FCC RADIO TEST REPORT

FCC ID: 2A8PD-YK01

Sample: Remote Control Transmitter

Trade Name: N/A

Main Model: YK01

Additional Model: YK02, YK03, YK05

Report No.: UNIA22091614ER-61

Prepared for

Dongguan Benzhuo Industrial Co.,Ltd.

11# Han Keng Street, Songbai Road, Yan Wu Village, Da Ling Shan Town, Dongguan City, Guangdong Province, China

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 Benzhuo Industrial Co.,Ltd.
Address	11# Han Keng Street, Songbai Road, Yan Wu Village, Da Ling Shan Town, Dongguan City, Guangdong Province, China
Manufacturer	Dongguan Benzhuo Industrial Co.,Ltd.
Address	11# Han Keng Street, Songbai Road, Yan Wu Village, Da Ling Shan Town, Dongguan City, Guangdong Province, China

Product description

Product	Remote Control Transmitter
Trade Name	N/A
Model Name	YK01
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	Sep. 16, 2022~ Sep. 28, 2022
Date of Issue	Sep. 28, 2022
Test Result	Pass

Prepared by: kahn.yang

KahnYang/Supervisor

Reviewer: Kelly Cheng

Kelly Cheng/Supervisor

Approved & Authorized Signer: liuze

Liuze/Manager

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1 TEST SUMMARY

1 TEST PROCEDURES AND RESULTS

FCC and IC Requirements		
FCC Part 15.207	Conducted Emission	Not Application
FCC §15.231(a)(1)	Automatically Deactivate	PASS
FCC Part 15.231(b)	Electric Field Strength of Fundamental Emission	PASS
FCC Part 15.205 &15.209& 15.231(b)	Electric Field Strength of Spurious Emission	PASS
FCC Part 15.231(c)	-20dB bandwidth	PASS

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: 674885

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.

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	

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

The following information of EUT submitted and identified by applicant:

Product	Remote Control Transmitter
Trade Name	N/A
Main Model	YK01
Serial No.	N/A
Model Difference	All model numbers are identical in interior only different in appearance color and model name.
FCC ID	2A8PD-YK01
Antenna Type	Internal Antenna
Antenna Gain	3dBi
Frequency Range	433.92MHz
Number of Channels	1CH
Modulation Type	ASK
Battery	DC 3V (Powered by CR2032 Battery)

2.2 CARRIER FREQUENCY OF CHANNELS

Channel	Frequency(MHz)
1	433.92

2.3 OPARATION OF EUT DURING TESTING

new battery is used during all test
Operating Mode
The mode is used: Transmitting mode

2.4 DESCRIPTION OF TEST SETUP

Operation of EUT during Radiation testing:

EUT

Table for auxiliary equipment:

Equipment Description	Manufacturer	Model	Calibration Due Date
/	/	/	/

2.5 ENVIRONMENTAL CONDITIONS

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

Temperature	Normal Temperature:	26°C
Voltage	Normal Voltage	3 V
Other	Relative Humidity	55 %
	Air Pressure	101 kPa

2.6 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	2023.09.22
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	2023.09.22
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 TEST CONDITIONS AND RESULTS

3.1 RADIATED EMISSION TEST

Radiation 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:

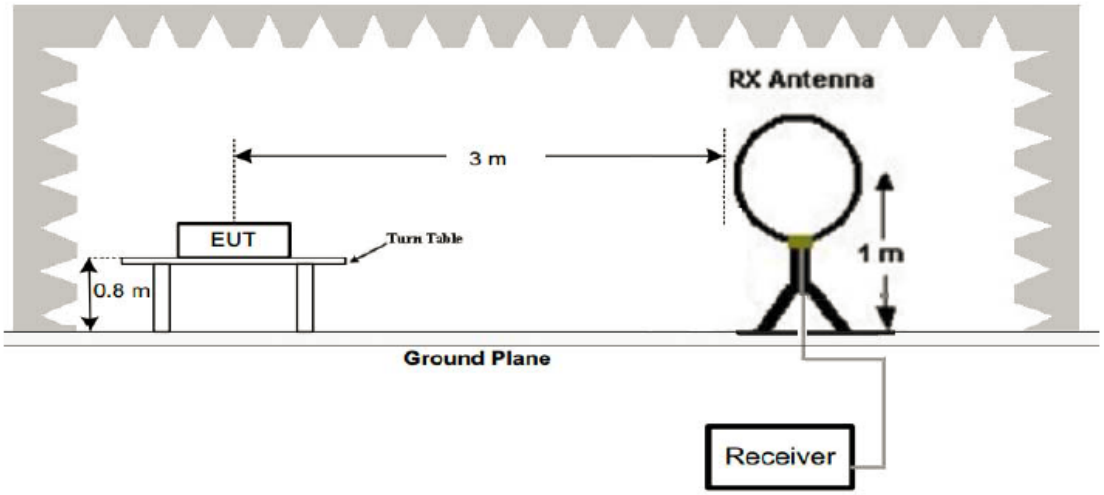
Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66–40.70.	2,250	225
70–130	1,250	125
130–174	[1] 1,250 to 3,750	[1] 125 to 375
174–260	3,750	375
260–470	[1] 3,750 to 12,500	[1] 375 to 1,250
Above 470	12,500	1,250

