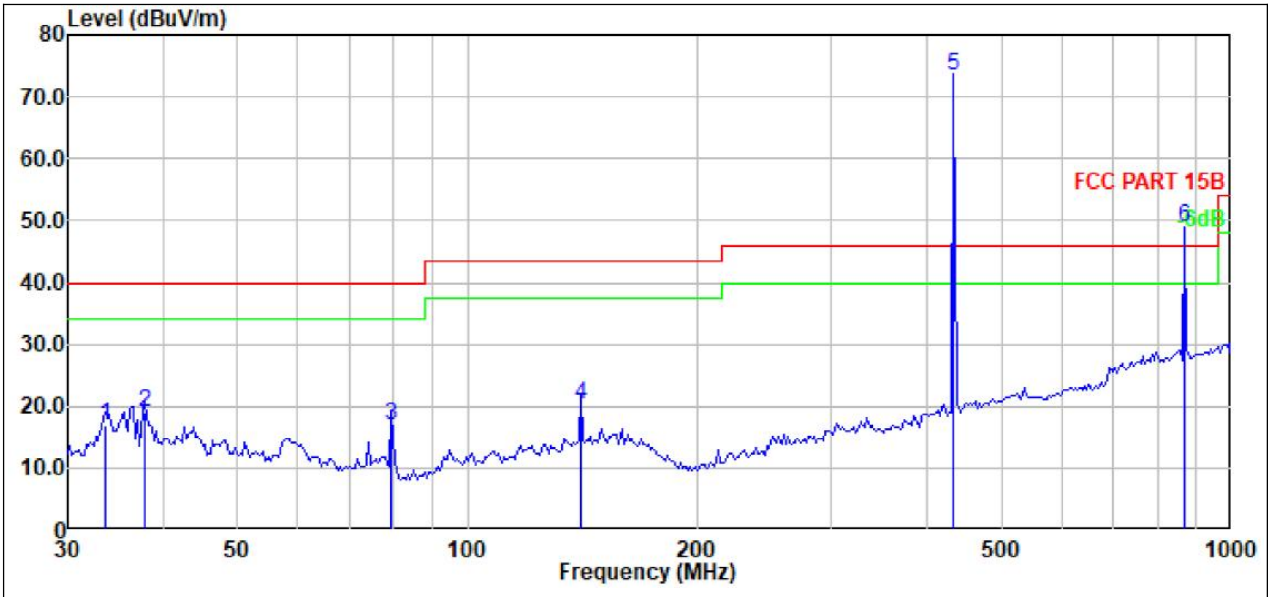
	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dBuV/m	dB/m	dBuV/m	dB		
1	31.073	33.09	11.93	-21.16	40.00	-28.07	Horizontal	QP
2	48.378	34.17	13.48	-20.69	40.00	-26.52	Horizontal	QP
3	80.238	38.12	13.52	-24.60	40.00	-26.48	Horizontal	QP
4	140.777	38.71	18.95	-19.76	43.50	-24.55	Horizontal	QP
5	433.340	89.66	74.80	-14.86	46.00	28.80	Horizontal	Peak
6	866.680	57.58	50.58	-7.00	46.00	4.58	Horizontal	Peak

Remark:

Factor = Cable loss + Antenna factor – Preamplifier;

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

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 3.7V		
Test Mode :	Mode 2		



	Freq	Read Level	Level	Factor	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dBuV/m	dB/m	dBuV/m	dB		
1	33.570	38.08	17.02	-21.06	40.00	-22.98	Vertical	QP
2	37.830	39.55	18.96	-20.59	40.00	-21.04	Vertical	QP
3	79.676	41.47	16.92	-24.55	40.00	-23.08	Vertical	QP
4	140.777	39.85	20.09	-19.76	43.50	-23.41	Vertical	QP
5	433.340	88.35	73.49	-14.86	46.00	27.49	Vertical	Peak
6	866.680	56.05	49.05	-7.00	46.00	3.05	Vertical	Peak

