



TEST REPORT

Reference No...... : WTS18S05113605E
Applicant..... : Shenzhen EBELONG Technology Co., Ltd
Address..... : Shenzhen wisdom innovation center Suite A.607, Qianjin 2nd Road,
Baoan District, ShenZhen, Guangdong, China
Manufacturer..... : Shenzhen EBELONG Technology Co., Ltd
Address..... : Shenzhen wisdom innovation center Suite A.607, Qianjin 2nd Road,
Baoan District, ShenZhen, Guangdong, China
Product..... : RX: WIFI wireless controller
TX: Batteryless wireless switch
Model(s)..... : RX: ERC309, ERC309-H, ERC609
TX: Refer to section 4.3
Standards..... : EN 55015: 2013+A1: 2015
EN 61547: 2009
EN 61000-3-2: 2014
EN 61000-3-3: 2013
Date of Receipt sample.... : 2018-06-02
Date of Test..... : 2018-06-02 to 2018-06-11
Date of Issue..... : 2018-06-12
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested; this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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1 Laboratories Introduction

Waltek Services (Shenzhen) Co., Ltd is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation) of USA, Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CEC(California energy efficiency), IC(Industry Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek(ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.



Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility(EMC), and energy performance, wireless radio. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.



1.1 Test Facility

A. Accreditations for Conformity Assessment (International)

Country/Region	Accreditation Body	Scope	Note
USA	A2LA (Certificate No.: 4243.01)	FCC ID \ DOC \ VOC	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India	International Services	WPC	-
Thailand		NTC	-
Singapore		IDA	-
Note:			
1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.			
2. IC Canada Registration No.: 7760A			

B.TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of ...	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681



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3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS18S05113605E	2018-06-02	2018-06-02 to 2018-06-11	2018-06-12	original	-	Valid



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4 General Information

4.1 General Description of E.U.T

Product..... : RX: WIFI wireless controller
 TX: Batteryless wireless switch
 Model(s) : RX: ERC309, ERC309-H, ERC609
 TX: Refer to section 4.3
 Model difference..... : RX : Only the model names and shapes are different.
 TX : Refer to section 4.3

4.2 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test Lab: N/A

Lab address: N/A

Test items: N/A

4.3 Details of product

TX:

Product	Model	Description
Batteryless wireless switch	ES2154	S2 series white one-button switch
	ES2254	S2 series white double button switches
	ES2354	S2 series white three-button switches
	ES2111	S2 series grey one-button switch
	ES2211	S2 series grey double button switches
	ES2311	S2 series grey three-button switches
	ES2165	S2 series gold one-button switch
	ES2265	S2 series gold two-button switches
	ES2365	S2 series gold three-button switches
	ES2187	S2 series silver one-button switch
	ES2287	S2 series silver two-button switches
	ES2387	S2 series silver three-button switches

4.4 Abnormalities from Standard Conditions

None.



5 Test Summary

EMISSION		
Test Item	Test Standard	Result
Conducted Disturbance at Mains Terminal, 9kHz to 30MHz	EN 55015	Pass
Radiation electromagnetic disturbance, 9kHz to 30MHz	EN 55015	Pass
Radiation Emission, 30MHz to 300MHz	EN 55015	Pass
Harmonic Current emission	EN 61000-3-2	Pass
Voltage Fluctuation and Flicker	EN 61000-3-3	Pass
IMMUNITY		
Test Item	Test Method	Result
Electrostatic Discharge(ESD)	IEC 61000-4-2	Pass
Radio-frequency electromagnetic fields (80MHz to 1GHz)	IEC 61000-4-3	Pass
Electrical Fast Transients (EFT)	IEC 61000-4-4	Pass
Surges	IEC 61000-4-5	Pass
Injected Currents, 0.15MHz to 80MHz	IEC 61000-4-6	Pass
Power-frequency magnetic field	IEC 61000-4-8	N/A
Voltage Dips and Interruptions	IEC 61000-4-11	Pass

Remark:

Pass

Test item meets the requirement

Fail

Test item does not meet the requirement

N/A

Test case does not apply to the test object



6 Equipment Used during Test

6.1 Equipment List

Conducted Emissions at Mains Terminals Disturbance Voltage (Conducted Emission)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMI Test Receiver	R&S	ESCI	100947	2017-09-11	2018-09-10
2	LISN	R&S	ENV216	100115	2017-09-11	2018-09-10
4	Cable	Top	TYPE16(3.5M)	-	2017-09-11	2018-09-10
Radiated electromagnetic disturbance(9kHz to 30MHz)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMI Test Receiver	R&S	ESCI	101155	2017-09-11	2018-09-10
2	LARGE LOOP ANTENNA	Laplace	RF300	9057	2017-07-19	2018-07-18
3	Cable	Laplace	RF300	-	2017-09-11	2018-09-10
3m Semi-anechoic Chamber for Radiation(TDK)						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2018-04-06	2019-04-05
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2018-04-06	2019-04-05
3	Amplifier	ANRITSU	MH648A	M43381	2018-04-06	2019-04-05
4	Cable	HUBER+SUHNER	CBL2	525178	2018-04-06	2019-04-05
Harmonic and Flicker Measuring System						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Digital Power Analyzer	SCHAFFNER	CCN 1000-1	72625	2018-04-09	2019-04-08
2	Power Source	SCHAFFNER	NSG 1007	58477	2018-04-09	2019-04-08
Electrostatic Discharge						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Electrostatic Discharge Simulator	SCHLODER	SESD 216	606144	2017-11-13	2018-11-12
Radio-frequency electromagnetic fields						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Signal Generater	R&S	SMB100A	105942	2017-09-11	2018-09-10
2	RF Power Amplifier	BONN Elektronik	BLWA0830-160/100/40D	128740	2017-09-11	2018-09-10



3	Gestockte Breitband (S tacked) Log.-per.Antenna	SCHWARZBECK	STLP9128D	043	2017-09-11	2018-09-10
4	Power Meter	R&S	NRP2	102031	2017-09-11	2018-09-10
Surge, EFT, Voltage dips and Interruption						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	All Modules Generator	SCHAFFNER	6150	34579	2017-09-21	2018-09-20
2	Capacitive Coupling Clamp	SCHAFFNER	CDN 8014	25311	2017-09-21	2018-09-20
3	Signal and Data Line Coupling Network	SCHAFFNER	CDN 117	25627	2017-09-21	2018-09-20
4	AC Power Supply	HENGYUAN	DTDGC-4	-	2017-09-21	2018-09-20
Conducted Immunity						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	RF Generator	TESEQ	NSG4070	25781	2017-09-11	2018-09-10
2	CDN M-Type	TESEQ	CDN M016	25112	2017-09-11	2018-09-10
3	EM-Clamp	TESEQ	KEMZ 801	25453	2017-09-11	2018-09-10
4	Attenuator 6dB	TESEQ	ATN6050	25376	2017-09-11	2018-09-10

6.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

6.3 Measurement Uncertainty

Parameter	Uncertainty (Note 1)
Temperature	±1°C
Humidity	±5%
DC and low frequency voltages	±3%
Conducted Emission (9kHz-30MHz)	±3.64dB
Radiation electromagnetic disturbance (9kHz-30MHz)	±3.00dB
Radiated Emission(30MHz-300MHz)	±5.03dB

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

6.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TEST CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave, Tianhe District, Guangzhou, Guangdong, China.



6.5 Test Mode

All item is on working mode.



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7 Emission Test Results

7.1 Conducted Disturbance at Mains Terminal

Test Requirement.....	: EN 55015
Test Method	: EN 55015
Test Result	: Pass
Frequency Range.....	: 9kHz to 30MHz
Class/Severity	: Table 2a of EN 55015

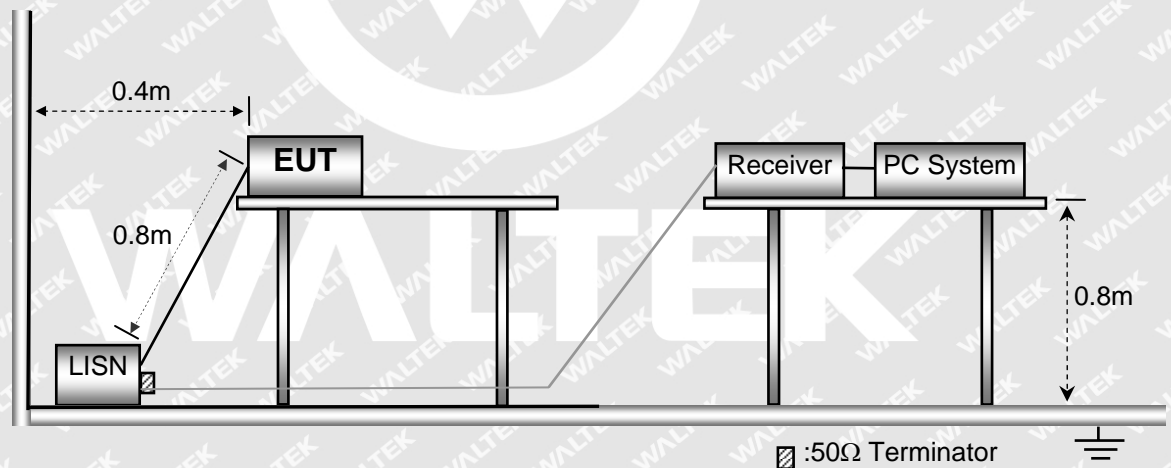
7.1.1 E.U.T. Operation

Operating Environment:

Temperature.....	: 21.5°C
Humidity.....	: 52.6%RH
Atmospheric Pressure.....	: 101.2kPa
EUT Operation	: Refer to section 6.5.

7.1.2 Block Diagram of Test Setup

The Conducted Disturbance at Mains Terminal tests were performed in accordance with the EN 55015



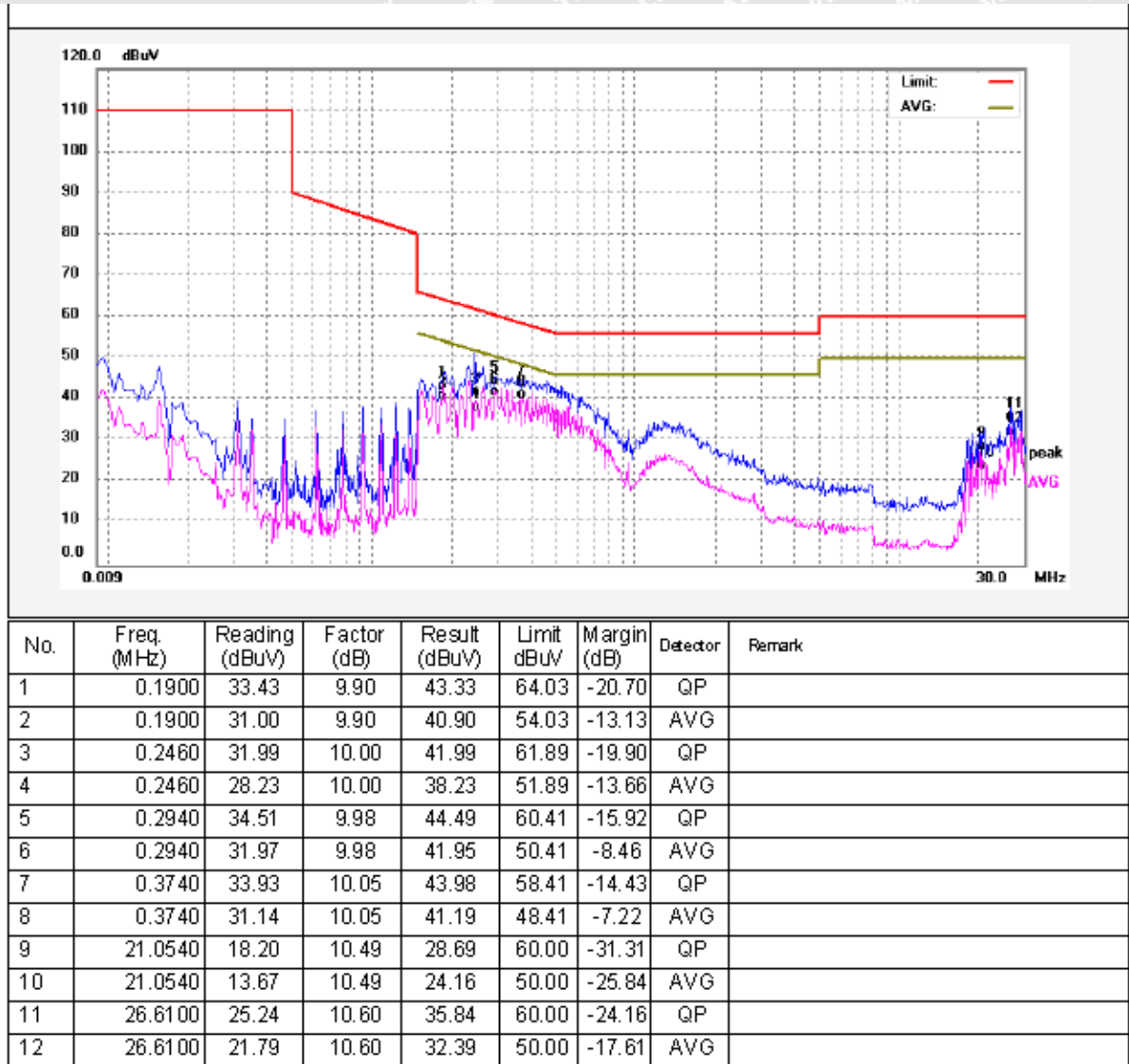
7.1.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.



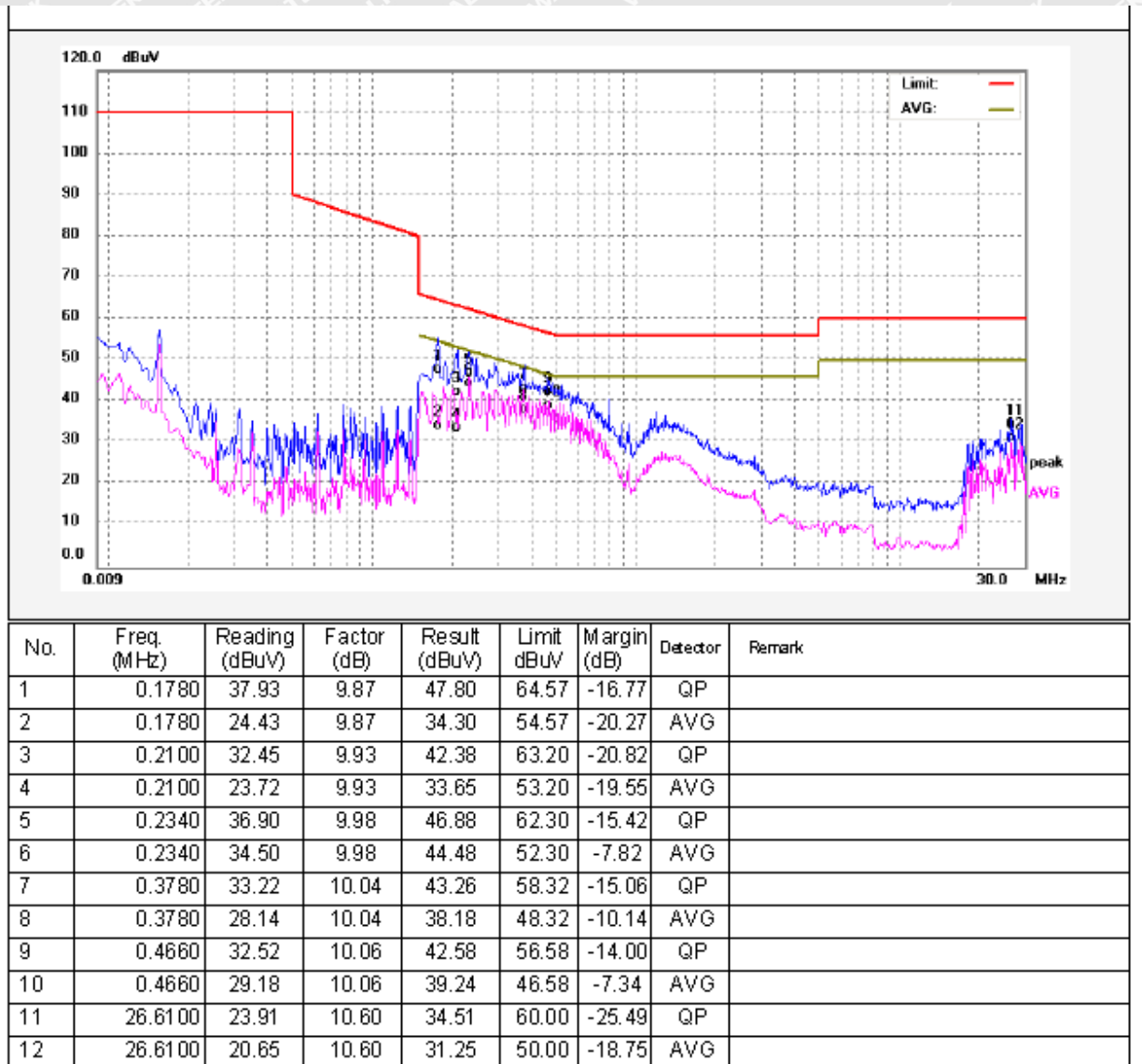
7.1.4 Conducted Disturbance at Mains Terminal Test Data

Live Line :





Neutral Line :





7.2 Radiation Electromagnetic Disturbance, 9kHz to 30MHz

Test Requirement.....	: EN 55015
Test Method.....	: EN 55015
Test Result	: Pass
Frequency Range.....	: 9kHz to 30MHz
Class/Severity.....	: Table 3a of EN 55015

7.2.1 E.U.T. Operation

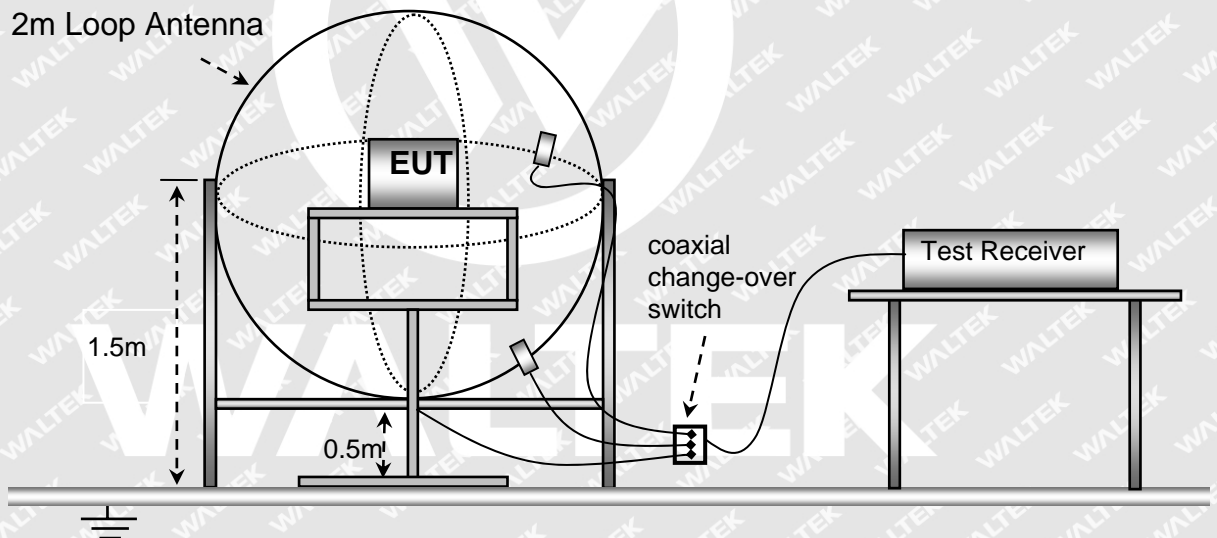
Operating Environment:

Temperature	: 21.8°C
Humidity	: 53.3%RH
Barometric Pressure	: 101.3kPa
EUT Operation.....	: Refer to section 6.5.

