SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

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TEST REPORT

Application No.:	SZEM1808007583CR
Applicant:	Shenzhen Chaihuo Maker Education Services Limited
Address of Applicant:	B608, Design Commune, Dashi 2nd Road, Nanshan District, Shenzhen, China
Manufacturer:	Shenzhen Chaihuo Maker Education Services Limited
Address of Manufacturer:	B608, Design Commune, Dashi 2nd Road, Nanshan District, Shenzhen, China
Factory:	Shenzhen Xinxian Technology Co., Limited
Address of Factory:	F4, Building 2, Runheng Dingfeng Hign-tech Industrial Park, Liuxian Road, Xin'an Avenue, Bao'an District, Shenzhen, China. P.R.C
Equipment Under Test (EUT):	
EUT Name:	Grove Zero Starter Kit
Model No.:	Grove Zero Starter Kit V2.0
Trade Mark:	柴火创客教育
Standard(s) :	47 CFR Part 15, Subpart B
Date of Receipt:	2018-08-20
Date of Test:	2018-08-20 to 2018-08-23
Date of Issue:	2018-08-27
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2018-08-27		Original

Authorized for issue by:				
				
		Harry Wu /Project Engineer		
				
		Eric Fu /Reviewer		

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2 Test Summary

Emission Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at Mains Terminals (150kHz-30MHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass

Internal Source	Upper Frequency
Below 1.705MHz	30MHz
1.705MHz to 108MHz	1GHz
108MHz to 500MHz	2GHz
500MHz to 1GHz	5GHz
Above 1GHz	5th harmonic of the highest frequency or 40GHz, whichever is lower

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4 General Information

4.1 Details of E.U.T.

Power supply:	DC3.7V Rechargeable Battery which can be charged by Micro USB port
Cable:	Micro USB Cable: 22cm, Unshielded

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Adapter	Apple	A1357 W010A051	REF. No.SEA0500

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conduction Emission	± 3.0dB (150kHz to 30MHz)
2	Radiated Emission	± 4.5dB (30MHz-1GHz)
3	Temperature test	± 1℃
4	Humidity test	± 3%

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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

• CNAS (No. CNAS L2929)

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• Industry Canada (IC)

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

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5 Equipment List

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Shielding Room	ChangZhou ZhongYu	GB-88	SEM001-06	2017-05-10	2020-05-09
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2018-07-12	2019-07-11
LISN	Rohde & Schwarz	ENV216	SEM007-01	2017-09-27	2018-09-26
LISN	ETS-LINDGREN	3816/2	SEM007-02	2018-04-02	2019-04-01
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2018-04-02	2019-04-01

Radiated Emissions (30MHz-1GHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2018-07-12	2019-07-11
EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2017-09-27	2018-09-26
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2018-04-02	2019-04-01

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2017-09-29	2018-09-28
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2017-09-29	2018-09-28
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2017-09-29	2018-09-28
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2018-04-08	2019-04-07

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6 Emission Test Results

6.1 Conducted Emissions at Mains Terminals (150kHz-30MHz)

Test Requirement:	47 CFR Part 15, Subpart B
Test Method:	ANSI C63.4:2014
Frequency Range:	150kHz to 30MHz
Limit:	
0.15M-0.5MHz	66dB(μV)-56dB(μV) quasi-peak, 56dB(μV)-46dB(μV) average
0.5M-5MHz	56dB(μV) quasi-peak, 46dB(μV) average
5M-30MHz	60dB(μV) quasi-peak, 50dB(μV) average
Detector:	Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

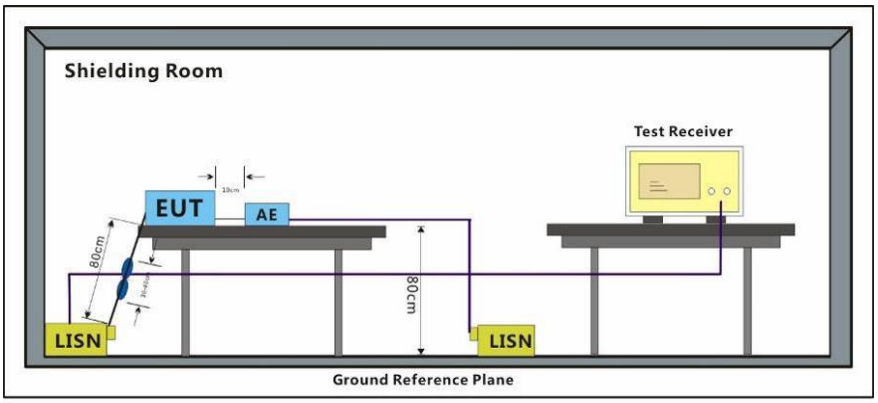
6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21.5 °C Humidity: 53.1 % RH Atmospheric Pressure: 1000 mbar

Test mode a:Normal Working_Keep EUT working normally and being charged.

6.1.2 Test Setup Diagram

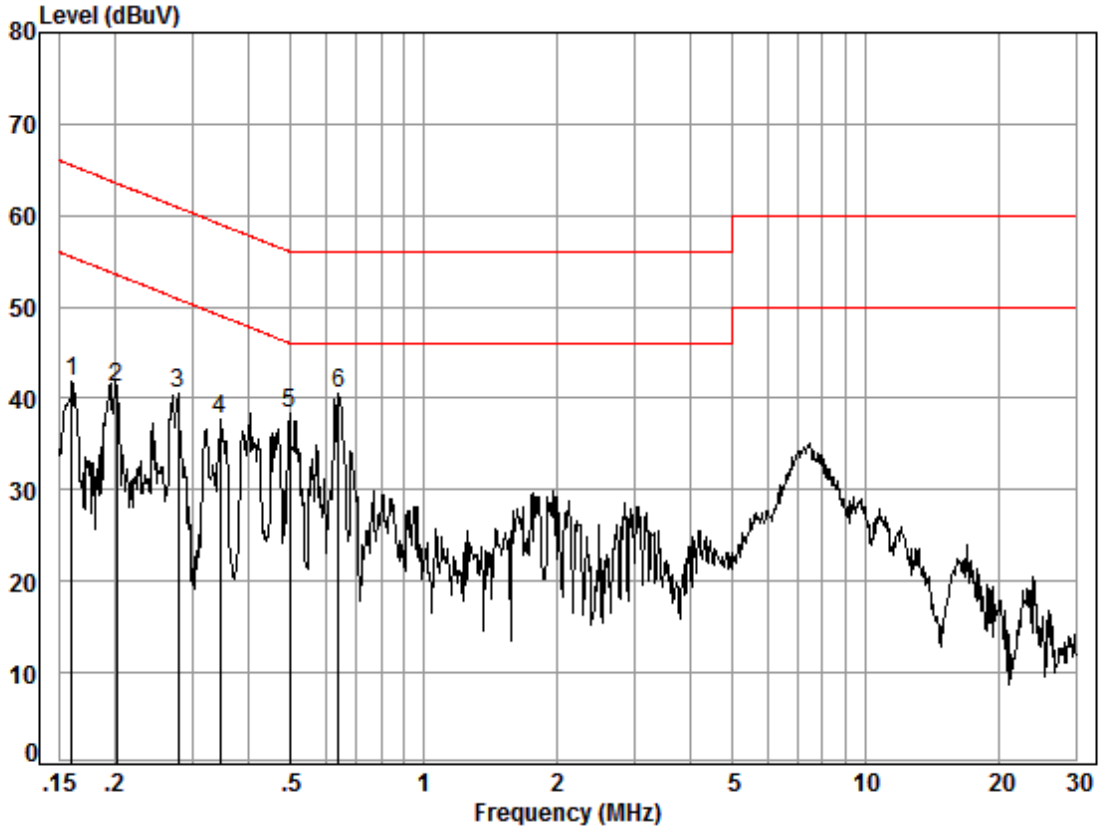


6.1.3 Measurement Data

An initial pre-scan was performed with peak detector.Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.

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Mode:a; Line:Live Line

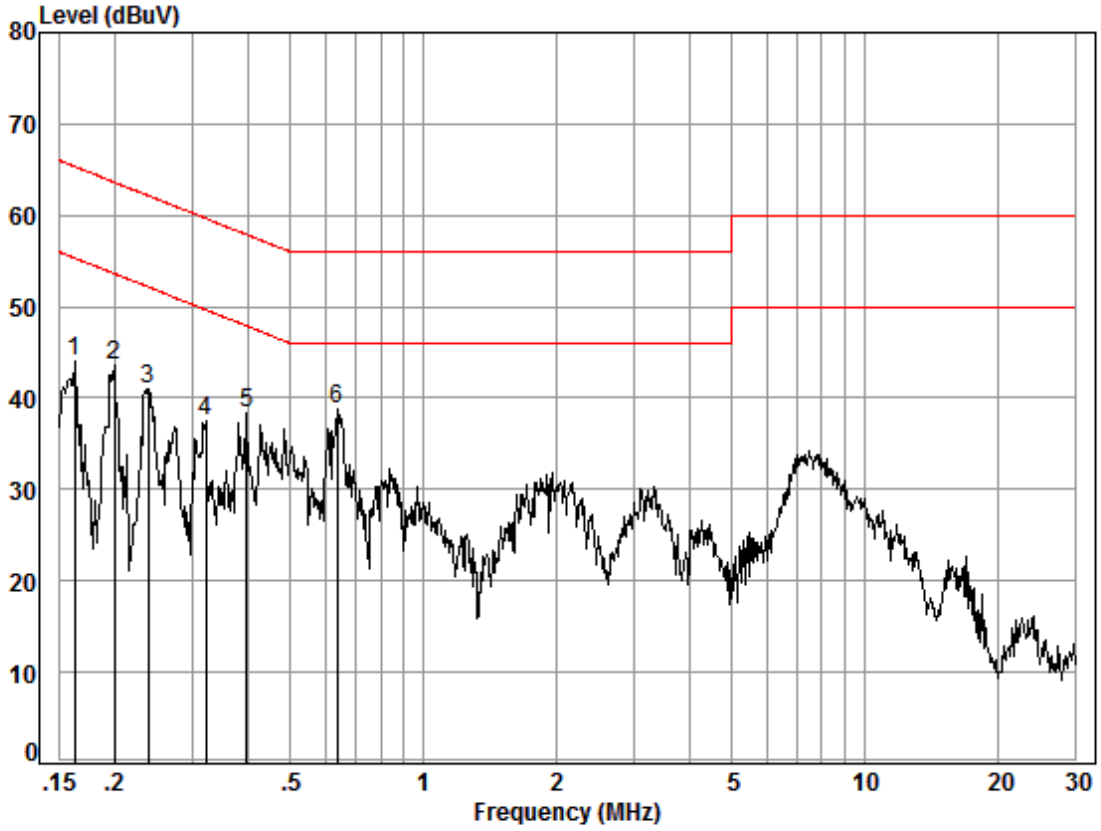


Site : Shielding Room
Condition: Line
Job No. : 07583CR
Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.02	9.52	32.37	41.91	55.47	-13.56	Peak
2	0.20	0.03	9.50	31.73	41.26	53.54	-12.28	Peak
3	0.28	0.03	9.51	30.97	40.51	50.85	-10.34	Peak
4	0.35	0.03	9.50	28.18	37.71	49.05	-11.34	Peak
5	0.50	0.04	9.49	28.92	38.45	46.05	-7.60	Peak
6	0.64	0.06	9.51	31.05	40.62	46.00	-5.38	Peak