Remark:
Factor = Cable loss + Antenna factor – Preamplifier;
Level = Reading Level + Factor; Over Limit = Level - Limit;

For Peak Emission

Frequency MHz	Read Level dBuV/m	Factor	Peak Level dBuV/m	Polarization	Limit Peak	Over Limit
433.34	89.66	-14.86	74.80	Horizontal	100.80	-26.00
866.68	57.58	-7.00	50.58	Horizontal	80.80	-30.22

Remark: Factor = Cable loss + Antenna factor – Preamplifier;

Peak Level = Read Level + Factor; Over Limit = Peak Level - Limit;

Frequency MHz	Read Level dBuV/m	Factor	Peak Level dBuV/m	Polarization	Limit Peak	Over Limit
433.34	88.35	-14.86	73.49	Vertical	100.80	-27.31
866.68	56.05	-7.00	49.05	Vertical	80.80	-31.75

Remark: Factor = Cable loss + Antenna factor – Preamplifier;

Peak Level = Read Level + Factor; Over Limit = Peak Level - Limit;

For Average Emission

Frequency MHz	Peak Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Polarization	Limit AV	Over Limit
433.34	74.80	-2.53	72.27	Horizontal	80.80	-8.53
866.68	50.58	-2.53	48.05	Horizontal	60.80	-12.75

Notes: 1. Average Level = Peak Level + Duty cycle factor

2. Over Limit = Average Level - Limit;

3. Duty cycle level please see clause 5.

Frequency MHz	Peak Level dBuV/m	Duty cycle factor	Average Level dBuV/m	Polarization	Limit AV	Over Limit
433.34	73.49	-2.53	70.96	Vertical	80.80	-9.84
866.68	49.05	-2.53	46.52	Vertical	60.80	-14.28

Notes: 1. Average Level = Peak Level + Duty cycle factor

2. Over Limit = Average Level - Limit;

3. Duty cycle level please see clause 5.

3.2.8 TEST RESULTS (1GHZ~5GHZ)

Frequency MHz	Peak Level dBuV/m	Duty Cycle Factor	Average Level dBuV/m	Limit		Margin dB		Polarization
				PK	AV	PK	AV	
1301.76	56.55	-2.53	54.02	80.80	60.80	-24.25	-6.78	Vertical
1735.68	56.34	-2.53	53.81	80.80	60.80	-24.46	-6.99	Vertical
2169.60	55.25	-2.53	52.72	80.80	60.80	-25.55	-8.08	Vertical
2603.52	54.66	-2.53	52.13	80.80	60.80	-26.14	-8.67	Vertical
1301.76	58.56	-2.53	56.03	80.80	60.80	-22.24	-4.77	Horizontal
1735.68	57.65	-2.53	55.12	80.80	60.80	-23.15	-5.68	Horizontal
2169.60	56.55	-2.53	54.02	80.80	60.80	-24.25	-6.78	Horizontal
2603.52	55.67	-2.53	53.14	80.80	60.80	-25.13	-7.66	Horizontal

Note:
1. PK Margin = Peak Level - PK Limit;
2. AV Margin = Average Level - AV Limit;
3. Average Level = Peak Level + Duty Cycle Factor;
4. Duty Cycle Level Please see Clause 5.

4. BANDWIDTH TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.231C) , Subpart C	
Section	Description
15.231C	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier. B.W (20dBc) Limit = 0.25% * f(MHz) = 0.25% * 433.92MHz = 1.0848MHz.

