

ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-17 V3.2.4 (2020-09)

TEST REPORT

For

Shenzhen Sonoff Technologies Co.,Ltd.

3F & 6F, Bldg A, No. 663, Bulong Rd, Shenzhen, Guangdong, China

Tested Models: M5-3C-80, M5-2C-80, M5-1C-80
Multiple Models: M5-1C-80W, M5-2C-80W,
M5-3C-80W, M5-1C-80G, M5-2C-80G, M5-3C-80G

Report Type: Amended Report	Product Type: SONOFF SwitchMan Smart Wall Switch
Report Number:	DG1220704-29964E-02A1
Report Date:	2022-07-11
Reviewed By:	Rocky Xiao RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1 st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY	3
DECLARATIONS	3
Exhibit A – Eut Photographs	4
M5-1C-80(WITH RELAY 4#)	4
M5-1C-80(WITH RELAY 5#)	12
M5-2C-80(WITH RELAY 4#)	20
M5-2C-80(WITH RELAY 5#)	28
M5-3C-80(WITH RELAY 3#)	36
M5-3C-80(WITH RELAY 1#)	44
M5-3C-80(WITH RELAY 2#)	52
DECLARATION LETTER.....	61
BELOW IS THE ORIGINAL REPORT	63

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	DG1210901-45614E-02	Original Report	2022-01-20
1	DG1220704-29964E-02A1	Amended Report	2022-07-11

Note: This is the first amended report application which was based on the original report. The differences between them as following:

1. Change the model to **M5-3C-80, M5-2C-80, M5-1C-80, M5-1C-80W, M5-2C-80W, M5-3C-80W, M5-1C-80G, M5-2C-80G, M5-3C-80G**
2. Reduce the size of the product shell(control part), without change the circuit (Please refer to EUT photos).

The change between the previous equipment and the current equipment is stated and guaranteed by the applicant. The difference between them will not affect the test results, we will keep the test results, test photos, but updated the related EUT photos.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol“▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

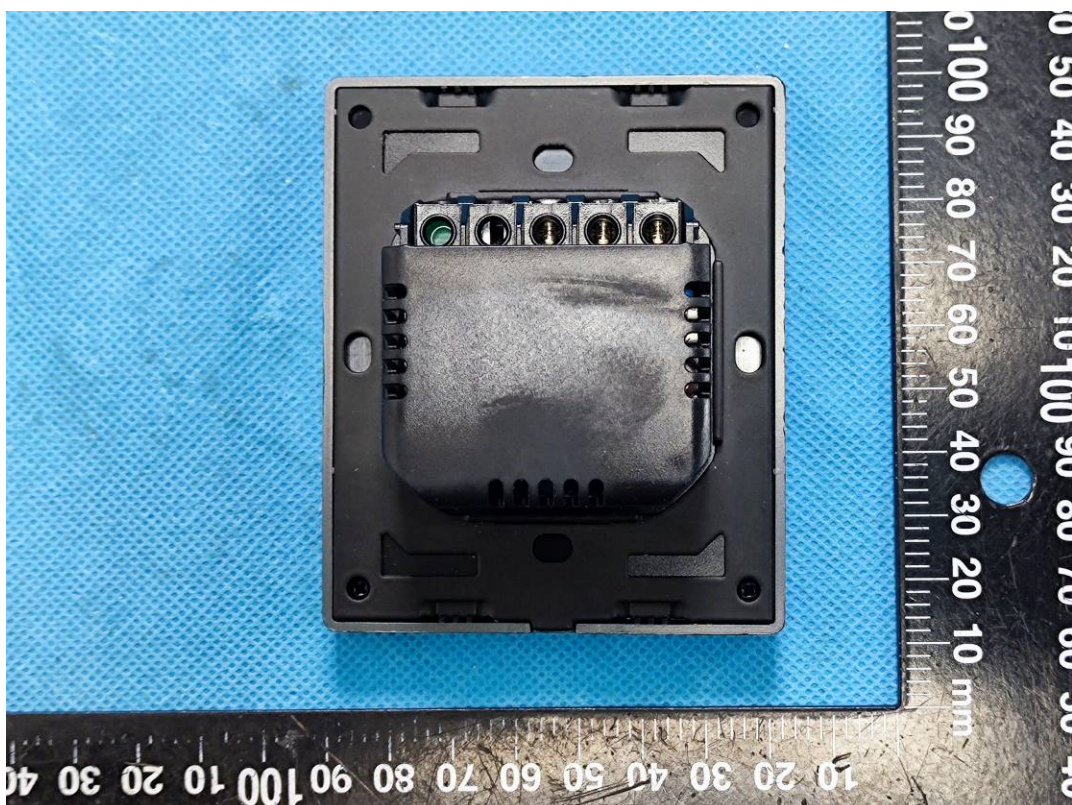
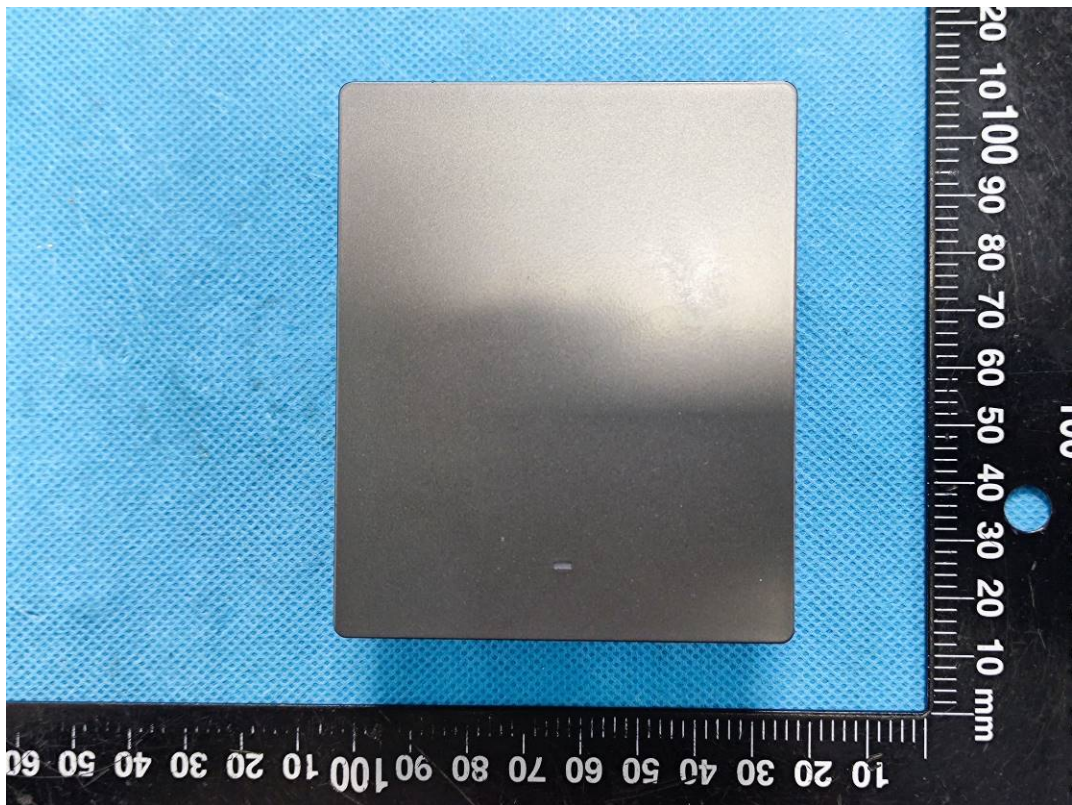
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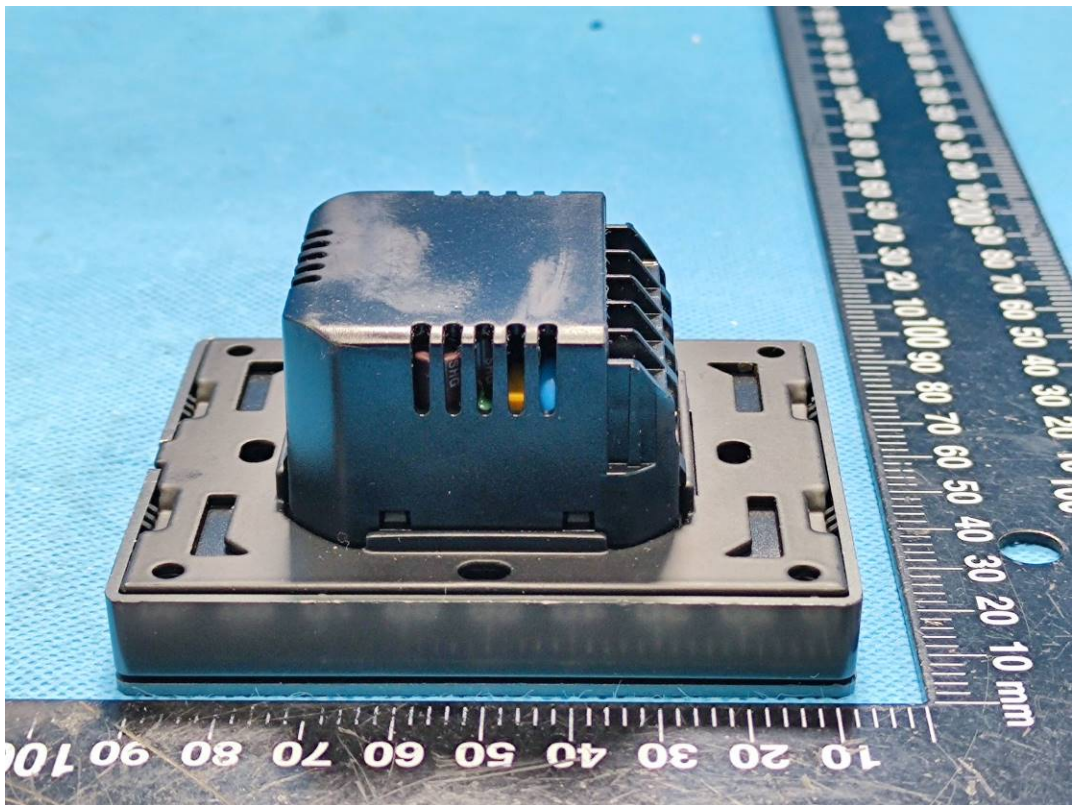
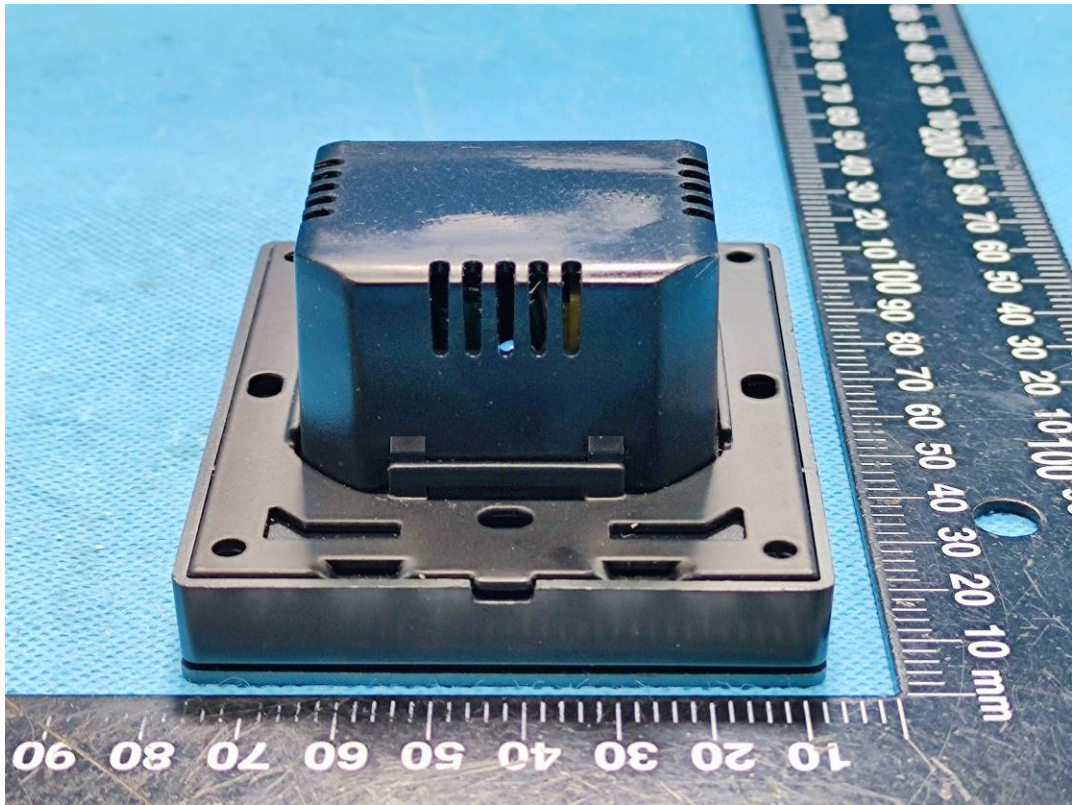
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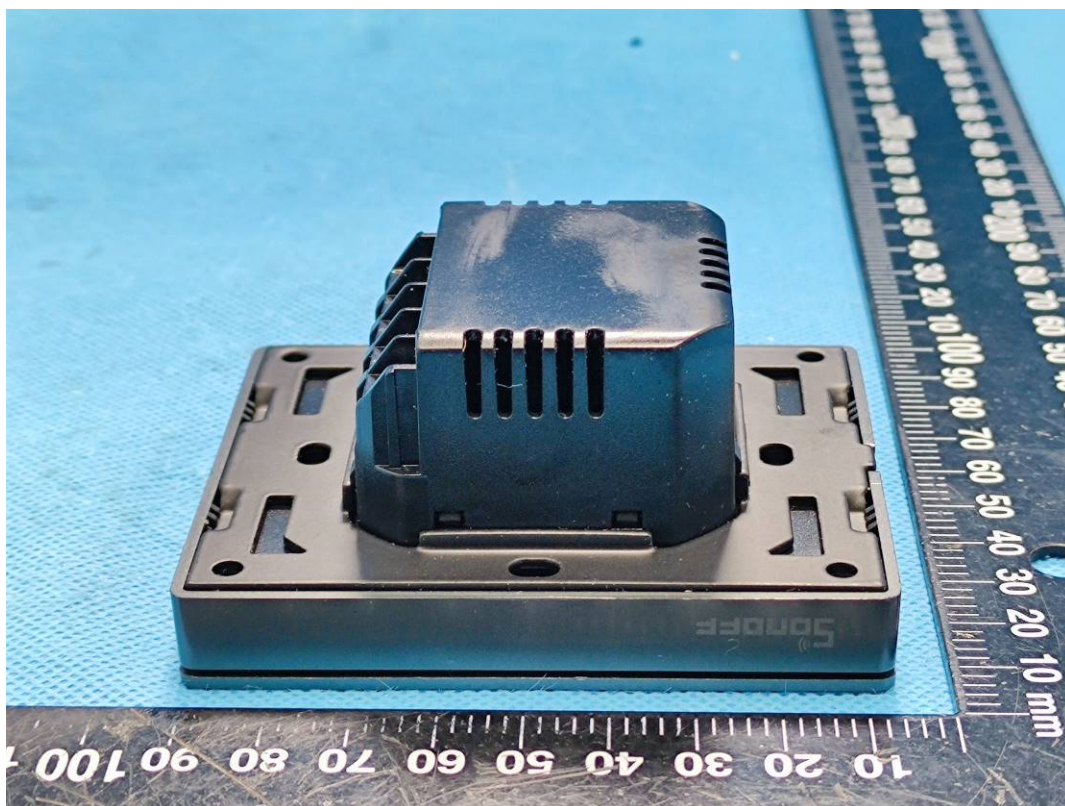
This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk “★”.

EXHIBIT A – EUT PHOTOGRAPHS

M5-1C-80(with relay 4#)



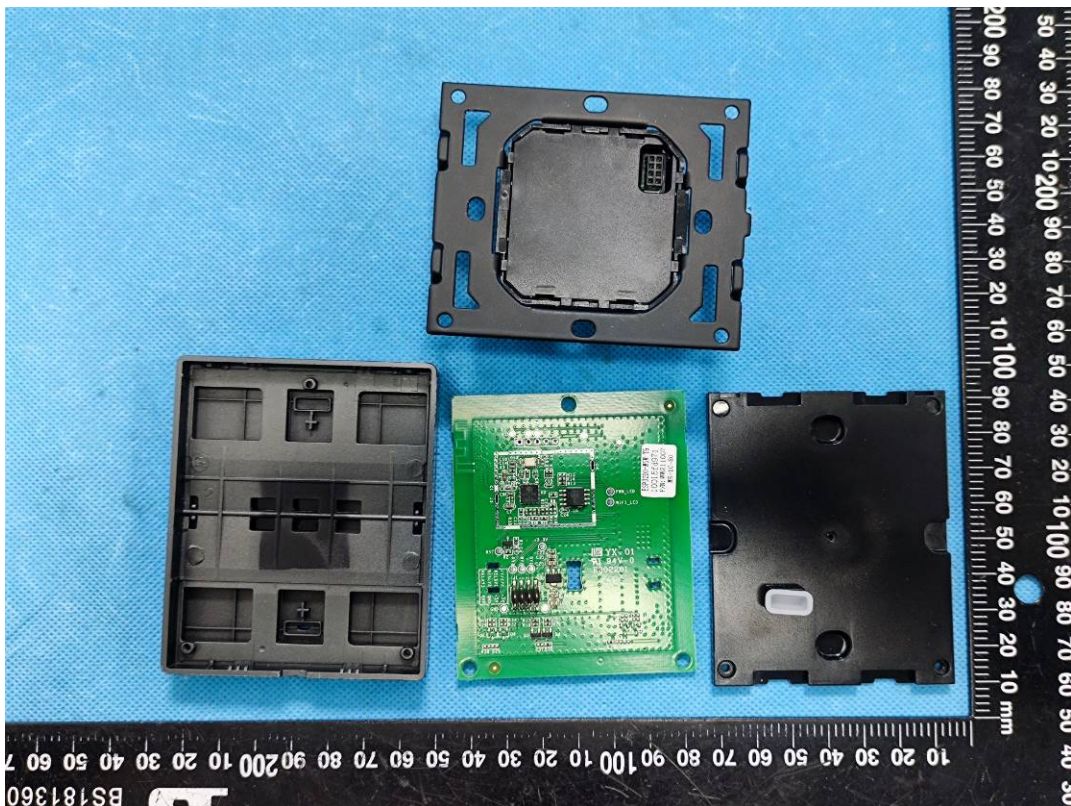


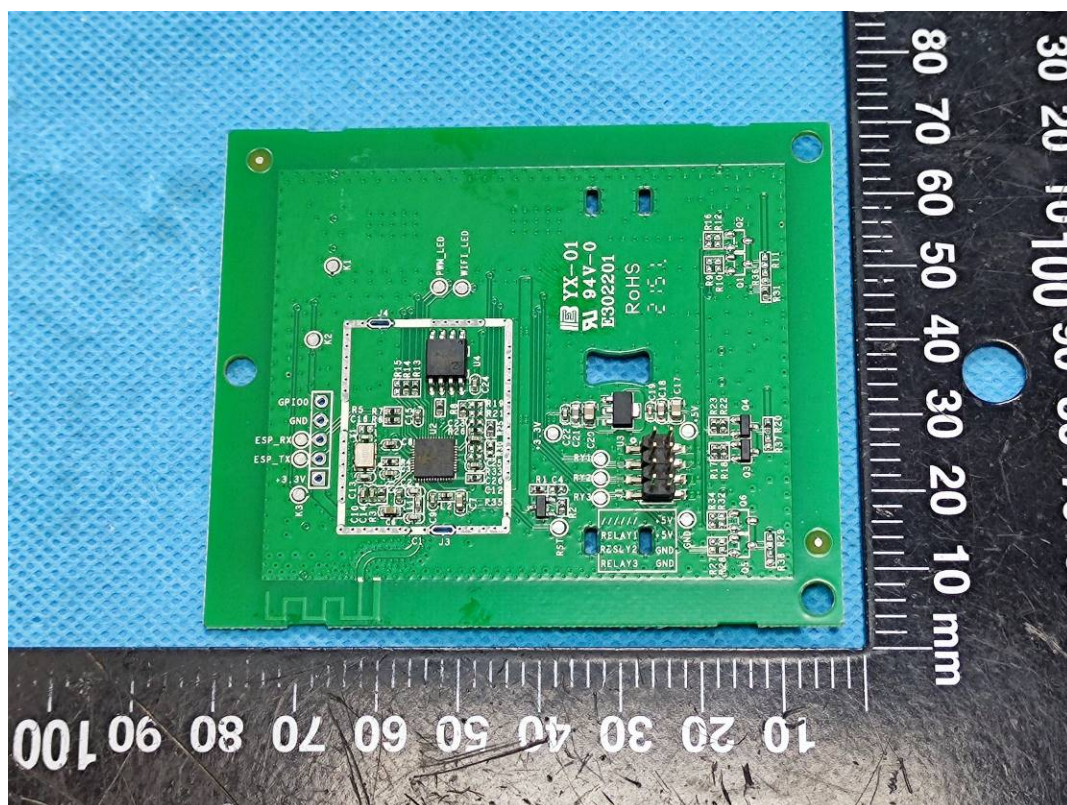


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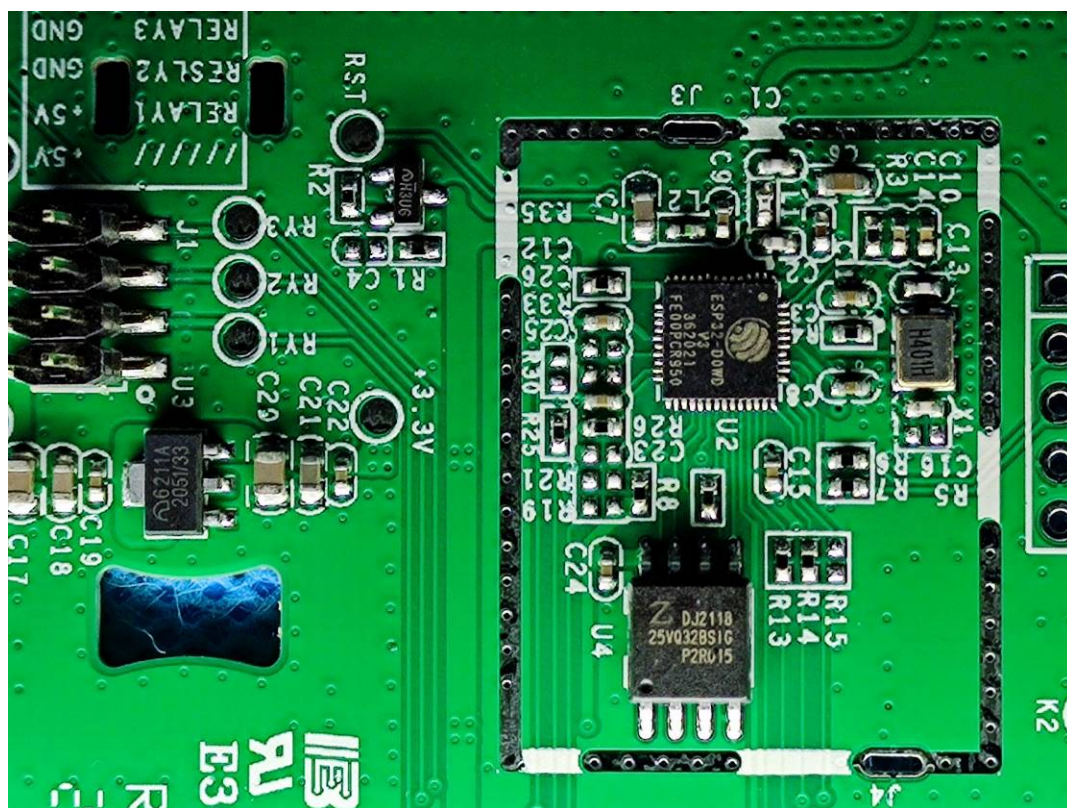


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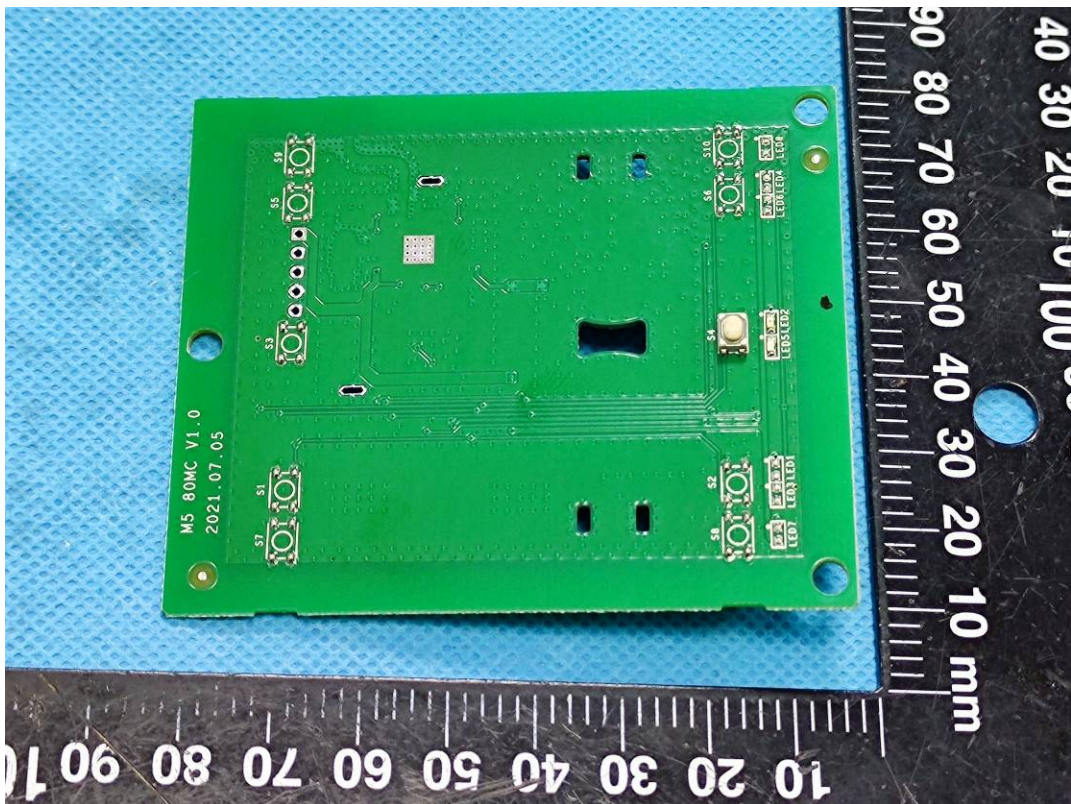
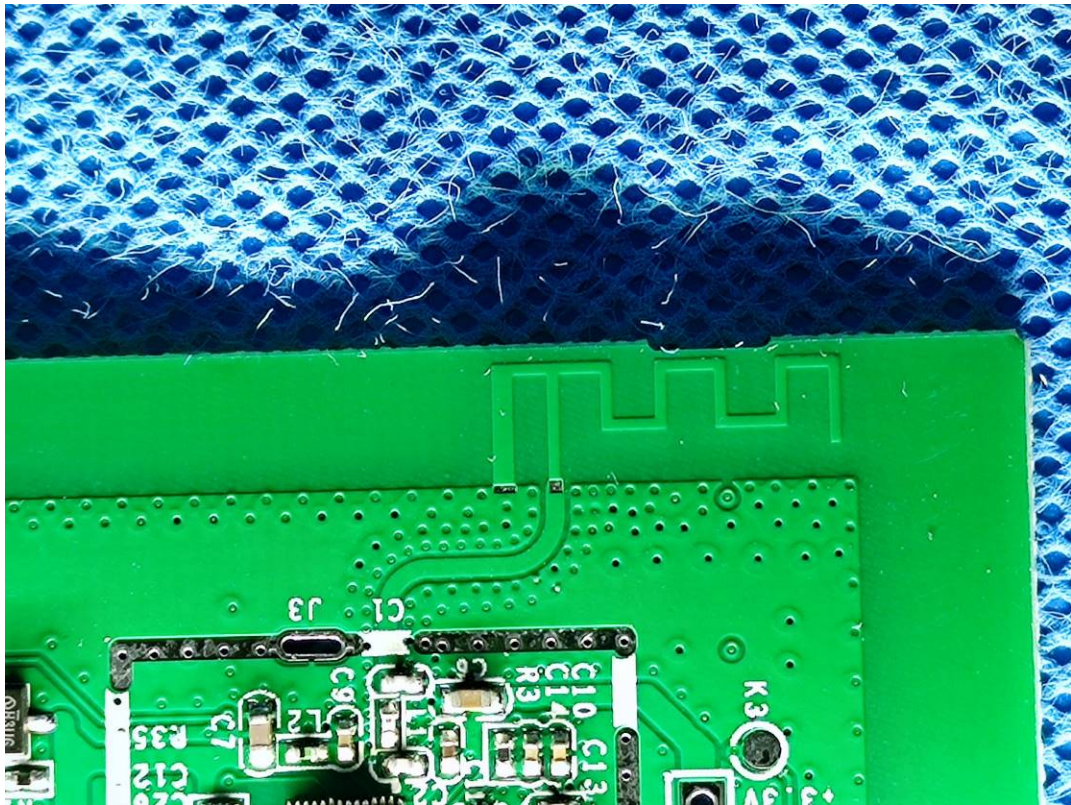


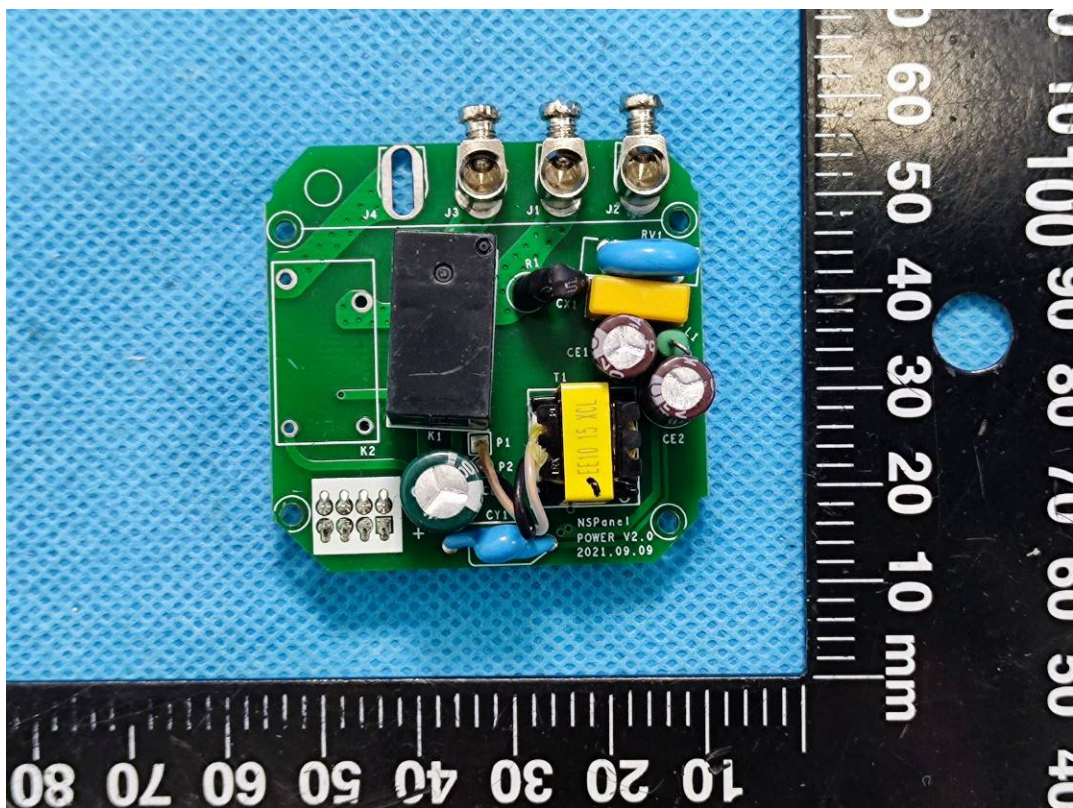
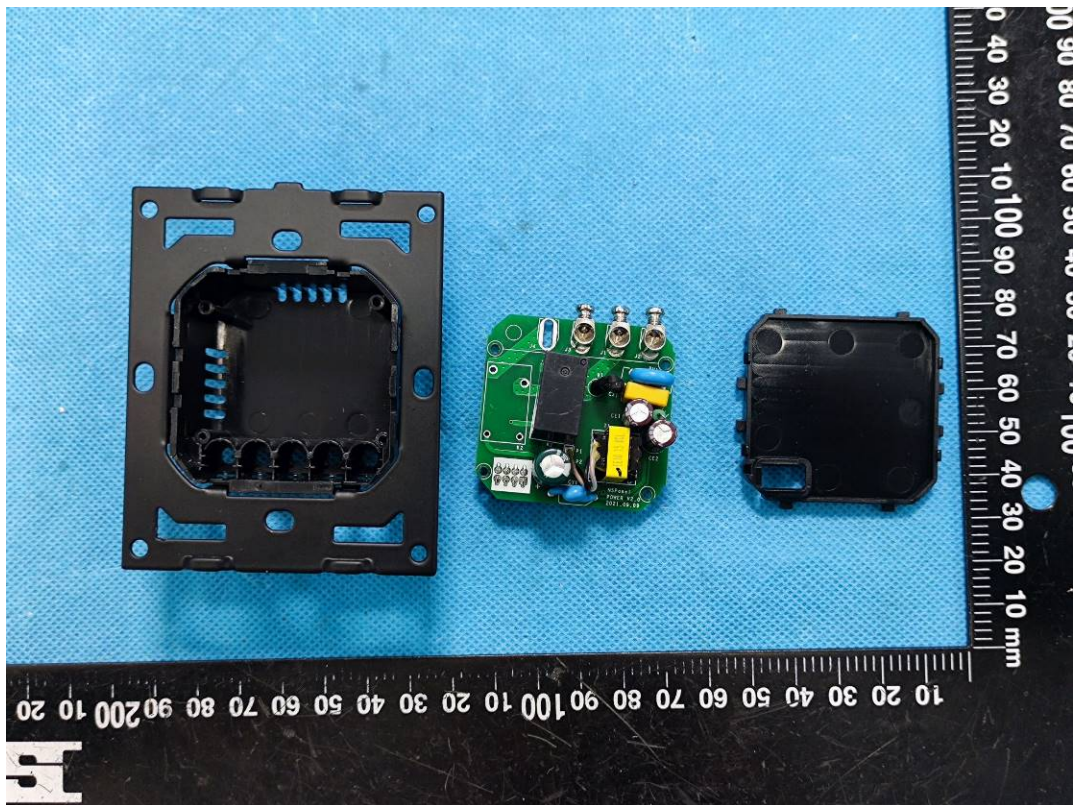


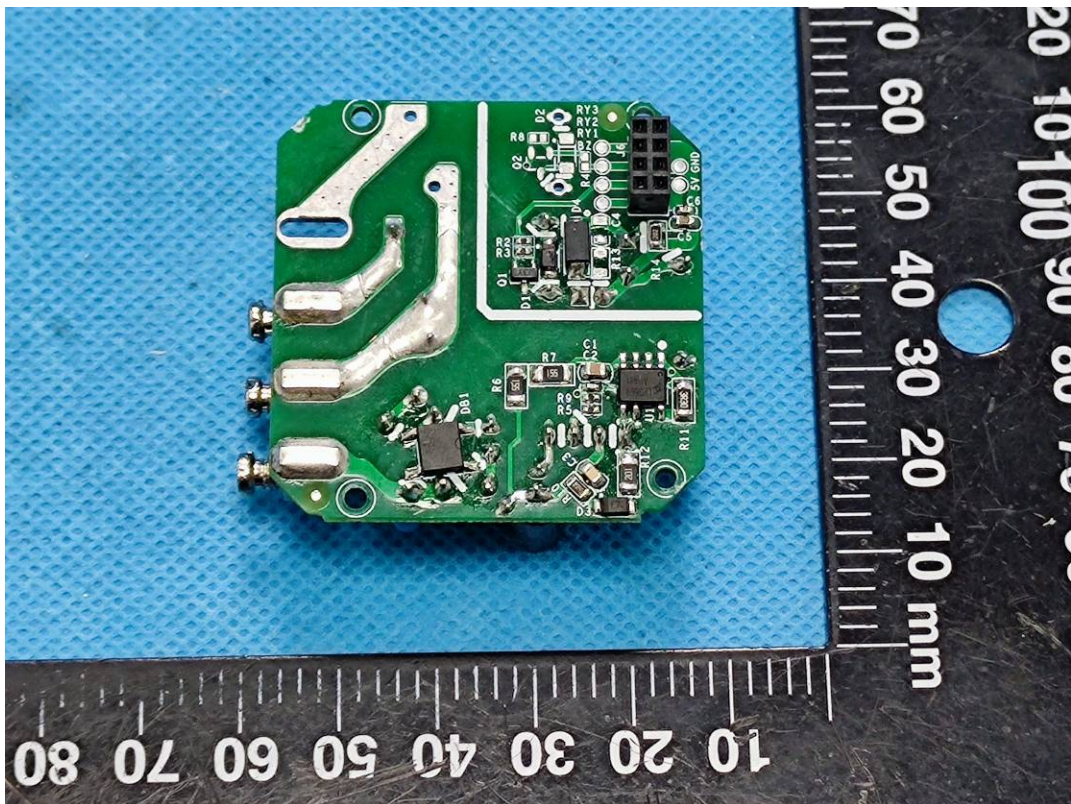
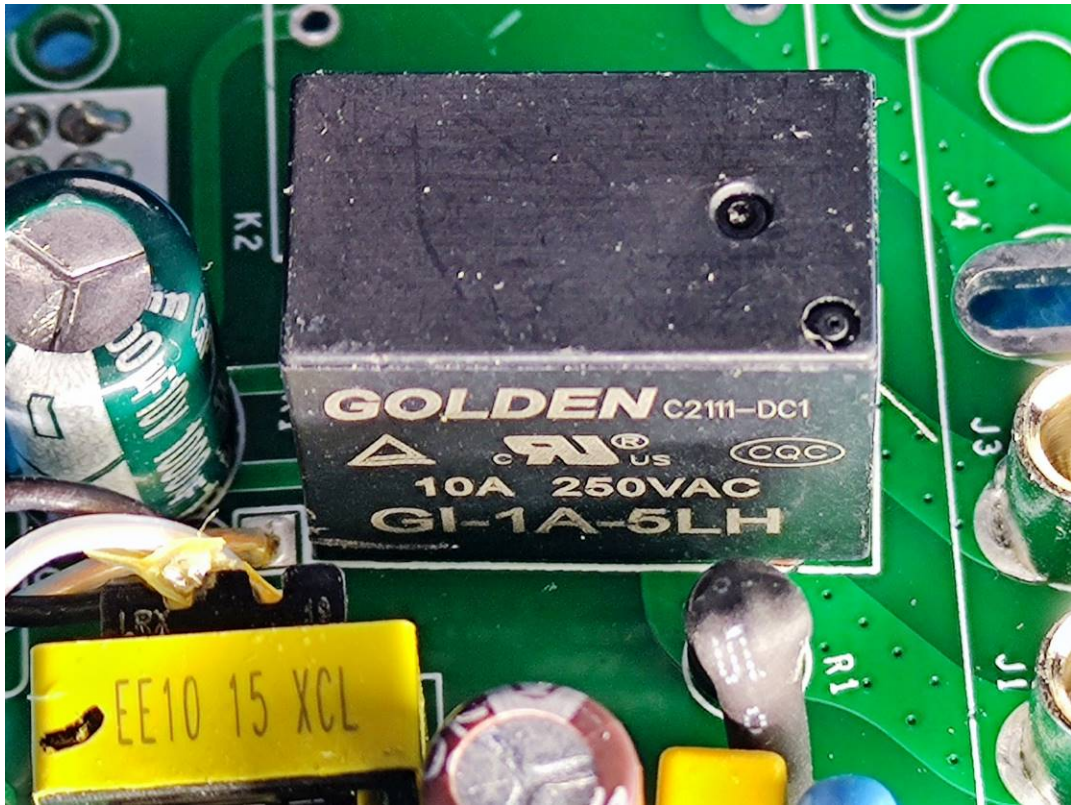
Chip1



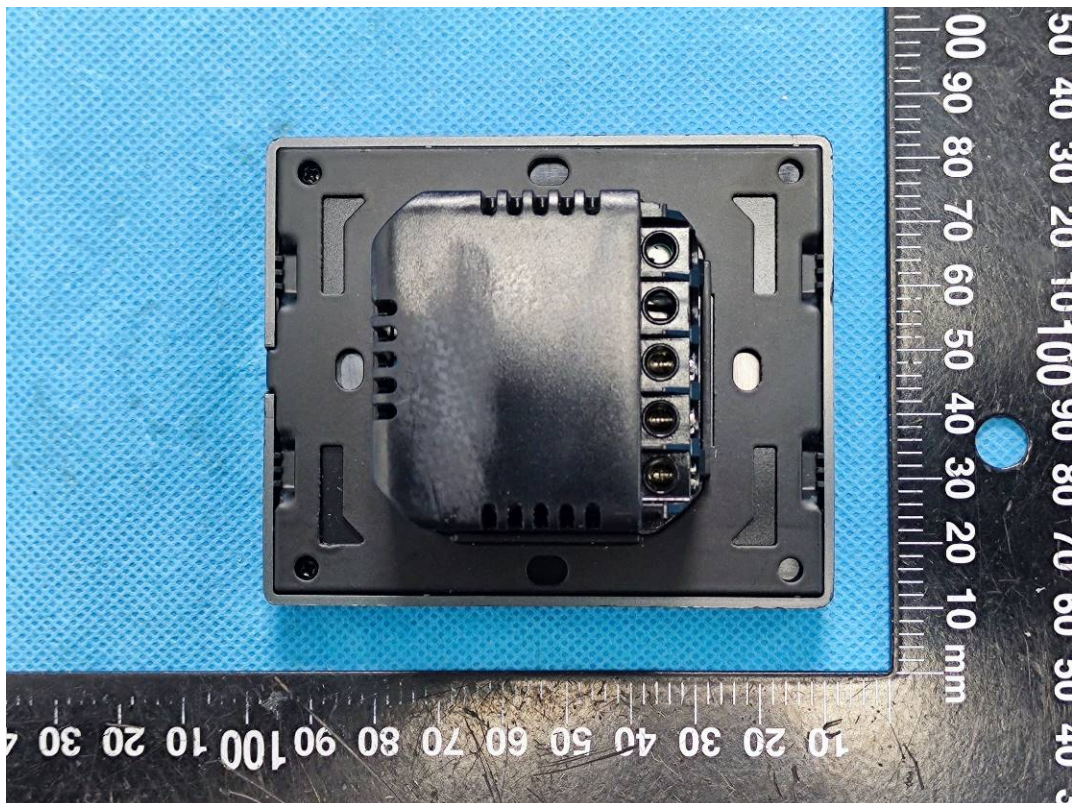
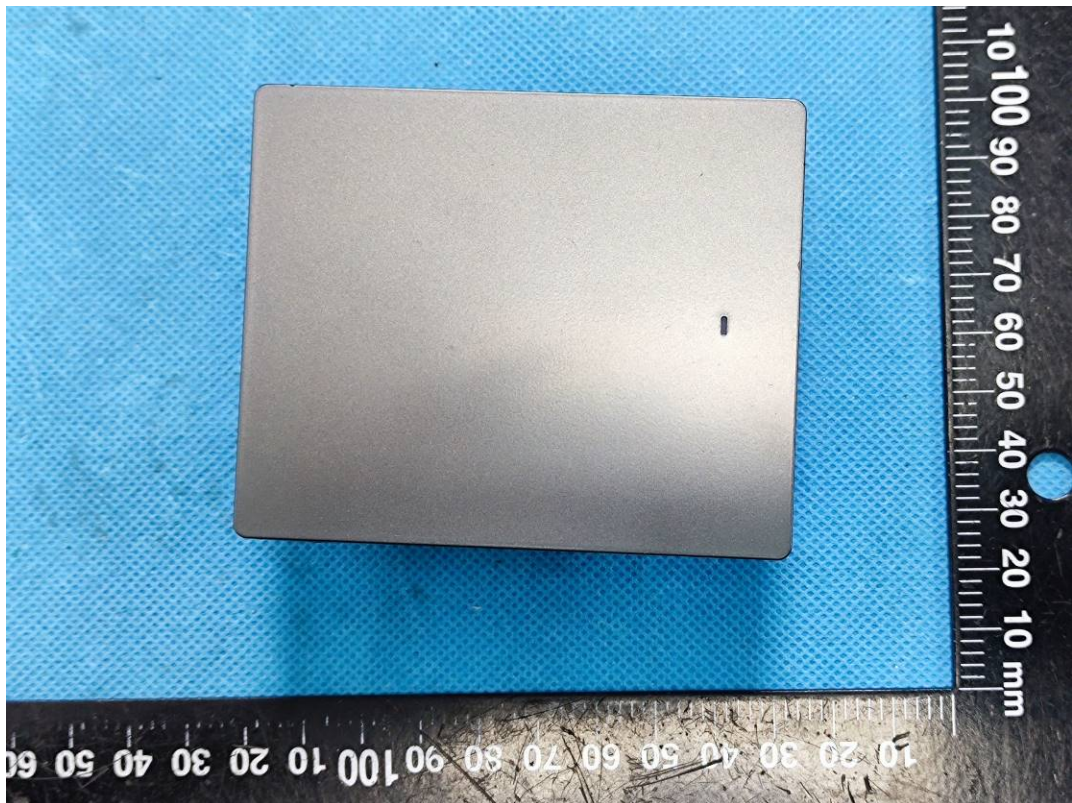
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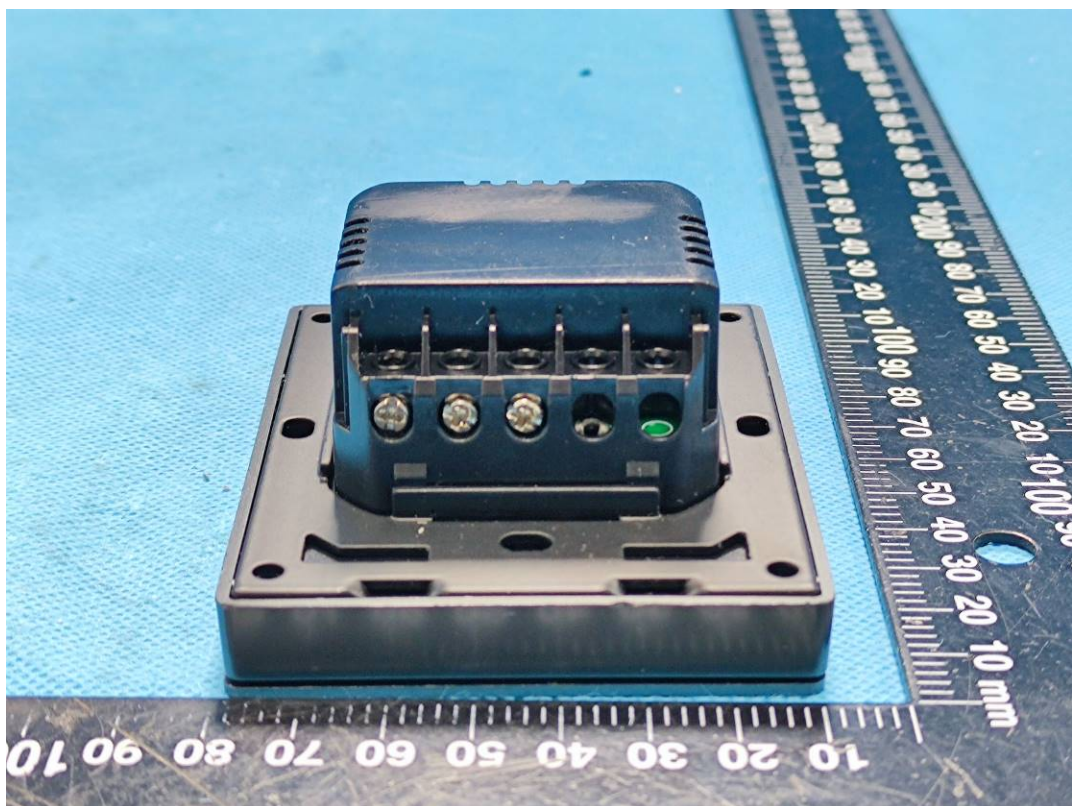
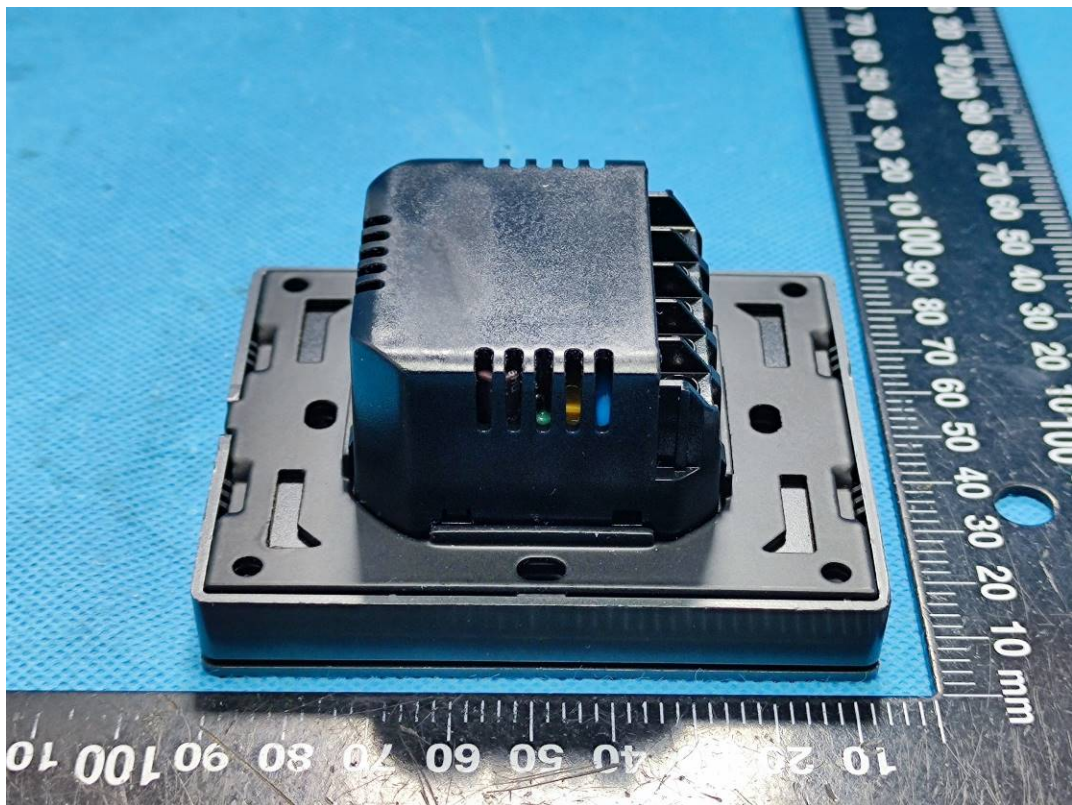


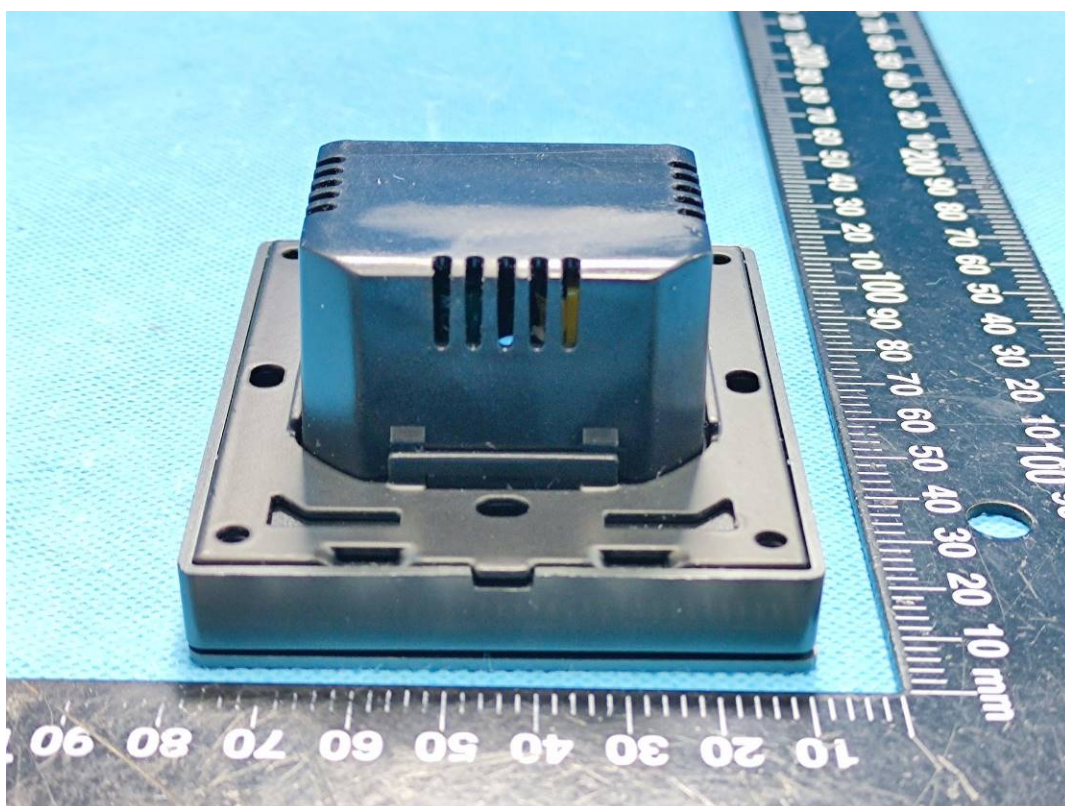
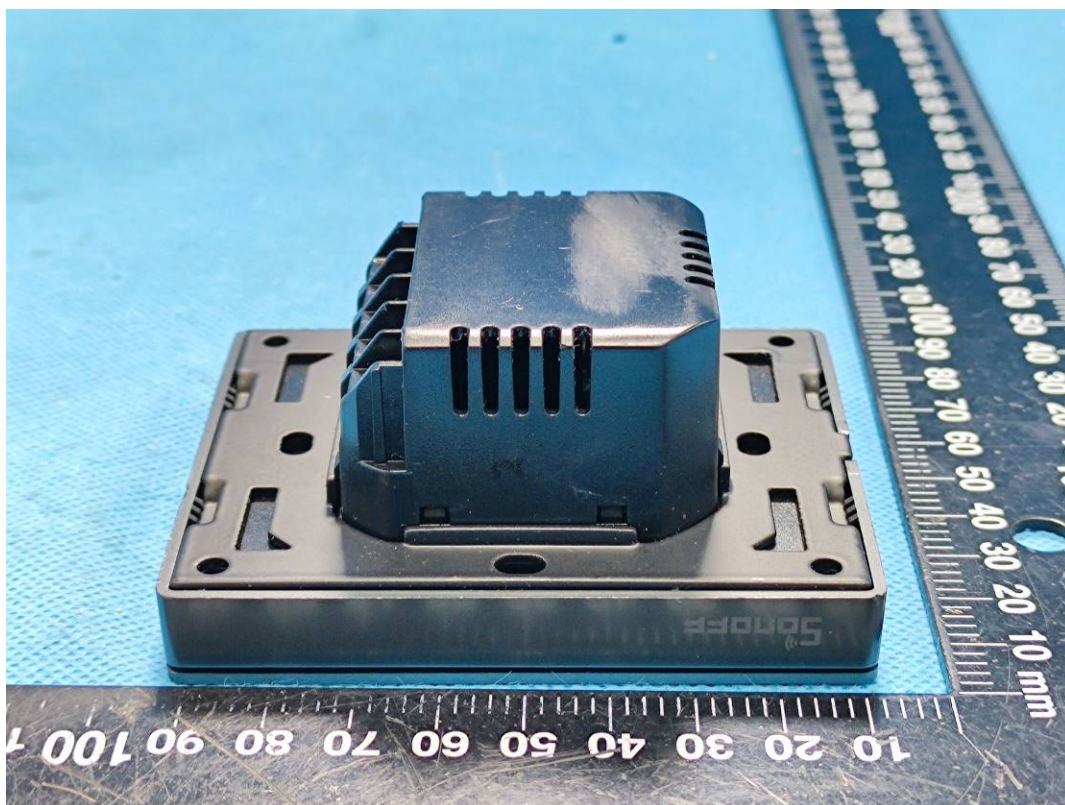




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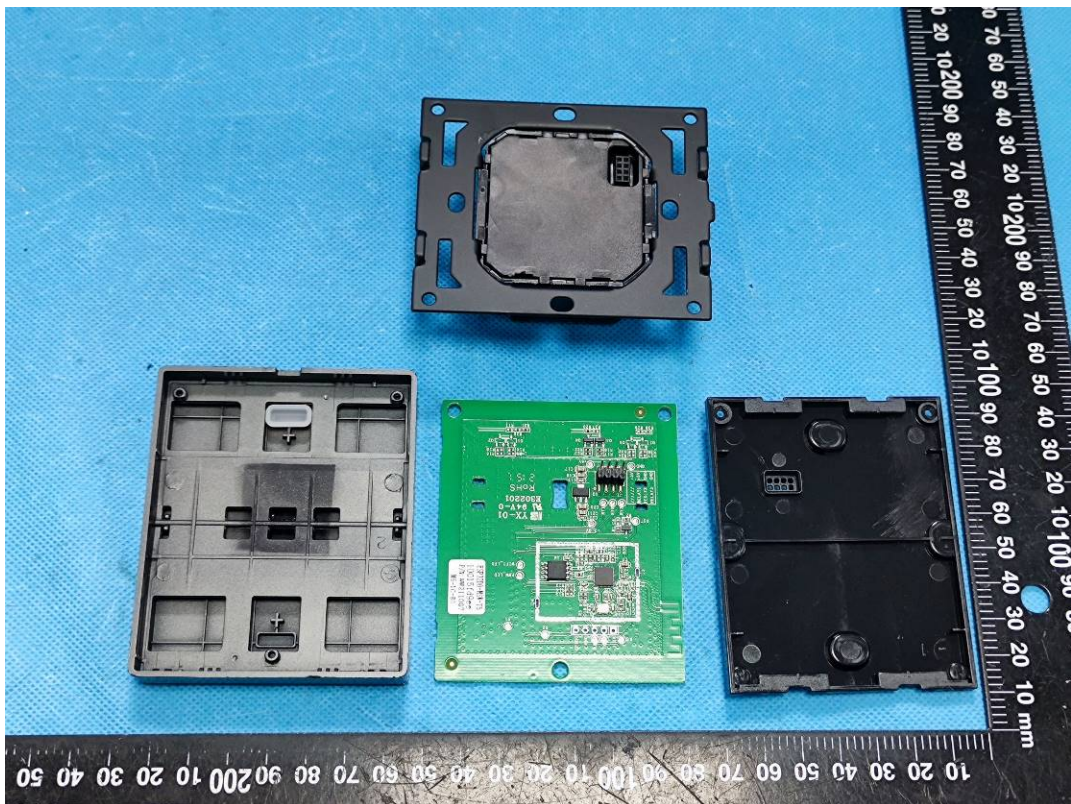


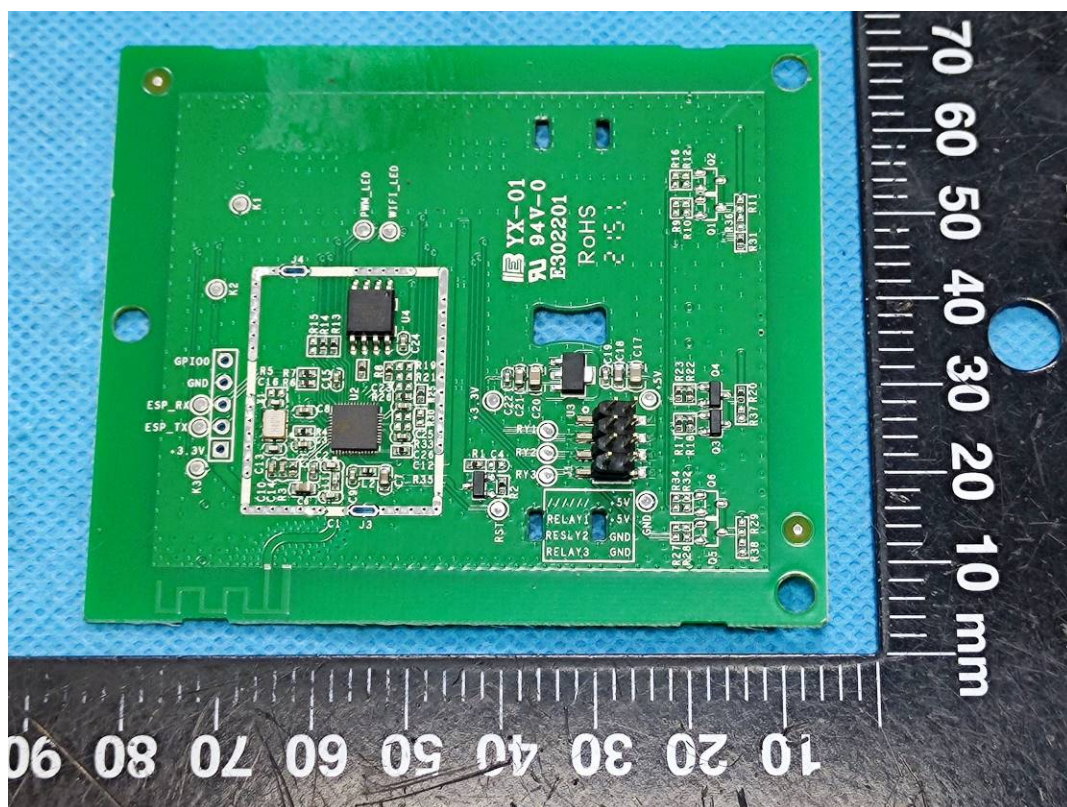


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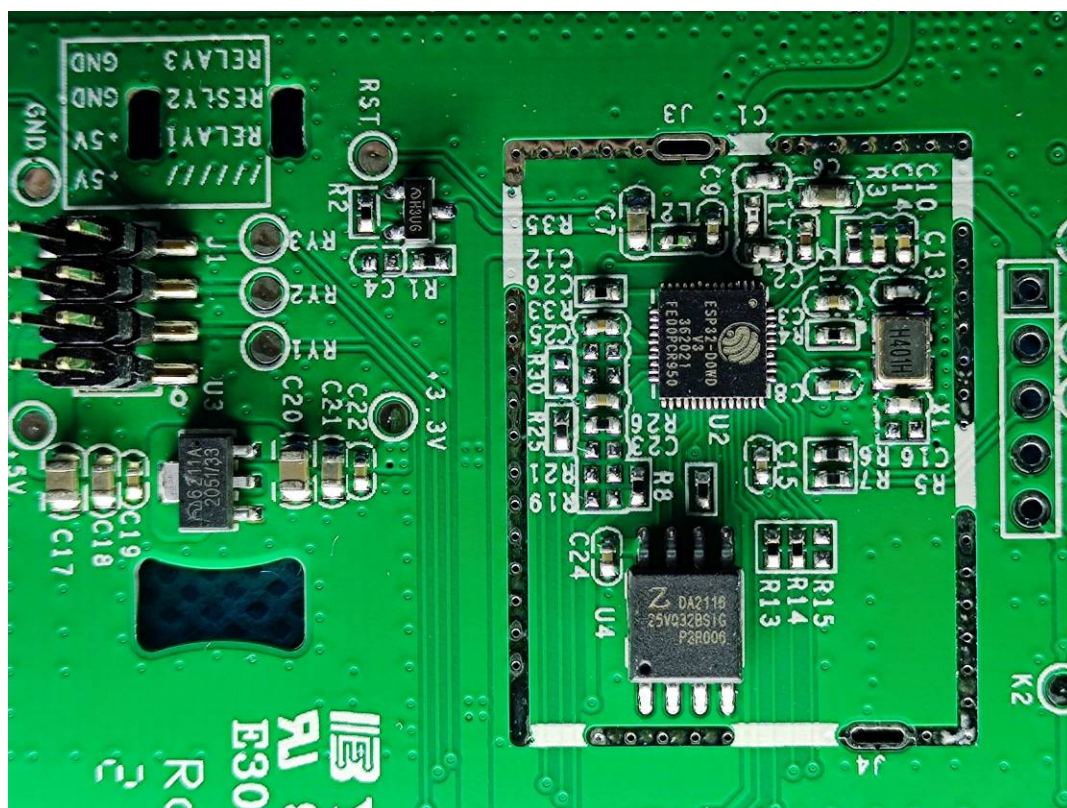


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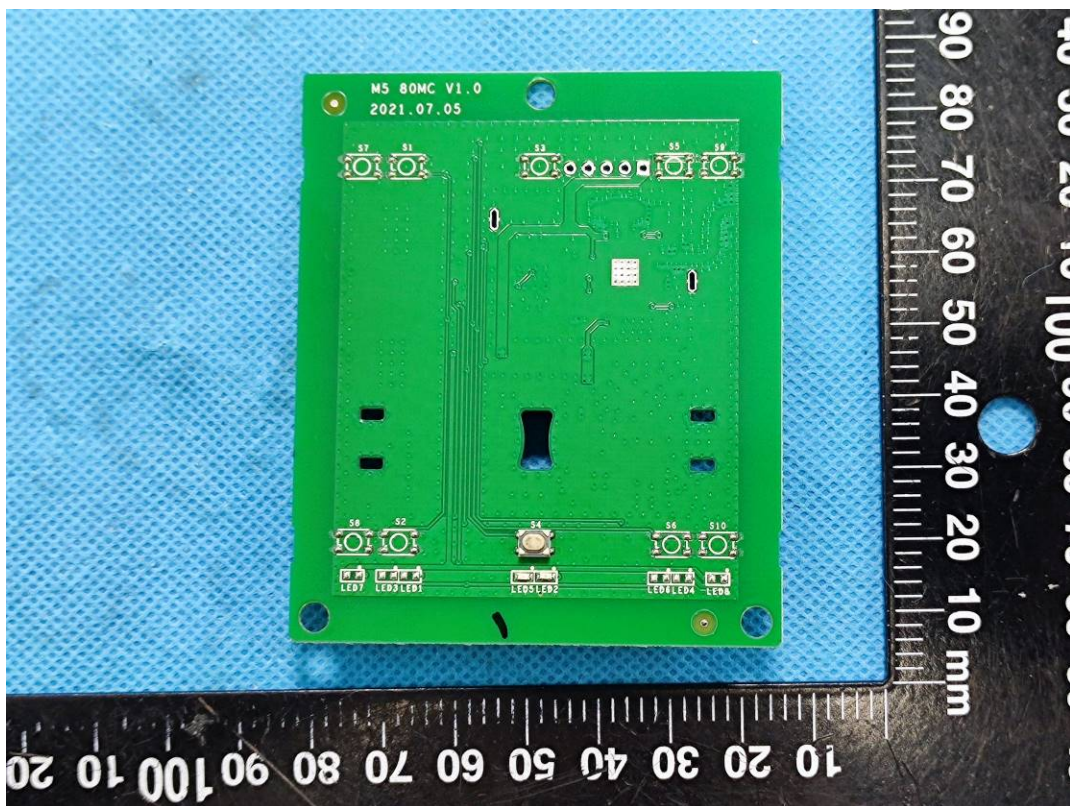
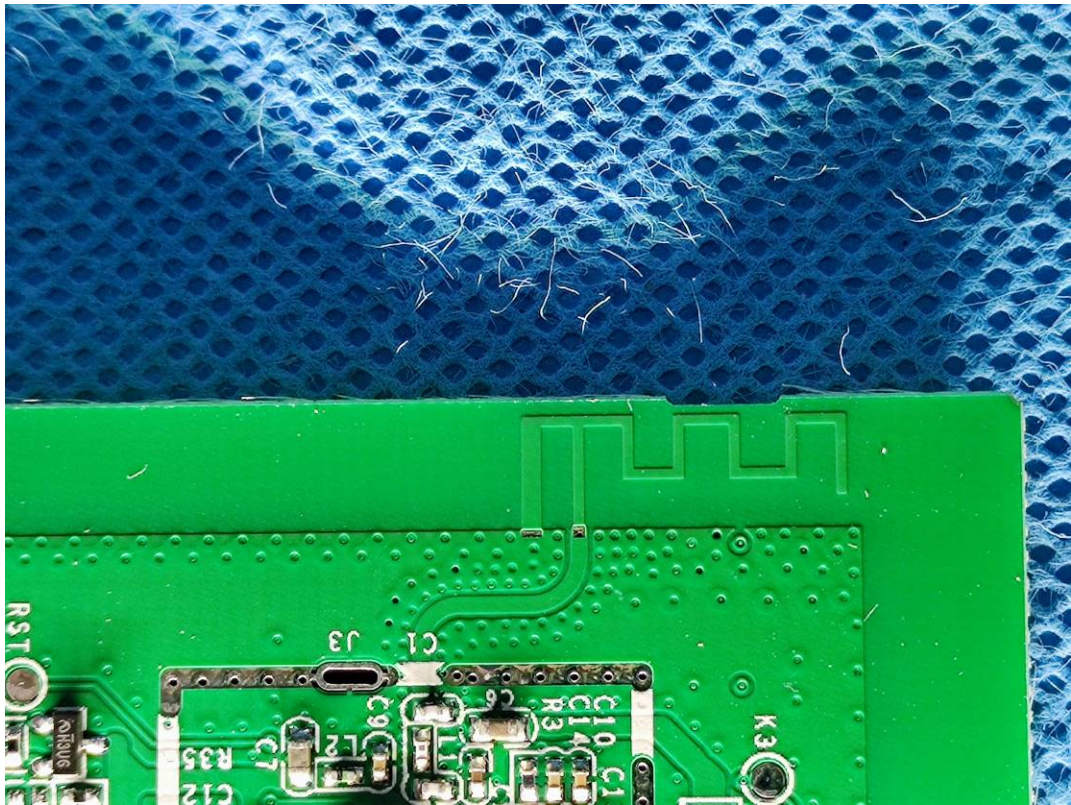


