FCC TEST REPORT

For

Elexa Consumer Products Inc.

Guardian Leak Detector

Model No.: GLD1v2

Prepared For	:	Elexa Consumer Products Inc.
Address	:	2275 Half Day Road, Suite 333, Bannockburn, Illinois, United States 60015
Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
Address	:	1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102 Tel: (86) 755-26066440 Fax: (86) 755-26014772
Report Number	:	SZAWW180913006-01
Date of Receipt	:	Sept. 13, 2018
Date of Test	:	Sept. 13~Oct. 15, 2018
Date of Report	:	Oct. 15, 2018

Contents

TEST REPORT

Applicant	:	Elexa Consumer Products Inc.
Manufacturer	:	Zmartgears Limited
Product Name	:	Guardian Leak Detector
Model No.	:	GLD1v2
Trade Mark	:	Guardian
Rating(s)	:	DC 3.6V

Test Standard(s)	:	**FCC Part15 Subpart C, Paragraph 15.249**
Test Method(s)	:	**ANSI C63.10: 2013**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test: Sept. 13~Oct. 15, 2018

Prepared by: (Engineer / Oliay Yang)

Reviewer: (Supervisor / Snowy Meng)

Approved & Authorized Signer: (Manager / Sally Zhang)

1. General Information

1.1. Client Information

Applicant	:	Elexa Consumer Products Inc.
Address	:	2275 Half Day Road, Suite 333, Bannockburn, Illinois, United States 60015
Manufacturer	:	Zmartgears Limited
Address	:	4/F, Building A3, Digital Tech Park Gaoxin South 7th Rd, Science Park, Nanshan District, SZ 518057, GD, CN
Factory	:	Zmartgears Limited
Address	:	4/F, Building A3, Digital Tech Park Gaoxin South 7th Rd, Science Park, Nanshan District, SZ 518057, GD, CN

1.2. Description of Device (EUT)

Product Name	:	Guardian Leak Detector	
Model No.	:	GLD1v2	
Trade Mark	:	Guardian	
Test Power Supply	:	DC 3.6V battery inside	
Test Sample No.	:	S1(Normal Sample), S2(Engineering Sample)	
Product Description	:	Operation Frequency:	915MHz
		Modulation Type:	LoRa/FSK
		Antenna Type:	Monopole Antenna
		Antenna Gain(Peak):	0 dBi
Remark: 1)For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.			

1.3. Auxiliary Equipment Used During Test

N/A		

1.4. Description of Test Modes

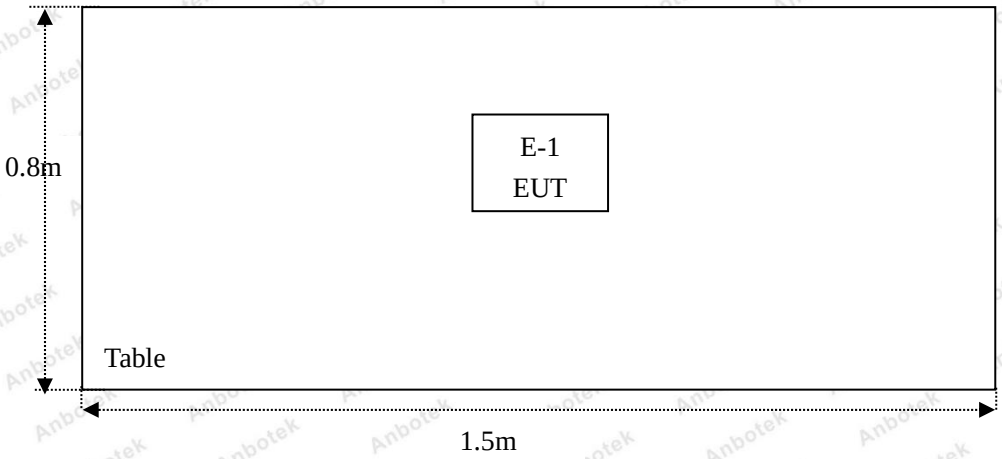
To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration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

Pretest Mode	Description
Mode 1	CH01

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH01

1.5. Description of Test Setup

RE



1.6. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 17, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 17, 2017	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 17, 2017	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	Nov. 17, 2017	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 18, 2017	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Nov. 17, 2017	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 20, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 20, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	HFH2-Z2	100047	Nov. 17, 2017	1 Year
10.	Horn Antenna	Schewarzbeck	BBHA9170	9170-375	Nov. 17, 2017	1 Year
11.	Pre-amplifier	SONOMA	310N	186860	Nov. 17, 2017	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Nov. 18, 2017	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Nov. 17, 2017	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Nov. 17, 2017	1 Year
16.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 18, 2017	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Nov. 18, 2017	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Nov. 18, 2017	1 Year
19.	DC Power Supply	LW	TPR-6410D	349315	Nov. 01, 2017	1 Year
20.	Constant Temperature Humidity Chamber	Sertep	ZJ-HWHS80B	ZJ-17042804	Nov. 01, 2017	1 Year

1.7. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

2. Summary of Test Results

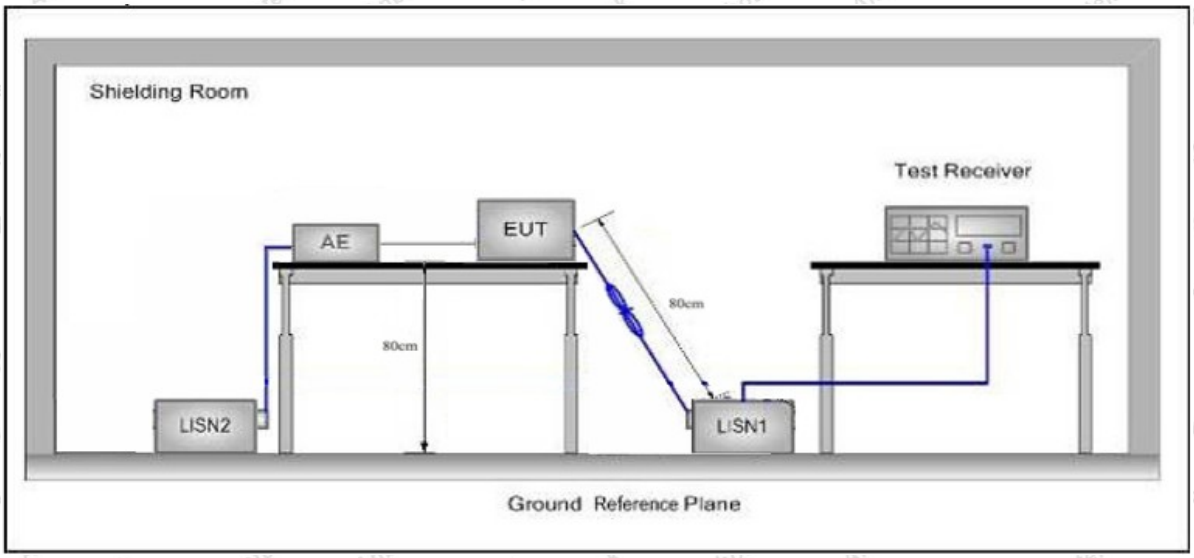
Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	N/A
15.249	Spurious Emission	PASS
15.215(c)	20dB Bandwidth	PASS
15.249(c)	Band Edge	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50
Remark: (1) *Decreasing linearly with logarithm of the frequency. (2) The lower limit shall apply at the transition frequency.			

