FCC TEST REPORT

Test report
On Behalf of
Shenzhen Valueplus2 Electronic Corp.,Ltd.
For
rangefinder
Model No.: Minimi,Mini,Mini Plus,Sniper,QQ,QQ800,QQ1000, QQ1500
FCC ID: 2AXLU-MINIMI

Prepared for :	**Shenzhen Valueplus2 Electronic Corp.,Ltd.** Room 12A, Building A, Zhongyu Green High Tech Industrial Park, Wenge Road, Gongming Street, Guangming New Area, Shenzhen, Guangdong, China
Prepared By :	**Shenzhen Tongzhou Testing Co.,Ltd** **1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen, China**
Date of Test:	**2020/8/20 ~ 2020/09/17**
Date of Report:	**2020/09/17**
Report Number:	**TZ200901626-E1**

The test report apply only to the specific sample(s) tested under stated test conditions
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

TEST RESULT CERTIFICATION

Applicant's name ..... :	**Shenzhen Valueplus2 Electronic Corp.,Ltd.**
Address ..... :	Room 12A, Building A, Zhongyu Green High Tech Industrial Park, Wenge Road, Gongming Street, Guangming New Area, Shenzhen, Guangdong, China
Manufacture's Name ..... :	**Shenzhen Valueplus2 Electronic Corp.,Ltd.**
Address ..... :	Room 12A, Building A, Zhongyu Green High Tech Industrial Park, Wenge Road, Gongming Street, Guangming New Area, Shenzhen, Guangdong, China

Product description

Trade Mark ..... :	Caddytalk
Product name ..... :	rangefinder
Model and/or type reference ..... :	Minimi,Mini,Mini Plus,Sniper,QQ,QQ800,QQ1000, QQ1500
Standards ..... :	**FCC Part 15.231**

Date of Test ..... :	
Date (s) of performance of tests ..... :	2020/8/20 ~ 2020/09/17
Date of Issue ..... :	2020/09/17
Test Result ..... :	**Pass**

Testing Engineer : Nancy Li

(Nancy Li)

Technical Manager : Hugo Chen

(Hugo Chen)

Authorized Signatory : Andy Zhang

(Andy Zhang)

Revision History

Revision	Issue Date	Revisions	Revised By
000	2020/9/17	Initial Issue	Andy Zhang

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.231:Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.
ANSI C63.10:2013 : American National Standard for Testing Unlicensed Wireless Devices

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Aug.20, 2020
Testing commenced on	:	Aug.20, 2020
Testing concluded on	:	Sep.01, 2020

2.2 Product Description

Product Name:	rangefinder
Model/Type reference:	Minimi
Testing sample ID：	TZ200901626-1#(Engineer sample) TZ200901626-2# (Normal sample)
Power supply:	DC3.0V from battery
Modulation:	ASK
Operation frequency:	433.925MHz
Channel number:	1
Antenna type:	Internal antenna
Antenna gain:	0 dBi

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

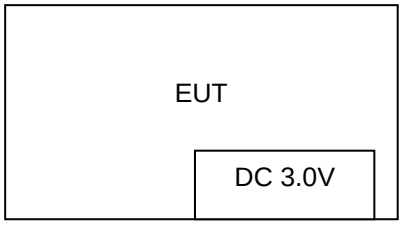
DC 3.0V from battery

2.4 Short description of the Equipment under Test (EUT)

This is a rangefinder.

For more details, refer to the user's manual of the EUT.

2.5 Block Diagram of Test Setup



2.6 Special Accessories

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Technical Parameters	Certificate	Provided by
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/

2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the device filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen Tongzhou Testing Co.,Ltd
1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen, China

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

3.2 Test Facility

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

Designation Number: CN1275
Test Firm Registration Number: 167722
A2LA Certificate Number:5463.01
The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010

3.3 Summary of measurement results

FCC and IC Requirements		
FCC Part 15.207	Conducted Emission	N/A
FCC Part 15.231(a)(2)	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

Remark: The measurement uncertainty is not included in the test result.

3.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Tongzhou Testing Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Tongzhou Testing Co.,Ltdis reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5 Operation of EUT During Testing

Operating Mode：
The mode is used:Transmitting mode
When press any Button, the EUT can achievea transmission.

