

TECHNICAL REPORT



Report No.: TW2107120-02E
File Reference No.: 2021-09-27

Applicant: SHENZHEN FORM ELECTRONICS CO. LTD.

Product: BT Micro Speaker/Charger

Model No.: SSX21P150, SSX21P151, SSX21P149

Trademark: Snap-on

Test Standards: FCC Part 15 Subpart C

Test Result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.4&FCC Part 15 Subpart C, for the evaluation of electromagnetic compatibility

Approved By

A handwritten signature in black ink that reads 'Terry Tang'.

Terry Tang

Manager

Dated: September 27, 2021

Results appearing herein relate only to the sample tested

The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com



Special Statement:

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

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

CNAS-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

Industry Canada (IC) —Registration No.:5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

A2LA (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

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Test Report Conclusion

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1.0 General Details

1.1 Test Lab Details

Name : SHENZHEN TIMEWAY TESTING LABORATORIES.
Address: Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China
Telephone: +86 755 83448688
Fax: +86 755 83442996
Site on File with the Federal Communications Commission – United States
Registration Number: 744189
For 3m Anechoic Chamber

1.2 Applicant Details

Applicant: SHENZHEN FORM ELECTRONICS CO. LTD.
Address: 4F Bldg E, JunFeng Industrial Park, Lezhujiao, Xixiang, Bao'an Dist, Shenzhen, China, 518103
Telephone: 15338707574
Fax: --

1.3 Description of EUT

Product: BT Micro Speaker/Charger
Manufacturer: SHENZHEN FORM ELECTRONICS CO. LTD.
Address: 4F Bldg E, JunFeng Industrial Park, Lezhujiao, Xixiang, Bao'an Dist, Shenzhen, China, 518103
Brand Name: Snap-on
Model Number: SSX21P150
Additional Model Name: SSX21P151, SSX21P149
Additional Trade Name: N/A
Rating: Input: DC5V, 1A, 5W
Wireless Charger Output: 10W
Power Supply: Model: W&T-AD1806B050100U
Input: 100-240V~, 50/60Hz, 0.25A
Output: DC5V, 1A
Battery: DC7.4V, 4400mAh, 32.56Wh Li-ion battery
Hardware Version: FM0160C-M-V0.9 2021-07-02
FM0160C-LED-2021-05-20 V03
FM0160C-DC-V0.3 2021-07-12
Software Version: 423E2E6F+BT Micro SpeakerCharger_20210712_1945
Serial No.: SSX21P15021080006
Operation Frequency: See below table

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Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	0.1115	06	0.140	11	0.165	16	0.190
02	0.120	07	0.145	12	0.170	17	0.195
03	0.125	08	0.150	13	0.175	18	0.200
04	0.130	09	0.155	14	0.180	19	0.205
05	0.135	10	0.160	15	0.185		
Test channel		Frequency (MHz)					
CH13		0.175 MHz					

Modulation Type: MSK
 Antenna Designation: Three Inductive Loop antennas with gain 0dBi

1.4 Submitted Sample
 2 Samples

1.5 Test Duration
 2021-07-08 to 2021-09-22

1.6 Test Uncertainty
 Conducted Emissions Uncertainty =3.6dB
 Radiated Emissions below 9kHz-30MHz Uncertainty =4.3dB
 Radiated Emissions below 30MHz-1GHz Uncertainty =4.7dB
 Radiated Emissions above 1GHz Uncertainty =6.0dB
 Conducted Power Uncertainty =6.0dB
 Occupied Channel Bandwidth Uncertainty =5%

1.7 Test Engineer *Andy Xing*
 The sample tested by _____

Print Name: Andy Xing

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2.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2021-06-18	2022-06-17
LISN	R&S	EZH3-Z5	100294	2021-06-18	2022-06-17
LISN	R&S	EZH3-Z5	100253	2021-06-18	2022-06-17
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2021-06-18	2022-06-17
Loop Antenna	EMCO	6507	00078608	2021-06-18	2024-06-17
Spectrum	R&S	FSIQ26	100292	2021-06-18	2022-06-17
Horn Antenna	A-INFO	LB-180400-KF	J211060660	2021-06-18	2022-06-17
Horn Antenna	R&S	BBHA 9120D	9120D-631	2021-07-02	2022-07-01
Power meter	Anritsu	ML2487A	6K00003613	2021-06-18	2022-06-17
Power sensor	Anritsu	MA2491A	32263	2021-06-18	2022-06-17
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2021-07-02	2022-07-01
9*6*6 Anechoic	--	--	N/A	2021-07-02	2022-07-01
EMI Test Receiver	RS	ESVB	826156/011	2021-06-18	2022-06-17
EMI Test Receiver	RS	ESH3	860904/006	2021-06-18	2022-06-17
Spectrum	HP/Agilent	ESA-L1500A	US37451154	2021-06-18	2022-06-17
Spectrum	HP/Agilent	E4407B	MY50441392	2021-06-18	2022-06-17
Spectrum	RS	FSP	1164.4391.38	2021-01-16	2022-01-15
RF Cable	Zhengdi	ZT26-NJ-NJ-8 M/FA	--	2021-06-18	2022-06-17
RF Cable	Zhengdi	7m	--	2021-06-18	2022-06-17
RF Switch	EM	EMSW18	060391	2021-06-18	2022-06-17
Pre-Amplifier	Schwarebeck	BBV9743	#218	2021-06-18	2022-06-17
Pre-Amplifier	HP/Agilent	8449B	3008A00160	2021-06-18	2022-06-17
LISN	SCHAFFNER	NNB42	00012	2021-01-06	2022-01-05

2.2 Automation Test Software

For Conducted Emission Test

Name	Version
EZ-EMC	Ver.EMC-CON 3A1.1

For Radiated Emissions

Name	Version
EMI Test Software BL410-EV18.91	V18.905
EMI Test Software BL410-EV18.806 High Frequency	V18.06

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3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications:			
Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.203	Antenna requirements	Pass	Compliant
FCC Part 15, Paragraph 15.207	Conducted Emission Test	Pass	Compliant
FCC Part 15, Paragraph 15.209 (a) (f)	General Requirement	Pass	Compliant
FCC Part 15, Paragraph 15.215	20dB Bandwidth Testing	Pass	Compliant

3.2 Test Standards

FCC Part 15 Subpart C , ANSI C63.4 :2014 and ANSI C63.10 :2013

4.0 EUT Modification

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES

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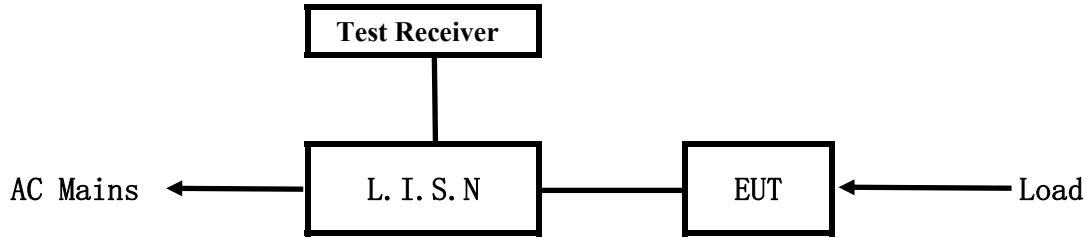
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5. Power Line Conducted Emission Test

5.1 Schematics of the test

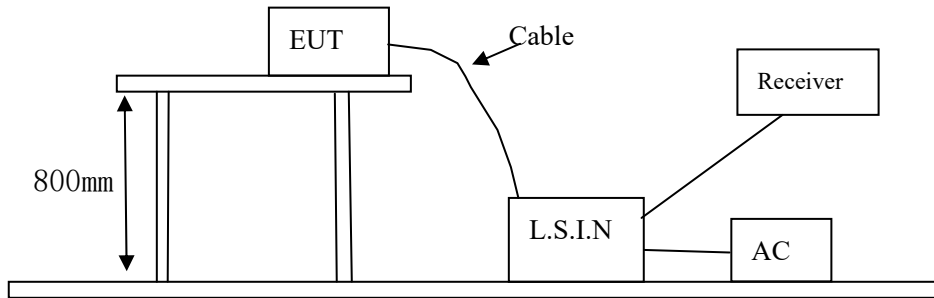


EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.10 -2013.

