



中国认可
国际互认
检测
TESTING
CNAS L5288

FCC PART 15C TEST REPORT FOR CERTIFICATION On Behalf of

Changsha Benlei Technology Co., Ltd.

Smart Cutting Machine

Model Number: SA501

Additional Model: S501,SA01,SA502,S502,SA02,SA501-PK,SA501-OG,

SA501-PL,SA501-GN,SA501-YL,SA501-BU,SA501-RD,SA501-WH

FCC ID: 2BEVY-SA501

Applicant :	Changsha Benlei Technology Co., Ltd.
Address:	Room 3002-621, Comprehensive Building, Sifang Community,
	No.168 Shuangyong Road, Sifangping Street, Kaifu District,
	Changsha City, Hunan Province, China
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan,
	Guangdong, China
Tel: 86-769-83081888-808	

Report Number:	ESTE-R2401205-1
Date of Test:	Sep. 19, 2024 ~ Sep. 23, 2024
Date of Report:	Sep. 26, 2024

TABLE OF CONTENTS

Description	Page
TEST REPORT VERIFICATION.....	3
1. GENERAL INFORMATION.....	4
1.1. Description of Device (EUT).....	4
1.2. Antenna Information	4
1.3. Information of RF Cable	4
2. SUMMARY OF TEST	5
2.1. Summary of test result	5
2.2. Test Facilities.....	6
2.3. Measurement uncertainty	7
2.4. Assistant equipment used for test	7
2.5. Block Diagram	7
2.6. Test Mode	8
2.7. Power Setting of Test Software	8
2.8. Duty Cycle.....	8
2.9. Channel List.....	9
2.10. Test Equipment List.....	10
3. RADIATED SPURIOUS EMISSIONS AND BAND EDGE	11
3.1. Limit.....	11
3.2. Test Setup.....	12
3.3. Spectrum Analyzer Setting.....	13
3.4. Test Procedure.....	13
3.5. Test Result.....	14
4. ANTENNA REQUIREMENTS.....	16
4.1. Limit.....	16
4.2. Test Result.....	16
5. TEST SETUP PHOTO.....	17
6. EUT PHOTO	18

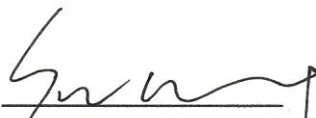
Applicant: Address:	Changsha Benlei Technology Co., Ltd. Room 3002-621, Comprehensive Building, Sifang Community, No.168 Shuangyong Road, Sifangping Street, Kaifu District, Changsha City, Hunan Province, China		
Manufacturer: Address:	Changsha Benlei Technology Co., Ltd. Room 3002-621, Comprehensive Building, Sifang Community, No.168 Shuangyong Road, Sifangping Street, Kaifu District, Changsha City, Hunan Province, China		
E.U.T:	Smart Cutting Machine		
Model Number:	SA501		
Additional Model:	S501,SA01,SA502,S502,SA02,SA501-PK,SA501-OG,SA501-PL,SA501-G N,SA501-YL,SA501-BU,SA501-RD,SA501-WH (They are identical except model name and color)		
Power Supply:	DC 18V From Adapter Input AC 100-240V, 50/60Hz		
Trade Name:	-----	Serial No.:	EST-231120010-001; EST-231120010-005
Date of Receipt:	Sep. 19, 2024	Date of Test:	Sep. 19, 2024 ~ Sep. 23, 2024
Test Specification:	FCC Part 15 Subpart C (15.247) ANSI C63.10:2013 FCC KDB 558074 D01 15.247 Meas Guidance v05r02		
Test Result:	The device described above is tested by EST Technology Co., Ltd. The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart C requirements. This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd. Date: Sep. 26, 2024		

Prepared by:

Zephyr Zhu

Zephyr Zhu / Assistant

Reviewed by:



Seven Wang / Engineer

Approved by:



Iceman Hu / Manager

Other Aspects: This report base on the previous report with report number: ESTE-R2401205. Updated product name and product exterior color, while internal Bluetooth module weld point size changed in this report.

Abbreviations: OK/P=passed fail/F=failed n.a/N=not applicable E.U.T=equipment under tested

This test report is based on a single evaluation of one sample of above mentioned products ,It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.

1.GENERAL INFORMATION

1.1.Description of Device (EUT)

Product Name	:	Smart Cutting Machine
Model Number	:	SA501
Software Version	:	1.0.1
Hardware Version	:	E001_A
Operation frequency	:	2402MHz~2480MHz
Number of channel	:	40
Max Output Power (PEAK)	:	-0.12 dBm
Modulation Type	:	GFSK
Sample Type	:	Prototype production

Note: For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

1.2.Antenna Information

Ant No.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	PCB	-	-0.58
Note: 1.The antenna gain is declared by the customer and the laboratory is not responsible for the accuracy of the antenna gain. 2.The test results of this report only apply to the sample as received					

1.3.Information of RF Cable

Cable Loss(dB)	Provided by
1.0	Changsha Benlei Technology Co., Ltd.
Note: 1.The customer declared the loss value of the RF Cable. and the test results of this report only apply to the sample as received. 2.The laboratory is not responsible for the accuracy of the cable loss.	

2.SUMMARY OF TEST

2.1.Summary of test result

No.	Description of Test Item	FCC Standard Section	Results
1	6dB Bandwidth	15.247(a)(2)	N/A
2	Maximum Peak Output Power	15.247(b)(3)	N/A
3	Power Spectral Density	15.247(e)	N/A
4	Conducted Band Edge	15.247(d)	N/A
5	Conducted Spurious Emissions	15.247(d)	N/A
6	Radiated Spurious Emissions and Band Edge	15.205 15.209 15.247(d)	PASS
7	AC Power Line Conducted Emissions	15.207	N/A
8	Antenna Requirement	15.203	PASS

Note:“N/A” denotes test is not applicable in this test report.

2.2.Test Facilities

EMC Lab : Accredited by CNAS, CHINA
Registration No.: L5288
This Accreditation is valid until: November 12, 2029

Recognized by FCC, USA
Designation Number: CN1215
This Recognition is valid until: January 31, 2026

Accredited by A2LA, USA
Registration No.: 4366.01
This Accreditation is valid until: January 31, 2026

Recognized by Industry Canada
CAB identifier No.: CN0035
This Recognition is valid until: January 31, 2026

Recognized by VCCI, Japan
Registration No.:C-14103; T-20073; R-13663;
R-20103; G-20097
Date of registration: Apr. 20, 2020
This Recognition is valid until: Apr. 19, 2026

Recognized by TUV Rheinland, Germany
Registration No.: UA 50413872 0001
Date of registration: July 31, 2018

Recognized by Intertek
Registration No.: 2011-RTL-L2-64
Date of registration: November 08, 2018

Name of Firm : EST Technology Co., Ltd.

