KSIGN (Guangdong) Testing Co., Ltd.

West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, People's Republic of China Tel.: + (86)755-29852678 Fax: + (86)755-29852397 E-mail: info@gdksign.cn Website: www.gdksign.com

TEST REPORT

Report No. KS2009S01005E01

FCC ID 2AXP4-WCHAR000X

Applicant LEGAMI s.r.l.

Manufacturer..... WSW Co.,Ltd

Address..... Block A, ZhongWu TaiXingLong Industry Zone, XiXiang, BaoAn,

ShenZhen, China

Product Name: WIRELESS CHARGER

Trade Mark: N/A

Model/Type reference..... WCHAR0003

WCHAR0006

Standard FCC CFR Title 47 Part 15 Subpart C

Section 15.207, 15.209, 15.203

ANSI C63.10:2013

Date of Receipt..... Sep.09, 2020

Date of Test Date Sep.09, 2020 -Oct.13, 2020

Date of issue Oct.13, 2020

Test result.....: Pass

Compiled by:

(Printed name+signature) Rory Huang

Supervised by:

(Printed name+signature)

Kelly Cheng

Approved by:

(Printed name+signature) Cary Luo

-1

Testing Laboratory Name KSIGN(Guangdong) Testing Co., Ltd.

West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu

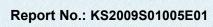
Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen,

Guangdong, People's Republic of China

This test report may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by KSIGN. The test results in the report only apply to the tested sample. The test report shall be invalid without all the signatures of testing engineers, reviewer and approver. Any objections must be raised to KSIGN within 15 days since the date when the report is received. It will not be taken into consideration beyond this limit. The test report merely correspond to the test sample.



	TABLE OF CONTENTS		Page
1. TEST SUMMARY	~~~	MA Tomor	
1.1. Test Standards		······	\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
1.2. REPORT VERSION			
1.3. TEST DESCRIPTION			4
1.4. MEASUREMENT UNCERTAINTY	200		
1.5. ENVIRONMENTAL CONDITIONS			<u>J</u>
2. GENERAL INFORMATION	1887		
	// 257		
2.2. GENERAL DESCRIPTION OF EUT			t
	т		
2.5. Test Software			
3. TEST ITEM AND RESULTS		•••••	X 5 7 9
3.1. ANTENNA REQUIREMENT	Ali.		
	2000		
4. EUT TEST PHOTOS	XXX		20
5. PHOTOGRAPHS OF EUT CONSTRU	ICTIONAL	5852	2





1. TEST SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15 Subpart C: Operation within the bands 110~205 KHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version

Revised No.	Date of issue	Description
01	Oct.13, 2020	Original
	· ·	
	J.	
N.	<u> </u>	- Alexander and the second and the s



1.3. Test Description

EMC Emission				
Test Item	FCC Rules	Result	Test Engineer	
Conducted Emission	§15.207	Pass	Rory Huang	
Radiated Emission	§15.209	Pass	Rory Huang	
ANTENNA APPLICATION	§15.203	Pass	Rory Huang	

Note: The measurement uncertainty is not included in the test result.



1.4. Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the KSIGN(Guangdong) Testing Co., Ltd. system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device. Below is the best measurement capability for KSIGN(Guangdong) Testing Co., Ltd.

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.42 dB	(1)
Transmitter power Radiated	2.14 dB	(1)
Conducted spurious emissions 9kHz~40GHz	1.60 dB	(1)
Radiated spurious emissions 9kHz~40GHz	2.20 dB	(1)
Conducted Emissions 9kHz~30MHz	3.20 dB	(1)
Radiated Emissions 30~1000MHz	4.70 dB	(1)
Radiated Emissions 1~18GHz	5.00 dB	(1)
Radiated Emissions 18~40GHz	5.54 dB	(1)
Occupied Bandwidth	2.80 dB	(1)

Note (1): This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.5. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba



2. GENERAL INFORMATION

2.1. Client Information

Applicant:	LEGAMI s.r.l.
Address:	Via Stezzano 18 - Azzano San Paolo 24052 (BG) - ITALY
Manufacturer:	WSW Co.,Ltd
Address:	Block A, ZhongWu TaiXingLong Industry Zone, XiXiang, BaoAn, ShenZhen, China

2.2. General Description of EUT

	10×20
Product Name:	WIRELESS CHARGER
Trade Mark:	N/A
Model/Type reference:	WCHAR0003
Listed Model(s):	WCHAR0001,WCHAR0002,WCHAR0004,WCHAR0005,WCHAR0006
Model Different:	The difference between product models only depends on the model naming and appearance colour are different for the marketing requirement. Other power supply methods, interior structure, electrical circuits and key components are the same, which do not affect the safety and electromagnetic compatibility performance.
Power supply :	Input :DC 9V 1.67A or DC 5V 2A Output:DC 9V 1A or DC 5V 2A
Hardware version:	WCHAR-CHARGER
Software version:	WCHAR-CHARGING-1ST
Specification	
Modulation:	Induction
Operation frequency:	124.5KHz
Antenna type:	Induction Coil
Antenna gain:	1.0dBi



2.3. Description of Test Modes

Operation Frequency List: The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

Operation Frequency range: 110KHz~205KHz

Test mode

MODE	TEST MODE DESCRIPTION
1,,,	Wireless charging Mode(Full load)
2	Wireless charging Mode(half load)
3	Wireless charging Mode(Null load)

Note:

1. The Mode 1 was the worst case and only the data of the worst case record in this report.



2.4. Measurement Instruments List

	Tonscend JS0806-2 Test system						
Item	tem Test Equipment Manufacturer Model No. Serial No. Cal. Until						
1	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2021		
2	Vector Signal Generator	Agilent	N5182A	MY50142520	04/07/2021		
3	Analog Signal Generator	HP	83752A	3344A00337	04/07/2021		
4	Power Sensor	Agilent	E9304A	MY50390009	04/07/2021		
5	Power Sensor	Agilent	E9300A	MY41498315	04/07/2021		
6	Wideband Radio Communication Tester	R&S	CMW500	157282	04/07/2021		
7	Climate Chamber	Angul	AGNH80L	1903042120	04/07/2021		
8	Dual Output DC Power Supply	Agilent	E3646A	MY40009992	04/07/2021		
9	RF Control Unit	Tonscend	JS0806-2	1	04/07/2021		

Page 8 of 27

386.3.200.08						
Transmitter spurious emissions & Receiver spurious emissions						
Item	Item Test Equipment Manufacturer Model No. Serial No.					
1	EMI Test Receiver	R&S	ESR	102525	04/07/2021	
2	High Pass Filter	Chengdu E-Microwave	OHF-3-18-S	0E01901038	03/27/2021	
3	High Pass Filter	Chengdu E-Microwave	OHF-6.5-18-S	0E01901039	03/27/2021	
4	Spectrum Analyzer	HP	8593E	3831U02087	04/07/2021	
5	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	03/29/2023	
6	Loop Antenna	Beijin ZHINAN	ZN30900C	18050	03/25/2021	
7	Spectrum Analyzer	R&S	FSV40-N	101798	04/07/2021	
8	Horn Antenna	Schwarzbeck	BBHA 9120 D	2023	03/29/2023	
9	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	04/07/2021	
10	Pre-Amplifier	EMCI	EMC051835SE	980662	04/07/2021	

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
1	LISN	R&S	ENV432	1326.6105.02	03/27/2021
2	EMI Test Receiver	R&S	ESR	102524	04/07/2021
3	Manual RF Switch	JS TOYO	lings 1	MSW-01/002	04/07/2021

2.5. Test Software

Software name	Model	Version
Conducted emission Measurement Software	EZ-EMC	EMC-Con 3A1.1
Radiated emission Measurement Software	EZ-EMC	FA-03A.2.RE

¹⁾The Cal. Interval was one year.
2)The cable loss has calculated in test result which connection between each test instruments.