7.2.2 Block Diagram of Test Setup

The Radiation Electromagnetic Disturbance (9kHz to 30MHz) test was performed in accordance with the EN 55015

2m Loop Antenna



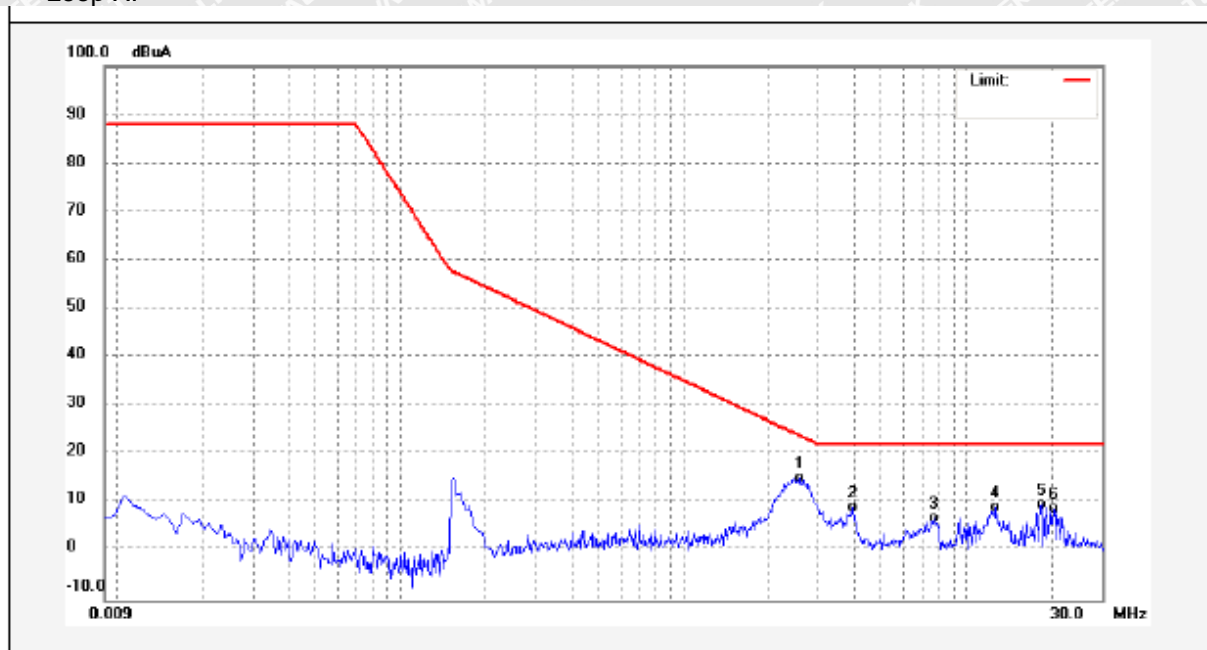
7.2.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for the loop antenna three directions. Quasi-peak measurements were performed if peak emissions were within 6dB of the Quasi-peak limit line.



7.2.4 Radiation Electromagnetic Disturbance Test Data, 9kHz to 30MHz

Loop X:

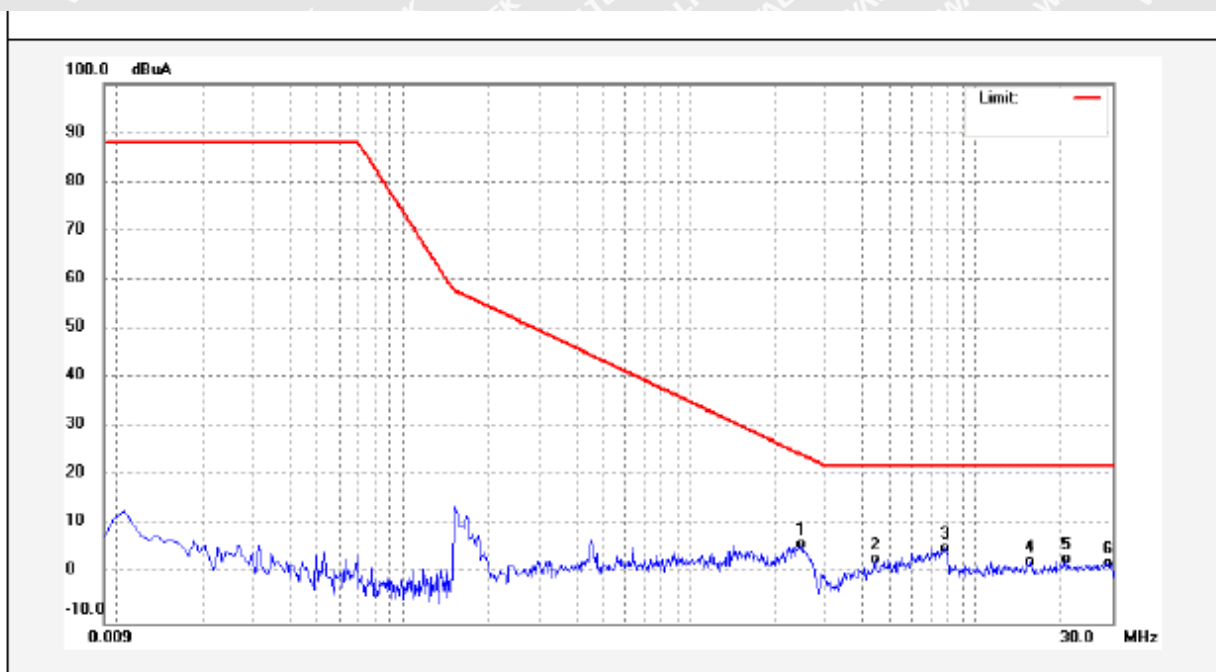


No.	Freq. (MHz)	Reading (dBuA)	Factor (dB)	Result (dBuA)	Limit (dBuA)	Margin (dB)	Detector	Remark
1	2.5586	-10.65	25.91	15.26	23.91	-8.65	QP	
2	3.9786	-17.16	26.20	9.04	22.00	-12.96	QP	
3	7.6626	-18.89	25.92	7.03	22.00	-14.97	QP	
4	12.5066	-16.53	25.72	9.19	22.00	-12.81	QP	
5	18.3666	-16.17	25.78	9.61	22.00	-12.39	QP	
6	20.2586	-16.91	25.79	8.88	22.00	-13.12	QP	

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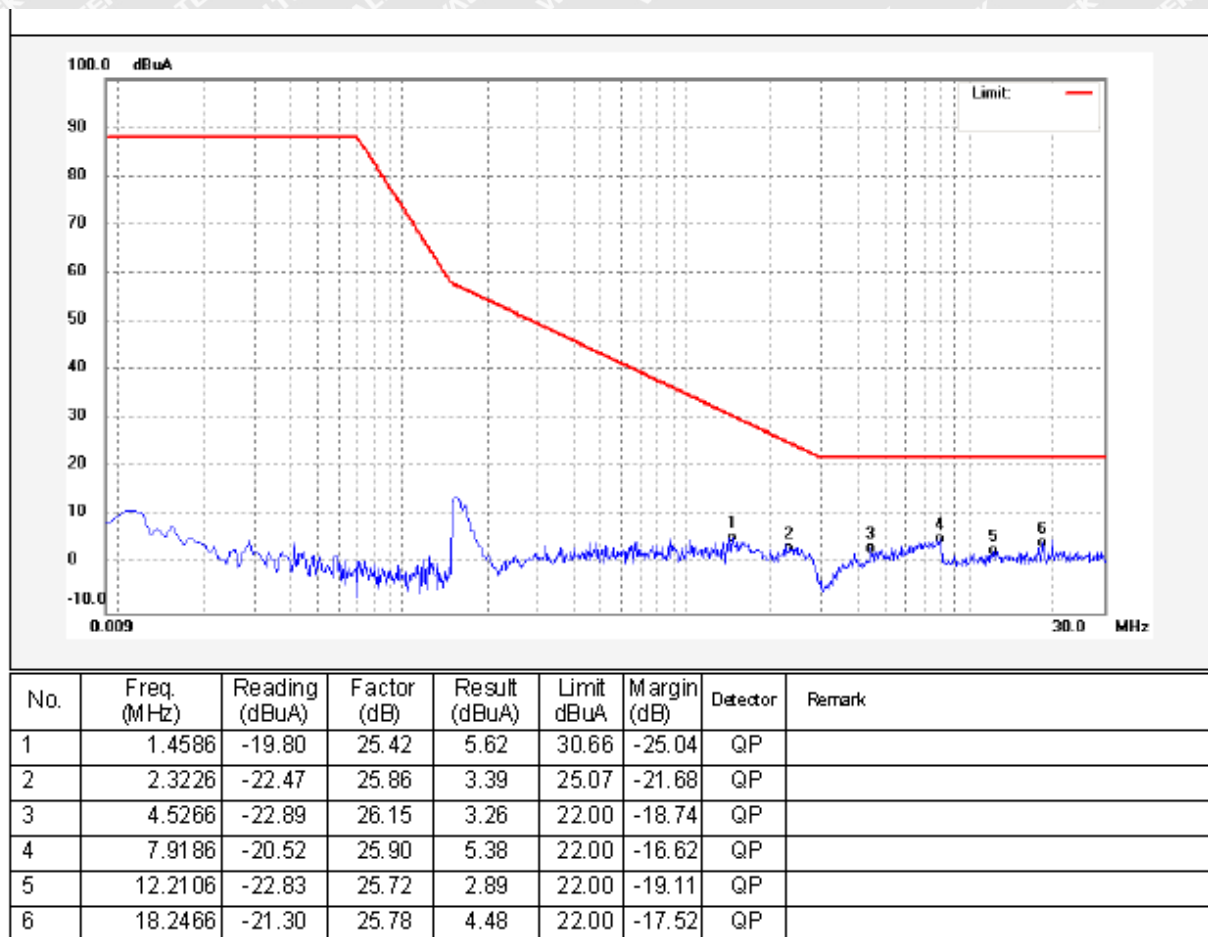
Loop Y:



No.	Freq. (MHz)	Reading (dBuA)	Factor (dB)	Result (dBuA)	Limit dBuA	Margin (dB)	Detector	Remark
1	2.4466	-19.90	25.89	5.99	24.45	-18.46	QP	
2	4.4906	-23.07	26.15	3.08	22.00	-18.92	QP	
3	7.8466	-20.77	25.91	5.14	22.00	-16.86	QP	
4	15.5106	-23.18	25.75	2.57	22.00	-19.43	QP	
5	20.6626	-22.76	25.77	3.01	22.00	-18.99	QP	
6	28.9946	-23.09	25.44	2.35	22.00	-19.65	QP	



Loop Z:





7.3 Radiation Emission, 30MHz to 300MHz

Test Requirement	: EN 55015
Test Method	: EN 55015
Test Result	: Pass
Frequency Range	: 30MHz to 300MHz
Class/Severity	: Table B.1 of EN 55015
Antenna polarisation	: Horizontal & Vertical

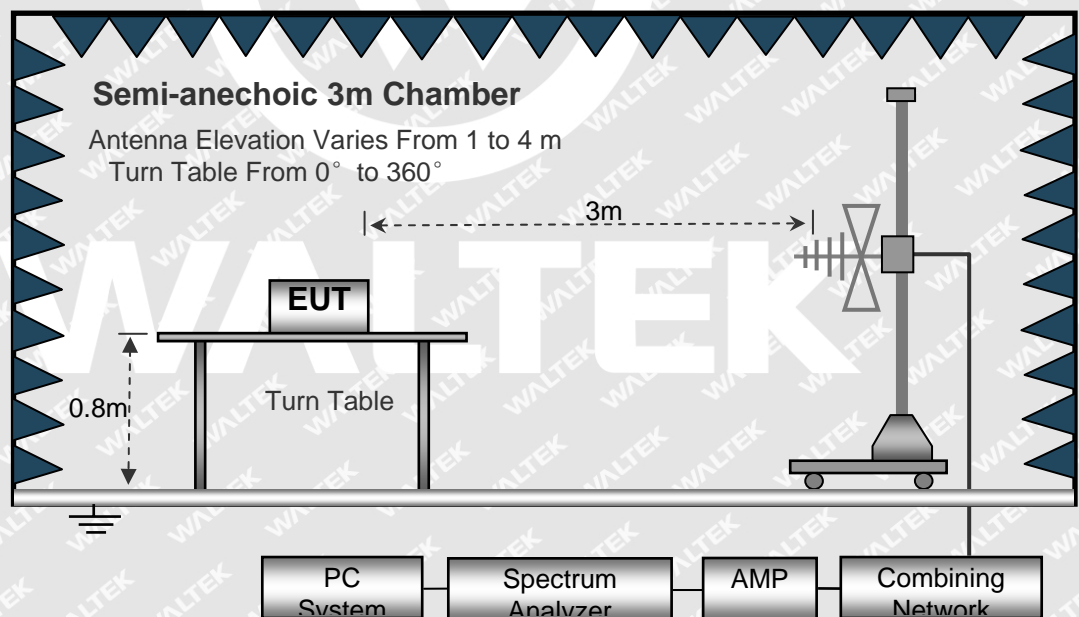
7.3.1 E.U.T. Operation

Operating Environment:

Temperature	: 21.7°C
Humidity	: 54.3%RH
Atmospheric Pressure	: 101.5kPa
EUT Operation	: Refer to section 6.5.

7.3.2 Block Diagram of Setup

The Radiation Emission test was performed in accordance with EN 55015



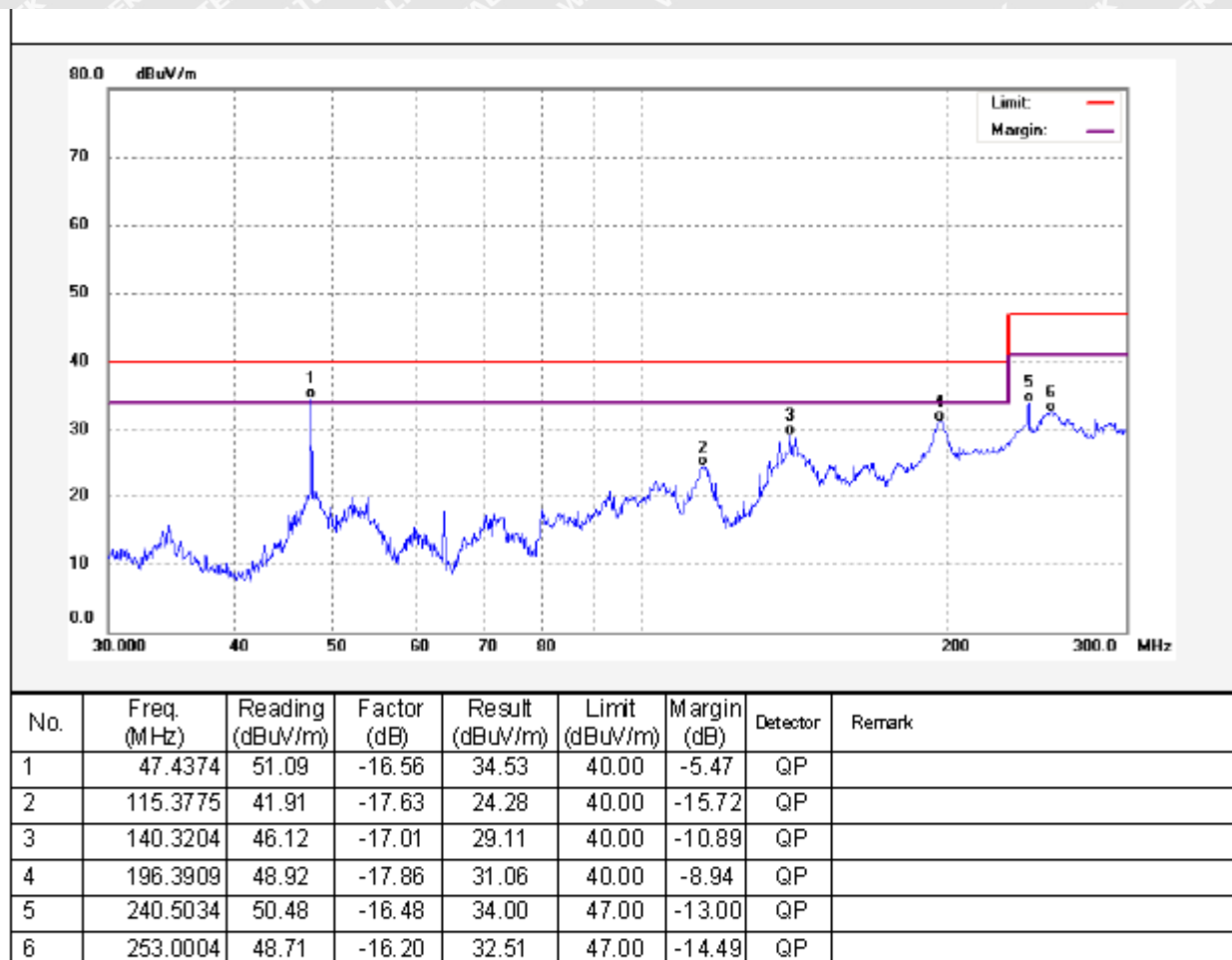
7.3.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Antenna Vertical Polarization and Antenna Horizontal Polarization. Quasi-peak measurements were performed if peak emissions were within 6dB of the Quasi-peak limit line.



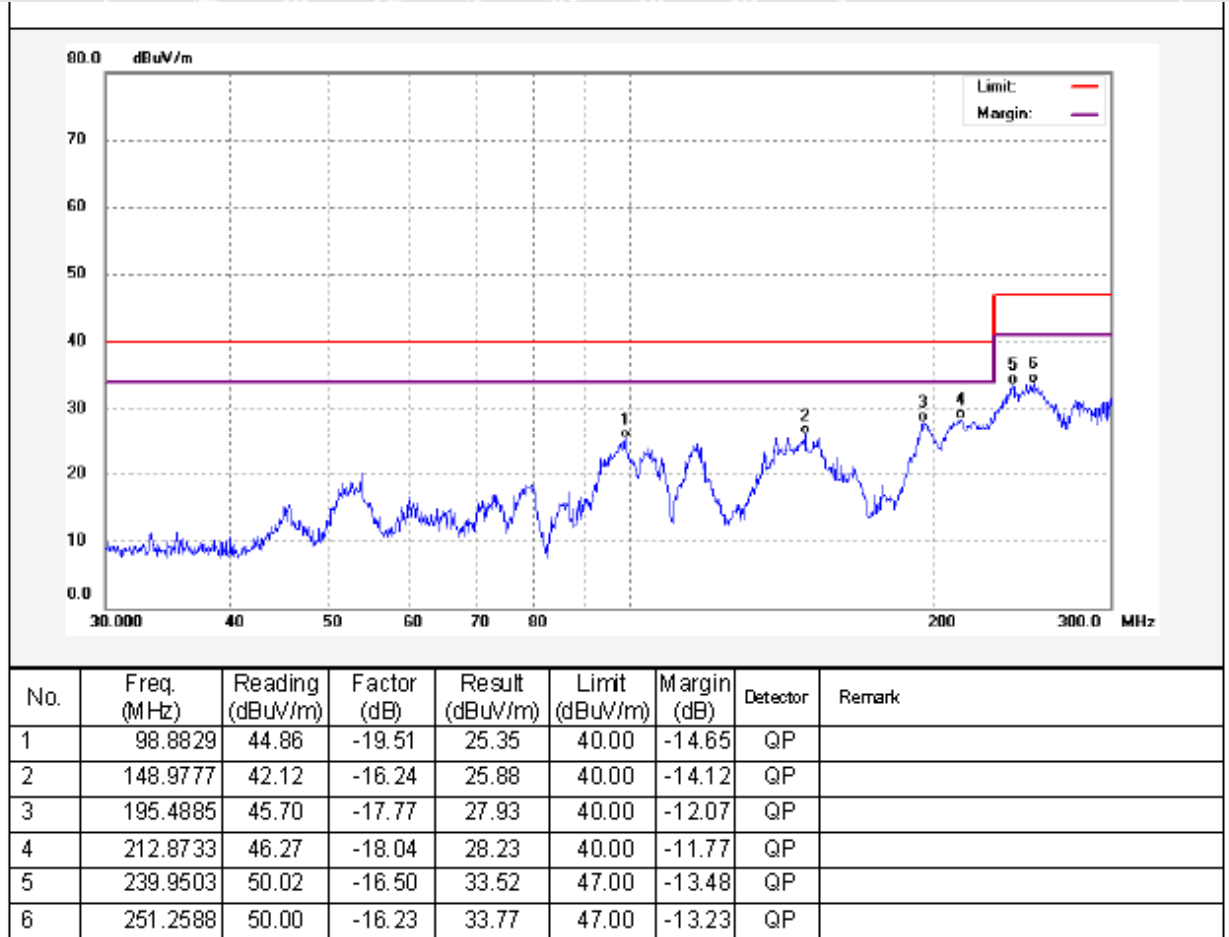
7.3.4 Radiation Emission Test Data, 30MHz to 300MHz

Antenna Polarization: Vertical





Antenna Polarization: Horizontal





7.4 Harmonics Current Emission

Test Requirement..... : EN 61000-3-2

Test Method : EN 61000-4-7

Test Result : Pass

Class/Severity : Class C

7.4.1 E.U.T. Operation

Operating Environment:

Temperature : 25°C

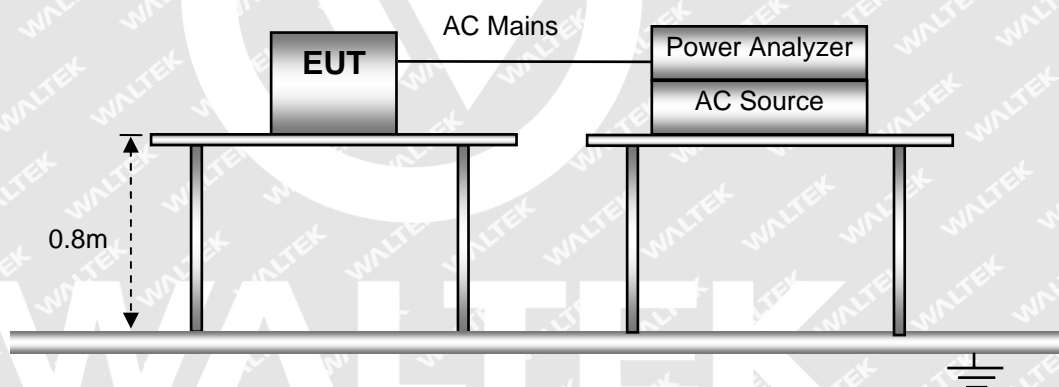
Humidity : 52.6%RH

Barometric Pressure : 101.4kPa

EUT Operation : Refer to section 6.5.

