FCC REPORT

Applicant:	Dongguan Vatro Electronics Technology Co., LTD
Address of Applicant:	No 25,Dabandi Industrial Park, Daning Village, Humen Town, Dongguan City, China
Manufacturer:	Dongguan Vatro Electronics Technology Co., LTD
Address of Manufacturer:	No 25,Dabandi Industrial Park, Daning Village, Humen Town, Dongguan City, China

Equipment Under Test (EUT)

Product Name:	Wireless Charger
Model No.:	C3C, X3C, D3C, S3C, K3C, Z3C
Trade Mark:	Vatro
FCC ID:	2AOP7-C3C
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C:2017
Date of sample receipt:	December 26, 2017
Date of Test:	December 27, 2017-January 04, 2018
Date of report issued:	January 05, 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	*January 05, 2018*	*Original*

Prepared By:		***Date:***	*January 05, 2018*
	Project Engineer		
Check By:		***Date:***	*January 05, 2018*
	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:	Wireless Charger
Model No.:	C3C, X3C, D3C, S3C, K3C, Z3C
Test Model No:	C3C
Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are color and model name for commercial purpose.	
Operation Frequency:	111.5kHz ~ 205KHz
Modulation type:	Backscatter modulation
Antenna Type:	Inductive loop coil antenna
Antenna gain:	0dBi
Power supply:	INPUT: DC5V 2A, DC9V 1.7A OUTPUT:DC5V 1A, DC9V1.1A

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 lowest channel	N/A
The middle channel	158KHz
The Highest channel	N/A

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting and charging mode
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.	

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC Approval
SAMSUNG	Mobile Phone	S7EDGE	R28H835BJ2B	DOC
APPLE	USB Charger	A1399	N/A	N/A

5.4 Test Facility

● **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:

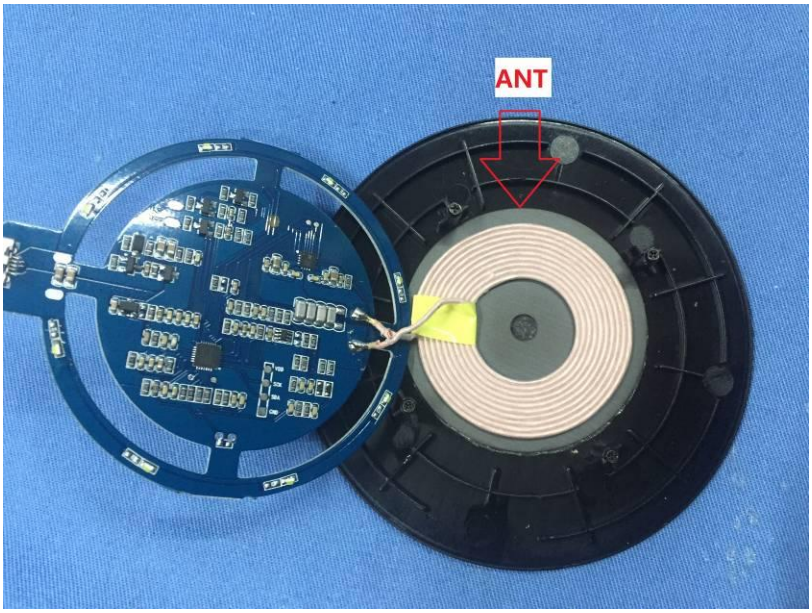
Standard requirement:	FCC Part15 C Section 15.203

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:

The antenna is Inductive loop coil antenna, the best case gain of the antenna is 0dBi.



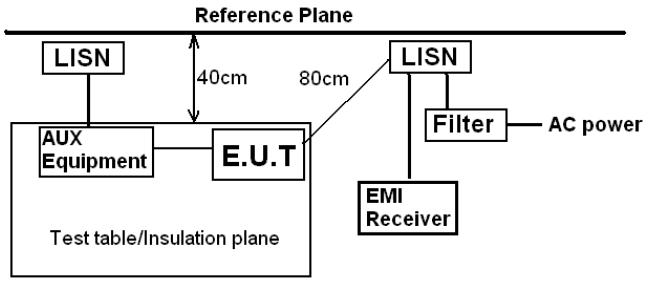
7.2 Conducted Emissions

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:



Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

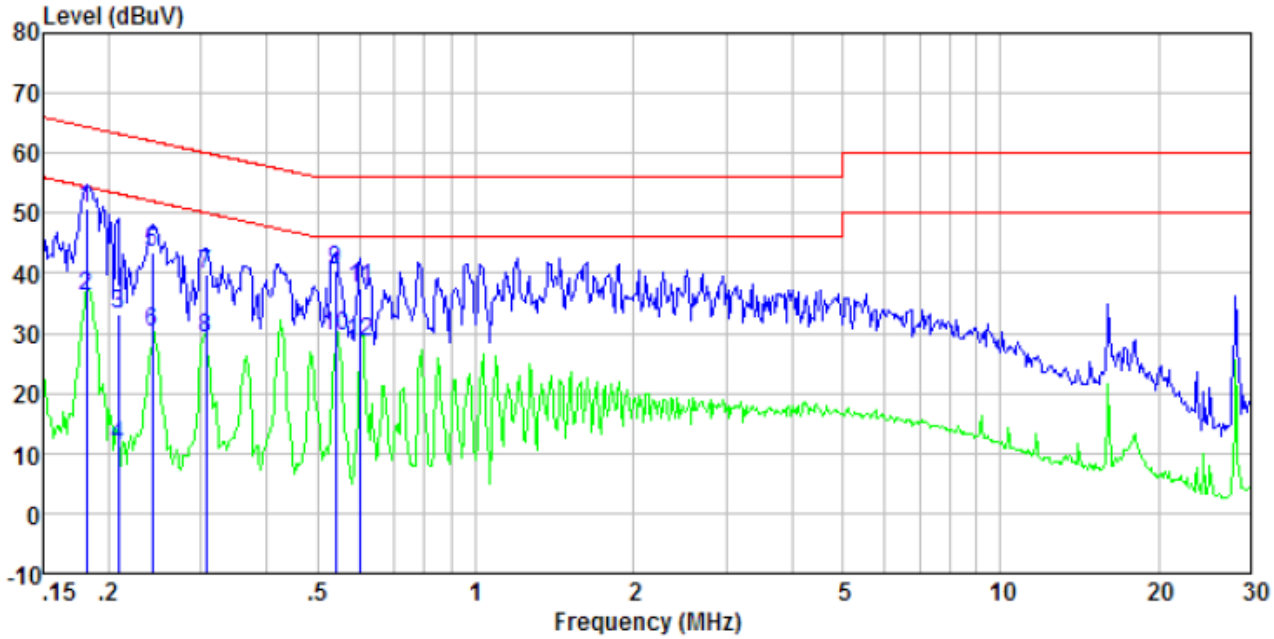
Test procedure:

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

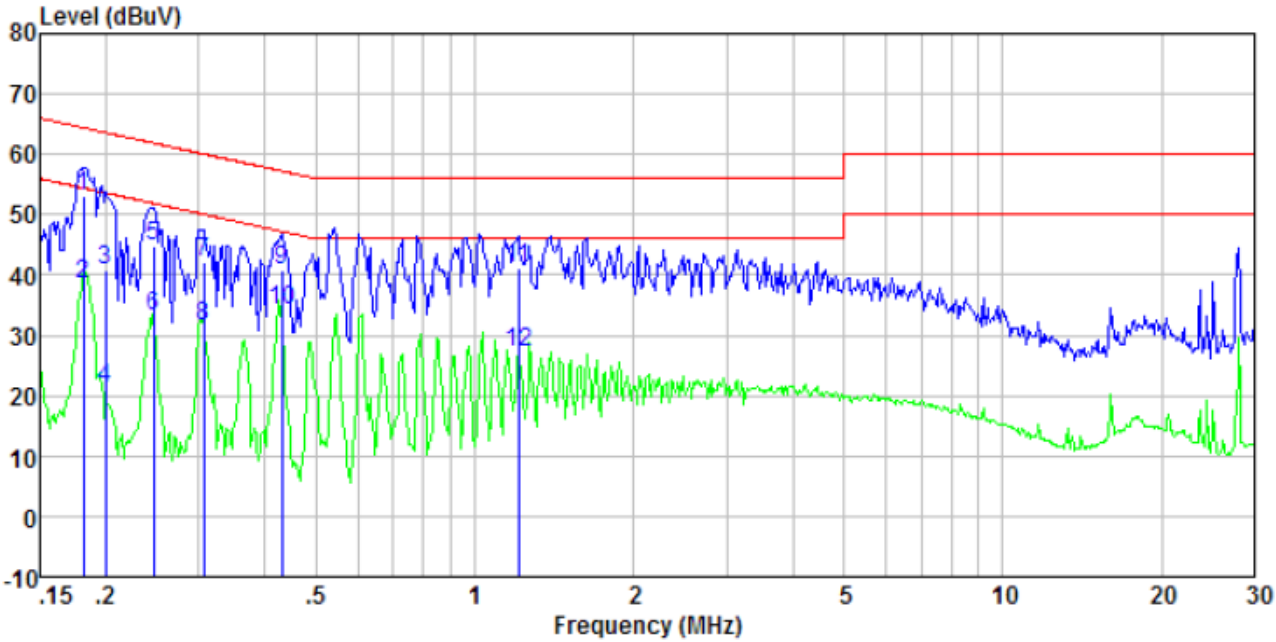
Measurement data:

Line:



Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.182	50.25	0.40	0.10	50.75	64.42	-13.67	QP
0.182	35.73	0.40	0.10	36.23	54.42	-18.19	Average
0.208	32.52	0.40	0.11	33.03	63.27	-30.24	QP
0.208	10.68	0.40	0.11	11.19	53.27	-42.08	Average
0.242	42.89	0.40	0.11	43.40	62.04	-18.64	QP
0.242	29.82	0.40	0.11	30.33	52.04	-21.71	Average
0.307	39.30	0.40	0.10	39.80	60.06	-20.26	QP
0.307	28.65	0.40	0.10	29.15	50.06	-20.91	Average
0.541	40.05	0.30	0.11	40.46	56.00	-15.54	QP
0.541	29.07	0.30	0.11	29.48	46.00	-16.52	Average
0.604	37.09	0.28	0.12	37.49	56.00	-18.51	QP
0.604	28.25	0.28	0.12	28.65	46.00	-17.35	Average

