



TEST REPORT

Reference No...... : WTF22F05101700W
FCC ID : 2A8EZ-7771938
Applicant..... : Bestech Group Limited
Address..... : Room 803, Chevalier House, 45-51 Chatham Road South, Tsim Sha Tsui, Kowloon, Hong Kong
Manufacturer : Foshan Shunde Tec Electrical., Co., Ltd.
Address..... : No.4 Xinyou Road, Ronggui Shunde Foshan of Guangdong China 528303
Product Name..... : 12 VOLT WIRELESS REMOTE CONTROL
Model No..... : 7771938
Test specification..... : FCC CFR47 Part 15 Subpart C (Section 15.231):2020
Date of Receipt sample : 2022-05-23
Date of Test : 2022-06-01
Date of Issue..... : 2022-10-14
Test Report Form No. : WEW-15231A-01A
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.

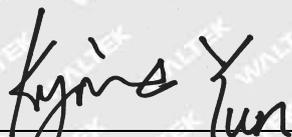
Prepared By:

Waltek Testing Group (Foshan) Co., Ltd.

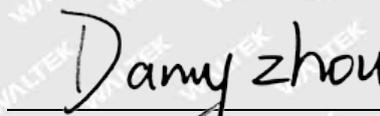
Address: No.13-19, 2/F., 2nd Building, Sunlink International Machinery City,
Chencun, Shunde District, Foshan, Guangdong, China

Tel:+86-757-23811398 Fax:+86-757-23811381 E-mail:info@waltek.com.cn

Tested by:


Kyrie Yun

Approved by:


Danny Zhou



1 Revision History

Test Report No.	Date of Issue	Description	Status
WTF22F05101700W	2022-10-14	Original	Valid

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3 General Information

3.1 General Description of E.U.T

Product Name : 12 VOLT WIRELESS REMOTE CONTROL
Model No. : 7771938
Model Description : ---
Rated Voltage..... : DC 12V
Battery Capacity : ---
Power Adapter : ---

3.2 Technical Characteristics of EUT

Operating Frequency : 315MHz
Max. Field Strength : 66.65dBuV/m (at 3m distance)
Modulation : ASK
Type of Antenna : Rod Antenna
Antenna Gain : 0.5dBi
Oscillator : 32.08MHz

3.3 Standards Applicable for Testing

FCC Rules Part 15.231: Periodic operation in the band 40.66-40.70MHz and above 70MHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.



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 and 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	315MHz

Test Conditions

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

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5 Equipment Used during Test

5.1 Equipment List

<input type="checkbox"/> Conducted Emissions 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal Date	Cal Due Date
1.	EMI Test Receiver	R&S	ESR3	102423	2022-01-06	2023-01-05
2.	LISN	R&S	ENV216	101343	2022-01-06	2023-01-05
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	223NN624	2022-01-06	2023-01-05
4.	Switch	CD	RSU-A4 18G	RSUA4008	2022-01-06	2023-01-05
<input type="checkbox"/> Conducted Emissions 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal Date	Cal Due Date
1.	EMI Test Receiver	R&S	ESCI	101178	2022-01-06	2023-01-05
2.	LISN	R&S	ENV216	101215	2022-01-06	2023-01-05
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	6102701	2022-01-06	2023-01-05
4.	Switch	ESE	RSU/M2	---	2022-01-07	2023-01-06
<input type="checkbox"/> Conducted Emissions 3#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal Date	Cal Due Date
1.	EMI Test Receiver	R&S	ESR3	102842	2022-01-06	2023-01-05
2.	LISN	R&S	ENV216	101542	2022-01-06	2023-01-05
3.	Cable	YIHENG	LMR195UF-NMNM-2.5	---	2022-01-07	2023-01-06
4.	Manual RF Switch	YIHENG	SW-2	RSU0402	2022-01-07	2023-01-06
<input checked="" type="checkbox"/> Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	3m Semi-anechoic Chamber	CHANGCHUANG	9m×6m×6m	-	2021-01-11	2024-01-10
2.	EMI Test Receiver	RS	ESR7	101566	2022-01-07	2023-01-06
3.	EMC Analyzer	Agilent	N9020A	MY48011796	2022-05-17	2023-05-16
4.	Active Loop Antenna	SCHWARZBECK	FMZB1519B	00004	2022-01-10	2023-01-09
5.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9162	9162-117	2022-01-09	2023-01-08
6.	Coaxial Cable (below 1GHz)	H+S	CBL3-NN-12+3 m	214NN320	2022-01-07	2023-01-06
7.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	2022-01-09	2023-01-08
8.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	01119	2022-01-09	2023-01-08
9.	Coaxial Cable (above 1GHz)	Times-Microwave	CBL5-NN	-	2022-01-06	2023-01-05
10.	Amplifier	Lunar E M	LNA1G18-40	20160501002	2022-01-06	2023-01-05



