

FCC REPORT

Applicant: SALUS North America, Inc.
Address of Applicant: 850 Main Street, Redwood City, California 94063, United States
Manufacturer: SALUS North America, Inc.
Address of Manufacturer: 850 Main Street, Redwood City, California 94063, United States
Factory: Computime Ltd
Address of Factory: Computime Technology Park, Dan Zhu Tou Cun, Buji, Longgang Region, Shenzhen, China
Equipment Under Test (EUT)
Product Name: Wireless Fan Coil Controller
Model No.: SAU62C1, SC102ZB
Trade Mark: SALUS
FCC ID: 2AG86-SC102ZB
Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt: June 12, 2018
Date of Test: June 13-19, 2018
Date of report issued: June 20, 2018
Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Robinson Lo

Laboratory Manager

This 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.

2 Version

Version No.	Date	Description
00	June 20, 2018	Original

Prepared By:

Tiger Chen

Date:

June 20, 2018

Project Engineer

Check By:

Andy Wu

Date:

June 20, 2018

Reviewer

3 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 CONTENTS	3
4 TEST SUMMARY	4
4.1 MEASUREMENT UNCERTAINTY	4
5 GENERAL INFORMATION	5
5.1 GENERAL DESCRIPTION OF EUT	5
5.2 TEST MODE	7
5.3 DESCRIPTION OF SUPPORT UNITS	7
5.4 TEST FACILITY	7
5.5 TEST LOCATION	7
5.6 ADDITIONAL INSTRUCTIONS	8
6 TEST INSTRUMENTS LIST	9
7 TEST RESULTS AND MEASUREMENT DATA	10
7.1 ANTENNA REQUIREMENT	10
7.2 SPURIOUS EMISSION	11
7.2.1 Radiated Emission Method	11
8 TEST SETUP PHOTO	15
9 EUT CONSTRUCTIONAL DETAILS	16

4 Test Summary

Test Item	Section in CFR 47	Tested Samples ID	Result
Antenna requirement	15.203/15.247 (c)	GTS201801000023-1	Pass
AC Power Line Conducted Emission	15.207	GTS201801000023-1	N/A
Conducted Peak Output Power	15.247 (b)(3)	GTS201801000023-1	N/A
Channel Bandwidth	15.247 (a)(2)	GTS201801000023-1	N/A
Power Spectral Density	15.247 (e)	GTS201801000023-1	N/A
Band Edge	15.247(d)	GTS201801000023-1	N/A
Spurious Emission	15.205/15.209	GTS201801000023-1	Pass

Pass: The EUT complies with the essential requirements in the standard.

N/A: Not applicable.

Remark : Test according to ANSI C63.10:2013

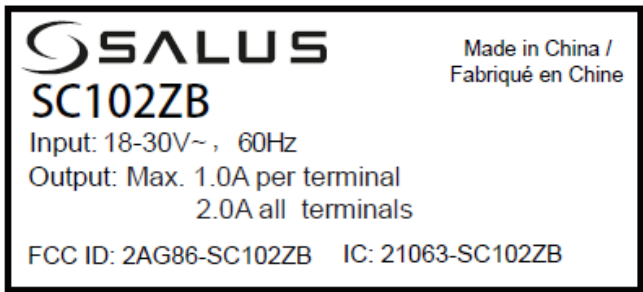
4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 26.5GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

5 General Information

5.1 General Description of EUT

Product Name:	Wireless Fan Coil Controller
Model No.:	SAU62C1, SC102ZB
Test model	SAU62C1
<i>Remark: All above models are identical in the same PCB layout, interior structure and electrical circuit. The only difference is the model name for commercial purpose.</i>	
Serial No.:	001E5E09023C0DE3
Test sample(s) ID:	GTS201806000157-1
Sample(s) Status	Engineer sample
Hardware:	V_X0_1211
Software:	ZB: V0.9, MCU: V1.3
Operation Frequency:	2405MHz~2480MHz
Channel numbers:	16
Channel separation:	5MHz
Modulation type:	O-QPSK
Antenna Type:	Integrated antenna
Antenna gain:	Internal Antenna 0dBi (declare by Applicant) External Antenna 2.15dBi(declare by Applicant)
Maximum output power:	Internal Antenna 18.10dBm External Antenna 17.78dBm
Power supply:	AC 18-30V, 60Hz
Labeling:	<div style="text-align: center;"> <p>45mm</p>  <p>20mm</p> </div>