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2014. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model	FCC ID
BT Micro Speaker/Charger	SHENZHEN FORM ELECTRONICS CO. LTD.	SSX21P150, SSX21P151, SSX21P149	2AAL7-SSX21P149-151

B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

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C. Peripherals

Device	Manufacturer	Model	Rating
N/A			

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.10 -2013.

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency (MHz)	Limits (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

- Notes: 1. *Decreasing linearly with logarithm of frequency.
 2. The tighter limit shall apply at the transition frequencies

5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz. (The average detector is necessary when the Quasi-peak emission level beyond the average Limit.)



A: Conducted Emission on Live Terminal (150kHz to 30MHz)

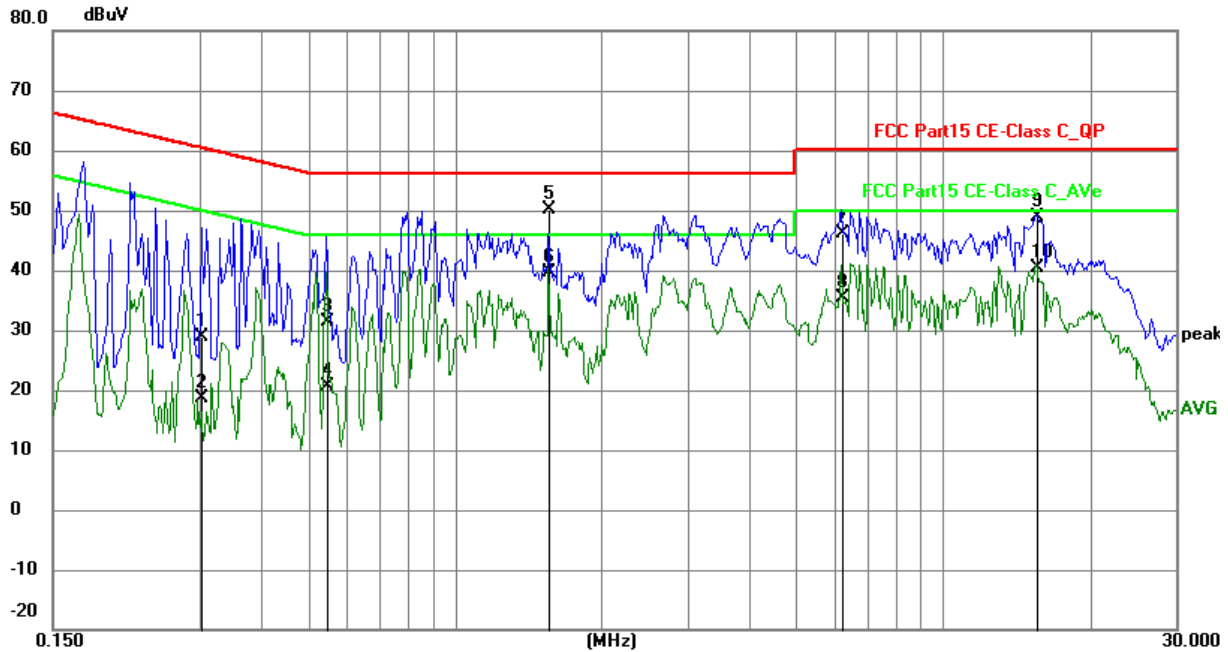
EUT Operating Environment

Temperature: 25°C Humidity:75%RH Atmospheric Pressure: 101 kPa

EUT set Condition: Keep Transmitting

Results: Pass

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.3021	19.18	9.76	28.94	60.18	-31.24	QP	P
2	0.3021	8.78	9.76	18.54	50.18	-31.64	AVG	P
3	0.5439	21.59	9.77	31.36	56.00	-24.64	QP	P
4	0.5439	10.89	9.77	20.66	46.00	-25.34	AVG	P
5	1.5540	40.32	9.80	50.12	56.00	-5.88	QP	P
6	1.5540	29.88	9.80	39.68	46.00	-6.32	AVG	P
7	6.1902	36.08	9.98	46.06	60.00	-13.94	QP	P
8	6.1902	25.47	9.98	35.45	50.00	-14.55	AVG	P
9	15.5034	38.37	10.41	48.78	60.00	-11.22	QP	P
10	15.5034	30.06	10.41	40.47	50.00	-9.53	AVG	P

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B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

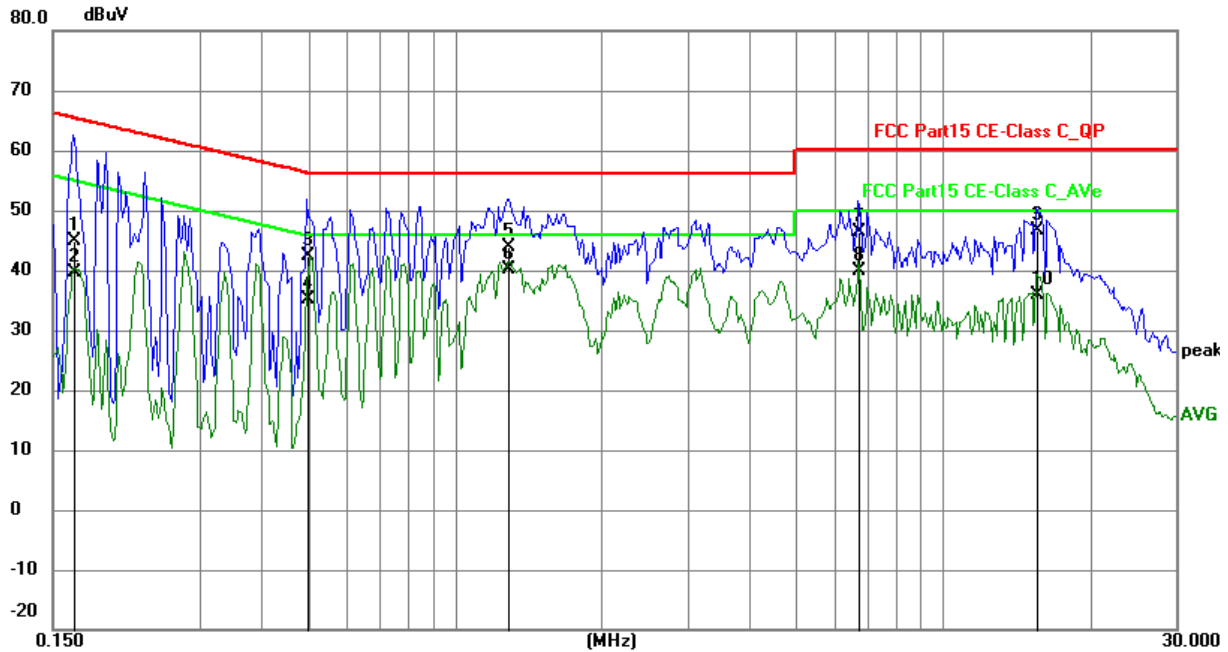
EUT Operating Environment

Temperature: 25°C Humidity:75%RH Atmospheric Pressure: 101 kPa

EUT set Condition: Keep Transmitting

Results: Pass

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1655	35.00	9.77	44.77	65.18	-20.41	QP	P
2	0.1655	29.76	9.77	39.53	55.18	-15.65	AVG	P
3	0.4971	32.64	9.77	42.41	56.05	-13.64	QP	P
4	0.4971	25.46	9.77	35.23	46.05	-10.82	AVG	P
5	1.2888	34.20	9.79	43.99	56.00	-12.01	QP	P
6	1.2888	30.28	9.79	40.07	46.00	-5.93	AVG	P
7	6.7245	36.37	10.00	46.37	60.00	-13.63	QP	P
8	6.7245	29.87	10.00	39.87	50.00	-10.13	AVG	P
9	15.5112	36.33	10.41	46.74	60.00	-13.26	QP	P
10	15.5112	25.42	10.41	35.83	50.00	-14.17	AVG	P