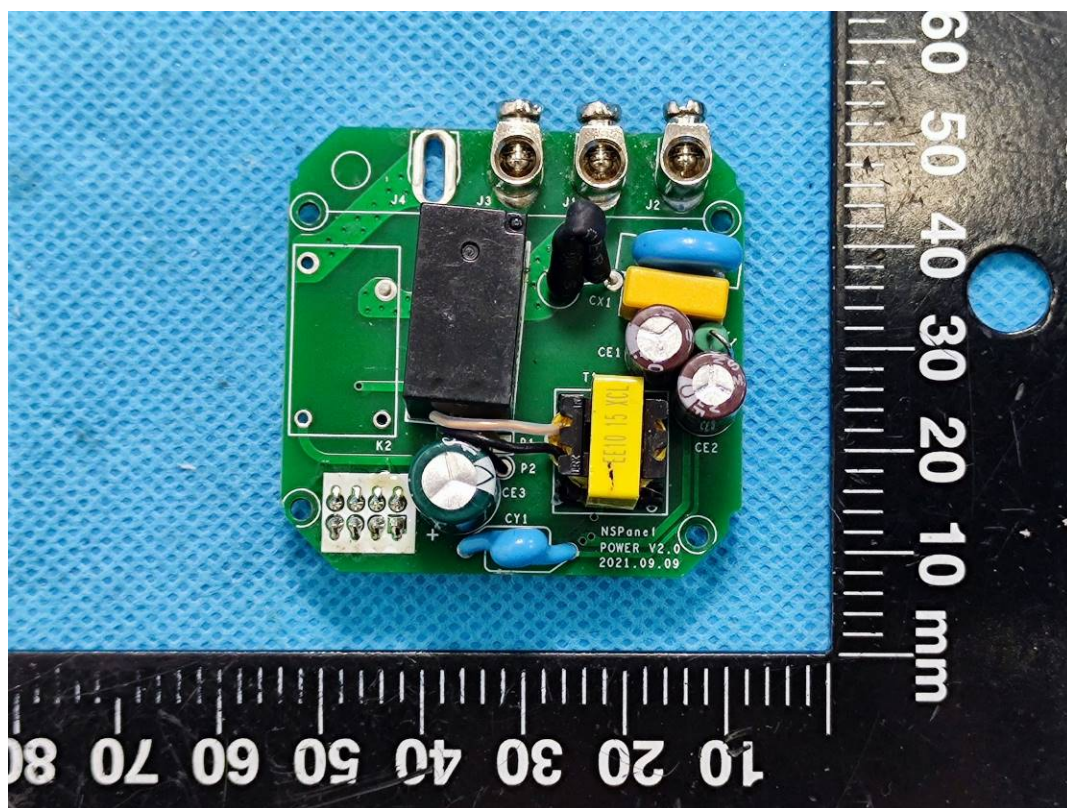
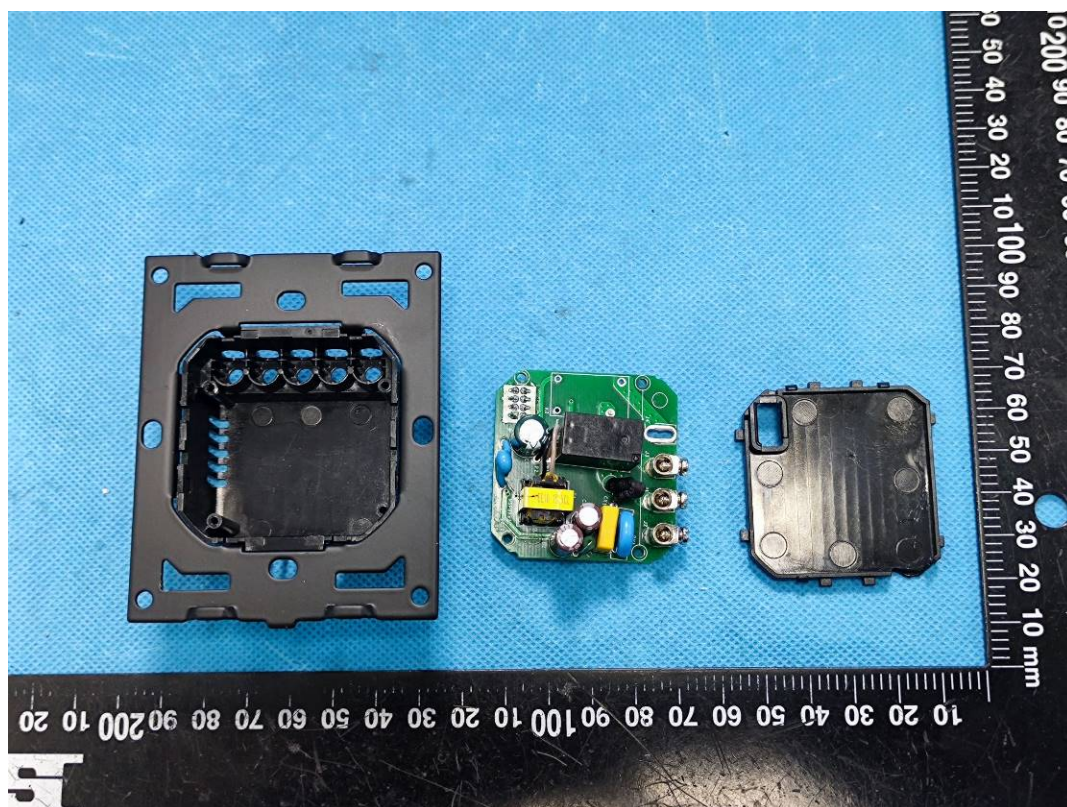


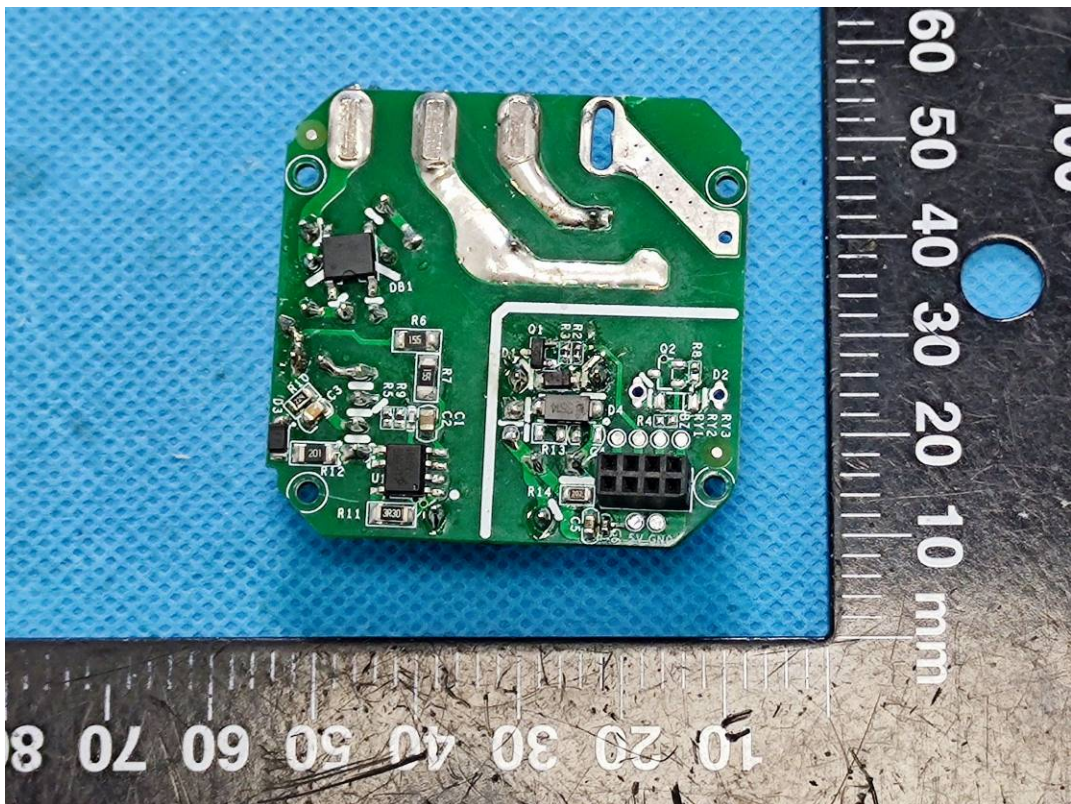
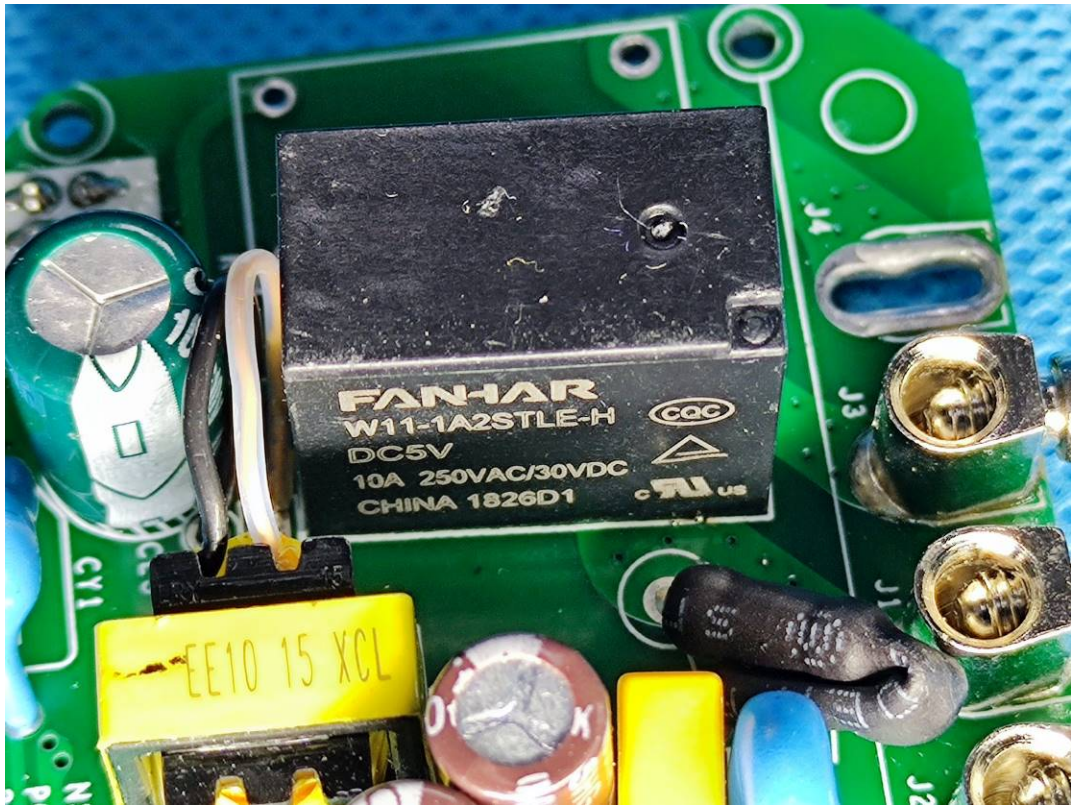
Chip2



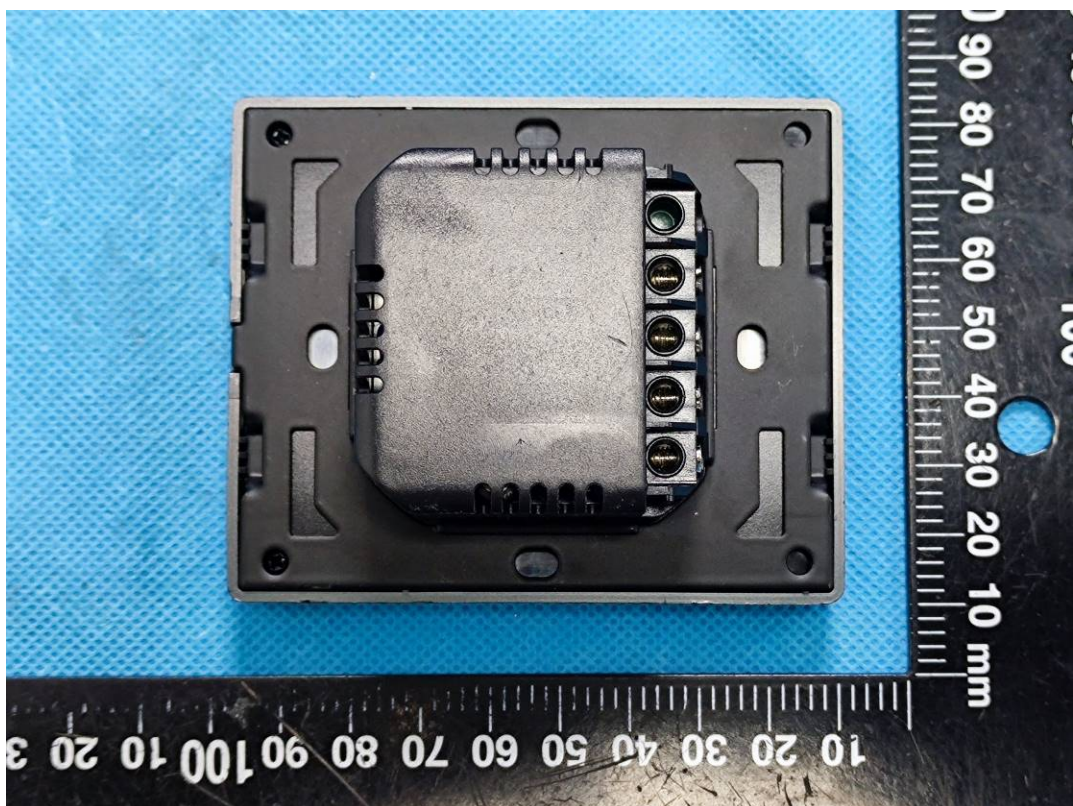
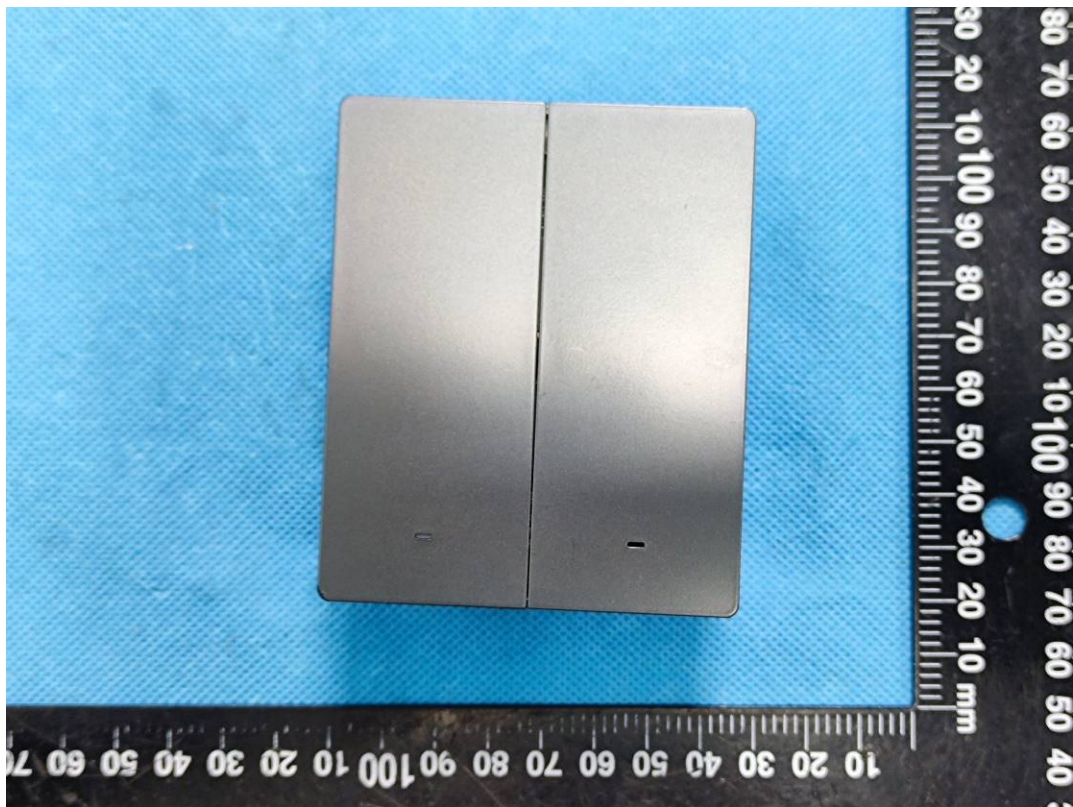
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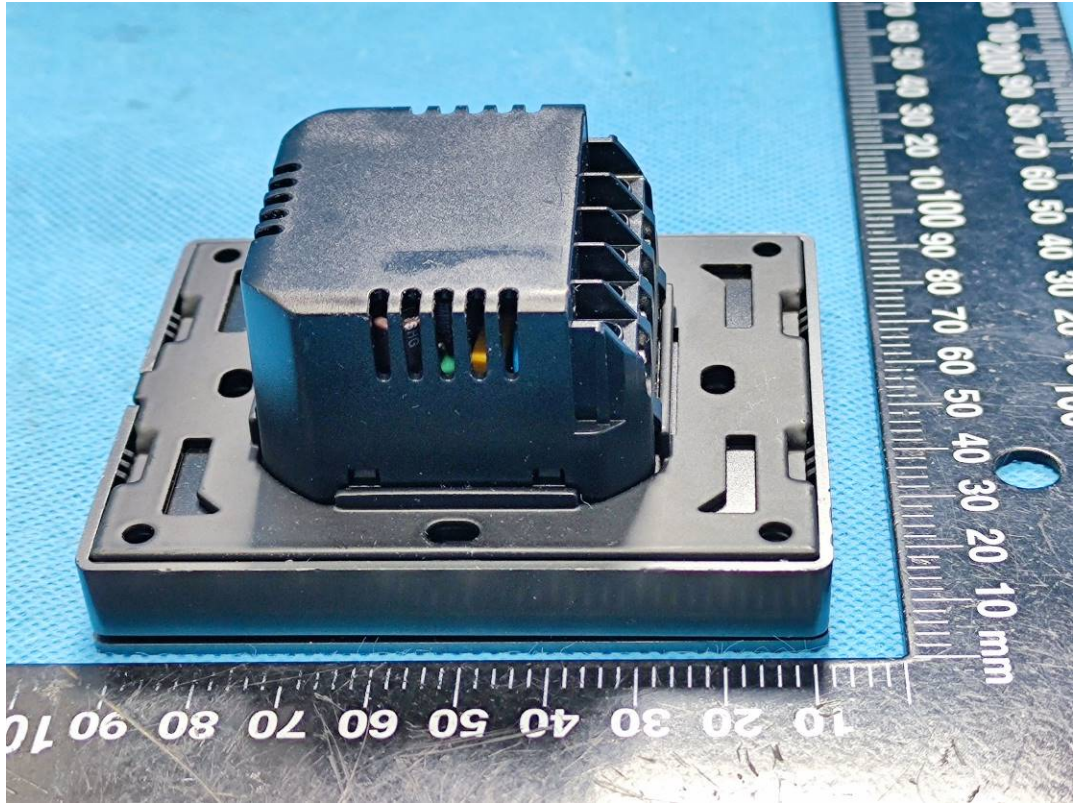


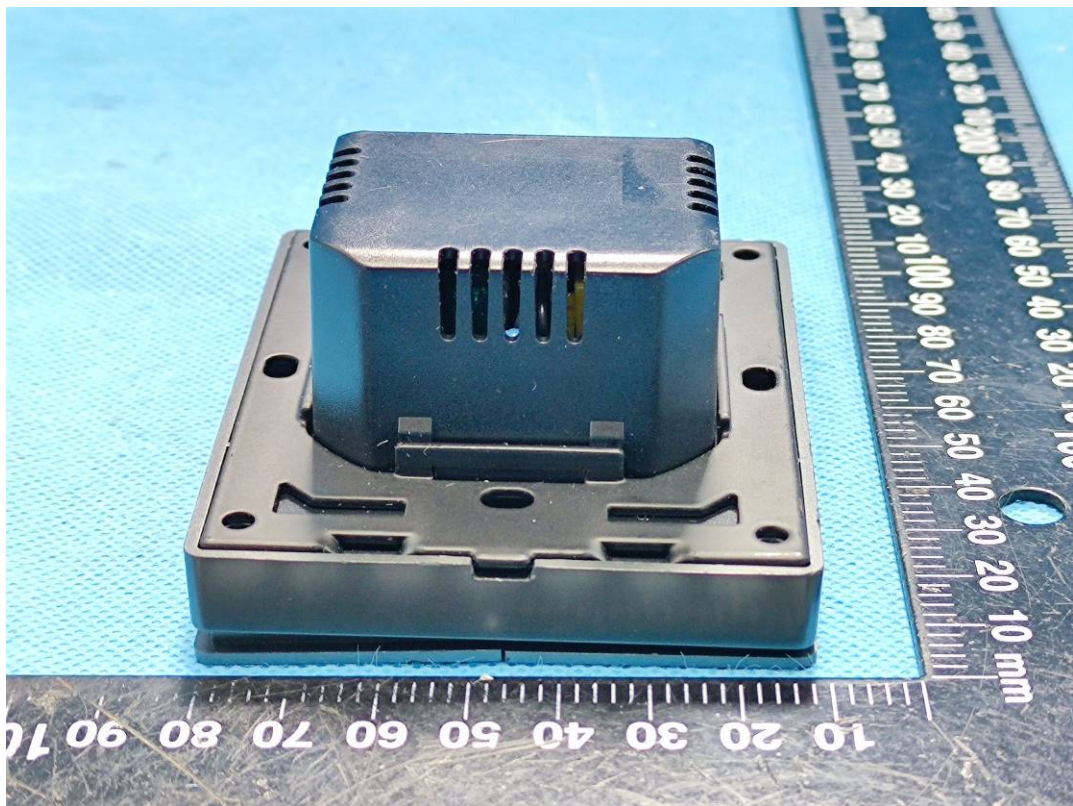
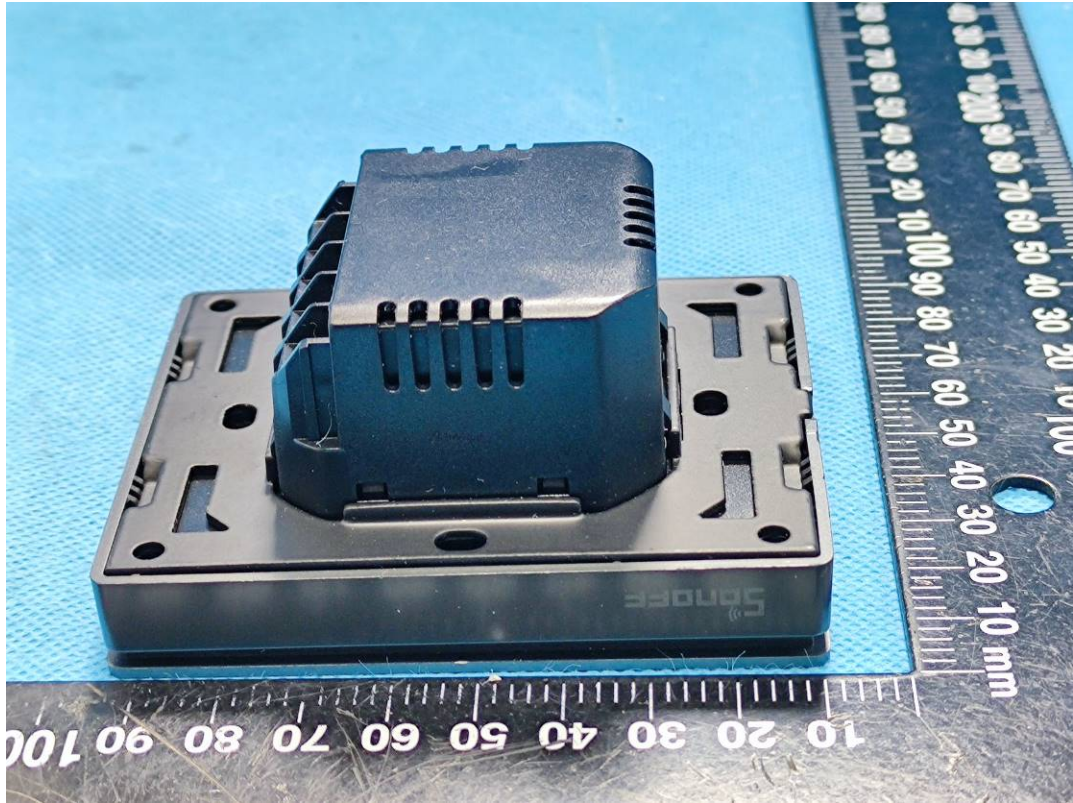




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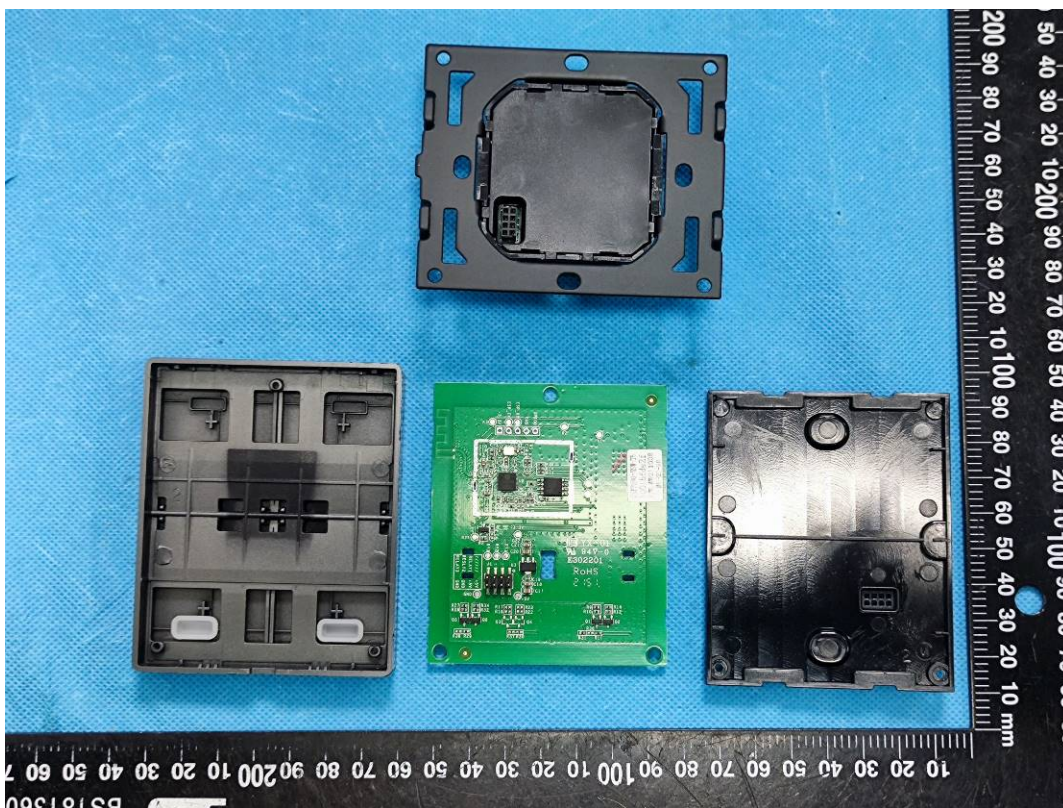


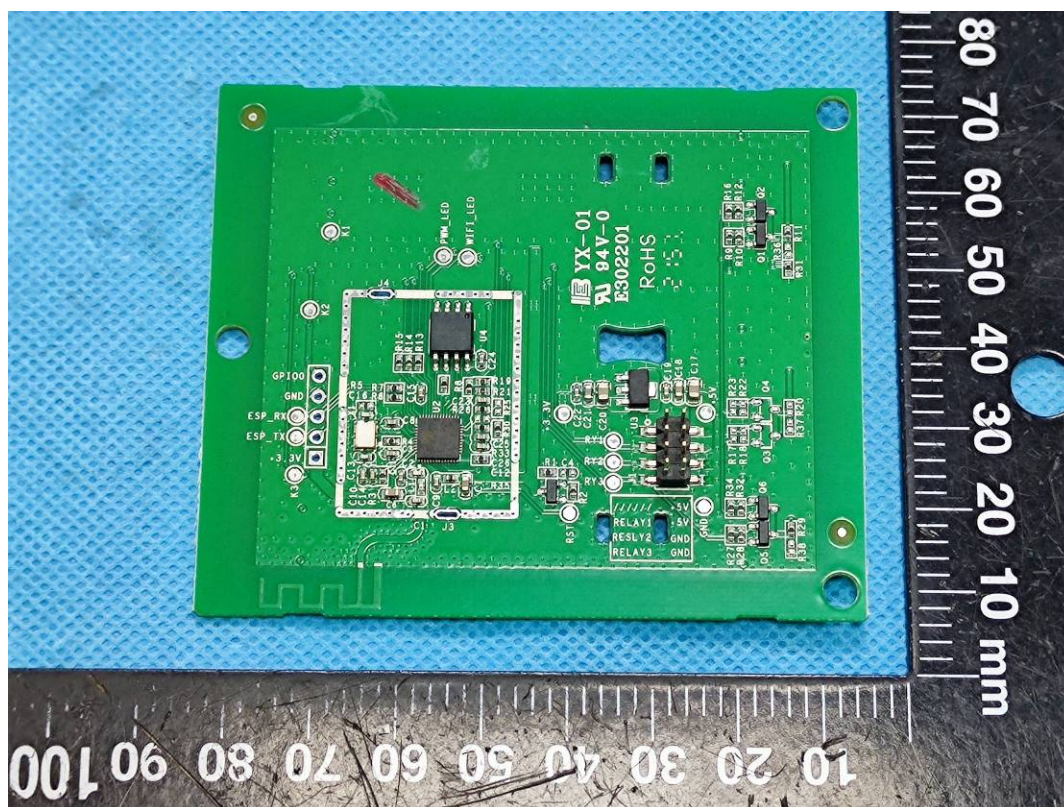


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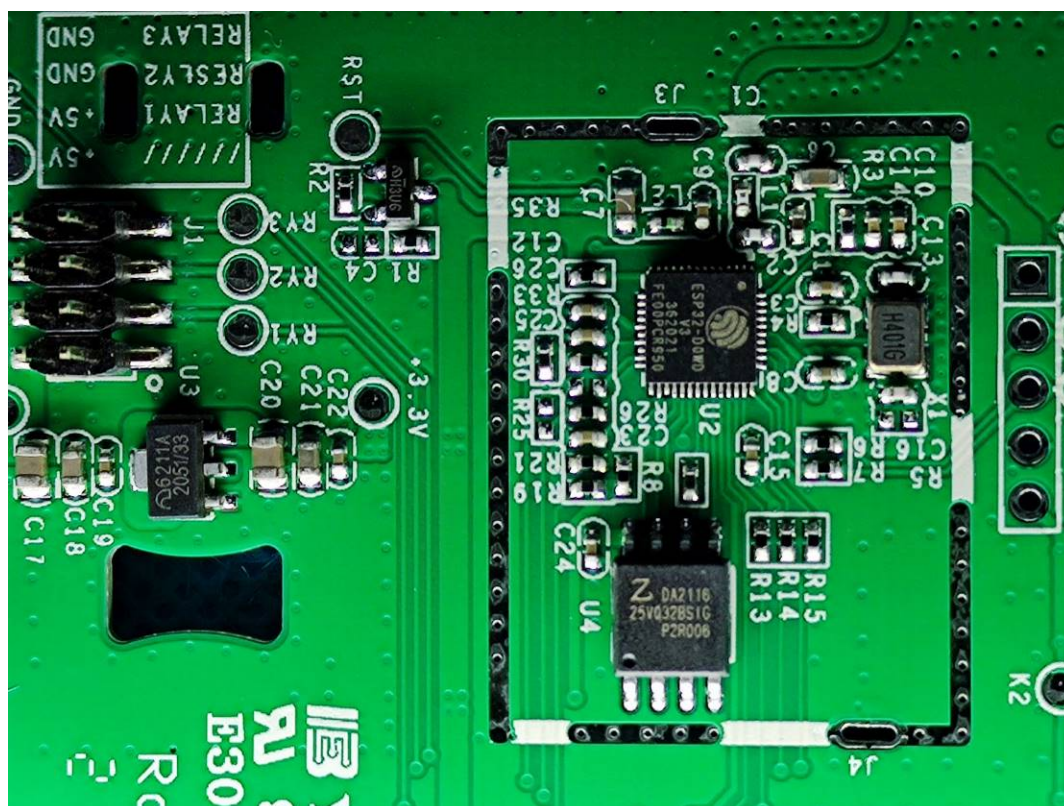


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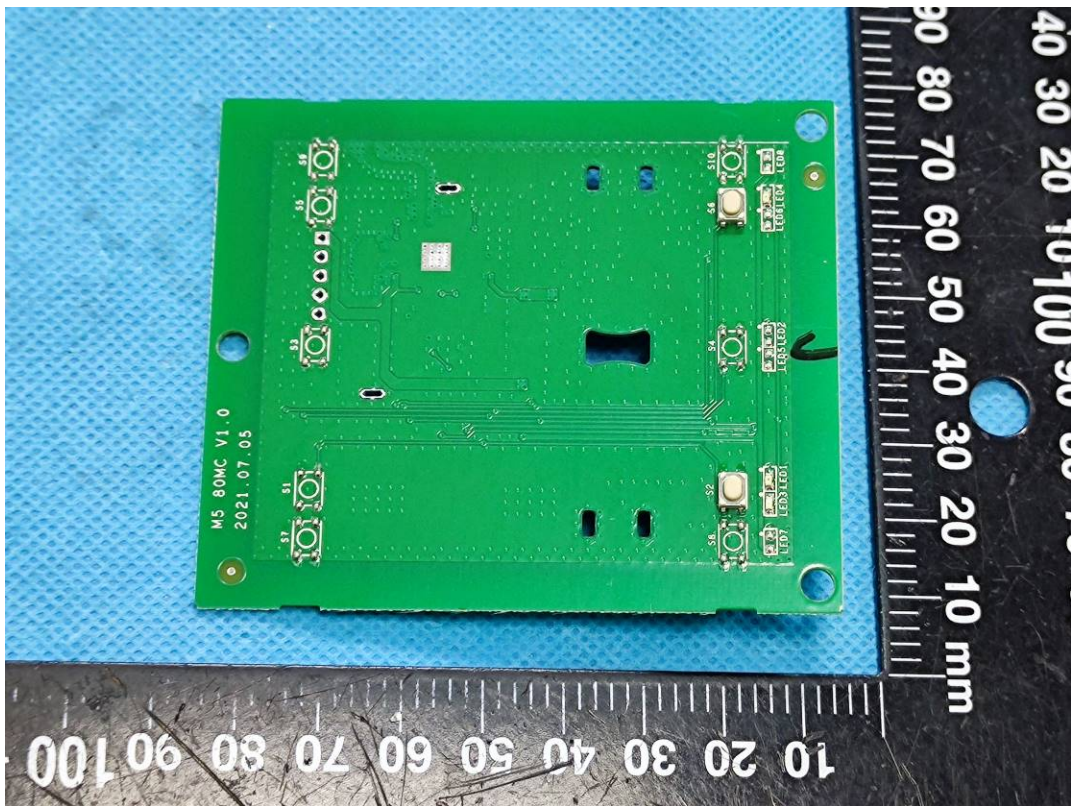
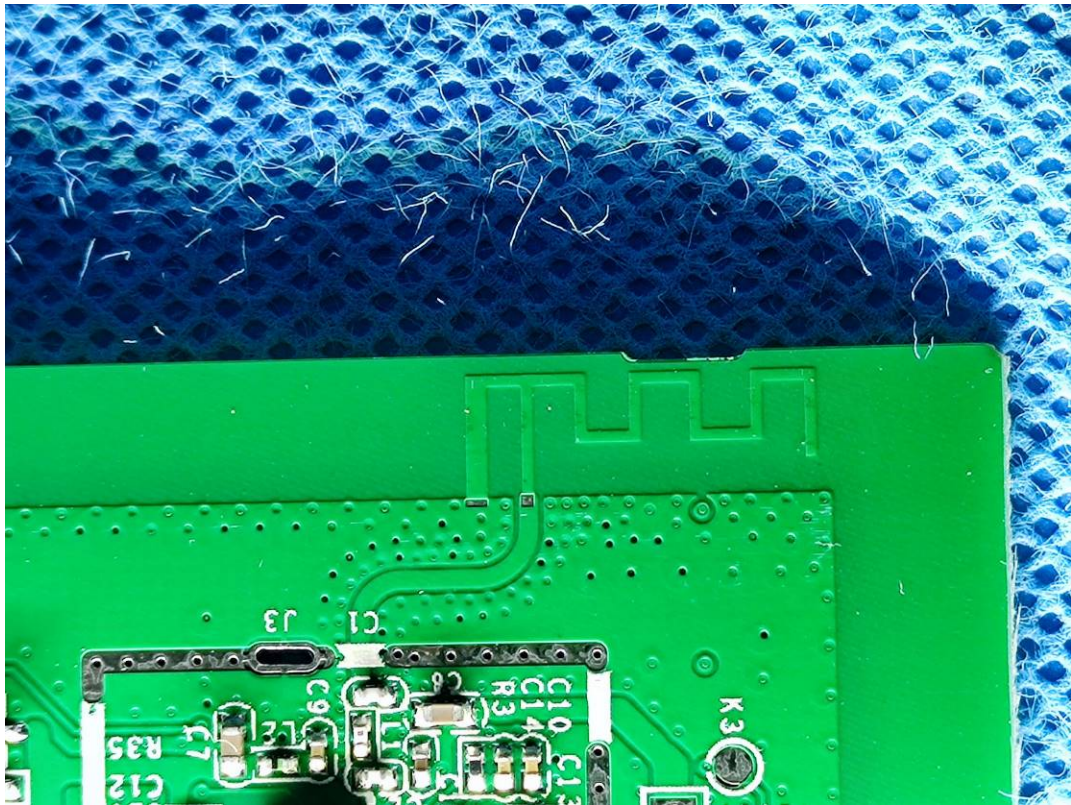


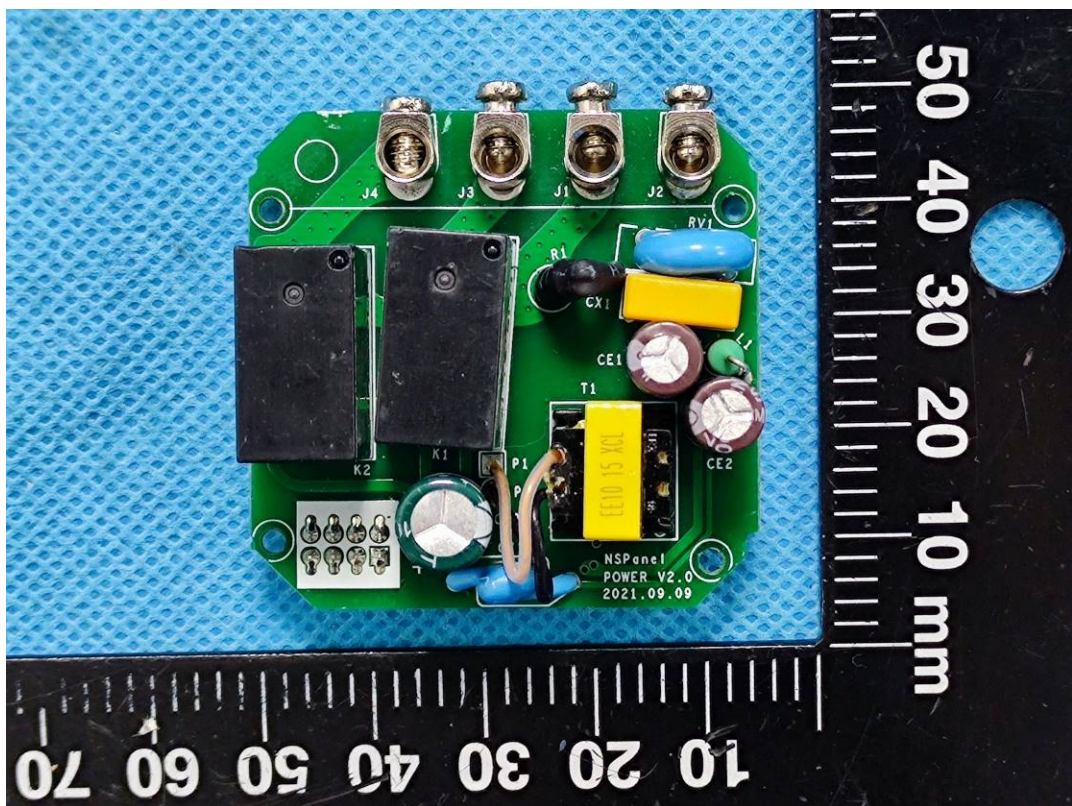
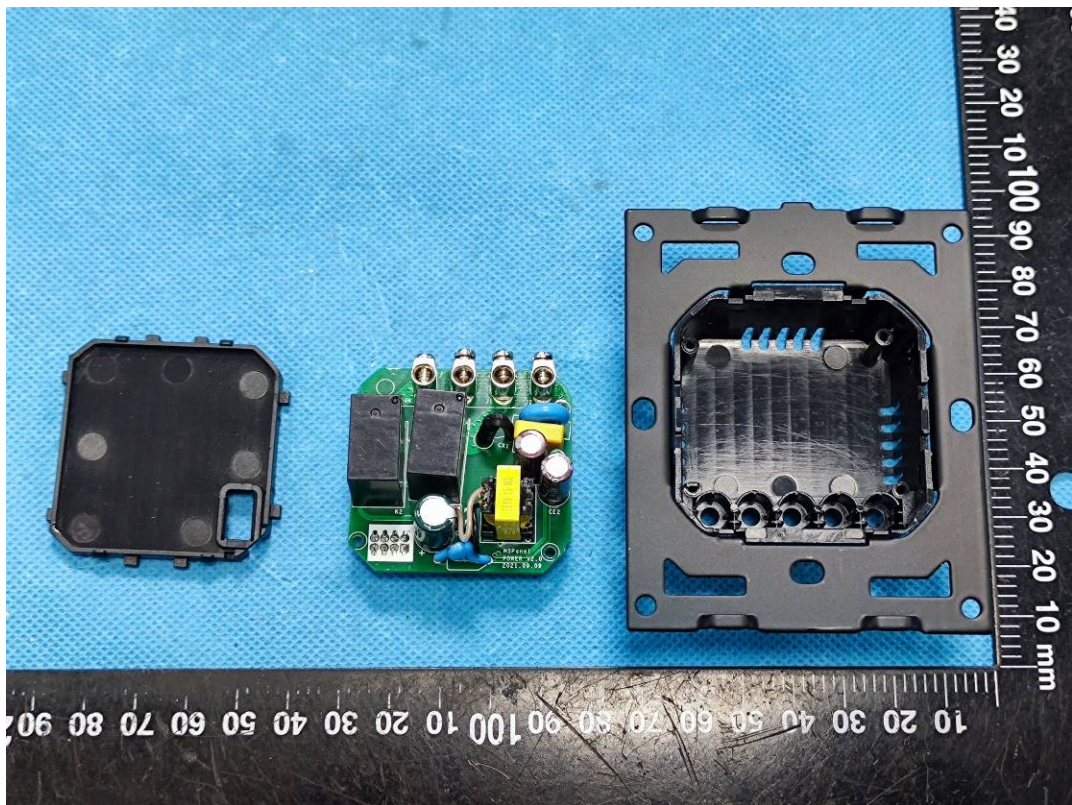


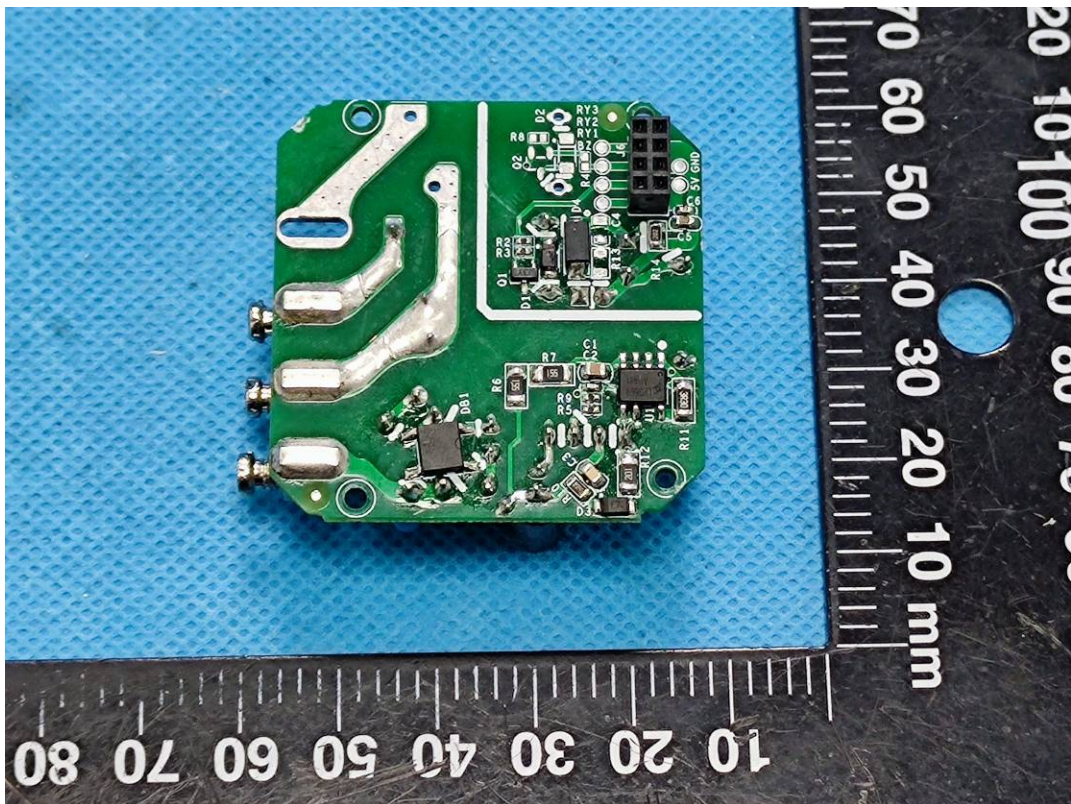
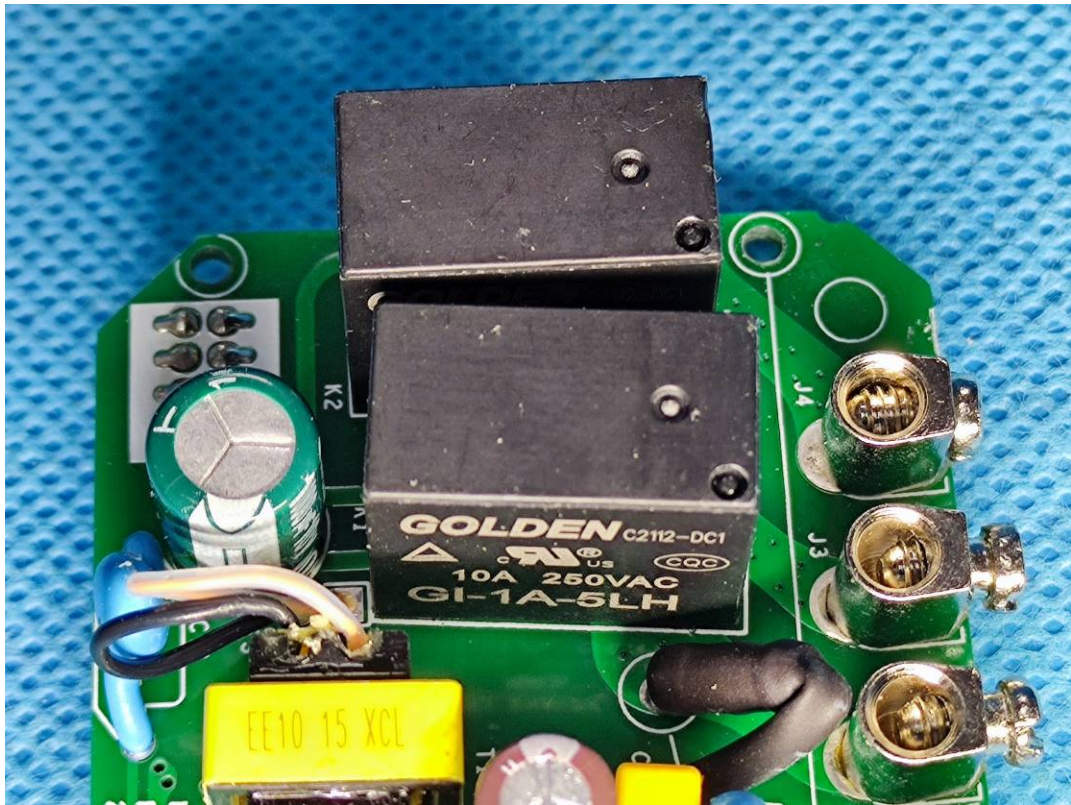
Chip1



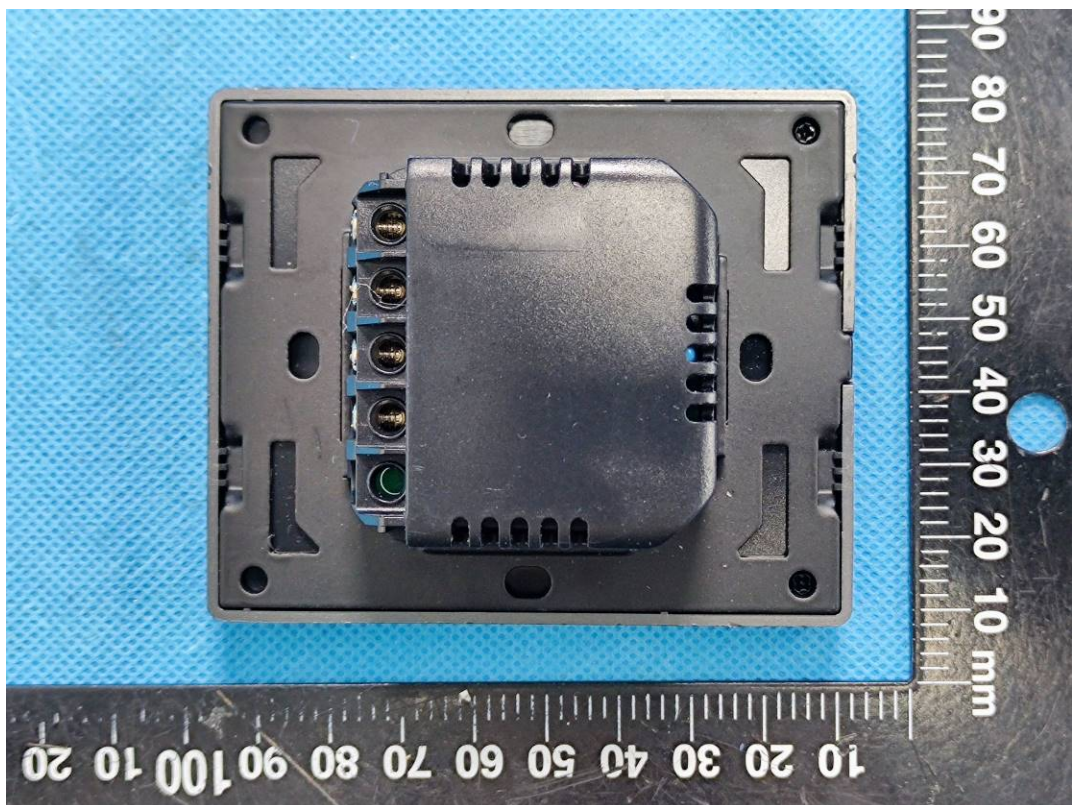
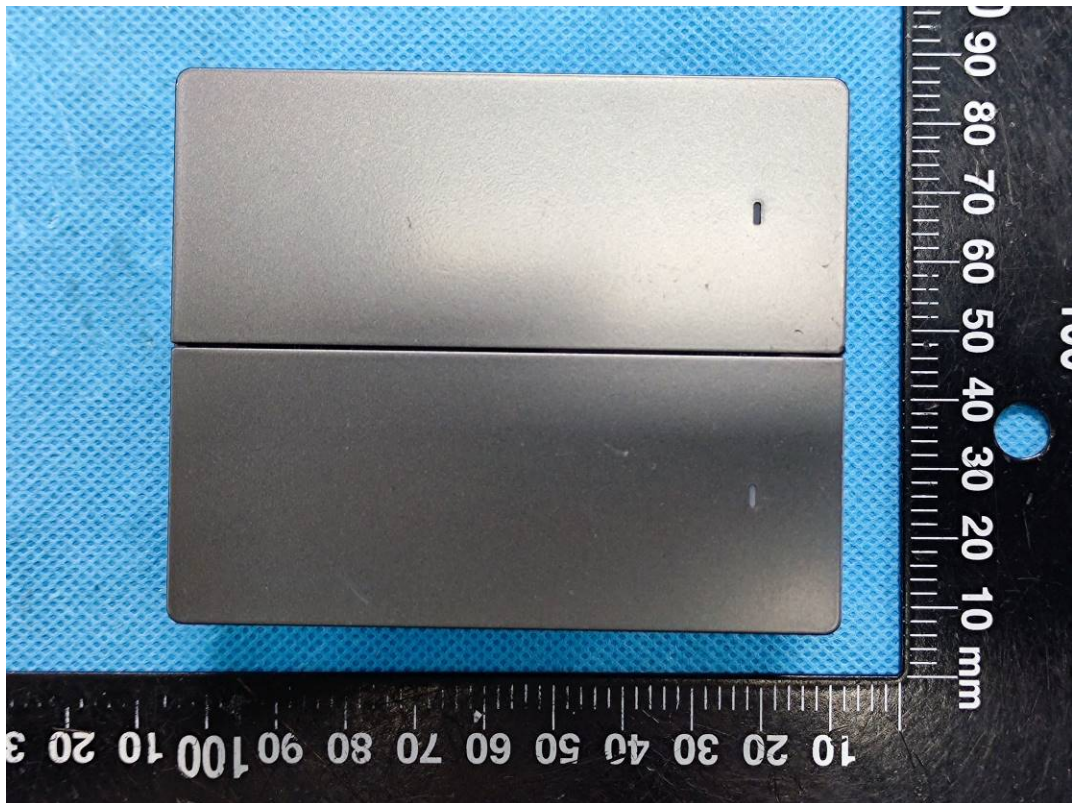
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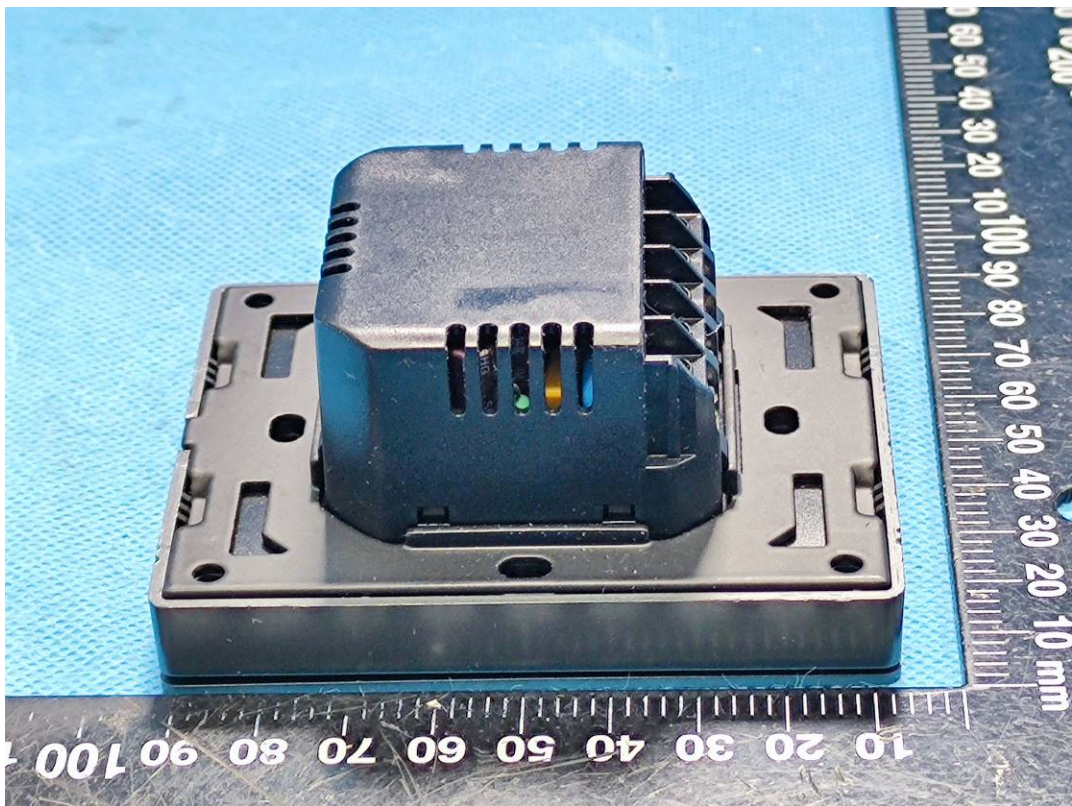
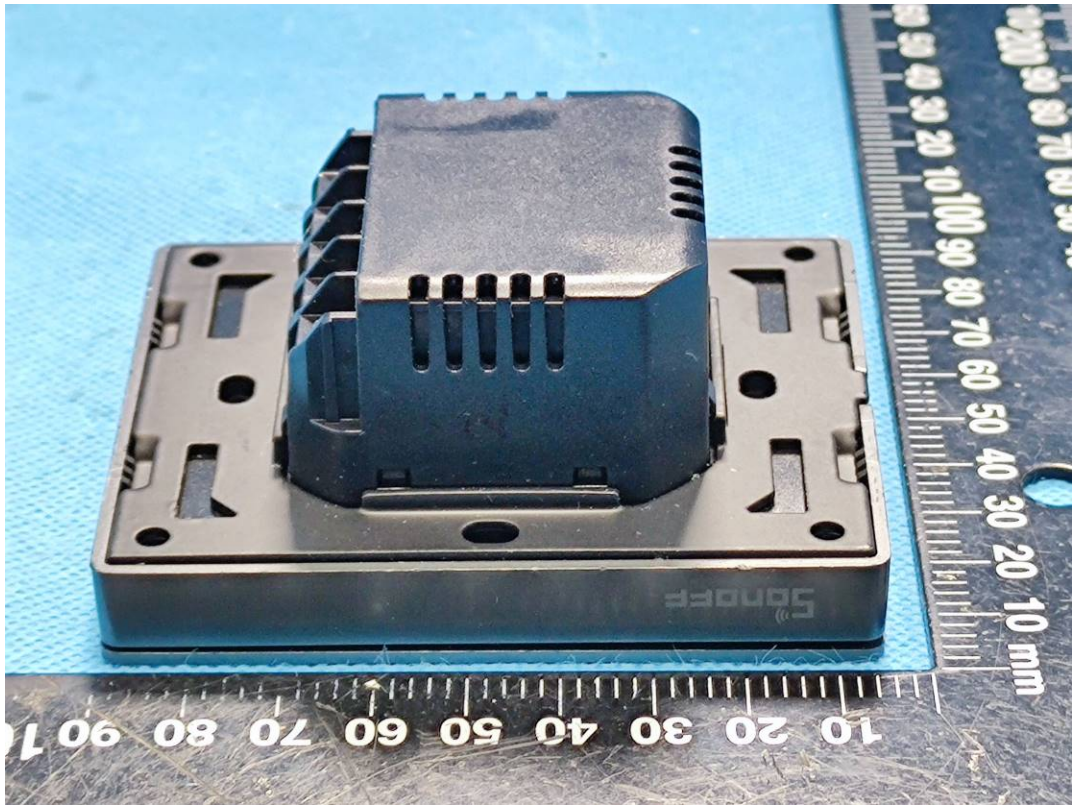


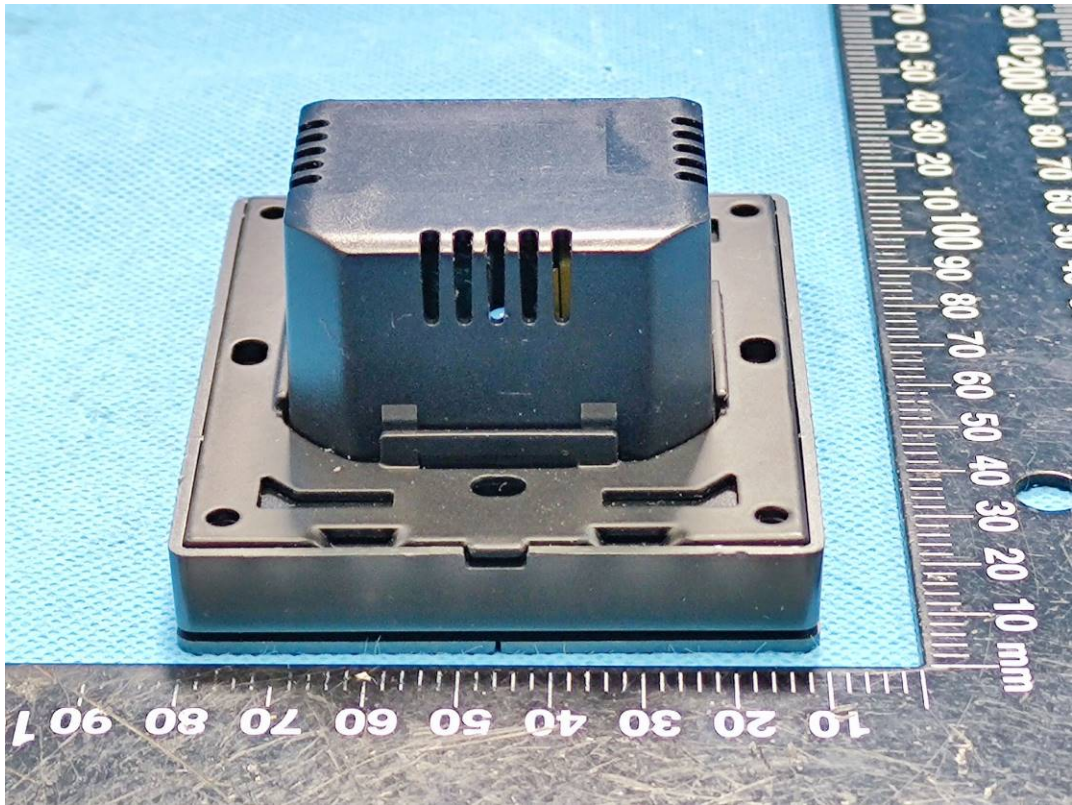




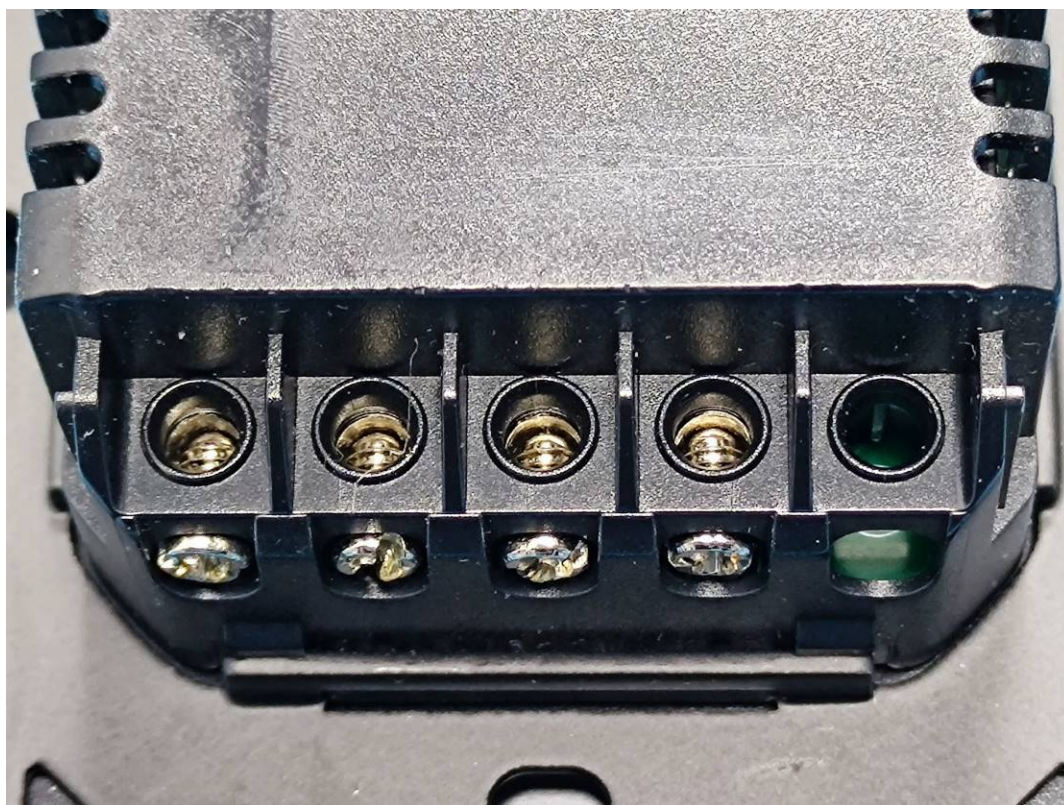
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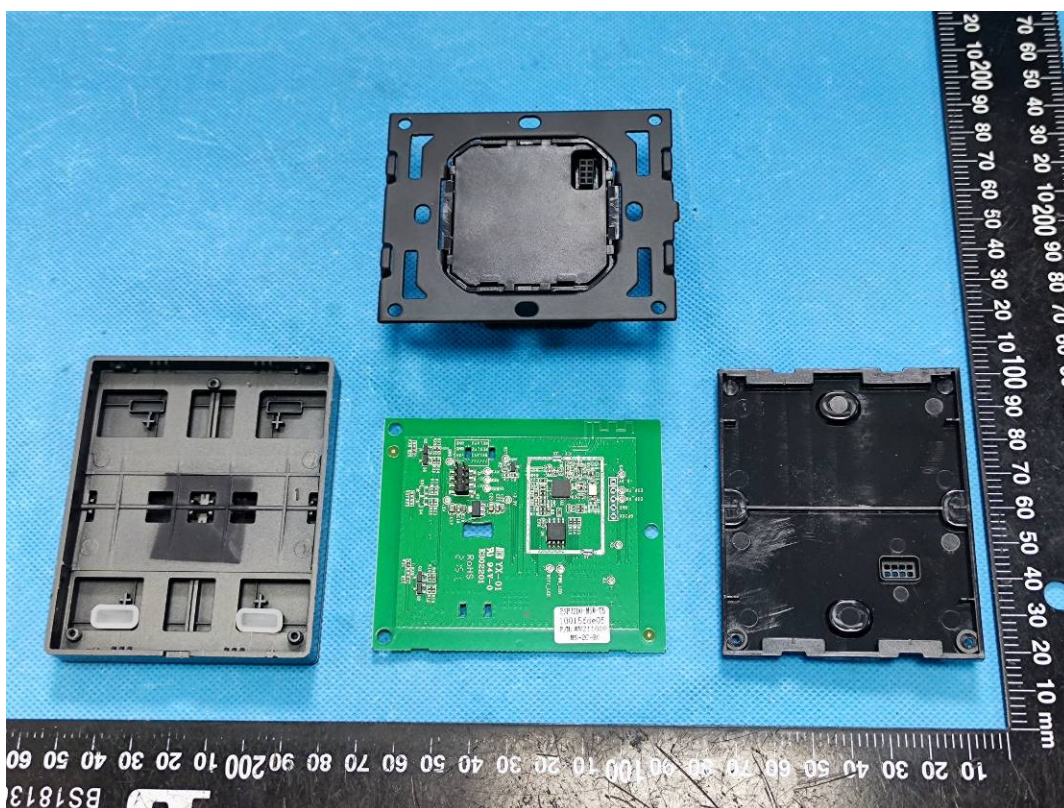


