TEST REPORT

Reference No.	:	WTF23F08180217W
FCC ID	:	2ATB5-T301G
Applicant.....	:	Tarzan Technology Co.,Ltd
Address.....	:	2F,Build 4,No 111 Jintong Rd,Tangxia Town,Pengjiang District,Jiangmen Guangdong ,China
Manufacturer	:	The same as above
Address.....	:	The same as above
Product Name.....	:	Remote Control Transmitter
Model No.	:	T301F, T301G
Test specification.....	:	FCC CFR47 Part 15 Subpart C (Section 15.231):2021
Date of Receipt sample	:	2023-08-18
Date of Test	:	2023-08-23 to 2023-09-12
Date of Issue.....	:	2023-10-20
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:

Roy Hong

Approved by:

Tarry Zhou

1 Revision History

Test Report No.	Date of Issue	Description	Status
WTF23F08180217W	2023-10-20	Original	Valid

2 Contents

Page

1 REVISION HISTORY 2
2 CONTENTS 3
3 GENERAL INFORMATION 4
3.1 GENERAL DESCRIPTION OF E.U.T 4
3.2 TECHNICAL CHARACTERISTICS OF EUT 4
3.3 STANDARDS APPLICABLE FOR TESTING 4
3.4 TEST FACILITY 5
3.5 SUBCONTRACTED 5
3.6 ABNORMALITIES FROM STANDARD CONDITIONS 5
3.7 DISCLAIMER 5
4 EUT SETUP AND TEST MODE 6
5 EQUIPMENT USED DURING TEST 7
5.1 EQUIPMENT LIST 7
5.2 TEST SOFTWARE 8
5.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT 8
5.4 MEASUREMENT UNCERTAINTY 8
6 SUMMARY OF TEST RESULT 9
6.1 ANTENNA REQUIREMENT 10
6.2 RADIATED SPURIOUS EMISSIONS 11
6.3 20DB BANDWIDTH 15
6.4 TRANSMISSION TIME 16
6.5 DUTY CYCLE 17
7 PHOTOGRAPHS TEST SETUP 19
7.1 PHOTOGRAPHS - RADIATED EMISSION TEST SETUP 19
8 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS 20
8.1 EUT - EXTERNAL PHOTOS 20
8.2 EUT - INTERNAL PHOTOS 26

3 General Information

3.1 General Description of E.U.T

Product Name ..... : Remote Control Transmitter

Model No. ..... : T301F, T301G

Model Description ..... : The two models have the same electric circuit except for the appearance, the T301F has no mechanical buttons, and the T301G has two mechanical buttons.Therefore the full tests were performed on model T301G.

Rated Voltage..... : Battery 3V (2*1.5V AAA)

Battery Capacity ..... : ---

Power Adapter ..... : ---

3.2 Technical Characteristics of EUT

Operating Frequency ..... : 303.875MHz

Max. Field Strength ..... : 76.93dBuV/m (at 3m distance)

Modulation ..... : ASK

Type of Antenna ..... : PCB Antenna

Antenna Gain ..... : 0dBi

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 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	303.875MHz

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	2023-01-05	2024-01-04
2.	LISN	R&S	ENV216	101343	2023-01-05	2024-01-04
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	223NN624	2023-01-05	2024-01-04
4.	Switch	CD	RSU-A4 18G	RSUA4008	2023-01-05	2024-01-04

☐Conducted Emissions 2#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal Date**	**Cal Due Date**
1.	EMI Test Receiver	R&S	ESCI	101178	2023-01-05	2024-01-04
2.	LISN	R&S	ENV216	101215	2023-01-05	2024-01-04
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	6102701	2023-01-05	2024-01-04
4.	Switch	ESE	RSU/M2	---	2023-01-05	2024-01-04

☐Conducted Emissions 3#						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Cal Date**	**Cal Due Date**
1.	EMI Test Receiver	R&S	ESR3	102842	2023-01-05	2024-01-04
2.	LISN	R&S	ENV216	101542	2023-01-05	2024-01-04
3.	Cable	YIHENG	LMR195UF-NMNM-2.5	---	2023-01-05	2024-01-04
4.	Manual RF Switch	YIHENG	SW-2	RSU0402	2023-01-05	2024-01-04

☒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	2023-01-05	2024-01-04
3.	EMC Analyzer	Agilent	N9020A	MY48011796	2023-05-15	2024-05-14
4.	Active Loop Antenna	SCHWARZBECK	FMZB1519B	00004	2023-01-05	2024-01-04
5.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9162	9162-117	2023-03-10	2024-03-09
6.	Coaxial Cable (below 1GHz)	H+S	CBL3-NN-12+3 m	214NN320	2023-01-06	2024-01-05
7.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	2023-01-06	2024-01-05
8.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	01119	2023-01-06	2024-01-05
9.	Coaxial Cable (above 1GHz)	Times-Micorwave	CBL5-NN	-	2023-01-05	2024-01-04
10.	Amplifier	Lunar E M	LNA1G18-40	20160501002	2023-01-05	2024-01-04

☒RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	Spectrum Analyzer	Agilent	N9020A	MY48011796	2023-05-15	2024-05-14
2.	Analog Signal Generator	Agilent	N5181A	MY48180720	2023-01-05	2024-01-04
3.	RF Control Unit	CHANGCHUANG	JS0806-2	-	2023-01-06	2024-01-05

☐: ***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 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

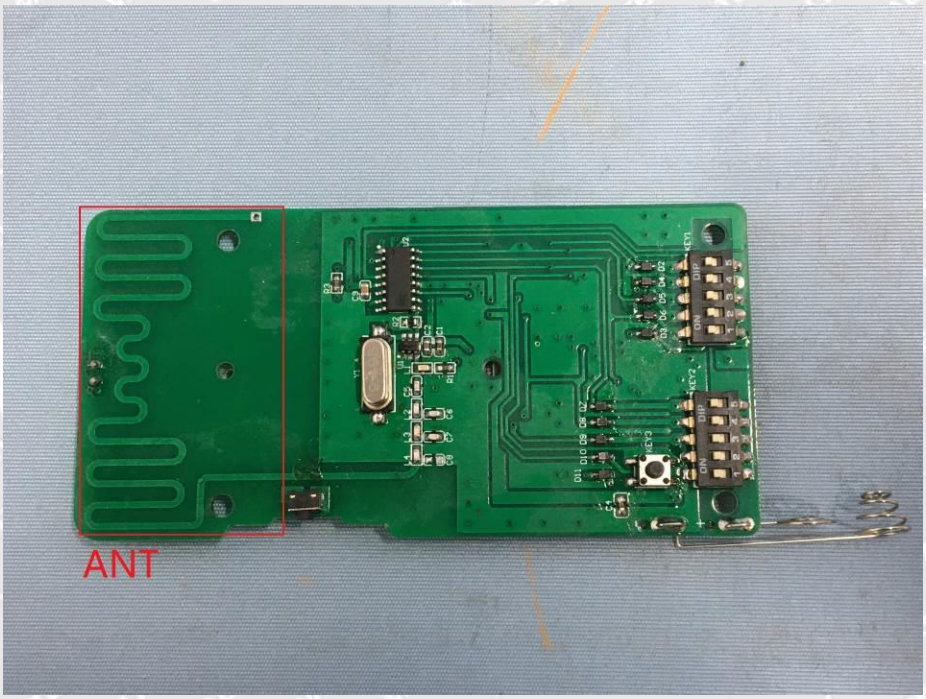
6.1 Antenna Requirement

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.

