TCT 通测检测
TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID: 2ATMY-WD1C

Product: WEDRAW EGGY

Model No.: WD1C

Additional Model No.: WD1T

Trade Mark: WEDRAW

Report No.: TCT190606E906

Issued Date: Jun. 11, 2019

Issued for:

Shenzhen Little Monster Education Technology Ltd.
Room 403, Building Tianshu, Park Xinggang Tongchuanghui, 6099 Baoan Road, Shenzhen, China

Issued By:

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TABLE OF CONTENTS

1. Test Certification 3
2. Test Result Summary 4
3. EUT Description 5
4. General Information 6
4.1. Test Environment and Mode 6
4.2. Description of Support Units 6
5. Facilities and Accreditations 7
5.1. Facilities 7
5.2. Location 7
5.3. Measurement Uncertainty 7
6. Test Results and Measurement Data 8
6.1. Antenna Requirement 8
6.2. Conducted Emission 9
6.3. Radiated Emission Measurement 13
6.4. Occupied Bandwidth 17
6.5. Frequency stability 19
Appendix A: Photographs of Test Setup
Appendix B: Photographs of EUT

1. Test Certification

Product:	WEDRAW EGGY
Model No.:	WD1C
Additional Model:	WD1T
Trade Mark:	**WEDRAW**
Applicant:	Shenzhen Little Monster Education Technology Ltd.
Address:	Room 403, Building Tianshu, Park Xinggang Tongchuanghui, 6099 Baoan Road, Shenzhen, China
Manufacturer:	Shenzhen Little Monster Education Technology Ltd.
Address:	Room 403, Building Tianshu, Park Xinggang Tongchuanghui, 6099 Baoan Road, Shenzhen, China
Date of Test:	Nov. 14, 2018 - Nov. 20, 2018
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.225

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By: Jin Wang **Date:** ***Nov. 20, 2018***

Jin Wang

Reviewed By: Beryl Zhao **Date:** ***Jun. 11, 2019***

Beryl Zhao

Approved By: Tomsin **Date:** ***Jun. 11, 2019***

Tomsin

2. Test Result Summary

Requirement	CFR 47 Section IC Paragraph	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Spurious emissions	§15.225/ §15.209	PASS
Occupied Bandwidth	§15.215 (c)	PASS
Frequency stability	§15.225	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

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3. EUT Description

Product:	WEDRAW EGGY
Model No.:	WD1C
Additional Model:	WD1T
Trade Mark:	**WEDRAW**
Hardware Version:	V2.3
Software Version:	V0.6.3
Operation Frequency:	13.56MHz
Antenna Type:	Internal Antenna
Antenna Gain:	0dBi
Power Supply:	Rechargeable Li-ion Battery
Remark:	All models above are identical in interior structure, electrical circuits and components, and just model names are different for the marketing requirement.

4. General Information

4.1. Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation
The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

4.2. Description of Support Units

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.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Adapter	EP-TA20EWE	/	/	/

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

5. Facilities and Accreditations

5.1. Facilities

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

- FCC - Registration No.: 645098
  Shenzhen Tongce Testing Lab
  The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.
- IC - Registration No.: 10668A-1
  The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

5.2. Location

Shenzhen Tongce Testing Lab
Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China
TEL: +86-755-27673339

5.3. Measurement Uncertainty

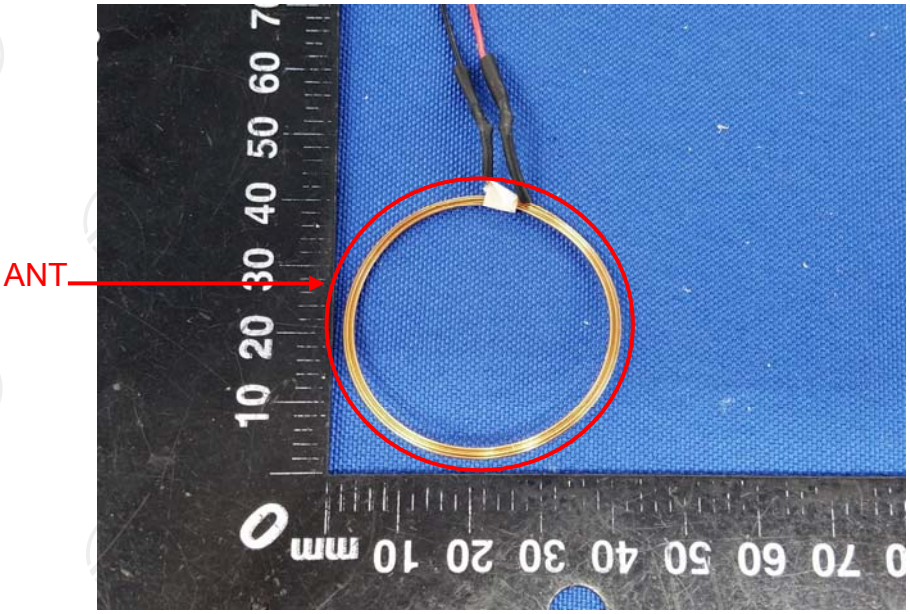
The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

6. Test Results and Measurement Data

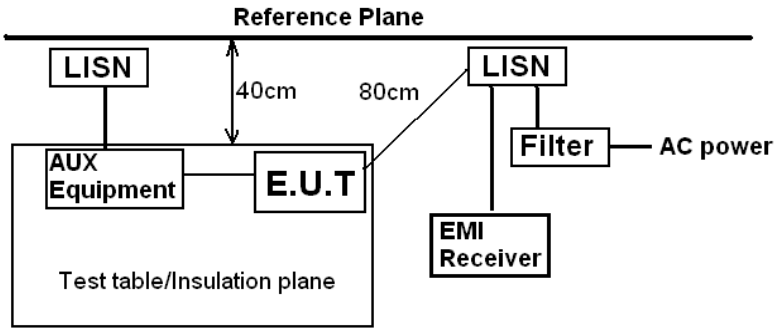
6.1. Antenna Requirement

Standard requirement:	FCC Part15 C Section 15.203
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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	
E.U.T Antenna:	
The NFC antenna is internal antenna which permanently attached.	



