



Test Report No.:
FCC2021-0030

TEST REPORT

Applicant : Schneider Electric (China) Co., Ltd.,
Shenzhen Branch

Product Name : Z-WAVE+ 600W DIMMER SINGLE
POLE

Mode No. : SQR22102WHZ,SQR22102LAZ,SQ
R22102BKZ

CVC Testing Technology Co., Ltd.
威凯检测技术有限公司

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Test Report No. FCC2021-0030		Page 2 of 26	
Applicant		Name : Schneider Electric (China) Co., Ltd., Shenzhen Branch Address : Room 201, Building A, No. 1 Qianwanyi Road, Shengang Cooperation Zone, Qianhai, Shenzhen, China	
Manufacturer		Name : Schneider Electric (China) Co., Ltd., Shenzhen Branch Address : Room 201, Building A, No. 1 Qianwanyi Road, Shengang Cooperation Zone, Qianhai, Shenzhen, China	
Equipment under Test		Product Name : Z-WAVE+ 600W DIMMER SINGLE POLE Model No. : SQR22102WHZ Trade mark : Schneider Electric, Square D Serial no. : — Sampling : —	
Date of Receipt.	2021.10.14	Date of Testing	2021.12.06
Test Specification		Test Result	
FCC CFR47 Part 15B (2020) Radio Frequency Devices ANSI C63.4 (2014)		PASS	
Evaluation of Test Result		The equipment under test was found to comply with the requirements of the standards applied. Issue Date: 2021.12.06	
Tested by:  Xu Zhenfei		Reviewed by:  Liu Yonghai	
		Approved by:  Chen Huawen	
Other Aspects: NONE.			
Abbreviations: OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested			
This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC .			

TABLE OF CONTENTS

1. GENERAL PRODUCT INFORMATION	4
1.1 GENERAL INFORMATION	4
2. TEST SITES	5
2.1 TEST FACILITIES	5
2.2 DESCRIPTION OF NON-STANDARD METHOD AND DEVIATIONS	5
2.3 LIST OF TEST AND MEASUREMENT INSTRUMENTS	5
3. TEST CONFIGURATION	6
3.1 TEST MODE	6
4. SUMMARY OF MEASUREMENT RESULTS	7
5. MEASUREMENT PROCEDURE	8
5.1 CONDUCTED EMISSION	8
5.2 RADIATED EMISSION	12
6. TEST SETUP PHOTOGRAPH	19
7. EUT PHOTOGRAPH	21
8. APPENDIX	26

General Product Information

The model of this application: SQR22102WHZ,SQR22102LAZ,SQR22102BKZ.
SQR22102LAZ and SQR22102BKZ have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction with SQR22102WHZ. The difference lies only model number and color. All the tests carried out on model SQR22102WHZ.

General information

Product Name	Z-WAVE+ 600W DIMMER SINGLE POLE
Model No.	SQR22102WHZ,SQR22102LAZ,SQR22102BKZ
Power Supply	AC 120 V, 60Hz
FCC ID	2AUCU-22102Z
Note: 1. The information of the EUT is declared by the manufacturer.	

Test Sites

Test Facilities

The tests and measurements refer to this report were performed by EMC testing Lab. of CVC Testing Technology Co., Ltd.

Add.: No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou, 510663, P. R. China

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Test firm designation number: CN1282

The EMC testing laboratory has been recognized by CNAS, and authorized by Nemko of Norway since 1997, and accredited by DAkkS of Germany since 2007, and assessed and found eligible to participated in the TDAP of VDE testing and certification Institute since 2004, and registered by FCC since 2001.

Description of Non-standard Method and Deviations

The testing and measurement methods used in this report are applied by all standard methods. Not any non-standard method or deviation from the used standards was used.

List of Test and Measurement Instruments

Refer to **Appendix**.

Test Configuration

Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

Summary of measurement results

Summary of measurements of results	Clause in FCC rules	Class / Severity	Verdict
Conducted Emissions	FCC CFR47 Part 15B ANSI C63.4	Class B	PASS
Radiated Emissions	FCC CFR47 Part 15B ANSI C63.4	Class B	PASS

Measurement procedure

Conducted Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

The test is in transmitting mode.

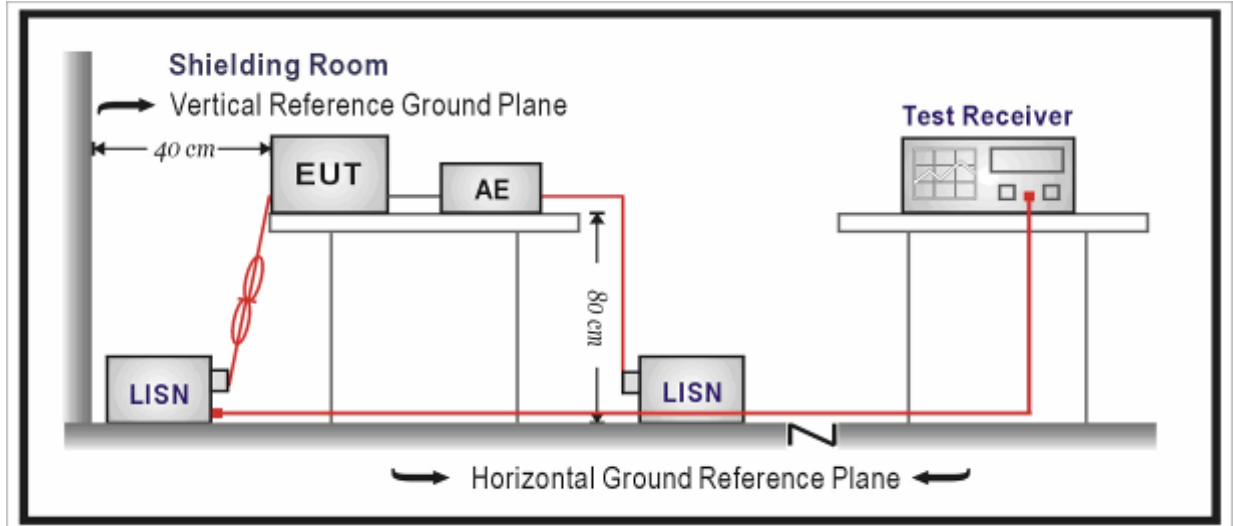
Limits:

Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Test Setup:



Note: AC Power source is used to change the voltage 120V/60Hz.