Neutral:



Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.182	52.65	0.40	0.10	53.15	64.42	-11.27	QP
0.182	38.11	0.40	0.10	38.61	54.42	-15.81	Average
0.200	40.46	0.40	0.11	40.97	63.62	-22.65	QP
0.200	20.67	0.40	0.11	21.18	53.62	-32.44	Average
0.247	44.40	0.40	0.10	44.90	61.86	-16.96	QP
0.247	32.53	0.40	0.10	33.03	51.86	-18.83	Average
0.307	41.53	0.40	0.10	42.03	60.06	-18.03	QP
0.307	30.86	0.40	0.10	31.36	50.06	-18.70	Average
0.431	40.41	0.34	0.11	40.86	57.24	-16.38	QP
0.431	33.82	0.34	0.11	34.27	47.24	-12.97	Average
1.210	40.63	0.20	0.16	40.99	56.00	-15.01	QP
1.210	26.87	0.20	0.16	27.23	46.00	-18.77	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
	AV	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

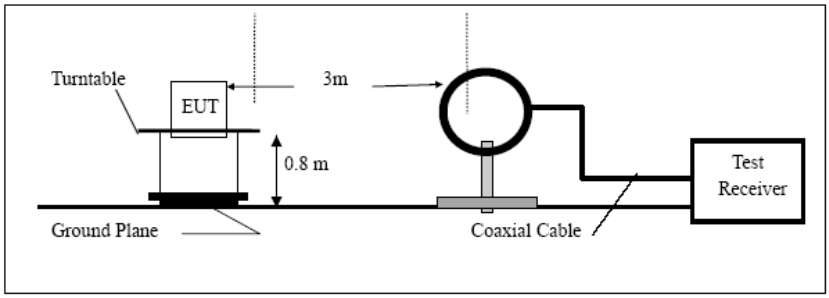
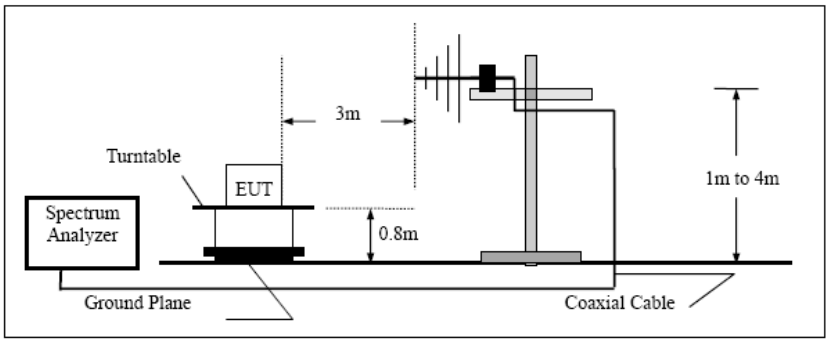
Limits for frequency Above 30MHz

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

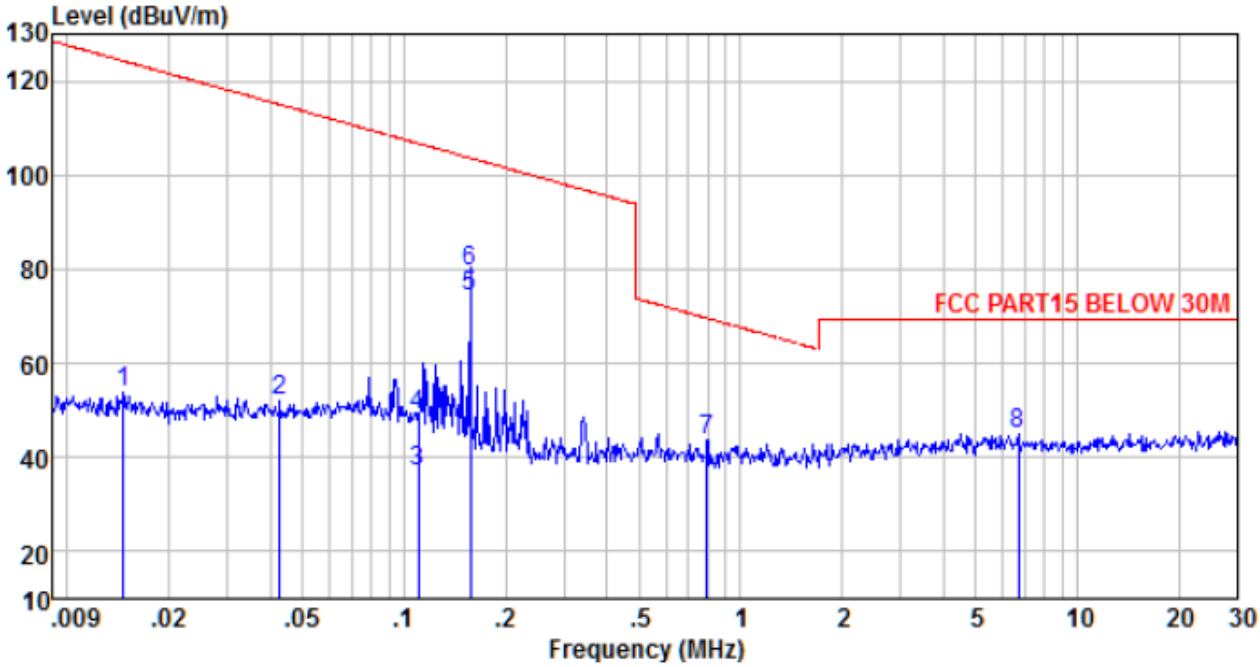
Measurement data:

Measurement data:

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

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

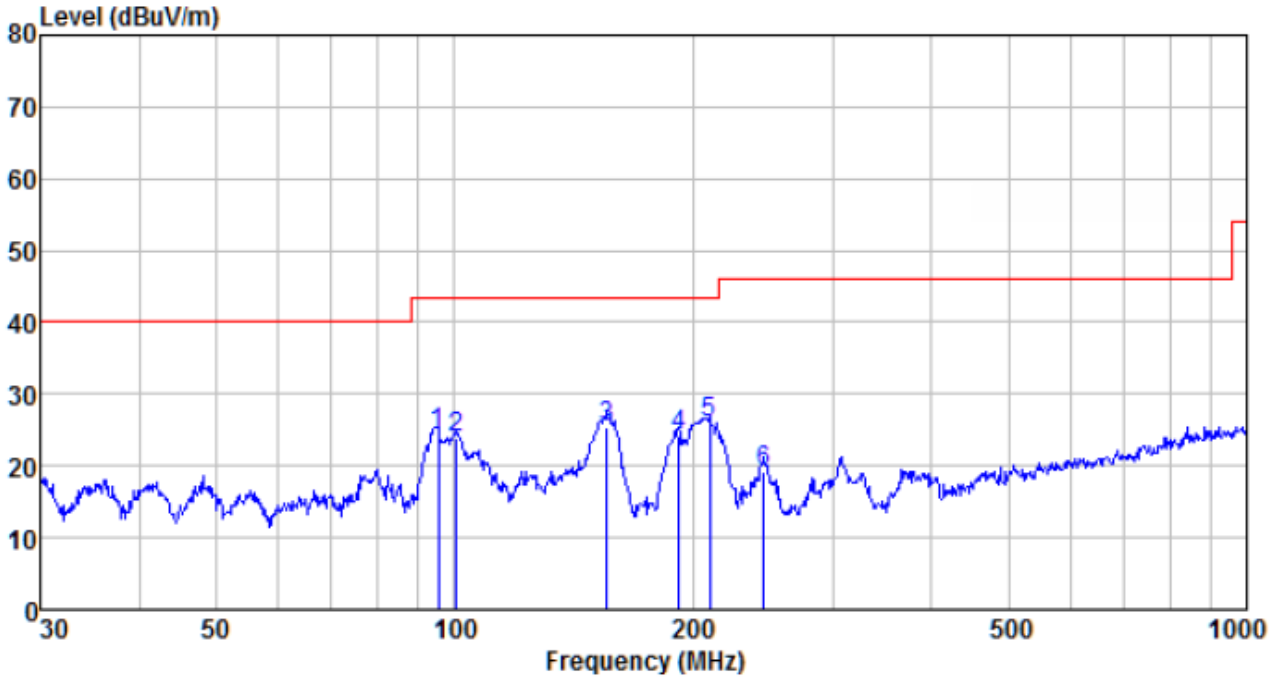
Below 30MHz



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
0.015	33.38	20.36	0.03	0.00	53.77	124.29	-70.52	Peak
0.043	31.02	20.96	0.11	0.00	52.09	114.99	-62.90	Peak
0.110	12.85	24.12	0.17	0.00	37.14	106.78	-69.64	Average
0.110	24.71	24.12	0.17	0.00	49.00	106.78	-57.78	Peak
0.158	51.00	22.79	0.20	0.00	73.99	103.63	-29.64	Average
0.158	56.45	22.79	0.20	0.00	79.44	103.63	-24.19	Peak
0.792	22.73	20.68	0.31	0.00	43.72	69.63	-25.91	Peak
6.689	21.68	22.83	0.46	0.00	44.97	69.54	-24.57	Peak