[1] Linear interpolations.

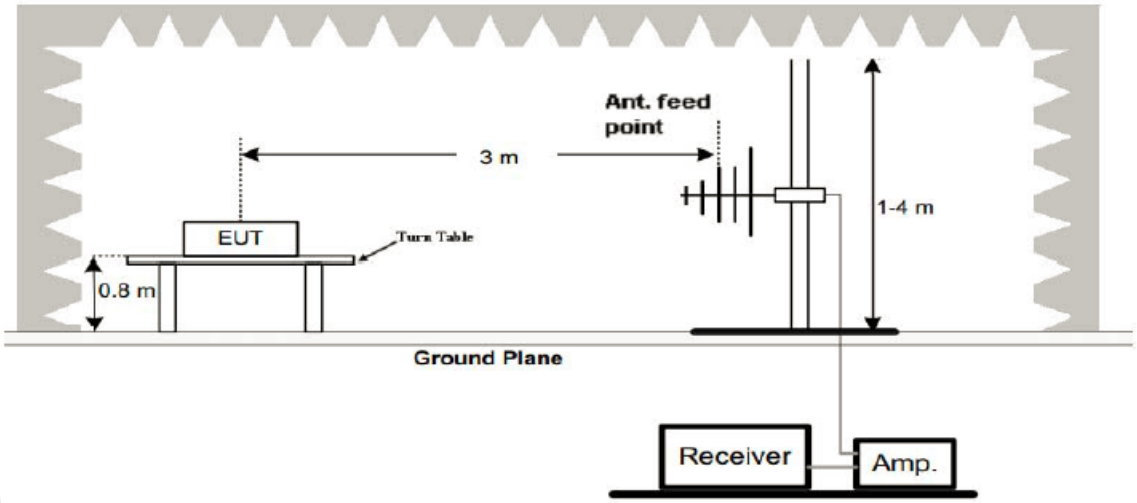
[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 260-470 MHz, μV/m at 3 meters =41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

Test Setup

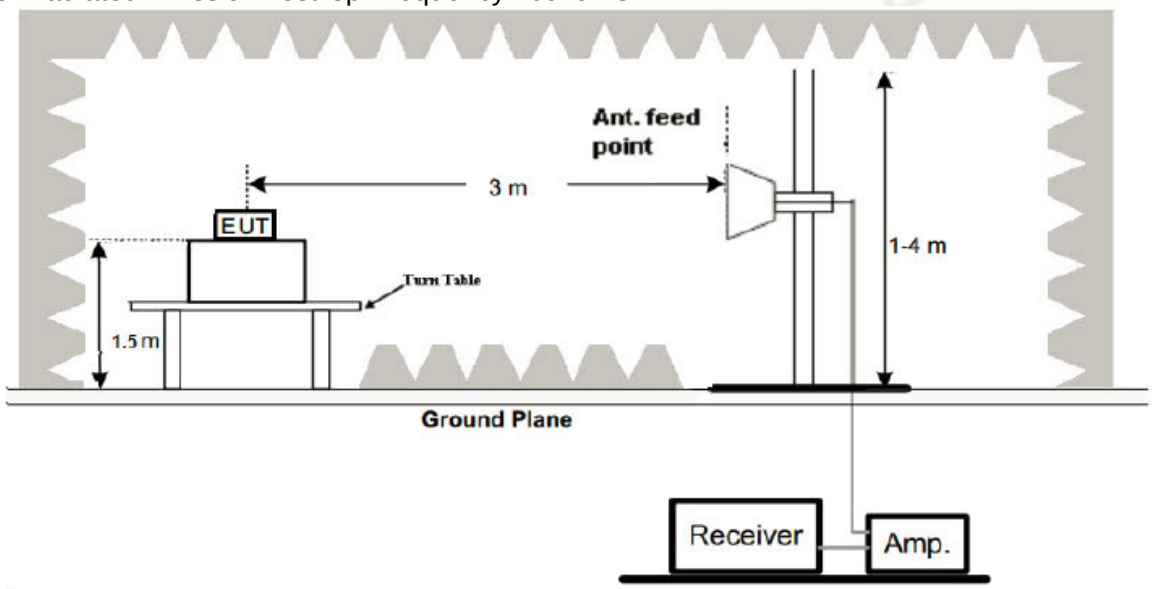
1. Radiated Emission Test-Up Frequency Below 30MHz



