TCT 通测检测
TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID: 2AIOC-1070

Product: Fast Wireless Charging Pad

Model No.: HKWP1070-10Q

Additional Model: HKWP1070-05

Trade Mark: N/A

Report No.: TCT180103E012

Issued Date: Jan. 11, 2018

Issued for:

HANK ELECTRONICS CO., LTD.
Floor 2nd-7th, A8, Hongye Industry City, Lezhujiao, Zhoushi Road, Baoan District, Shenzhen, China

Issued By:

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1. Test Certification

Product:	Fast Wireless Charging Pad
Model No.:	HKWP1070-10Q
Additional Model No.:	HKWP1070-05
Trade Mark:	**N/A**
Applicant:	HANK ELECTRONICS CO., LTD.
Address:	Floor 2nd-7th, A8, Hongye Industry City, Lezhujiao, Zhoushi Road, Baoan District, Shenzhen, China
Manufacturer:	HANK ELECTRONICS CO., LTD.
Address:	Floor 2nd-7th, A8, Hongye Industry City, Lezhujiao, Zhoushi Road, Baoan District, Shenzhen, China
Date of Test:	Jan. 03, 2018 - Jan. 10, 2018
Applicable Standards:	FCC CFR Title 47 Part 15 Subpart C

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:	Jin Wang	***Date:***	***Jan. 10, 2018***
	Jin Wang		
Reviewed By:	Joe Zhou	***Date:***	***Jan. 11, 2018***
	Joe Zhou		
Approved By:	Tomsin	***Date:***	***Jan. 11, 2018***
	Tomsin		

SHENZHEN TONGCE TESTING LAB TCT

2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Spurious Emission	§15.209(a)(f)	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

3. EUT Description

Product:	Fast Wireless Charging Pad
Model No.:	HKWP1070-10Q
Additional Model No.:	HKWP1070-05
Trade Mark:	**N/A**
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	110-205KHz
Number of Channel:	20 Channels
Modulation Technology:	MSK
Antenna Type:	Coil Antenna
Antenna Gain:	0dBi
Remark:	All models above are identical in interior structure, electrical circuits and components, and just model names are different for the marketing requirement.

Operation Frequency each of channel

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	0.110	6	0.135	11	0.160	16	0.185
2	0.115	7	0.140	12	0.165	17	0.190
3	0.120	8	0.145	13	0.170	18	0.195
4	0.125	9	0.150	14	0.175	19	0.200
5	0.130	10	0.155	15	0.180	20	0.205

4. Genera Information

4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 98.46%) with Fully-charged battery.
The sample was placed (0.1m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Adapter	HW-059200CHQ	K68247F5H01734	/	**HUAWEI**
Mobilephone	SM-G9350	R28HA2ER3GT	/	**SAMSUNG**

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

5. Facilities and Accreditations

5.1. Facilities

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

- FCC - Registration No.: 645098
  Shenzhen Tongce Testing Lab
  The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.
- IC - Registration No.: 10668A-1
  The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

5.2. Location

Shenzhen Tongce Testing Lab
Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China
TEL: +86-755-27673339

5.3. Measurement Uncertainty

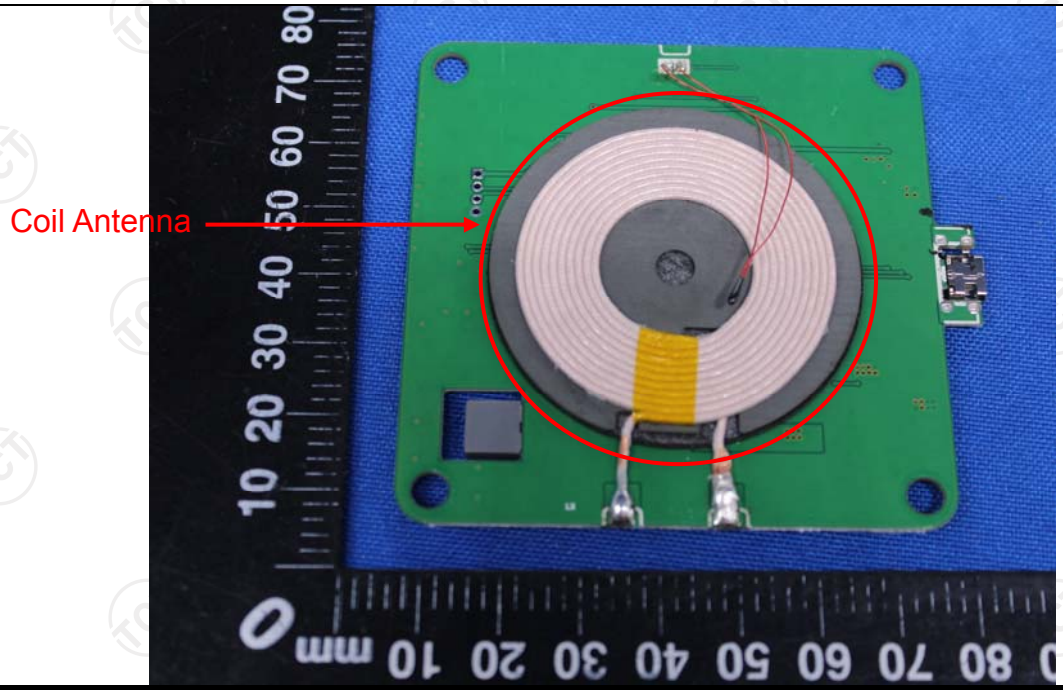
The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

6. Test Results and Measurement Data

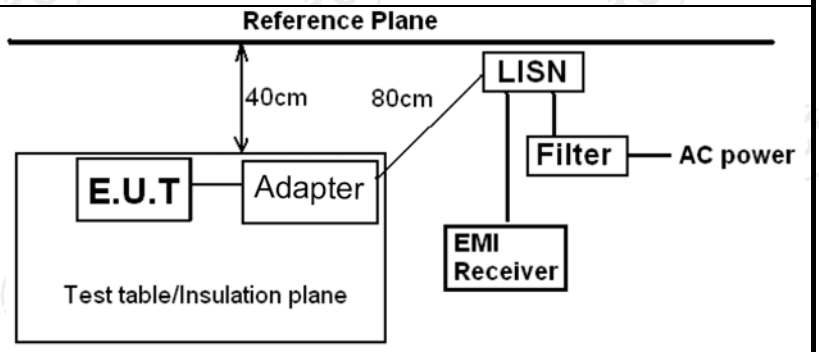
6.1. Antenna requirement

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.	
E.U.T Antenna:	
The antenna is coil antenna which permanently attached, and the best case gain of the antenna is 0dBi.	



