

TEST REPORT

Reference No...... : WTS17S1298079-1E
FCC ID : 2AIOC-1090
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
Product..... : Wireless Charging Pad
Model(s) : HKWP1090-05, HKWP1090-10Q, HKWP1070-05, HKWP1070-10Q, HKWP1080-05, HKWP1080-10Q, HKWP1010-05, HKWP1010-10Q, HKWP1050-10Q, HKWP1060-10Q, HKWP1100-10Q, HKWP1110-10Q, QC0003, QC0004, WL-QIFC
Standards..... : FCC CFR47 Part 15.207: 2017
FCC CFR47 Part 15.209: 2017
Date of Receipt sample : 2017-12-14
Date of Test : 2017-12-15 to 2018-01-02
Date of Issue..... : 2018-01-03
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 compiler and approver.

Prepared By:

Waltek Services (Shenzhen) Co., Ltd.

Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China

Test Site/Test Location:

Waltek Services (Shenzhen) Co., Ltd.

Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China

Tel :+86-755-83551033

Fax:+86-755-83552400

Compiled by:

Robin Zhou

Robin Zhou / Project Engineer

Approved by:



Philo Zhong

Philo Zhong / Manager

1 Laboratories Introduction

Waltek Services Test Group Ltd. is one of the largest and the most comprehensive third party testing organizations in China, our headquarter located in Shenzhen (CNAS Registration No. L3110, A2LA Certificate Number: 4243.01) and have branches in Foshan (CNAS Registration No. L6478), Dongguan (CNAS Registration No. L9950), Zhongshan, Suzhou (CNAS Registration No. L7754), Ningbo and Hong Kong, Our test capability covered four large fields: safety test. Electronic Magnetic Compatibility(EMC), reliability and energy performance, Chemical test. Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CPSC(Consumer Product Safety Commission), CEC(California energy efficiency), IC(Industry Canada) and ELI(Efficient Lighting Initiative). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as UL, Intertek(ETL-SEMKO), CSA, TÜV Rheinland, TÜV SÜD, etc. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

Waltek Services (Shenzhen) Co., Ltd.

A. Accreditations for Conformity Assessment (International)

Country/Region	Accreditation Body	Scope	Note	
USA	CNAS (Registration No.: L3110) A2LA (Certificate No.: 4243.01)	FCC ID \ DOC \ VOC	1	
Canada		IC ID \ VOC	2	
Japan		MIC-T \ MIC-R	-	
Europe		EMCD \ RED	-	
Taiwan		NCC	-	
Hong Kong		OFCA	-	
Australia		RCM	-	
India		WPC	-	
Thailand		International Services	NTC	-
Singapore			IDA	-
Note: 1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476. 2. IC Canada Registration No.: 7760A				

B. TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of ...	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

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3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS17S1298079-1E	2017-12-14	2017-12-15 to 2018-01-02	2018-01-03	original	N/A	Valid

4 General Information

4.1 General Description of E.U.T.

Product	: Wireless Charging Pad
Model(s)	: HKWP1090-05, HKWP1090-10Q, HKWP1070-05, HKWP1070-10Q, HKWP1080-05, HKWP1080-10Q, HKWP1010-05, HKWP1010-10Q, HKWP1050-10Q, HKWP1060-10Q, HKWP1100-10Q, HKWP1110-10Q, QC0003, QC0004, WL-QIFC
Model Description	Only the model name is different, the model HKWP1090-05 is the test sample.
Hardware Version	: HKWP1090-05-V1.0
Software Version	: PMQ8005B_HKWP1090-05_VER1.0

4.2 Details of E.U.T.

Operation Frequency	: 110kHz to 205kHz
Type of Modulation	: ASK
Antenna installation	: Coil Antenna
Antenna Gain	: N/A
Ratings	: Input: DC 5V-2A Output: DC 5V-1A

4.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Test channel
Transmitting	154kHz