7.4.2 Block Diagram of Test Setup

The Harmonics Current emission test was performed in accordance with EN 61000-4-7.





7.4.3 Test Data

Harmonics – Class-C per Ed. 4.0 (2014)(Run time)

Test category: Class-C per Ed. 4.0 (2014) (European limits) Test Margin: 100

Test date: 2018/6/7

Start time: 11:12:15

End time: 11:14:57

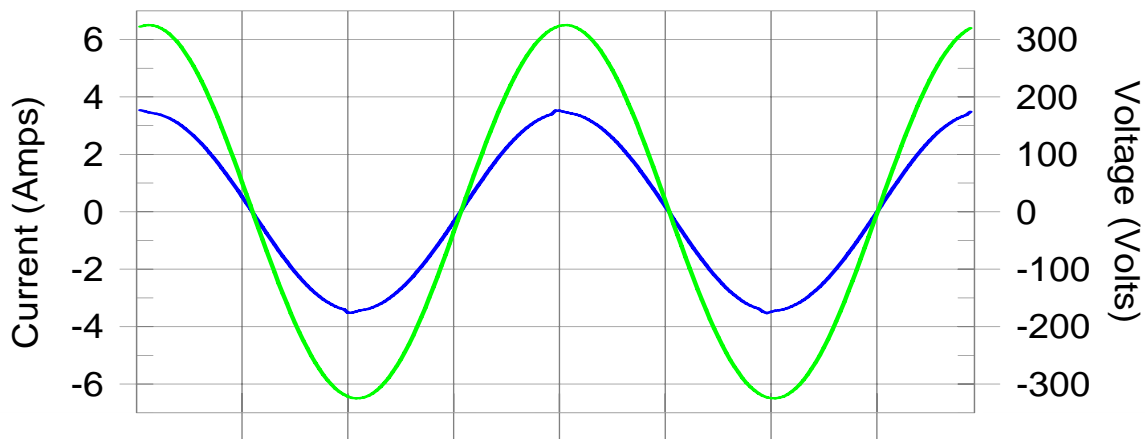
Test duration (min): 2.5

Data file name: H-000508.cts_data

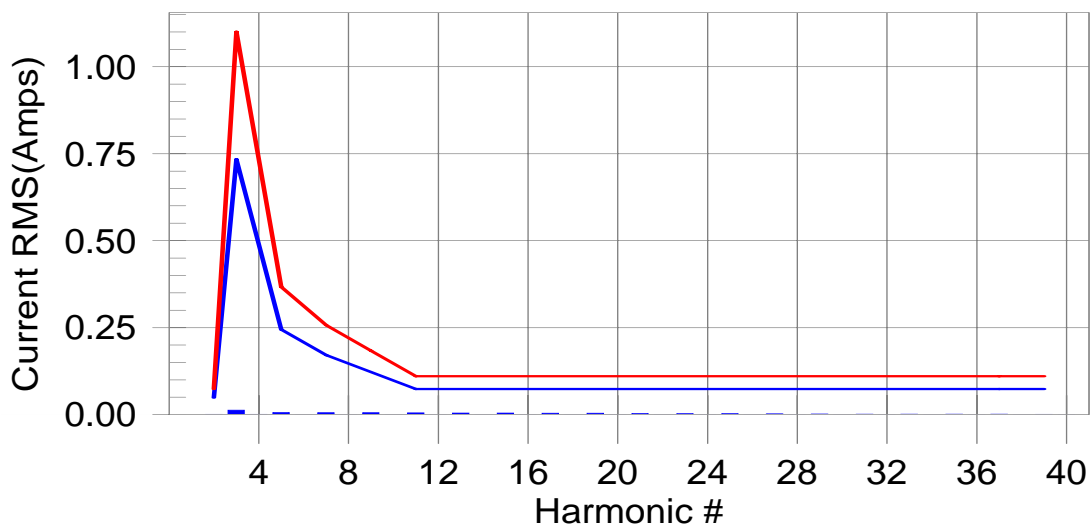
Test Result: Pass

Source qualification: Normal

Current & voltage waveforms



Harmonics and Class C limit line European Limits



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



Current Test Result Summary (Run time)

Test category: Class-C per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test date: 2018/6/7 Start time: 11:12:15 End time: 11:14:57
 Test duration (min): 2.5 Data file name: H-000508.cts_data

Test Result: Pass Source qualification: Normal
 THC(A): 0.020 I-THD(%): 0.8 POHC(A): 0.007 POHC Limit(A): 0.232

Highest parameter values during test:

V_RMS (Volts): 229.93 Frequency(Hz): 50.00
 I_Peak (Amps): 3.555 I_RMS (Amps): 2.447
 I_Fund (Amps): 2.447 Crest Factor: 1.454
 Power (Watts): 562.4 Power Factor: 1.000

Harm#	Harms(avg)		100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status
2	0.001	0.049	N/A	0.001	0.073	N/A		Pass
3	0.013	0.734	N/A	0.013	1.101	N/A		Pass
4	0.001	0.000	N/A	0.001	0.000	N/A		Pass
5	0.006	0.245	N/A	0.006	0.367	N/A		Pass
6	0.000	0.000	N/A	0.001	0.000	N/A		Pass
7	0.005	0.171	N/A	0.006	0.257	N/A		Pass
8	0.000	0.000	N/A	0.001	0.000	N/A		Pass
9	0.005	0.122	N/A	0.006	0.183	N/A		Pass
10	0.001	0.000	N/A	0.001	0.000	N/A		Pass
11	0.005	0.073	N/A	0.005	0.110	N/A		Pass
12	0.001	0.000	N/A	0.001	0.000	N/A		Pass
13	0.005	0.073	N/A	0.005	0.110	N/A		Pass
14	0.000	0.000	N/A	0.001	0.000	N/A		Pass
15	0.004	0.073	N/A	0.004	0.110	N/A		Pass
16	0.000	0.000	N/A	0.001	0.000	N/A		Pass
17	0.004	0.073	N/A	0.004	0.110	N/A		Pass
18	0.000	0.000	N/A	0.001	0.000	N/A		Pass
19	0.004	0.073	N/A	0.004	0.110	N/A		Pass
20	0.001	0.000	N/A	0.001	0.000	N/A		Pass
21	0.003	0.073	N/A	0.003	0.110	N/A		Pass
22	0.001	0.000	N/A	0.001	0.000	N/A		Pass
23	0.003	0.073	N/A	0.003	0.110	N/A		Pass
24	0.000	0.000	N/A	0.001	0.000	N/A		Pass
25	0.003	0.073	N/A	0.003	0.110	N/A		Pass
26	0.000	0.000	N/A	0.001	0.000	N/A		Pass
27	0.002	0.073	N/A	0.002	0.110	N/A		Pass
28	0.000	0.000	N/A	0.001	0.000	N/A		Pass
29	0.002	0.073	N/A	0.002	0.110	N/A		Pass
30	0.000	0.000	N/A	0.001	0.000	N/A		Pass
31	0.002	0.073	N/A	0.002	0.110	N/A		Pass
32	0.000	0.000	N/A	0.001	0.000	N/A		Pass
33	0.002	0.073	N/A	0.002	0.110	N/A		Pass
34	0.000	0.000	N/A	0.001	0.000	N/A		Pass
35	0.001	0.073	N/A	0.001	0.110	N/A		Pass
36	0.000	0.000	N/A	0.000	0.000	N/A		Pass
37	0.001	0.073	N/A	0.001	0.110	N/A		Pass
38	0.000	0.000	N/A	0.000	0.000	N/A		Pass
39	0.001	0.073	N/A	0.001	0.110	N/A		Pass
40	0.000	0.000	N/A	0.000	0.000	N/A		Pass

Note: Dynamic limits were applied for this test. The highest harmonics values in the above table may not occur at the same window as the maximum harmonics/limit ratio.



Voltage Source Verification Data (Run time)

Test category: Class-C per Ed. 4.0 (2014) (European limits) Test Margin: 100
 Test date: 2018/6/7 Start time: 11:12:15 End time: 11:14:57
 Test duration (min): 2.5 Data file name: H-000508.cts_data

Test Result: Pass Source qualification: Normal

Highest parameter values during test:

Voltage (Vrms):	229.93	Frequency(Hz):	50.00
I_Peak (Amps):	3.555	I_RMS (Amps):	2.447
I_Fund (Amps):	2.447	Crest Factor:	1.454
Power (Watts):	562.4	Power Factor:	1.000

Harm#	Harmonics	V-rmsLimit	V-rms% of Limit	Status
2	0.062	0.460	13.47	OK
3	0.493	2.069	23.84	OK
4	0.056	0.460	12.22	OK
5	0.050	0.920	5.47	OK
6	0.030	0.460	6.47	OK
7	0.022	0.690	3.20	OK
8	0.010	0.460	2.14	OK
9	0.031	0.460	6.80	OK
10	0.009	0.460	1.99	OK
11	0.013	0.230	5.47	OK
12	0.012	0.230	5.32	OK
13	0.007	0.230	3.15	OK
14	0.005	0.230	2.03	OK
15	0.006	0.230	2.72	OK
16	0.008	0.230	3.66	OK
17	0.007	0.230	3.15	OK
18	0.008	0.230	3.55	OK
19	0.012	0.230	5.19	OK
20	0.020	0.230	8.62	OK
21	0.012	0.230	5.38	OK
22	0.002	0.230	1.01	OK
23	0.005	0.230	1.99	OK
24	0.004	0.230	1.55	OK
25	0.006	0.230	2.70	OK
26	0.002	0.230	0.96	OK
27	0.006	0.230	2.66	OK
28	0.003	0.230	1.26	OK
29	0.006	0.230	2.57	OK
30	0.002	0.230	0.82	OK
31	0.003	0.230	1.45	OK
32	0.002	0.230	0.79	OK
33	0.004	0.230	1.62	OK
34	0.003	0.230	1.18	OK
35	0.002	0.230	1.08	OK
36	0.001	0.230	0.62	OK
37	0.002	0.230	1.01	OK
38	0.002	0.230	0.91	OK
39	0.004	0.230	1.85	OK
40	0.011	0.230	4.67	OK



7.5 Voltage Fluctuation and Flicker

Test Requirement : EN 61000-3-3

Test Method : EN 61000-4-15

Test Result : Pass

7.5.1 E.U.T. Operation

Operating Environment:

Temperature : 22.8°C

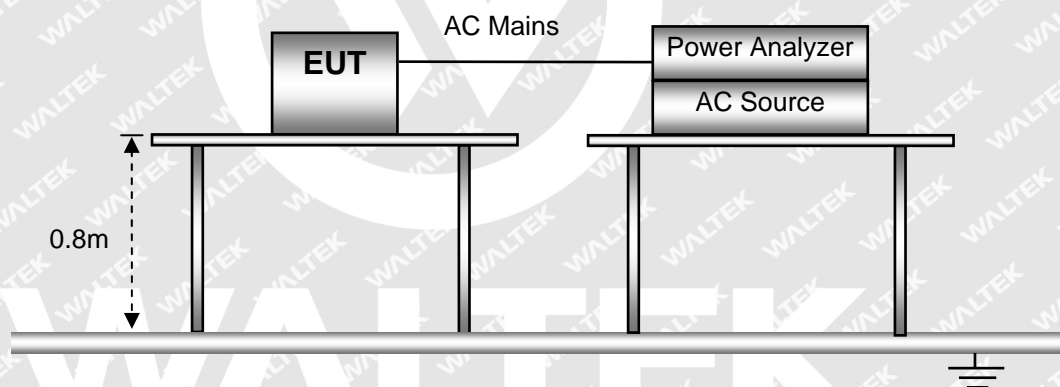
Humidity : 54.2%RH

Barometric Pressure : 101.1kPa

EUT Operation : Refer to section 6.5.

7.5.2 Block Diagram of Setup

The Voltage Fluctuation and Flicker test was performed in accordance with the EN 61000-4-15.





7.5.3 Test Data

Flicker Test Summary per EN/IEC61000-3-3 Ed. 3.0 (2013) (Run time)

Test category: All parameters (European limits)

Test Margin: 100

Test date: 2018/6/7

Start time: 11:22:03

End time: 11:32:30

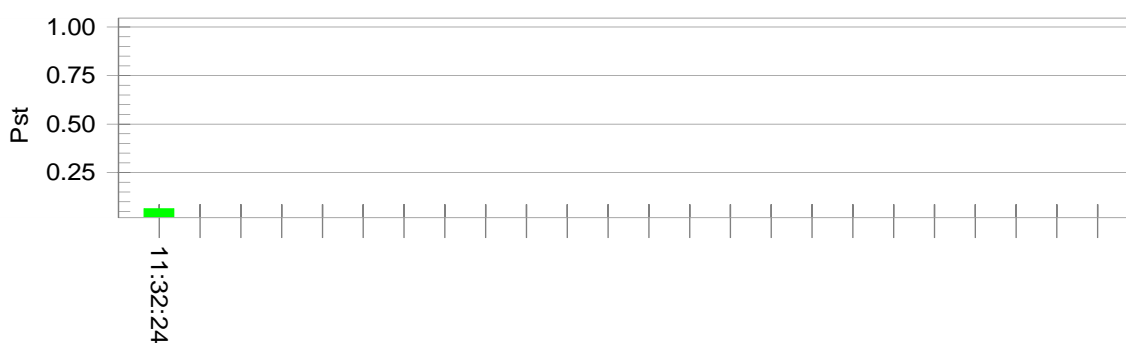
Test duration (min): 10

Data file name: F-000510.cts_data

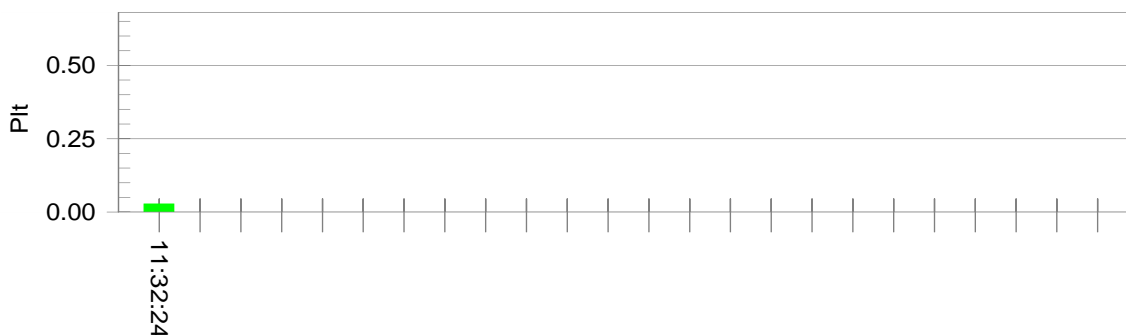
Test Result: Pass Status: Test Completed

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt): 228.77

T-max (mS): 0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.064

Highest Plt (2 hr. period): 0.028

Test limit (mS): 500.0

Test limit (%): 3.30

Test limit (%): 4.00

Test limit: 1.000

Test limit: 0.650

Pass

Pass

Pass

Pass

Pass



8 Immunity Test Results

8.1 Performance Criteria

Performance criterion A: During the test, no change of the luminous intensity shall be observed and the regulating control, if any, shall operate during the test as intended.

Performance criterion B: During the test, the luminous intensity may change to any value. After the test, the luminous intensity shall be restored to its initial value within 1 min. Regulating controls need not function during the test, but after the test, the mode of the control shall be the same as before the test provided that during the test no mode changing commands were given.

Performance criterion C: During and after the test, any change of the luminous intensity is allowed and the lamp(s) may be extinguished. After the test, within 30 min, all functions shall return to normal, if necessary by temporary interruption of the mains supply and/or operating the regulating control. For further details, please refer to EN 61547



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8.2 Electrostatic Discharge(ESD)

Test Requirement.....	: EN 61547
Test Method	: IEC 61000-4-2
Test Result	: Pass
Discharge Impedance	: 330Ω / 150pF
Discharge Voltage.....	: Air Discharge: ±8kV Contact Discharge: ±4kV HCP & VCP: ±4kV
Polarity	: Positive & Negative
Number of Discharge	: Minimum 10 times at each test point
Discharge Mode	: Single Discharge
Discharge Period	: 1 second minimum

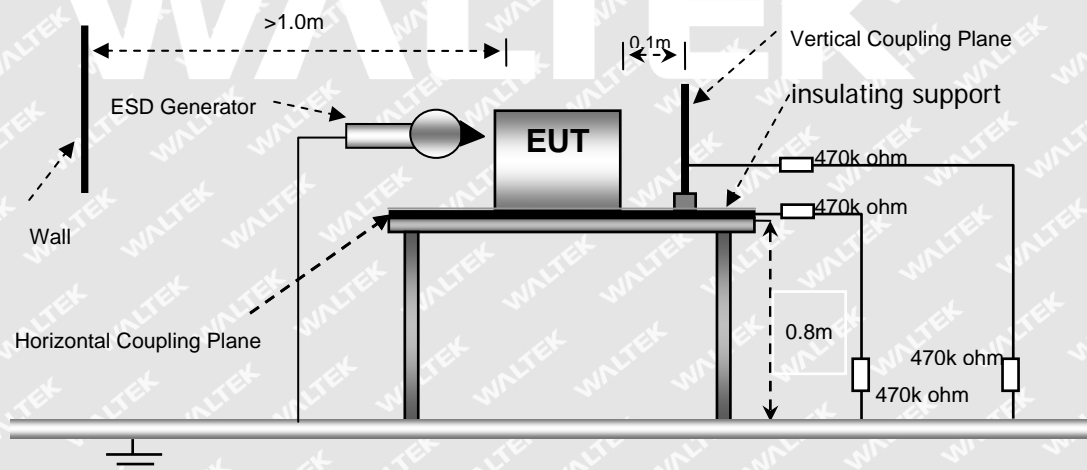
8.2.1 E.U.T. Operation

Operating Environment:

Temperature	: 22.8°C
Humidity	: 54.7%RH
Barometric Pressure	: 100.8kPa
EUT Operation	: Refer to section 6.5.

8.2.2 Block Diagram of Setup

The ESD test was performed in accordance with the IEC 61000-4-2.





8.2.3 Direct Discharge Test Results

Observations:

Test points:

1. All Exposed Surface & Seams;
2. All metallic part

Direct Discharge			Test Results	
Applied Voltage (kV)	Performance Criterion	Test Point	Contact Discharge	Air Discharge
±8	B	1	N/A	Pass
±4	B	2	Pass	N/A

8.2.4 Indirect Discharge Test Results

Observations:

Test points: 1. All sides.

