TEST REPORT

Reference No.	:	WTF24F12298587W
FCC ID	:	2ABUP-FT12W09Y
Applicant	:	Shenzhen Funpower General Technology Co.,Ltd
Address	:	Room 201B, Habor Venture Building, No.1041 Houhai Avenue, Shekou,Nanshan District, Shenzhen City, China
Manufacturer	:	The same as above
Address	:	The same as above
Product Name	:	Remote Control Transmitter
Model No.	:	FT12W09Y
Test specification	:	FCC CFR47 Part 15 Subpart C (Section 15.231)
Date of Receipt sample	:	2024-12-19
Date of Test	:	2024-12-23
Date of Issue	:	2024-12-27
Test Report Form No.	:	WEW-15231A-01B
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 approver.

Prepared By:
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Tested by: Kyrie Yun

Approved by: Danny Zhou

1 Revision History

Test Report No.	Date of Issue	Description	Status
WTF24F12298587W	2024-12-27	Original	Valid

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3 General Information

3.1 General Description of E.U.T

Product Name ..... : Remote Control Transmitter

Model No. ..... : FT12W09Y

Model Description ..... : ---

Rating ..... : AC 120V/60Hz

Battery Capacity ..... : ---

Power Adapter ..... : ---

3.2 Technical Characteristics of EUT

Operating Frequency ..... : 433.92 MHz

Max. Field Strength ..... : 87.23 dBuV/m (at 3m distance)

Modulation ..... : ASK

Type of Antenna ..... : PCB Antenna

Antenna Gain ..... : 0 dBi

3.3 Standards Applicable for Testing

The following report is prepared in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commissions rules.

3.4 Test Facility

The test facility has a test site registered with the following organizations:

- **ISED – Registration No.: 21895**

Waltek Testing Group (Foshan) Co., Ltd. has been registered and fully described in a report filed with the Innovation, Science an Economic Development Canada(ISED). The acceptance letter from the ISED is maintained in our files. Registration ISED number:21895, March 12, 2019

- **FCC – Registration No.: 820106**

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 820106, August 16, 2018

- **FCC – Designation No.: CN5034**

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation No. CN5034.

- **NVLAP – Lab Code: 600191-0**

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 600191-0.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

3.5 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 items: ---

Lab information: ---

3.6 Abnormalities from Standard Conditions

None.

3.7 Disclaimer

The antenna gain information is provided by the customer. The laboratory is not responsible for the accuracy of the antenna gain information.

4 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List

Test Mode	Description	Remark
TM1	Transmitting	With modulation(433.92MHz)

Test Conditions

Temperature:	22~25℃
Relative Humidity:	50~55%
Atmospheric pressure:	101.9kPa

5 Equipment Used during Test

5.1 Equipment List

☐**Conducted Emissions 1#**

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal Date	Cal Due Date
1.	EMI Test Receiver	R&S	ESR3	102423	2024-01-05	2025-01-04
2.	LISN	R&S	ENV216	101343	2024-01-05	2025-01-04
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	223NN624	2024-01-04	2025-01-03
4.	Switch	CD	RSU-A4 18G	RSUA4008	2024-01-04	2025-01-03

☒**Conducted Emissions 2#**

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal Date	Cal Due Date
1.	EMI Test Receiver	R&S	ESCI	101178	2024-01-06	2025-01-05
2.	LISN	R&S	ENV216	101215	2024-01-05	2025-01-04
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	6102701	2024-01-04	2025-01-03
4.	Switch	ESE	RSU/M2	---	2024-01-04	2025-01-03

☐**Conducted Emissions 3#**

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal Date	Cal Due Date
1.	EMI Test Receiver	R&S	ESR3	102842	2024-01-05	2025-01-04
2.	LISN	R&S	ENV216	101542	2024-01-05	2025-01-04
3.	Cable	YIHENG	LMR195UF-NMNM-2.5	---	2024-01-04	2025-01-03
4.	Manual RF Switch	YIHENG	SW-2	RSU0402	2024-01-04	2025-01-03

☒**Radiation Emissions**

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	-	2024-01-05	2025-01-04
2.	EMI Test Receiver	RS	ESR7	101566	2024-01-06	2025-01-05
3.	EMC Analyzer	Agilent	N9020A	MY48011796	2024-01-04	2025-01-03
4.	Active Loop Antenna	SCHWARZBECK	FMZB1519B	00004	2024-01-05	2025-01-04
5.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9162	9162-117	2024-01-05	2025-01-04
6.	Coaxial Cable (below 1GHz)	H+S	CBL3-NN-12+3 m	214NN320	2024-01-06	2025-01-05
7.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	2024-01-05	2025-01-04
8.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	01119	2024-01-05	2025-01-04
9.	Coaxial Cable (above 1GHz)	Times-Micorwave	CBL5-NN	-	2024-01-04	2025-01-03
10.	Amplifier	Lunar E M	LNA1G18-40	20160501002	2024-01-04	2025-01-03

☒RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	Spectrum Analyzer	Agilent	N9020A	MY48011796	2024-01-04	2025-01-03
2.	Analog Signal Generator	Agilent	N5181A	MY48180720	2024-01-04	2025-01-03
3.	RF Control Unit	CHANGCHUANG	JS0806-2	-	2024-01-04	2025-01-03

☐: ***Not Used***

☒: ***Used***

5.2 Test Software

Description	Manufacturer	Model	Version
EMI Test Software (Conducted Emission 1#)	FARATRONIC	EZ-EMC	EMEC-3A1
EMI Test Software (Conducted Emission 2#)	FARATRONIC	EZ-CON	FARAD-3A1.1+
EMI Test Software (Conducted Emission 3#)	FARATRONIC	EZ-EMC	EMC-CON 3A1.1+
EMI Test Software (Radiated Emission)	FARATRONIC	EZ-EMC	RA-03A1-2
RF Conducted Test Software	TONSCEND	JS1120-2	V2.6

5.3 Special Accessories and Auxiliary Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.
1.	/	/	/	/

5.4 Measurement Uncertainty

Parameter	Uncertainty
RF Output Power	±2.2dB
Occupied Bandwidth	±1.5%
Conducted Emission	±2.6dB
Transmitter Spurious Emission	±3.8dB (for 25MHz-1GHz)
	±5.0dB (for 1GHz-18GHz)

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

6 Summary of Test Result

Test Items	FCC Rules	Result
Antenna Requirement	§15.203	Compliant
Restricted Band of Operation	§15.205	Compliant
Conducted Emissions	§15.207(a)	Compliant
Radiated Spurious Emissions	§15.209	Compliant
Deactivation Testing	§15.231(a)	Compliant
Radiated Emissions	§15.231(b)	Compliant
20dB Bandwidth Testing	§15.231(c)	Compliant

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

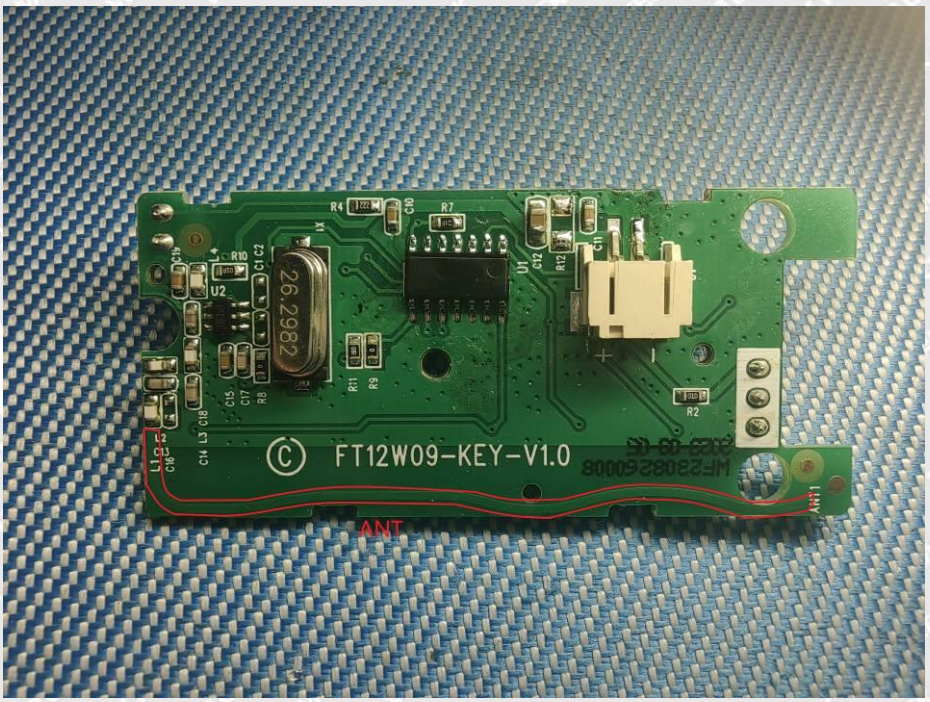
6.1 Antenna Requirement

6.1.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

6.1.2 Evaluation Information

The EUT has a PCB Antenna, the gain is 0dBi, fulfil the requirement of this section.