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

There is DC 3.6V battery inside, So there is no need to test.

4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209 and 15.205				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3
Remark: (1)The lower limit shall apply at the transition frequency. (2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.					

Test Standard	FCC Part15 C Section 15.249					
Test Limit	Fundamental frequency (MHz)	Field Strength	Limit (microvolts/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	902~928	Fundamental	50	94.0	Quasi-peak	3
		Harmonics	500	74.0	Average	3
			-	94.0	Peak	3
Remark: (1) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.						

4.2. Test Setup

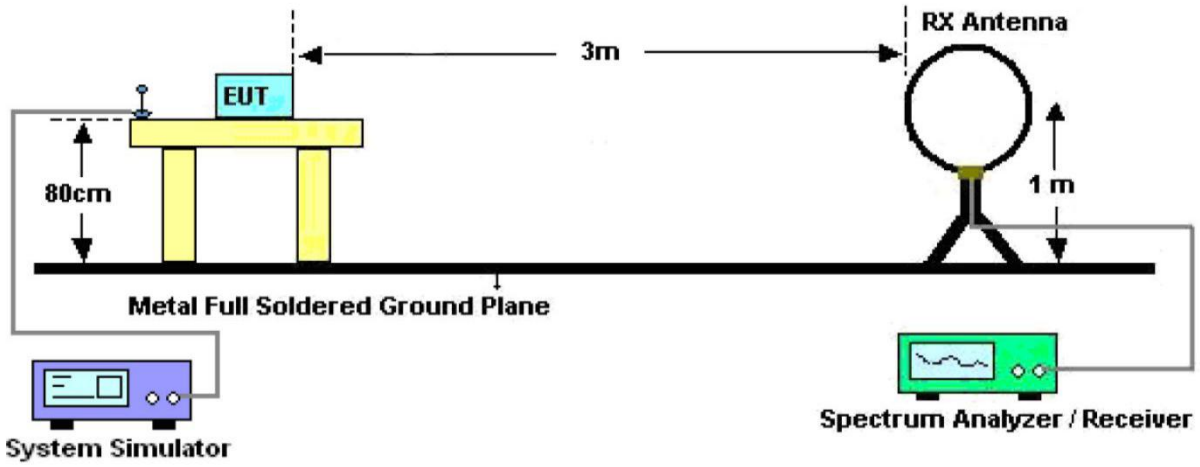


Figure 1. Below 30MHz

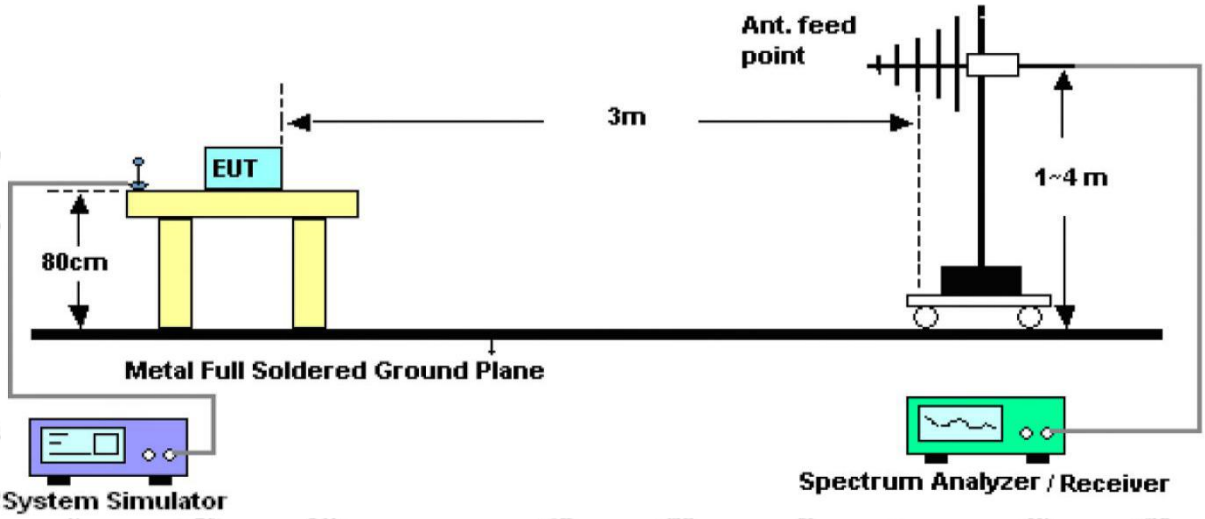


Figure 2. 30MHz to 1GHz

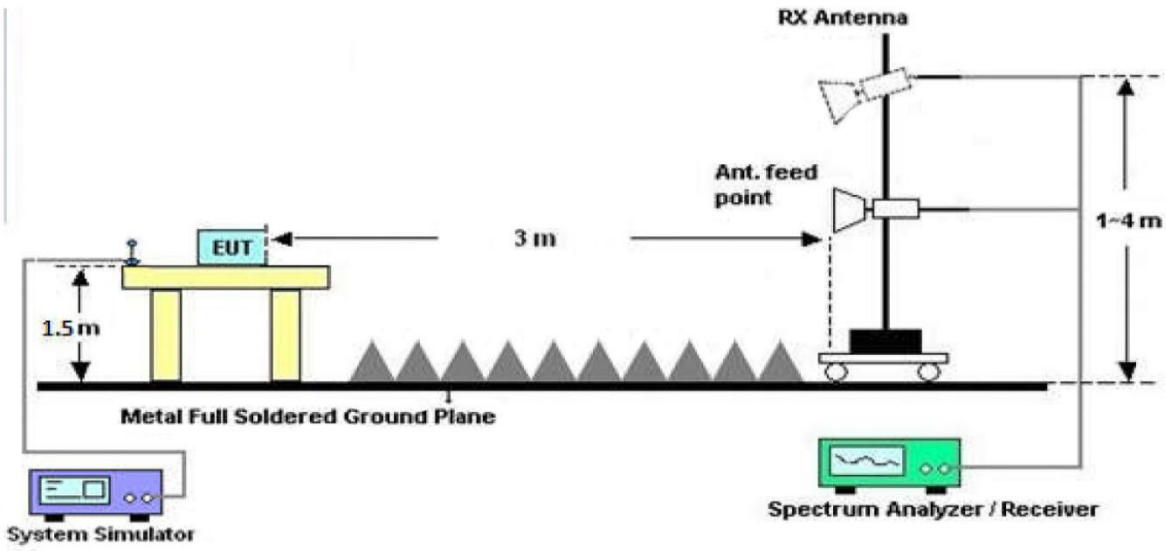


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.
For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.
The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

For 9kHz to 150kHz, Set the spectrum analyzer as:
RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:
RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:
RBW = 120KHz, VBW =300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz,Set the spectrum analyzer as:
RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.
RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