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Mode:a; Line:Neutral Line



Site : Shielding Room
Condition: Neutral
Job No. : 07583CR
Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.02	9.59	34.51	44.12	55.34	-11.22	Peak
2	0.20	0.03	9.57	34.00	43.60	53.62	-10.02	Peak
3	0.24	0.03	9.58	31.40	41.01	52.17	-11.16	Peak
4	0.32	0.03	9.58	27.81	37.42	49.66	-12.24	Peak
5	0.40	0.04	9.59	28.68	38.31	47.90	-9.59	Peak
6	0.64	0.06	9.62	29.09	38.77	46.00	-7.23	Peak

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6.2 Radiated Emissions (30MHz-1GHz)

Test Requirement:	47 CFR Part 15, Subpart B
Test Method:	ANSI C63.4:2014
Frequency Range:	30MHz to 1GHz
Measurement Distance:	3m
Limit:	
30MHz -88MHz	40.0(dBμV/m) quasi-peak
88MHz-216MHz	43.5(dBμV/m) quasi-peak
216MHz-960MHz	46.0(dBμV/m) quasi-peak
960MHz-1000MHz	54.0(dBμV/m) quasi-peak
Detector:	Peak for pre-scan (120kHz resolution bandwidth) 30M to1000MHz

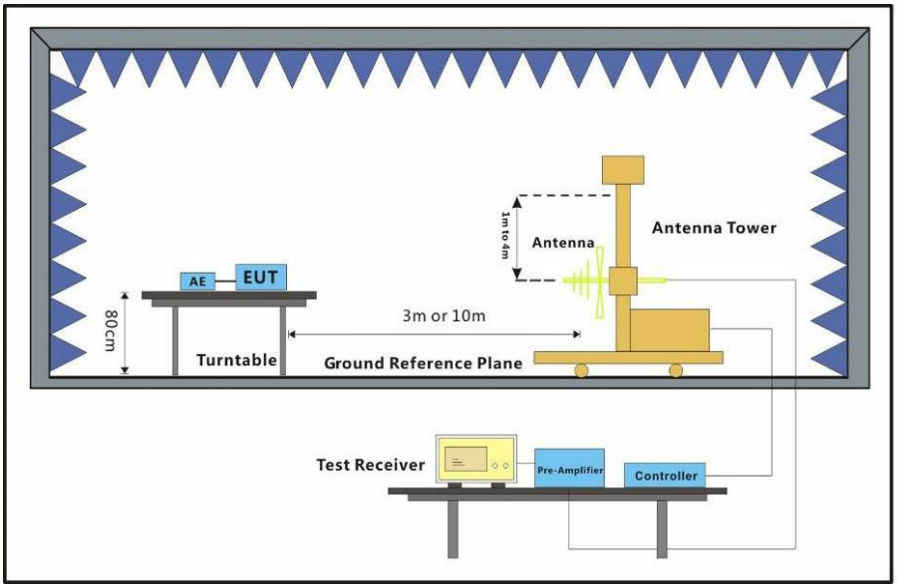
6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 59.3 % RH Atmospheric Pressure: 1000 mbar

Test mode a:Normal Working_Keep EUT working normally and being charged.

6.2.2 Test Setup Diagram

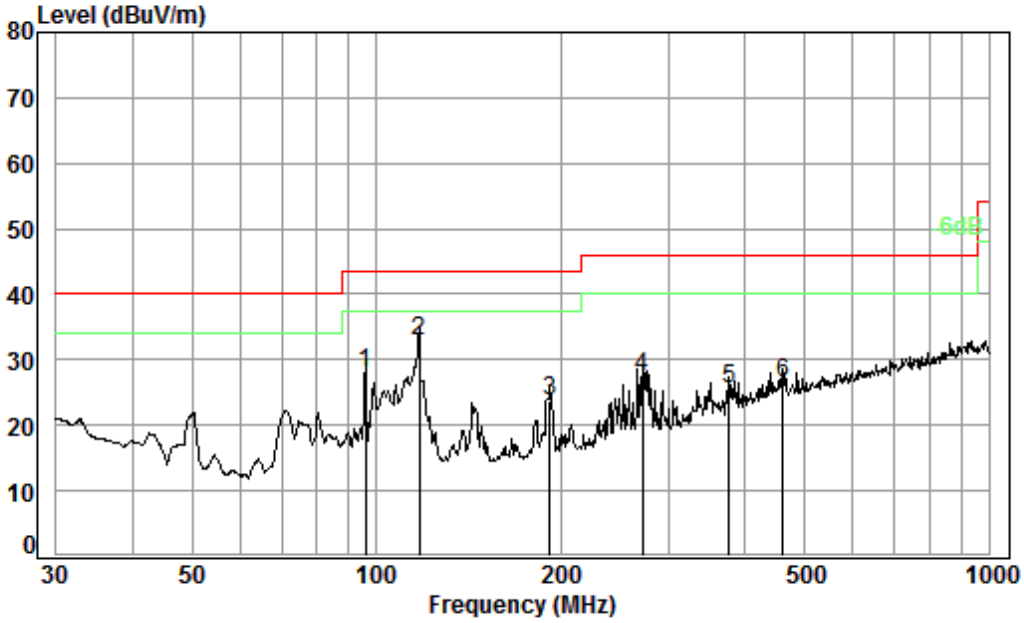


6.2.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

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Mode:a; Polarization:Horizontal

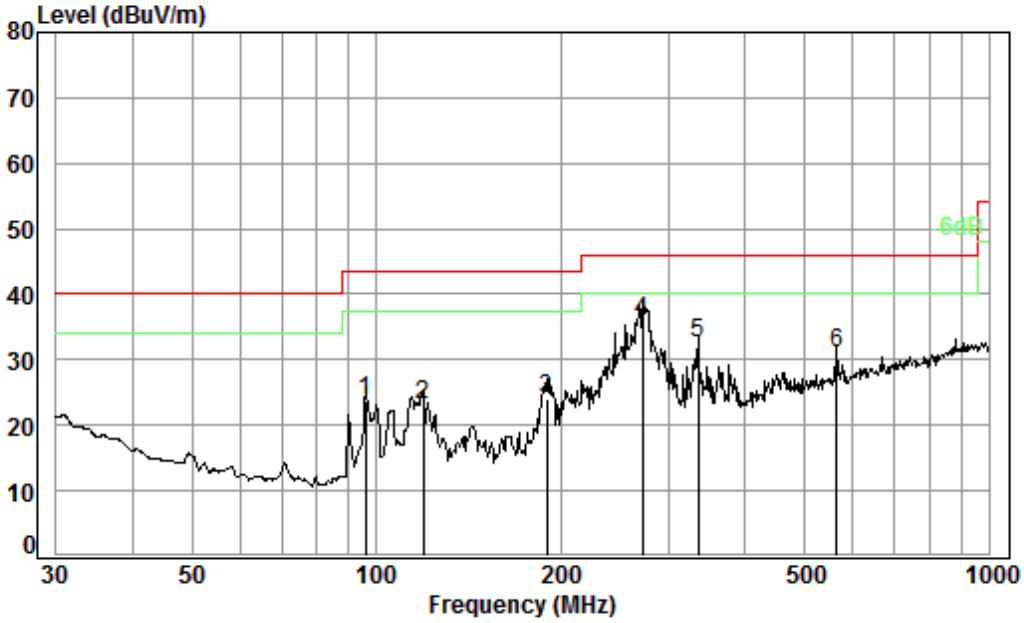


Condition: 3m VERTICAL
Job No. : 07583CR
Test mode: a

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	96.10	1.16	13.66	27.35	40.53	28.00	43.50	-15.50
2 pp	117.36	1.25	13.21	27.25	45.71	32.92	43.50	-10.58
3	191.75	1.39	16.26	26.93	33.02	23.74	43.50	-19.76
4	272.28	1.78	18.91	26.70	33.34	27.33	46.00	-18.67
5	377.26	2.14	21.83	27.07	28.60	25.50	46.00	-20.50
6	460.73	2.45	23.79	27.45	27.79	26.58	46.00	-19.42

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Mode:a; Polarization:Vertical



Condition: 3m HORIZONTAL
Job No. : 07583CR
Test mode: a

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	96.10	1.16	13.66	27.35	36.40	23.87	43.50	-19.63
2	119.44	1.25	13.12	27.24	36.05	23.18	43.50	-20.32
3	189.74	1.38	16.20	26.94	33.42	24.06	43.50	-19.44
4 pp	272.28	1.78	18.91	26.70	41.97	35.96	46.00	-10.04
5	334.86	2.01	20.67	26.85	36.62	32.45	46.00	-13.55
6	564.64	2.67	25.93	27.84	30.33	31.09	46.00	-14.91

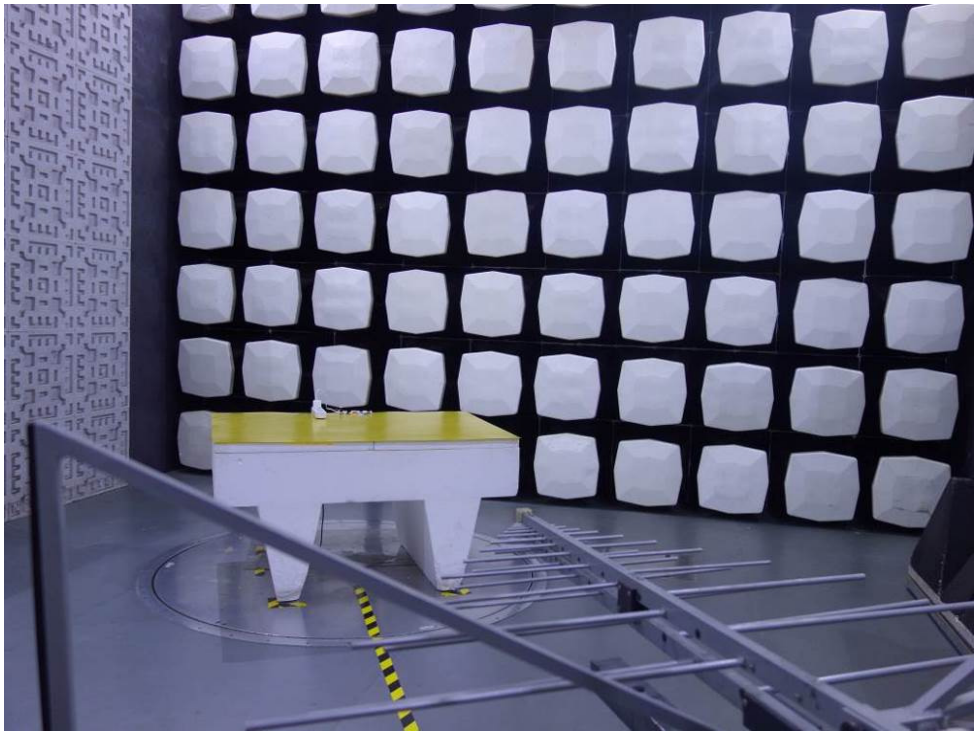
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7 Photographs