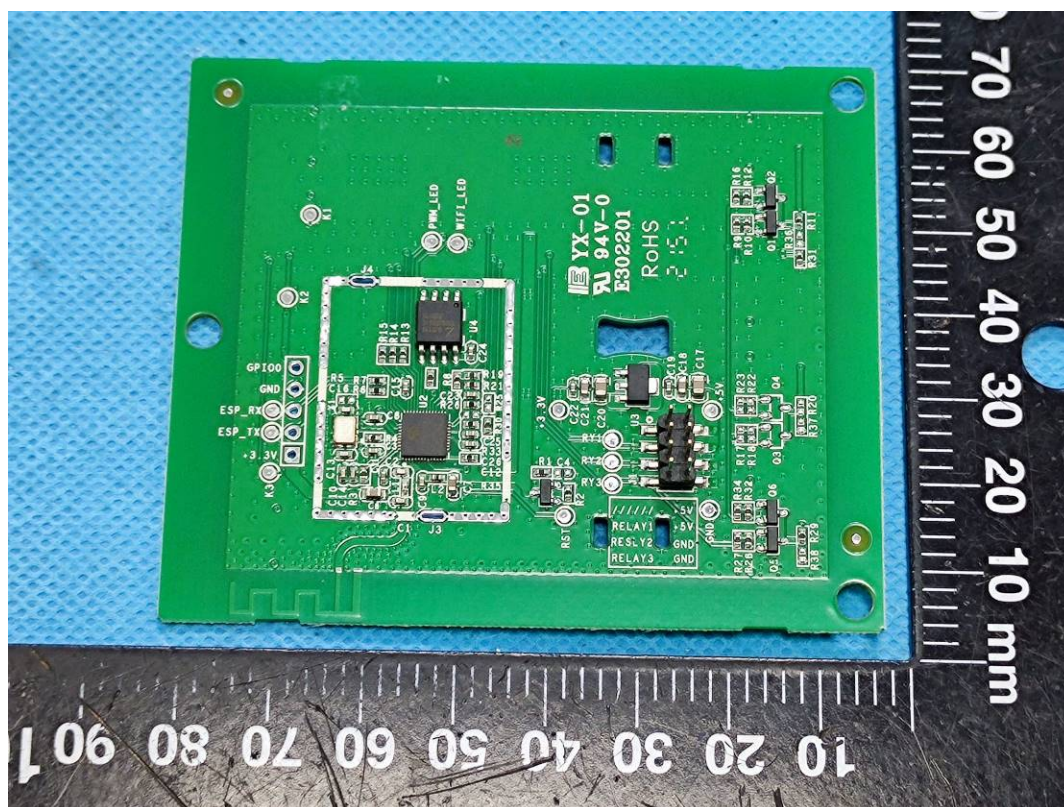


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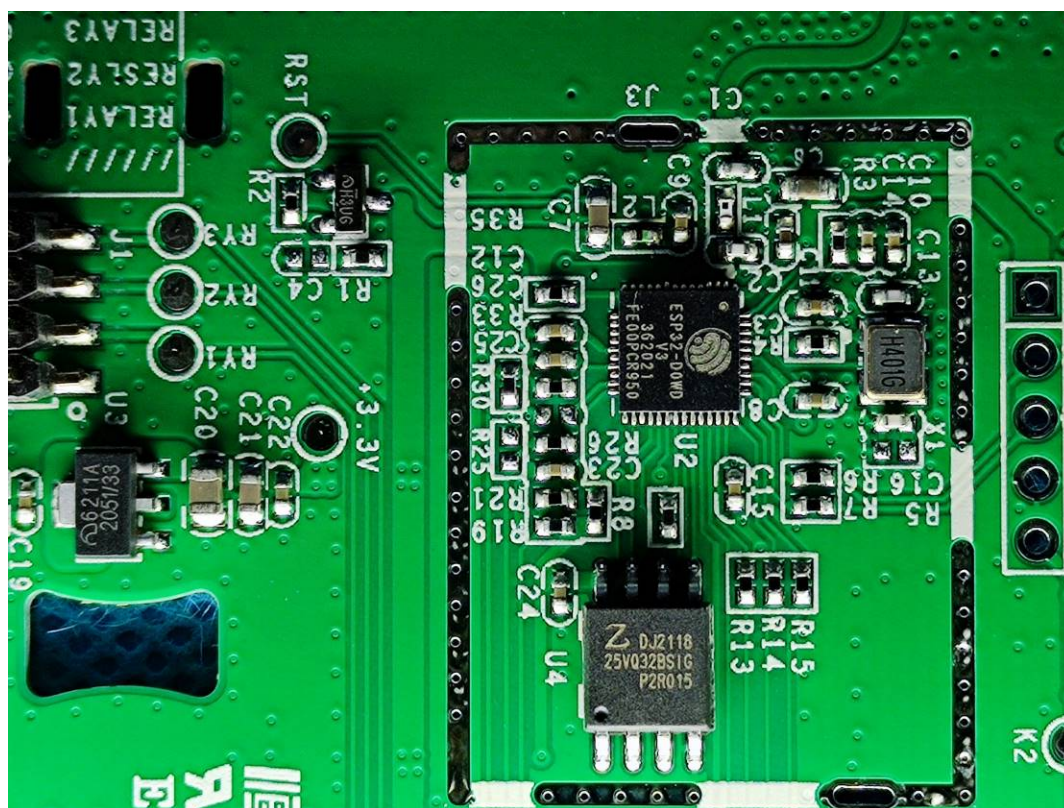


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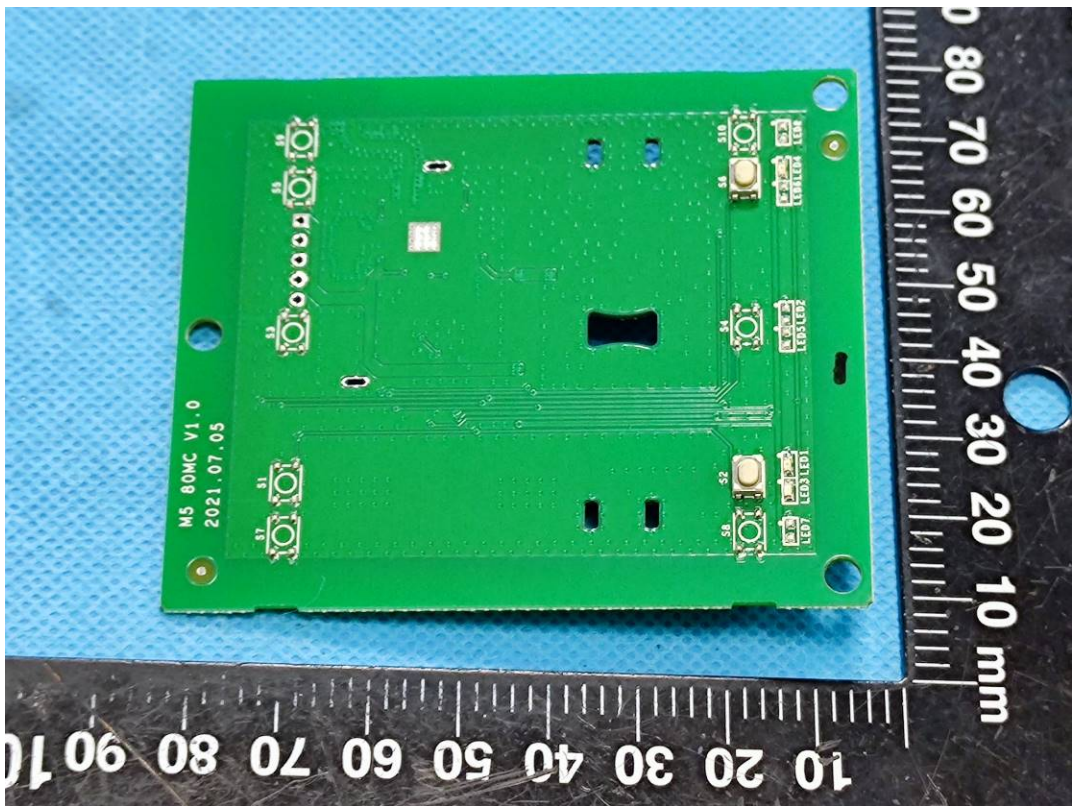
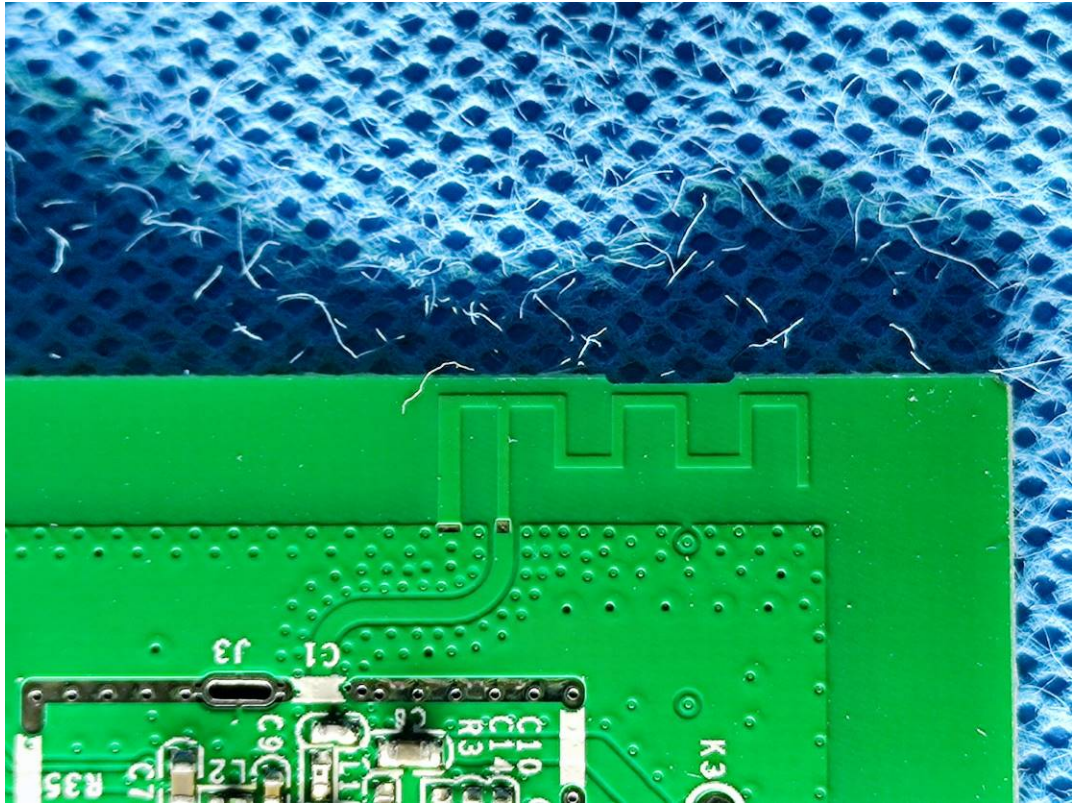


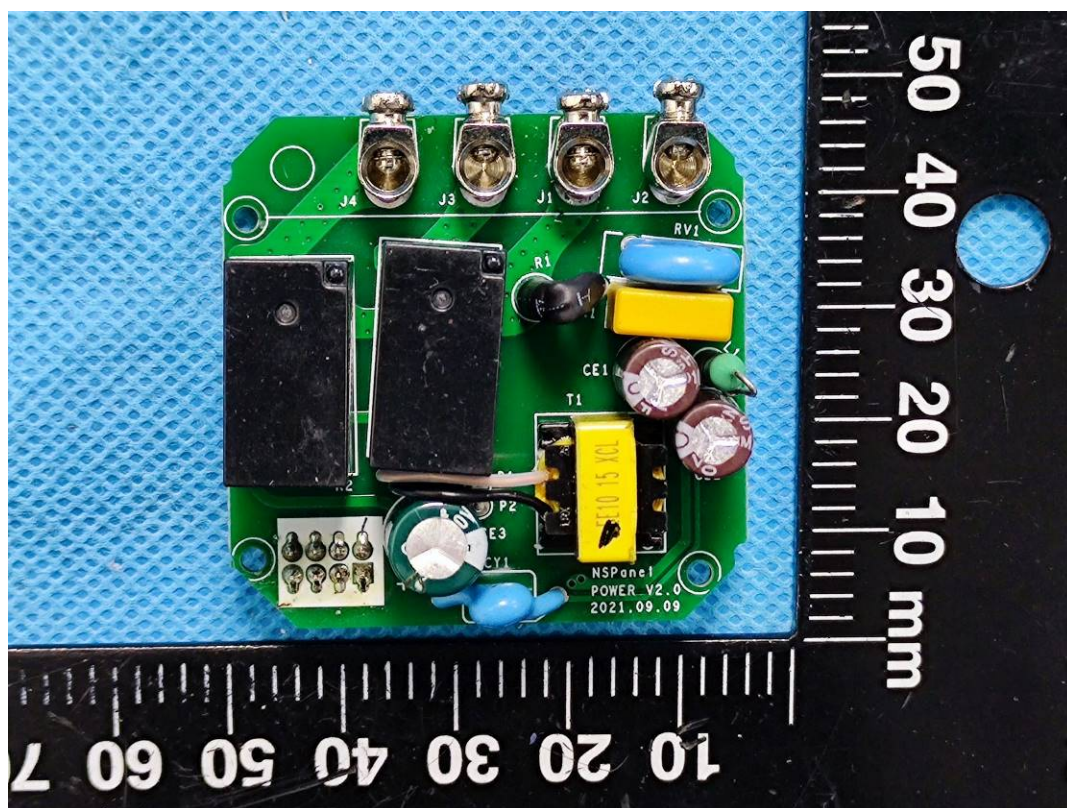
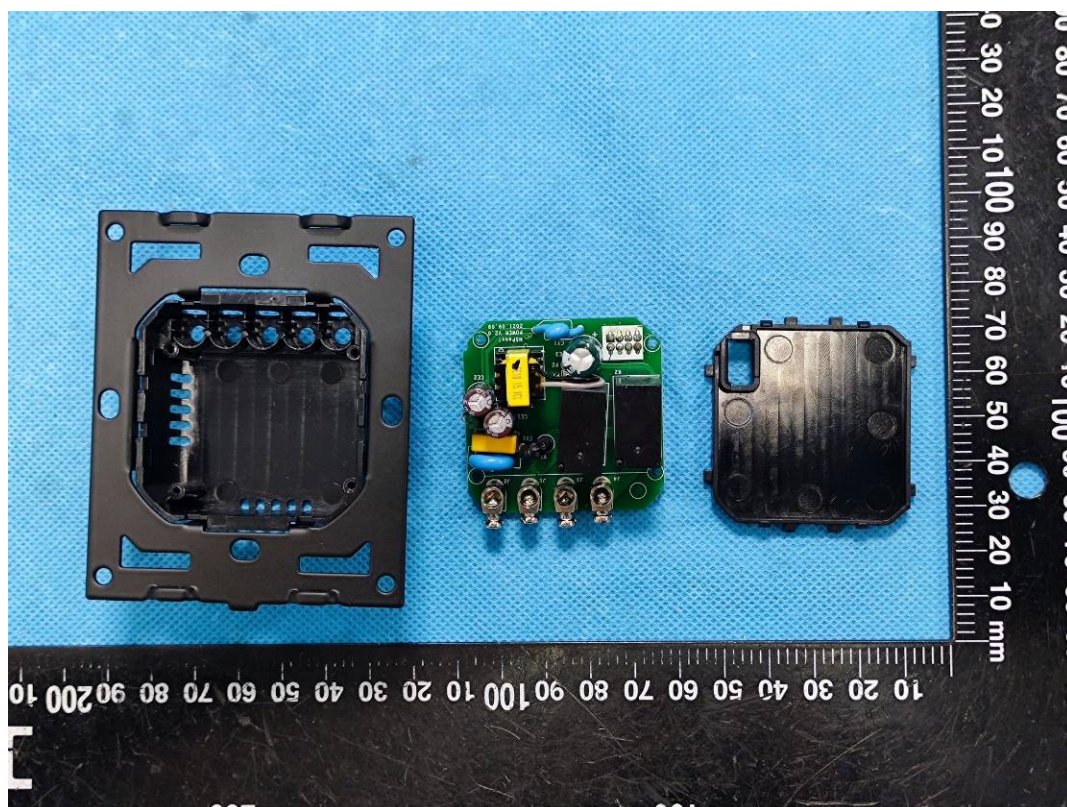


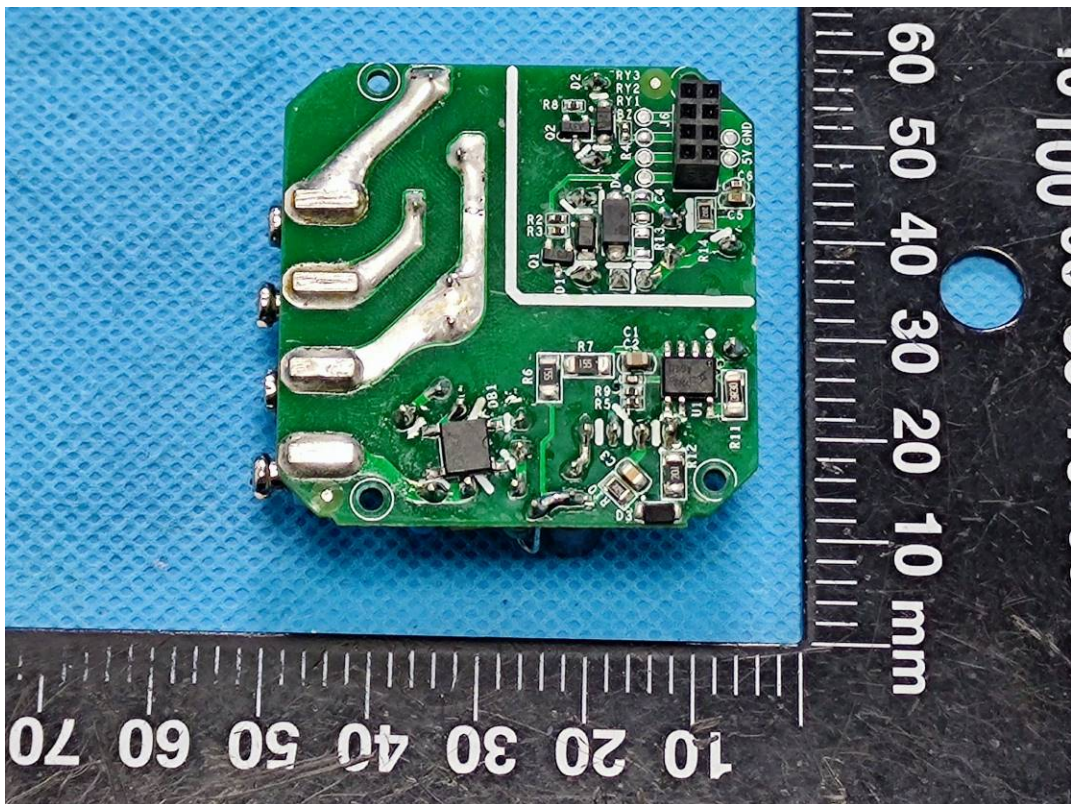
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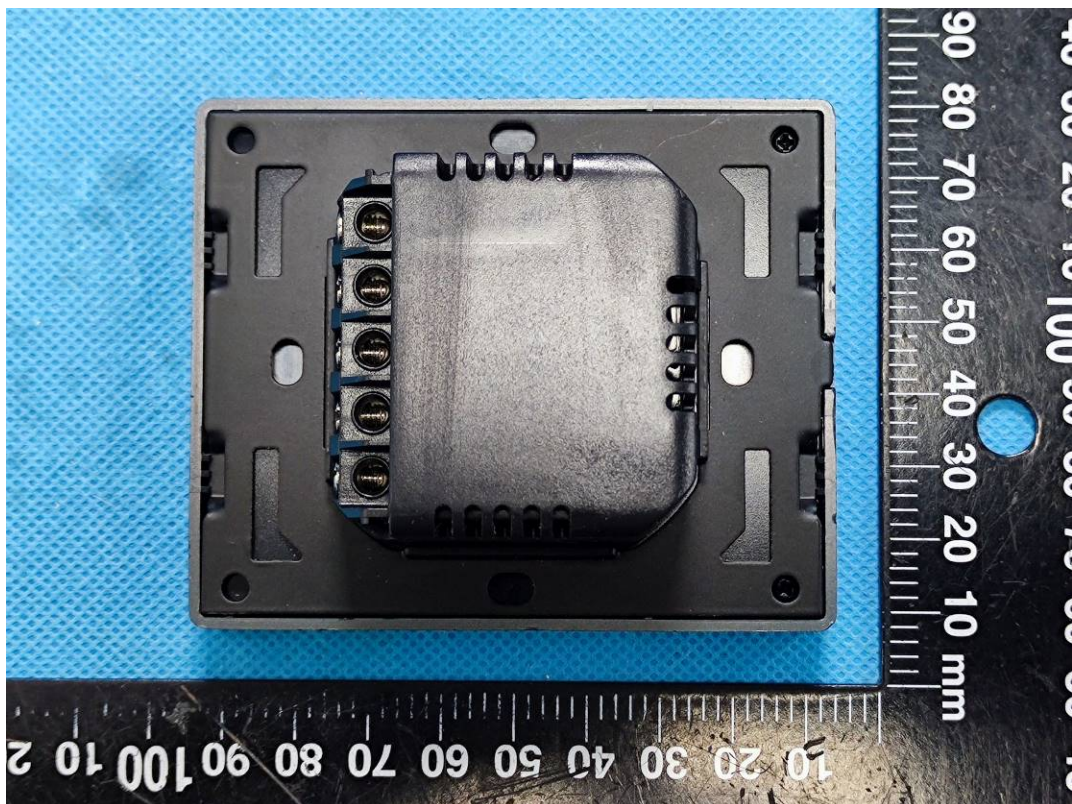
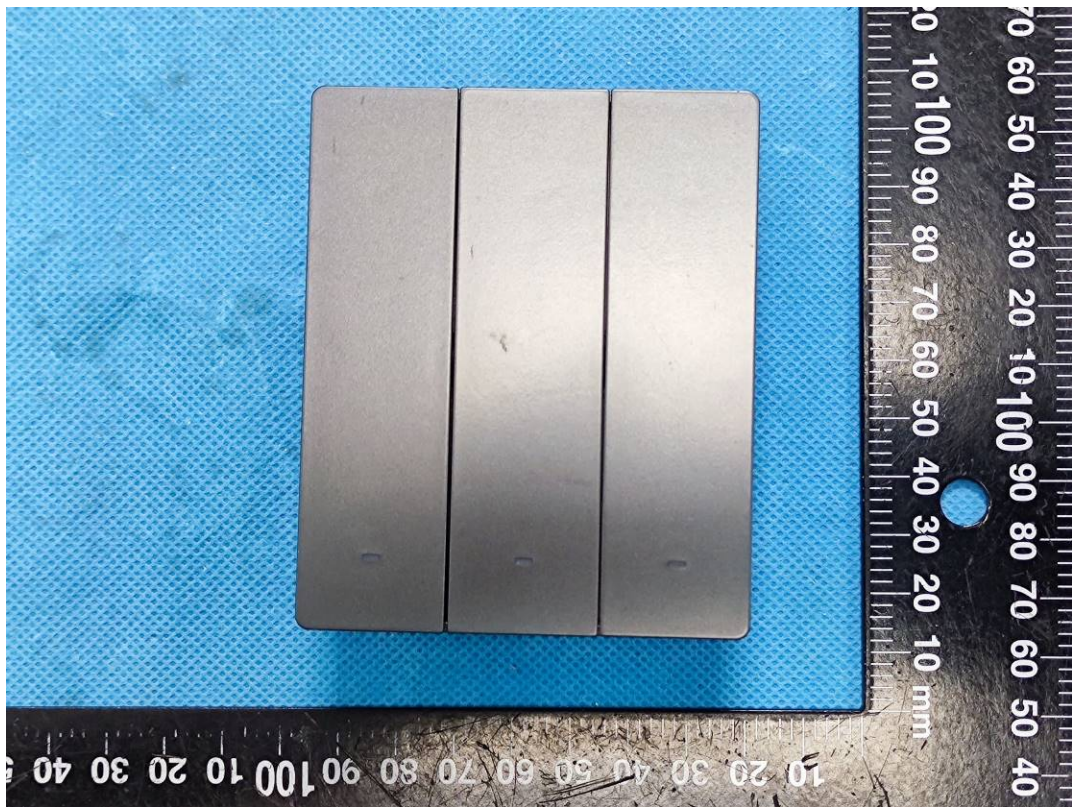
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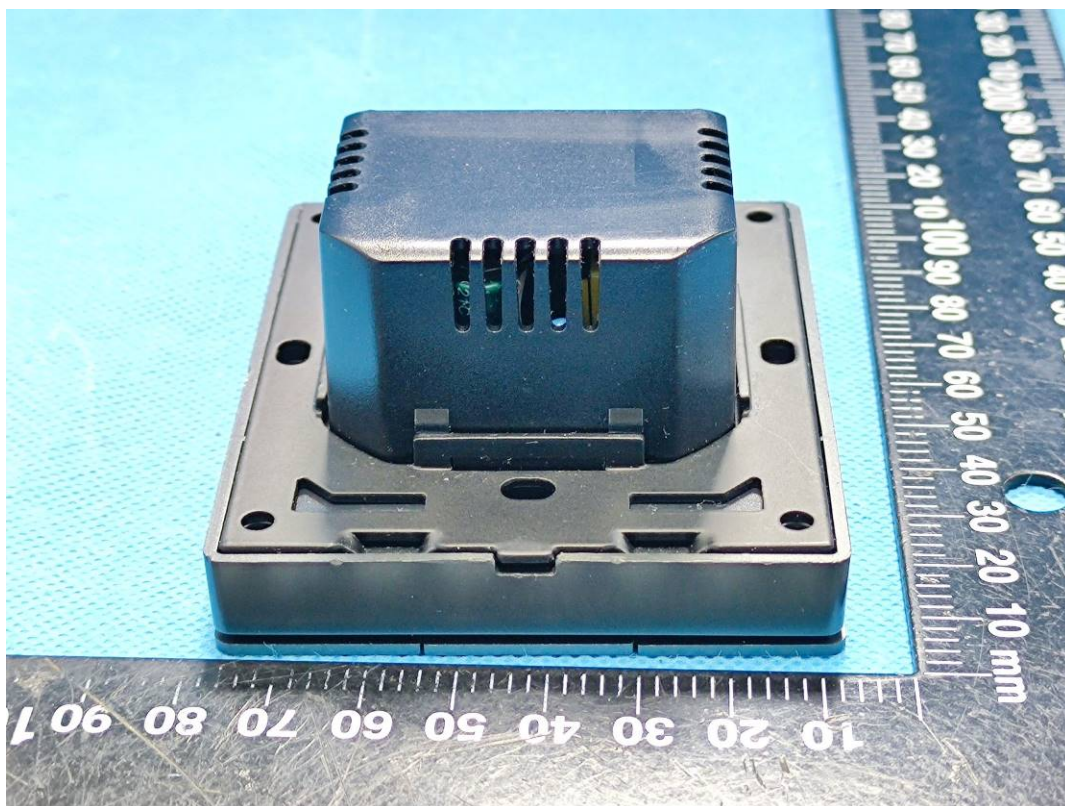
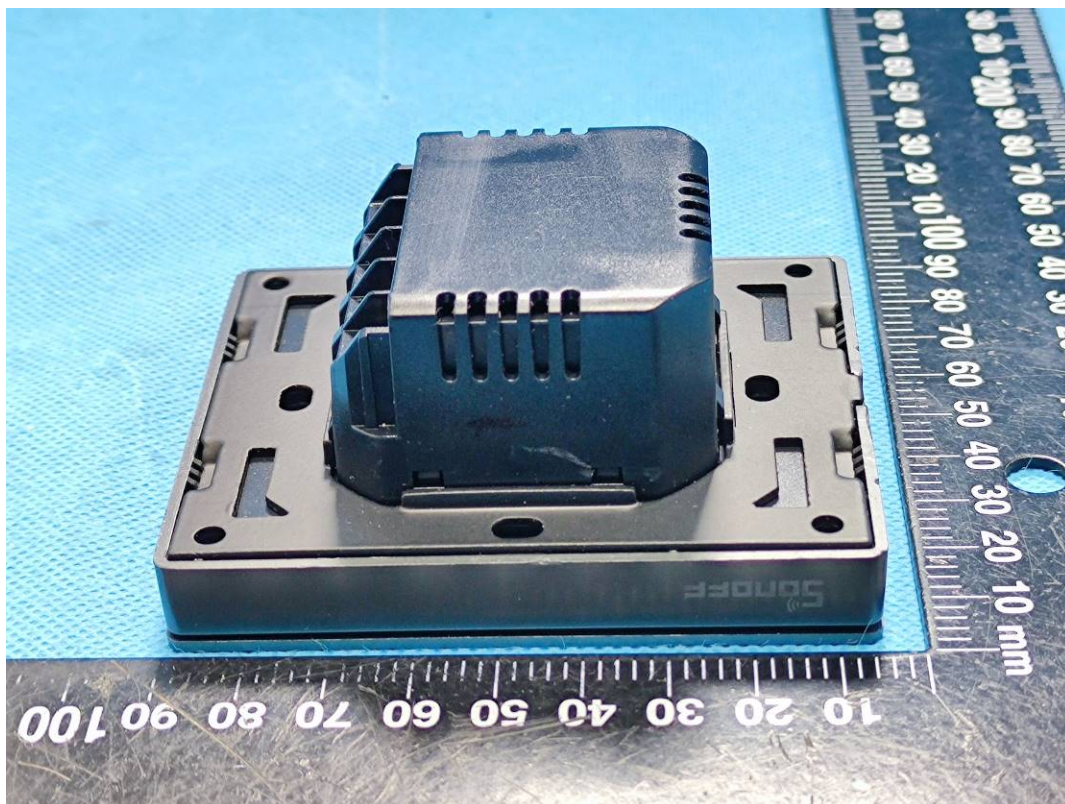


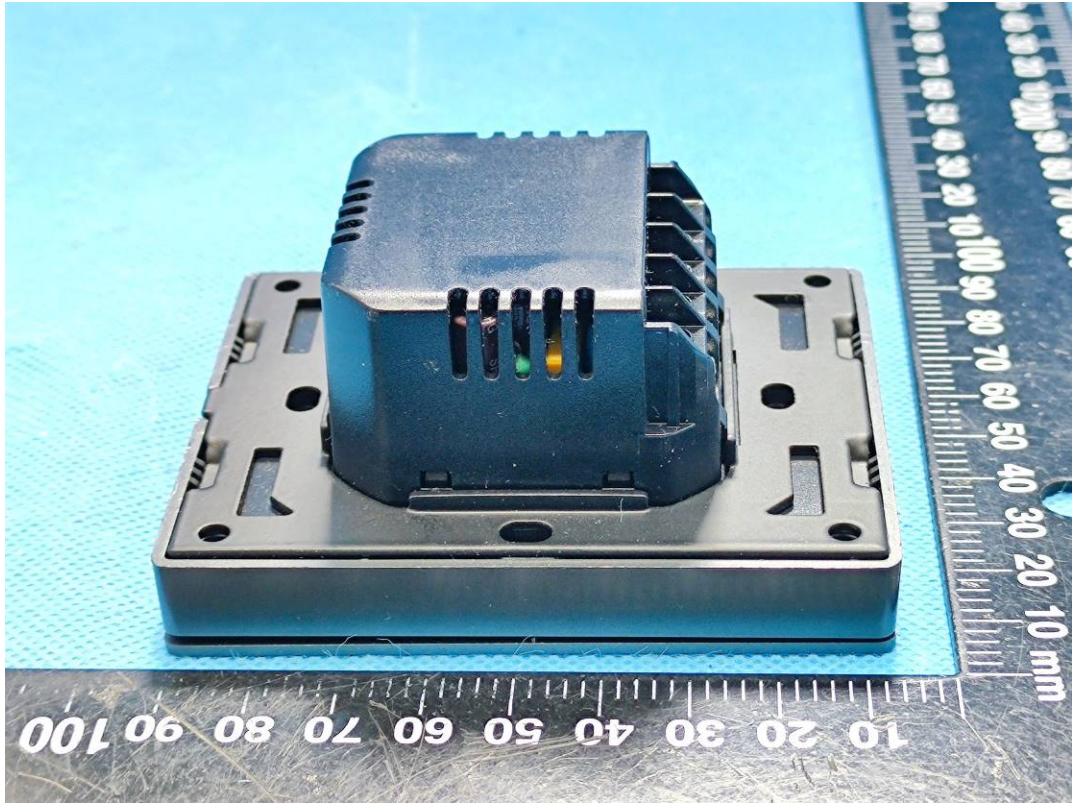




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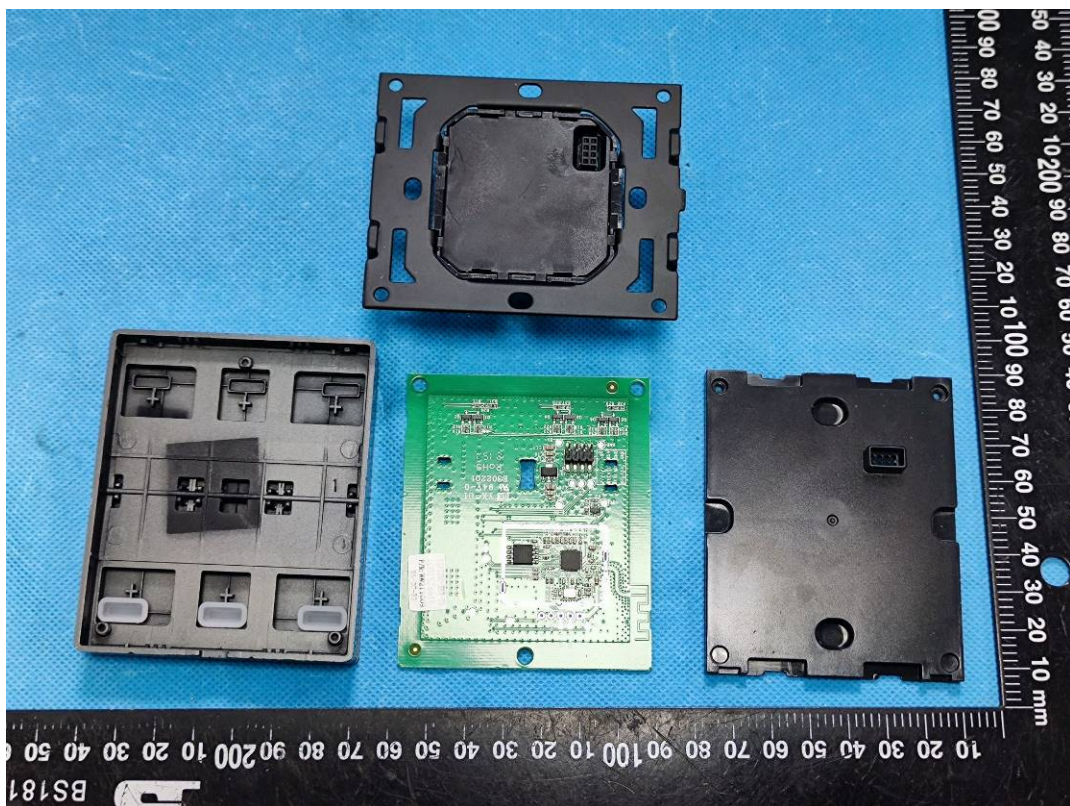


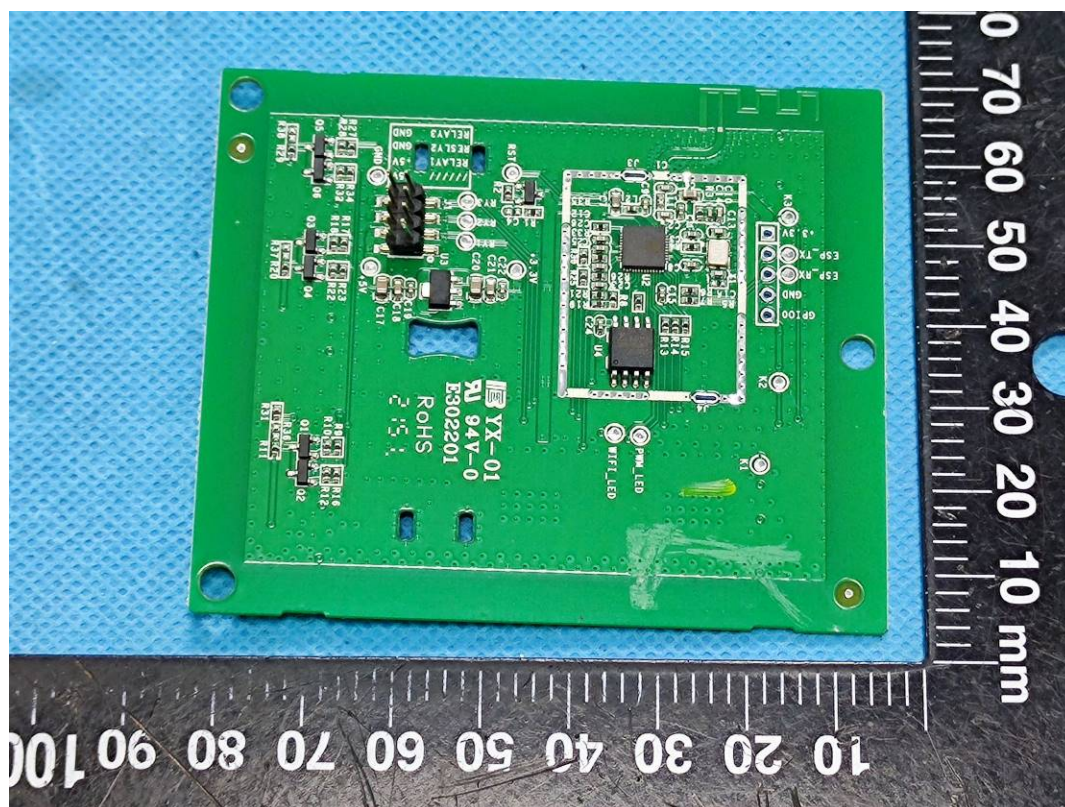


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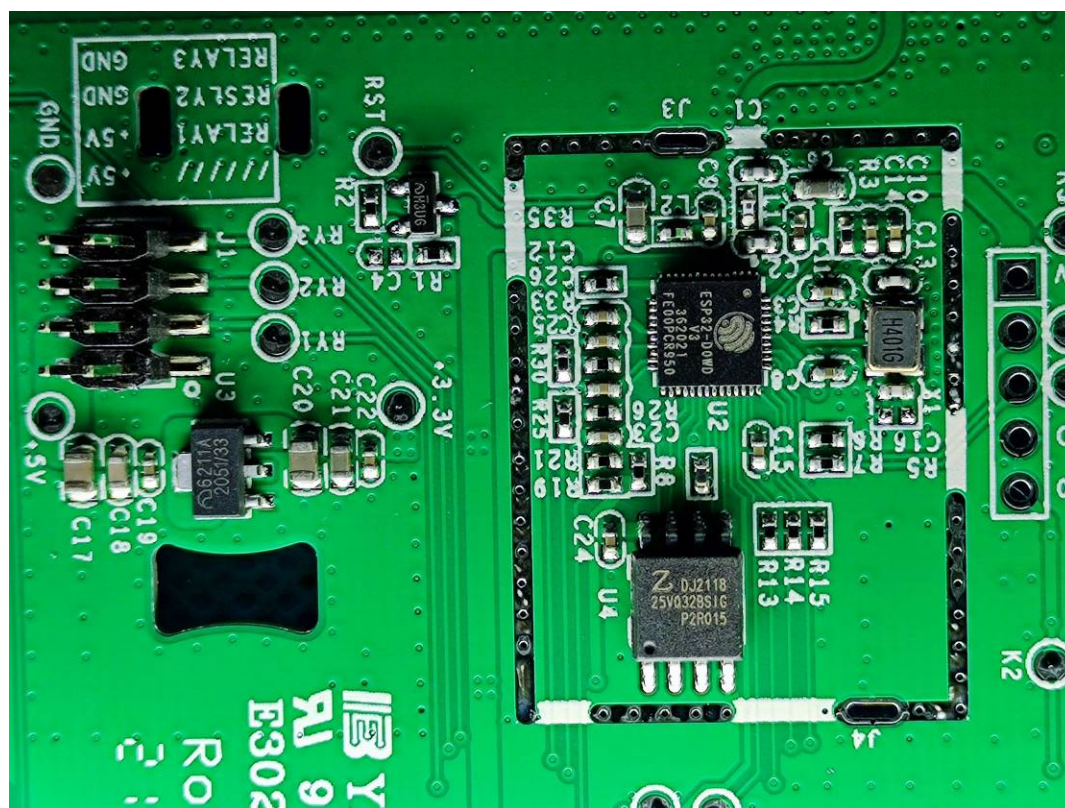


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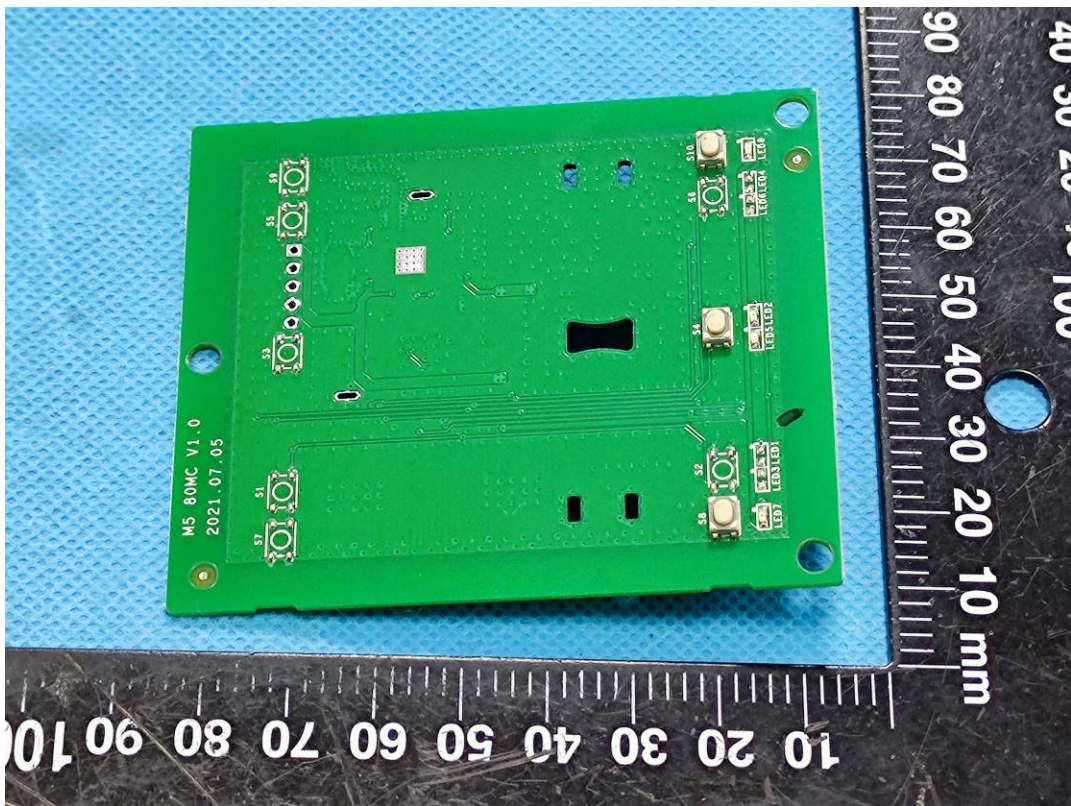
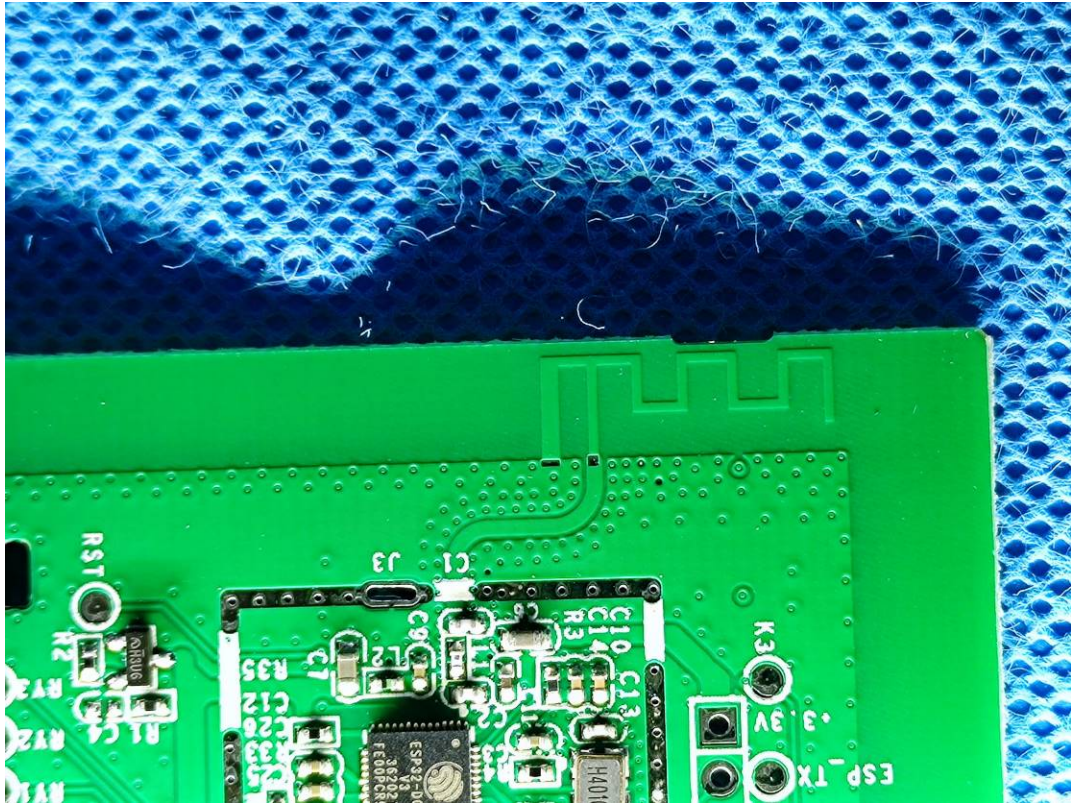


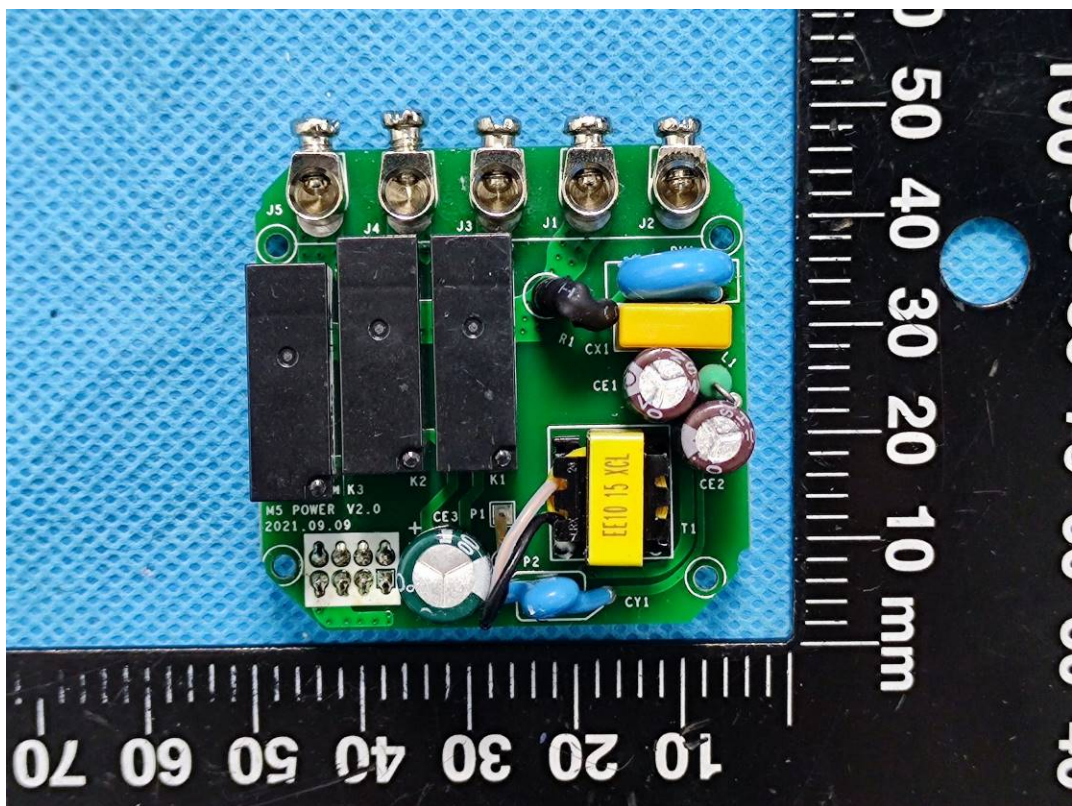
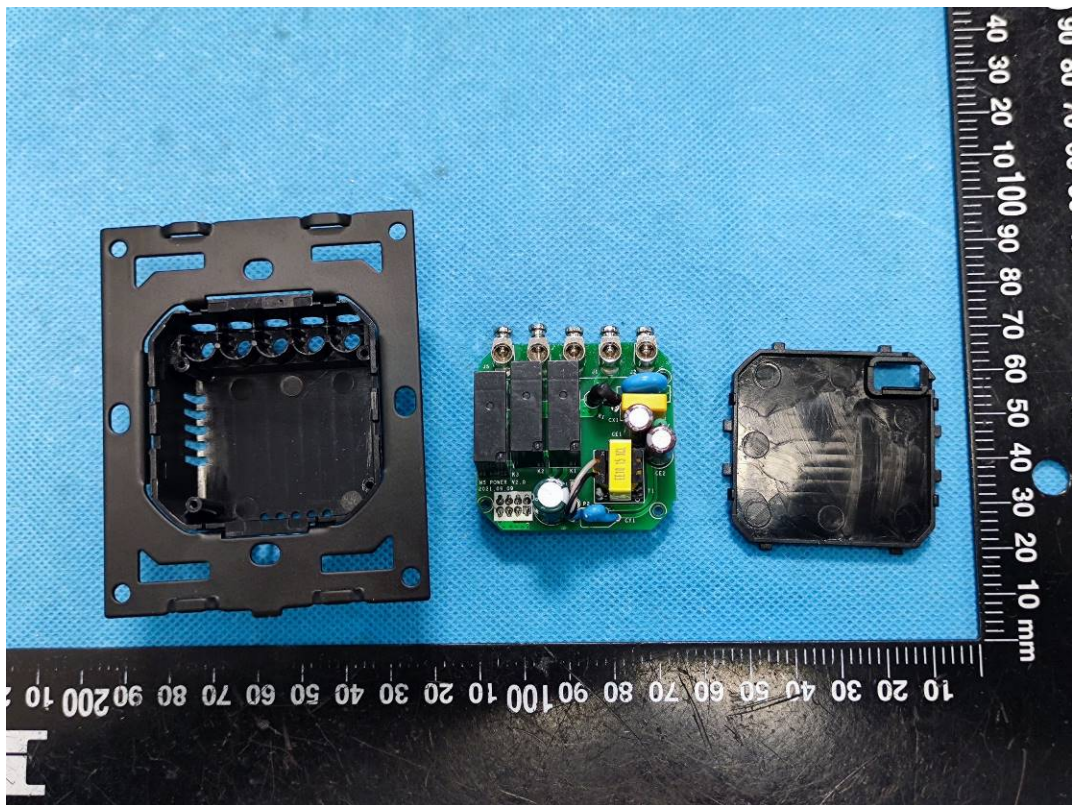


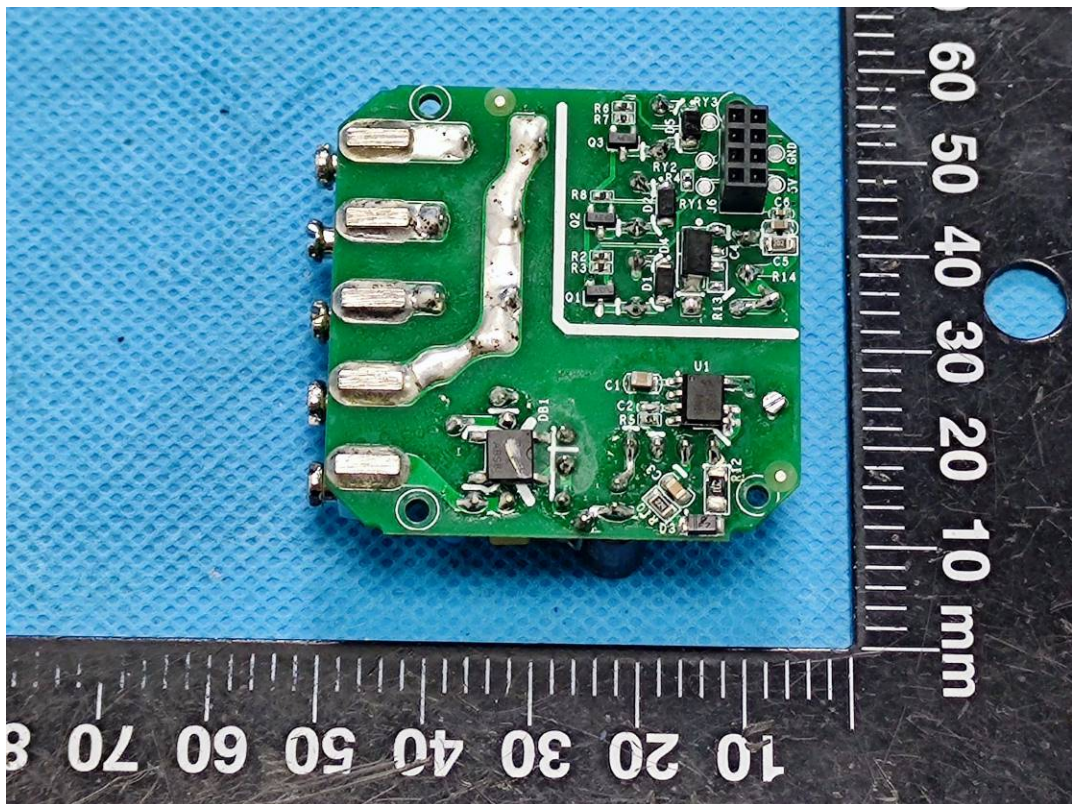
Chip1



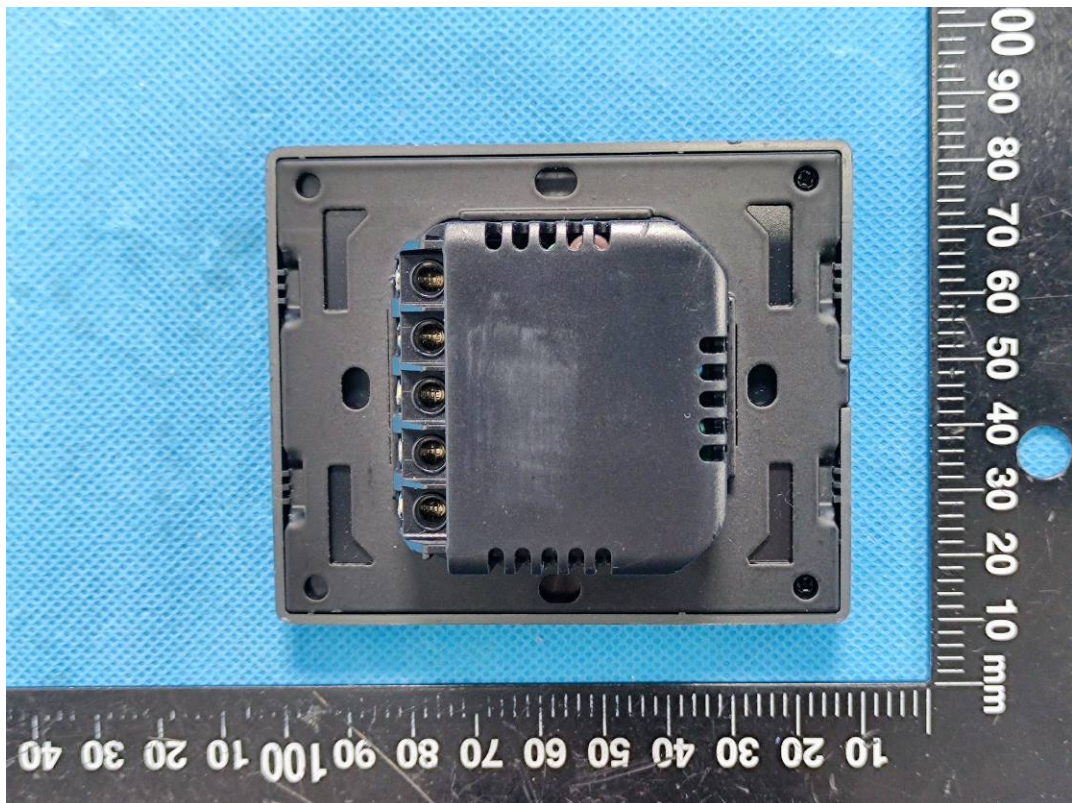
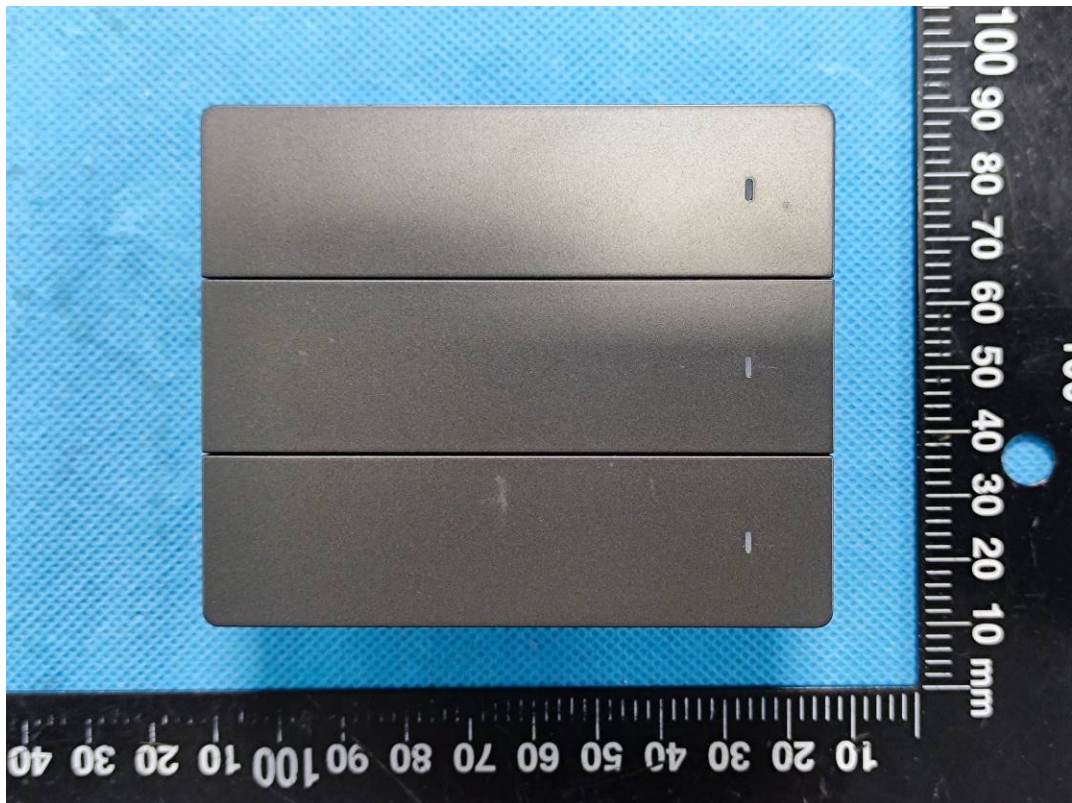
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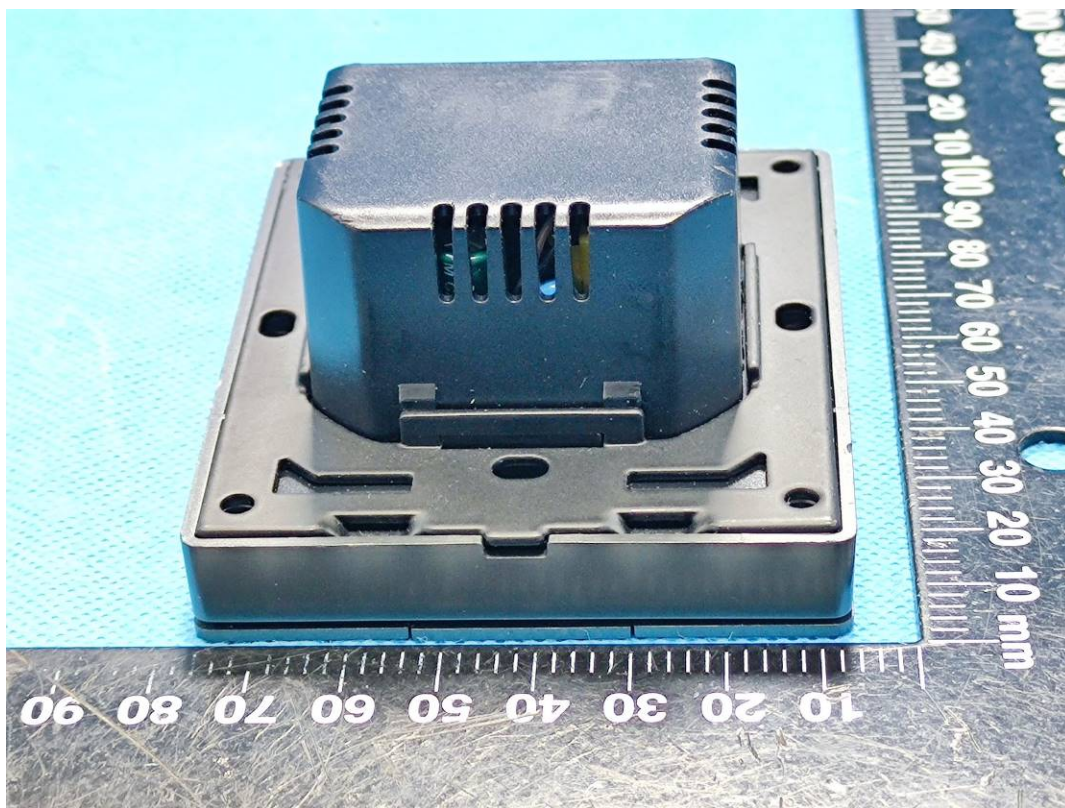
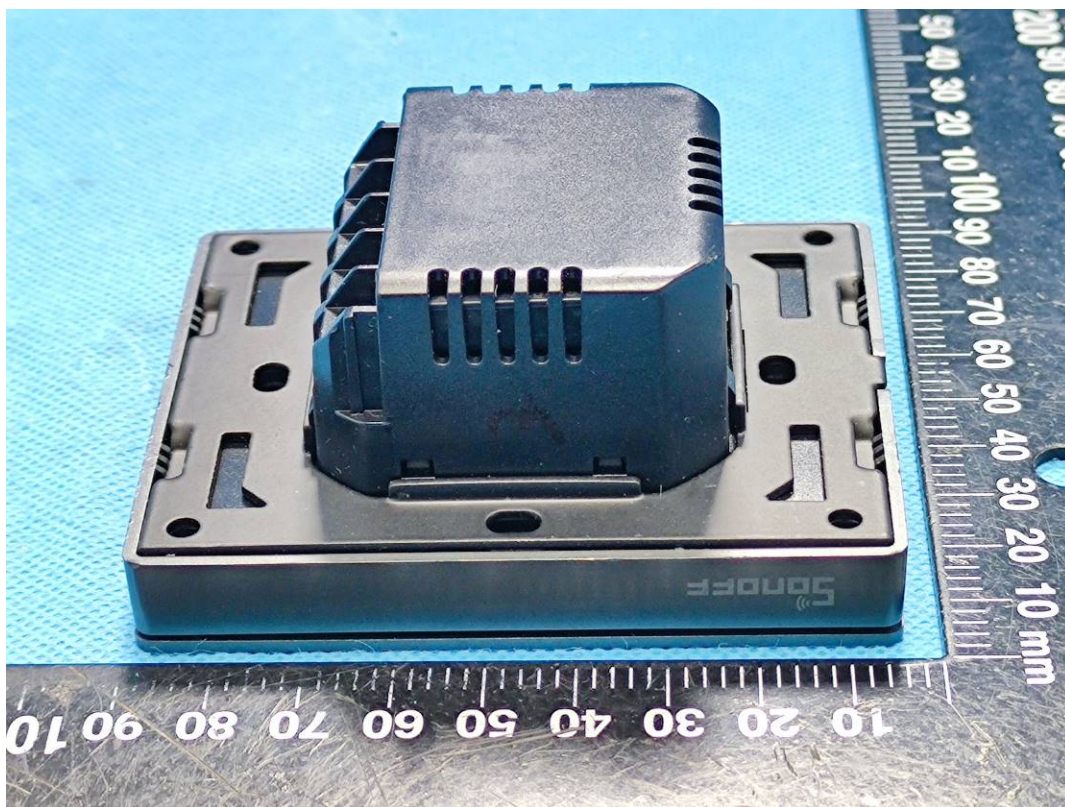


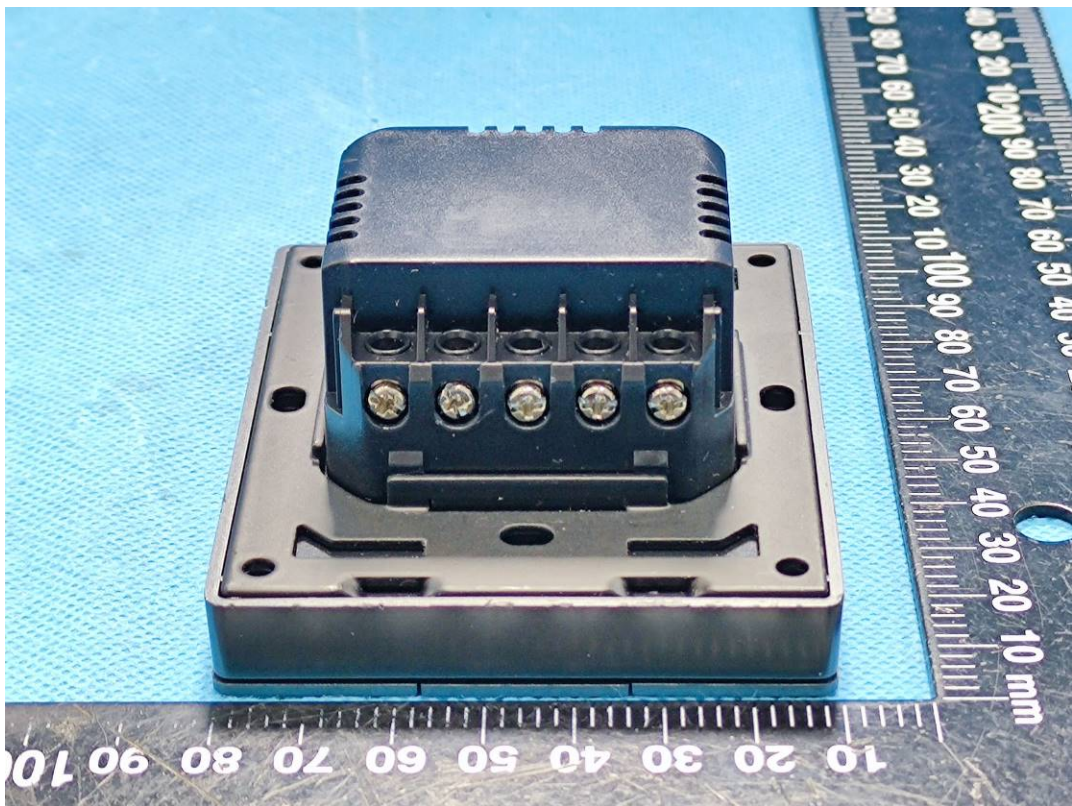
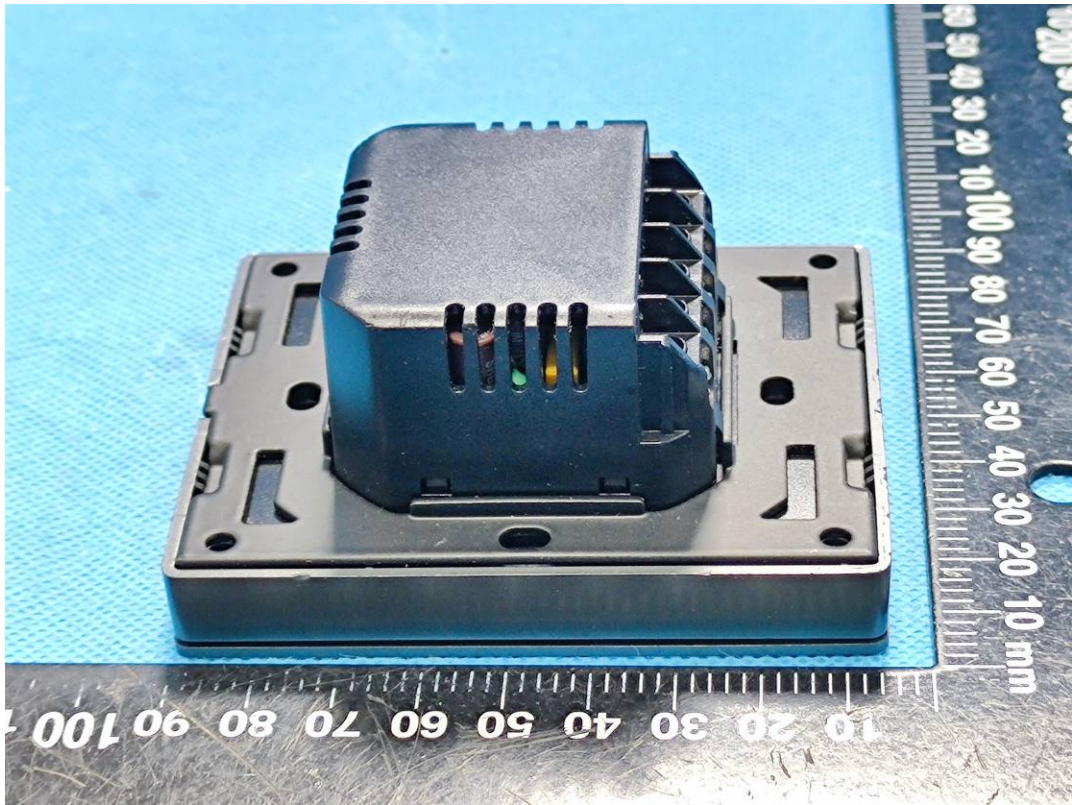




