FCC RADIO TEST REPORT

FCC ID: 2AZUG-GGMMR3

Sample: Wireless Transmitter

Trade Name: N/A

Main Model: GGMMR3

Additional Model: N/A

Report No.: UNIA23040701ER-61

Prepared for

Dongguan Beijia Electronic Technology Co., Ltd

Room 403, 4th Floor, 102 Yanwu Road, Dalingshan Town, Dongguan City, Guangdong Province

Prepared by

Shenzhen United Testing Technology Co., Ltd.

2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd, Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

TEST RESULT CERTIFICATION

Applicant	Dongguan Beijia Electronic Technology Co., Ltd
Address	Room 403, 4th Floor, 102 Yanwu Road, Dalingshan Town, Dongguan City, Guangdong Province
Manufacturer	Dongguan Beijia Electronic Technology Co., Ltd
Address	Room 403, 4th Floor, 102 Yanwu Road, Dalingshan Town, Dongguan City, Guangdong Province

Product description

Product	Wireless Transmitter
Trade Name	N/A
Model Name	GGMMR3
Test Methods	FCC Part 15 Subpart C 15.231 ANSI C63.10: 2013

This device described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date (s) of performance of tests	April 3~6, 2023
Date of Issue	April 6, 2023
Test Result	Pass

Prepared by: Jason Ye

Jason Ye/Supervisor

Reviewer: Kelly Cheng

Kelly Cheng/Supervisor

Approved & Authorized Signer: Liuze

Liuze/Manager

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1 TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

Item	FCC Rules	Description Of Test	Result
1	FCC Part 15.207	Conducted Emission	N/A
2	FCC §15.231(a)(1)	Automatically Deactivate	Pass
3	FCC Part 15.231(b)	Electric Field Strength of Fundamental Emission	Pass
4	FCC Part 15.205 &15.209& 15.231(b)	Electric Field Strength of Spurious Emission	Pass
5	FCC Part 15.231(c)	-20dB bandwidth	Pass

Note:

"N/A" denotes test is not applicable in this Test Report.

1.2 TEST FACILITY

Test Firm : Shenzhen United Testing Technology Co., Ltd.

Address : 2F, Annex Bldg, Jiahuangyuan Tech Park, #365 Baotian 1 Rd,Tiegang Community, Xixiang Str, Bao'an District, Shenzhen, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

A2LA Certificate Number: 4747.01

The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 0027159896

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 21947

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

1.3 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 %.

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9kHz ~ 150kHz	2.96	
		150kHz ~ 30MHz	2.44	

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9kHz ~ 30MHz	2.50	
		30MHz ~ 1000MHz	4.80	
		1000MHz ~ 18000MHz	4.13	

C. RF Conducted Method:

Item	Measurement Uncertainty
Uncertainty of Occupied Channel Bandwidth	U_c = ±2 %

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

The following information of EUT submitted and identified by applicant:

Product	Wireless Transmitter
Trade Name	N/A
Main Model	GGMMR3
Serial No.	N/A
Model Difference	N/A
FCC ID	2AZUG-GGMMR3
Antenna Type	Spring Antenna
Antenna Gain	0dBi
Frequency Range	433.92MHz
Number of Channels	1CH
Modulation Type	ASK
Battery	DC 3V

2.2 CARRIER FREQUENCY OF CHANNELS

Channel	Frequency (MHz)
1	433.92

2.3 OPARATION OF EUT DURING TESTING

No.	Test Mode Description
1	Transmitting mode (433.92MHz)

Note:
1. All the test modes can be supply by new battery, and only the data of the worst case recorded in the test report.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. For battery operated equipment, the battery is full charged during test.
4. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

2.4 DESCRIPTION OF TEST SETUP

Operation of EUT during Radiation testing:

EUT

2.5 EQUIPMENT USED IN TESTED SYSTEM

N/A

2.6 ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

	NORMAL CONDITIONS	EXTREME CONDITIONS
Temperature range (℃)	15 - 35	-20 - 50
Relative humidty range	20 % - 75 %	20 % - 75 %
Pressure range (kPa)	86 - 106	86 - 106
Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.		

2.7 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
Radiated Emissions Measurement					
1	Radiated Emission Test Software	EZ-EMC	Ver.CCS-03A1	N/A	N/A
2	Horn Antenna	Sunol	DRH-118	A101415	2023.09.27
3	Broadband Hybrid Antenna	Sunol	JB1	A090215	2024.02.26
4	PREAMP	HP	8449B	3008A00160	2023.09.22
5	PREAMP	HP	8447D	2944A07999	2023.05.30
6	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2023.09.22
7	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2023.09.22
8	Signal Generator	Agilent	E4421B	MY4335105	2023.09.22
9	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2023.09.22
10	MXA Signal Analyzer	Keysight	N9020A	MY51110104	2023.09.22
11	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2023.05.30
12	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2023.05.30
13	RF power divider	Anritsu	K241B	992289	2023.09.22
14	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2023.09.22
15	Active Loop Antenna	Com-Power	AL-130R	10160009	2023.05.30
16	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2023.09.22
17	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2023.05.30
18	Horn Antenna	A-INFOMW	LB-180400-KF	J211060660	2023.09.27
19	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2023.09.22
20	Signal Generator	Agilent	N5183A	MY47420153	2023.09.22
21	Spctrum Analyzer	Rohde&Schwarz	FSP 40	100501	2023.09.22
22	Power Meter	KEYSIGHT	N1911A	MY50520168	2023.09.22
23	Frequency Meter	VICTOR	VC2000	997406086	2023.09.22
24	DC Power Source	HYELEC	HY5020E	055161818	2023.09.22

