Shenzhen CTA Testing Technology Co., Ltd.

Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

TEST REPORT

Report Reference No.....:	**CTA24081301703**
Compiled by (position+printed name+signature)..:	File administrators Jinghua Xiao
Supervised by (position+printed name+signature)..:	Project Engineer Xudong Zhang
Approved by (position+printed name+signature)..:	RF Manager Eric Wang
Date of issue.....:	Aug. 27, 2024
Testing Laboratory Name .....:	**Shenzhen CTA Testing Technology Co., Ltd.**
Address.....:	Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China
Applicant's name.....:	**STEAM Academy PRO PBC**
Address.....:	16192 Coastal Highway, Lewes, DE 19958
Test specification ..... **:**	
Standard .....:	**ETSI EN 301 489-1 V2.2.3 (2019-11)** **ETSI EN 301 489-17 V3.2.4 (2020-09)** **EN 55032:2015+AC:2016+A1:2020+A11:2020** **EN 55035:2017+A11:2020** **EN IEC 61000-3-2:2019/A2:2024** **EN 61000-3-3:2013/A2:2021/AC:2022**

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Test item description .....:	**Revolution Robotics Challenge Kit**
Trade Mark .....:	Revolution Robotics 88129312
Manufacturer .....:	Shenzhen Sunbloom Technology Company Limited
Model/Type reference.....:	SA-RR-CK 2.0
List Model .....:	N/A
Hardware version .....:	V1.0
Software version.....:	V1.0
Ratings.....:	DC 3.7V From battery 1 DC 7.2V From battery 2 DC 5.0V From external circuit
Result.....:	**PASS**

TEST REPORT

Equipment under Test	:	Revolution Robotics Challenge Kit
Model /Type	:	SA-RR-CK 2.0
Listed Models	:	N/A
Applicant	:	**STEAM Academy PRO PBC**
Address	:	16192 Coastal Highway, Lewes, DE 19958
Manufacturer	:	**Shenzhen Sunbloom Technology Company Limited**
Address	:	Room 801A, 8F, A7 Building, Tianrui Industrial Park, No. 35 Fuyuanyi Rd, Baoan district, Shenzhen City, Guangdong, China 518103

Test Result	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. TEST STANDARDS

The tests were performed according to following standards:

ETSI EN 301 489-1 V2.2.3 (2019-11)–ElectroMagnetic Compatibility (EMC) tandard for radio equipment and services;Part 1: Common technical requirements;Harmonised Standard for ElectroMagnetic Compatibility
Draft ETSI EN 301 489-17 V3.2.4 (2020-09)–ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility
EN 55032:2015+AC:2016+A1:2020+A11:2020- Electromagnetic compatibility of multimedia equipment - Emission Requirements
EN 55035:2017+A11:2020- Electromagnetic compatibility of multimedia equipment - Immunity requirements
EN IEC 61000-3-2:2019/A2:2024-Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase)
EN 61000-3-3:2013/A2:2021/AC:2022- Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Aug. 20, 2024
Testing commenced on	:	Aug. 20, 2024
Testing concluded on	:	Aug. 27, 2024

2.2. Product Description

Product Name:	Revolution Robotics Challenge Kit
Model/Type reference:	SA-RR-CK 2.0
Power supply:	DC 3.7V From battery 1 DC 7.2V From battery 2 DC 5.0V From external circuit
Adapter information (Auxiliary test supplied by test Lab）:	Model: EP-TA20CBC Input: AC 100-240V 50/60Hz Output: DC 5V 2A
WIFI	
WLAN	Supported 802.11b/802.11g/802.11n HT20
WLAN CE Operation frequency	IEEE 802.11b:2412-2472MHz IEEE 802.11g:2412-2472MHz IEEE 802.11n HT20:2412-2472MHz
WLAN CE Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
Channel number:	13
BLE	
Bluetooth:	Supported BLE
Operation frequency:	2402MHz-2480MHz
Modulation Type:	GFSK
Channel separation:	2MHz
Channel number:	40

2.3. EUT operation mode

Test mode	WIFI	BT	Adapter
1	■		■
2		■	■

Note:
1. ■ is operation mode.
2. Note：We tested all Modes and recorded the worst case as follow:

Test item	Test mode (Worse case mode)
Conducted emission	Mode 1
Conducted emission(LAN)	Mode 1
Radiated emission	Mode 1
EMS	Mode 1

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer
○ - supplied by the lab

○	/	M/N:	/
		Manufacturer:	/

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen CTA Testing Technology Co., Ltd.
Room 106, Building 1, Yibaolai Industrial Park, Qiaotou Community, Fuhai Street, Bao'an District, Shenzhen, China

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:
FCC-Registration No.: 517856 Designation Number: CN1318

Shenzhen CTA Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6534.01

Shenzhen CTA Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3. Environmental conditions

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

Normal Temperature:	25°C
Lative Humidity	55 %
Air Pressure	989 hPa

3.4. Test Description

Emission Measurement		
Radiated Emission	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+AC:2016+A1:2020+A11:2020	PASS
Conducted Emission(AC Mains)	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+AC:2016+A1:2020+A11:2020	PASS
Harmonic Current Emissions	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN IEC 61000-3-2:2019/A2:2024	N/A
Voltage Fluctuations and Flicker	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 61000-3-3:2013/A2:2021/AC:2022	N/A
Immunity Measurement		
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
Fast Transients Common Mode	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
RF Common Mode 0,15 MHz to 80 MHz	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS

Voltage Dips and Interruptions	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS
Surges	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55035:2017+A11:2020	PASS

Remark:1. N/A means “not applicable”.
2.The measurement uncertainty is not included in the test result.

3.5. 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 Shenzhen Global Test Service Co.,Ltd 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 Shenzhen Global Test Service Co.,Ltd for Products Quality is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	9KHz~30MHz	3.02 dB	(1)
Radiated Emission	30~1000MHz	4.06 dB	(1)
Radiated Emission	1~18GHz	5.14 dB	(1)
Radiated Emission	18-40GHz	5.38 dB	(1)
Conducted Disturbance	0.15~30MHz	2.14 dB	(1)
Output Peak power	30MHz~18GHz	0.55 dB	(1)
Power spectral density	/	0.57 dB	(1)
Spectrum bandwidth	/	1.1%	(1)
Radiated spurious emission (30MHz-1GHz)	30~1000MHz	4.10 dB	(1)
Radiated spurious emission (1GHz-18GHz)	1~18GHz	4.32 dB	(1)
Radiated spurious emission (18GHz-40GHz)	18-40GHz	5.54 dB	(1)

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

3.6. Equipments Used during the Test

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	EMI Test Receiver	R&S	ESPI	CTA-307	2024/08/03	2025/08/02
2	Artificial Mains	R&S	ENV-216	CTA-308	2024/08/03	2025/08/02
3	Artificial Mains	R&S	ENV-216	CTA-314	2024/08/03	2025/08/02
4	ISN	Schwarzbeck	NTFM8158	CTA-407	2024/08/03	2025/08/02
5	ISN	Schwarzbeck	CAT58158	CTA-408	2024/08/03	2025/08/02
6	ISN	Schwarzbeck	CAT38158	CTA-409	2024/08/03	2025/08/02
7	Universal Radio Communication	R&S	CMW500	CTA-302	2024/08/03	2025/08/02
8	EMI Test Software	Tonscend	TS®JS32-CE	N/A	N/A	N/A

Harmonic Current/ Voltage Fluctuation and Flicker						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	Harmonic and Flicker Analyzer	Voltech	PM6000	CTA-339	2024/08/03	2025/08/02
2	Universal Radio Communication	R&S	CMW500	CTA-302	2024/08/03	2025/08/02

Electrostatic Discharge						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	ESD Simulators	NOISEKEN	ESS-100L(A)	CTA-315	2024/08/03	2025/08/02
2	Universal Radio Communication	R&S	CMW500	CTA-302	2024/08/03	2025/08/02

Radiated Emission						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	Ultra-Broadband Antenna	Schwarzbeck	VULB9163	CTA-310	2023/10/17	2024/10/16
2	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	CTA-306	2024/08/03	2025/08/02
3	Horn Antenna	Schwarzbeck	BBHA 9120D	CTA-309	2023/10/13	2024/10/12
4	Universal Radio Communication	CMW500	R&S	CTA-302	2024/08/03	2025/08/02
5	Band-reject filter	Xi'an Xingbo Technology Co.,Ltd	XBLBQ-DZA66	CTA-410	2024/08/03	2025/08/02
6	Band-reject filter	Xi'an Xingbo Technology Co.,Ltd	XBLBQ-DZA64	CTA-411	2024/08/03	2025/08/02
7	Band-reject filter	Xi'an Xingbo Technology Co.,Ltd	XBLBQ-DZA63	CTA-411	2024/08/03	2025/08/02
8	High-pass filter	Xi'an Xingbo Technology Co.,Ltd	XBLBQ-GTA10	CTA-412	2024/08/03	2025/08/02
9	High-pass filter	Xi'an Xingbo Technology Co.,Ltd	XBLBQ-GTA18	CTA-402	2024/08/03	2025/08/02
10	EMI Test Software	Tonscend	TS®JS32-RE	N/A	N/A	N/A

Electrical Fast Transient						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	Fast Transient Burst Simulator	Prima	EFT61004TA	CTA-316	2024/08/03	2025/08/02
2	Coupling Clamp	Prima	EFT-CLAMP	CTA-317	2024/08/03	2025/08/02

3	Universal Radio Communication	R&S	CMW500	CTA-302	2024/08/03	2025/08/02

Surge						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	Lightning Surge Generator	Prima	SUG61005TB	CTA-318	2024/08/03	2025/08/02
2	Lightning Surge Generator	Prima	SUG10/700TA	CTA-319	2024/08/03	2025/08/02
3	Universal Radio Communication	R&S	CMW500	CTA-302	2024/08/03	2025/08/02

Dips						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	Cycle Sag Simulator	Prima	DRP61011TA	CTA-321	2024/08/03	2025/08/02
2	Universal Radio Communication	R&S	CMW500	CTA-302	2024/08/03	2025/08/02

RF Field Strength Susceptibility						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	SIGNAL GENERATOR	Agilent	N5182A	CTA-305	2024/08/03	2025/08/02
2	POWER AMPLIFIER	AR	150W1000	CTA-413	2024/08/03	2025/08/02
3	POWER AMPLIFIER	Mictop	MPA-1000-6000-100	CTA-414	2024/08/03	2025/08/02
4	DUAL DIRECTIONAL COUPLER	AR	DC6080	CTA-415	2024/08/03	2025/08/02
5	POWER METER	Agilent	E4419B	CTA-416	2024/08/03	2025/08/02
6	Power sensor	Agilent	E9301A	CTA-417	2024/08/03	2025/08/02
7	Power sensor	Agilent	8483A	CTA-418	2024/08/03	2025/08/02
8	TRANSMITTING ANTENNA	AR	AT1080	CTA-419	2023/10/17	2024/10/16
9	TRANSMITTING ANTENNA	Schwarzbeck	STLP 9149	CTA-420	2023/10/17	2024/10/16
10	Radio Communication Tester	R&S	CMW500	CTA-302	2024/08/03	2025/08/02
11	Audio Analyzer	R&S	UPL	CTA-421	2024/08/03	2025/08/02

Conducted Susceptibility						
Item	Test Equipment	Manufacturer	Model No.	Equipment No.	Last Cal.	Cal.Due
1	CS Test system	Schloder	CDG 6000-75	CTA-322	2024/08/03	2025/08/02
2	CDN M2+M3	Zhinan	ZN3750	CTA-323	2024/08/03	2025/08/02
3	6dB Attenuator	Schloder	CDG60100	CTA-324	2024/08/03	2025/08/02
4	EM Clamp	Schloder	EMCL-20	CTA-325	2024/08/03	2025/08/02

5	Audio Analyzer	R&S	UPL	CTA-421	2024/08/03	2025/08/02
6	Universal Radio Communication	R&S	CMW500	CTA-302	2024/08/03	2025/08/02

Test Equipment	Manufacturer	Model No.	Version number	Calibration Date	Calibration Due Date
EMI Test Software	Tonscend	TS®JS32-RE	5.0.0.2	N/A	N/A
EMI Test Software	Tonscend	TS®JS32-CE	5.0.0.1	N/A	N/A
RF Test Software	Tonscend	TS®JS1120-3	3.1.65	N/A	N/A
RF Test Software	Tonscend	TS®JS1120	3.1.46	N/A	N/A

For CONDUCTED EMISSION, Surger, EFT, CS for network port

Conducted Disturbance					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ETVT Test Receiver	ROHDE & SCHWARZ	ESCI	100900	2024/08/03
3	Foue Balanced Telecom Pair ISN	FCC	FCC-TLISN-T8-02	20375	2024/08/03

Electrical Fast Transient/Burst					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Ultra Compact Simulator	EM TEST	UCS500M6	0500-19	2024/08/03
2	Coupling Clamp	EM TEST	HFK	1501-14	2024/08/03

Surge					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ULTRA COMPACT SIMULATOR	EM TEST	UCS500M6	0500-19	2024/08/03
2	Surger Generator	EM TEST	TSS500M4	1100-04	2024/08/03
3	3-Phase Coupling Network	EM TEST	CNV503S5/16A	1200-04	2024/08/03

4. TEST CONDITIONS AND RESULTS

4.1. EMISSION

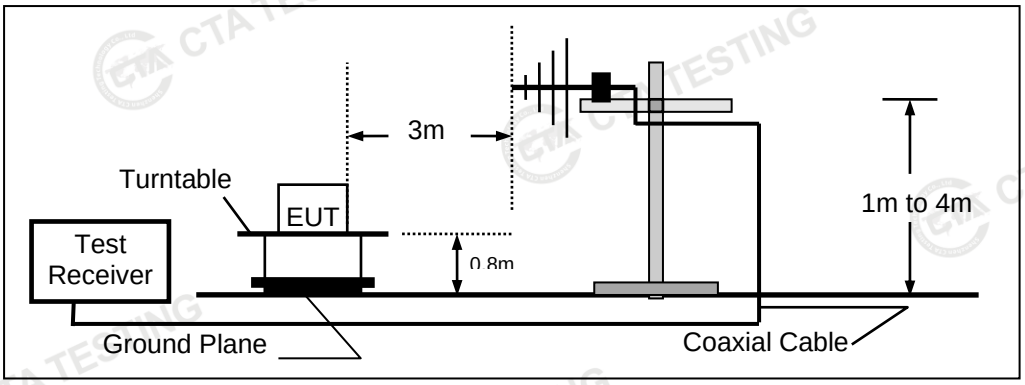
4.1.1. Radiated Emission

LIMIT

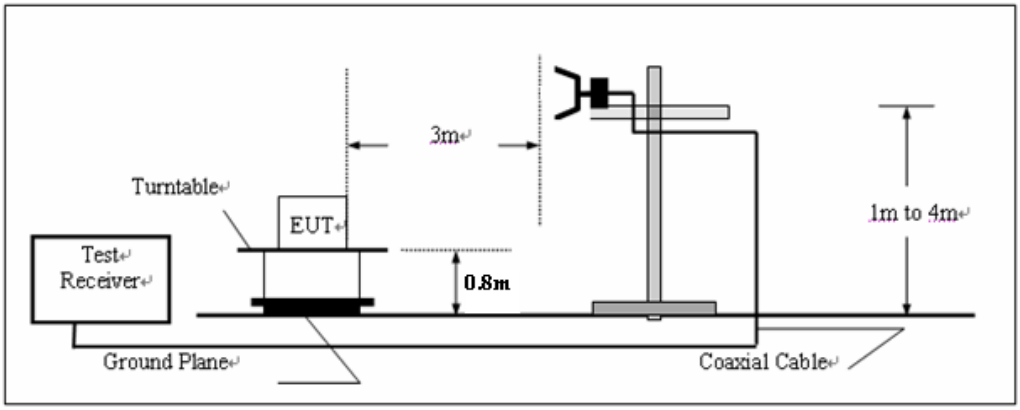
Please refer to ETSI EN301489-1 Clause 8.2.3, Table 4 and EN55032 Annex A, Table A.2,A.3, and Class B

TEST CONFIGURATION

a) Radiated emission test set-up, frequency below 1000MHz:



b) Radiated emission test set-up, frequency above 1000MHz



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 8.2.3 and EN55032 Annex A for the measurement methods

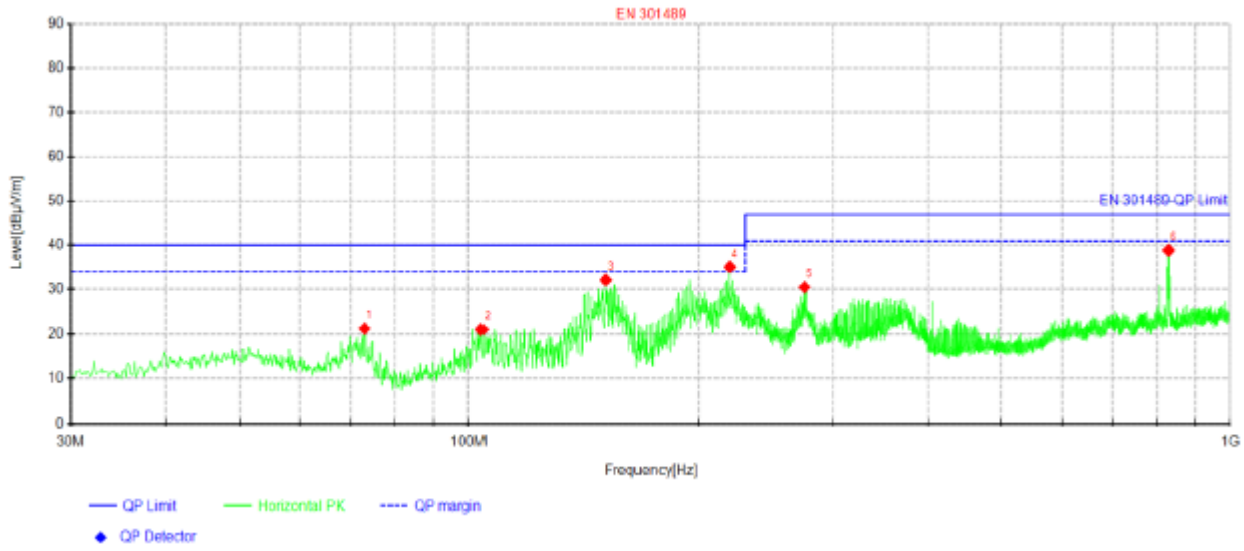
TEST RESULTS

Passed

Please refer to the below test data:

Note: While performing the testing, the notch filter is used for avoiding test instrument overload.