6.2. Conducted Emission

6.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Frequency Range:	150 kHz to 30 MHz
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto
Limits:	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
Test Setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Mode:	Refer to section 4.1 for details
Test Procedure:	1. The E.U.T is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Test Result:	PASS

6.2.2. Test Instruments

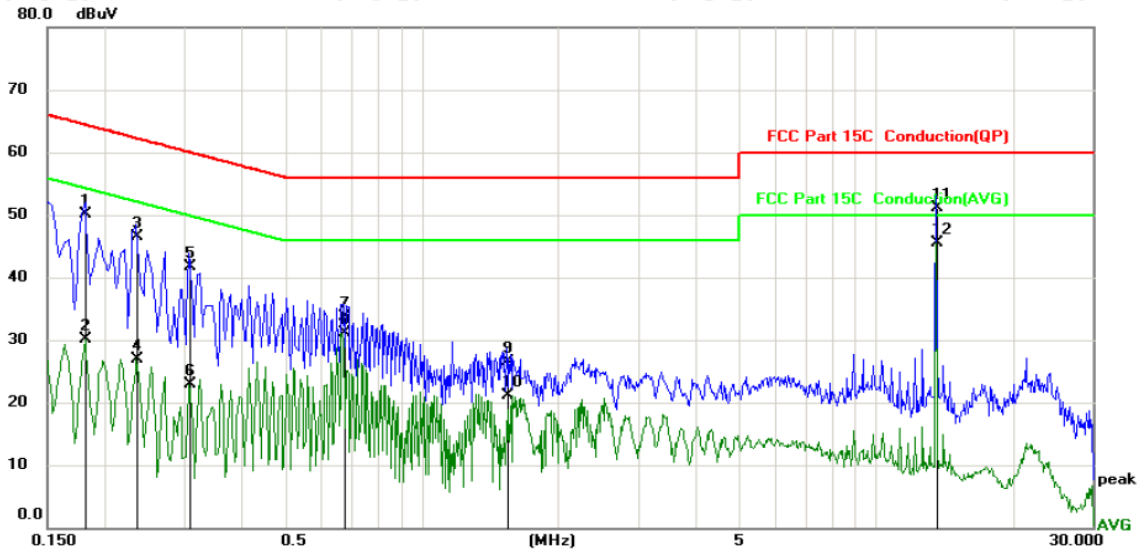
Conducted Emission Shielding Room Test Site (843)				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Test Receiver	R&S	ESPI	101402	Jul. 17, 2019
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 20, 2019
Coax cable (9KHz-30MHz)	TCT	CE-05	N/A	Sep. 16, 2019
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Site | Phase: L1 | Temperature: 25

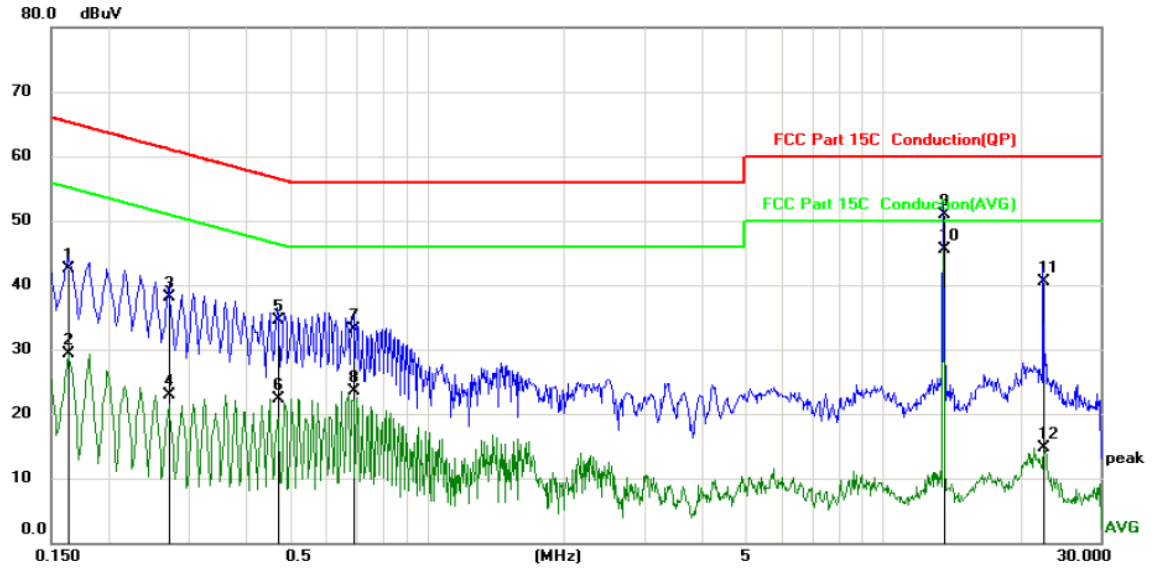
Limit: FCC Part 15C Conduction(QP) | Power: | Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1815	50.10	0.00	50.10	64.42	-14.32	QP	
2		0.1815	30.05	0.00	30.05	54.42	-24.37	AVG	
3		0.2355	46.50	0.00	46.50	62.25	-15.75	QP	
4		0.2355	26.84	0.00	26.84	52.25	-25.41	AVG	
5		0.3075	41.80	0.00	41.80	60.04	-18.24	QP	
6		0.3075	22.84	0.00	22.84	50.04	-27.20	AVG	
7		0.6720	33.70	0.00	33.70	56.00	-22.30	QP	
8		0.6720	31.07	0.00	31.07	46.00	-14.93	AVG	
9		1.5360	26.60	0.00	26.60	56.00	-29.40	QP	
10		1.5360	21.07	0.00	21.07	46.00	-24.93	AVG	
11		13.5600	51.20	0.00	51.20	60.00	-8.80	QP	
12	*	13.5600	45.54	0.00	45.54	50.00	-4.46	AVG	