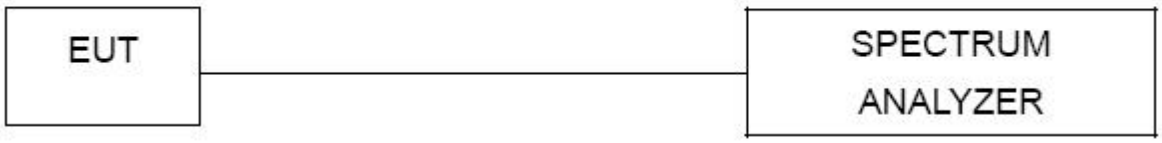
4.1.1 TEST PROCEDURE

1. Set RBW = 10 kHz.
2. Set the video bandwidth (VBW) = 30 kHz.
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.

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 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

Frequency (MHz)	20dB Bandwidth (MHz)	Result
433.92	0.121	Pass

ASK

5. CALCULATION OF AVERAGE FACTOR

5.1 APPLIED PROCEDURES / LIMIT

The output field strengths of specification in accordance with the FCC rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.
The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame.
The duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

5.1.1 TEST PROCEDURE

1. Set RBW = 100kHz.
2. Set the video bandwidth (VBW) ≥3RBW.
3. Detector = Peak.
4. Span: 0MHz
5. Sweep = 200ms.
6. Allow the trace to stabilize.

5.1.2 TEST SETUP

5.1.3 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.

5.1.4 TEST RESULTS

Duty Cycle= Effective time one cycle/ Total time one cycle

Averaging factor in dB =20log (duty cycle)

The duration of one cycle = 54.60ms

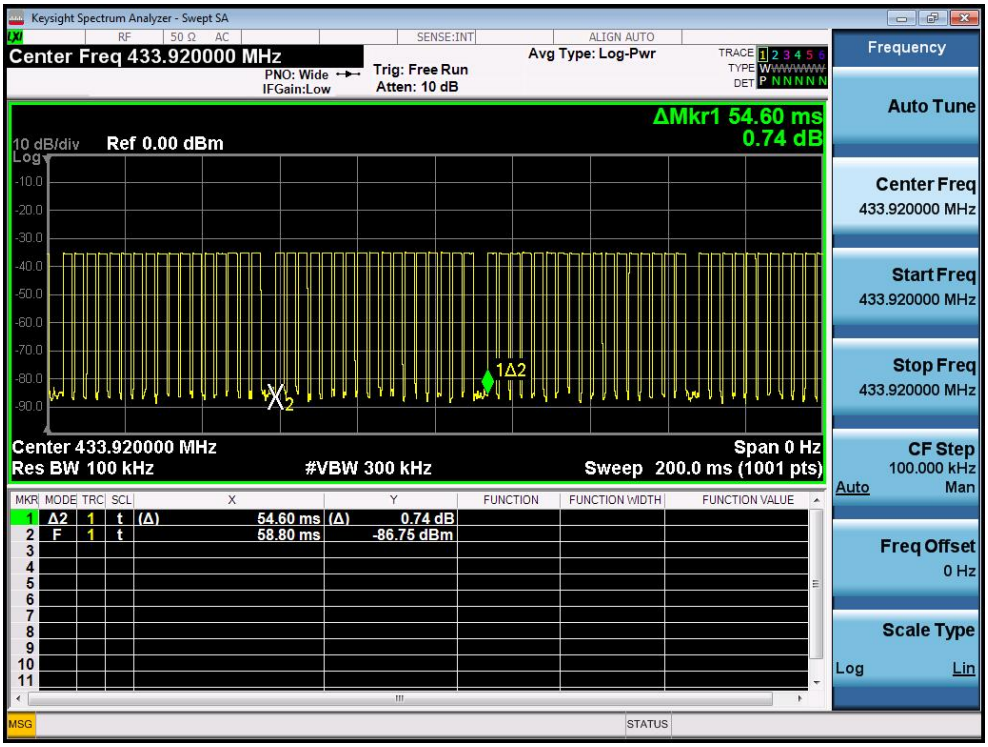
The duty cycle is simply the on-time divided the duration of one cycle