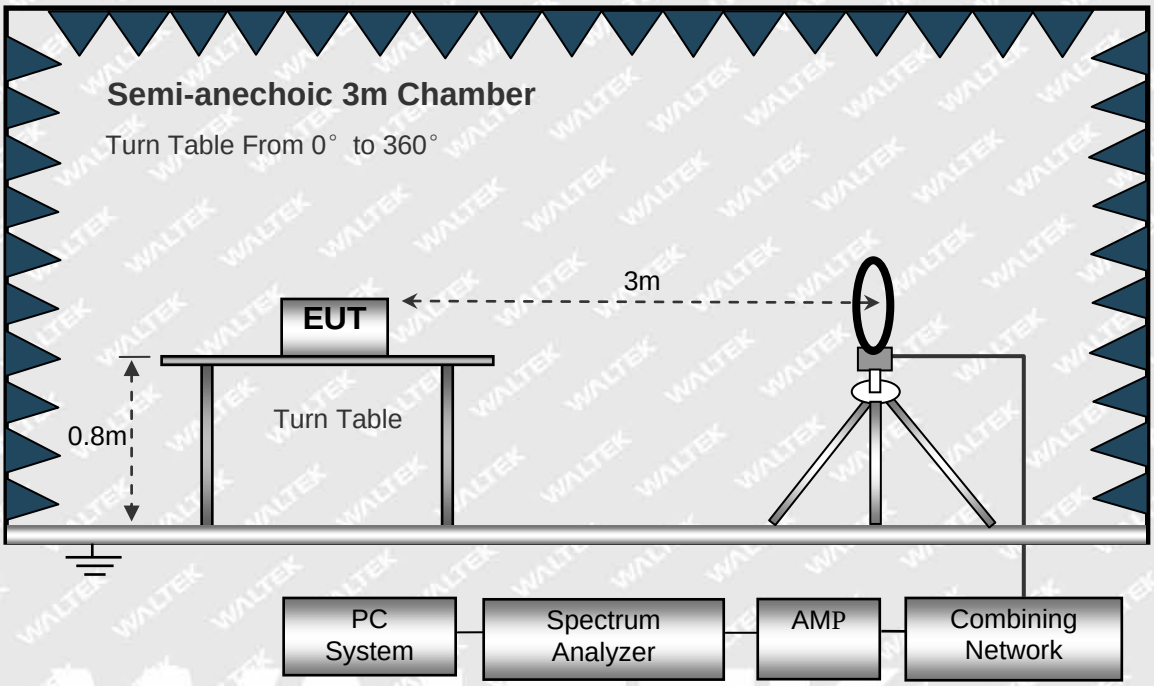
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

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

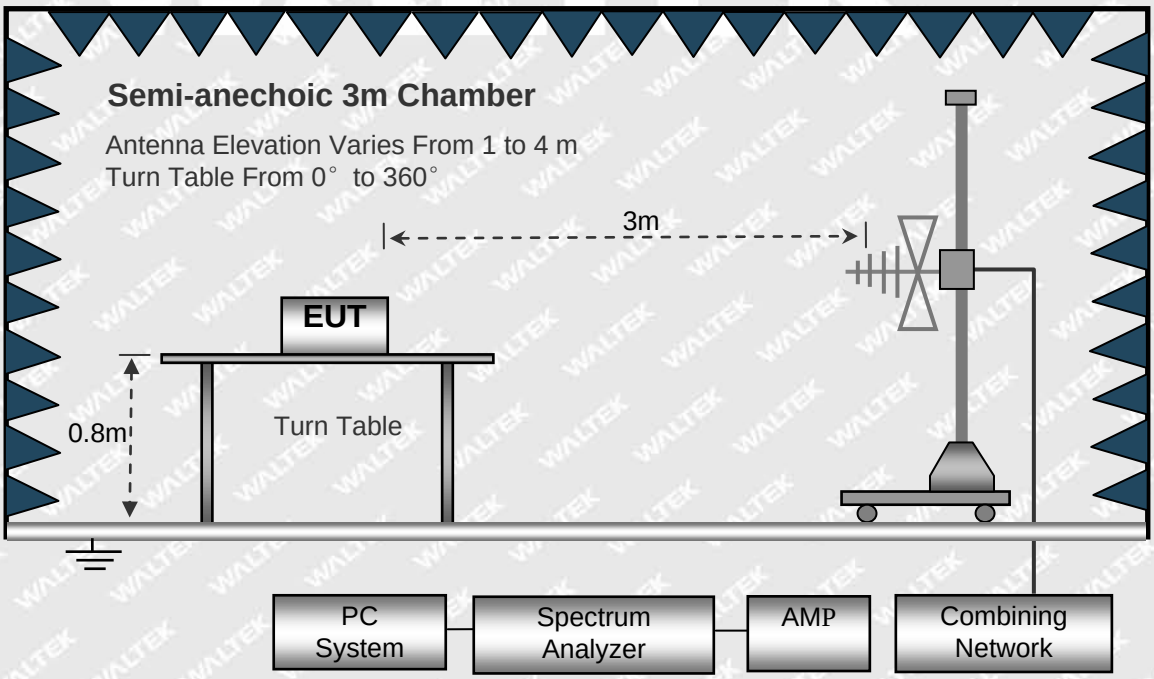
6.2.2 Test Procedure

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.