<input checked="" type="checkbox"/> RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	Spectrum Analyzer	Agilent	N9020A	MY48011796	2022-05-17	2023-05-16
2.	Analog Signal Generator	Agilent	N5181A	MY48180720	2022-01-06	2023-01-05
3.	RF Control Unit	CHANGCHUANG	JS0806-2	-	2022-01-06	2023-01-05

: 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-EMC	CON-03A1
EMI Test Software (Conducted Emission 3#)	FARATRONIC	EZ-EMC	COM 3A1.1
EMI Test Software (Radiated Emission)	FARATRONIC	EZ-EMC	RA-03A1-1
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 Spurious Emission	±2.7dB
Conducted Emission	±2.6dB
Transmitter Spurious Emission	±3.8dB (for 25MHz-1GHz)
	±5.0dB (for 1GHz-18GHz)



6 Summary of Test Result

Test Items	FCC Rules	Result
Antenna Requirement	§15.203	Compliant
Restricted Band of Operation	§15.205	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
Conducted Emissions	§15.207(a)	N/A

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

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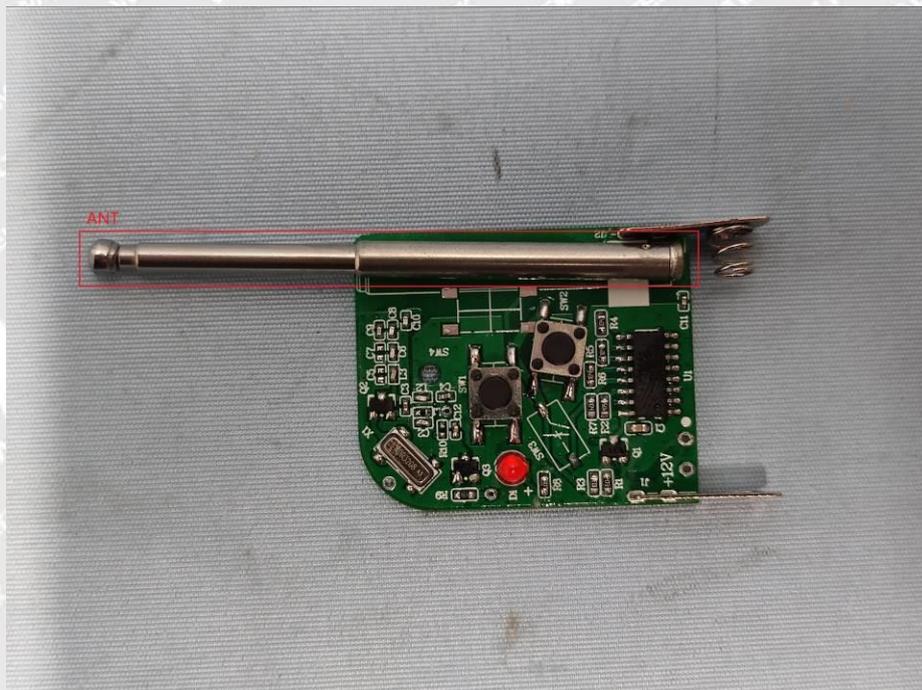
6.1 Antenna Requirement

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 Rod Antenna, the gain is 0.5dBi, 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.

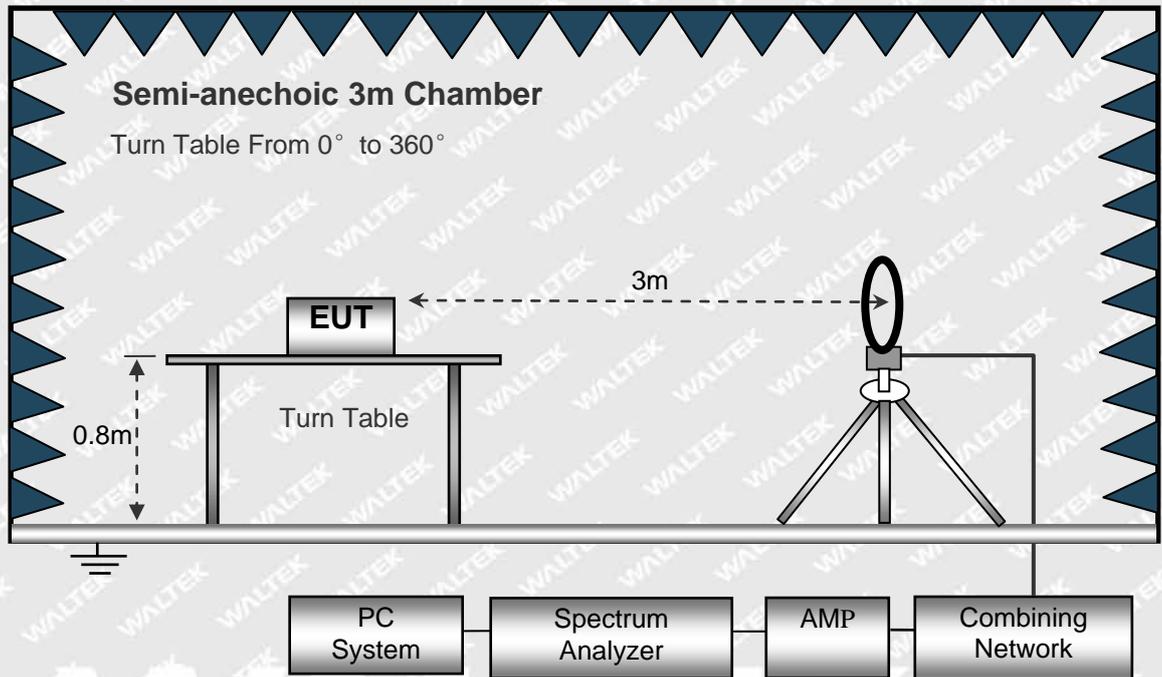
Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.