4.4. Test Data

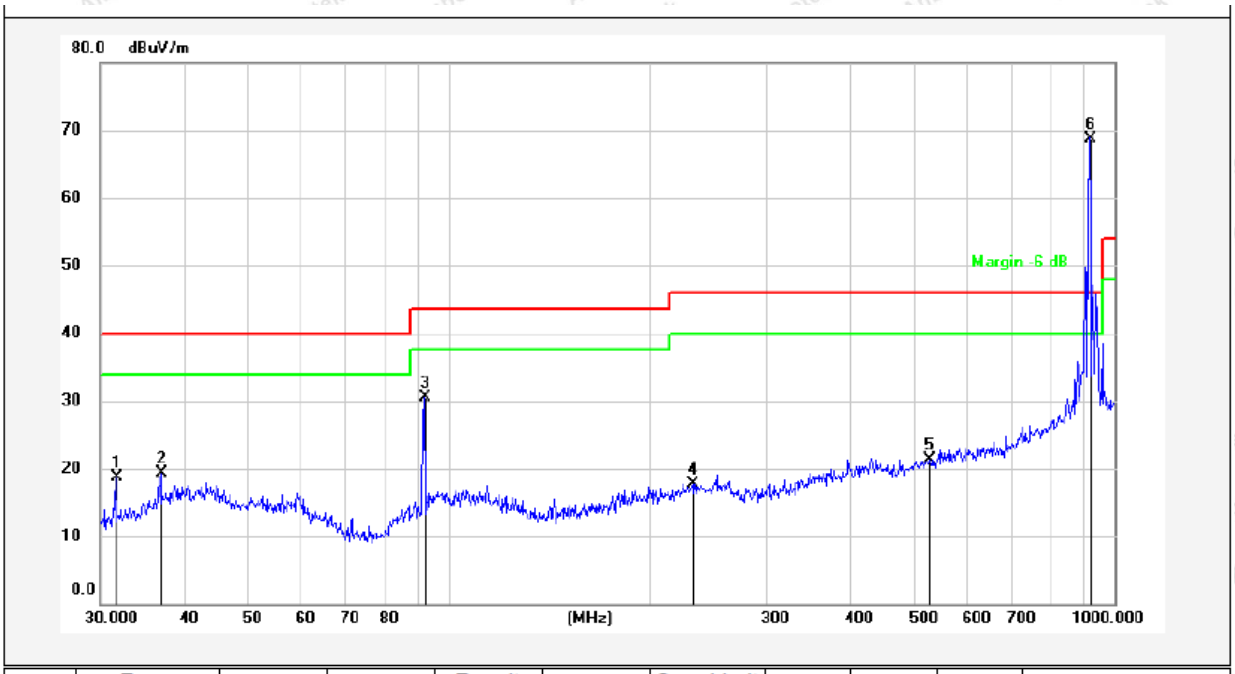
PASS

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

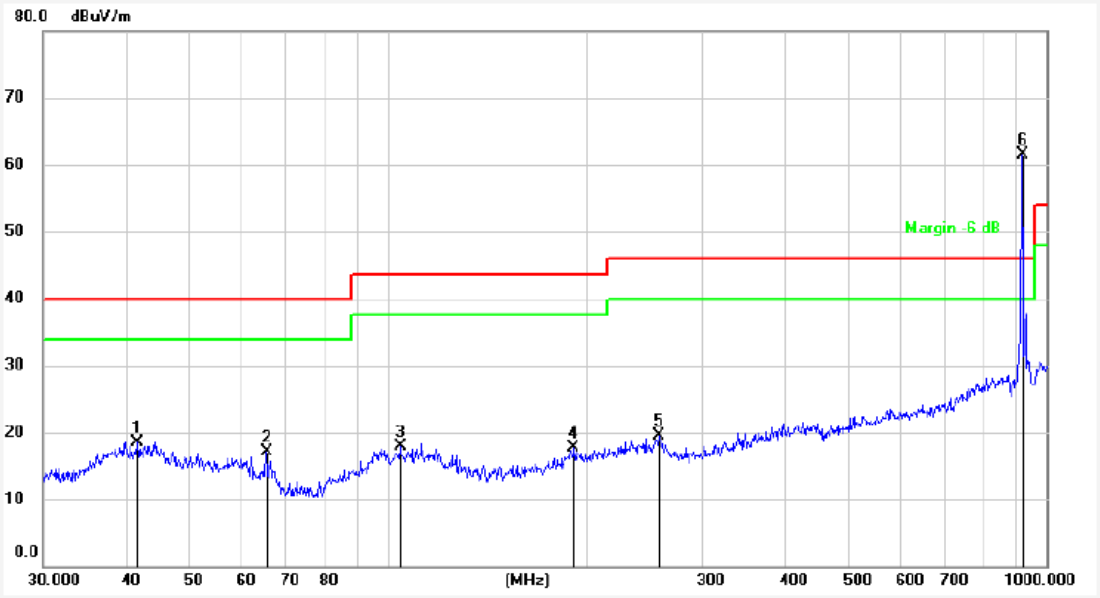
Test Results (30~1000MHz)

Job No.:	SZAWW180913006-01	Temp.(℃)/Hum.(%RH):	23.9℃/56%RH
Standard:	FCC PART 15C	Power Source:	DC 3.6V battery inside
Test Mode:	CH01	Polarization:	Horizontal



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	31.6202	36.83	-18.08	18.75	40.00	-21.25	QP	300	0	
2	37.0248	35.27	-15.98	19.29	40.00	-20.71	QP	300	97	
3	91.8163	52.99	-22.54	30.45	43.50	-13.05	QP	300	128	
4	232.5318	35.82	-18.18	17.64	46.00	-28.36	QP	300	245	
5	528.2458	32.27	-11.04	21.23	46.00	-24.77	QP	300	298	
6	916.0687	73.23	-4.52	68.71	94.00	-25.29	QP	300	364	

Job No.:	SZAWW180913006-01	Temp.(℃)/Hum.(%RH):	23.9℃/56%RH
Standard:	FCC PART 15C	Power Source:	DC 3.6V battery inside
Test Mode:	CH01	Polarization:	Vertical



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	41.7129	32.26	-13.70	18.56	40.00	-21.44	QP	100	0	
2	65.3432	35.04	-18.00	17.04	40.00	-22.96	QP	100	97	
3	104.5361	32.52	-14.69	17.83	43.50	-25.67	QP	100	186	
4	191.7450	32.60	-14.92	17.68	43.50	-25.82	QP	100	214	
5	258.3264	33.02	-13.59	19.43	46.00	-26.57	QP	100	327	
6	916.0687	64.99	-3.52	61.47	94.00	-32.53	QP	100	360	

Harmonics Emissions

Frequency	Antenna	Reading	Cable Loss	Ant Factor	Amplifier	Level	Limits	Margin	Det.
(MHz)	Pol.	(dBuV/m)	(dB)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Mode
1830.9000	H	50.03	7.39	28.73	26.31	59.84	74	-14.16	PK
1830.9000	H	39.8	7.39	28.73	26.31	49.61	54	-4.39	AV
2746.6000	H	47.68	8.10	29.71	27.01	58.48	74	-15.52	PK
2746.6000	H	37.37	8.10	29.71	27.01	48.17	54	-5.83	AV
3662.2000	H	--	--	--	--	--	--	--	PK
3662.2000	H	--	--	--	--	--	--	--	AV
1830.9000	V	45.67	7.39	28.73	26.31	55.48	74	-18.52	PK
1830.9000	V	38.83	7.39	28.73	26.31	48.64	54	-5.36	AV
2746.6000	V	45.37	8.10	29.71	27.01	56.17	74	-17.83	PK
2746.6000	V	37.81	8.10	29.71	27.01	48.61	54	-5.39	AV
3662.2000	V	--	--	--	--	--	--	--	PK
3662.2000	V	--	--	--	--	--	--	--	AV