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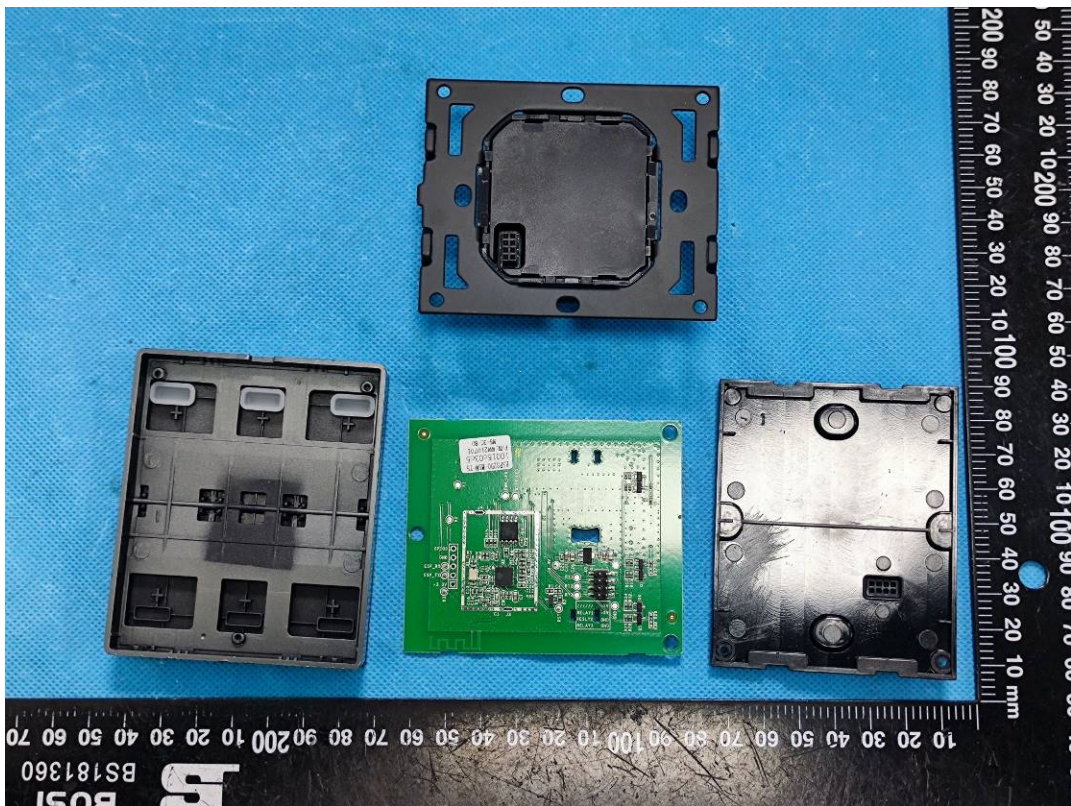


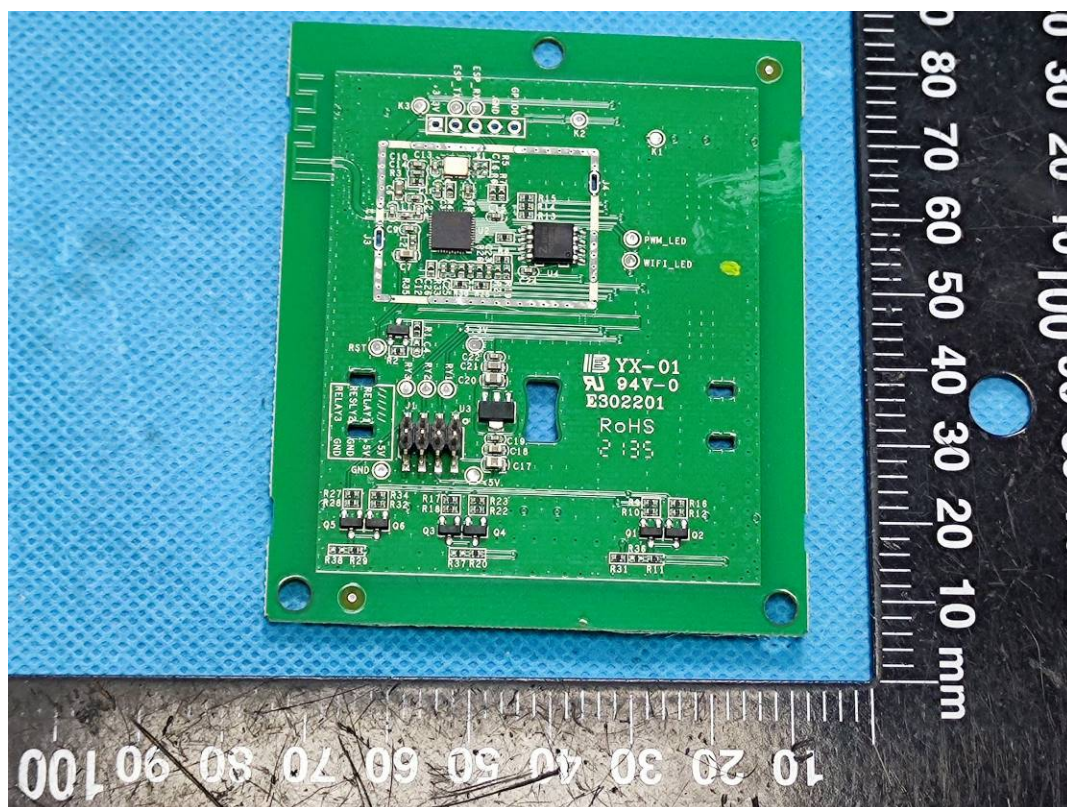


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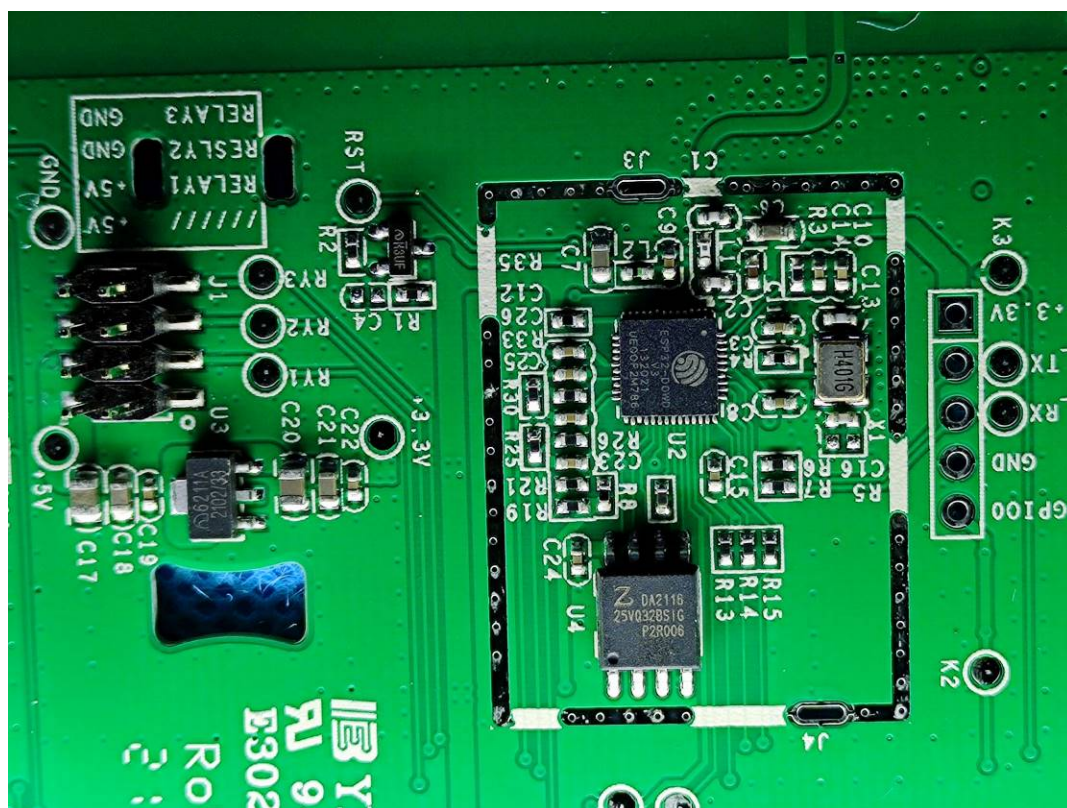


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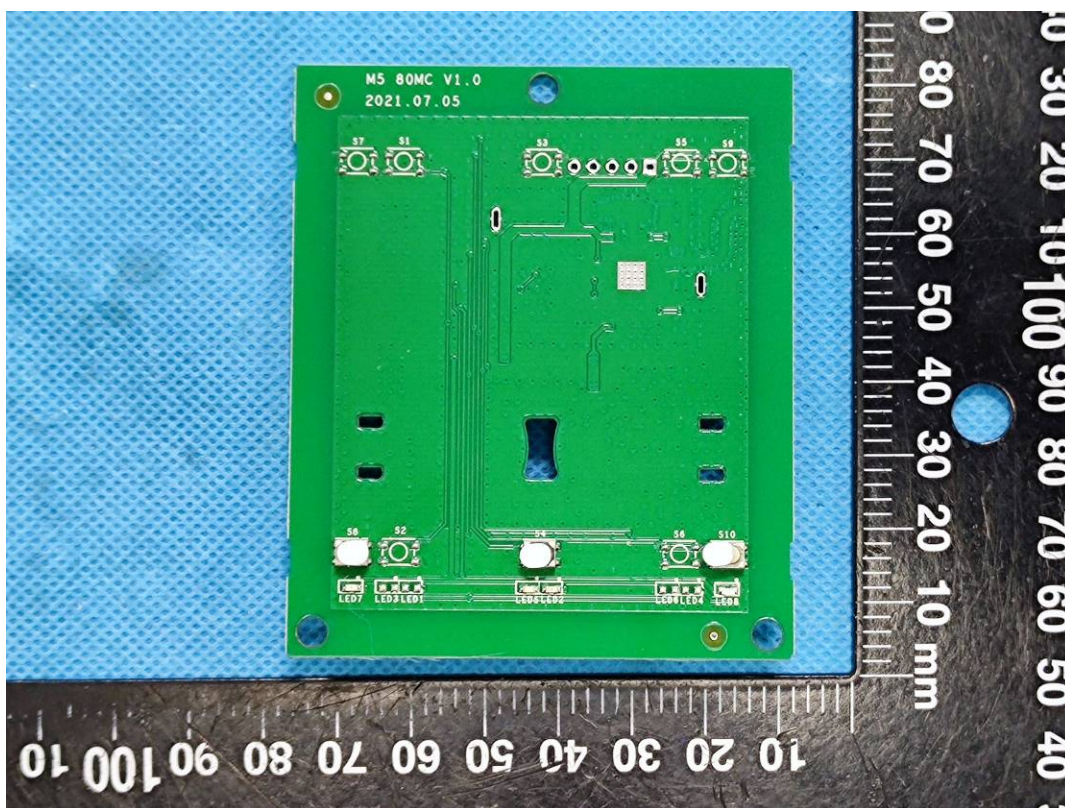
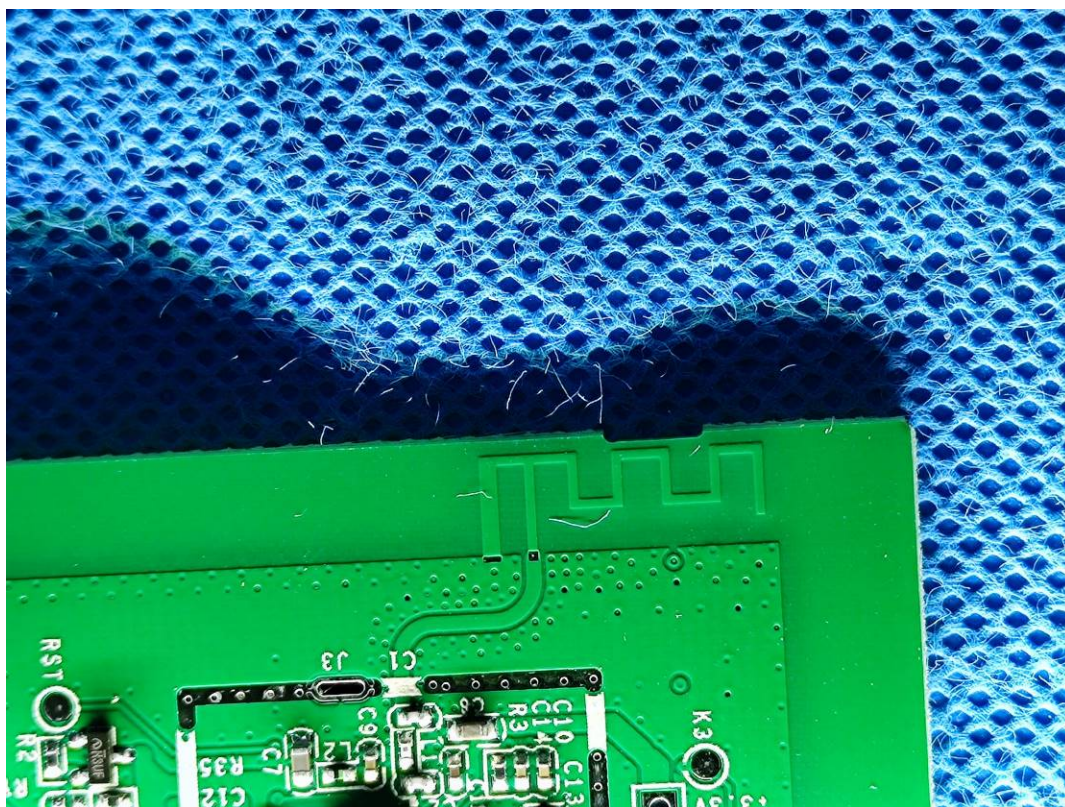


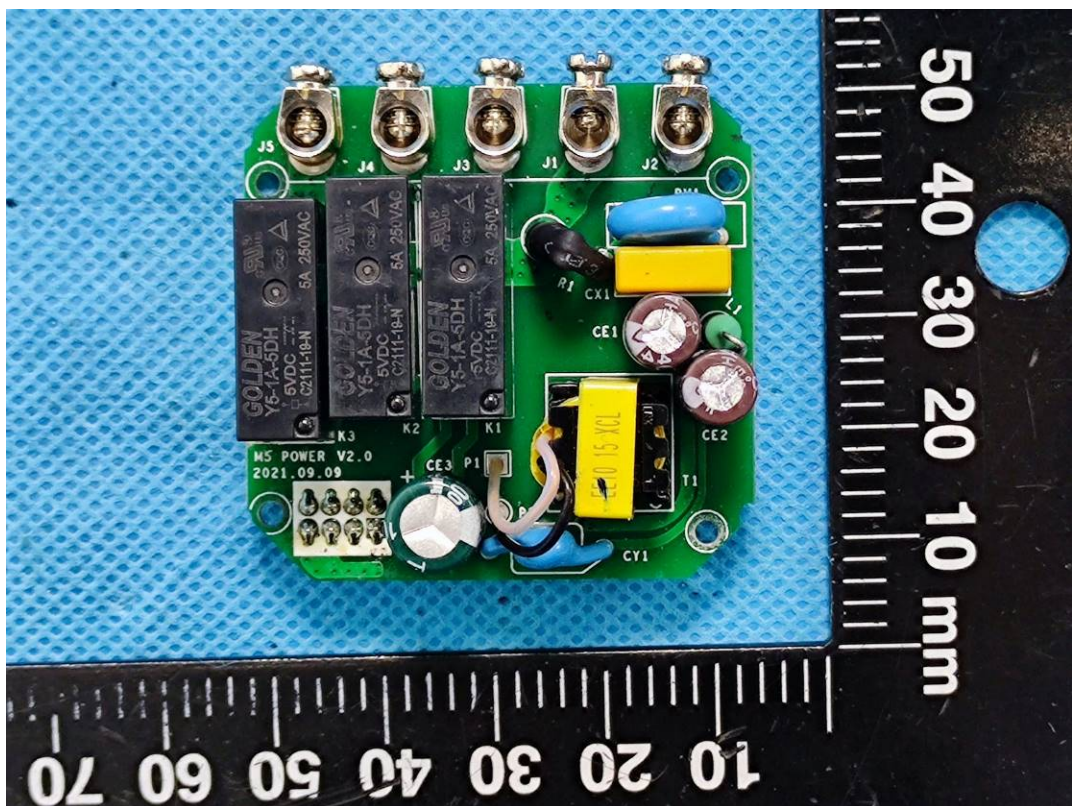
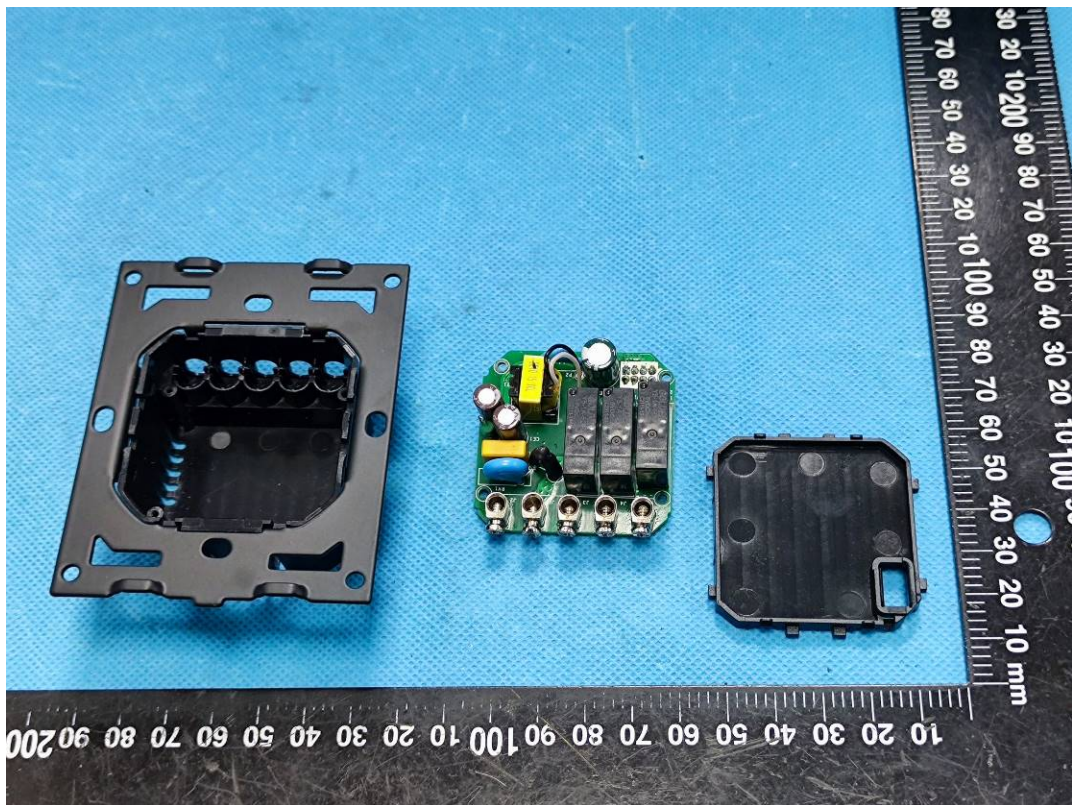


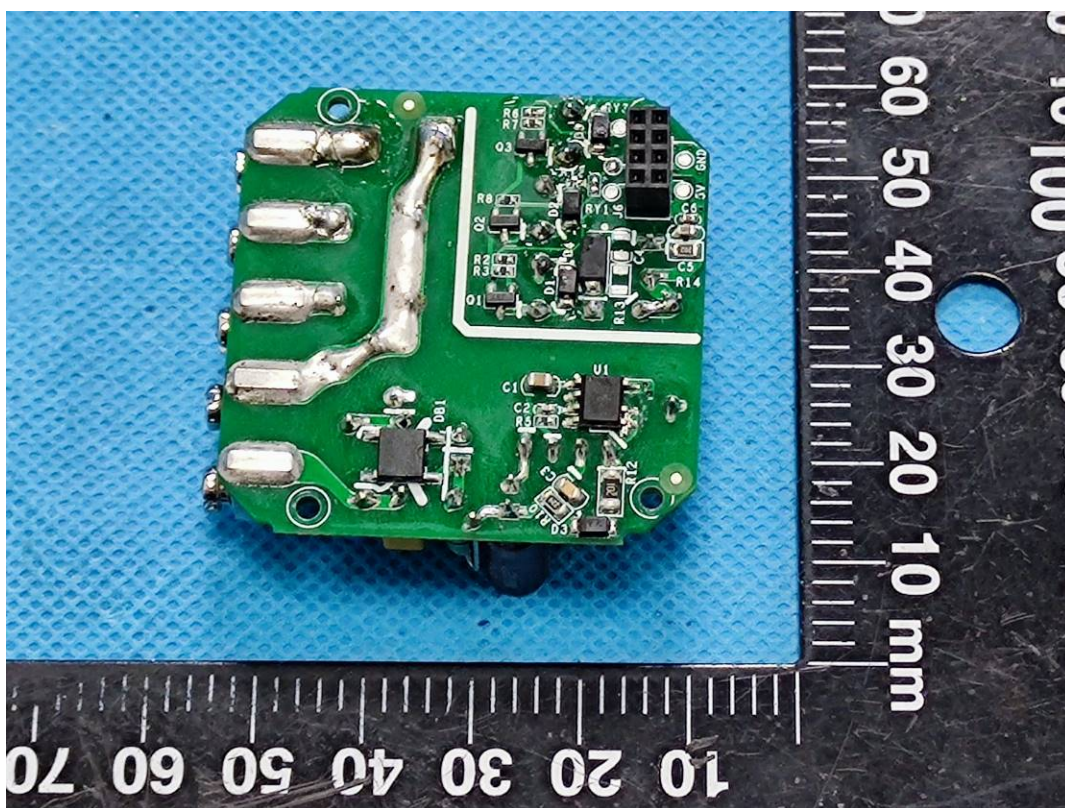
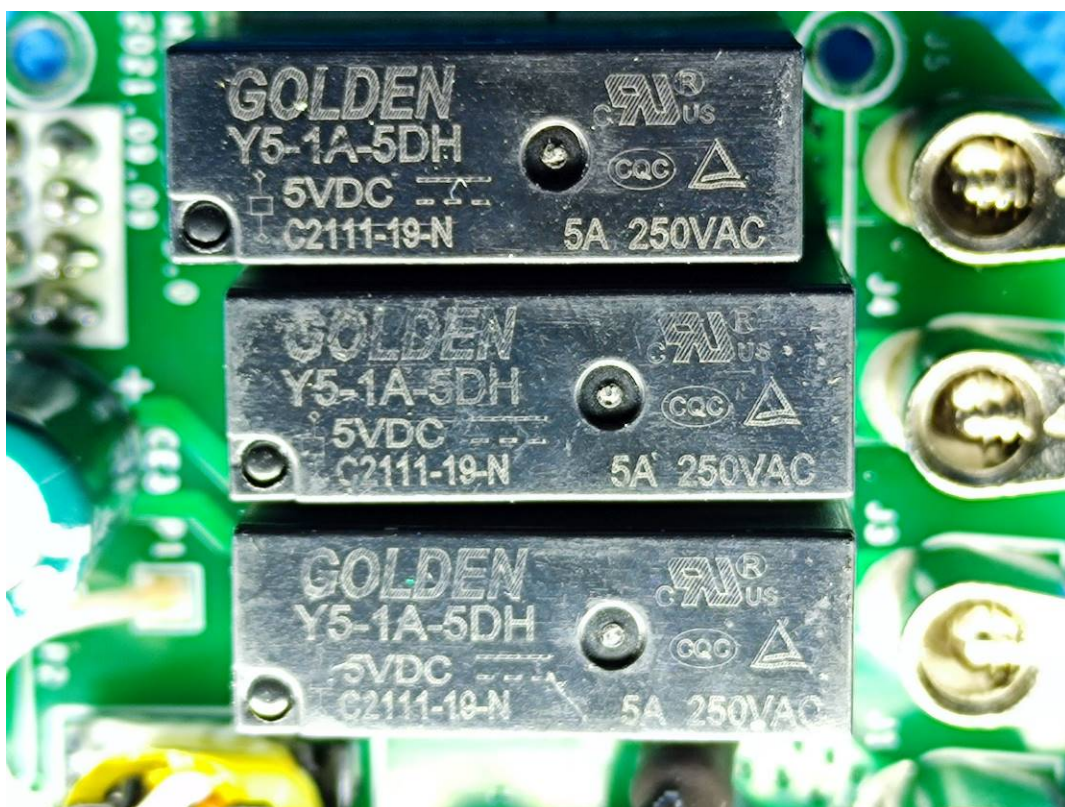
Chip2



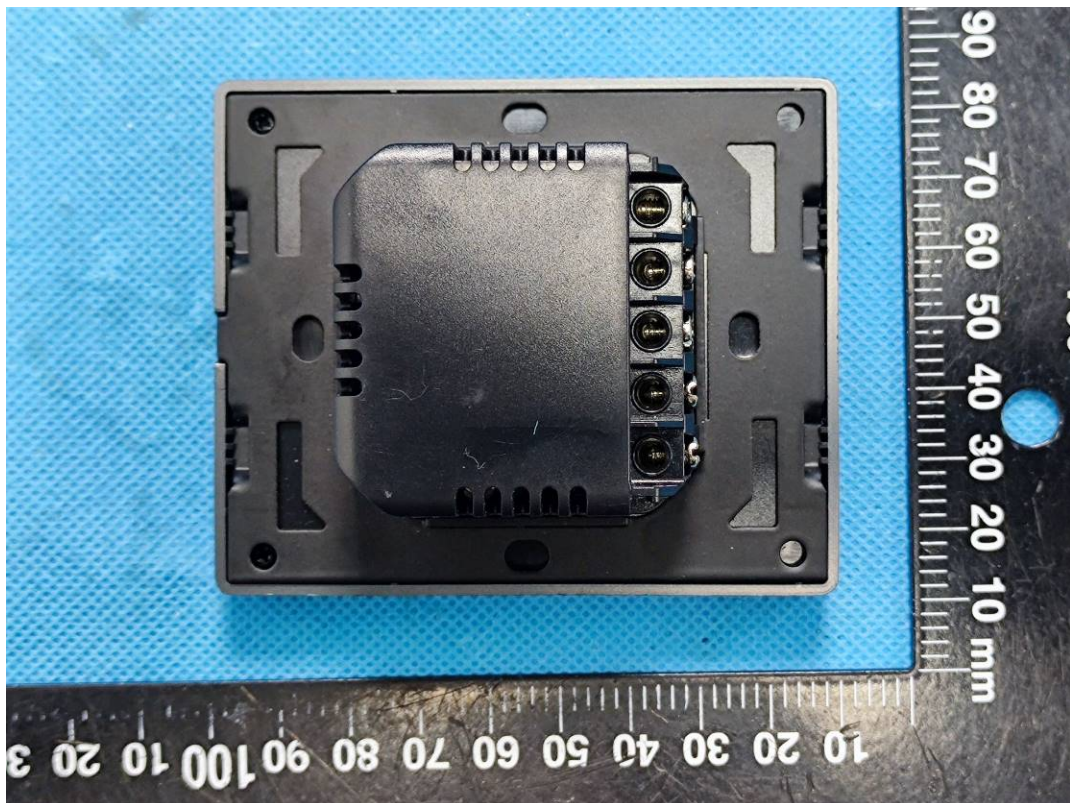
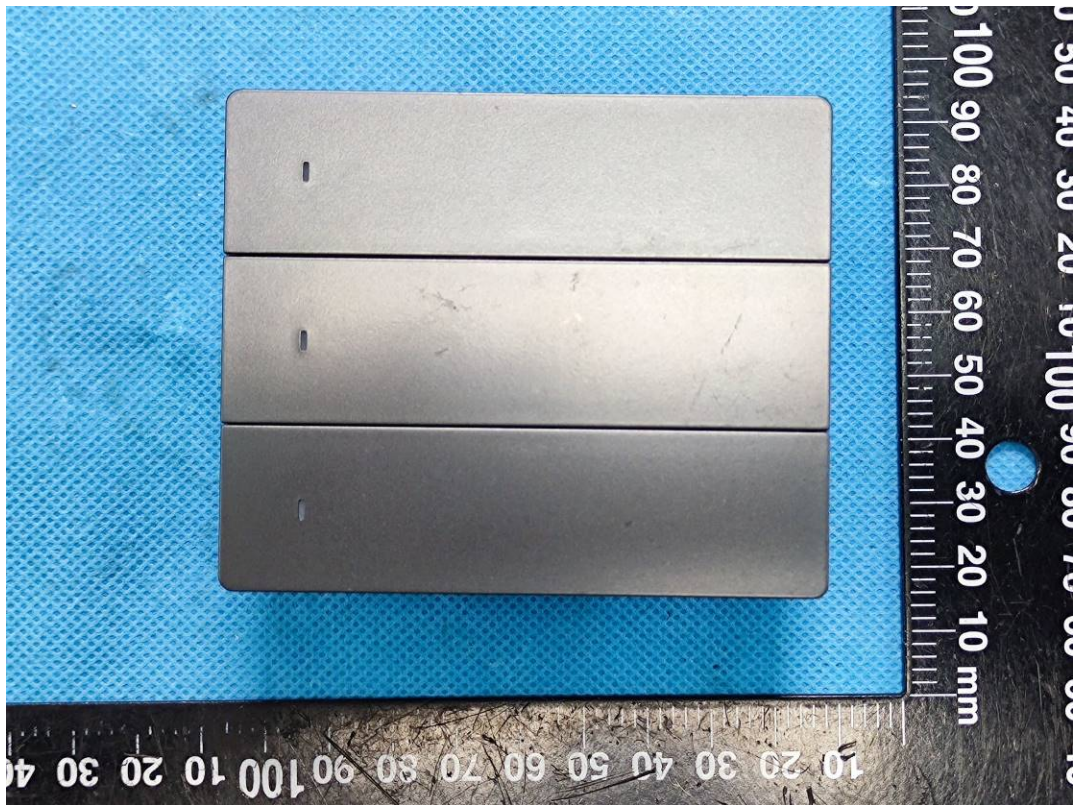
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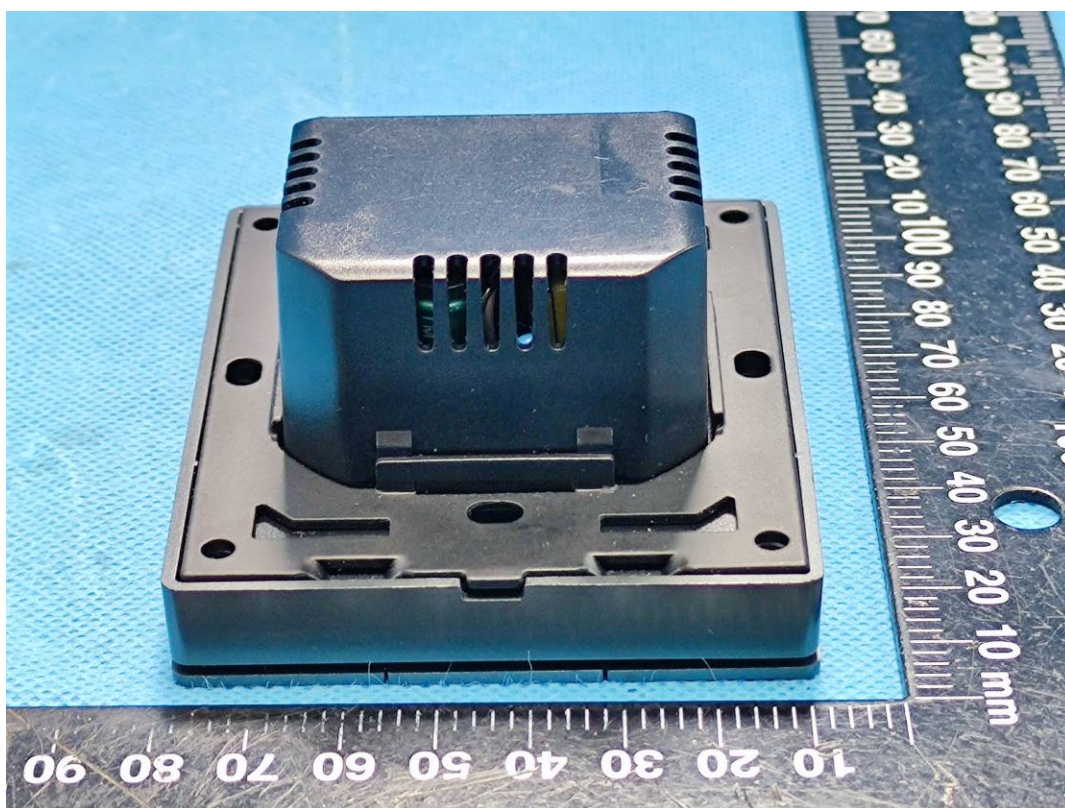
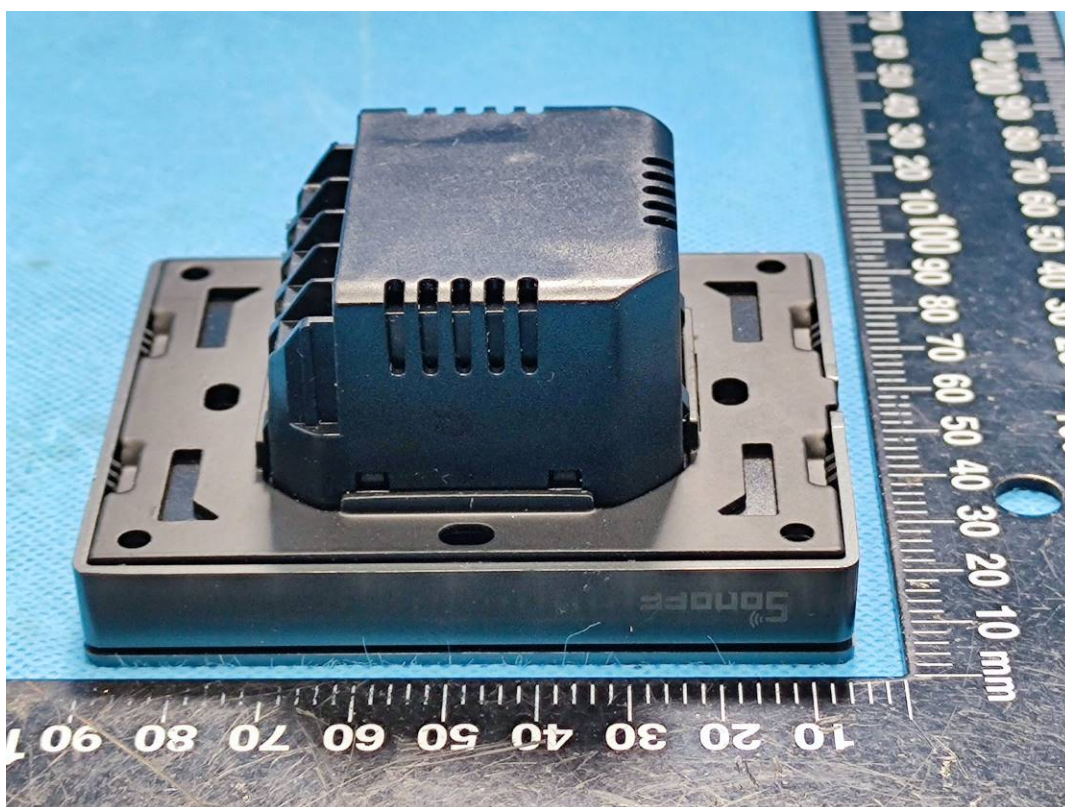


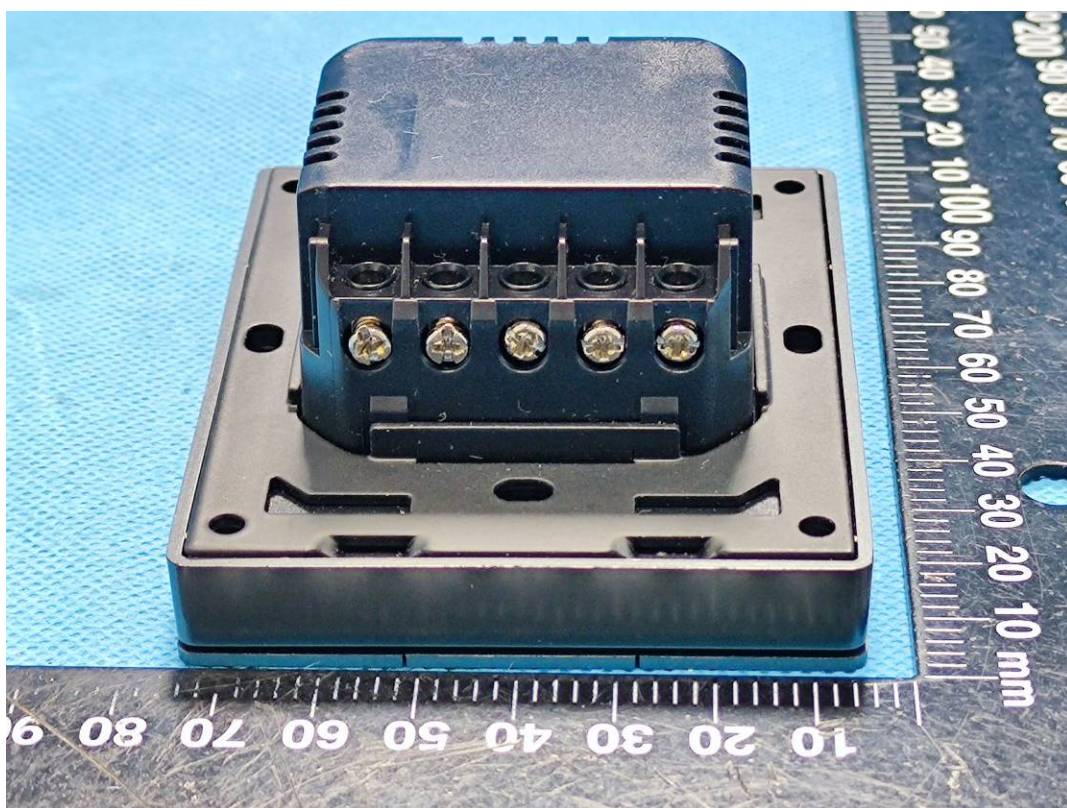
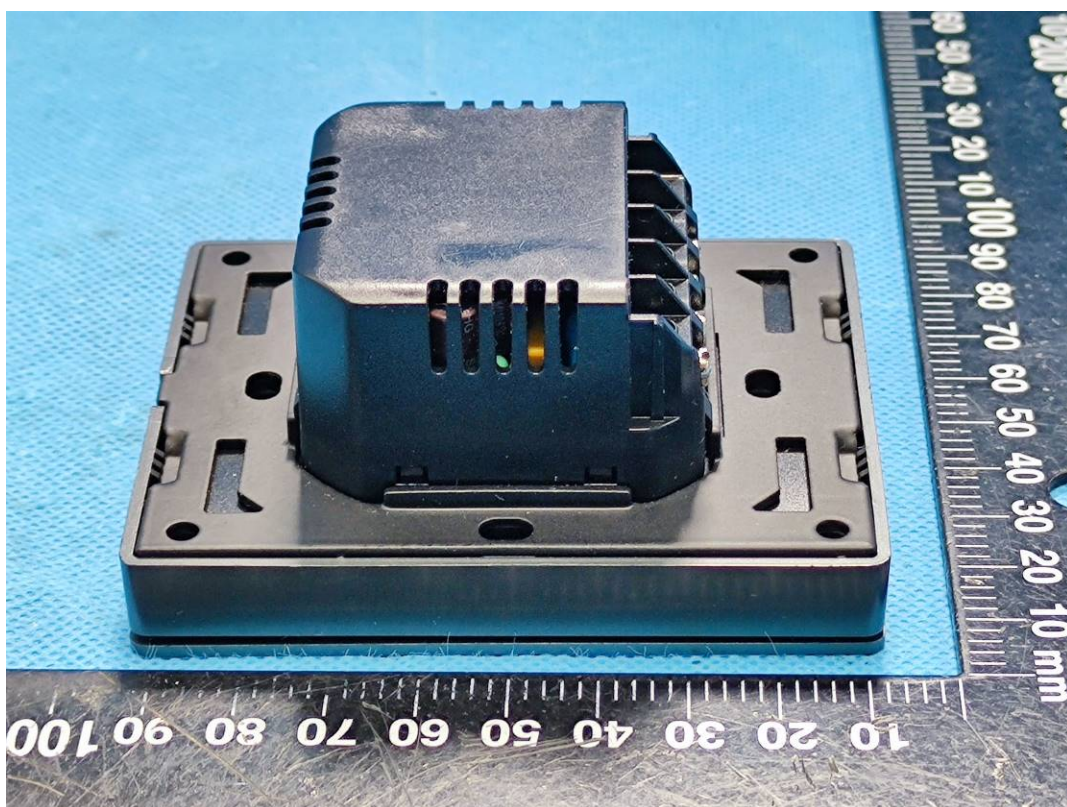




M5-3C-80(with relay 2#)





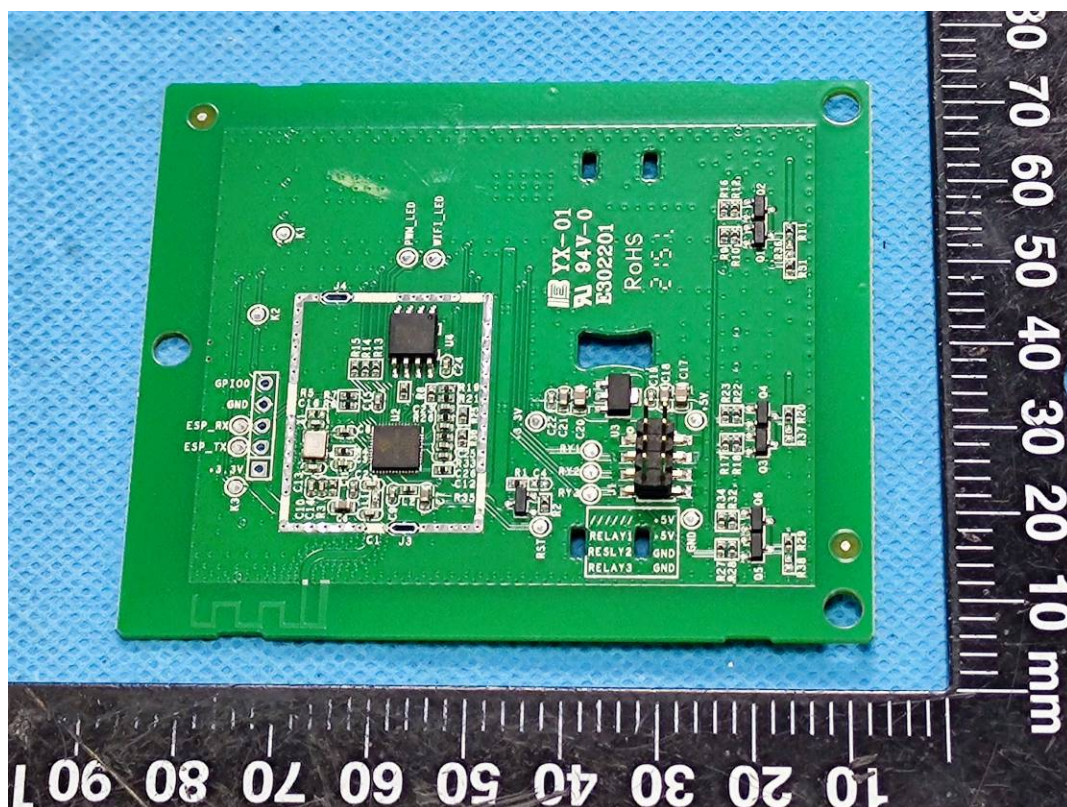


Port

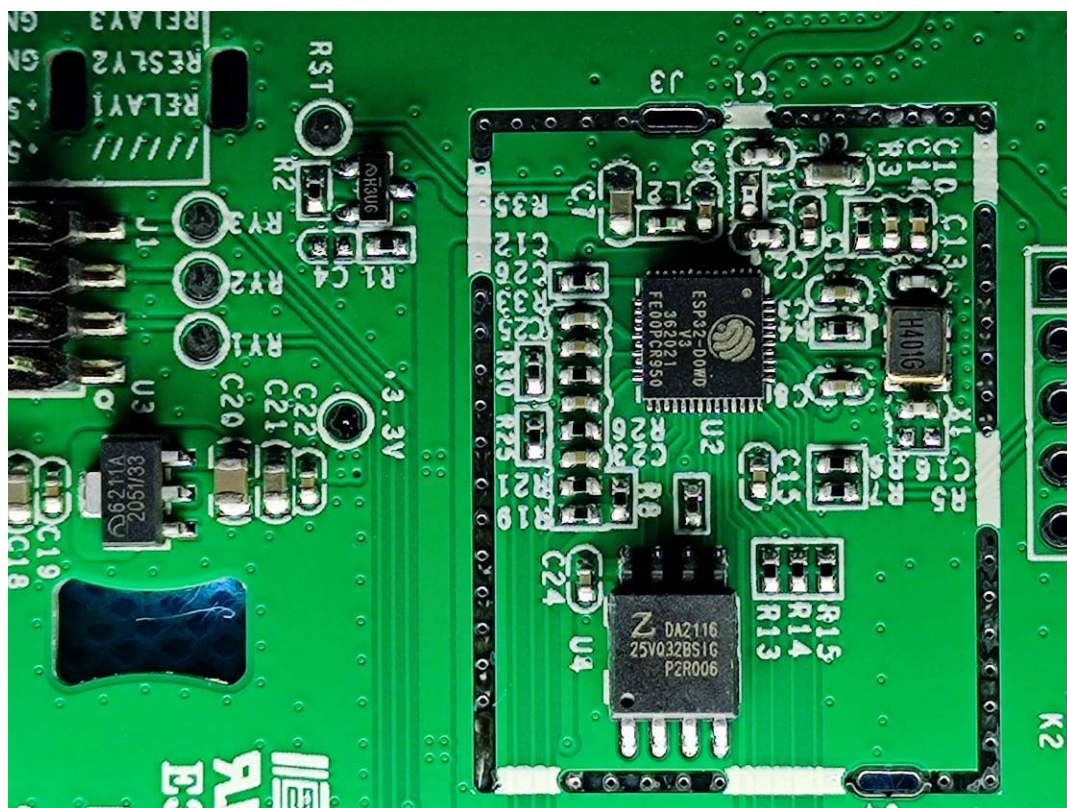


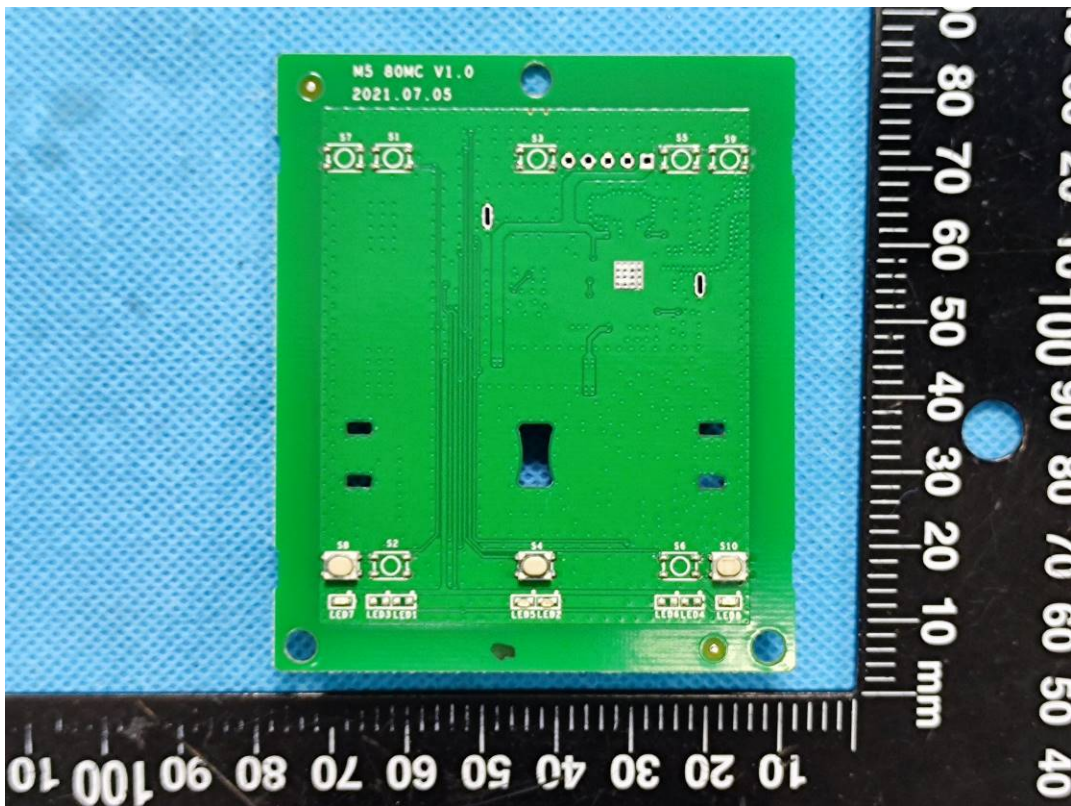
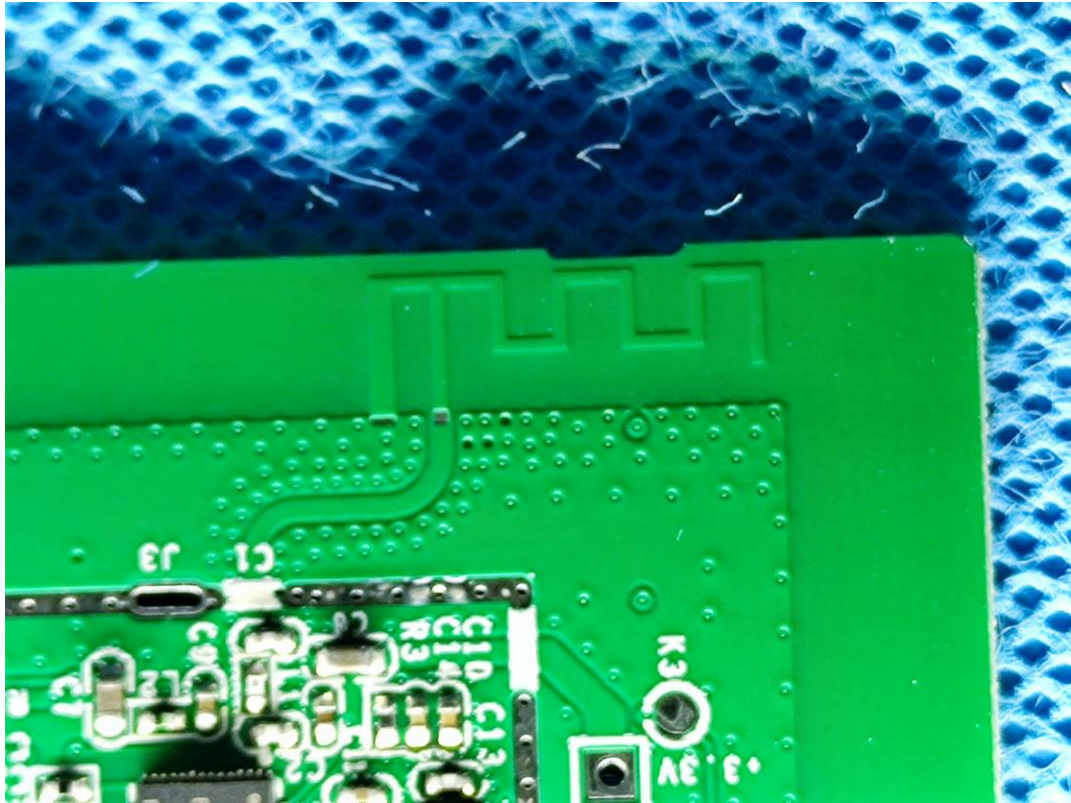
Uncover

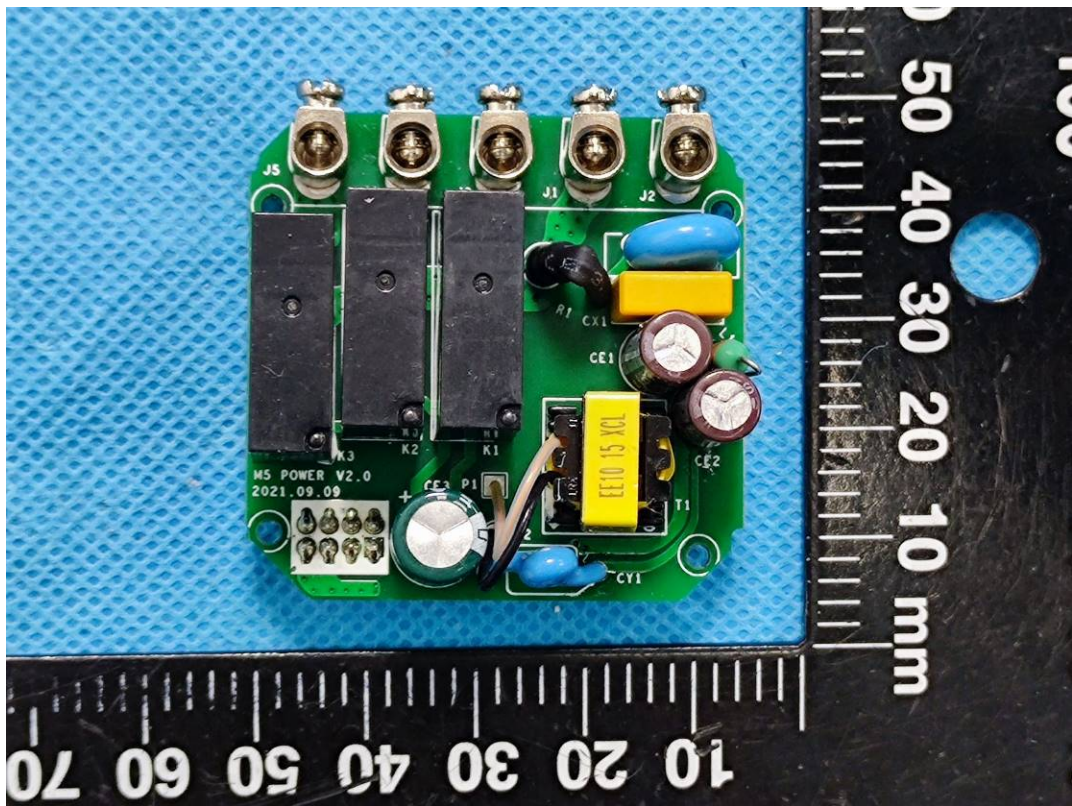
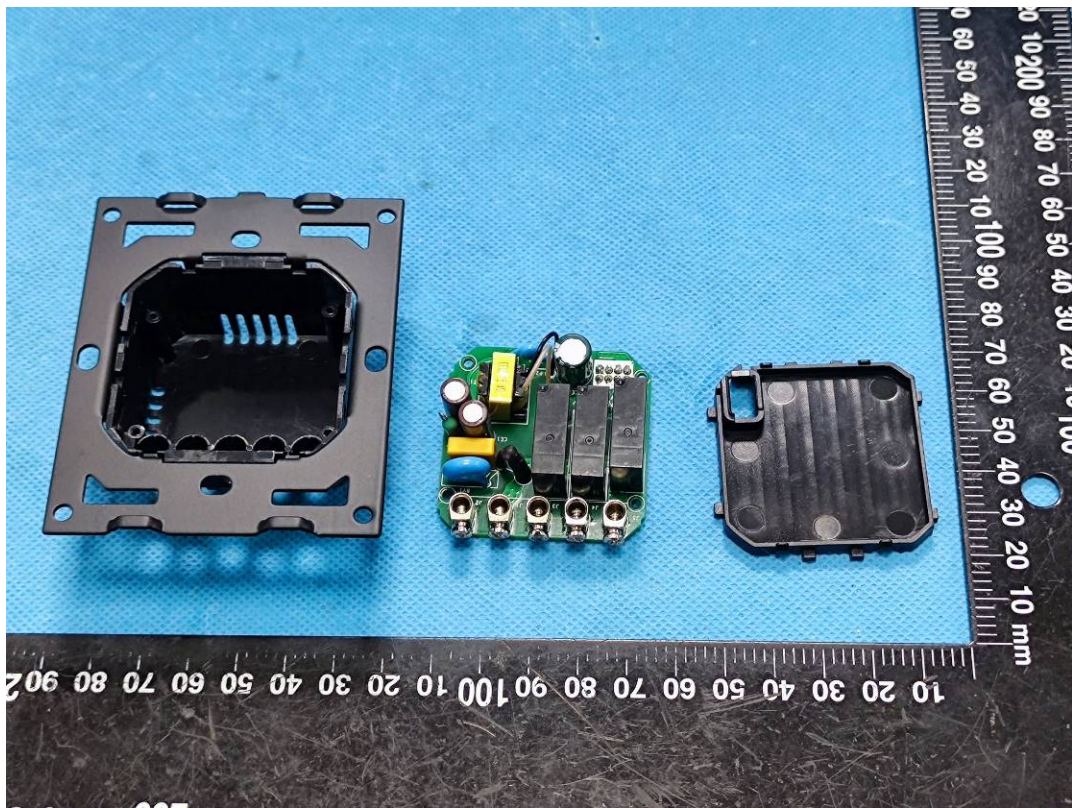


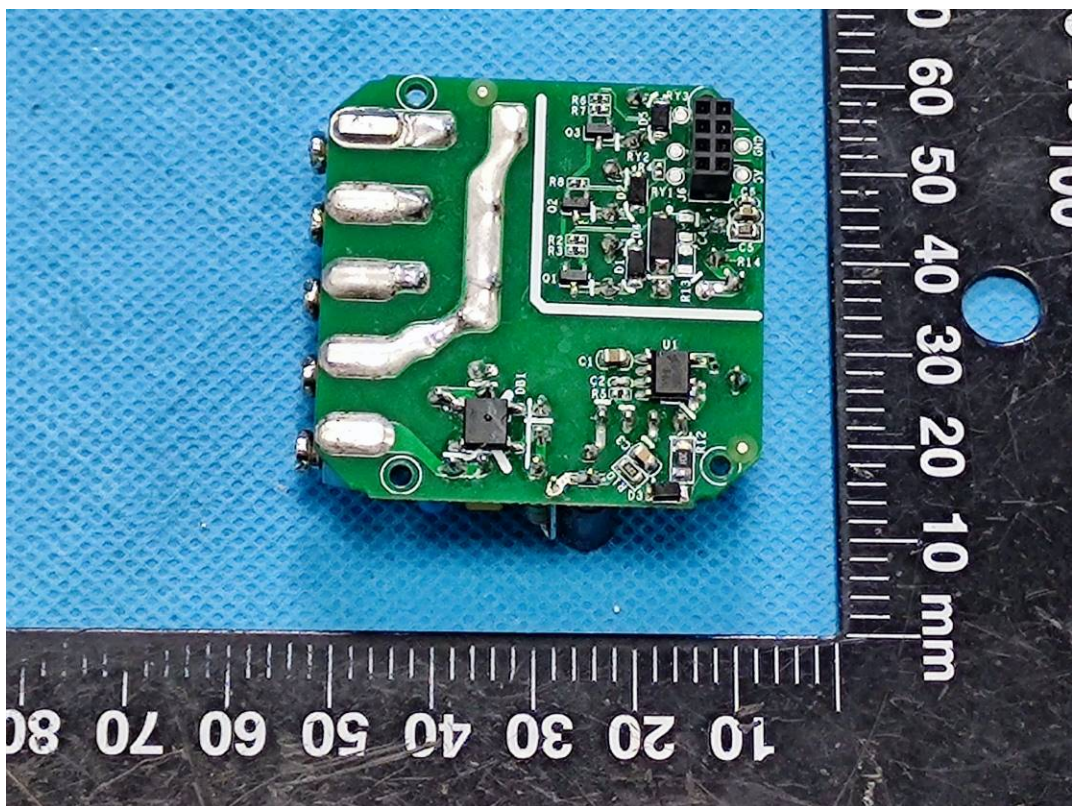
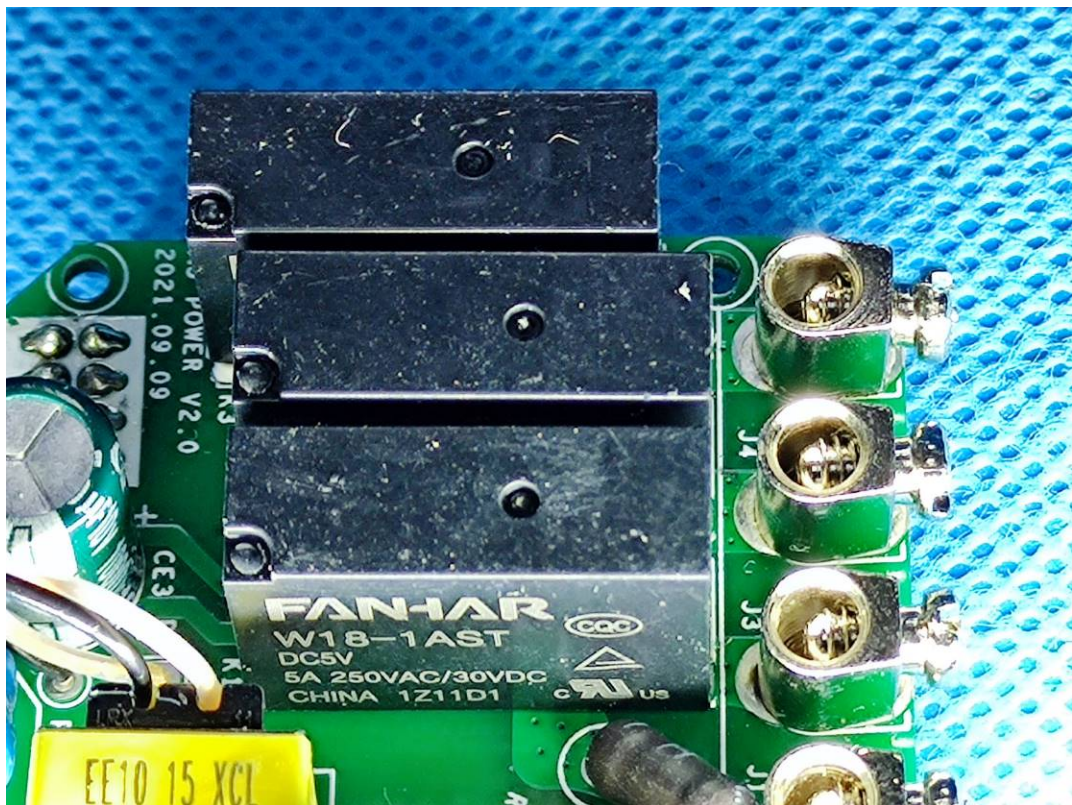


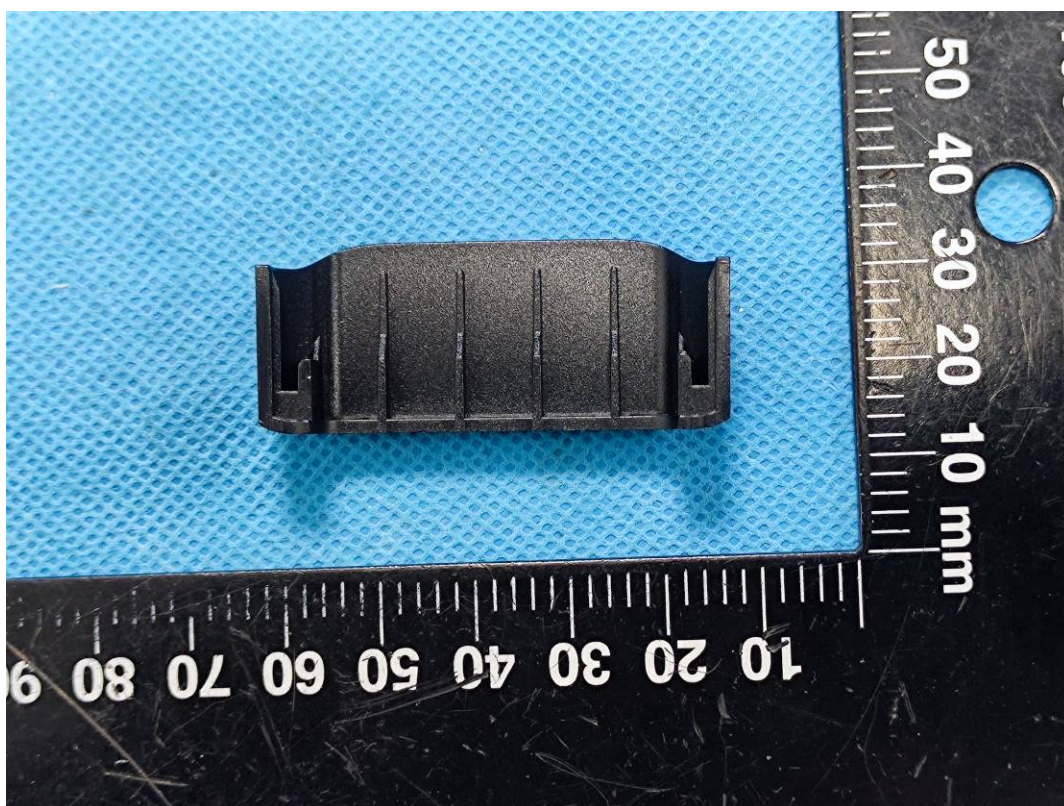
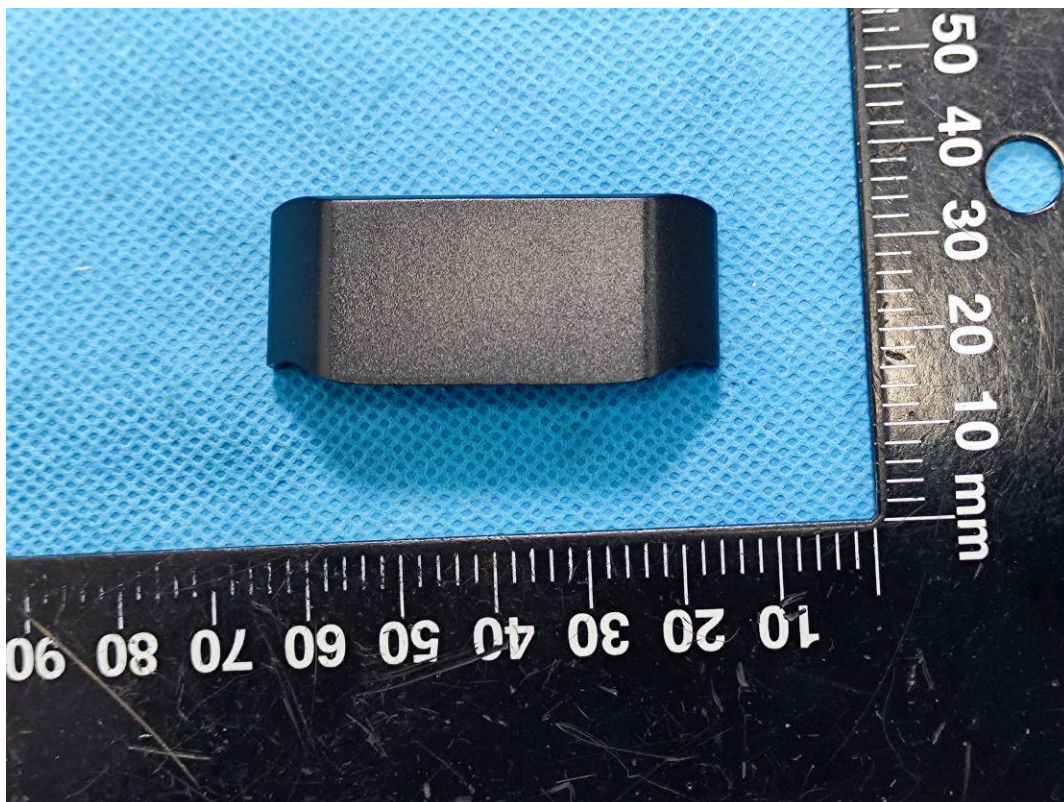
Chip3











DECLARATION LETTER

Shenzhen Sonoff Technologies Co.,Ltd.