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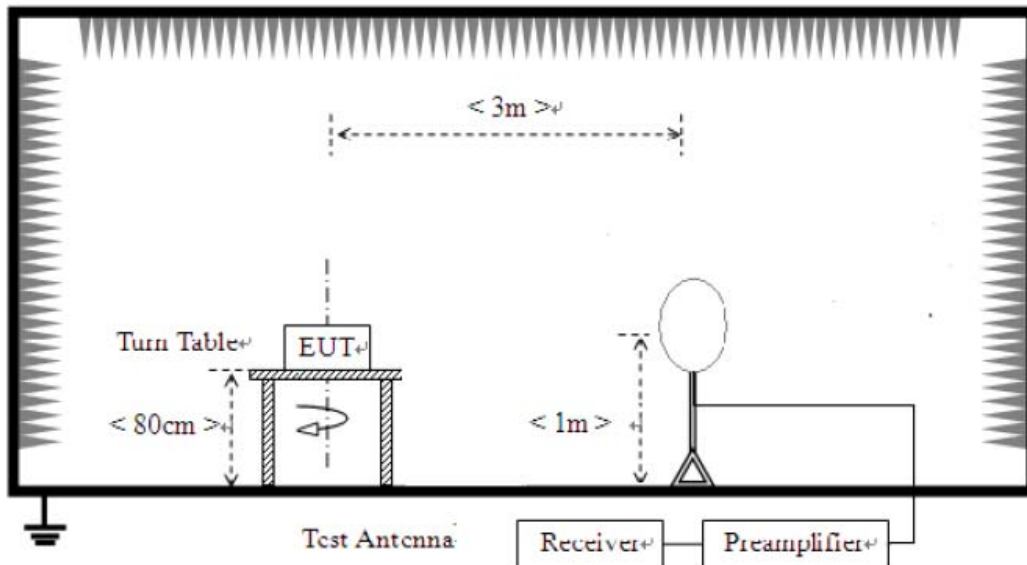
6 Radiated Emission Test

6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at TIMEWAY EMC Laboratory. This site is on file with the FCC laboratory division, Registration No.744189
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 9 kHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with RBW=120 kHz/VBW=300 kHz; All readings from 9 kHz to 30 MHz are quasi-peak values with RBW=10 kHz/VBW=30 kHz. For the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz Radiated emission test in these three bands are based on measurements employing an average detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
- (6) The antenna polarization: Vertical polarization and Horizontal polarization.

Block diagram of Test setup

9kHz-30MHz



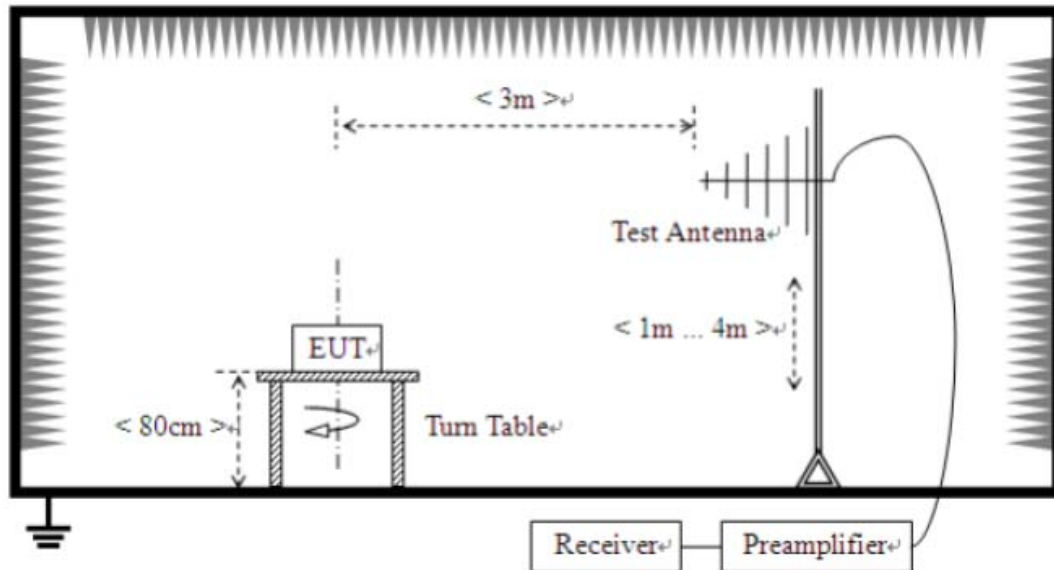
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30MHz-1000MHz



6.2 Configuration of The EUT

Same as section 5.3 of this report

6.3 EUT Operating Condition

Same as section 5.4 of this report.

6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

B. Frequencies in restricted band are compiled to limit on Paragraph 15.209.

Limits for frequency below 30MHz

Frequency Range (MHz)	Distance (m)	Field strength (V/m)
0.009-0.490	300	2400/F(kHz)
0.490-1.705	30	24000/F(kHz)
1.705-30	30	30

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Limits for frequency above 30MHz

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

- Note:
1. RF Voltage (dBuV) = 20 log RF Voltage (μ V)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
 4. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6.5 Test result

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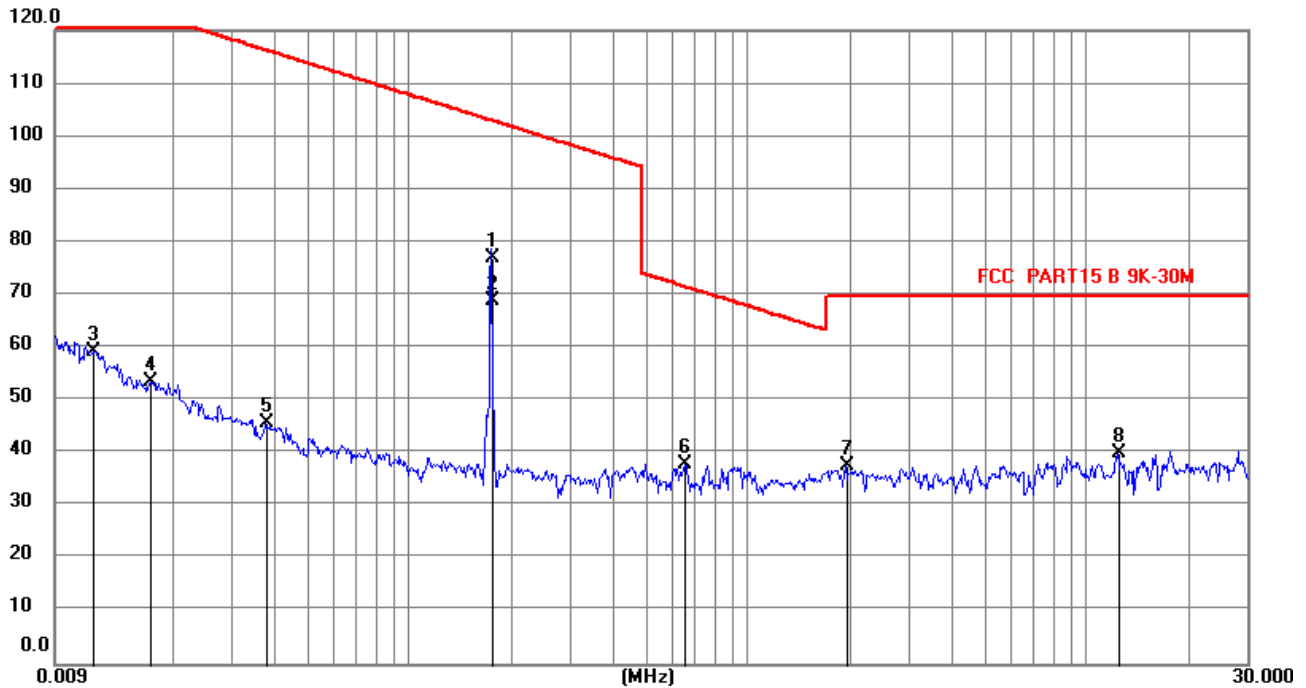