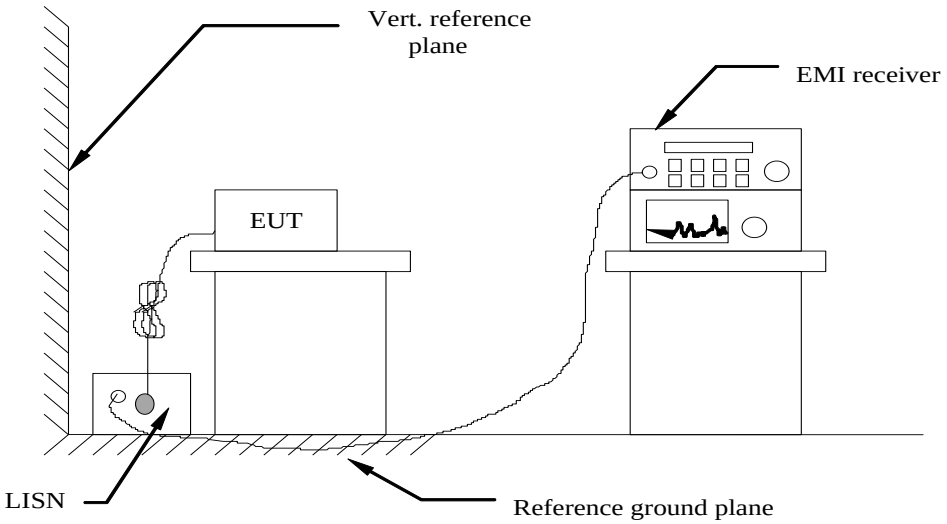
3.6 Equipments Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	MXA Signal Analyzer	Keysight	N9020A	MY52091623	2020/1/2	2021/1/1
2	Power Sensor	Agilent	U2021XA	MY5365004	2020/1/2	2021/1/1
3	Power Meter	Agilent	U2531A	TW53323507	2020/1/2	2021/1/1
4	Wideband Antenna	schwarzbeck	VULB 9163	958	2019/11/16	2022/11/15
5	Horn Antenna	schwarzbeck	9120D-1141	1574	2019/11/16	2022/11/15
6	EMI Test Receiver	R&S	ESCI	100849/003	2020/1/2	2021/1/1
7	Controller	MF	MF7802	N/A	N/A	N/A
8	Amplifier	schwarzbeck	BBV 9743	209	2020/1/2	2021/1/1
9	Amplifier	Tonscend	TSAMP-0518SE	--	2020/1/2	2021/1/1
10	RF Cable(below 1GHz)	HUBER+SUHNER	RG214	N/A	2020/1/2	2021/1/1
11	RF Cable(above 1GHz)	HUBER+SUHNER	RG214	N/A	2020/1/2	2021/1/1
12	Artificial Mains	ROHDE & SCHWARZ	ENV 216	101333-IP	2020/1/2	2021/1/1
12	EMI Test Software	ROHDE & SCHWARZ	ESK1	V1.71	N/A	N/A
14	RE test software	Tonscend	JS32-RE	V2.0.2.0	N/A	N/A
15	Test Software	Tonscend	JS1120-3	V2.5.77.0418	N/A	N/A
16	Horn Antenna	A-INFO	LB-180400-KF	J211020657	2019/11/16	2020/11/15
17	Amplifier	SKET	LNPA_1840-50	SK2018101801	2019/10/22	2020/10/21
18	Spectrum Analyzer	R&S	FSV40	100020	2019/10/22	2020/10/21

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2 Support equipment, if needed, was placed as per ANSI C63.10-2013
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4 The EUT received DC 12V power from adapter, the adapter received AC120V/60Hz and AC 240V/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.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

TEST RESULTS

Not applicabe, the device is powered by battery.

4.2 Radiated Emission

Limit

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

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

In addition to the provisions of 15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

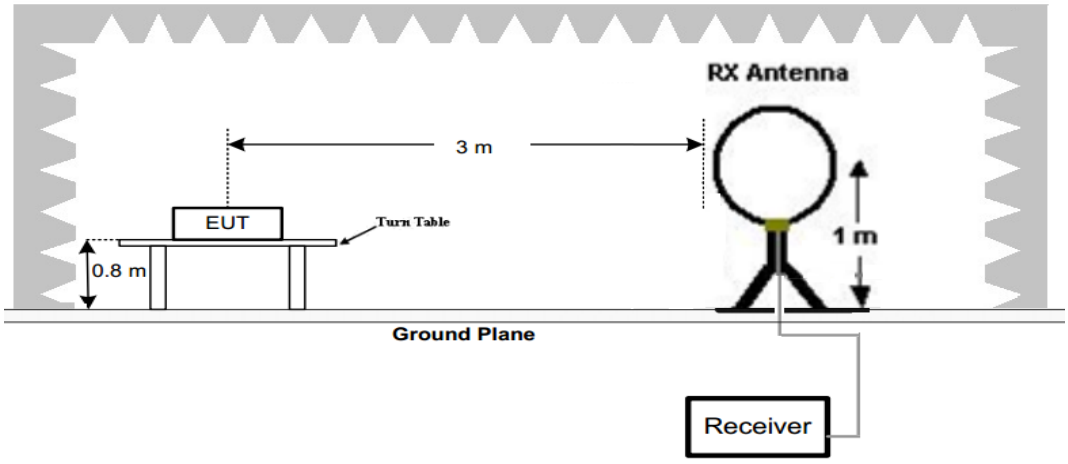
Funda-mental fre-quency (MHz)	Field strength of funda-mental (microvolts/ meter)	Field strength of spurious emissions (microvolts/meter)
40.66–40.70.	2,250	225
70–130	1,250	125
130–174	[1] 1,250 to 3,750	[1] 125 to 375
174–260	3,750	375
260–470	[1] 3,750 to 12,500	[1] 375 to 1,250
Above 470	12,500	1,250

[1] Linear interpolations.