6.2. Conducted Emission

6.2.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Frequency Range:</td><td>150 kHz to 30 MHz</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9 kHz, VBW=30 kHz, Sweep time=auto</td></tr>
<tr><td>Limits:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
</td></tr>
<tr><td>Test Setup:</td><td>


Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m
</td></tr>
<tr><td>Test Mode:</td><td>Charging + Transmitting Mode</td></tr>
<tr><td>Test Procedure:</td><td>1. The E.U.T is connected to an adapter 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: 2013 on conducted measurement.</td></tr>
<tr><td>Test Result:</td><td>PASS</td></tr>
</table>

6.2.2. Test Instruments

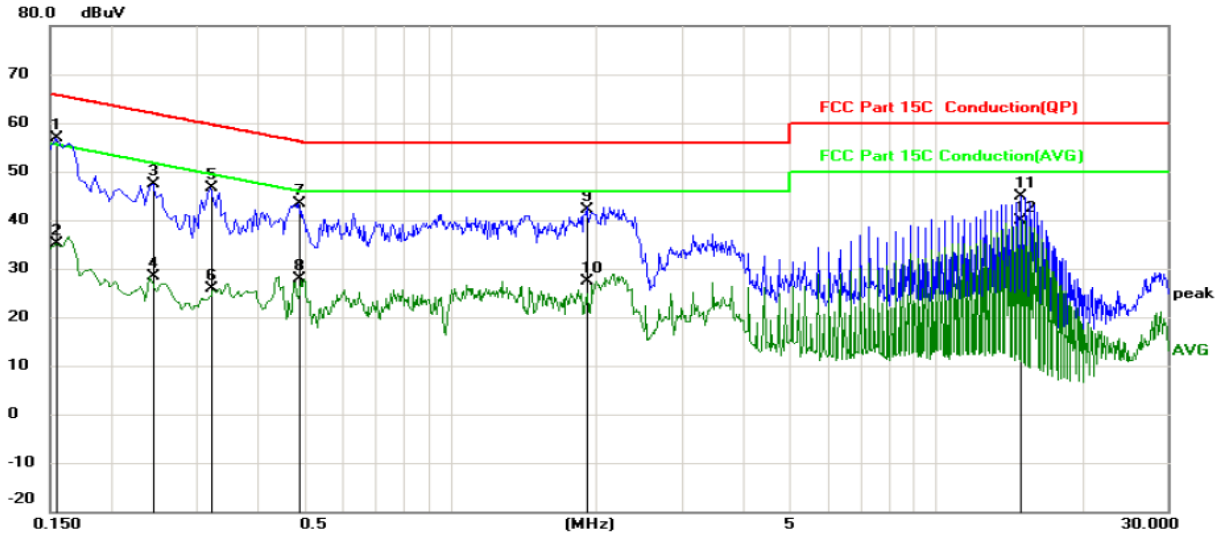
Conducted Emission Shielding Room Test Site (843)				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Test Receiver	R&S	ESPI	101401	Jun. 12, 2018
LISN	Schwarzbeck	NSLK 8126	8126453	Sep. 27, 2018
Coax cable (9KHz-30MHz)	TCT	CE-05	N/A	Sep. 27, 2018
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



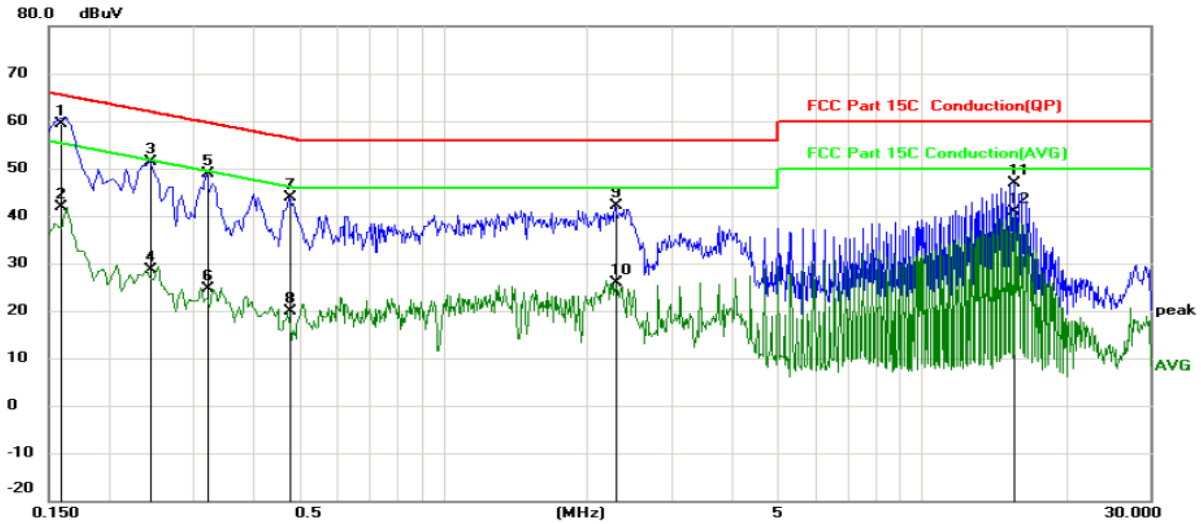
Site	Phase: L1	Temperature: 25	
Limit: FCC Part 15C Conduction(QP)	Power:	Humidity: 55 %	

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1544	45.35	11.47	56.82	65.76	-8.94	QP	
2		0.1544	23.68	11.47	35.15	55.76	-20.61	AVG	
3		0.2445	36.05	11.43	47.48	61.94	-14.46	QP	
4		0.2445	16.99	11.43	28.42	51.94	-23.52	AVG	
5		0.3209	35.15	11.39	46.54	59.68	-13.14	QP	
6		0.3209	14.55	11.39	25.94	49.68	-23.74	AVG	
7		0.4875	31.95	11.31	43.26	56.21	-12.95	QP	
8		0.4875	16.50	11.31	27.81	46.21	-18.40	AVG	
9		1.9139	30.50	11.65	42.15	56.00	-13.85	QP	
10		1.9139	15.68	11.65	27.33	46.00	-18.67	AVG	
11		14.9370	33.17	11.67	44.84	60.00	-15.16	QP	
12		14.9370	28.20	11.67	39.87	50.00	-10.13	AVG	

Note:

Freq. = Emission frequency in MHz
Reading level (dBµV) = Receiver reading
Corr. Factor (dB) = Antenna factor + Cable loss
Measurement (dBµV) = Reading level (dBµV) + Corr. Factor (dB)
Limit (dBµV) = Limit stated in standard
Margin (dB) = Measurement (dBµV) – Limits (dBµV)
Q.P. =Quasi-Peak
AVG =average
** is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz*

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Site | Phase: N | Temperature: 25

Limit: FCC Part 15C Conduction(QP) | Power: | Humidity: 55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1590	48.00	11.47	59.47	65.52	-6.05	QP	
2		0.1590	30.50	11.47	41.97	55.52	-13.55	AVG	
3		0.2445	40.00	11.43	51.43	61.94	-10.51	QP	
4		0.2445	17.26	11.43	28.69	51.94	-23.25	AVG	
5		0.3209	37.57	11.39	48.96	59.68	-10.72	QP	
6		0.3209	13.28	11.39	24.67	49.68	-25.01	AVG	
7		0.4785	32.60	11.31	43.91	56.37	-12.46	QP	
8		0.4785	8.57	11.31	19.88	46.37	-26.49	AVG	
9		2.2919	30.58	11.58	42.16	56.00	-13.84	QP	
10		2.2919	14.39	11.58	25.97	46.00	-20.03	AVG	
11		15.5760	35.24	11.55	46.79	60.00	-13.21	QP	
12		15.5760	29.25	11.55	40.80	50.00	-9.20	AVG	

Note1:

Freq. = Emission frequency in MHz

Reading level (dBµV) = Receiver reading

Corr. Factor (dB) = Antenna factor + Cable loss

Measurement (dBµV) = Reading level (dBµV) + Corr. Factor (dB)