Measurement data:

Note: Limit dBuV/m @3m = Limit dBuV/m @300m+ 80

Limit dBuV/m @3m = Limit dBuV/m @30m + 40

9 kHz~30 MHz



No.	Frequency (MHz)	Reading ()	Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	0.1753	67.06	9.77	76.83	102.68	-25.85	peak	P
2	0.1753	59.15	9.77	68.92	102.68	-33.76	AVG	P
3	0.0117	49.33	10.06	59.39	126.06	-66.67	peak	P
4	0.0171	43.37	10.25	53.62	122.78	-69.16	peak	P
5	0.0379	35.68	10.03	45.71	115.91	-70.20	peak	P
6	0.6572	28.17	9.78	37.95	71.26	-33.31	peak	P
7	1.9512	27.72	9.80	37.52	69.50	-31.98	peak	P
8	12.4375	29.74	10.27	40.01	69.57	-29.56	peak	P

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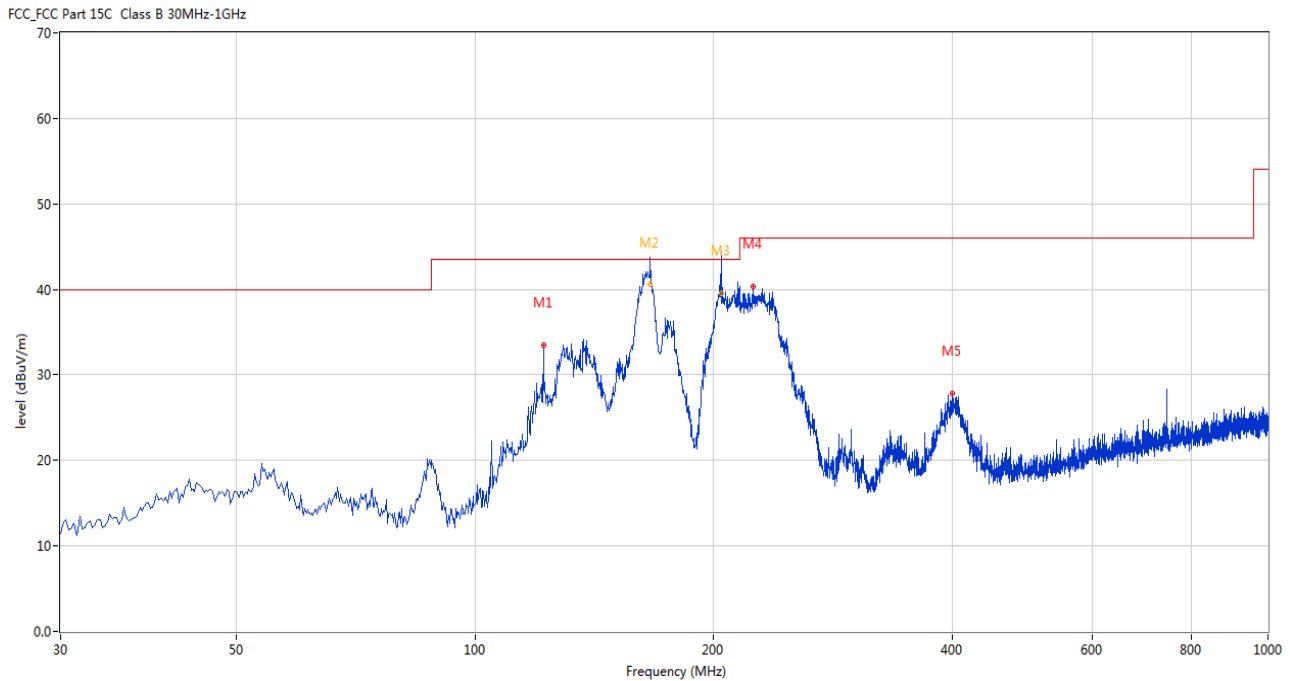
A. General Radiated Emission Data

Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Transmitting

Results: Pass

Please refer to following diagram for individual



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	121.885	33.54	-15.72	43.5	-9.96	Peak	282.00	100	Horizontal	Pass
2	166.400	43.70	-16.05	43.5	0.20	Peak	139.00	100	Horizontal	N/A
2*	166.400	40.65	-16.05	43.5	-2.85	QP	139.00	100	Horizontal	Pass
3	204.318	44.47	-13.53	43.5	0.97	Peak	1.00	100	Horizontal	N/A
3*	204.318	39.53	-13.53	43.5	-3.97	QP	1.00	100	Horizontal	Pass
4	223.952	40.36	-13.07	46.0	-5.64	Peak	163.00	100	Horizontal	Pass
5	399.963	27.77	-8.57	46.0	-18.23	Peak	286.00	100	Horizontal	Pass

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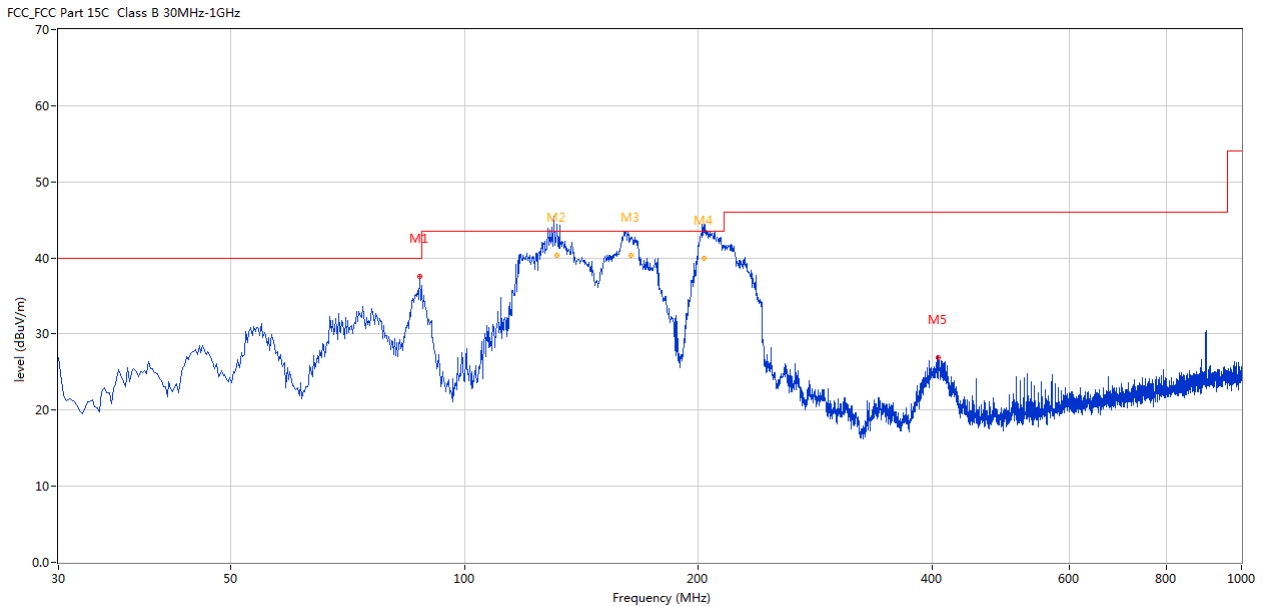
B. General Radiated Emission Data

Radiated Emission In Vertical (30MHz----1000MHz)