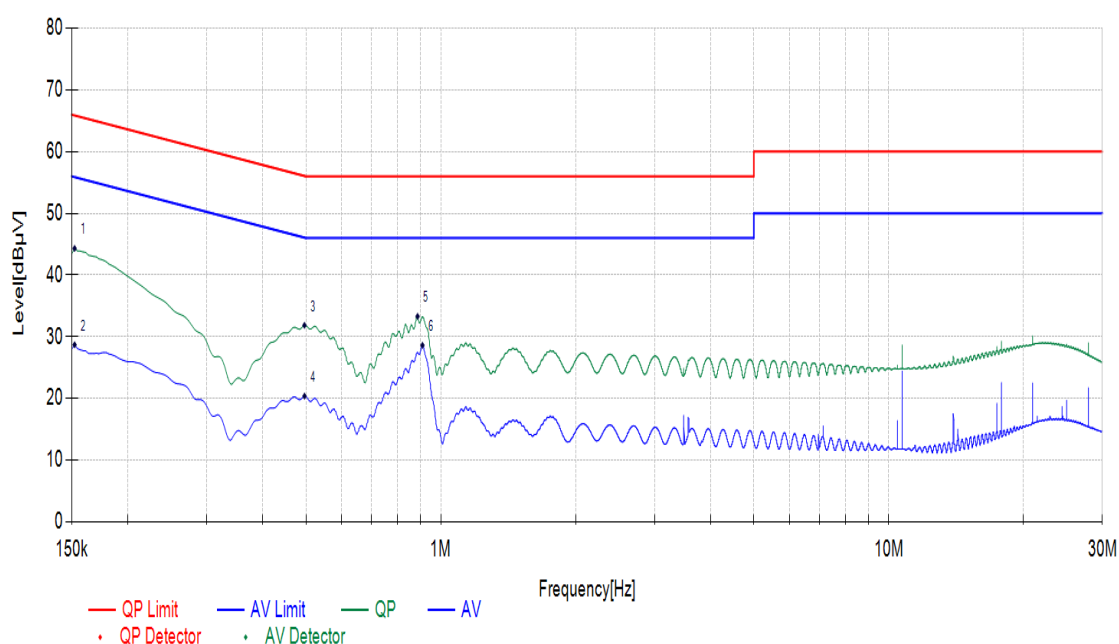
Measurement Uncertainty:

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.12$ dB.

Test Results:

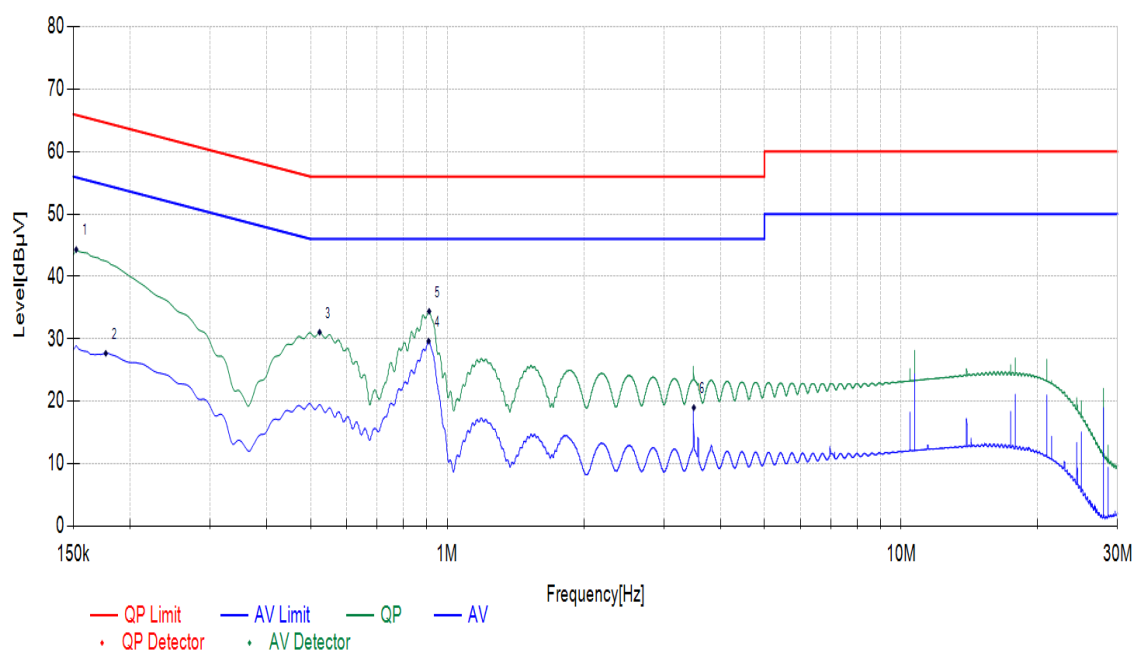
Power Line	L
Test Mode	Normal Working

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dB μ V]	Level [dB μ V]	Limit [dB μ V]	Margin [dB]	Detector	Type	Pass/Fail
1	0.1523	10.30	34.01	44.31	65.88	21.57	QP	L	PASS
3	0.4965	10.30	21.54	31.84	56.06	24.22	QP	L	PASS
5	0.8880	10.32	22.97	33.29	56.00	22.71	QP	L	PASS
2	0.1523	10.30	18.38	28.68	55.88	27.20	AV	L	PASS
4	0.4965	10.30	10.05	20.35	46.06	25.71	AV	L	PASS
6	0.9105	10.32	18.28	28.60	46.00	17.40	AV	L	PASS



Power Line	N
Test Mode	Normal Working

Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Type	Pass/Fail
1	0.1523	10.29	34.01	44.30	65.88	21.58	QP	N	PASS
3	0.5235	10.30	20.75	31.05	56.00	24.95	QP	N	PASS
5	0.9128	10.32	24.08	34.40	56.00	21.60	QP	N	PASS
2	0.1770	10.28	17.39	27.67	54.63	26.96	AV	N	PASS
4	0.9105	10.32	19.31	29.63	46.00	16.37	AV	N	PASS
6	3.4958	10.41	8.56	18.97	46.00	27.03	AV	N	PASS



Radiated Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The test set-up was made in accordance to the general provisions of ANSI C63.4-2014. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

During the test, below 30MHz, the center of the loop shall be 1 meters; above 30MHz, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

Below 1GHz (detector: Peak and Quasi-Peak)

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz(detector: Peak):

(a)PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

(b)AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded. Then this mode was measured in the following mode: EUT with cradle and EUT without cradle. The worst emission was found in EUT with cradle mode and the worst case was recorded.

The test is in transmitting mode.