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



3. Radiated Emission Test-Up Frequency Above 1GHz



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.

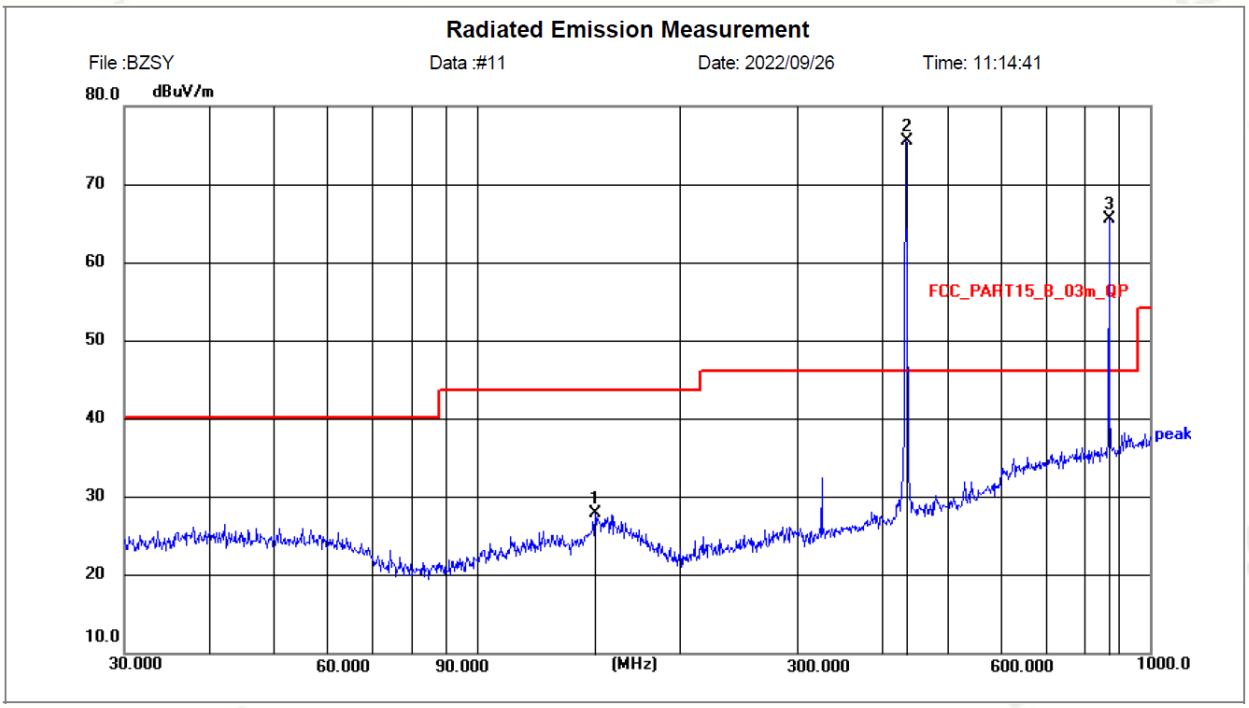
Test Result

---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:

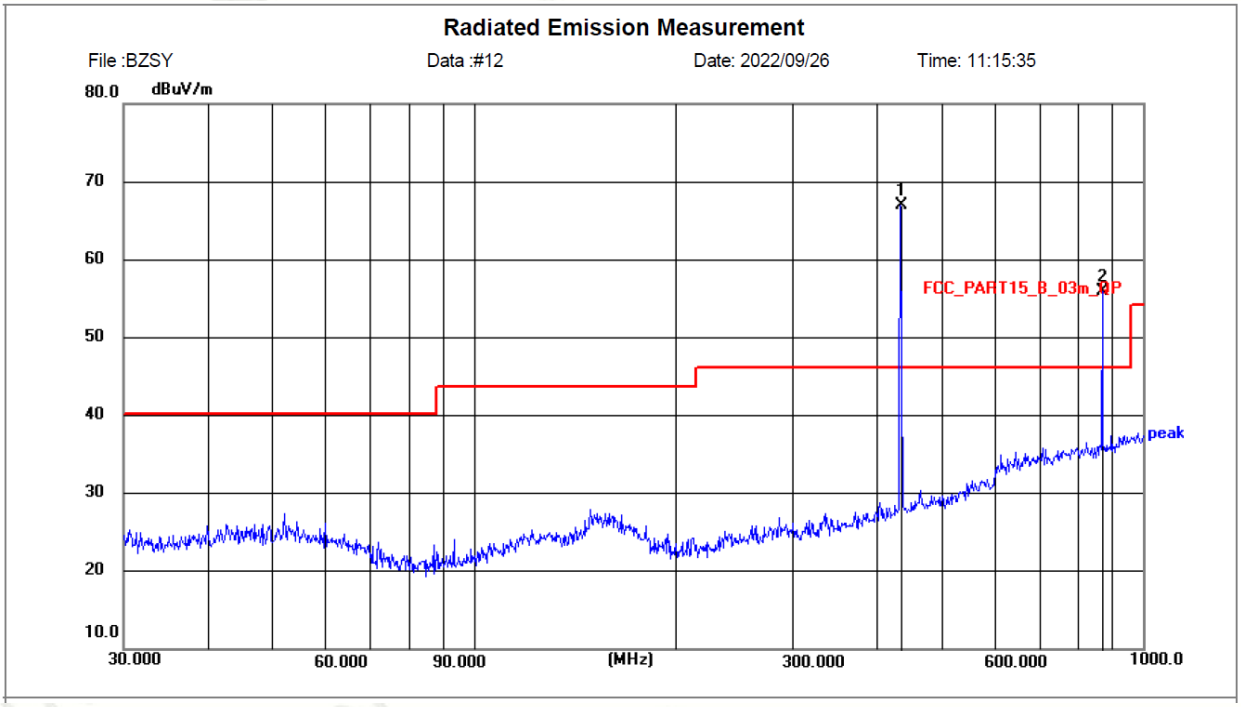
Temperature:	24℃	Relative Humidity:	49%
Test Date:	Sep. 26, 2022	Pressure:	1010hPa
Test Voltage:	DC 3V	Polarization:	Horizontal
Test Mode:	Normal work		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Remark
1	150.0108	11.98	16.00	27.98	43.50	-15.52	255	2.4	peak

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

Temperature:	24℃	Relative Humidity:	49%
Test Date:	Sep. 26, 2022	Pressure:	1010hPa
Test Voltage:	DC 3V	Polarization:	Vertical
Test Mode:	Normal work		



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

Test Results:

Frequency (MHz)	Reading (dBμV/m)	Factor Corr.	Average Factor	Result (dBμV/m)		Limit (dBμV/m)		Margin (dB)		Polarization
	PEAK	(dB)	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
433.92	57.9	17.65	-9.9	65.65	75.55	80.82	100.82	-15.17	-25.27	Horizontal
867.84	41.86	23.67	-9.9	55.63	65.53	60.82	80.82	-5.19	-15.29	
1301.76	71.26	-2	-9.9	59.36	69.26	60.82	80.82	-1.46	-11.56	
1735.68	64.12	-0.39	-9.9	53.83	63.73	60.82	80.82	-6.99	-17.09	
2169.6	55.39	1.76	-9.9	47.25	57.15	60.82	80.82	-13.57	-23.67	
2603.52	53.9	3.73	-9.9	47.73	57.63	60.82	80.82	-13.09	-23.19	
3037.44	53.72	5.53	-9.9	49.35	59.25	60.82	80.82	-11.47	-21.57	
3905.28	42.02	6.89	-9.9	39.01	48.91	60.82	80.82	-21.81	-31.91	
433.92	49.4	17.65	-9.9	57.15	67.05	80.82	100.82	-23.67	-33.77	Vertical
867.84	32.31	23.67	-9.9	46.08	55.98	60.82	80.82	-14.74	-24.84	
1301.76	63.82	-2	-9.9	51.92	61.82	60.82	80.82	-8.9	-19	
1735.68	69.39	-0.39	-9.9	59.1	69	60.82	80.82	-1.72	-11.82	
2169.6	50.51	1.76	-9.9	42.37	52.27	60.82	80.82	-18.45	-28.55	
2603.52	54.35	3.73	-9.9	48.18	58.08	60.82	80.82	-12.64	-22.74	
3037.44	49.67	5.53	-9.9	45.3	55.2	60.82	80.82	-15.52	-25.62	
3471.36	41.35	5.97	-9.9	37.42	47.32	60.82	80.82	-23.4	-33.5	
3905.28	41.36	6.89	-9.9	38.35	48.25	60.82	80.82	-22.47	-32.57	

