



FCC REPORT

Applicant: Shenzhen HC Tech Co.,Ltd.

Address of Applicant: Room 601,Building 21,District B,Dongbian, Minzhi Road,Longhua, shenzhen 518131, China

Manufacturer/Factory: Shenzhen HC Tech Co.,Ltd.

Address of Manufacturer/Factory: Room 601,Building 21,District B,Dongbian, Minzhi Road,Longhua, shenzhen 518131, China

Equipment Under Test (EUT)

Product Name: OTOPROG

Model No.: UP400

Trade Mark: AURO

FCC ID: 2AN27PRGUP400

Applicable standards: FCC CFR Title 47 Part 15 Subpart C:2017

Date of sample receipt: January 09, 2017

Date of Test: January 10-12, 2017

Date of report issued: January 15, 2017

Test Result : PASS *

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

Authorized Signature:

Robinson Lo

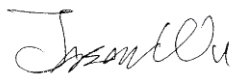
Laboratory Manager

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	January 15, 2017	Original

Prepared By:

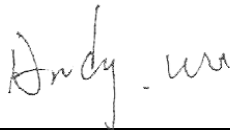


Date:

January 15, 2017

Project Engineer

Check By:



Date:

January 15, 2017

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Radiated Emission	15.209	Pass
20dB Bandwidth	15.215	Pass

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

5 General Information

5.1 General Description of EUT

Product Name:	OTOPROG
Model No.:	UP400
Operation Frequency:	125KHz
Modulation type:	ASK
Antenna Type:	Integral antenna
Antenna gain:	0dBi
Power supply:	INPUT: DC5V or DC12V

Note:

In section 15.31(m), regards to the operating frequency range less than 1 MHz, only the middle frequency of channel was selected to perform the test, and the selected channel see below:

Channel	Frequency
The middle channel	125KHz

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

Manufacturer	Description	Model	Serial Number	FCC Approval
AURO	OtoSys	OtoSys IM600	N/A	2AN27OTOSYSIM600

5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations: • 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

5.5 Test Location

All tests were performed at:
Global United Technology Services Co., Ltd. No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960

5.6 Other Information Requested by the Customer

None.

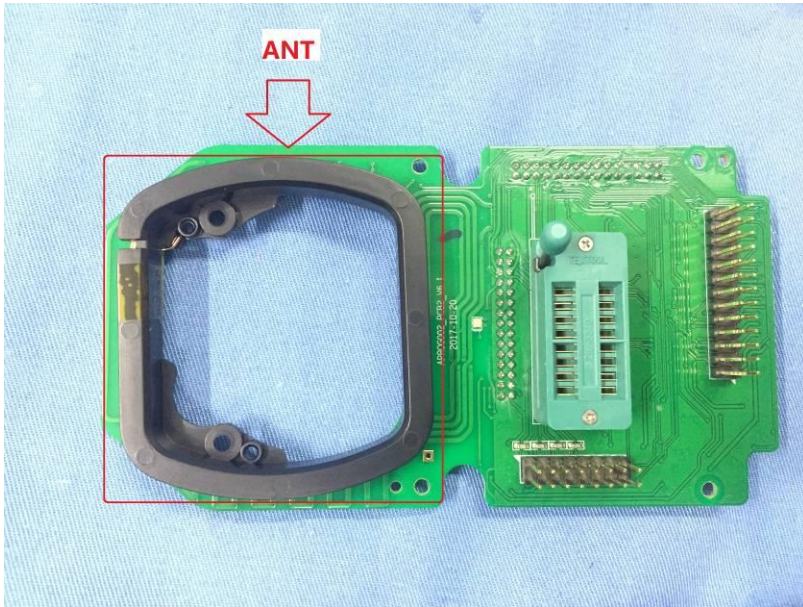
6 Test Instruments list

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 26 2017	June 25 2018
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 26 2017	June 25 2018
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 26 2017	June 25 2018
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 26 2017	June 25 2018
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 26 2017	June 25 2018
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	June 26 2017	June 25 2018
10	Coaxial Cable	GTS	N/A	GTS211	June 26 2017	June 25 2018
11	Coaxial cable	GTS	N/A	GTS210	June 26 2017	June 25 2018
12	Coaxial Cable	GTS	N/A	GTS212	June 26 2017	June 25 2018
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 26 2017	June 25 2018
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 26 2017	June 25 2018
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 26 2017	June 25 2018
16	Band filter	Amindeon	82346	GTS219	June 26 2017	June 25 2018
17	Power Meter	Anritsu	ML2495A	GTS540	June 26 2017	June 25 2018
18	Power Sensor	Anritsu	MA2411B	GTS541	June 26 2017	June 25 2018

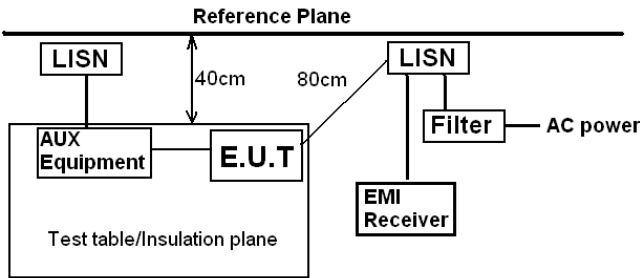
Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2017	June. 25 2018
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 26 2017	June. 25 2018
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 26 2017	June. 25 2018
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 26 2017	June. 25 2018