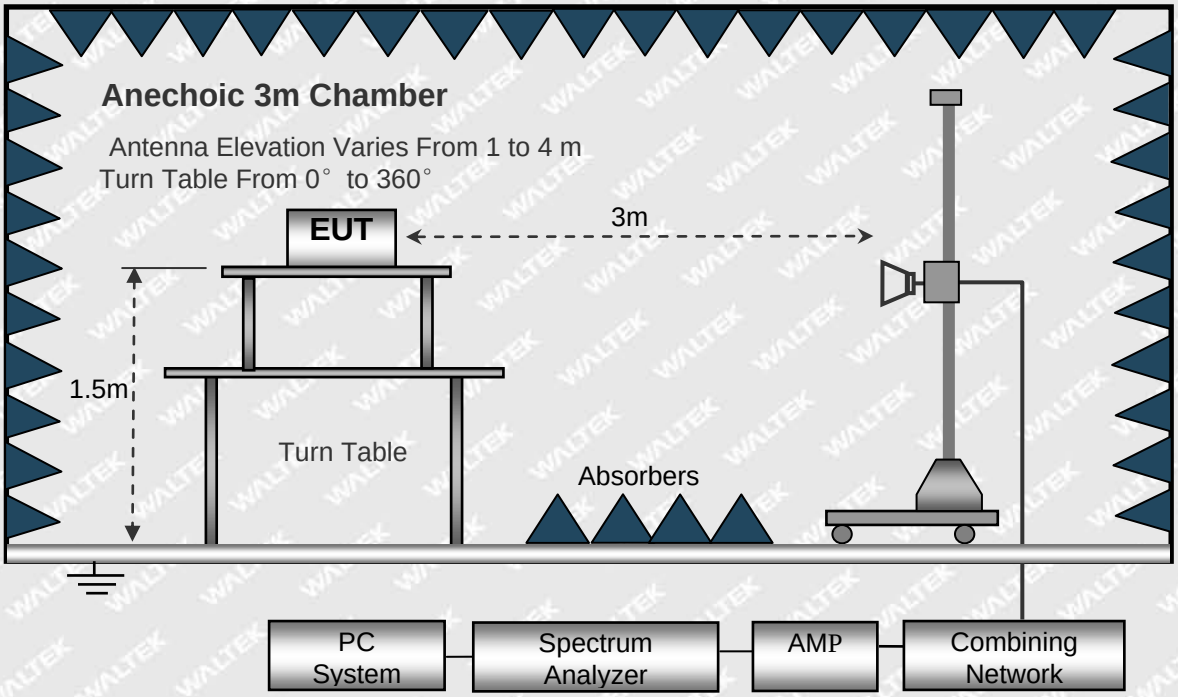
The test setup for emission measurement below 30MHz.



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:

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

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)
303.86	61.17	174	1.3	H	15.76	76.93	94.93	-18
303.86	53.73	107	1.2	V	16.56	70.29	94.93	-24.64
911.90	5.03	296	1.1	H	26.55	31.58	74.93	-43.35
911.90	9.16	190	1.0	V	27.73	36.89	74.93	-38.04
1519.50	31.41	274	1.3	H	29.87	61.28	74	-12.72
1519.50	22.10	318	1.4	V	28.71	50.81	74	-23.19
2430.50	28.58	218	1.6	H	32.48	61.06	74	-12.94
2430.50	20.92	314	1.2	V	32.43	53.35	74	-20.65

AV = Peak +20Log$_{10}$(duty cycle) =PK+(-8.12) [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)
303.86	76.93	H	-8.12	68.81	74.93	-6.12
303.86	70.29	V	-8.12	62.17	74.93	-12.76
911.90	31.58	H	-8.12	23.46	54.93	-31.47
911.90	36.89	V	-8.12	28.77	54.93	-26.16
1519.50	61.28	H	-8.12	53.16	54	-0.84
1519.50	50.81	V	-8.12	42.69	54	-11.31
2430.50	61.06	H	-8.12	52.94	54	-1.06
2430.50	53.35	V	-8.12	45.23	54	-8.77

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.

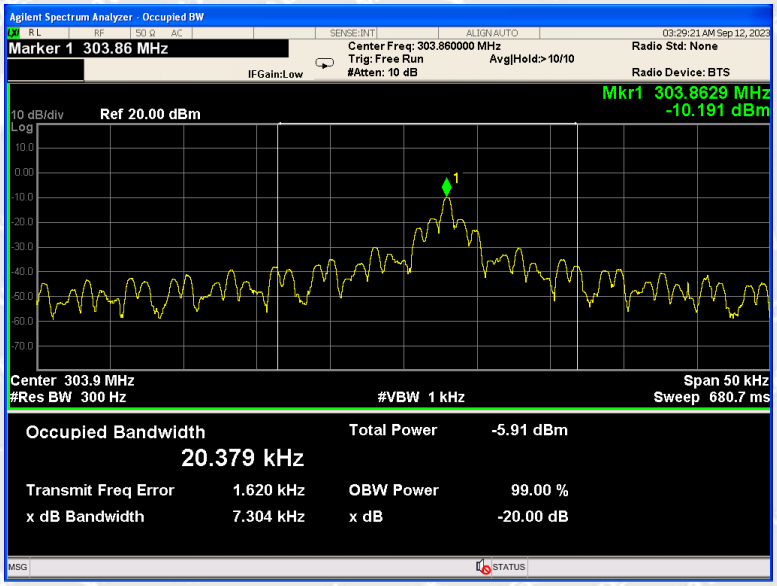
6.3.3 Test Result

Test Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
303.875	7.304	759.69	Pass

Limit = Fundamental Frequency x 0.25% = 303.875 MHz x 0.25% =759.69 kHz

Test Plots:

20dB Bandwidth Test Plot



6.4 Transmission Time

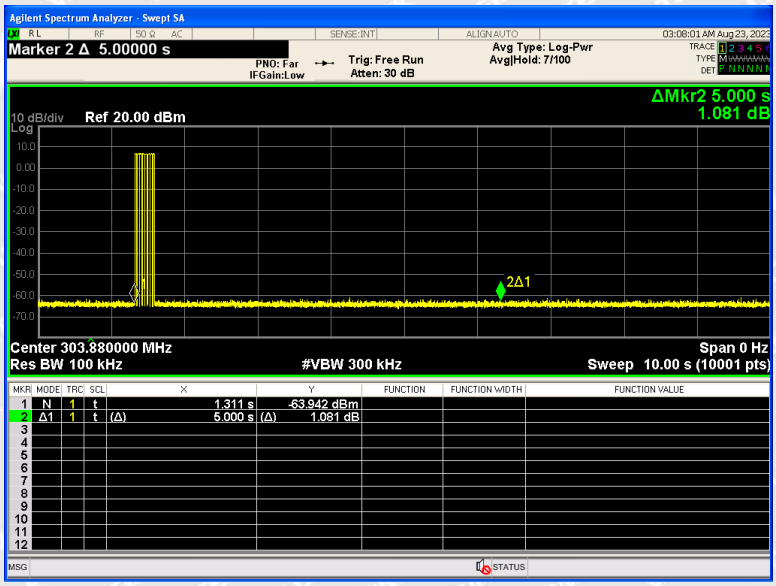
6.4.1 Standard Applicable

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 303.875MHz, 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 303.875MHz, 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