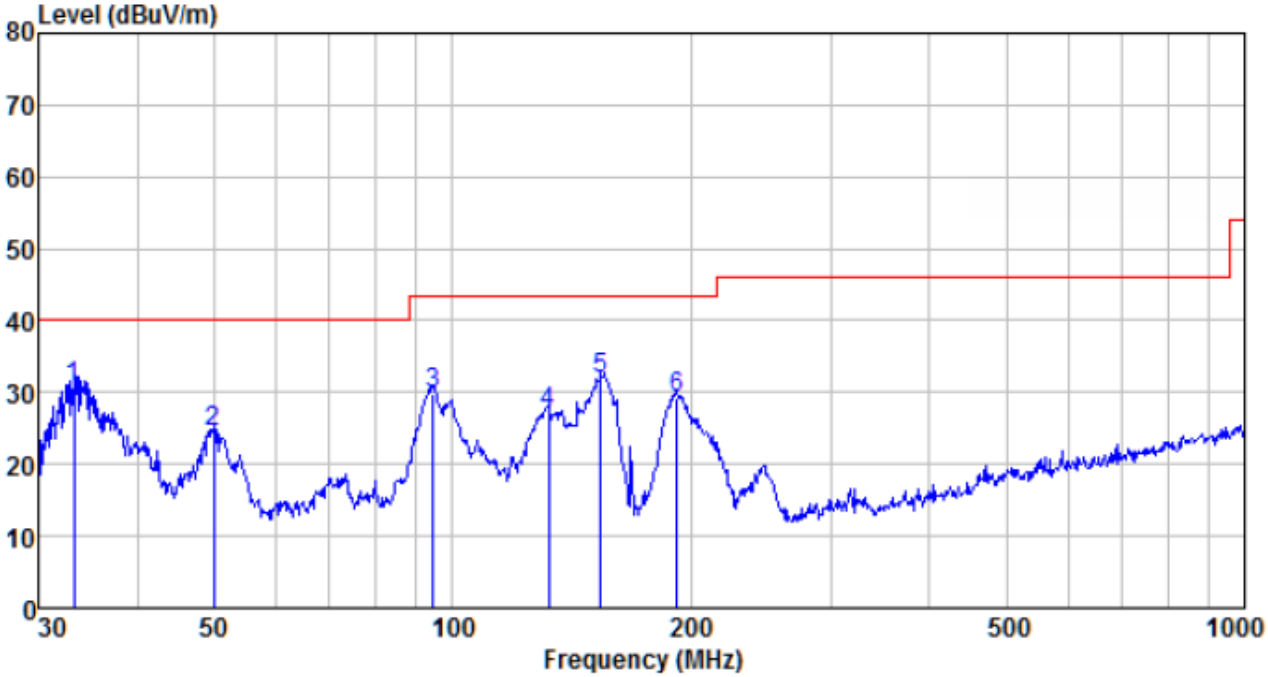
30MHz ~ 1GHz

Horizontal



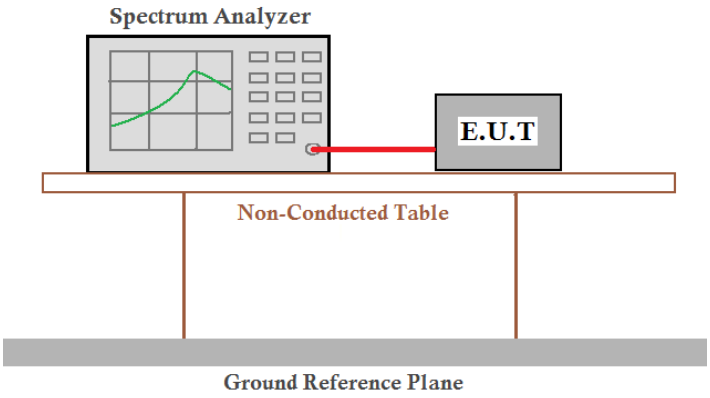
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
95.427	48.56	11.35	1.16	36.68	24.39	43.50	-19.11	QP
100.581	47.30	12.10	1.19	36.73	23.86	43.50	-19.64	QP
155.910	53.02	7.85	1.60	37.11	25.36	43.50	-18.14	QP
191.745	50.06	9.70	1.80	37.29	24.27	43.50	-19.23	QP
210.048	50.78	10.59	1.90	37.34	25.93	43.50	-17.57	QP
245.951	42.79	11.75	2.10	37.38	19.26	46.00	-26.74	QP

Vertical

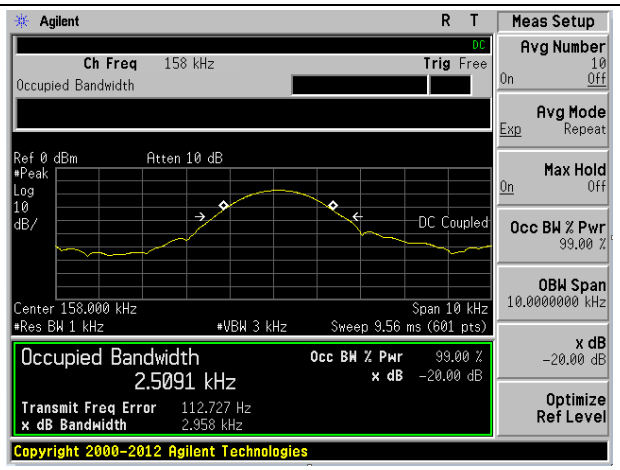


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
33.211	53.97	11.25	0.59	35.23	30.58	40.00	-9.42	QP
49.881	47.67	12.20	0.77	36.17	24.47	40.00	-15.53	QP
94.428	53.90	11.35	1.15	36.68	29.72	43.50	-13.78	QP
132.221	54.72	8.10	1.45	36.97	27.30	43.50	-16.20	QP
153.739	59.51	7.85	1.59	37.10	31.85	43.50	-11.65	QP
191.745	54.99	9.70	1.80	37.29	29.20	43.50	-14.30	QP

7.4 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.215
Test Method:	ANSI C63.10:2013
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