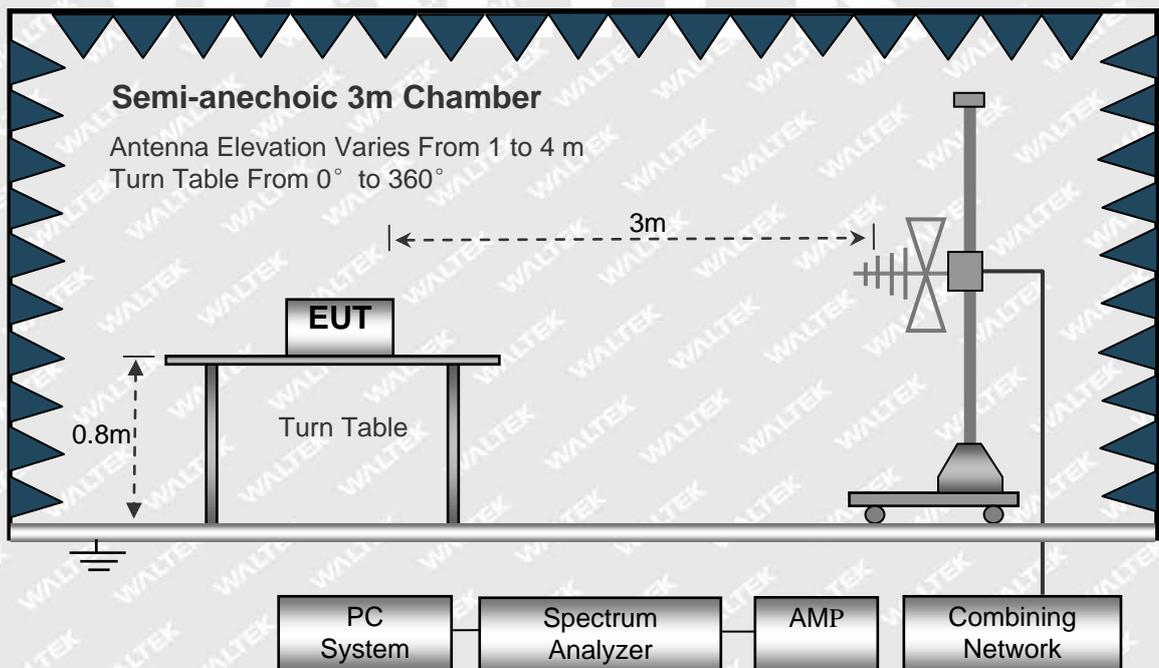
6.2.2 Test Procedure

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.

The test setup for emission measurement below 30MHz.