7 Test results and Measurement Data

7.1 Antenna requirement:

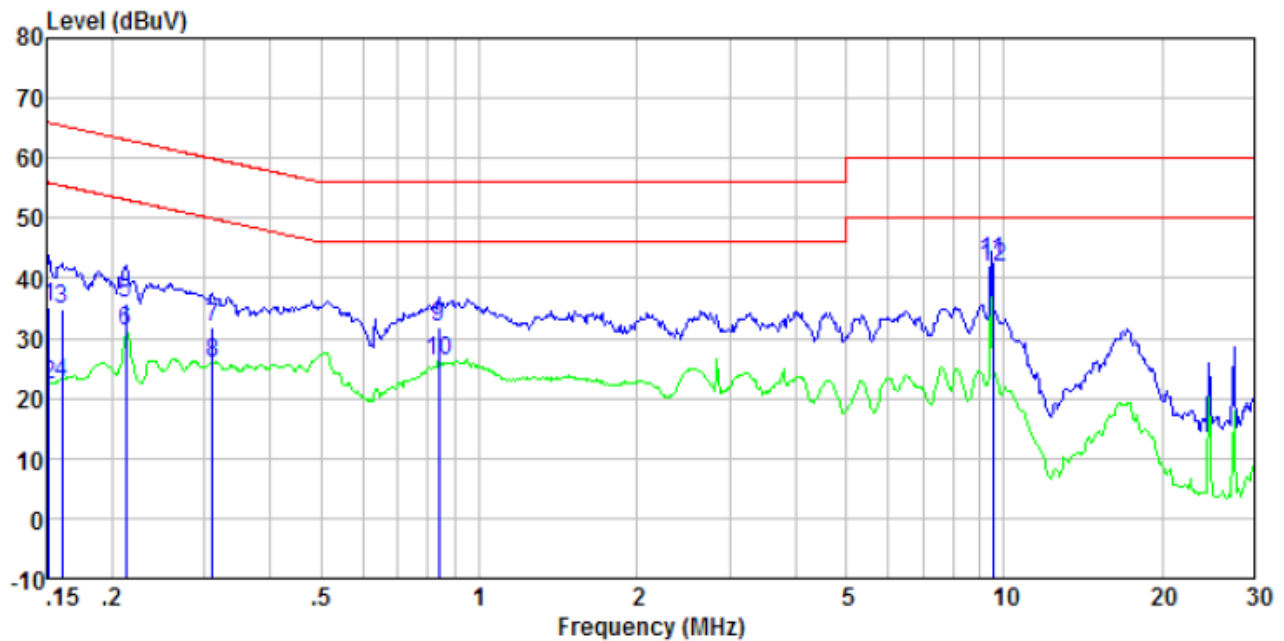
Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling 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.	
EUT Antenna: <i>The antenna is Integral Antenna, the best case gain of the antenna is 0dBi</i> 	

7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207			
Test Method:	ANSI C63.10:2013			
Test Frequency Range:	150KHz to 30MHz			
Class / Severity:	Class B			
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto			
Limit:	Frequency range (MHz)	Limit (dBuV)		
		Quasi-peak	Average	
		0.15-0.5	66 to 56*	56 to 46*
		0.5-5	56	46
		5-30	60	50
* Decreases with the logarithm of the frequency.				
Test setup:				
	<i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i>			
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.			
Test Instruments:	Refer to section 6.0 for details			
Test mode:	Refer to section 5.2 for details			
Test results:	Pass			

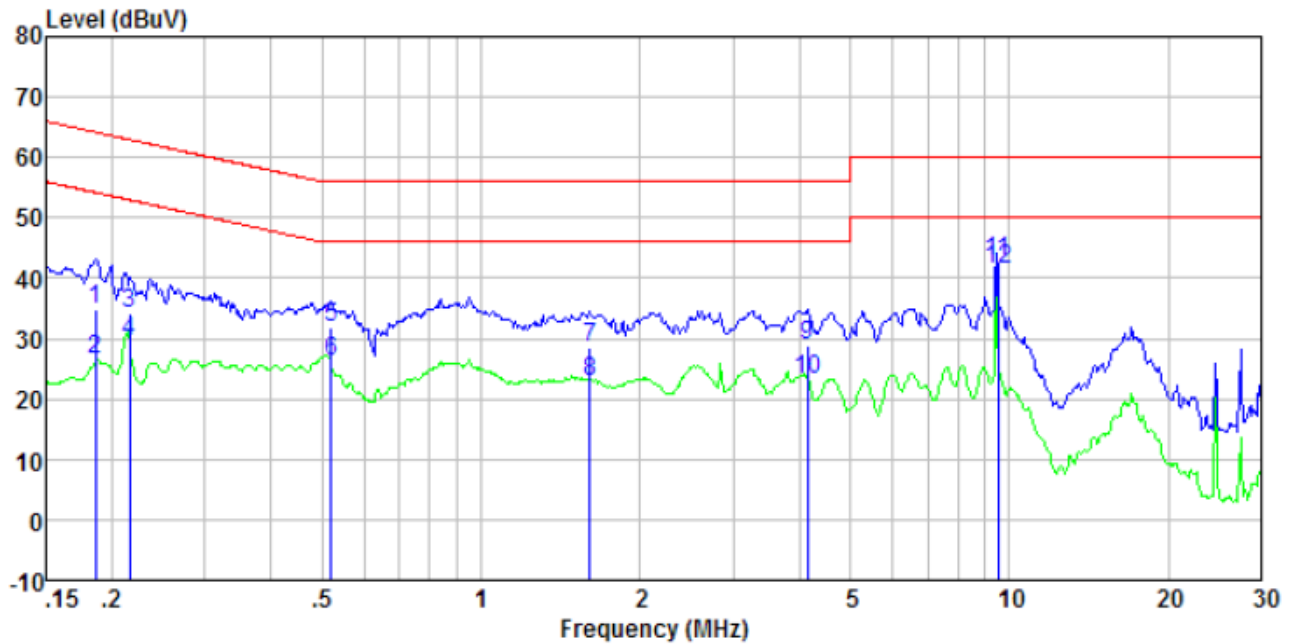
Measurement data:

Line:



Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.152	34.60	0.40	0.07	35.07	65.91	-30.84	QP
0.152	21.63	0.40	0.07	22.10	55.91	-33.81	Average
0.161	34.30	0.40	0.08	34.78	65.43	-30.65	QP
0.161	22.18	0.40	0.08	22.66	55.43	-32.77	Average
0.213	35.34	0.40	0.11	35.85	63.10	-27.25	QP
0.213	30.79	0.40	0.11	31.30	53.10	-21.80	Average
0.310	31.39	0.39	0.10	31.88	59.97	-28.09	QP
0.310	25.37	0.39	0.10	25.86	49.97	-24.11	Average
0.839	31.46	0.23	0.14	31.83	56.00	-24.17	QP
0.839	25.83	0.23	0.14	26.20	46.00	-19.80	Average
9.506	42.53	0.20	0.20	42.93	60.00	-17.07	QP
9.506	41.25	0.20	0.20	41.65	50.00	-8.35	Average

Neutral:



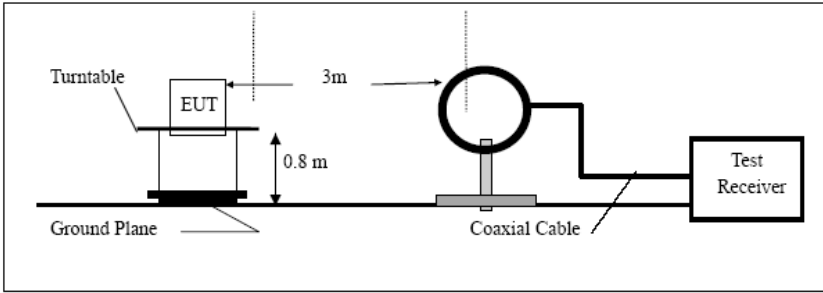
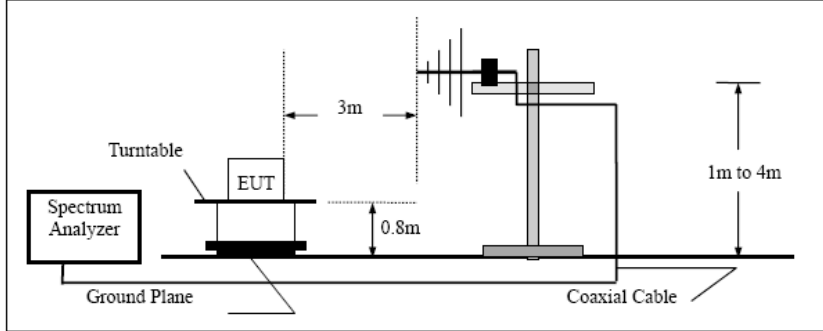
Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.186	34.27	0.40	0.10	34.77	64.20	-29.43	QP
0.186	25.87	0.40	0.10	26.37	54.20	-27.83	Average
0.216	33.56	0.40	0.11	34.07	62.96	-28.89	QP
0.216	28.89	0.40	0.11	29.40	52.96	-23.56	Average
0.521	31.37	0.31	0.11	31.79	56.00	-24.21	QP
0.521	25.67	0.31	0.11	26.09	46.00	-19.91	Average
1.610	28.28	0.20	0.17	28.65	56.00	-27.35	QP
1.610	22.56	0.20	0.17	22.93	46.00	-23.07	Average
4.158	28.44	0.20	0.18	28.82	56.00	-27.18	QP
4.158	22.88	0.20	0.18	23.26	46.00	-22.74	Average
9.506	42.37	0.20	0.20	42.77	60.00	-17.23	QP
9.506	41.11	0.20	0.20	41.51	50.00	-8.49	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

7.3 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 1GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz - 30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Remark: For the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission test in these three bands are based on measurements employing an average detector.					
Limit: (Spurious Emissions)	Limits for frequency below 30MHz				
	Frequency	Limit (uV/m)	Measurement Distance(m)	Remark	
	0.009-0.490	2400/F(kHz)	300	Quasi-peak Value	
	0.490-1.705	24000/F(kHz)	30	Quasi-peak Value	
	1.705-30	30	30	Quasi-peak Value	
	Limits for frequency Above 30MHz				
	Frequency	Limit (dBuV/m @3m)	Remark		
	30MHz-88MHz	40.00	Quasi-peak Value		
	88MHz-216MHz	43.50	Quasi-peak Value		
	216MHz-960MHz	46.00	Quasi-peak Value		
960MHz-1GHz	54.00	Quasi-peak Value			
Above 1GHz	54.00	Average Value			
	74.00	Peak Value			
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.					
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters 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.
Test setup:	Below 30MHz  30MHz ~ 1000MHz 
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