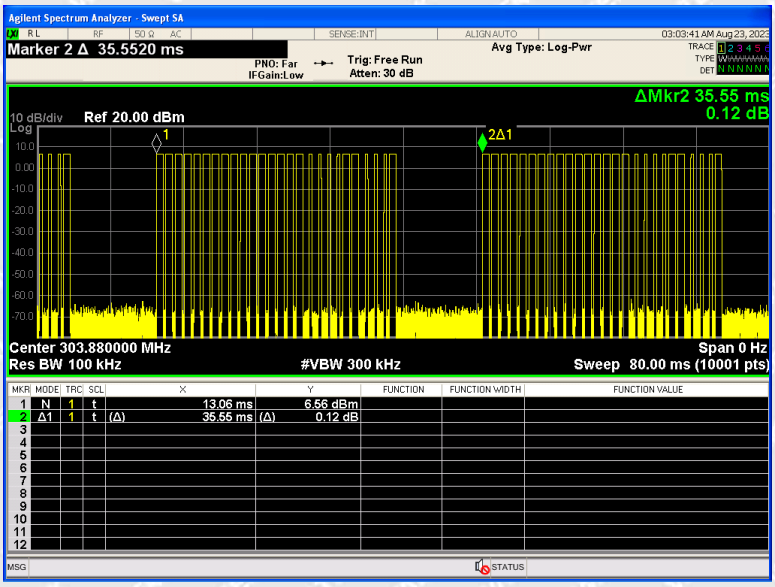
Type of Pulse	Width of Pulse (ms)	Quantity of Pulse	Transmission Time (ms)	Total Time (T_{on}) (ms)
Pulse 1 (Wide)	0.681	17	11.577	13.953
Pulse 2 (Narrow)	0.297	8	2.376	

Test Period (T_p) (ms)	Total Time (T_{on}) (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
13.953	35.55	39.25	-8.12

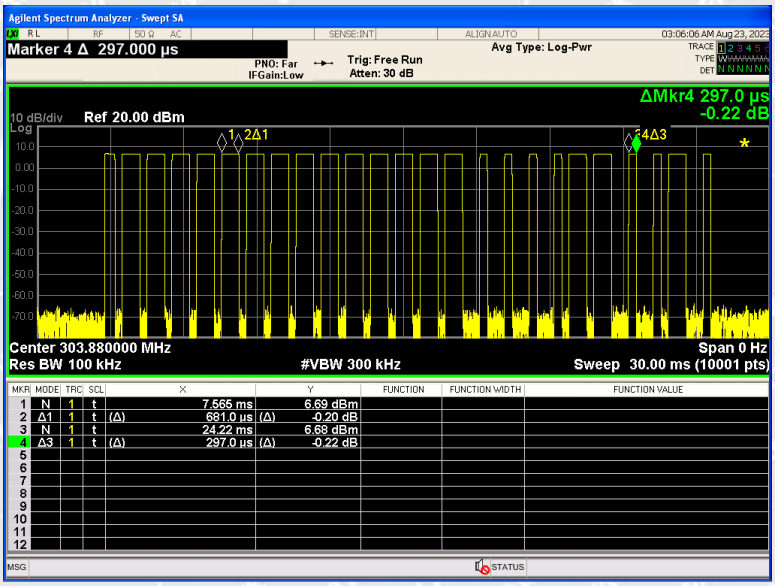
Remark: Duty Cycle Factor=20*log(Duty Cycle)

Test Plots:

Test Period



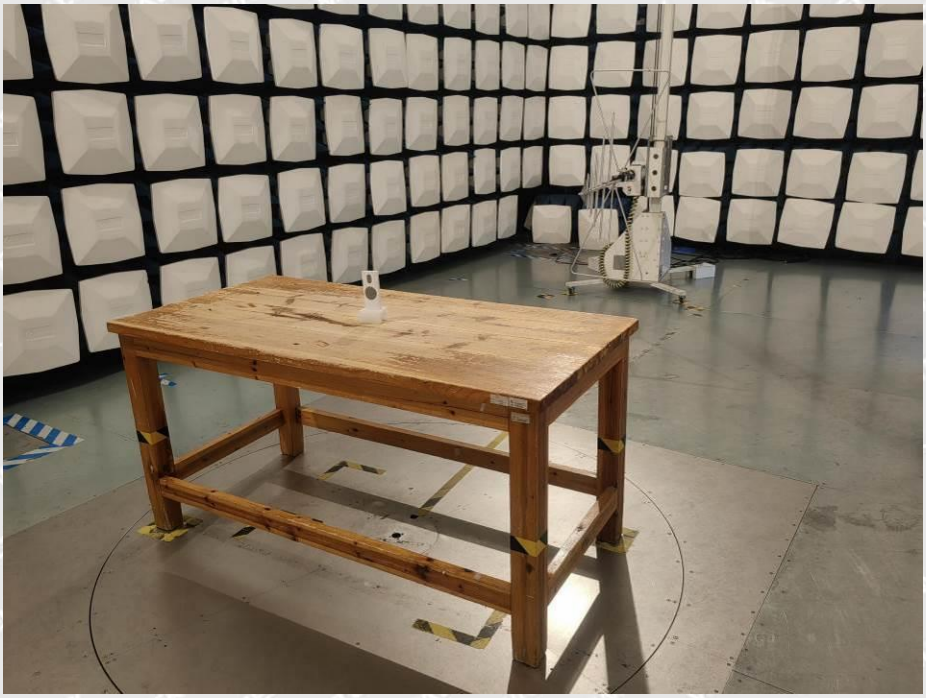
Pulse Number



7 Photographs Test Setup

7.1 Photographs - Radiated Emission Test Setup

30MHz-1GHz

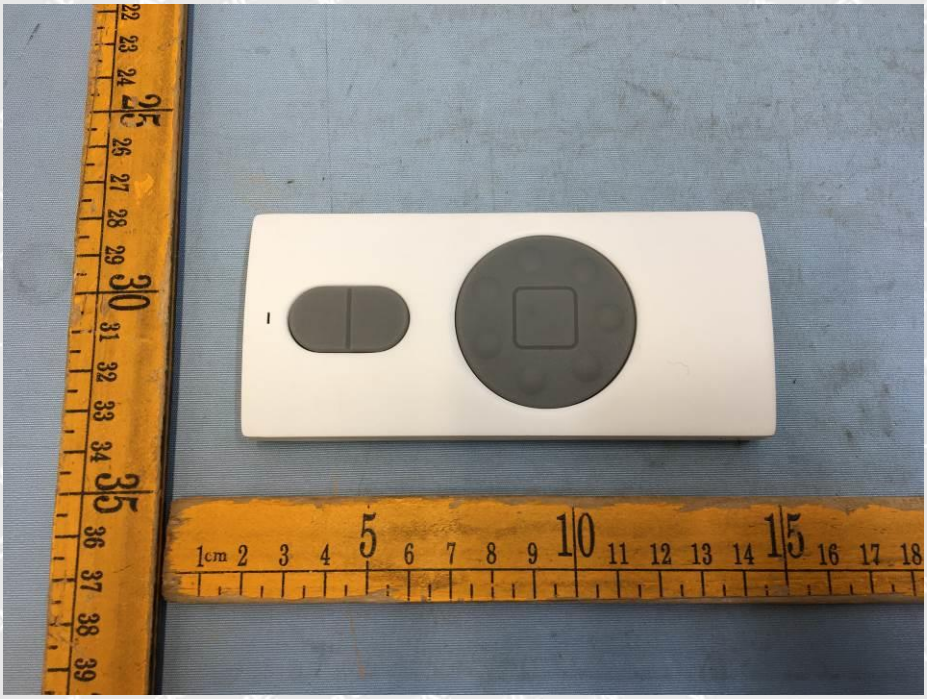


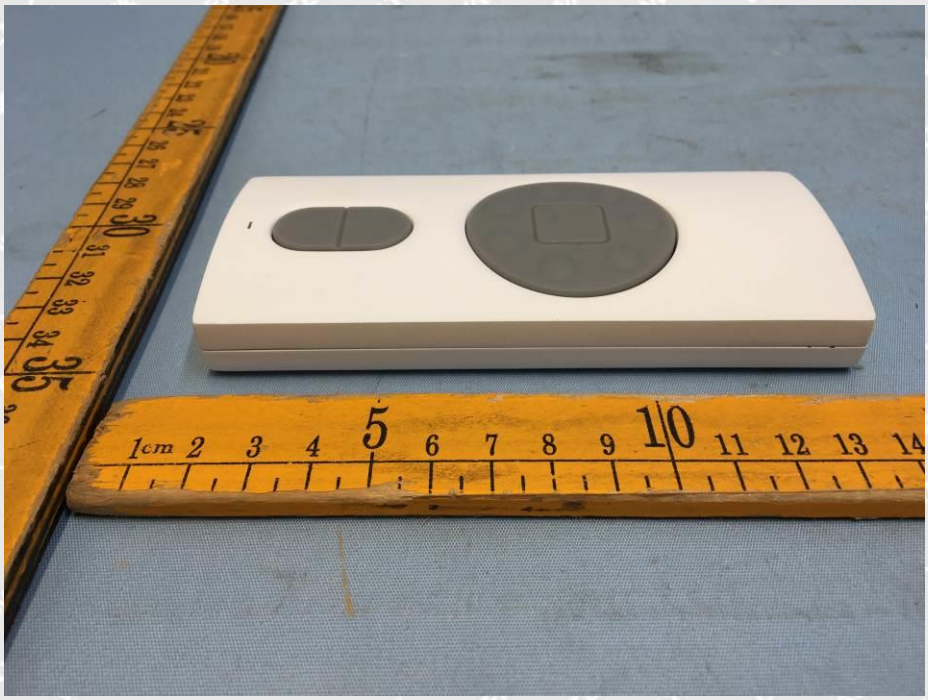
Above 1GHz

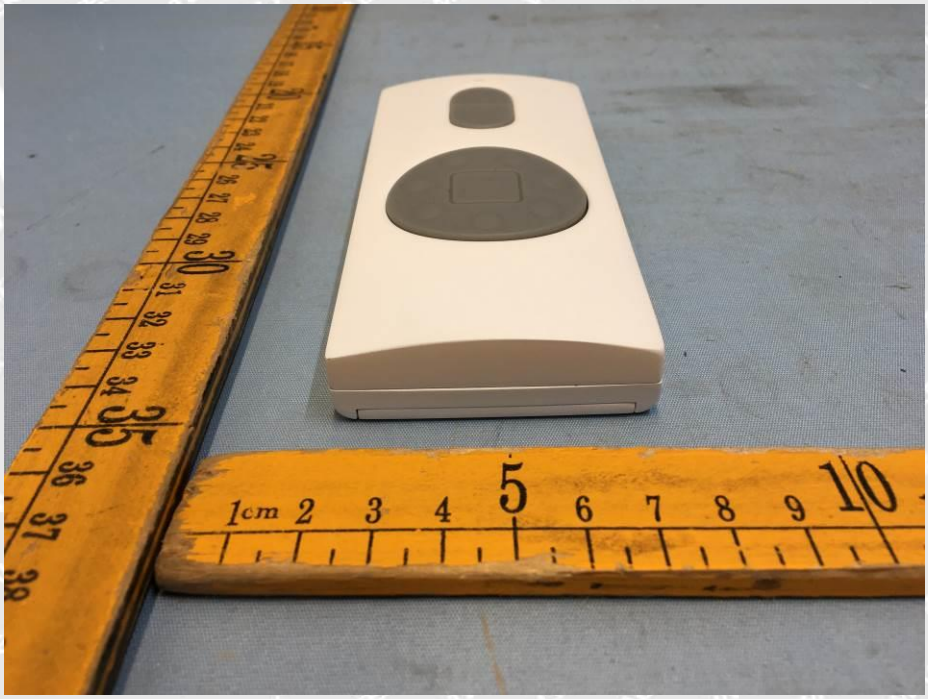