Test mode:	Mode 1	Polarization	Horizontal



Suspected Data List

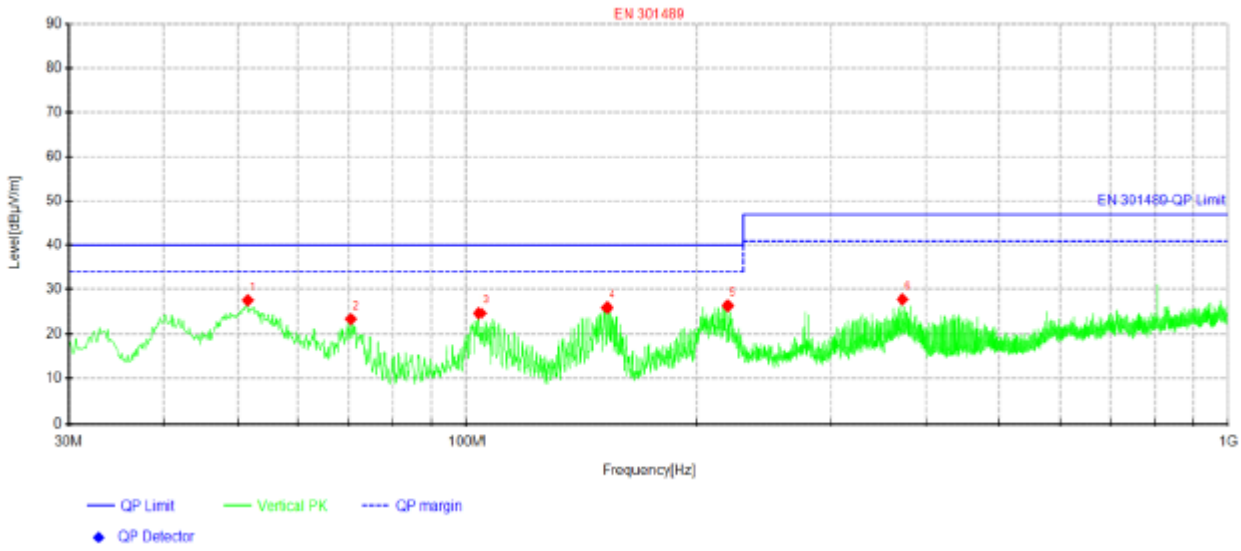
NO.	Freq. [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	73.0438	36.70	21.17	-15.53	40.00	18.83	100	359	Horizontal
2	103.841	33.99	20.97	-13.02	40.00	19.03	100	161	Horizontal
3	150.765	47.62	32.17	-15.45	40.00	7.83	100	185	Horizontal
4	219.513	47.60	35.10	-12.50	40.00	4.90	100	56	Horizontal
5	275.288	42.06	30.55	-11.51	47.00	16.45	100	185	Horizontal
6	829.643	43.16	38.87	-4.29	47.00	8.13	100	314	Horizontal

Note:1).Level (dBµV/m)= Reading (dBµV/m)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBµV/m) - Level (dBµV/m)

Test mode:	Mode1	Polarization	Vertical



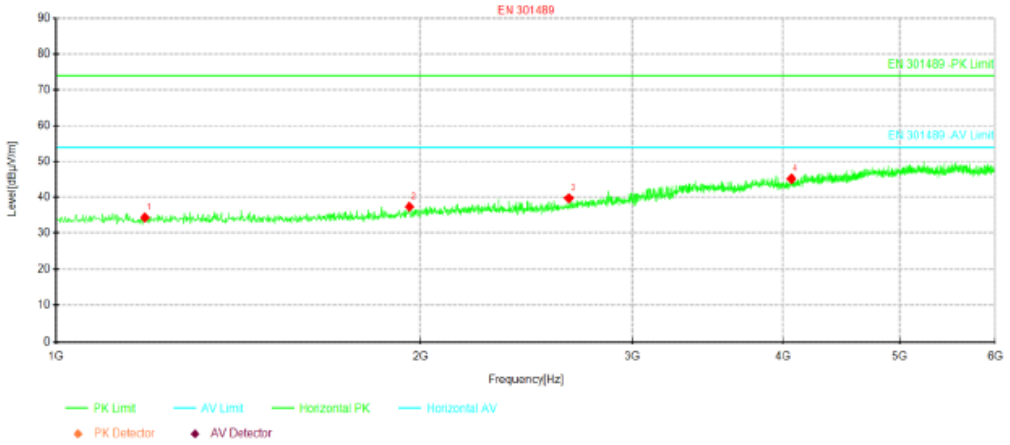
Suspected Data List									
NO.	Freq. [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	51.5825	38.85	27.58	-11.27	40.00	12.42	100	186	Vertical
2	70.4975	38.13	23.31	-14.82	40.00	16.69	100	151	Vertical
3	103.841	37.65	24.63	-13.02	40.00	15.37	100	338	Vertical
4	152.341	41.45	25.90	-15.55	40.00	14.10	100	270	Vertical
5	219.513	38.83	26.33	-12.50	40.00	13.67	100	279	Vertical
6	372.652	38.27	27.77	-10.50	47.00	19.23	100	94	Vertical

Note:1).Level (dBµV/m)= Reading (dBµV/m)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBµV/m) - Level (dBµV/m)

Test mode:	Mode 1	Polarization	Horizontal



Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1185	99.40	34.36	-65.04	74.00	39.64	100	170	Horizontal
2	1958.75	100.47	37.38	-63.09	74.00	36.62	100	40	Horizontal
3	2656.25	101.29	39.79	-61.50	74.00	34.21	100	160	Horizontal
4	4065	103.90	45.19	-58.71	74.00	28.81	100	360	Horizontal

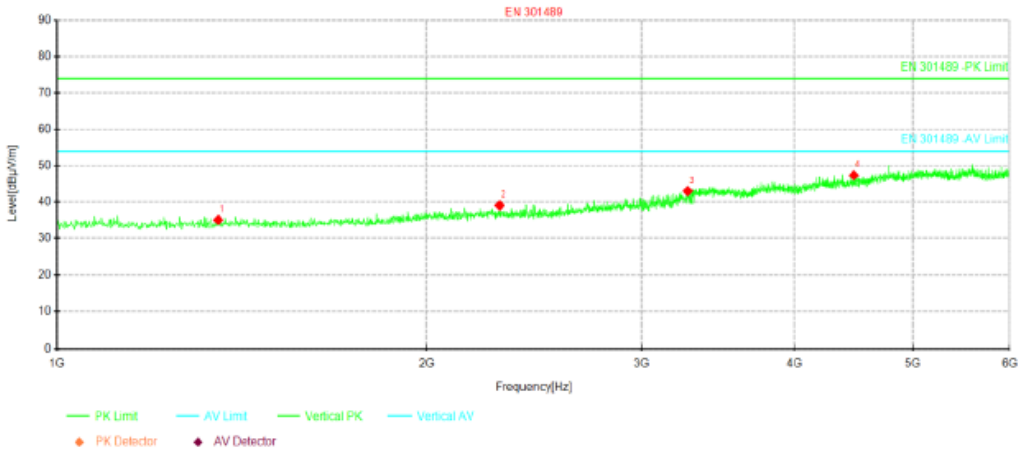
a

Note:1).Level (dBµV/m)= Reading (dBµV/m)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

3). Margin(dB) = Limit (dBµV/m) - Level (dBµV/m)

Test mode:	Mode 1	Polarization	Vertical



Suspected Data List

NO.	Freq. [MHz]	Reading [dBµV]	Level [dBµV/m]	Factor [dB/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1355	99.80	35.08	-64.72	74.00	38.92	100	70	Vertical
2	2295	101.56	39.10	-62.46	74.00	34.90	100	220	Vertical
3	3271.25	103.54	43.06	-60.48	74.00	30.94	100	230	Vertical
4	4472.5	104.36	47.38	-56.98	74.00	26.62	100	40	Vertical

Note:1).Level (dBµV/m)= Reading (dBµV/m)+ Factor (dB/m)

2). Factor(dB/m)=Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB)

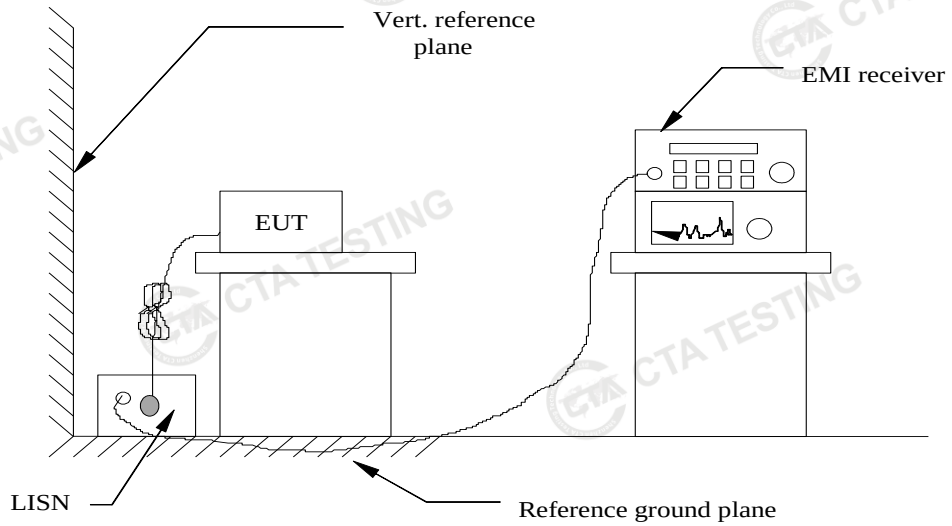
3). Margin(dB) = Limit (dBµV/m) - Level (dBµV/m)

4.1.2. Conducted Emission

LIMIT

Please refer to ETSI EN301489-1 Clause 8.4.3, Table 8 and EN55032 Annex A, Table A.10, A.12

TEST CONFIGURATION



TEST PROCEDURE

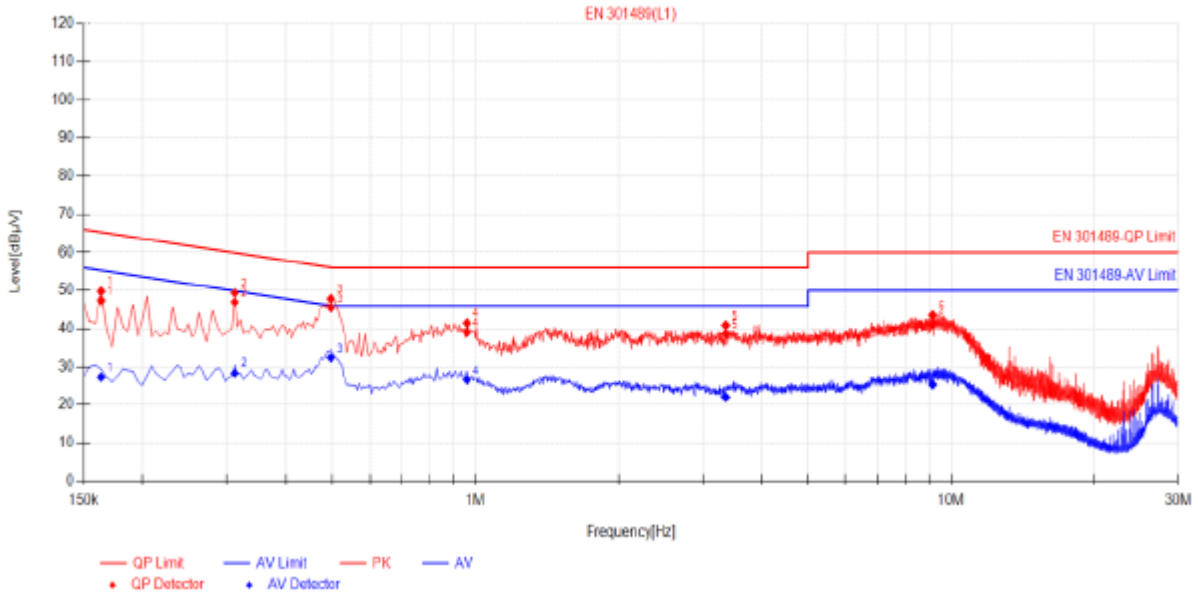
Please refer to ETSI EN 301 489-1 Clause 8.4.3 and EN55032 Annex A for the measurement methods.

TEST RESULTS

Passed

Please refer to the below test data:

Power supply:	DC 5V from Adapter AC 230V/50Hz	Polarization	L



Final Data List

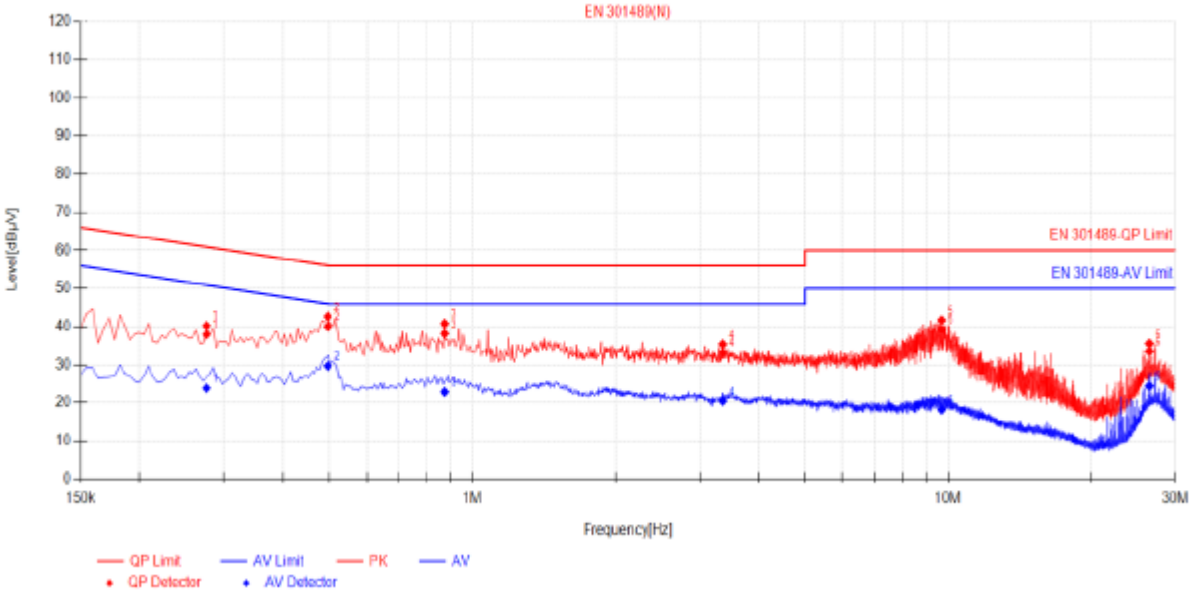
NO.	Freq. [MHz]	Factor [dB]	QP Reading[dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.1635	9.93	37.51	47.44	65.28	17.84	17.37	27.30	55.28	27.98	PASS
2	0.312	9.93	37.06	46.99	59.92	12.93	18.44	28.37	49.92	21.55	PASS
3	0.4965	10.01	35.47	45.48	56.06	10.58	22.34	32.35	46.06	13.71	PASS
4	0.96	9.96	29.14	39.10	56.00	16.90	16.63	26.59	46.00	19.41	PASS
5	3.3585	9.98	28.66	38.64	56.00	17.36	12.03	22.01	46.00	23.99	PASS
6	9.141	10.26	30.79	41.05	60.00	18.95	15.05	25.31	50.00	24.69	PASS

Note:1).Level (dBµV)= Reading (dBµV)+ Factor (dB)

2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)

3). Margin(dB) = Limit (dBµV) - Level (dBµV)

Power supply:	DC 5V from Adapter AC 230V/50Hz	Polarization	N



Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Reading[dBµV]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Reading [dBµV]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.276	9.94	28.00	37.94	60.94	23.00	13.97	23.91	50.94	27.03	PASS
2	0.4965	10.01	30.03	40.04	56.06	16.02	19.69	29.70	46.06	16.36	PASS
3	0.8745	10.13	28.05	38.18	56.00	17.82	12.81	22.94	46.00	23.06	PASS
4	3.3585	10.20	23.00	33.20	56.00	22.80	10.28	20.48	46.00	25.52	PASS
5	9.6945	10.40	28.86	39.26	60.00	20.74	7.83	18.23	50.00	31.77	PASS
6	26.4885	10.74	22.79	33.53	60.00	26.47	13.71	24.45	50.00	25.55	PASS

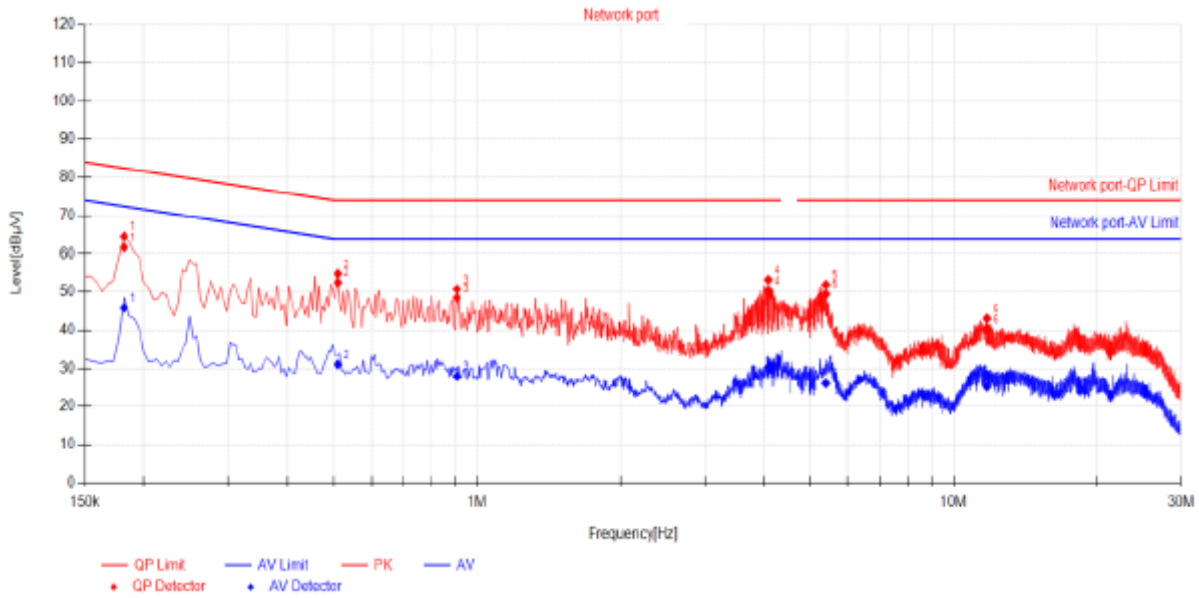
Note:1).Level (dBµV)= Reading (dBµV)+ Factor (dB)

2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)

3). Margin(dB) = Limit (dBµV) - Level (dBµV)

For network port

Test mode:	Mode 1	Polarization	LAN1



Final Data List

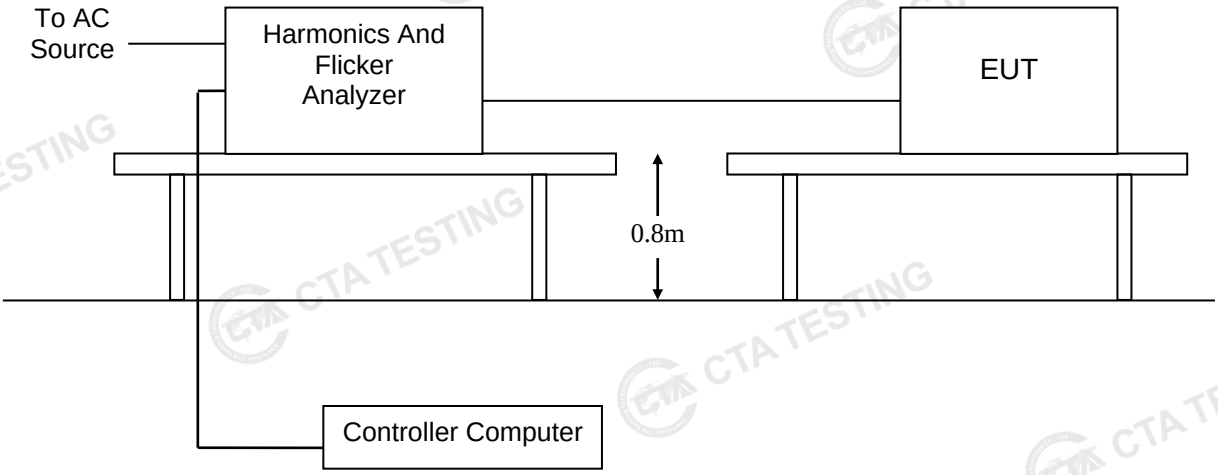
NO.	Freq. [MHz]	Factor [dB]	QP Reading[dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.1815	10.01	51.67	61.68	82.42	20.74	35.89	45.90	72.42	26.52	PASS
2	0.51	10.02	42.52	52.54	74.00	21.46	21.00	31.02	64.00	32.98	PASS
3	0.906	10.02	38.47	48.49	74.00	25.51	17.94	27.96	64.00	36.04	PASS
4	4.083	9.92	40.47	50.39	74.00	23.61	20.38	30.30	64.00	33.70	PASS
5	5.388	10.05	39.43	49.48	74.00	24.52	16.06	26.11	64.00	37.89	PASS
6	11.751	10.27	30.14	40.41	74.00	33.59	14.95	25.22	64.00	38.78	PASS

4.1.3. Harmonic Current Emission

LIMIT

Please refer to EN 61000-3-2

TEST CONFIGURATION



TEST PROCEDURE

Please refer to EN 61000-3-2 for the measurement methods.