Note:

Freq. = Emission frequency in MHz
Reading level (dBµV) = Receiver reading
Corr. Factor (dB) = LISN factor + Cable loss
Measurement (dBµV) = Reading level (dBµV) + Corr. Factor (dB)
Limit (dBµV) = Limit stated in standard
Margin (dB) = Measurement (dBµV) – Limits (dBµV)
Q.P. =Quasi-Peak, AVG =average
** is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz*

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Site | Phase: *N* | Temperature: 25

Limit: FCC Part 15C Conduction(QP) | Power: | Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1635	42.60	0.00	42.60	65.28	-22.68	QP	
2		0.1635	29.37	0.00	29.37	55.28	-25.91	AVG	
3		0.2714	38.20	0.00	38.20	61.07	-22.87	QP	
4		0.2714	22.98	0.00	22.98	51.07	-28.09	AVG	
5		0.4695	34.50	0.00	34.50	56.52	-22.02	QP	
6		0.4695	22.39	0.00	22.39	46.52	-24.13	AVG	
7		0.6900	33.20	0.00	33.20	56.00	-22.80	QP	
8		0.6900	23.50	0.00	23.50	46.00	-22.50	AVG	
9		13.5600	50.90	0.00	50.90	60.00	-9.10	QP	
10	*	13.5600	45.58	0.00	45.58	50.00	-4.42	AVG	
11		22.4655	40.60	0.00	40.60	60.00	-19.40	QP	
12		22.4655	14.76	0.00	14.76	50.00	-35.24	AVG	

Note:

Freq. = Emission frequency in MHz
Reading level (dBµV) = Receiver reading
Corr. Factor (dB) = LISN factor + Cable loss
Measurement (dBµV) = Reading level (dBµV) + Corr. Factor (dB)
Limit (dBµV) = Limit stated in standard
Margin (dB) = Measurement (dBµV) – Limits (dBµV)
Q.P. =Quasi-Peak
AVG =average
** is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz*

6.3. Radiated Emission Measurement

6.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.225
Test Method:	ANSI C63.10: 2013
Frequency Range:	9 kHz to 1000 MHz
Measurement Distance:	3 m
Antenna Polarization:	Horizontal & Vertical

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value

Limit:

FCC Part15 C Section 15.225

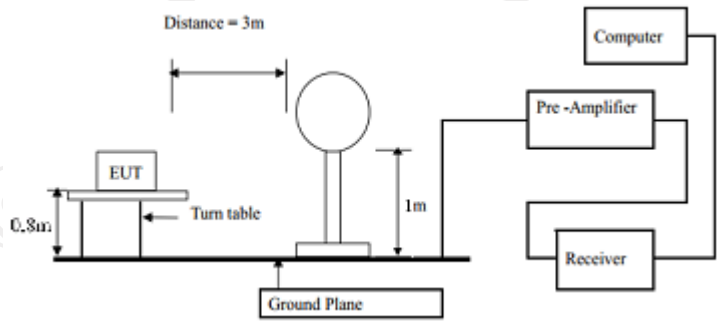
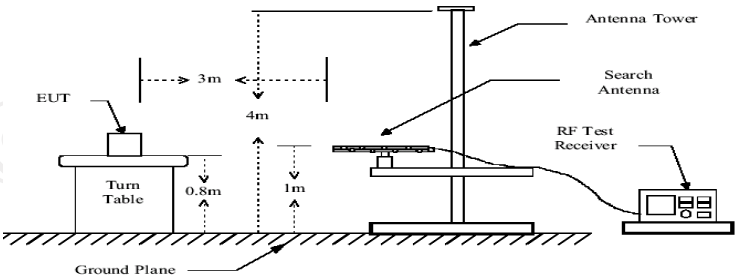
Frequency (MHz)	Limit (uV/m @30m)	Limit (dBuV/m @3m)	Detector
13.110-13.410	106	80.5	QP
13.410-13.553	334	90.5	QP
13.553-13.567	15848	124.0	QP
13.567-13.7110	224	90.5	QP
13.710-14.010	106	80.5	QP

Note: *RF Voltage (dBuV) = 20 log RF Voltage (uV)*
Limit (dBuV/m @3m) = 20log(Limit (uV/m @30m)) + 40

FCC Part15 C Section 15.209

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)	Detector
0.009-0.490	3	20log 2400/F (kHz) + 80	QP
0.490-1.705	3	20log 24000/F (kHz) + 40	QP
1.705-30	3	20log 30 + 40	QP
30-88	3	40.0	40.0
88-216	3	43.5	43.5
216-960	3	46.0	46.0
Above 960	3	54.0	54.0

Note:
1. *RF Voltage (dBuV) = 20 log RF Voltage (uV)*
2. *In the Above Table, the tighter limit applies at the band edges.*
3. *Distance refers to the distance in meters between the measuring instrument antenna and the EUT*
4. *The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.*
5. *If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula Ld1 = Ld2 * (d2/d1)*

Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber in below 1GHz. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. 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. 4. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. 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.
Test setup:	For radiated emissions below 30MHz  30MHz to 1GHz 
Test Mode:	Refer to section 4.1 for details

Test results:	PASS

6.3.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Test Receiver	ROHDE&SCHWARZ	ESIB7	100197	Jul. 17, 2019
Spectrum Analyzer	ROHDE&SCHWARZ	FSQ40	200061	Sep. 20, 2019
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 16, 2019
Pre-amplifier	HP	8447D	2727A05017	Sep. 16, 2019
Loop antenna	ZHINAN	ZN30900A	12024	Oct. 20, 2019
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 02, 2019
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Oct. 20, 2019
Antenna Mast	Keleto	RE-AM	N/A	N/A
Coax cable (9KHz-1GHz)	TCT	RE-low-01	N/A	Sep. 16, 2019
Coax cable (9KHz-40GHz)	TCT	RE-high-02	N/A	Sep. 16, 2019
Coax cable (9KHz-1GHz)	TCT	RE-low-03	N/A	Sep. 16, 2019
Coax cable (9KHz-40GHz)	TCT	RE-high-04	N/A	Sep. 16, 2019
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.3.3. Test Data