Site Location : Chilingxiang, Qishantou, Santun, Houjie, Dongguan,
Guangdong, China

2.3.Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	$\pm 3.48\text{dB}$
Uncertainty for spurious emissions test (Below 30MHz)	$\pm 1.62\text{ dB}$
Uncertainty for spurious emissions test (30MHz-1GHz)	$\pm 4.60\text{ dB(Polarize: H)}$
	$\pm 4.68\text{ dB(Polarize: V)}$
Uncertainty for spurious emissions test (1GHz to 25GHz)	$\pm 4.96\text{dB}$
Uncertainty for radio frequency	7×10^{-8}
Uncertainty for conducted RF Power	1.08dB
Uncertainty for Power density test	0.26dB

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

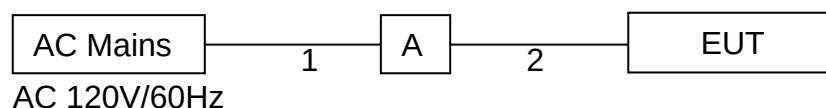
2.4.Assistant equipment used for test

Item	Equipment	Brand	Model Name/Type No.	FCC ID	Series No.
A	Adapter	-	MKE-1801500C8	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	NO	NO	1.0m	AC Cable
2	NO	NO	1.5m	DC Cable

2.5.Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 (or 1.5) meter high above ground. EUT was beset into BLE test mode by software before test.



(EUT: Smart Cutting Machine)

2.6.Test Mode

The test mode was selected for the final test as listed below.

Test Item	Modulation Type	Test Channel
Radiated Spurious Emissions(Below 1GHz)	GFSK	Low/Middle/High

Note: In radiated measurement, the EUT had been pre-scan on the positioned of each 3 axis(X,Y,Z), the worst case was found when positioned on **X-plane**.

2.7.Power Setting of Test Software

Software Name	FCC Assist 1.0.2.2		
Frequency(MHz)	2402	2440	2480
GFSK 1Mbps Setting	Default	Default	Default
GFSK 2Mbps Setting	Default	Default	Default

Note: This information is provided by the applicant.

2.8.Duty Cycle

Refer to section 11: Appendix G

Note:

1. If duty cycle <98 %, the conducted average output power and average power spectral density should be add duty factor.
2. If duty cycle ≥98 %,the EUT is consider to be transmitting continuously,the conducted average output power and average power spectral density no need to add duty factor(consider to be zero).
3. The conducted peak output power and peak power spectral density no need to consider duty factor.
4. The on-time time is transmission duration(T).

2.9.Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404
2	2406	3	2408
4	2410	5	2412
6	2414	7	2416
8	2418	9	2420
10	2422	11	2424
12	2426	13	2428
14	2430	15	2432
16	2434	17	2436
18	2438	19	2440
20	2442	21	2444
22	2446	23	2448
24	2450	25	2452
26	2454	27	2456
28	2458	29	2460
30	2462	31	2464
32	2466	33	2468
34	2470	35	2472
36	2474	37	2476
38	2478	39	2480

2.10. Test Equipment List

For radiated emission test(9kHz-30MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	EST-E047	LISAI	June 11,24	June 10,25
Active Loop Antenna	SCHWABE BECK	FMZB 1519B	EST-E054	LISAI	June 11,24	June 10,25
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
9kHz-30MHz Cable	N/A	EST-001	N/A	N/A	N/A	N/A

For radiated emissions test (30MHz-1000MHz)						
Equipment	Manufacturer	Model No.	Serial No.	Calibration Body	Last Cal.	Next Cal.
EMI Test Receiver	Rohde & Schwarz	ESR7	EST-E047	LISAI	June 11,24	June 10,25
Bilog Antenna	Teseq	CBL 6111D	EST-E034	LISAI	June 11,24	June 10,25
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A
30-1000MHz Cable	N/A	EST-002	N/A	N/A	N/A	N/A

3.RADIATED SPURIOUS EMISSIONS AND BAND EDGE

3.1.Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

15.209 Limit

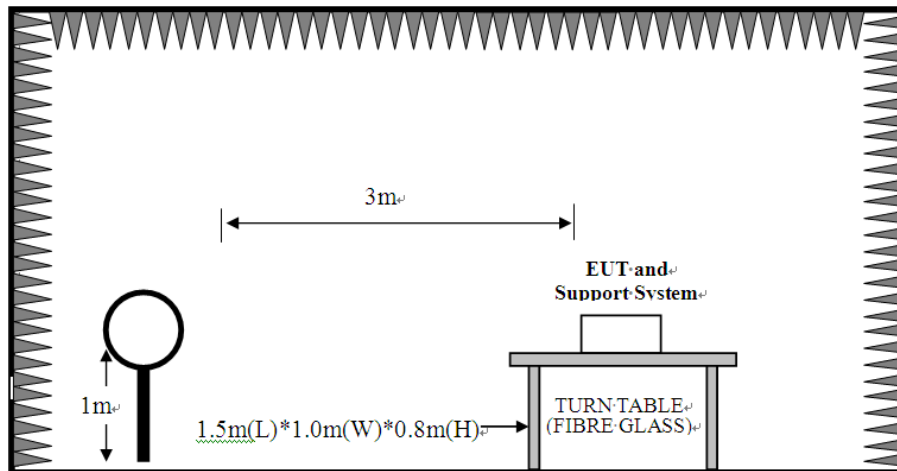
Frequency (MHz)	Field Strength(μ V/m)	Distance(m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