Add: 3F & 6F, Bldg A, No. 663, Bulong Rd, Shenzhen, Guangdong, China

Tel: 0755-27955416 Fax: 0755-27955416

E-mail: cert@itead.cc

DECLARATION OF SIMILARITY

Date: 2022-07-04

To Whom It May Concern

Dear Sir or Madam:

We, Shenzhen Sonoff Technologies Co.,Ltd., hereby declare that product: SONOFF SwitchMan Smart Wall Switch, The model M5-1C-80W, M5-2C-80W, M5-3C-80W, M5-1C-80G, M5-2C-80G, M5-3C-80G are electrically identical with the model: M5-1C-80, M5-2C-80, M5-3C-80 which was tested by BACL(Dongguan) with the same electromagnetic emissions and electromagnetic compatibility characteristics.

The following is a description of the differences and declaration similarities between several configurations.

Model	Color	Relay	Gang(s)	PCB Board	
				Power supply board	RF&Control Board
M5-3C-80	black	Relay 1#	three	Different from 2C	Same (The RF part of the 3C series model is the same as the 2C series and 1C series models, but the PCBA of the control board is different)
M5-3C-80W	white	Relay 2#			
M5-3C-80G	golden	Relay 3#			
M5-2C-80	black	Relay 4# Relay 5#	two	/	
M5-2C-80W	white				
M5-2C-80G	golden				
M5-1C-80	black	Relay 4# Relay 5#	one	Same as 2C	
M5-1C-80W	white				
M5-1C-80G	golden				

The difference of the relay is described as follows:

Components	Manufacturer	Type/Model	Technical Data
Relay 1#	Shenzhen Golden Electrical Appliance Co Ltd.	Y5-1A -5DH 5DH	5A 250VAC
Relay 2#	Zhejiang Fanhar Electronics Co., Ltd.	W18-1AST-DC5V	DC5V 5A 250VAC
Relay 3#	SUZHOU GEEKO ELECTRICAPPLIANCES CO.,LTD	GK101-1AS-DC5V	5A 250 VAC
Relay 4#	Shenzhen Golden Electrical Appliance Co Ltd.	GI-1A-5LH	DC5V 10A 250VAC

Relay 5#	Zhejiang Fanhar Electronics Co., Ltd.	W11-1A2STLE-H-DC5V	DC5V 10A 250VAC
----------	---------------------------------------	--------------------	-----------------

Except the differences above, we declare the products are electrically identical. We guarantee all the information provided above is true, and notice that we'll bear all the consequences caused by any false information or concealing.

Please contact me should there be need for any additional clarification or information.

Best Regards,

Signature *Stan Li*

Name: Stan Lee

Hardware Department Manager

BELOW IS THE ORIGINAL REPORT

ETSI EN 301 489-1 V2.2.3 (2019-11)
ETSI EN 301 489-17 V3.2.4 (2020-09)

TEST REPORT

For

Shenzhen Sonoff Technologies Co.,Ltd.

3F & 6F, Bldg A, No. 663, Bulong Rd, Shenzhen, Guangdong, China

Test Models: M5-3C-86, M5-2C-86, M5-1C-86
Multiple Models: M5-1C-86W, M5-2C-86W,
M5-3C-86W, M5-1C-86G, M5-2C-86G,
M5-3C-86G

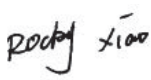
Report Type: Original Report	Product Type: SONOFF SwitchMan Smart Wall Switch
Report Number:	DG1210901-45614E-02
Report Date:	2022-01-20
Reviewed By:	Rocky Xiao RF Engineer 
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.12, Pulong East 1 st Road, Tangxia Town, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

TABLE OF CONTENTS

General Information.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	4
OBJECTIVE.....	4
TEST METHODOLOGY	4
TEST FACILITY	4
DECLARATIONS	5
System Test Configuration	6
DESCRIPTION OF TEST CONFIGURATION.....	6
EQUIPMENT MODIFICATIONS	6
EUT EXERCISE SOFTWARE.....	6
BLOCK DIAGRAM OF TEST SETUP.....	7
TEST EQUIPMENT LIST	8
ENVIRONMENTAL CONDITIONS.....	9
Summary of Test Results	10
1 – Enclosure of ancillary equipment measured on a stand alone basis.....	11
MEASUREMENT UNCERTAINTY.....	11
TEST SYSTEM SETUP.....	11
EMI TEST RECEIVER SETUP.....	12
TEST PROCEDURE.....	12
CORRECTED AMPLITUDE & MARGIN CALCULATION	13
TEST DATA	14
3 – AC mains power input/output ports.....	26
EUT SETUP	26
EMI TEST RECEIVER SETUP.....	26
TEST PROCEDURE.....	26
CORRECTED AMPLITUDE & MARGIN CALCULATION	27
TEST DATA	28
4 – Harmonic current emissions (AC mains input port).....	34
5 – Voltage fluctuations and flicker (AC mains input port)	45
TEST SYSTEM SETUP.....	45
TEST STANDARD	45
TEST DATA	46
7 – Radio frequency electromagnetic fields (80 MHz to 6 000 MHz)	47
TEST SYSTEM SETUP.....	47
TEST LEVEL.....	47
PERFORMANCE CRITERION: A	47
TEST PROCEDURE.....	48
TEST DATA	48
8 – Electrostatic discharges.....	49
TEST SYSTEM SETUP	49
TEST LEVEL.....	49
PERFORMANCE CRITERION: B	49
TEST PROCEDURE.....	50
TEST DATA	51
9 – Fast transients, common mode.....	53
TEST SYSTEM SETUP	53
TEST LEVEL.....	53
PERFORMANCE CRITERION: B.....	53
TEST PROCEDURE.....	53

TEST DATA	54
10 – Radio frequency, common mode.....	55
TEST SETUP	55
TEST LEVEL.....	55
PERFORMANCE CRITERION: A	55
TEST PROCEDURE.....	55
TEST DATA	56
12 – Voltage dips and short interruptions.....	57
TEST SETUP	57
TEST LEVEL AND PERFORMANCE CRITERION	57
TEST PROCEDURE.....	57
TEST DATA	58
13 – Surges	59
TEST SYSTEM SETUP	59
TEST LEVEL.....	59
PERFORMANCE CRITERION: B.....	59
TEST PROCEDURE.....	59
TEST DATA	60
Exhibit A – Eut Photographs.....	61
Exhibit B – Test Setup Photographs.....	90
RADIATED EMISSION.....	90
CONDUCTED EMISSIONS _AC.....	96
HARMONIC	99
FLICKER.....	101
RS.....	103
ESD.....	105
EFT	107
CS.....	109
DIPS.....	111
SURGE	113

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:	SONOFF SwitchMan Smart Wall Switch
Tested Models:	M5-3C-86, M5-2C-86, M5-1C-86
Multiple Models:	M5-1C-86W, M5-2C-86W, M5-3C-86W, M5-1C-86G, M5-2C-86G, M5-3C-86G
Model Difference:	Refer to DOS
Rated Input Voltage:	AC230V
Serial Number:	M5-3C-86: DG1210901-45614E-RF-S2 M5-2C-86: DG1210901-45614E-RF-S3 M5-1C-86: DG1210901-45614E-RF-S4
EUT Received Date:	2021-09-02
EUT Received Status:	Good

Objective

This report is prepared on behalf of *Shenzhen Sonoff Technologies Co., Ltd.* in accordance with ETSI EN 301 489-1 V2.2.3 (2019-11) Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for Electro Magnetic Compatibility;

ETSI EN 301 489-17 V3.2.4 (2020-09) Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems.

The objective is to determine the compliance of EUT with: ETSI EN 301 489-1&17.

Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 489-1 V2.2.3 (2019-11).

Test Facility

Bay Area Compliance Laboratories Corp. (Dongguan) located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

'Harmonic current emissions' was subcontracted to Shenzhen Accurate Technology Co., Ltd. located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

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SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user)

Test mode:

Wireless Link&Full Load Operating

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

Software app “eWeLink” was used to setup and monitor the status of EUT.

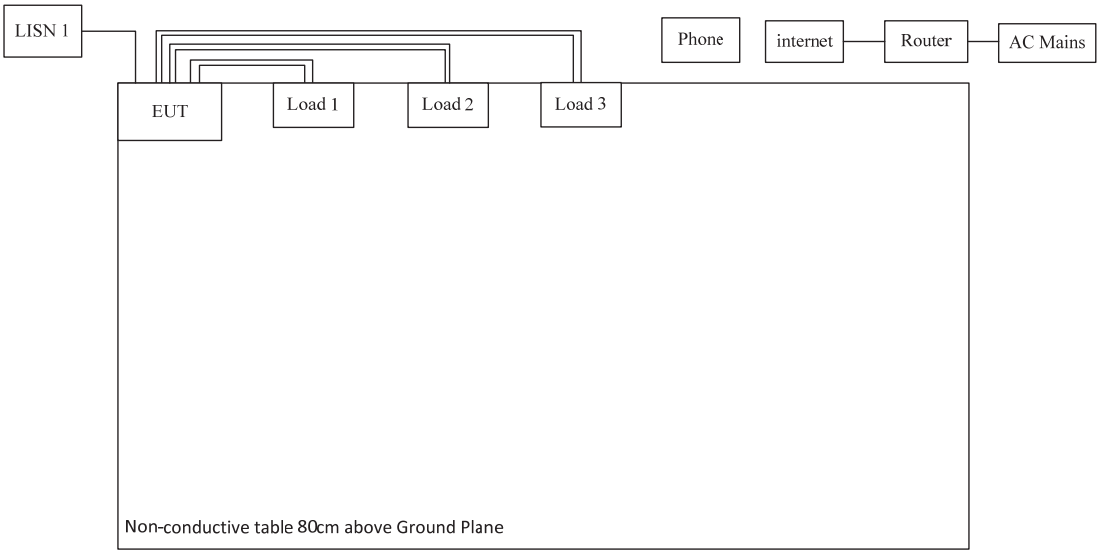
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Apple	Mobile Phone	MGAA2CG/A	FK1R95UYG5QT
TOTOLINK	Router	T6	IP04447_1620714
Hengxin electronic	Resistive Load_Load 1	RX20-T1000W	EMZBRL21120401EN
Hengxin electronic	Resistive Load_Load 2	RX20-T1000W	EMZBRL21120402EN
Hengxin electronic	Resistive Load_Load 3	RX20-T2000W	EMZBRL21120403EN
UNI-T	Multimeter	UT39A	M130199938

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
AC Power Cable	No	No	1.2	EUT	LISN 1
AC Power Cable*3	No	No	1	EUT	Load 1/2/3

Block Diagram of Test Setup



Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted emission					
R&S	LISN	ENV 216	101614	2021-09-11	2022-09-10
R&S	EMI Test Receiver	ESCI	101121	2021-07-22	2022-07-21
MICRO-COAX	Coaxial Cable	C-NJNJ-50	C-0200-01	2021-09-05	2022-09-04
R&S	Test Software	EMC32	Version 9.10.00	N/A	N/A
Radiated emissions below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-1	2020-11-10	2023-11-10
R&S	EMI Test Receiver	ESR3	102453	2021-09-22	2022-09-21
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2021-07-19	2022-07-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2021-07-19	2022-07-18
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2021-07-19	2022-07-18
Sonoma	Amplifier	310N	372193	2021-07-18	2022-07-17
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Radiated emissions Above 1GHz					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2021-10-12	2024-10-11
Agilent	Spectrum Analyzer	E4440A	SG43360054	2021-07-22	2022-07-21
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2021-09-04	2022-09-03
Mini-Circuit	Amplifier	ZVA-213-S+	54201245	2021-09-04	2022-09-03
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2021-06-16	2022-06-15
ESD					
HAEFELY	Electrostatic Discharge Simulator	ONYX	180786	2021-09-15	2022-09-14
EFT & Surge & Dips					
EM TEST	Ultra Compact Generator	UCS 500N5	P1406130994	2021-07-22	2022-07-21
EM TEST	Autotransformer	MV2616	P1450144859	N/A	N/A
Flicker					
ELGAR	AC Power Source	1751SX	5611	2021-09-22	2022-09-21
EM TEST	Harmonic & Flicker Analyzer	DPA 500	303278	2021-09-16	2022-09-15
CS					
HP	Signal Generator	8648A	3246A00831	2021-09-11	2022-09-10
R&S	Power Amplifier	15A250	12934	N/A	N/A
Werlatone	Dual Directional Coupler	C5091-10	113192	2021-02-09	2022-02-08
HP	Power Meter	HP EPM-441A	GB37481494	2021-07-22	2022-07-21
Agilent	8482A Power sensor	8482A	US37296108	2021-07-22	2022-07-21
NARDA	Attenuator	769-6	2754	N/A	N/A
COM-POWER	CDN	M325E	521064	2021-07-22	2022-07-21

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RS					
AR	Antenna	ATL80M1G	0351400	N/A	N/A
AR	Antenna	ATT700M12G	0349410	N/A	N/A
HP	Signal Generator	8665B	3438a00584	2021-09-11	2022-09-10
AR	Power Amplifier	500W1000C	0353561	N/A	N/A
AR	Power Amplifier	60S1G6	0348711	N/A	N/A
PASTERNAK	Dual Directional Coupler	PE2239-30	1711	2021-07-15	2022-07-14
Agilent	EPM Series Power Meter	E4419B	MY45103907	2021-07-22	2022-07-21
Agilent	E-Series Avg Power Sensor	E9301A	MY41497625	2021-07-22	2022-07-21
Agilent	E-Series Avg Power Sensor	E9301A	MY41497628	2021-07-22	2022-07-21

* Statement of Traceability: Bay Area Compliance Laboratories Corp.(Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Harmonic					
California Instruments	5KVA AC POWER SOURCE	5001iX-400	55692	2020/12/25	2021/12/24
California Instruments	HARMONICS/FLICKER TEST ANALYZER	PACS-1	72254	2020/12/24	2021/12/23

* Statement of Traceability: Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Environmental Conditions

Test Item:	Conducted emission	Radiated emissions below 1GHz	Radiated emissions above 1GHz	EMS & Flicker	Harmonic
Temperature:	24.1°C	23.8°C	18.5 °C	24.2~27°C	23.5~25.4°C
Relative Humidity:	53%	43 %	48%	51~58%	39~45%
ATM Pressure:	101.1kPa	101.1kPa	101.8kPa	100.7kPa	101.7~101.8kPa
Tester:	Walker Chen	Alex Hu	Bill Yang	Ether xu	Caro Mo
Test Date:	2021.11.18	2021.11.18	2021.12.29	2021.11.20	2021.12.13~2021.12.19

SUMMARY OF TEST RESULTS

SN	Rule and Clause	Description of Test	Test Result
1	EN 301 489 Clause 8.2	Enclosure of ancillary equipment measured on a stand alone basis	Compliance
2	EN 301 489 Clause 8.3	DC power input/output ports	Not applicable*
3	EN 301 489 Clause 8.4	AC mains power input/output ports	Compliance
4	EN 301 489 Clause 8.5	Harmonic current emissions (AC mains input port)	Compliance
5	EN 301 489 Clause 8.6	Voltage fluctuations and flicker (AC mains input port)	Compliance
6	EN 301 489 Clause 8.7	Wired network ports	Not applicable**
7	EN 301 489 Clause 9.2	Radio frequency electromagnetic fields (80 MHz to 6 000 MHz)	Compliance
8	EN 301 489 Clause 9.3	Electrostatic discharges	Compliance
9	EN 301 489 Clause 9.4	Fast transients, common mode	Compliance
10	EN 301 489 Clause 9.5	Radio frequency, common mode	Compliance
11	EN 301 489 Clause 9.6	Transients and surges in the vehicular environment	Not applicable***
12	EN 301 489 Clause 9.7	Voltage dips and short interruptions	Compliance
13	EN 301 489 Clause 9.8	Surges	Compliance

Note:

Not applicable*: Test voltage is AC 230V/50Hz.

Not applicable**: EUT has no wired network port.

Not applicable***: EUT is not equipment intended for vehicular use.

1 – ENCLOSURE OF ANCILLARY EQUIPMENT MEASURED ON A STAND ALONE BASIS

Measurement Uncertainty

Compliance or non-compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cisp} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{lab} is greater than U_{cisp} of Table 1, then:

- compliance is deemed to occur if no measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{lab} - U_{cisp})$, exceeds the disturbance limit.

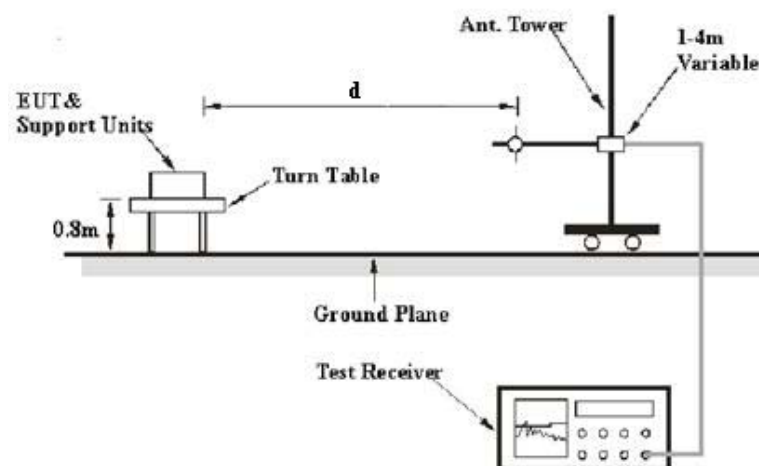
Based on CISPR 16-4-2: 2011, measurement uncertainty of radiated emission at a distance of 10m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.55 dB for Horizontal, 4.57 dB for Vertical; 200M~1GHz: 4.66 dB for Horizontal, 4.56 dB for Vertical; measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Dongguan) is: 30M~200MHz: 4.58 dB for Horizontal, 4.59 dB for Vertical; 200M~1GHz: 4.83 dB for Horizontal, 5.85 dB for Vertical; 1G~6GHz: 4.45 dB, 6G~18GHz: 5.23 dB.

Table 1 – Values of U_{cisp}

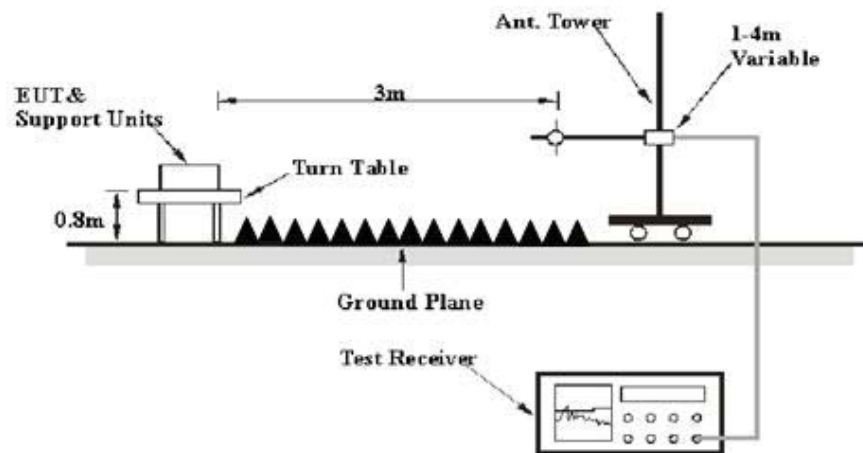
Measurement	U_{cisp}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

Test System Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests below 1GHz were performed in 3 meters, above 1GHz were performed in the 3 meters. The specification used was EN 55032 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 6 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	Peak
	1MHz	10Hz	/	Peak

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak and average detection mode above 1 GHz.

If the maximized peak measured value complies with under the QP limit more than 6dB, then it is unnecessary to perform an QP measurement.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$\text{Result} = \text{Meter Reading} + \text{Corrected}$$

Note:

$$\text{Corrected} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

or

$$\text{Corrected} = \text{Antenna Factor} + \text{Cable Loss} + \text{Insertion loss of attenuator} - \text{Amplifier Gain}$$

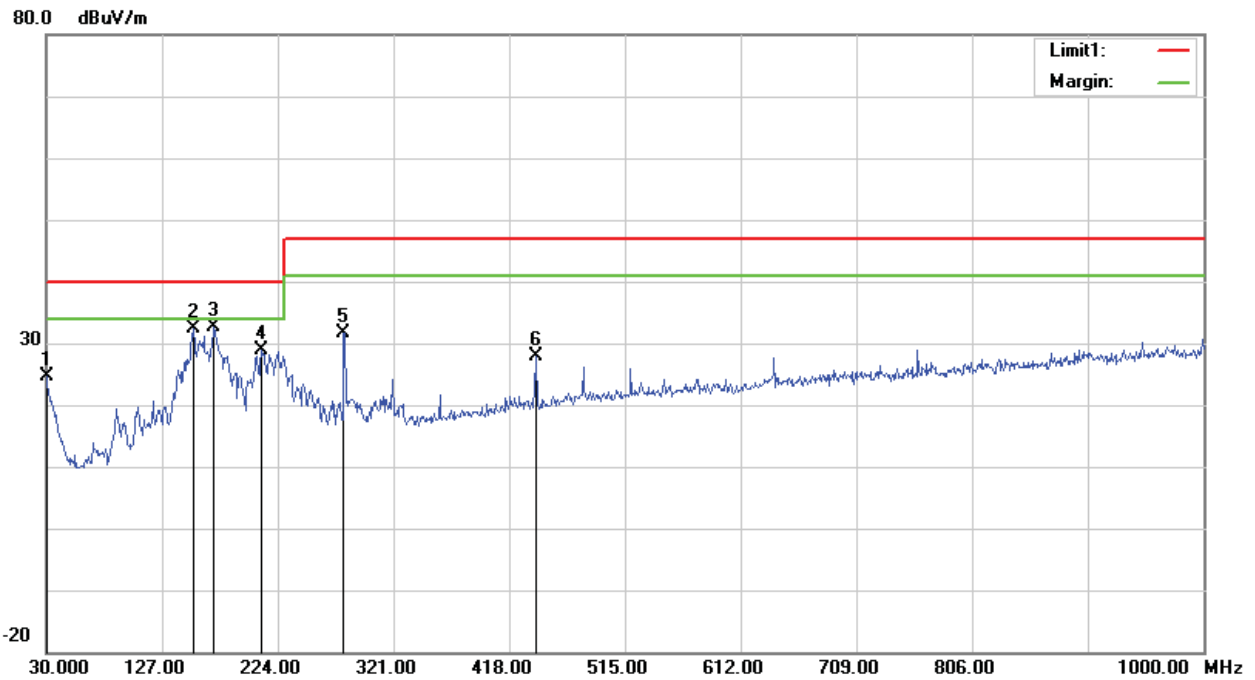
The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Result}$$

Test Data

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

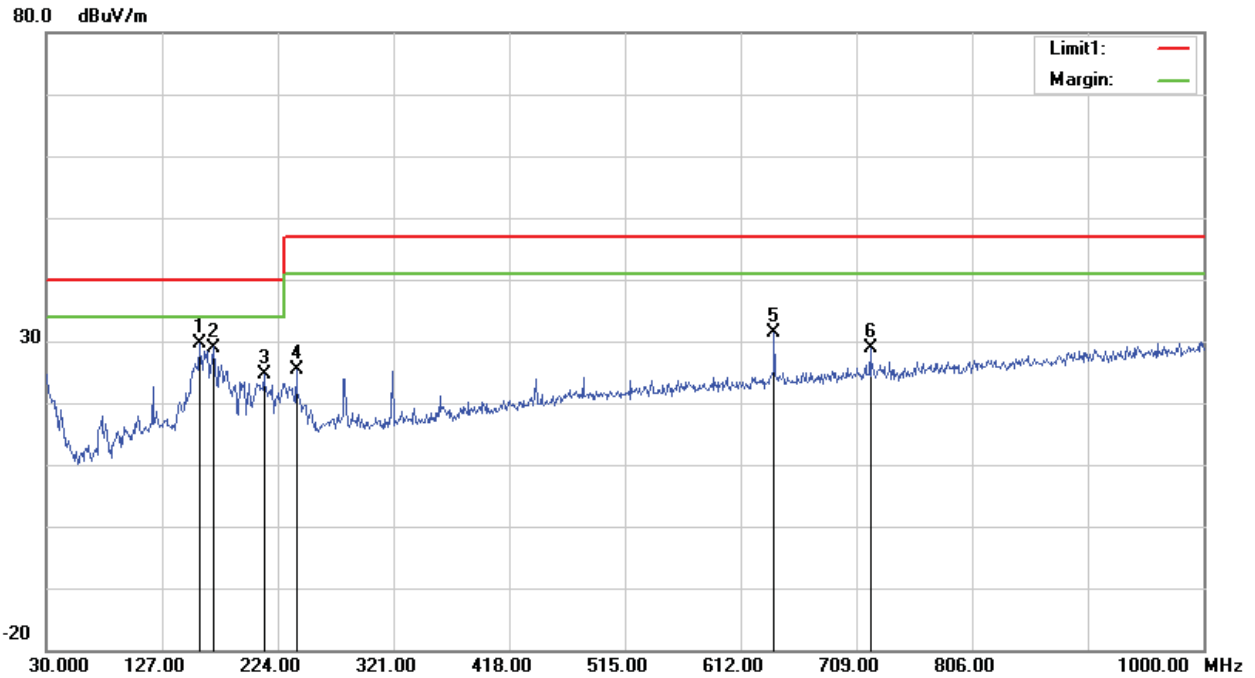
Polarization: Horizontal
Model: M5-3C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	28.02	peak	-3.49	24.53	40.00	15.47
2	153.1900	44.37	peak	-11.97	32.40	40.00	7.60
3	170.6500	45.61	peak	-12.91	32.70	40.00	7.30
4	210.4200	42.73	peak	-13.87	28.86	40.00	11.14
5	279.2900	42.19	peak	-10.63	31.56	47.00	15.44
6	440.3100	34.73	peak	-6.92	27.81	47.00	19.19

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

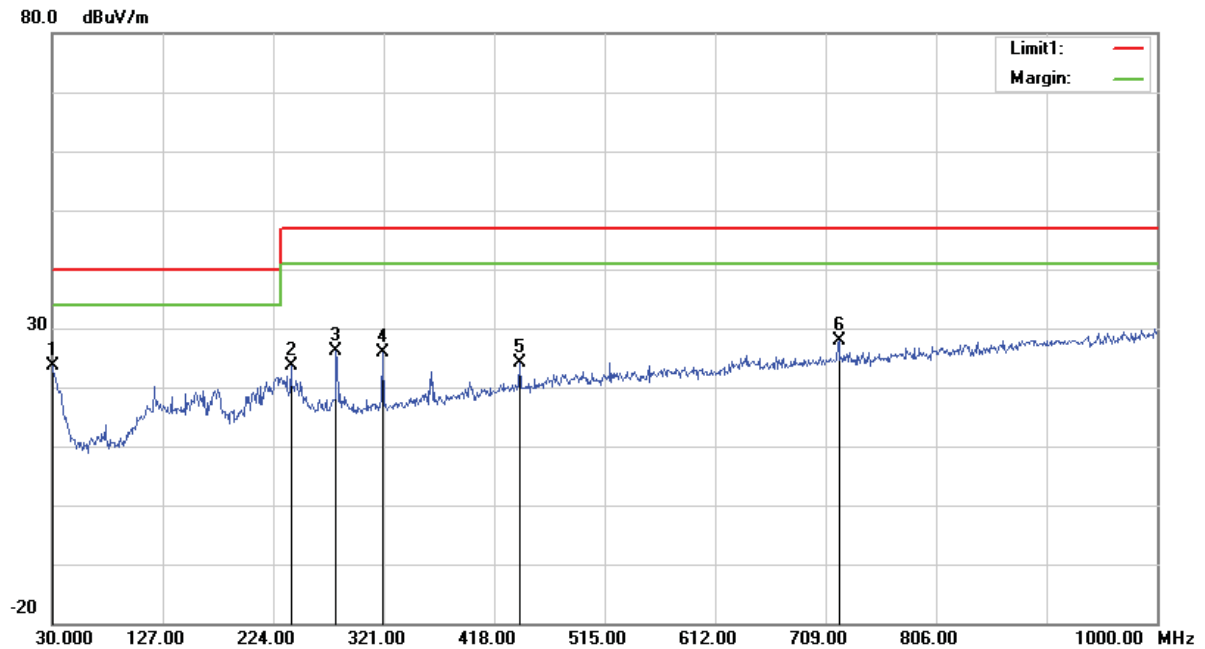
Polarization: Vertical
Model: M5-3C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	158.0400	41.37	peak	-11.85	29.52	40.00	10.48
2	170.6500	41.67	peak	-12.91	28.76	40.00	11.24
3	212.3600	38.42	peak	-13.85	24.57	40.00	15.43
4	239.5200	38.04	peak	-12.68	25.36	47.00	21.64
5	640.1300	34.39	peak	-3.10	31.29	47.00	15.71
6	720.6400	31.06	peak	-2.24	28.82	47.00	18.18

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

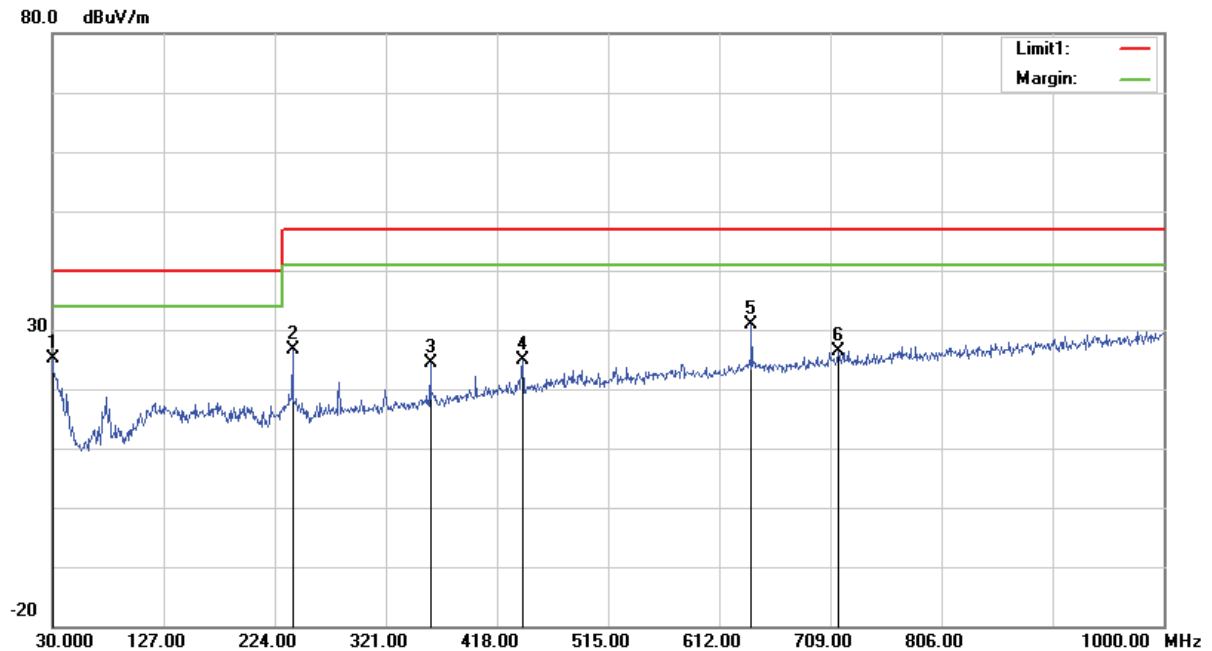
Polarization: Horizontal
Model: M5-2C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	27.13	peak	-3.49	23.64	40.00	16.36
2	239.5200	36.33	peak	-12.68	23.65	47.00	23.35
3	279.2900	36.64	peak	-10.63	26.01	47.00	20.99
4	320.0300	35.77	peak	-10.00	25.77	47.00	21.23
5	440.3100	30.98	peak	-6.92	24.06	47.00	22.94
6	720.6400	30.14	peak	-2.24	27.90	47.00	19.10

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

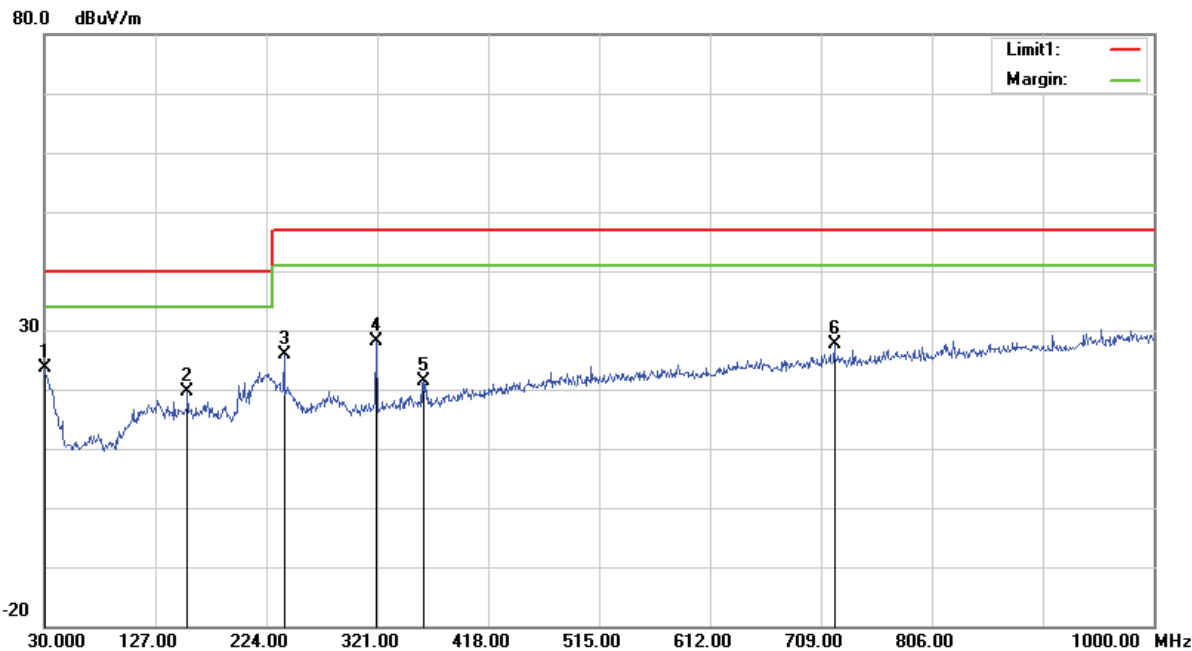
Polarization: Vertical
Model: M5-2C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	28.63	peak	-3.49	25.14	40.00	14.86
2	239.5200	39.21	peak	-12.68	26.53	47.00	20.47
3	359.8000	33.43	peak	-9.13	24.30	47.00	22.70
4	440.3100	31.88	peak	-6.92	24.96	47.00	22.04
5	640.1300	33.88	peak	-3.10	30.78	47.00	16.22
6	715.7900	28.78	peak	-2.33	26.45	47.00	20.55

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

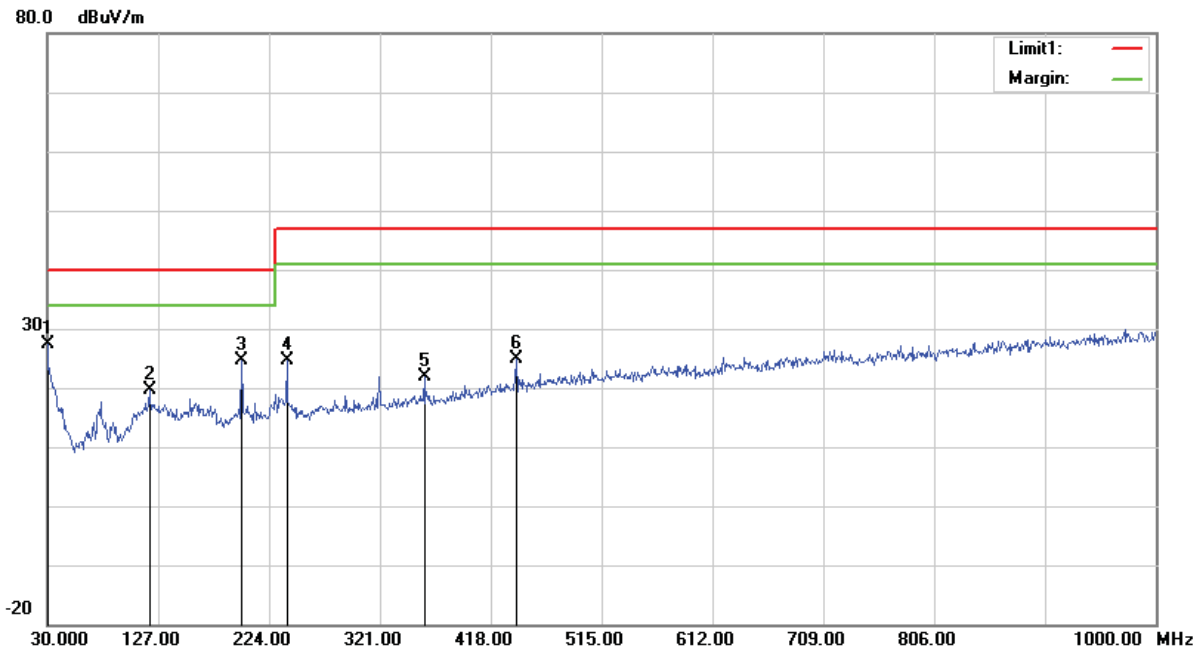
Polarization: Horizontal
Model: M5-1C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	27.04	peak	-3.49	23.55	40.00	16.45
2	155.1300	31.40	peak	-11.89	19.51	40.00	20.49
3	239.5200	38.50	peak	-12.68	25.82	47.00	21.18
4	320.0300	38.02	peak	-10.00	28.02	47.00	18.98
5	361.7400	30.45	peak	-9.09	21.36	47.00	25.64
6	720.6400	29.98	peak	-2.24	27.74	47.00	19.26

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

Polarization: Vertical
Model: M5-1C-86

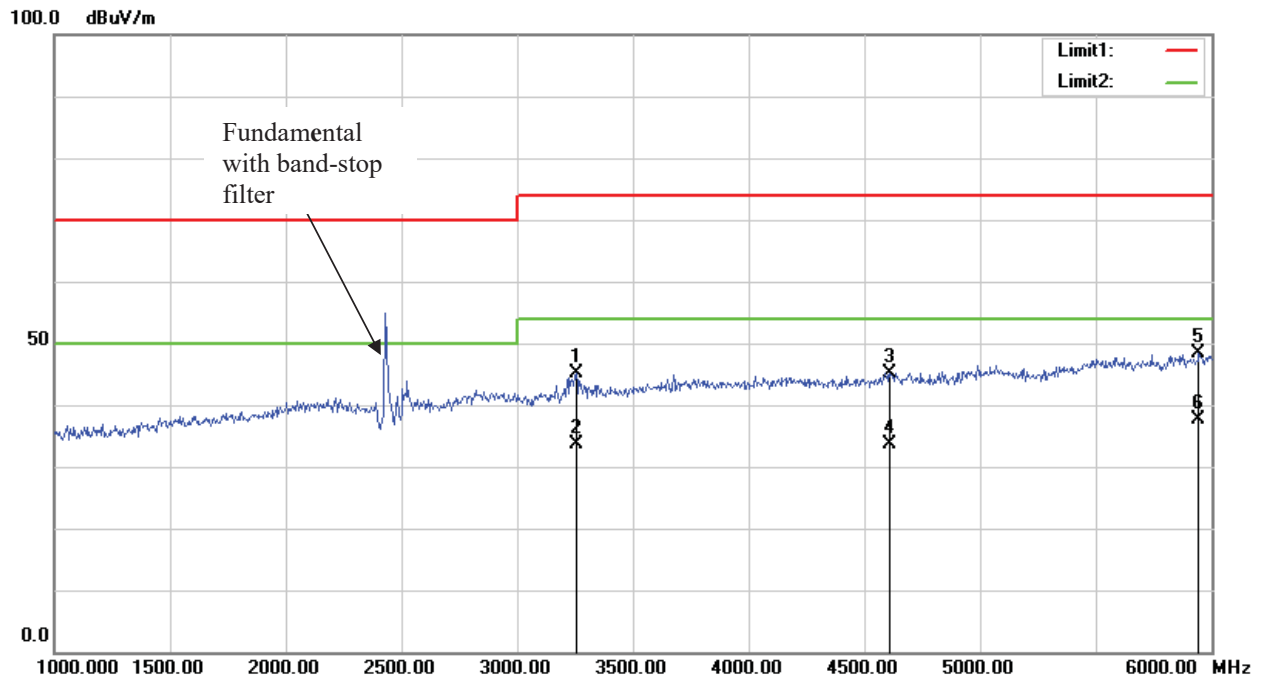


No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.0000	30.79	peak	-3.49	27.30	40.00	12.70
2	119.2400	30.26	peak	-10.65	19.61	40.00	20.39
3	199.7500	36.88	peak	-12.31	24.57	40.00	15.43
4	239.5200	37.19	peak	-12.68	24.51	47.00	22.49
5	359.8000	31.10	peak	-9.13	21.97	47.00	25.03
6	440.3100	31.87	peak	-6.92	24.95	47.00	22.05

Above 1 G:

Condition: EN 301 489 Class B
 Test Mode: Wireless Link&Full Load Operating

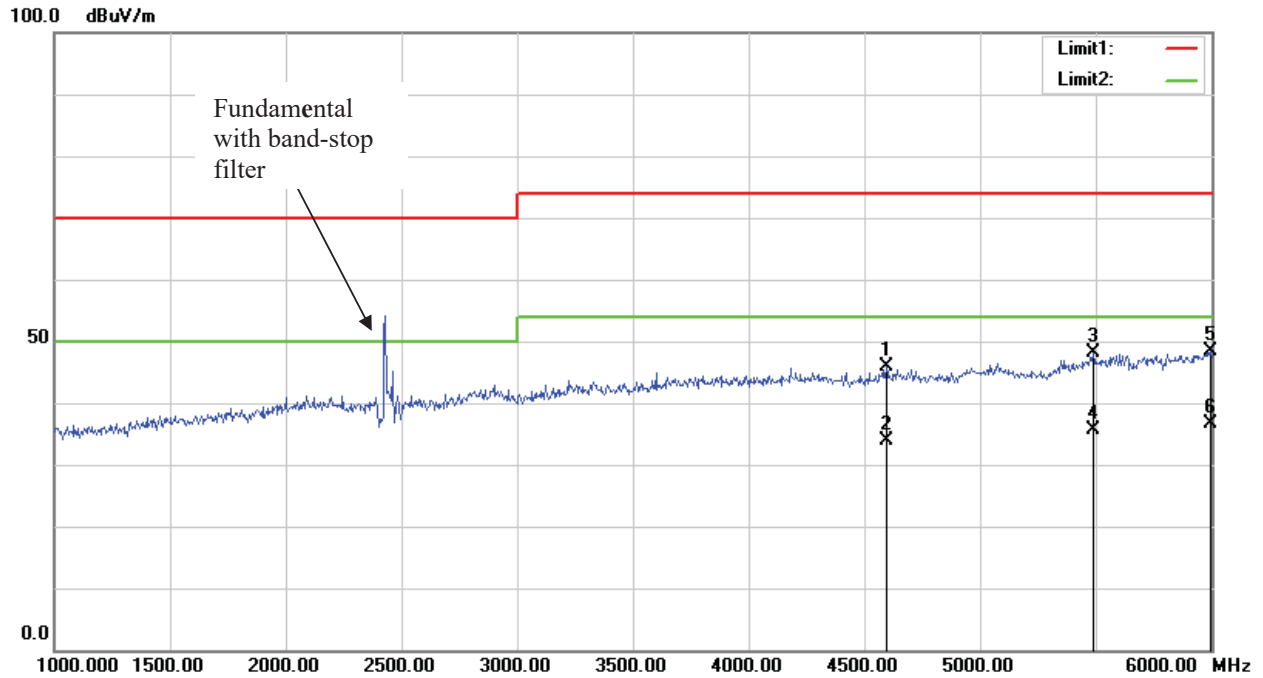
Polarization: Horizontal
 Model: M5-3C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	3255.000	38.07	peak	6.97	45.04	74.00	28.96
2	3255.000	26.75	AVG	6.97	33.72	54.00	20.28
3	4610.000	35.37	peak	9.83	45.20	74.00	28.80
4	4610.000	23.69	AVG	9.83	33.52	54.00	20.48
5	5947.500	34.45	peak	13.88	48.33	74.00	25.67
6	5947.500	23.64	AVG	13.88	37.52	54.00	16.48

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

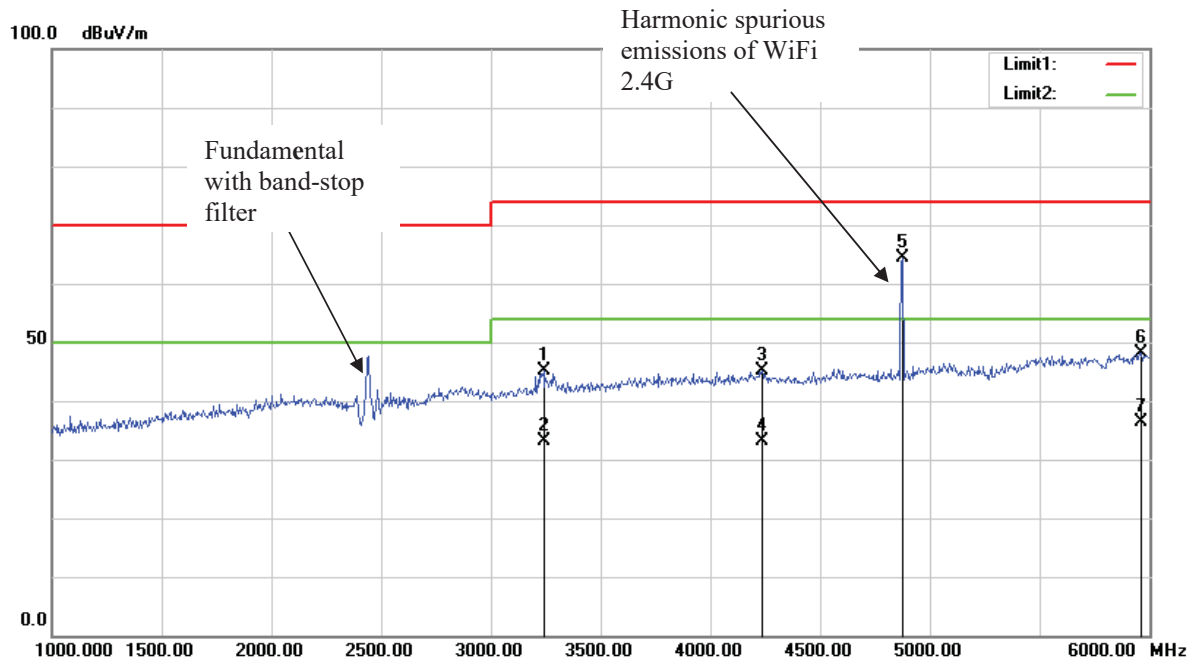
Polarization: Vertical
Model: M5-3C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	4597.500	36.06	peak	9.80	45.86	74.00	28.14
2	4597.500	24.16	AVG	9.80	33.96	54.00	20.04
3	5490.000	35.71	peak	12.32	48.03	74.00	25.97
4	5490.000	23.41	AVG	12.32	35.73	54.00	18.27
5	5995.000	34.29	peak	14.05	48.34	74.00	25.66
6	5995.000	22.46	AVG	14.05	36.51	54.00	17.49

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

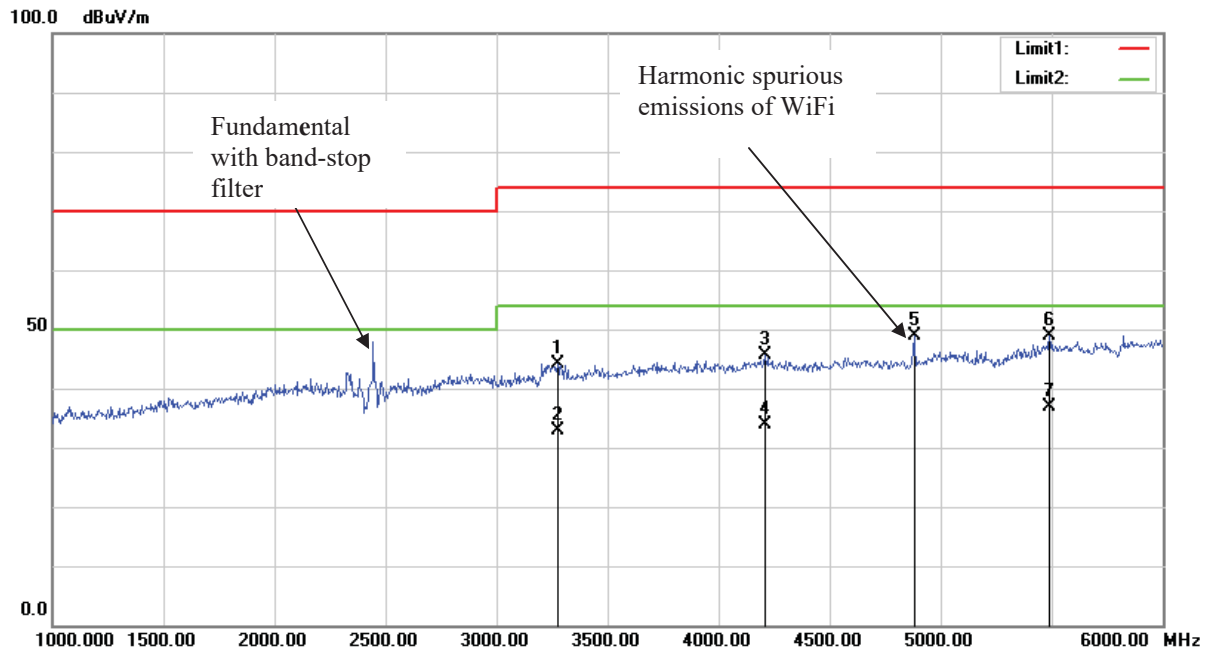
Polarization: Horizontal
Model: M5-2C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	3242.500	38.15	peak	6.94	45.09	74.00	28.91
2	3242.500	26.31	AVG	6.94	33.25	54.00	20.75
3	4237.500	35.79	peak	9.40	45.19	74.00	28.81
4	4237.500	23.61	AVG	9.40	33.01	54.00	20.99
5	4875.000	53.67	peak	10.66	64.33	74.00	9.67
6	5965.000	34.23	peak	13.95	48.18	74.00	25.82
7	5965.000	22.47	AVG	13.95	36.42	54.00	17.58

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

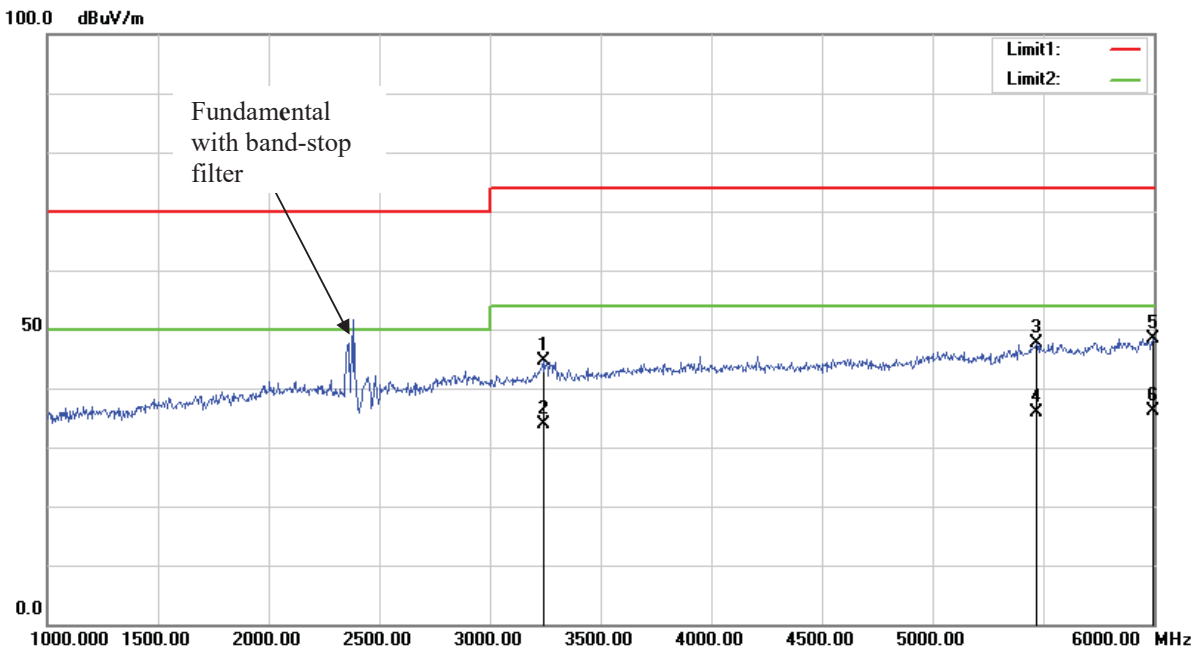
Polarization: Vertical
Model: M5-2C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	3275.000	37.17	peak	7.00	44.17	74.00	29.83
2	3275.000	25.78	AVG	7.00	32.78	54.00	21.22
3	4210.000	36.37	peak	9.35	45.72	74.00	28.28
4	4210.000	24.59	AVG	9.35	33.94	54.00	20.06
5	4882.500	38.24	peak	10.68	48.92	74.00	25.08
6	5492.500	36.53	peak	12.33	48.86	74.00	25.14
7	5492.500	24.62	AVG	12.33	36.95	54.00	17.05

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

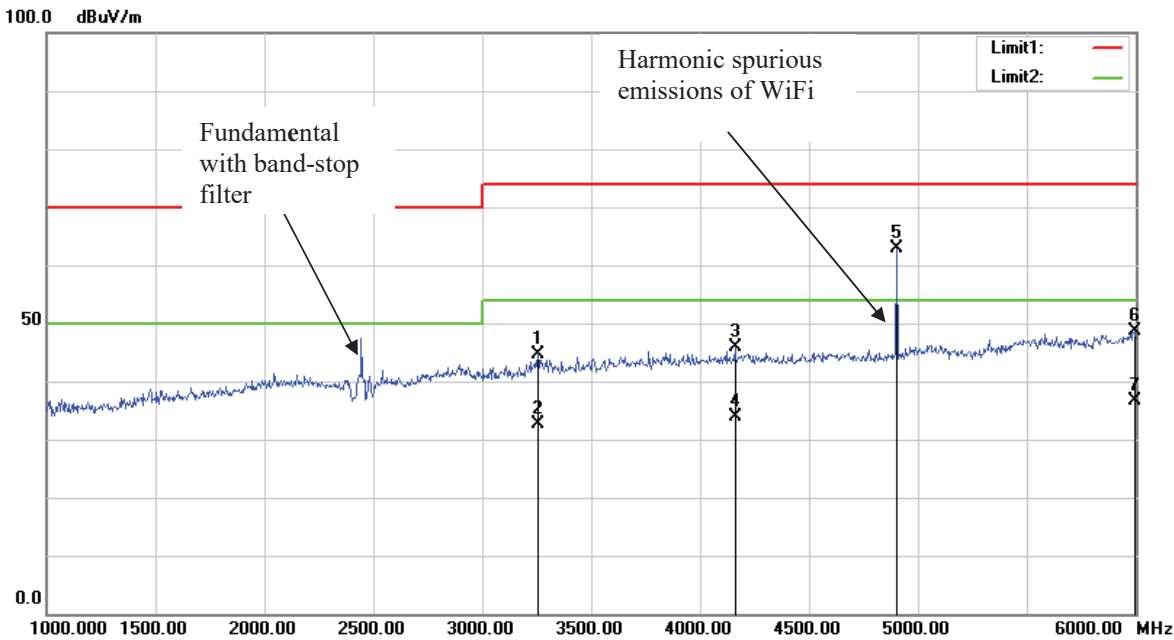
Polarization: Horizontal
Model: M5-1C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	3242.500	37.70	peak	6.94	44.64	74.00	29.36
2	3242.500	26.94	AVG	6.94	33.88	54.00	20.12
3	5472.500	35.28	peak	12.29	47.57	74.00	26.43
4	5472.500	23.51	AVG	12.29	35.80	54.00	18.20
5	5995.000	34.36	peak	14.05	48.41	74.00	25.59
6	5995.000	22.14	AVG	14.05	36.19	54.00	17.81

Condition: EN 301 489 Class B
Test Mode: Wireless Link&Full Load Operating

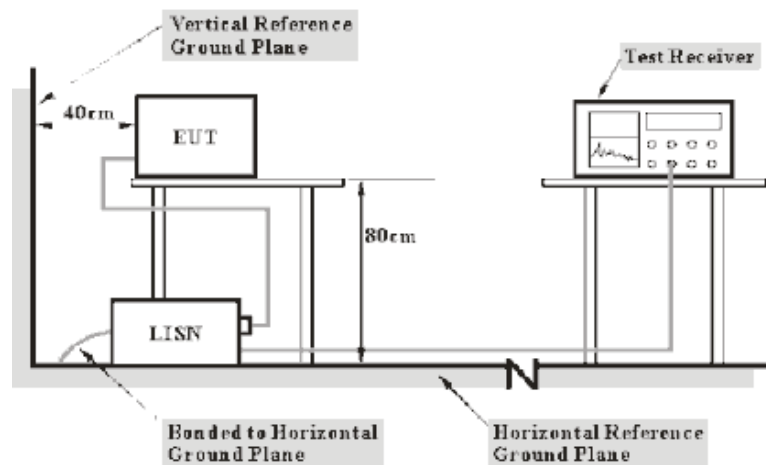
Polarization: Vertical
Model: M5-1C-86



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	3255.000	37.78	peak	6.97	44.75	74.00	29.25
2	3255.000	25.64	AVG	6.97	32.61	54.00	21.39
3	4160.000	36.55	peak	9.23	45.78	74.00	28.22
4	4160.000	24.61	AVG	9.23	33.84	54.00	20.16
6	5995.000	34.57	peak	14.05	48.62	74.00	25.38
7	5995.000	22.48	AVG	14.05	36.53	54.00	17.47

3 – AC MAINS POWER INPUT/OUTPUT PORTS

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per EN 301 489-1 measurement procedures. The specification used was with the EN 301 489-1 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

Power cable connected to AC230V/50Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emissions test, the Power cable was connected to the main outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Except for the recorded frequency points (no more than 6), the remaining frequency points have a margin more than 20dB.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result (QuasiPeak or Average) = Meter Reading + Corr.