Field Strength of Fundamental

Frequency (MHz)	*Reading Level* (dBuV/m)	*Factor*	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Result
13.56	57.09	25.62	82.71	124	-41.29	PASS

In-Band Radiated Spurious Emissions

Frequency (MHz)	*Reading Level* (dBuV/m)	*Factor*	Emission Level (dBuV/m)	Horizontal /Vertical	Limit (dBuV/m)	Detector	Margin (dB)
13.112	25.90	25.74	51.64	/	80.5	QP	-28.86
13.341	33.49	25.68	59.17	/	80.5	QP	-21.33
13.483	35.85	25.56	61.41	/	90.5	QP	-29.09
13.613	37.22	25.60	62.82	/	90.5	QP	-27.68
13.764	32.79	25.56	58.35	/	80.5	QP	-22.15
13.932	21.21	25.51	46.72	/	80.5	QP	-33.78

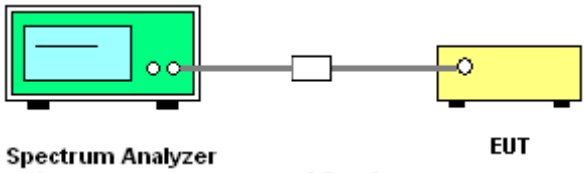
Out-Of-Band Radiated Spurious Emissions

Frequency (MHz)	*Reading Level* (dBuV/m)	*Factor*	Emission Level (dBuV/m)	Horizontal /Vertical	Limit (dBV/m)	Detector	Margin (dB)
7.58	22.65	25.77	48.42	/	69.54	QP	-21.12
27.13	16.91	25.40	42.31	/	69.54	QP	-27.23
36.78	46.08	-13.14	32.94	V	40.00	QP	-7.06
75.32	51.97	-17.27	34.70	V	40.00	QP	-5.30
121.46	48.72	-14.40	34.32	H	43.52	QP	-9.20
180.03	52.41	-13.96	38.45	V	43.52	QP	-5.07

Note *: 1) QP= Quasi-peak*
2) Emission Level = Reading Level + Factor

6.4. Occupied Bandwidth

6.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.215(c)
Test Method:	ANSI C63.10: 2013
Limit:	N/A
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW⩾1% of the 20 dB bandwidth; VBW⩾RBW; Sweep = auto; Detector function = peak; Trace = max hold. 4. Measure and record the results in the test report.
Test setup:	
Test Mode:	Refer to section 4.1 for details
Test results:	PASS

6.4.2. Test Instruments

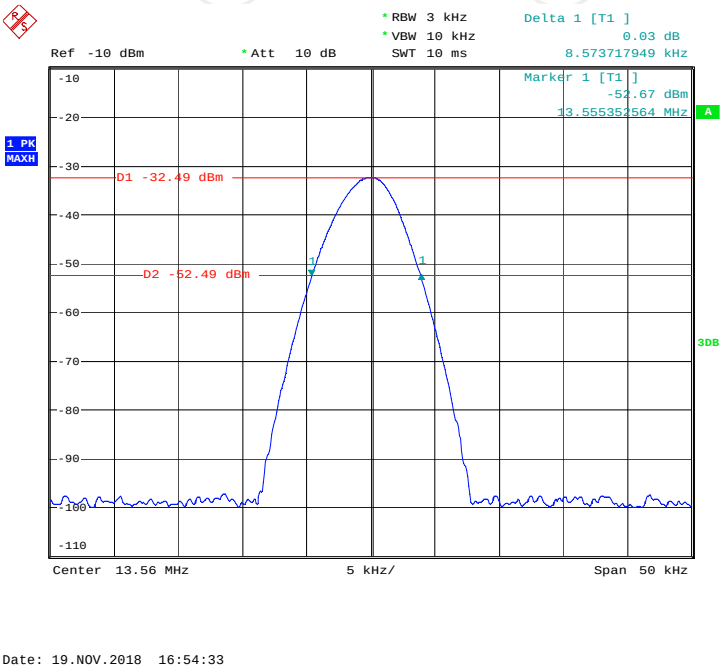
RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	R&S	FSU	200054	Sep. 20, 2019

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.4.3. Test data

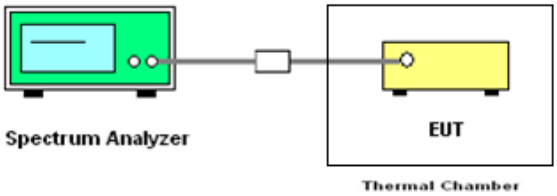
Frequency(MHz)	20dB Occupy Bandwidth (kHz)	Limit (kHz)	Conclusion
13.56	8.57	---	PASS

Test plots as follows:



6.5. Frequency stability

6.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.225
Test Method:	ANSI C63.10 : 2013
Operation mode:	Refer to item 4.1
Limit:	+/-0.01%
Test Setup:	
Test Procedure:	1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected to a spectrum analyzer. 3. The EUT was placed inside the temperature chamber. 4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to -20℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached. 7. Variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20℃
Test Result:	PASS