3 CONDUCTED EMISSIONS TEST

3.1 LIMIT

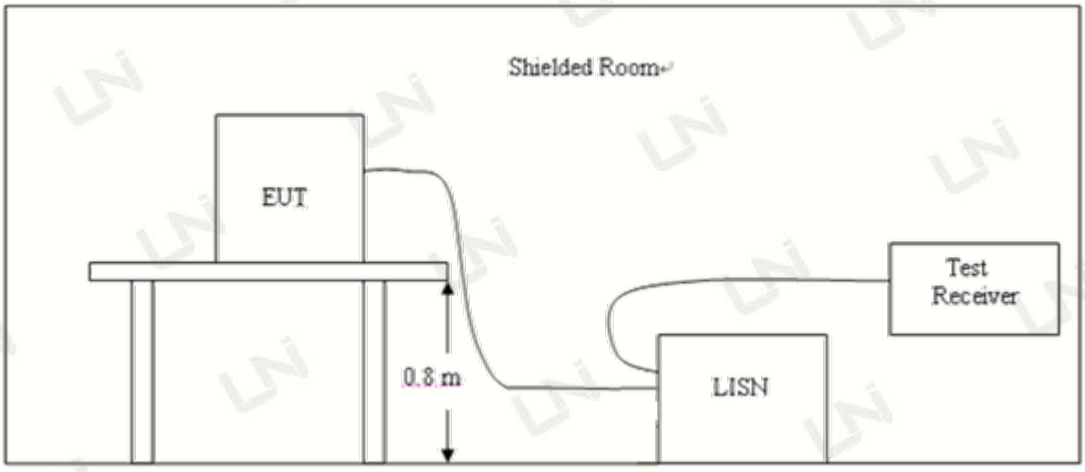
For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following

Frequency	Maximum RF Line Voltage	
	Q.P. (dBμV)	Average (dBμV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 TEST SETUP



3.3 TEST PROCEDURE

1, The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. A wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
2, Support equipment, if needed, was placed as per ANSI C63.10.
3, All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4, If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5, All support equipments received AC power from a second LISN, if any.
6, The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7, Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.

3.4 TEST RESULT

N/A

Remark:
The EUT is powered by DC 3V battery.

4 RADIATED EMISSION TEST

4.1 LIMIT

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40	100
88-216	3	43.5	150
216-960	3	46	200
Above 960	3	54	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

In addition to the provisions of 15.231(b) and RSS 210-A1.1.2, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

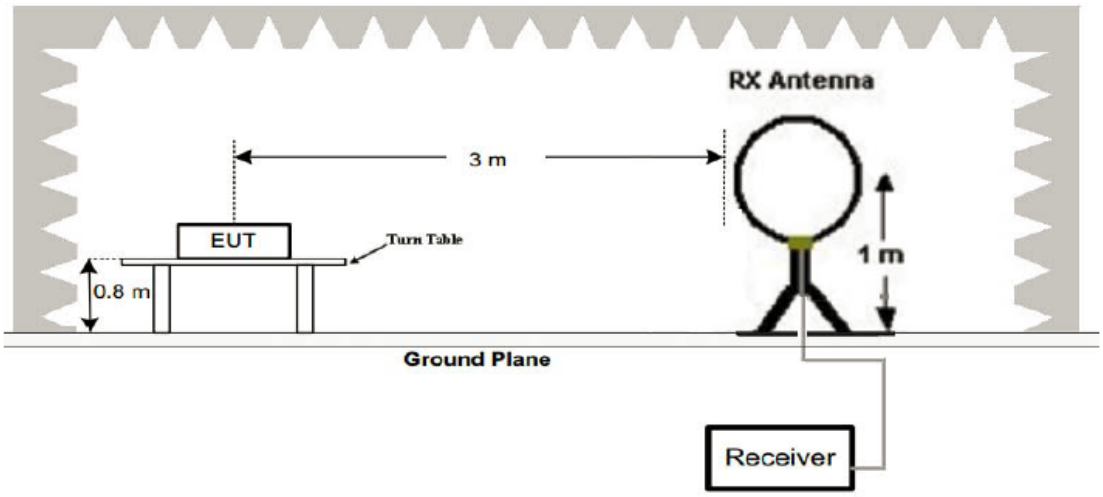
Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66–40.70.	2,250	225
70–130	1,250	125
130–174	[1] 1,250 to 3,750	[1] 125 to 375
174–260	3,750	375
260–470	[1] 3,750 to 12,500	[1] 375 to 1,250
Above 470	12,500	1,250

[1] Linear interpolations.