Remark:

1. Level = Reading + Cable Loss+Ant Factor-Amplifier
2. " -- " Mark indicated Background Noise Level

Radiated Band Edge:

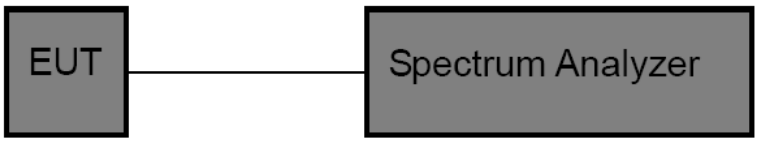
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Det.
902.0000	40.24	22.45	4.48	31.33	35.84	46.00	-10.16	H	QP
928.0000	41.06	22.59	4.54	31.35	36.84	46.00	-9.16	H	QP
902.0000	43.14	22.45	4.48	31.33	38.74	46.00	-7.26	V	QP
928.0000	43.06	22.59	4.54	31.35	38.84	46.00	-7.16	V	QP

5. 20dB Bandwidth Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.249

5.2. Test Setup



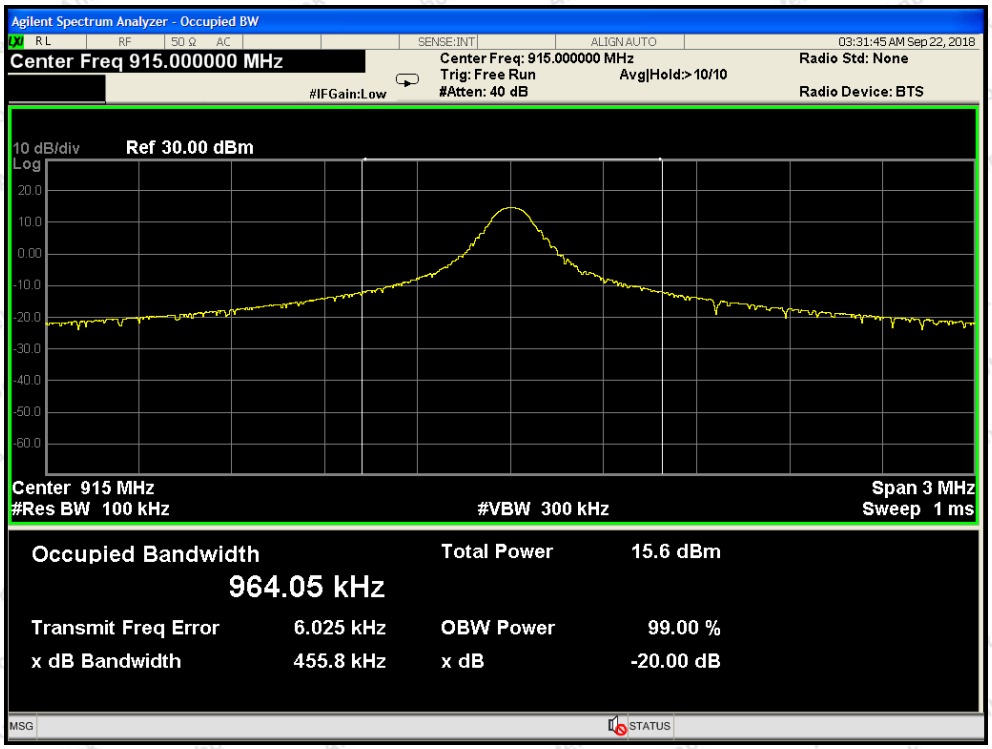
5.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
   RBW = 100kHz, VBW≥3*RBW =300kHz,
   Detector= peak
   Trace mode= Max hold.
   Sweep- auto couple.
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

5.4. Test Data

Test Item	:	20dB Bandwidth	Test Mode	:	TX Mode
Test Voltage	:	DC 3.6V battery inside	Temperature	:	24℃
Test Result	:	PASS	Humidity	:	55%RH

Frequency (MHz)	Bandwidth (kHz)	Result
915	455.8	PASS


Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:31:45 AM Sep 22, 2018
Center Freq 915.000000 MHz
Center Freq: 915.000000 MHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 40 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Center 915 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
Occupied Bandwidth
964.05 kHz
Total Power
15.6 dBm
Transmit Freq Error
6.025 kHz
OBW Power
99.00 %
x dB Bandwidth
455.8 kHz
x dB
-20.00 dB
MSG
STATUS

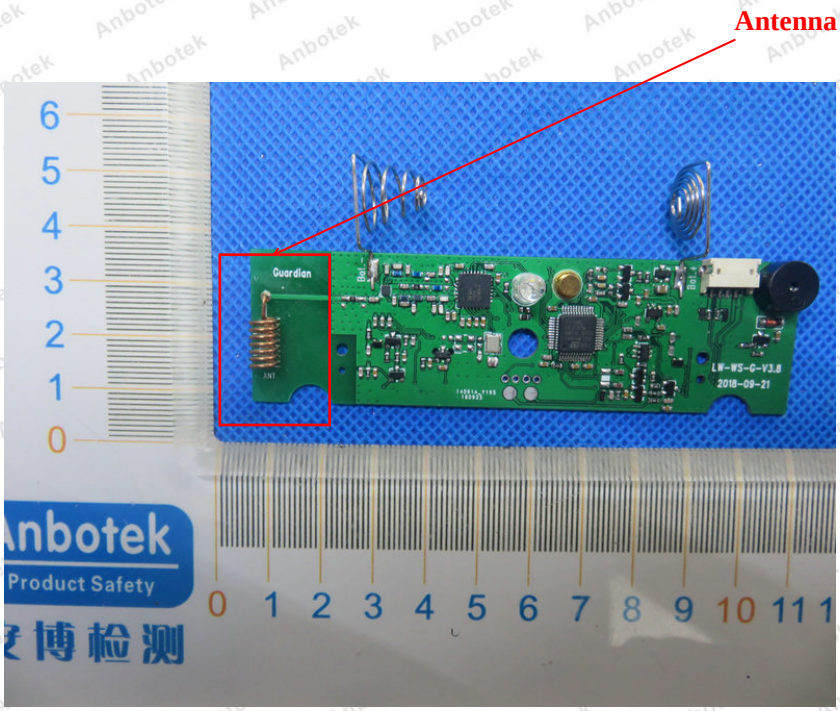
6. Antenna Requirement

6.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	1) 15.203 requirement: 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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.