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 perform a separate average measurement.

3.2 -20db OCCUPIED BANDWIDTH

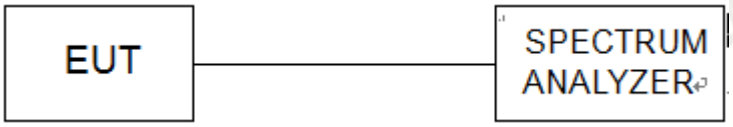
Limit

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.

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.

Test Configuration

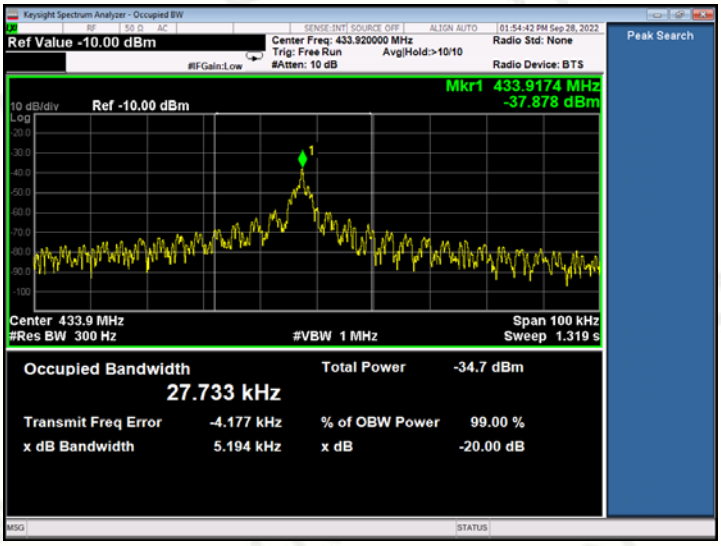


Test Result

---PASS---

Modulation	Channel Frequency (MHz)	20dB bandwidth (KHz)	Limit (KHz)	Result
ASK	433.92	5.194	0.25%*433910=1084.8	Pass

ASK Modulation



3.3 Deactivation Time

LIMIT

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

TEST PROCEDURE

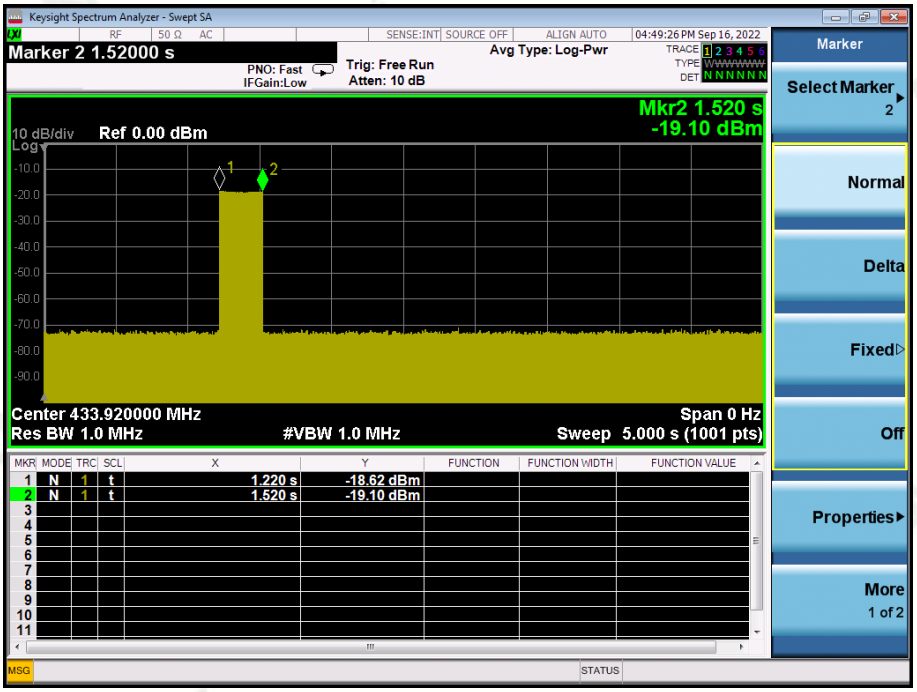
1. The EUT was placed on a wooded table which is 0.8m height and close to receiver antenna of spectrum analyzer.