6.5.2. Test Instruments

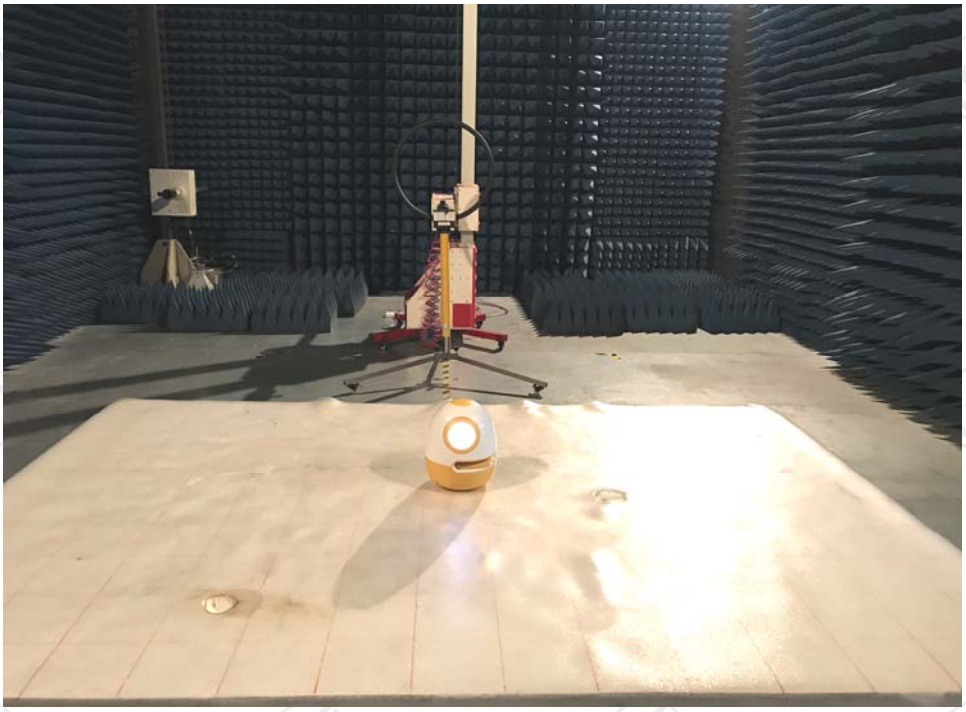
RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	R&S	FSU	200054	Sep. 20, 2019
DC power supply	Kingrang	KR3005K	N/A	Sep. 16, 2019

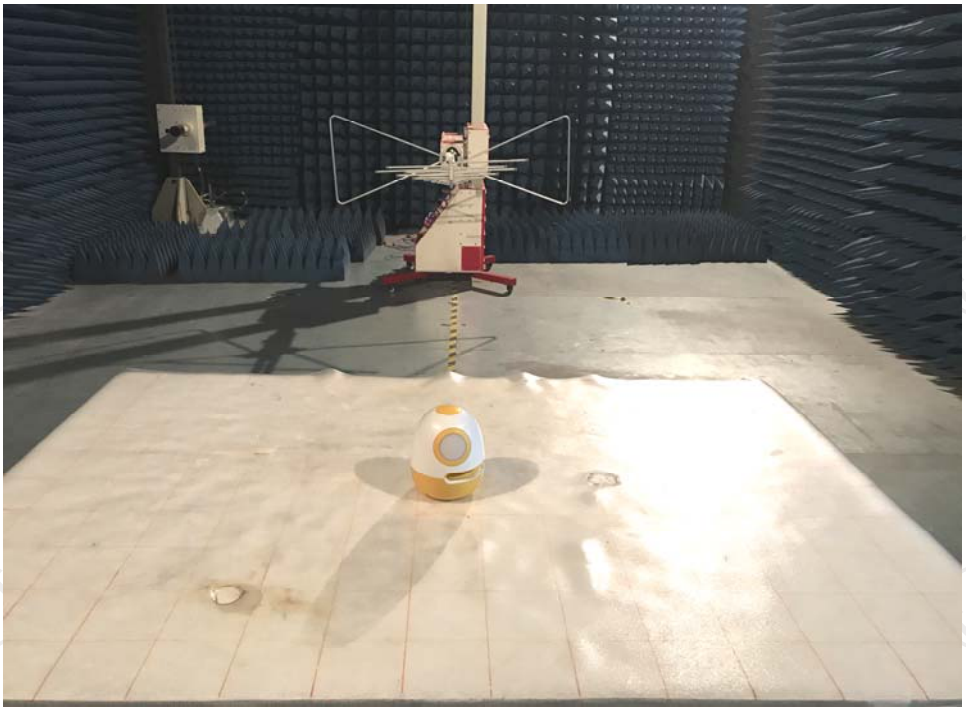
6.5.3. Test Data

Voltage (Vac)	Temperature (℃)	Frequency (MHz)	Deviation (%)	Limit (%)
3.7	-20	13.56037	0.00273	+/-0.01%
3.7	-10	13.56036	0.00265	
3.7	0	13.56064	0.00472	
3.7	10	13.56054	0.00398	
3.7	20	13.56047	0.00347	
3.7	30	13.56052	0.00383	
3.7	40	13.56039	0.00288	
3.7	50	13.56048	0.00354	
3.5	20	13.56050	0.00369	
4.2	20	13.56042	0.00310	