Limit (dBµV) = Limit stated in standard

Margin (dB) = Measurement (dBµV) – Limits (dBµV)

Q.P. =Quasi-Peak AVG =average

** is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.*

6.3. Radiated Spurious Emission Measurement

6.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10: 2013
Frequency Range:	9 kHz to 25 GHz
Measurement Distance:	3 m
Antenna Polarization:	Horizontal & Vertical
Operation mode:	Refer to item 4.1

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

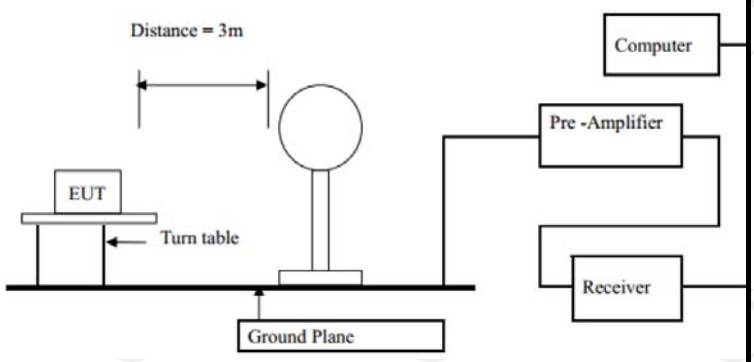
Limit:

Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

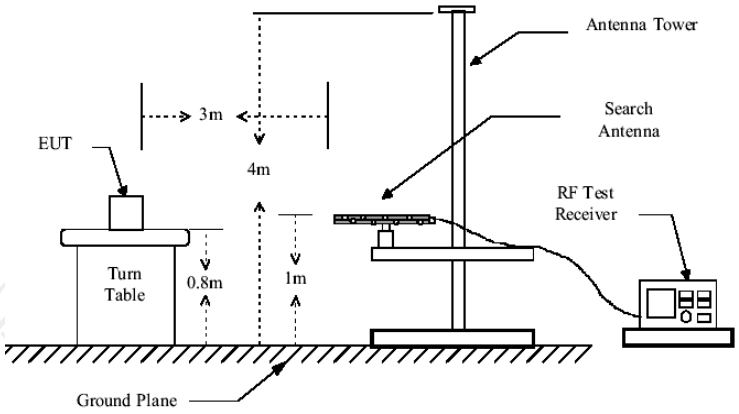
Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector
Above 1GHz	500	3	Average
	5000	3	Peak

Test setup:

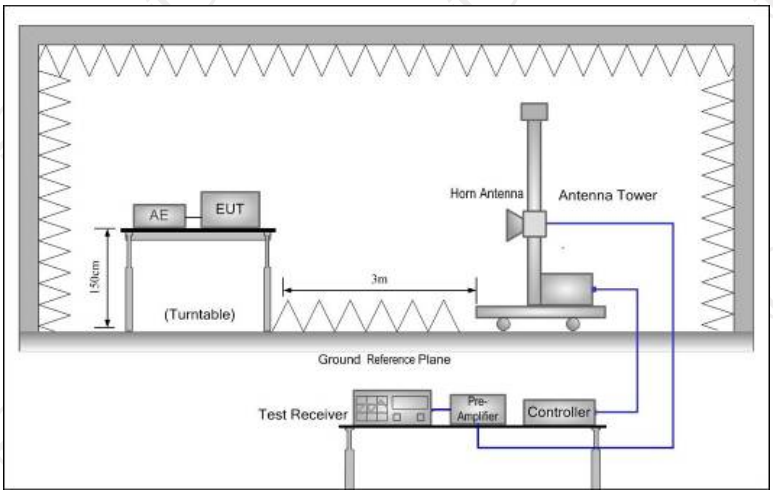
For radiated emissions below 30MHz



30MHz to 1GHz



Above 1GHz



Test Procedure:

1. For the radiated emission test below 1GHz:
   The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.
   For the radiated emission test above 1GHz:
   Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final

	measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. 2. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level 3. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. 4. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for f < 1 GHz; VBW ⩾RBW; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for f 1 GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW ⩾ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test mode:	Refer to section 4.1 for details
Test results:	PASS

6.3.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep. 27, 2018
Spectrum Analyzer	ROHDE&SCHWARZ	FSQ	200061	Sep. 27, 2018
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 27, 2018
Pre-amplifier	HP	8447D	2727A05017	Sep. 27, 2018
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 27, 2018
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 27, 2018
Horn Antenna	Schwarzbeck	BBH 9170	582	Jun. 07, 2018
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Coax cable (9KHz-1GHz)	TCT	RE-low-01	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-02	N/A	Sep. 27, 2018
Coax cable (9KHz-1GHz)	TCT	RE-low-03	N/A	Sep. 27, 2018
Coax cable (9KHz-40GHz)	TCT	RE-high-04	N/A	Sep. 27, 2018
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

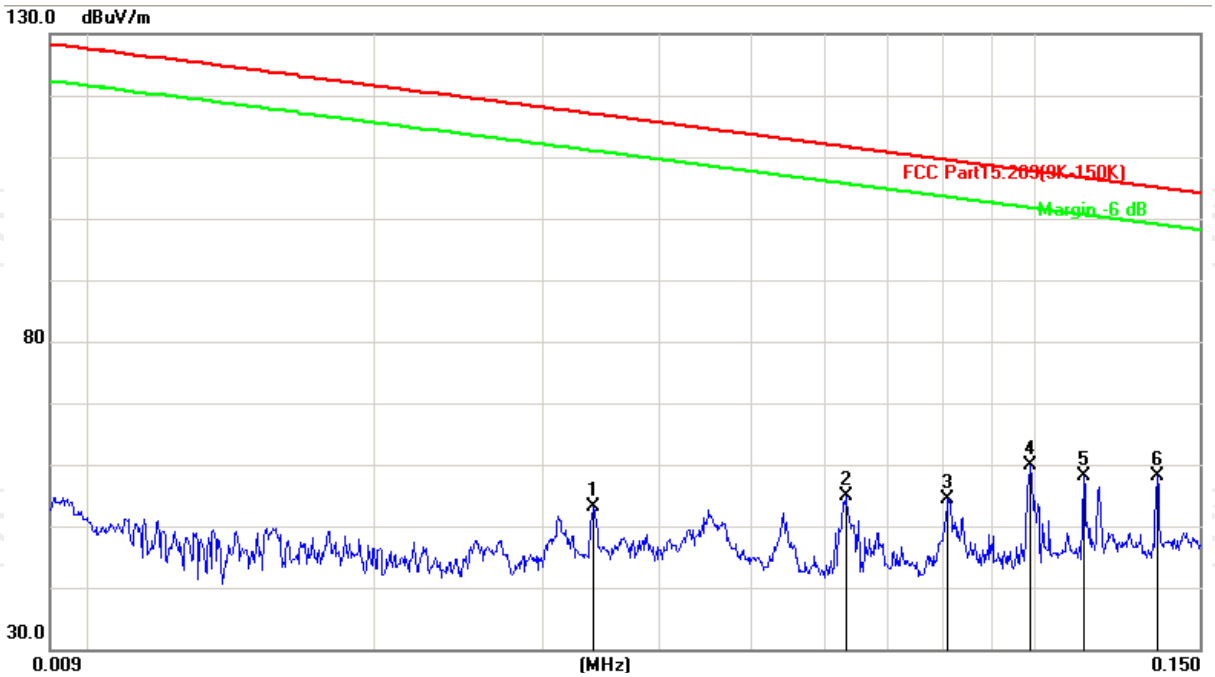
Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.3.3. Test Data