Note:

Corr. = Cable loss + Factor of coupling device

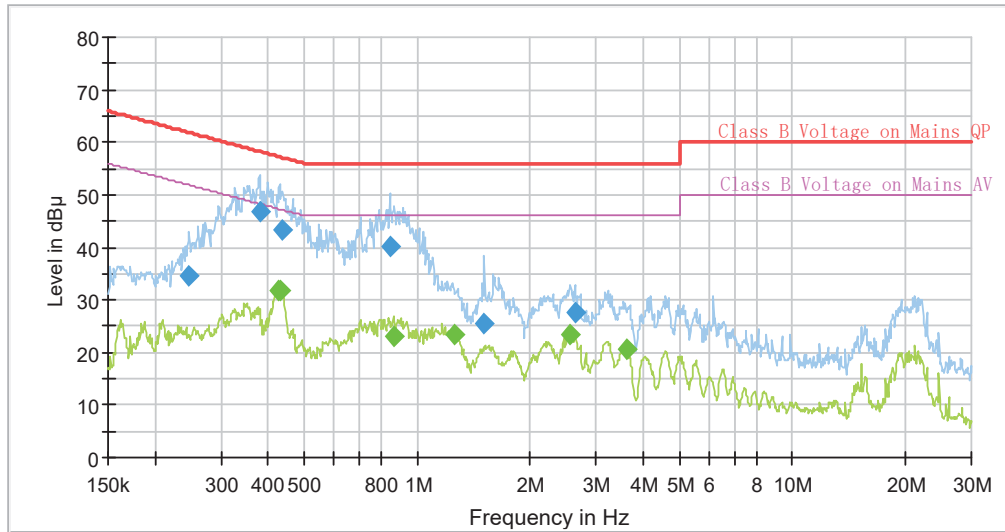
The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Result

Test Data

Please refer to following table and plots:

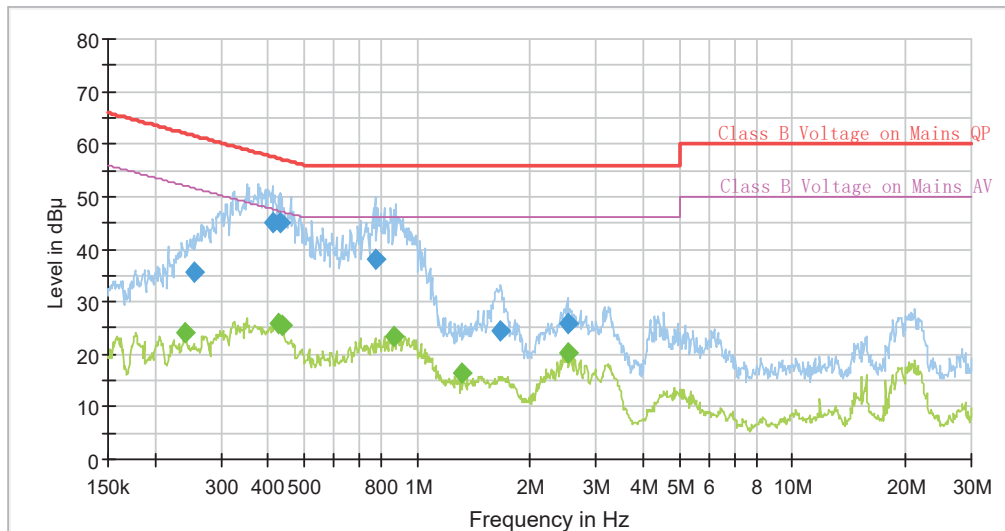
Port: L
Test Mode: Wireless Link&Full Load Operating
Note: M5-3C-86



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.247000	34.53	---	61.86	27.33	9.000	L1	9.6
0.381193	46.79	---	58.25	11.46	9.000	L1	9.6
0.427528	---	31.72	47.30	15.58	9.000	L1	9.6
0.433973	---	31.90	47.18	15.28	9.000	L1	9.6
0.438323	43.34	---	57.09	13.75	9.000	L1	9.6
0.846671	40.07	---	56.00	15.93	9.000	L1	9.7
0.863732	---	22.89	46.00	23.11	9.000	L1	9.7
1.255549	---	23.30	46.00	22.70	9.000	L1	9.7
1.510003	25.37	---	56.00	30.63	9.000	L1	9.7
2.562008	---	23.48	46.00	22.52	9.000	L1	9.7
2.639835	27.65	---	56.00	28.35	9.000	L1	9.7
3.614420	---	20.60	46.00	25.40	9.000	L1	9.7

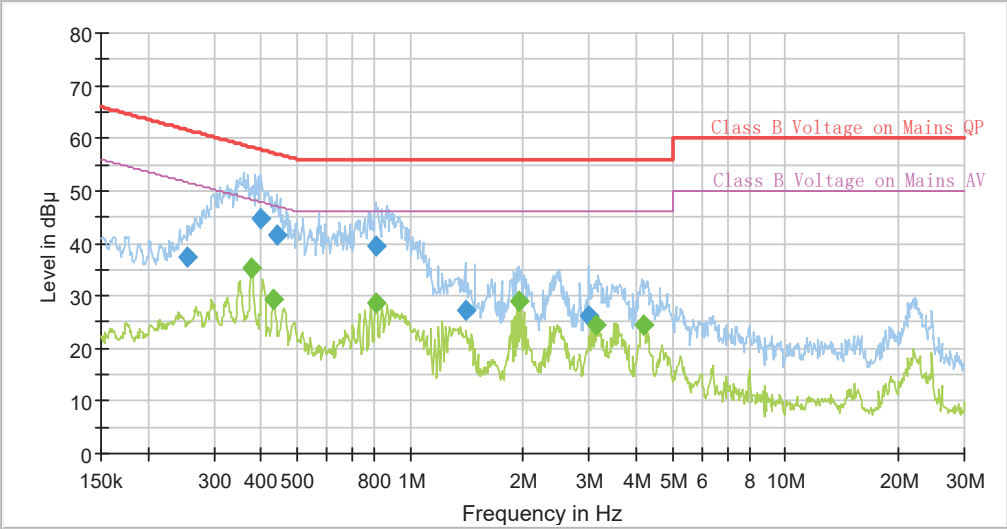
Port: N
Test Mode: Wireless Link&Full Load Operating
Note: M5-3C-86



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.240917	---	24.05	52.06	28.01	9.000	N	9.6
0.253237	35.50	---	61.65	26.15	9.000	N	9.6
0.410805	45.16	---	57.63	12.47	9.000	N	9.6
0.427528	---	25.84	47.30	21.46	9.000	N	9.6
0.433973	45.22	---	57.18	11.96	9.000	N	9.6
0.436143	---	25.40	47.13	21.73	9.000	N	9.6
0.773973	38.18	---	56.00	17.82	9.000	N	9.6
0.868051	---	23.26	46.00	22.74	9.000	N	9.6
1.313192	---	16.53	46.00	29.47	9.000	N	9.6
1.668396	24.49	---	56.00	31.51	9.000	N	9.6
2.511402	---	20.41	46.00	25.59	9.000	N	9.6
2.511402	25.68	---	56.00	30.32	9.000	N	9.6

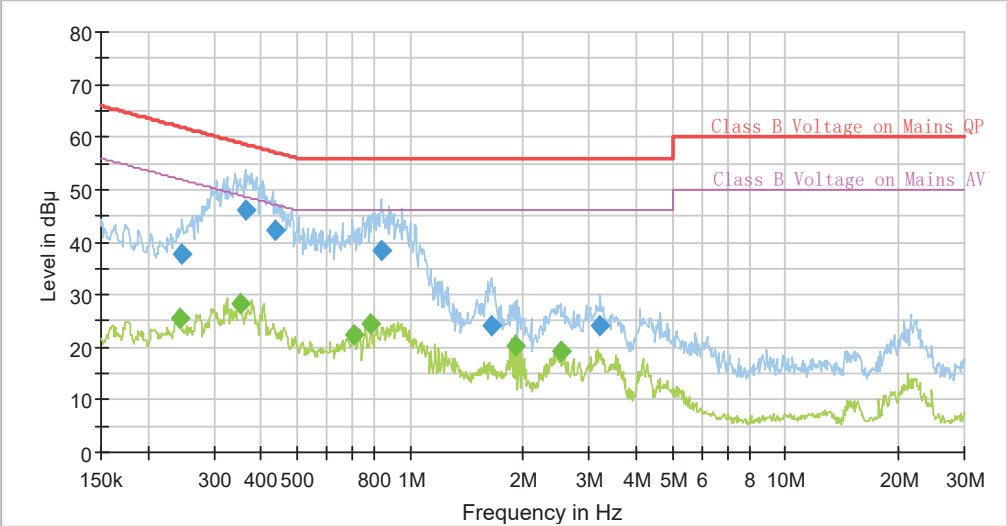
Port: L
Test Mode: Wireless Link&Full Load Operating
Note: M5-2C-86



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.254504	37.30	---	61.61	24.31	9.000	L1	9.6
0.379296	---	35.35	48.29	12.94	9.000	L1	9.6
0.400687	44.74	---	57.84	13.10	9.000	L1	9.6
0.433973	---	29.45	47.18	17.73	9.000	L1	9.6
0.440515	41.51	---	57.05	15.54	9.000	L1	9.6
0.809506	39.31	---	56.00	16.69	9.000	L1	9.7
0.813554	---	28.74	46.00	17.26	9.000	L1	9.7
1.401157	27.36	---	56.00	28.64	9.000	L1	9.7
1.947363	---	29.13	46.00	16.87	9.000	L1	9.7
2.990393	26.16	---	56.00	29.84	9.000	L1	9.7
3.143322	---	24.56	46.00	21.44	9.000	L1	9.7
4.197788	---	24.55	46.00	21.45	9.000	L1	9.7

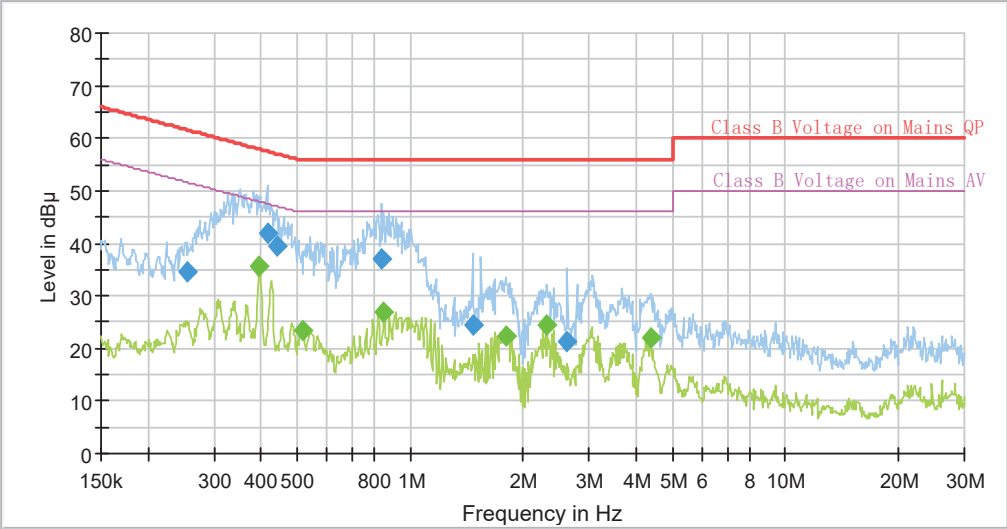
Port: N
Test Mode: Wireless Link&Full Load Operating
Note: M5-2C-86



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.242121	---	25.66	52.02	26.36	9.000	N	9.6
0.247000	37.56	---	61.86	24.30	9.000	N	9.6
0.351956	---	28.14	48.92	20.78	9.000	N	9.6
0.364460	46.01	---	58.63	12.62	9.000	N	9.6
0.438323	42.14	---	57.09	14.95	9.000	N	9.6
0.707516	---	22.51	46.00	23.49	9.000	N	9.6
0.785640	---	24.35	46.00	21.65	9.000	N	9.6
0.834097	38.49	---	56.00	17.51	9.000	N	9.6
1.643618	24.27	---	56.00	31.73	9.000	N	9.6
1.899401	---	20.37	46.00	25.63	9.000	N	9.6
2.511402	---	19.07	46.00	26.93	9.000	N	9.6
3.206662	24.23	---	56.00	31.77	9.000	N	9.6

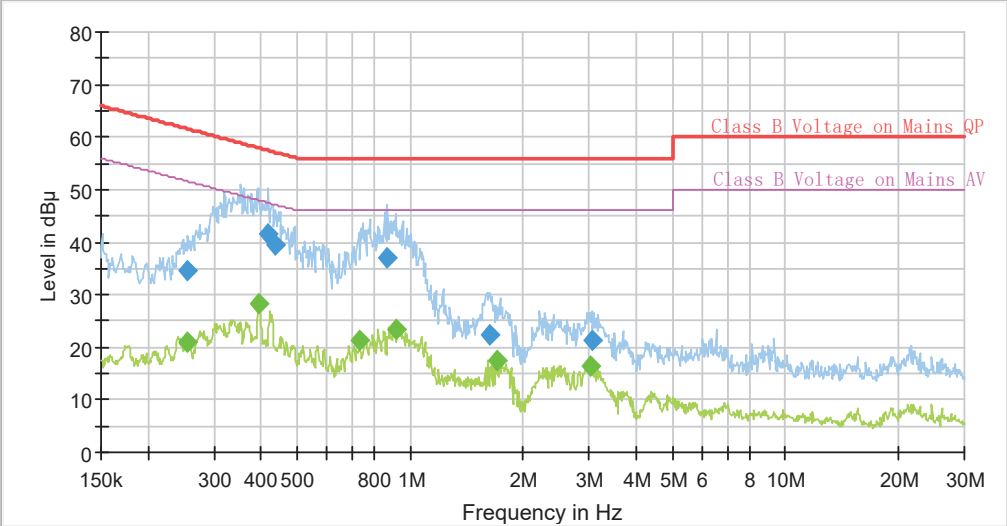
Port: L
Test Mode: Wireless Link&Full Load Operating
Note: M5-1C-86



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.253237	34.42	---	61.65	27.23	9.000	L1	9.6
0.396710	---	35.72	47.92	12.20	9.000	L1	9.6
0.416998	41.89	---	57.51	15.62	9.000	L1	9.6
0.440515	39.65	---	57.05	17.40	9.000	L1	9.6
0.519327	---	23.34	46.00	22.66	9.000	L1	9.6
0.838267	37.02	---	56.00	18.98	9.000	L1	9.7
0.850904	---	26.83	46.00	19.17	9.000	L1	9.7
1.465485	24.32	---	56.00	31.68	9.000	L1	9.7
1.798001	---	22.25	46.00	23.75	9.000	L1	9.7
2.318778	---	24.45	46.00	21.55	9.000	L1	9.7
2.626701	21.40	---	56.00	34.60	9.000	L1	9.7
4.368668	---	22.03	46.00	23.97	9.000	L1	9.7

Port: N
Test Mode: Wireless Link&Full Load Operating
Note: M5-1C-86

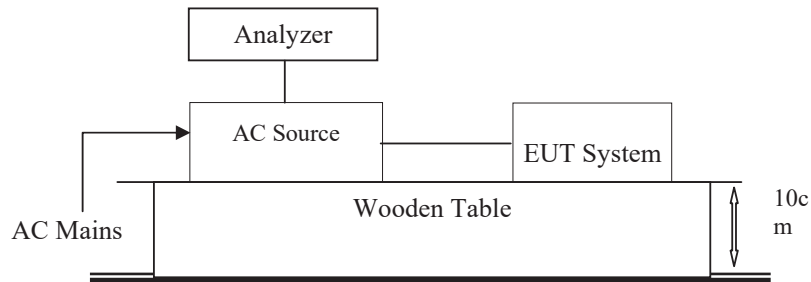


Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.254504	---	20.85	51.61	30.76	9.000	N	9.6
0.254504	34.47	---	61.61	27.14	9.000	N	9.6
0.394736	---	28.23	47.96	19.73	9.000	N	9.6
0.419083	41.48	---	57.47	15.99	9.000	N	9.6
0.438323	39.48	---	57.09	17.61	9.000	N	9.6
0.732654	---	21.26	46.00	24.74	9.000	N	9.6
0.868051	36.92	---	56.00	19.08	9.000	N	9.6
0.912443	---	23.24	46.00	22.76	9.000	N	9.6
1.627304	22.23	---	56.00	33.77	9.000	N	9.6
1.702015	---	17.63	46.00	28.37	9.000	N	9.6
3.020372	---	16.45	46.00	29.55	9.000	N	9.6
3.050651	21.28	---	56.00	34.72	9.000	N	9.6

4 - HARMONIC CURRENT EMISSIONS (AC MAINS INPUT PORT)

Test System Setup



Test Standard

EN 61000-3-2:2019

Test product class

Class A: - Balanced three-phase equipment

- Household appliances excluding equipment identified as class D
- Tools excluding portable tools
- Dimmers for incandescent lamps
- Audio equipment

Class B: - Portable tools

- Arc welding equipment, which is not professional equipment

Class C: - Lighting equipment

Class D: Equipment having a specified power less than or equal to 600w, of the following type:

- Personal computer and personal computer monitors
- Television receivers

Table 1 – Limits for Class A equipment

Harmonic order n	Maximum permissible harmonic current A
Odd harmonics	
3	2,30
5	1,14
7	0,77
9	0,40
11	0,33
13	0,21
$15 \leq n \leq 39$	$0,15 \frac{15}{n}$
Even harmonics	
2	1,08
4	0,43
6	0,30
$8 \leq n \leq 40$	$0,23 \frac{8}{n}$

Table 2 – Limits for Class C equipment

Harmonic order n	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	$30 \cdot \lambda^*$
5	10
7	7
9	5
$11 \leq n \leq 39$ (odd harmonics only)	3
* λ is the circuit power factor	

Table 3 – Limits for Class D equipment

Harmonic order n	Maximum permissible harmonic current per watt mA/W	Maximum permissible harmonic current A
3	3,4	2,30
5	1,9	1,14
7	1,0	0,77
9	0,5	0,40
11	0,35	0,33
$13 \leq n \leq 39$ (odd harmonics only)	$\frac{3,85}{n}$	See Table 1

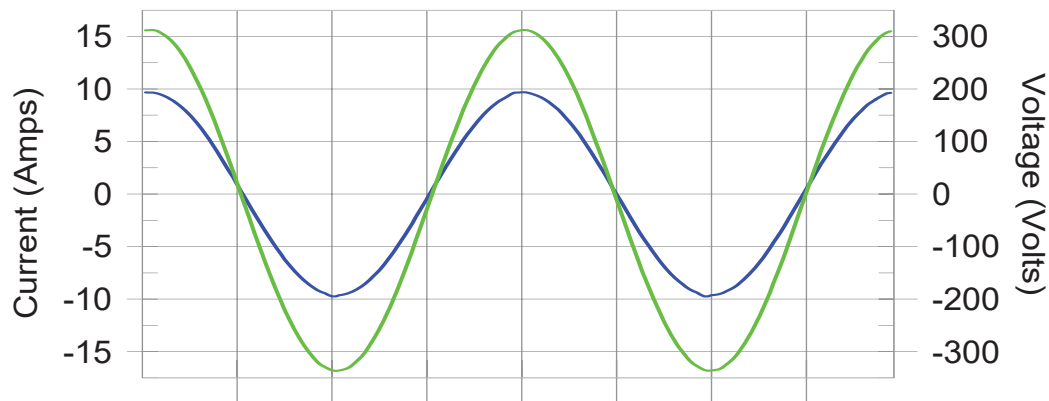
Test Data

Model: M5-3C-86

Test Result: Pass

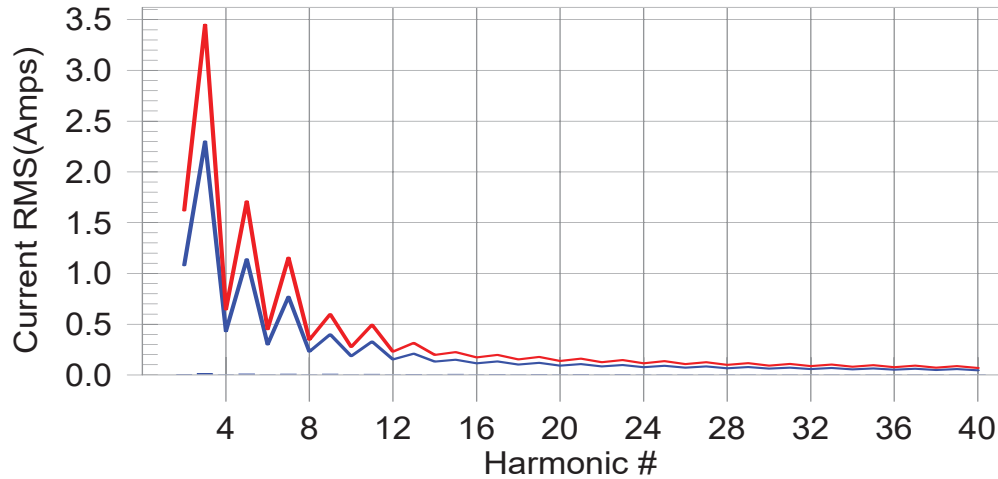
Source qualification: Normal

Current & voltage waveforms



Harmonics and Class A limit line

European Limits



Test result: Pass Worst harmonics H0-0.0% of 150% limit, H0-0% of 100% limit

Test Result: Pass Source qualification: Normal
 THC(A): 0.026 I-THD(%): 0.4 POHC(A): 0.005 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts): 229.75 Frequency(Hz): 50.00
 I_Peak (Amps): 9.786 I_RMS (Amps): 6.818
 I_Fund (Amps): 6.818 Crest Factor: 1.435
 Power (Watts): 1564.1 Power Factor: 0.999

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.003	1.080	N/A	0.004	1.620	N/A	Pass
3	0.014	2.300	N/A	0.016	3.450	N/A	Pass
4	0.001	0.430	N/A	0.002	0.645	N/A	Pass
5	0.011	1.140	N/A	0.012	1.710	N/A	Pass
6	0.001	0.300	N/A	0.002	0.450	N/A	Pass
7	0.009	0.770	N/A	0.009	1.155	N/A	Pass
8	0.001	0.230	N/A	0.001	0.345	N/A	Pass
9	0.009	0.400	N/A	0.009	0.600	N/A	Pass
10	0.001	0.184	N/A	0.001	0.276	N/A	Pass
11	0.008	0.330	N/A	0.008	0.495	N/A	Pass
12	0.000	0.153	N/A	0.001	0.230	N/A	Pass
13	0.006	0.210	N/A	0.006	0.315	N/A	Pass
14	0.000	0.131	N/A	0.000	0.197	N/A	Pass
15	0.006	0.150	N/A	0.006	0.225	N/A	Pass
16	0.000	0.115	N/A	0.000	0.173	N/A	Pass
17	0.004	0.132	N/A	0.005	0.198	N/A	Pass
18	0.000	0.102	N/A	0.001	0.153	N/A	Pass
19	0.003	0.118	N/A	0.003	0.178	N/A	Pass
20	0.000	0.092	N/A	0.000	0.138	N/A	Pass
21	0.003	0.107	N/A	0.003	0.161	N/A	Pass
22	0.000	0.084	N/A	0.001	0.125	N/A	Pass
23	0.002	0.098	N/A	0.002	0.147	N/A	Pass
24	0.000	0.077	N/A	0.000	0.115	N/A	Pass
25	0.002	0.090	N/A	0.002	0.135	N/A	Pass
26	0.000	0.071	N/A	0.000	0.107	N/A	Pass
27	0.001	0.083	N/A	0.001	0.125	N/A	Pass
28	0.000	0.066	N/A	0.000	0.099	N/A	Pass
29	0.002	0.078	N/A	0.002	0.116	N/A	Pass
30	0.000	0.061	N/A	0.000	0.092	N/A	Pass
31	0.001	0.073	N/A	0.001	0.109	N/A	Pass
32	0.000	0.058	N/A	0.000	0.086	N/A	Pass
33	0.001	0.068	N/A	0.001	0.102	N/A	Pass
34	0.000	0.054	N/A	0.000	0.081	N/A	Pass
35	0.001	0.064	N/A	0.001	0.096	N/A	Pass
36	0.000	0.051	N/A	0.000	0.077	N/A	Pass
37	0.001	0.061	N/A	0.001	0.091	N/A	Pass
38	0.000	0.048	N/A	0.000	0.073	N/A	Pass
39	0.001	0.058	N/A	0.001	0.087	N/A	Pass
40	0.000	0.046	N/A	0.000	0.069	N/A	Pass

Test Result: Pass

Source qualification: Normal

Highest parameter values during test:

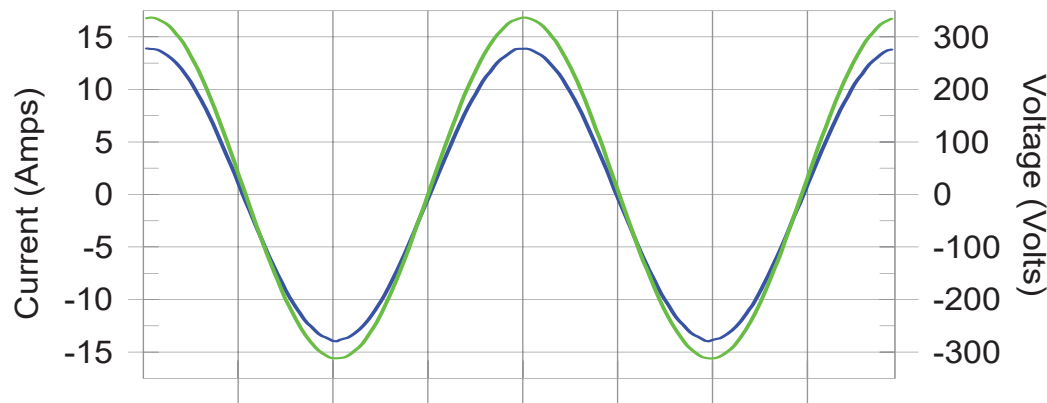
Voltage (Vrms):	229.75	Frequency(Hz):	50.00
I_Peak (Amps):	9.786	I_RMS (Amps):	6.818
I_Fund (Amps):	6.818	Crest Factor:	1.435
Power (Watts):	1564.1	Power Factor:	0.999

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.141	0.459	30.79	OK
3	0.586	2.067	28.36	OK
4	0.068	0.459	14.81	OK
5	0.091	0.919	9.92	OK
6	0.065	0.459	14.10	OK
7	0.054	0.689	7.86	OK
8	0.031	0.459	6.69	OK
9	0.039	0.459	8.47	OK
10	0.037	0.459	8.03	OK
11	0.027	0.230	11.96	OK
12	0.021	0.230	9.22	OK
13	0.012	0.230	5.36	OK
14	0.014	0.230	6.20	OK
15	0.015	0.230	6.39	OK
16	0.014	0.230	6.00	OK
17	0.017	0.230	7.47	OK
18	0.015	0.230	6.47	OK
19	0.014	0.230	5.99	OK
20	0.015	0.230	6.56	OK
21	0.007	0.230	3.12	OK
22	0.014	0.230	6.07	OK
23	0.007	0.230	3.15	OK
24	0.005	0.230	2.35	OK
25	0.009	0.230	4.11	OK
26	0.008	0.230	3.54	OK
27	0.009	0.230	3.81	OK
28	0.008	0.230	3.62	OK
29	0.008	0.230	3.35	OK
30	0.008	0.230	3.55	OK
31	0.004	0.230	1.87	OK
32	0.008	0.230	3.43	OK
33	0.007	0.230	2.94	OK
34	0.004	0.230	1.77	OK
35	0.003	0.230	1.14	OK
36	0.003	0.230	1.36	OK
37	0.005	0.230	2.39	OK
38	0.003	0.230	1.28	OK
39	0.004	0.230	1.66	OK
40	0.006	0.230	2.43	OK

Model: M5-2C-86

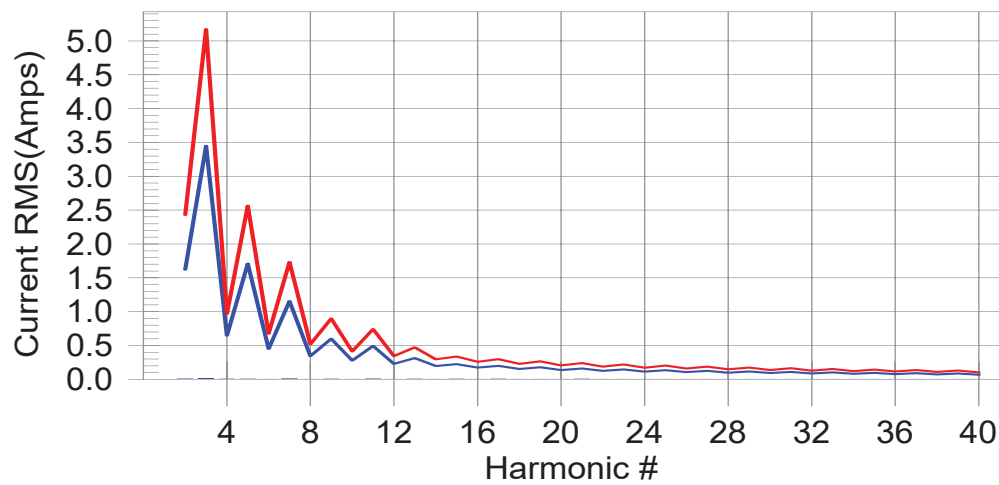
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class B limit line

European Limits



Test result: Pass Worst harmonics H0-0.0% of 150% limit, H0-0% of 100% limit

Test Result: Pass Source qualification: Normal
 THC(A): 0.018 I-THD(%): 0.4 POHC(A): 0.004 POHC Limit(A): 0.251

Highest parameter values during test:

V_RMS (Volts): 229.75 Frequency(Hz): 50.00
 I_Peak (Amps): 14.008 I_RMS (Amps): 9.803
 I_Fund (Amps): 9.776 Crest Factor: 1.468
 Power (Watts): 2242.8 Power Factor: 0.999

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.005	1.620	N/A	0.009	2.430	N/A	Pass
3	0.017	3.450	N/A	0.023	5.175	N/A	Pass
4	0.004	0.645	N/A	0.006	0.968	N/A	Pass
5	0.004	1.710	N/A	0.005	2.565	N/A	Pass
6	0.003	0.450	N/A	0.004	0.675	N/A	Pass
7	0.009	1.155	N/A	0.011	1.733	N/A	Pass
8	0.001	0.345	N/A	0.002	0.518	N/A	Pass
9	0.003	0.600	N/A	0.005	0.900	N/A	Pass
10	0.001	0.276	N/A	0.002	0.414	N/A	Pass
11	0.008	0.495	N/A	0.008	0.743	N/A	Pass
12	0.001	0.230	N/A	0.001	0.345	N/A	Pass
13	0.004	0.315	N/A	0.005	0.473	N/A	Pass
14	0.000	0.197	N/A	0.001	0.295	N/A	Pass
15	0.004	0.225	N/A	0.005	0.338	N/A	Pass
16	0.001	0.173	N/A	0.001	0.260	N/A	Pass
17	0.004	0.199	N/A	0.005	0.299	N/A	Pass
18	0.001	0.153	N/A	0.001	0.230	N/A	Pass
19	0.002	0.178	N/A	0.003	0.267	N/A	Pass
20	0.001	0.138	N/A	0.001	0.207	N/A	Pass
21	0.003	0.161	N/A	0.004	0.241	N/A	Pass
22	0.000	0.125	N/A	0.001	0.188	N/A	Pass
23	0.001	0.147	N/A	0.002	0.221	N/A	Pass
24	0.000	0.115	N/A	0.001	0.173	N/A	Pass
25	0.002	0.135	N/A	0.002	0.203	N/A	Pass
26	0.000	0.106	N/A	0.000	0.159	N/A	Pass
27	0.001	0.125	N/A	0.002	0.188	N/A	Pass
28	0.000	0.099	N/A	0.000	0.149	N/A	Pass
29	0.001	0.116	N/A	0.001	0.174	N/A	Pass
30	0.000	0.092	N/A	0.001	0.138	N/A	Pass
31	0.001	0.110	N/A	0.001	0.164	N/A	Pass
32	0.000	0.086	N/A	0.000	0.129	N/A	Pass
33	0.001	0.102	N/A	0.001	0.153	N/A	Pass
34	0.000	0.081	N/A	0.000	0.122	N/A	Pass
35	0.001	0.096	N/A	0.001	0.144	N/A	Pass
36	0.000	0.077	N/A	0.000	0.116	N/A	Pass
37	0.001	0.092	N/A	0.001	0.137	N/A	Pass
38	0.000	0.073	N/A	0.000	0.110	N/A	Pass
39	0.000	0.087	N/A	0.001	0.131	N/A	Pass
40	0.000	0.069	N/A	0.000	0.104	N/A	Pass

Voltage Source Verification Data (Run time)

Test Result: Pass

Source qualification: Normal

Highest parameter values during test:

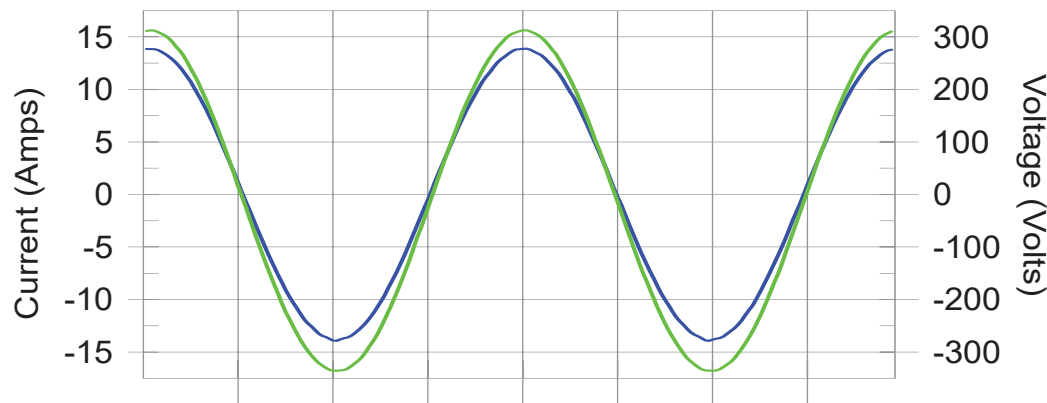
Voltage (Vrms): 229.75	Frequency(Hz): 50.00
I_Peak (Amps): 14.008	I_RMS (Amps): 9.803
I_Fund (Amps): 9.776	Crest Factor: 1.468
Power (Watts): 2242.8	Power Factor: 0.999

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.135	0.459	29.28	OK
3	0.568	2.067	27.46	OK
4	0.081	0.459	17.57	OK
5	0.080	0.919	8.66	OK
6	0.084	0.459	18.28	OK
7	0.063	0.689	9.14	OK
8	0.044	0.459	9.68	OK
9	0.025	0.459	5.38	OK
10	0.041	0.459	8.95	OK
11	0.033	0.230	14.31	OK
12	0.017	0.230	7.21	OK
13	0.024	0.230	10.59	OK
14	0.014	0.230	6.12	OK
15	0.014	0.230	5.89	OK
16	0.015	0.230	6.60	OK
17	0.014	0.230	6.02	OK
18	0.016	0.230	7.07	OK
19	0.013	0.230	5.88	OK
20	0.014	0.230	6.24	OK
21	0.005	0.230	2.31	OK
22	0.013	0.230	5.77	OK
23	0.009	0.230	4.13	OK
24	0.005	0.230	2.27	OK
25	0.009	0.230	3.93	OK
26	0.008	0.230	3.63	OK
27	0.007	0.230	3.07	OK
28	0.006	0.230	2.73	OK
29	0.007	0.230	3.03	OK
30	0.007	0.230	3.20	OK
31	0.006	0.230	2.60	OK
32	0.007	0.230	3.19	OK
33	0.007	0.230	2.91	OK
34	0.006	0.230	2.42	OK
35	0.004	0.230	1.60	OK
36	0.004	0.230	1.74	OK
37	0.006	0.230	2.52	OK
38	0.003	0.230	1.40	OK
39	0.004	0.230	1.67	OK
40	0.005	0.230	2.20	OK

Model: M5-1C-86

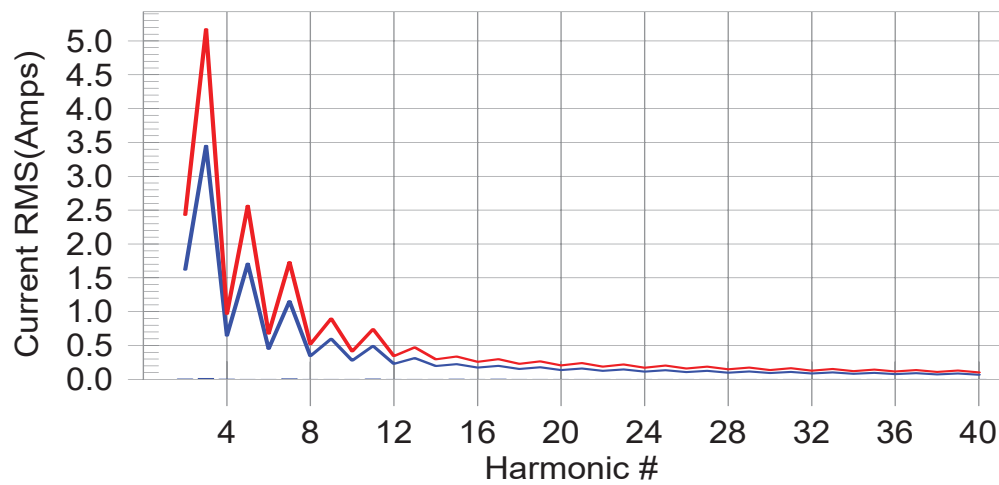
Test Result: Pass Source qualification: Normal

Current & voltage waveforms



Harmonics and Class B limit line

European Limits



Test result: Pass Worst harmonics H0-0.0% of 150% limit, H0-0% of 100% limit

Test Result: Pass Source qualification: Normal
 THC(A): 0.022 I-THD(%): 0.2 POHC(A): 0.004 POHC Limit(A): 0.377

Highest parameter values during test:

V_RMS (Volts): 229.75 Frequency(Hz): 50.00
 I_Peak (Amps): 13.982 I_RMS (Amps): 9.795
 I_Fund (Amps): 9.795 Crest Factor: 1.436
 Power (Watts): 2247.0 Power Factor: 0.999

Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.006	1.620	N/A	0.008	2.430	N/A	Pass
3	0.016	3.450	N/A	0.023	5.175	N/A	Pass
4	0.004	0.645	N/A	0.005	0.968	N/A	Pass
5	0.003	1.710	N/A	0.004	2.565	N/A	Pass
6	0.003	0.450	N/A	0.004	0.675	N/A	Pass
7	0.008	1.155	N/A	0.010	1.733	N/A	Pass
8	0.001	0.345	N/A	0.002	0.518	N/A	Pass
9	0.002	0.600	N/A	0.004	0.900	N/A	Pass
10	0.001	0.276	N/A	0.002	0.414	N/A	Pass
11	0.007	0.495	N/A	0.007	0.743	N/A	Pass
12	0.001	0.230	N/A	0.001	0.345	N/A	Pass
13	0.003	0.315	N/A	0.004	0.473	N/A	Pass
14	0.001	0.197	N/A	0.001	0.295	N/A	Pass
15	0.004	0.225	N/A	0.004	0.338	N/A	Pass
16	0.001	0.173	N/A	0.001	0.260	N/A	Pass
17	0.004	0.199	N/A	0.004	0.299	N/A	Pass
18	0.001	0.153	N/A	0.001	0.230	N/A	Pass
19	0.002	0.178	N/A	0.003	0.267	N/A	Pass
20	0.001	0.138	N/A	0.001	0.207	N/A	Pass
21	0.003	0.161	N/A	0.003	0.241	N/A	Pass
22	0.000	0.125	N/A	0.001	0.188	N/A	Pass
23	0.001	0.147	N/A	0.001	0.221	N/A	Pass
24	0.000	0.115	N/A	0.000	0.173	N/A	Pass
25	0.002	0.135	N/A	0.002	0.203	N/A	Pass
26	0.000	0.106	N/A	0.000	0.159	N/A	Pass
27	0.001	0.125	N/A	0.002	0.188	N/A	Pass
28	0.000	0.099	N/A	0.000	0.149	N/A	Pass
29	0.001	0.116	N/A	0.001	0.174	N/A	Pass
30	0.000	0.092	N/A	0.000	0.138	N/A	Pass
31	0.001	0.110	N/A	0.001	0.164	N/A	Pass
32	0.000	0.086	N/A	0.000	0.129	N/A	Pass
33	0.000	0.102	N/A	0.001	0.153	N/A	Pass
34	0.000	0.081	N/A	0.000	0.122	N/A	Pass
35	0.001	0.096	N/A	0.001	0.144	N/A	Pass
36	0.000	0.077	N/A	0.000	0.116	N/A	Pass
37	0.001	0.092	N/A	0.001	0.137	N/A	Pass
38	0.000	0.073	N/A	0.000	0.110	N/A	Pass
39	0.000	0.087	N/A	0.001	0.131	N/A	Pass
40	0.000	0.069	N/A	0.000	0.104	N/A	Pass

Test Result: Pass

Source qualification: Normal

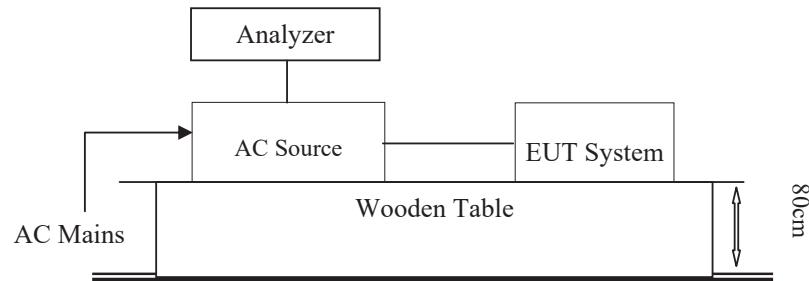
Highest parameter values during test:

Voltage (Vrms):	229.75	Frequency(Hz):	50.00
I_Peak (Amps):	13.982	I_RMS (Amps):	9.795
I_Fund (Amps):	9.795	Crest Factor:	1.436
Power (Watts):	2247.0	Power Factor:	0.999

Harm#	Harmonics V-rms	Limit V-rms	% of Limit	Status
2	0.132	0.459	28.77	OK
3	0.576	2.067	27.86	OK
4	0.090	0.459	19.68	OK
5	0.089	0.919	9.68	OK
6	0.092	0.459	19.92	OK
7	0.067	0.689	9.68	OK
8	0.042	0.459	9.09	OK
9	0.033	0.459	7.09	OK
10	0.044	0.459	9.47	OK
11	0.037	0.230	16.30	OK
12	0.020	0.230	8.55	OK
13	0.030	0.230	13.19	OK
14	0.014	0.230	6.04	OK
15	0.015	0.230	6.40	OK
16	0.017	0.230	7.21	OK
17	0.016	0.230	6.82	OK
18	0.019	0.230	8.18	OK
19	0.013	0.230	5.68	OK
20	0.016	0.230	6.89	OK
21	0.006	0.230	2.65	OK
22	0.013	0.230	5.80	OK
23	0.008	0.230	3.53	OK
24	0.006	0.230	2.76	OK
25	0.010	0.230	4.22	OK
26	0.009	0.230	3.85	OK
27	0.008	0.230	3.66	OK
28	0.007	0.230	2.94	OK
29	0.008	0.230	3.37	OK
30	0.007	0.230	3.21	OK
31	0.007	0.230	3.19	OK
32	0.008	0.230	3.34	OK
33	0.008	0.230	3.43	OK
34	0.005	0.230	2.29	OK
35	0.004	0.230	1.79	OK
36	0.004	0.230	1.77	OK
37	0.005	0.230	2.22	OK
38	0.003	0.230	1.50	OK
39	0.005	0.230	2.30	OK
40	0.006	0.230	2.43	OK

5 – VOLTAGE FLUCTUATIONS AND FLICKER (AC MAINS INPUT PORT)

Test System Setup



Test Standard

EN 61000-3-3:2013

Flicker Test Limits :

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6 and annex A. Tests made to prove compliance with the limits are considered to be type tests.

The following limits apply:

- the value of Pst shall not be greater than 1,0;
- the value of Plt shall not be greater than 0,65;
- the value of d(t) during a voltage change shall not exceed 3,3 % for more than 500 ms;
- the relative steady-state voltage change, dc, shall not exceed 3,3 %;
- the maximum relative voltage change dmax, shall not exceed

a) 4 % without additional conditions;

b) 6 % for equipment which is:

switched manually, or

- switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

Note: The cycling frequency will be further limited by the Pst and Plt limit. For example: a dmax of 6 % producing a rectangular voltage change characteristic twice per hour will give a Plt of about 0,65.

c) 7 % for equipment which is

- attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
- switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

In the case of equipment having several separately controlled circuits in accordance with 6.6, limits b) and c) shall apply only if there is delayed or manual restart after a power supply interruption; for all equipment with automatic switching which is energized immediately on restoration of supply after a power supply interruption, limits a) shall apply; for all equipment with manual switching, limits b) or c) shall apply depending on the rate of switching. Pst and Plt requirements shall not be applied to voltage changes caused by manual switching. The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions.

Test Data

Please refer to following tables:

Short time (Pst): 10 min
Observation time: 120 min (12 Flicker measurement)
Test Mode: Wireless Link&Full Load Operating
Power Source: AC 230V/50Hz
Test Result: PASS

Maximum Flicker results M5-1C-86

	EUT values	Limit	Result
Pst	0.138	1.00	PASS
Plt	0.138	0.65	PASS
dc [%]	0.012	3.30	PASS
dmax [%]	1.521	4.00	PASS
dt [s]	0.000	0.50	PASS

Maximum Flicker results M5-2C-86

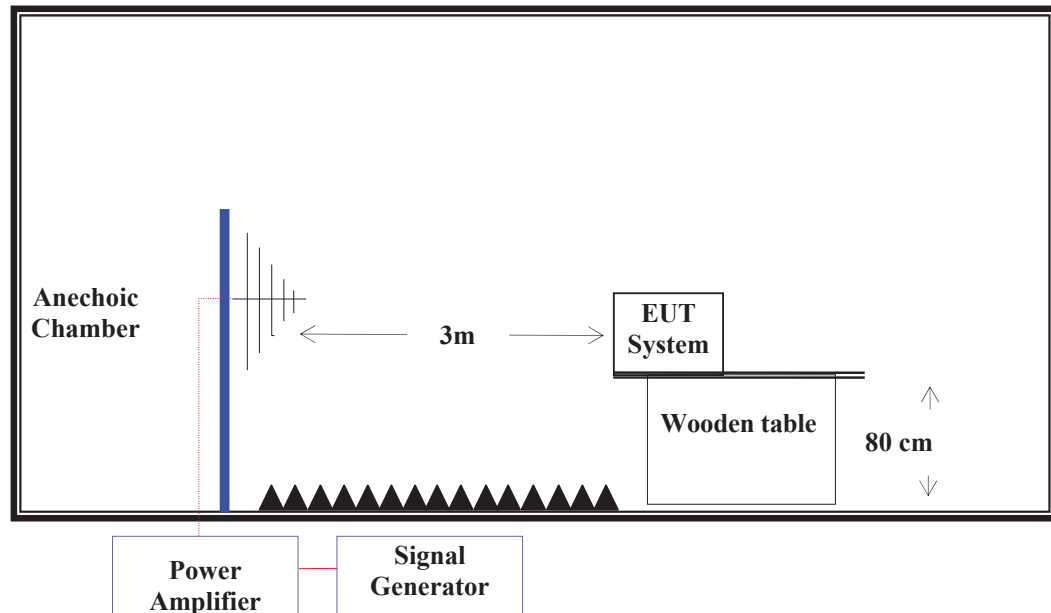
	EUT values	Limit	Result
Pst	0.085	1.00	PASS
Plt	0.085	0.65	PASS
dc [%]	0.008	3.30	PASS
dmax [%]	0.187	4.00	PASS
dt [s]	0.000	0.50	PASS

Maximum Flicker results M5-3C-86

	EUT values	Limit	Result
Pst	0.094	1.00	PASS
Plt	0.094	0.65	PASS
dc [%]	0.204	3.30	PASS
dmax [%]	0.716	4.00	PASS
dt [s]	0.000	0.50	PASS

7 – RADIO FREQUENCY ELECTROMAGNETIC FIELDS (80 MHZ TO 6 000 MHZ)

Test System Setup



Test Level

Level	Field Strength V/m
1.	1
2.	3
3.	10
X.	Special

Performance Criterion: A

General Performance Criteria:

- The apparatus shall continue to operate as intended during and after the test. The manufacturer specifies some minimum performance level. The performance level may be specified by the manufacture as a permissible loss of performance.
- The apparatus shall continue to operate as intended after the test. This indicates that the EUT does not need to function at normal performance levels during the test, but must recover. Again some minimal performance is defined by the manufacture. No change in operating state or loss or data is permitted.
- Temporary loss of function is allowed. Operation of the EUT may stop as long as it is either automatically reset or can be manually restored by operation of the controls.
- The apparatus is broken, cannot be normal operated.

Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above the ground. The EUT is set 3 meters away from the antenna which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are set on test. Each of the four sides of EUT must be faced this antenna and measured individually.

In order to judge the EUT performance, a CCD camera and Multimeter were used to monitor the EUT.

Test Data

Please refer to following tables:

Test Mode:	Wireless Link&Full Load Operating
Note:	M5-3C-86, M5-2C-86, M5-1C-86

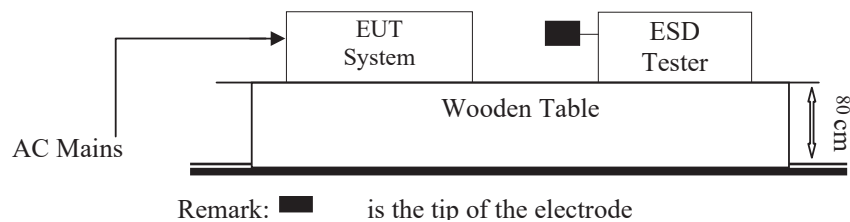
Condition of Test	Remarks
Field Strength	3 V/m (Test Level 2)
RF Signal	1 kHz, 80% AM, sine wave
Sweep Frequency Step	1%, logarithmic
Dwell Time	1 Sec

Frequency Range (MHz)	Front Side		Rear Side		Left Side		Right Side	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	A	A	A	A	A	A	A	A
1000-6000	A	A	A	A	A	A	A	A

Note: "A" stand for, during test, operate as intended no loss of function, no degradation of performance, no unintentional transmissions and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.

8 – ELECTROSTATIC DISCHARGES

Test System Setup



EN 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.6 by 0.8-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

Test Level

Level	Test Voltage Contact Discharge (±kV)	Test Voltage Air Discharge (±kV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X.	Special	Special

Test Level 3 for Air Discharge at ±8 kV

Test Level 2 for Direct Discharge at ±4 kV

Performance criterion: B

Test Procedure

Air Discharge:

This test is done on a non-conductive surface. 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 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Contact Discharge:

All the procedure shall be same as Section 8.3.1 of EN 61000-4-2, except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

Indirect discharge for horizontal coupling plane

At least 50 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane

At least 50 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 Data

Please refer to following tables:

Test Mode:	Wireless Link&Full Load Operating
Note:	M5-3C-86, M5-2C-86, M5-1C-86

Table 1: Electrostatic Discharge Immunity (Air Discharge)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-8 kV	+8 kV	-15 kV	+15 kV
Non-metallic Shell	A	A	A	A	A	A	/	/
Seam	A	A	A	A	A	A	/	/
Button	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
/	/	/	/	/	/	/	/	/

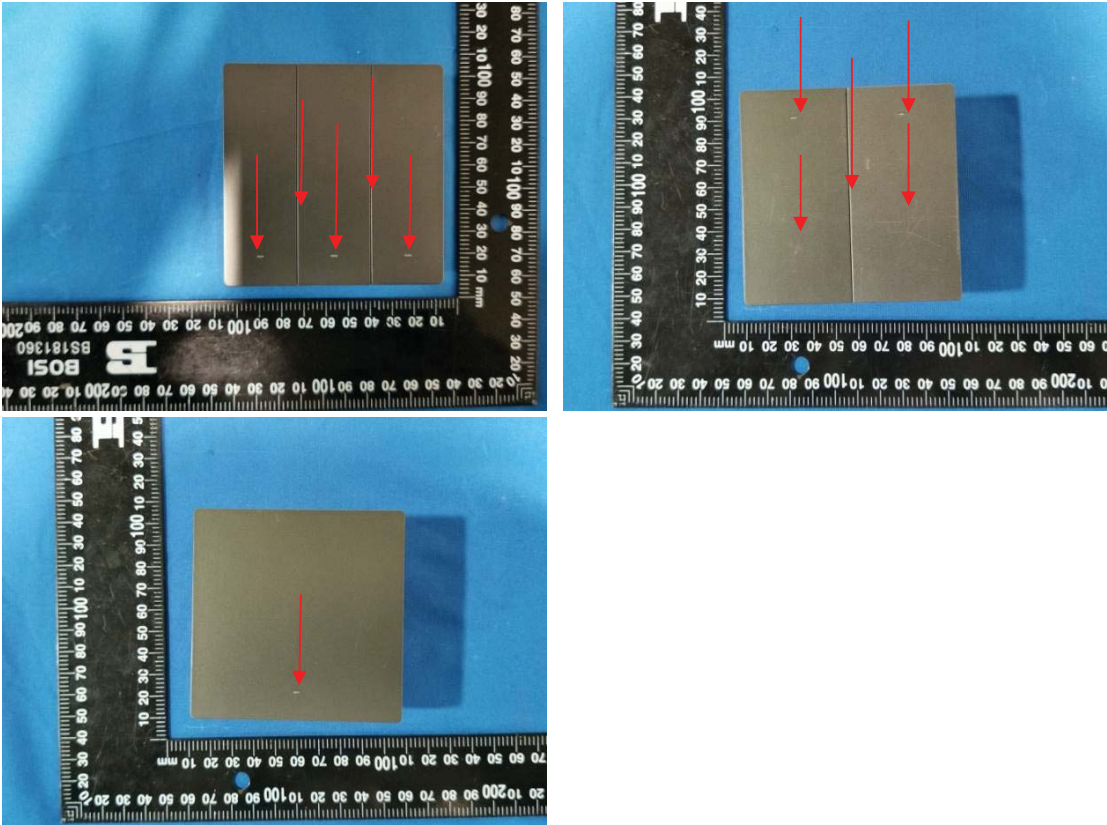
Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

Test Points Location	Test Level							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

ESD Location Photo



Air Discharge:

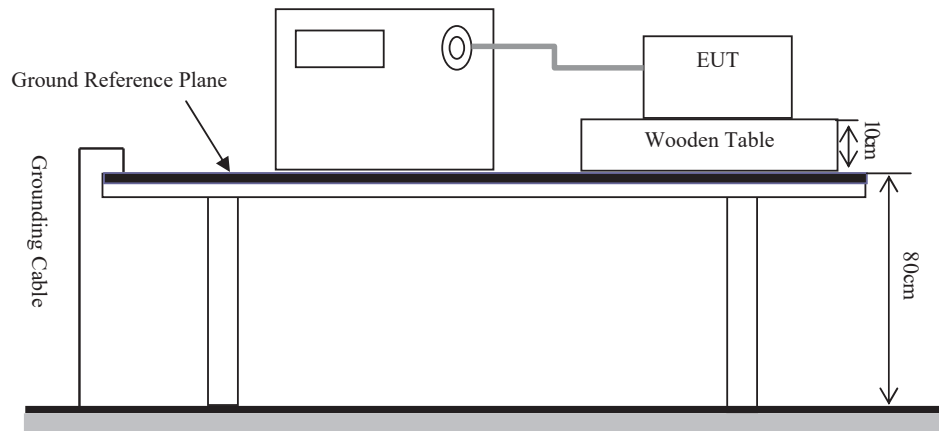


Direct Contact:



9 – FAST TRANSIENTS, COMMON MODE

Test System Setup



Test Level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Test Level 2 for AC power supply lines at 1 kV

Performance Criterion: B

Test Procedure

The EUT was arranged for Power Line Coupling and for I/O Line Coupling through a capacitive clamp, where applicable. (Note: The I/O coupling test using a capacitive clamp is performed on the I/O interface cables that are longer in length than 3 meters.) A metal ground plane 2.4 meter by 2.0 meter was placed between the floor and the table and is connected to the earth by a 2.0 meter ground rod. The ground rod is connected to the test facility's electrical earth.

Test Data

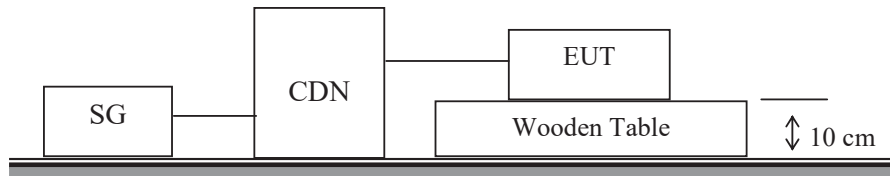
Please refer to following tables:

Test Mode:	Wireless Link&Full Load Operating
Note:	M5-3C-86, M5-2C-86, M5-1C-86

Test Points		Test Level (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
AC mains power input ports	L	A	A	A	A	/	/	/	/
	N	A	A	A	A	/	/	/	/
	Earth	/	/	/	/	/	/	/	/
	L+N	A	A	A	A	/	/	/	/
	L + Earth	/	/	/	/	/	/	/	/
	N + Earth	/	/	/	/	/	/	/	/
	L+N+Earth	/	/	/	/	/	/	/	/
Signal ports	/	/	/	/	/	/	/	/	/

10 – RADIO FREQUENCY, COMMON MODE

Test Setup



Test Level

Level	Voltage Level (r.m.s.) (U ₀)
1	1
2	3
3	10
X	Special

Test level 2 at 3 V (r.m.s.)

Performance Criterion: A

Test Procedure

- 1) Let the EUT work in test mode and test it.
- 2) The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 3) The disturbance signal described below is injected to EUT through CDN.
- 4) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 5) The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.
- 6) Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5 s.
- 7) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

Test Data

:

Please refer to following tables:

Test Mode:	Wireless Link&Full Load Operating
Note:	M5-3C-86, M5-2C-86, M5-1C-86

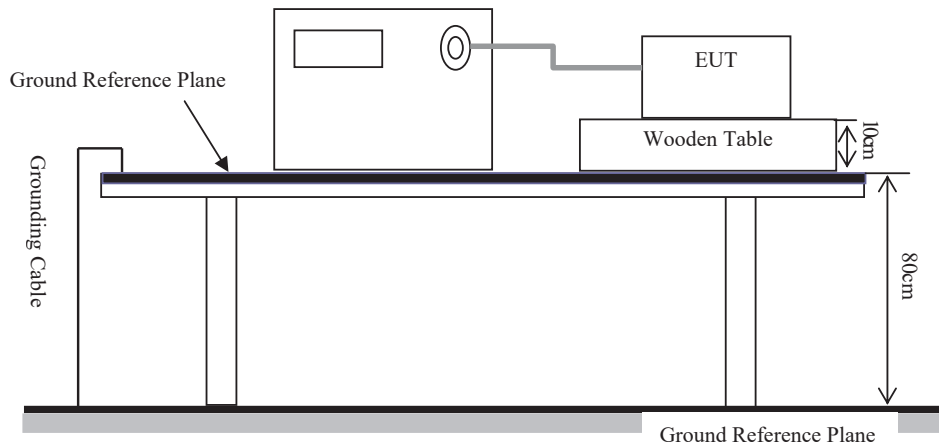
Table 1: AC mains power input port

Frequency range: 150 kHz to 80 MHz
■ Modulated: Amplitude 80%, 1kHz sine wave □ Unmodulated □ Other:
Severity Level: 3 V Unmodulated , r.m.s

Level	Voltage Level (e.m.f.) U_0	Pass	Fail
1	1	/	/
2	3	A	/
3	10	/	/
X	Special	/	/

12 – VOLTAGE DIPS AND SHORT INTERRUPTIONS

Test Setup



Test Level and Performance Criterion

Test Level	Voltage dip and short interruptions (%) Residual	Duration (in period)	Performance criterion
1	0	0.5	B
2	0	1	B
3	70	25	C
4	0	250	C

Test Procedure

- 1) The interruption is introduced at selected phase angles with specified duration.
- 2) Record any degradation of performance.

Test Data

Please refer to following tables:

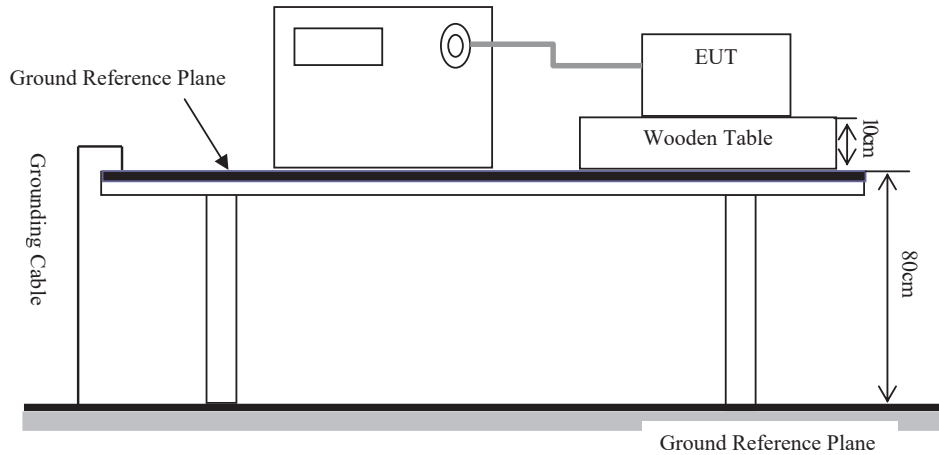
Test Mode:	Wireless Link&Full Load Operating
Note:	C means that the EUT will be powered off during the test and manual operation is required to resume normal operation

Table 1: Voltage Dips/Interruptions Test

U2 (% Reduction)	Td (Periods)	Phase Angle	N	Result
100	0.5	0/90/180/270	3	A
100	1	0/90/180/270	3	A
30	25	0/90/180/270	3	A
100	250	0/90/180/270	3	C

13 – SURGES

Test System Setup



Test Level

Level	Open Circuit Output Test Voltage $\pm 10\%$
1	0.5 kV
2	1 kV
3	2 kV
4	4 kV
X	Special

AC Mains: L-N: Test level 2 at 1 kV

Performance Criterion: B

Test Procedure

- 1) For line to line coupling mode, provide a 0.5 kV 1.2/50us voltage surge (at open-circuit condition).
- 2) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 3) Different phase angles are done individually.
- 4) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

Test Data

Please refer to following tables:

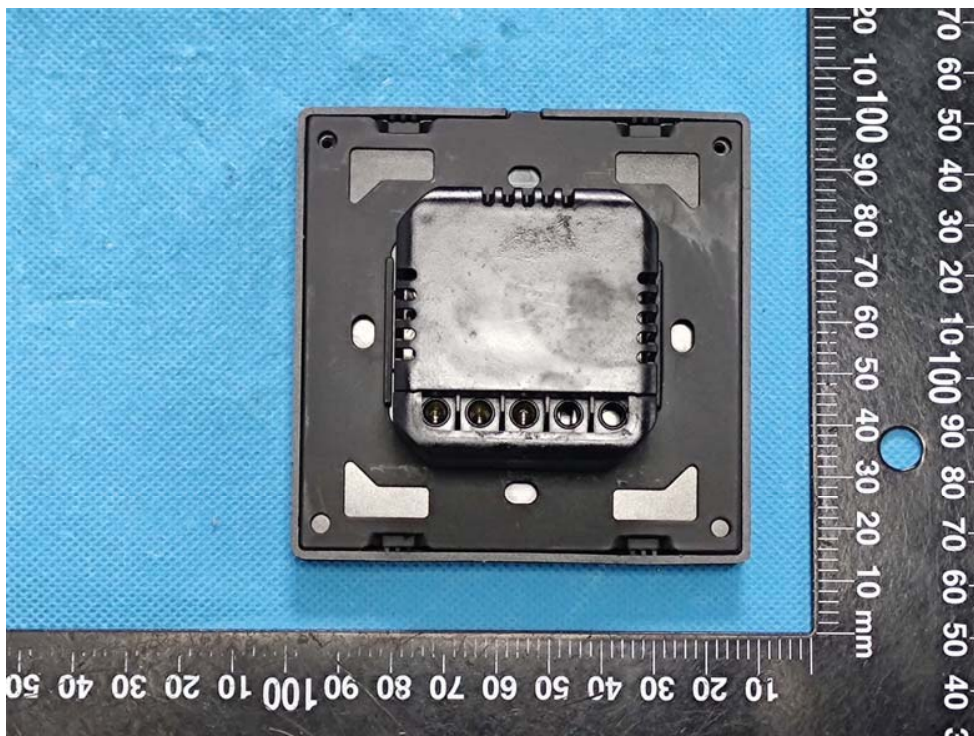
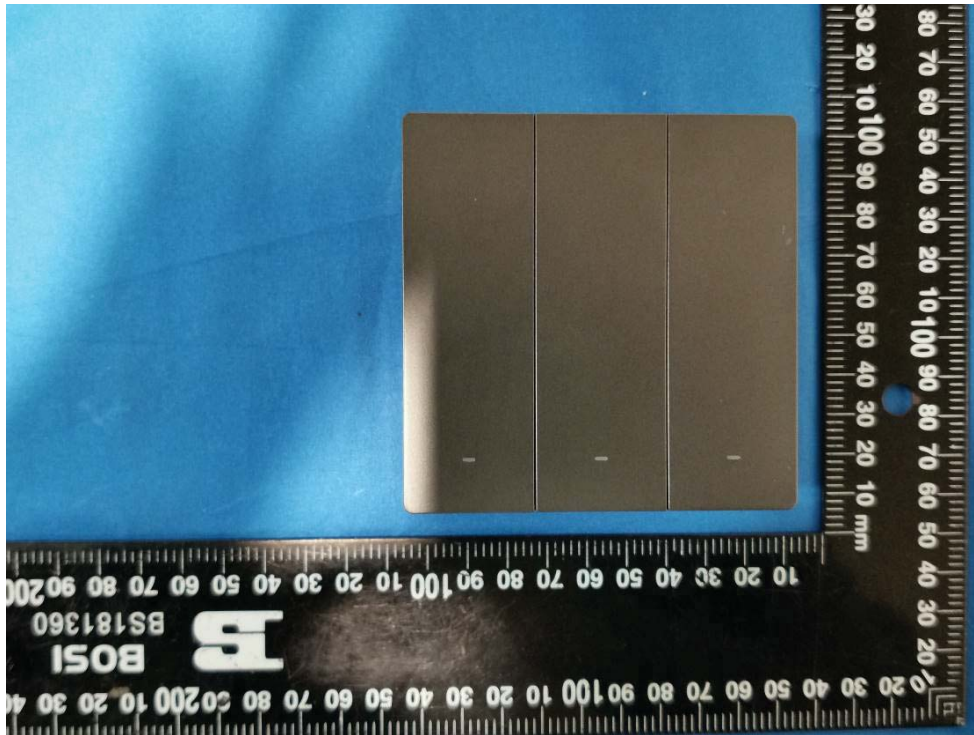
Test Mode:	Wireless Link&Full Load Operating
Note:	M5-3C-86, M5-2C-86, M5-1C-86

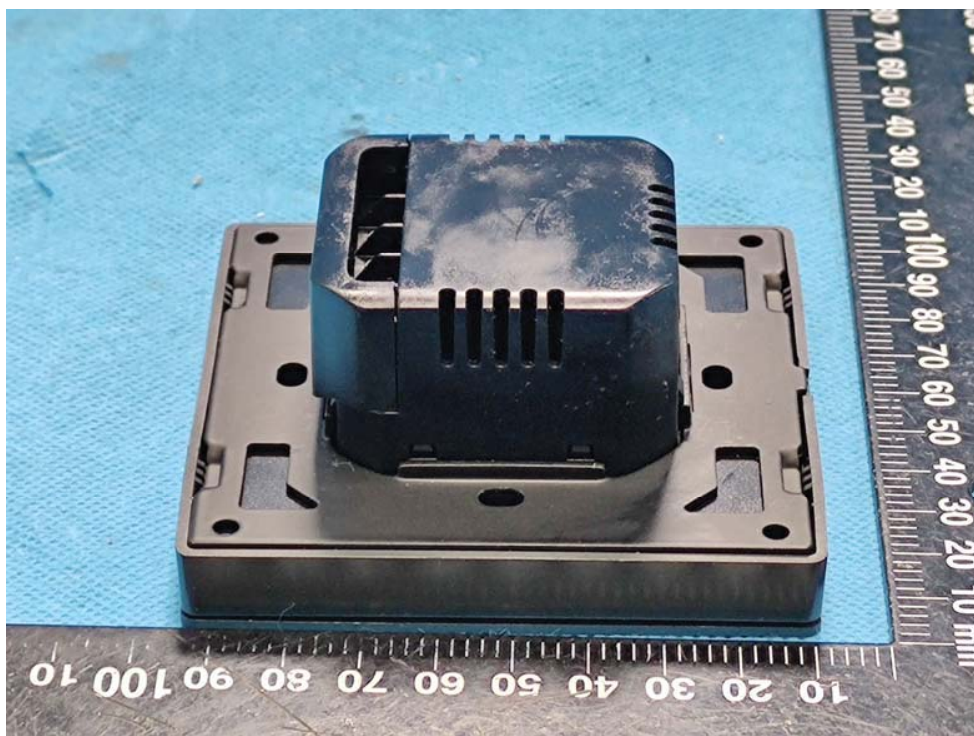
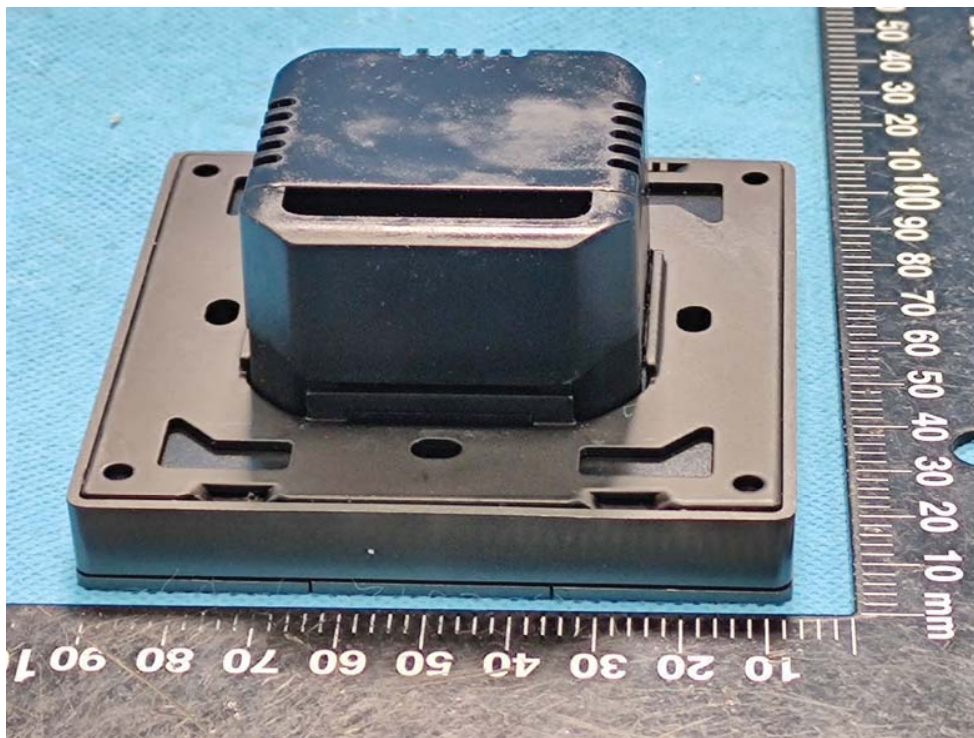
Table 1: _____ AC _____ mains power input port

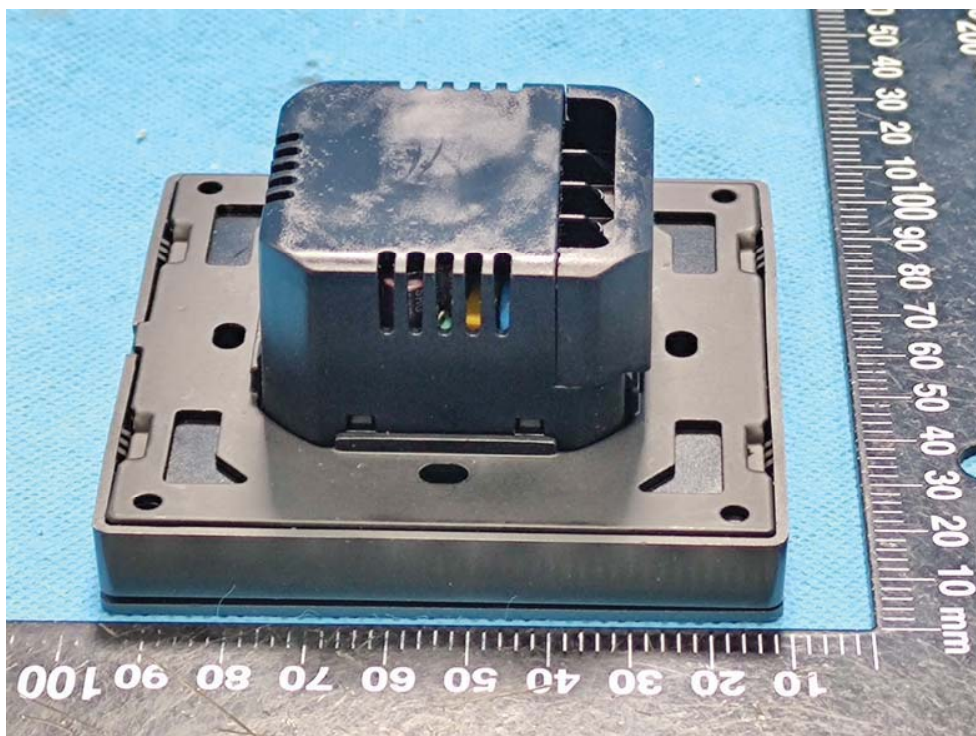
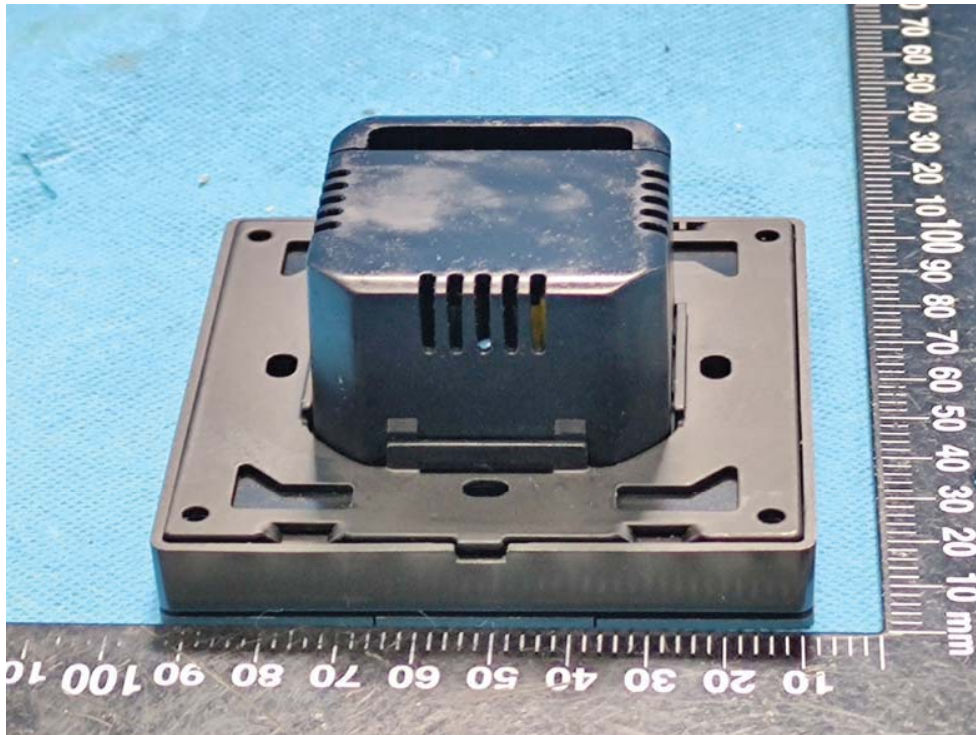
Level	Voltage	Poll	Path	Pass	Fail
1	0.5kV	±	Line-Line	A	/
2	1kV	±	Line-Line	A	/
3	2kV	±	/	/	/
4	4kV	±	/	/	/