EUT set Condition: Keep Transmitting

Results: Pass

Please refer to following diagram for individual



No	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	87.458	37.55	-15.72	40.0	-2.45	Peak	94.00	100	Vertical	Pass
2	131.582	44.48	-16.93	43.5	0.98	Peak	280.00	100	Vertical	N/A
2*	131.582	40.39	-16.93	43.5	-3.11	QP	280.00	100	Vertical	Pass
3	163.584	43.60	-16.33	43.5	0.10	Peak	0.00	100	Vertical	N/A
3*	163.584	40.31	-16.33	43.5	-3.19	QP	0.00	100	Vertical	Pass
4	203.587	43.70	-13.48	43.5	0.20	Peak	38.00	100	Vertical	N/A
4*	203.587	40.00	-13.48	43.5	-3.50	QP	38.00	100	Vertical	Pass
5	406.508	26.84	-8.66	46.0	-19.16	Peak	353.00	100	Vertical	Pass

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7.0 20dB Bandwidth Testing

7.1 Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

7.3 Test Data

Frequency (MHz)	20dB Bandwidth Emission (kHz)	Limit (kHz)	Result
0.175	3.31	--	Pass

Refer to attached plots:

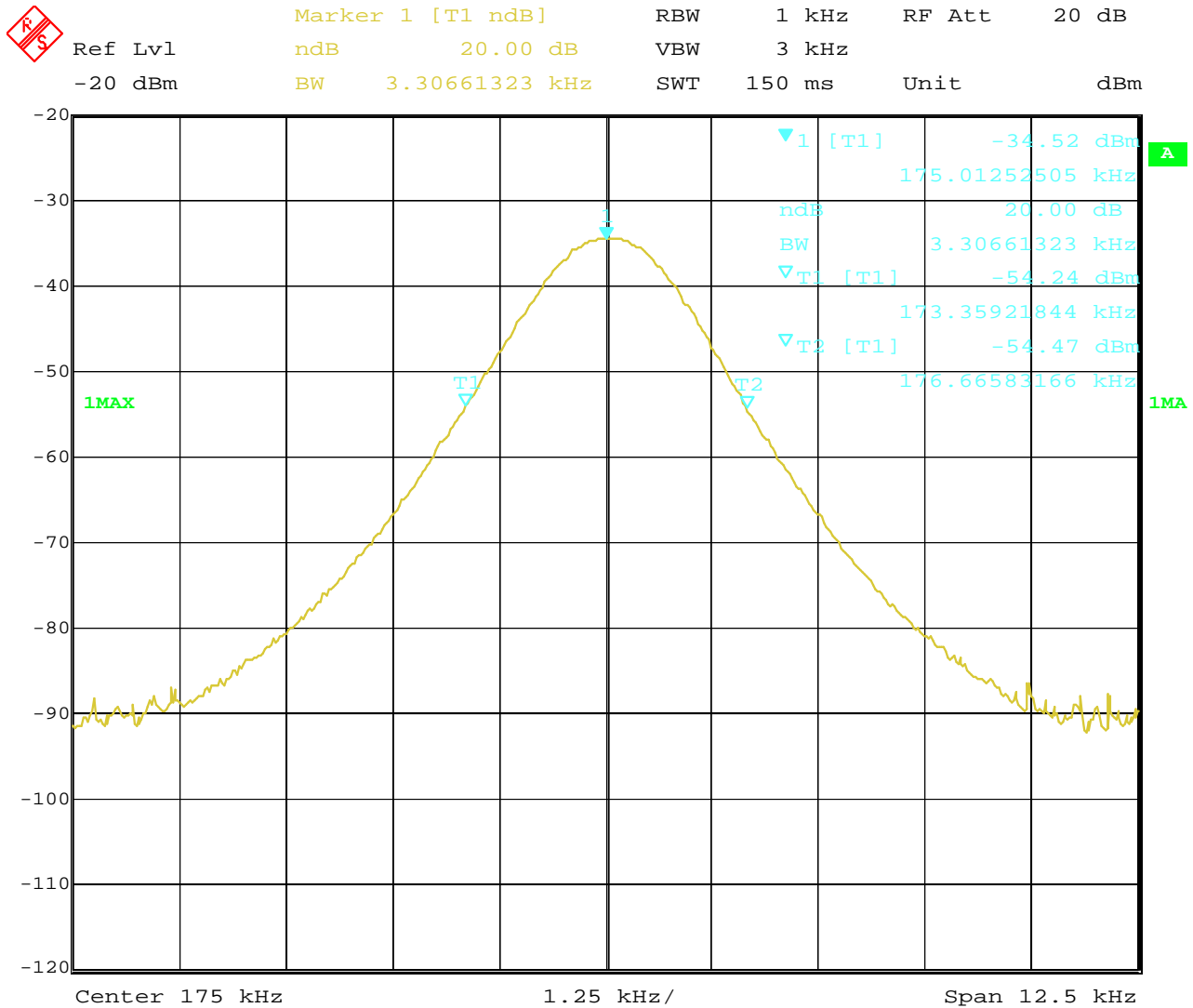
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20dB Bandwidth



Date: 5.AUG.2021 13:03:27

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8.0 Antenna Requirement

8.1 Standard Applicable

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 Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 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.

8.2 Antenna Connected constructions

The antennas are Inductive Loop Antennas. The antenna gain is 0dBi for each one. So it meets the requirement of 15.203