6.2 Radiated Spurious Emissions

6.2.1 Standard Applicable

According to §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations

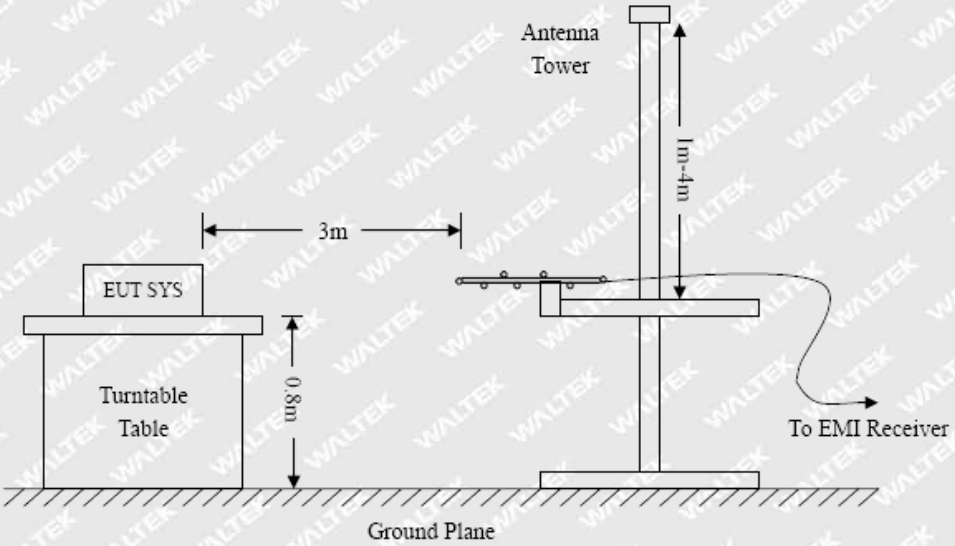
The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

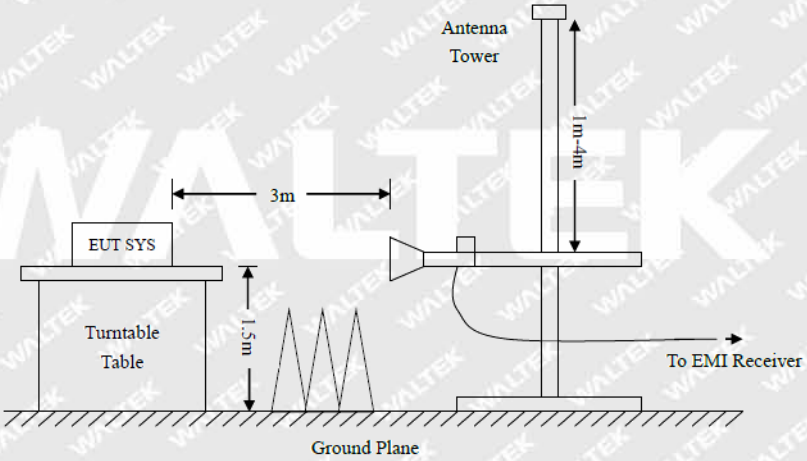
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

6.2.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.231(b) and FCC Part 15.209 Limit.





6.2.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading +Ant.Loss +Cab. Loss – Ampl.Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB V means the emission is 6dB V below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15C Limit

6.2.4 Test Results

Test Frequency : 30MHz ~ 5GHz

Frequency	Receiver Reading (PK)	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude (PK)	Limit	Margin
			Height	Polar				
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)
433.92	68.21	148	1.0	H	19.02	87.23	100.83	-13.60
433.92	66.47	288	1.6	V	19.02	85.49	100.83	-15.34
867.91	24.98	120	2.0	H	26.29	51.27	80.83	-29.56
867.91	20.29	163	1.1	V	26.29	46.58	80.83	-34.25
1869.50	54.14	282	2.0	H	-12.34	41.80	74	-32.20
1869.50	51.17	116	1.0	V	-12.34	38.83	74	-35.17
9965.25	45.71	249	2.0	H	7.43	53.14	74	-20.86
9965.25	45.47	252	1.7	V	7.43	52.90	74	-21.10

AV = Peak +20Log$_{10}$(duty cycle) =PK+(-10.74) [refer to section 6.5 for more detail]

Frequency	PK	RX Antenna Polar	Duty cycle Factor	Calculated AV	Limit	Margin
(MHz)	(dBμV/m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
433.92	87.23	H	-10.74	76.49	80.83	-4.34
433.92	85.49	V	-10.74	74.75	80.83	-6.08
867.91	51.27	H	-10.74	40.53	60.83	-20.30
867.91	46.58	V	-10.74	35.84	60.83	-24.99
1869.50	41.80	H	-10.74	31.06	54	-22.94
1869.50	38.83	V	-10.74	28.09	54	-25.91
9965.25	53.14	H	-10.74	42.40	54	-11.60
9965.25	52.90	V	-10.74	42.16	54	-11.84

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 6th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. The fundamental frequency is 433.92*MHz, so the fundamental and spurious emissions radiated limit base on the the operating frequency* 433.92*MHz.*

6.3 20dB Bandwidth

6.3.1 Standard Applicable

According to FCC Part 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

6.3.2 Test Procedure

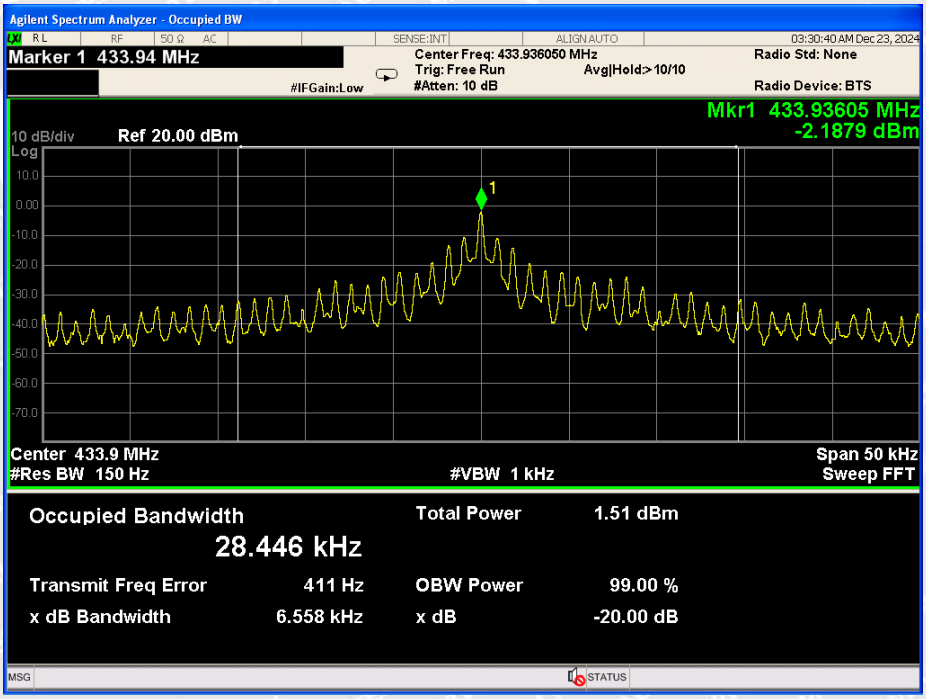
With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna, which was connected to the spectrum analyzer with the START, and STOP frequencies set to the EUT's operation band.