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.

Test Configuration

TEST RESULTS

Frequency (MHz)	One transmission time (S)	Limit(S)	Result
433.92	1.52	5	Pass



3.4 CALCULATION OF AVERAGE FACTOR

According to ANSI C63.10-2013.

ANSI C63.10-2013 Section 7.5 Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 s (100 ms). In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval.64 The following procedure is an example of how the average value may be determined. The average field strength may be found by measuring the peak pulse amplitude (in log equivalent units) and determining the duty cycle correction factor (in dB) associated with the pulse modulation as shown in Equation (10):

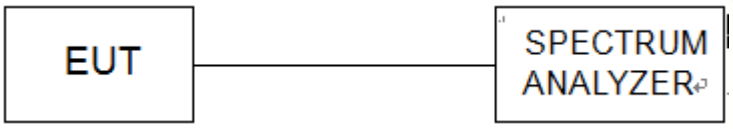
Average factor in dB = 20 log (duty cycle)

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---

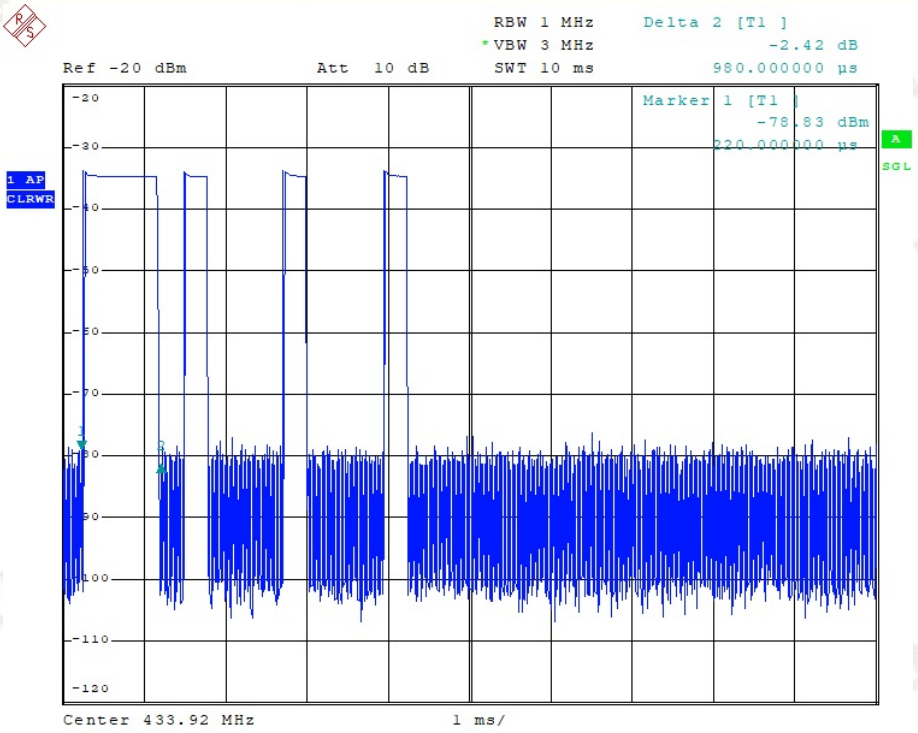
The duty cycle is simply the on time divided by the period:

Effective period of the cycle = (0.98*7+0.32*18)ms =12.62ms

DC = 12.62ms / 39.3ms =0.32

Therefore, the average factor is found by 20log0.32= -9.9dB

The spectral following.