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9.0 FCC ID Label

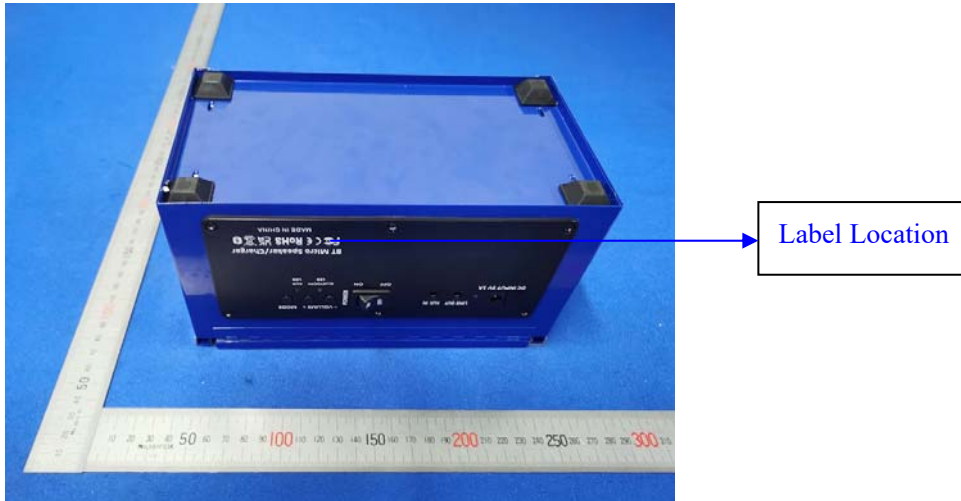
FCC ID: 2AAL7-SSX21P149-151

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



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10.0. Photo of testing

10.1 Conducted test View



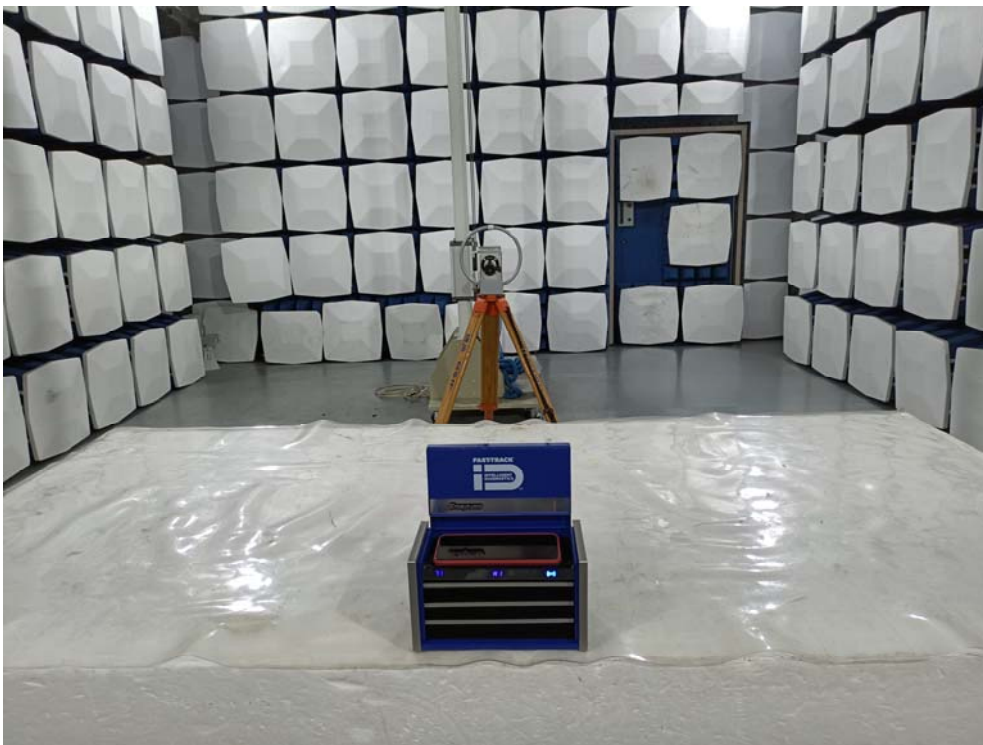
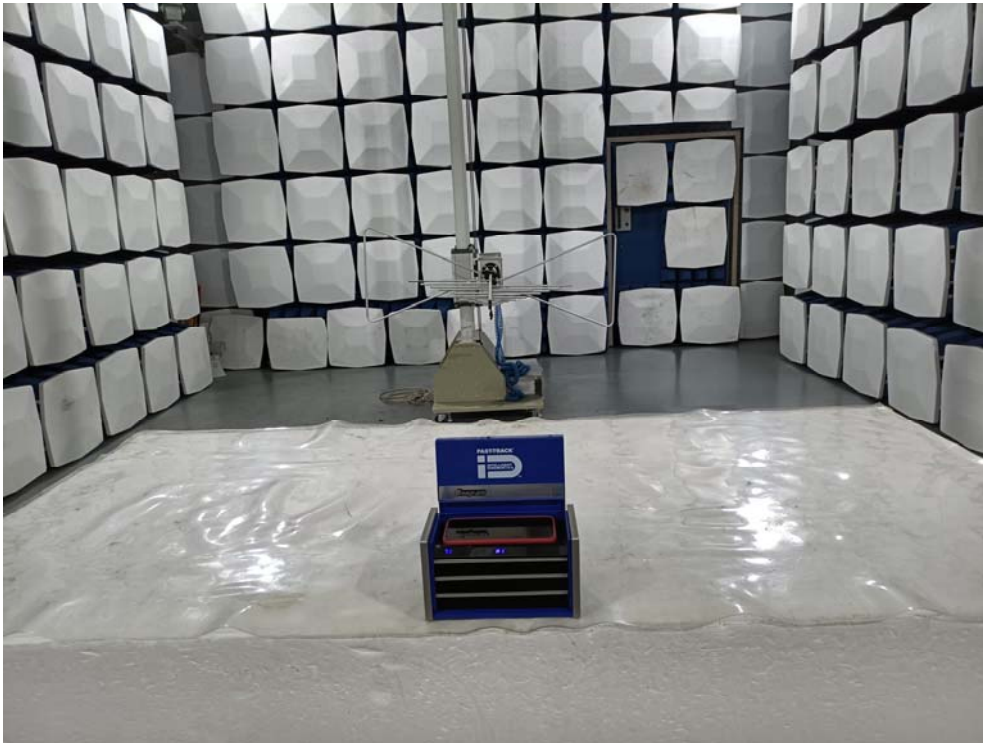
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10.2 Radiated emission test view



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Photo for the EUT



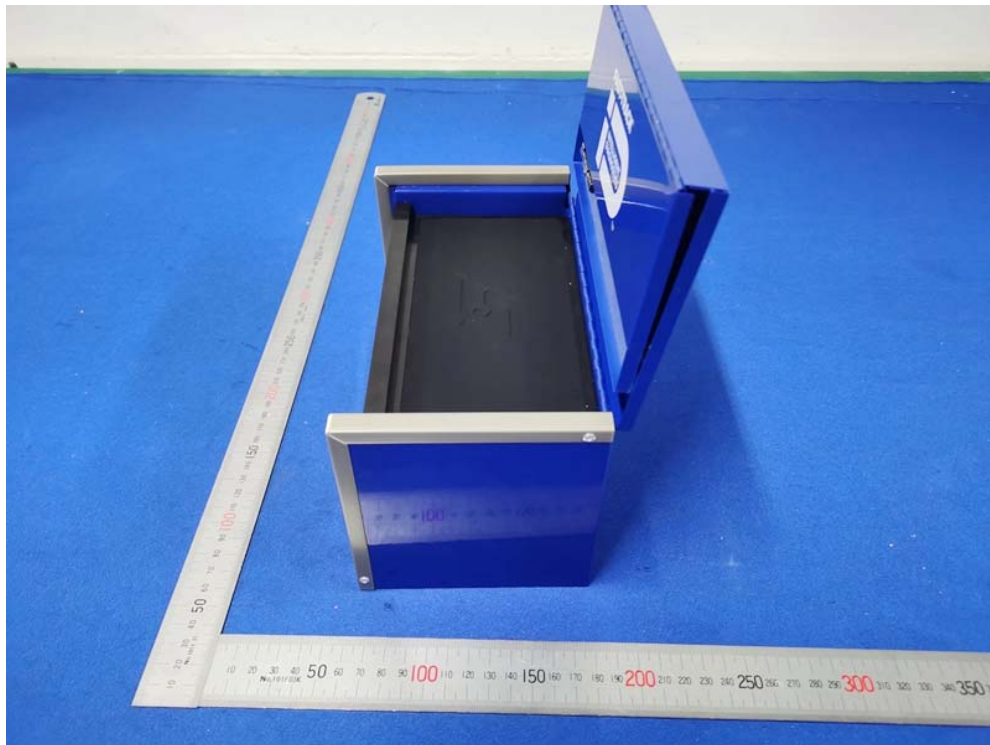
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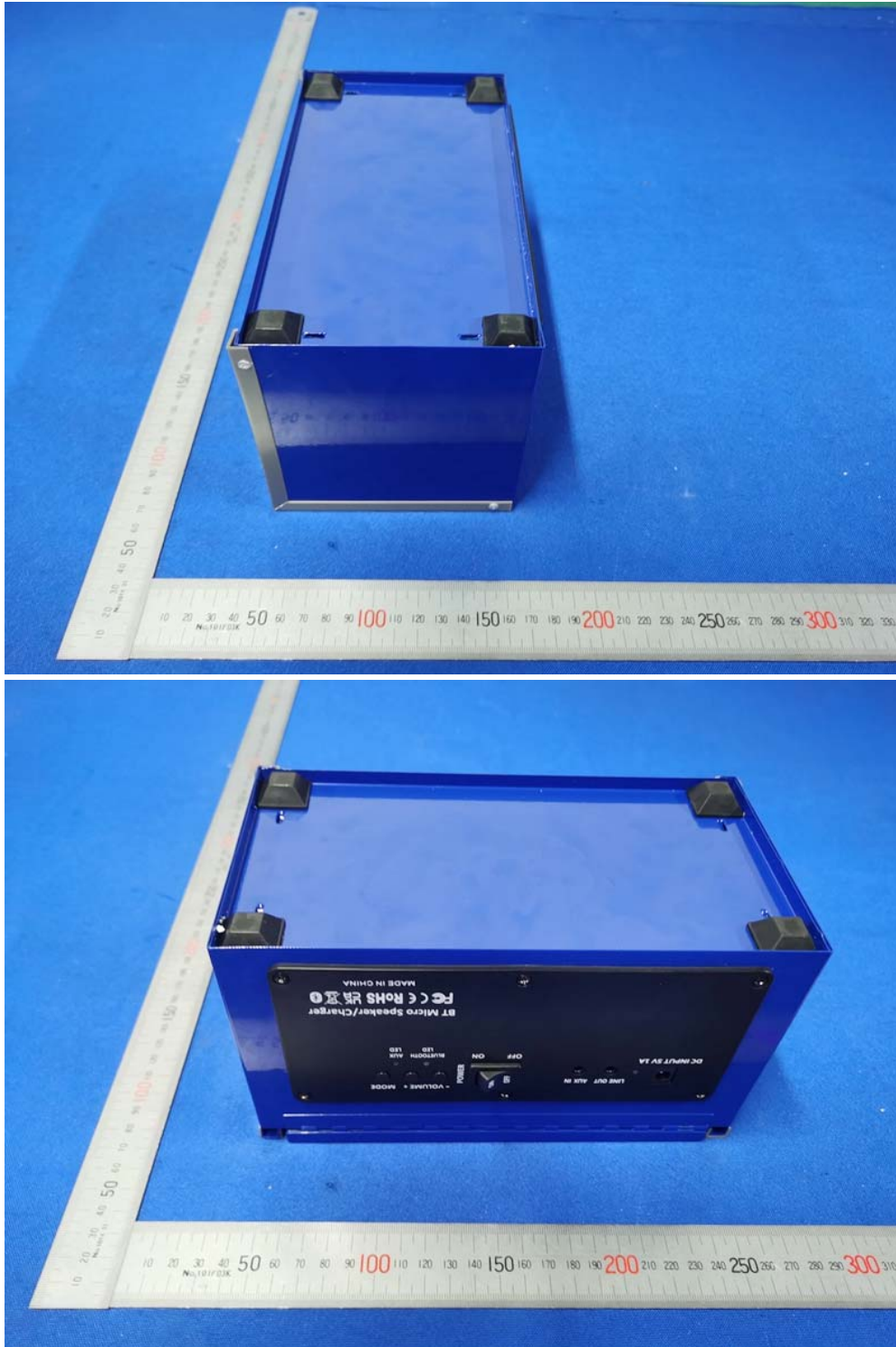