8 Photographs - Constructional Details

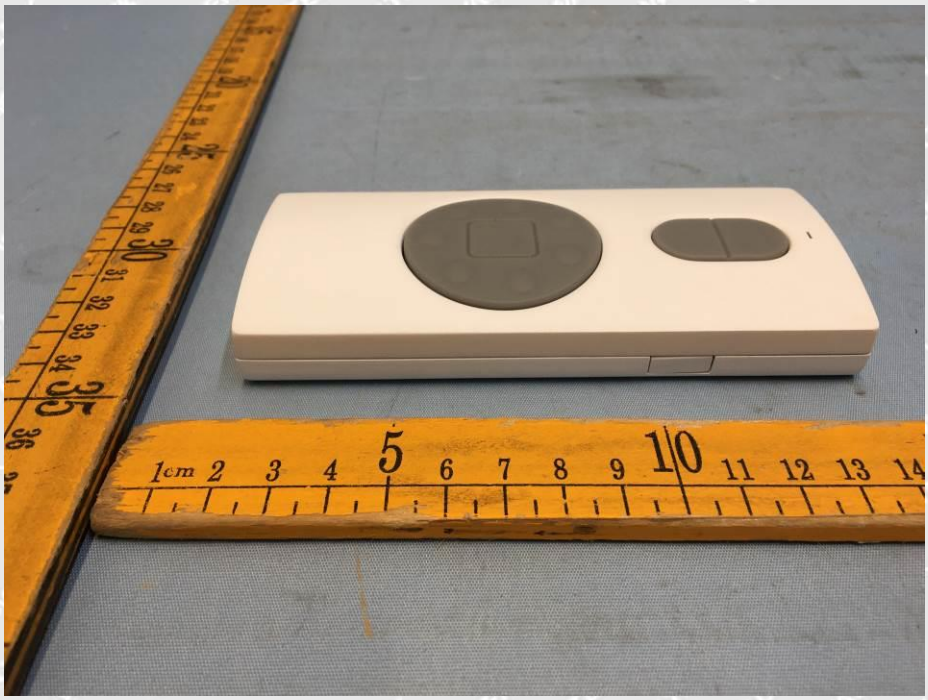
8.1 EUT - External Photos

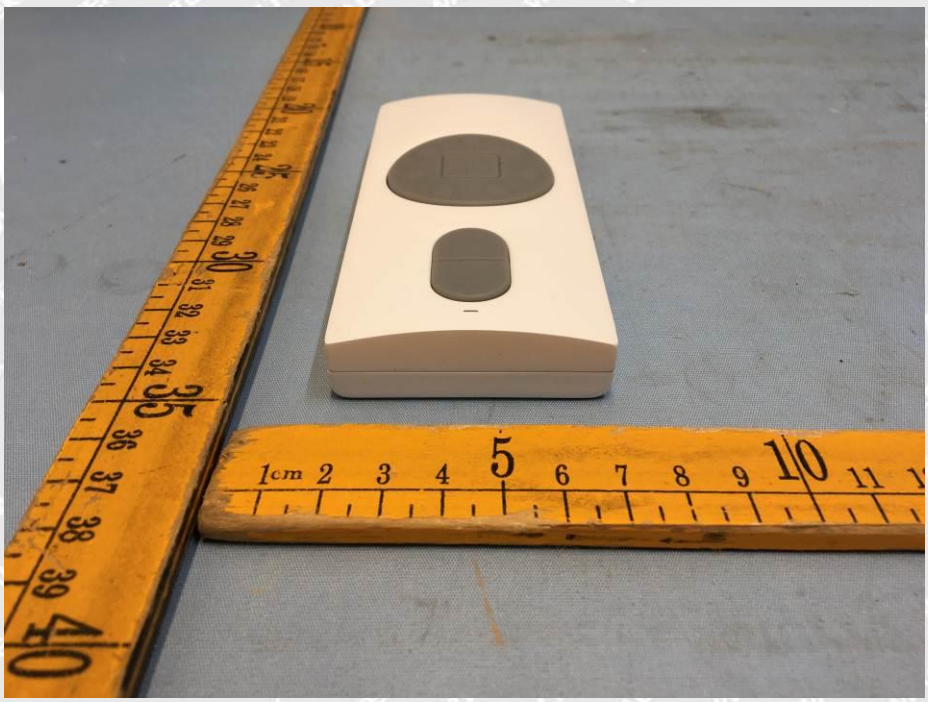
Model T301G




1cm 2 3 4 5 6 7 8 9 10 11 12 13 14


1cm 2 3 4 5 6 7 8 9 10

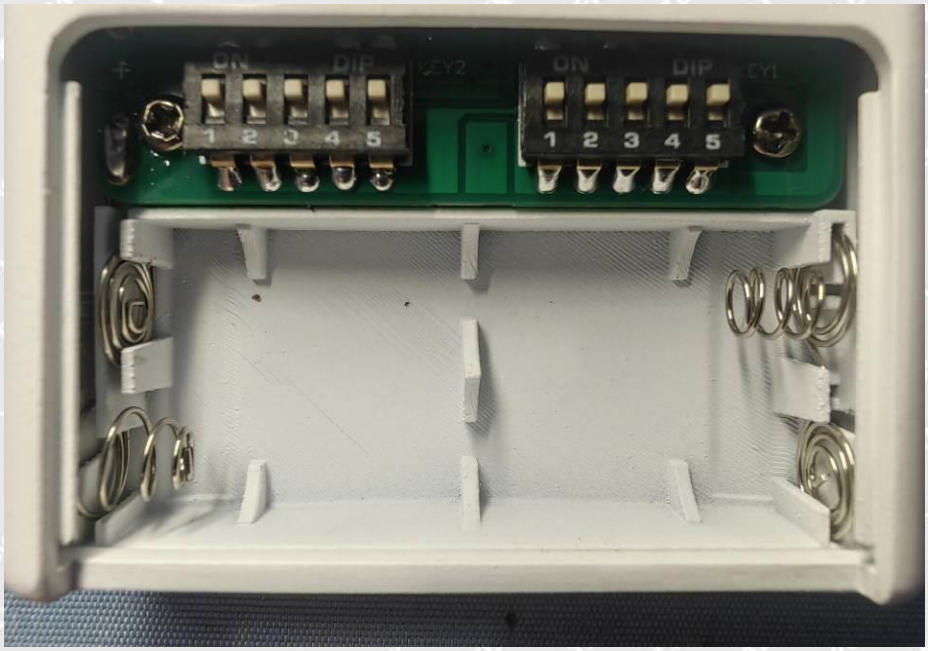