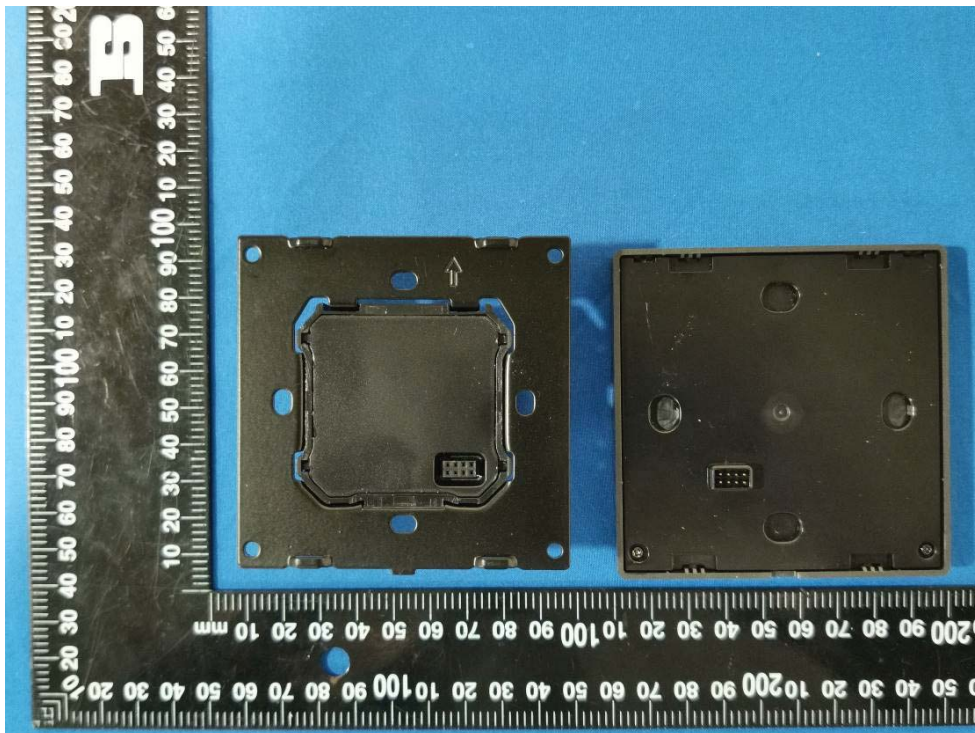
EXHIBIT A – EUT PHOTOGRAPHS

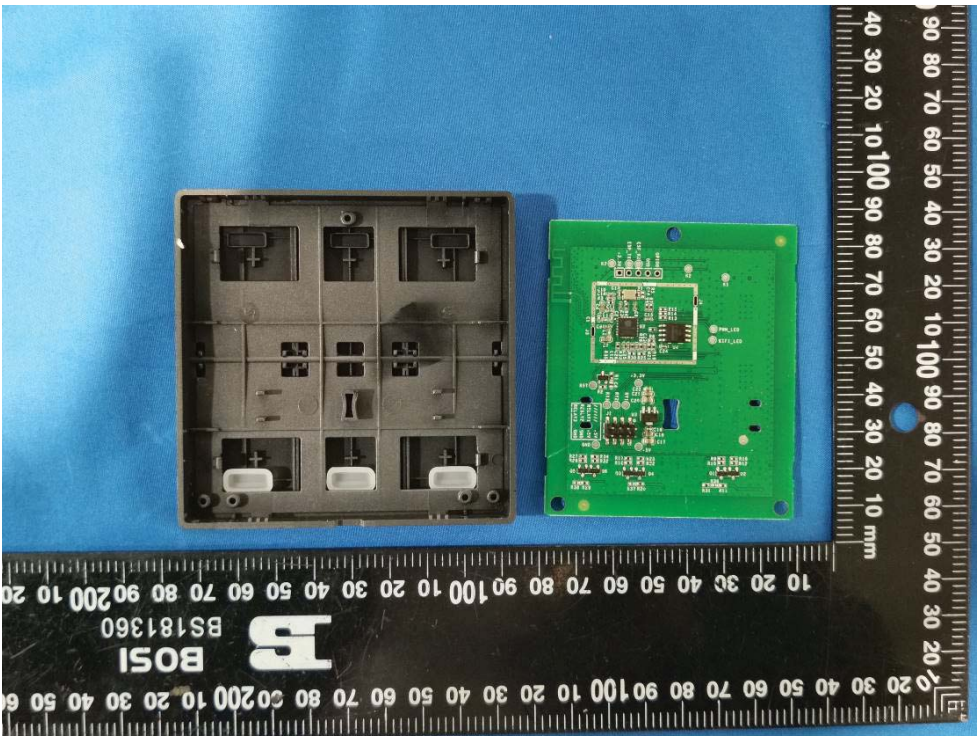
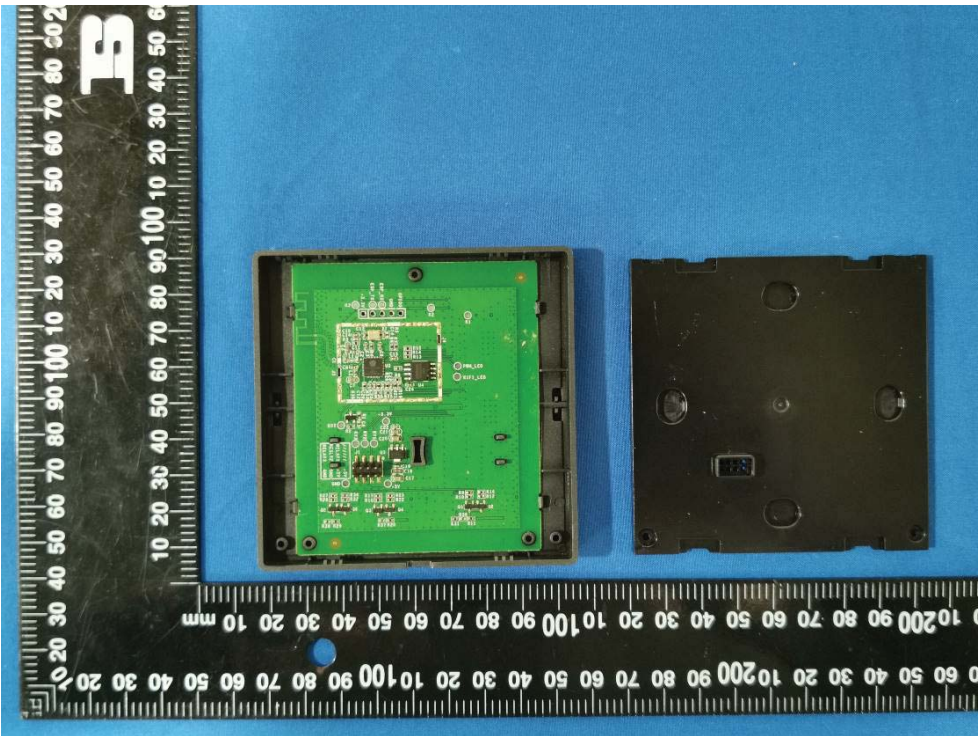
M5-3C-86

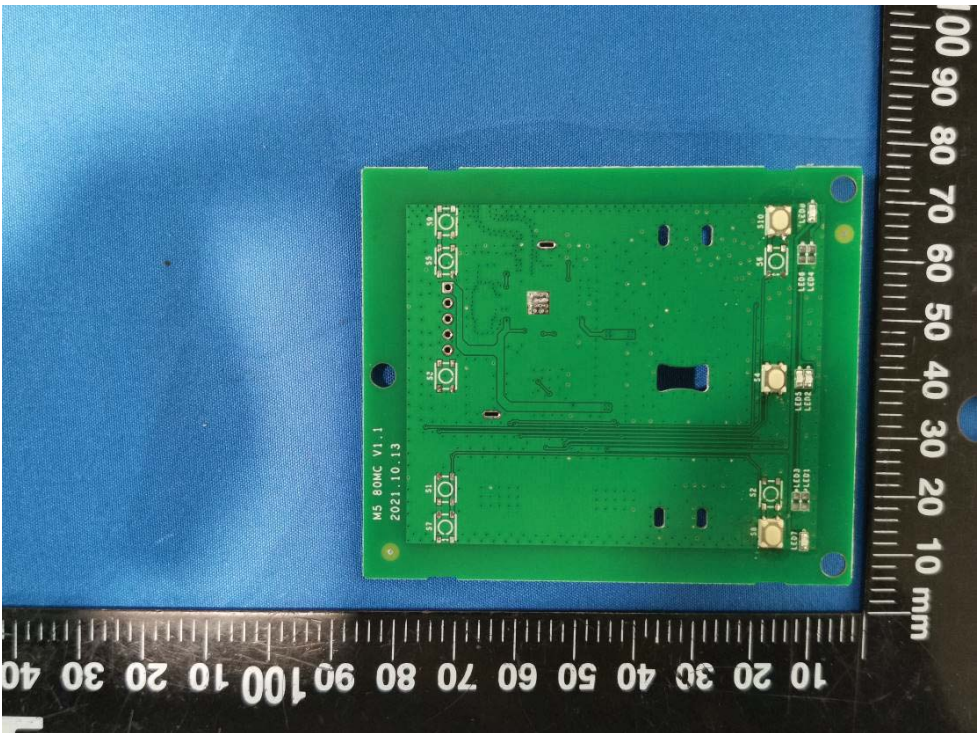
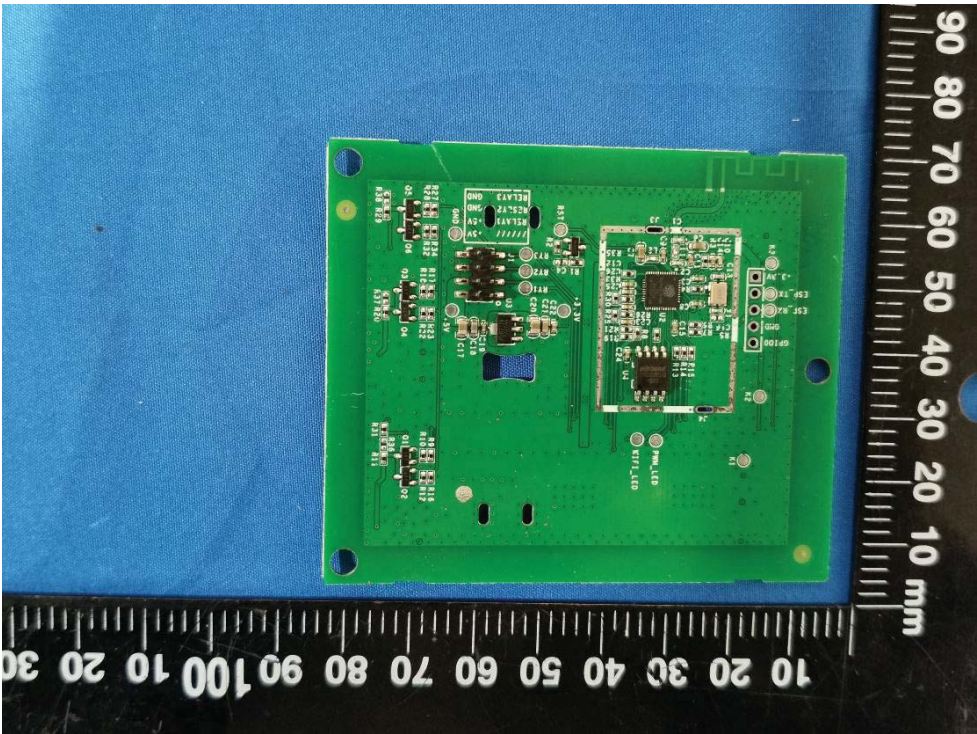


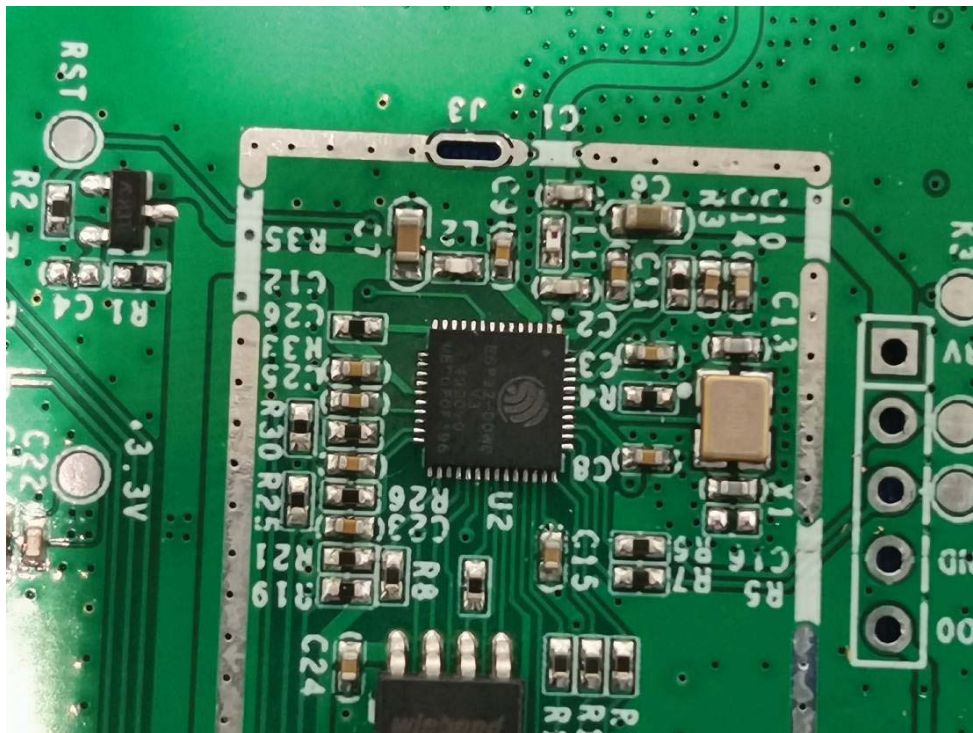




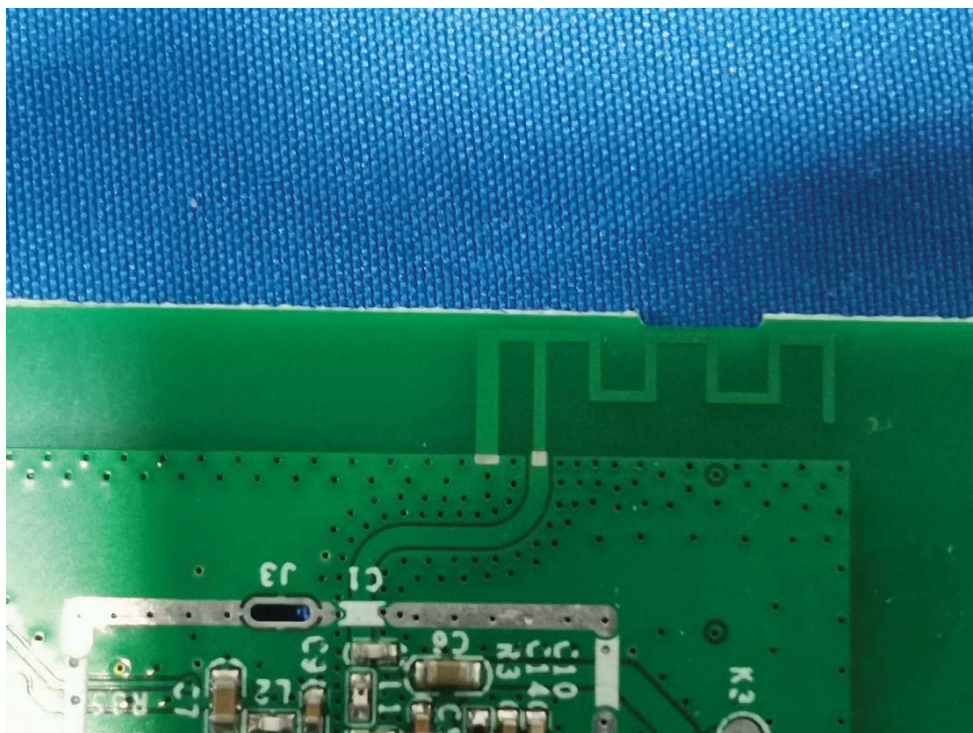


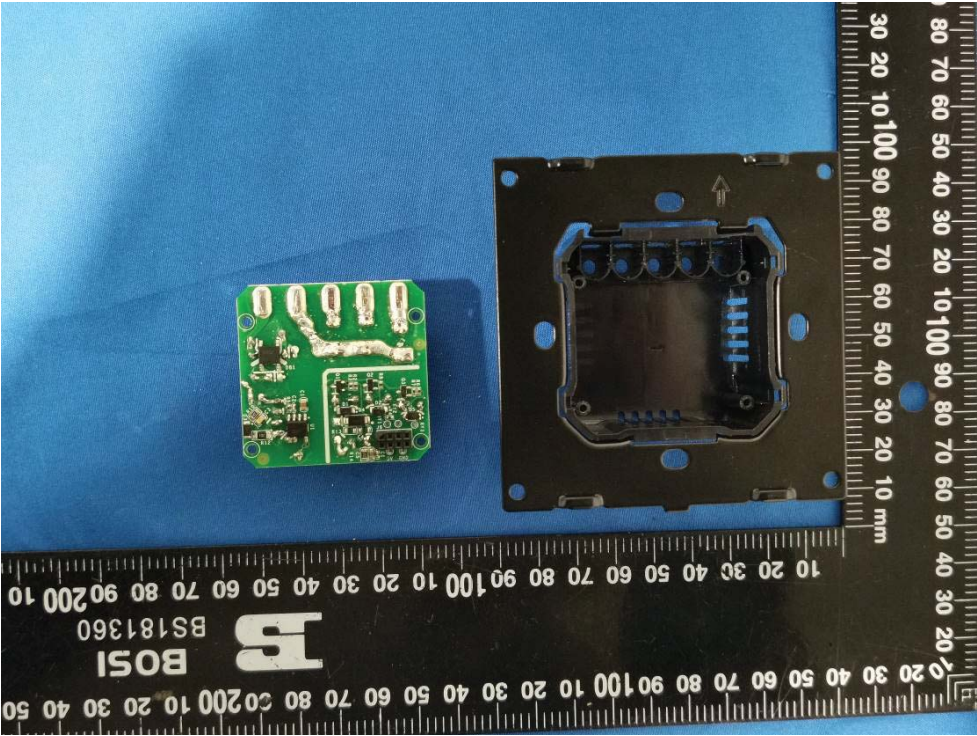
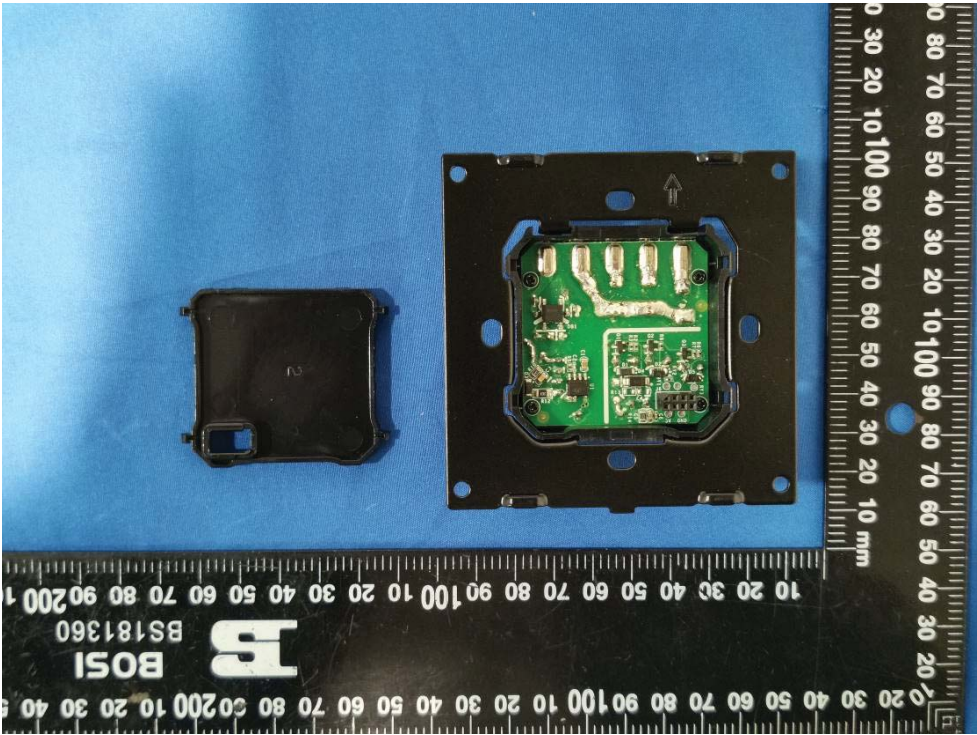


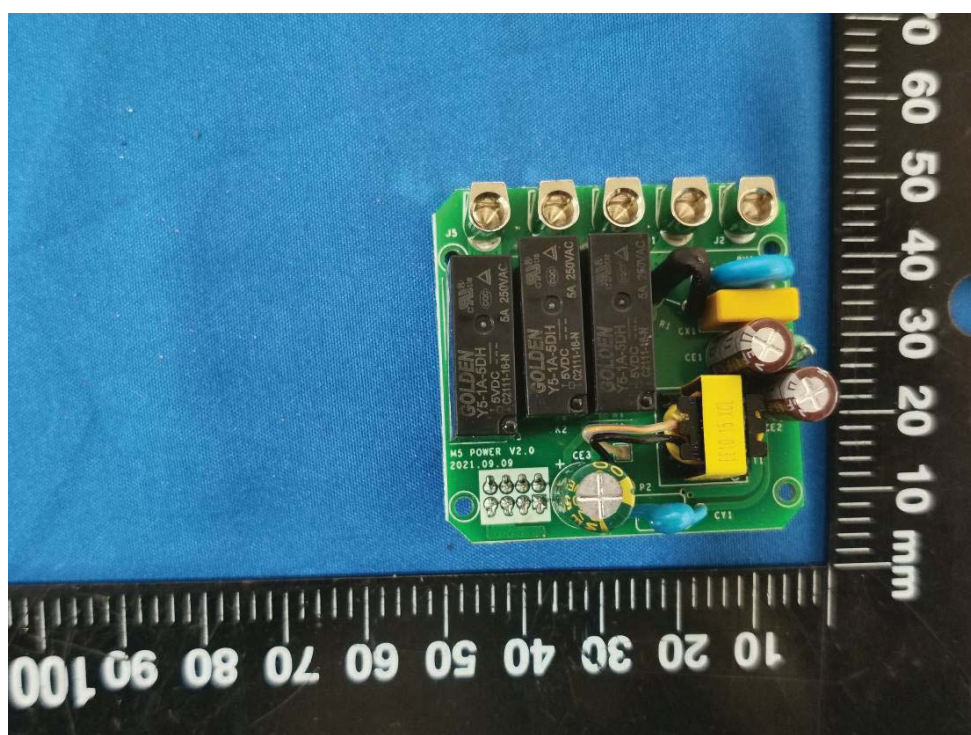
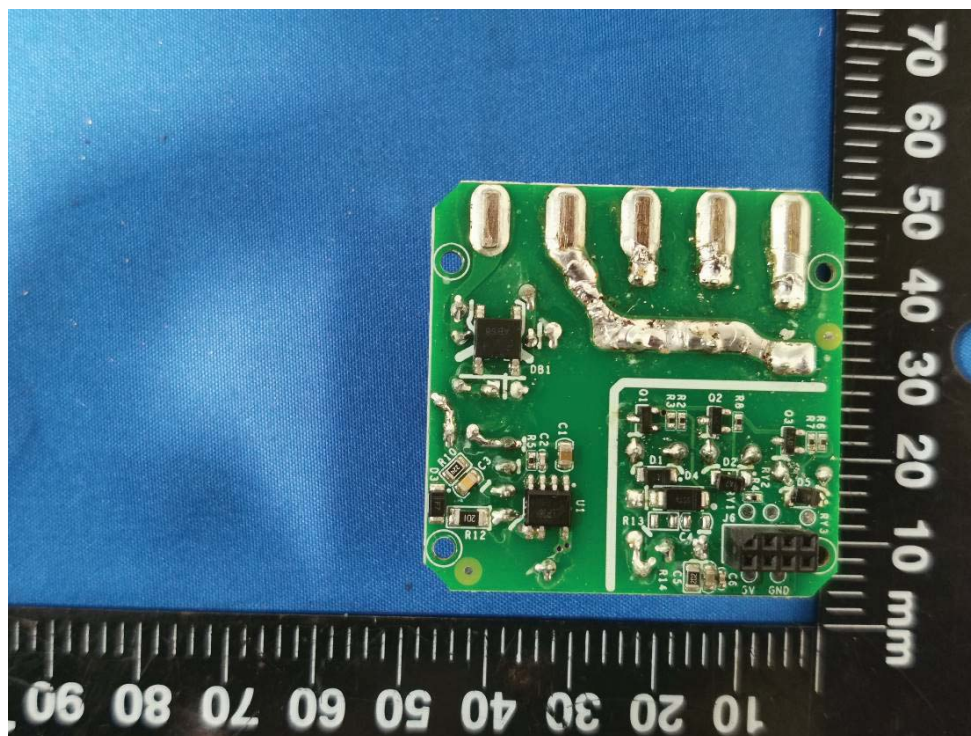




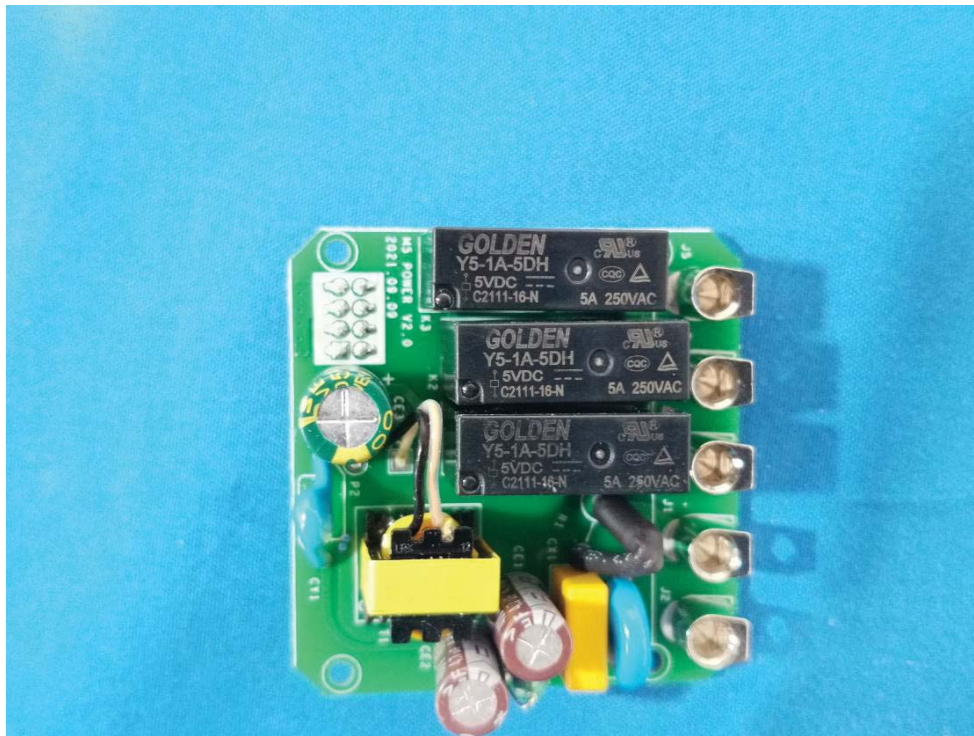
Antenna







Relay 1#



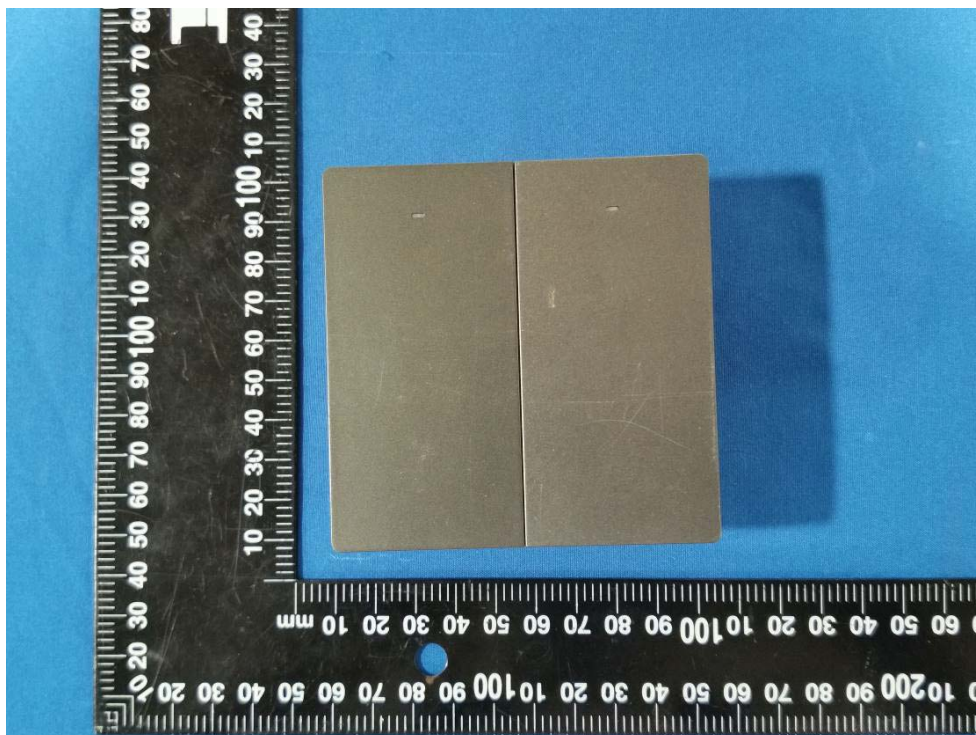
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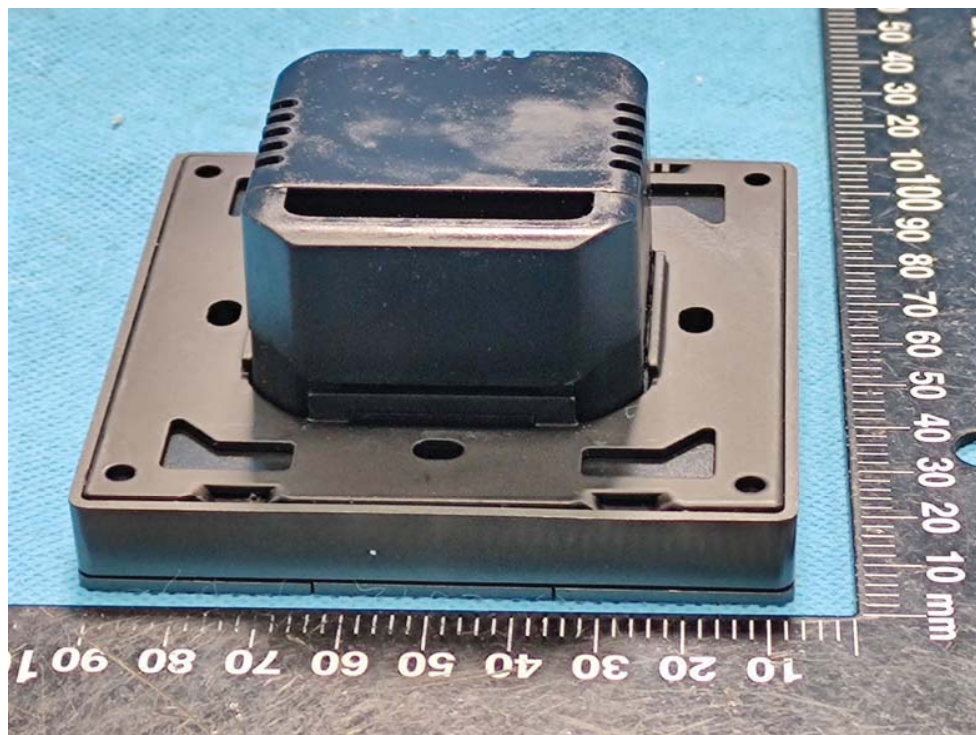
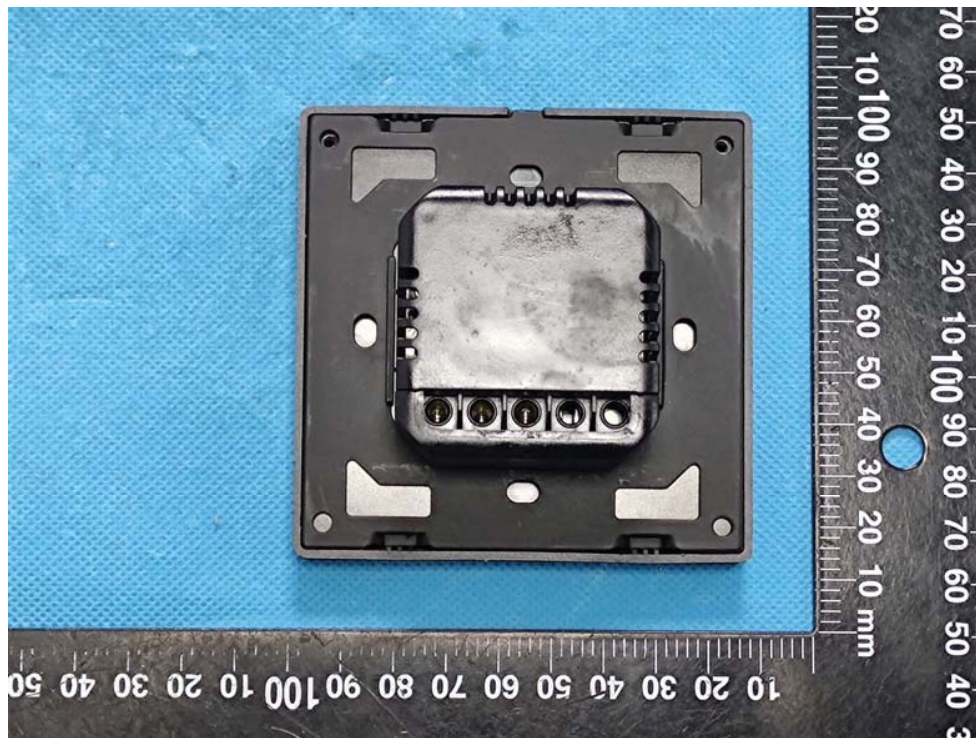


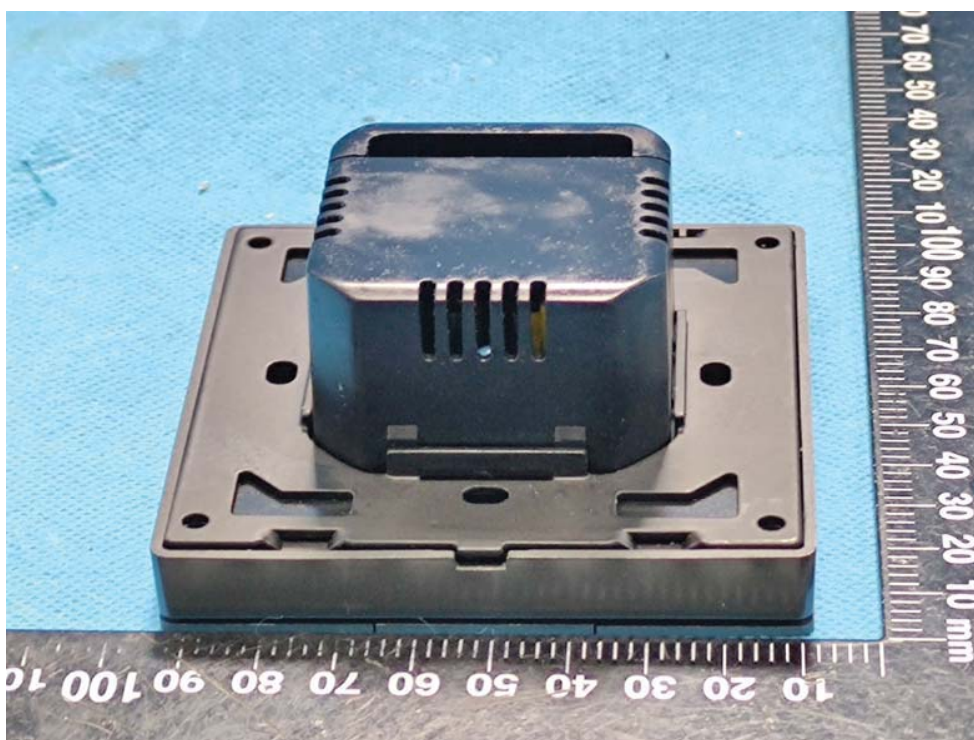
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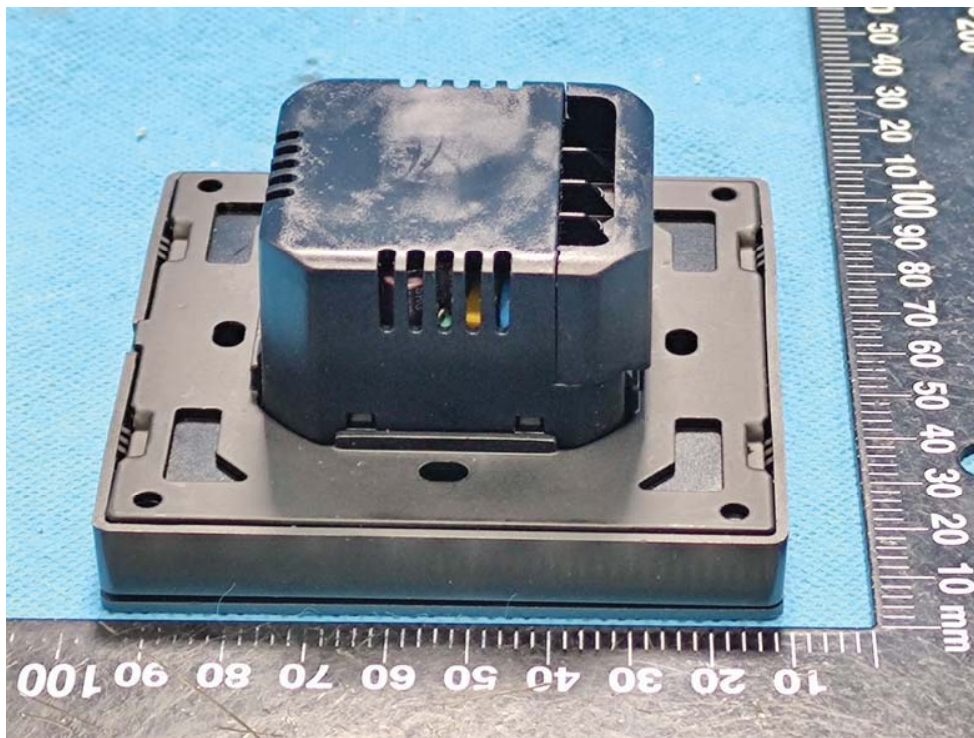


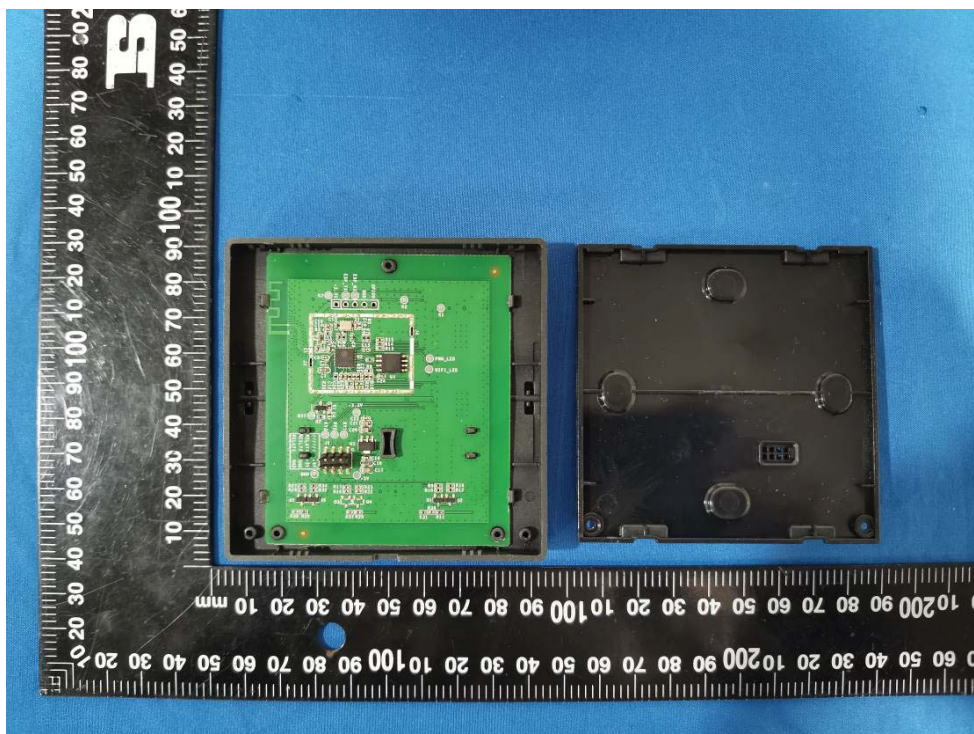
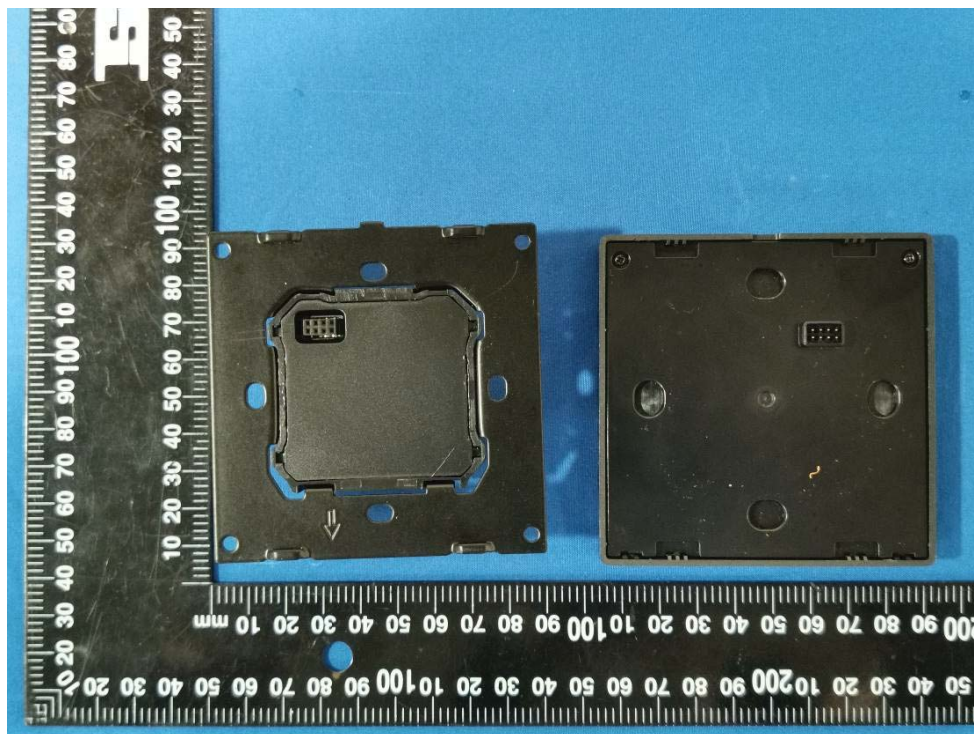
M5-2C-86

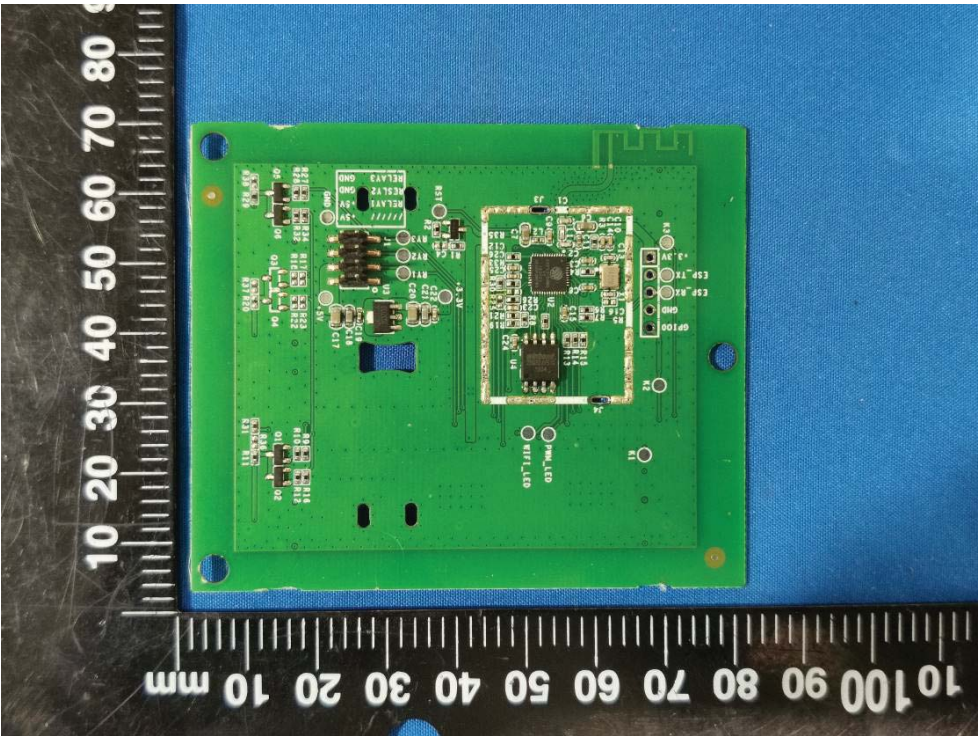
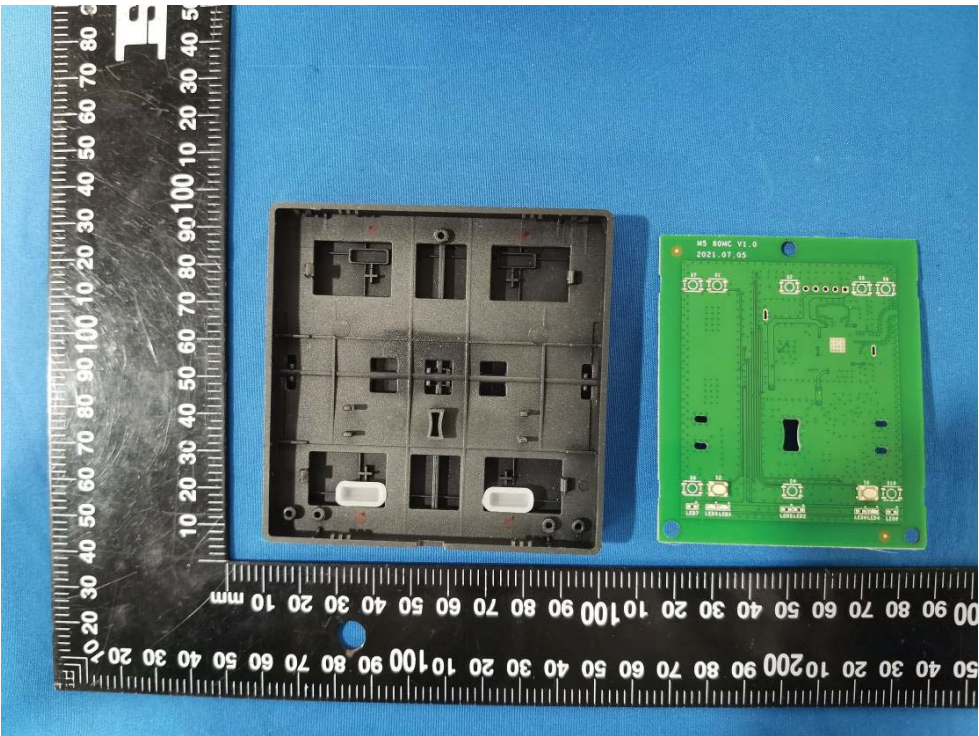


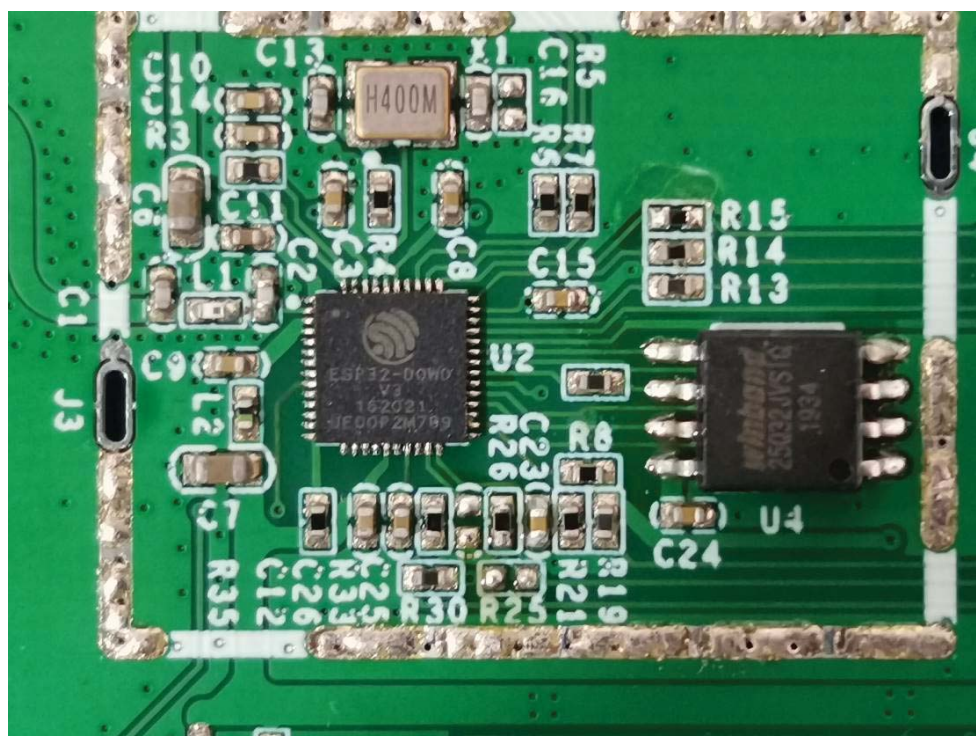


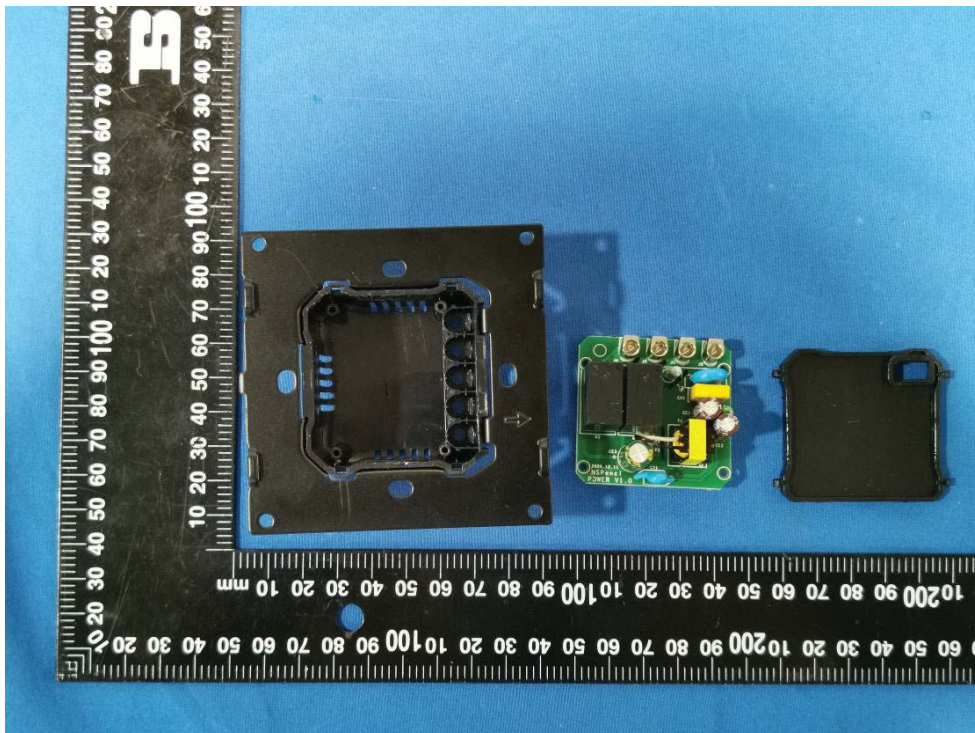


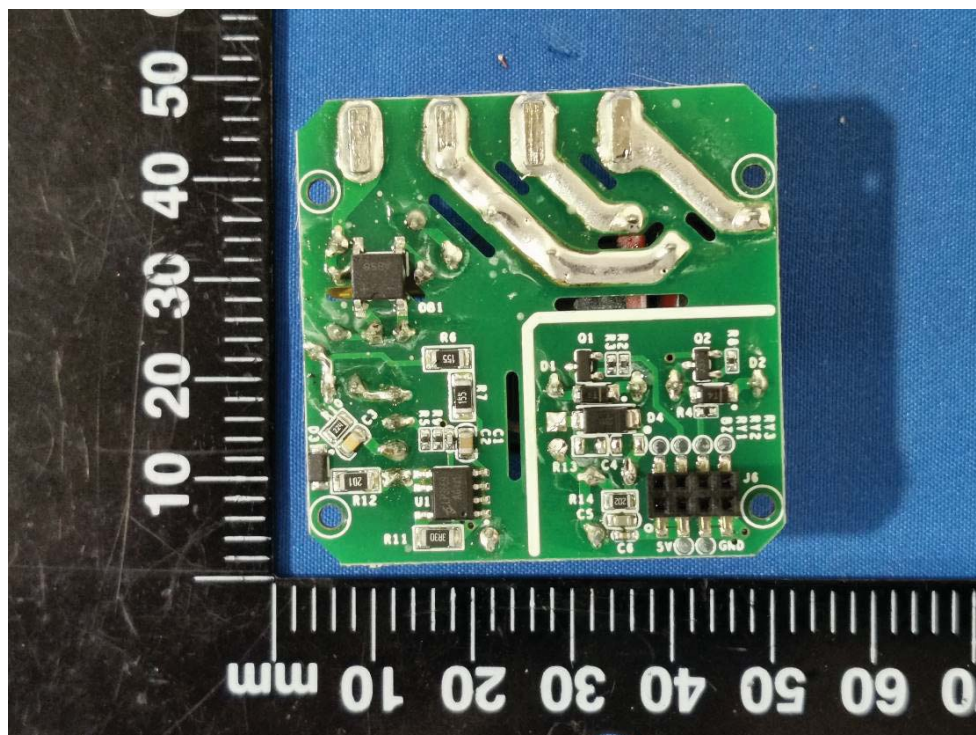
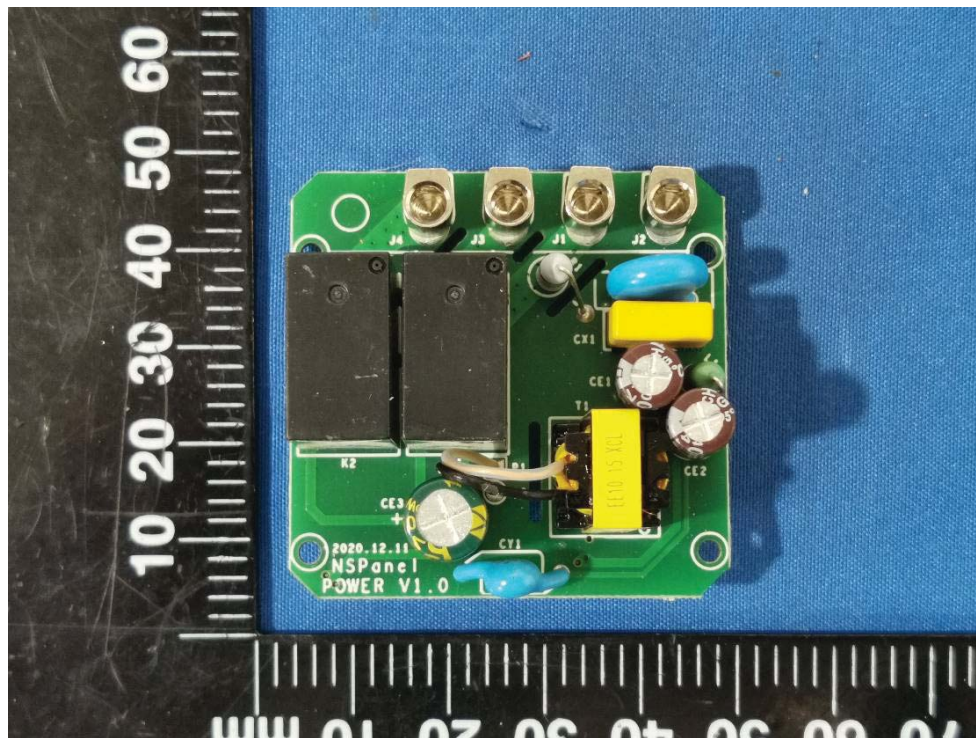




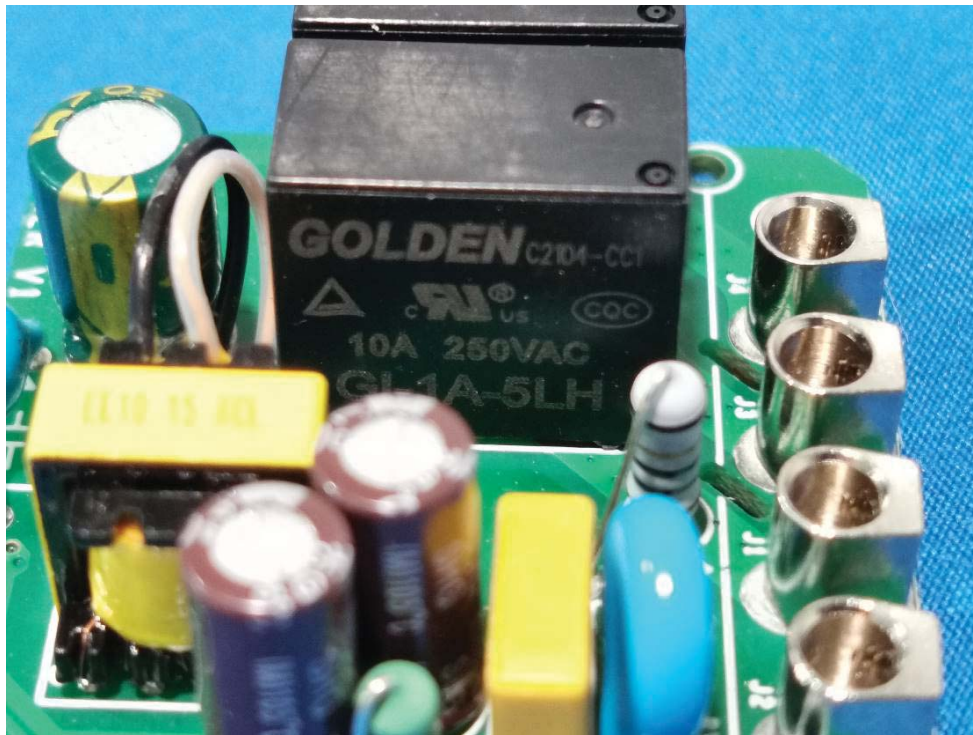








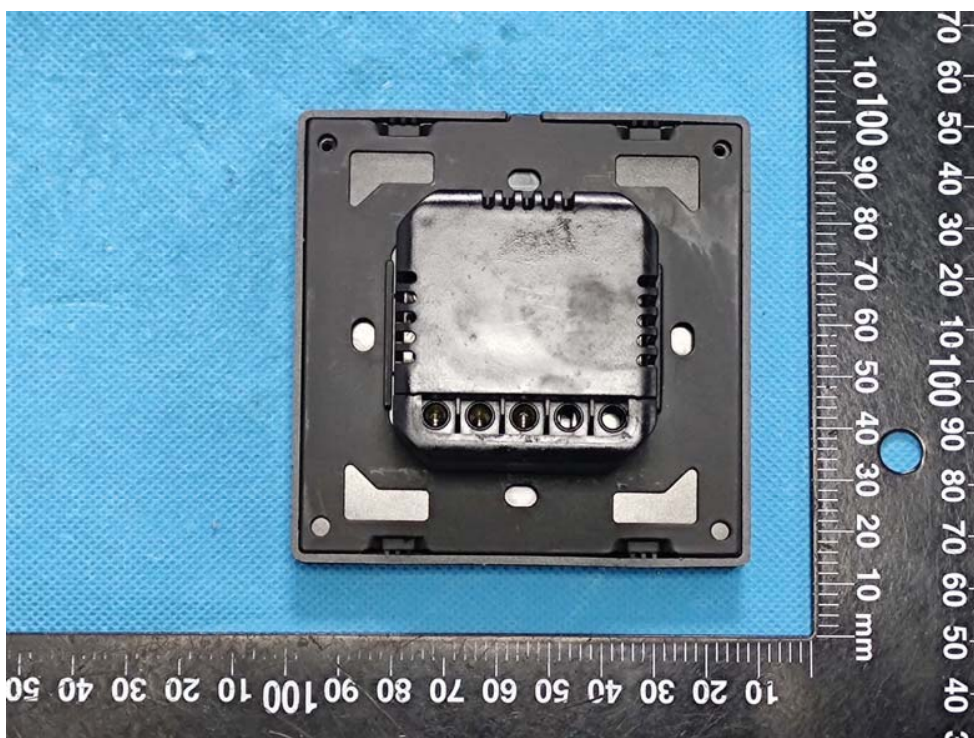
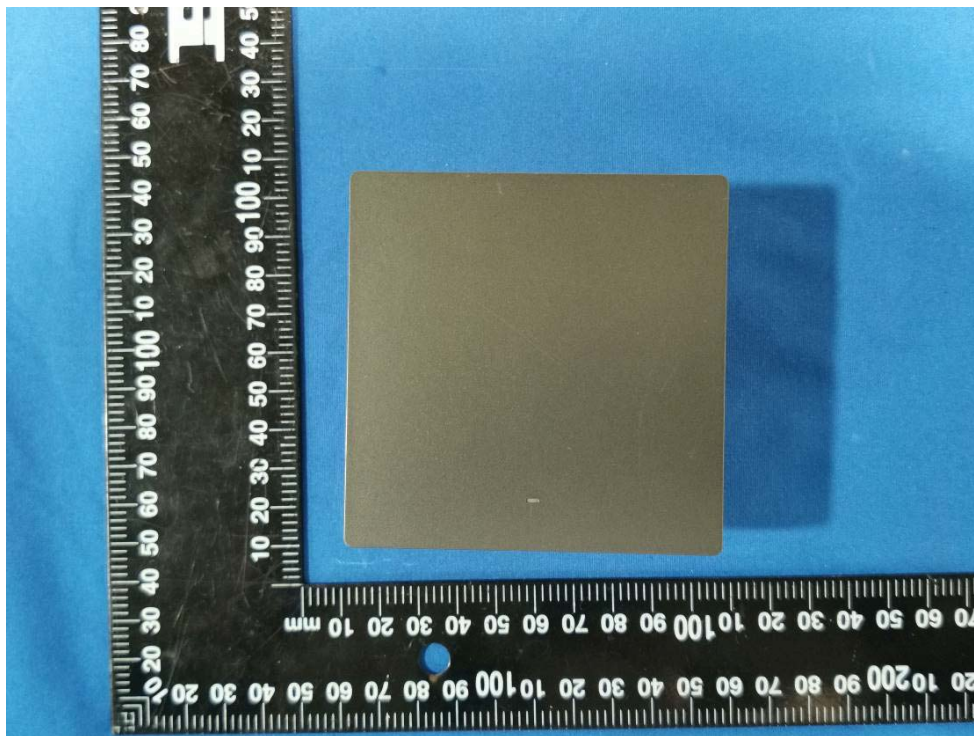
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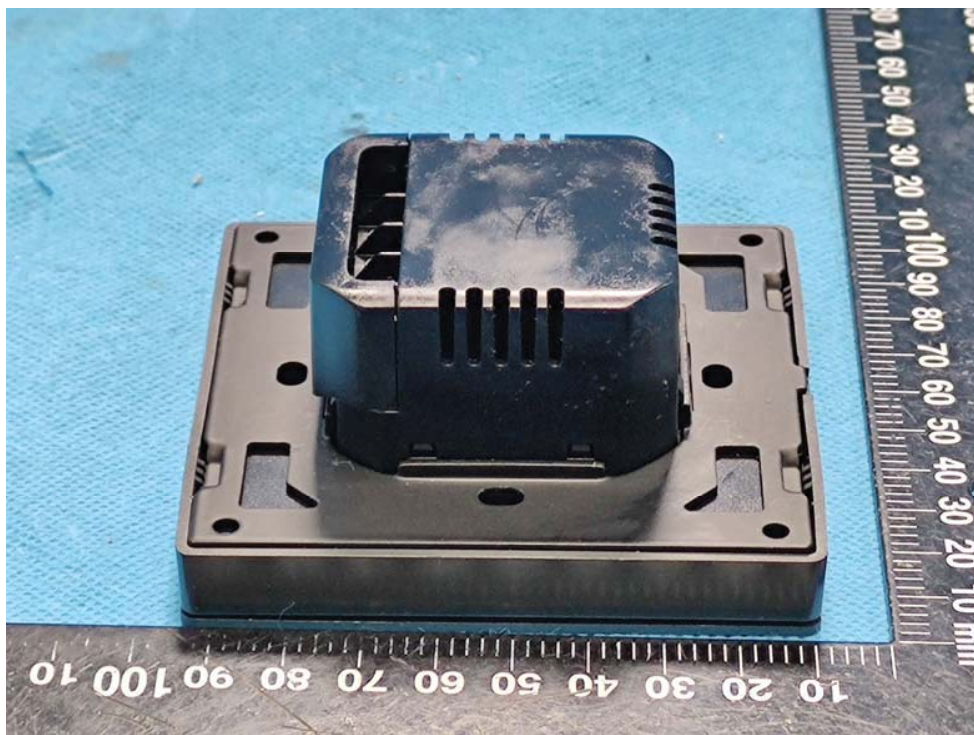
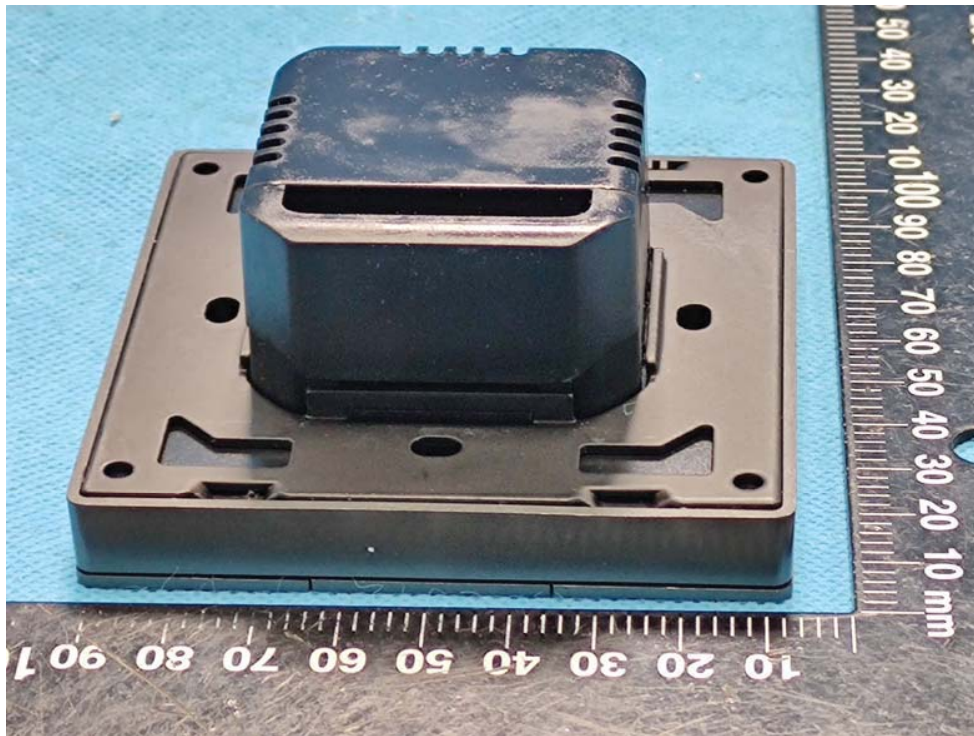