Limits:

Limit in restricted band(Part 15.109)

Frequency (MHz)	Measurement Distance (m)	Field strength(uV/m)	Level (dBuV/m)
30 - 88	3	100	40
88 - 216	3	150	43.5
216 - 960	3	200	46
Above 960-1000	3	500	54

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument Antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

Limit in radiated emission measurement (Part 15.109)

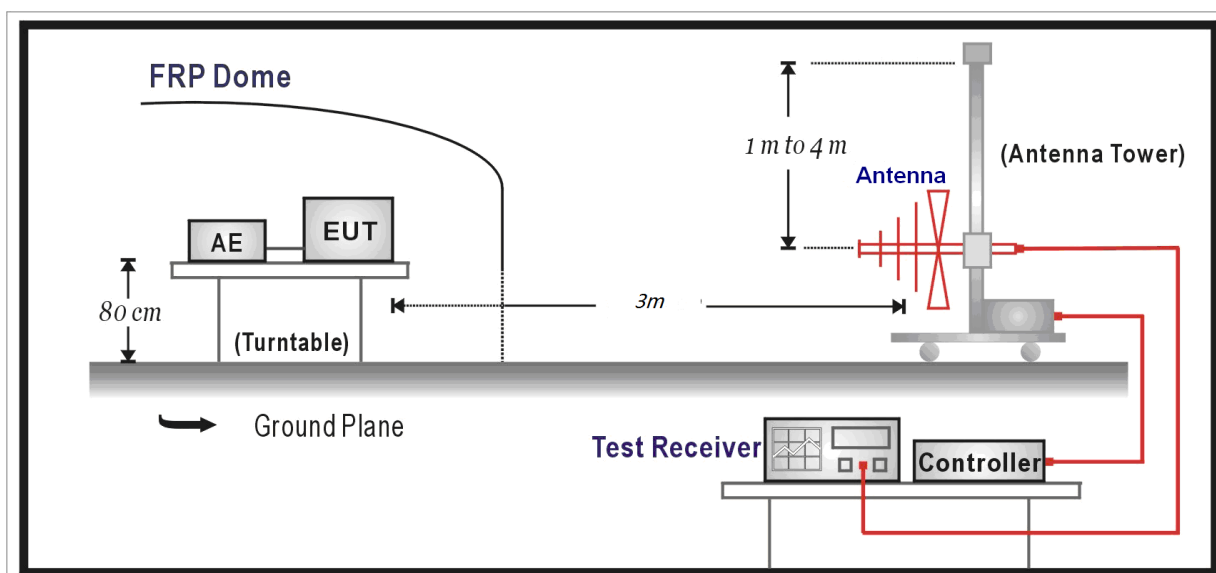
Frequency(MHz)	Field strength(dBuV/m) @3m	
Above 1000	74(peak)	54(average)

According to FCC Part 15.33(b),for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

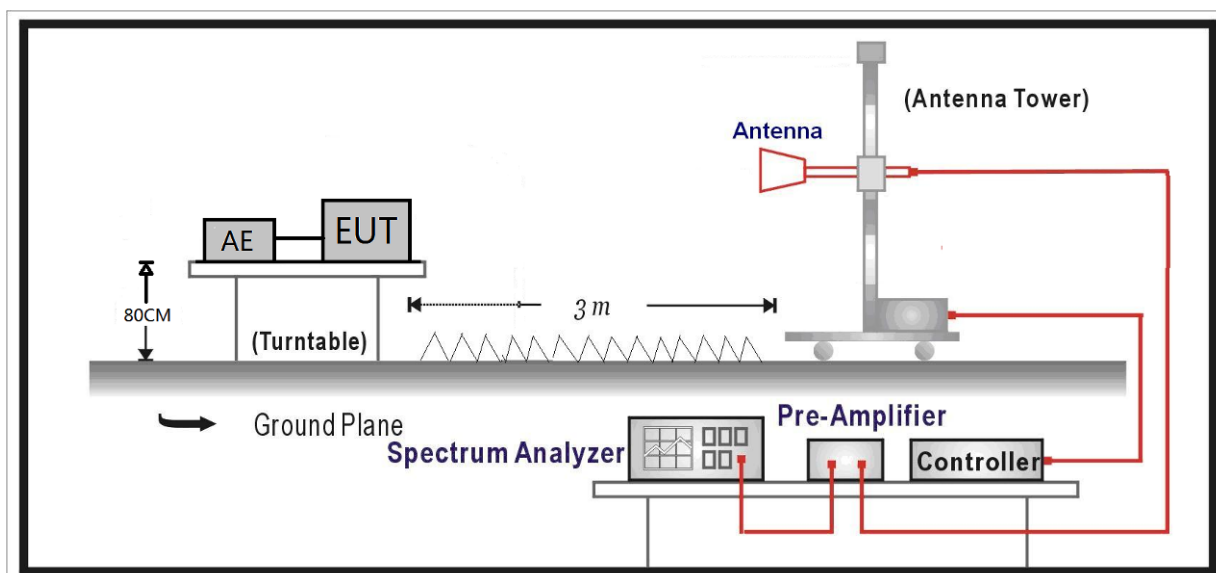
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Above 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Test Setup:

Below 1GHz Test Setup:



Above 1GHz Test Setup:

**Measurement Uncertainty:**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
above 1G	4.10 dB
below 1G	4.84 dB

Test Results:

SPURIOUS EMISSIONS 30MHz~1GHz:

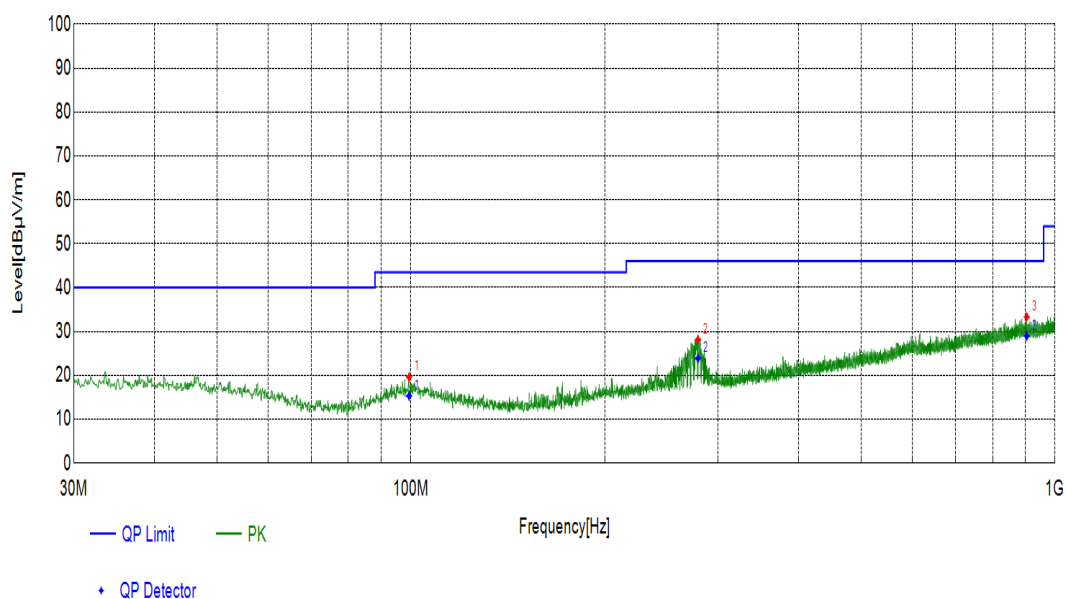
Radiated Emission	30MHz-1GHz
Polarity	Horizontal
Test Mode	Normal Working