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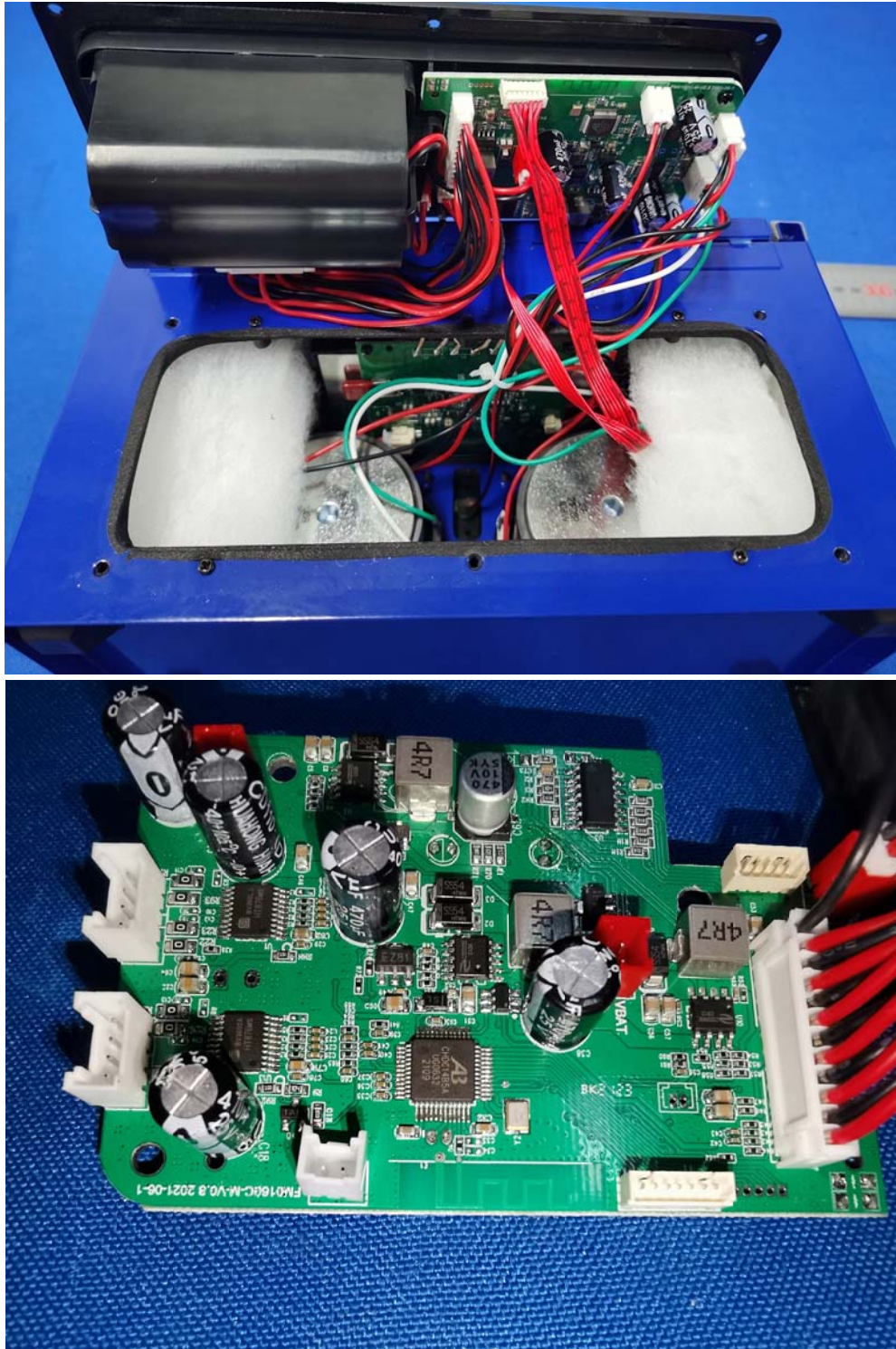