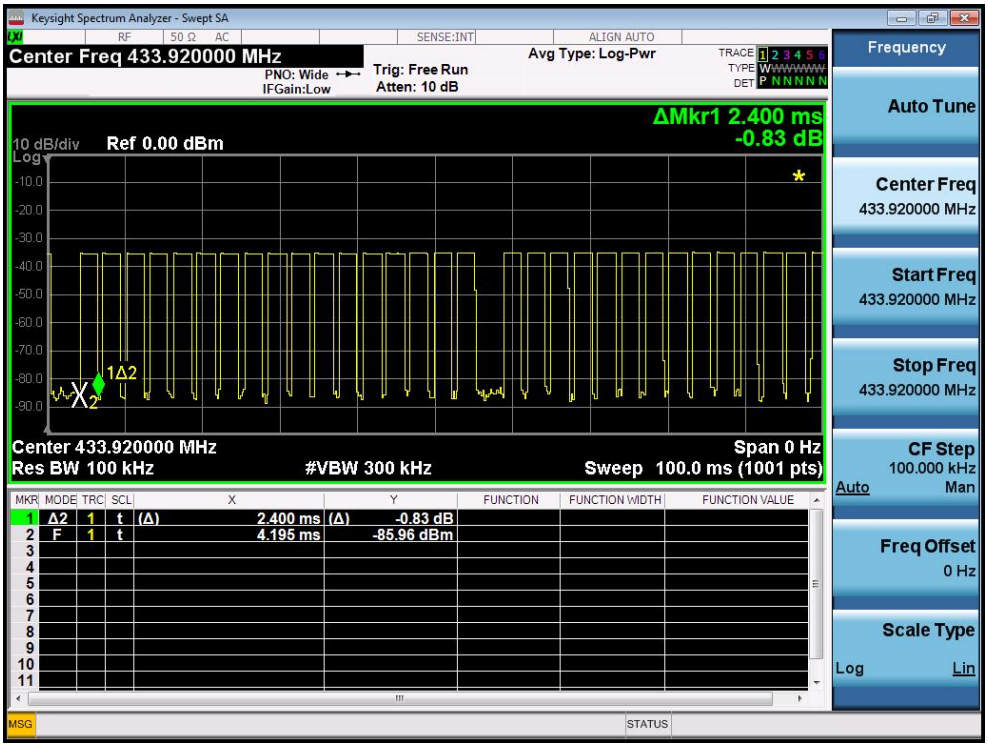
Duty Cycle =(2.4*17)/54.60ms=40.8/54.6=0.7473

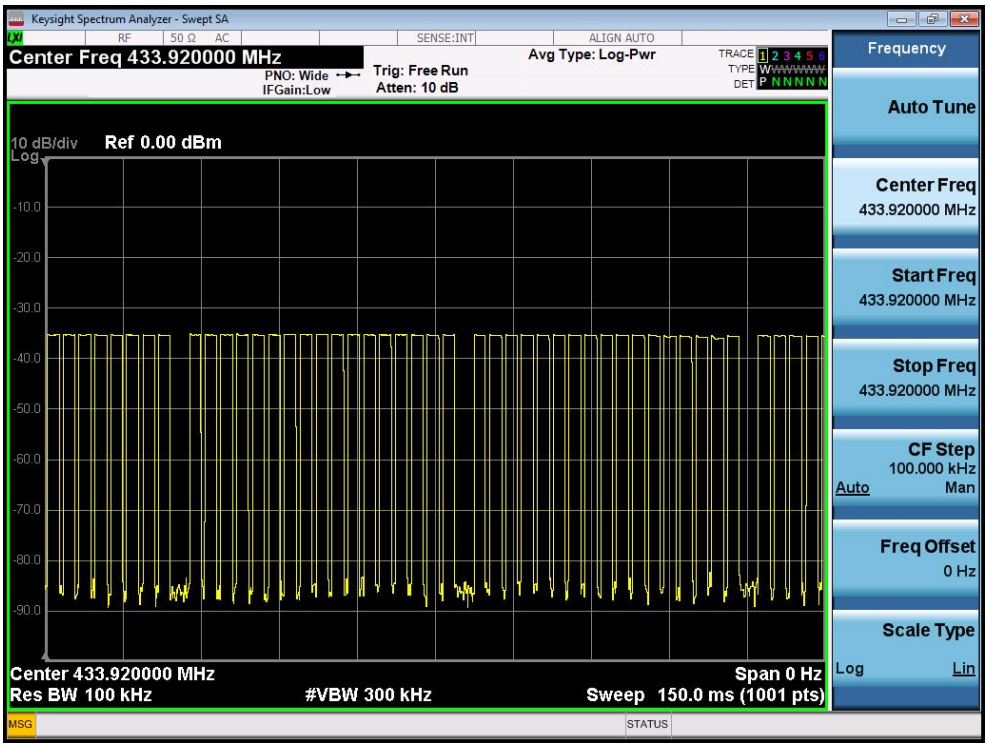
Therefore, the averaging factor is found by 20log0.7473=-2.53dB