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
11	2405MHz	15	2425MHz	19	2445MHz	23	2465MHz
12	2410MHz	16	2430MHz	20	2450MHz	24	2470MHz
13	2415MHz	17	2435MHz	21	2455MHz	25	2475MHz
14	2420MHz	18	2440MHz	22	2460MHz	26	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2405MHz
The middle channel	2440MHz
The Highest channel	2475MHz and 2480MHz

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

5.3 Description of Support Units

N/A

5.4 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> • FCC —Registration No.: 381383 Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 381383, Jan 08, 2018. • Industry Canada (IC) —Registration No.: 9079A-2 The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.
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5.5 Test Location

All tests were performed at:
<p>Global United Technology Services Co., Ltd. Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China Tel: 0755-27798480 Fax: 0755-27798960</p>

5.6 Additional instructions

Software (Used for test) from client

Mode	Built-in by manufacturer
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Channel	Power level
11	-4
18	-4
25	-8
26	-24

Test software set s





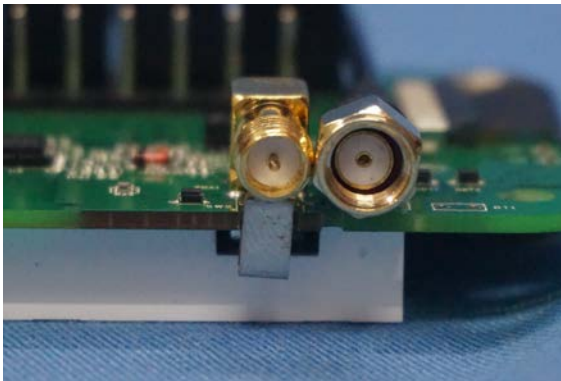
6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June 28 2017	June 27 2018
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 28 2017	June 27 2018
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 28 2017	June 27 2018
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2017	June 27 2018
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 28 2017	June 27 2018
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	June 28 2017	June 27 2018
10	Coaxial Cable	GTS	N/A	GTS211	June 28 2017	June 27 2018
11	Coaxial cable	GTS	N/A	GTS210	June 28 2017	June 27 2018
12	Coaxial Cable	GTS	N/A	GTS212	June 28 2017	June 27 2018
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 28 2017	June 27 2018
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 28 2017	June 27 2018
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2017	June 27 2018
16	Band filter	Amindeon	82346	GTS219	June 28 2017	June 27 2018