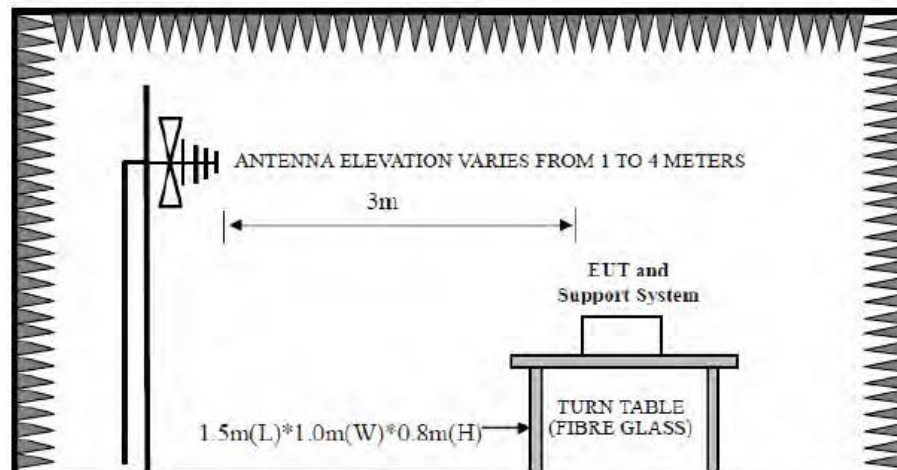
- (1) Emission level $\text{dB}\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$.
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

3.2.Test Setup

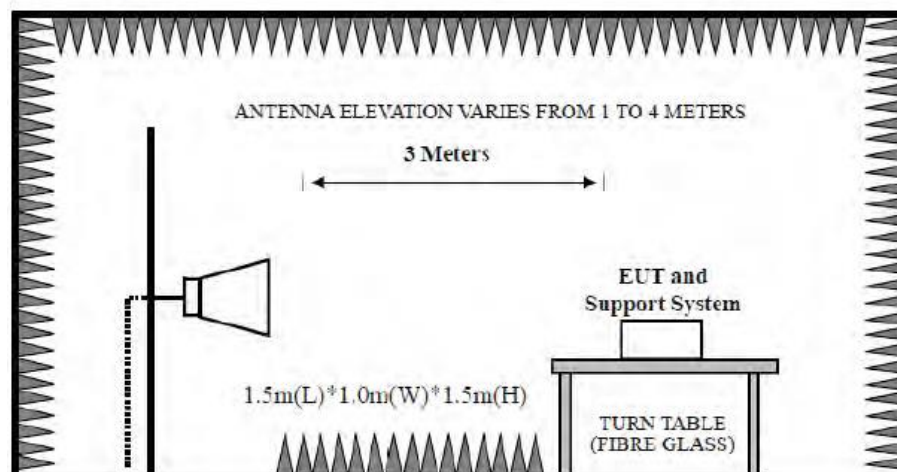
9kHz~30MHz



30~1000MHz



Above 1GHz



3.3.Spectrum Analyzer Setting

For 9KHz-150KHz

Spectrum Parameters	Setting
RBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
VBW	300Hz(for Peak&AVG)/CISPR 200Hz(for QP)
Start frequency	9KHz
Stop frequency	150KHz
Sweep Time	Auto
Detector	PEAK/QP/AVG
Trace Mode	Max Hold

For 150KHz-30MHz

Spectrum Parameters	Setting
RBW	9KHz
VBW	9KHz
Start frequency	150KHz
Stop frequency	30MHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

For 30MHz-1GHz

Spectrum Parameters	Setting
RBW	120KHz
VBW	300KHz
Start frequency	30MHz
Stop frequency	1GHz
Sweep Time	Auto
Detector	QP
Trace Mode	Max Hold

Note :T is the on-time time of the duty cycle,when EUT transmit continuously with maximum output power,unit is seconds. reference section 2.8 for the on-time time.

3.4.Test Procedure

- EUT was placed on a turn table, which is 0.8 meter high above ground for below 1GHz test, and which is 1.5 meter high above ground for above 1GHz test.
- EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower.
- Set the EUT transmit continuously with maximum output power.
- The turn table can rotate 360 degrees to determine the position of the maximum emission level.
- The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.
- Spectrum analyzer setting parameters in accordance with section 8.3.
- Repeat above procedures until all channels were measured.

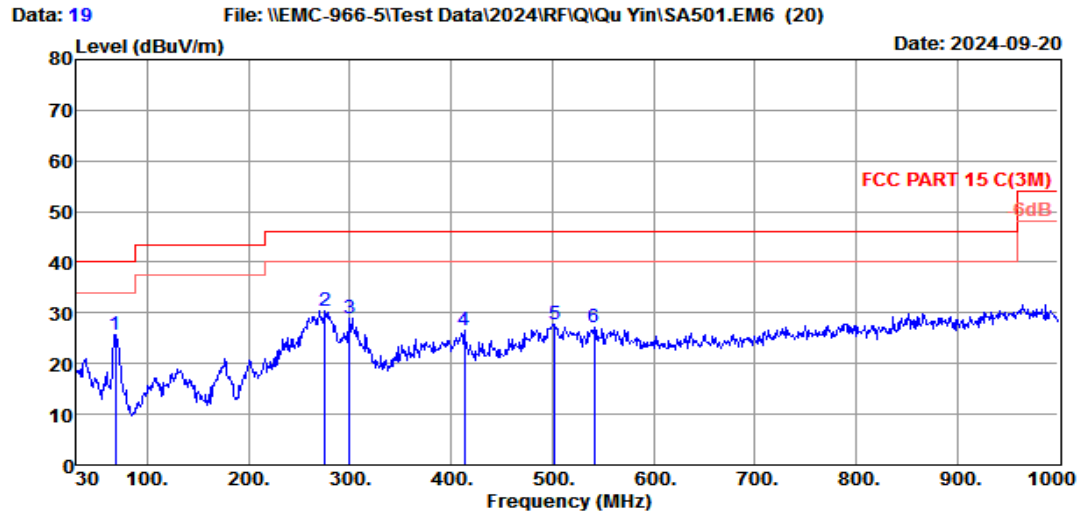
h. Record the results in the test report.