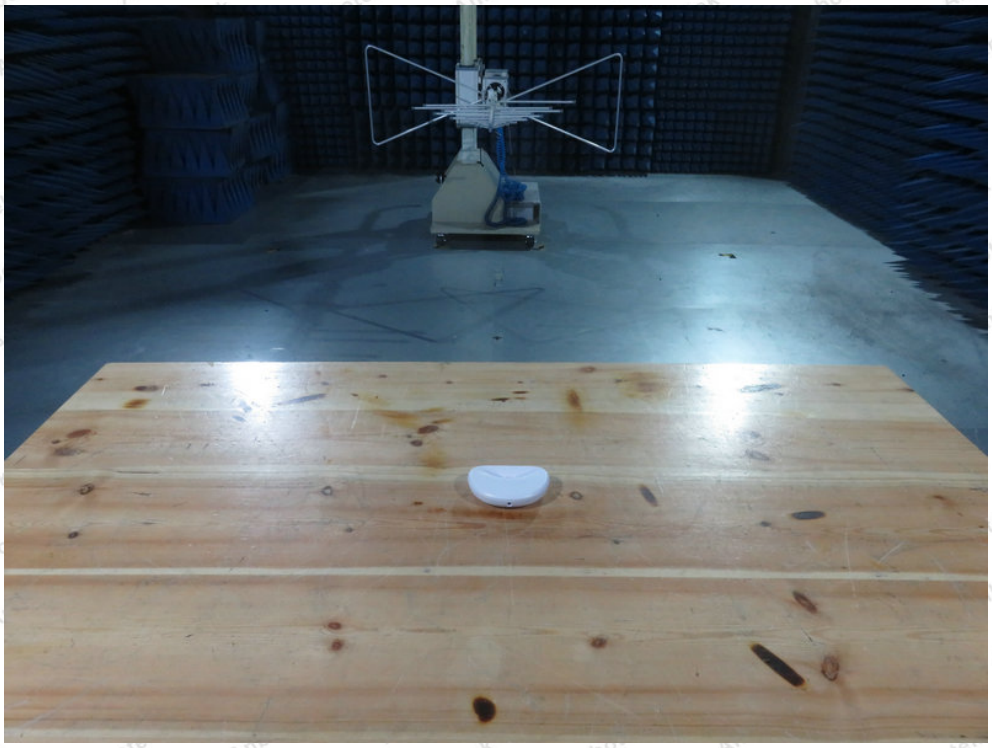
6.2. Antenna Connected Construction

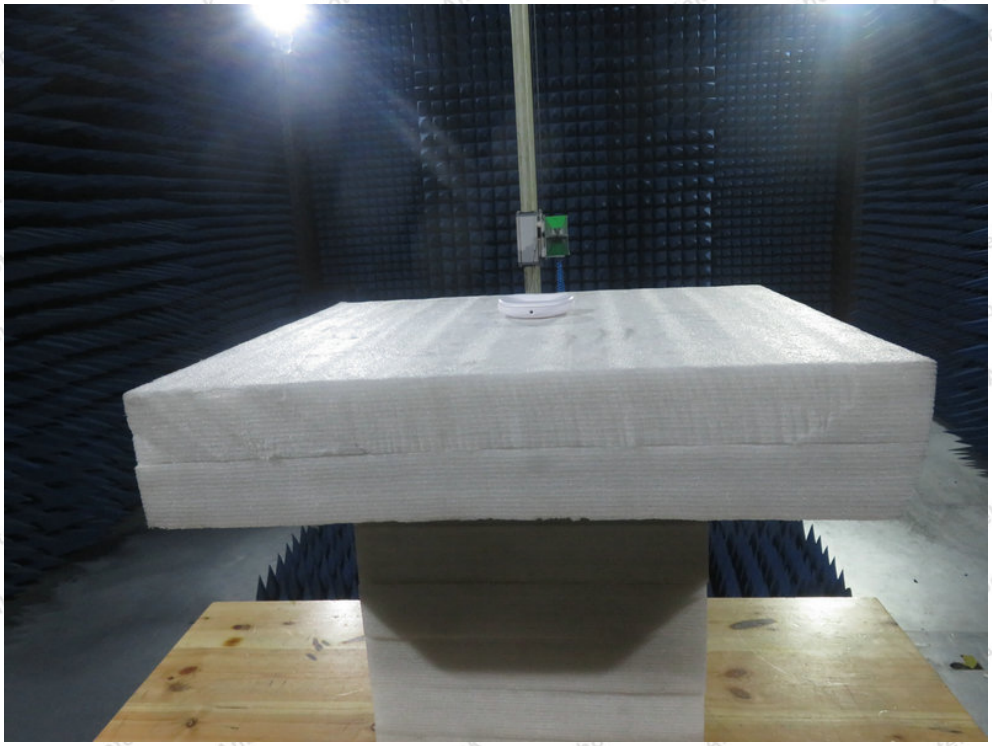
The antenna is a Monopole Antenna which permanently attached, and the best case gain of the antenna is 0 dBi. It complies with the standard requirement.