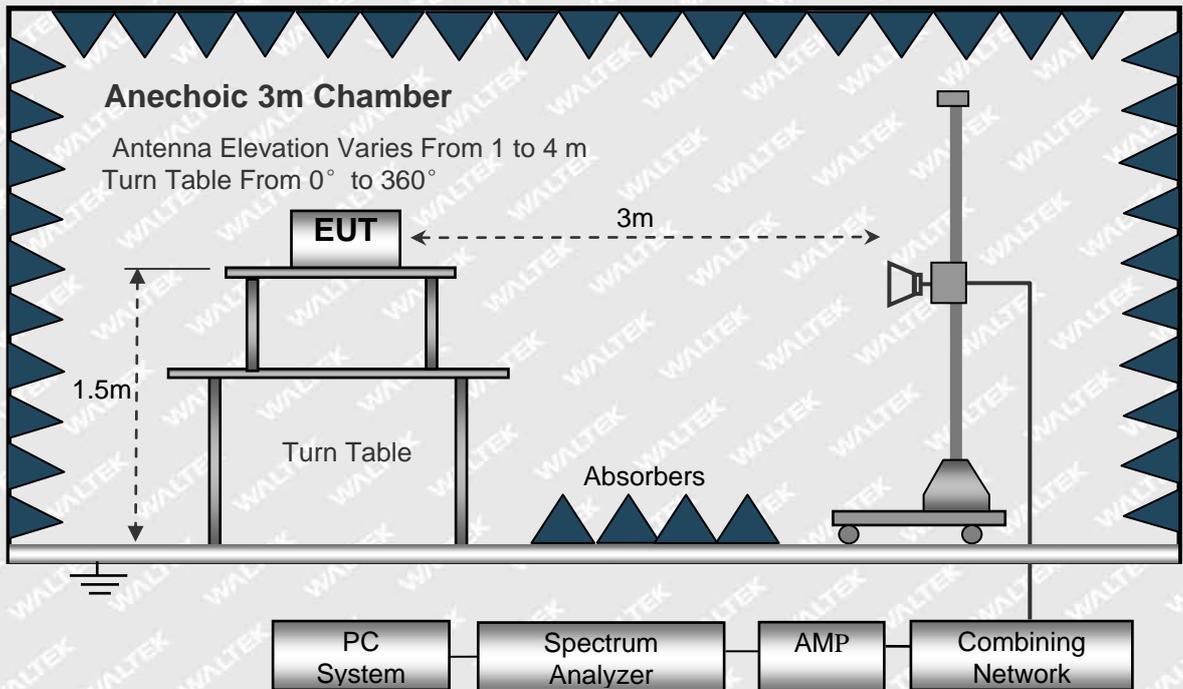


The test setup for emission measurement from 30 MHz to 1 GHz.





The test setup for emission measurement above 1 GHz.



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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Loss} + \text{Cab. Loss} - \text{Ampl. Gain}$$

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:

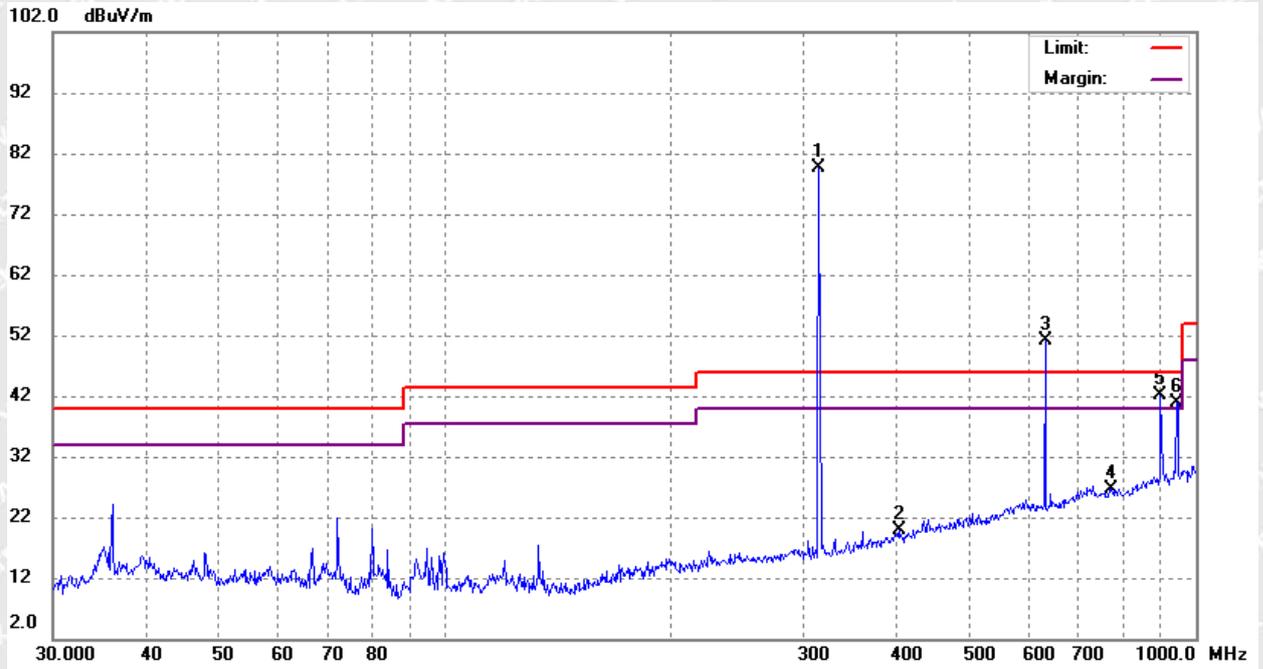
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15C Limit}$$



6.2.4 Test Results

Test Channel 315MHz

Polarization Vertical



Frequency (MHz)	Reading (dBuV/m)	Corrected Factor (dB)	Duty Cycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
315.0384	63.12	16.53	/	79.65	95.62	-15.97	Peak
/	/	/	-13	66.65	75.62	-8.97	AVG
945.1083	13.30	27.54	/	40.84	75.62	-34.78	Peak
/	/	/	-13	27.84	55.62	-27.78	AVG