Please refer to following diagram for individual

9KHz-30MHz

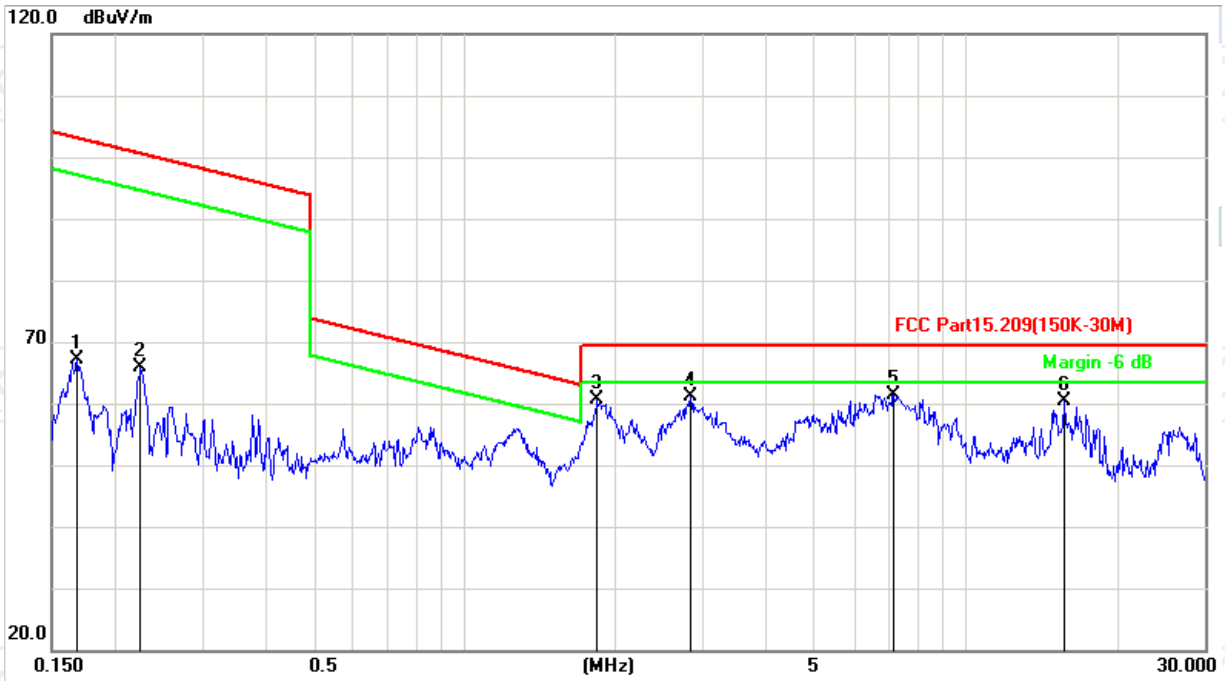
9KHz-150KHz:



Site	Polarization: *Vertical*	Temperature:	25
Limit: FCC Part15.209(9K-150K)	Power: AC 120V/60Hz	Humidity:	55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		0.0340	33.58	19.47	53.05	116.9	-63.93	peak			
2		0.0631	33.54	21.43	54.97	111.6	-56.64	peak			
3		0.0810	31.74	22.65	54.39	109.4	-55.06	peak			
4		0.0990	36.06	23.87	59.93	107.7	-47.78	peak			
5		0.1129	33.68	24.56	58.24	106.5	-48.33	peak			
6	*	0.1350	32.62	25.62	58.24	105.0	-46.77	peak			

150KHz-30MHz:

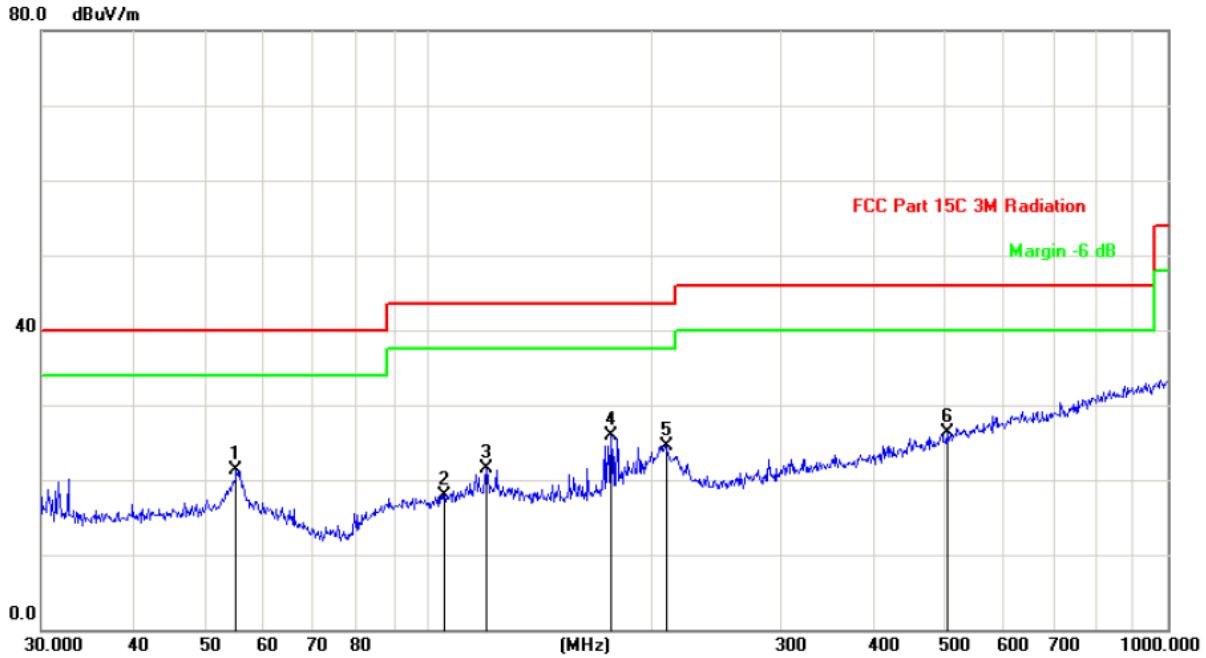


Site	Polarization: *Vertical*	Temperature:	25
Limit: FCC Part15.209(150K-30M)	Power: AC 120V/60Hz	Humidity:	55 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		0.1685	40.98	26.19	67.17	103.0	-35.92	peak			
2		0.2255	40.05	25.89	65.94	100.5	-34.61	peak			
3		1.8386	35.48	25.08	60.56	69.50	-8.94	peak			
4		2.8239	36.13	24.97	61.10	69.50	-8.40	peak			
5	*	7.1753	35.80	25.62	61.42	69.50	-8.08	peak			
6		15.7179	34.94	25.36	60.30	69.50	-9.20	peak			