5 Equipment Used during Test

5.1 Equipment List

Conducted Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMI Test Receiver	R&S	ESCI	101155	2017-09-12	2018-09-11
2	LISN	SCHWARZBECK	NSLK 8128	8128-289	2017-09-12	2018-09-11
3	Limiter	York	MTS-IMP-136	261115-001-0024	2017-09-12	2018-09-11
4	Cable	LARGE	RF300	-	2017-09-12	2018-09-11
3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2017-04-13	2018-04-12
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2017-04-13	2018-04-12
3	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	2017-04-09	2018-04-08
4	Amplifier	ANRITSU	MH648A	M43381	2017-04-13	2018-04-12
5	Cable	HUBER+SUHNER	CBL2	525178	2017-04-13	2018-04-12
6	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	2017-09-12	2018-09-11
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSL6	100959	2017-09-12	2018-09-11

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Conducted Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)
Confidence interval: 95%. Confidence factor:k=2	

6 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	Pass
Radiated Spurious Emissions	15.205(a) 15.209	Pass
Bandwidth Measurement	15.205(a) 15.215(c)	Pass
Antenna Requirement	15.203	Pass
Note: Pass =Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

7 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.10:2013
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	

Frequency (MHz)	Limit (dB μ V)	
	Qsi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	50	60
5 to 30	60	50

7.1 E.U.T. Operation

Operating Environment :

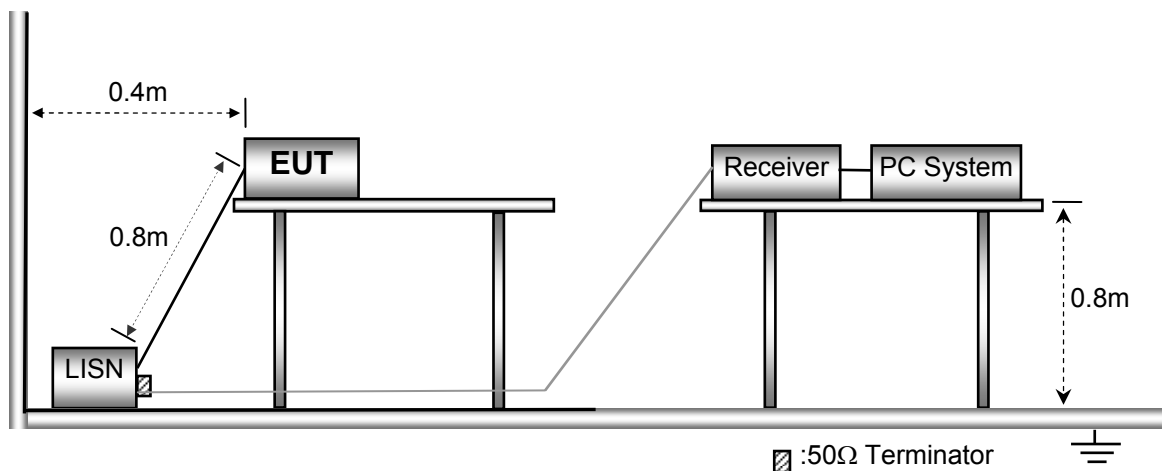
Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

7.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.