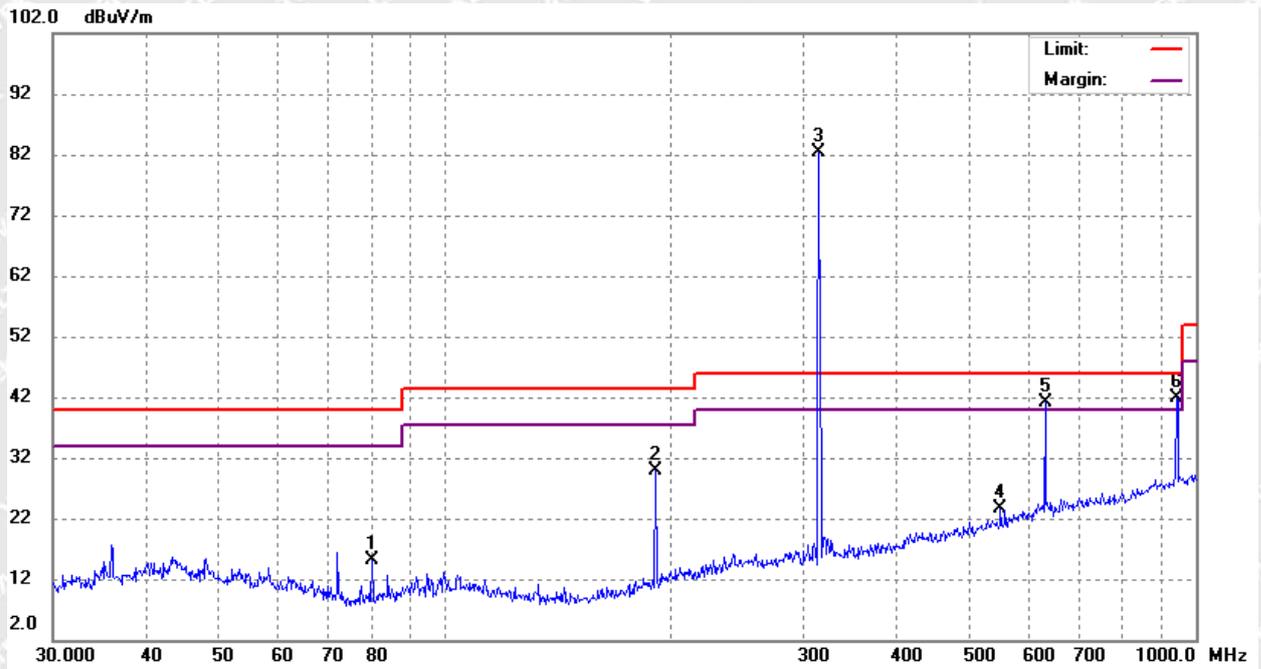
Above 1GHz

Frequency (MHz)	Reading (dBuV/m)	Corrected Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1599.250	49.53	-13.15	36.38	74.00	-37.62	Peak
7204.000	42.25	3.06	48.31	74.00	-25.69	Peak
11069.750	42.51	10.33	52.84	74.00	-21.16	Peak
11880.500	43.21	10.40	53.61	74.00	-20.39	Peak



Test Channel 315MHz

Polarization Horizontal



Frequency (MHz)	Reading (dB μ V/m)	Corrected Factor (dB)	Duty Cycle Factor (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Remark
315.0384	65.97	16.33	/	82.30	95.62	-13.32	Peak
/	/	/	-13	69.30	75.62	-6.32	AVG
945.1083	14.74	27.14	/	41.88	75.62	-33.74	Peak
/	/	/	-13	28.88	55.62	-26.74	AVG

Above 1GHz

Frequency (MHz)	Reading (dB μ V/m)	Corrected Factor (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Remark
1517.000	50.43	-13.39	37.04	74.00	-36.96	Peak
7239.250	45.43	3.10	48.53	74.00	-25.47	Peak
10999.250	42.91	10.28	53.19	74.00	-20.81	Peak
12280.000	43.16	10.20	53.36	74.00	-20.64	Peak

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.



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.