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	June 28 2017	June 27 2018

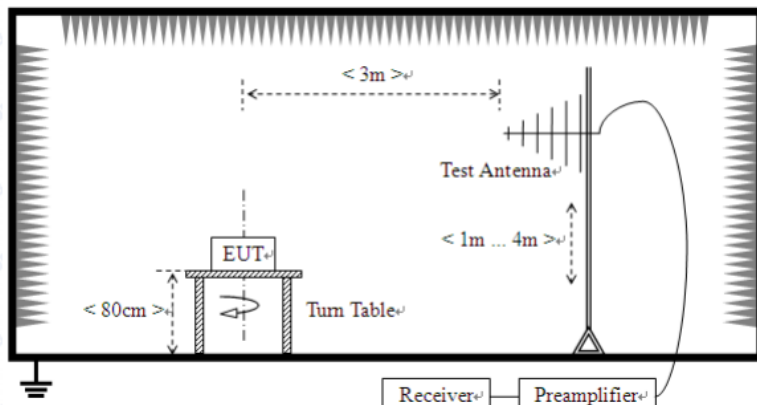
7 Test results and Measurement Data

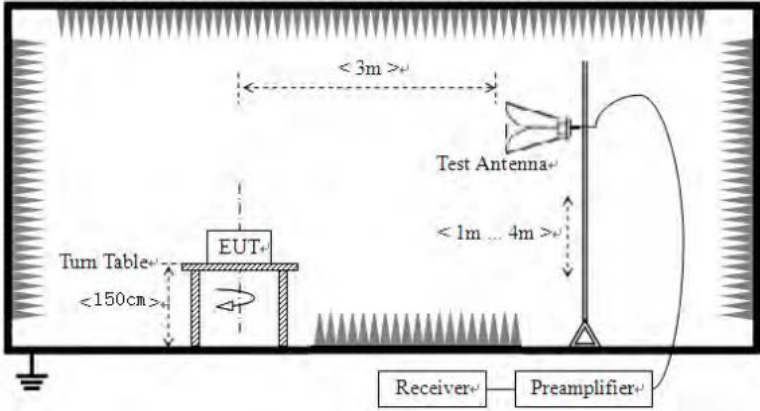
7.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
<p>15.203 requirement:</p> <p>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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(c) (1)(i) requirement:</p> <p>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
EUT Antenna:	
<p><i>Both internal and external antenna are integral Antenna, the best case gain of the internal antenna is 0 dBi, The best case gain of the external antenna is 2.15dBi. The manufacturer design the external ANT using an abnormal jark, so that the ANT cannot be replaced by user.</i></p>	
  	

7.2 Spurious Emission

7.2.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	30MHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		RMS	1MHz	3MHz	Average
Limit:	Frequency		Limit (dBuV/m @3m)		Value
	30MHz-88MHz		40.00		Quasi-peak
	88MHz-216MHz		43.50		Quasi-peak
	216MHz-960MHz		46.00		Quasi-peak
	960MHz-1GHz		54.00		Quasi-peak
	Above 1GHz		54.00		Average
			74.00		Peak
Test setup:	Below 1GHz				
	<div></div>				
Test setup:	Above 1GHz				

	
<p>Test Procedure:</p>	<ol style="list-style-type: none"> 1. The EUT was placed on the top of a rotating table (0.8 meters for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.2 for details</p>
<p>Test results:</p>	<p>Pass</p>

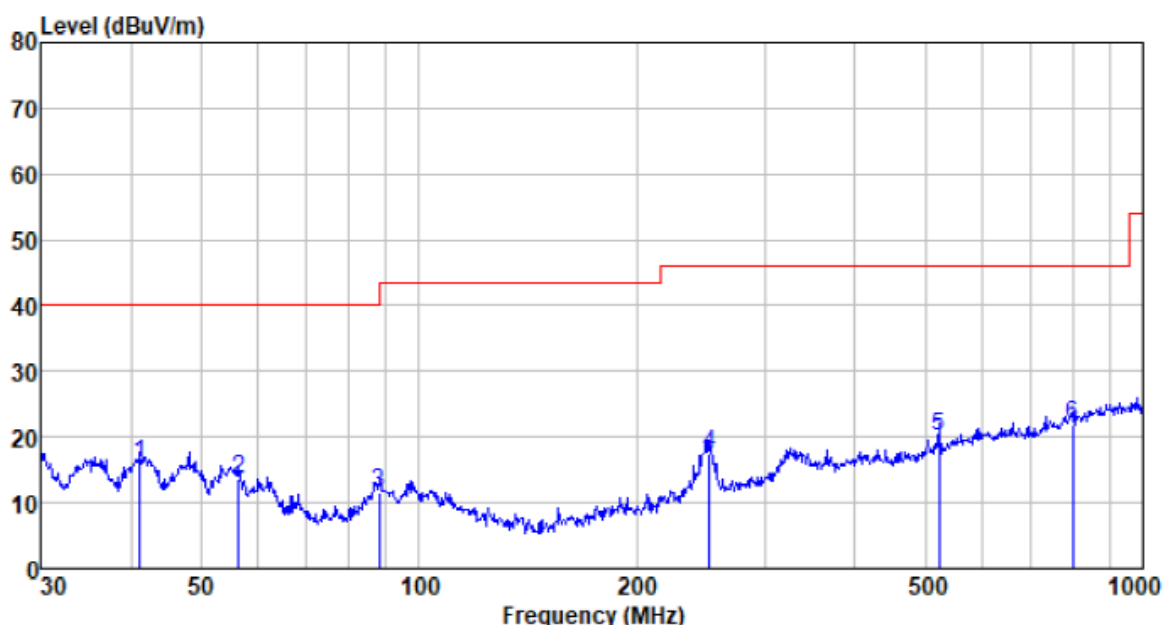
Remark:

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

Measurement Data

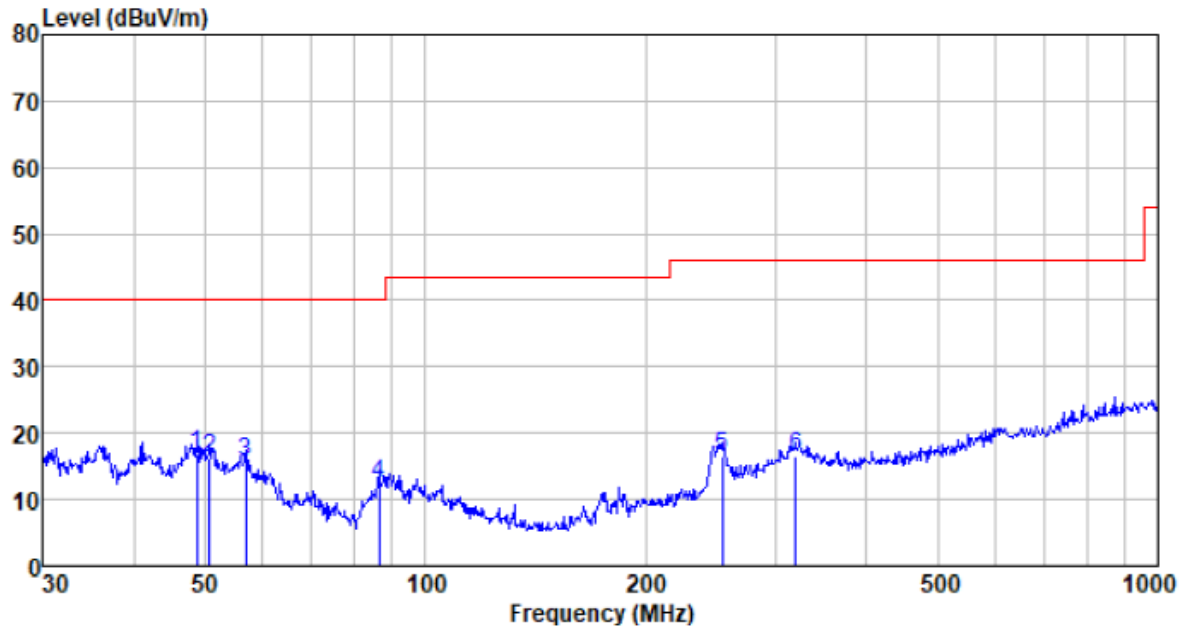
■ Below 1GHz

Mode:	Transmitting mode	Test by:	Tiger
Temp./Hum.(%RH):	27°C/55%RH	Polarization:	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
41.132	38.69	12.21	0.67	35.73	15.84	40.00	-24.16	QP
56.395	37.47	11.65	0.83	36.27	13.68	40.00	-26.32	QP
88.033	37.00	10.07	1.09	36.62	11.54	43.50	-31.96	QP
252.063	40.56	12.22	2.14	37.38	17.54	46.00	-28.46	QP
522.718	36.27	17.85	3.40	37.52	20.00	46.00	-26.00	QP
798.980	33.68	21.40	4.45	37.62	21.91	46.00	-24.09	QP

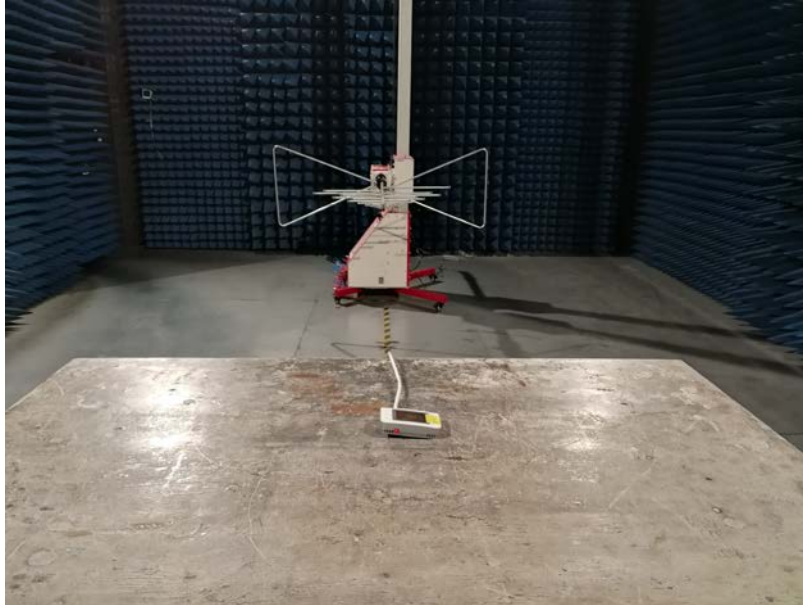
Mode:	Transmitting mode	Test by:	Tiger
Temp./Hum.(%RH):	27°C/55%RH	Polarization:	Vertical