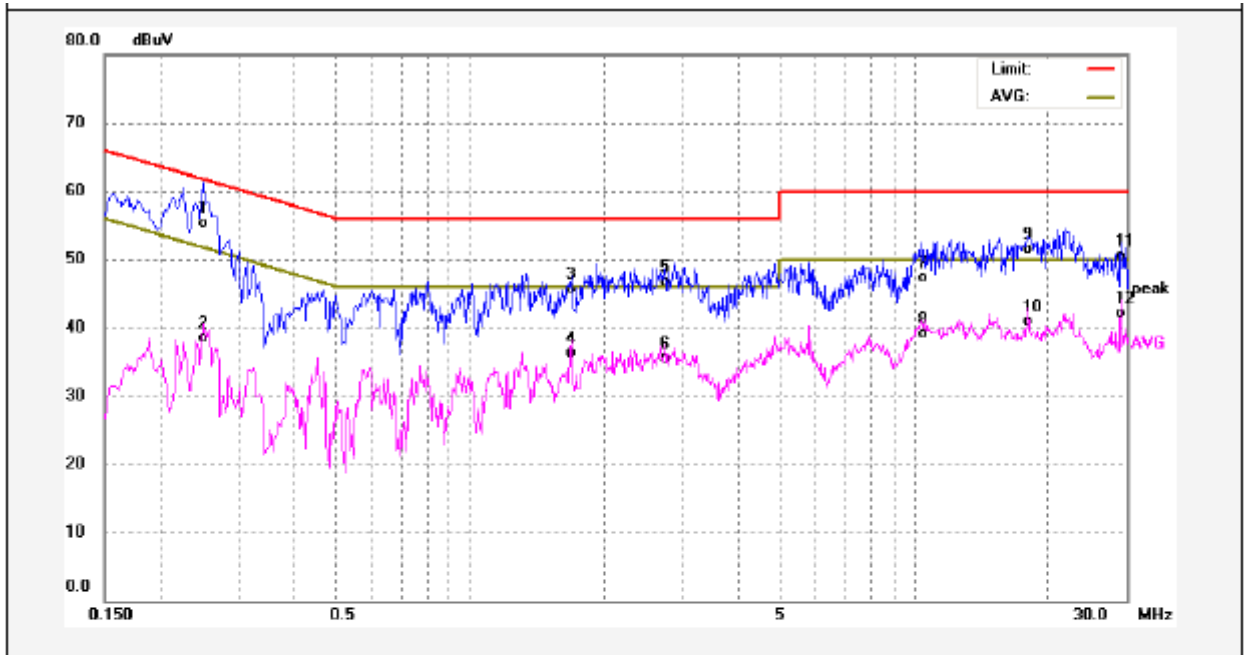


7.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

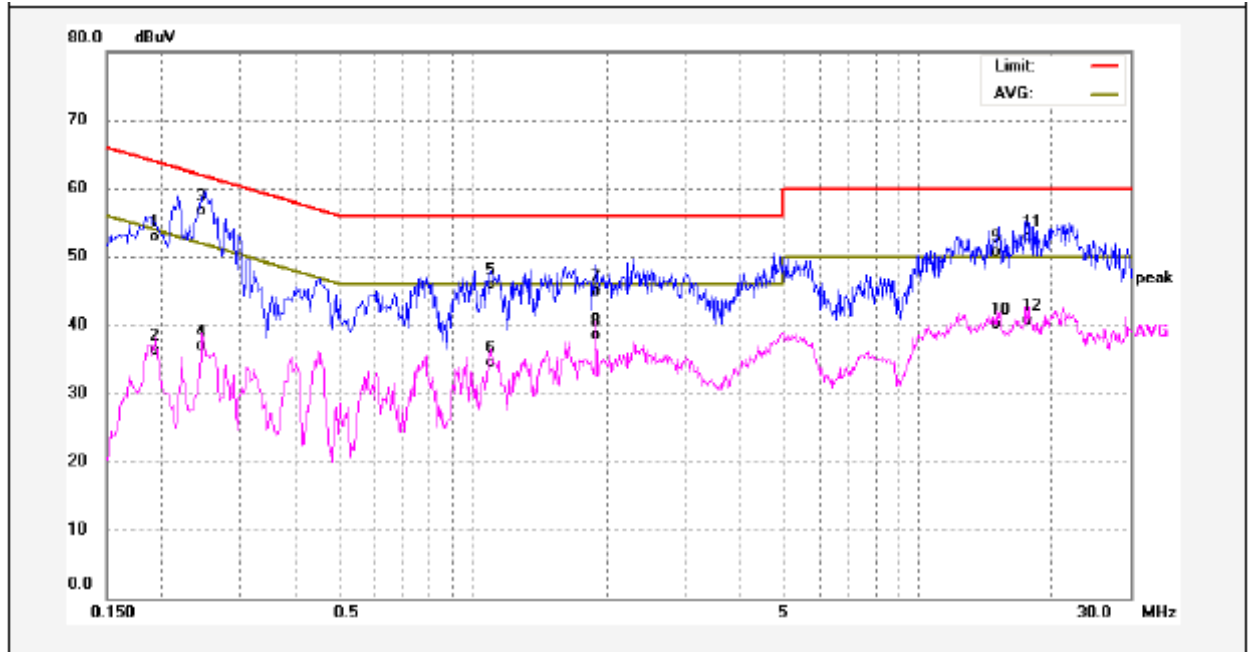
7.4 Conducted Emission Test Result

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.2500	45.38	10.01	55.39	61.75	-6.36	QP	
2	0.2500	28.58	10.01	38.59	51.75	-13.16	AVG	
3	1.6820	35.47	10.17	45.64	56.00	-10.36	QP	
4	1.6820	26.15	10.17	36.32	46.00	-9.68	AVG	
5	2.7580	36.45	10.24	46.69	56.00	-9.31	QP	
6	2.7580	25.26	10.24	35.50	46.00	-10.50	AVG	
7	10.5579	37.00	10.37	47.37	60.00	-12.63	QP	
8	10.5579	28.69	10.37	39.06	50.00	-10.94	AVG	
9	18.0299	41.08	10.43	51.51	60.00	-8.49	QP	
10	18.0299	30.39	10.43	40.82	50.00	-9.18	AVG	
11	29.1140	39.86	10.64	50.50	60.00	-9.50	QP	
12	29.1140	31.38	10.64	42.02	50.00	-7.98	AVG	

Live N:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1940	42.94	9.90	52.84	63.86	-11.02	QP	
2	0.1940	26.41	9.90	36.31	53.86	-17.55	AVG	
3	0.2460	46.74	10.00	56.74	61.89	-5.15	QP	
4	0.2460	26.84	10.00	36.84	51.89	-15.05	AVG	
5	1.0980	35.65	10.25	45.90	56.00	-10.10	QP	
6	1.0980	24.21	10.25	34.46	46.00	-11.54	AVG	
7	1.8900	34.65	10.19	44.84	56.00	-11.16	QP	
8	1.8900	28.25	10.19	38.44	46.00	-7.56	AVG	
9	15.0299	40.23	10.38	50.61	60.00	-9.39	QP	
10	15.0299	29.70	10.38	40.08	50.00	-9.92	AVG	
11	17.7259	42.38	10.43	52.81	60.00	-7.19	QP	
12	17.7259	30.32	10.43	40.75	50.00	-9.25	AVG	

8 Radiated Spurious Emissions

Test Requirement: FCC Part15 Paragraph 15.209, 15.205(a)