30MHz-1GHz

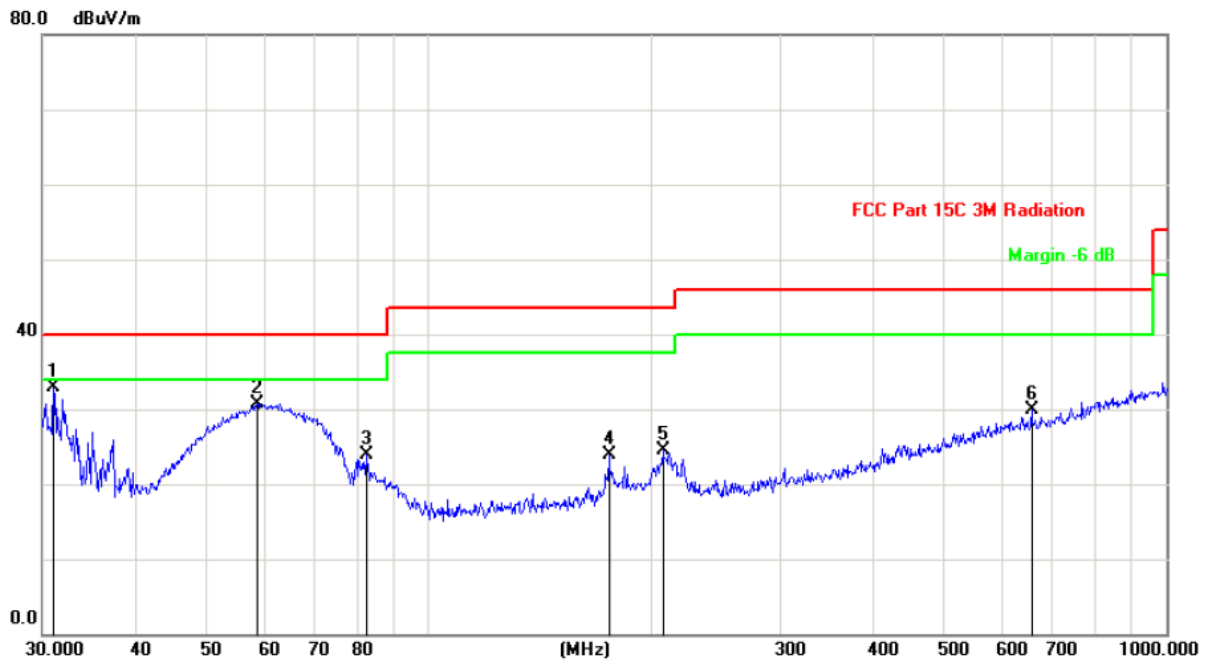
Horizontal:



Site	Polarization: ***Horizontal***	Temperature: 25	
Limit: FCC Part 15C 3M Radiation	Power:	Humidity: 55 %	

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1		55.0274	34.28	-13.03	21.25	40.00	-18.75	peak			
2		105.2718	30.15	-12.20	17.95	43.50	-25.55	peak			
3		119.8556	35.57	-14.16	21.41	43.50	-22.09	peak			
4	*	176.8878	40.10	-14.15	25.95	43.50	-17.55	peak			
5		210.0482	36.87	-12.35	24.52	43.50	-18.98	peak			
6		502.9395	29.29	-3.04	26.25	46.00	-19.75	peak			

Vertical:



Site	Polarization: ***Vertical***	Temperature:	25
Limit: FCC Part 15C 3M Radiation	Power:	Humidity:	55 %

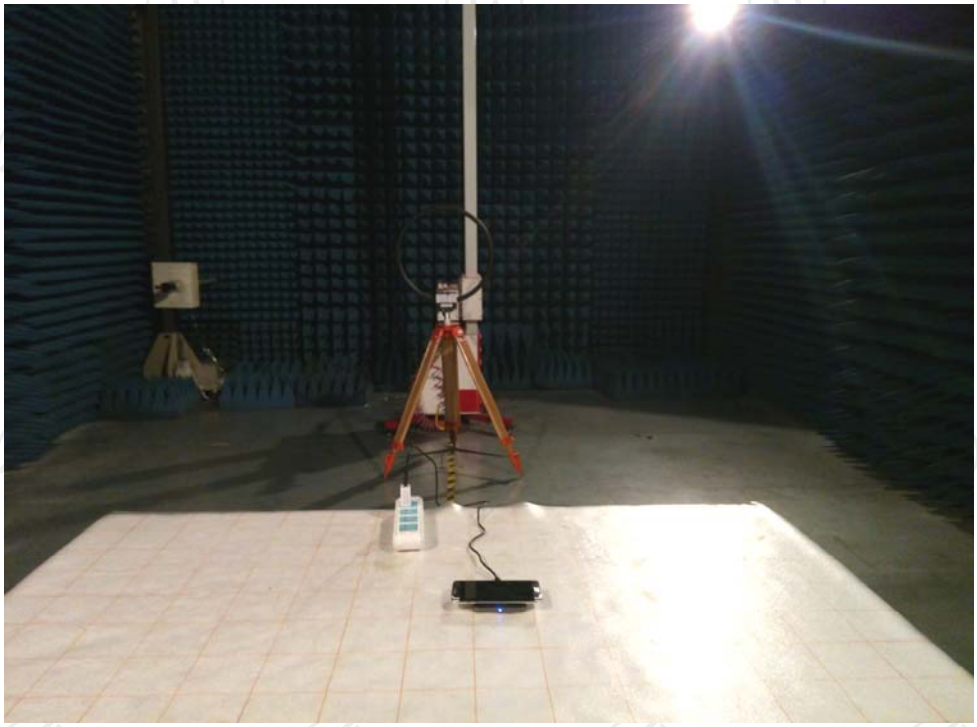
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector	cm	degree	Comment
1	*	31.0706	46.56	-13.68	32.88	40.00	-7.12	peak			
2		58.6126	44.03	-13.34	30.69	40.00	-9.31	peak			
3		82.3588	40.35	-16.45	23.90	40.00	-16.10	peak			
4		175.6516	38.05	-14.23	23.82	43.50	-19.68	peak			
5		207.8501	36.88	-12.44	24.44	43.50	-19.06	peak			
6		656.5300	30.23	-0.34	29.89	46.00	-16.11	peak			

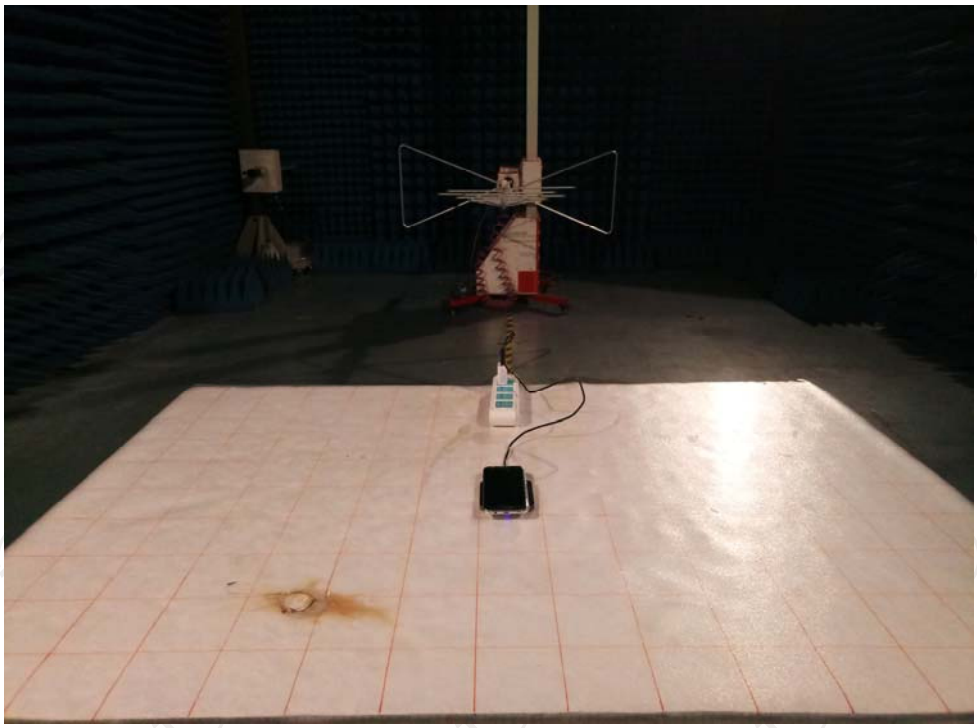
Note:

Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

Appendix A: Photographs of Test Setup

Product: Fast Wireless Charging Pad
Model: HKWP1070-10Q
Radiated Emission

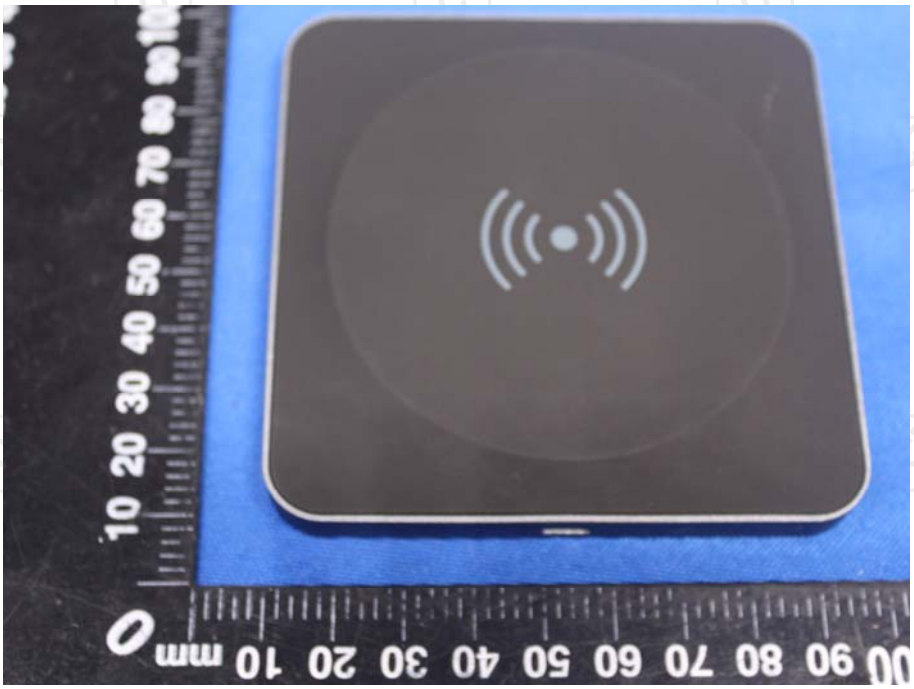


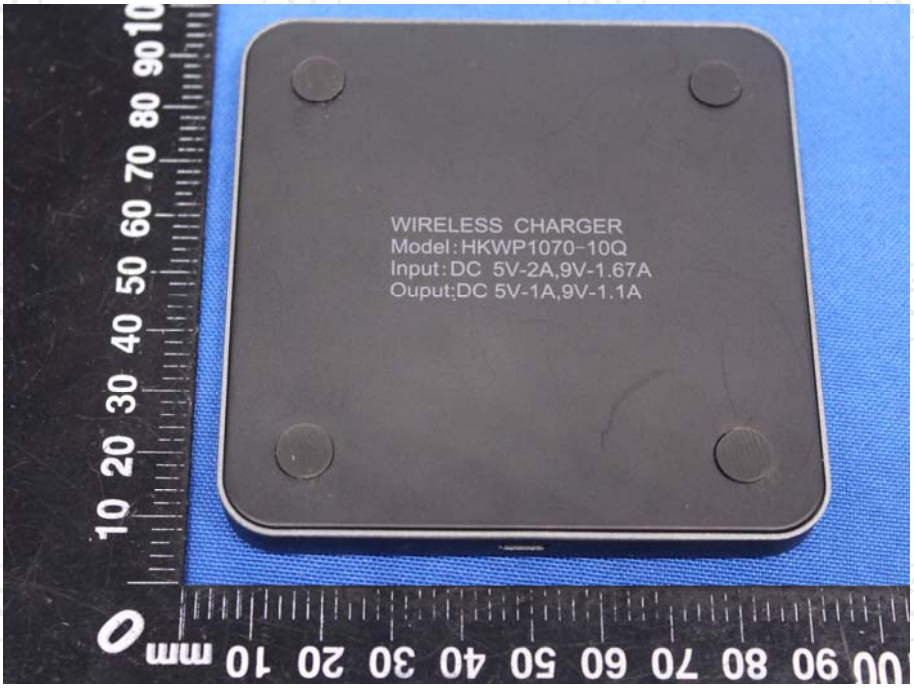