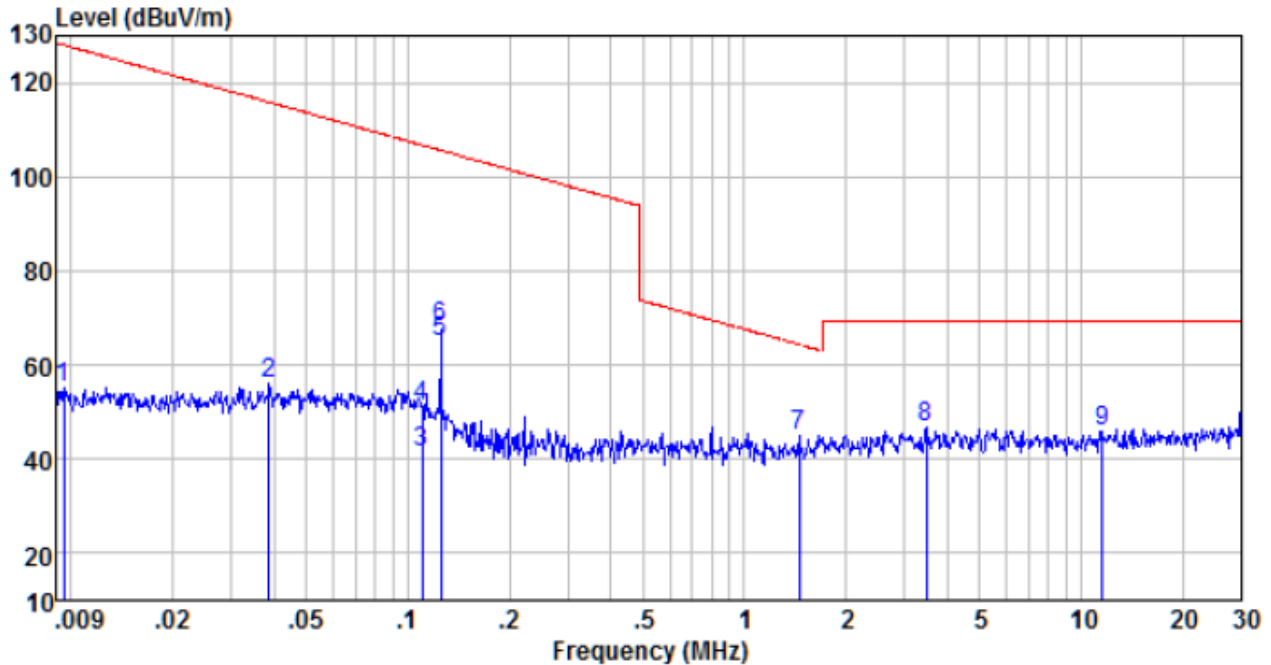
Measurement data:

Measurement data:

Note: Limit dBuV/m @3m = Limit dBuV/m @300m+ 80

Limit dBuV/m @3m = Limit dBuV/m @30m + 40

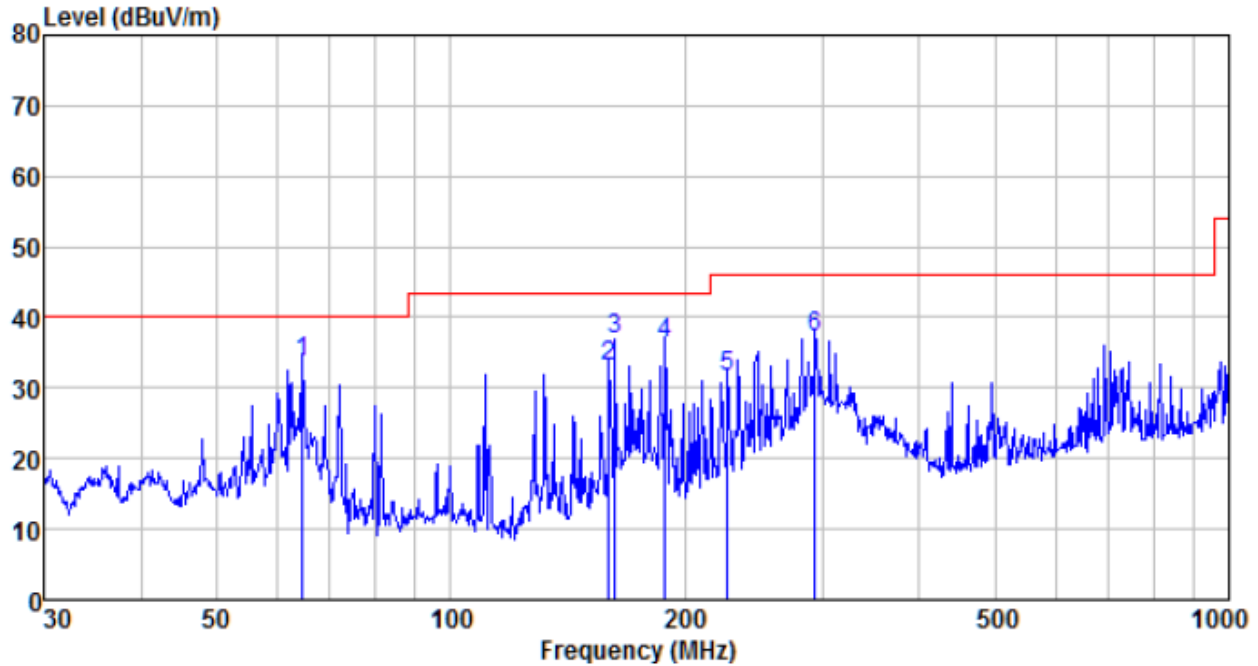
Below 30MHz



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
0.010	32.69	22.39	0.00	0.00	55.08	128.02	-72.94	Peak
0.039	35.46	20.69	0.10	0.00	56.25	115.83	-59.58	Peak
0.110	17.34	24.12	0.17	0.00	41.63	106.78	-65.15	Average
0.110	26.71	24.12	0.17	0.00	51.00	106.78	-55.78	Peak
0.125	41.12	23.64	0.18	0.00	64.94	105.66	-40.72	Average
0.125	44.26	23.64	0.18	0.00	68.08	105.66	-37.58	Peak
1.456	23.64	20.84	0.35	0.00	44.83	64.34	-19.51	Peak
3.468	24.79	21.35	0.41	0.00	46.55	69.54	-22.99	Peak
11.613	22.42	23.08	0.49	0.00	45.99	69.54	-23.55	Peak