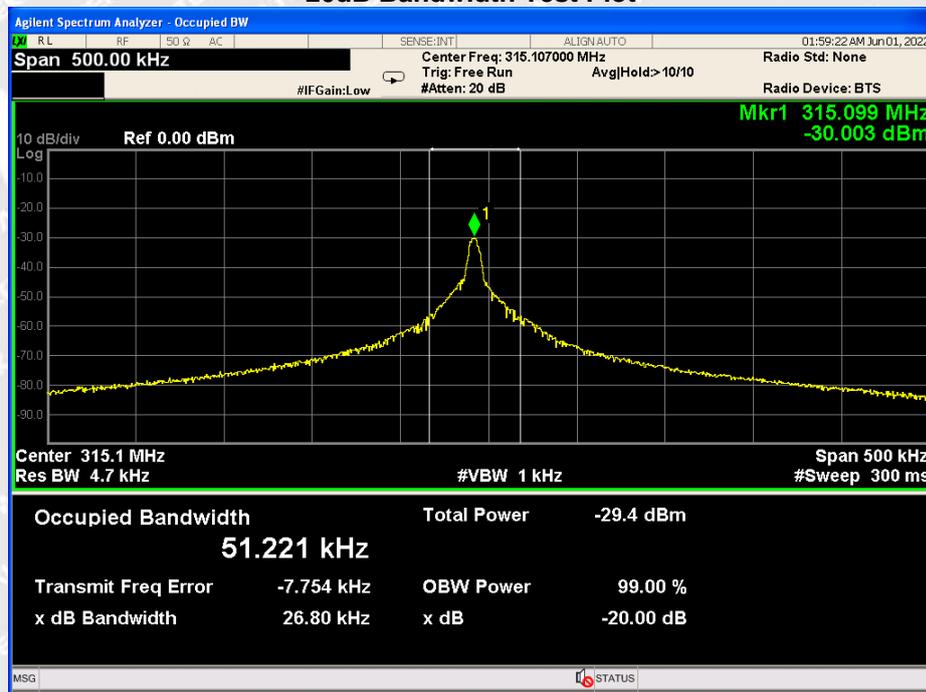
6.3.3 Test Result

Test Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
315	51.221	787.50	Pass

Limit = Fundamental Frequency x 0.25% = 315.00 MHz x 0.25% = 787.50 kHz

Test Plots:

20dB Bandwidth Test Plot





6.4 Transmission Time

6.4.1 Standard Applicable

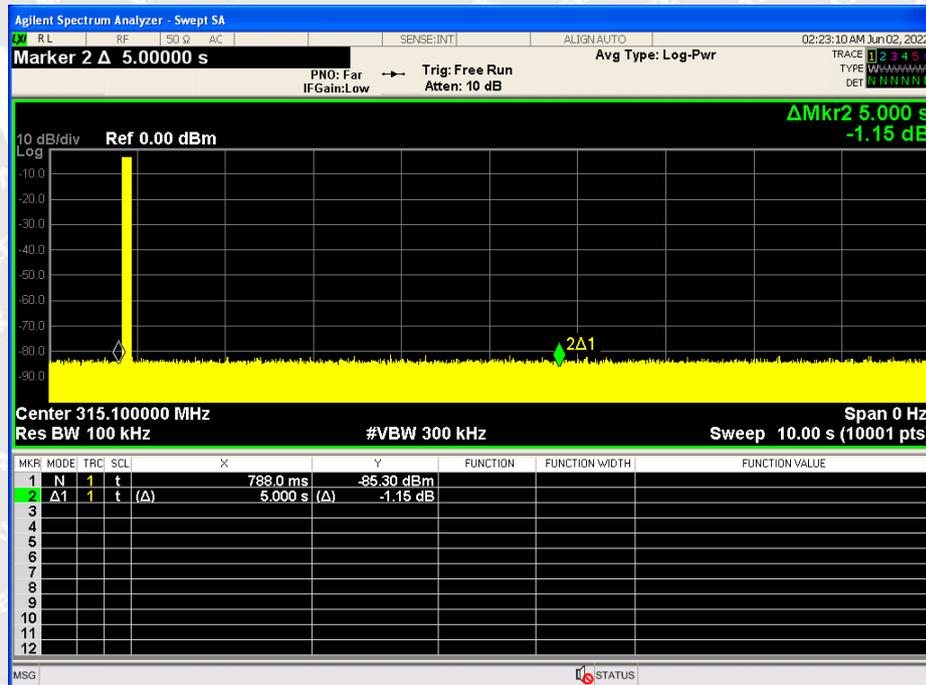
According to FCC Part 15.231 (a), the transmitter shall be complied the following requirements:

- 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 315MHz, 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 315MHz, 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

Type of Pulse	Width of Pulse (ms)	Quantity of Pulse	Transmission Time (ms)	Total Time (T _{on}) (ms)
Pulse 1 (Wide)	0.398	10	3.98	5.06
Pulse 2 (Narrow)	0.072	15	1.08	

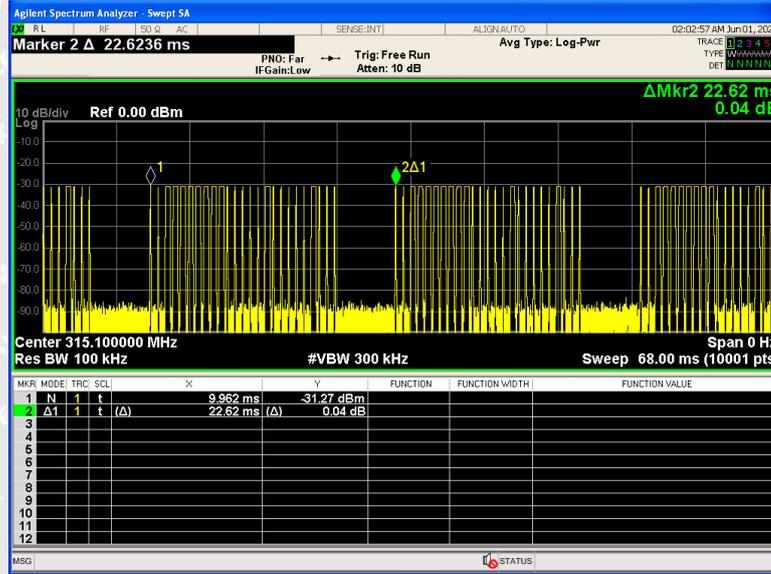
Test Period (T _p) (ms)	Total Time (T _{on}) (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
5.06	22.62	22.37	-13