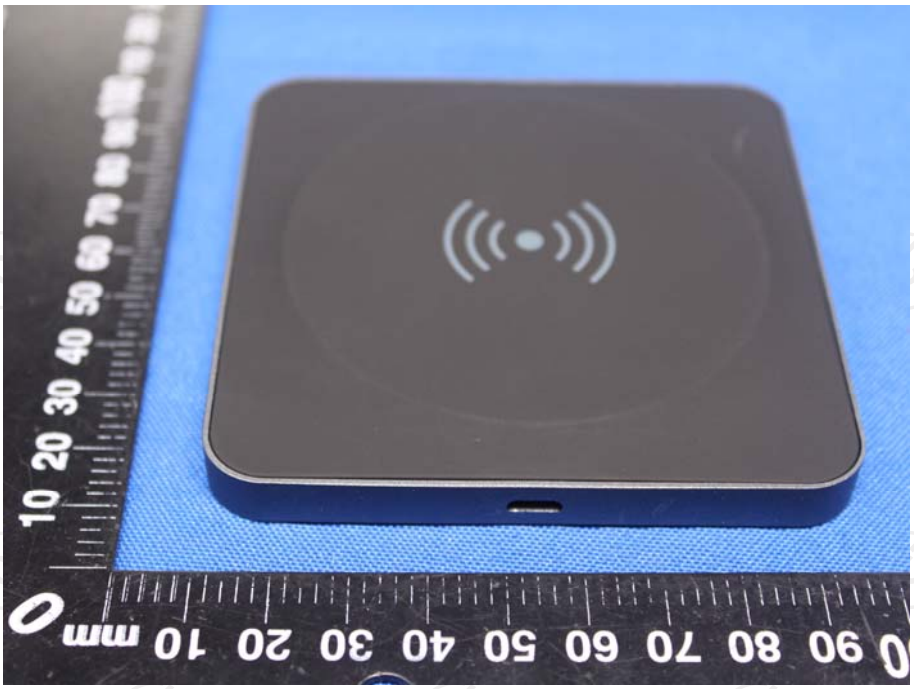
Conducted Emission

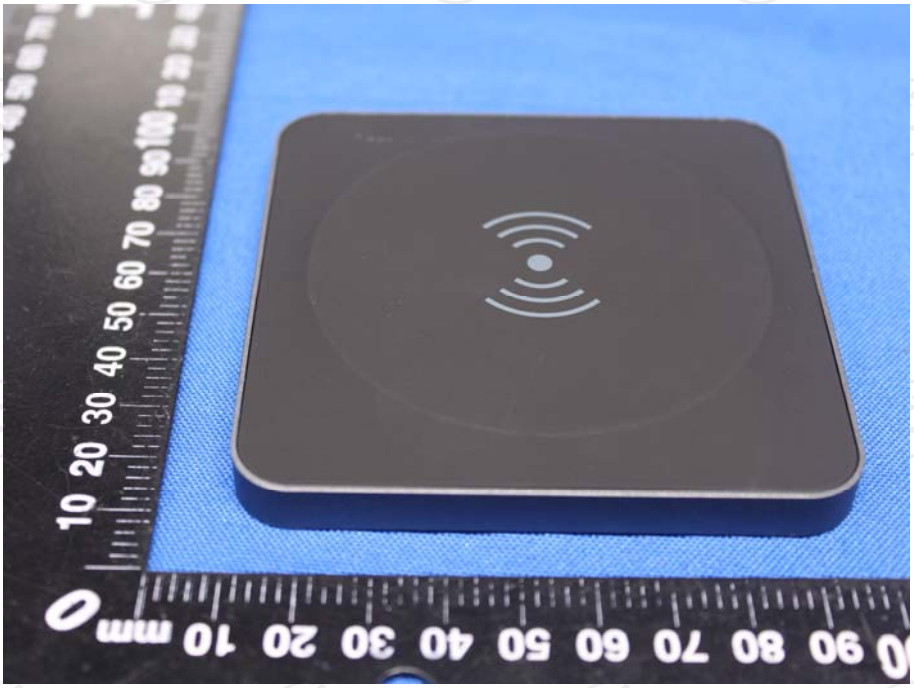
Appendix B: Photographs of EUT

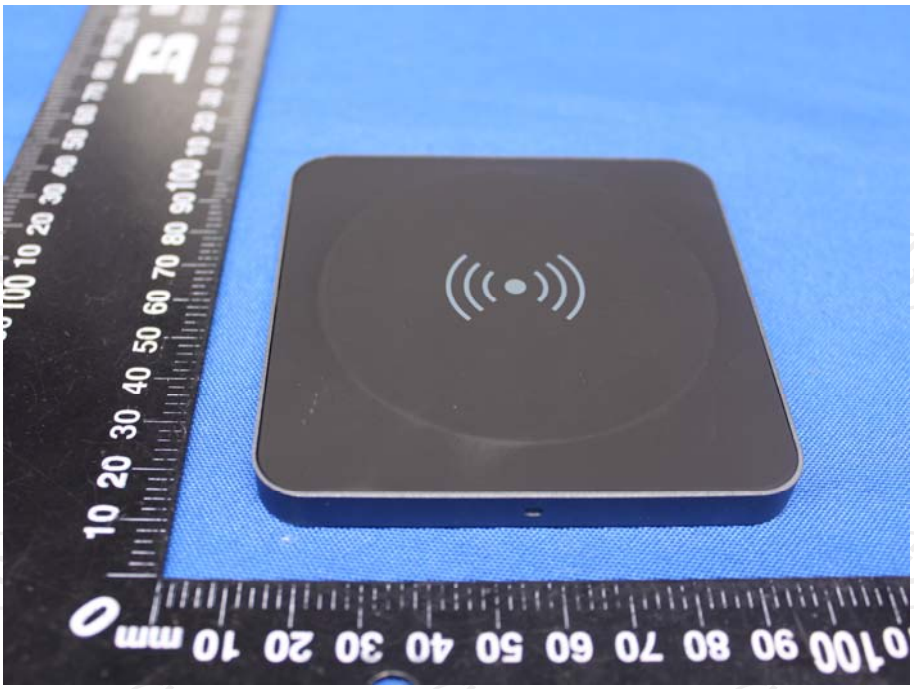
Product: Fast Wireless Charging Pad
Model: HKWP1070-10Q
External Photos