Appendix A: Photographs of Test Setup

Product: WEDRAW EGGY
Model: WD1C
Radiated Emission





CE

Appendix B: Photographs of EUT

Product: WEDRAW EGGY

Model: WD1C

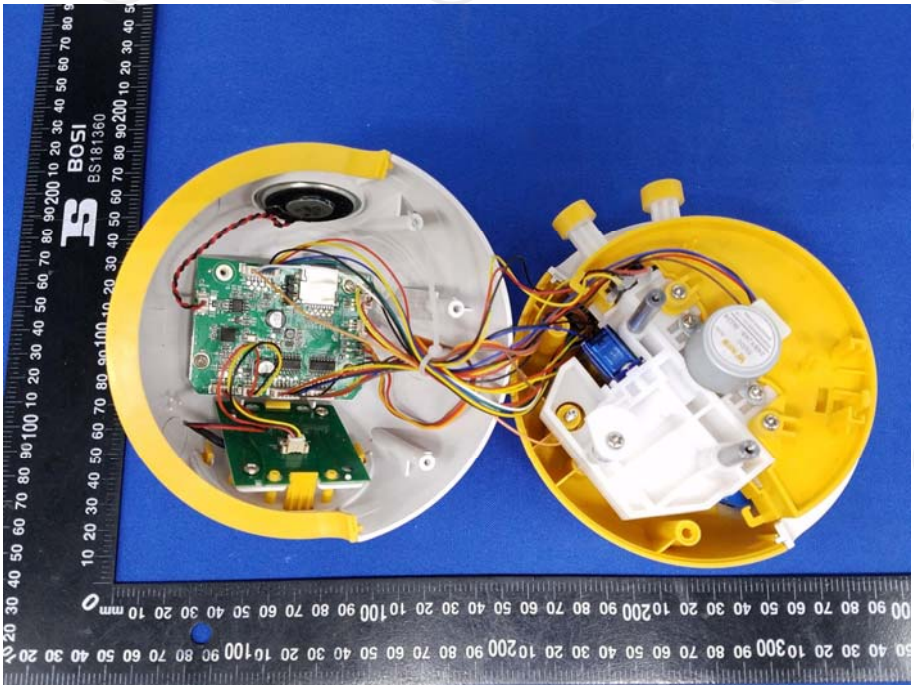
External Photos

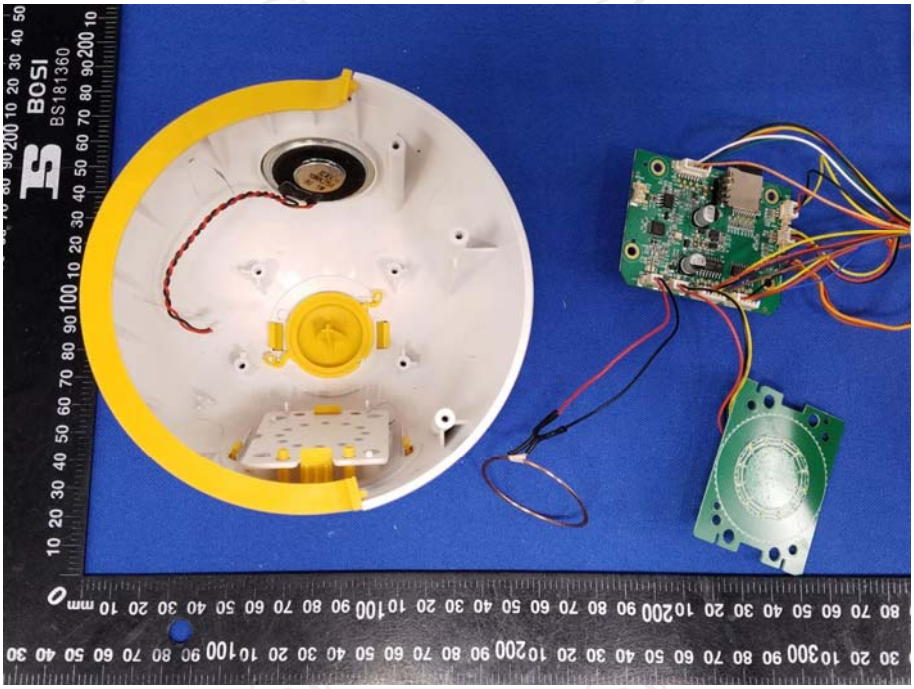
BOSI
BS181360

BOSI
BS181360

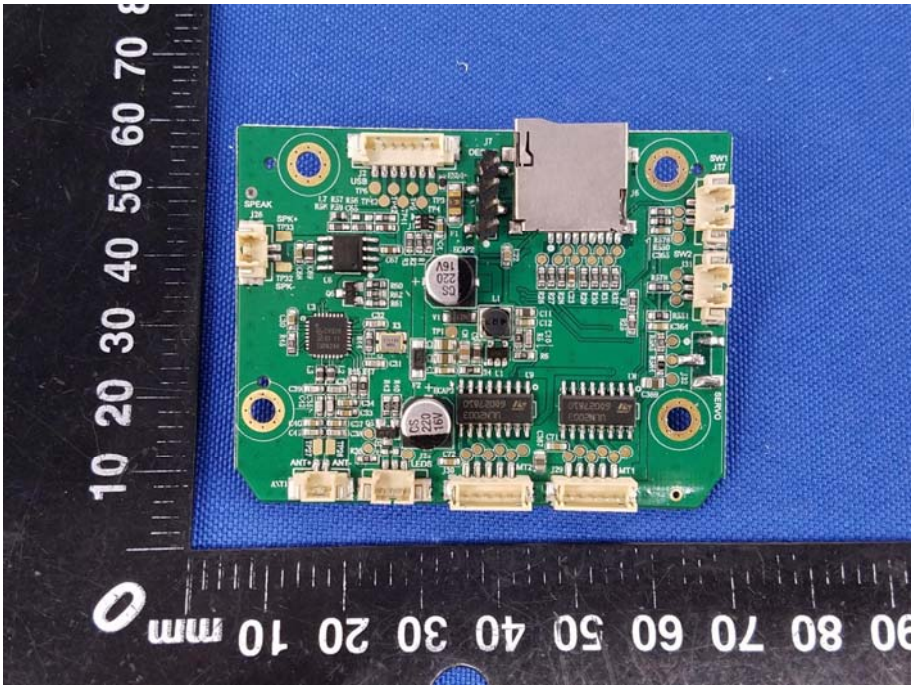
BOSI
BS191060

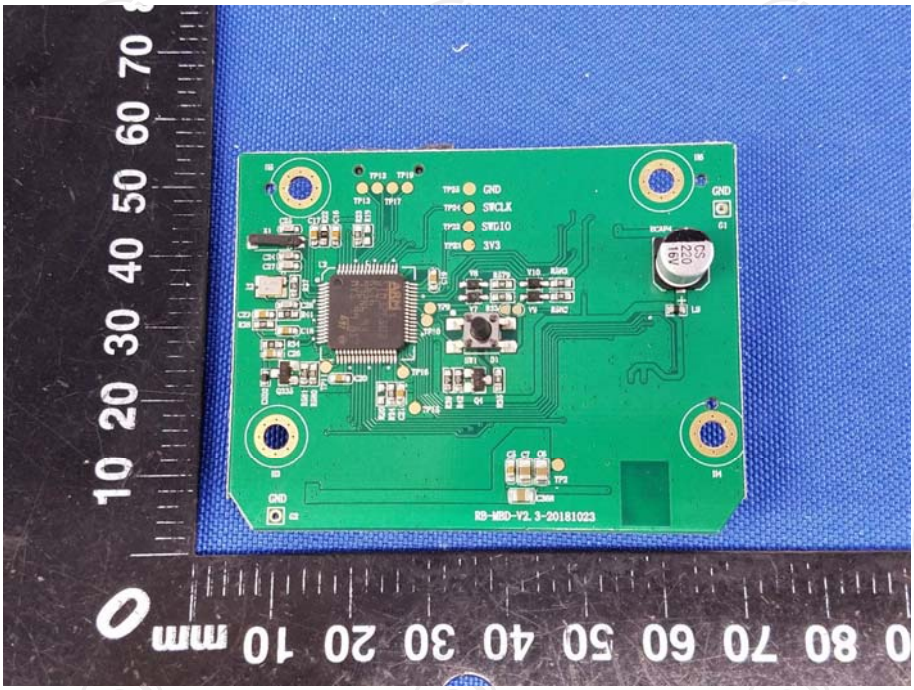
Product: WEDRAW EGGY
Model: WD1C
Internal Photos