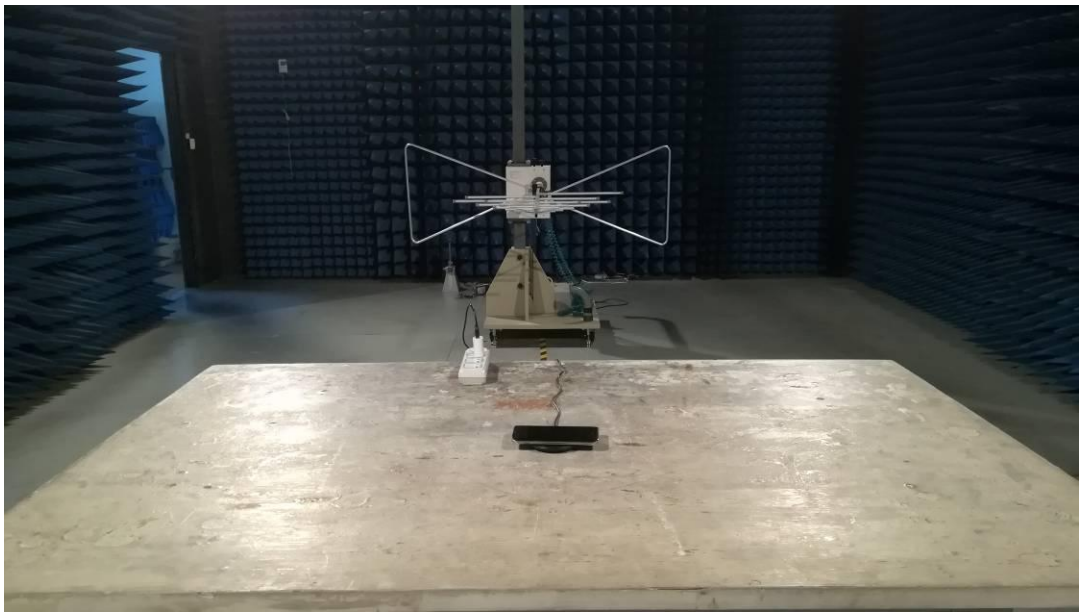
Measurement Data



158kHz: 20dB BW=2.509kHz

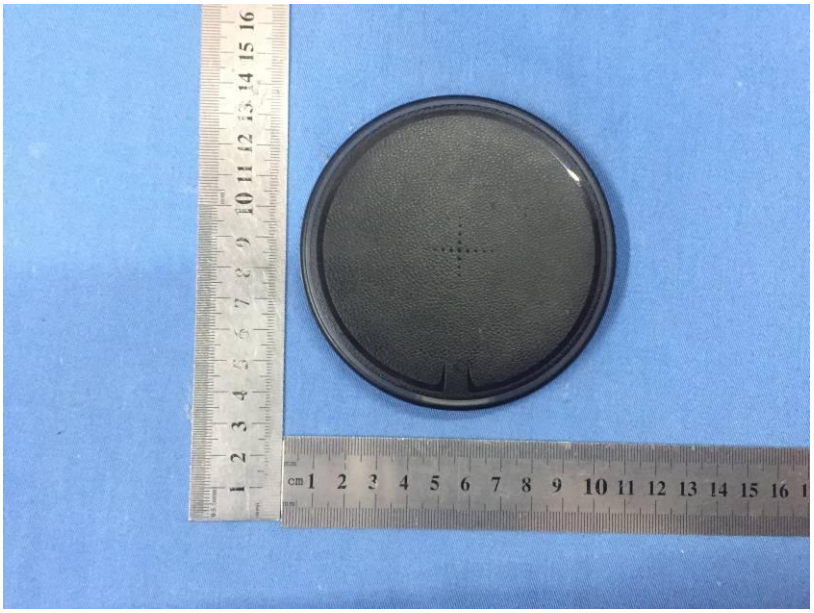
8 Test Setup Photo

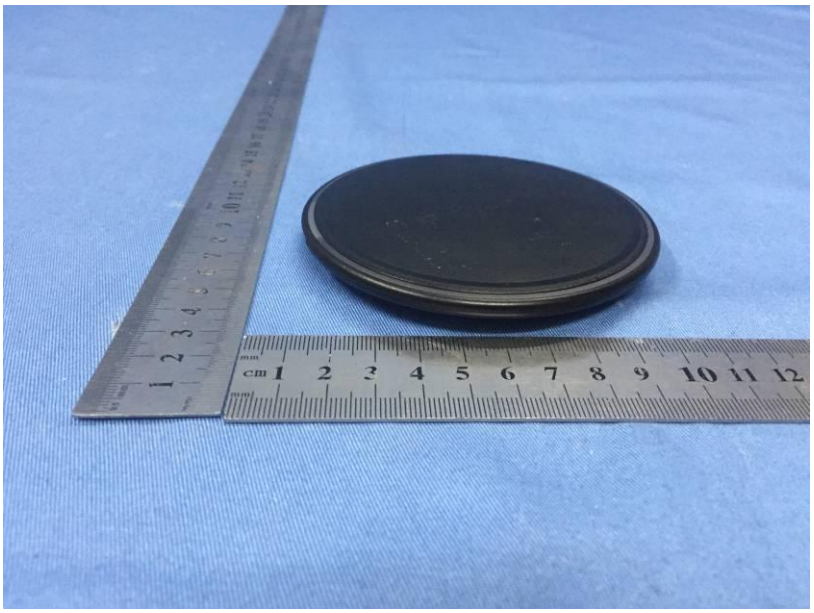