Test plot as follows:

T period






Keysight Spectrum Analyzer - Swept SA
Center Freq 433.920000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
10 dB/div
Log
Ref 0.00 dBm
Center 433.920000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 150.0 ms (1001 pts)
Frequency
Auto Tune
Center Freq
433.920000 MHz
Start Freq
433.920000 MHz
Stop Freq
433.920000 MHz
CF Step
100.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

6. DWELL TIME

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.231a) , Subpart C	
Section	Description
15.231a	A manually operated Wireless Remote Control shall employ a switch that will automatically deactivate the Wireless Remote Control within not more than 5 seconds of being released.

6.1.1 TEST PROCEDURE

1. Set RBW = 1MHz.
2. Set the video bandwidth (VBW) ≥1MHz.
3. Detector = Peak.
4. Trace mode = max hold.
5. Allow the trace to stabilize.

6.1.2 DEVIATION FROM STANDARD

No deviation.

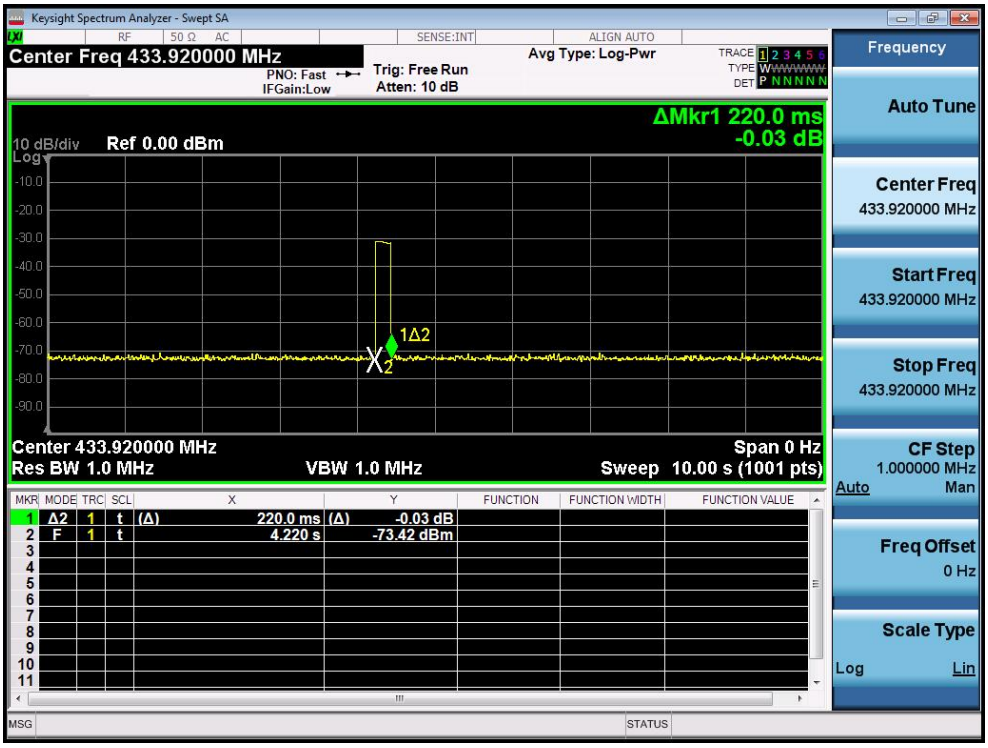
6.1.3 TEST SETUP

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