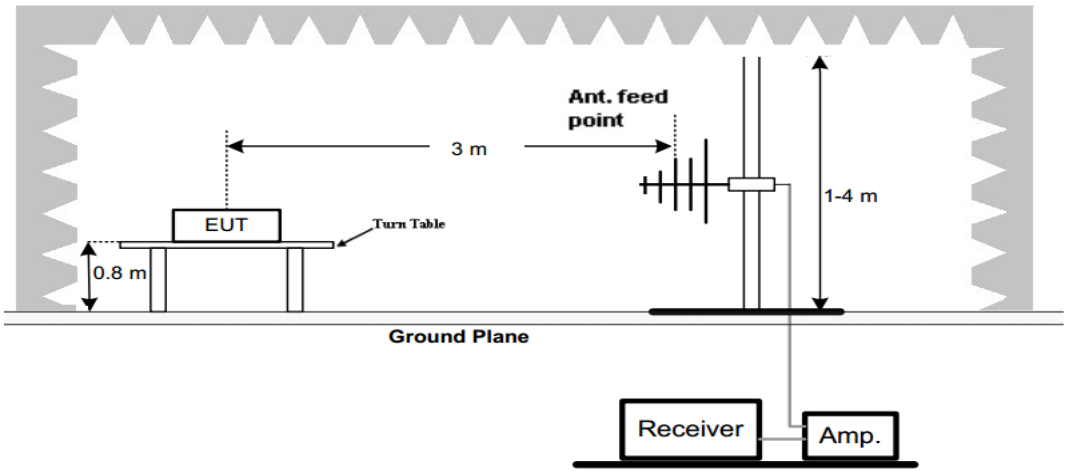
[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 260-470 MHz, 20*log(41.6667*433.925-7083.3333)=80.83dBuV/m The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

TEST CONFIGURATION

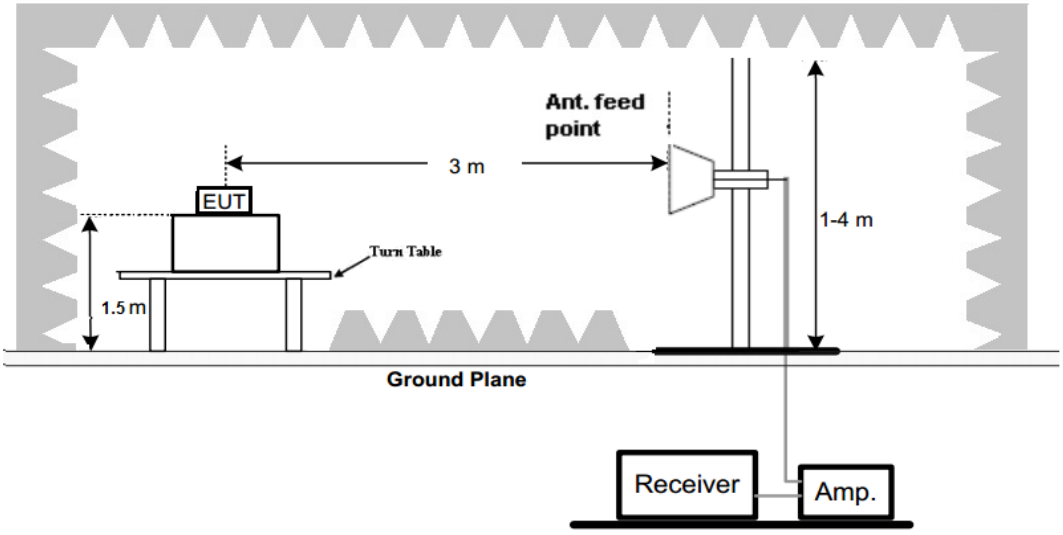
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

TEST RESULTS

Temperature	22.5℃	Humidty	56%
Test Engineer	Anna Hu	Configurations	433.925MHz

The emissions from 30MHz to 5GHz are measured peak and average level, below 1 GHz measured QP level, detailed test data please see below. Besides, we tested 3 directions and recorded the worst data.