7.1 Conducted Emissions at Mains Terminals (150kHz-30MHz) Test Setup

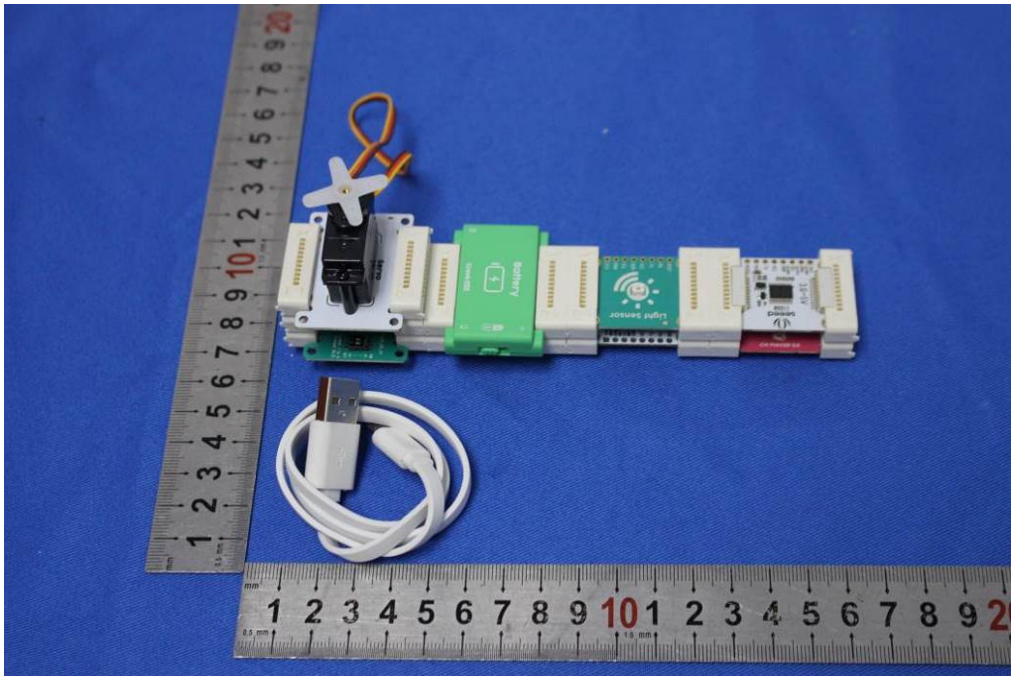


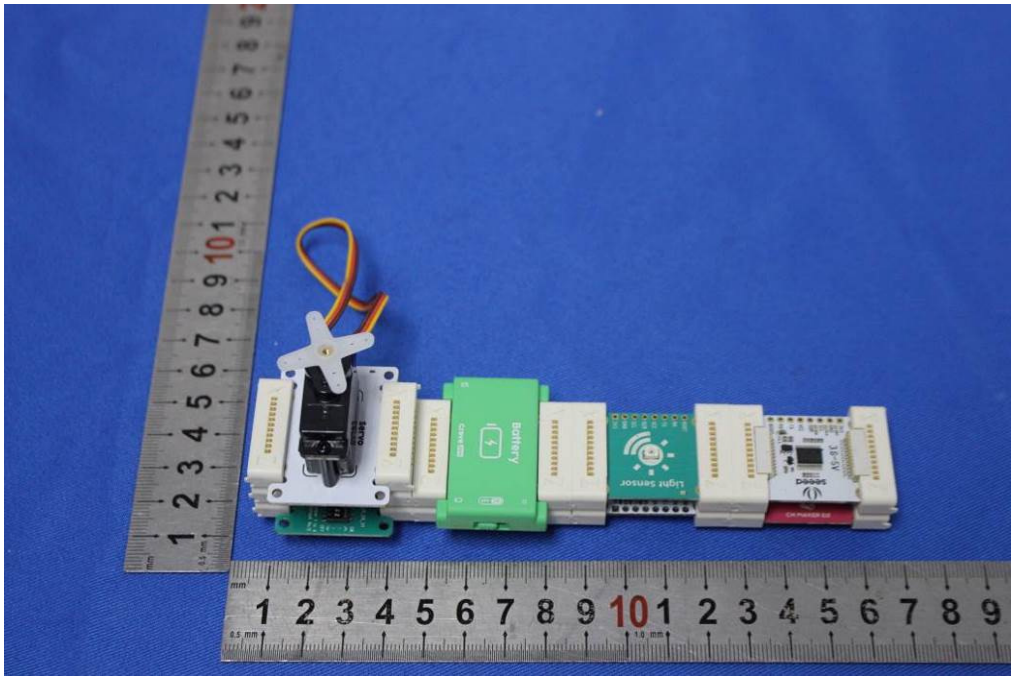
7.2 Radiated Emissions (30MHz-1GHz) Test Setup



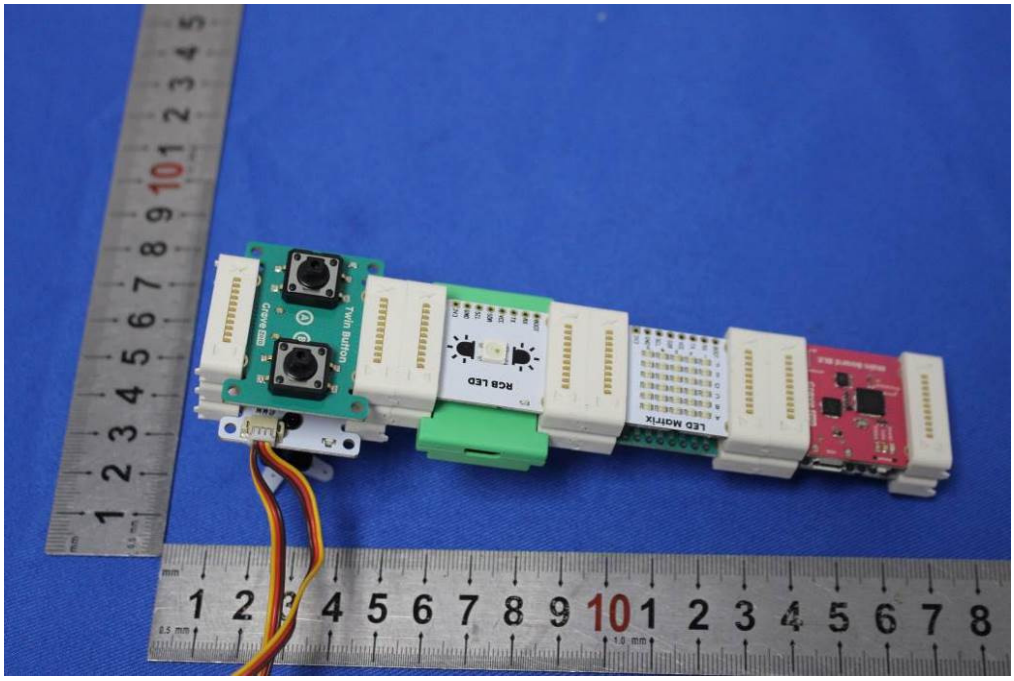
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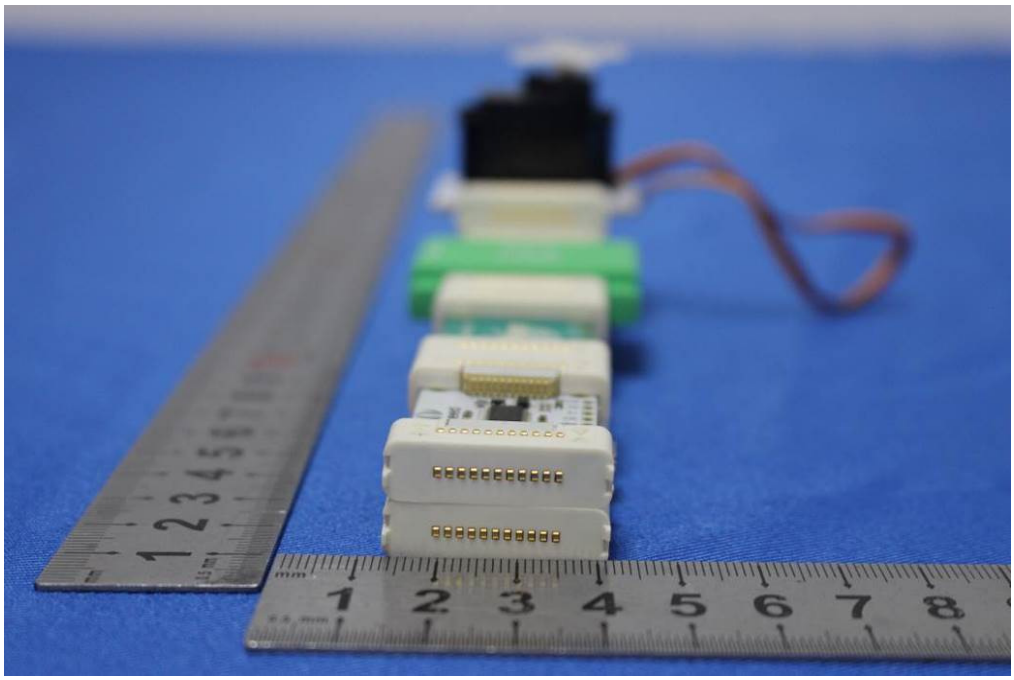
7.3 EUT Constructional Details (EUT Photos)