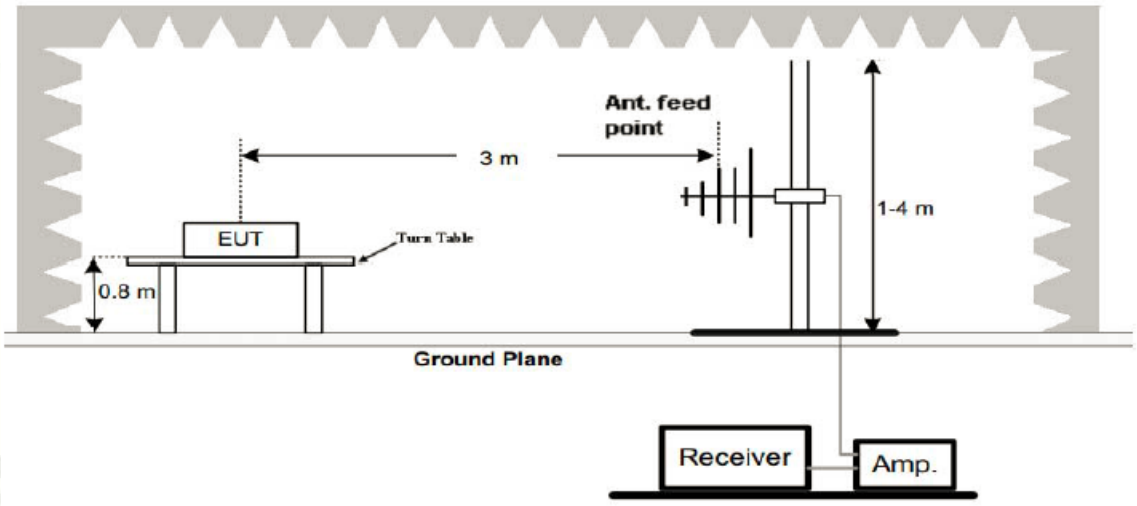
[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 260-470 MHz, μV/m at 3 meters =41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

4.2 TEST SETUP

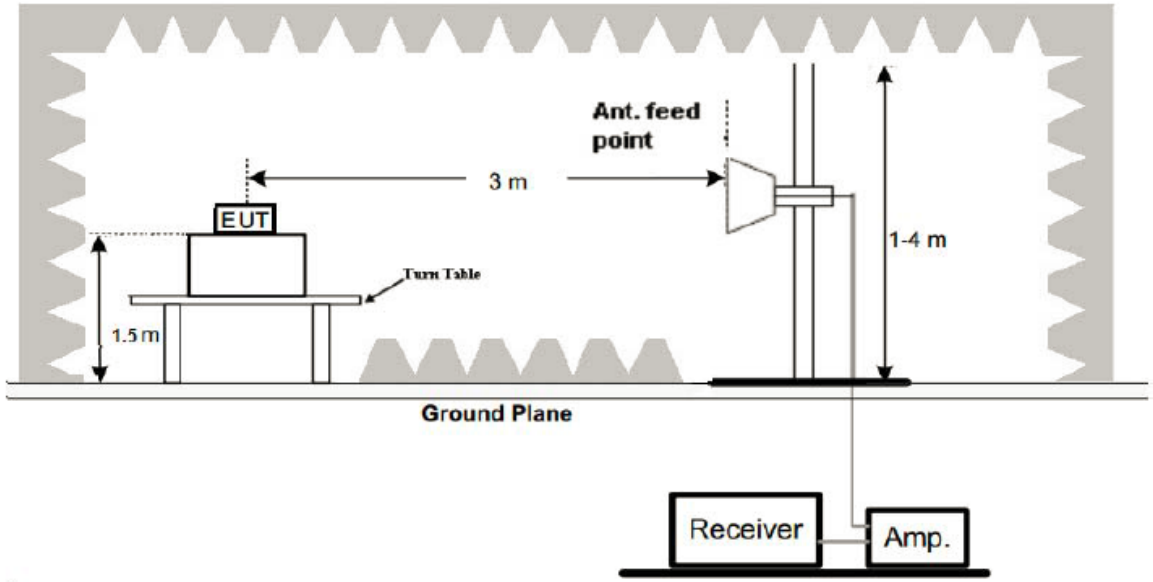
1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz



3. Radiated Emission Test-Up Frequency Above 1GHz



4.3 TEST PROCEDURE

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
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 varied from 1m to 4m to find out the highest 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 test frequency range from 9kHz to 25GHz per FCC PART 15.33(a).

Note:
For battery operated equipment, the equipment tests shall be performed using a new battery.