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

FCC Part15 Paragraph 15.209

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 51.1 % RH

Atmospheric Pressure: 101.2kPa

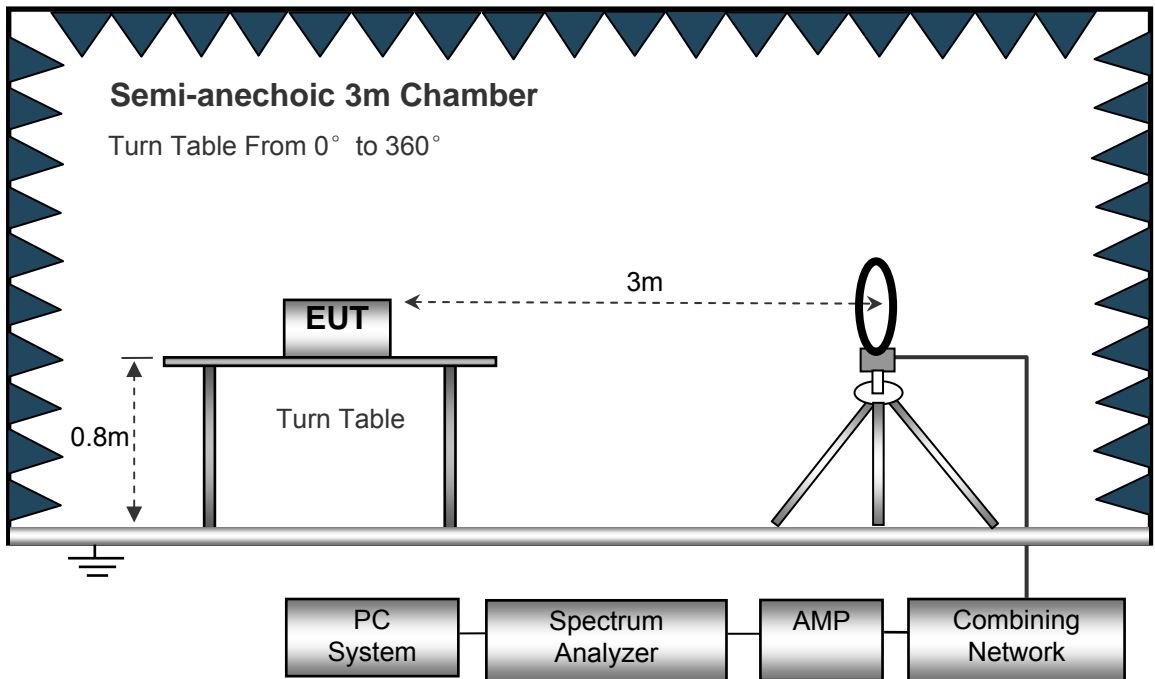
EUT Operation :

The test was performed in Transmitting mode, the test data were shown in the report.

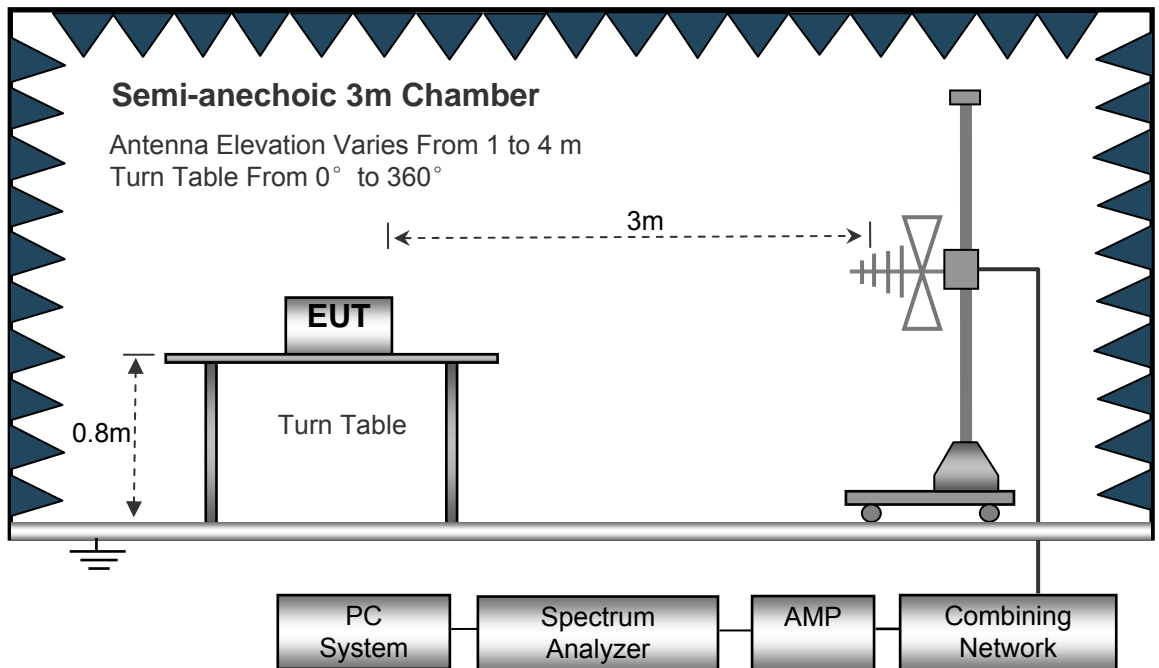
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10