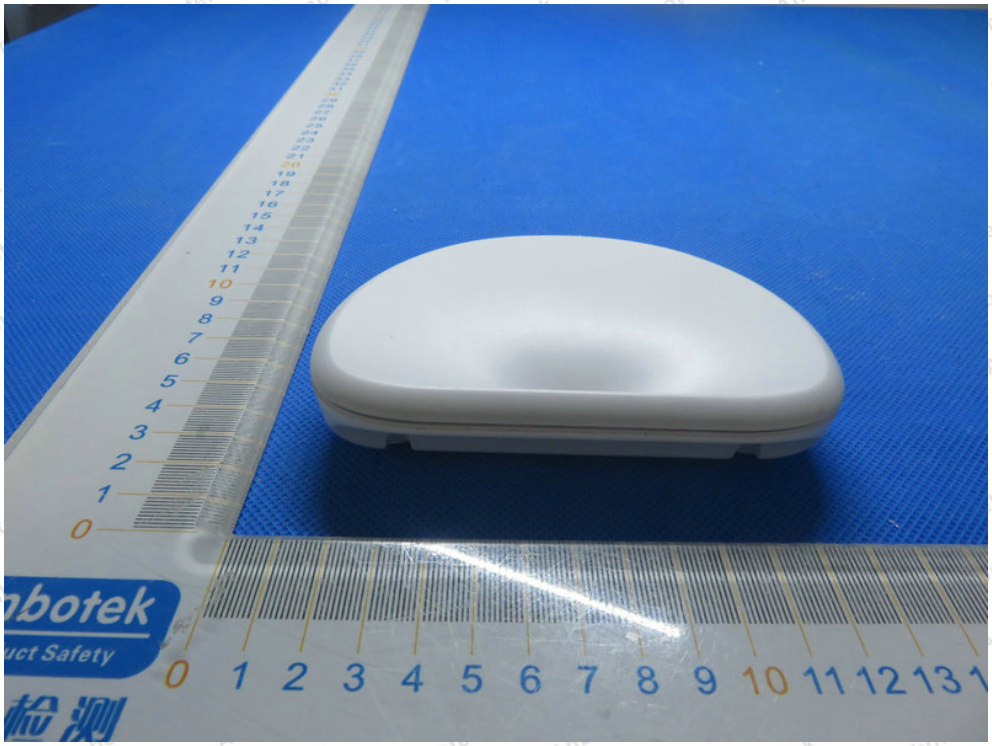
APPENDIX I -- TEST SETUP PHOTOGRAPH

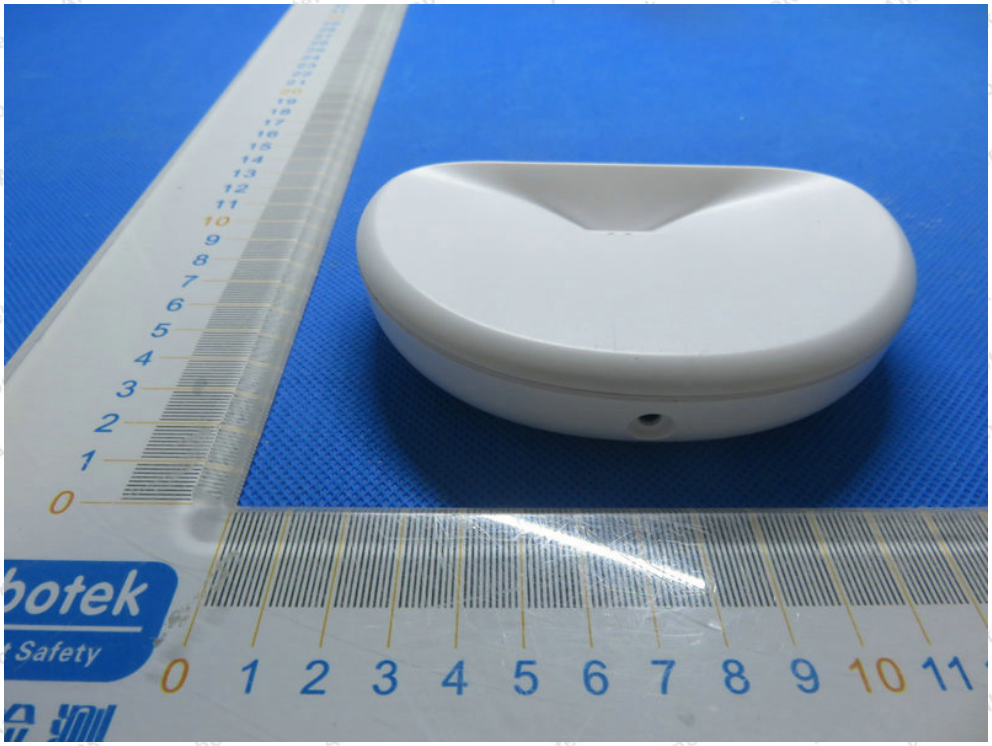
Photo of Radiation Emission Test

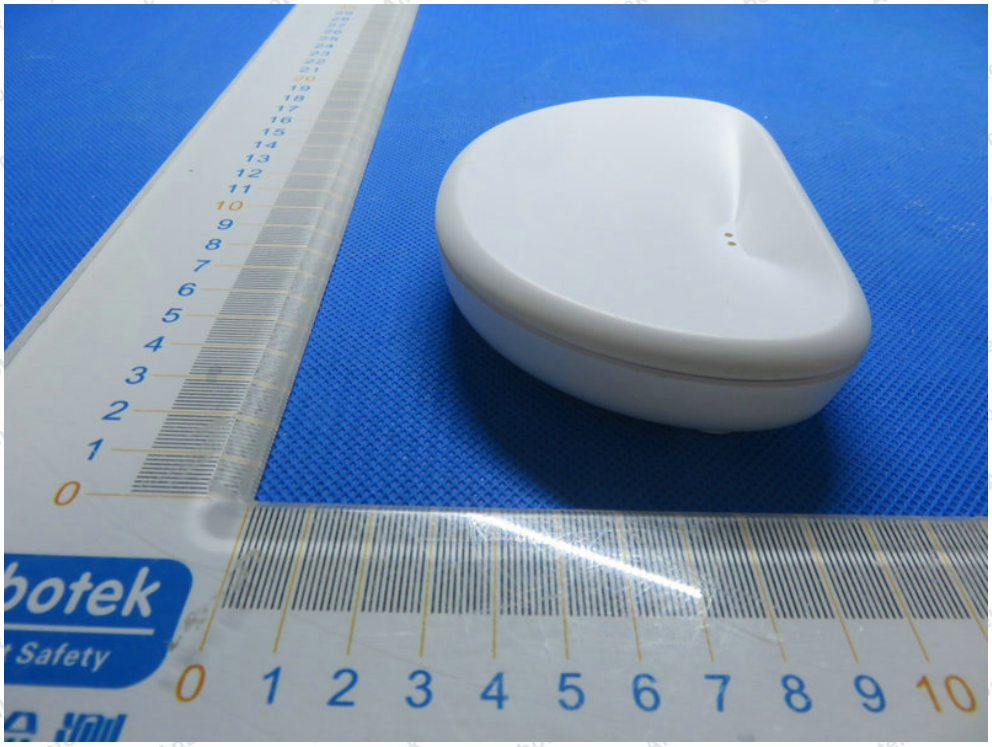


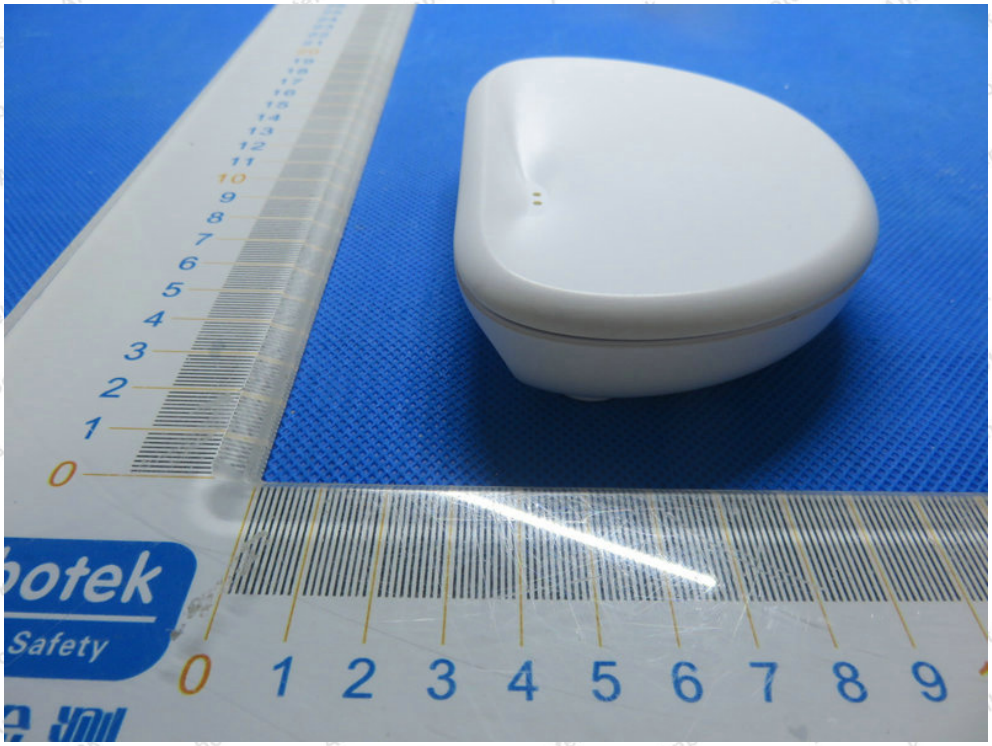


APPENDIX II -- EXTERNAL PHOTOGRAPH