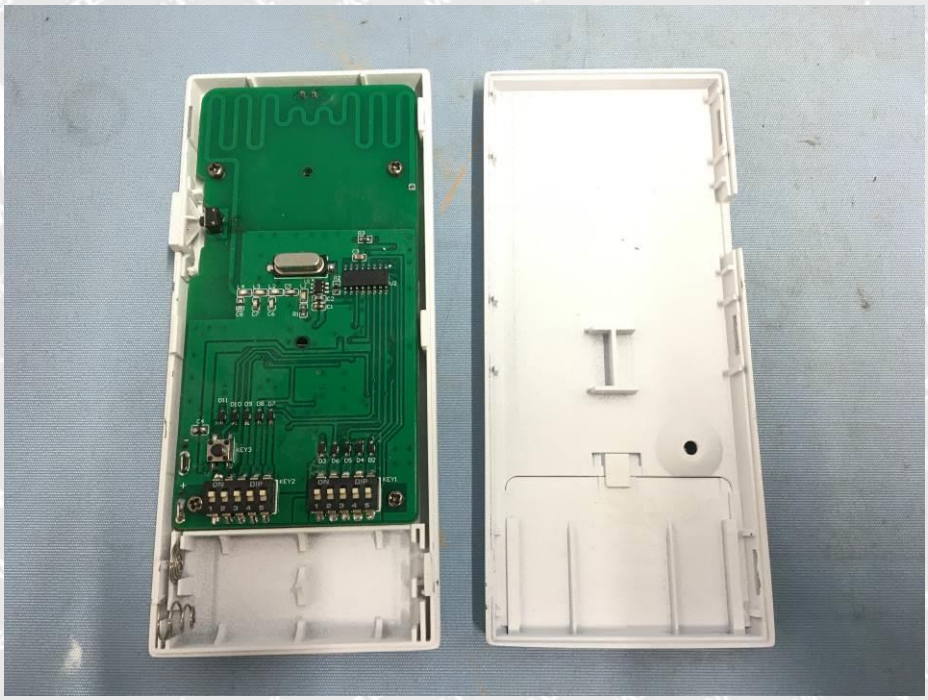


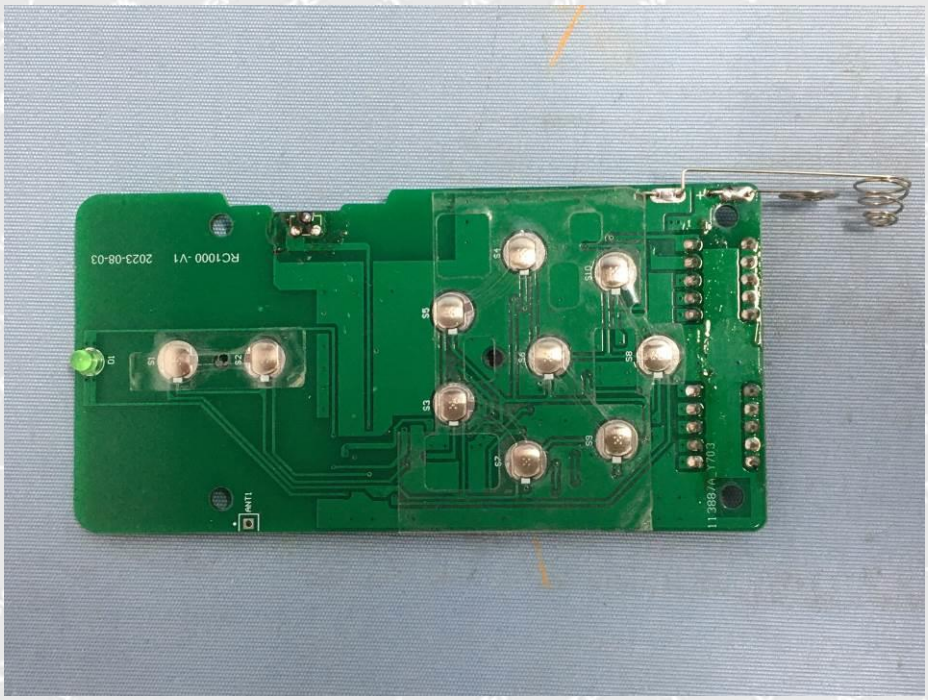
Model T301F

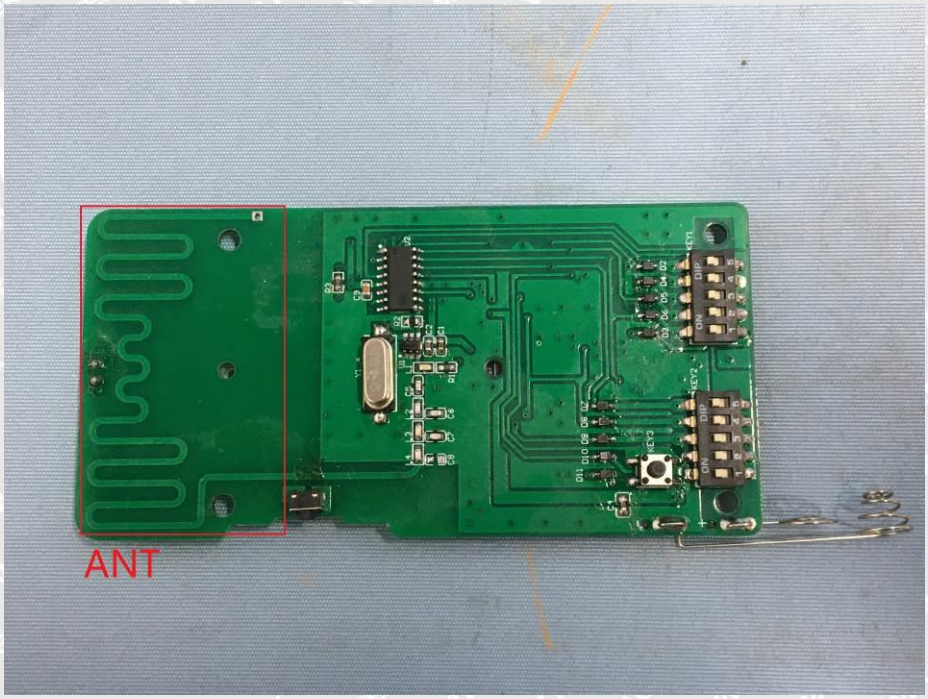
8.2 EUT - Internal Photos

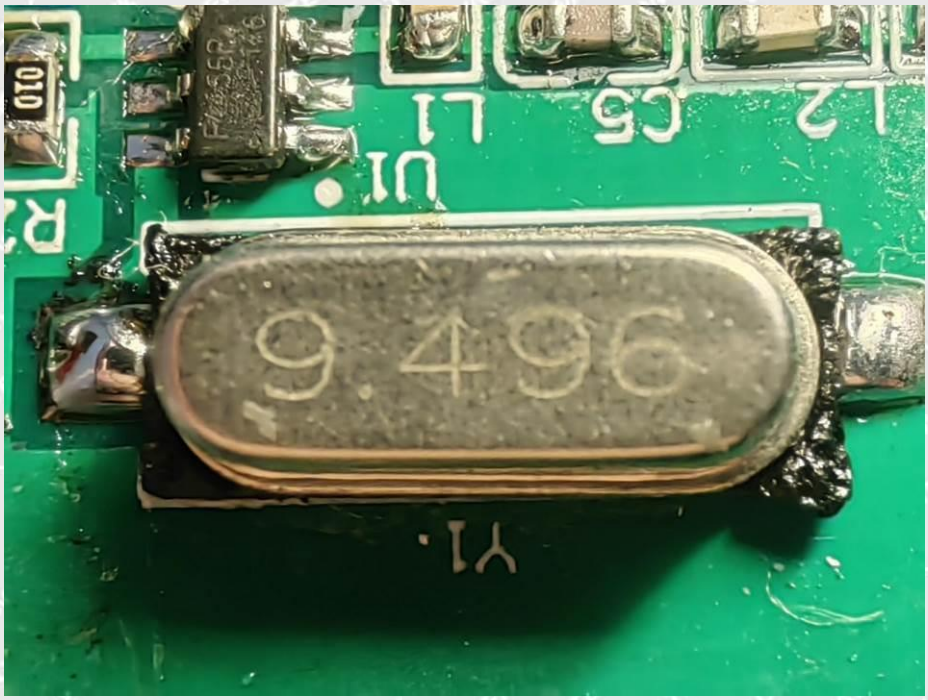
Model T301G



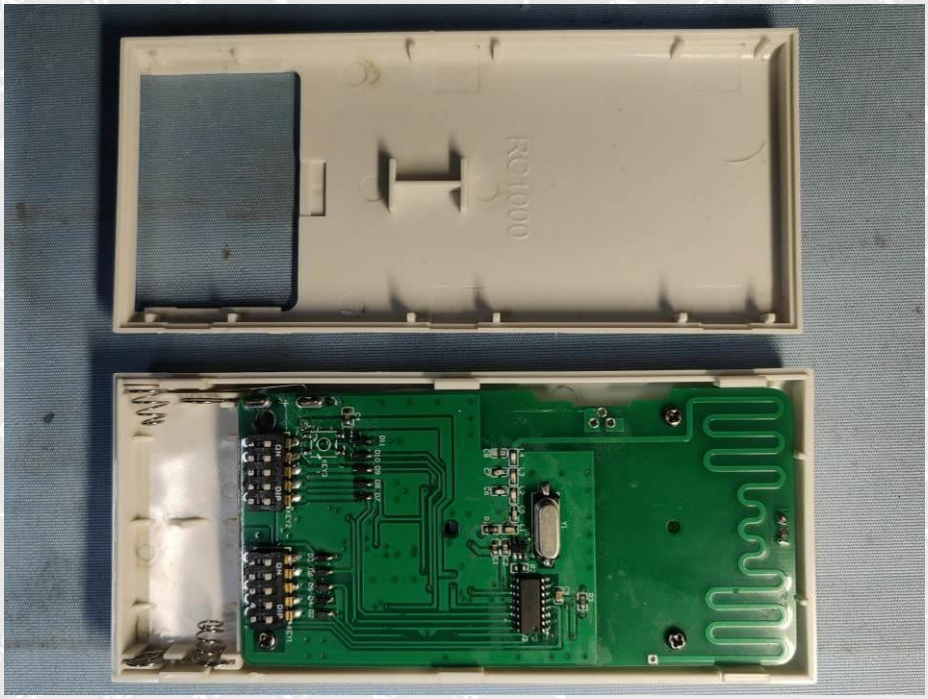