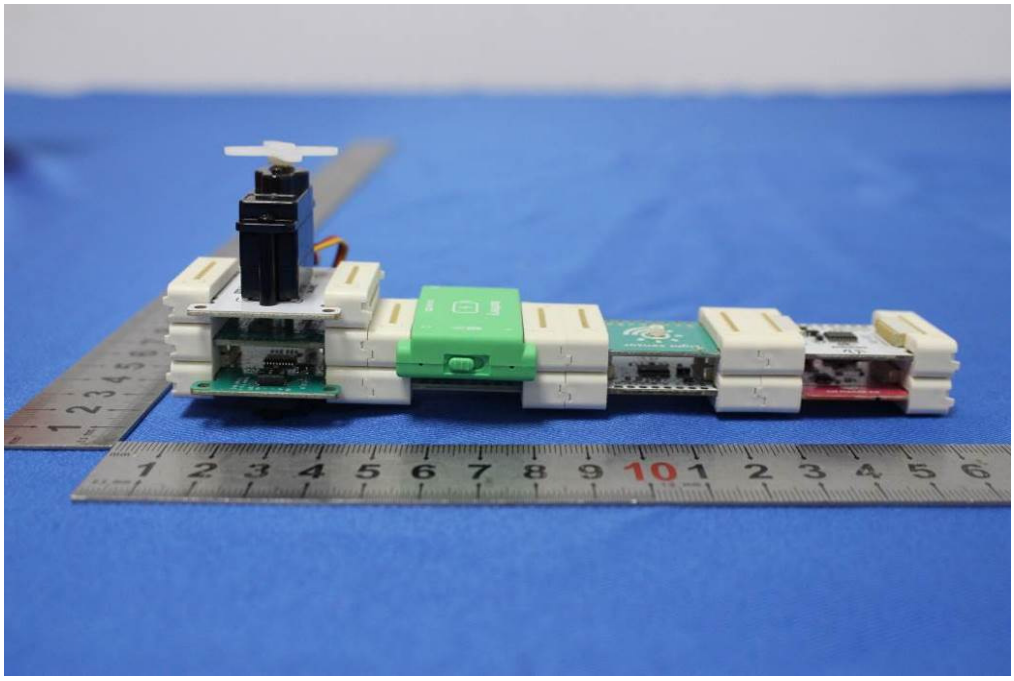


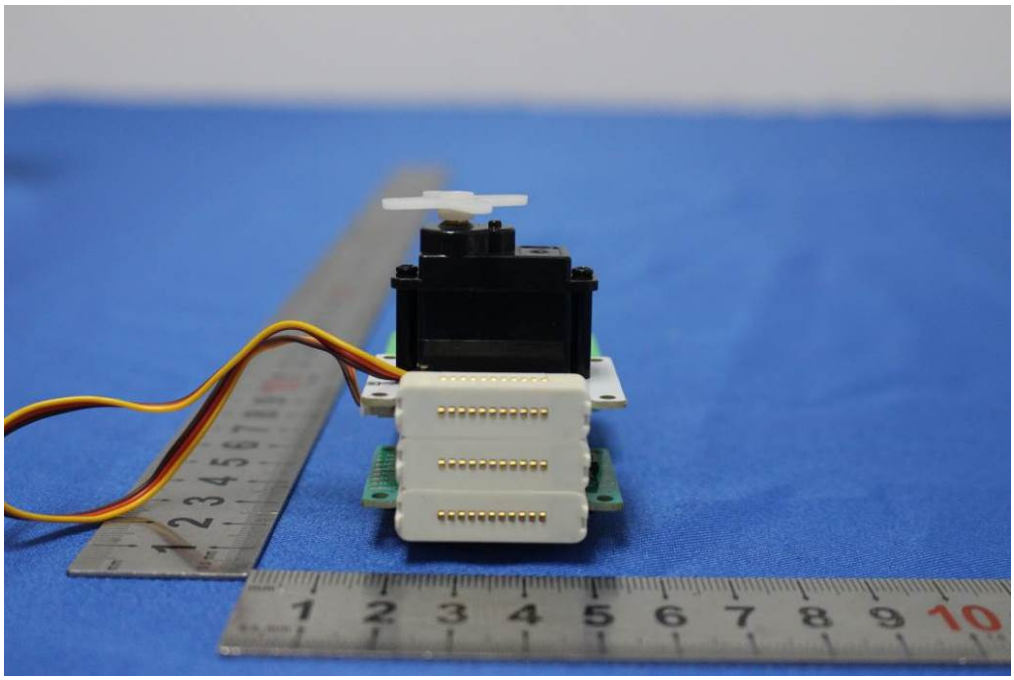
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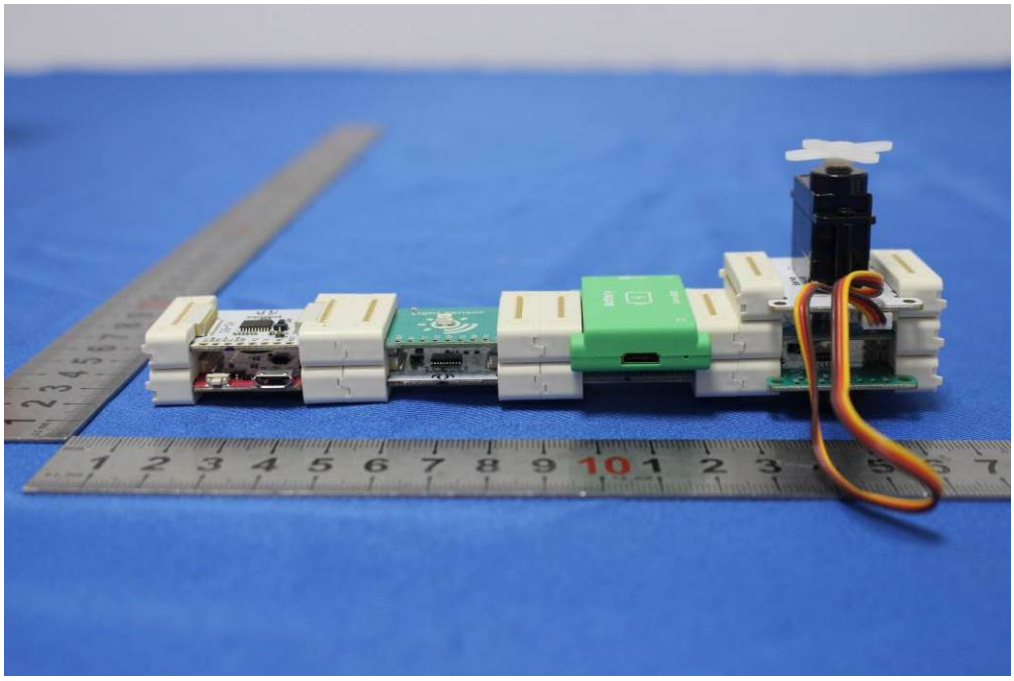


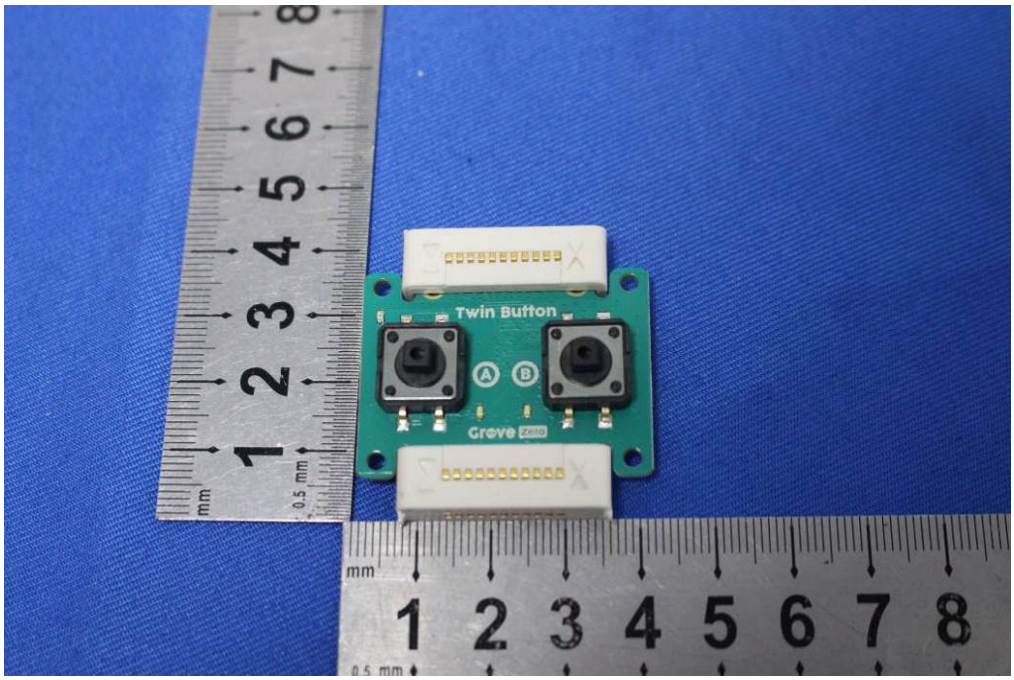
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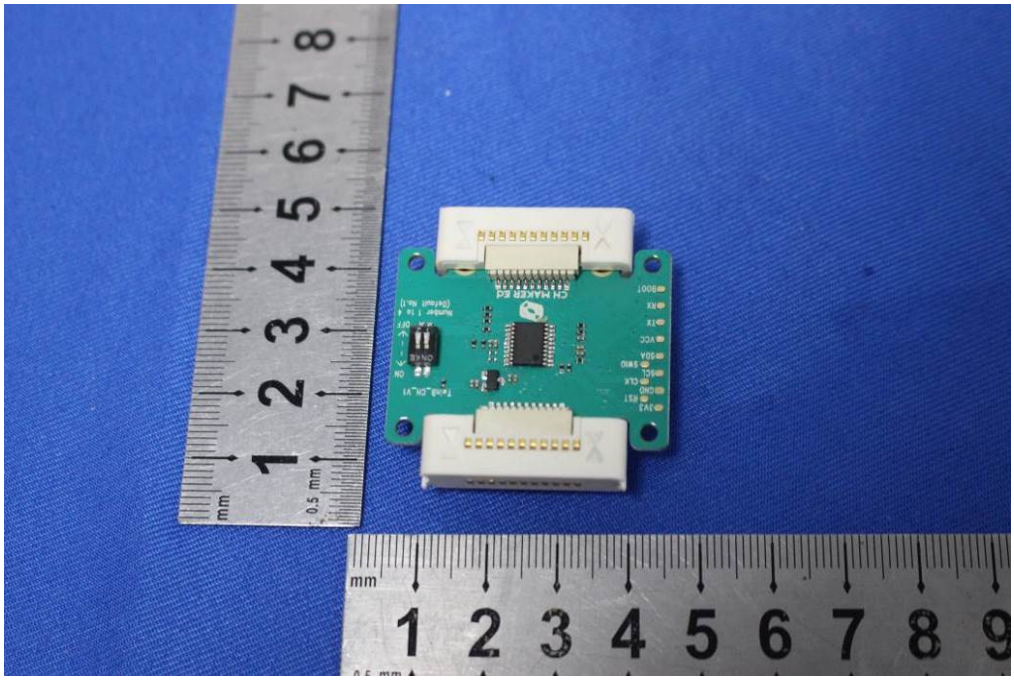