Suspected List

Frequency [MHz]	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
99.3619	20.06	-0.43	19.63	43.52	23.89	PK	100	217	PASS
279.1209	20.82	7.35	28.17	46.02	17.85	PK	100	130	PASS
904.0574	31.87	1.42	33.29	46.02	12.73	PK	100	65	PASS

Final Data List

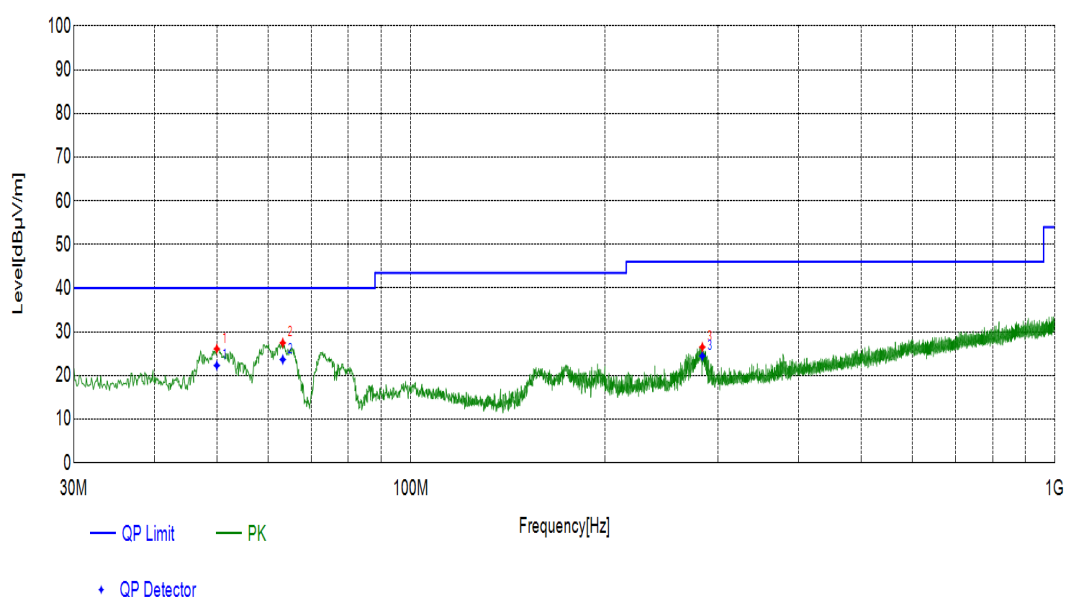
Frequency [MHz]	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
99.3619	20.06	15.33	43.52	28.19	255	217	PASS
279.1209	20.82	23.87	46.02	22.15	290	130	PASS
904.0574	31.87	28.99	46.02	17.03	182	65	PASS



Radiated Emission	30MHz-1GHz
Polarity	Vertical
Test Mode	Normal Working

Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
49.9840	20.56	5.56	26.12	40.00	13.88	PK	100	317	PASS
63.2743	17.67	9.81	27.48	40.00	12.52	PK	100	239	PASS
283.4863	20.92	5.58	26.50	46.02	19.52	PK	100	221	PASS

Final Data List							
Frequency [MHz]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
49.9840	20.56	22.30	40.00	17.70	230	317	PASS
63.2743	17.67	23.66	40.00	16.34	300	239	PASS
283.4863	20.92	24.47	46.02	21.55	288	221	PASS



Note: 1. Quasi-Peak = Reading value + Correction factor

2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

SPURIOUS EMISSIONS 1GHz~10GHz:

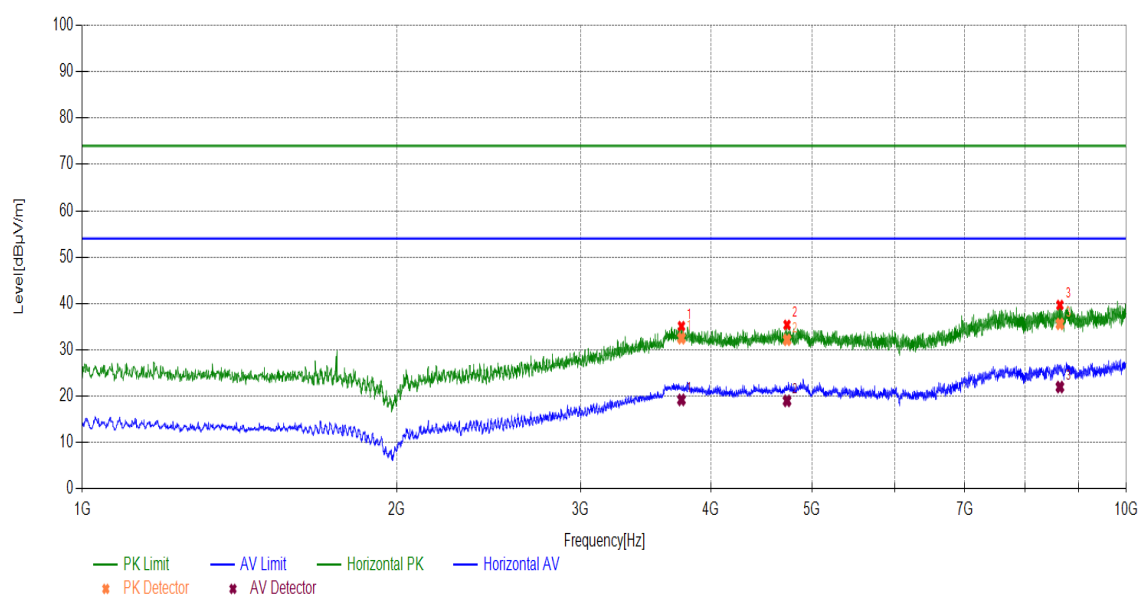
Radiated Emission	1GHz~10GHz
Polarity	Horizontal
Test Mode	Normal Working

Suspected List

Frequency [MHz]	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
3748.8749	-6.14	41.23	35.09	74.00	38.91	PK	100	267	PASS
4731.7732	-4.93	40.30	35.37	74.00	38.63	PK	100	0	PASS
8637.2637	1.77	37.88	39.65	74.00	34.35	PK	100	305	PASS