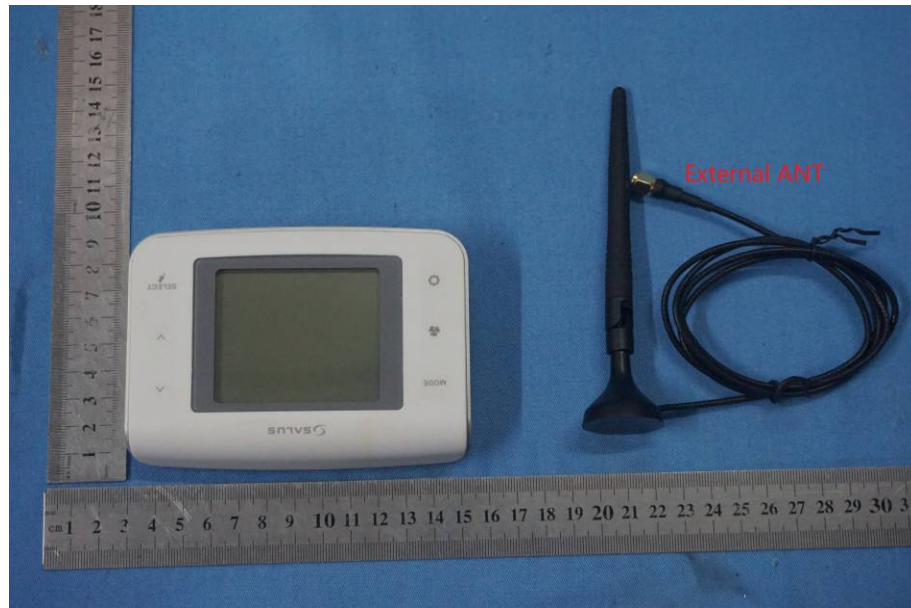
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
48.672	39.83	12.29	0.76	36.12	16.76	40.00	-23.24	QP
50.764	39.46	12.23	0.78	36.19	16.28	40.00	-23.72	QP
56.792	39.38	11.60	0.83	36.28	15.53	40.00	-24.47	QP
86.503	38.38	9.56	1.08	36.61	12.41	40.00	-27.59	QP
253.837	39.61	12.29	2.14	37.38	16.66	46.00	-29.34	QP
319.937	37.66	13.98	2.47	37.44	16.67	46.00	-29.33	QP