Indirect Discharge			Test Results	
Applied Voltage (kV)	Performance Criterion	Test Point	Horizontal Coupling	Vertical Coupling
±4	B	1	Pass	Pass



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8.3 Radio-frequency electromagnetic fields, 80MHz to 1GHz

Test Requirement	: EN 61547
Test Method	: IEC 61000-4-3
Test Result	: Pass
Frequency Range	: 80MHz to 1GHz
Test level	: 3V/m
Modulation	: 80%, 1kHz Amplitude Modulation.
Face of EUT	: Front, Back, Left, Right
Antenna polarisation	: Horizontal& Vertical

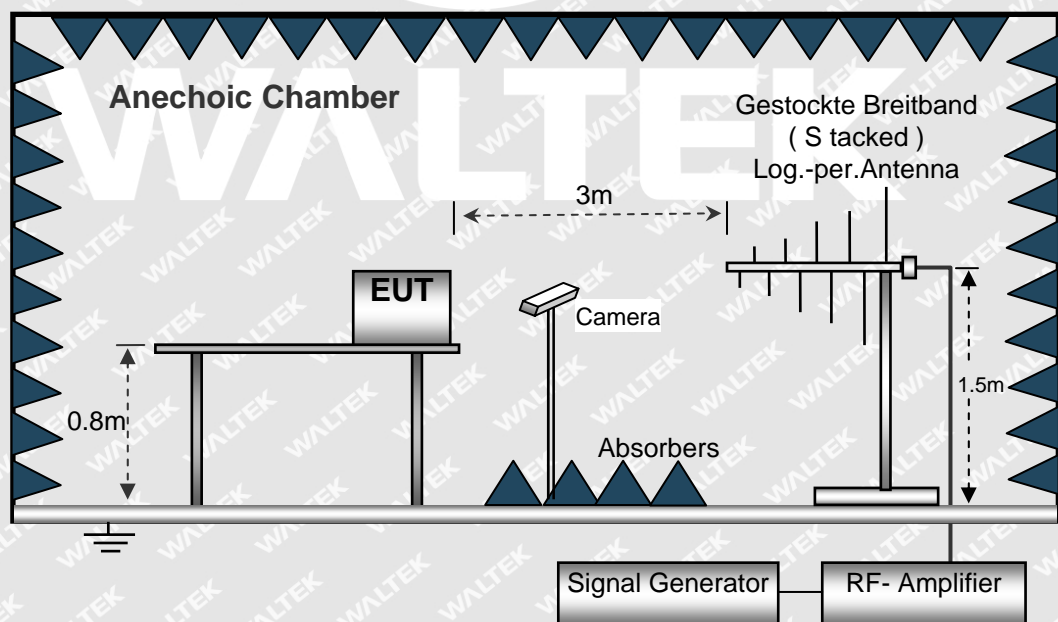
8.3.1 E.U.T. Operation

Operating Environment:

Temperature	: 21.7°C
Humidity	: 52.4% RH
Barometric Pressure	: 102.4kPa
EUT Operation	: Refer to section 6.5.

8.3.2 Block Diagram of Setup

The Radio-frequency electromagnetic fields Immunity test was performed in accordance with the IEC 61000-4-3.





8.3.3 Test Results

Frequency	Face of EUT	Antenna polarisation	Test Level	Step Size	Dwell Time	Performance Criterion	Result
80 to 1000MHz	Front, Back, Left, Right	Horizontal	3V/m	1%	1s	A	Pass
80 to 1000MHz	Front, Back, Left, Right	Vertical	3V/m	1%	1s	A	Pass



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8.4 Electrical Fast Transients (EFT)

Test Requirement.....	: EN 61547
Test Method	: IEC 61000-4-4
Test Result	: Pass
Polarity.....	: Positive & Negative
Repetition Frequency	: 5kHz
Burst Duration	: 300ms
Test Duration.....	: 2 minutes per level & polarity

8.4.1 E.U.T. Operation

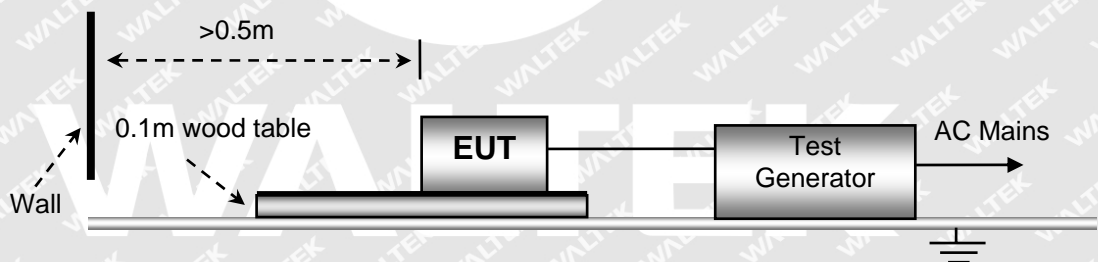
Operating Environment:

Temperature.....	: 21.9°C
Humidity.....	: 53.5%RH
Barometric Pressure	: 102.3kPa
EUT Operation	: Refer to section 6.5.

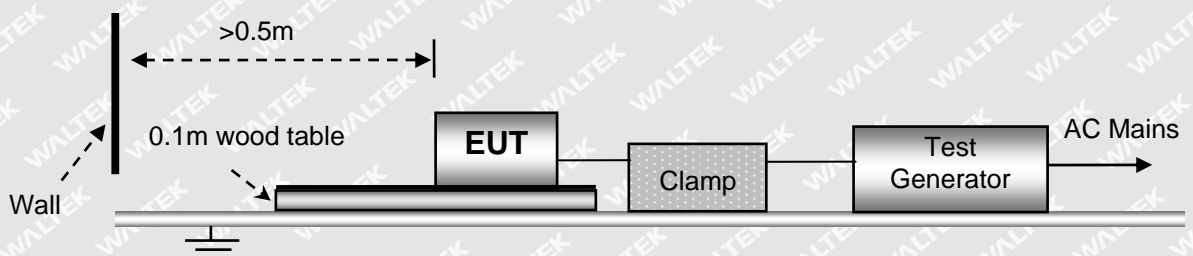
8.4.2 Block Diagram of Setup

The Electrical Fast Transients Immunity test was performed in accordance with IEC 61000-4-4.

For AC Mains or DC Ports:



For Signal and Control Ports:





8.4.3 Test Results

Test Ports	Test Level(kV)	Performance Criterion	Result
AC Mains	± 1.0	B	PASS
Signal	± 0.5	B	N/A ^a
DC Ports	± 0.5	B	N/A

Remark:

- a Applicable only to cables which according to the manufacturer's specification supports communication on cable lengths greater than 3 m.



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8.5 Surges

Test Requirement..... : EN 61547
 Test Method : IEC 61000-4-5
 Test Result : Pass
 Interval..... : 60s between each surge
 No. of surges : 5 positive at 90°, 5 negative at 270°.

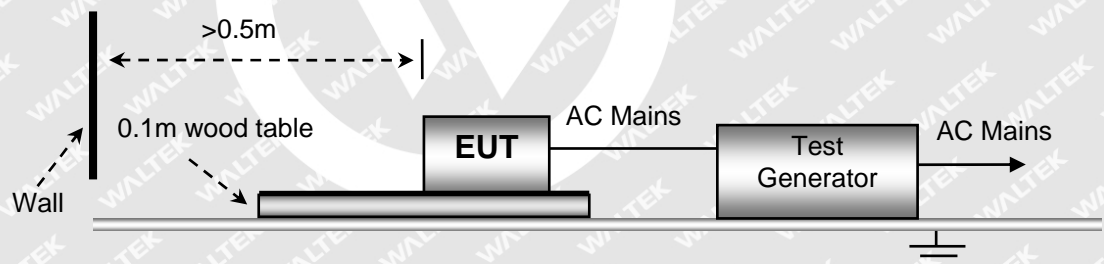
8.5.1 E.U.T. Operation

Operating Environment:

Temperature..... : 22.5°C
 Humidity..... : 53.1%RH
 Barometric Pressure . : 101.2kPa
 EUT Operation : Refer to section 6.5.

8.5.2 Block Diagram of Setup

The Surge Immunity test was performed in accordance with the IEC 61000-4-5.



8.5.3 Test Results

Test Port	Applied Voltage (kV)	Performance criterion	Result
AC Mains (Between Live And Neutral)	± 0.5	C	PASS
AC Mains (Between Live And Earth)	± 1	C	N/A
AC Mains (Between Neutral And Earth)	± 1	C	N/A



8.6 Injected Currents Immunity 0.15MHz to 80MHz

Test Requirement	: EN 61547
Test Method	: IEC 61000-4-6
Test Result	: Pass
Frequency Range	: 0.15MHz to 80MHz
Test level	: 3V r.m.s. (unmodulated emf into 150 Ω)
Modulation	: 80%, 1kHz Amplitude Modulation.

8.6.1 E.U.T. Operation

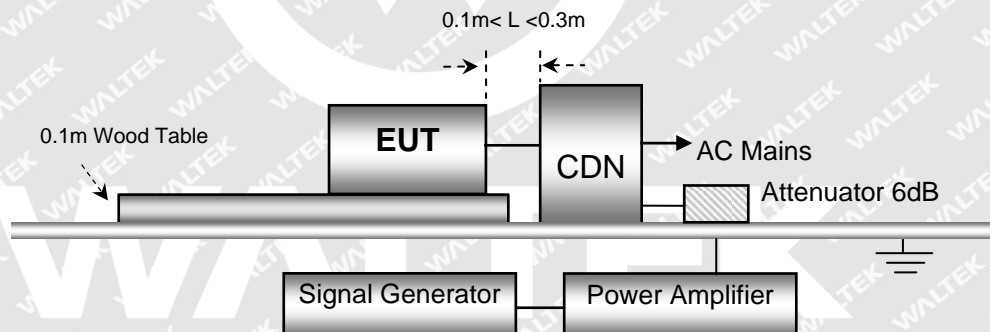
Operating Environment:

Temperature	: 23.4°C
Humidity	: 51.2% RH
Barometric Pressure	: 103.2kPa
EUT Operation	: Refer to section 6.5.

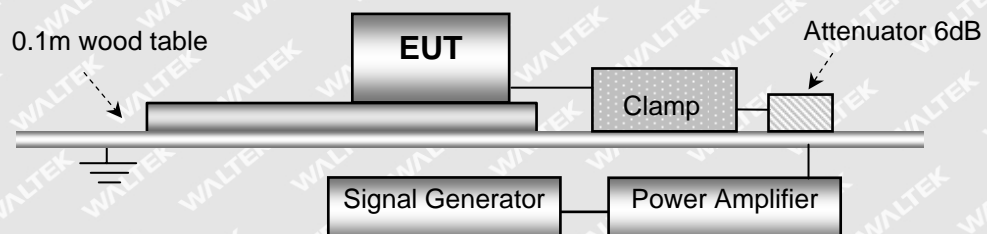
8.6.2 Block Diagram of Setup

The Injected Currents Immunity test was performed in accordance with IEC 61000-4-6.

For AC Mains or DC Port:



For Signal or Control Ports:



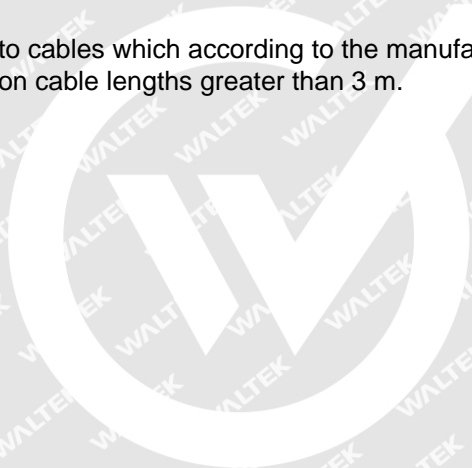


8.6.3 Test Results

Line	Test Level	Modulation	Step Size	Dwell Time	Criterion Required	Observations
AC mains	3Vrms	80%, 1kHz Amp. Mod.	1%	1s	A	A
DC Line	3Vrms	80%, 1kHz Amp. Mod.	1%	1s	A	N/A
Signal Line	3Vrms	80%, 1kHz Amp. Mod.	1%	1s	A	N/A ^a
Control Line	3Vrms	80%, 1kHz Amp. Mod.	1%	1s	A	N/A ^a

Remark:

- ^a Applicable only to cables which according to the manufacturer's specification supports communication on cable lengths greater than 3 m.



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8.7 Voltage Dips and Interruptions

Test Requirement..... : EN 61547
 Test Method : IEC 61000-4-11
 Test Result : Pass
 Test Level(Voltage reduction) : 0%&70 % of U_T (Supply Voltage)
 No. of Dips / Interruptions : 1 per Level at 20ms intervals

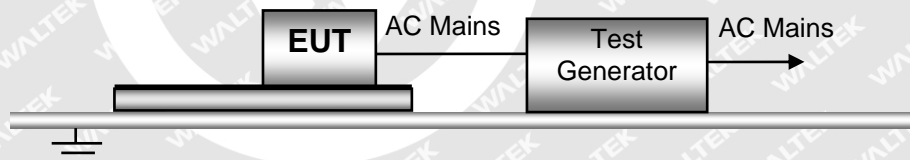
8.7.1 E.U.T. Operation

Operating Environment:

Temperature..... : 23.5°C
 Humidity..... : 53.8%RH
 Barometric Pressure : 102.4kPa
 EUT Operation : Refer to section 6.5.

8.7.2 Block Diagram of Setup

The Voltage Dips and Interruptions Immunity test was performed in accordance with the IEC 61000-4-11.



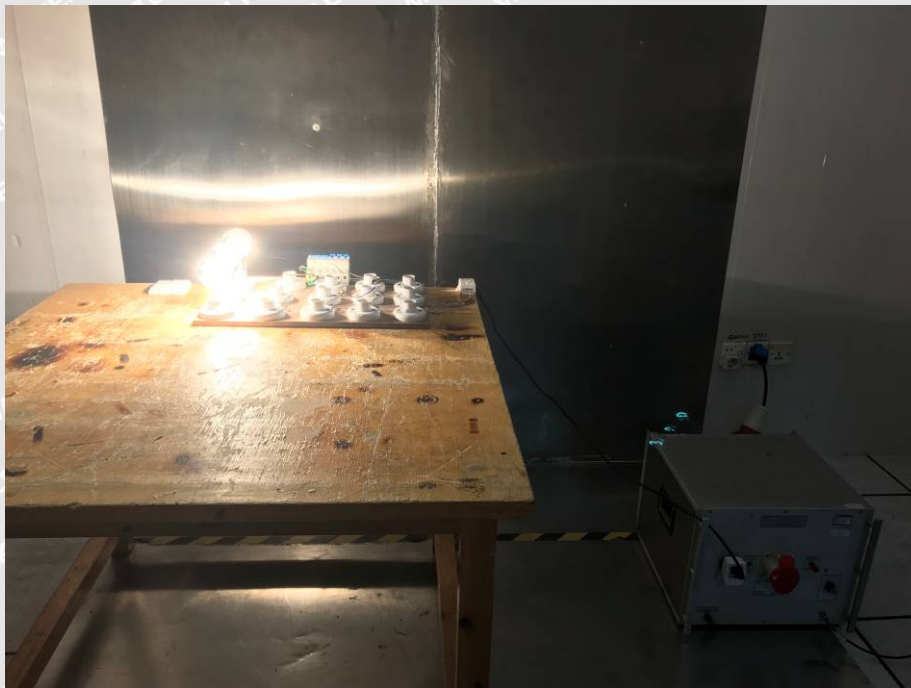
8.7.3 Test Results

Test Level in % U_T	Phase	Performance criterion	Duration	Result
0	0°	B	0.5	Pass
	180°			Pass
70	0°	C	10	Pass
	180°			Pass