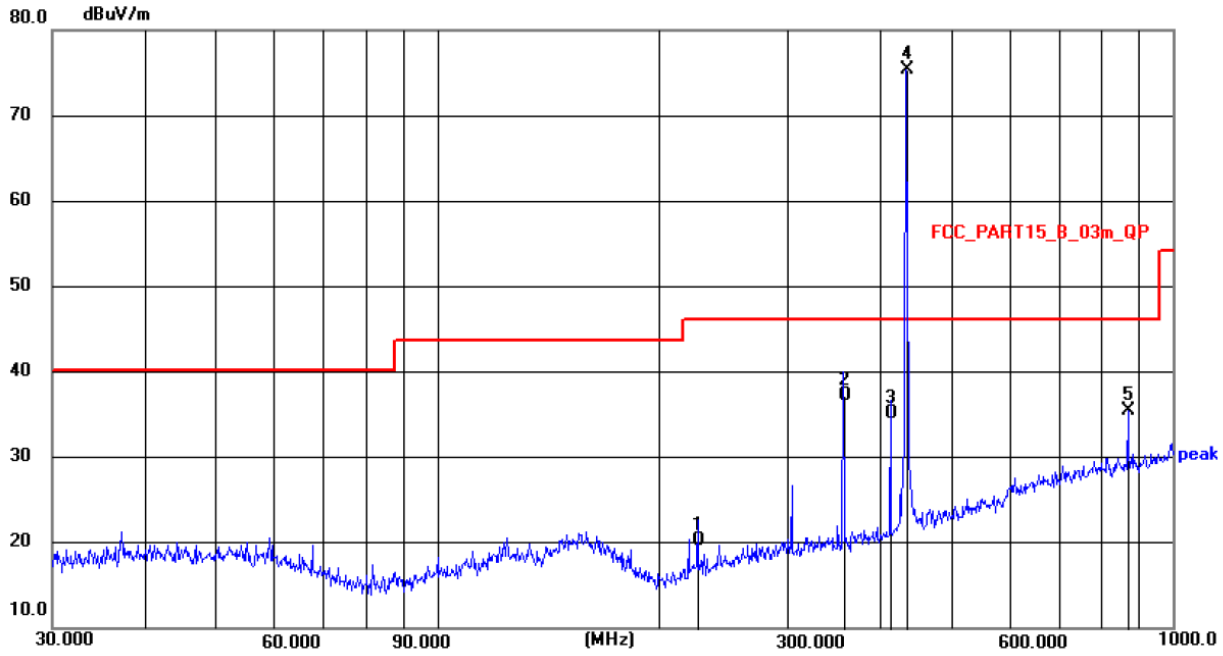
4.4 TEST RESULT

PASS

Remark:
1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, and test data recorded in this report.
2. Radiated emission test from 9KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9KHz to 30MHz and not recorded in this report.

Below 1GHz Test Results:

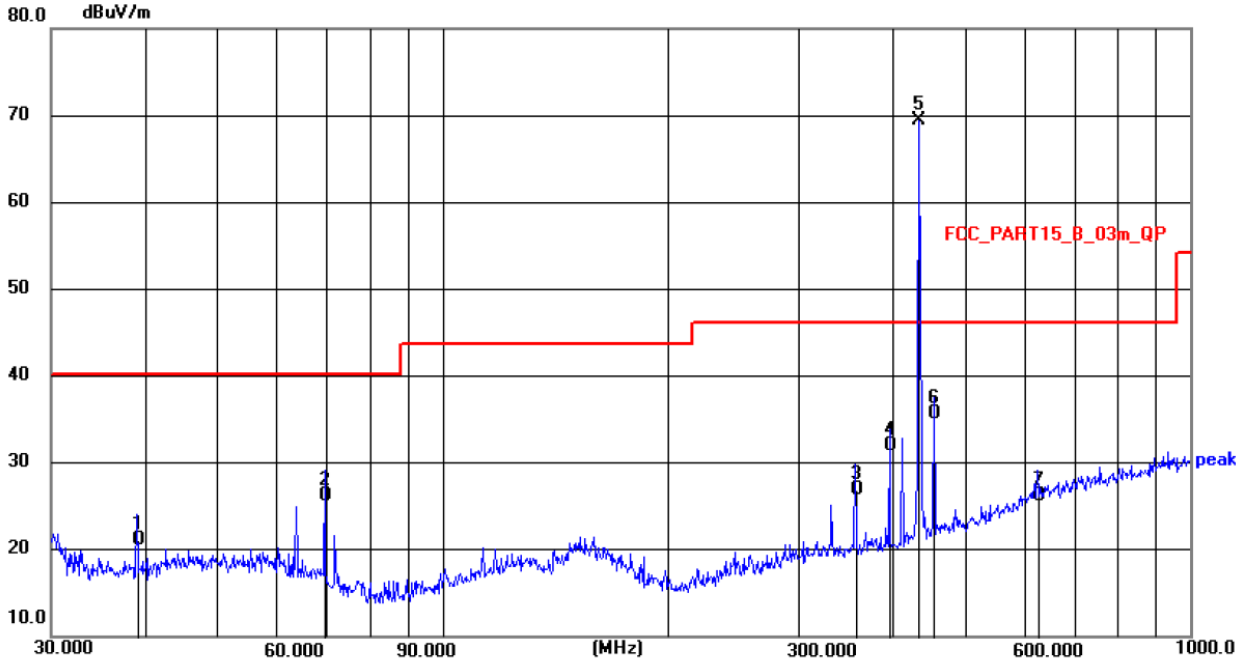
Temperature:	24℃	Relative Humidity:	49%
Test Date:	April 4, 2023	Pressure:	1010hPa
Test Voltage:	DC 3V	Polarization:	Horizontal
Test Mode:	Normal work		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F
1	226.0994	7.52	12.79	20.31	46.00	25.69	QP	118	249	P
2	356.6758	21.29	15.96	37.25	46.00	8.75	QP	142	14	P
3	413.2706	18.00	17.12	35.12	46.00	10.88	QP	110	354	P
4 *	433.9200	57.73	17.65	75.38	100.82	-25.44	peak	118	318	P
5	867.8400	11.87	23.67	35.54	80.82	45.28	peak	127	19	P