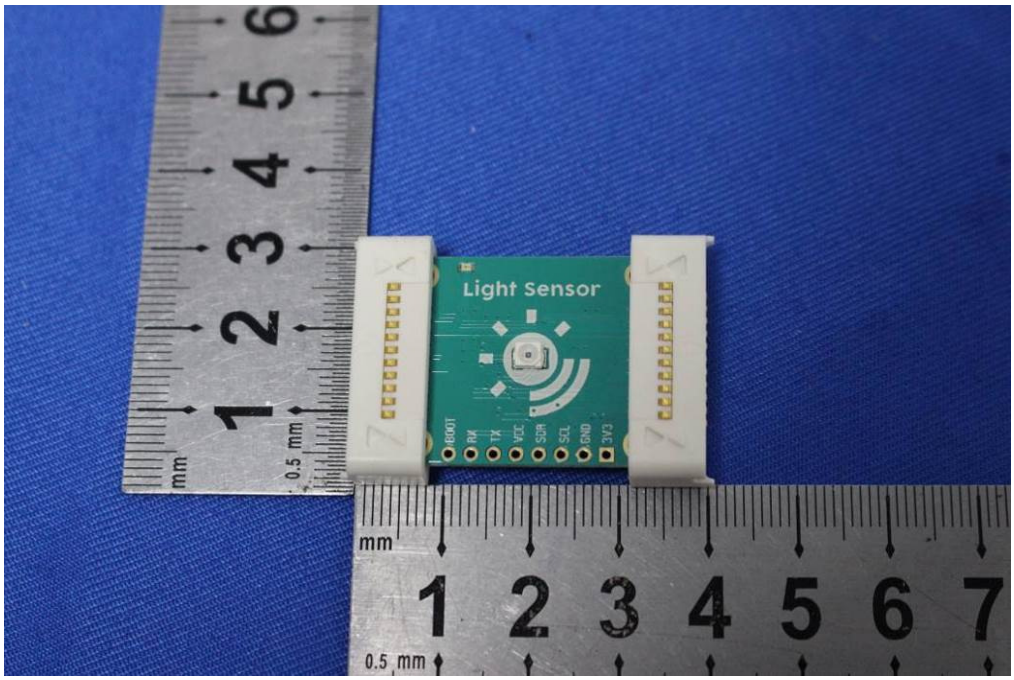
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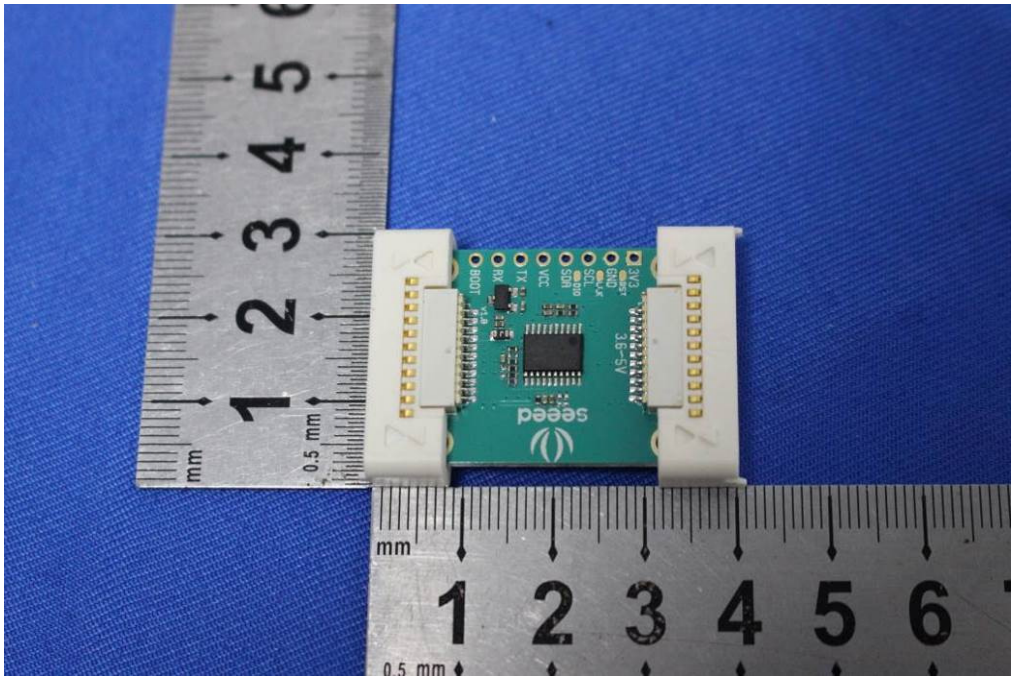


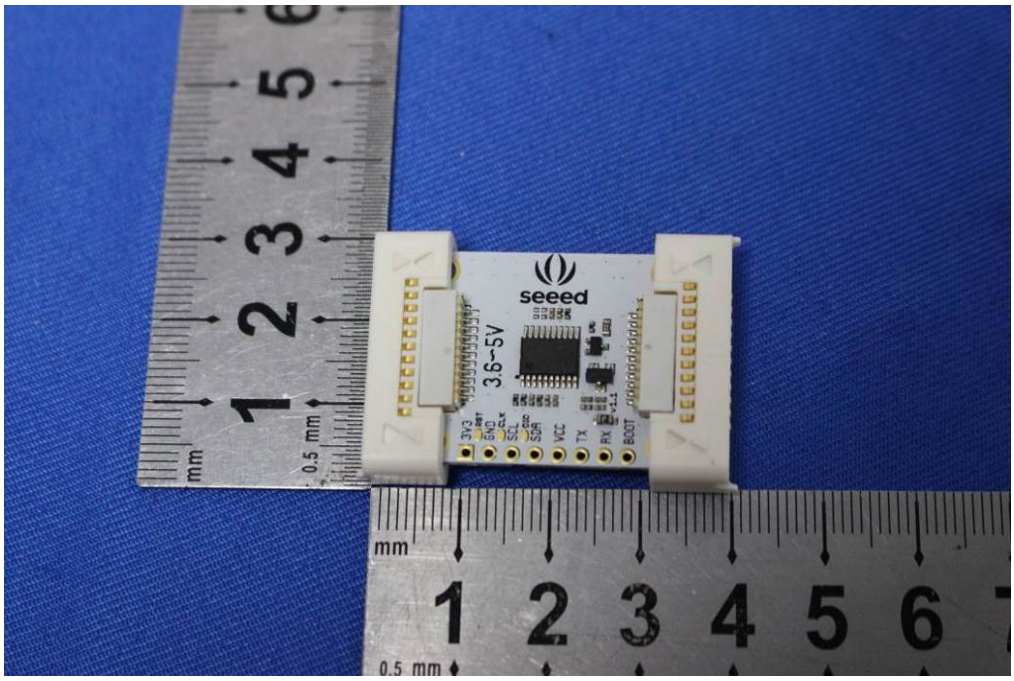
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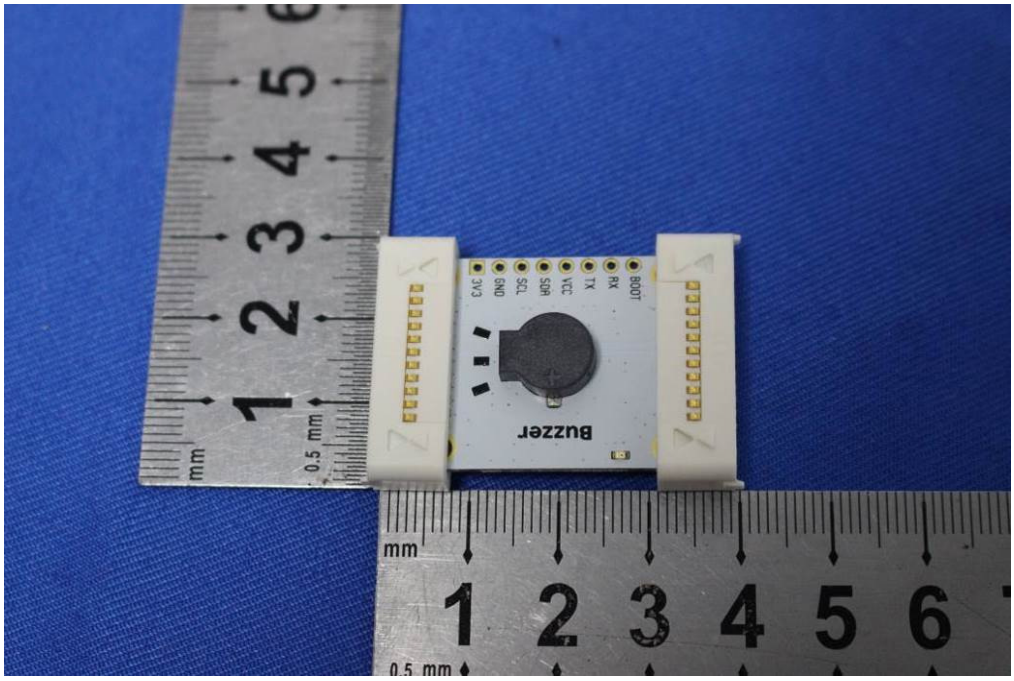


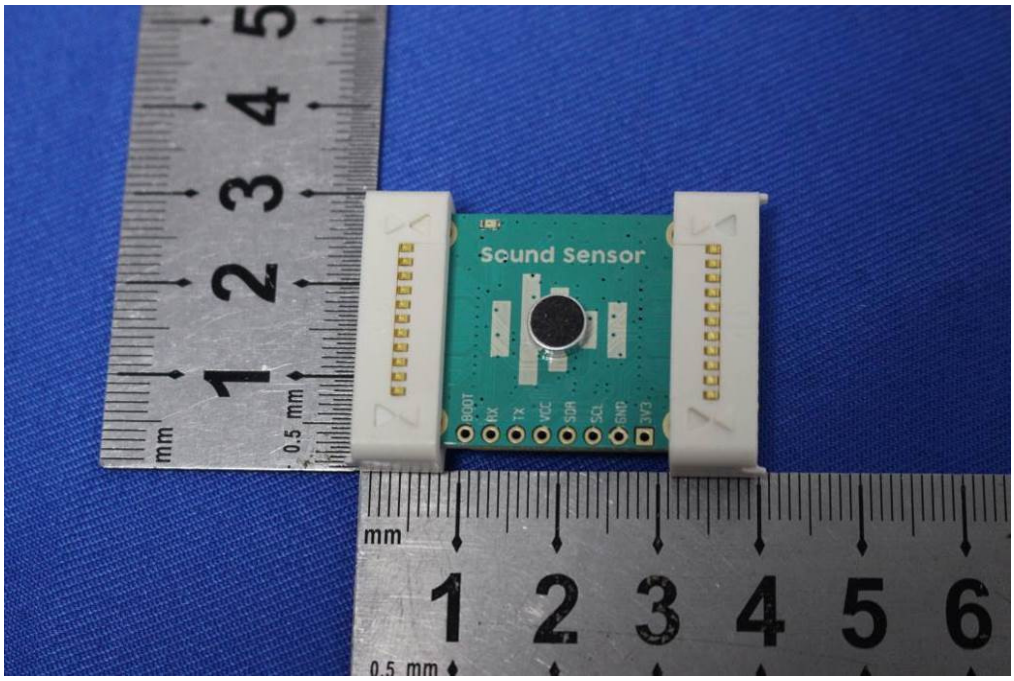
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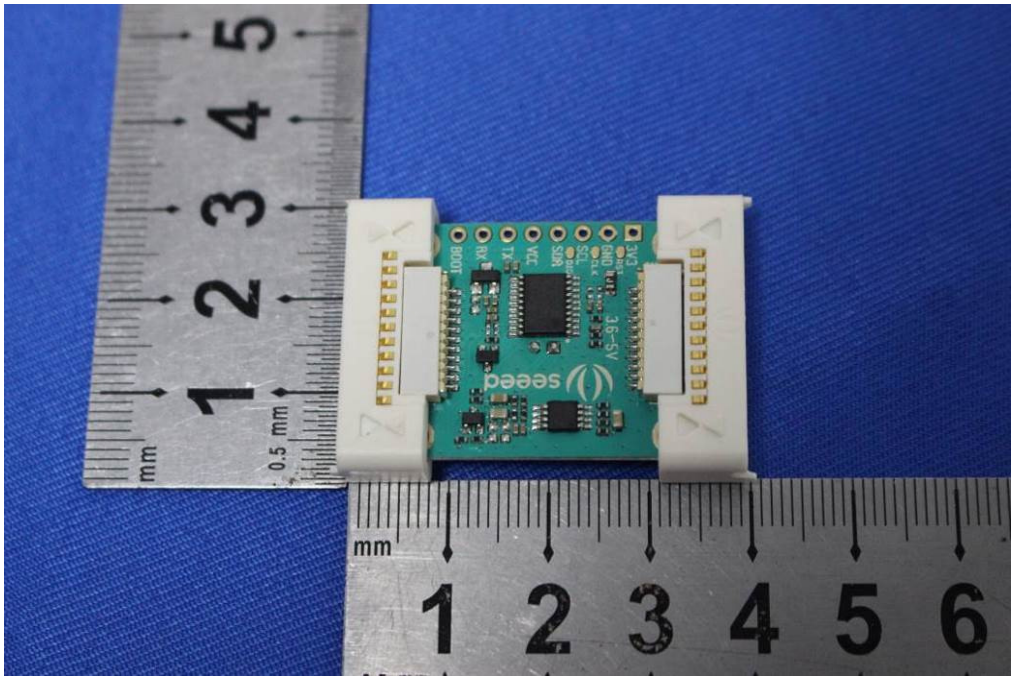