6.3.3 Test Result

Test Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
433.92	6.558	1084.8	Pass

Limit = Fundamental Frequency x 0.25% = 433.92 MHz x 0.25% = 1084.8 kHz

Test Plots:



6.4 Transmission Time

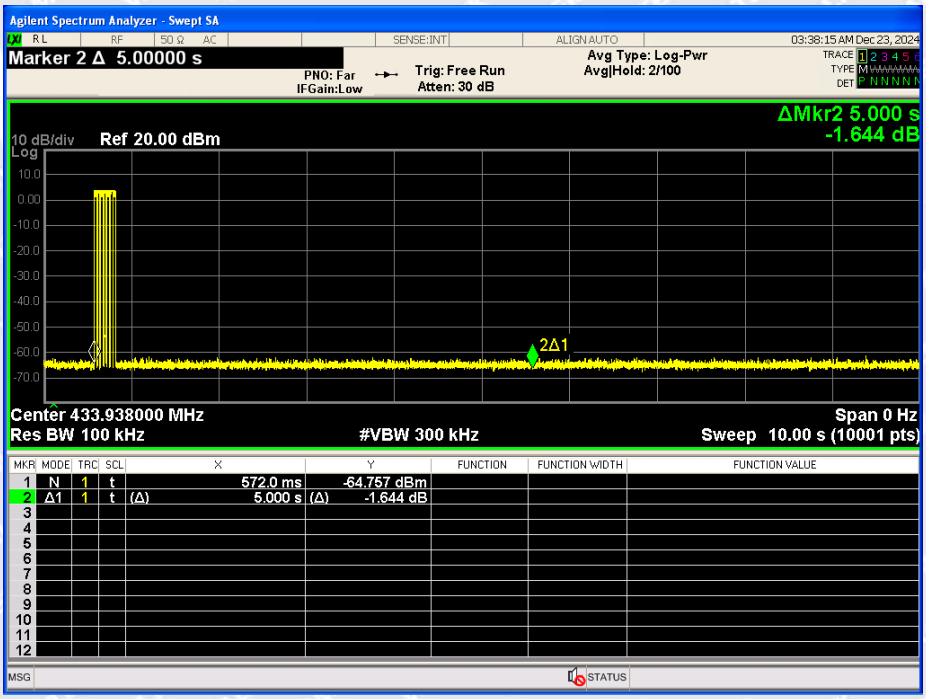
6.4.1 Standard Applicable

According to FCC Part 15.231 (a), the transmitter shall be complied the following requirements:
1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

6.4.2 Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

6.4.3 Test Result



6.5 Duty Cycle

6.5.1 Standard Applicable

According to FCC Part 15.231 (b)(2) and 15.35 (c), For pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

6.5.2 Test Procedure

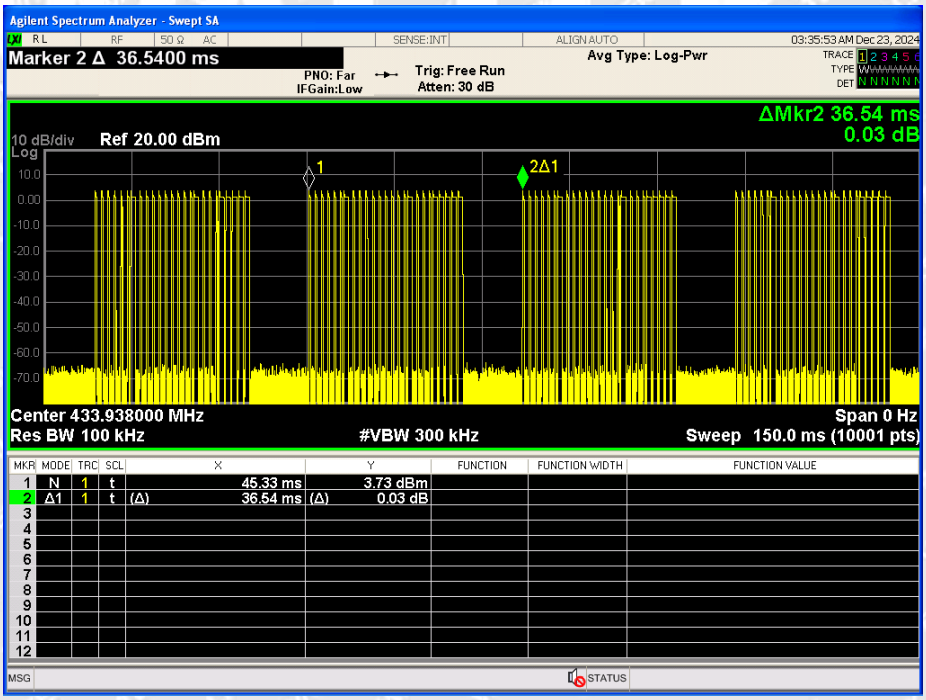
With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

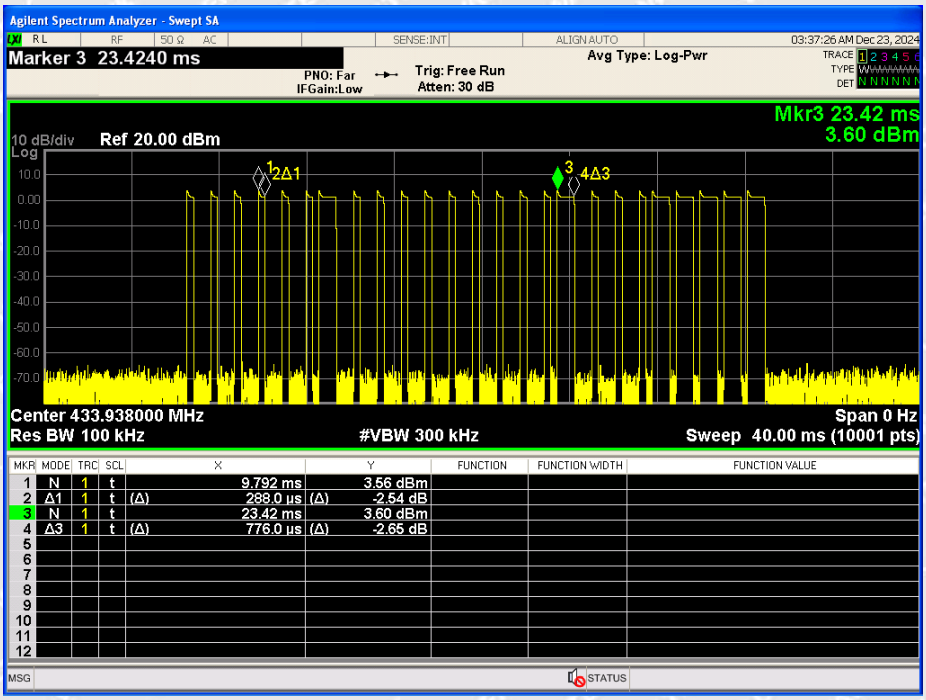
6.5.3 Test Result

Total transmission time(ms)	0.288*18+0.776*7=10.616
Length of a complete transmission period(ms)	36.54
Duty Cycle(%)	29.05
Duty Cycle Correction Factor(dB)	-10.74

Remark: Duty Cycle Factor=20*log(Duty Cycle)

Test Plots:




Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
03:37:26 AM Dec 23, 2024
Marker 3 23.4240 ms
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE WWWWW
DET N N N N N
PNO: Far
IFGain:Low
Trig: Free Run
Atten: 30 dB
Mkr3 23.42 ms
3.60 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1Δ1
3Δ3
Center 433.938000 MHz
Res BW 100 kHz
#VBW 300 kHz
Span 0 Hz
Sweep 40.00 ms (10001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 t 9.792 ms 3.56 dBm
2 Δ1 1 t (Δ) 288.0 µs (Δ) -2.54 dB
3 N 1 t 23.42 ms 3.60 dBm
4 Δ3 1 t (Δ) 776.0 µs (Δ) -2.65 dB
5
6
7
8
9
10
11
12
MSG
STATUS

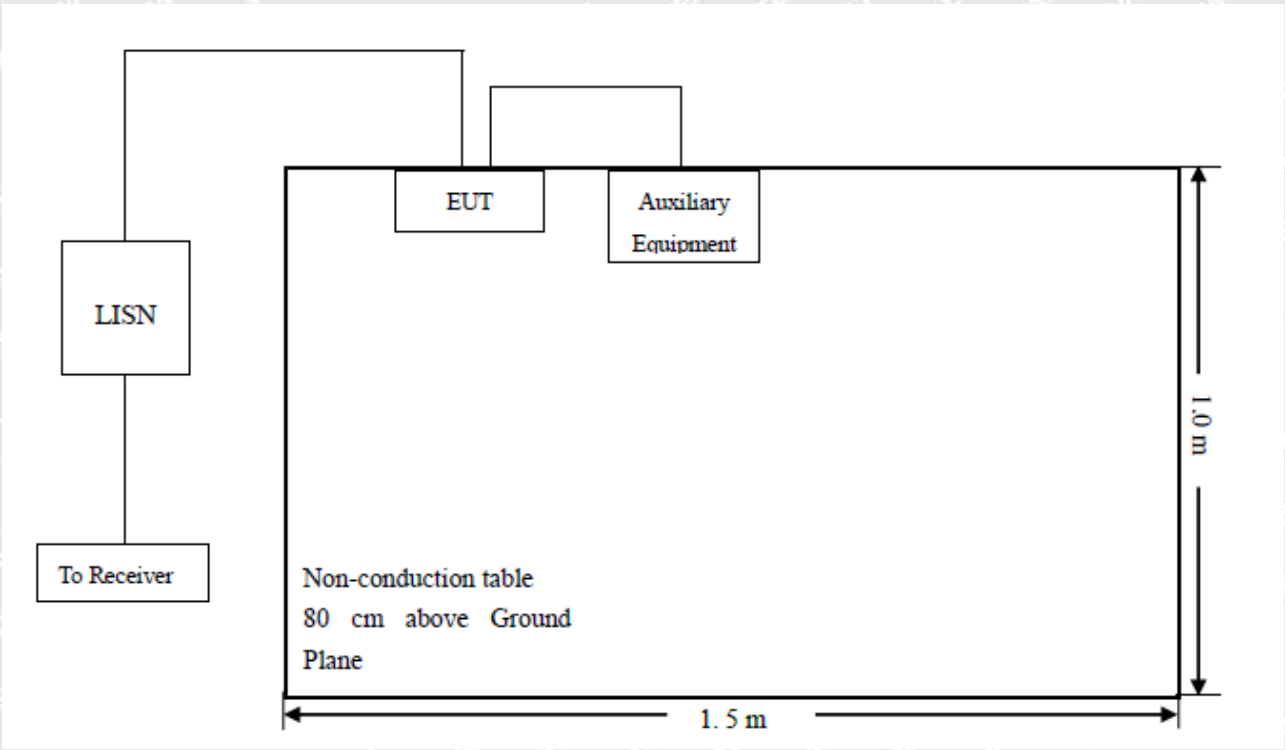
6.6 Conducted Emissions

6.6.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013measurement procedure. The specification used was with the FCC Part 15.207Limit.

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

6.6.2 Basic Test Setup Block Diagram



6.6.3 Test Receiver Setup

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

Start Frequency.....150 kHz

Stop Frequency.....30 MHz

Sweep Speed.....Auto

IF Bandwidth.....10 kHz

Quasi-Peak Adapter Bandwidth.....9 kHz

Quasi-Peak Adapter Mode.....Normal

6.6.4 Measurement Description

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.

6.6.5 Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF(Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Measurement=Reading Level+Correct Factor

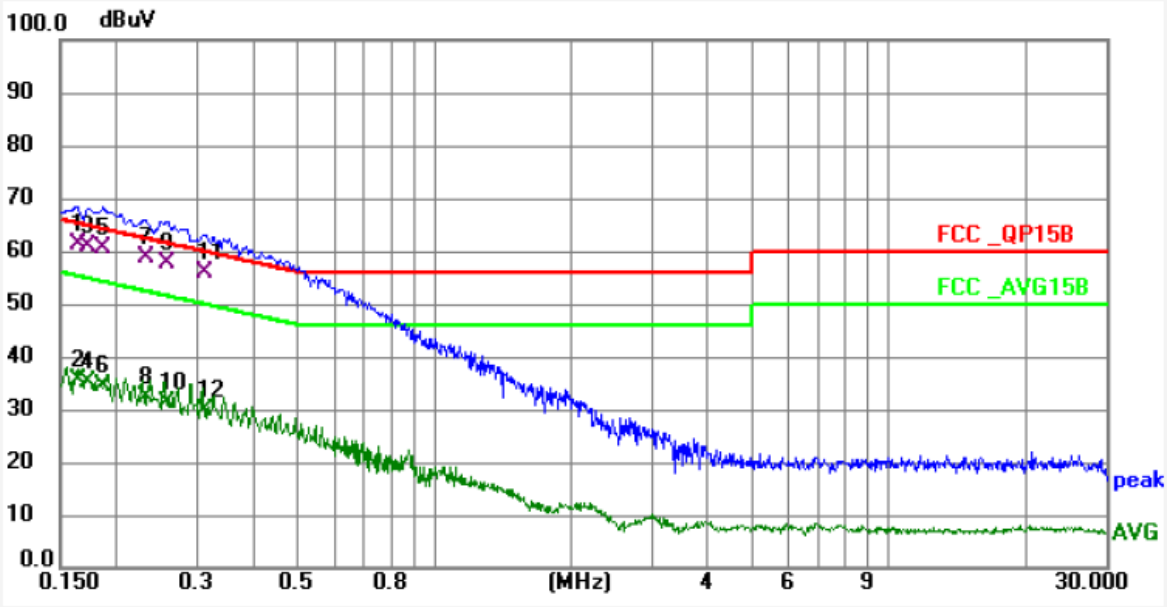
Correct Factor=LISN VDF+Cable Loss

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:

Margin= Measurement-Limit

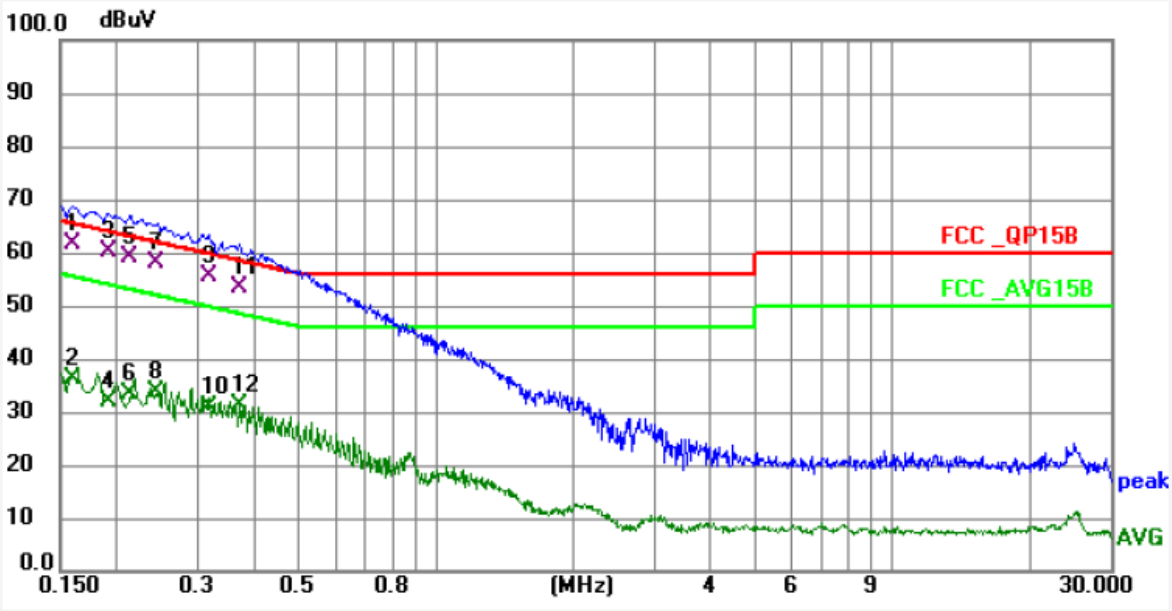
6.6.6 Test Result

Test Mode Communication mode(AC 120V/60Hz) **Polarity** Line



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.164	51.72	9.61	61.33	65.26	-3.93	QP	
2	0.164	26.07	9.61	35.68	55.26	-19.58	AVG	
3	0.172	51.34	9.61	60.95	64.86	-3.91	QP	
4	0.172	25.60	9.61	35.21	54.86	-19.65	AVG	
5	0.186	50.98	9.61	60.59	64.21	-3.62	QP	
6	0.186	24.82	9.61	34.43	54.21	-19.78	AVG	
7	0.231	49.10	9.61	58.71	62.41	-3.70	QP	
8	0.231	22.61	9.61	32.22	52.41	-20.19	AVG	
9	0.258	48.12	9.61	57.73	61.50	-3.77	QP	
10	0.258	21.63	9.61	31.24	51.50	-20.26	AVG	
11	0.312	46.10	9.62	55.72	59.92	-4.20	QP	
12	0.312	20.05	9.62	29.67	49.92	-20.25	AVG	

Test Mode Communication mode(AC 120V/60Hz) **Polarity** Neutral



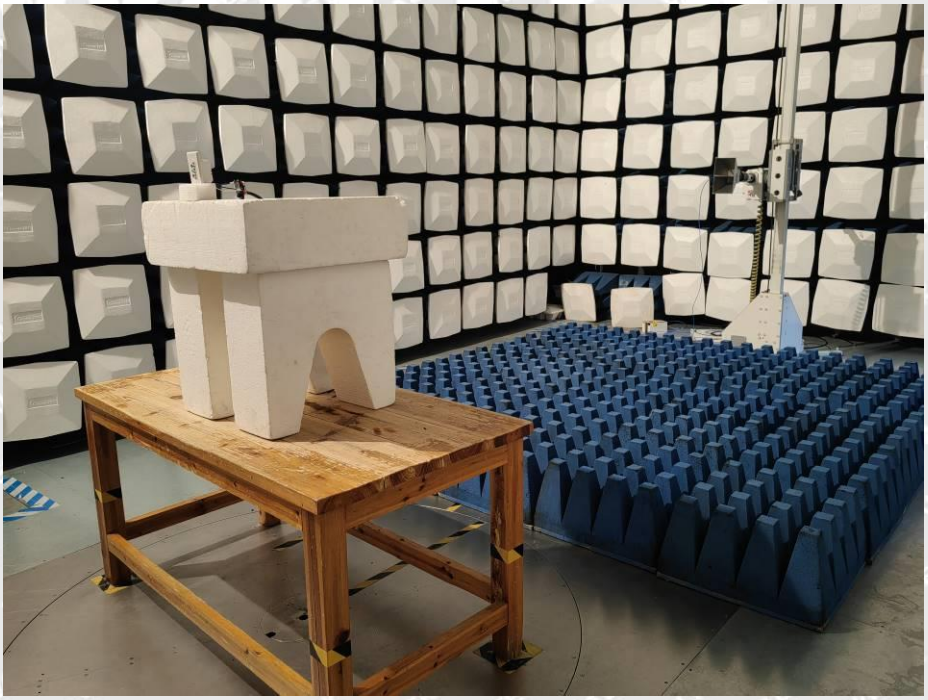
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.159	51.97	9.52	61.49	65.52	-4.03	QP	
2	0.159	26.68	9.52	36.20	55.52	-19.32	AVG	
3	0.191	50.56	9.53	60.09	63.99	-3.90	QP	
4	0.191	22.48	9.53	32.01	53.99	-21.98	AVG	
5	0.213	49.70	9.53	59.23	63.09	-3.86	QP	
6	0.213	24.00	9.53	33.53	53.09	-19.56	AVG	
7	0.244	48.54	9.54	58.08	61.96	-3.88	QP	
8	0.244	24.11	9.54	33.65	51.96	-18.31	AVG	
9	0.317	45.89	9.55	55.44	59.79	-4.35	QP	
10	0.317	21.19	9.55	30.74	49.79	-19.05	AVG	
11	0.370	44.01	9.56	53.57	58.50	-4.93	QP	
12	0.370	21.70	9.56	31.26	48.50	-17.24	AVG	