TEST RESULTS

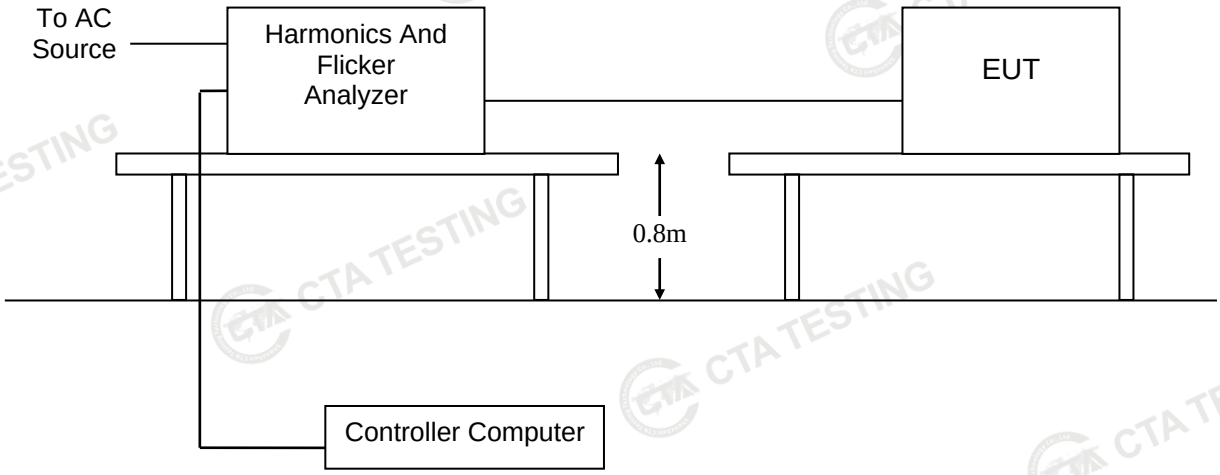
The power of this product is less than 75W, So this test item is not applicable for the EUT.

4.1.4. Voltage Fluctuation and Flicker

LIMIT

Please refer to EN 61000-3-3

TEST CONFIGURATION



TEST PROCEDURE

Please refer to EN 61000-3-3 for the measurement methods.

TEST RESULTS

The maximum input power of the EUT is less than 20W, which unlikely to produce significant voltage fluctuation. Therefore this test item is not applicable for the EUT.
See clause 6.1 *** EN 61000-3-3, clause 6.1:" ... Tests need not be made on equipment which is unlikely to produce significant voltage fluctuations or flicker. ..."***

4.2. IMMUNITY

4.2.1. Performance criteria

■ ETSI EN301489-1

General performance criteria

• performance criterion A applies for immunity tests with phenomena of a continuous nature;

• performance criterion B applies for immunity tests with phenomena of a transient nature.

•The equipment shall meet the minimum performance criteria as specified in the following.

Criteria	During test	After test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
NOTE: Where "operate as intended" or "no loss of function" is specified, the EUT shall demonstrate correct functioning as described in clause 5.		

■ ETSI EN301489-17

General performance criteria

• Performance criteria A for immunity tests with phenomena of a continuous nature;

• Performance criteria B for immunity tests with phenomena of a transient nature;

• Performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following.

Criteria	During test	After test
A	Shall operate as intended. (See note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.		

Performance criteria for Continuous phenomena

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

Performance criteria for Continuous phenomena

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

Performance criteria for Transient phenomena

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

- Performance Criterion of EN55035

Criterion A: The equipment shall continue to operate as intended without operator intervention. No degradation of performance of loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

Criterion B: After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended.

Criterion C: Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

4.2.2. Monitoring EUT in Immunity Test

4.2.2.1 Monitoring for Continuous Phenomena Applied to the EUT

- **WIFI Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate WIFI protocol Analyzer);

During the test, observe whether the EUT operate as intended, no loss of function and no unintentional transmissions. Monitoring PER and shall exeed 10%

After the test, Check the function and critical stored data of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **other Mode**

During and after the test, observe the Screen status by eyes or monitor to see whether there is degration of performance

4.2.2.2 Monitoring for Transient Phenomena Applied to the EUT

- **WIFI Mode**

At the start of the test, establish a wireless link between the EUT and CMW500(integrate WIFI protocol Analyzer);

After the test, Check the function and critical stored data of the EUT with no degration.

In addition, when EUT working in Idle /Receiver mode, monitor whether the transmitter unintentionally operates.

- **other Mode**

After the test, observe the Screen status by eyes or monitor to see whether there is degration of performance

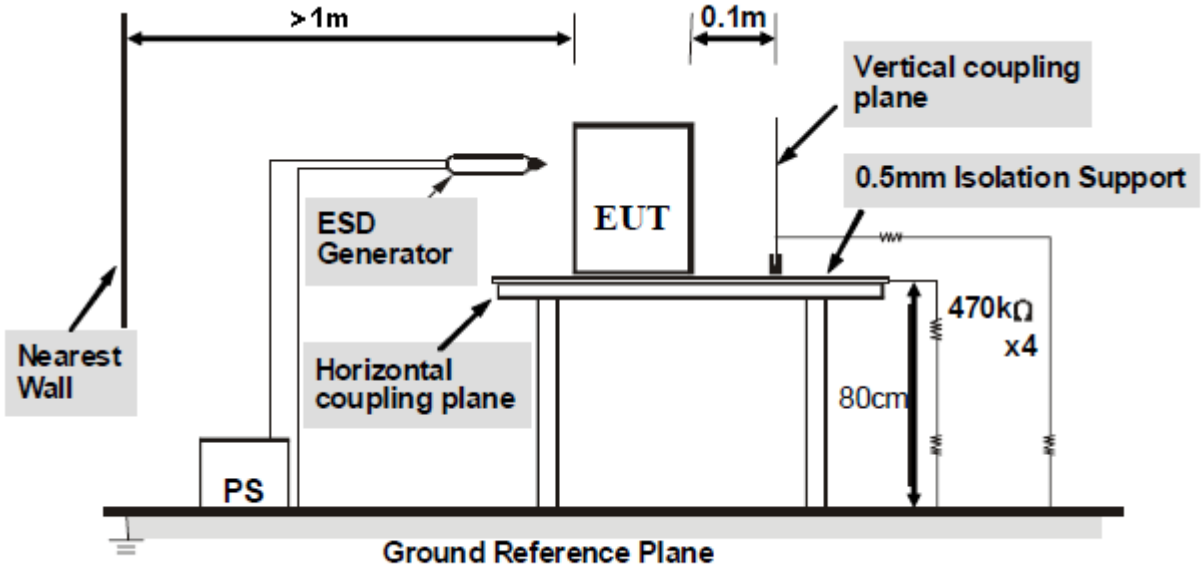
4.2.3. Electrostatic Discharge

LIMIT

SEVERITY LEVELS OF ELECTROSTATIC DISCHARGE

Test level: Contact Discharge at ±2KV, ±4KV Air Discharge at ±2KV, ±4KV, ±8KV

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.3.2 , EN 55035 and EN 61000-4-2 for the measurement methods.

Contact Discharge:

The ESD generator is held perpendicular to the surface to which the discharge is applied and the tip of the discharge electrode touch the surface of EUT. Then turn the discharge switch. The generator is then re-triggered for a new single discharge and repeated at least 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Air Discharge:

Air discharge is used where contact discharge can't be applied. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated at least 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Indirect discharge for horizontal coupling plane:

At least 10 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT.

Indirect discharge for vertical coupling plane:

At least 10 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

TEST MODE

Please reference to the section 2.3

TEST RESULTS

Direct discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Level	Result
Contact discharge	±2	No degradation in performance of the EUT was observed (A)	B	Pass
	±4	A	B	
Air discharge	±2	A	B	
	±4	A	B	
	±8	A	B	
Indirect discharge				
Type of discharge	Discharge voltage (KV)	Observations Performance	Criteria Level	Result
HCP (6 sides)	±2	A	B	Pass
	±4	A	B	
VCP (4 sides)	±2	A	B	
	±4	A	B	

Remark: The ancillary equipment's specification for an acceptable level of performance or degradation of performance during and/or after the ESD tests.

4.2.4. RF Electromagnetic Field

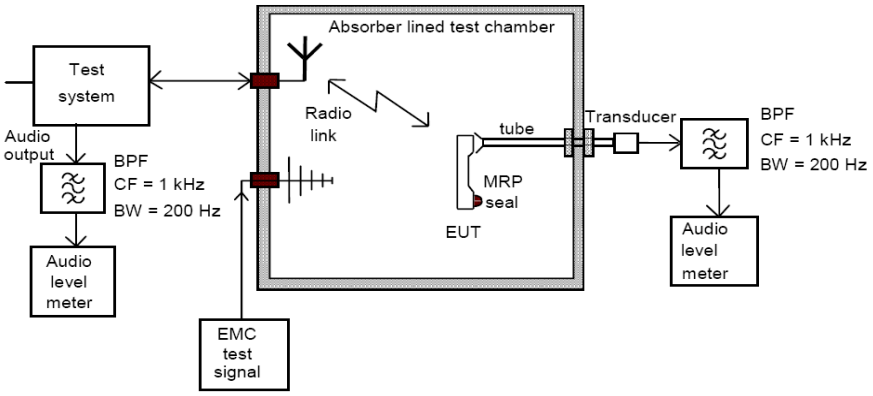
PERFORMANCE CRITERION

Criteria A

TEST LEVEL

3V/m (80%, 1kHz Amplitude Modulation)

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.2.2 and EN 61000-4-3 for the measurement methods.

TEST MODE

Please reference to the section 2.3

TEST RESULTS

Frequency	Level	Modulation	Antenna Polarization	EUT Face	Observations (Performance Criterion)	Result
80MHz-6GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds	V	Front	A	Pass
			H		A	Pass
			V	Rear	A	Pass
			H		A	Pass
			V	Left	A	Pass
			H		A	Pass
			V	Right	A	Pass
			H		A	Pass
			V	Top	A	Pass
			H		A	Pass
			V	Bottom	A	Pass
			H		A	Pass

Remark: A: No degradation in performance of the EUT was observed.

Note：During and after test, the EUT's (BT/ WIFI) PER less than 10%, there is no any degradation of performance.

4.2.5. Surges

PERFORMANCE CRITERION

Criteria B

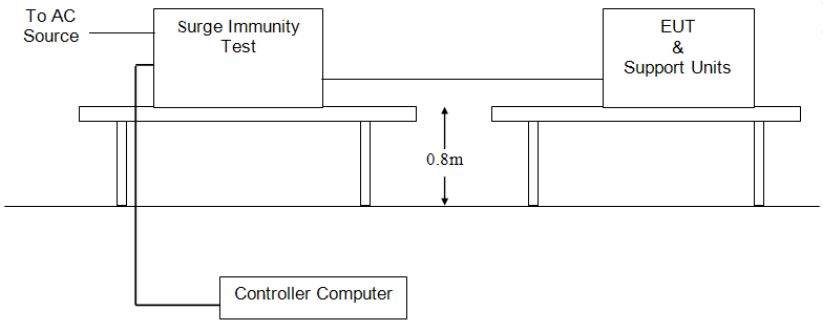
TEST LEVEL

1kV Line to Line: Differential mode

2kV Line to Ground: Common mode

(Voltage Waveform: 1.2/50 us; Current Waveform: 8/20 us)

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.8.2 and EN 61000-4-5 for the measurement methods.

TEST RESULTS

Location	Level(kV)	Pulse No	Surge Interval	Phase(deg)	Observations (Performance Criterion)	Result
L-N	± 1	5	60s	0°	A	Pass
				90°	A	Pass
				180°	A	Pass
				270°	A	Pass

Remark: A: No degradation in performance of the EUT was observed.

For network port

Location	Level(kV)	Pulse No	Surge Interval	Observations (Performance Criterion)	Result
LAN Line to line	± 0.5K	5	60s	B	Pass

4.2.6. RF- Common Mode 0.15MHz to 80MHz

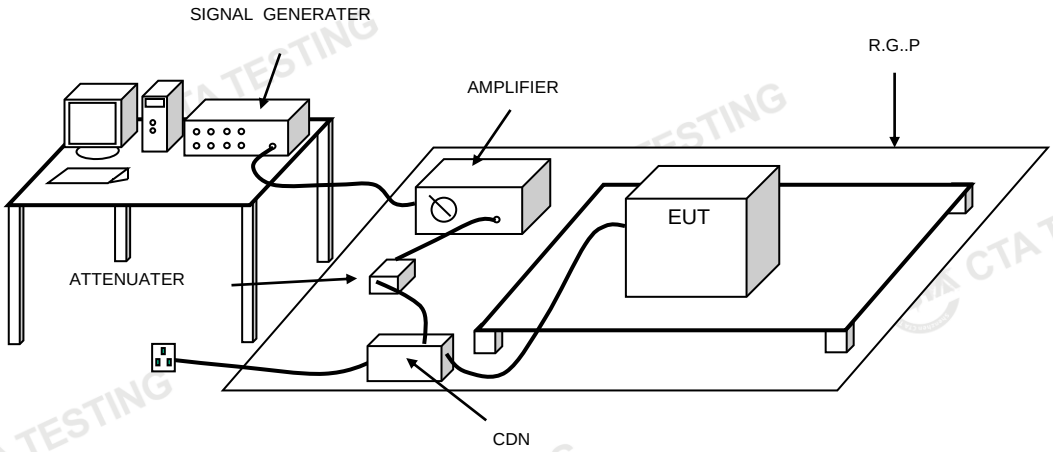
PERFORMANCE CRITERION

Criteria A

TEST LEVEL

3Vrms on AC main port (80%, 1kHz Amplitude Modulation)

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.5.2 and EN 61000-4-6 for the measurement methods.

TEST RESULTS

Frequency	Injected Position	Coupling Direct/Clamp	Level	Modulation	Observations (Performance Criterion)	Result
150kHz to 80MHz	AC Mains	Direct	3Vrms	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds	A	Pass

For network Wire

Frequency	Injected Position	Coupling Direct/Clamp	Level	Modulation	Observations (Performance Criterion)	Result
150kHz to 80MHz	network Wire	Clamp	3Vrms	1 kHz, 80 % Amp. Mod, 1 % increment, dwell time=3seconds	A	Pass

Remark: A: No degradation in performance of the EUT was observed

Note：During and after test, the EUT's (BT/ WIFI) PER less than 10%, there is no any degradation of performance.

4.2.7. Fast Transients Common Mode

PERFORMANCE CRITERION

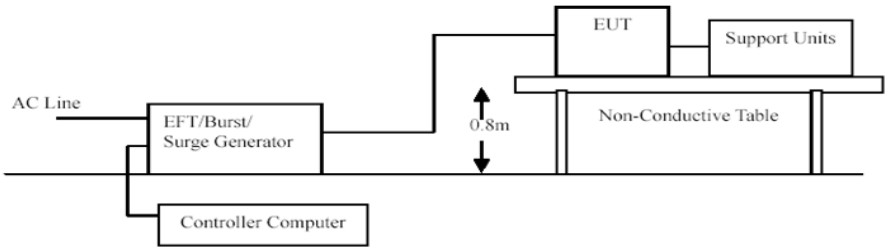
Criteria B

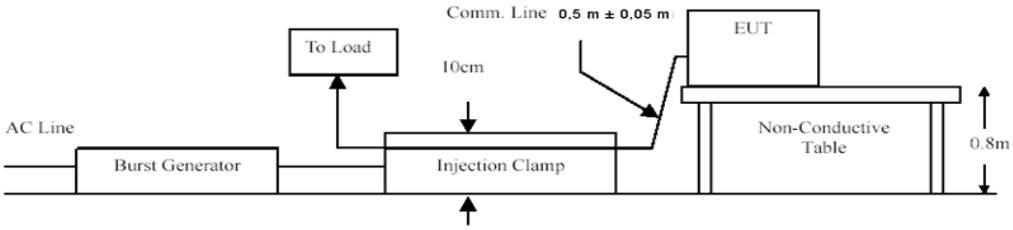
TEST LEVEL

1KV for AC main port

(Impulse Frequency: 5 kHz; Tr/Th: 5/50ns; Burst Duration: 15ms; Burst Period: 3Hz)

TEST CONFIGURATION





TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.4.2， EN55035 and EN 61000-4-4 for the measurement methods.

TEST RESULTS

Lead under Test	Level (±Kv)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
L	±1	Direct	A	Pass
N	±1	Direct	A	Pass
L-N	±1	Direct	A	Pass

Remark: A: No degradation in performance of the EUT was observed.

For network port

Lead under Test	Level (±kV)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
Network Wire	±0.5	Clamp	A	Pass

Remark: A: No degradation in performance of the EUT was observed.

4.2.8. Voltage Dips and Interruptions

PERFORMANCE CRITERION

>95% VD, 0.5 period----Performance criterion: B

>95% VD, 1.0 period----Performance criterion: B

30% VD, 25 period----Performance criterion: C

>95% VI, 250 period----Performance criterion: C

TEST LEVEL

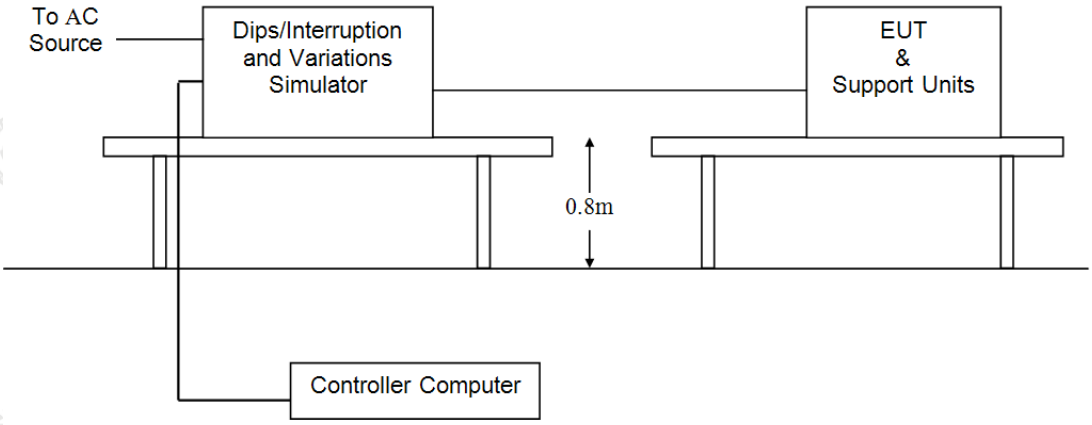
0% of VT(Supply Voltage) for 0.5 period

0% of VT(Supply Voltage) for 1.0 period

70% of VT(Supply Voltage) for 25 period

0% of VT(Supply Voltage) for 250 period

TEST CONFIGURATION



TEST PROCEDURE

Please refer to ETSI EN 301 489-1 Clause 9.7.2 and EN 61000-4-11 for the measurement methods.