The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
 IF Bandwidth..... 10kHz
 Video Bandwidth..... 10kHz
 Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed Auto
 Detector PK
 Resolution Bandwidth..... 100kHz
 Video Bandwidth..... 300kHz

8.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the Z position. So the data shown was the Z position only.

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

8.6 Summary of Test Results

Test Frequency: 9 kHz ~ 30 MHz

Frequency	Receiver Reading (AV)	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude (AV)	FCC Part 15.209	
			Height	Polar			Limit	Margin
(MHz)	(dB μ V@3m)	Degree	(m)	(H/V)	(dB/m)	(dB μ V/m)	(dB μ V/m)@3m	(dB)
0.154	55.41	201	1.7	H	19.58	74.99	103.85	-28.86
0.154	46.44	157	1.9	V	19.58	66.02	103.85	-37.83

Test Frequency: 30 MHz ~ 1 GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.209	
				Height	Polar			Limit	Margin
(MHz)	(dB μ V)	QP	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
34.52	29.59	QP	282	1.0	H	-16.98	12.61	40.00	-27.39
34.52	32.77	QP	53	1.5	V	-16.98	15.79	40.00	-24.21
89.27	55.35	QP	163	1.5	H	-19.75	35.60	43.50	-7.90
89.27	45.31	QP	97	1.8	V	-19.75	25.56	43.50	-17.94
948.76	31.76	QP	358	1.7	H	-0.56	31.20	46.00	-14.80
948.76	31.10	QP	307	1.4	V	-0.56	30.54	46.00	-15.46

Note: Correct factor = Cable loss + Antenna factor

9 Bandwidth Measurement

Test Requirement: FCC Part15.215(C), Part15.205 (a)

Test Method: ANSI C63.10: 2013

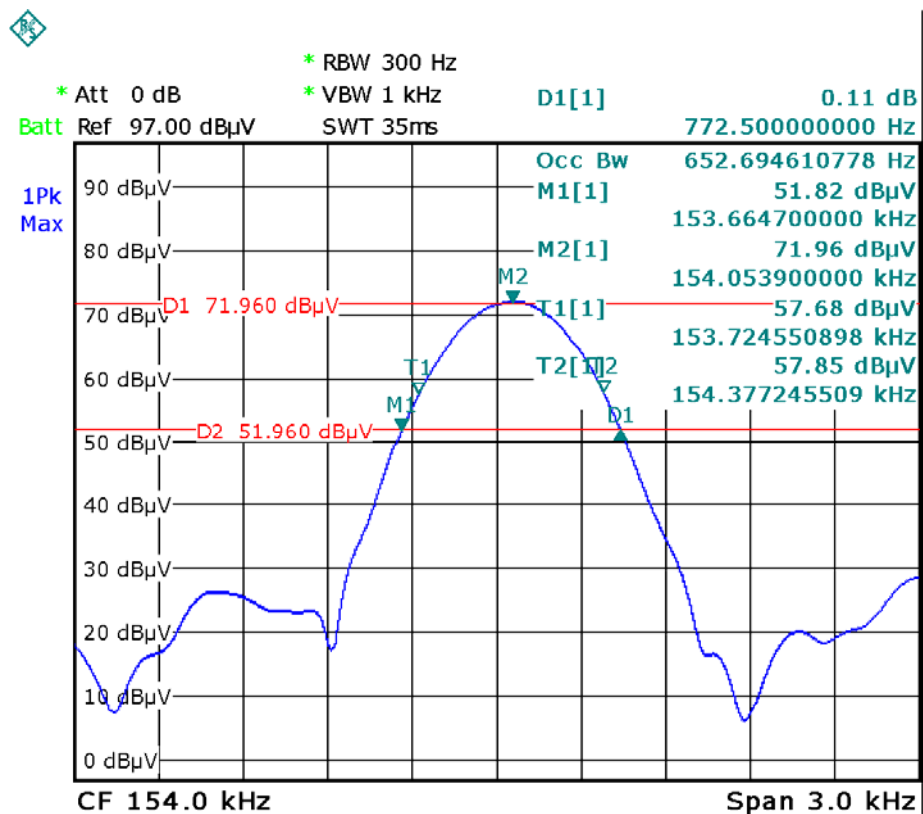
9.1 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak mode.
2. Bandwidth Measure the resolution bandwidth of 300 Hz and the video bandwidth of 1 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier and 99% Bandwidth.