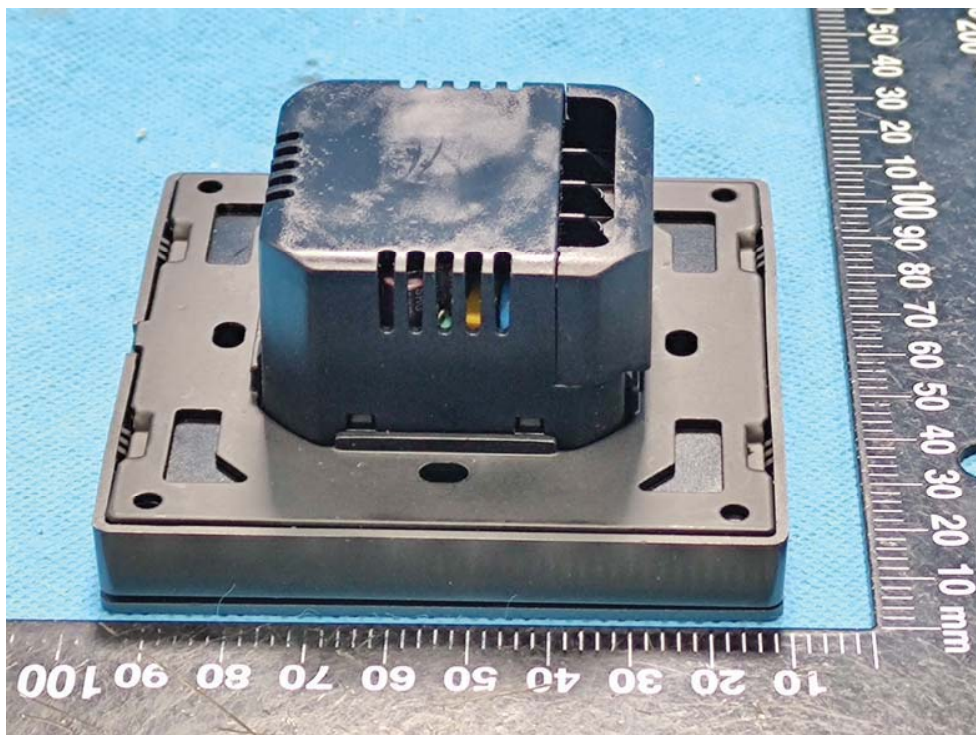
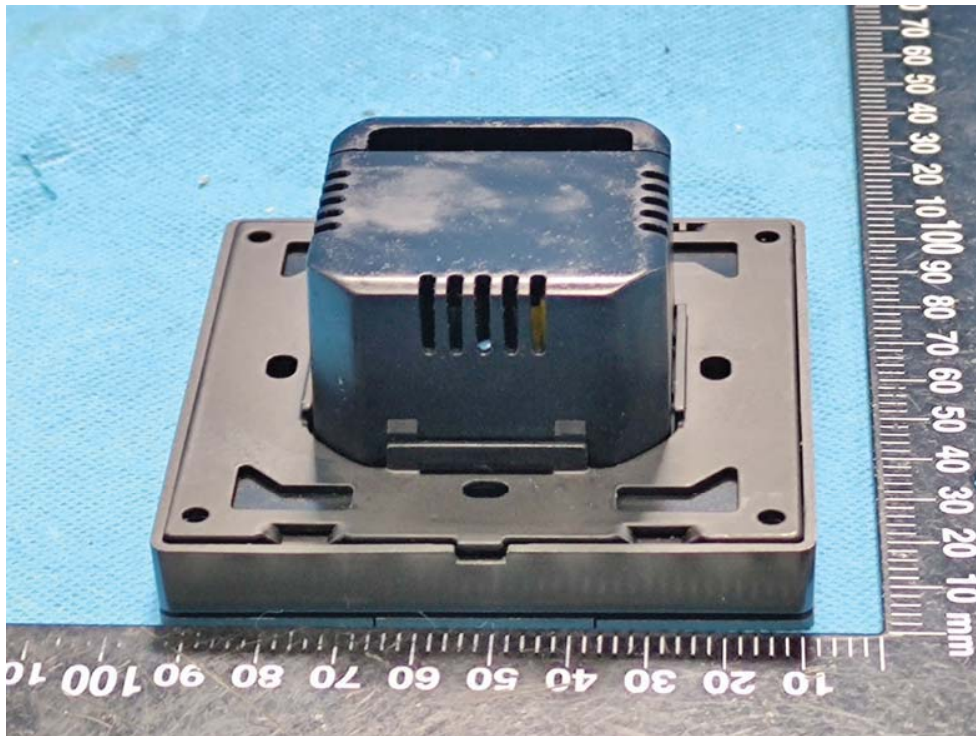
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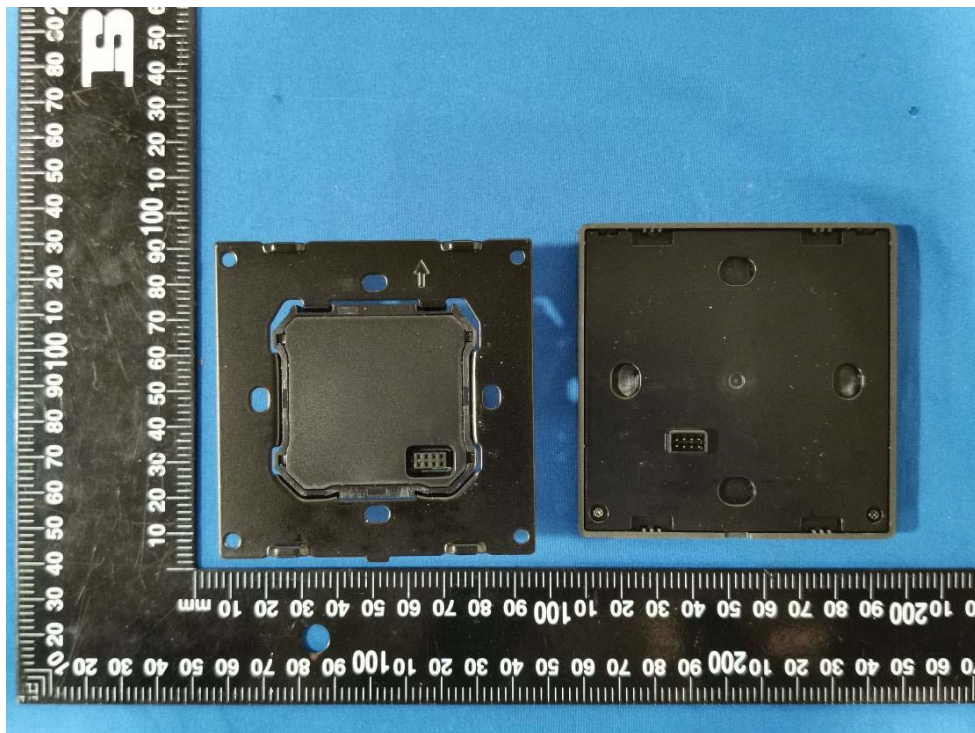


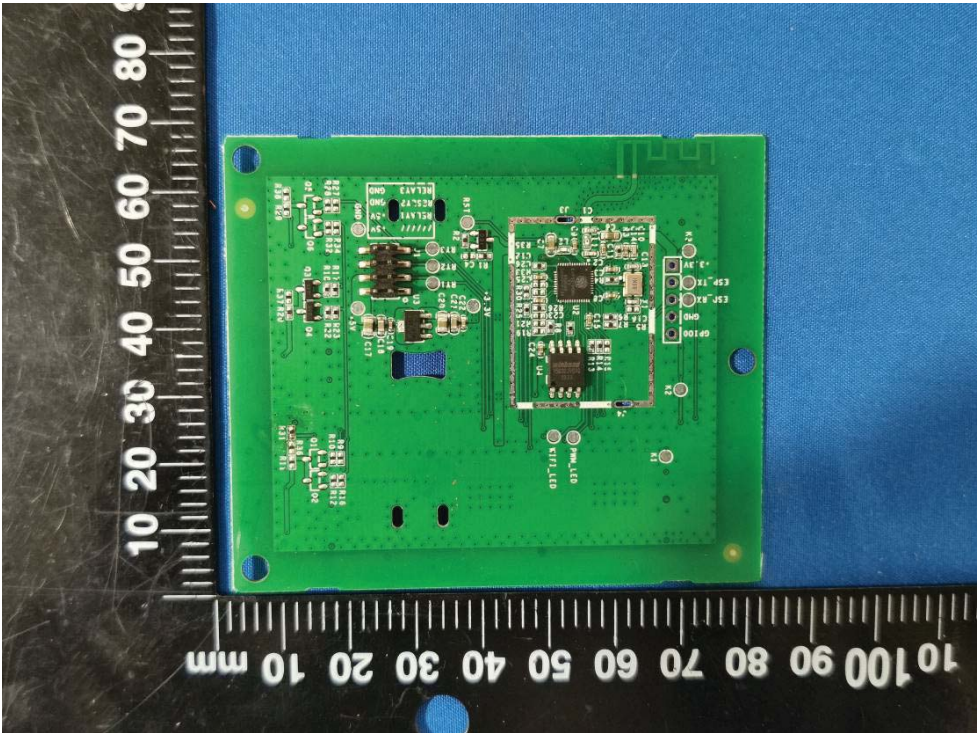
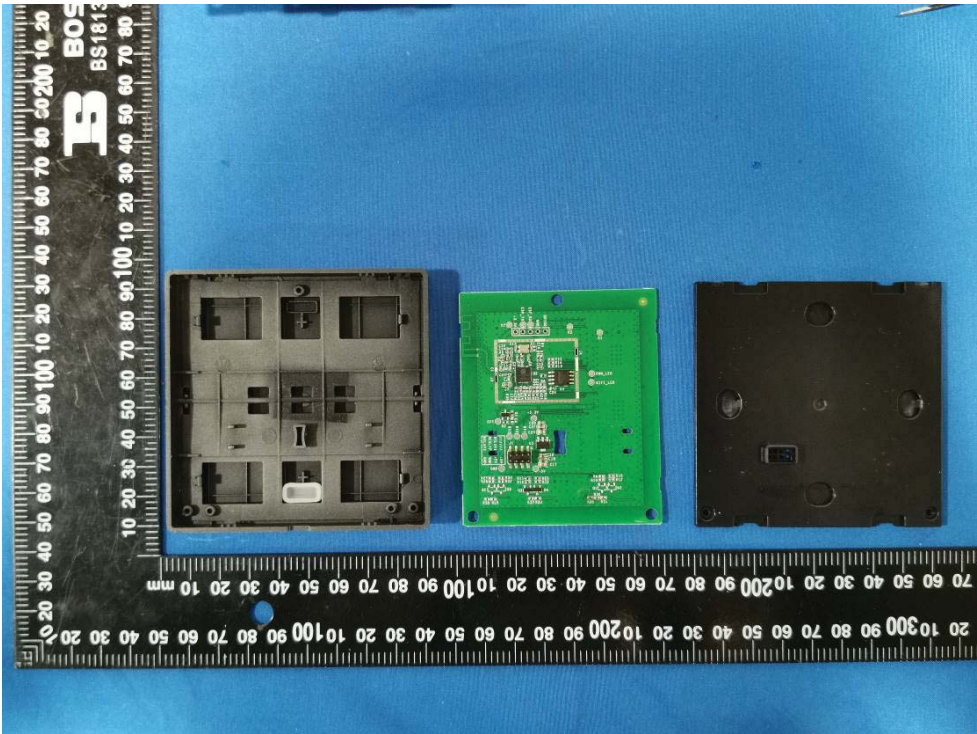
M5-1C-86

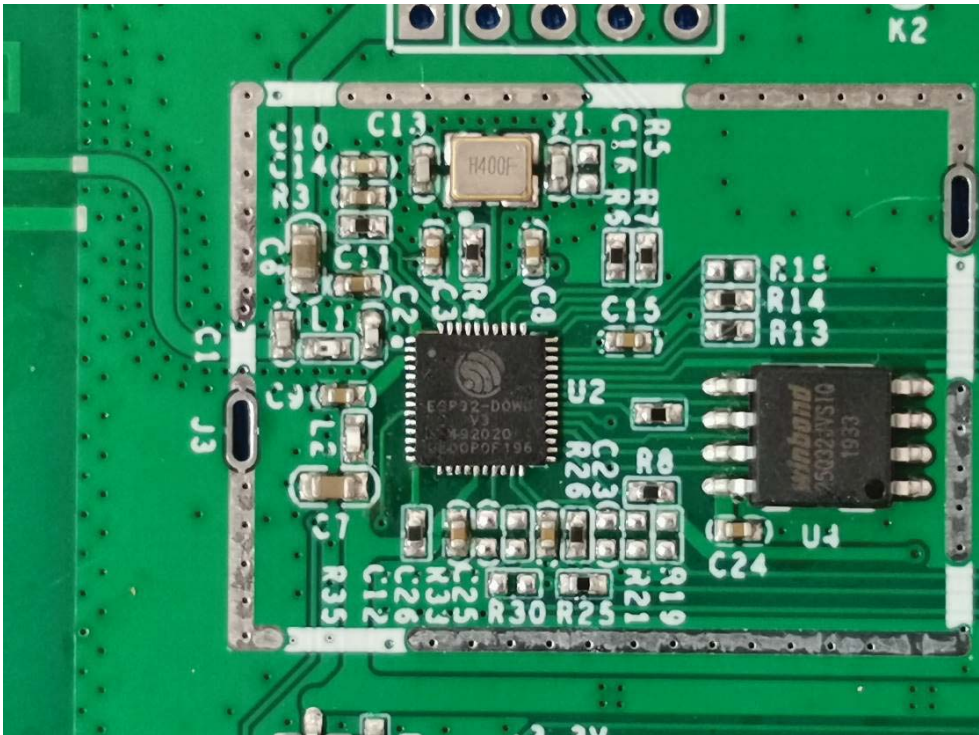
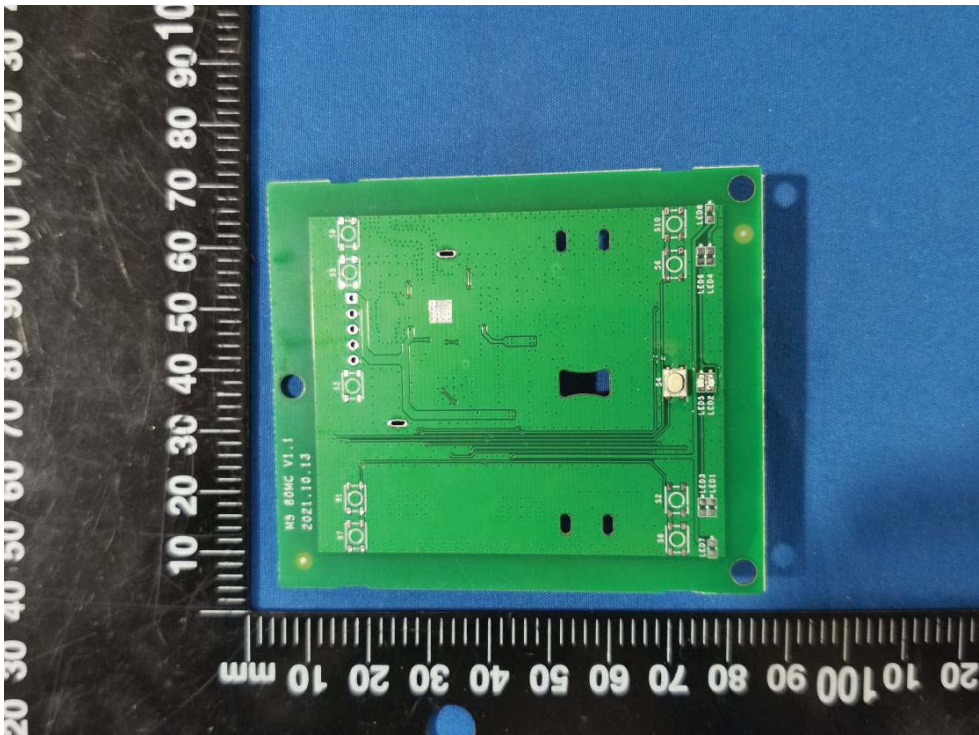


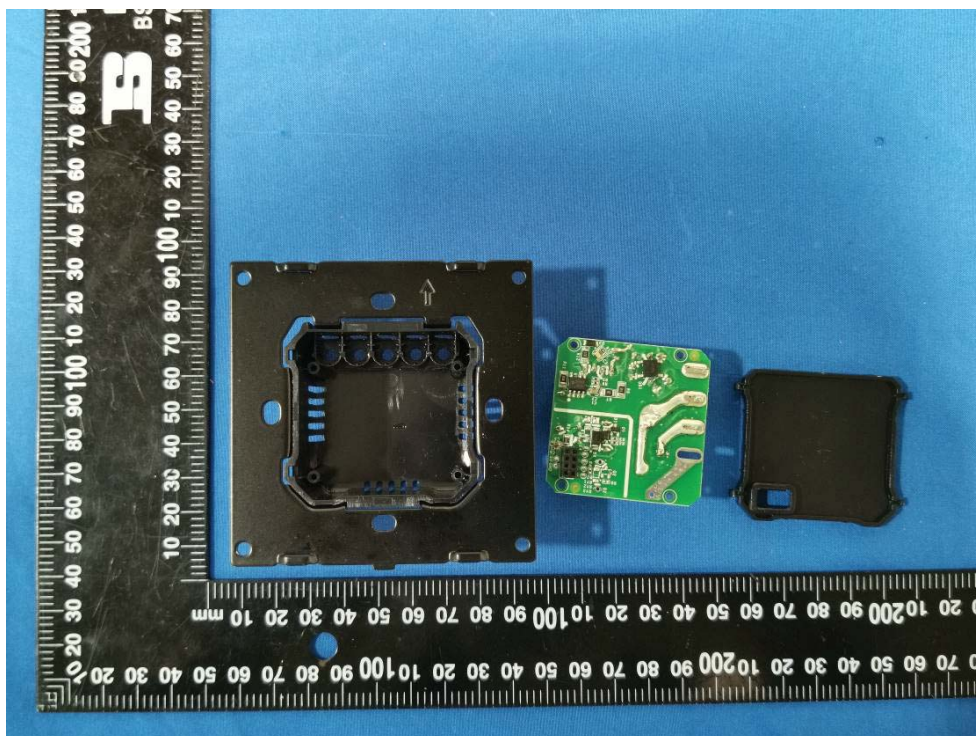
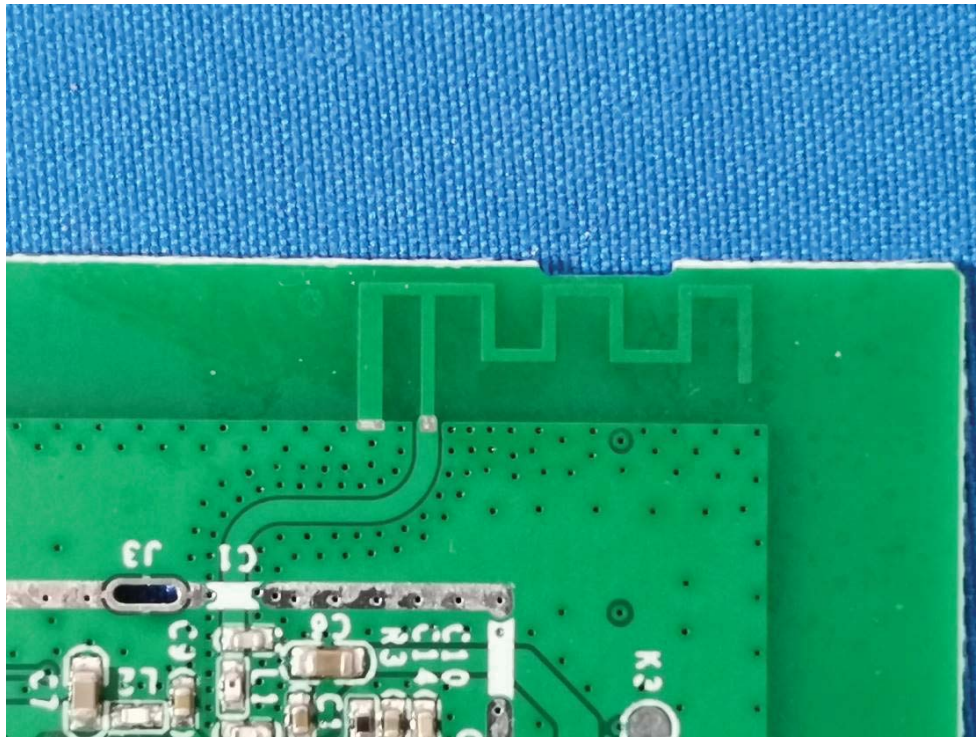


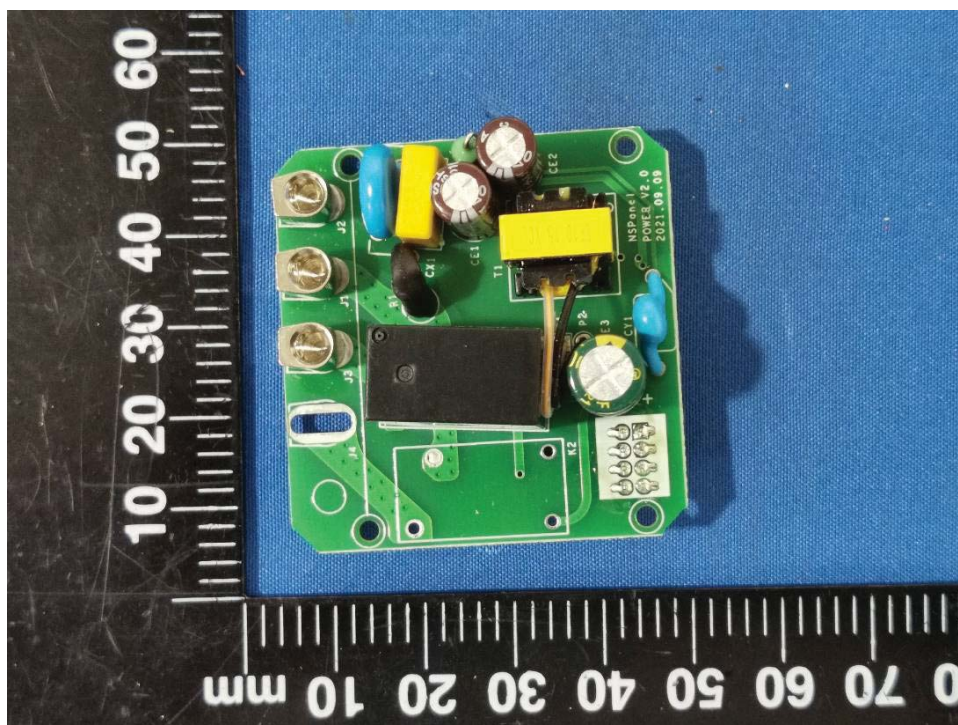
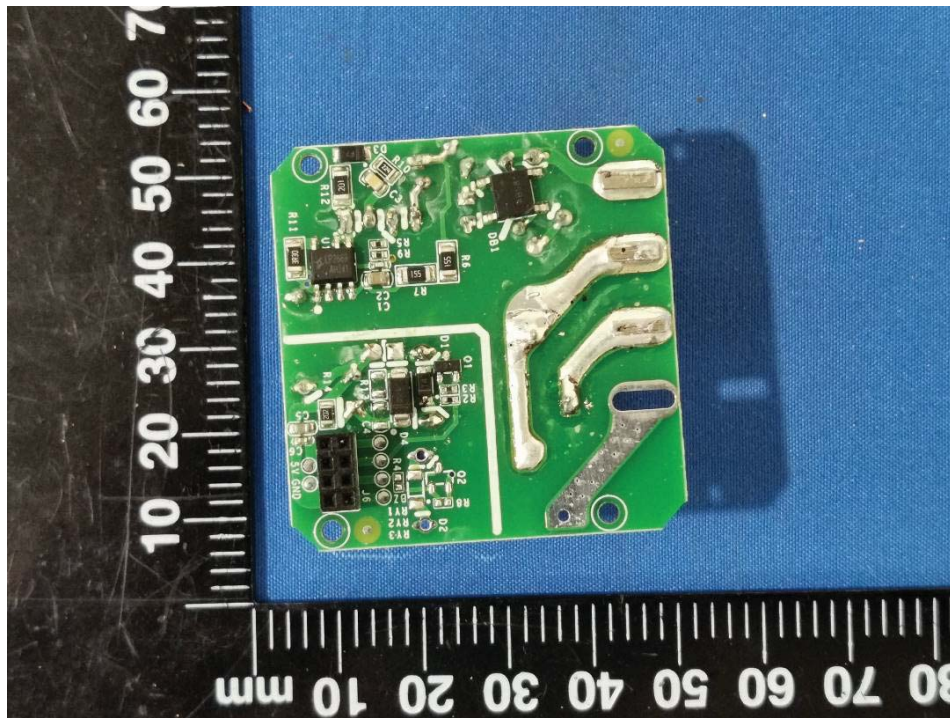












Relay 4#



Relay 5#

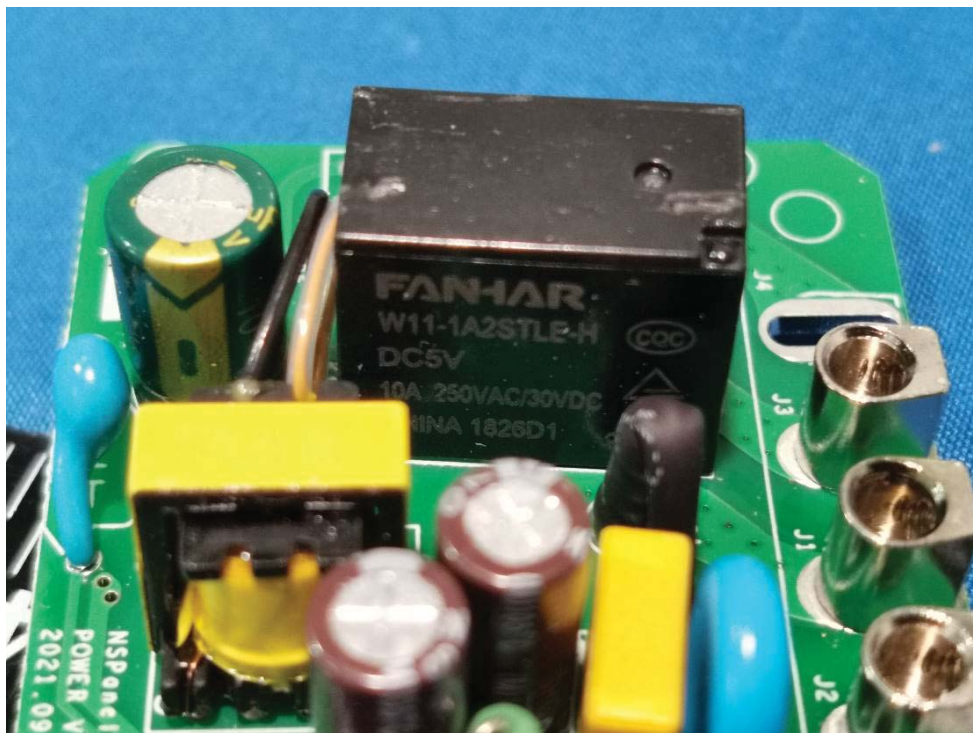


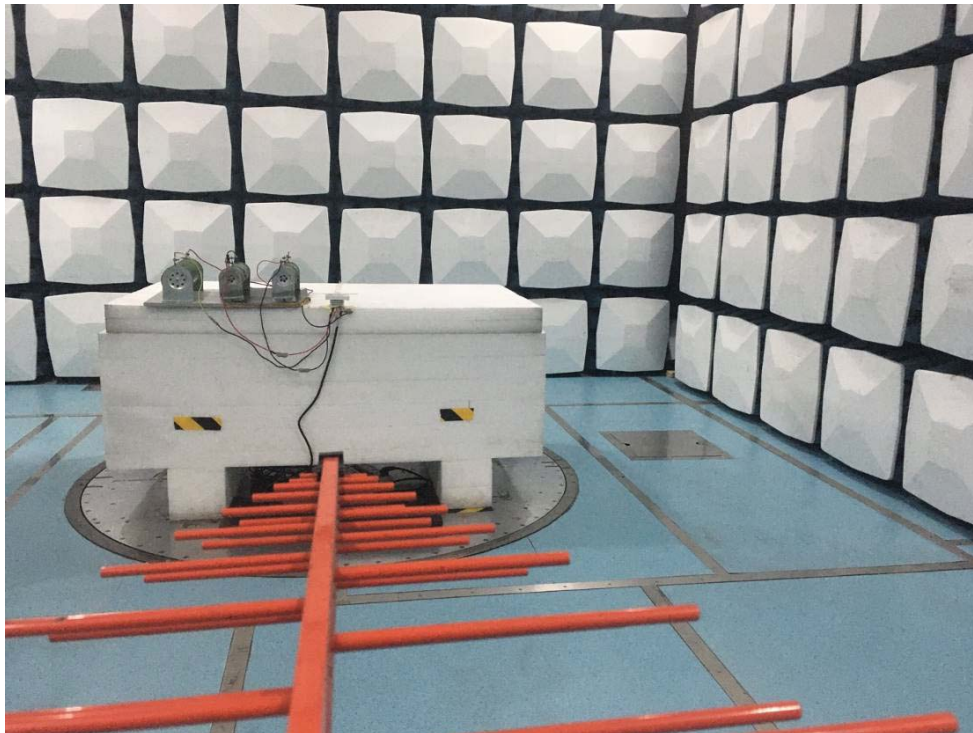
EXHIBIT B – TEST SETUP PHOTOGRAPHS

Radiated Emission

Radiated Emission Below 1GHz front View-M5-3C-86



Radiated Emission Below 1GHz rear View-M5-3C-86



Radiated Emission Below 1GHz front View- M5-2C-86



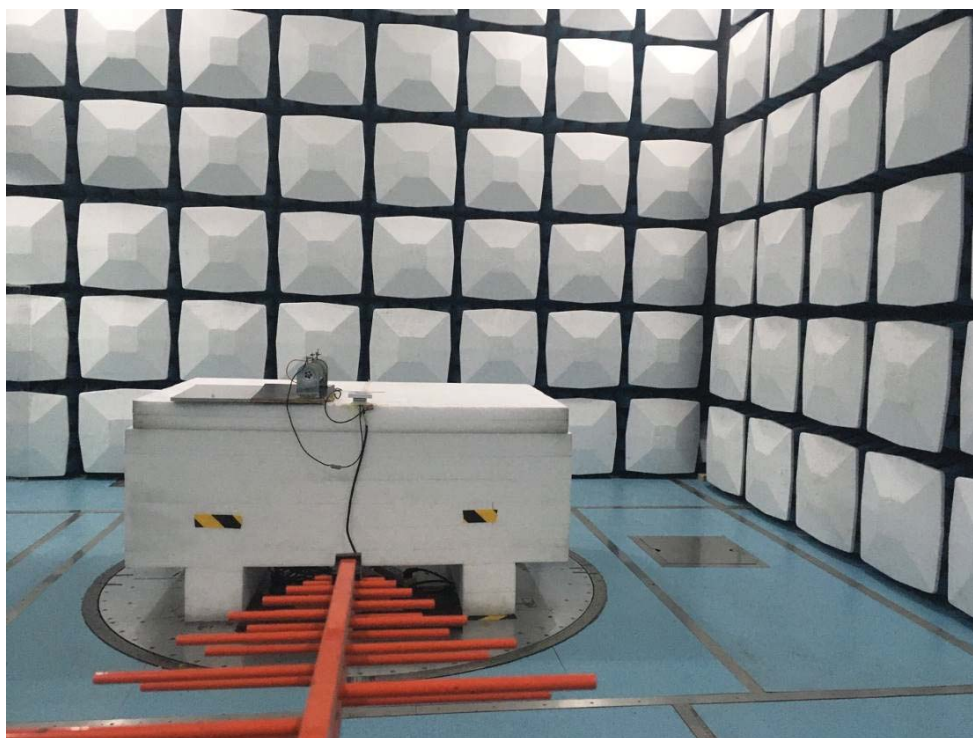
Radiated Emission Below 1GHz rear View- M5-2C-86



Radiated Emission Below 1GHz front View-M5-1C-86



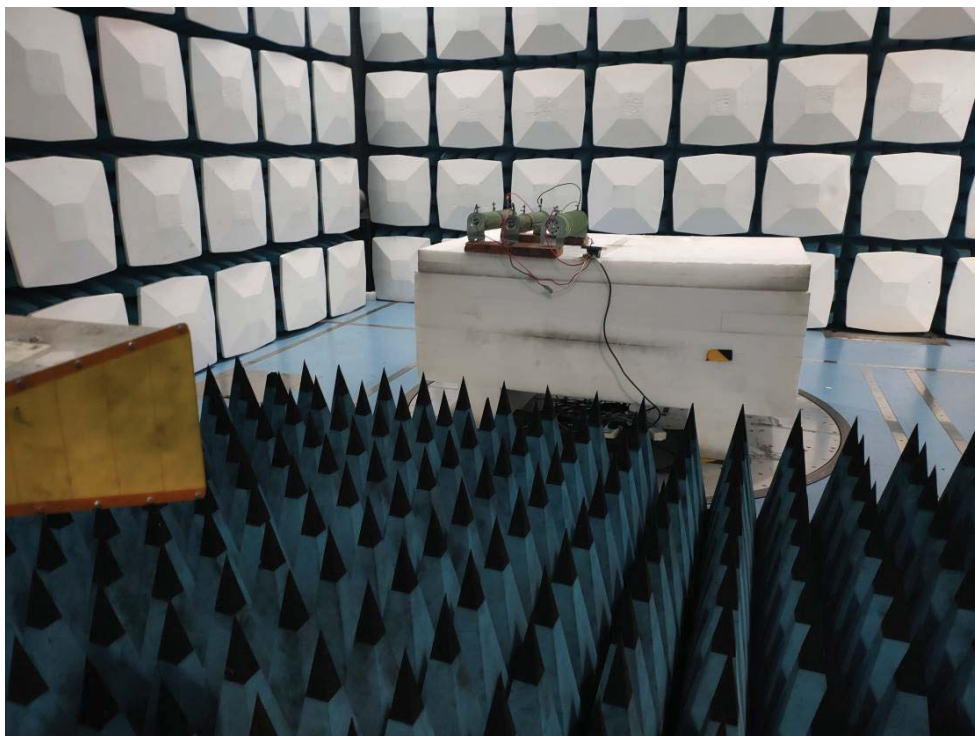
Radiated Emission Below 1GHz rear View-M5-1C-86



Radiated Emission Above 1GHz front View-M5-3C-86



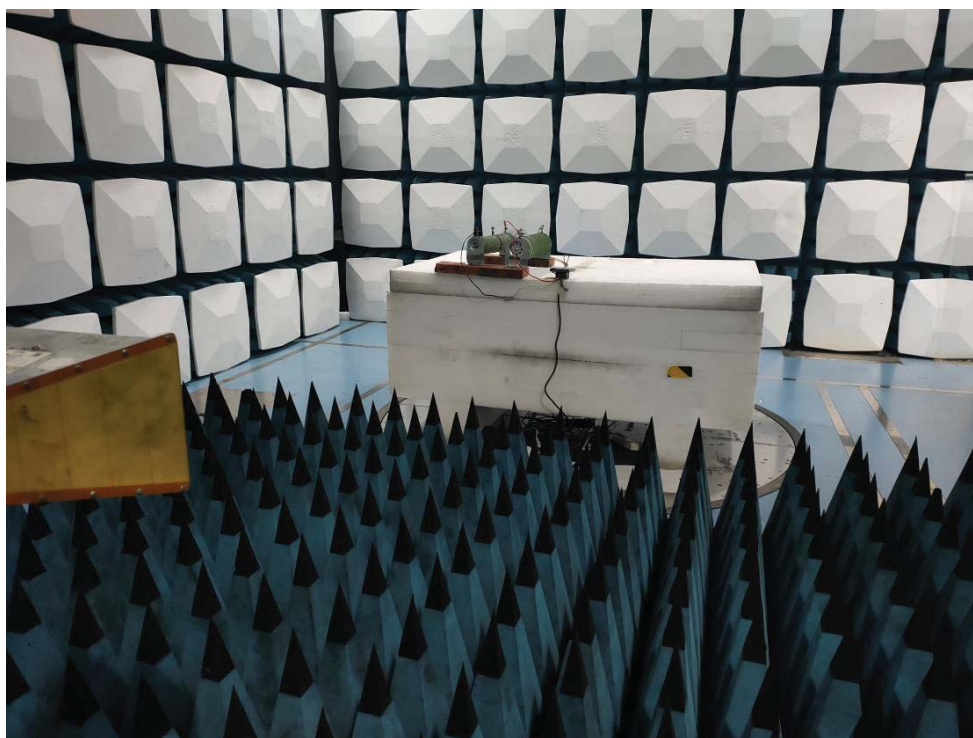
Radiated Emission Above 1GHz rear View-M5-3C-86



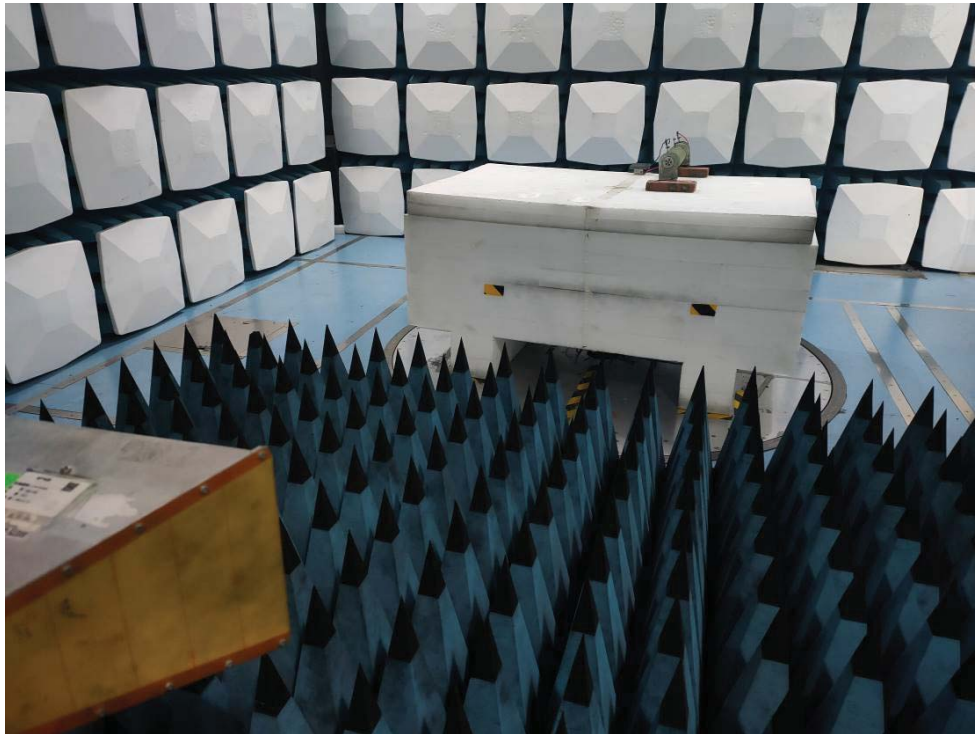
Radiated Emission Above 1GHz front View- M5-2C-86



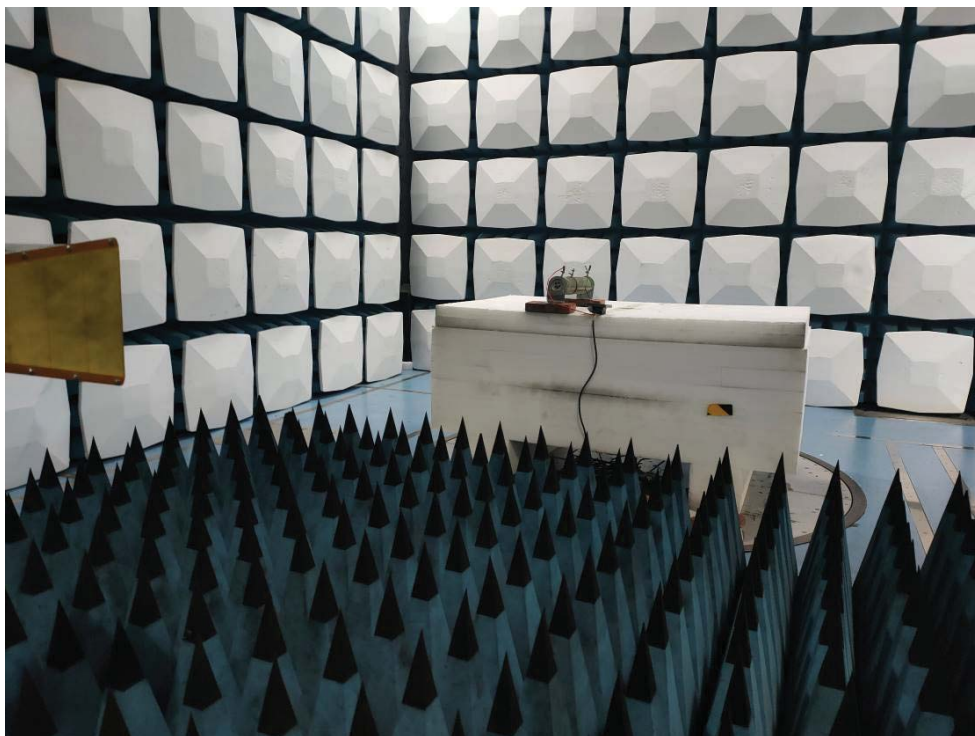
Radiated Emission Above 1GHz rear View- M5-2C-86



Radiated Emission Above 1GHz front View-M5-1C-86



Radiated Emission Above 1GHz rear View-M5-1C-86



Conducted Emissions_AC

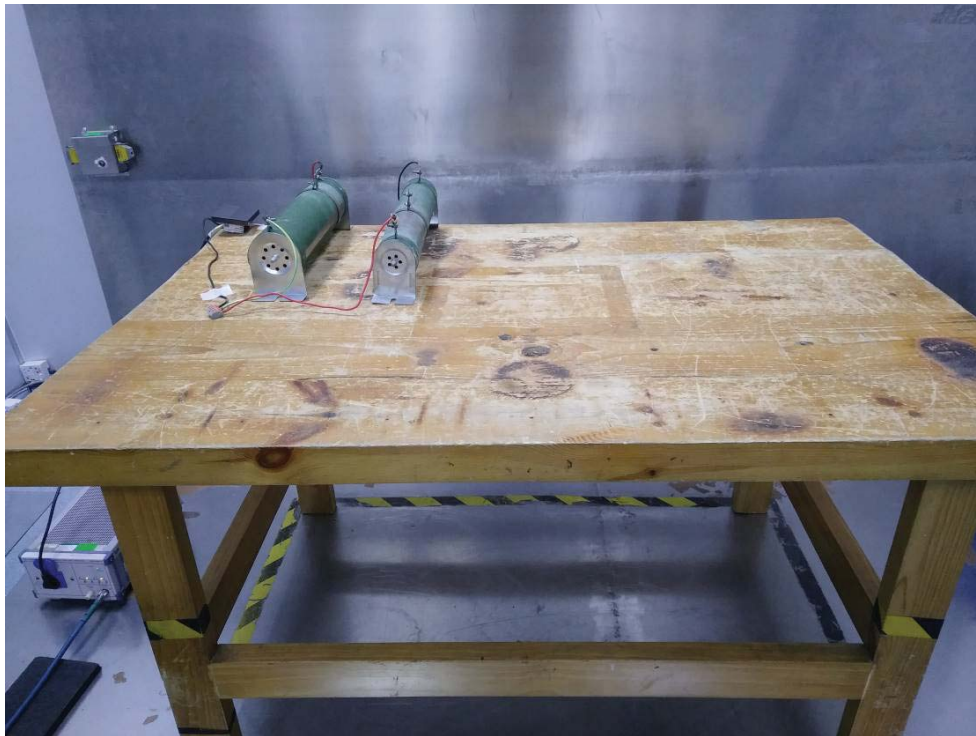
Conducted Emissions front View-M5-3C-86



Conducted Emissions side View-M5-3C-86



Conducted Emissions front View-M5-2C-86



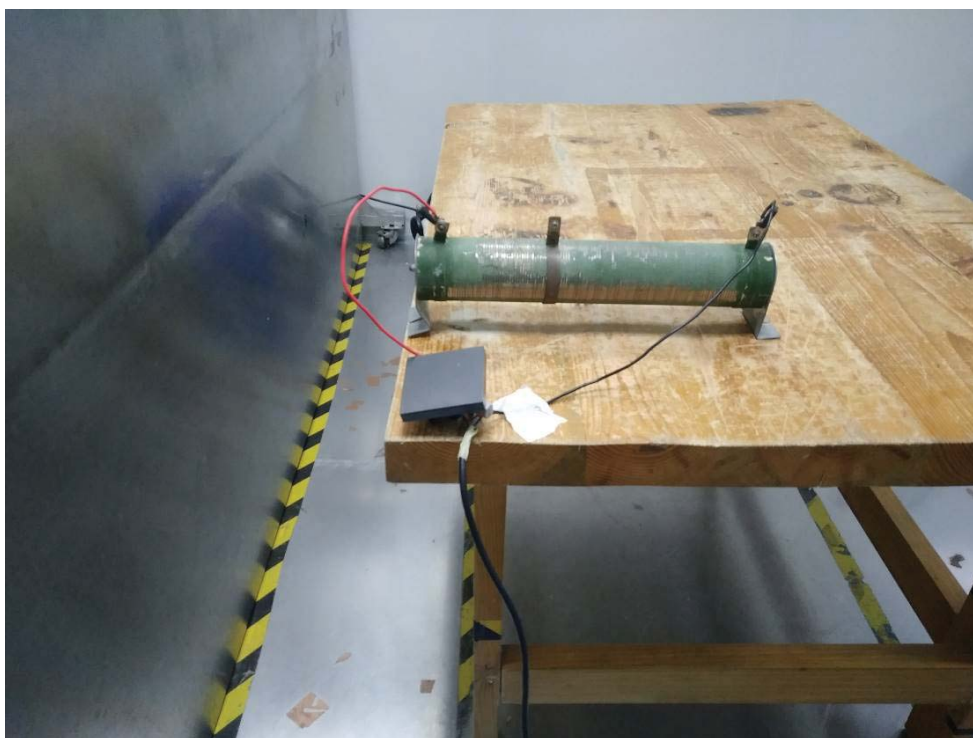
Conducted Emissions side View-M5-2C-86



Conducted Emissions front View-M5-1C-86



Conducted Emissions side View-M5-1C-86

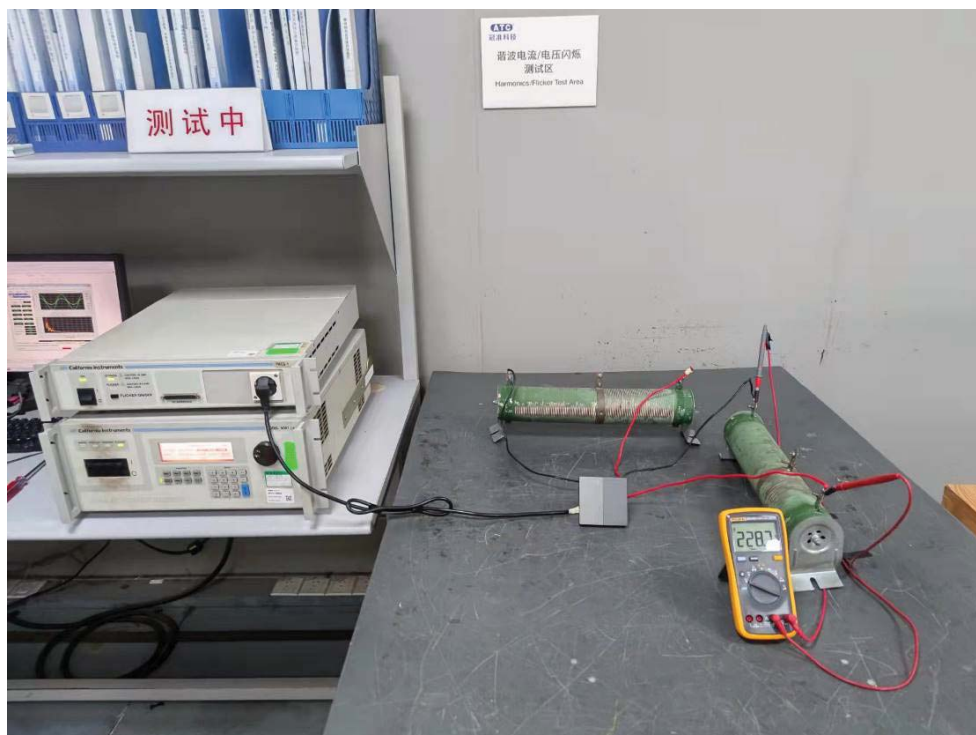


Harmonic

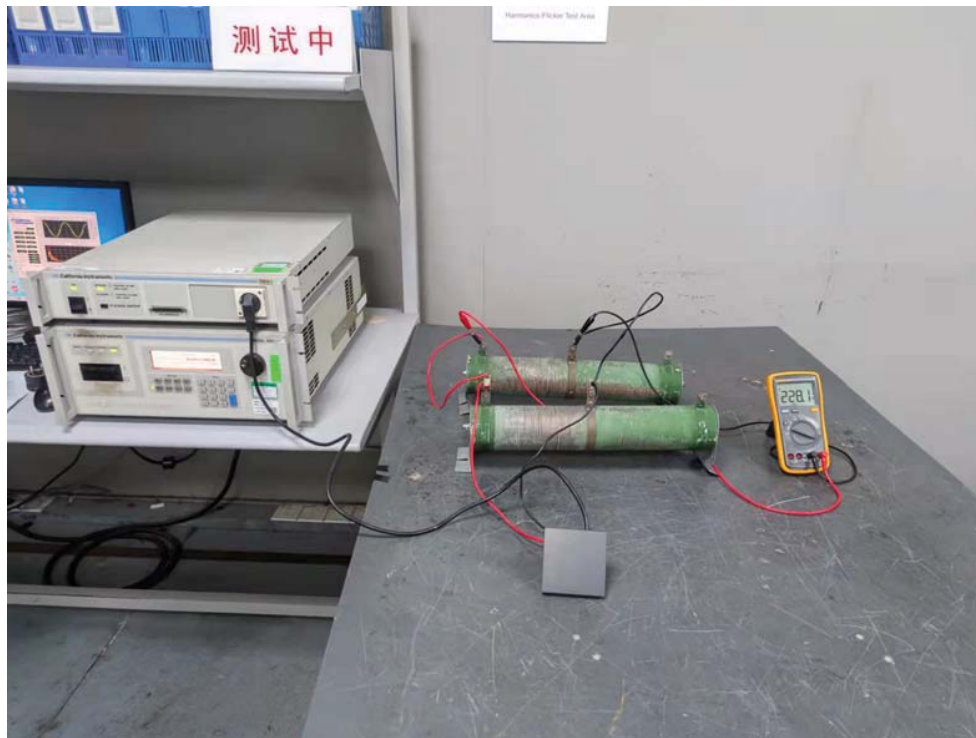
Test Setup Photo View-M5-3C-86



Test Setup Photo View-M5-2C-86



Test Setup Photo View-M5-1C-86



Flicker

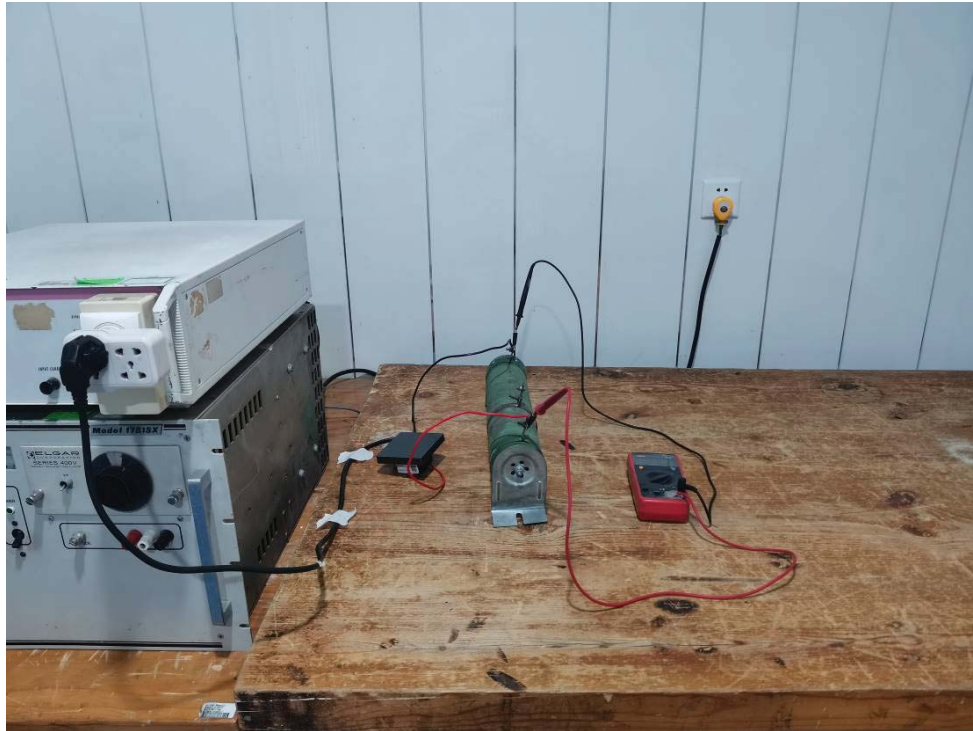
Test Setup Photo View-M5-3C-86



Test Setup Photo View-M5-2C-86

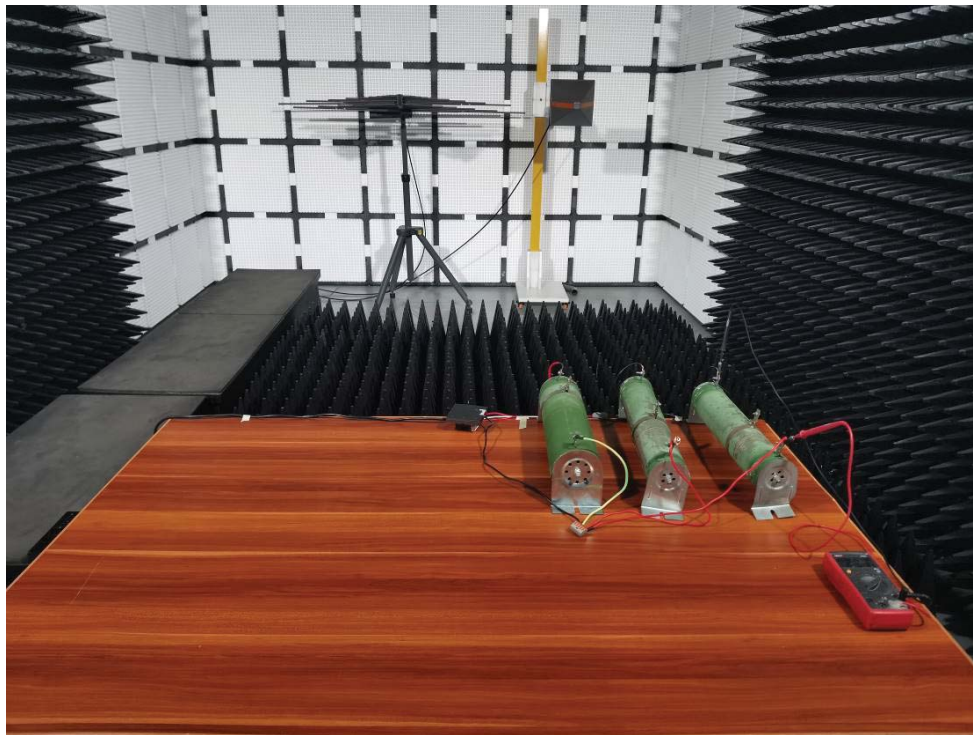


Test Setup Photo View-M5-1C-86

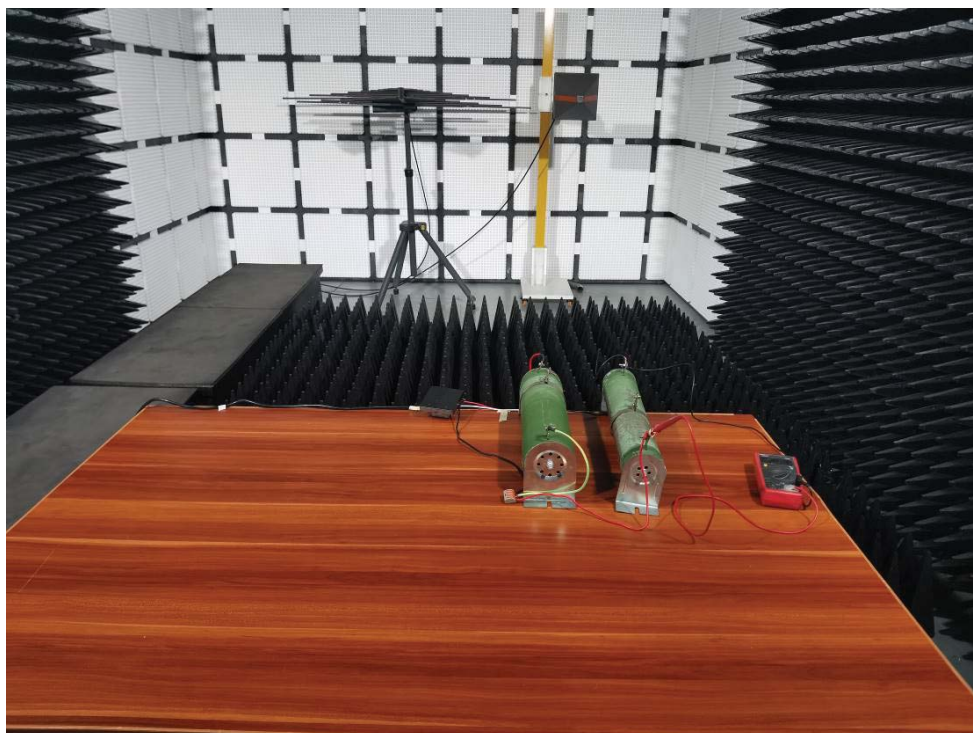


RS

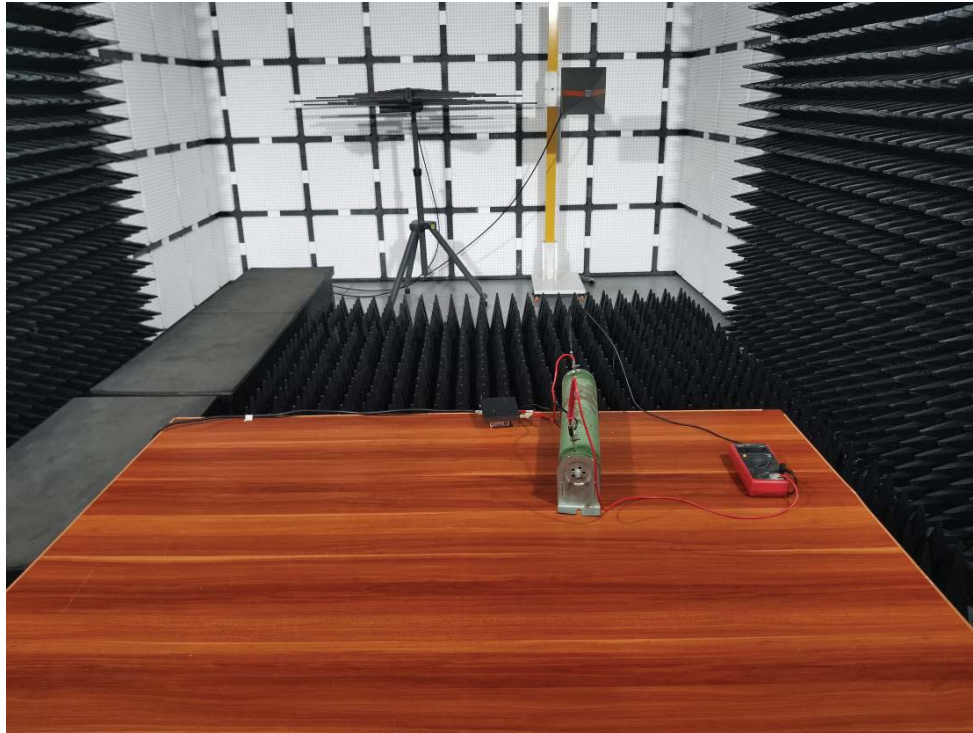
Test Setup Photo View-M5-3C-86



Test Setup Photo View-M5-2C-86



Test Setup Photo View-M5-1C-86



ESD

Test Setup Photo View-M5-3C-86



Test Setup Photo View-M5-2C-86



Test Setup Photo View-M5-1C-86

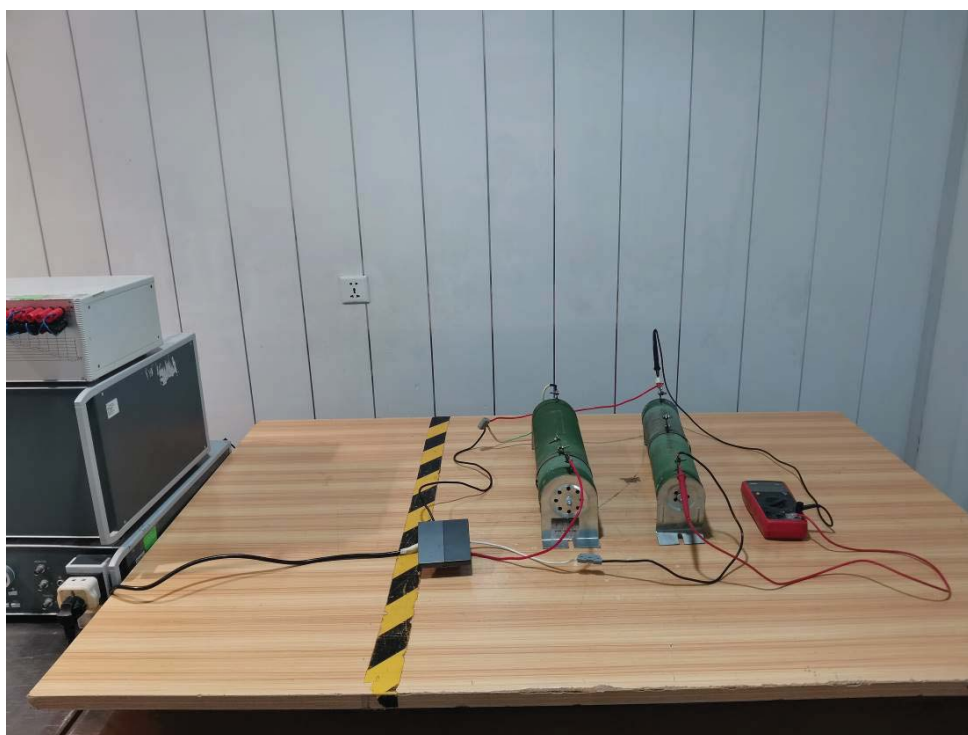


EFT

Test Setup Photo View-M5-3C-86



Test Setup Photo View-M5-2C-86



Test Setup Photo View-M5-1C-86



CS

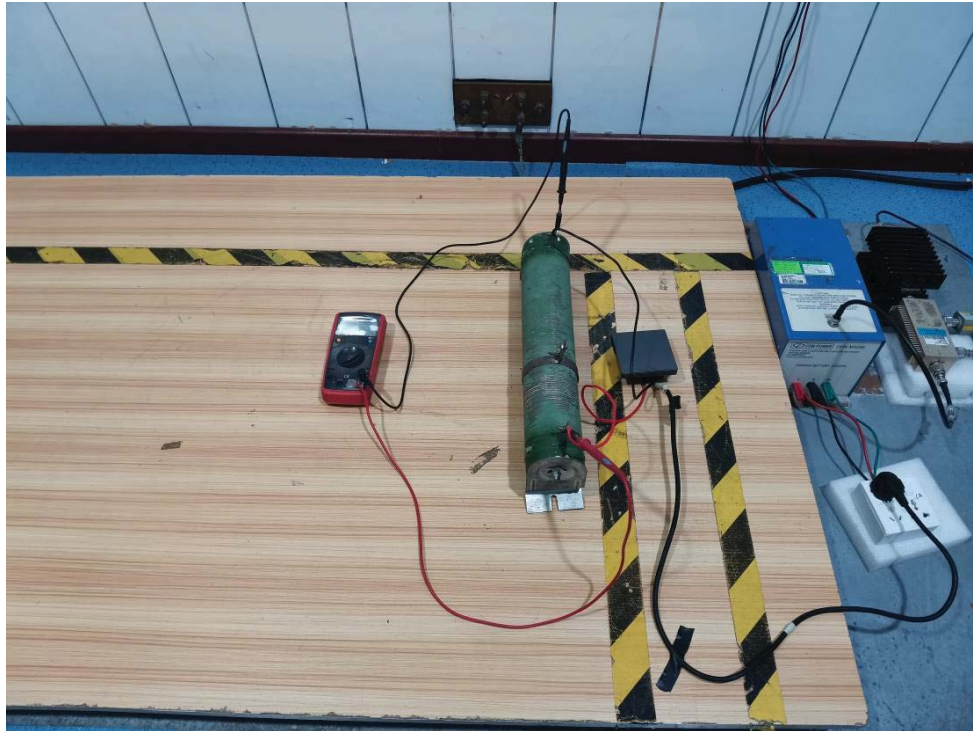
Test Setup Photo View-M5-3C-86



Test Setup Photo View-M5-2C-86



Test Setup Photo View-M5-1C-86

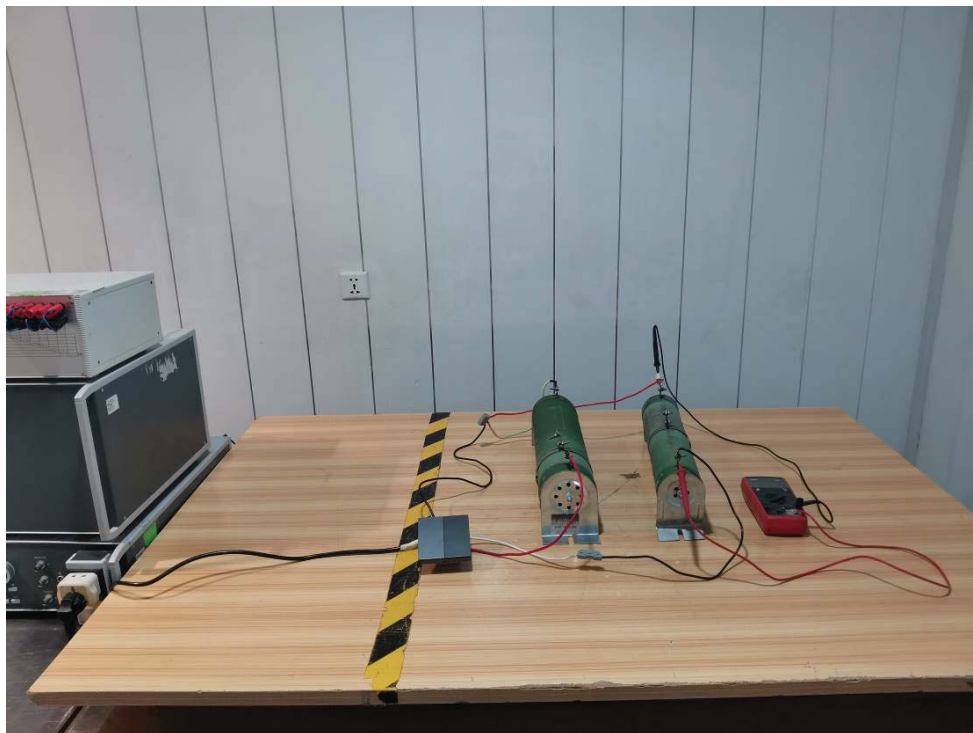


Dips

Test Setup Photo View-M5-3C-86



Test Setup Photo View-M5-2C-86



Test Setup Photo View-M5-1C-86

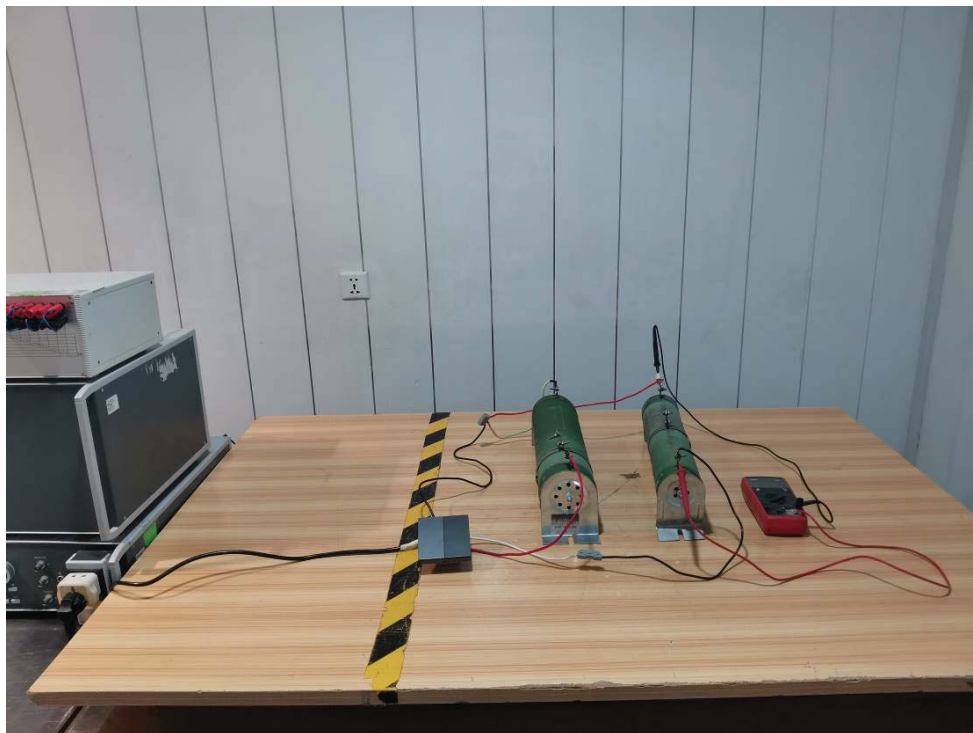


Surge

Test Setup Photo View-M5-3C-86



Test Setup Photo View-M5-2C-86



Test Setup Photo View-M5-1C-86



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