Emission Styles	Frequency (MHz)	Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Direction (H/V)
Fundamental	433.925	69.42	100.83	31.41	PK	H
Spurious	468.12	42.73	46.00	3.27	PK	H
Harmonics	867.85	54.29	80.83	26.54	PK	H
Harmonics	1301.78	53.29	74.00	20.71	PK	H
--	--	--	--	--	--	--
Fundamental	433.925	52.85	100.83	47.98	PK	V
Spurious	468.12	42.75	46.00	3.25	PK	V
Harmonics	867.85	56.52	80.83	24.31	PK	V
Harmonics	1301.78	54.24	74.00	19.76	PK	V
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Emission Styles	Frequency (MHz)	PK Level (dBuV/m)	AV Factor (dB/m)	AV Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Direction (H/V)
Fundamental	433.925	69.42	-10.43	58.99	80.83	21.84	H
Harmonics	867.85	54.29	-10.43	43.86	60.83	16.97	H
Harmonics	1301.78	53.29	-10.43	42.86	54.00	11.14	H
--	--	--	--	--	--	--	--
Fundamental	433.925	52.85	-10.43	42.42	80.83	38.41	V
Harmonics	867.85	56.52	-10.43	46.09	60.83	14.74	V
Harmonics	1301.78	54.24	-10.43	43.81	54.00	10.19	V
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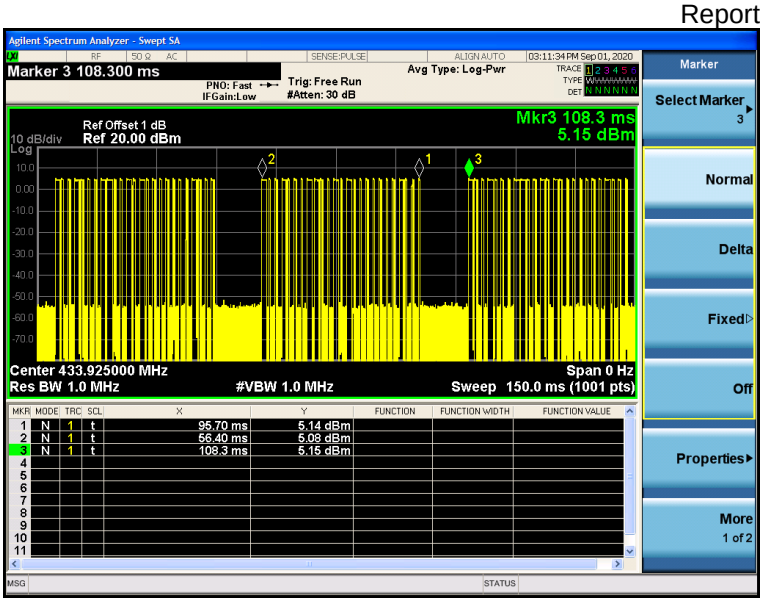
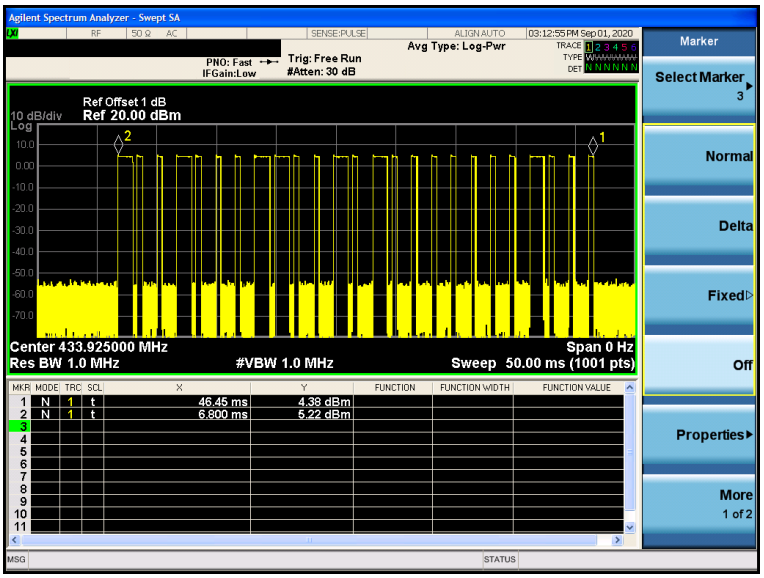
Note:

1. AV Level (dBuV/m)= PK Level (dBuV/m)+ AV Factor(dB)
2. In a transmit cycle 51.90ms period found burst 25pcs, the Duty Cycle can calculate as below:
   Duty Cycle= (1.20*7+0.40*18)/51.90=(8.40+27.20)/51.90=0.301
   AV Factor=20*log(Duty Cycle)=20*log(0.301)=-10.43

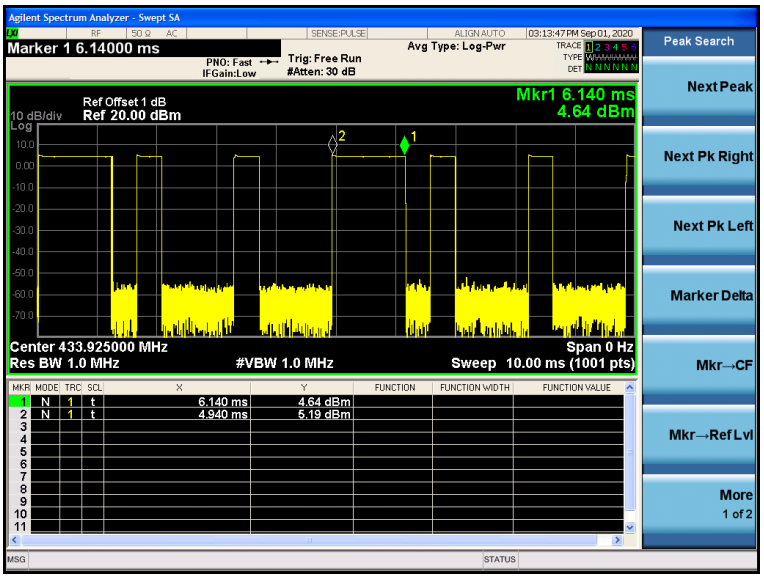
(The plot of Duty Cycle See the follow page)