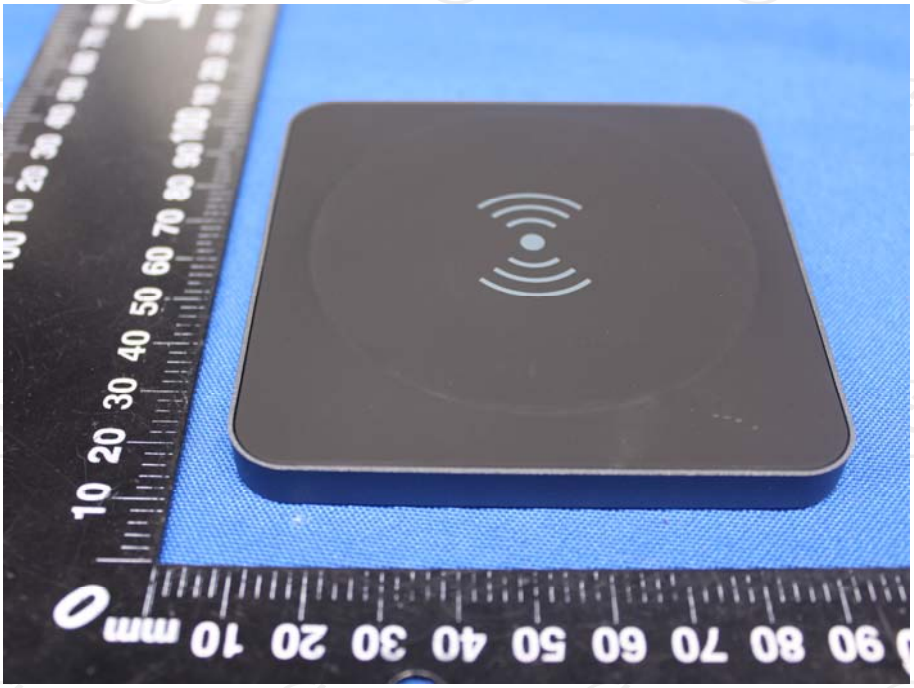




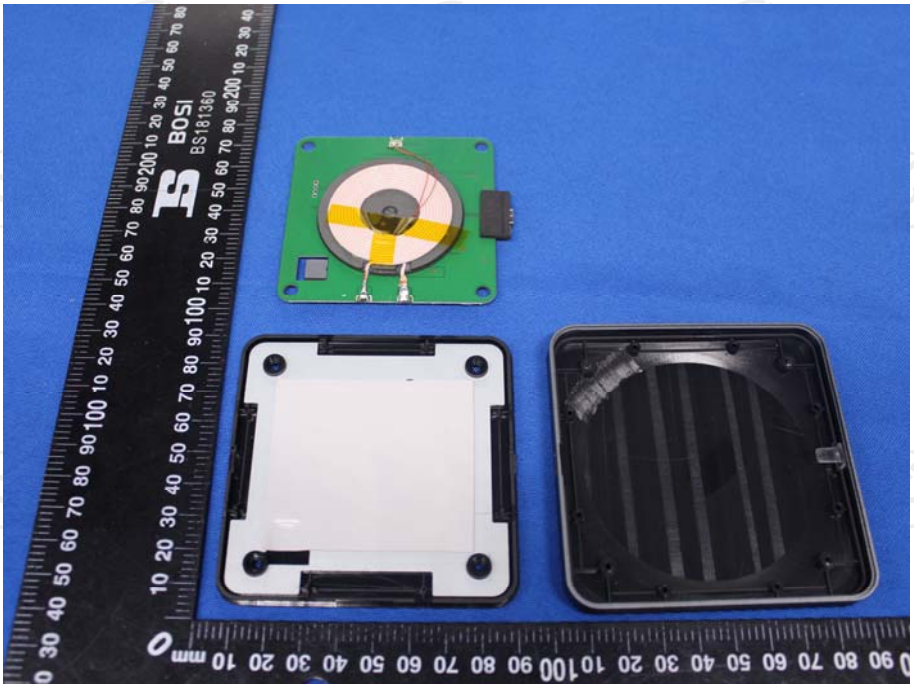


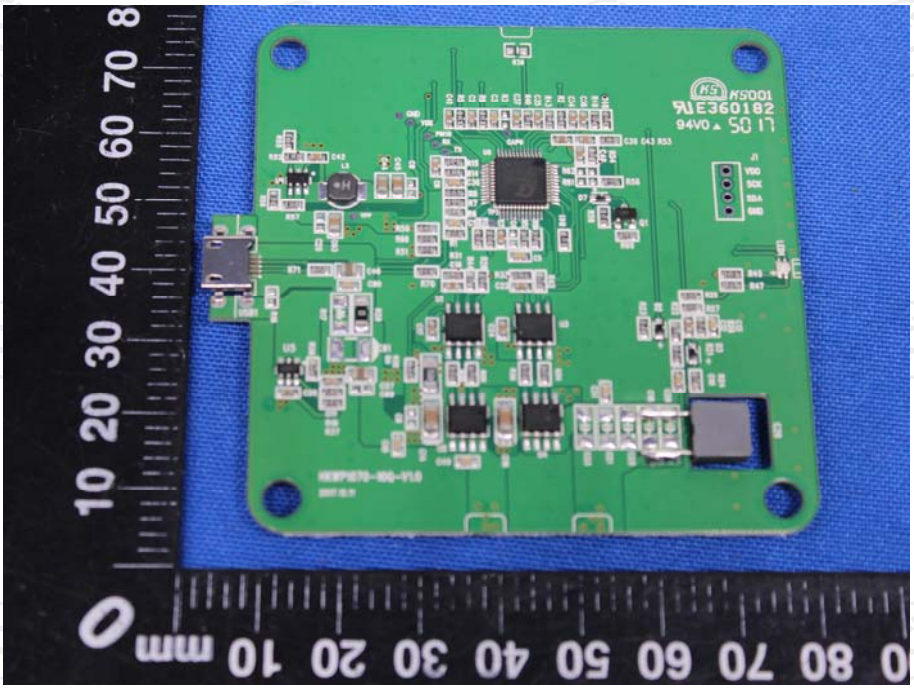


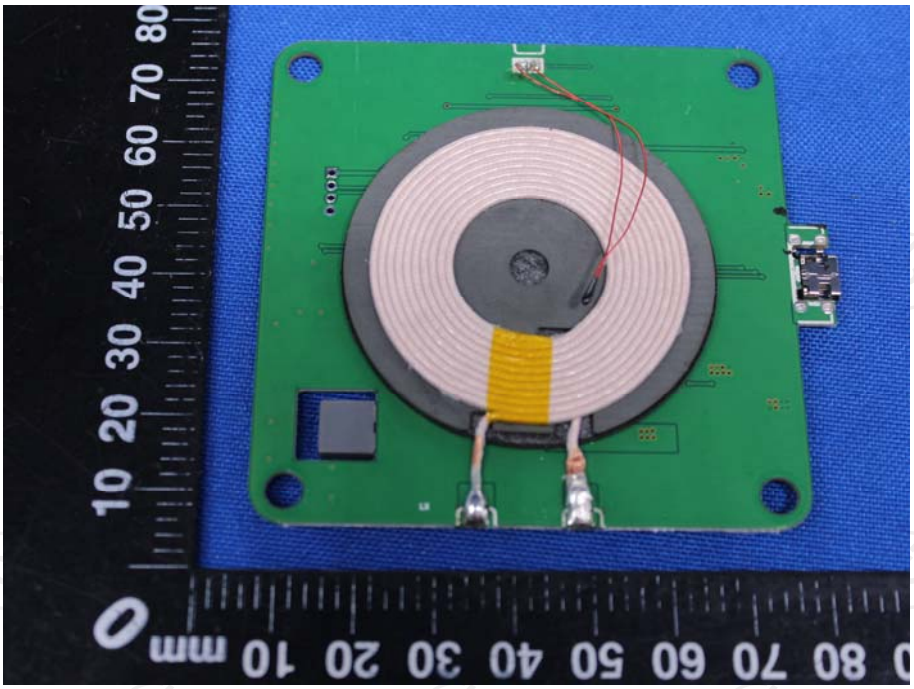


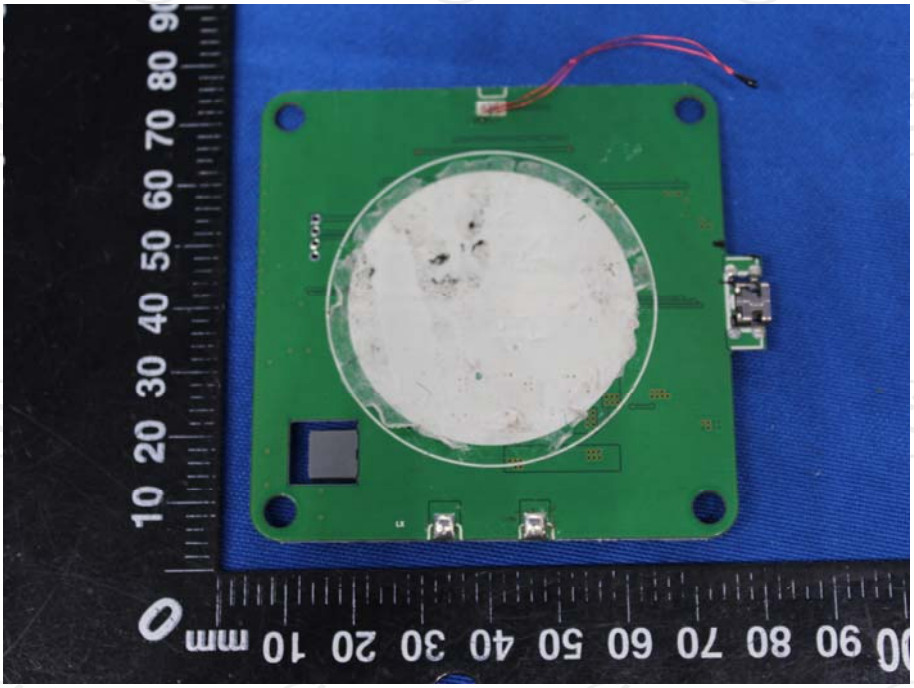


Product: Fast Wireless Charging Pad
Model: HKWP1070-10Q
Internal Photos









********END OF REPORT********