8 Test Setup Photo

Radiated Emission



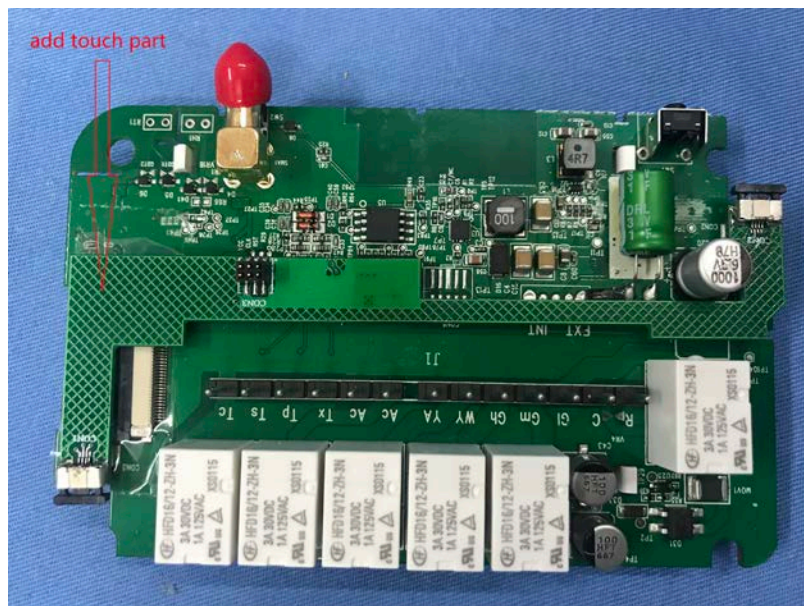
9 EUT Constructional Details

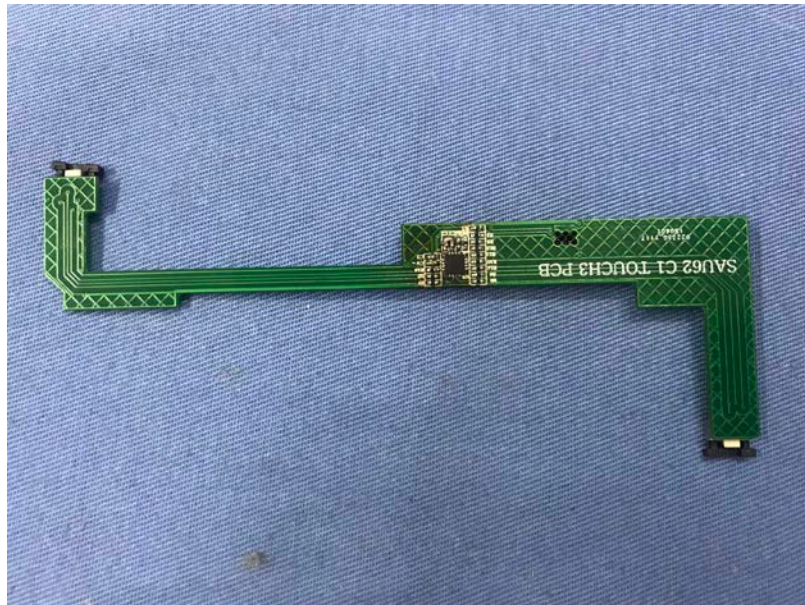
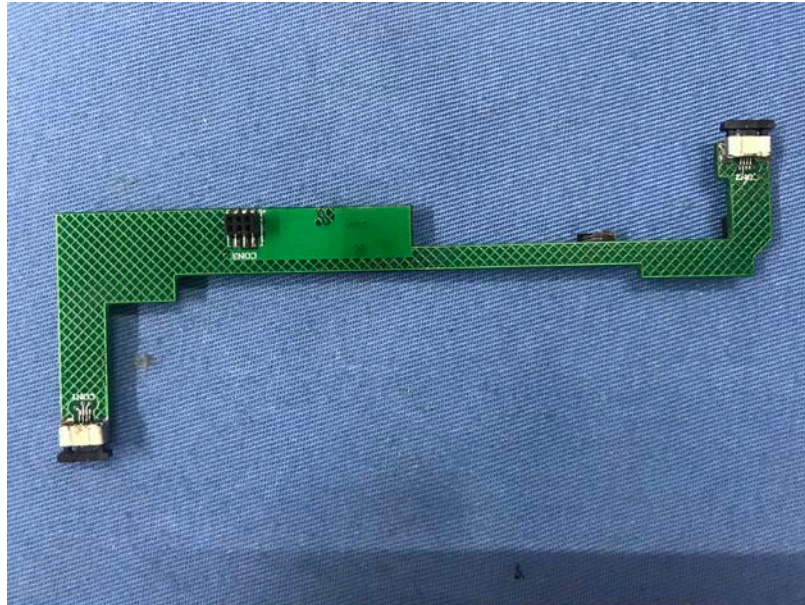