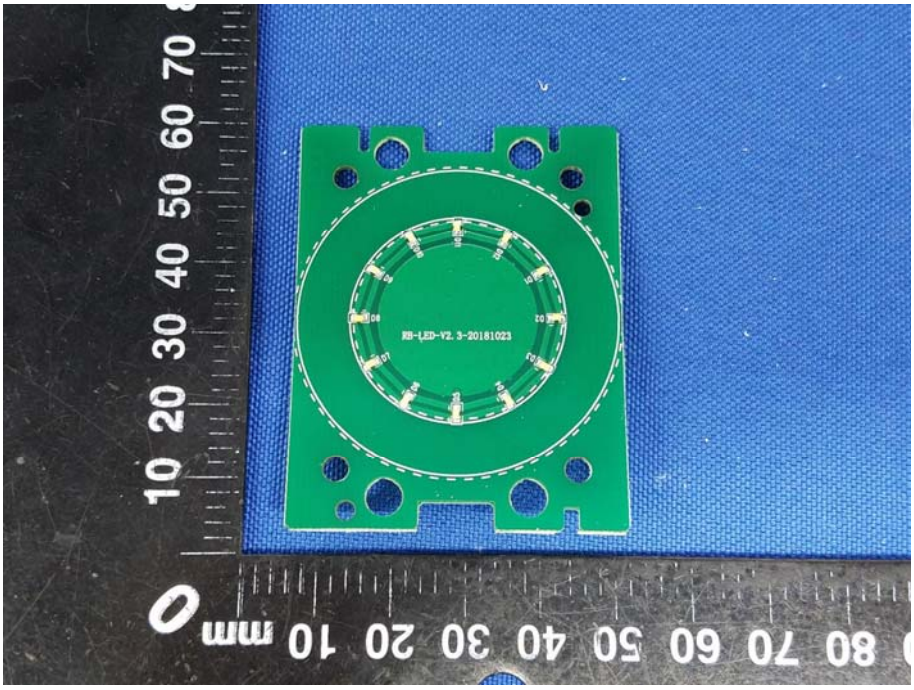


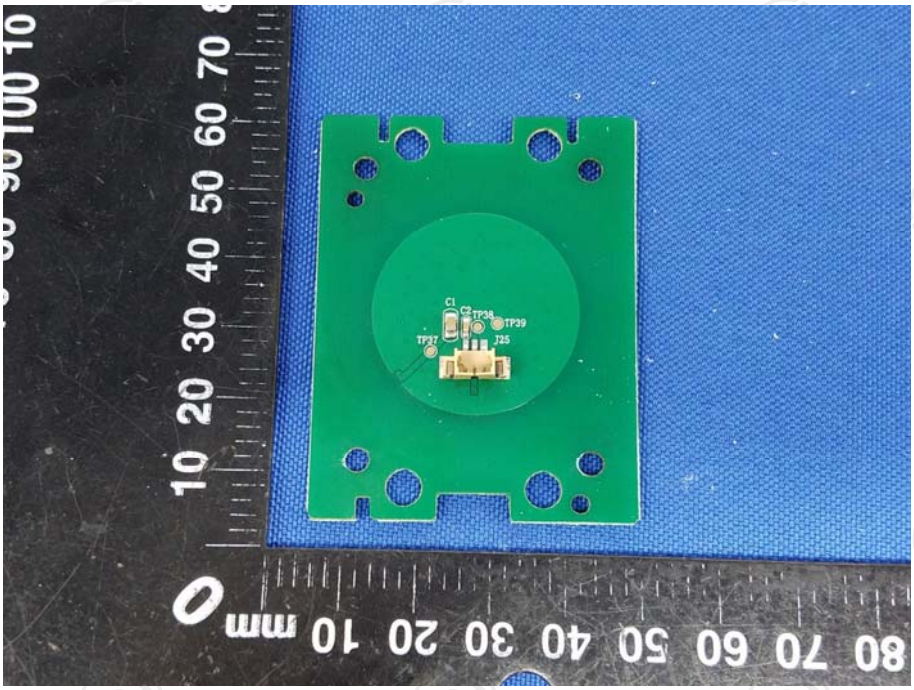


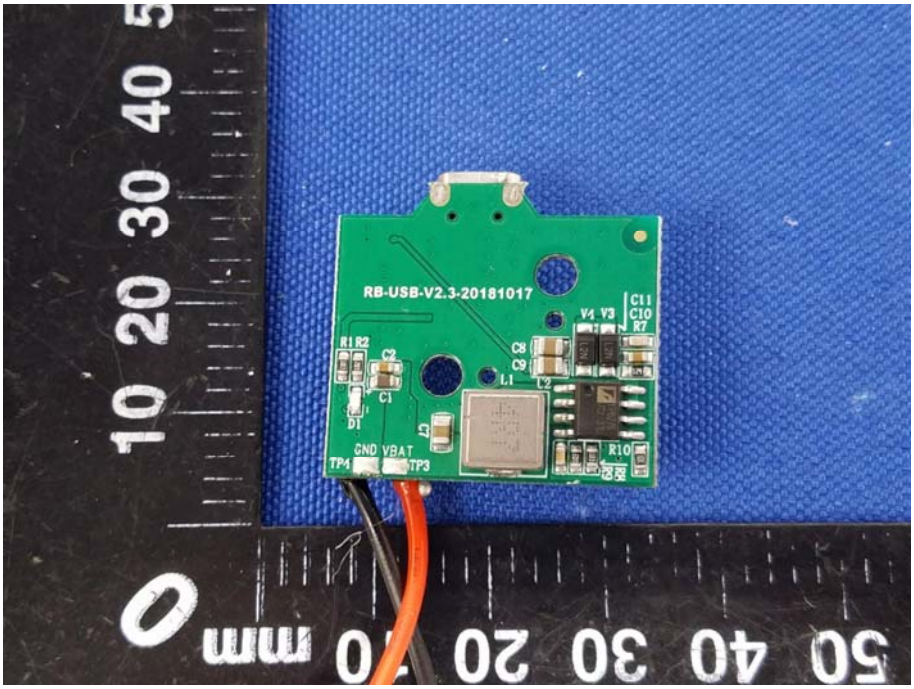
BOSI
BS181360

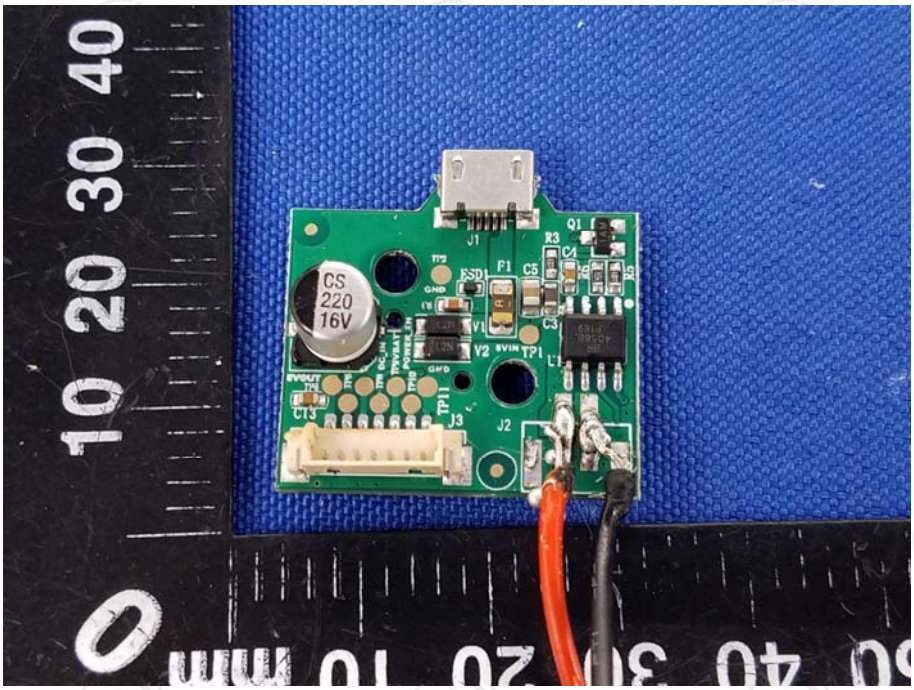



GND
SWCLK
SWDIO
3V3
RB-MBD-V2.3-20181023


RB-LED-V2.3-20181023