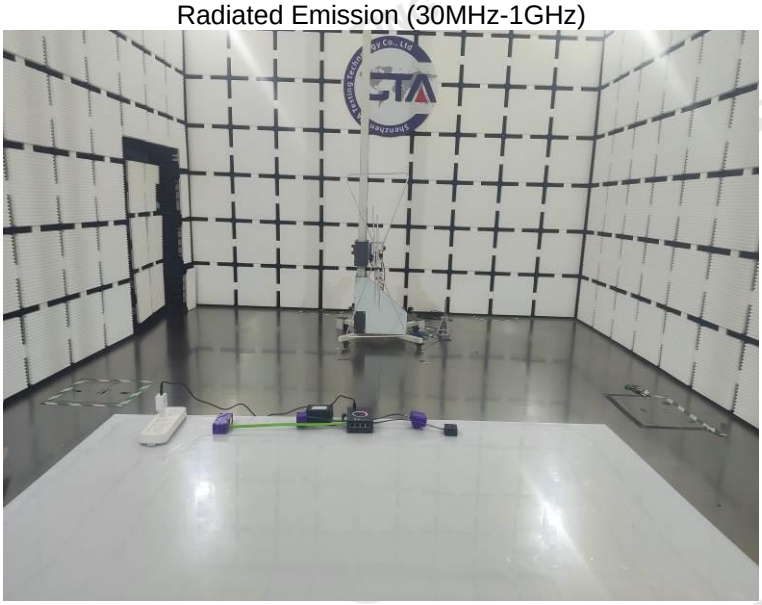
TEST RESULTS

Test Level % UT	Duration (Periods)	Phase angle	No. of drop out	Time between dropout	Observations (Performance Criterion)	Result
0	0.5	0°, 90°, 180°, 270°	3	10s	A	Pass
0	1.0	0°, 90°, 180°, 270°	3	10s	A	Pass
70	25	0°, 90°, 180°, 270°	3	10s	A	Pass
0	250	0°, 90°, 180°, 270°	3	10s	B	Pass

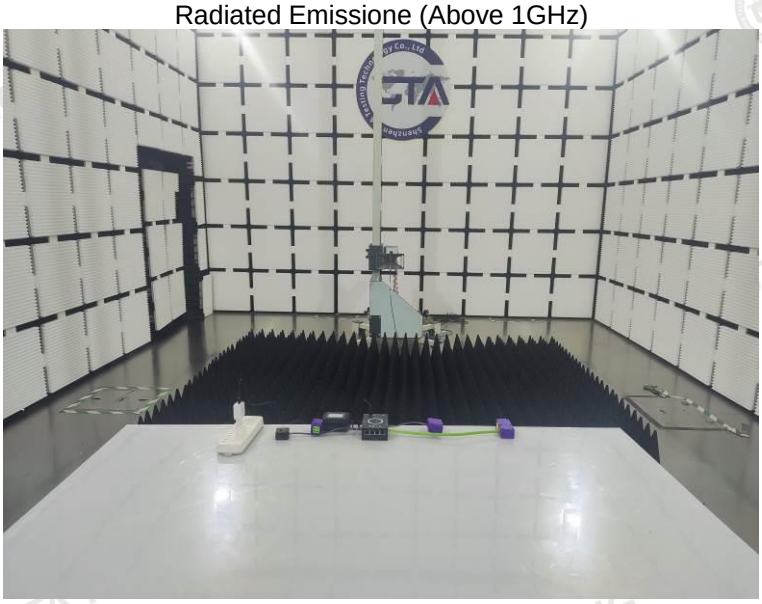
Remark :
A: No degradation in performance of the EUT was observed.
B: During the test, the power shut down, after the experiment, the function can automatically return to normal

5. Test Set-up Photos of the EUT

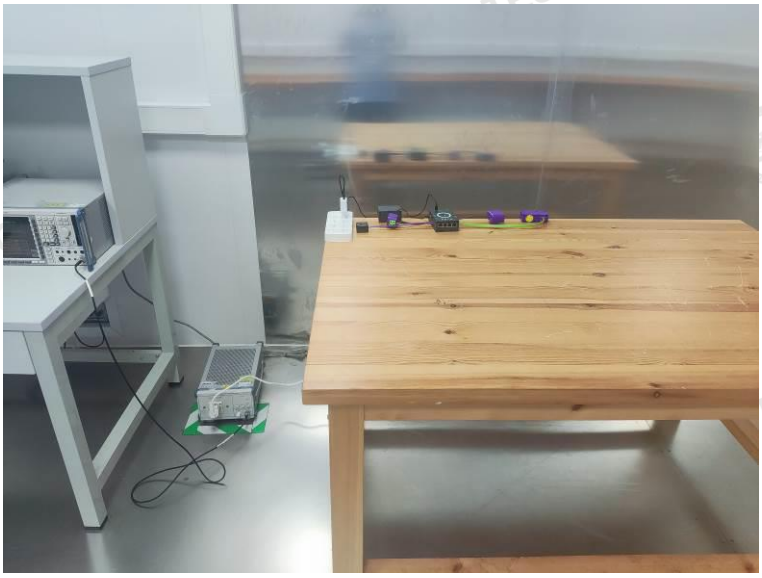
Radiated Emission (30MHz-1GHz)



Radiated Emissione (Above 1GHz)

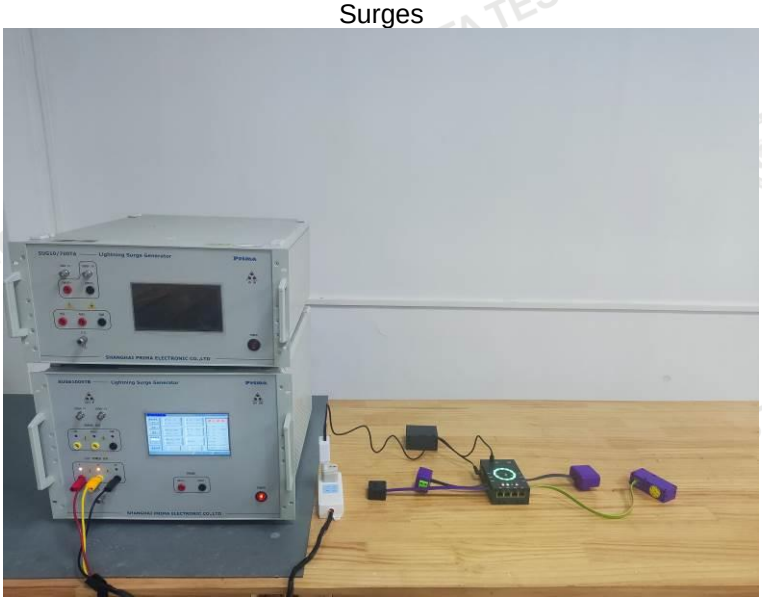


Conducted Emission



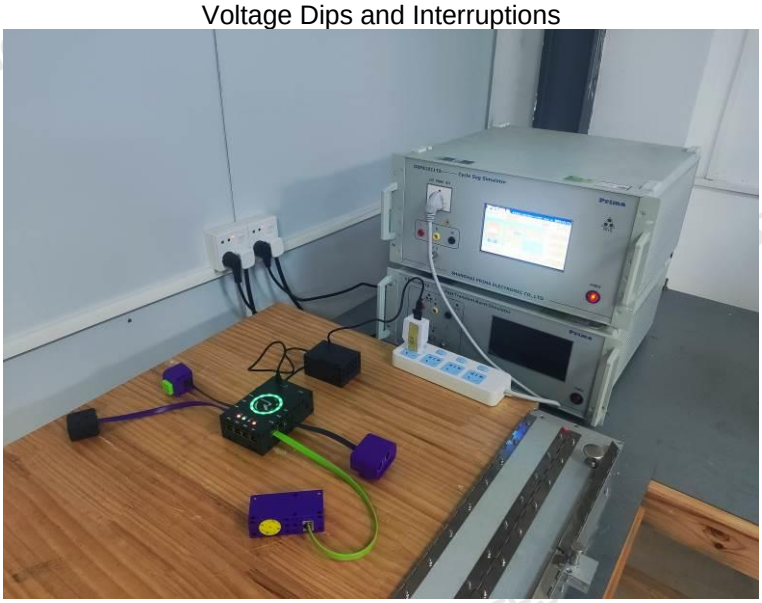
Electrostatic Discharge

Surges

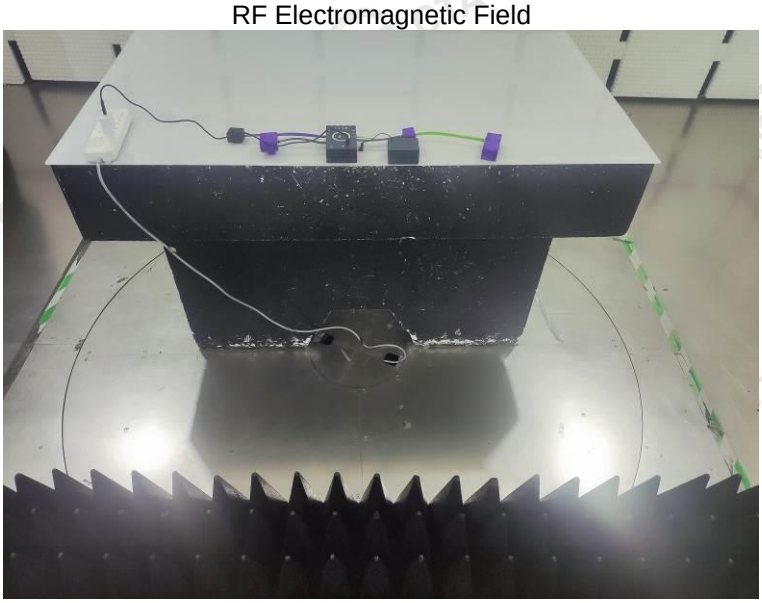


Fast Transients

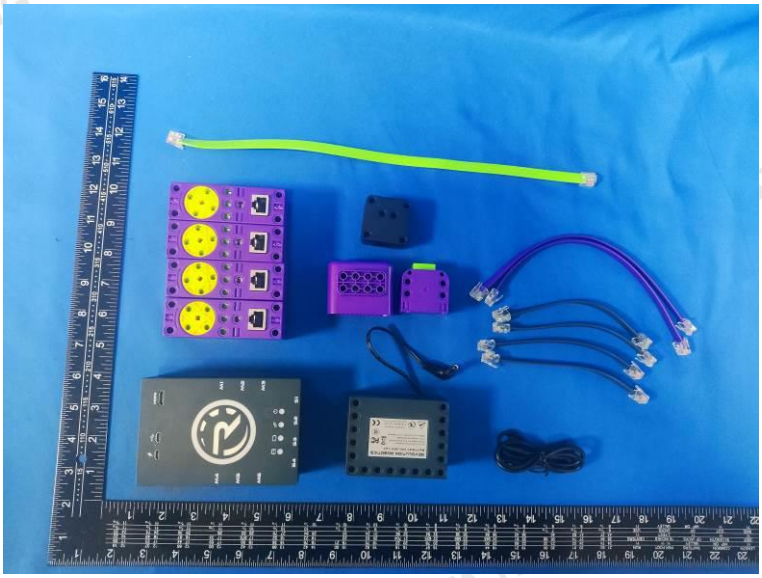
Voltage Dips and Interruptions

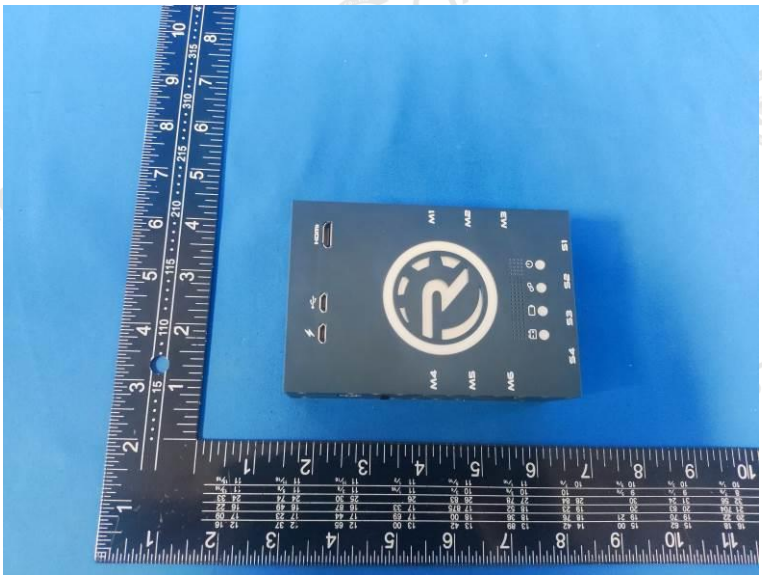


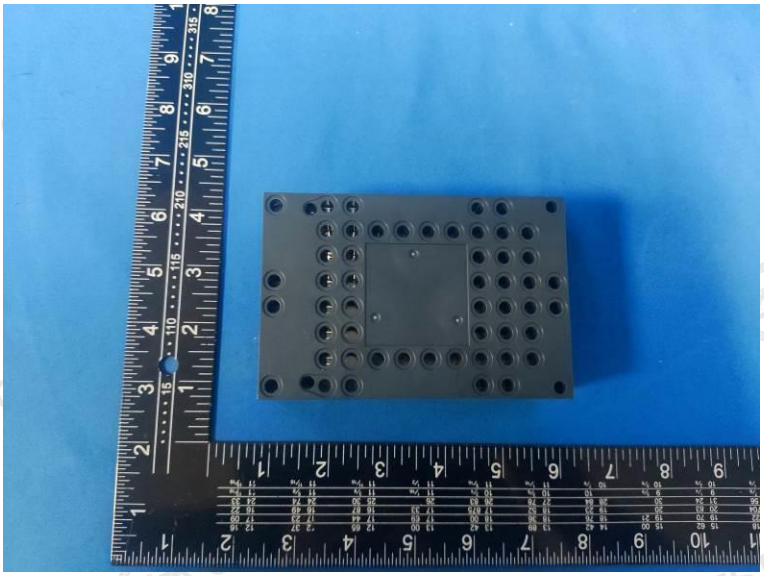
RF Electromagnetic Field

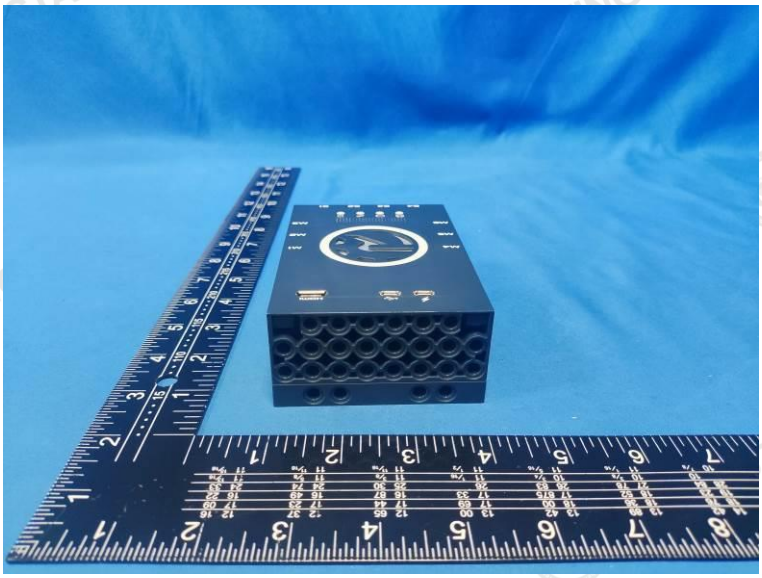


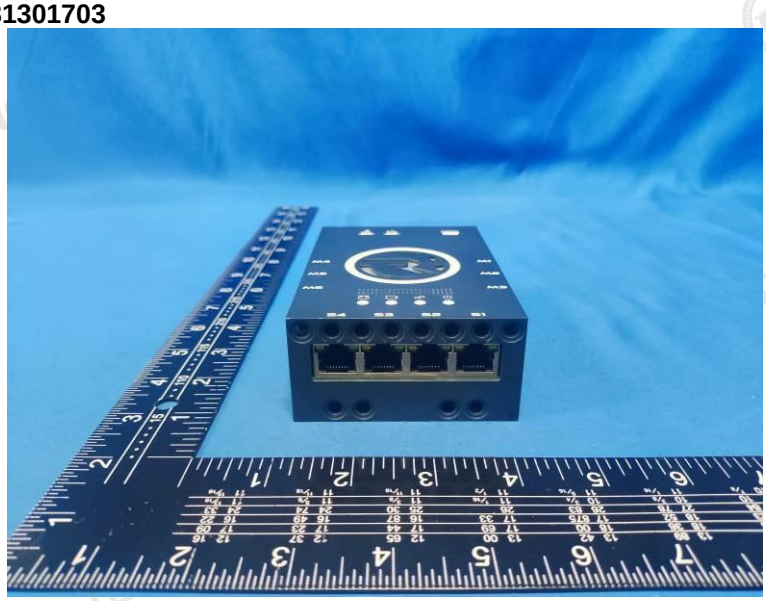
6. External and Internal Photos of the EUT