Radiated Emission

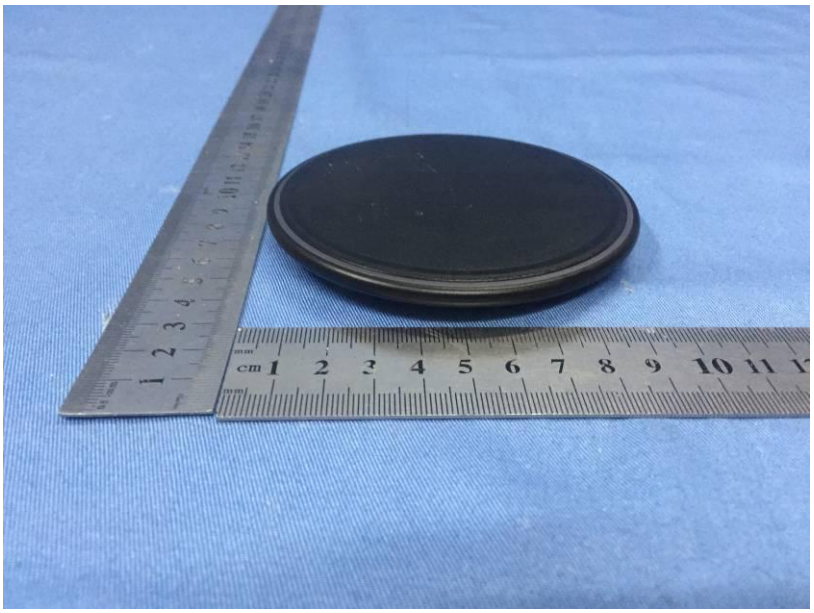


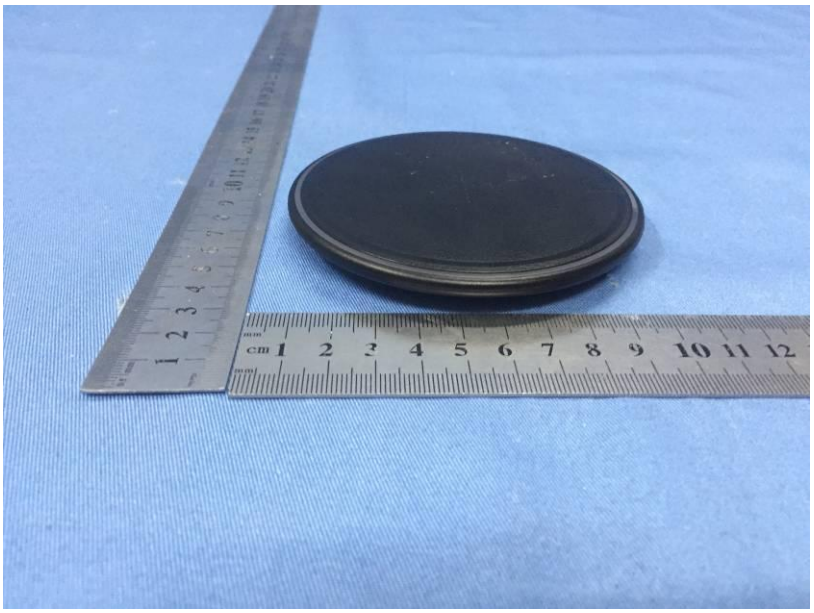
Conducted Emission

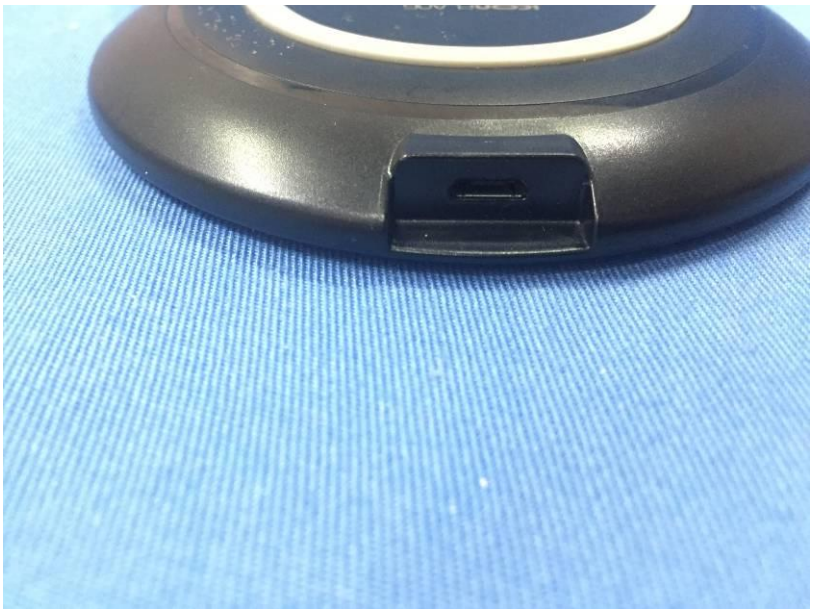
9 EUT Constructional Details