C1
C2
TP38
TP39
TP37
J25


RB-USB-V2.3-20181017
R1 R2
C2
C1
D1
C7
GND VBAT
TP4
TP3
C8
C9
L1
V4 V3
C11
C10
R7
R10



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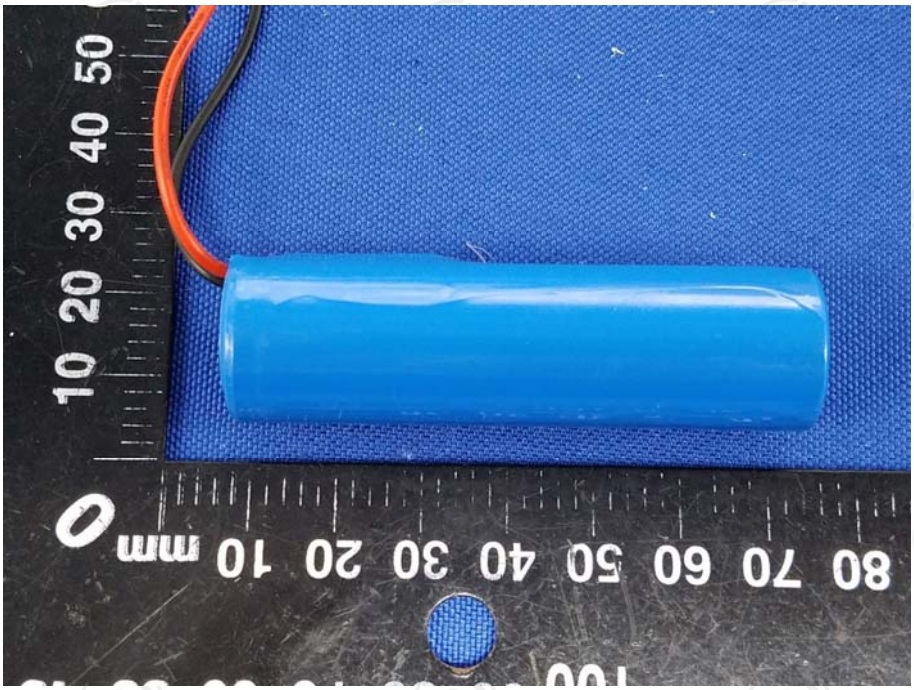

********END OF REPORT********