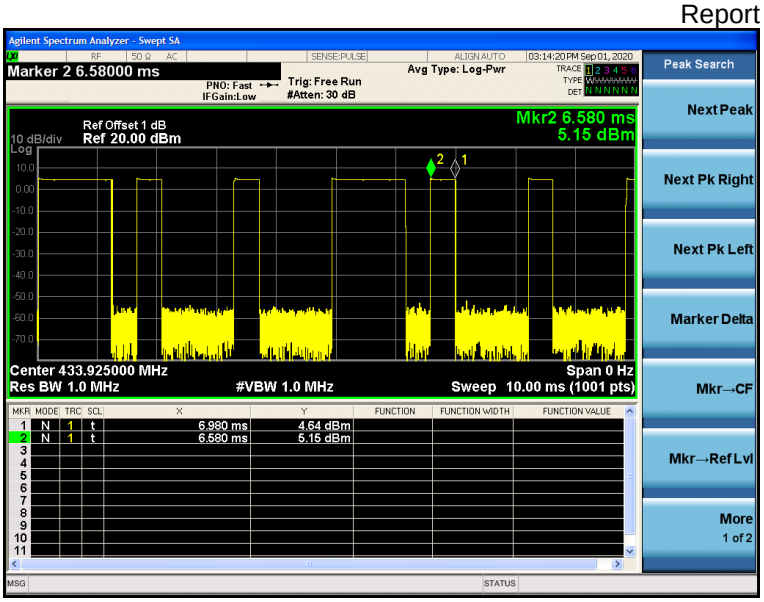
(Transmit cycle 51.90ms)



(Total Bursts in a transmit cycle 25pcs)



(Time per burst: 1.20ms*7pcs)



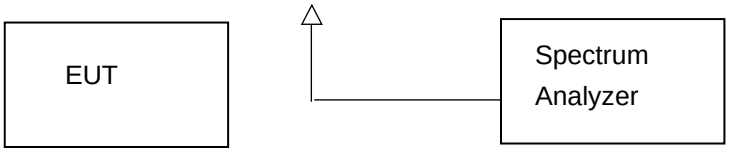
(Time per burst: 0.400ms*18pcs)

4.3 20dB 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 Configuration



Test Procedure

The 20dB bandwidth and 99% bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

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

The occupied bandwidth (OBW), that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

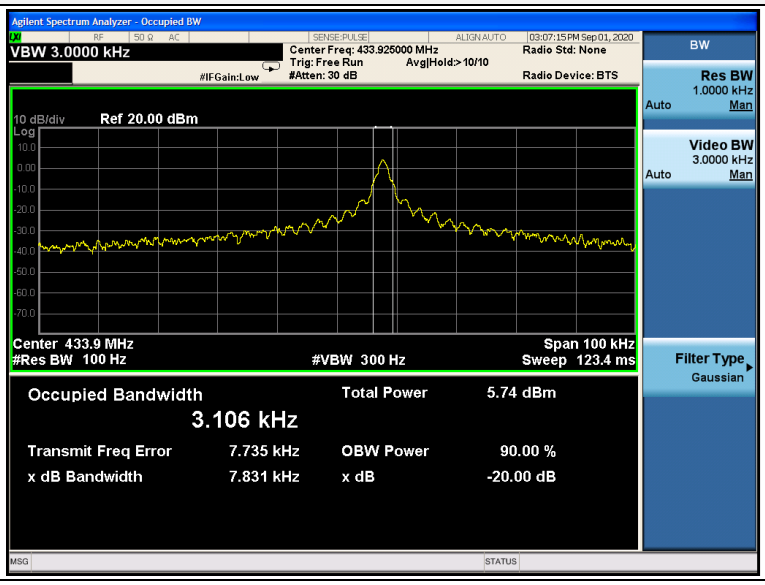
Test Results

Temperature	22.5℃	Humidty	56%
Test Engineer	Anna Hu	Configurations	433.925MHz

Modulation	Channel Frequency (MHz)	99% OBW (KHz)	20dB bandwidth (KHz)	Limit (KHz)	Result
ASK	433.925	3.106	7.831	0.25*433.925=108.48	Pass

Test plot as follows:

ASK Modulation

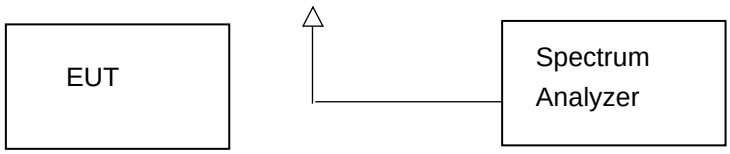


4.4 Deactivation Time

Limit

According to FCC §15.231(a)(2), A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test Configuration



Test Procedure

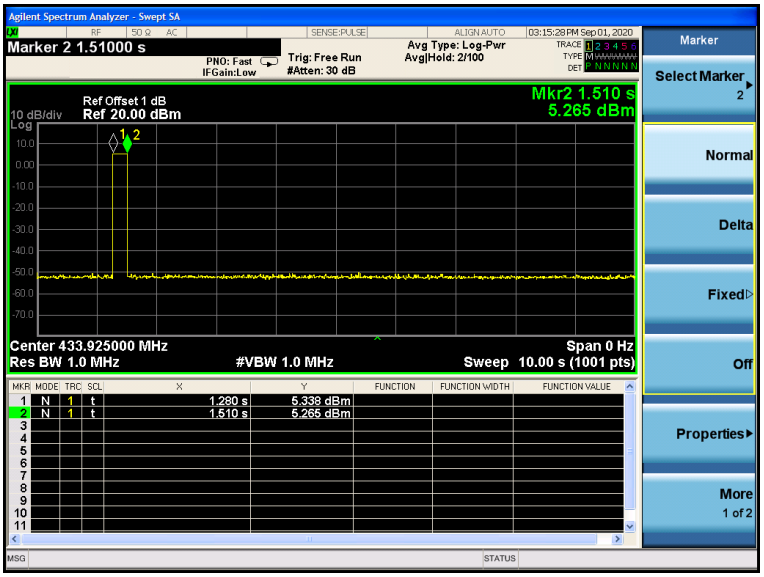
1. The EUT was placed on a wooded table which is 0.8m height and close to receiver antenna of spectrum analyzer.
2. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was set to 1 MHz to encompass all significant spectral components during the test. The spectrum analyzer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

TEST RESULTS

Temperature	22.5℃	Humidty	56%
Test Engineer	Anna Hu	Configurations	433.925MHz

Note: The transmitter was automatically activated, and the carrier frequency 433.925MHz:

Frequency (MHz)	One transmission time (S)	Limit(S)	Result
433.925	0.230	5	Pass



4.5 Antenna Requirement

Standard Applicable

According to FCC Part 15C 15.203

a) An intentional radiator shall be de-signed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

b) The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

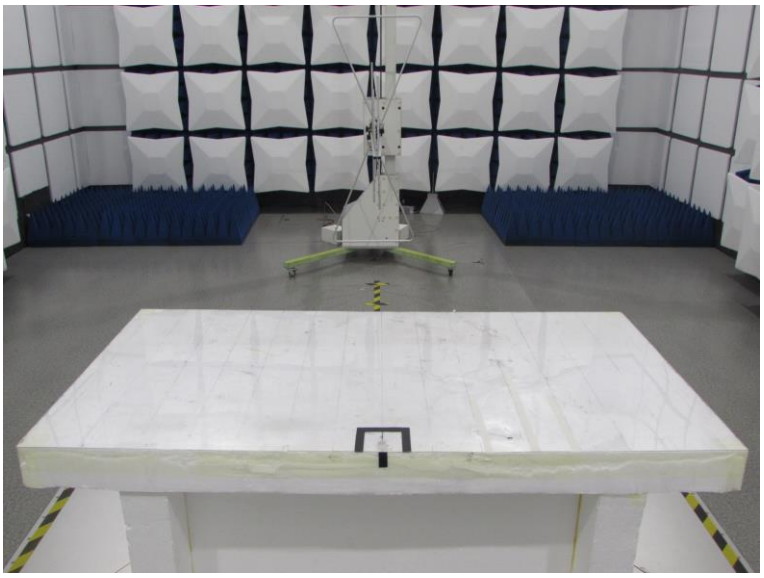
Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