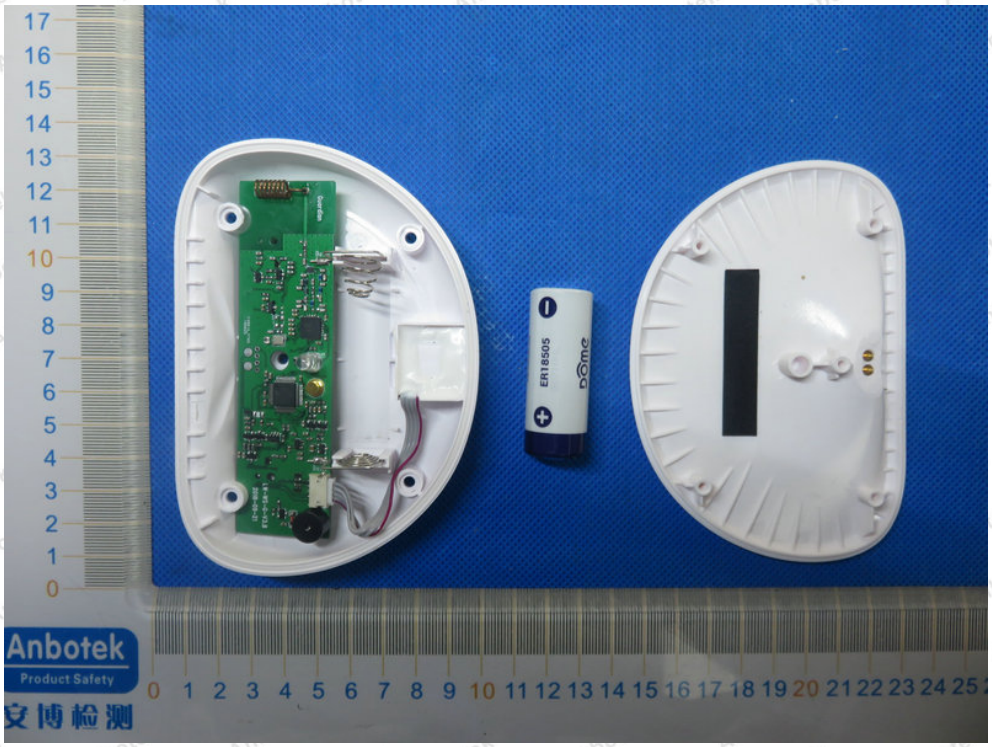


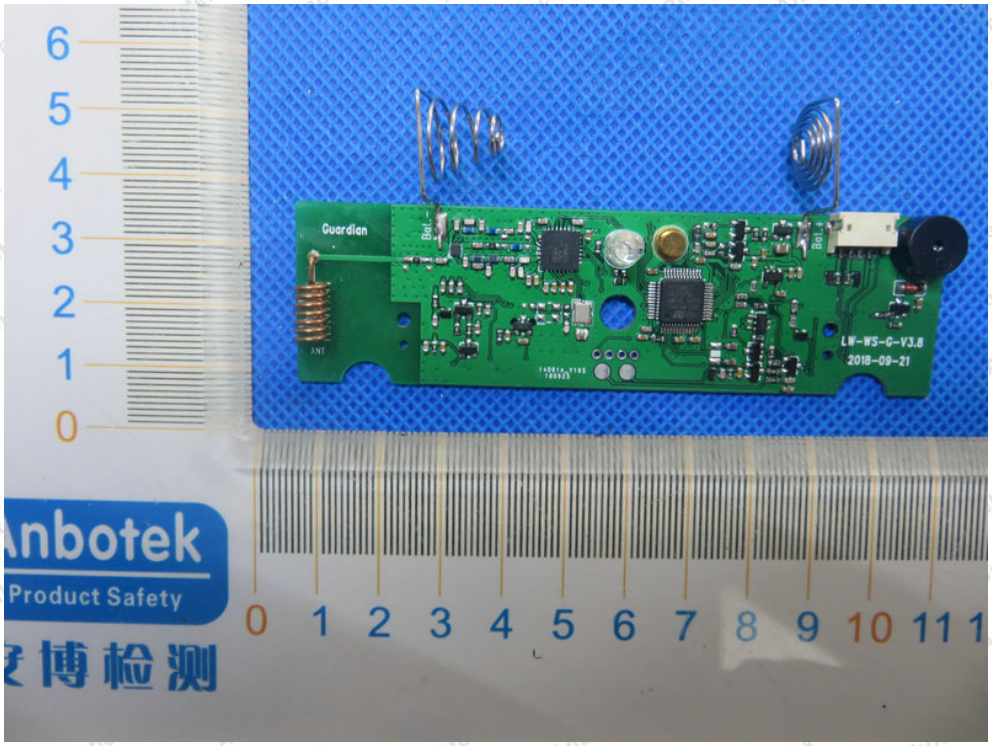


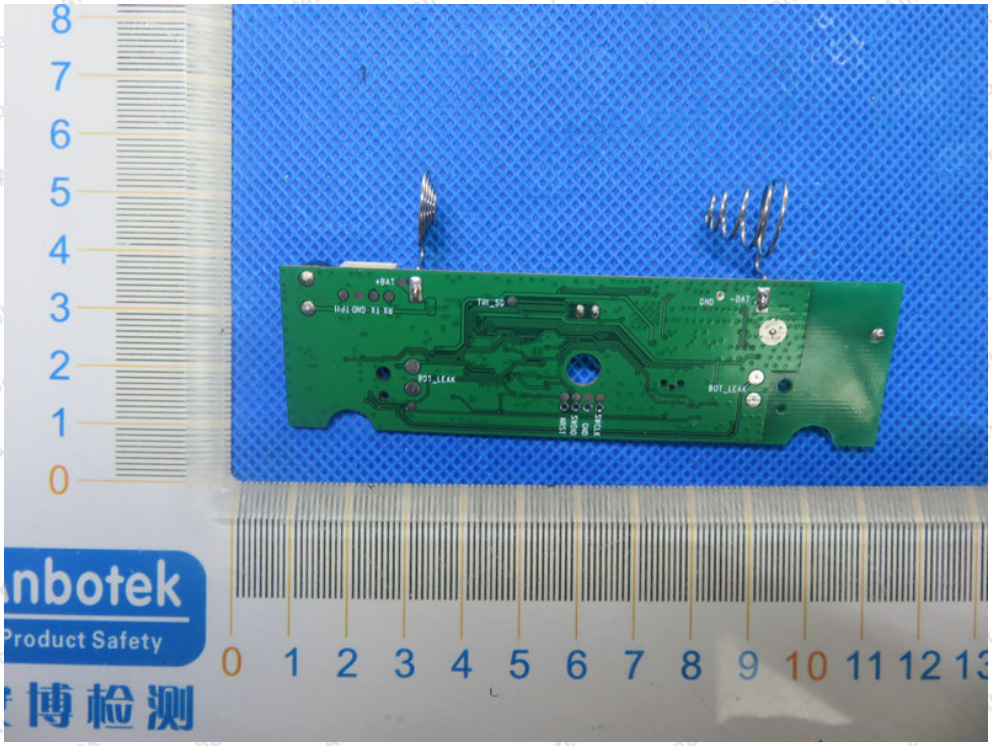


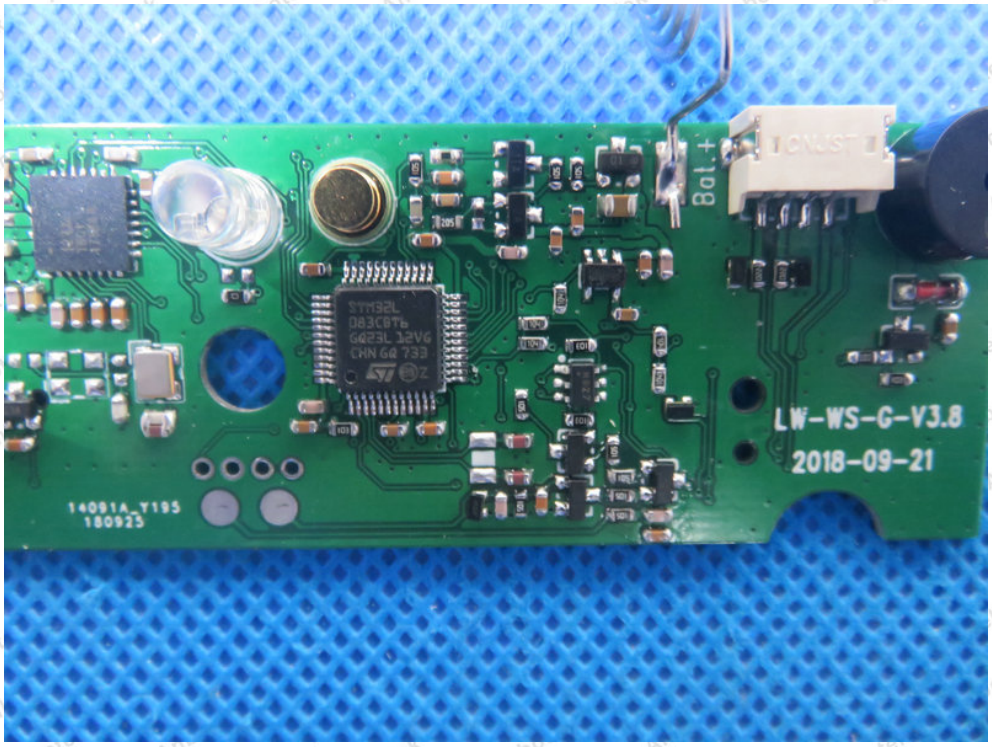

GUARDIAN
PIN: 78B5
Leak Detector
Model#: GLD1v2
DEVICE ID: 5410EC687885
SERIAL#: GLD10146201700844