Remark: Level= Reading+ Factor, Margin= Level-Limit
Factor=Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	24℃	Relative Humidity:	49%
Test Date:	April 4, 2023	Pressure:	1010hPa
Test Voltage:	DC 3V	Polarization:	Vertical
Test Mode:	Normal work		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F
1	39.0245	7.28	13.75	21.03	40.00	18.97	QP	184	44	P
2	69.6005	13.93	12.21	26.14	40.00	13.86	QP	140	297	P
3	356.6758	10.89	15.96	26.85	46.00	19.15	QP	189	266	P
4	396.2415	15.19	16.71	31.90	46.00	14.10	QP	112	2	P
5 *	433.9200	51.75	17.65	69.40	100.82	31.42	peak	124	106	P
6	454.3100	17.62	18.09	35.71	46.00	10.29	QP	131	209	P
7	625.0780	5.03	21.07	26.10	46.00	19.90	QP	113	83	P

Remark: Level= Reading+ Factor, Margin= Level-Limit
Factor=Ant. Factor + Cable Loss – Pre-amplifier

Above 1 GHz Test Results:

Frequency (MHz)	Reading (dBmV/m)	Factor Corr. (dB/m)	Average Factor (dB)	Result (dBmV/m)		Limit (dBmV/m)		Margin (dB)		Polarization
				AV	PEAK	AV	PEAK	AV	PEAK	
433.92	57.73	17.65	-6.47	68.91	75.38	80.82	100.82	-11.91	-25.44	Horizontal
867.84	11.87	23.67	-6.47	29.07	35.54	60.82	80.82	-31.75	-45.28	
1301.76	59.53	-13.84	-6.47	39.22	45.69	60.82	80.82	-21.6	-35.13	
2169.6	62.95	-10.83	-6.47	45.65	52.12	60.82	80.82	-15.17	-28.7	
3037.44	53.95	-7.96	-6.47	39.52	45.99	60.82	80.82	-21.3	-34.83	
3471.36	55.03	-7.57	-6.47	40.99	47.46	60.82	80.82	-19.83	-33.36	
3905.28	62.83	-6.7	-6.47	49.66	56.13	60.82	80.82	-11.16	-24.69	
4339.2	56.06	-5.93	-6.47	43.66	50.13	60.82	80.82	-17.16	-30.69	
433.92	51.75	17.65	-6.47	62.93	69.4	80.82	100.82	-17.89	-31.42	Vertical
3905.28	56.4	-6.58	-6.47	43.35	49.82	60.82	80.82	-17.47	-31	

Note: 1. Average value= PK value + Average Factor (duty factor)

2. If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to performa separate average measurement.

5 -20db OCCUPIED BANDWIDTH

5.1 LIMIT

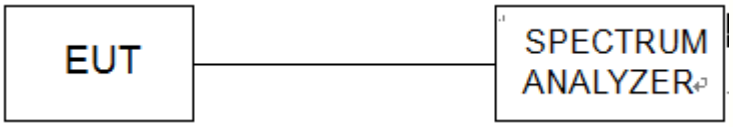
According to 47 CFR 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.

5.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=1%-5%OBW, VBW=3RBW, Span= 2*OBW～5*OBW.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