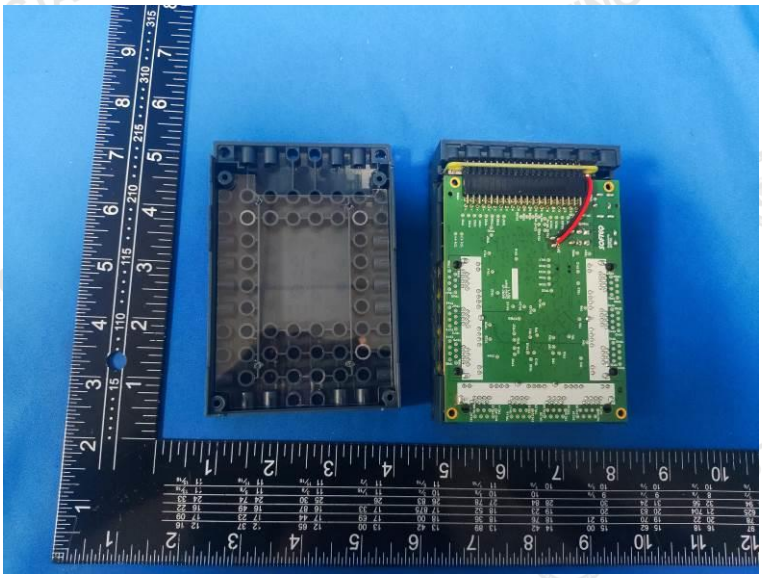


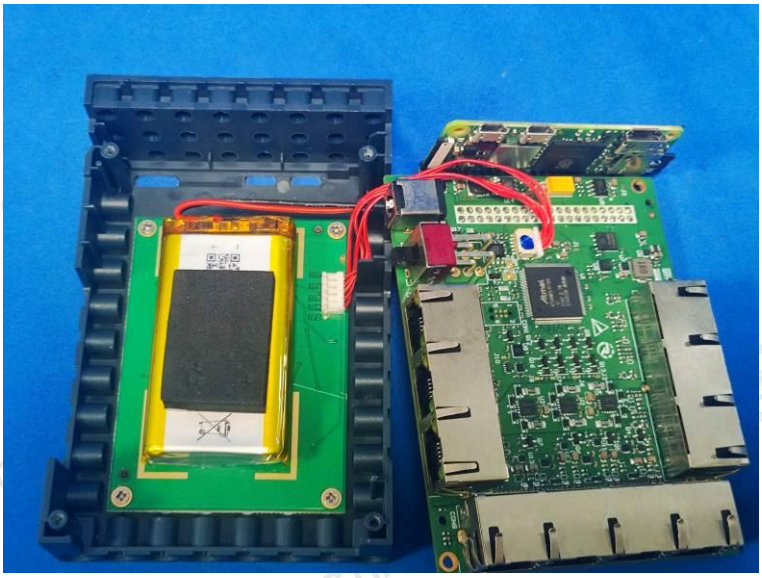


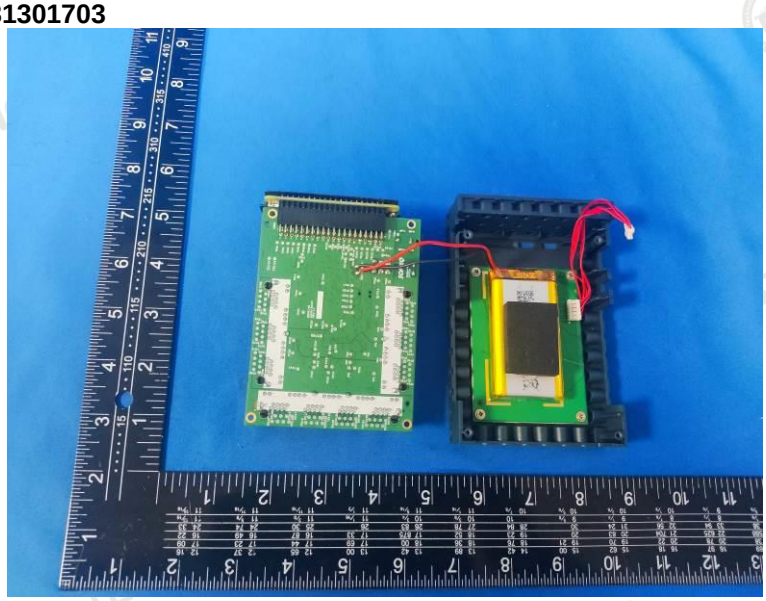


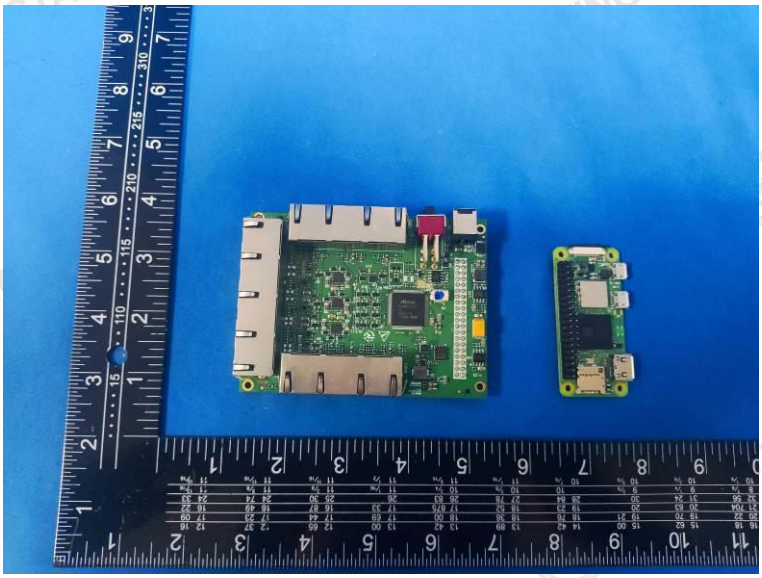


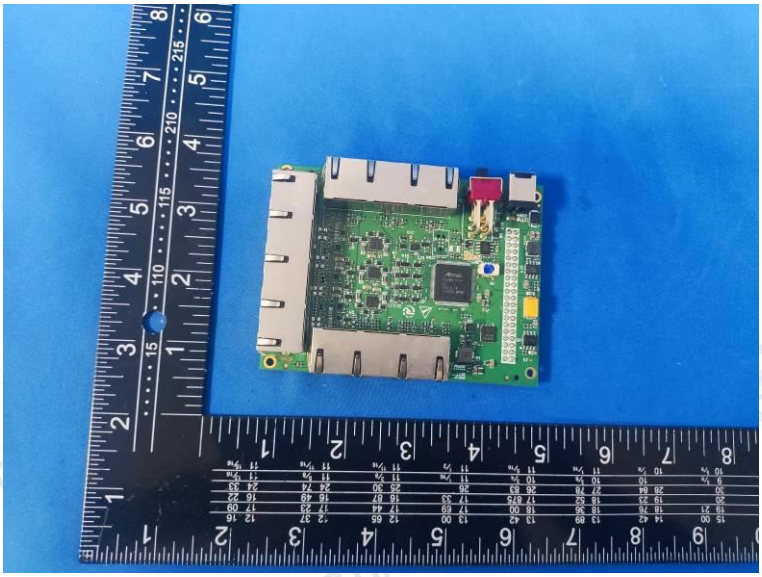












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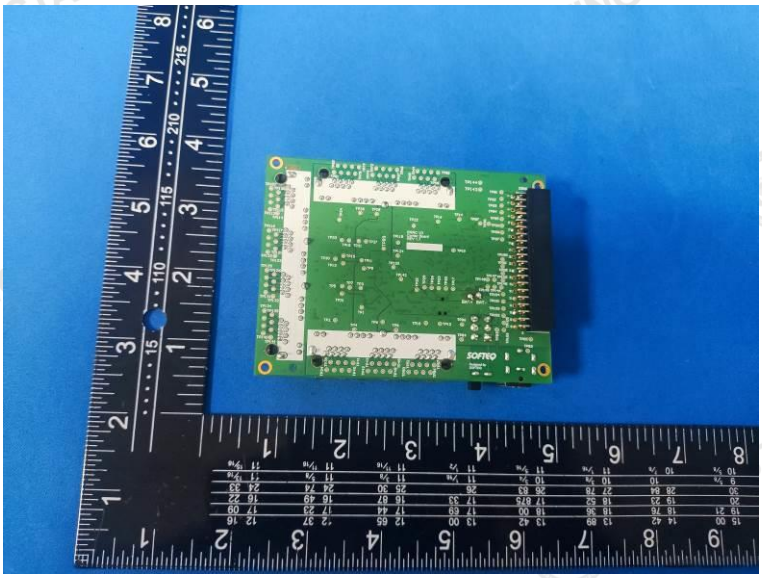

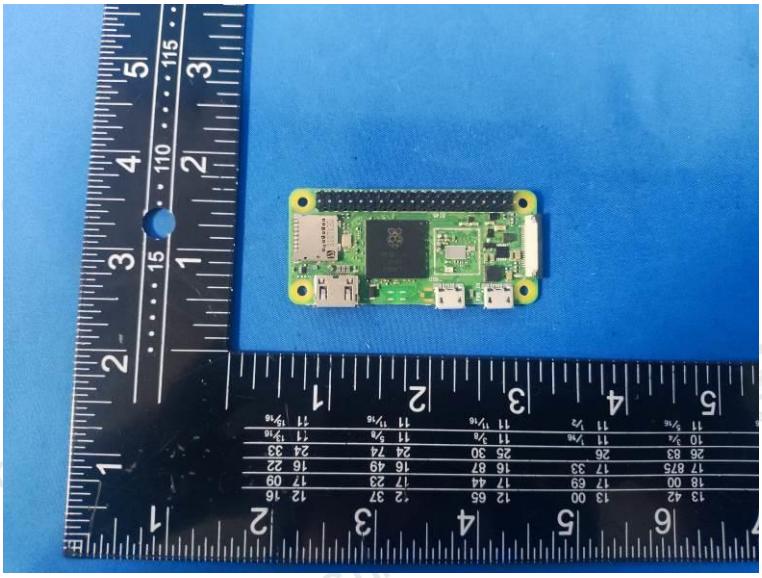

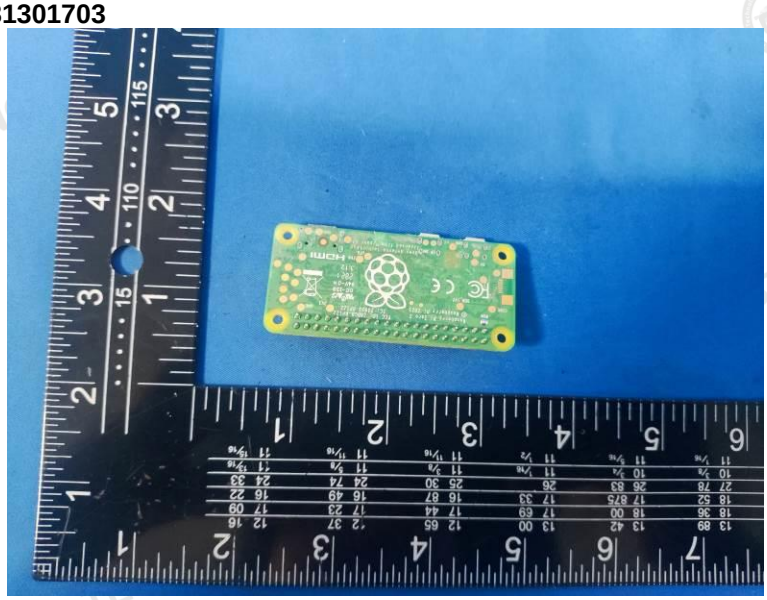

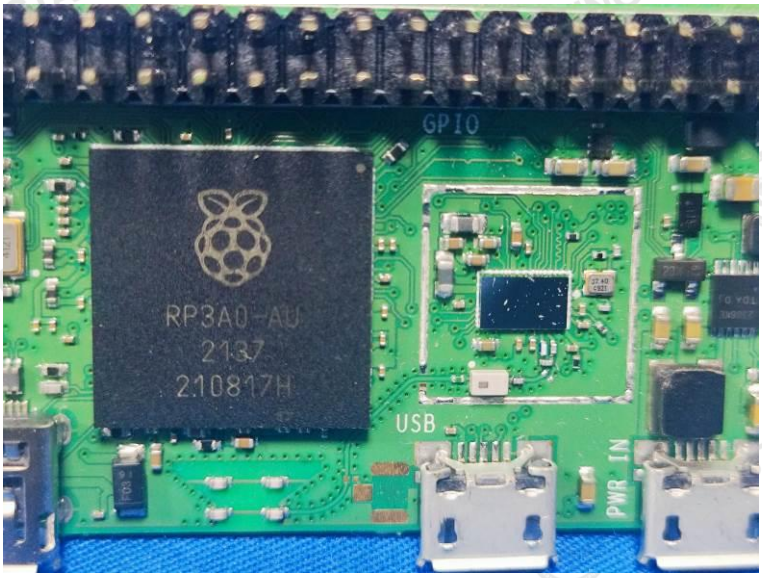
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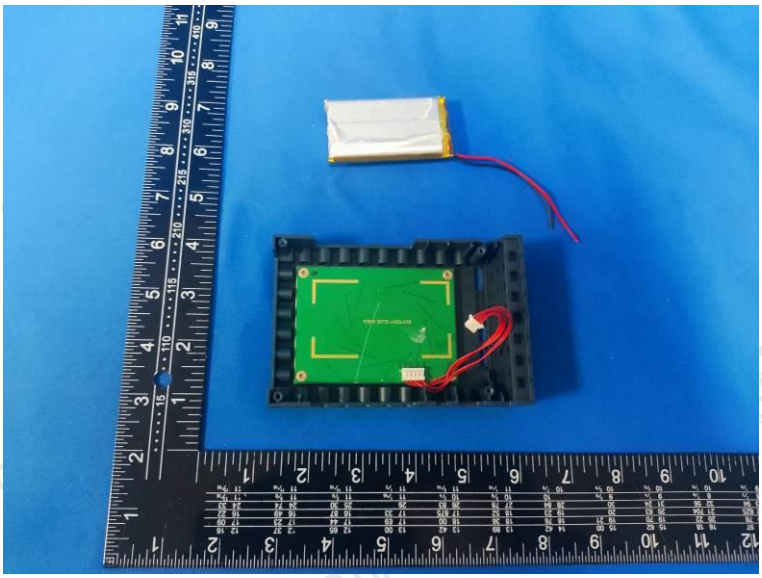

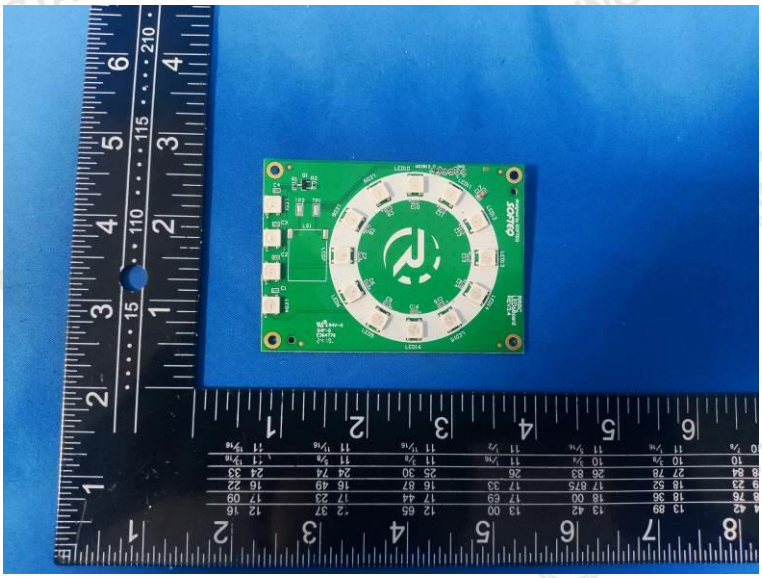

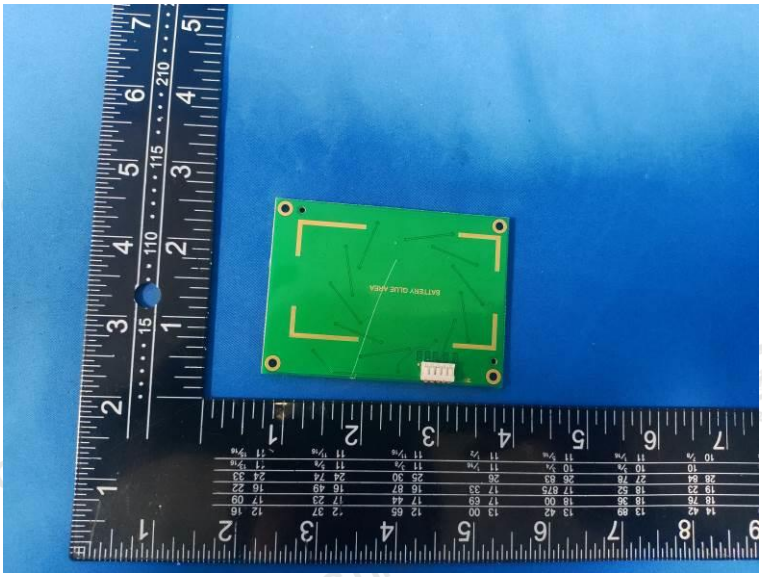
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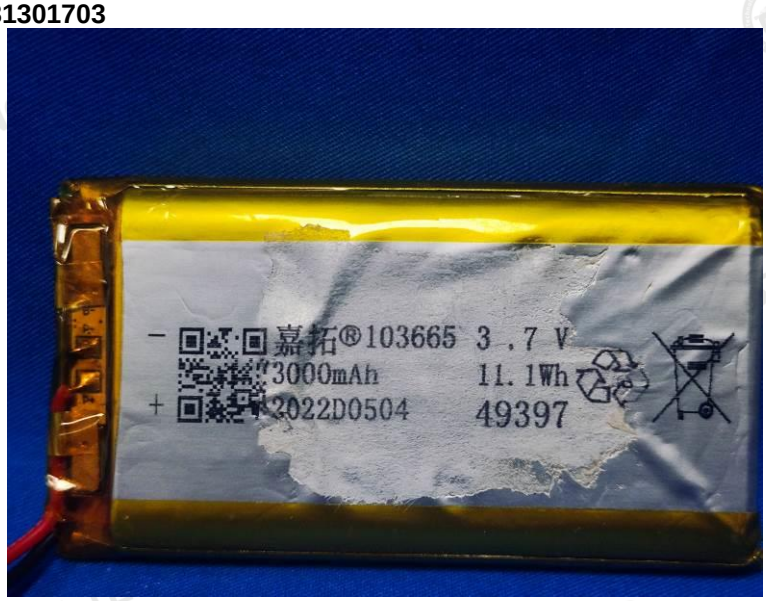
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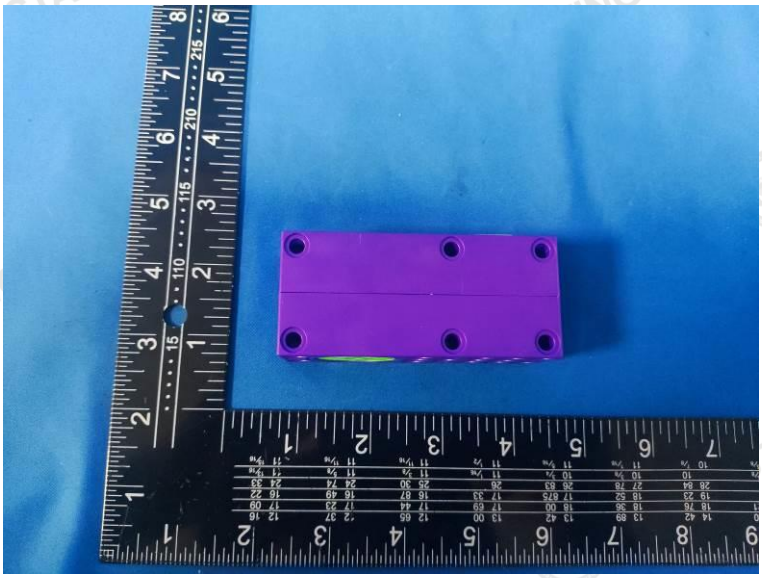