9 Photographs – Test Setup

9.1 Photograph – Conducted Disturbance at Mains Terminal Test Setup



9.2 Photograph – Radiation electromagnetic disturbance Test Setup





9.3 Photograph – Radiation Emission Test Setup

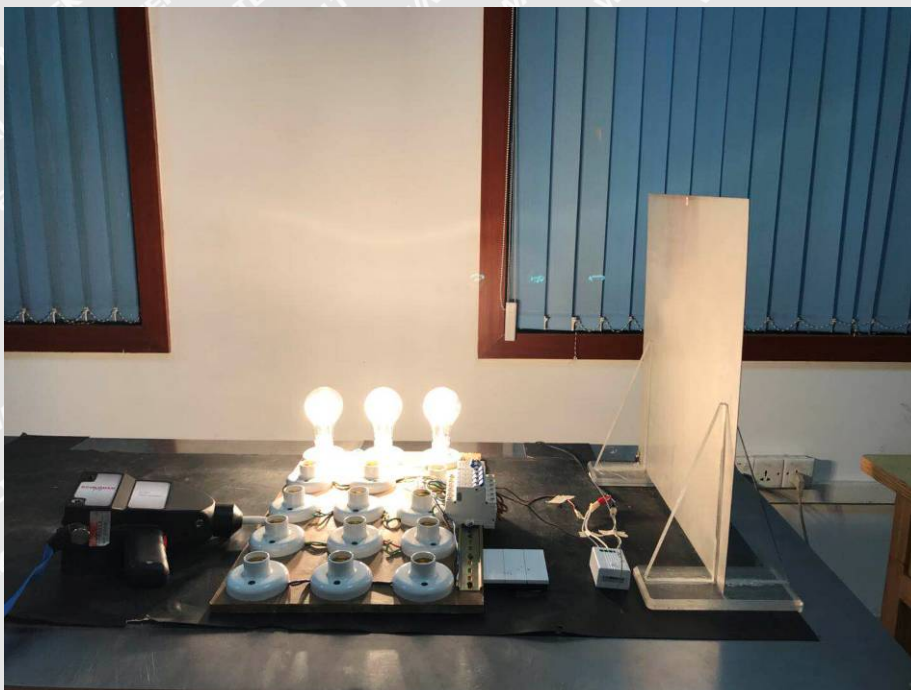


9.4 Photograph – Harmonic Current and Voltage Fluctuation and Flicker Test Setup

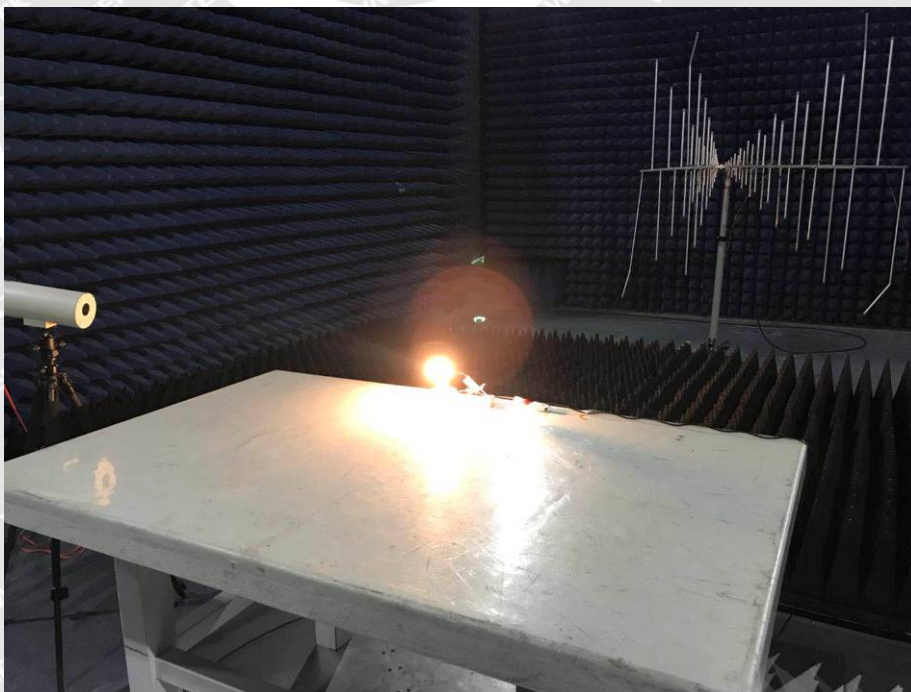




9.5 Photograph – ESD Immunity Test Setup



9.6 Photograph – Radio-frequency electromagnetic fields Immunity Test Setup

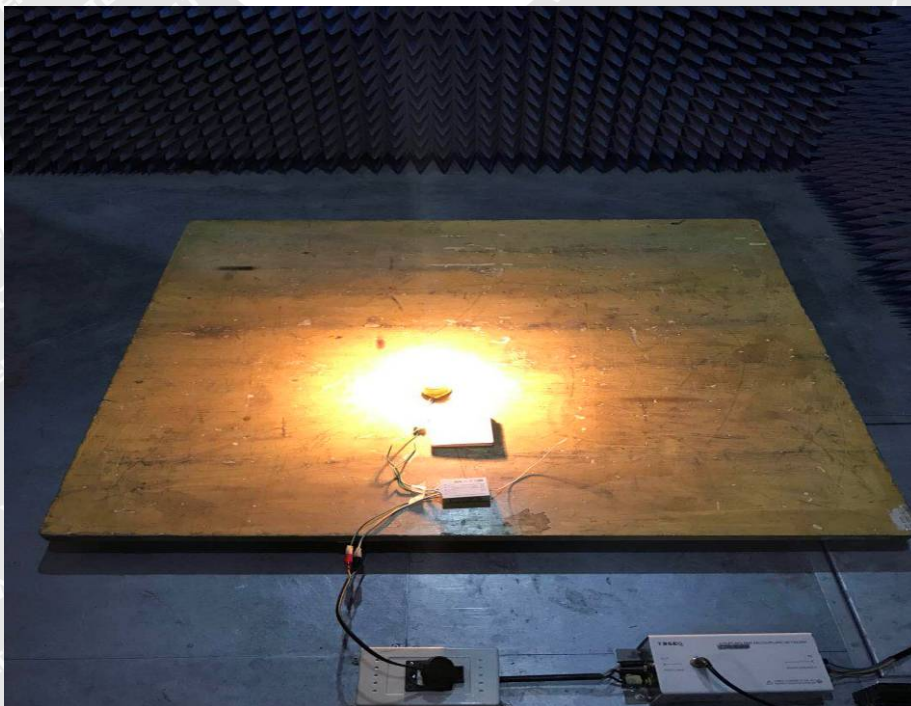




9.7 Photograph–EFT&Surges& Voltage Dips and Interruptions Immunity Test Setup



9.8 Photograph – Injected Currents Immunity Test Setup

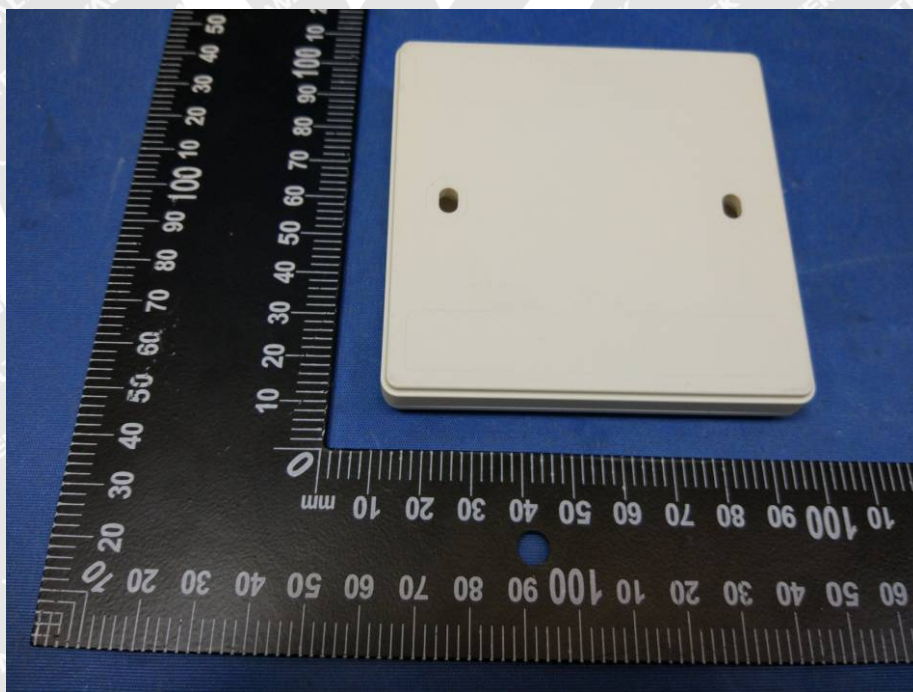
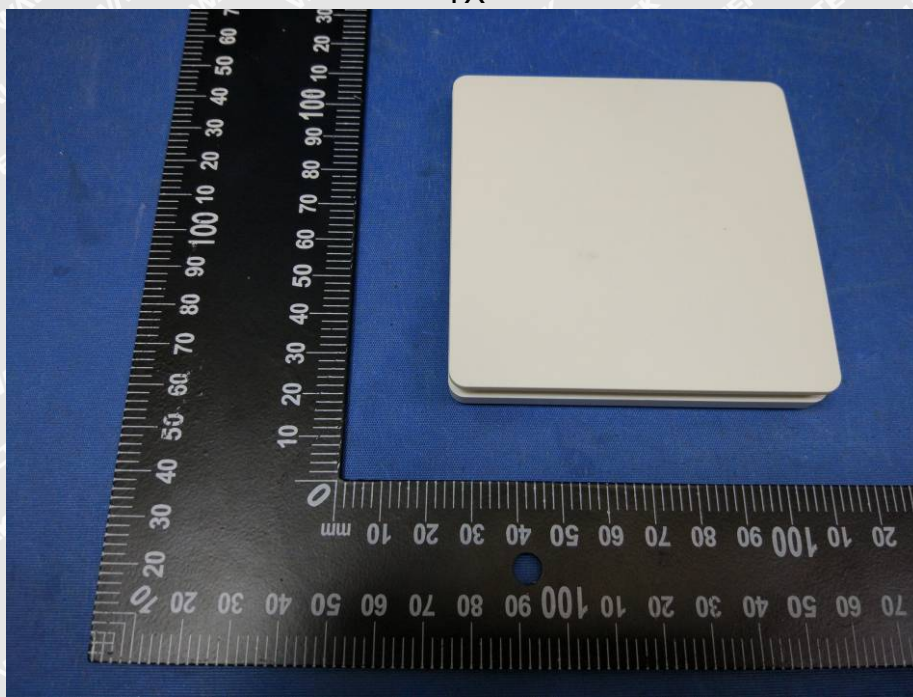


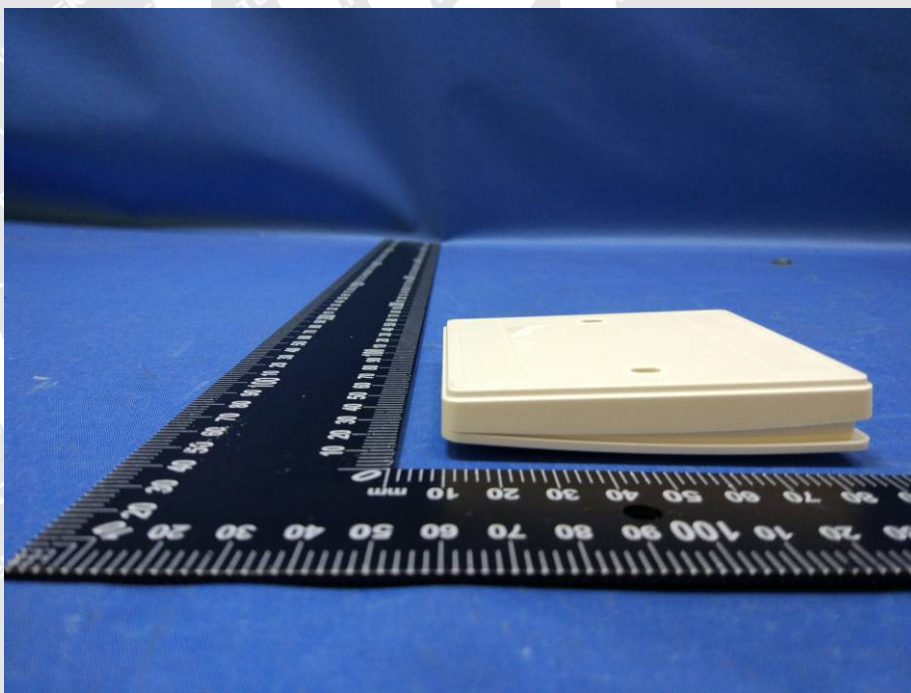
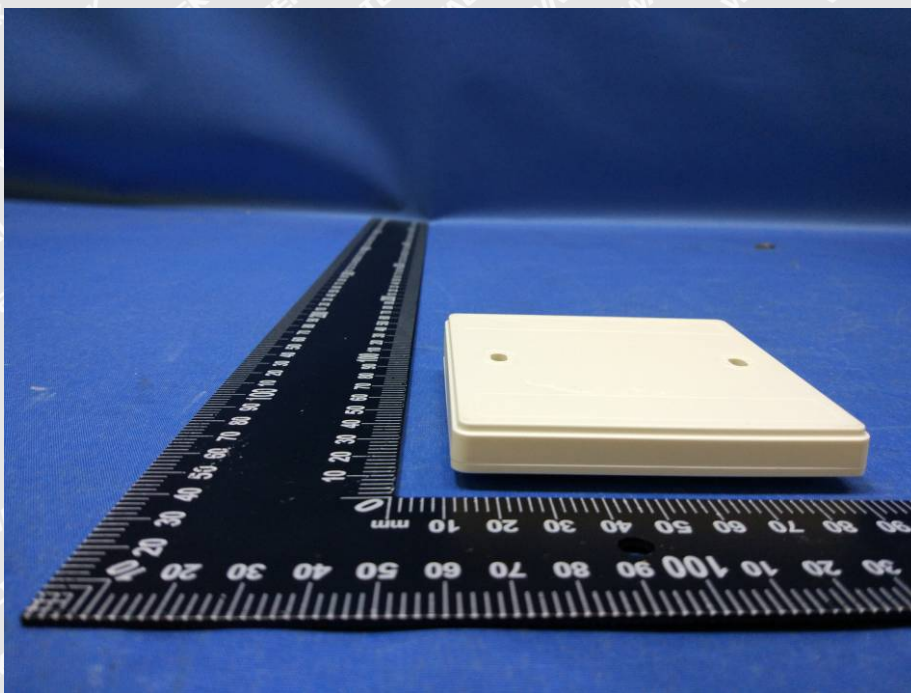


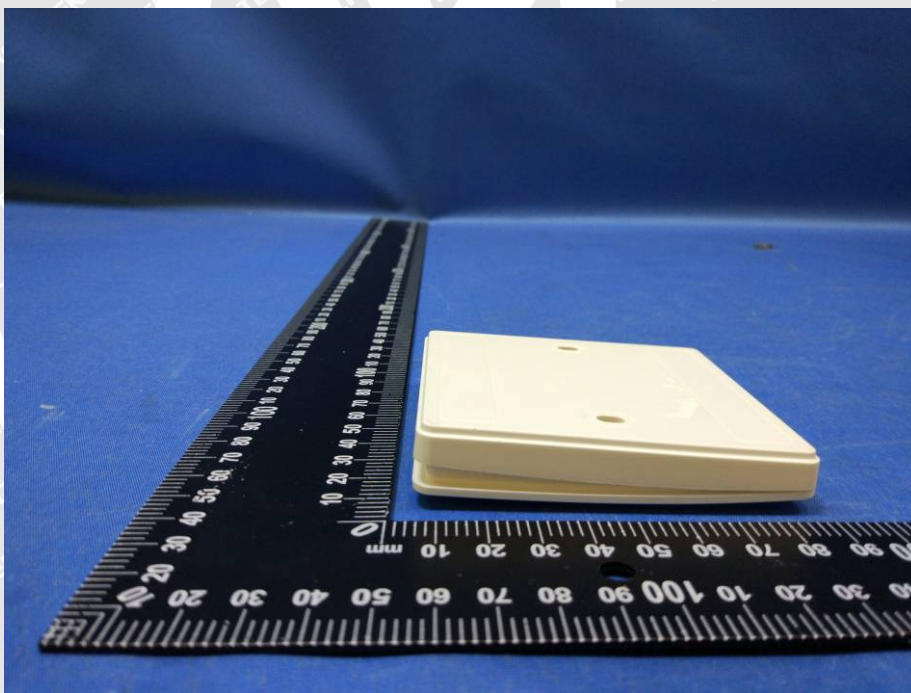
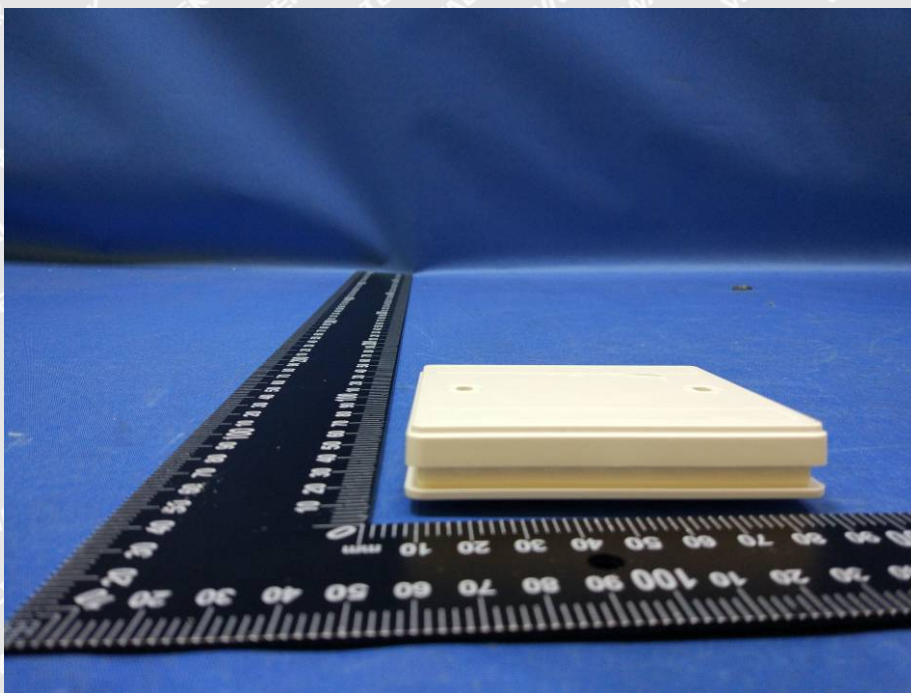
10 Photographs – Constructional Details

10.1 EUT – Appearance View

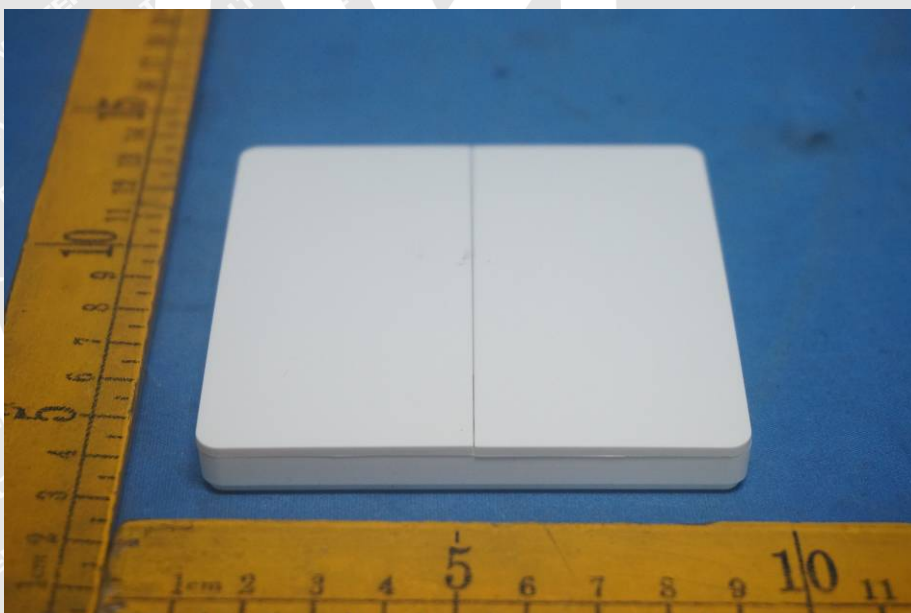
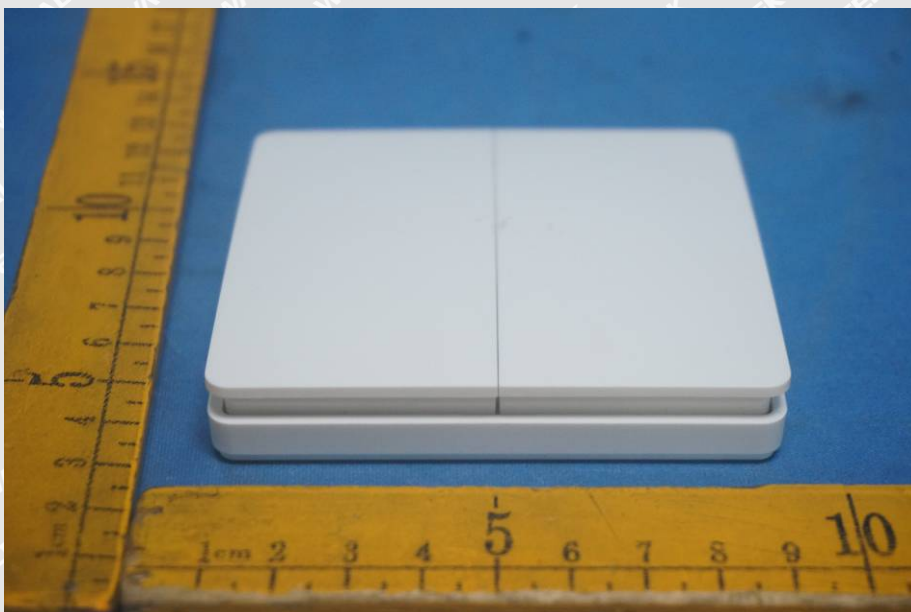
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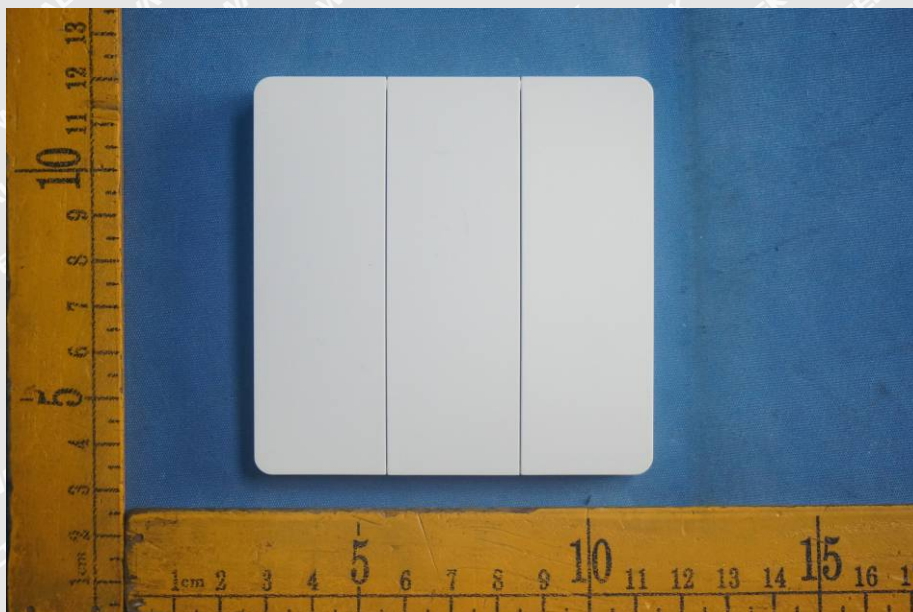