7 Photographs Test Setup

7.1 Photographs - Radiated Emission Test Setup

30MHz-1GHz

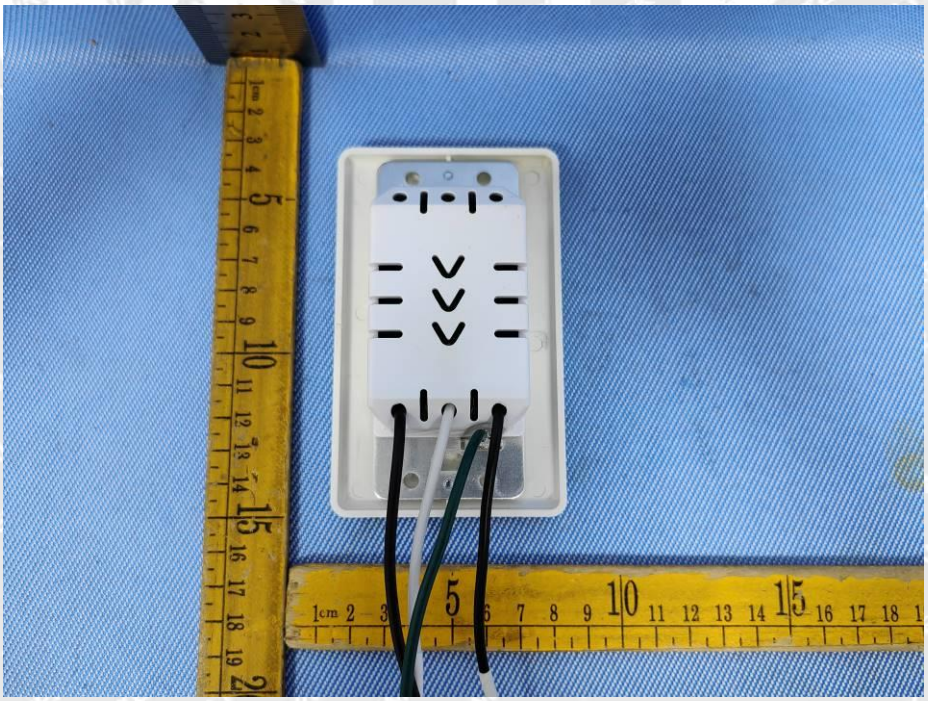
Above 1GHz

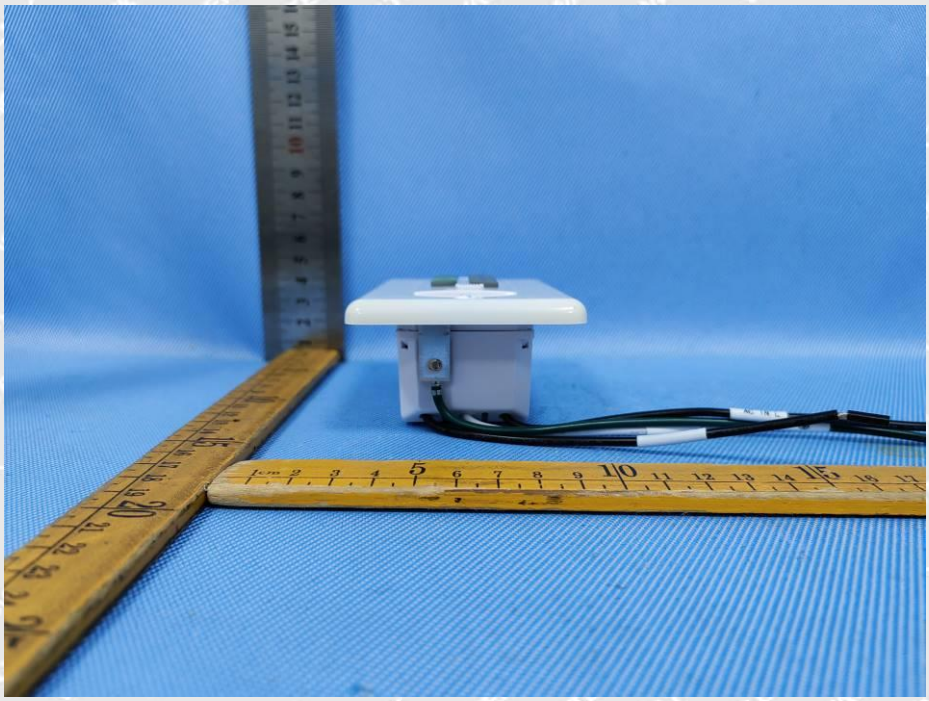


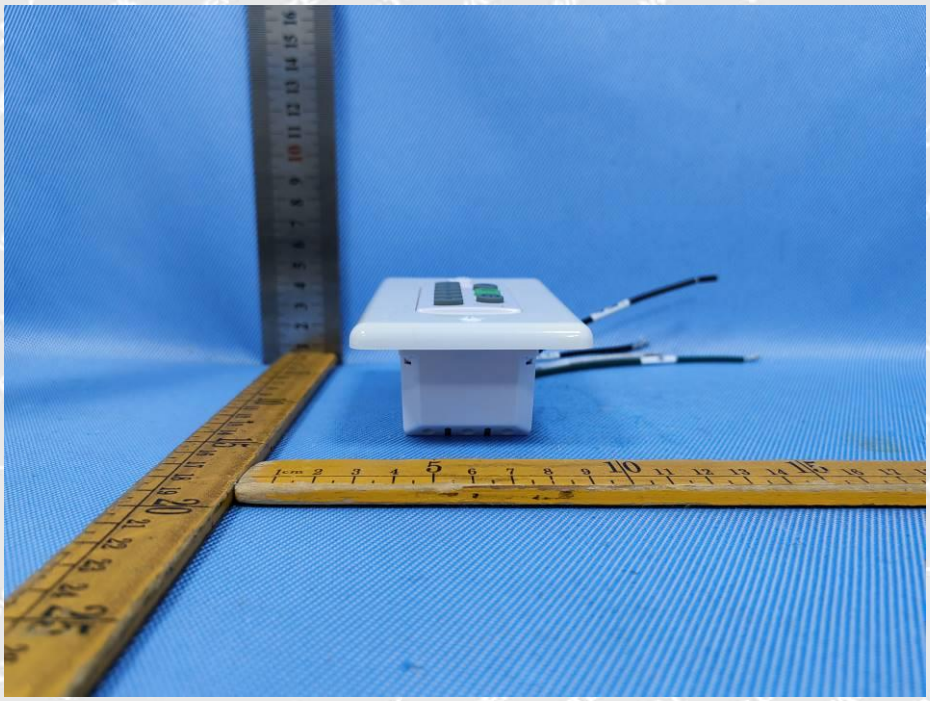
7.2 Photographs - Conducted Emission Test Setup