5.3 TEST CONFIGURATION

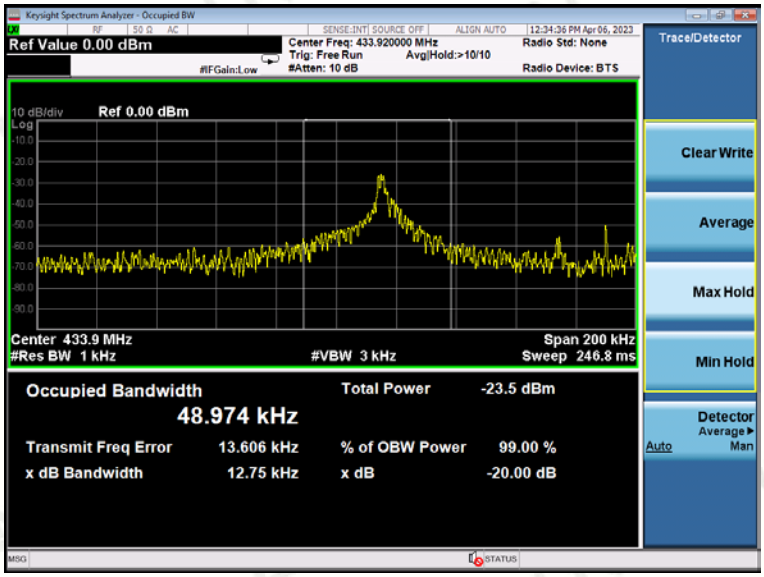


5.4 TEST RESULT

PASS

Modulation	Channel Frequency (MHz)	20dB bandwidth (kHz)	Limit (kHz)	Result
ASK	433.92	12.75	0.25%*433920=1084.8	Pass

ASK Modulation



6 DEACTIVATION TIME

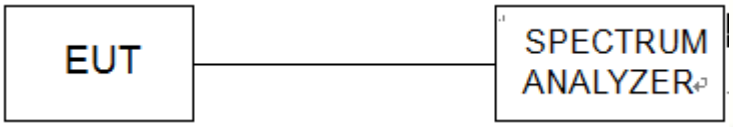
6.1 LIMIT

According to FCC §15.231(a)(1), A transmitter activated automatically shall cease transmission within 5 seconds after activation.

6.2 TEST PROCEDURE

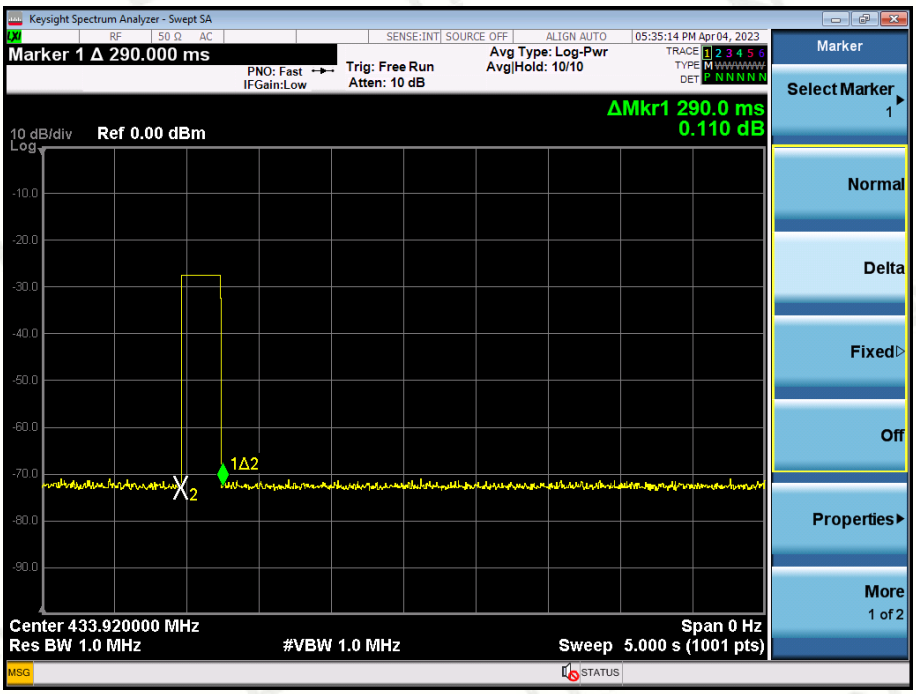
1. The EUT was placed on a wooded table which is 0.8m height and close to receiver antenna of spectrum analyzer.
2. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was set to 1 MHz to encompass all significant spectral components during the test. The spectrum analyzer was operated in linear scale and zero span mode after tuning to the transmitter carrier frequency.

6.3 TEST CONFIGURATION



6.4 TEST RESULTS

Frequency (MHz)	One transmission time(s)	Limit(s)	Result
433.92	0.29	5	Pass



7 CALCULATION OF AVERAGE FACTOR

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.

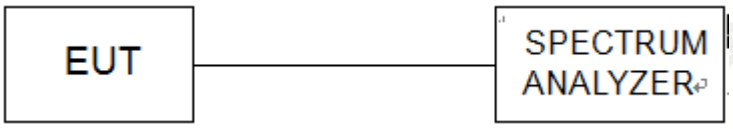
Averaging factor in dB =20log (duty cycle)

TEST RESULTS

1. Set SPA Center Frequency = Fundamental frequency,
   RBW = 100 kHz, VBW = 300 kHz, Span = 0 Hz.
2. Set EUT as normal operation and press Transmitter button.
3. Set SPA View. Delta Mark time.
4. The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation

Test Configuration

The equipment are installed on Release Time Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.