Final Data List

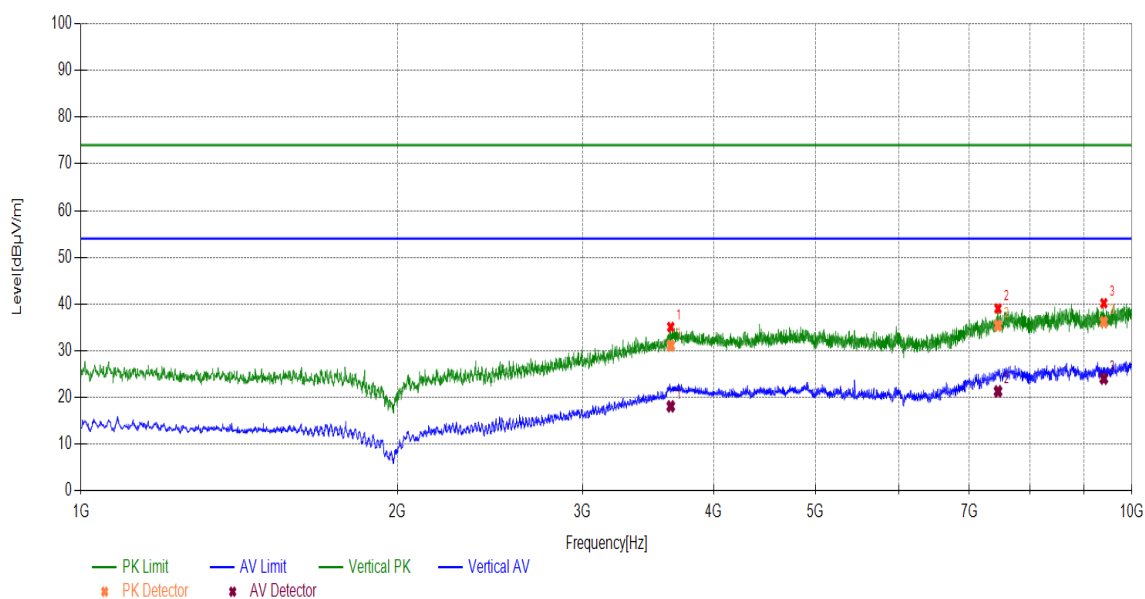
Frequency [MHz]	Factor [dB]	PK Value [dB μ V/m]	PK Limit [dB μ V/m]	PK Margin [dB]	AV Value [dB μ V/m]	AV Limit [dB μ V/m]	AV Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
3748.8749	-6.14	32.49	74.00	41.51	19.18	54.00	34.82	100	267	PASS
4731.7732	-4.93	32.14	74.00	41.86	18.97	54.00	35.03	100	0	PASS
8637.2637	1.77	35.58	74.00	38.42	21.95	54.00	32.05	100	305	PASS



Radiated Emission	1GHz~10GHz
Polarity	Vertical
Test Mode	Normal Working

Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
3640.8641	-6.31	41.38	35.07	74.00	38.93	PK	100	341	PASS
7457.2457	0.82	38.20	39.02	74.00	34.98	PK	100	360	PASS
9402.3402	3.75	36.40	40.15	74.00	33.85	PK	100	38	PASS

Final Data List										
Frequency [MHz]	Factor [dB]	PK Value [dBμV/m]	PK Limit [dBμV/m]	PK Margin [dB]	AV Value [dBμV/m]	AV Limit [dBμV/m]	AV Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
3640.8641	-6.31	31.08	74.00	42.92	18.07	54.00	35.93	100	341	PASS
7457.2457	0.82	35.38	74.00	38.62	21.28	54.00	32.72	100	360	PASS
9402.3402	3.75	36.15	74.00	37.85	24.02	54.00	29.98	100	38	PASS



Note: 1. Quasi-Peak = Reading value + Correction factor

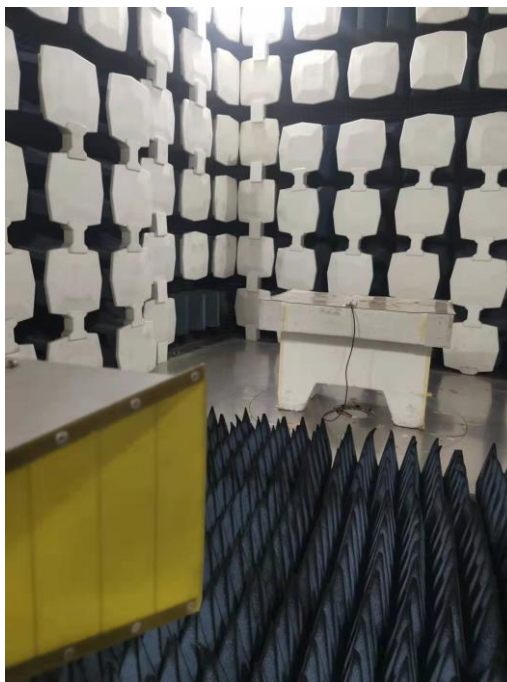
2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

Test Setup Photograph

(1) Radiated spurious emission Test Setup(Below 1GHz)



(2) Radiated spurious emission Test Setup(Above 1GHz)