3.5. Test Result

Radiated Emissions Below 1GHz

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan, Guangdong, China
Tel: +86-769-83081888
Fax: +86-769-83081878



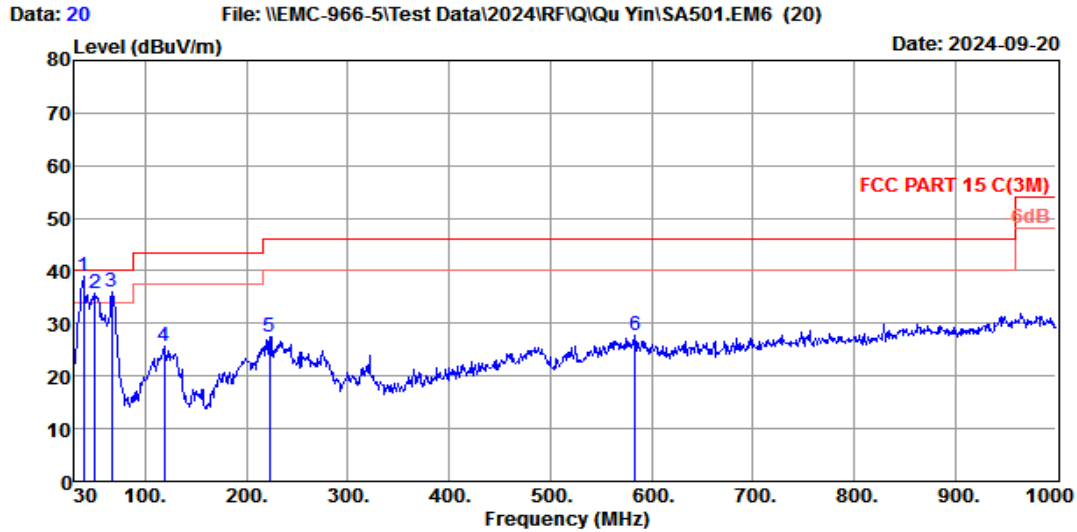
Site no. : 5# 966 Chamber Data no. : 19
Dis. / Ant. : 3m 54681 Ant. pol. : HORIZONTAL
Limit : FCC PART 15 C(3M)
Env. / Ins. : Temp:23' :Humi:54%: Prwss:101.1kPa
Engineer : Luke
EUT : Smart Cutting Machine
Power : DC 18V From Adapter Input AC 120V/60Hz
M/N : SA501
Test Mode : TX Mode

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	68.80	6.00	1.18	18.60	25.78	40.00	14.22	QP
2	275.41	12.70	2.88	14.81	30.39	46.00	15.61	QP
3	299.66	13.30	3.03	12.57	28.90	46.00	17.10	QP
4	413.15	16.54	3.59	6.42	26.55	46.00	19.45	QP
5	502.39	17.98	4.00	5.91	27.89	46.00	18.11	QP
6	541.19	18.54	4.15	4.49	27.18	46.00	18.82	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

EST Technology

Chilingxiang, Qishantou, Santun,
Houjie, Dongguan, Guangdong, China
Tel:+86-769-83081888
Fax:+86-769-83081878



Site no. : 5# 966 Chamber Data no. : 20
Dis. / Ant. : 3m 54681 Ant. pol. : VERTICAL
Limit : FCC PART 15 C(3M)
Env. / Ins. : Temp:23' :Humi:54%: Prwss:101.1kPa
Engineer : Luke
EUT : Smart Cutting Machine
Power : DC 18V From Adapter Input AC 120V/60Hz
M/N : SA501
Test Mode : TX Mode

	Freq. (MHz)	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	38.73	14.50	1.04	23.29	38.83	40.00	1.17	QP
2	50.37	9.10	1.19	25.55	35.84	40.00	4.16	QP
3	66.86	6.30	1.18	28.50	35.98	40.00	4.02	QP
4	118.27	12.40	1.40	11.98	25.78	43.50	17.72	QP
5	223.03	9.70	2.58	15.21	27.49	46.00	18.51	QP
6	583.87	19.86	4.33	3.53	27.72	46.00	18.28	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
2. Margin= Limit - Emission Level.
3. The emission levels that are 20dB below the official limit are not reported.

Note:

- The amplitude of 9KHz to 30MHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
- All channels had been pre-test,only the worst case was reported.

4.ANTENNA REQUIREMENTS

4.1. Limit

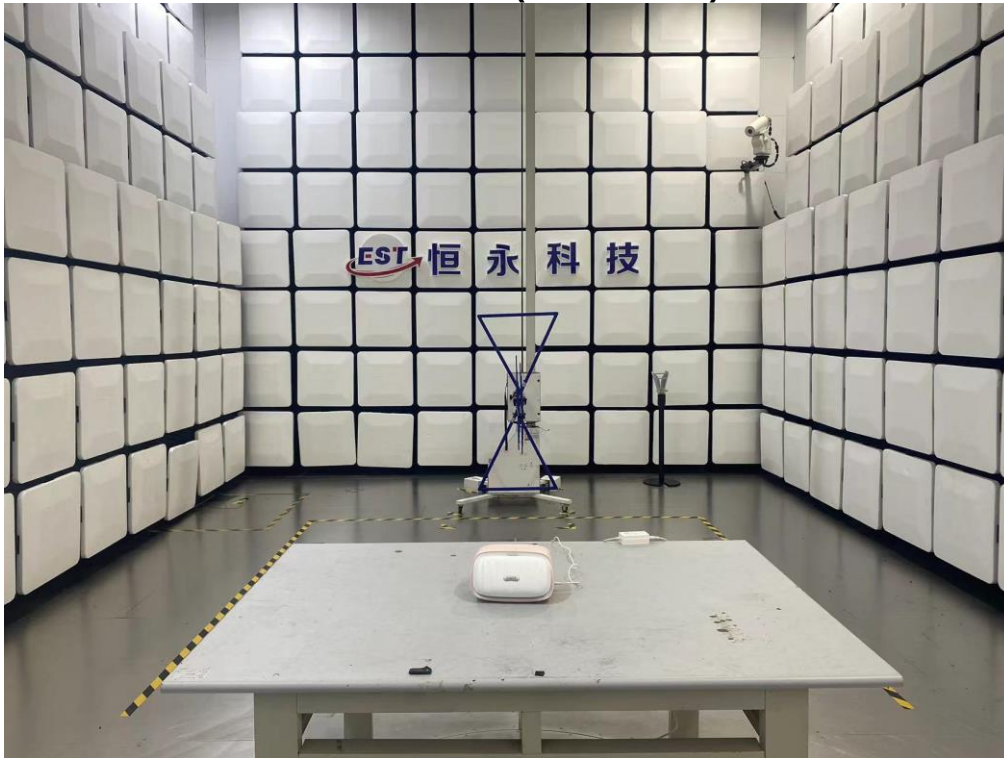
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. 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, 15.221, or §15.236. 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.