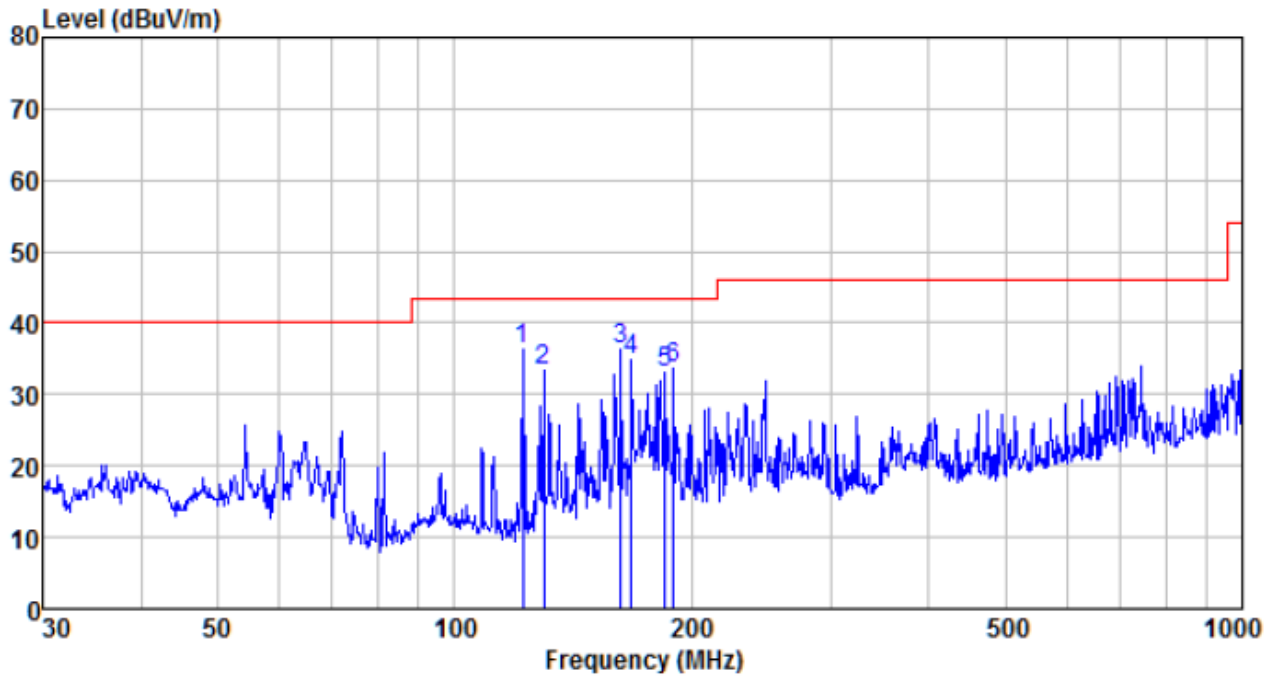
30MHz ~ 1GHz

Horizontal



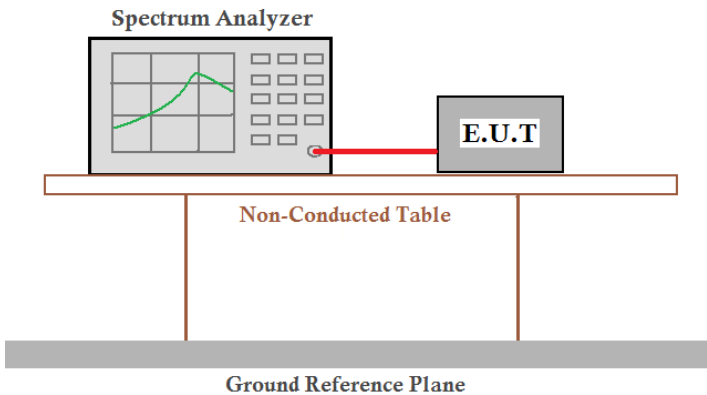
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
64.433	59.64	9.57	0.90	36.38	33.73	40.00	-6.27	QP
159.784	60.21	8.30	1.63	37.13	33.01	43.50	-10.49	QP
162.611	64.11	8.36	1.65	37.15	36.97	43.50	-6.53	QP
188.413	61.96	9.73	1.78	37.28	36.19	43.50	-7.31	QP
226.894	55.53	11.38	2.00	37.36	31.55	46.00	-14.45	QP
294.114	58.95	13.45	2.33	37.42	37.31	46.00	-8.69	QP