TEST RESULTS

---PASS---

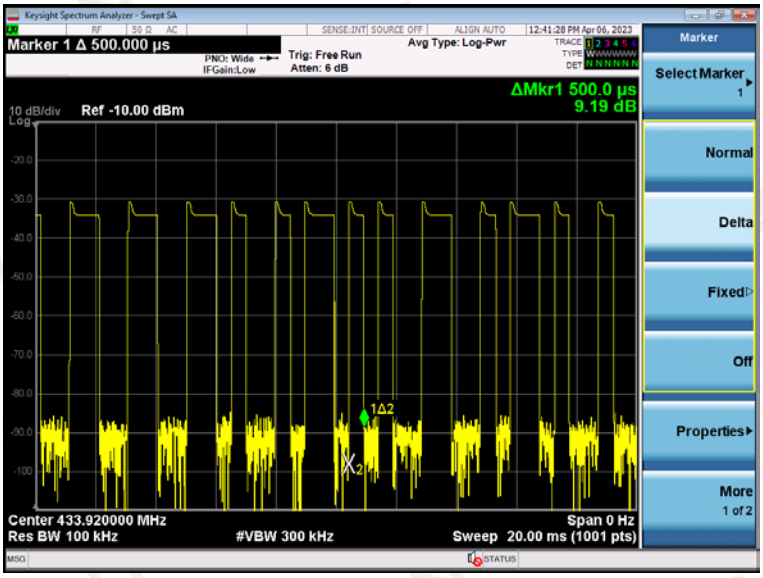
The duty cycle is simply the on time divided by the period:

Effective period of the cycle = (0.5*55)ms+(1*20)ms =47.5ms

DC = 47.5ms / 100ms =0.475

Therefore, the average factor is found by 20log0.475= -6.47dB

The spectral following.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PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 6 dB
Avg Type: Log-Pwr
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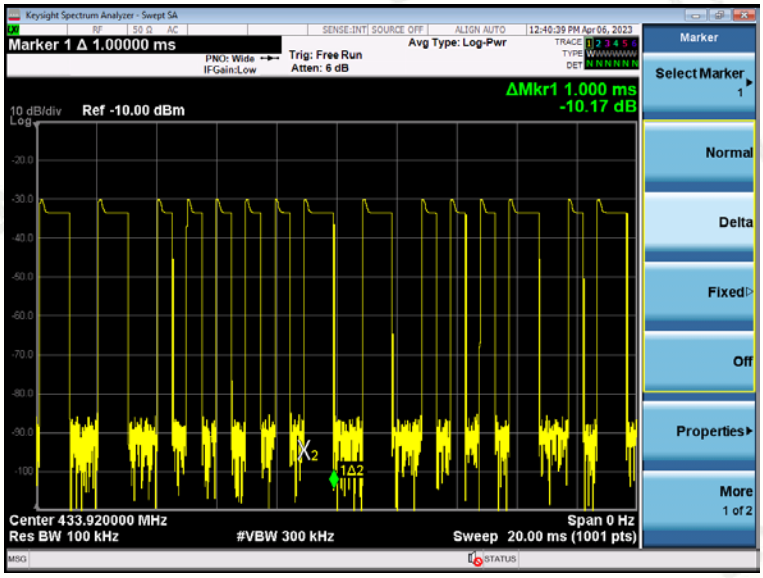
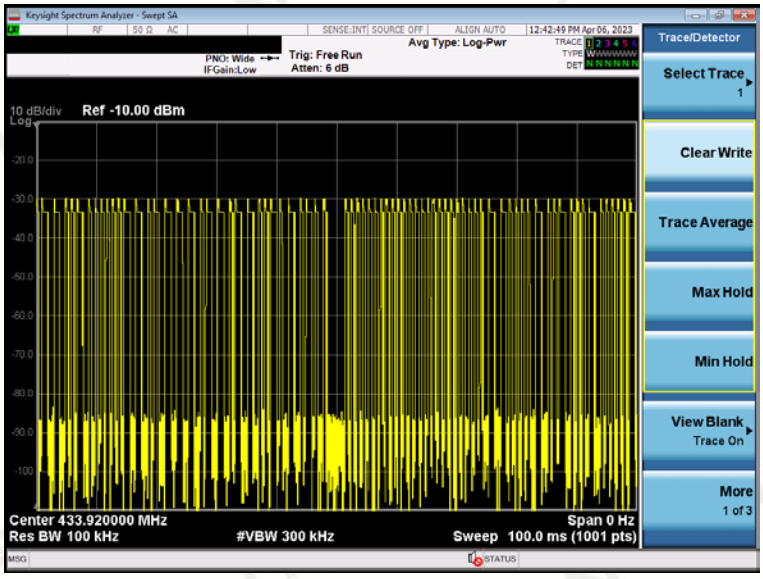
ΔMkr1 500.0 µs
9.19 dB
10 dB/div
Ref -10.00 dBm
Center 433.920000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 20.00 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2


Keysight Spectrum Analyzer - Swept SA
Marker 1 Δ 1.00000 ms
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 6 dB
Avg Type: Log-Pwr
12:40:39 PM Apr 06, 2023
ΔMkr1 1.000 ms
-10.17 dB
10 dB/div
Ref -10.00 dBm
Center 433.920000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 20.00 ms (1001 pts)
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