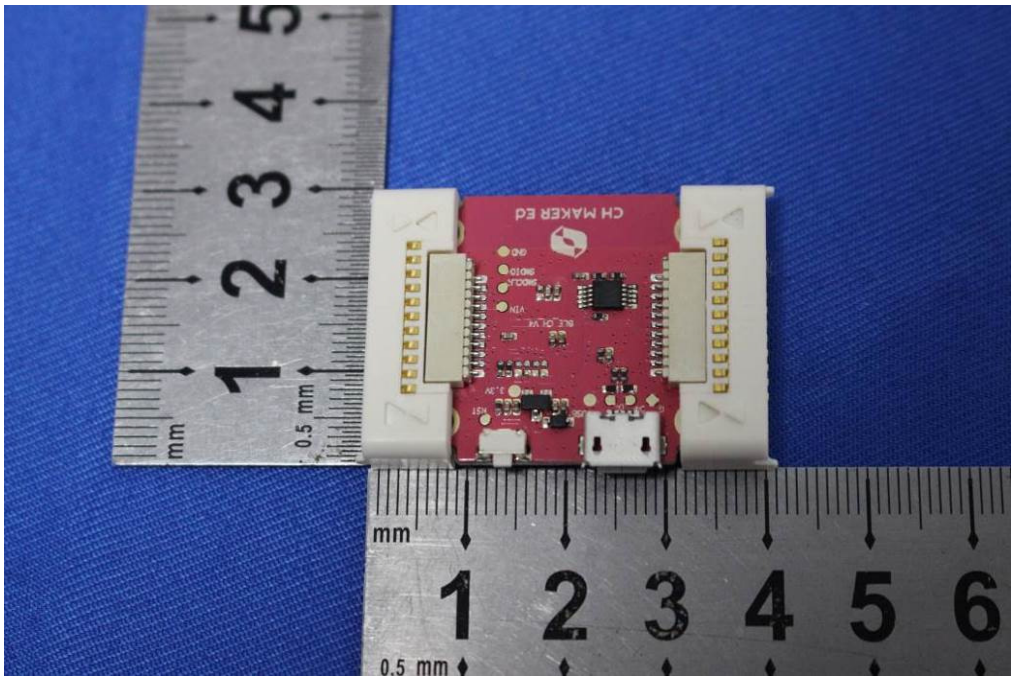
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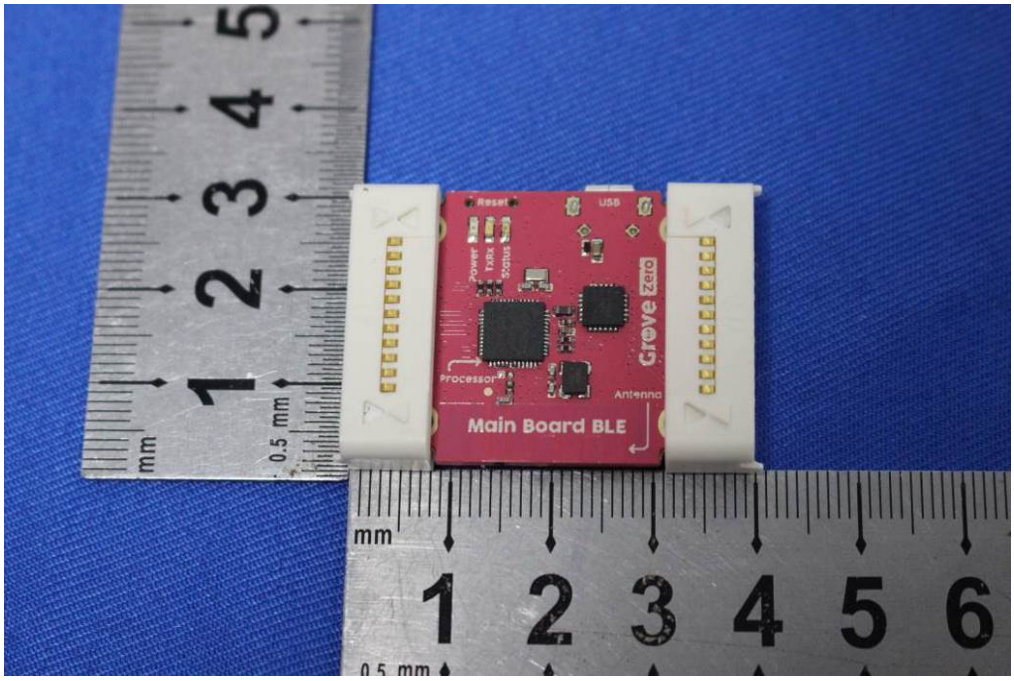


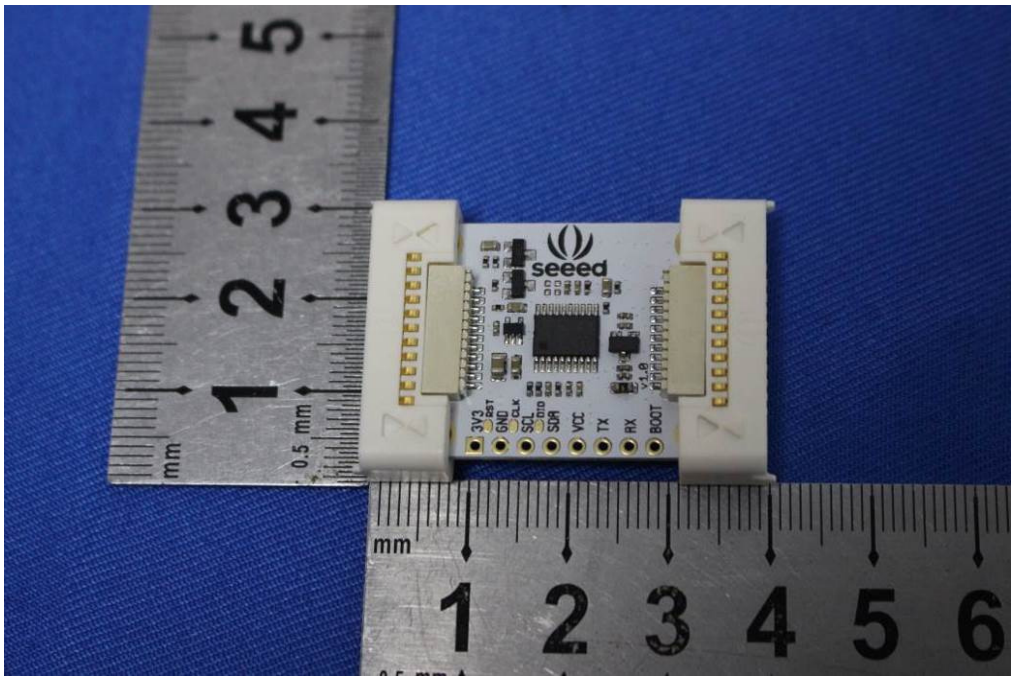
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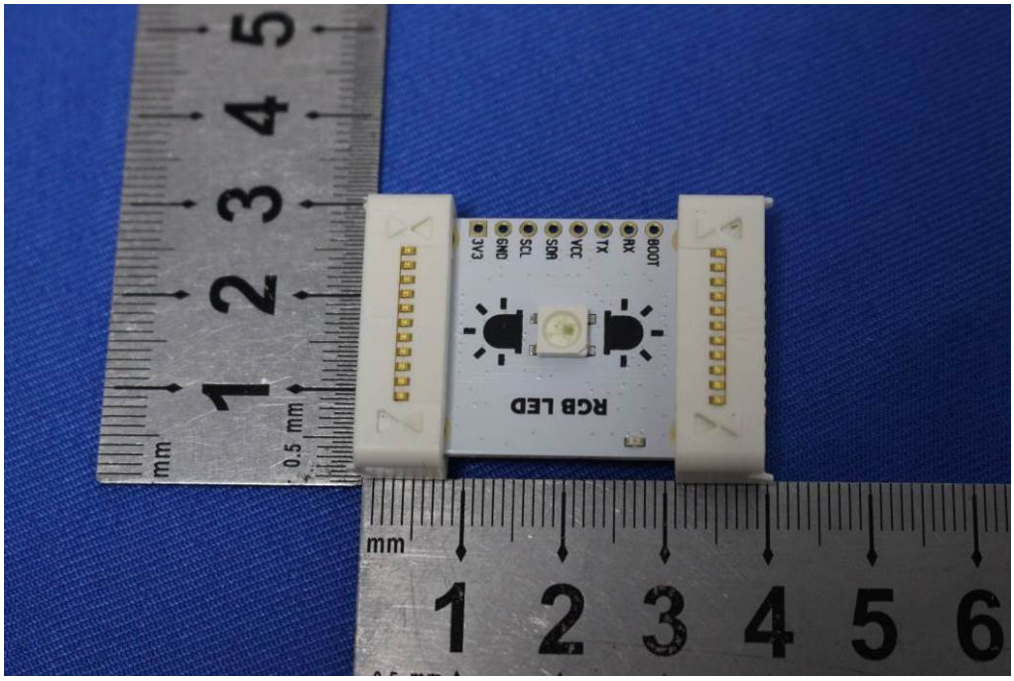