4.2. Test Result

The antennas used for this product is PCB antenna, so compliance with antenna requirements. (Please refer to the EUT photo for details)

5.TEST SETUP PHOTO

Radiated Test (Below 1GHz)



6. EUT PHOTO

External Photos M/N: SA501



External Photos

M/N: SA501



External Photos
M/N: SA501



External Photos
M/N: SA501



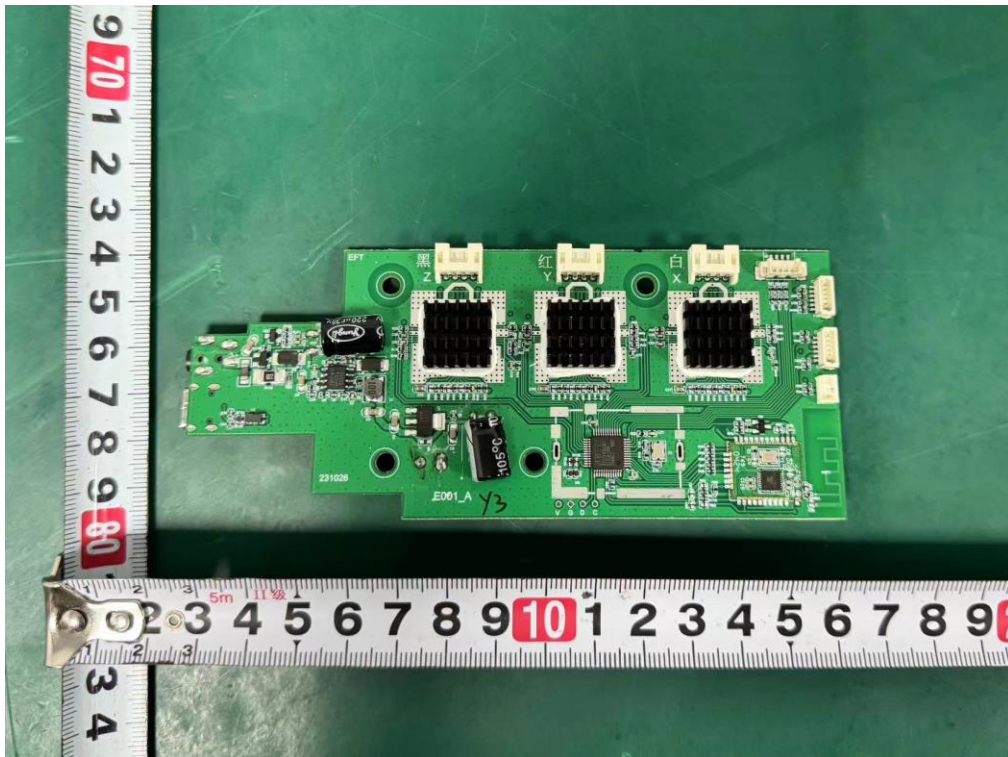
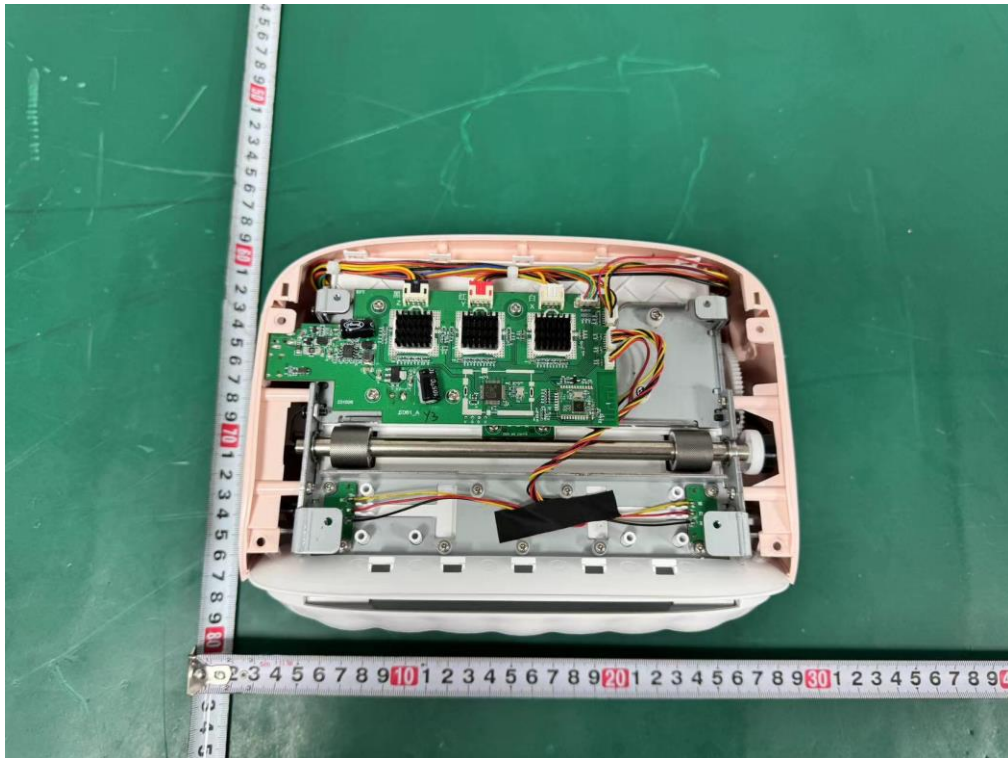
External Photos