FCC ID: VII-GLD10002 IC: 22838-GLD10002
Anbotek
Product Safety
安博检测

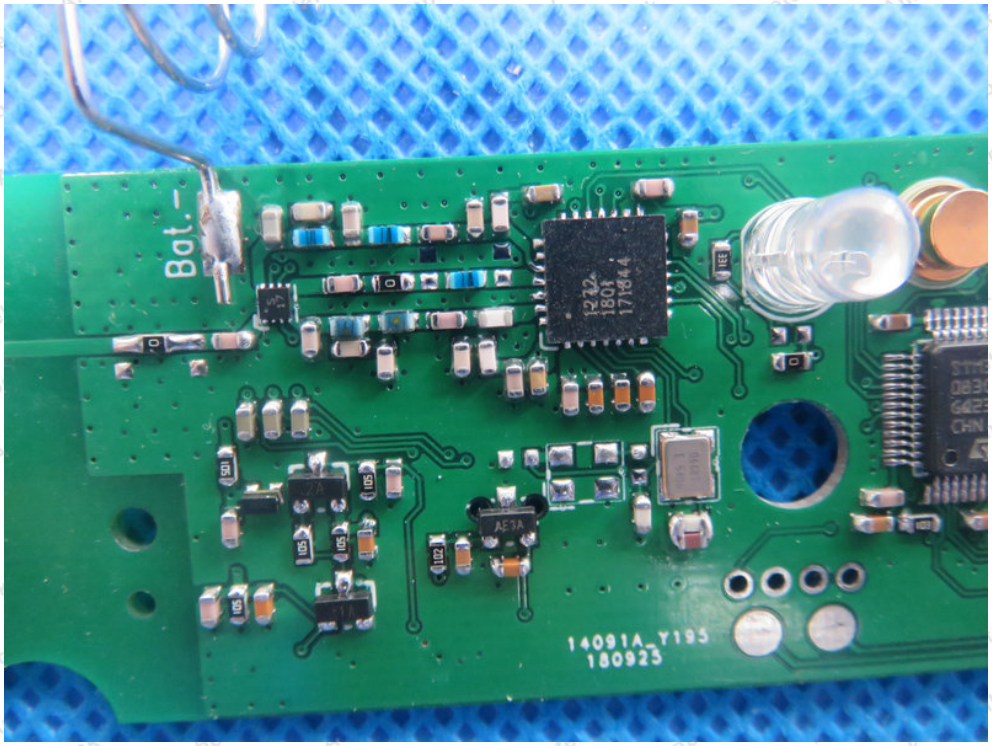
APPENDIX III -- INTERNAL PHOTOGRAPH

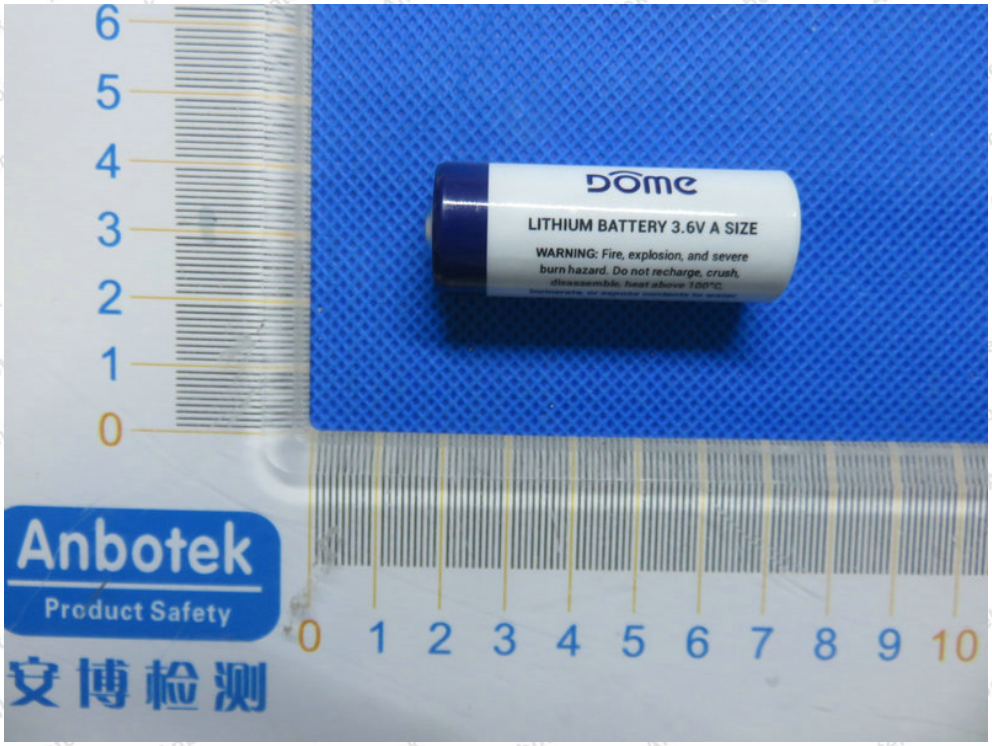







LW-WS-G-V3.8
2018-09-21





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