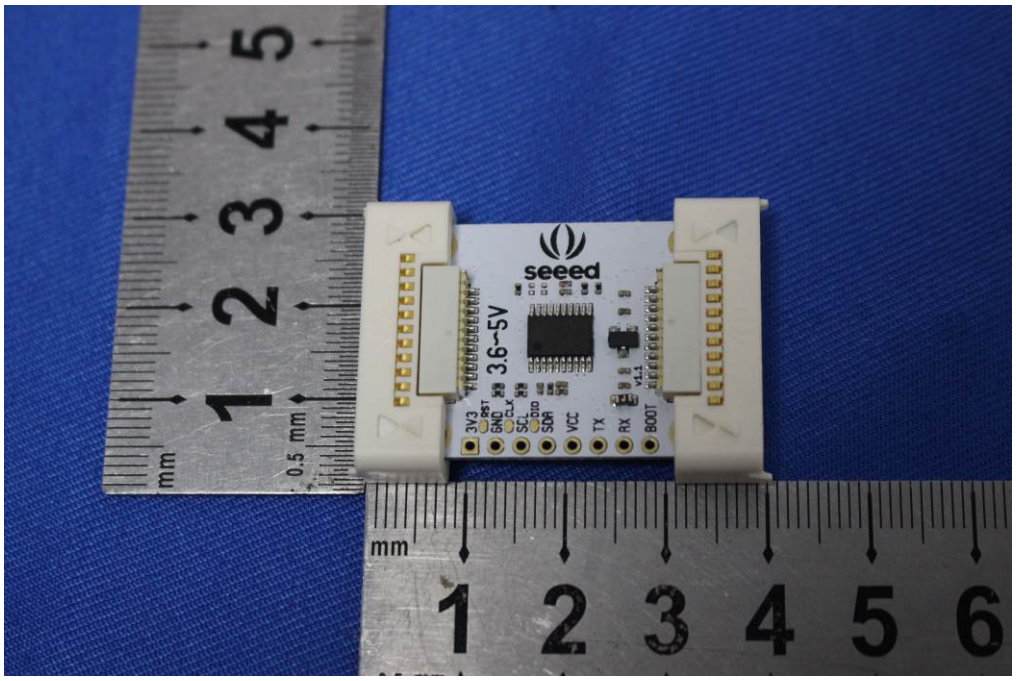
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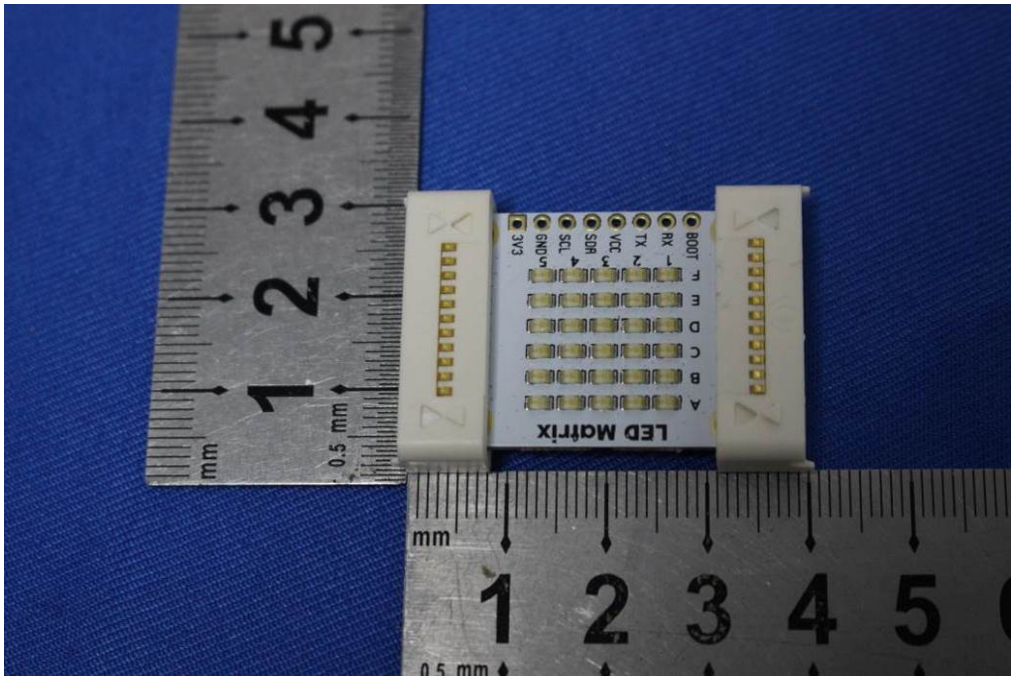


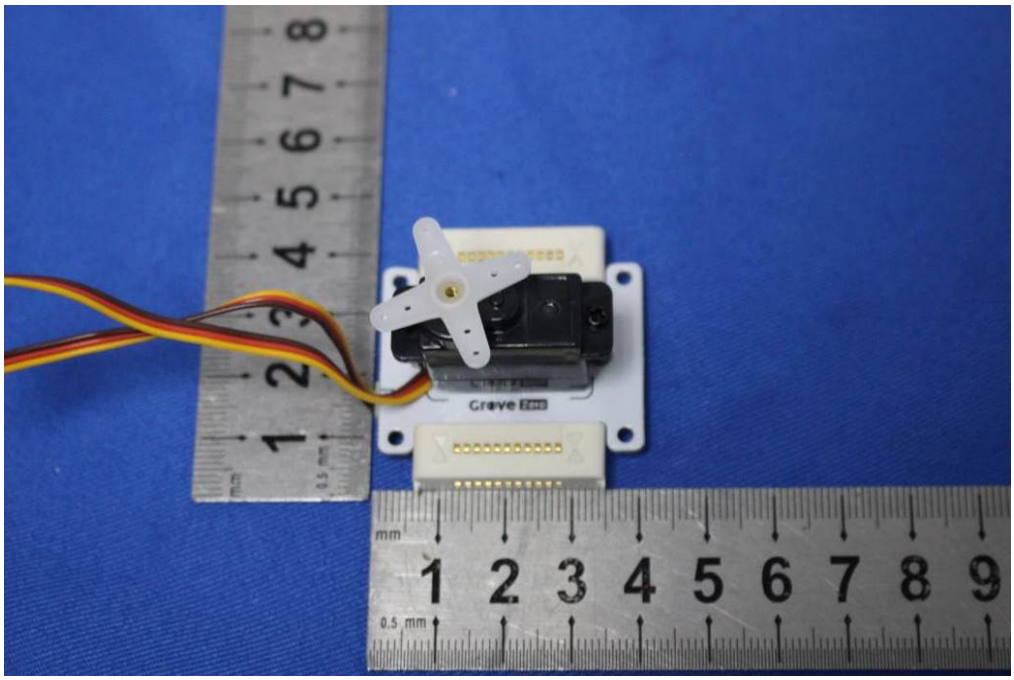
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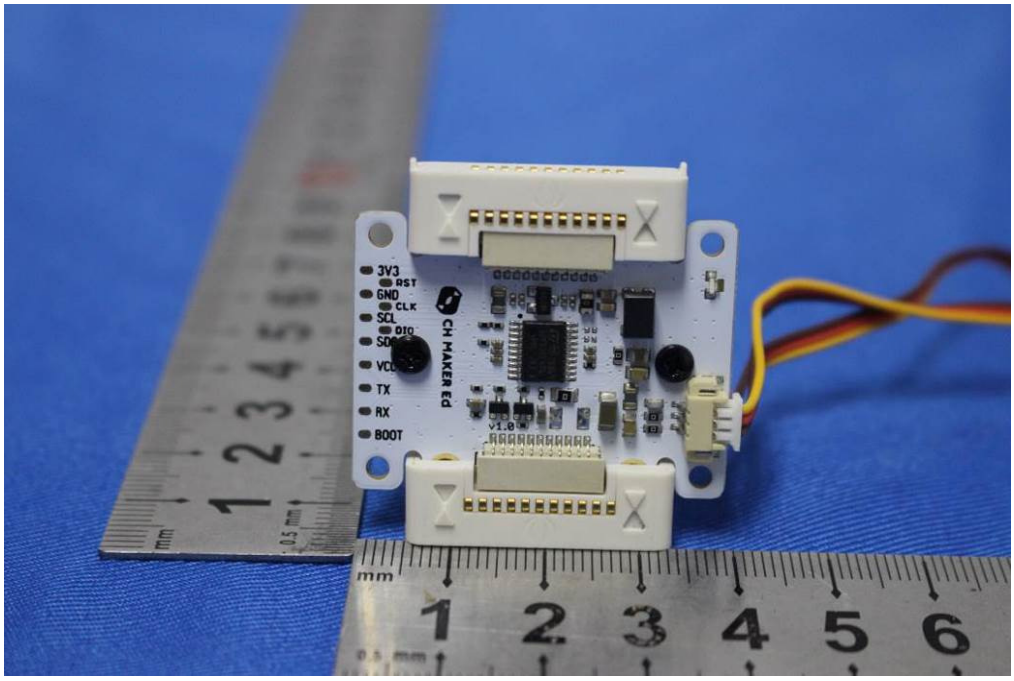


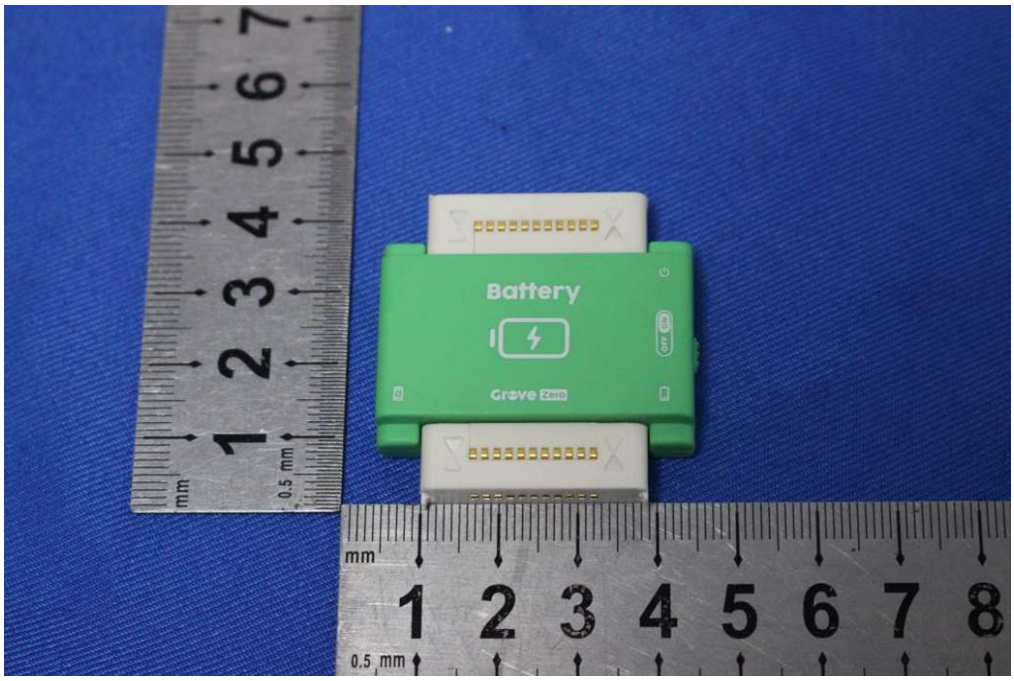
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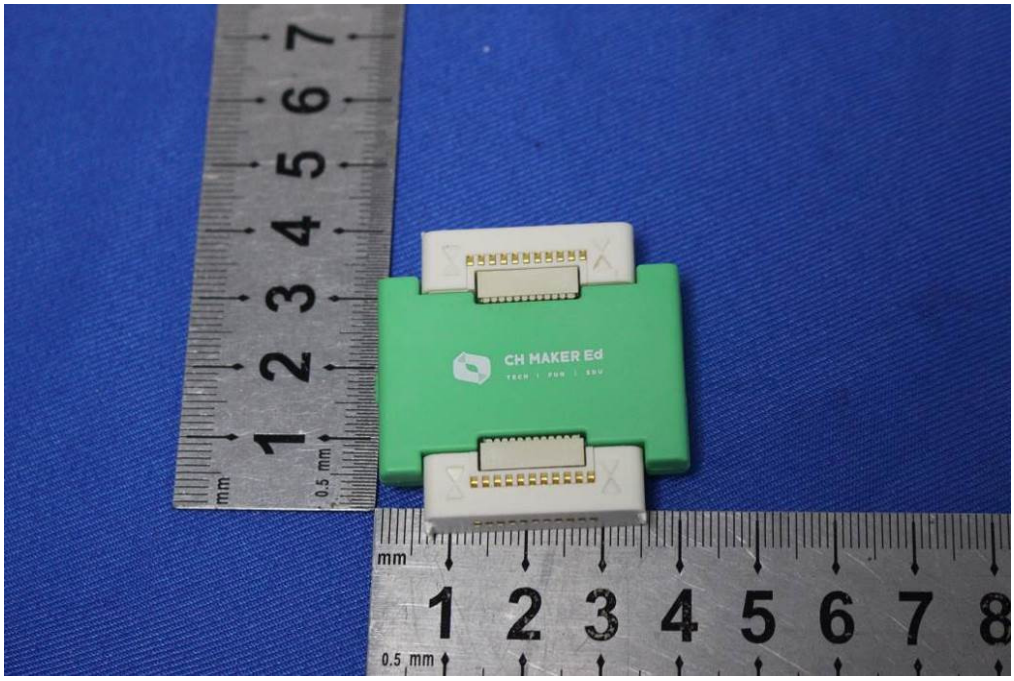