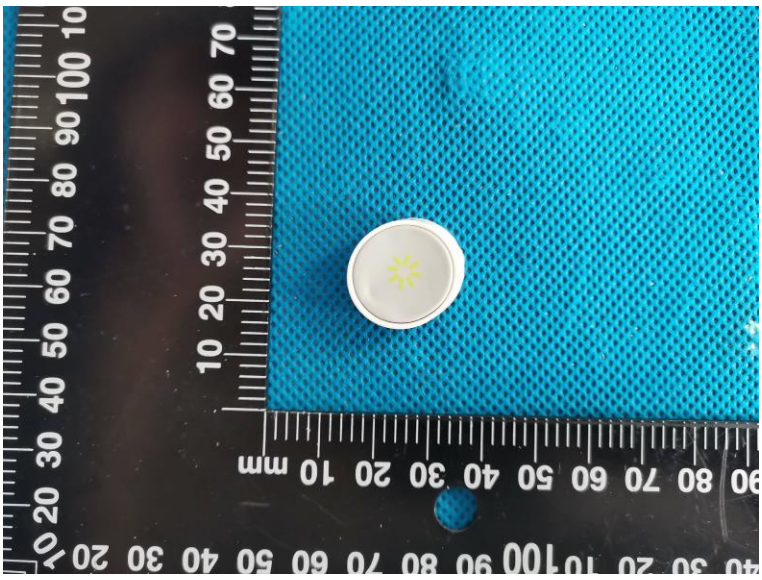
Antenna Connected Construction

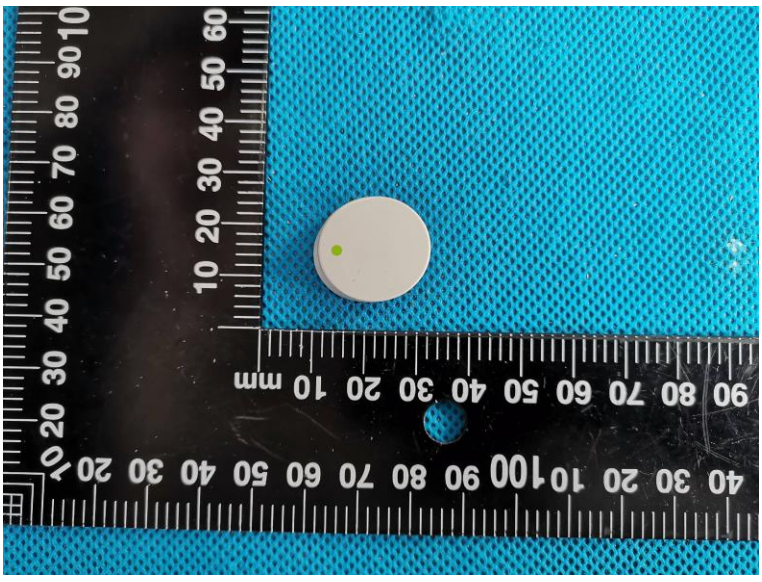
The antenna used in this product is an Internal Antenna, The directional gains of antenna used for transmitting is 0 dBi.