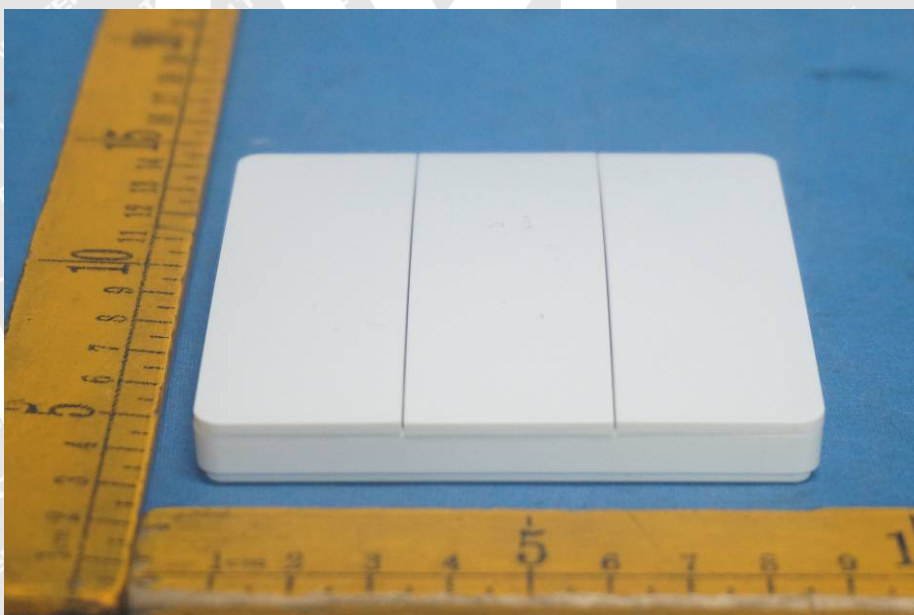








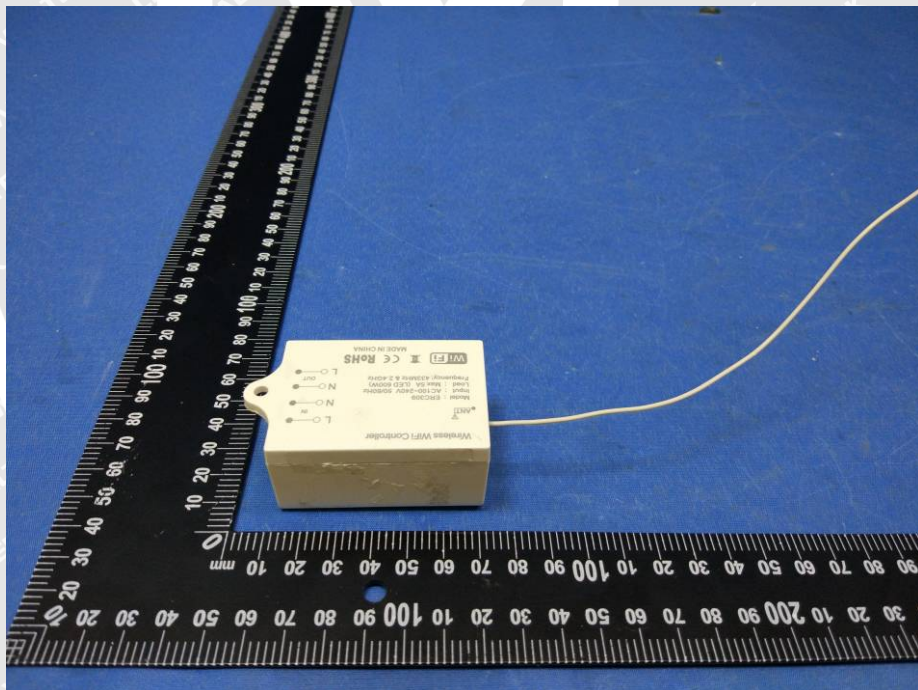
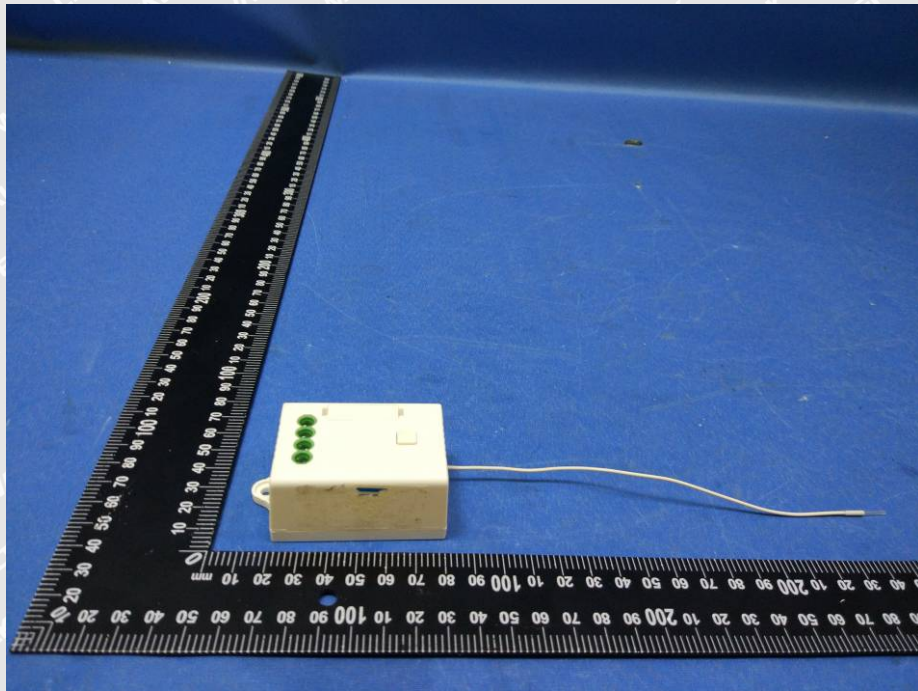


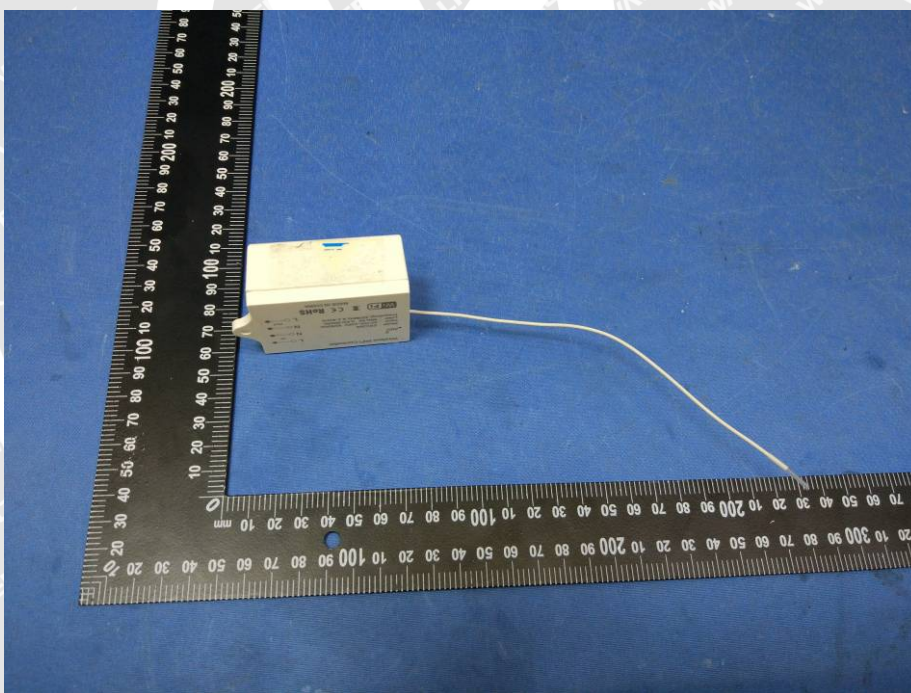
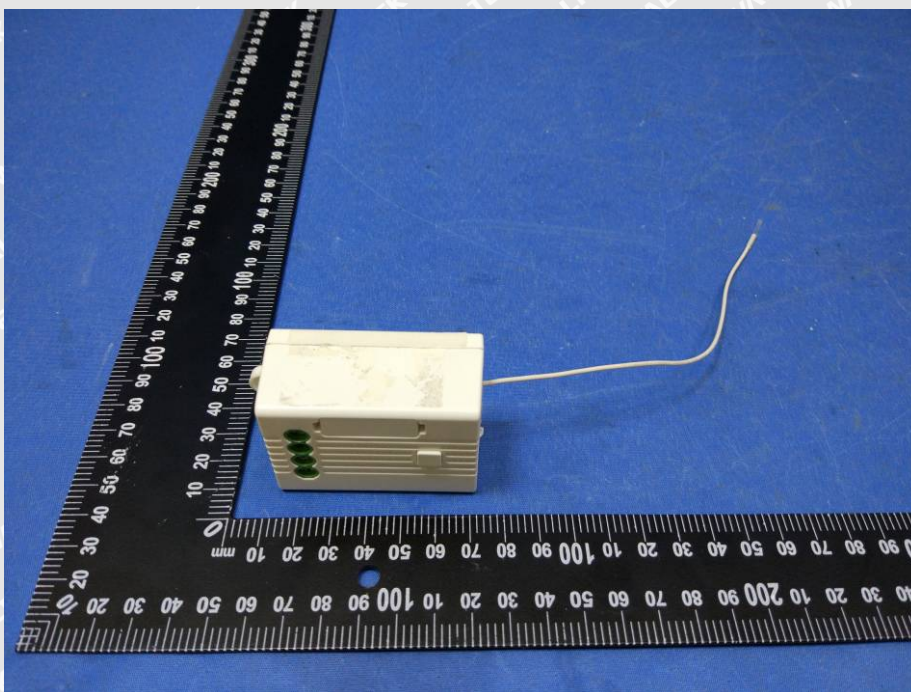


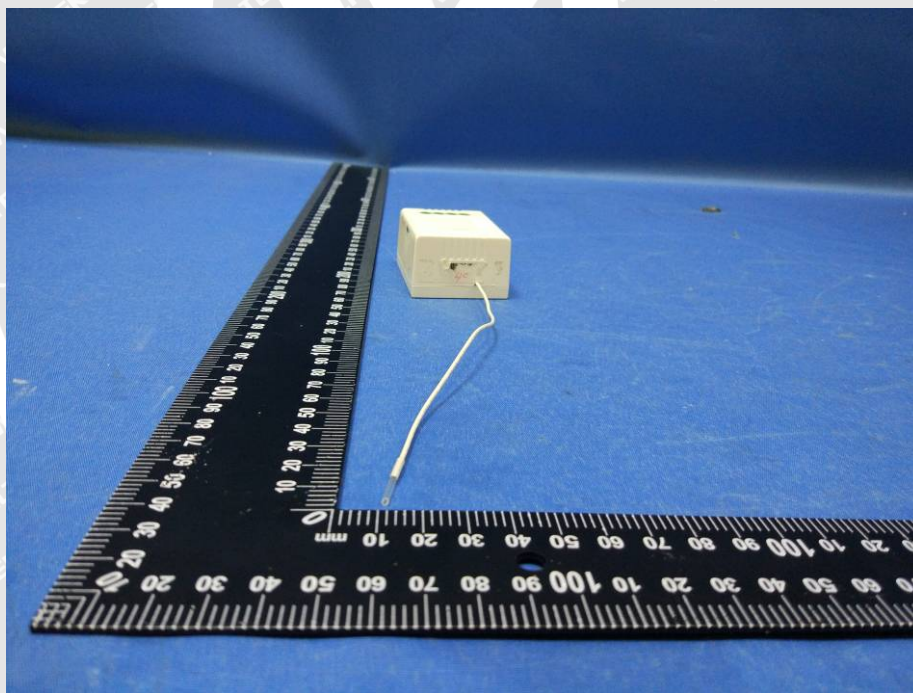
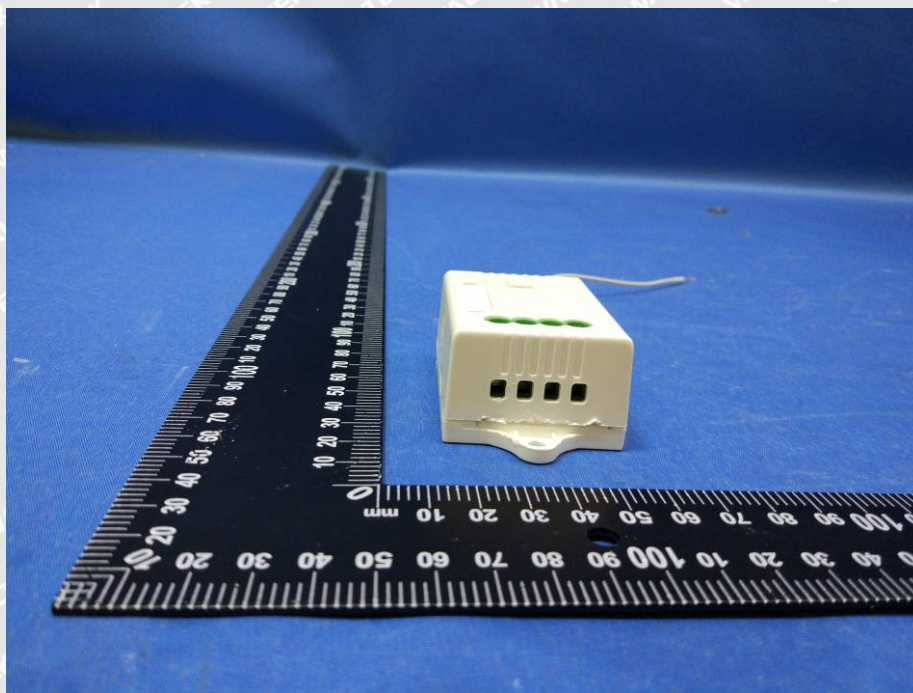




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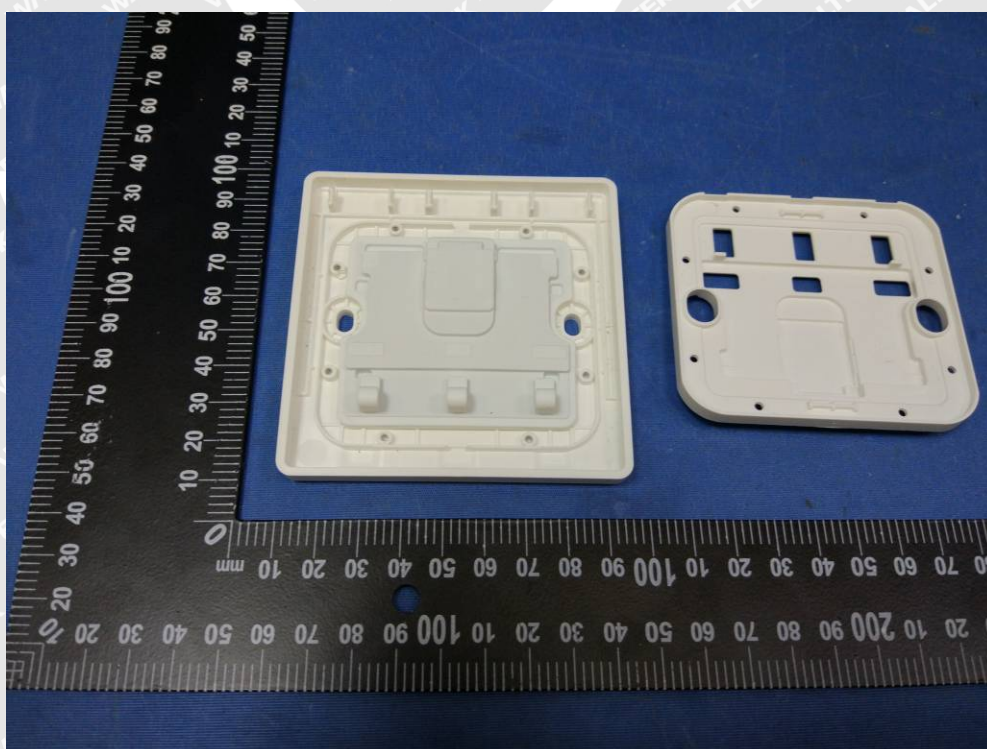
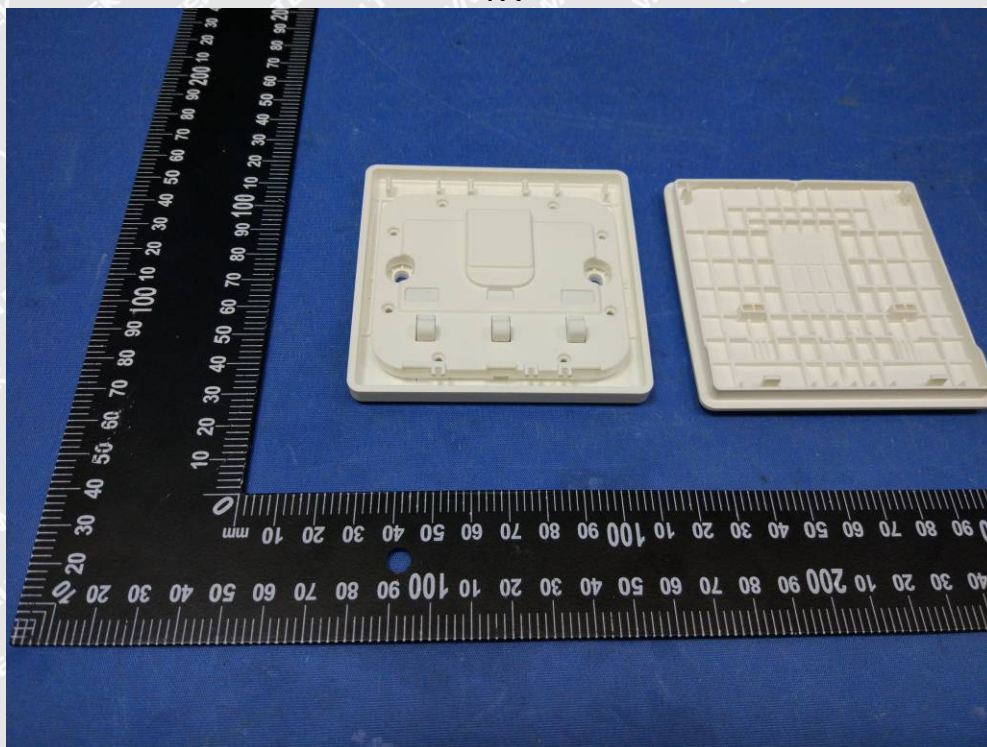


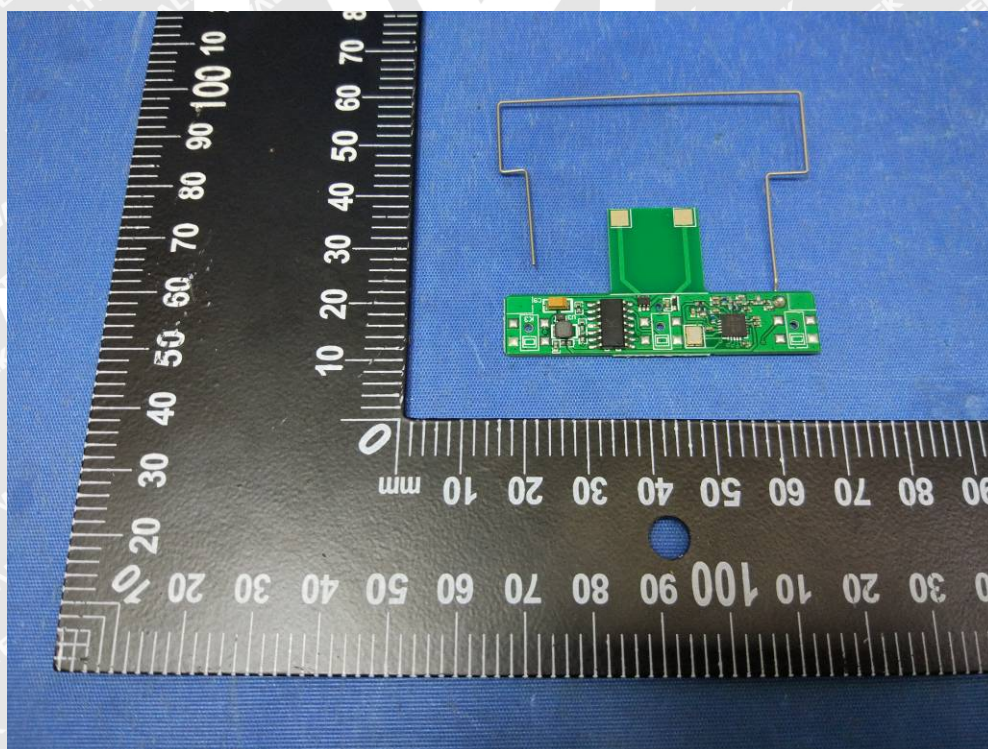
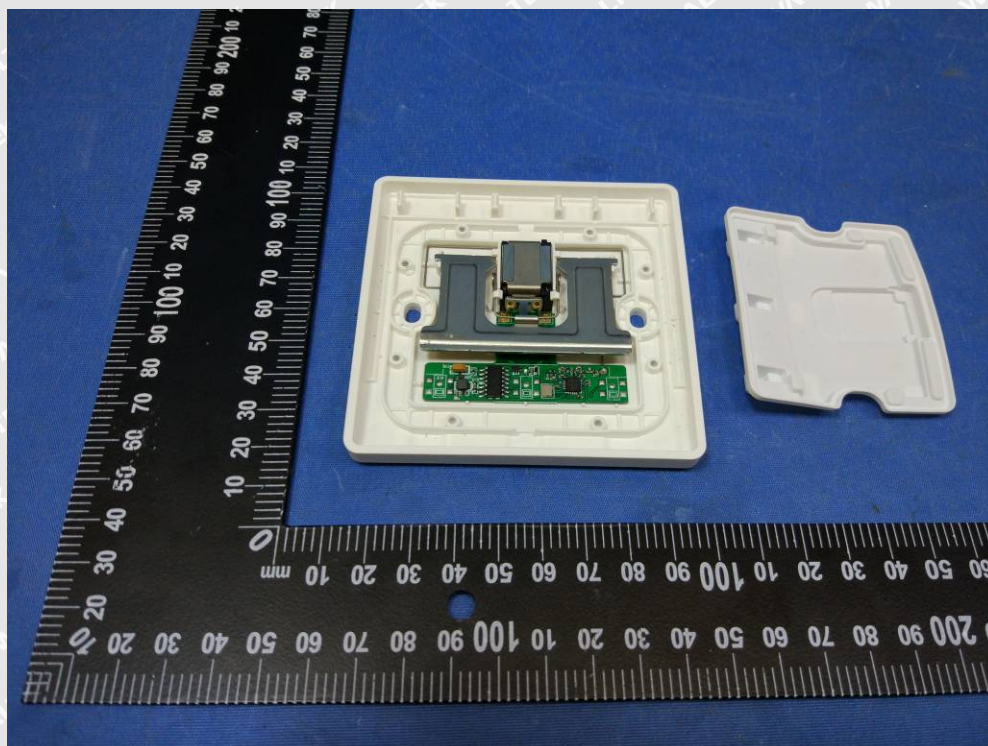