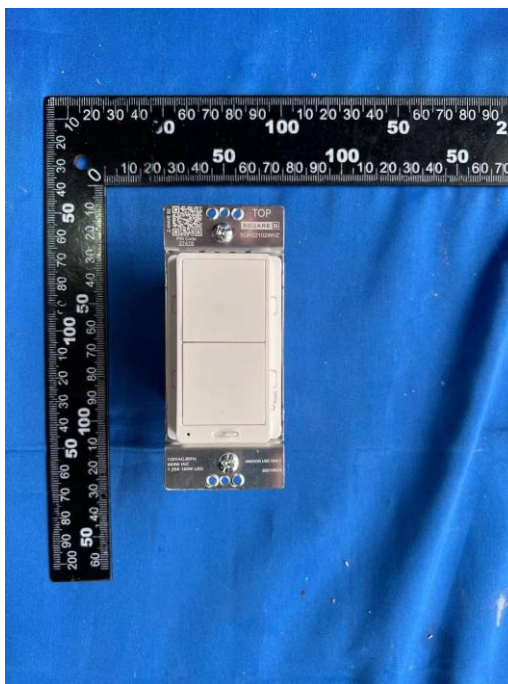


(3) Conducted Emission Test Setup

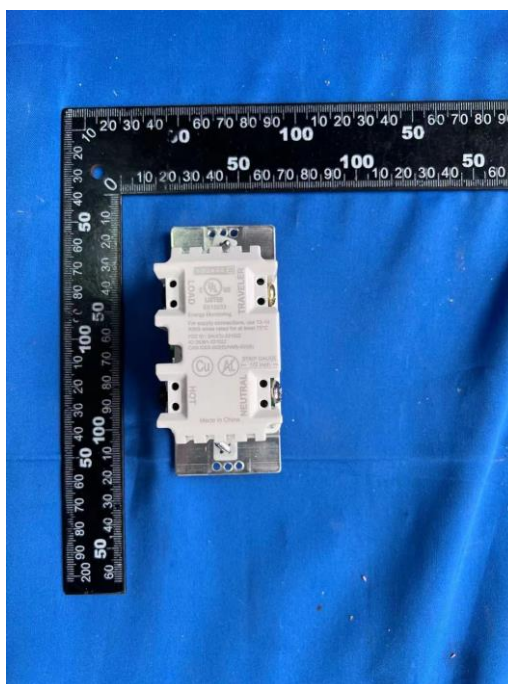


EUT Photograph

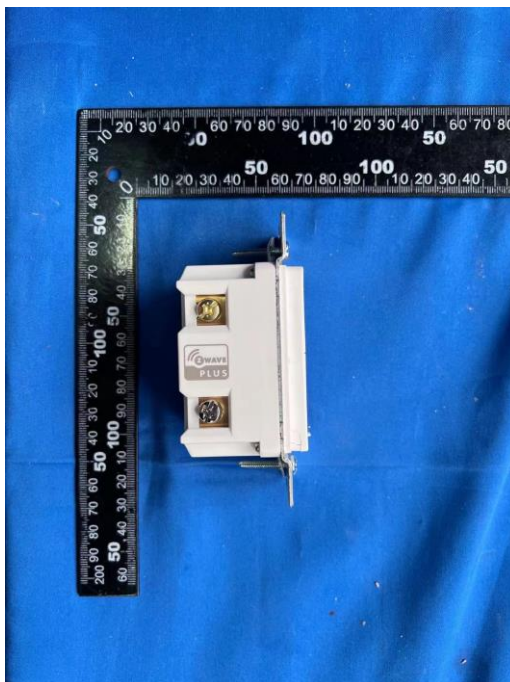
(1) EUT Photo



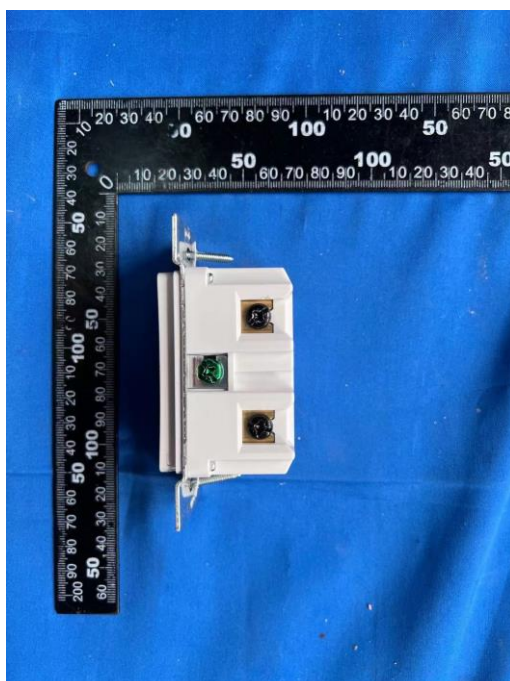
(2) EUT Photo



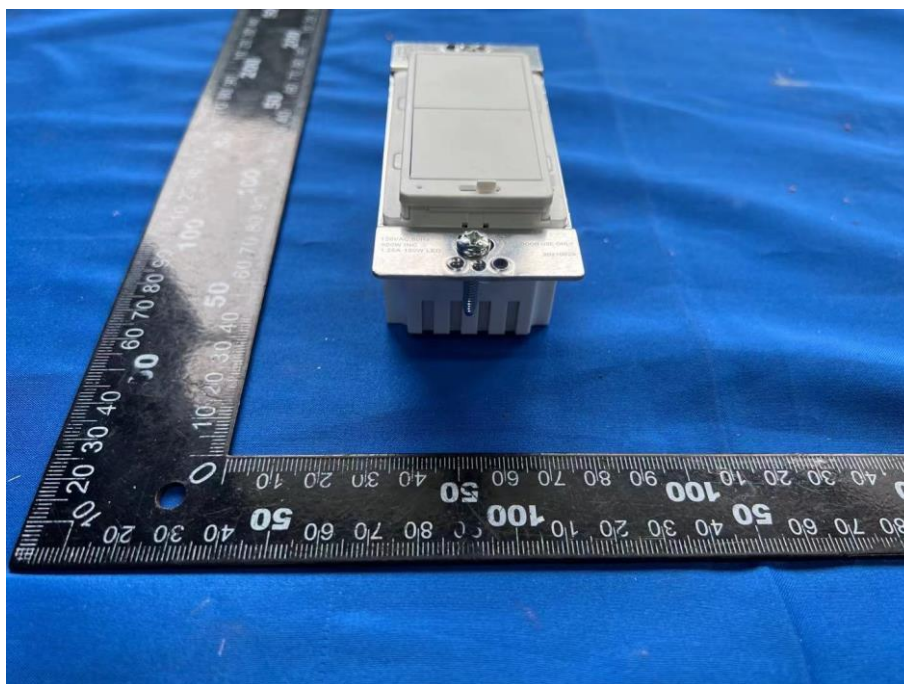
(3) EUT Photo



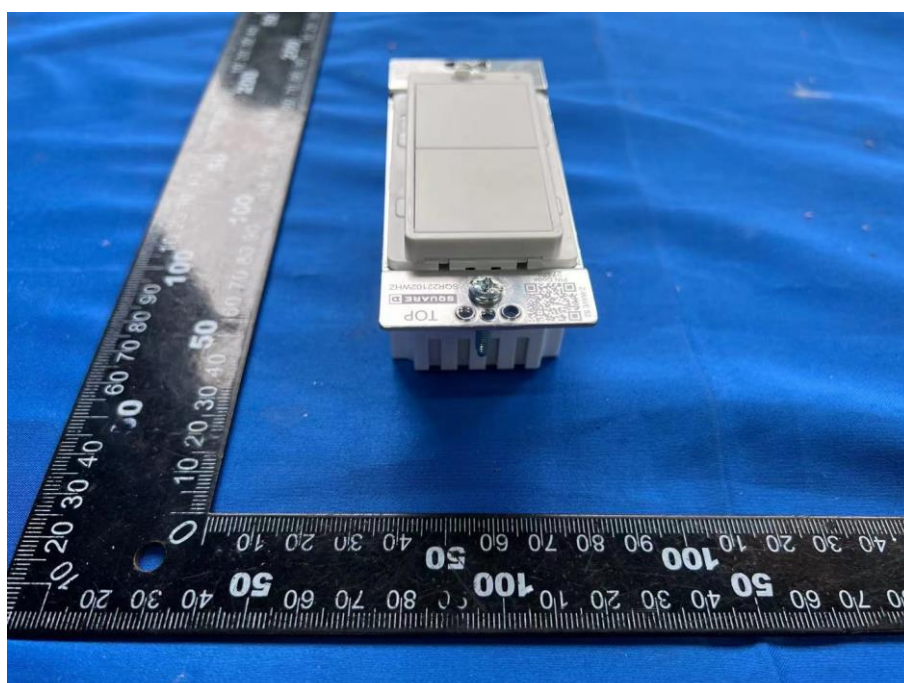
(4) EUT Photo



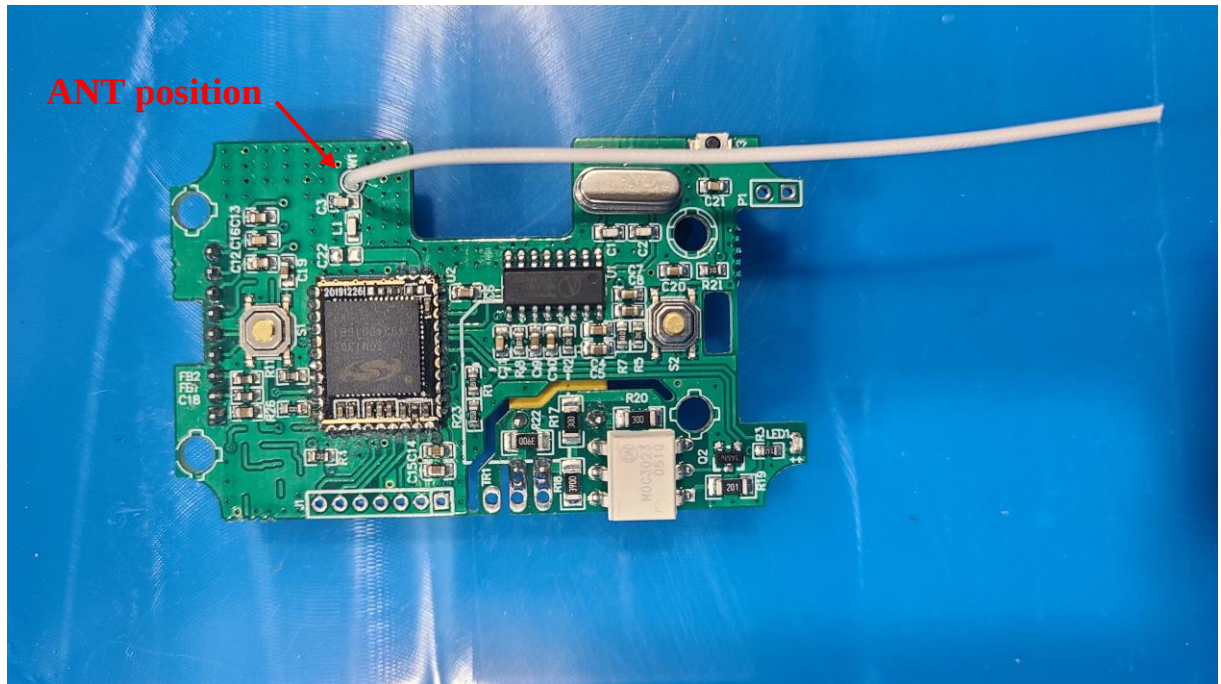
(5) EUT Photo



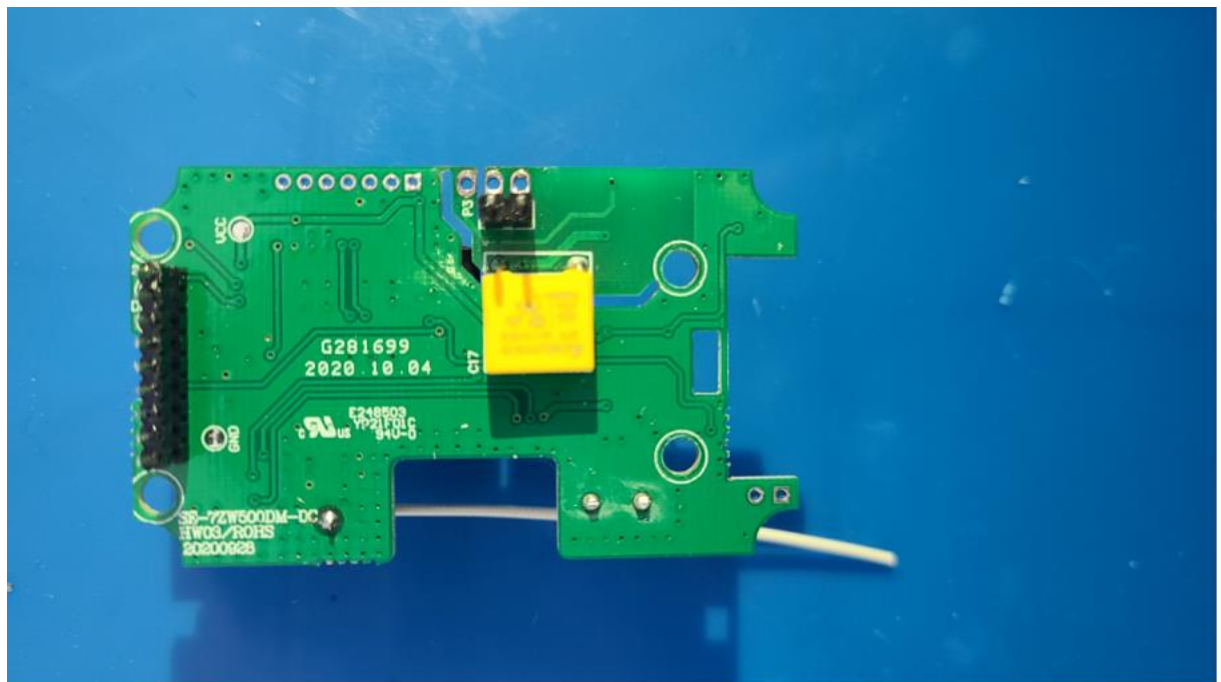
(6) EUT Photo



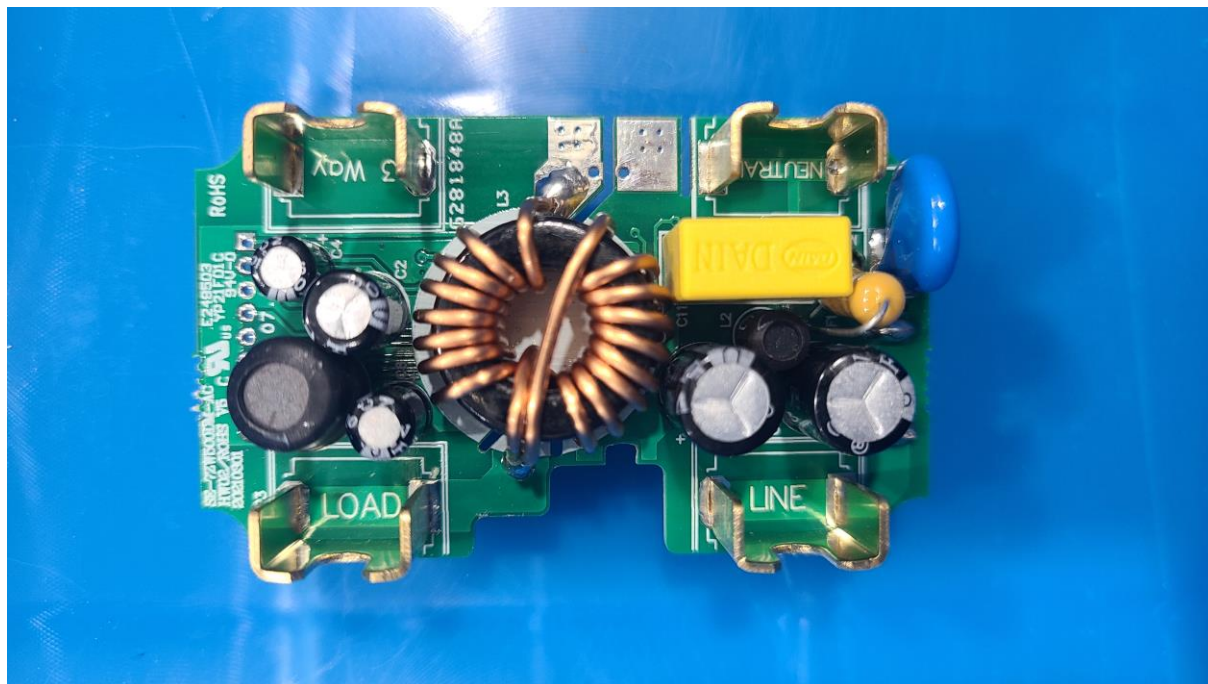
(7) EUT Photo



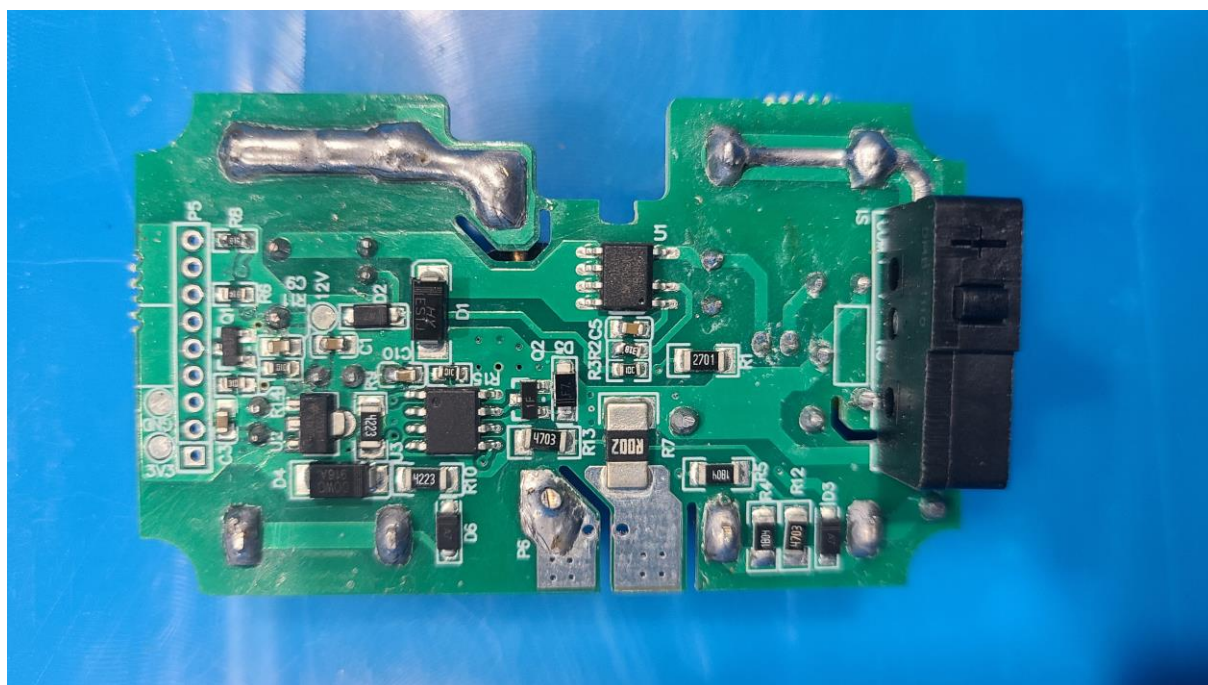
(8) EUT Photo