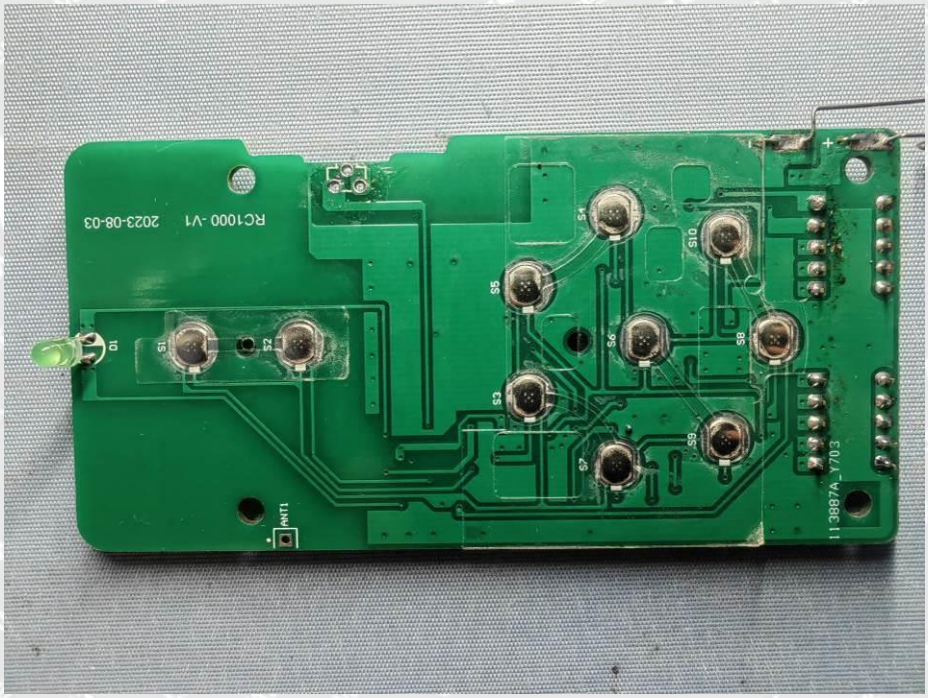

RC1000-V1 2023-08-03
ANT1

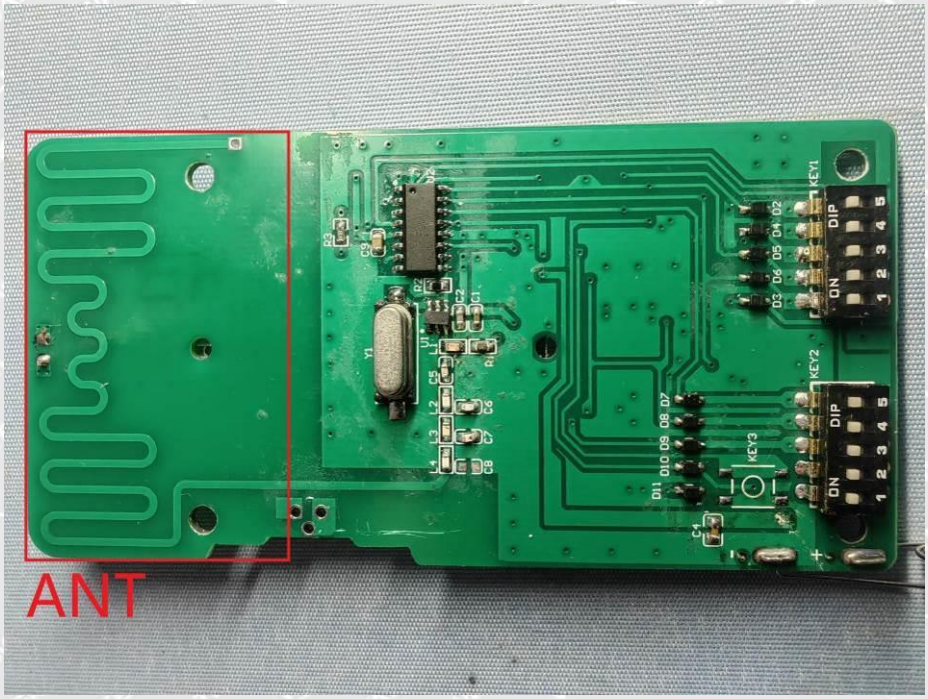

ANT



Model T301F


RC1000


RC1000 -V1 2023-08-03
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
D1
ANT1
I13887A_Y703



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