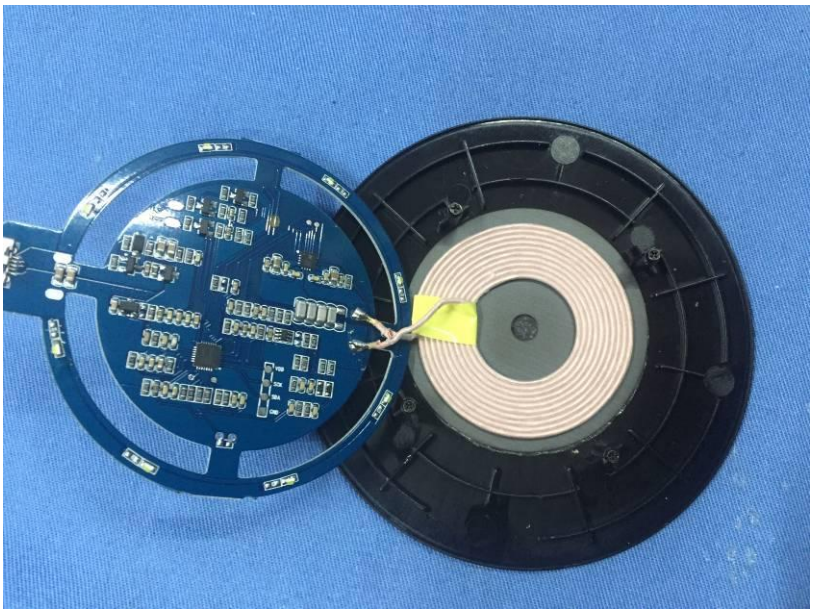


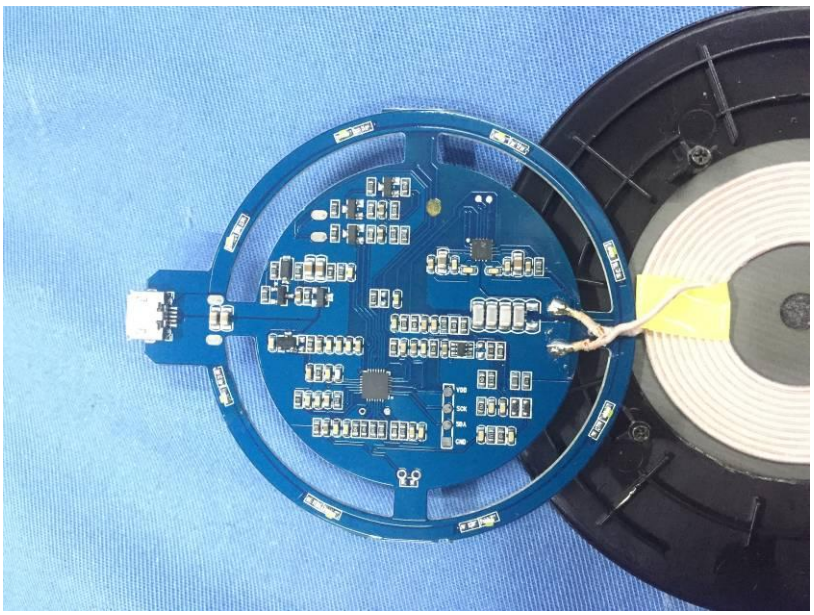




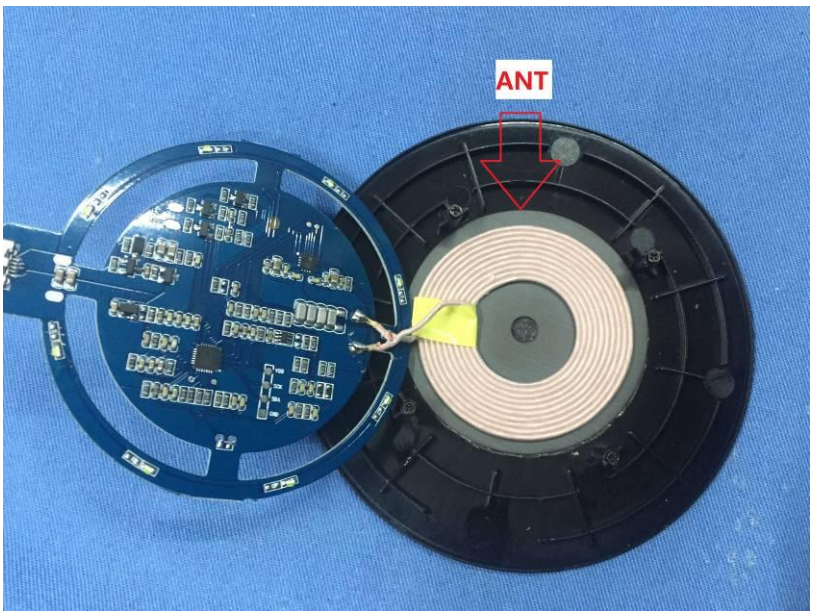








X3C V1.0



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