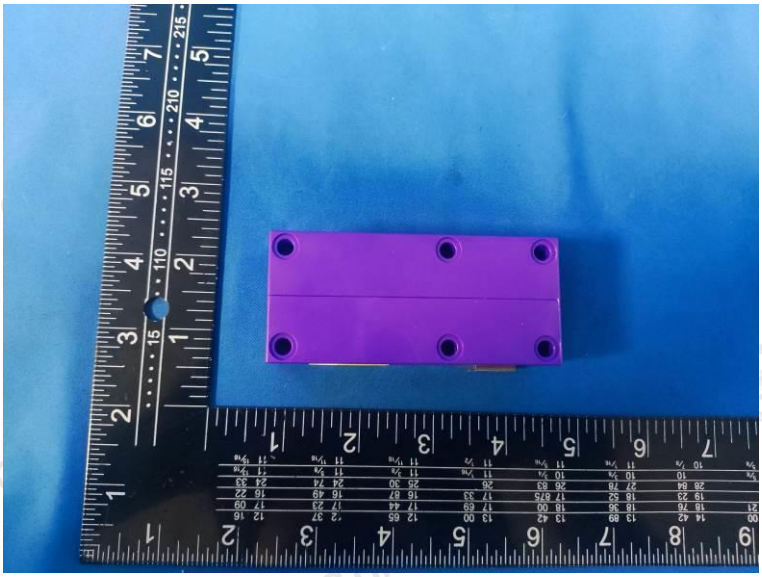

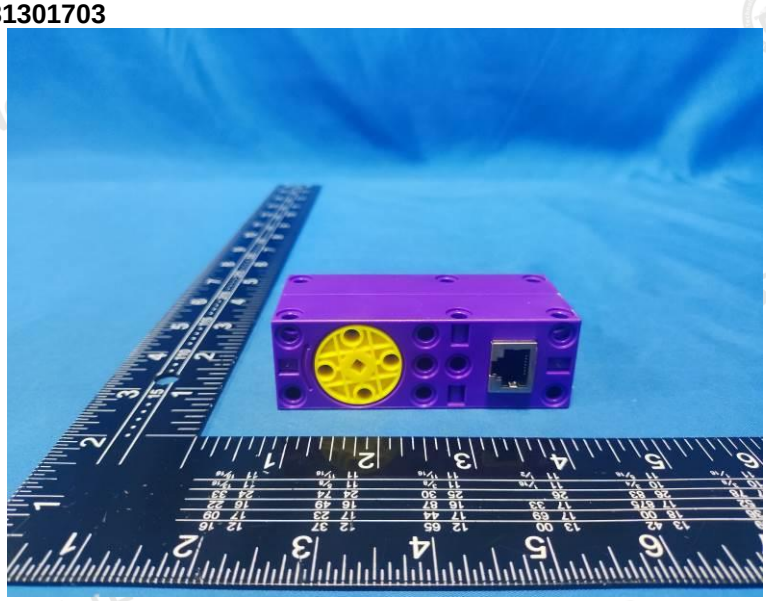

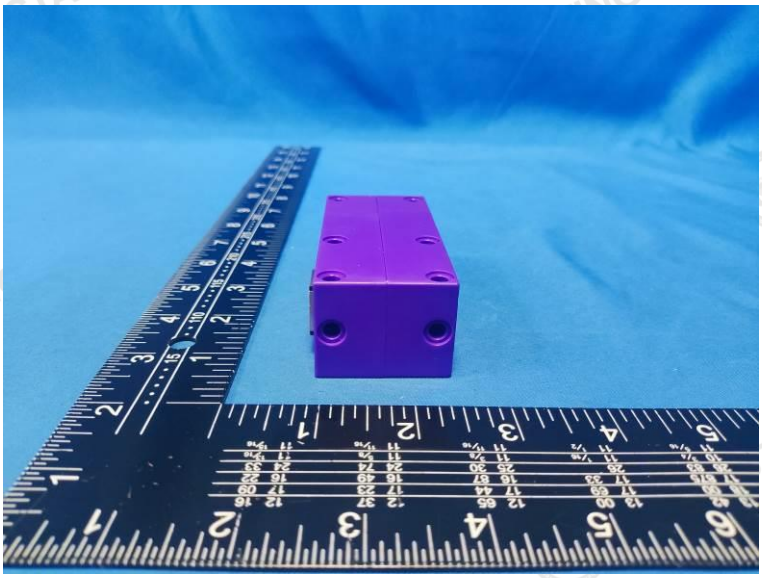

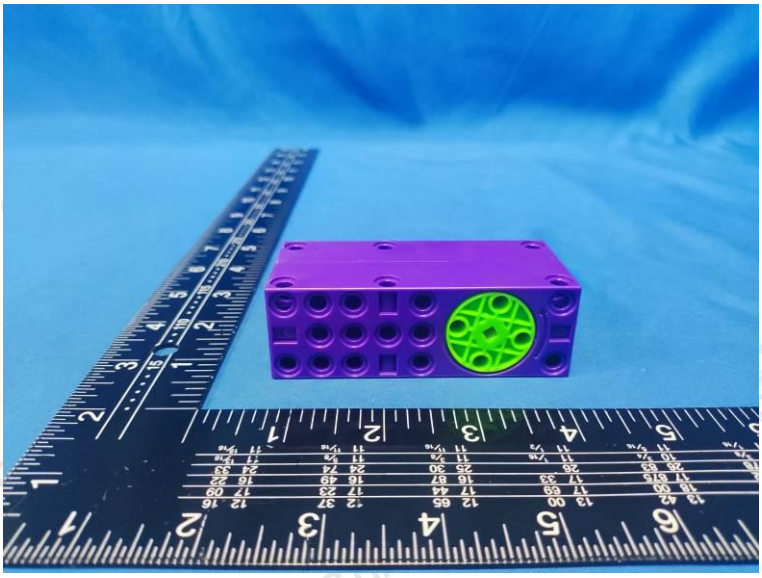

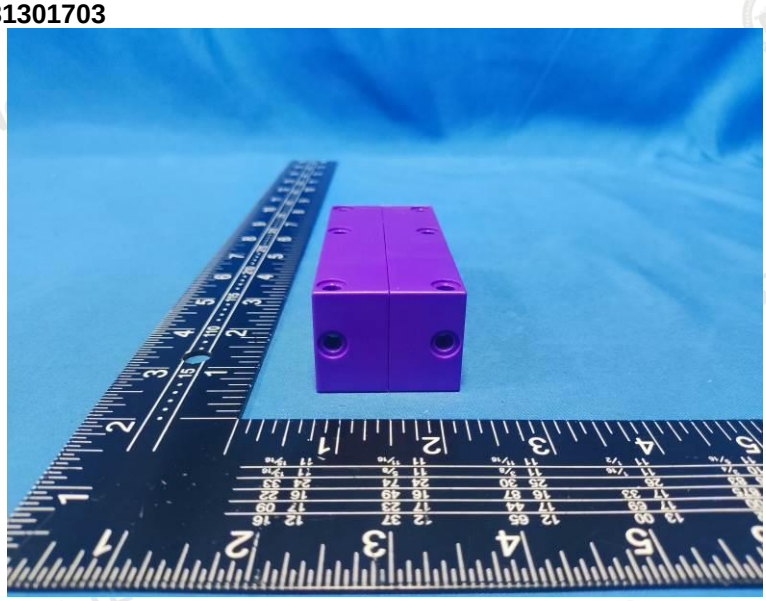

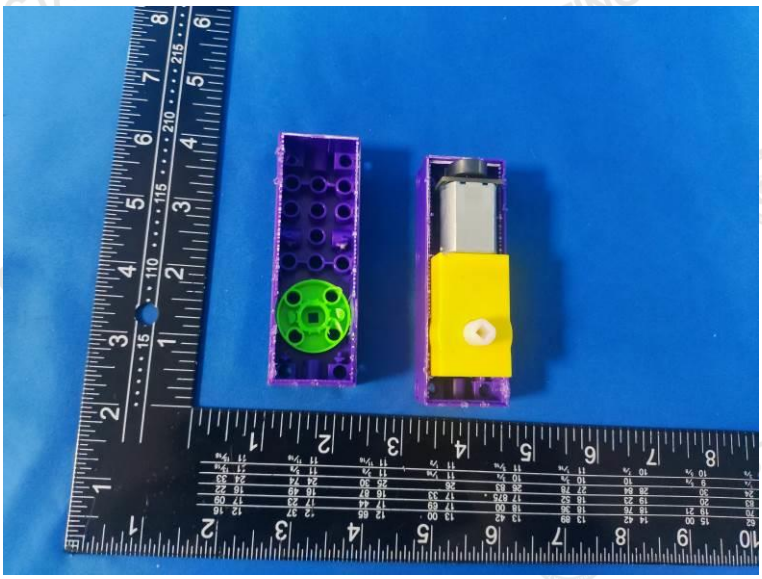

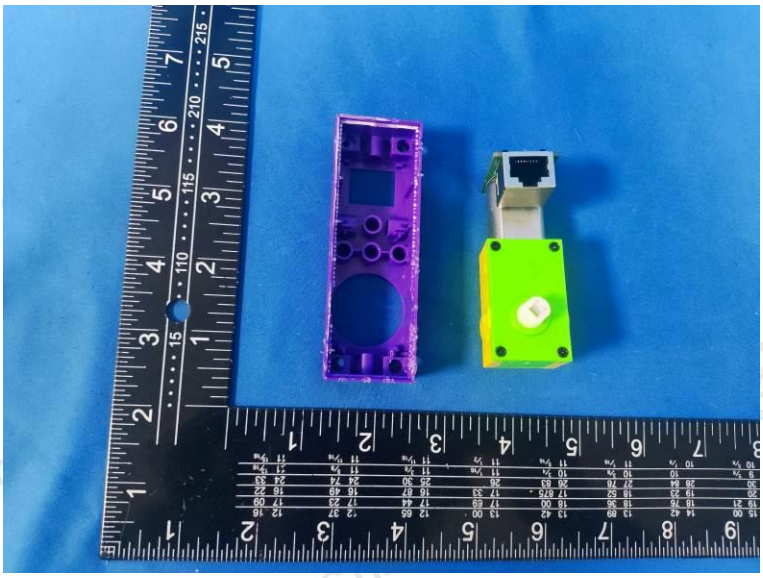

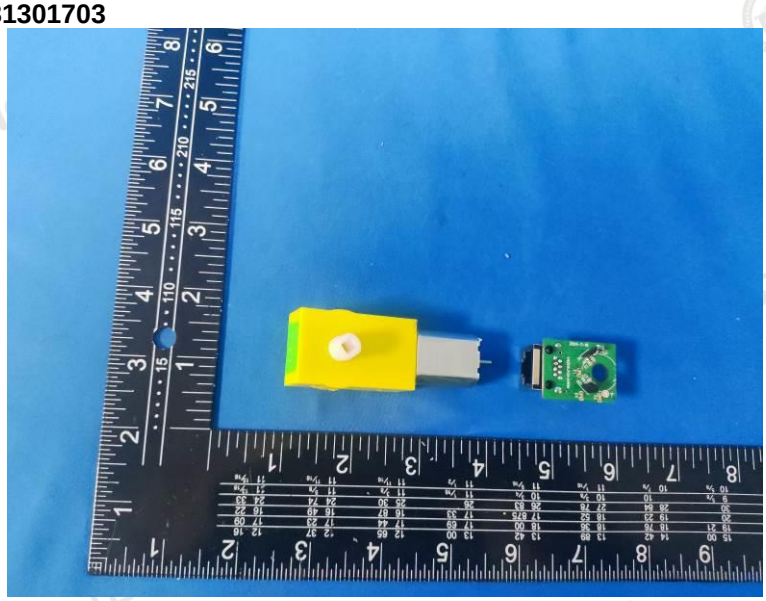

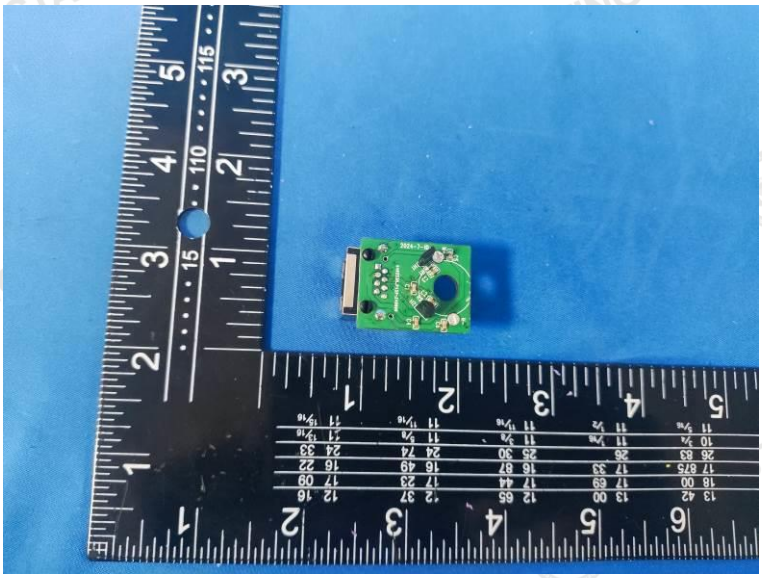

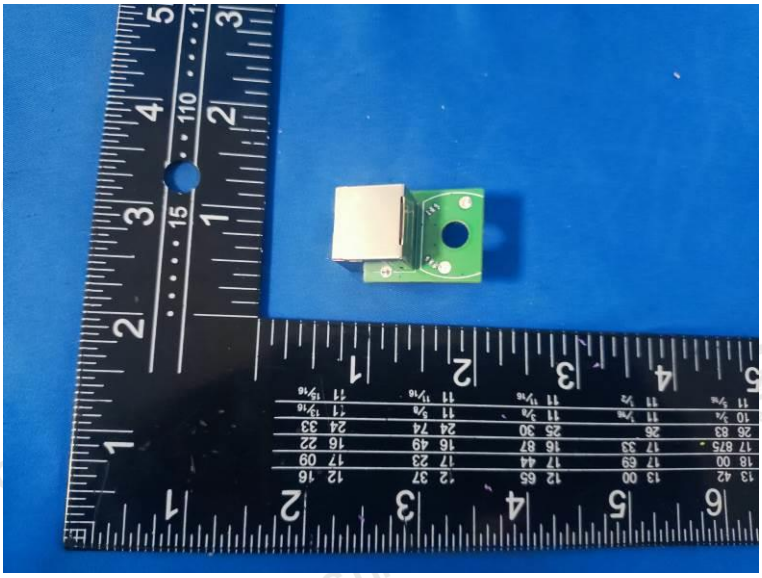

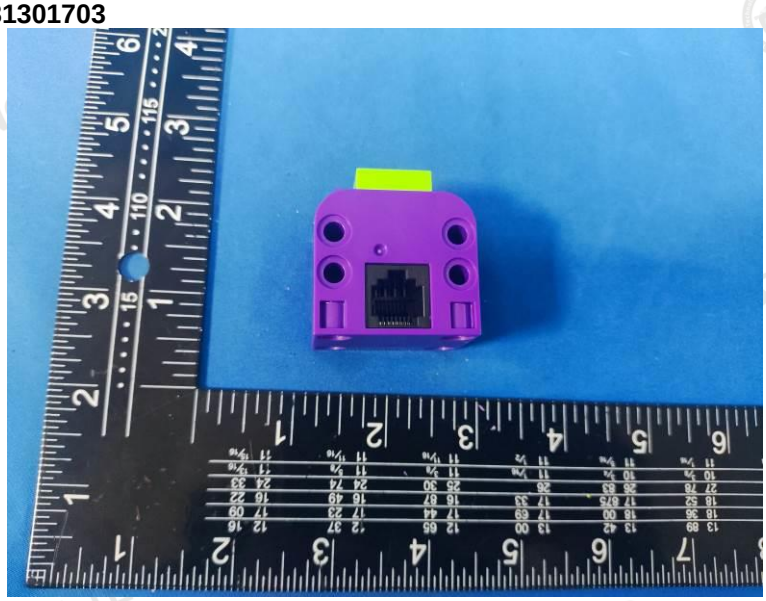

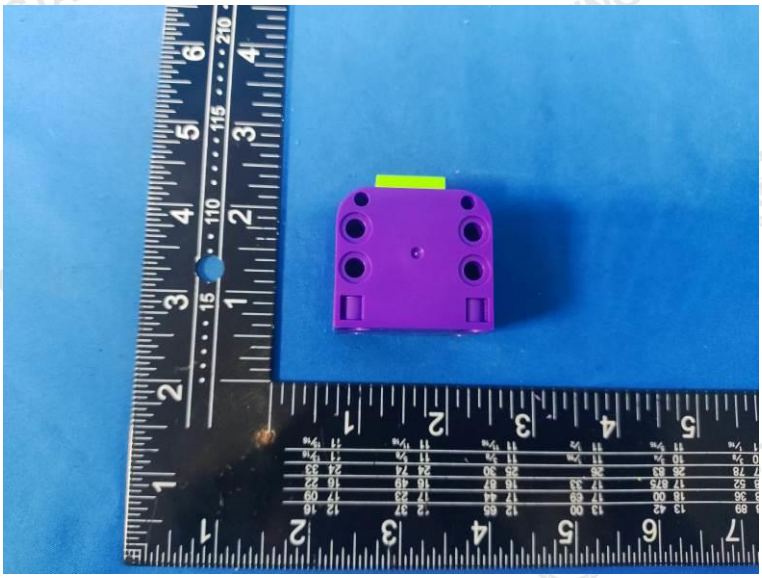

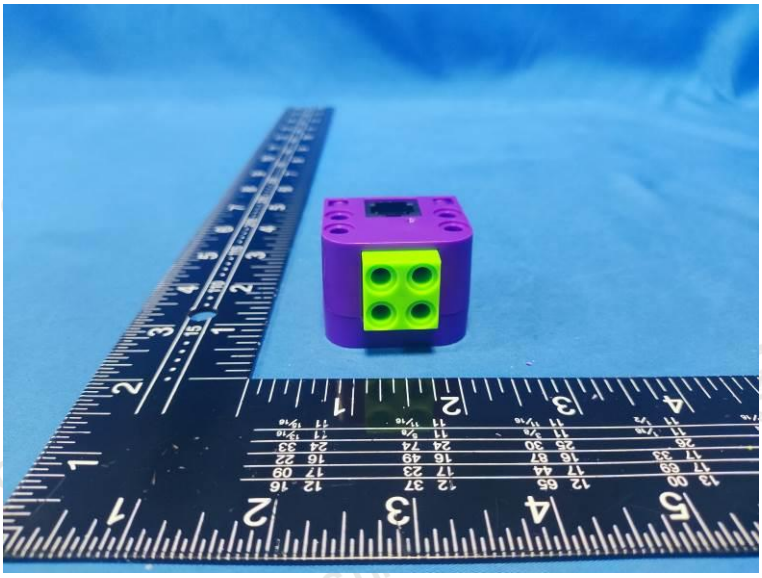

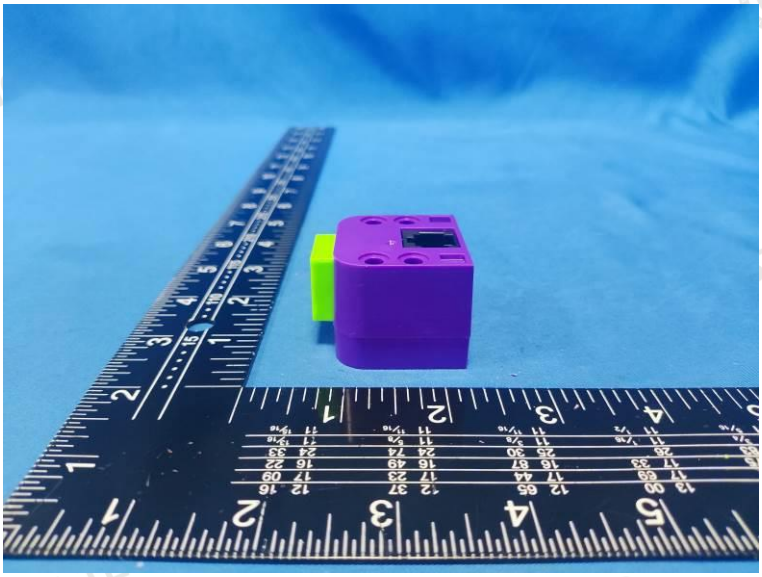

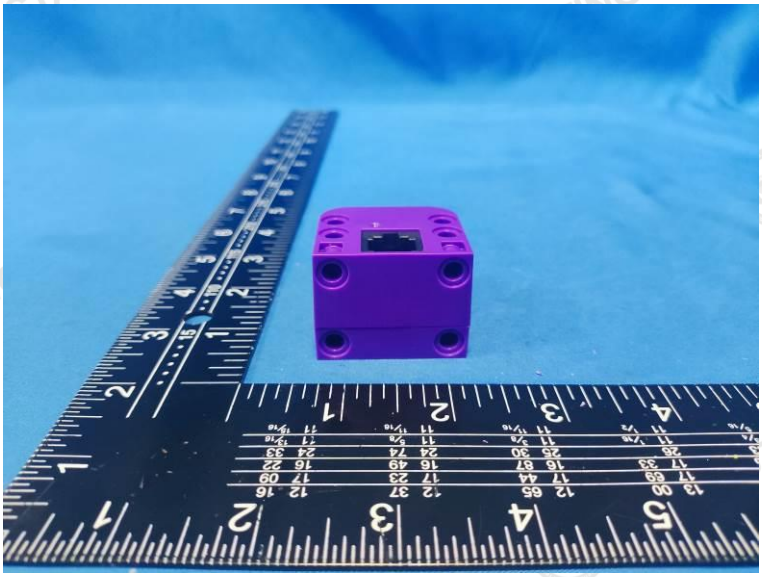

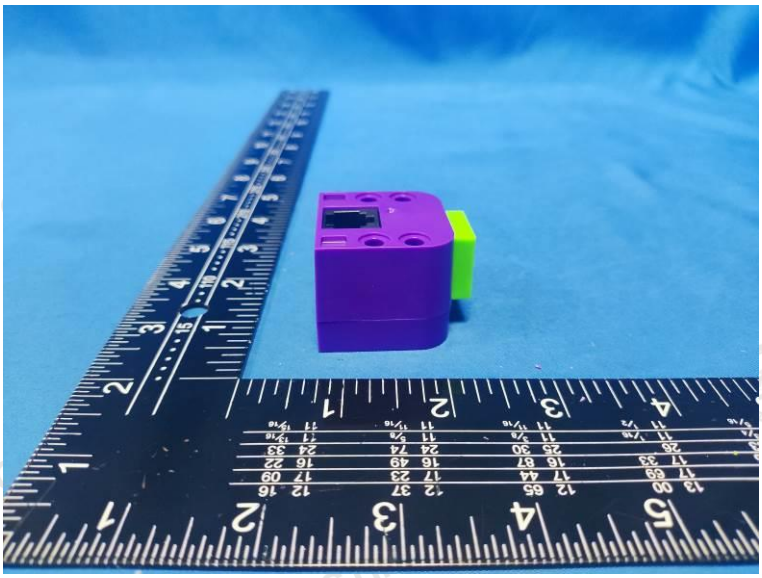