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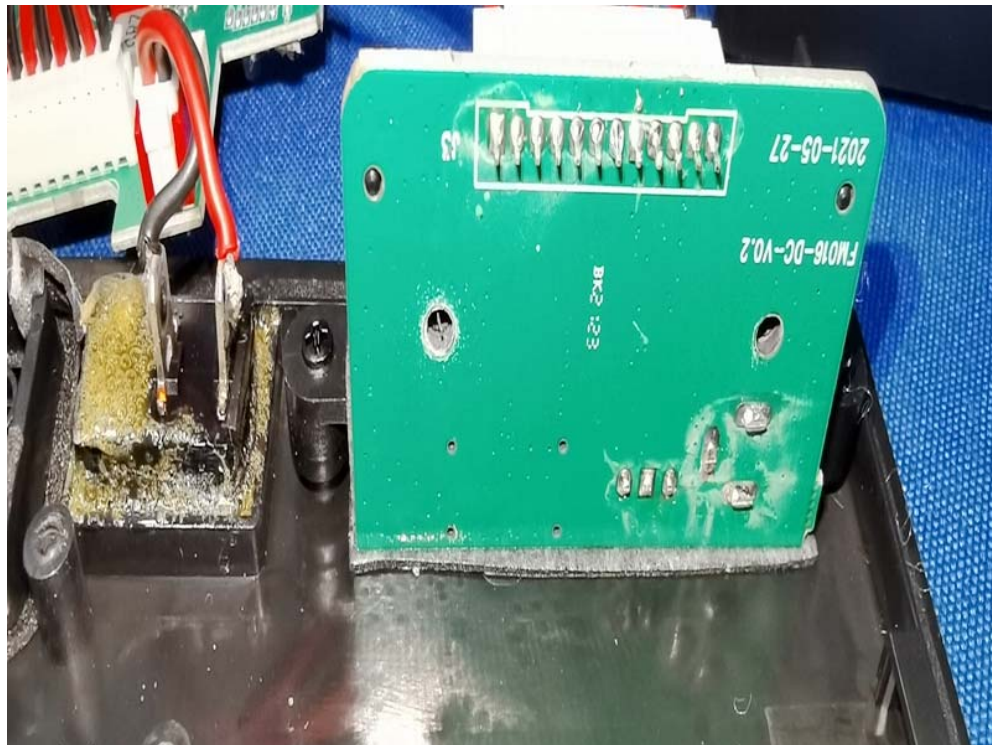
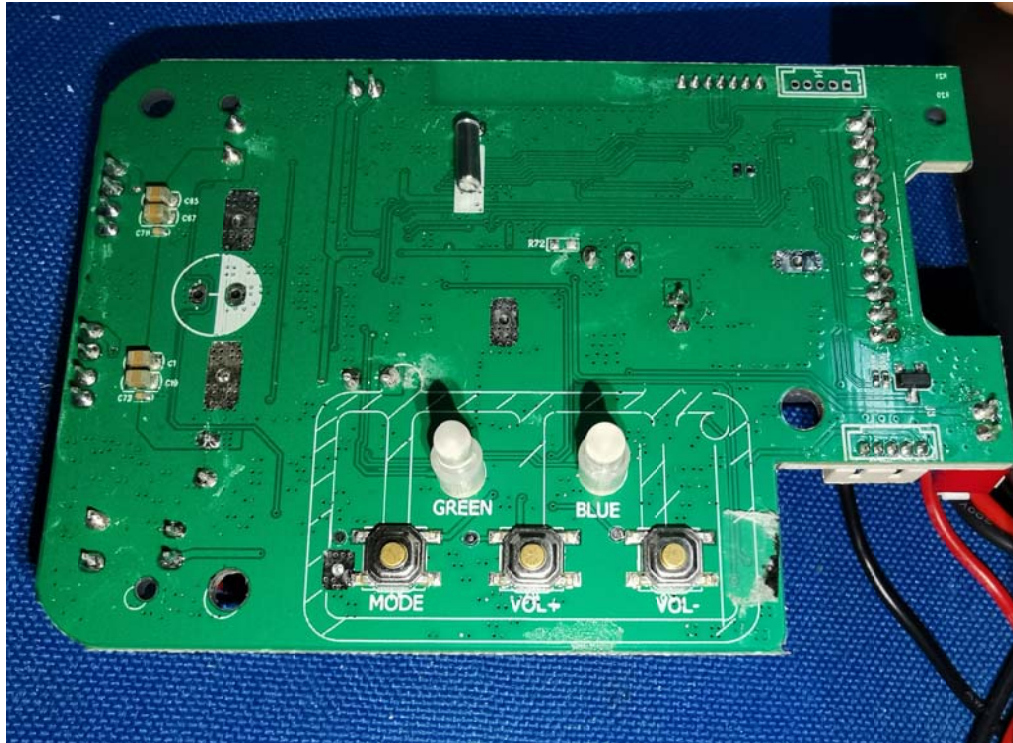


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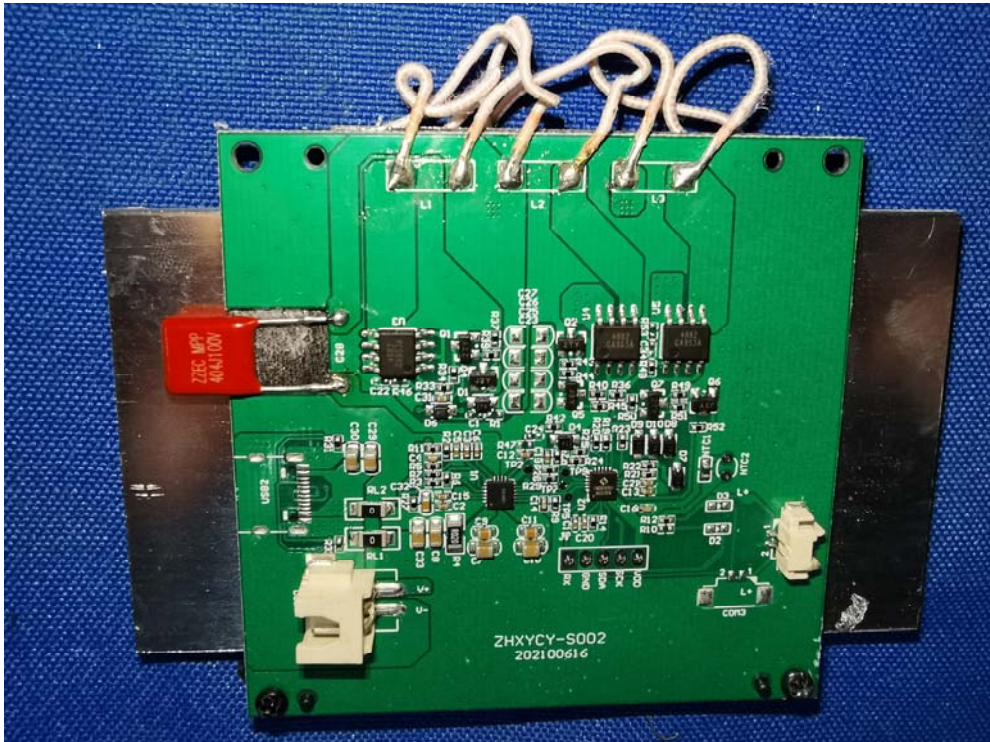


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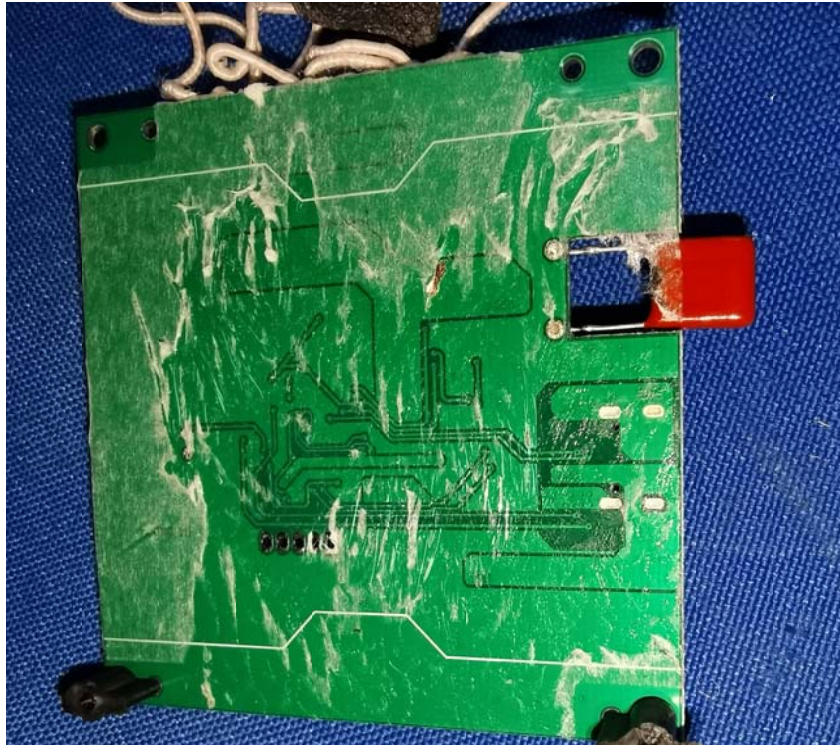
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