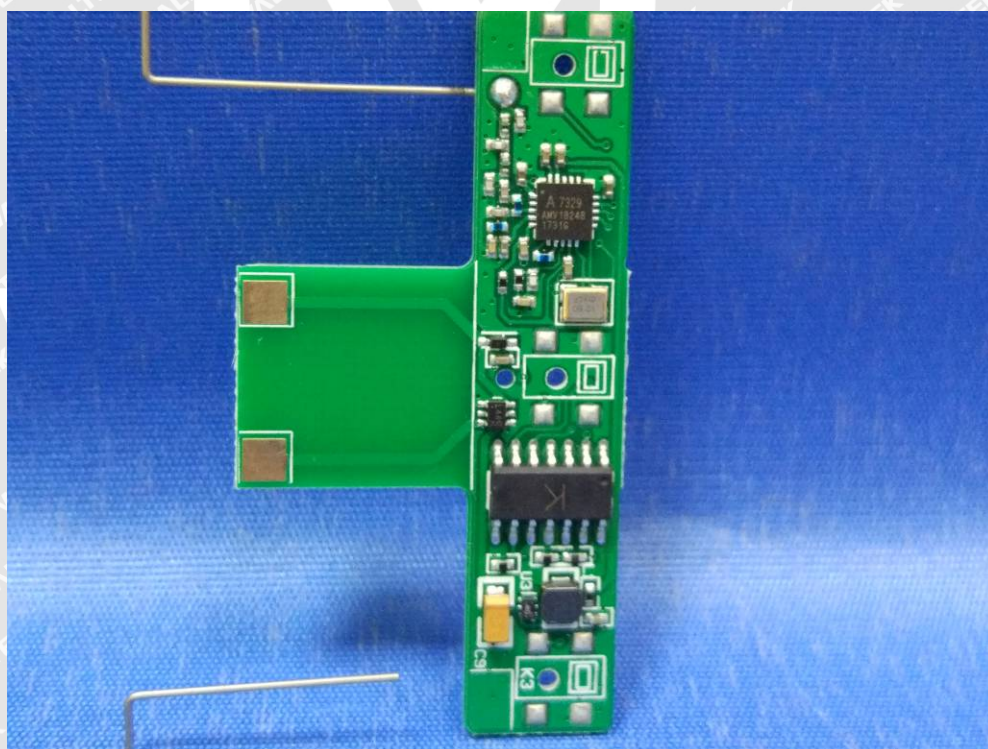
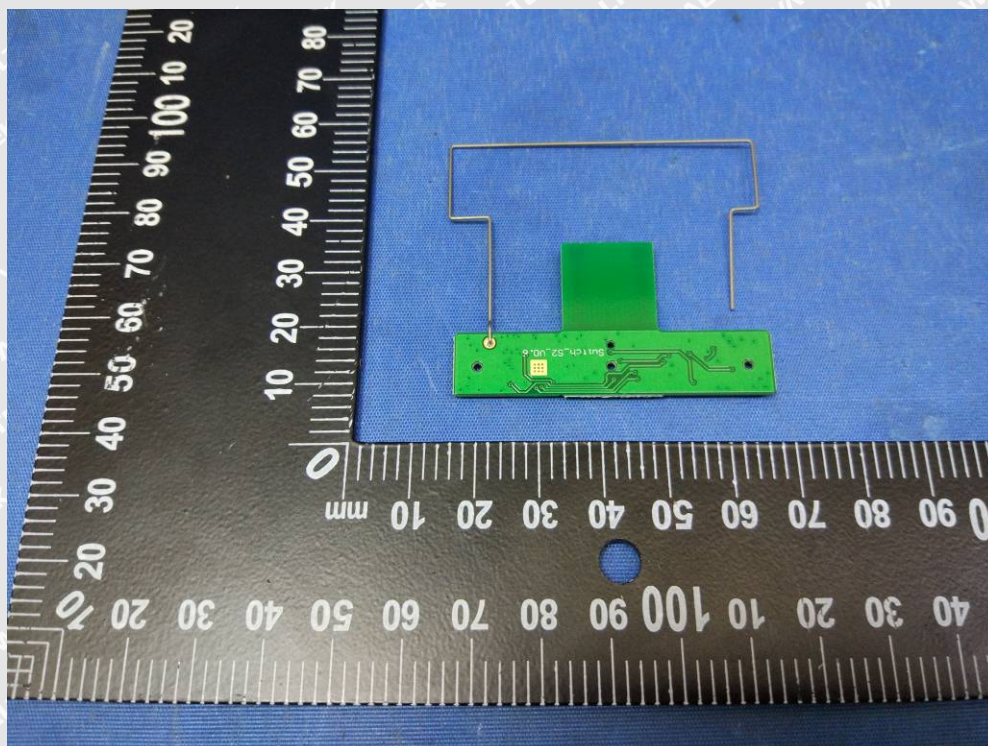


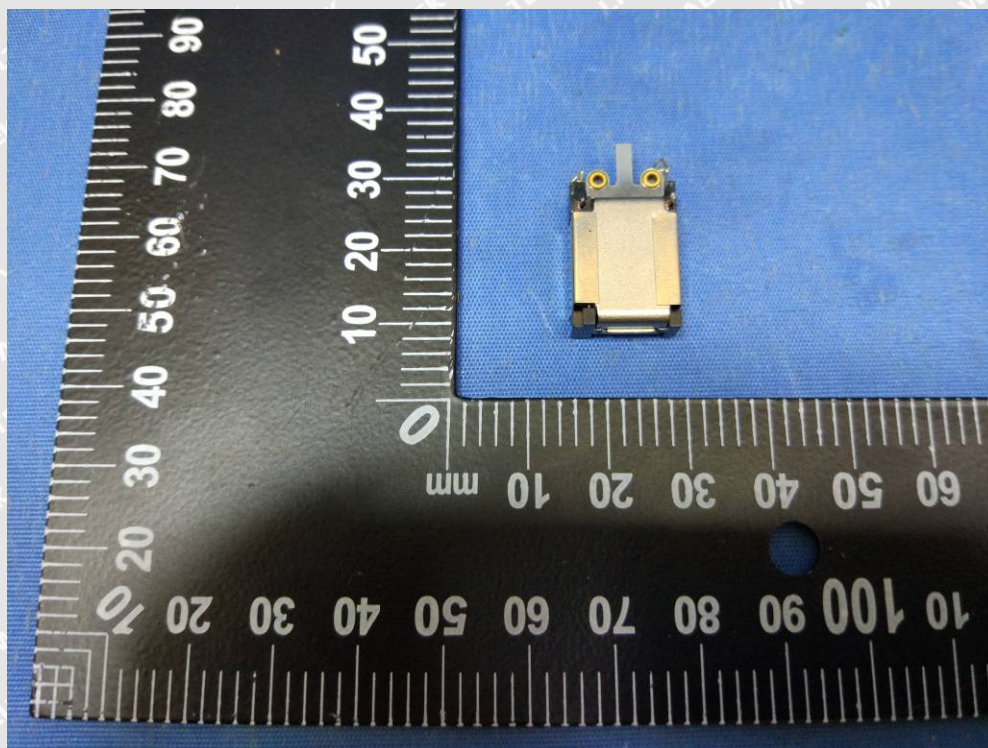
10.2 Internal Photos

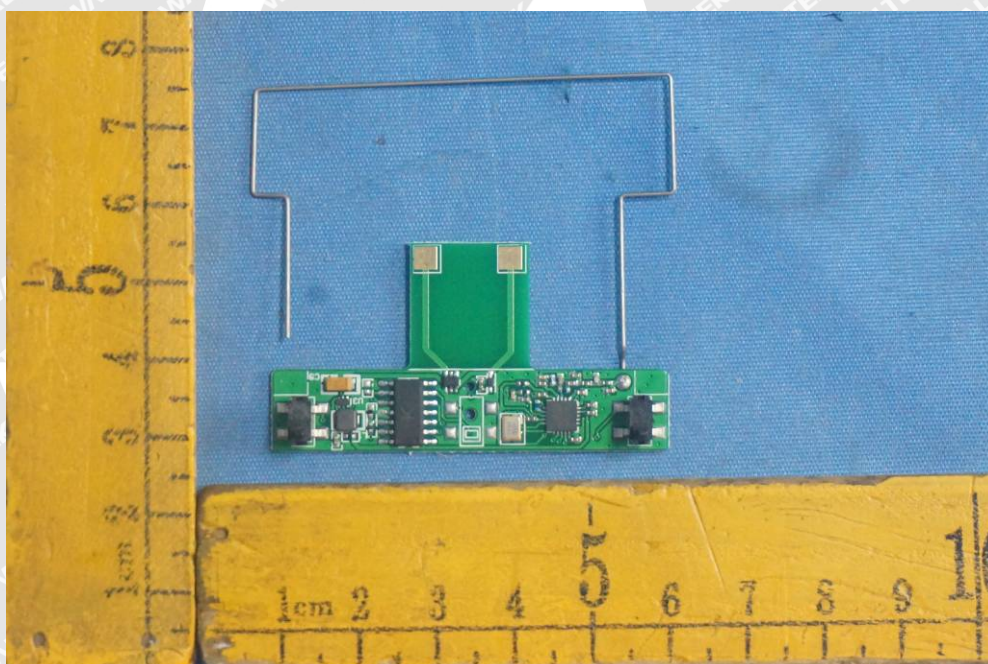
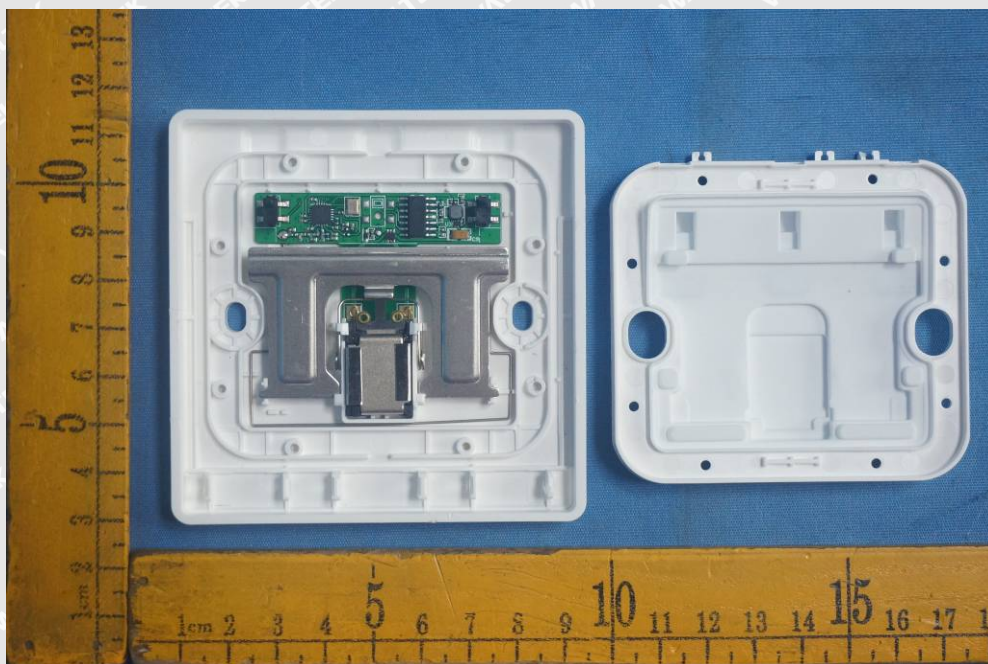
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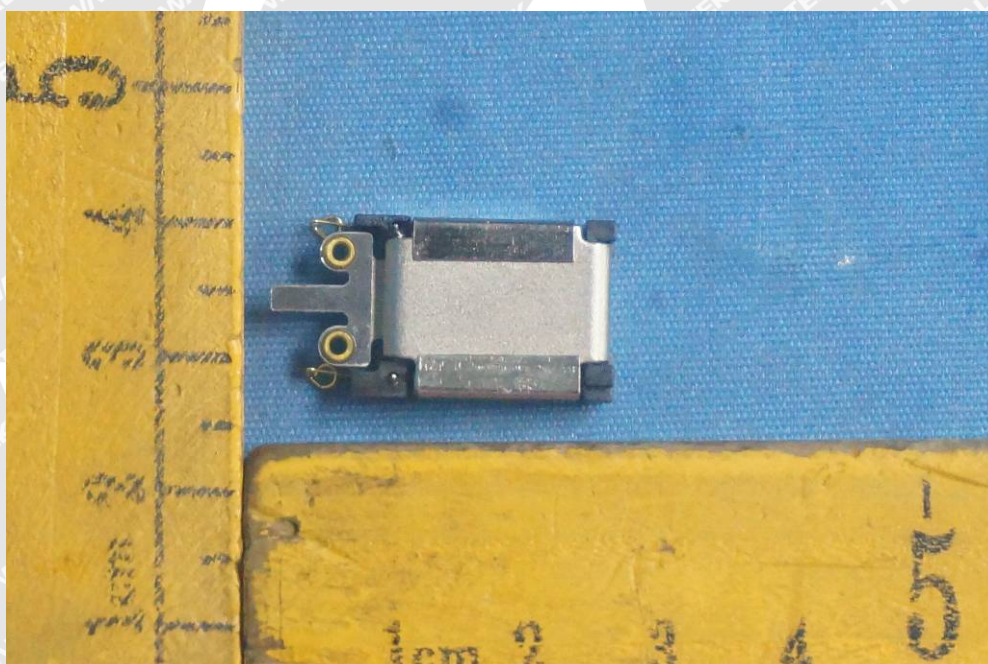
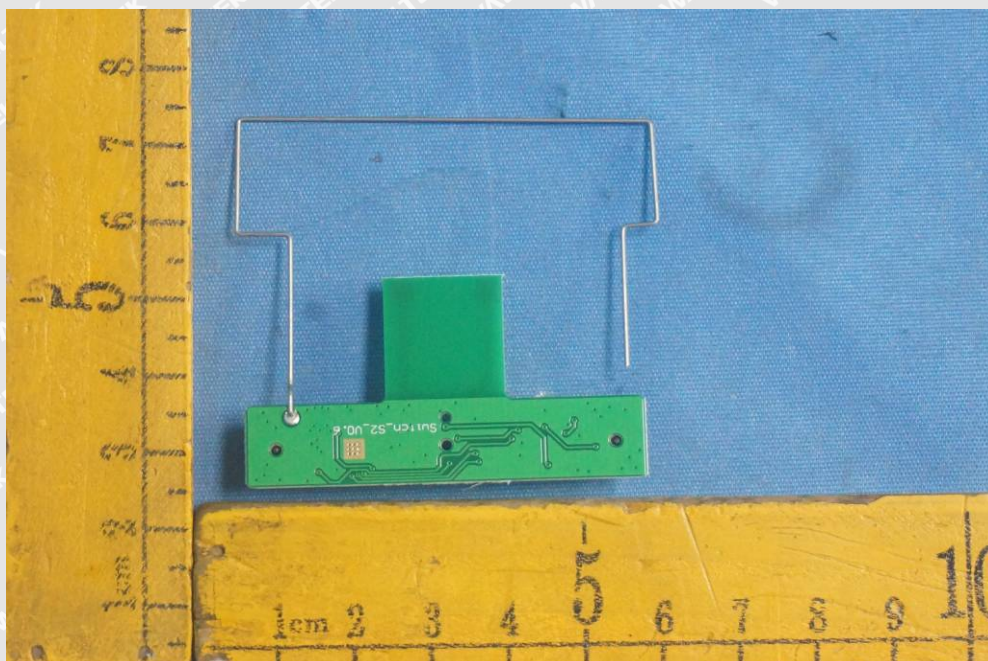


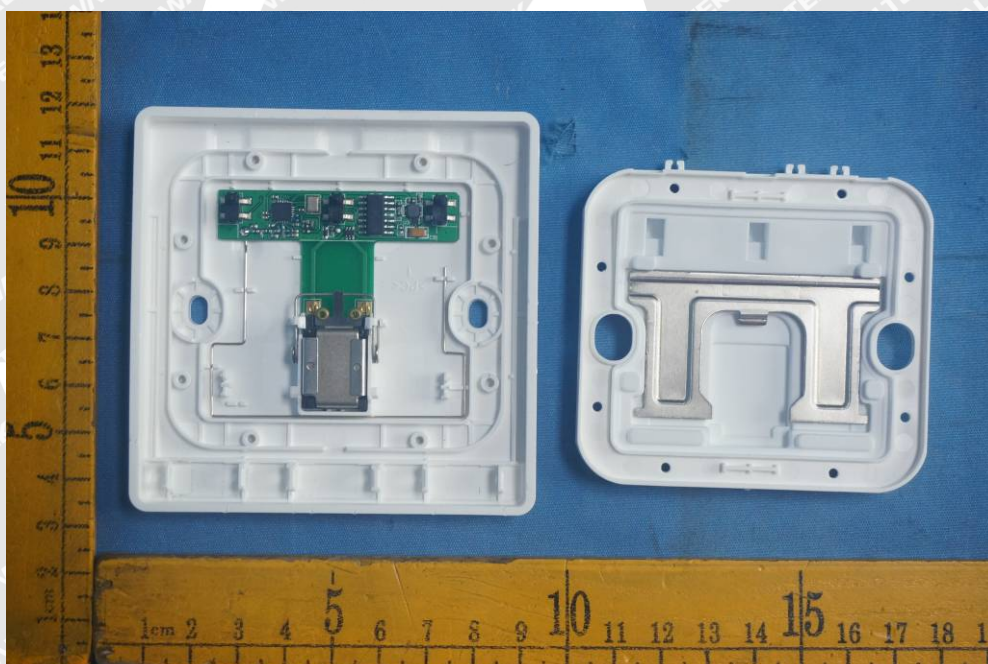
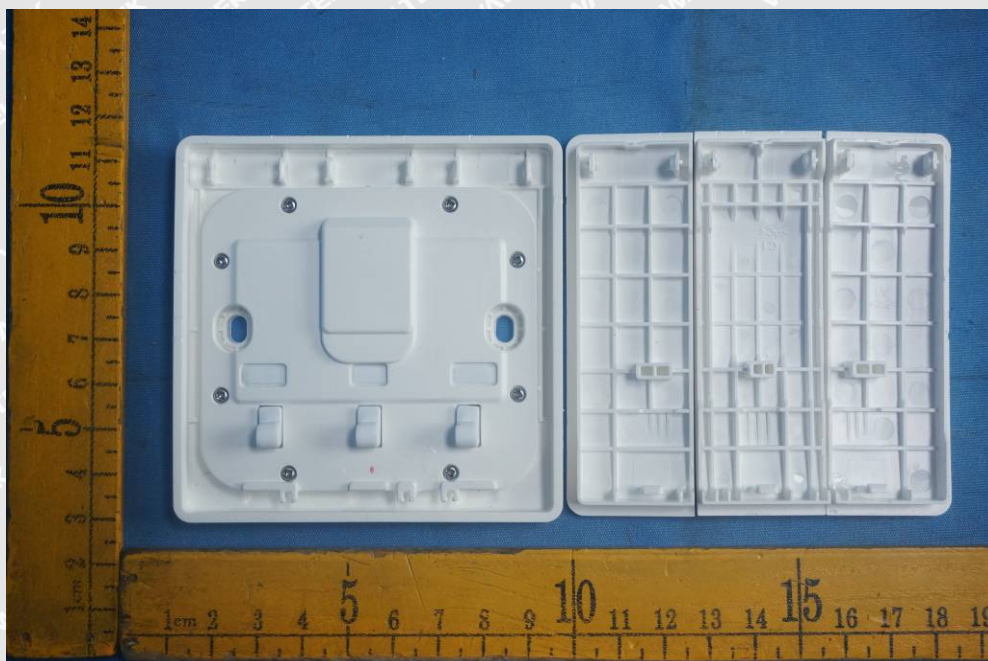