8 Photographs - Constructional Details

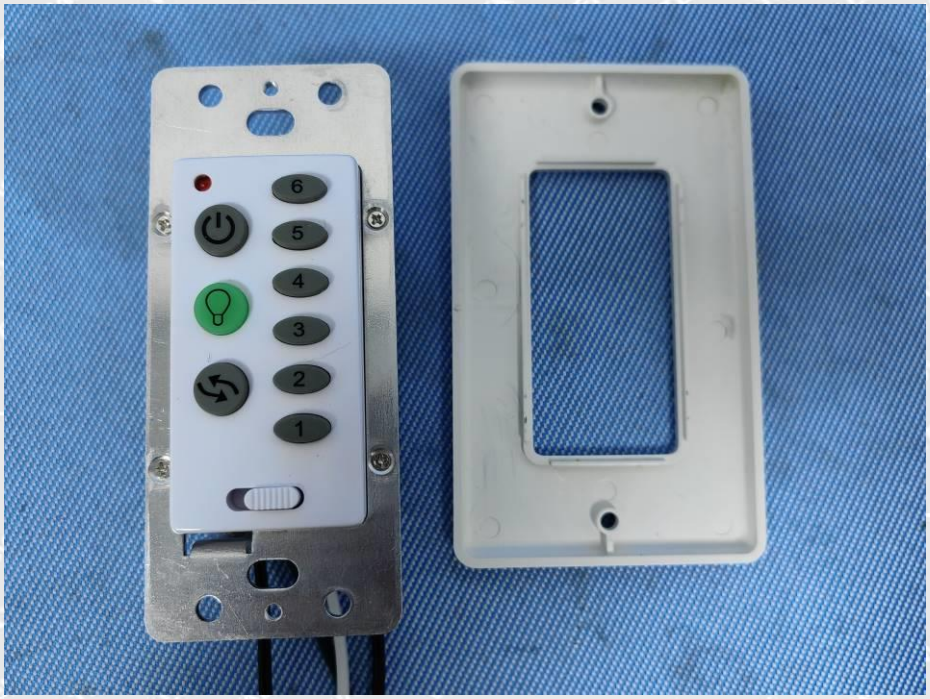
8.1 EUT - External Photos

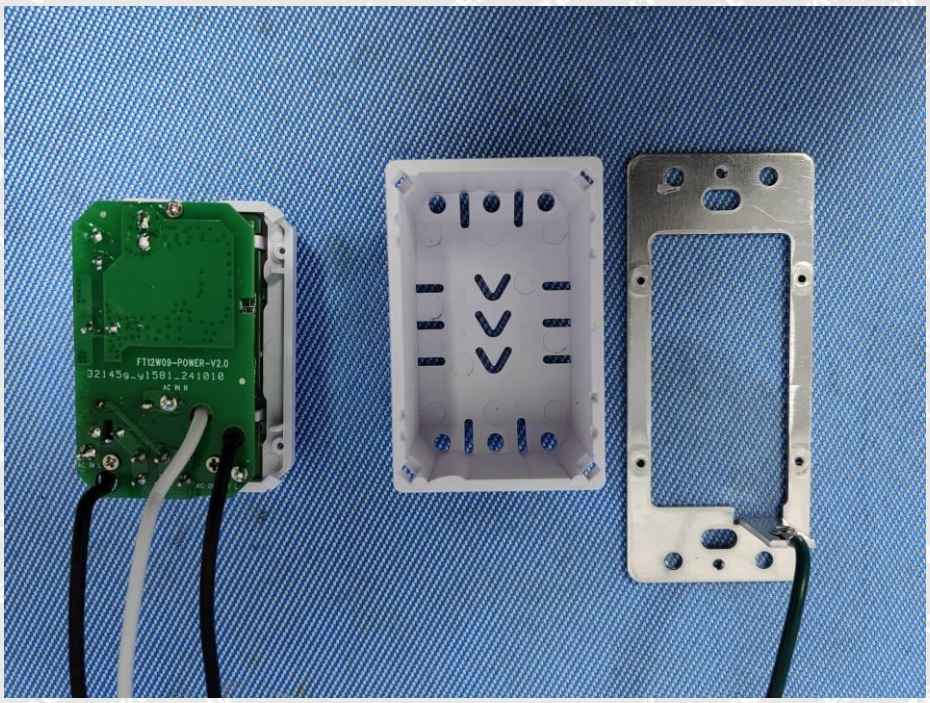


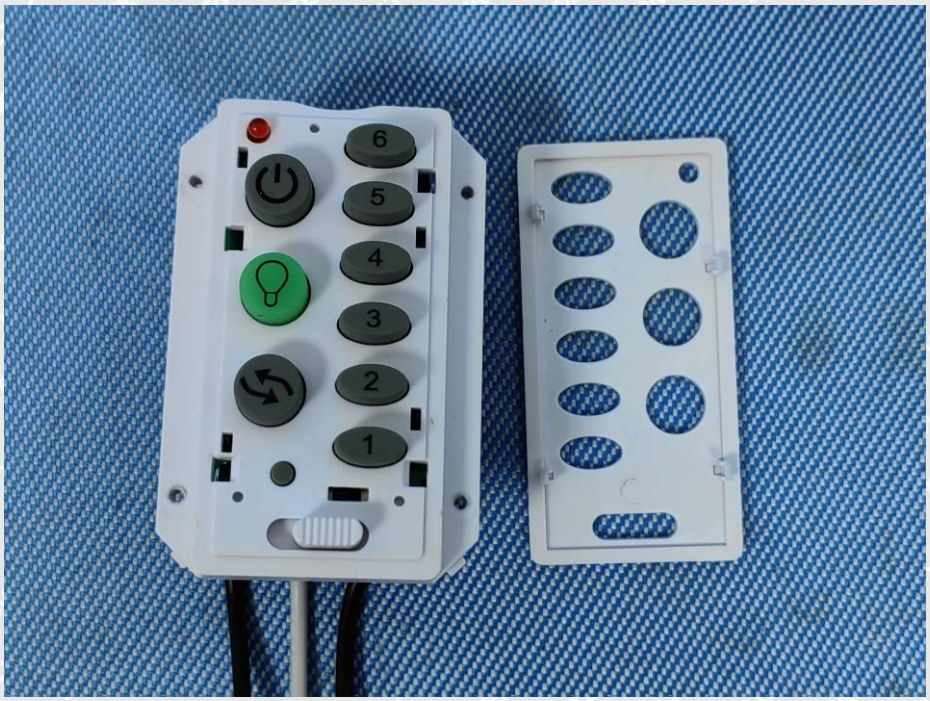


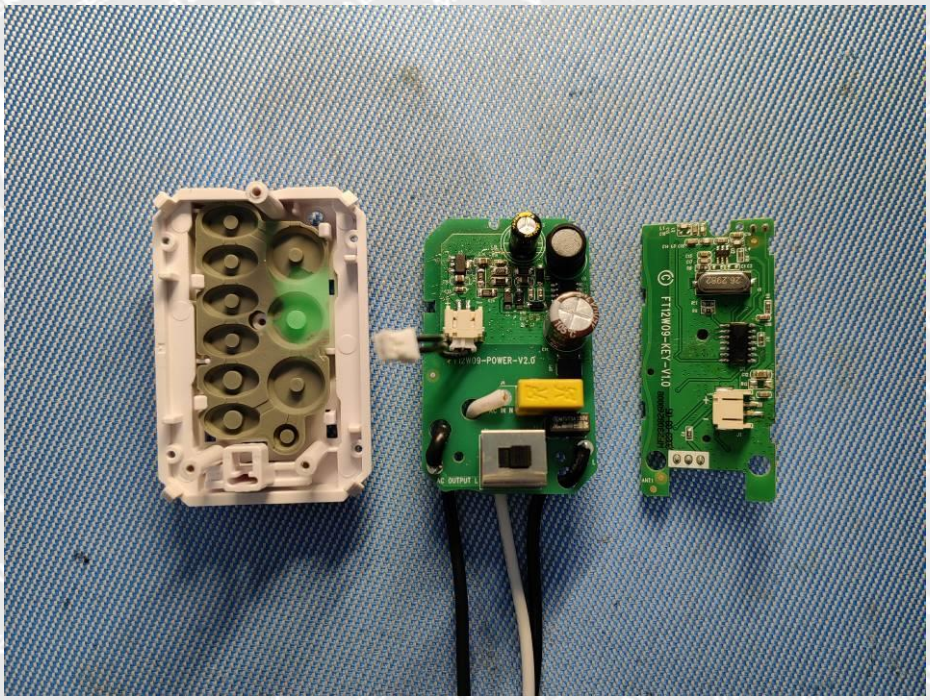


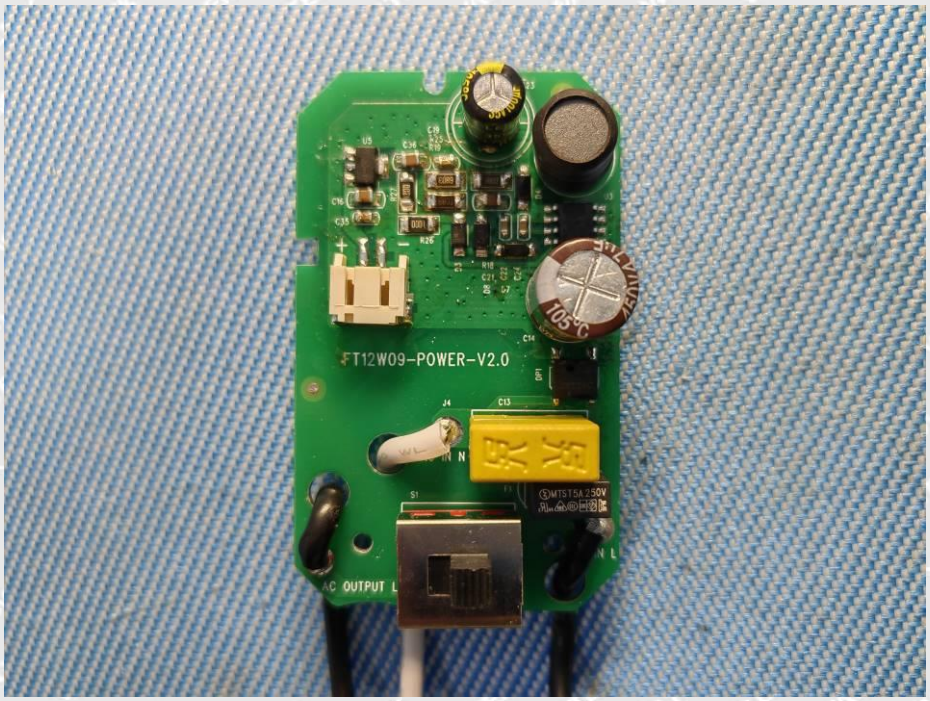
8.2 EUT - Internal Photos

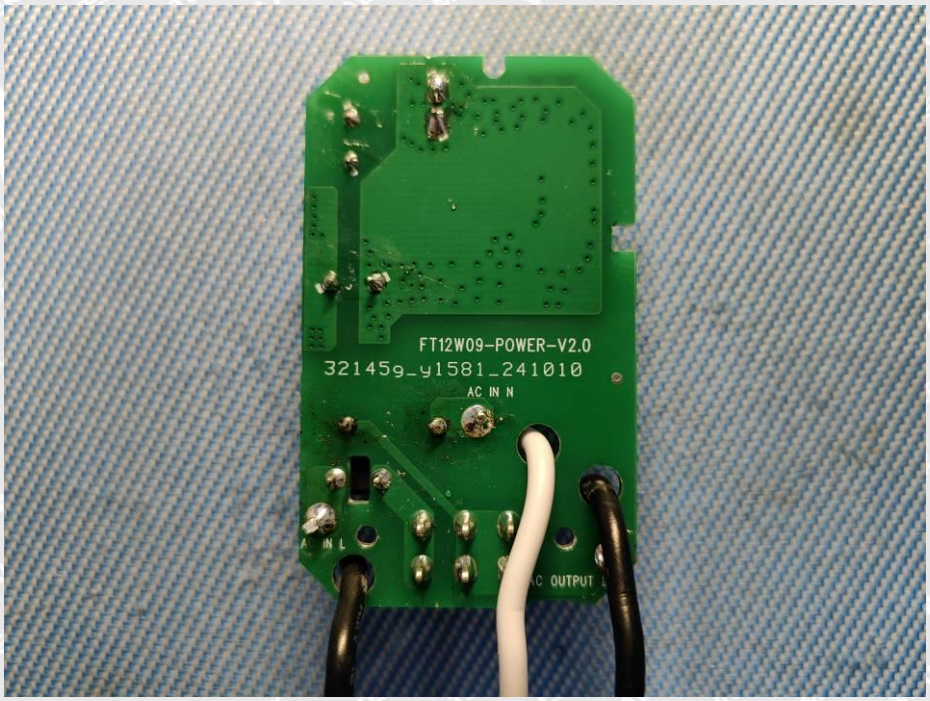