9.2 Test Result

Frequency(kHz)	20dB Bandwidth Emission(kHz)	99% Bandwidth Emission(kHz)
154	0.773	0.653

Test Plot



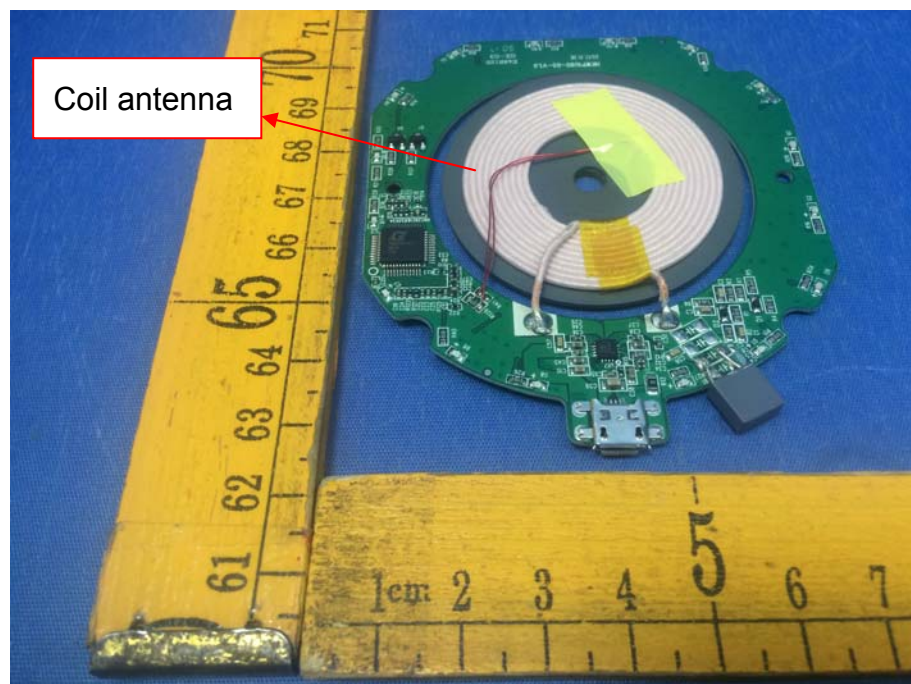
10 Antenna Requirement

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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 15 CFR Section 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.

Result:

The EUT has one Coil antenna, Meets the requirements of FCC 15.203.



11 FCC ID: 2AIOC-1090 RF Exposure Report

Note: Please refer to RF Exposure test report: WTS17S1298079-2E.

12 Photographs – HKWP1090-05 Test Setup Photos

Note: Please refer to Photos: WTS17S1298079-3E.

13 Photographs - Constructional Details

13.1 Model HKWP1090-05 – External Photos

Note: Please refer to Photos: WTS17S1298079-3E

13.2 Model HKWP1090-05 – Internal Photos

Note: Please refer to Photos: WTS17S1298079-3E

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