Vertical

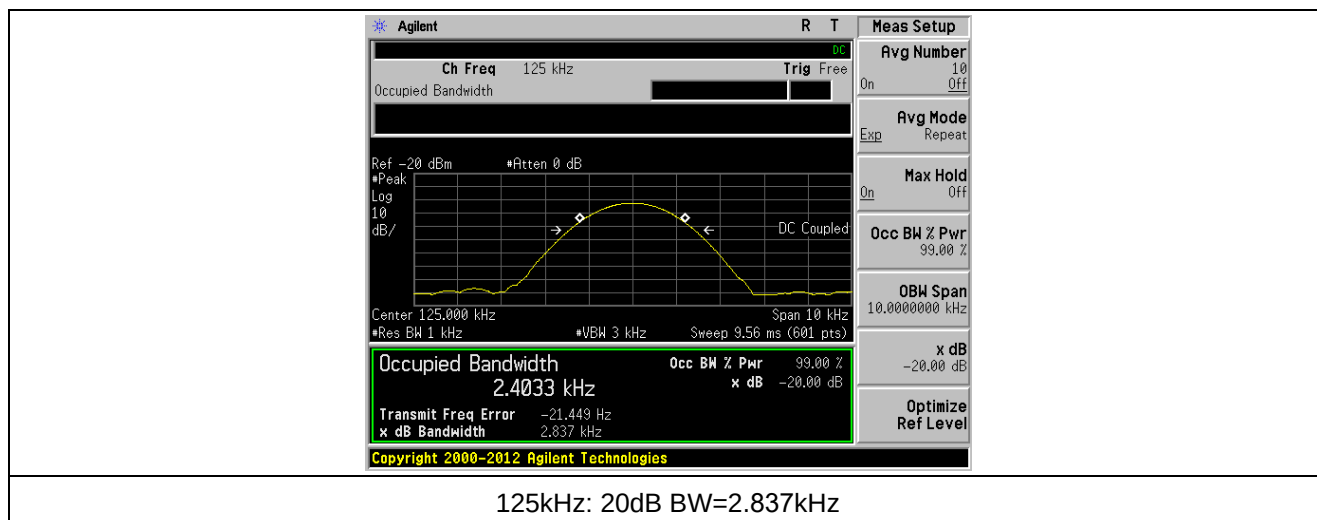


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
121.976	62.56	9.19	1.38	36.89	36.24	43.50	-7.26	QP
129.923	60.58	8.20	1.44	36.95	33.27	43.50	-10.23	QP
162.611	63.34	8.36	1.65	37.15	36.20	43.50	-7.30	QP
167.824	62.00	8.46	1.67	37.18	34.95	43.50	-8.55	QP
185.138	59.13	9.40	1.77	37.26	33.04	43.50	-10.46	QP
189.739	59.22	9.90	1.79	37.28	33.63	43.50	-9.87	QP

7.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.215
Test Method:	ANSI C63.10:2013
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

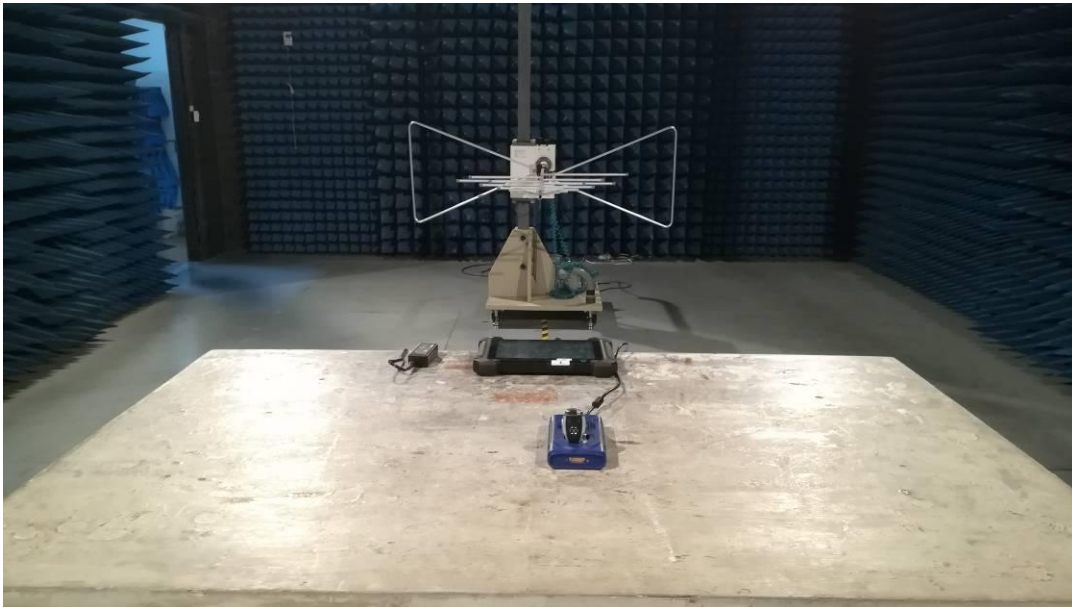
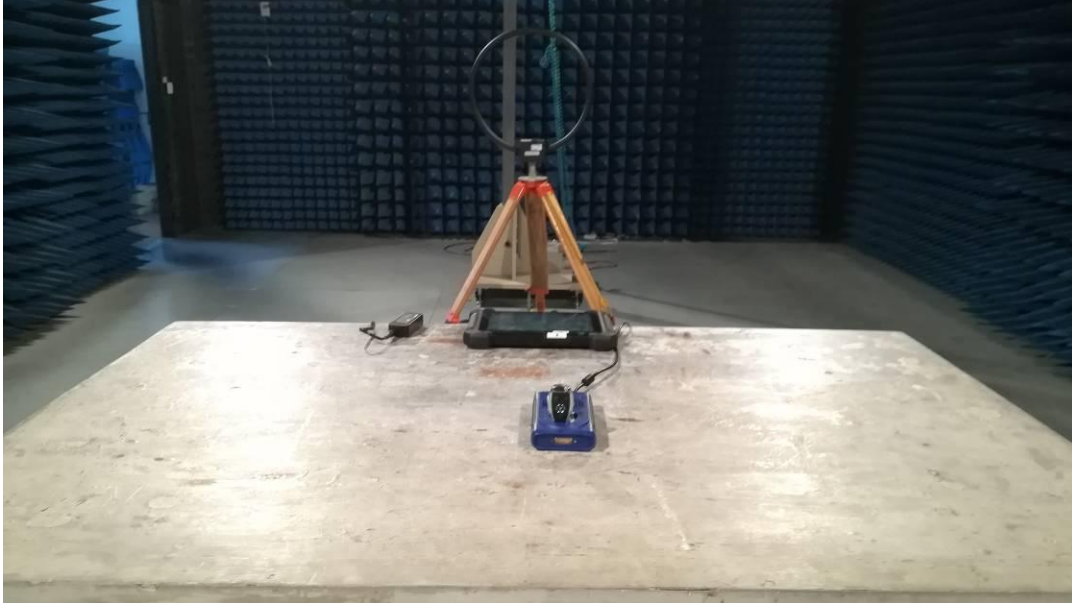
Measurement Data