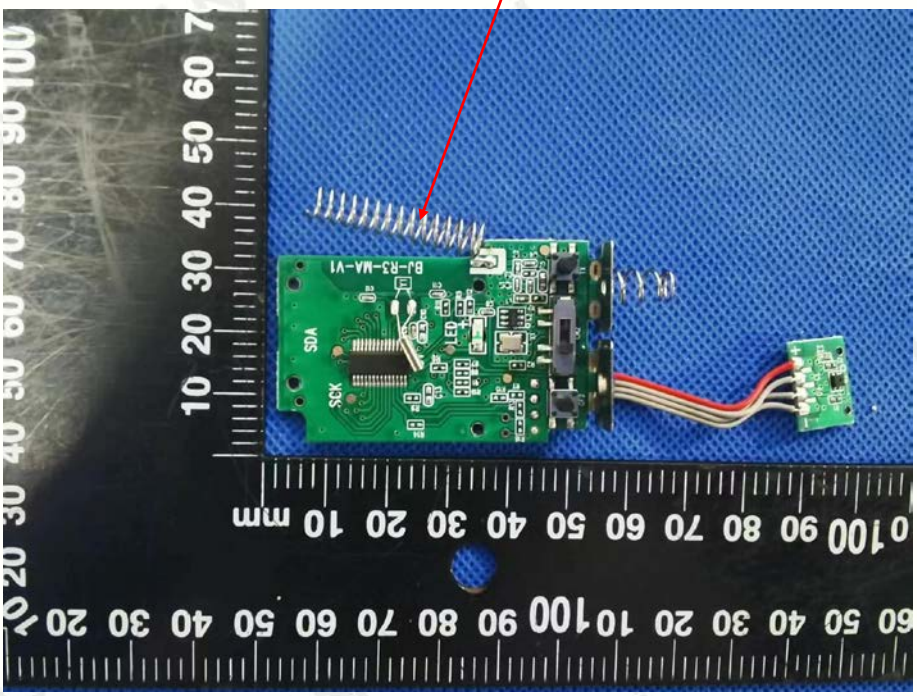

Keysight Spectrum Analyzer - Swept SA
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 6 dB
Avg Type: Log-Pwr
12:42:49 PM Apr 06, 2023
10 dB/div
Ref -10.00 dBm
Center 433.920000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 100.0 ms (1001 pts)
Trace/Detector
Select Trace
Clear Write
Trace Average
Max Hold
Min Hold
View Blank
Trace On
More
1 of 3

8 ANTENNA REQUIREMENT

Standard Applicable:
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Connected Construction
The antenna used in this product is a PCB antenna, the directional gains of antenna used for transmitting is 0dBi.It is permanently fixed and cannot be disassembled.

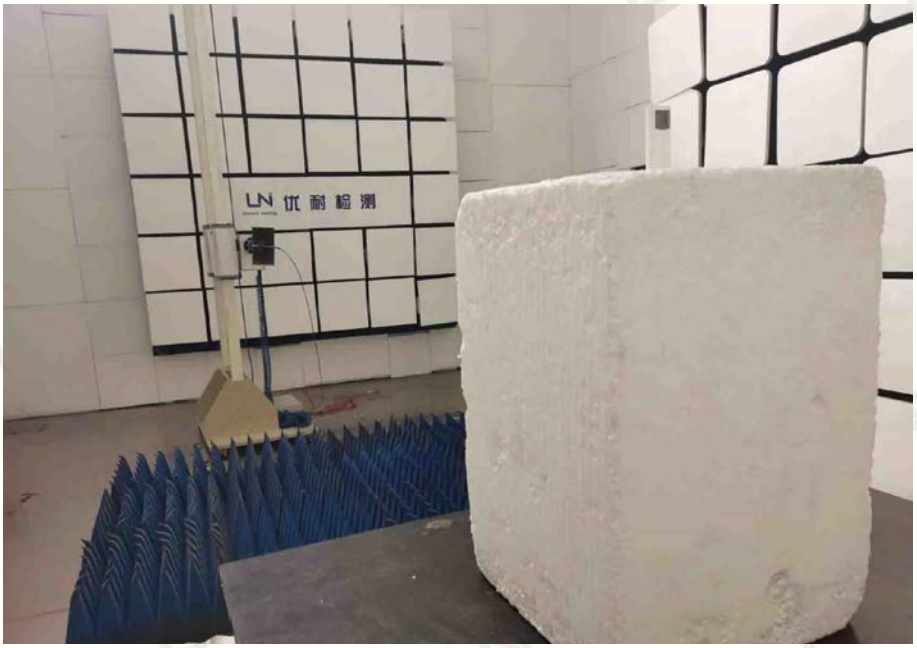
ANTENNA:



9 PHOTOGRAPH OF TEST

Radiated Emission

30MHz-1000MHz



Above 1GHz

Conducted Emission

N/A

**********End of Report**********