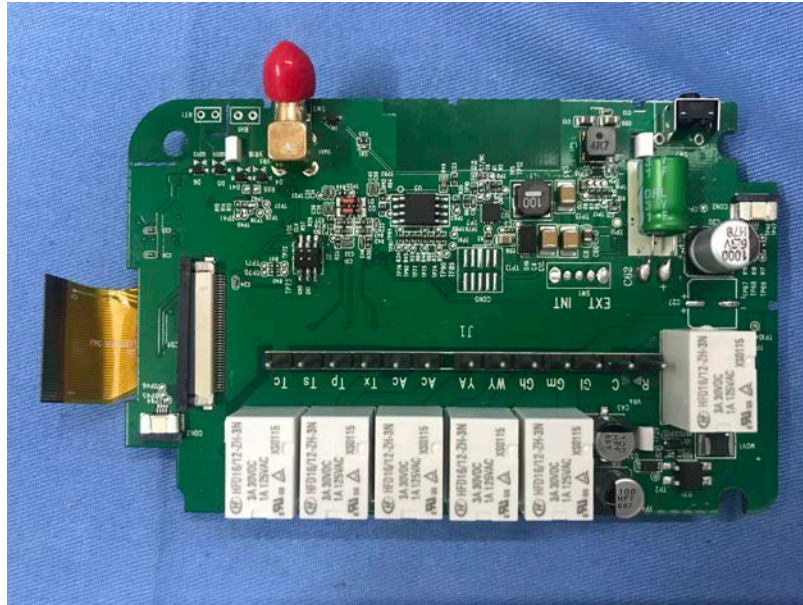


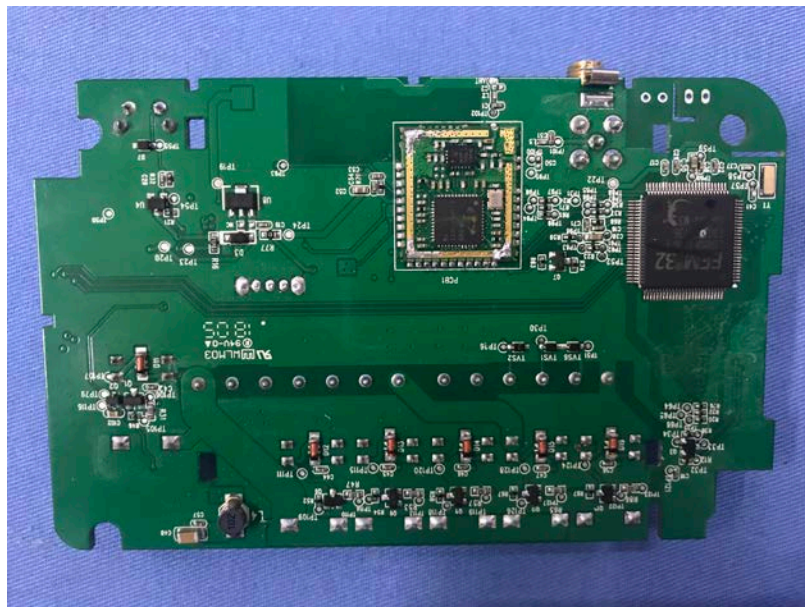
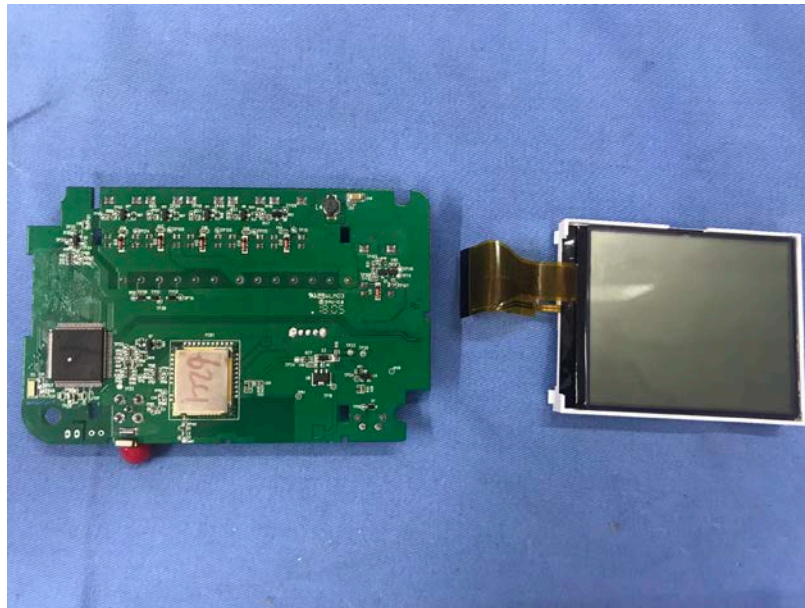












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