(9) EUT Photo



(10) EUT Photo



Appendix

Equipment list	Type/Mode	Equipment No.	Manufacturer	Cal. Due
EMI Test Receiver	ESCI	WKNB-0081	R&S	2021-12-08
EMI Test Receiver	ESR3	VG DY-0705	R&S	2022-03-15
LISN	NSLK 8127	VG DY-0150	SCHWARZBECK	2022-09-01
LISN	NSLK 8128	VG DY-0149	SCHWARZBECK	2022-09-01
Impedance Stabilization Network	NTFM8131	EM-000498	SCHWARZBECK	2022-06-05
Voltage Probe	TK9420	VG DY-0128	SCHWARZBECK	2022-03-05
Power Divider	4901.17.B	DB-0016	HUBER+SUHNER	2023-09-01
Shielding Room(#1)	GP1A	WKNF-0001	LEINING	2024-08-08
Shielding Room(#2)	GP1A	WKNF-0006	LEINING	2024-08-08
EMI Test Receiver	N9038A-508	EM-000397	Agilent	2022-03-05
EMI Test Receiver	ESR7	VG DY-0956	R&S	2022-03-05
Broadband Antenna(3m)	VULB 9163	EM-000342	SCHWARZBECK	2022-06-26
Broadband Antenna(5m)	VULB 9163	EM-000382	SCHWARZBECK	2022-05-07
Loop Antenna	HLA 6121	EM-000546	TESEQ	2022-06-05
Waveguide Horn Antenna	BBHA9120B	EM-000383	SCHWARZBECK	2022-03-05
Waveguide Horn Antenna	HF906	WKNA-0024-8	R&S	2022-03-05
Semi-Anechoic Chamber(3m)	FACT-4	WKNA-0024	ETS	2024-12-12
Semi-Anechoic Chamber(5m)	SAC-5	EM-000557	COMTEST	2024-11-02
Spectrum analyzer	N9010B	DZ-000174	KEYSIGHT	2022-03-05

The End