125kHz: 20dB BW=2.837kHz

8 Test Setup Photo

Radiated Emission

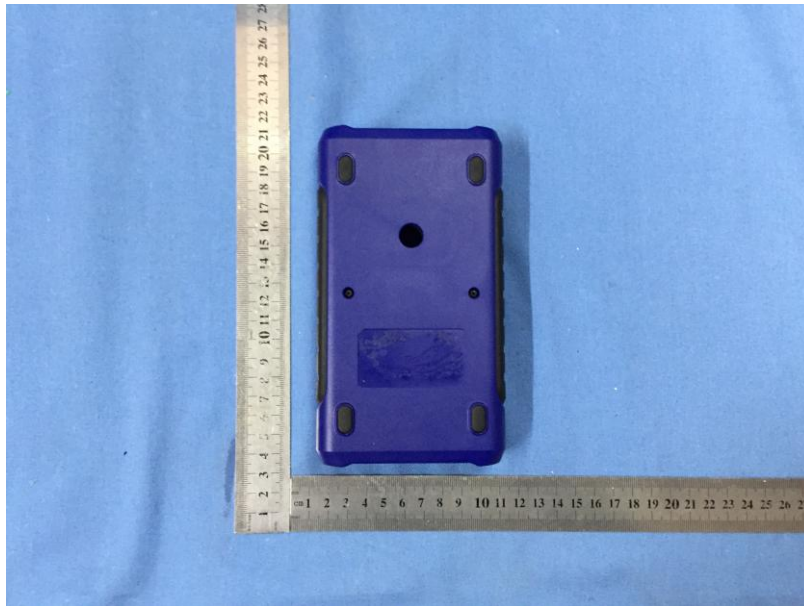


Conducted Emission

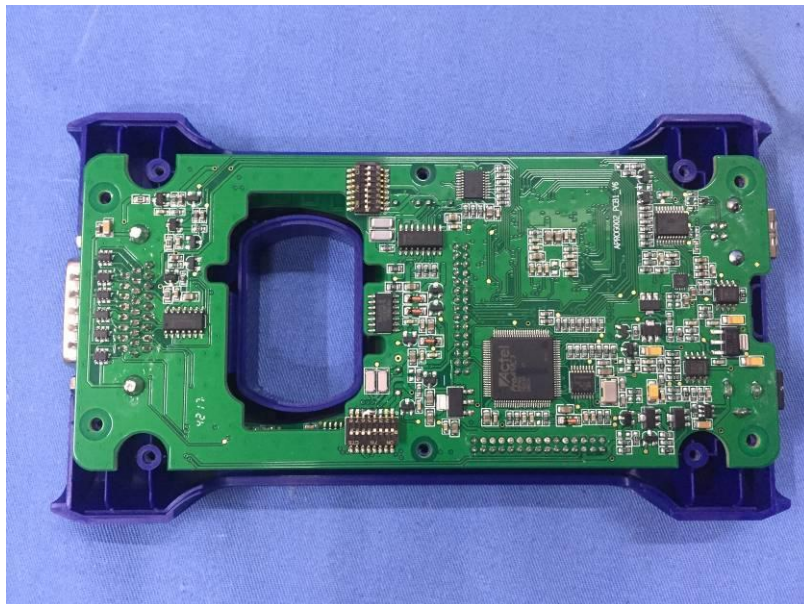


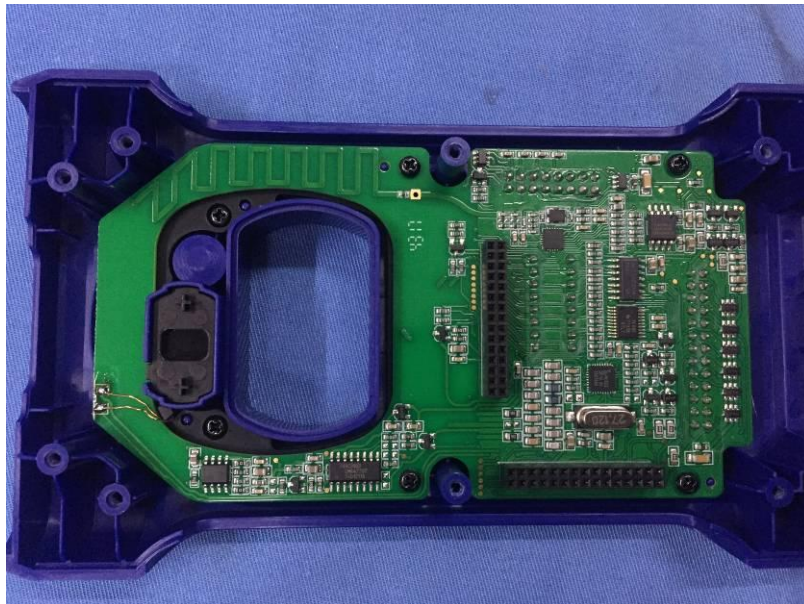