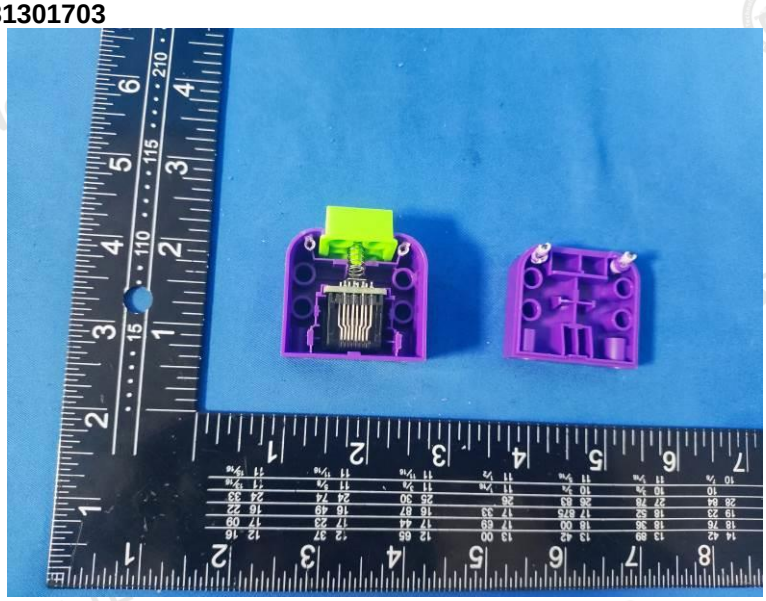

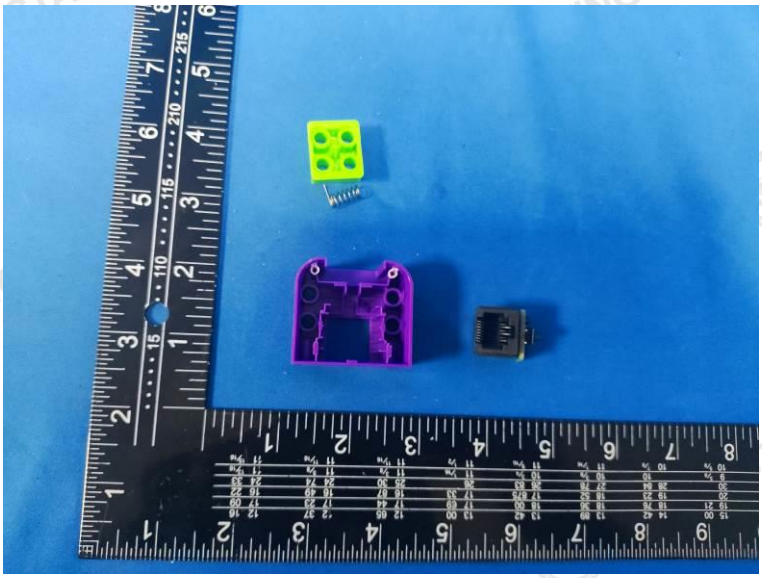

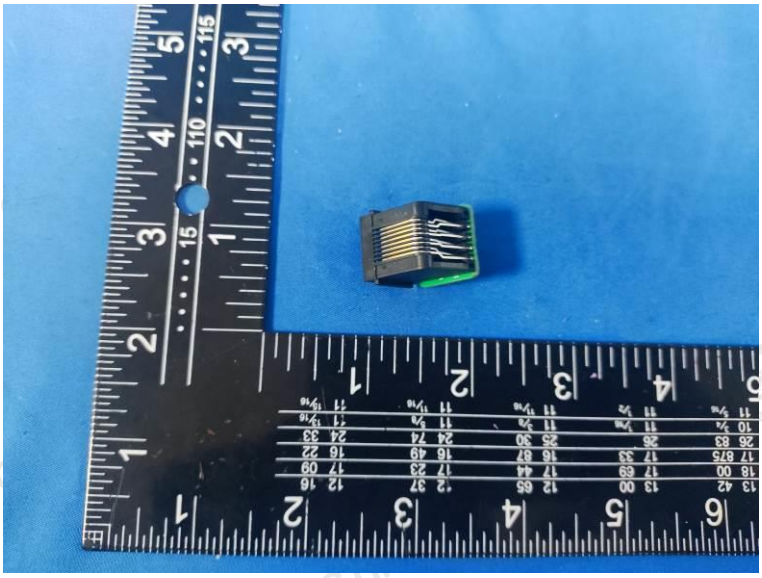

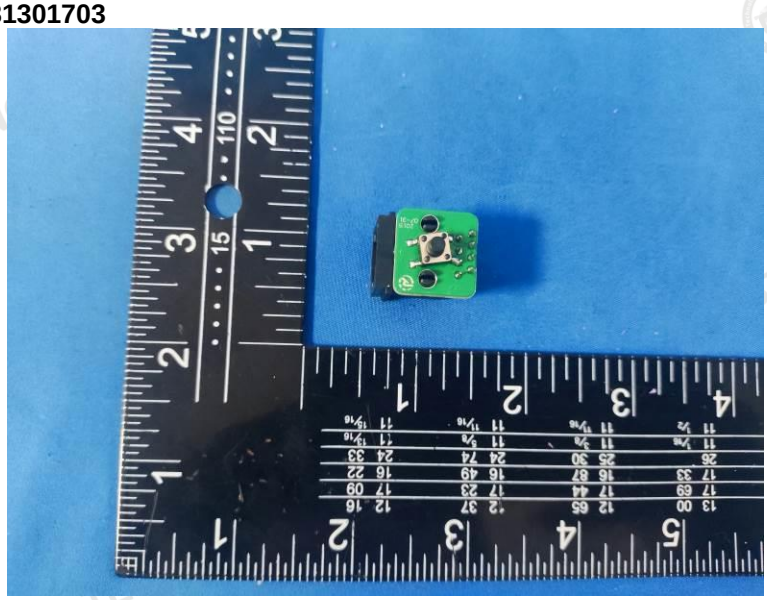

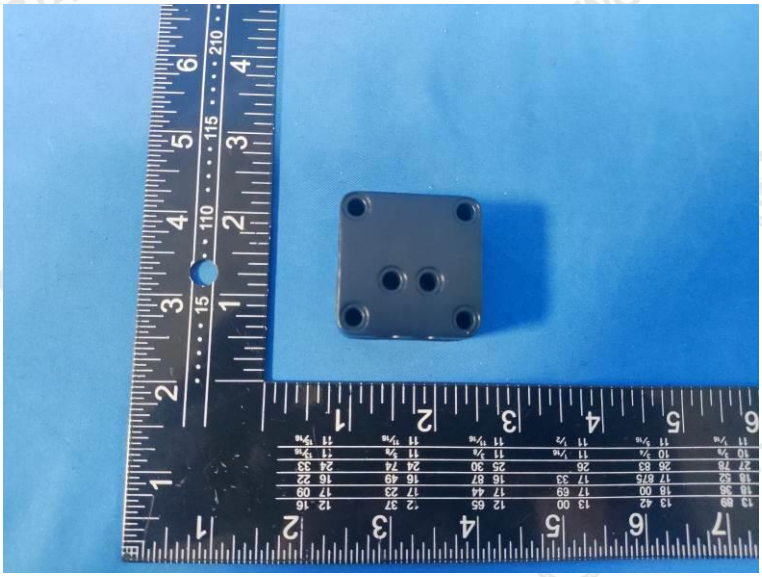

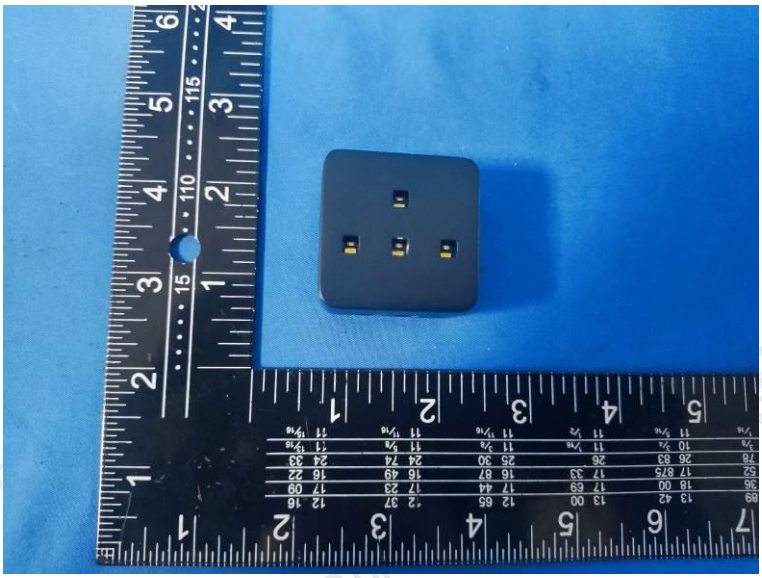

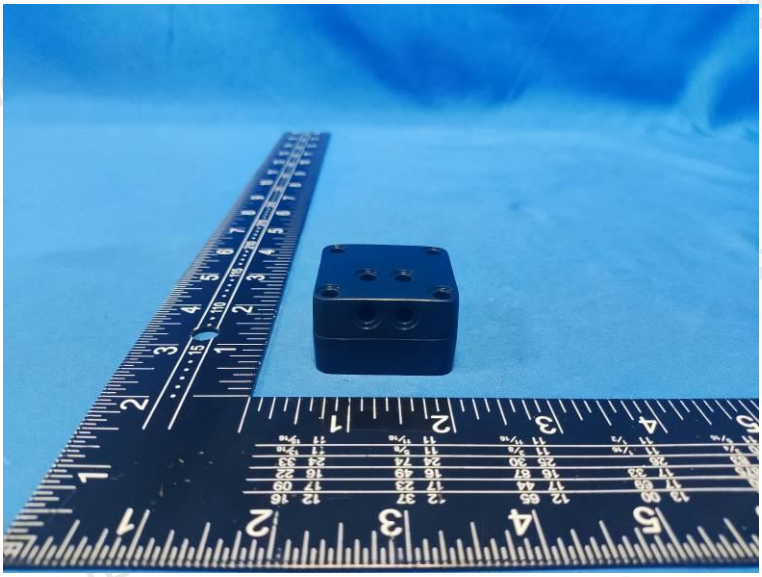

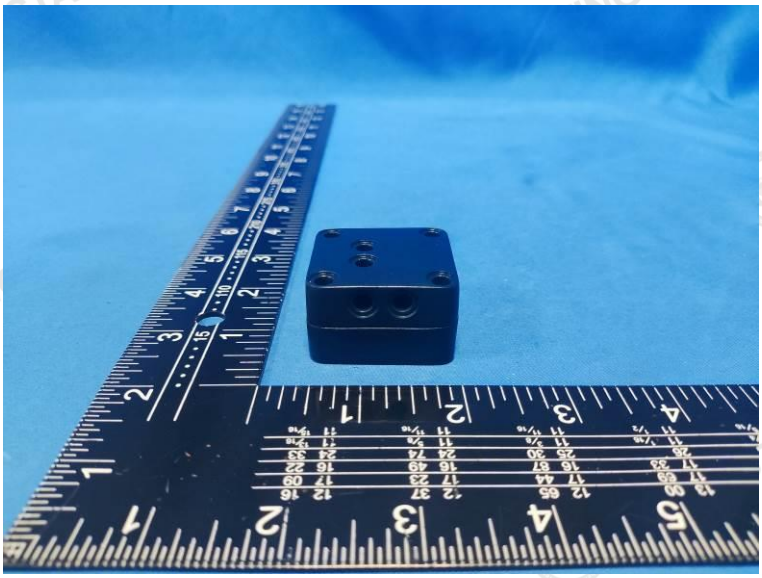

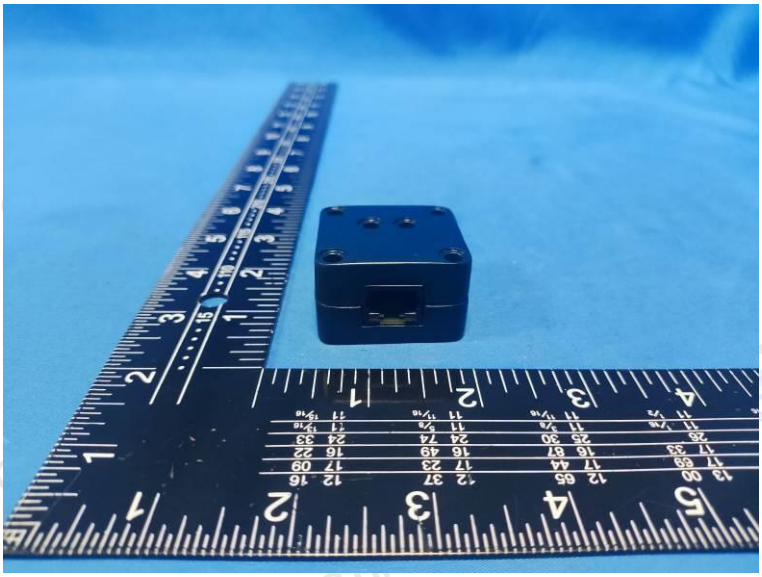

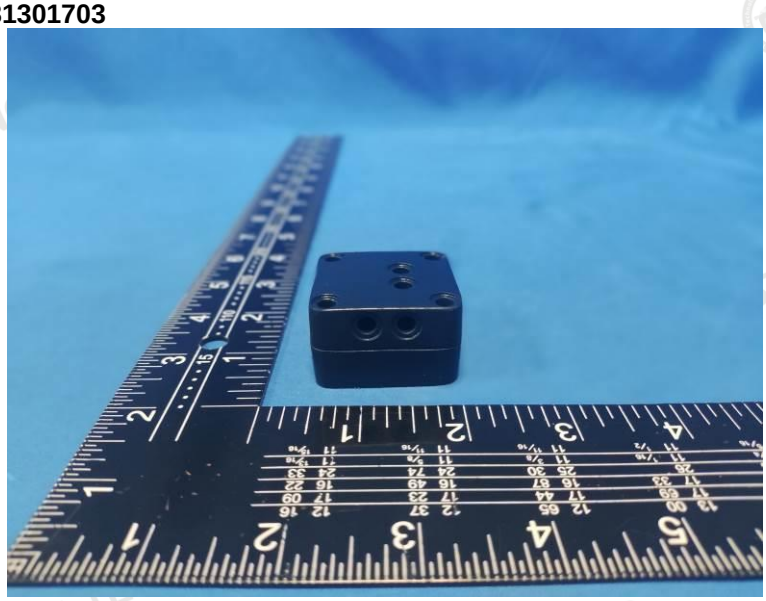

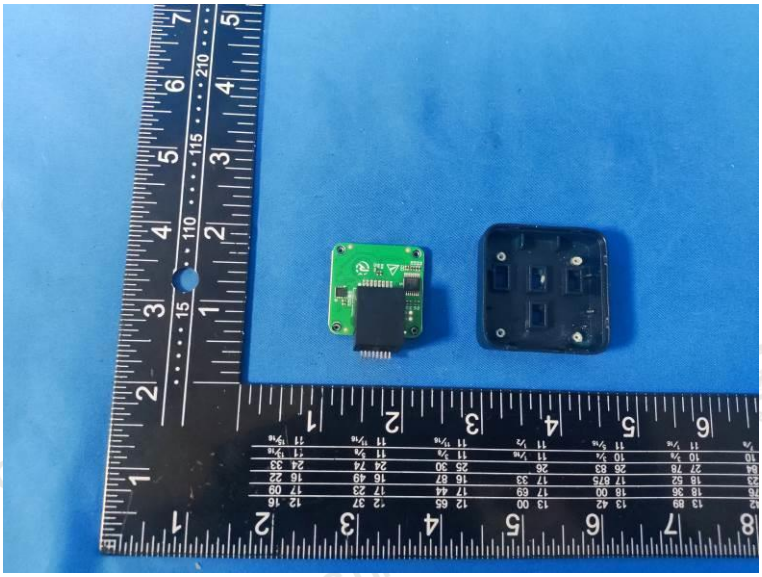

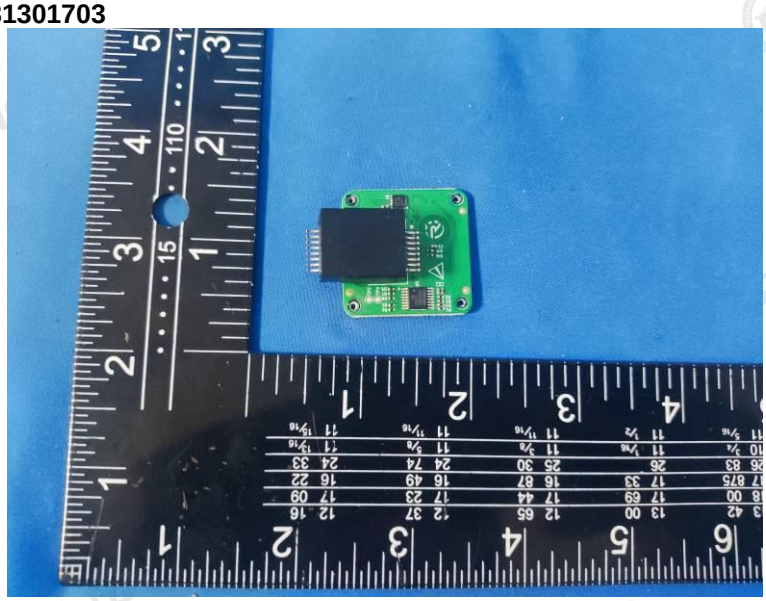

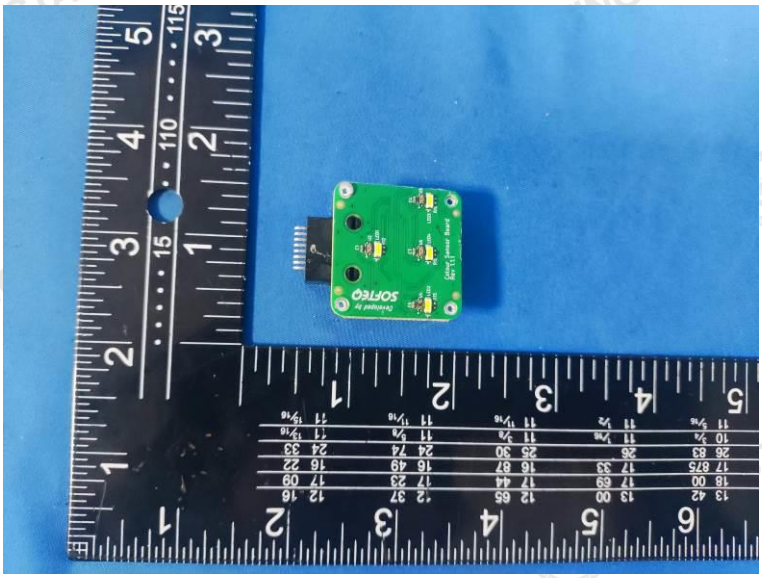

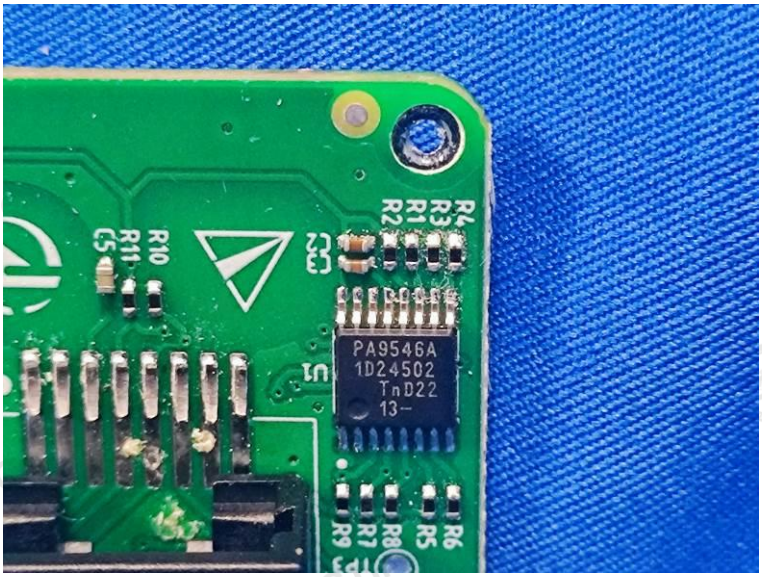
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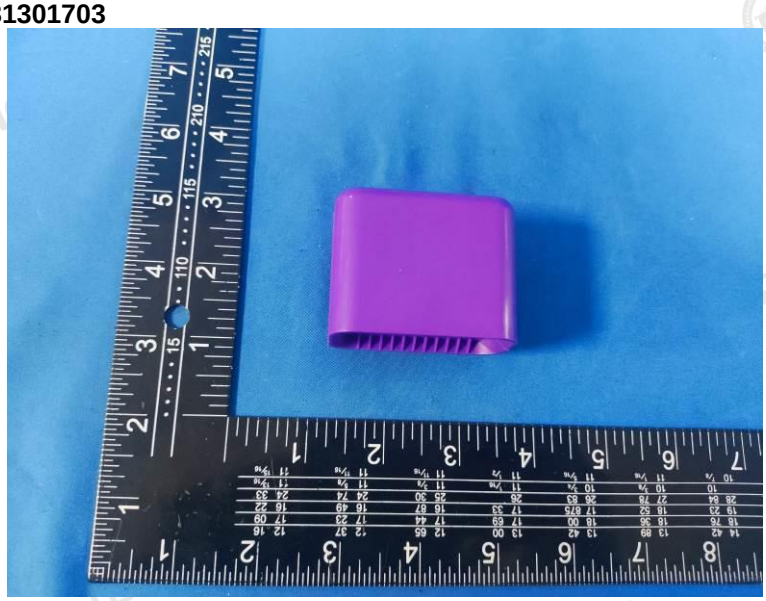