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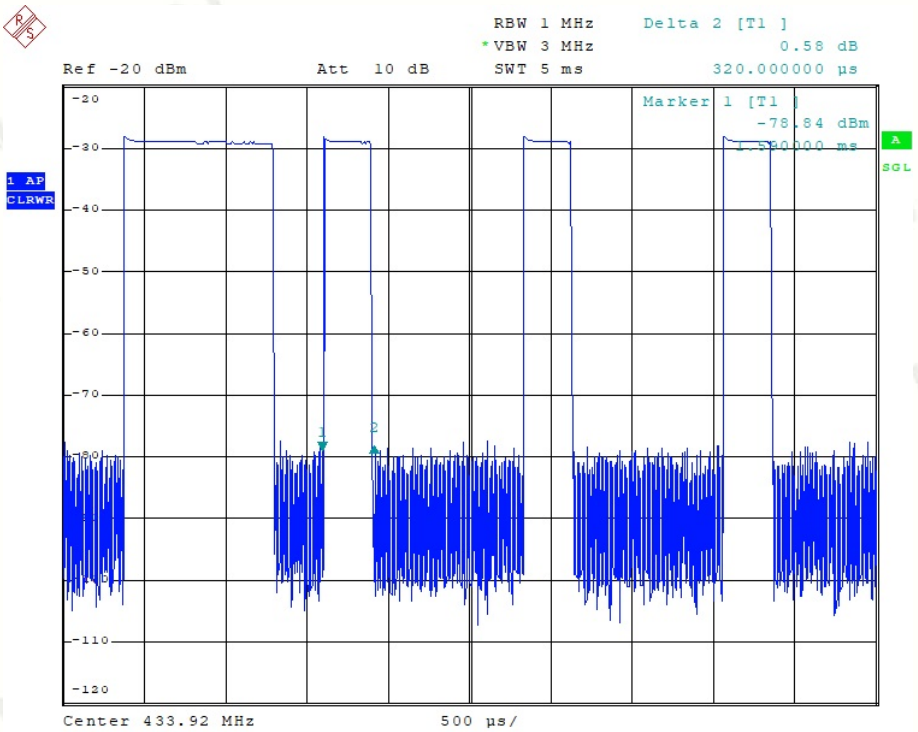

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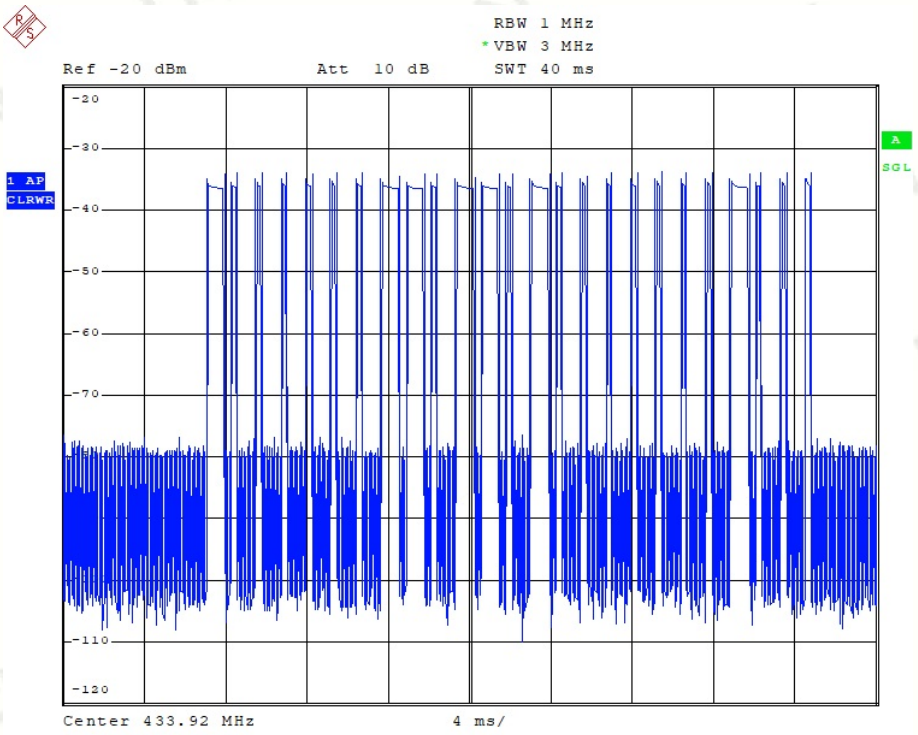