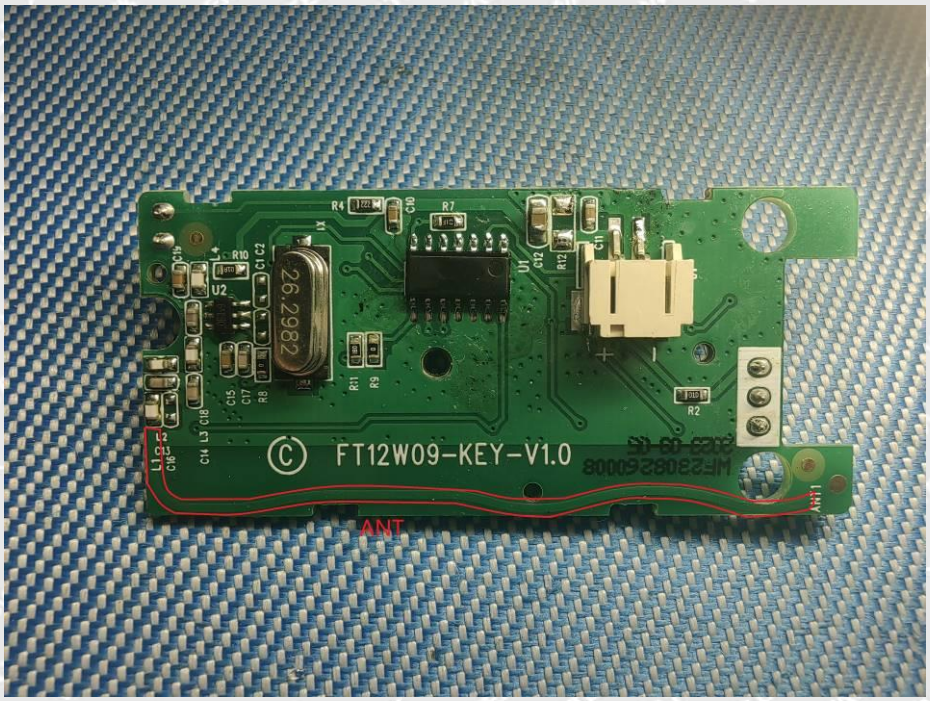


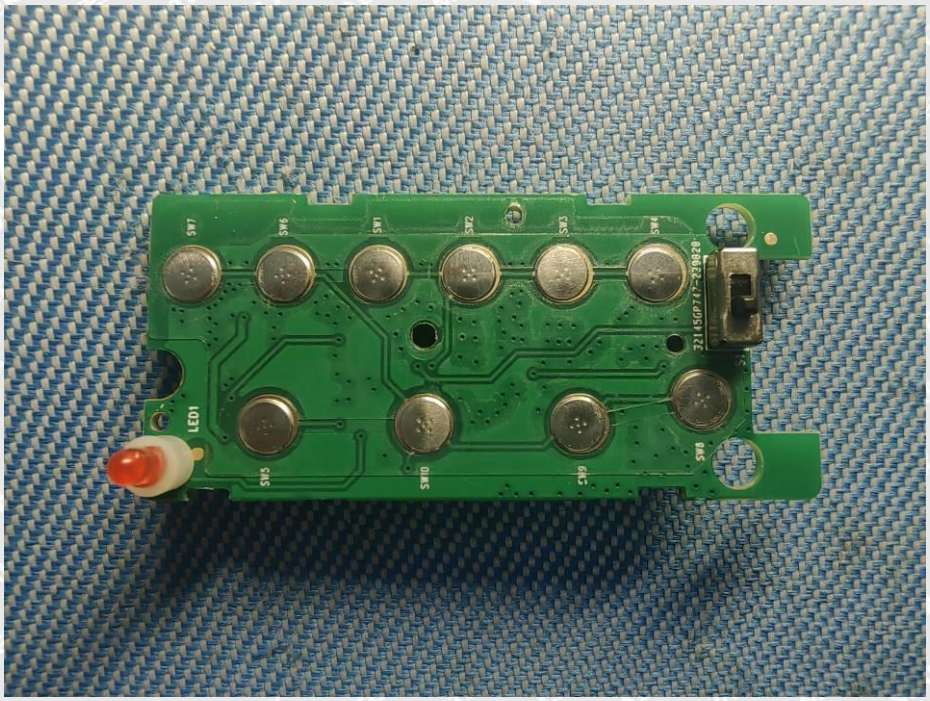

6
5
4
3
2
1

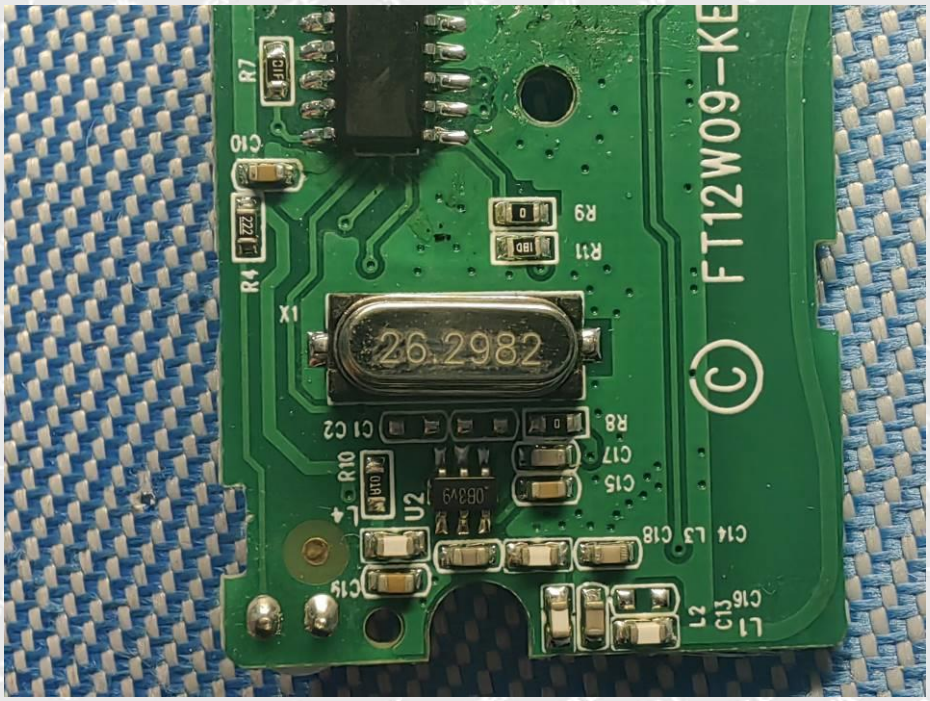

FT12W09-KEY-V1.0


FT12W09-POWER-V2.0
105°C
MTST5A 250V
AC OUTPUT


FT12W09-POWER-V2.0
32145g_y1581_241010
AC IN N
OUTPUT


FT12W09-KEY-V1.0
ANT





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