M/N: SA501



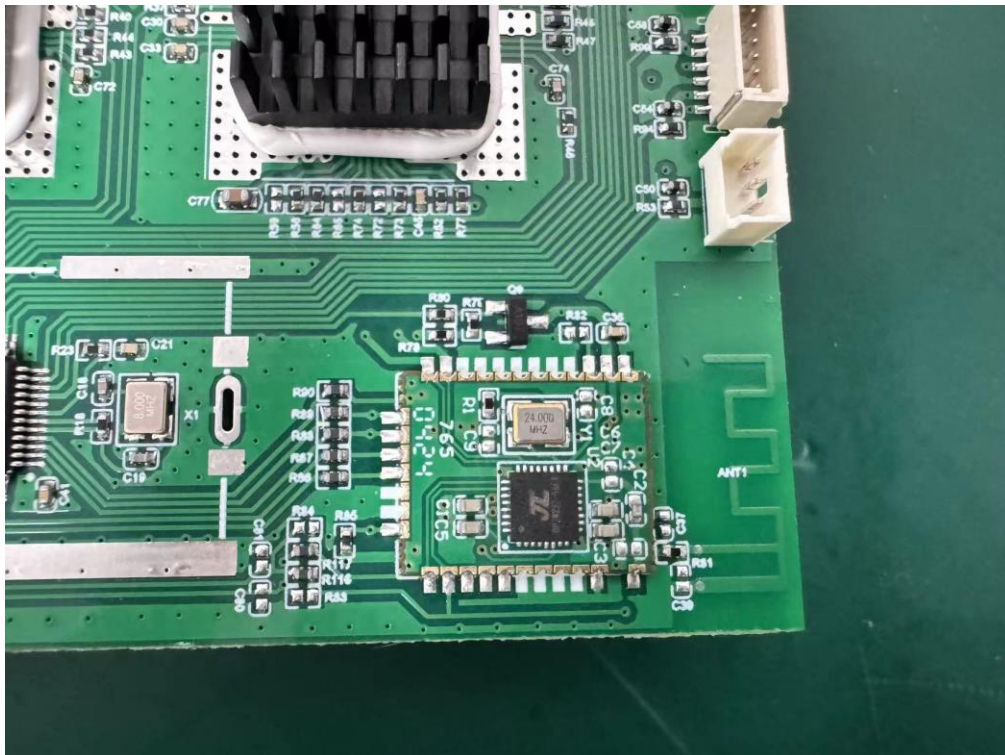
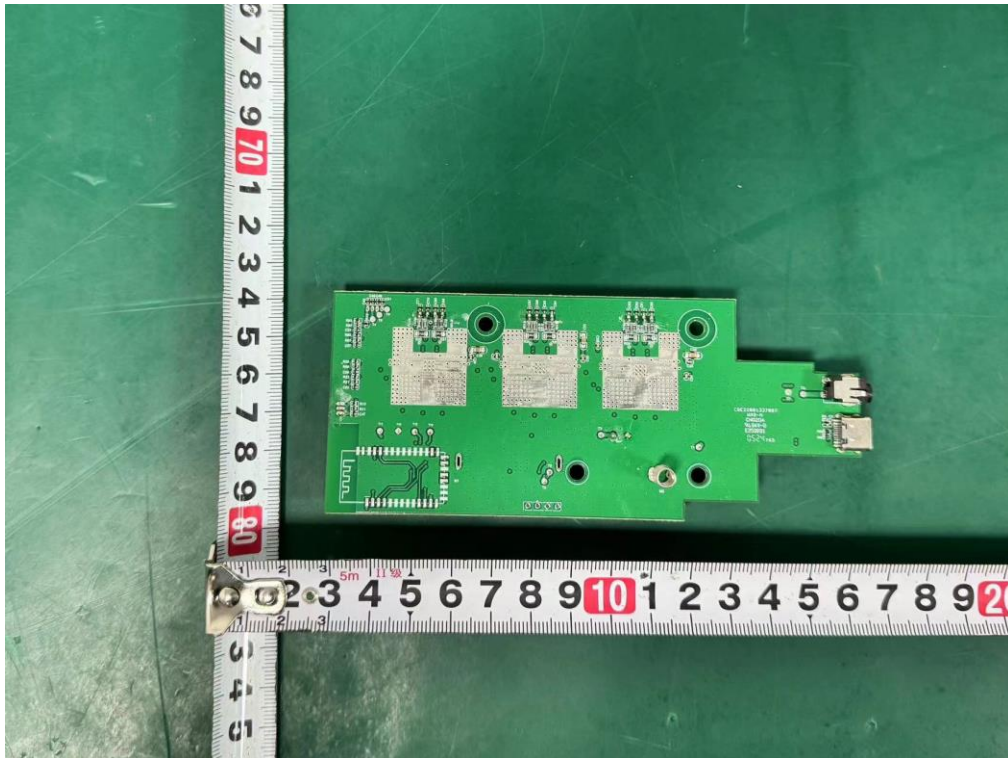
Internal Photos

M/N: SA501

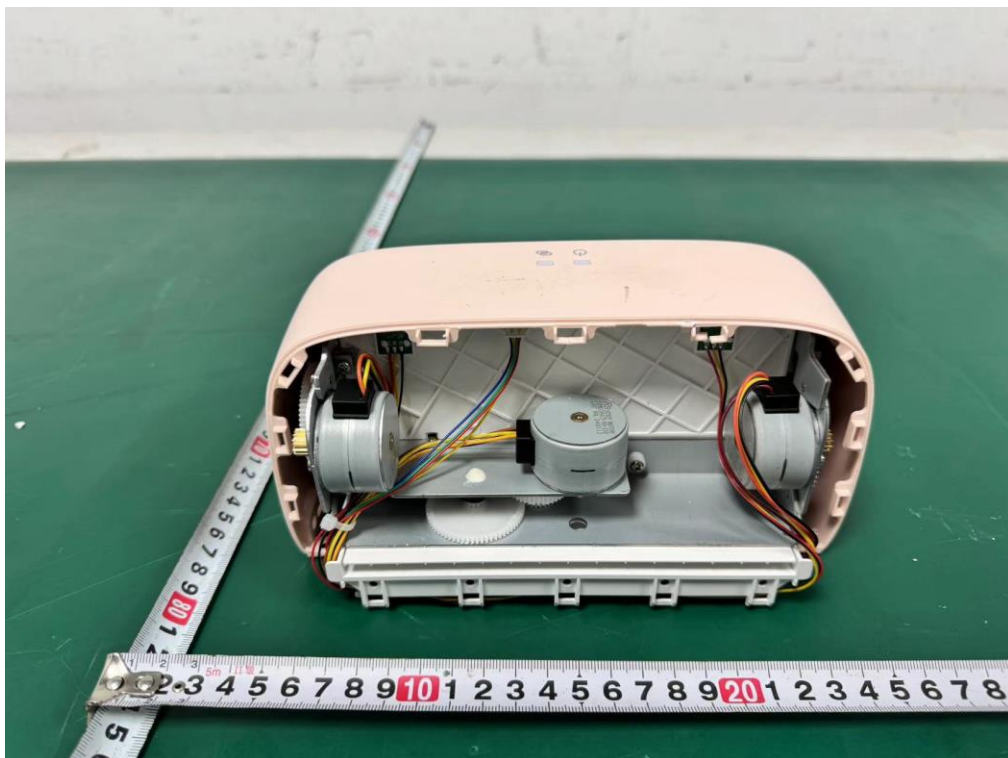
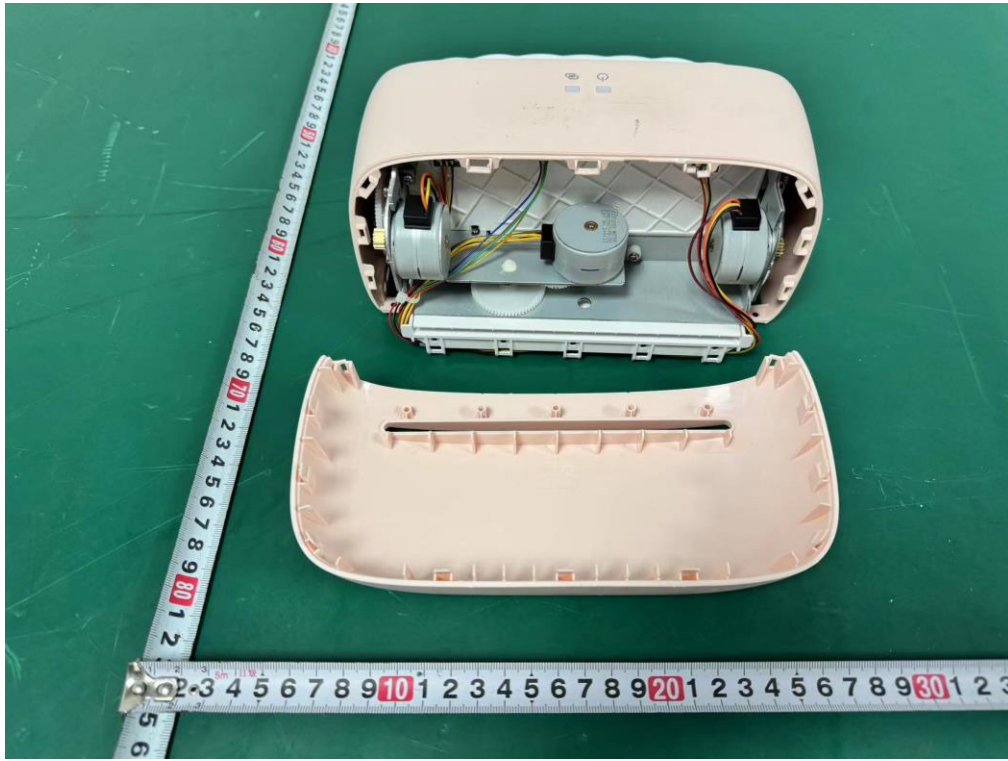