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

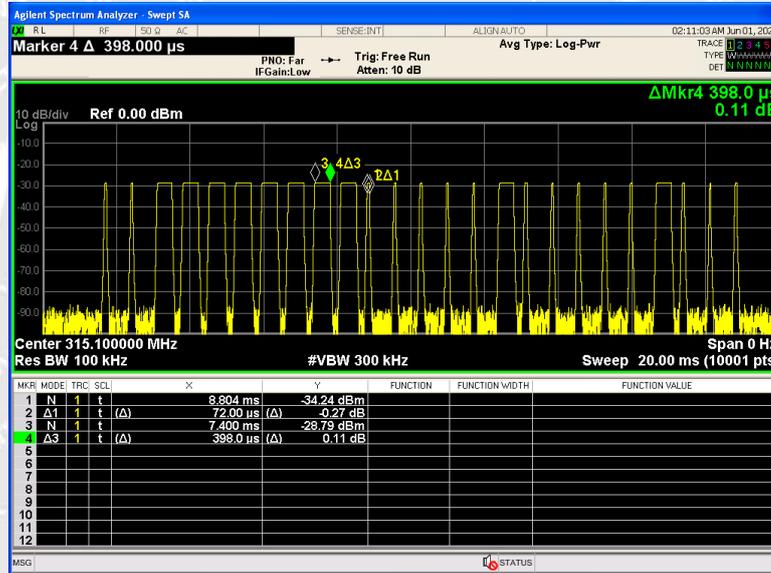


Test Plots:

Test Period



Pulse Number





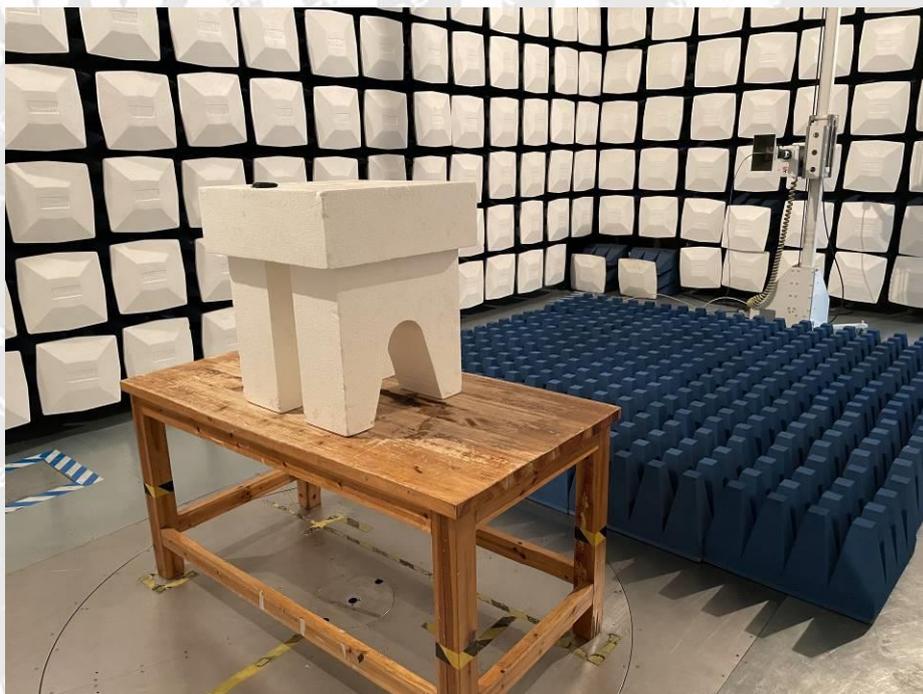
7 Photographs Test Setup

7.1 Photographs - Radiated Emission Test Setup

30MHz-1GHz



Above 1GHz





8 Photographs - Constructional Details

8.1 EUT - External Photos

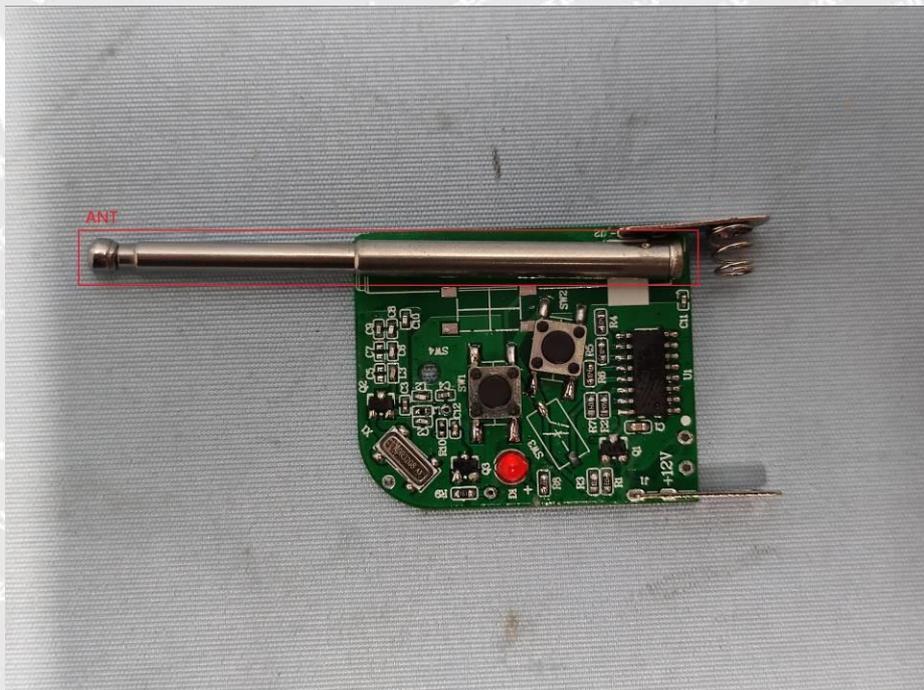


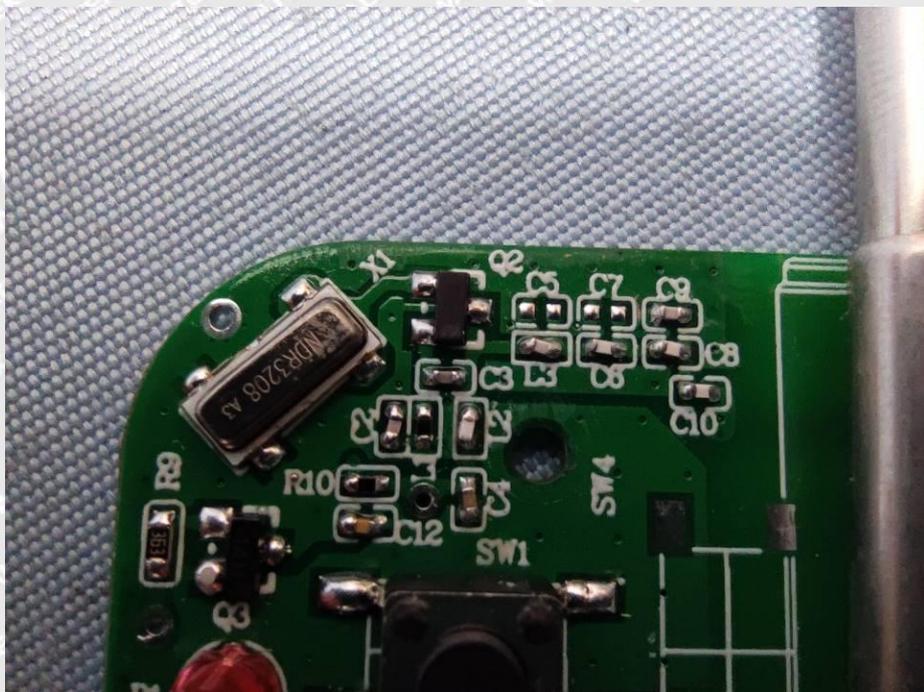
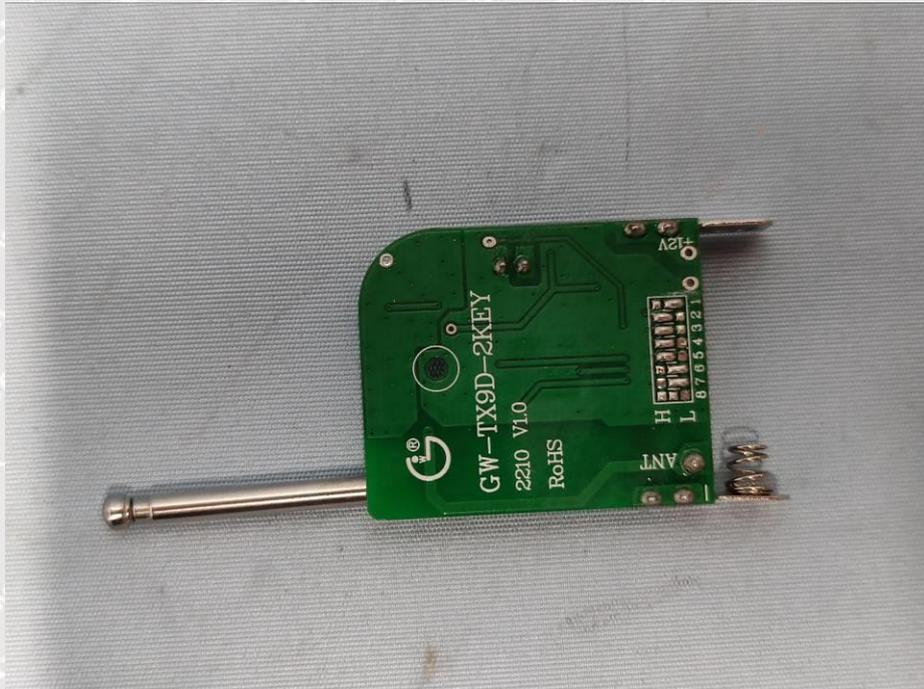






8.2 EUT - Internal Photos





====End of Report====