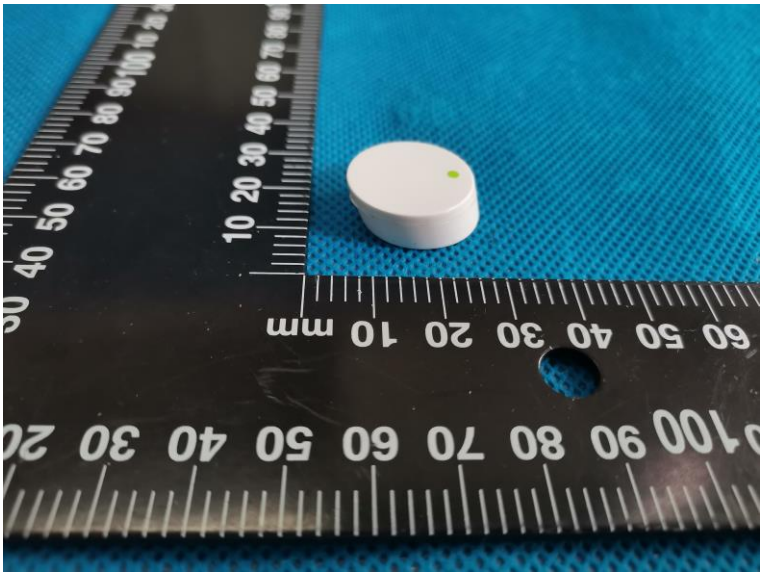
5 Test Setup Photos of the EUT

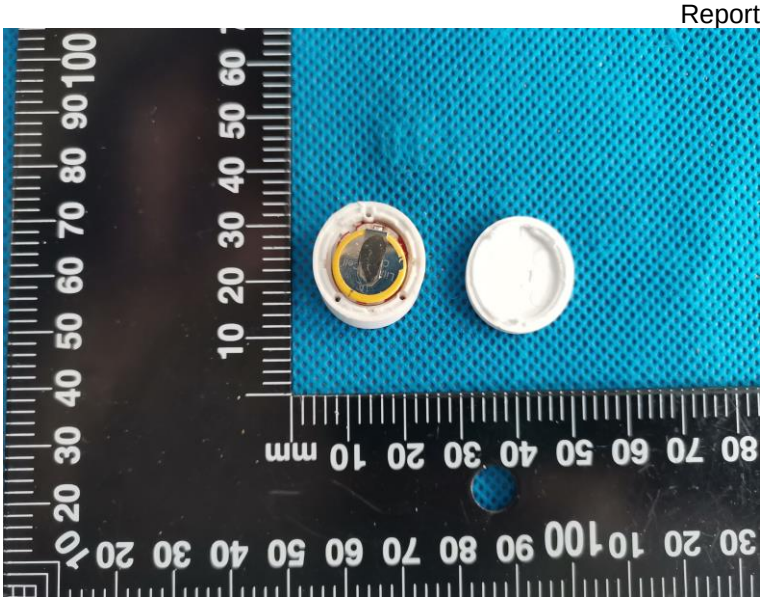


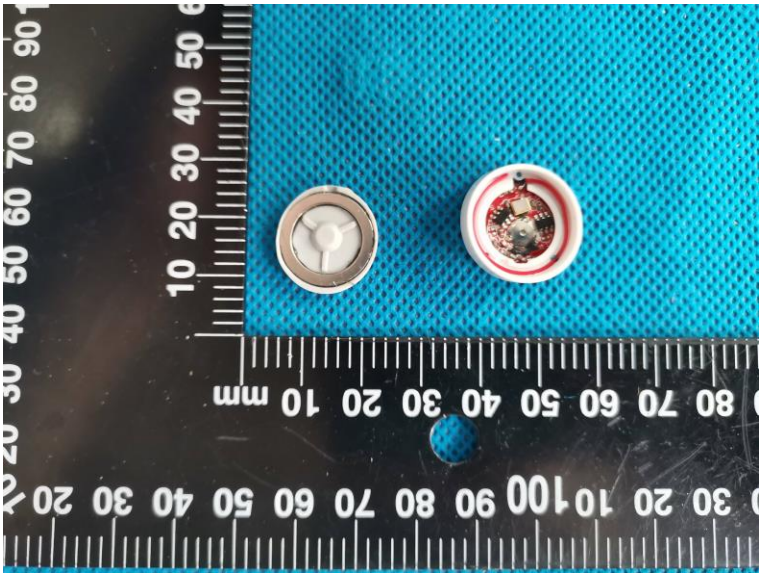
6 Photos of the EUT

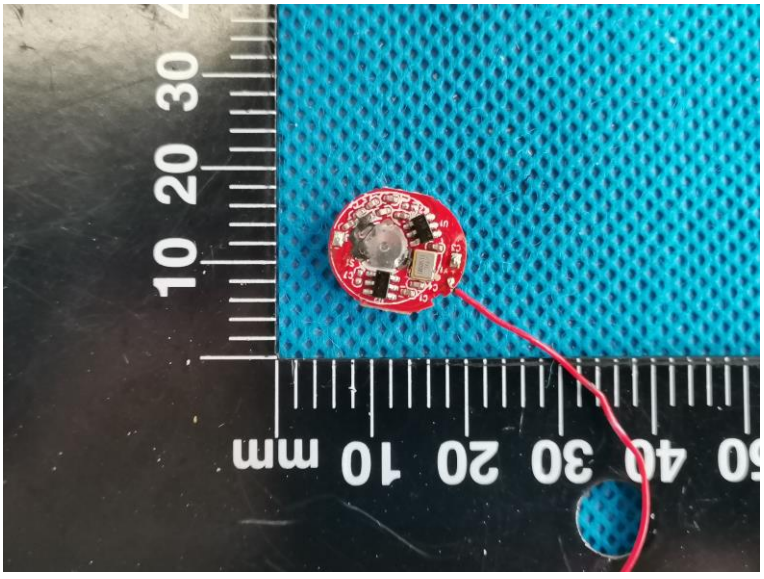


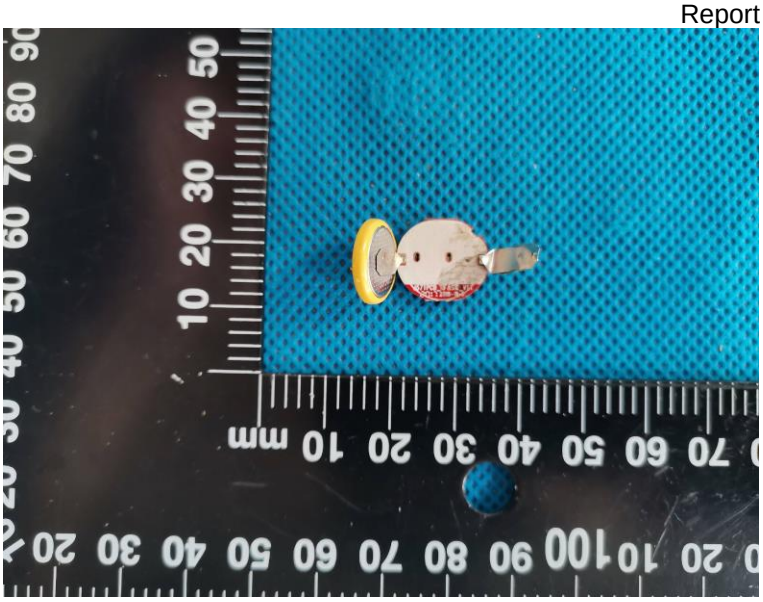












********** End of Report **********