Internal Photos

M/N: SA501

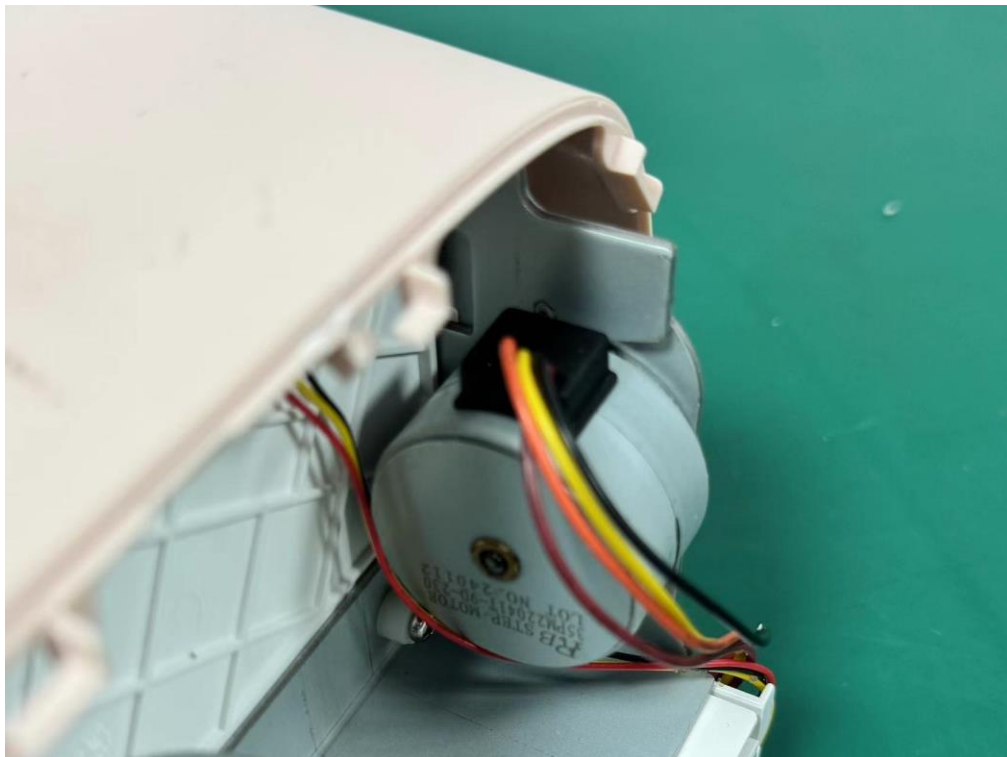
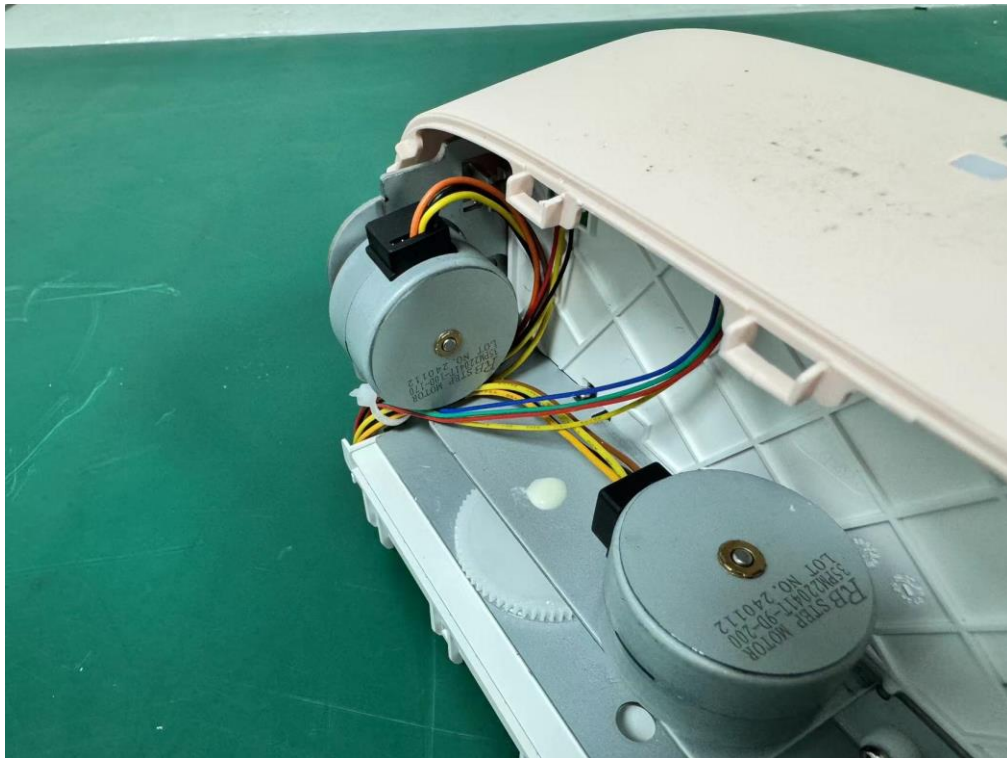