Frequency (MHz)	Dwell time (second)	Limit (second)	Result
433.92	0.220	<5s	Pass



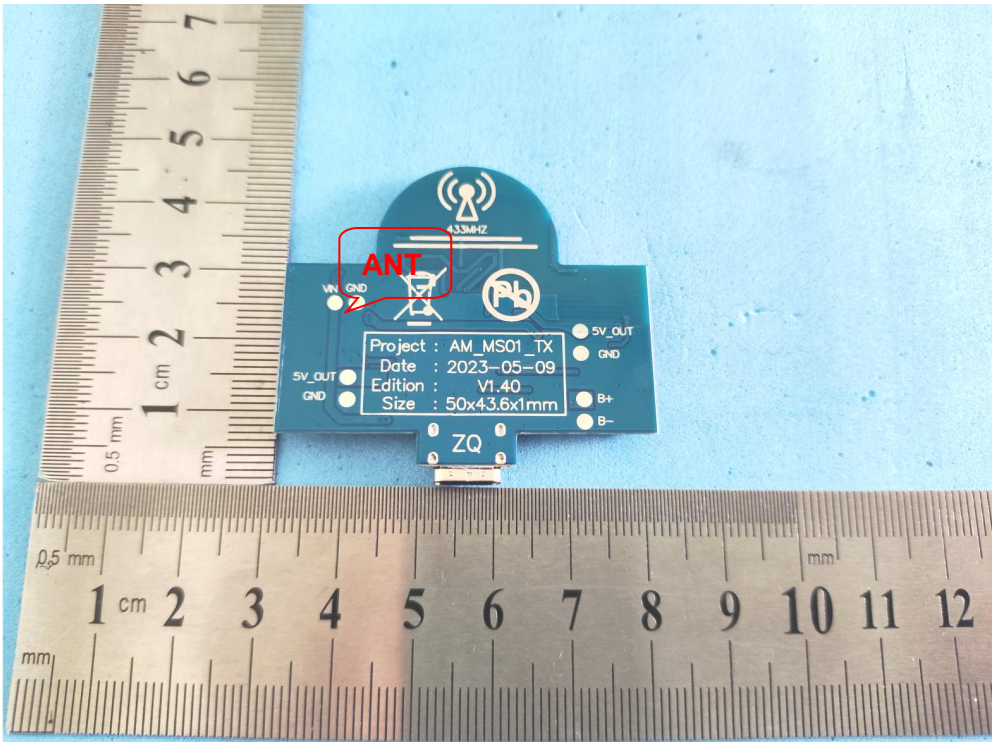
7. ANTENNA REQUIREMENT

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

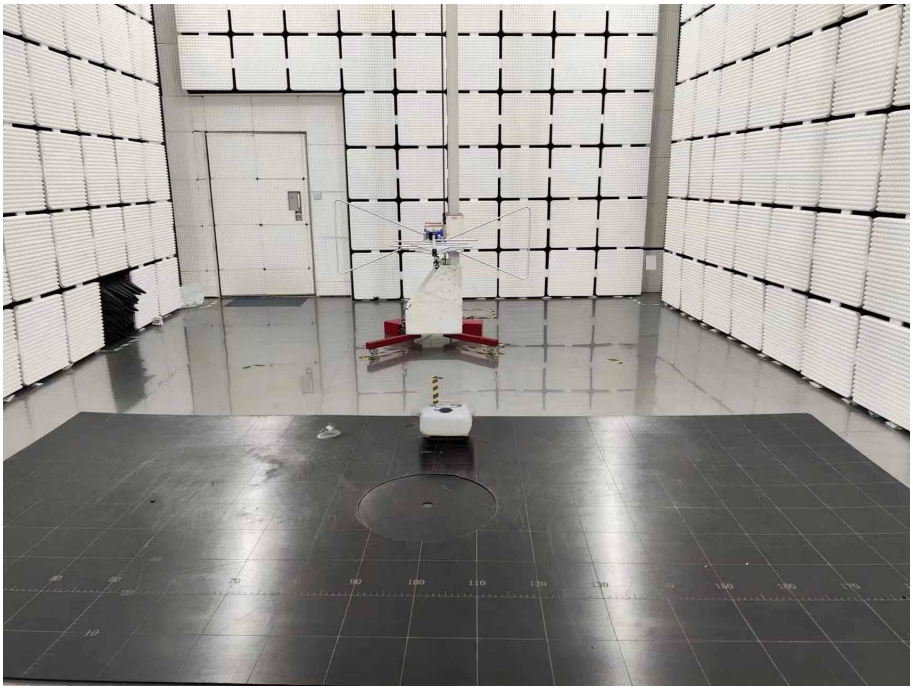
The antenna used in this product is an Internal Antenna, the directional gains of antenna used for transmitting is 0dBi



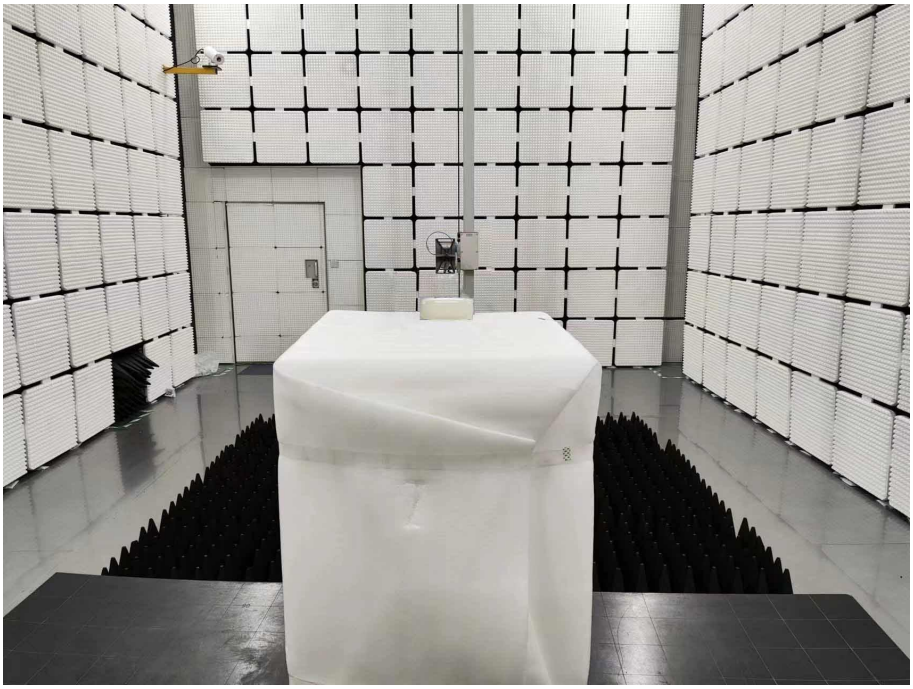
8. TEST SEUUP PHOTO

Radiated Measurement Photos

Below 1GHz



Above 1GHz



Conducted Measurement Photos

※※※※※ **END OF REPORT** ※※※※※