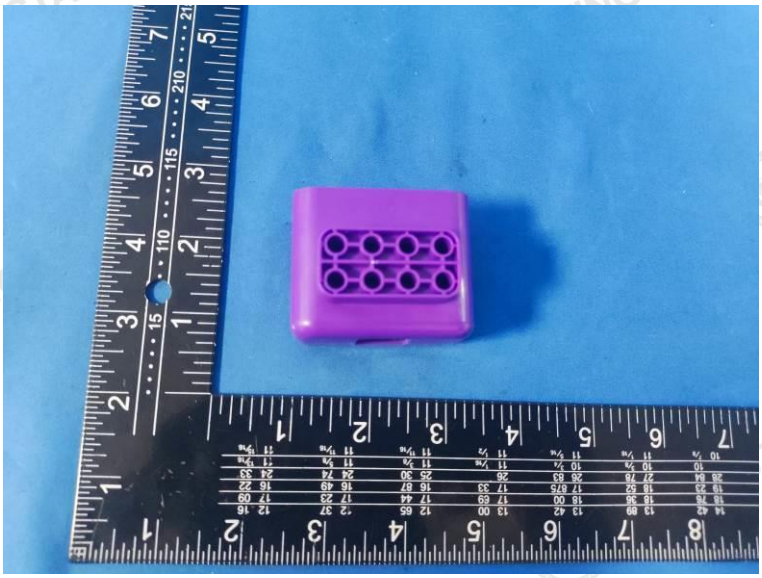

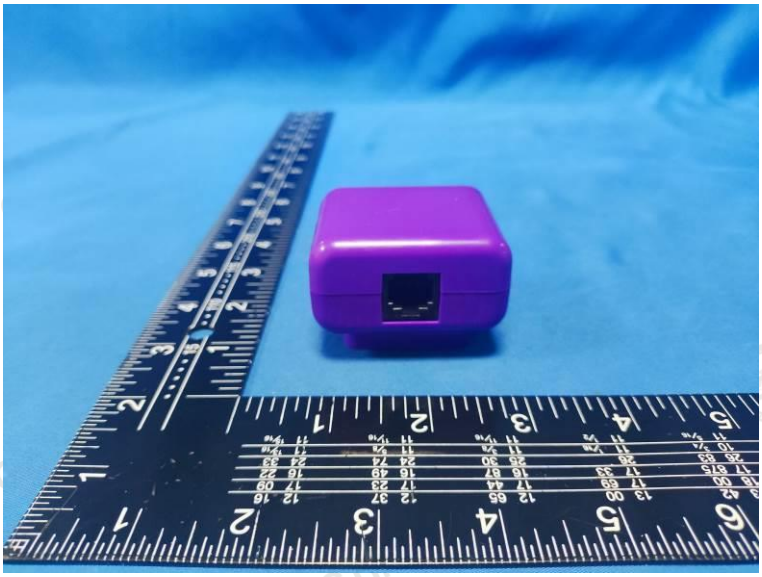

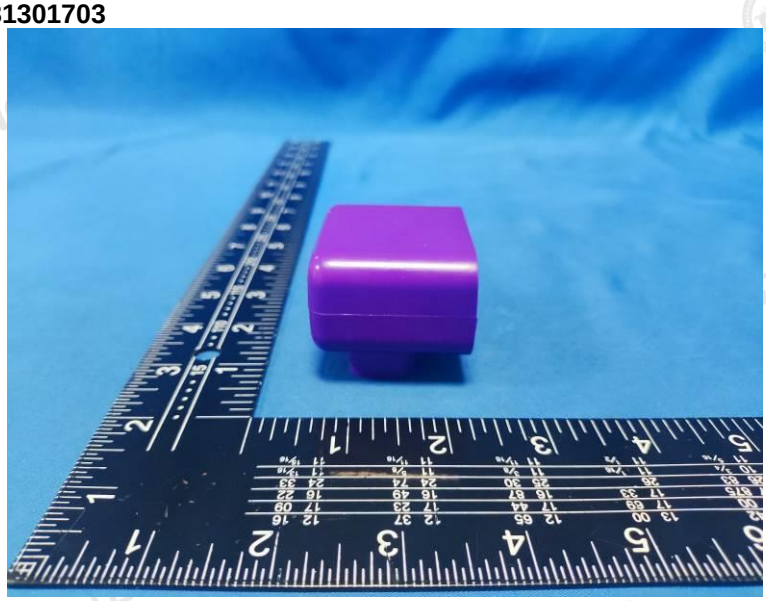

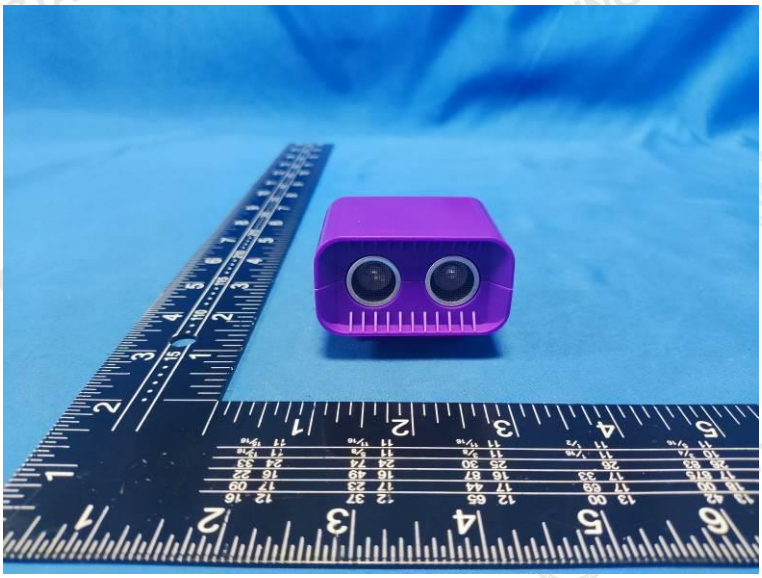

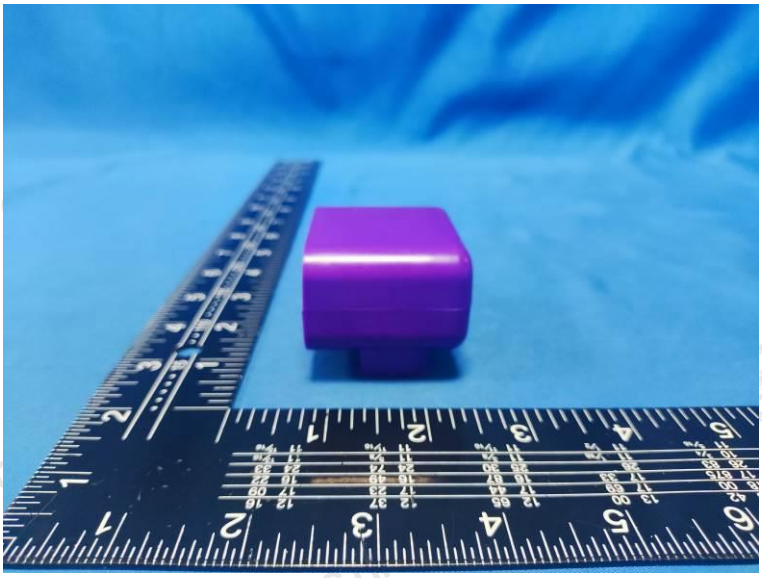

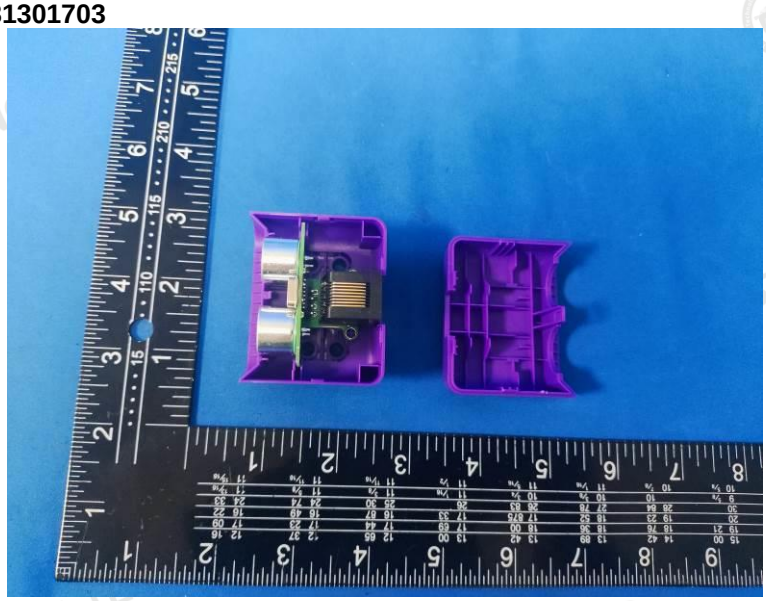

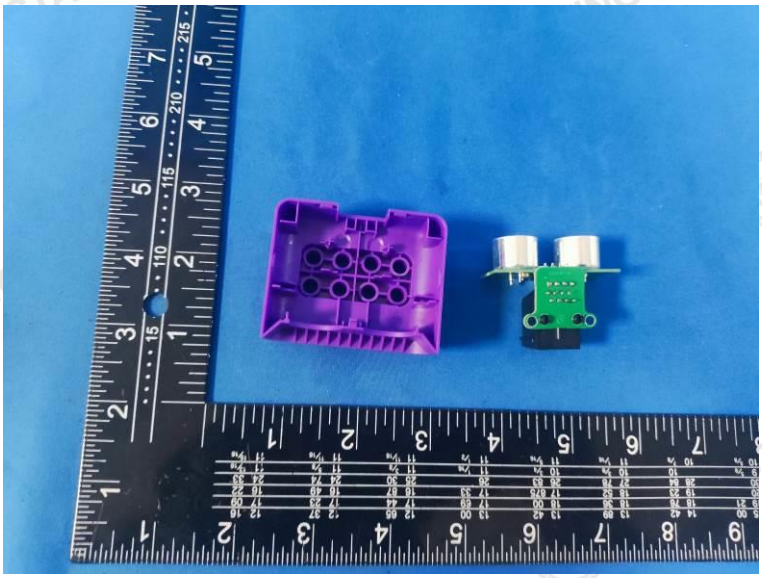

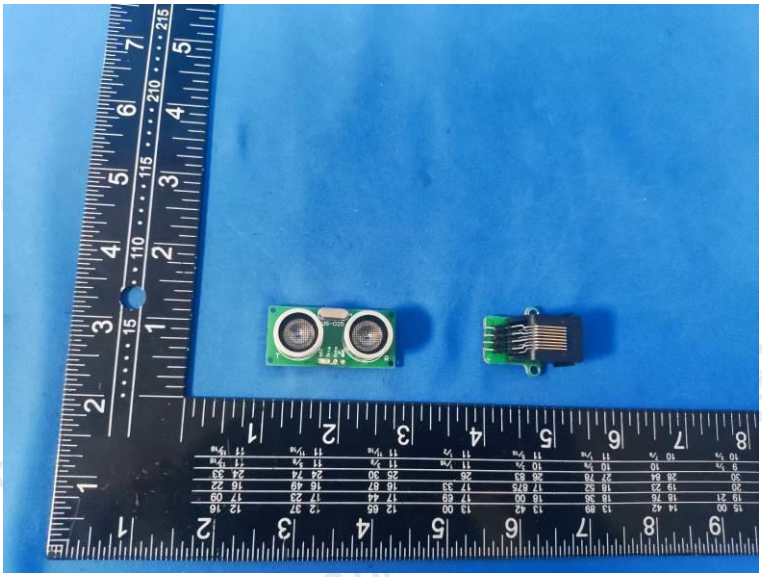

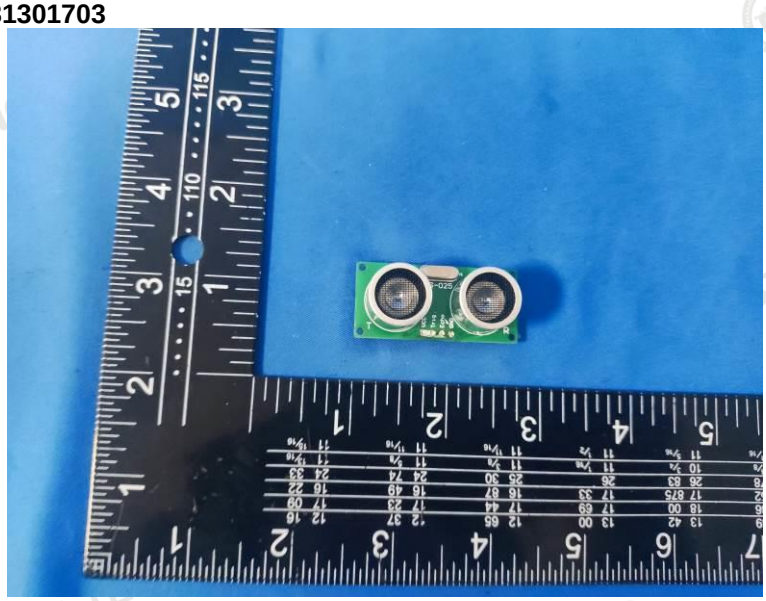

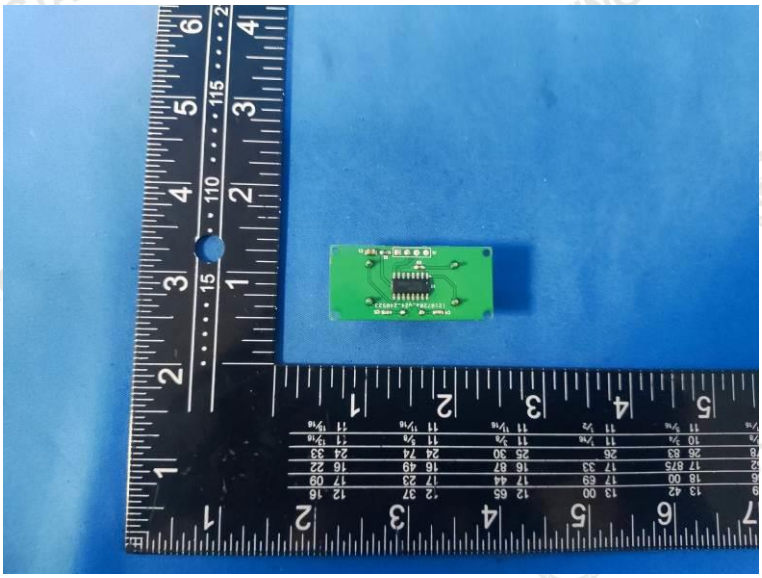

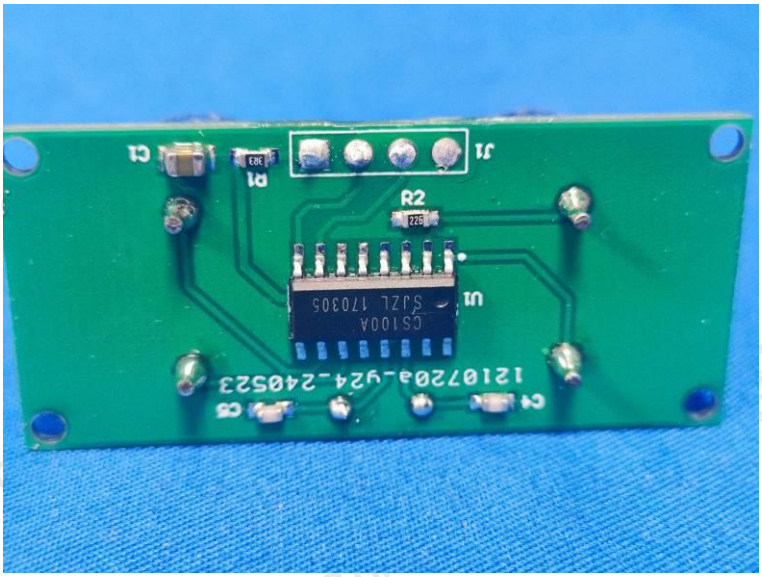
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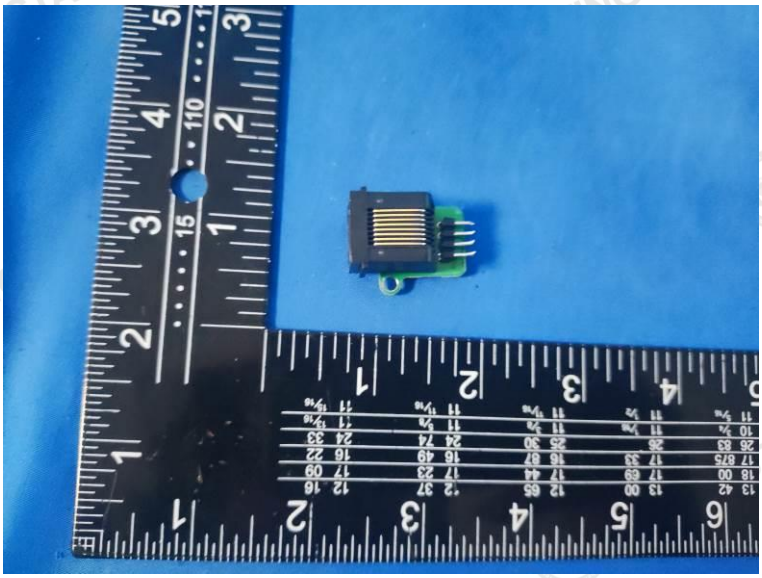

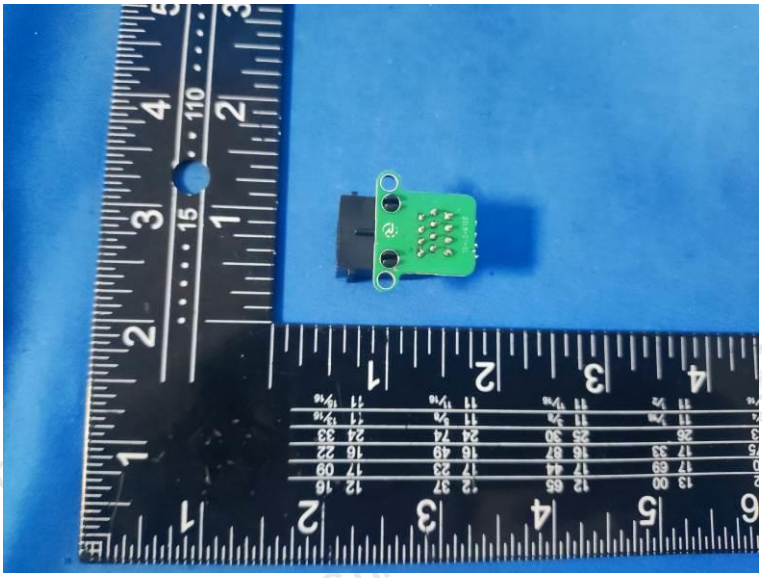

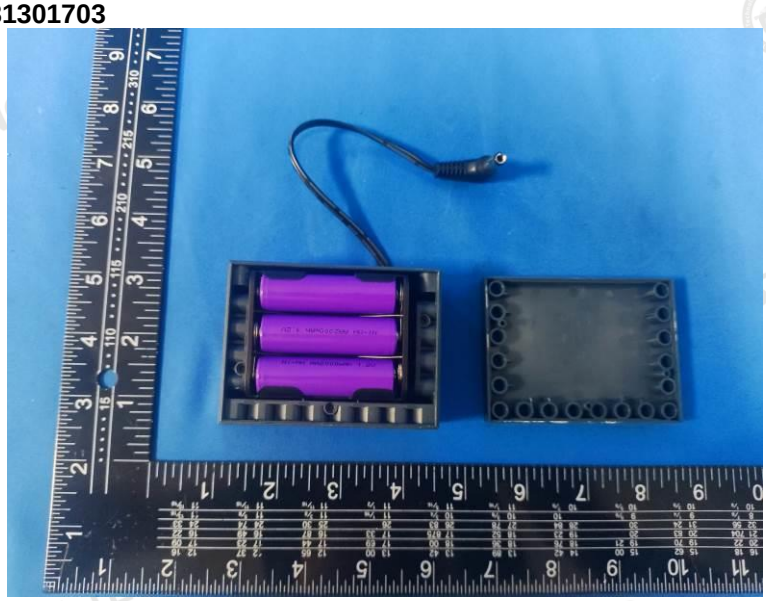

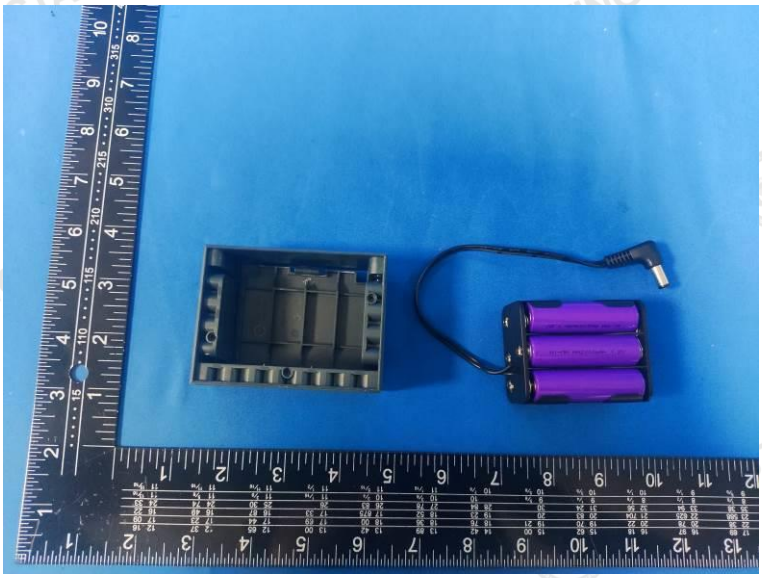

.....End of Report.....