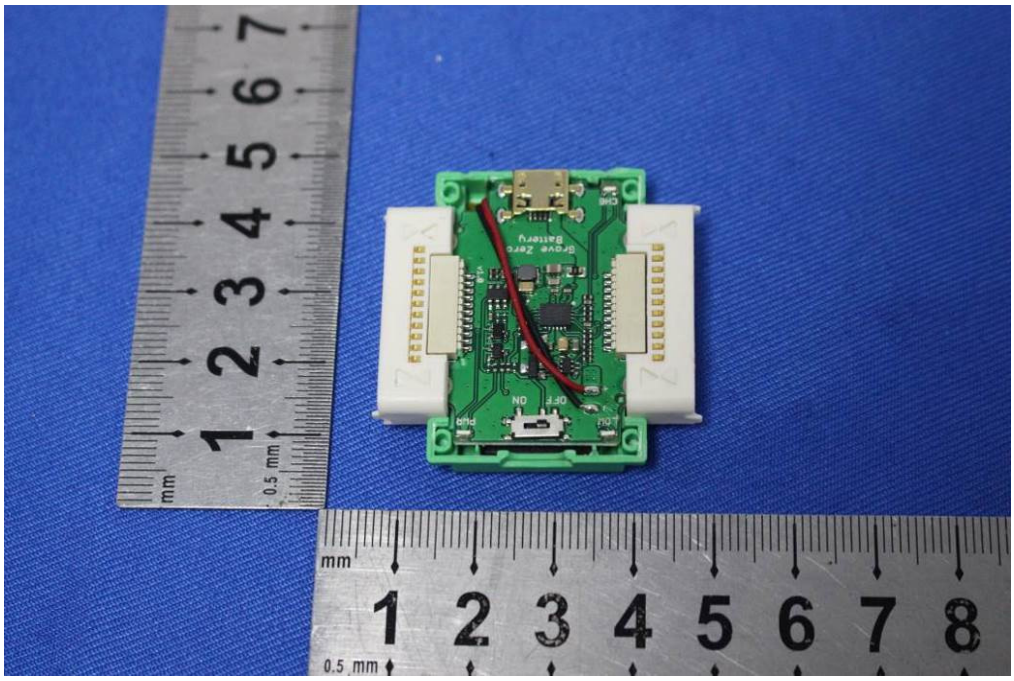
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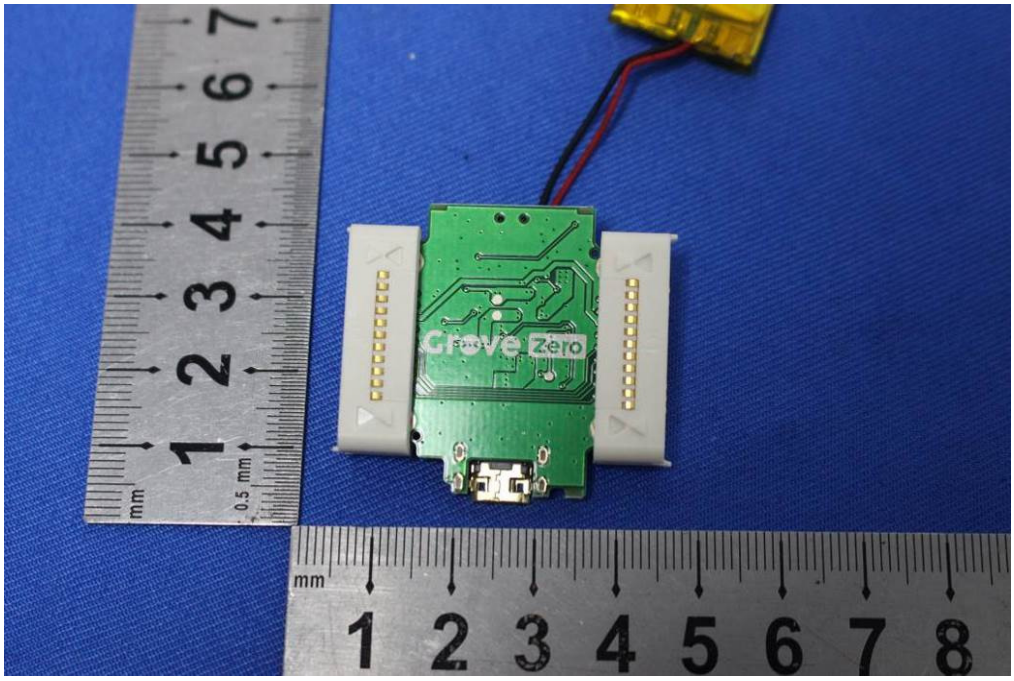


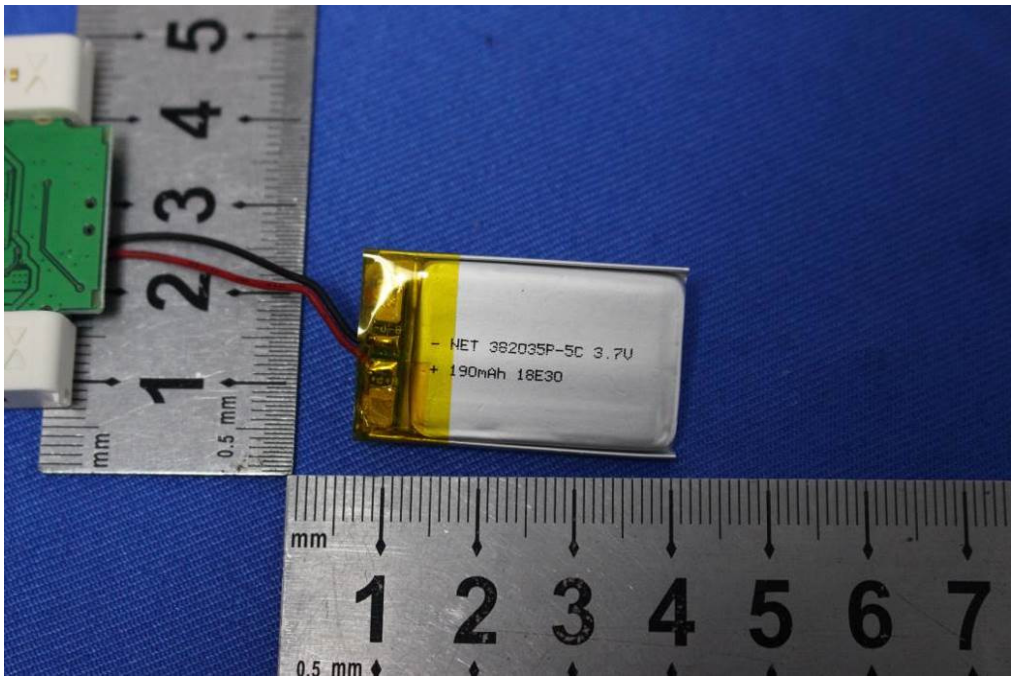
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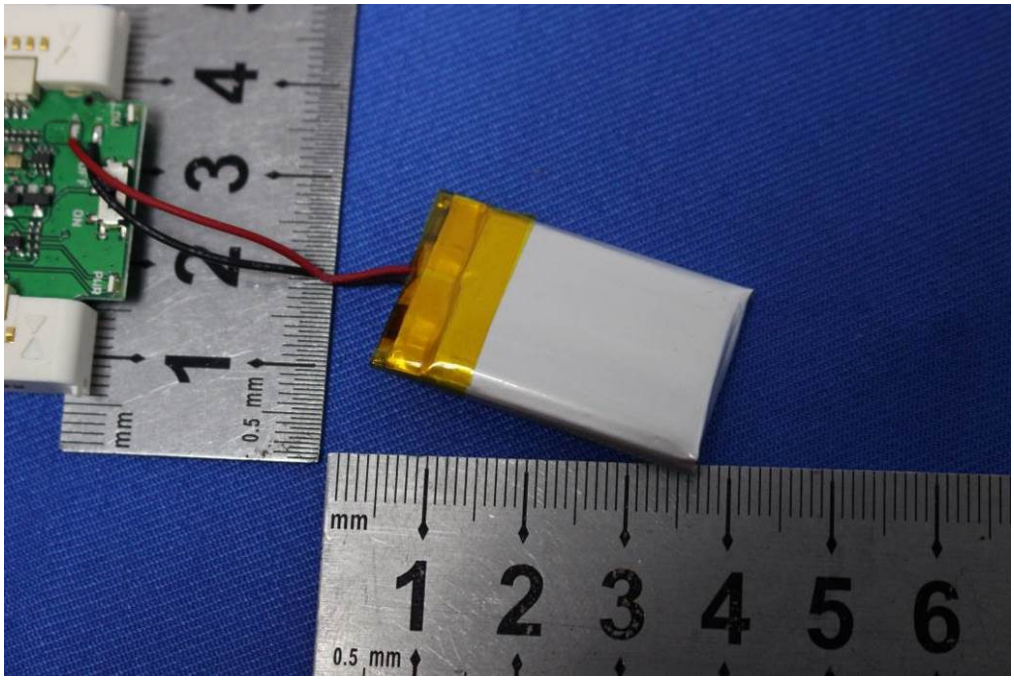


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- End of the Report -

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