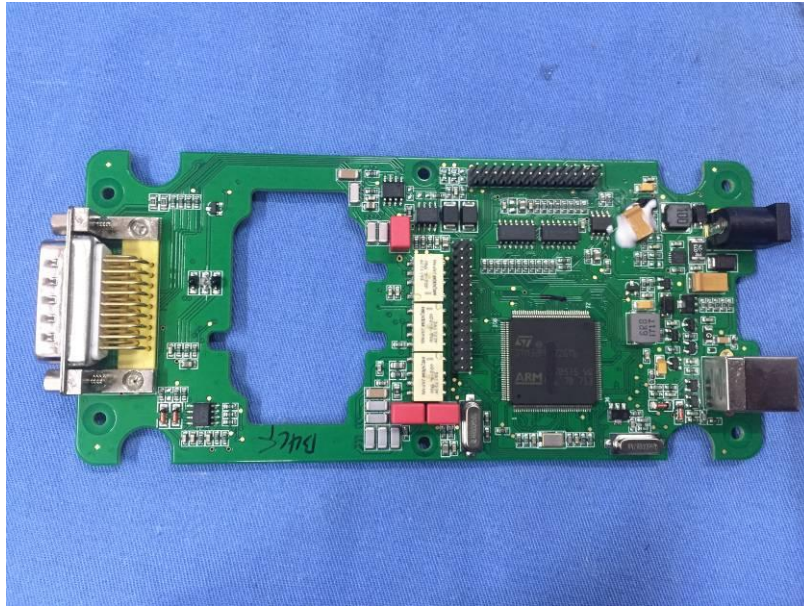
9 EUT Constructional Details

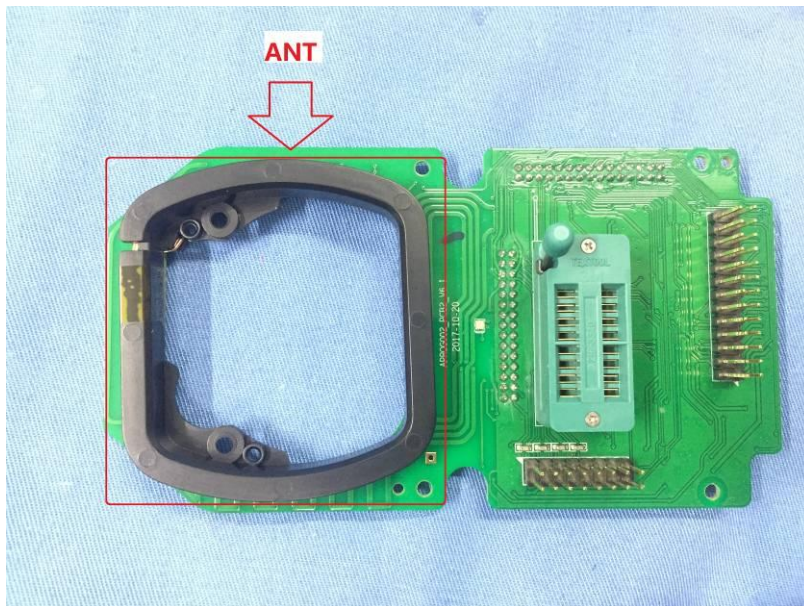
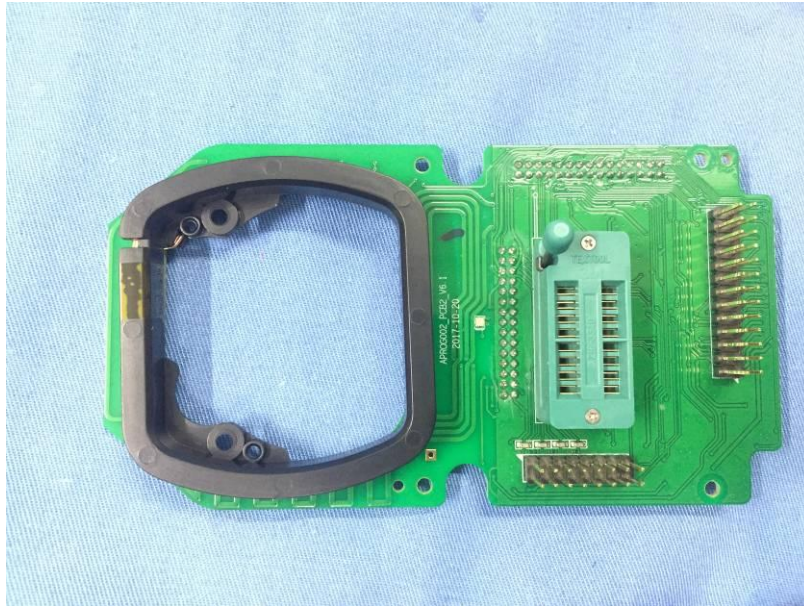












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