Internal Photos
M/N: SA501



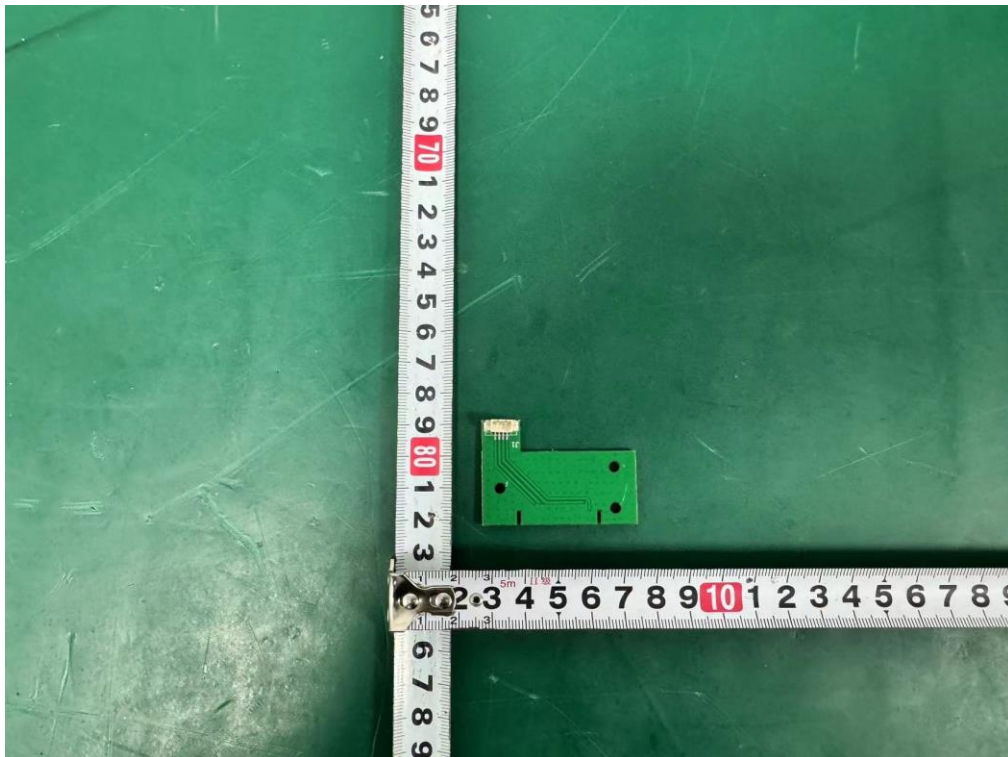
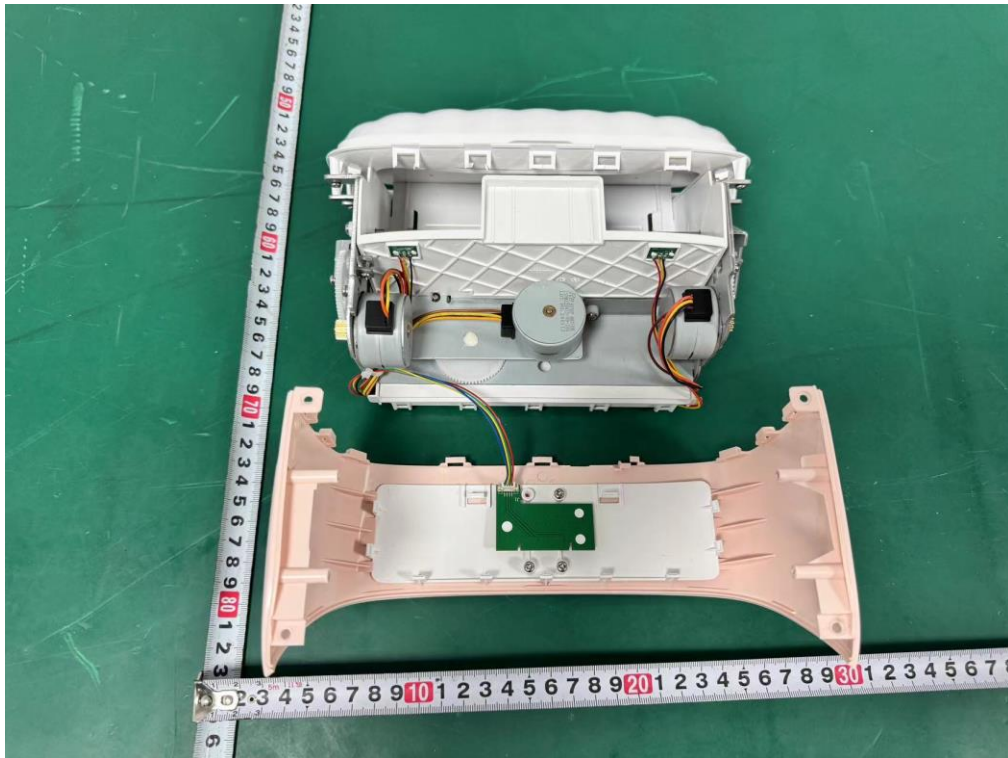
Internal Photos

M/N: SA501



Internal Photos

M/N: SA501



Internal Photos

M/N: SA501



End of Test Report