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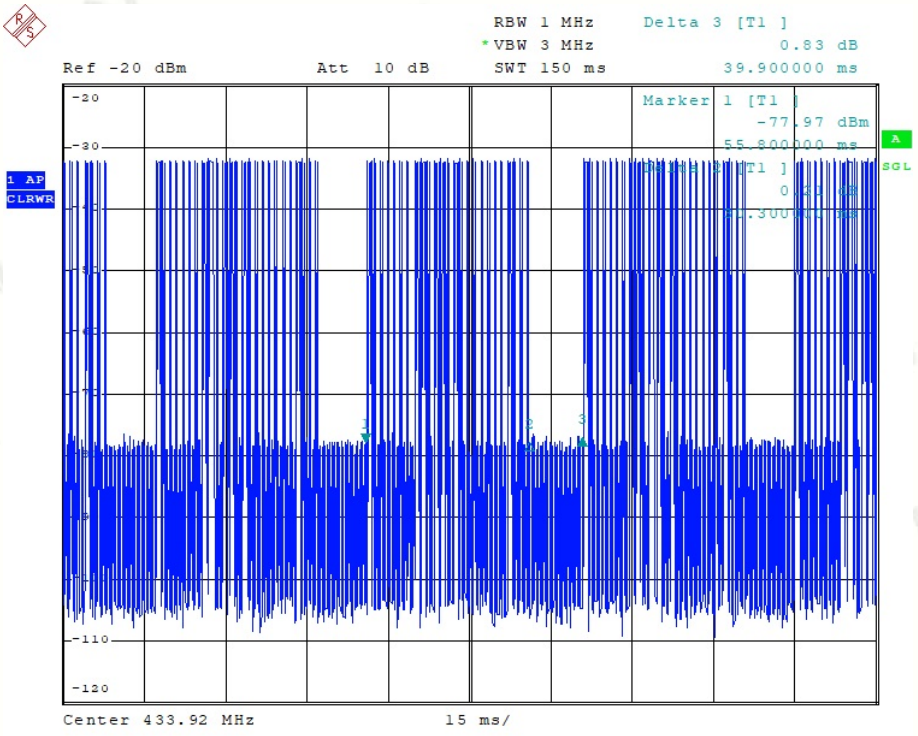

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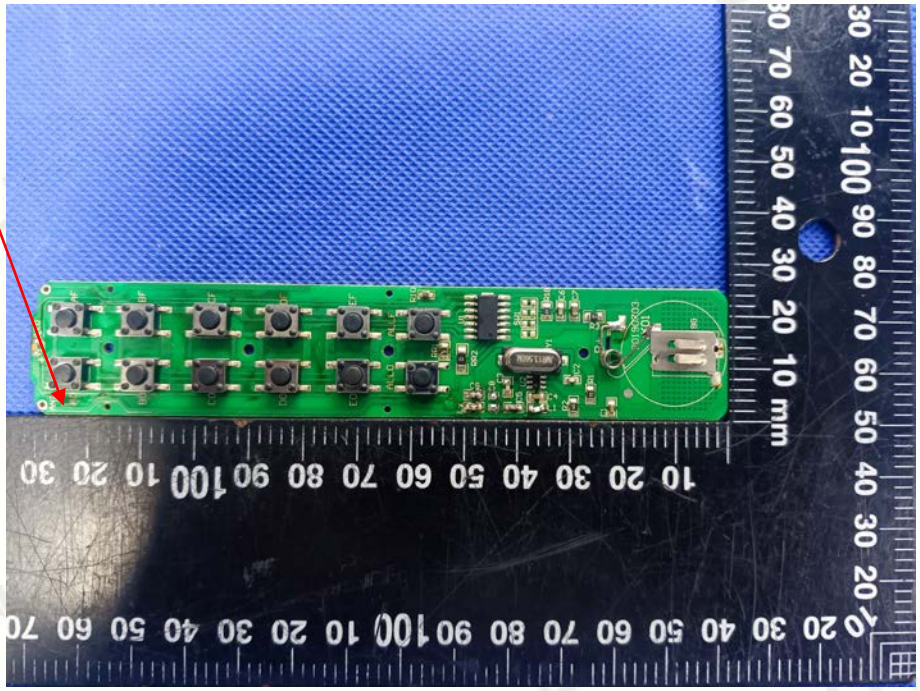
3.5 ANTENNA REQUIREMENT

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 Internal Antenna, the directional gains of antenna used for transmitting is 3dBi.It is permanently fixed and cannot be disassembled.

ANTENNA:



4 PHOTOGRAPH OF TEST

Radiated Emission

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