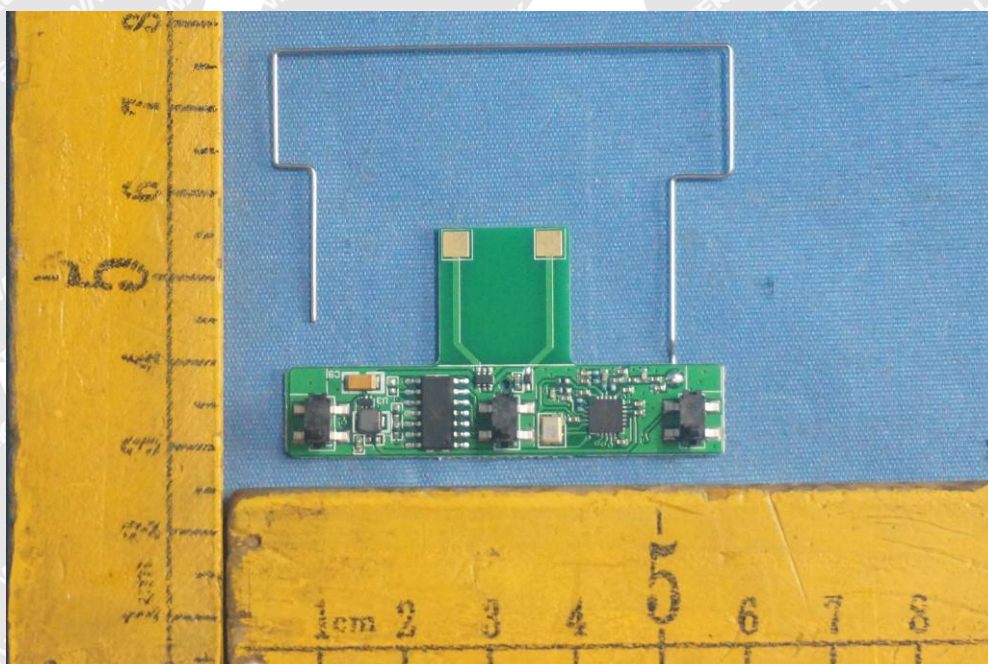
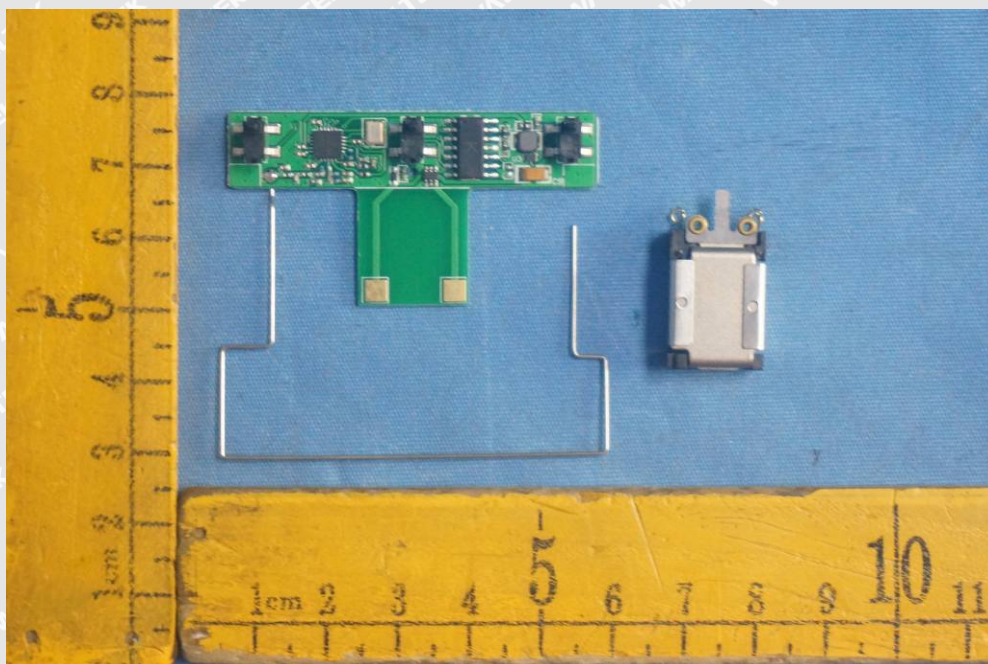


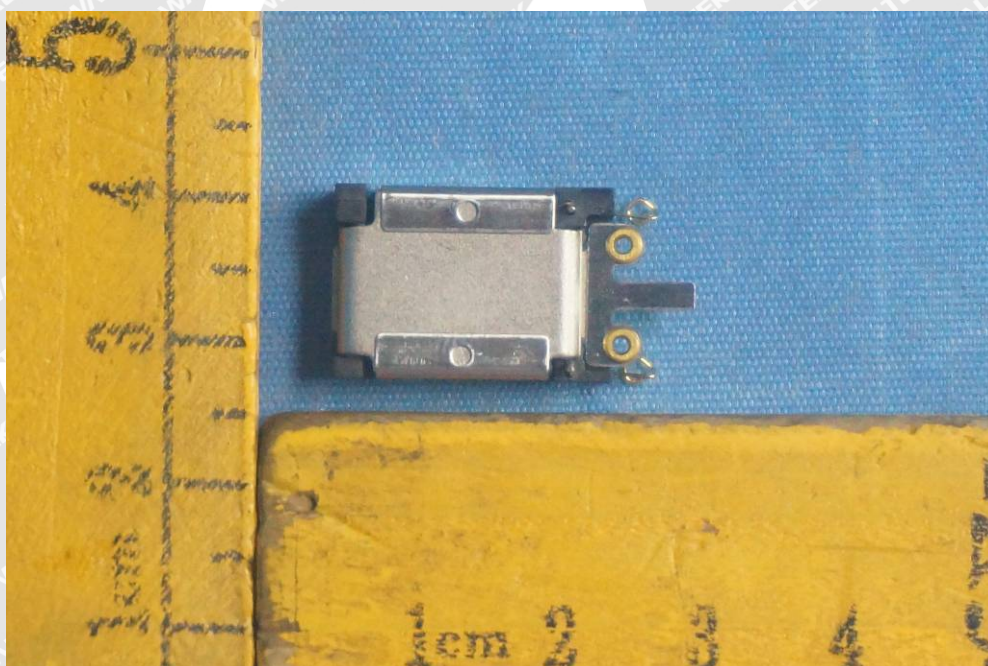
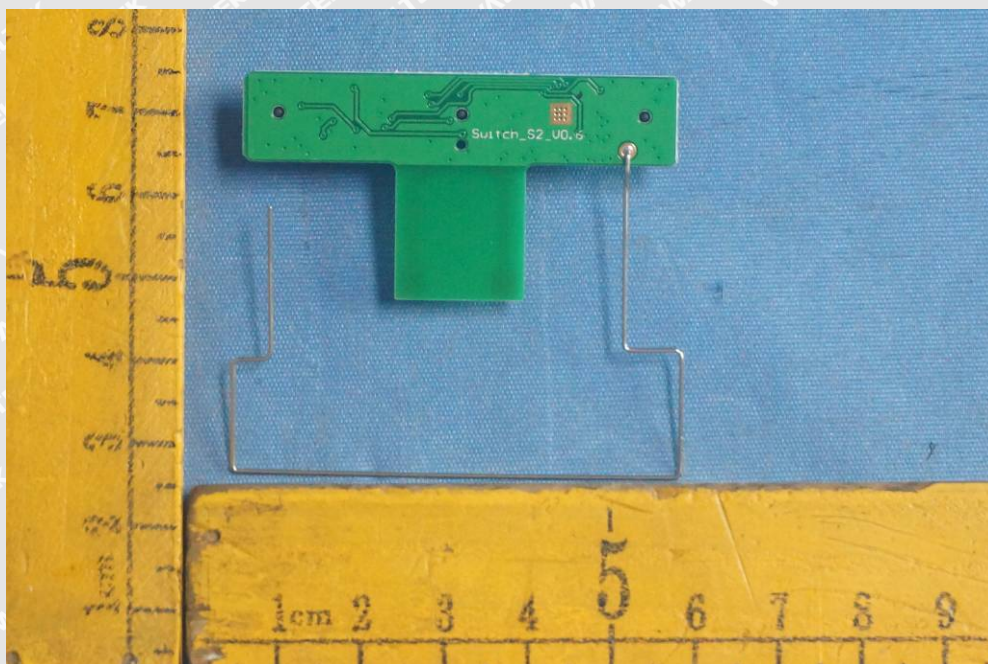






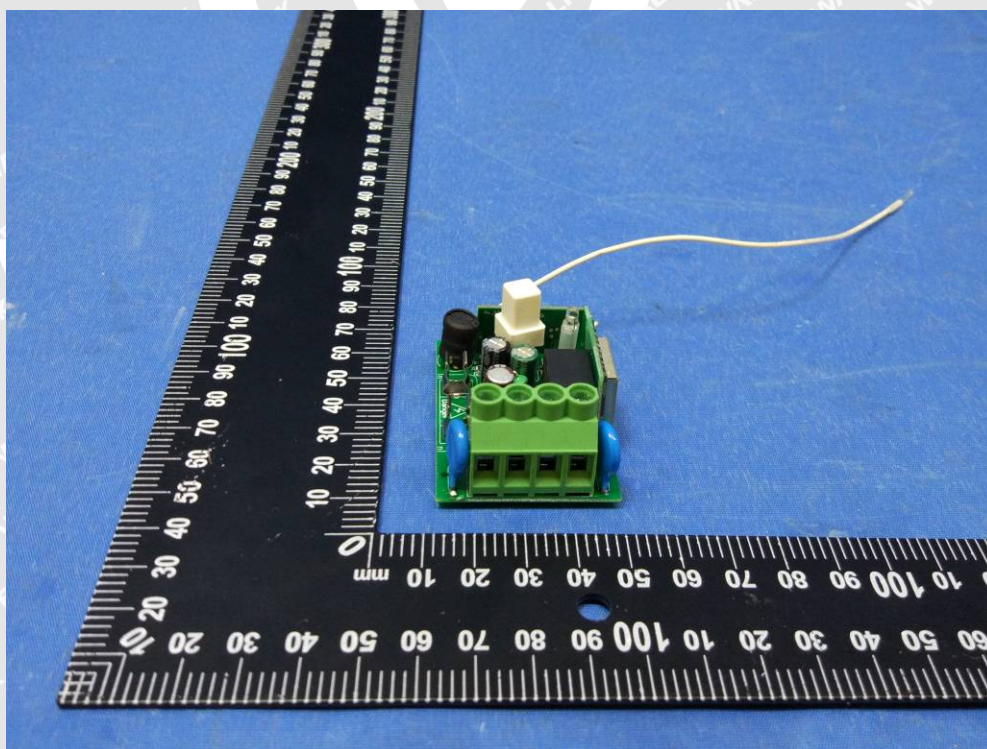
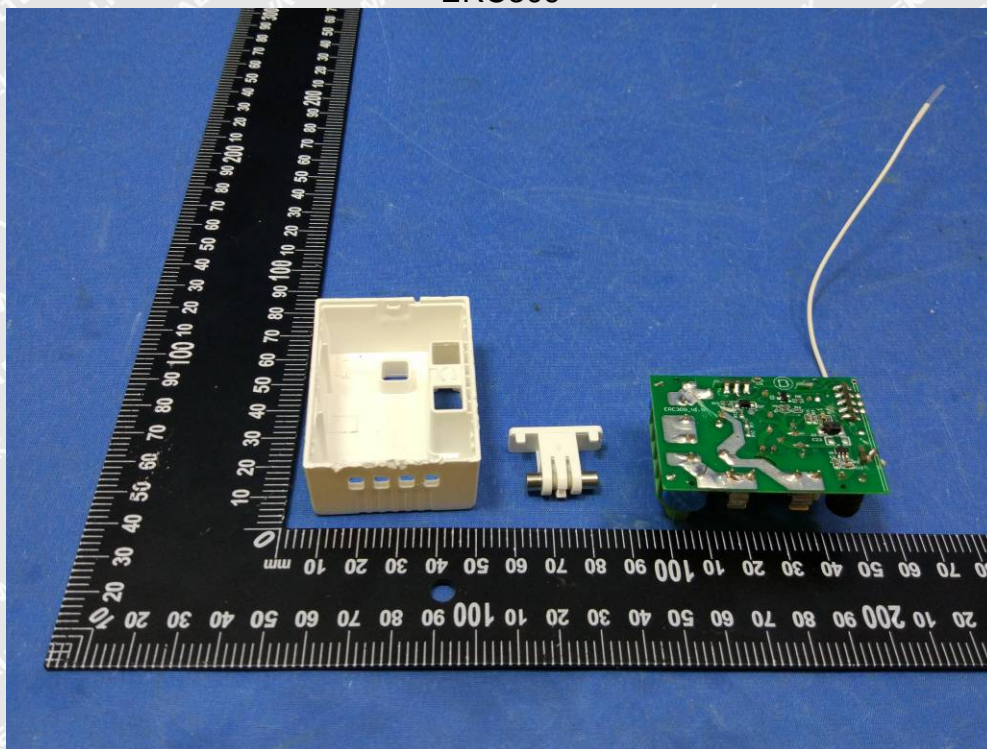


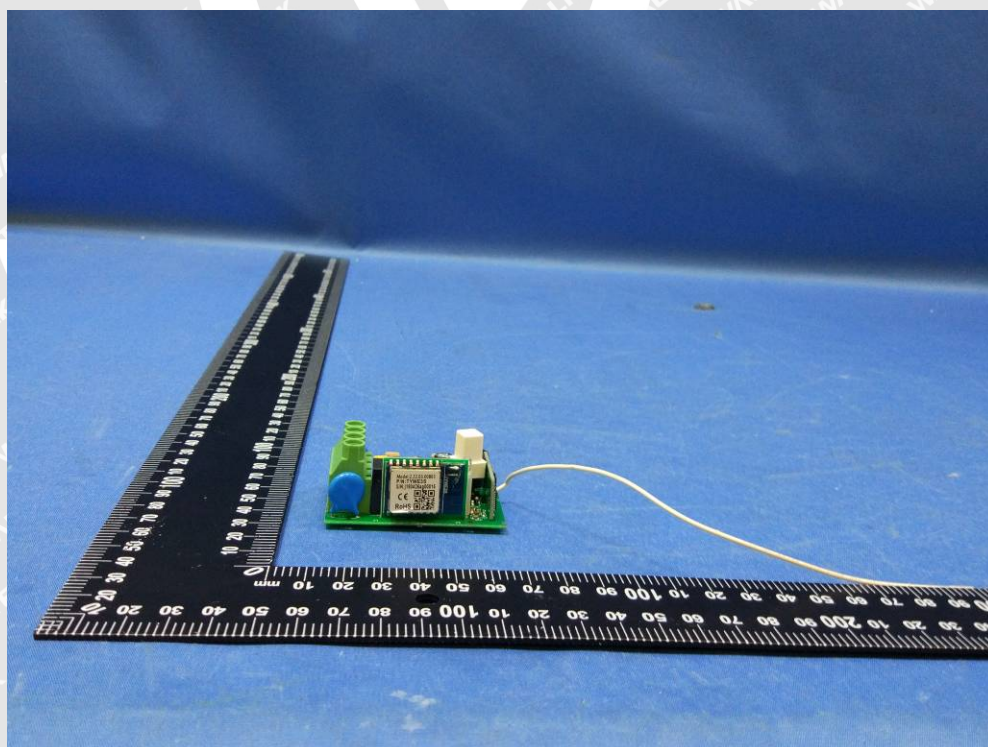
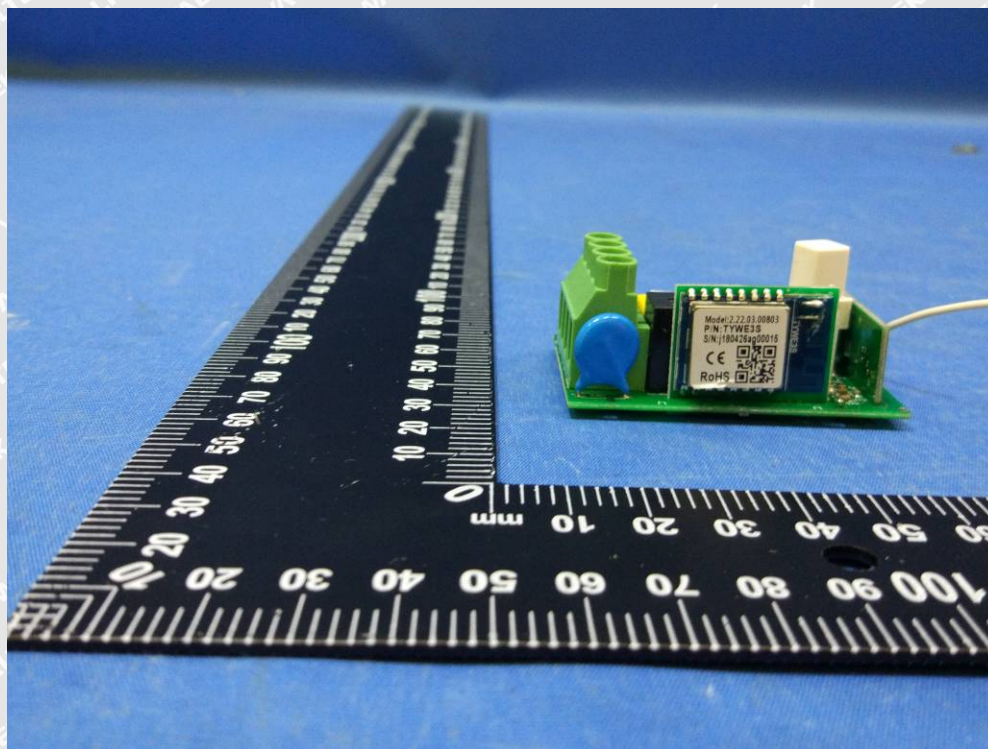


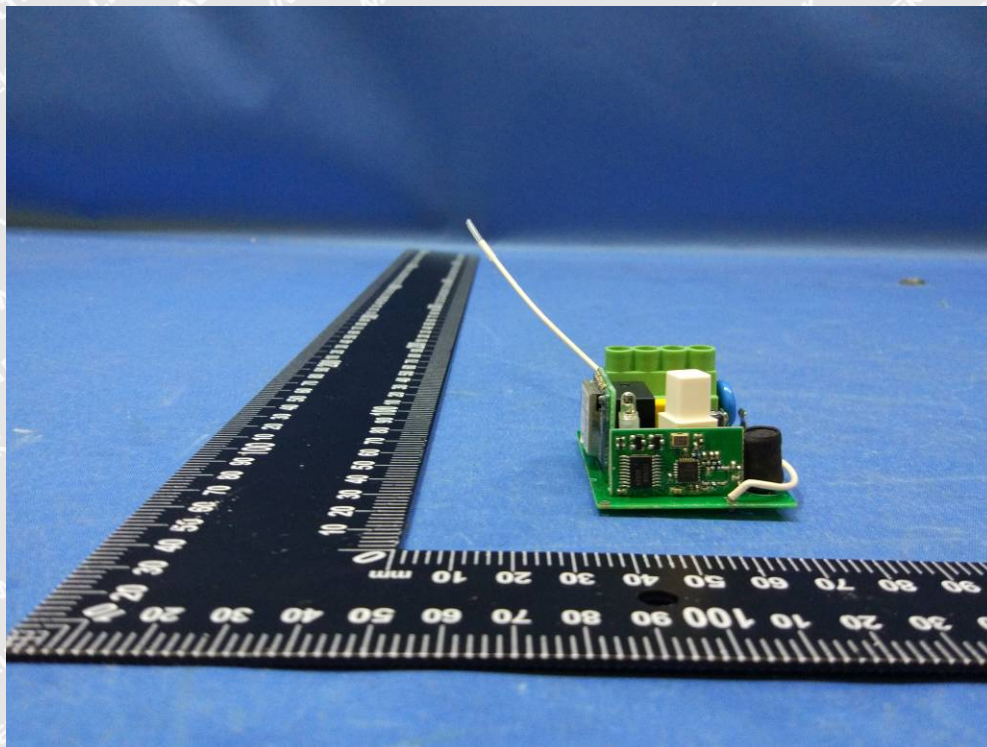




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=====End of Report=====

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