3. TEST ITEM AND RESULTS

3.1. Antenna requirement

Requirement

FCC CFR Title 47 Part 15 Subpart C 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. 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.

Report No.: KS2009S01005E01

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

(i) Systems operating in the 110KHz~205KHz 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.

Test Result

The directional gain of the antenna less than 6dBi, please refer to the EUT internal photographs antenna photo.

Note: The antenna is permanently fixed to the EUT



3.2. Conducted Emission

Limit

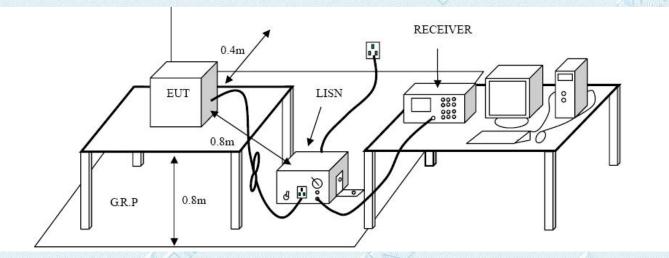
Conducted Emission Test Limit

Frequency 150kHz~500kHz 500kHz~5MHz	Maximum RF Line Voltage (dBμV)					
riequency	Quasi-peak Level	Average Level				
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *				
500kHz~5MHz	56	46				
5MHz~30MHz	60	50				

Notes:

- (1) *Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Configuration



Test Procedure

- 1. The EUT was setup according to ANSI C63.10:2013 requirements.
- 2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
- 3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50ohm /50uH coupling impedance for the measuring equipment.

 The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
- 4. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
- 5. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- 6. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 7. During the above scans, the emissions were maximized by cable manipulation.

Test Mode:

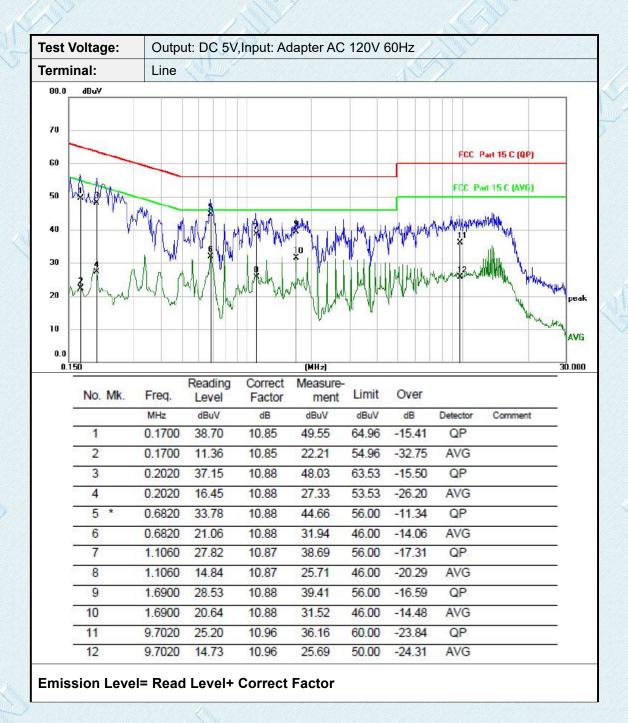
Please refer to the clause 2.3.

Test Results

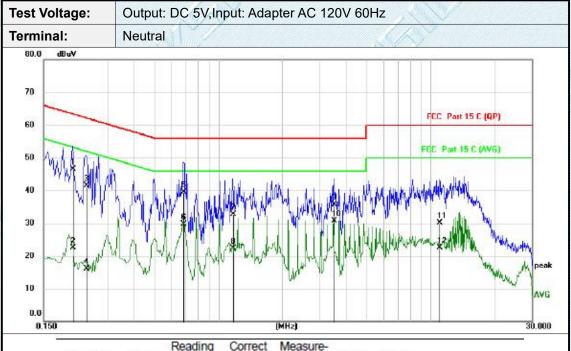
Pre-scan Full load, Half load, Null load, and found Full load which it is worse case, so only show the test data for worse case.







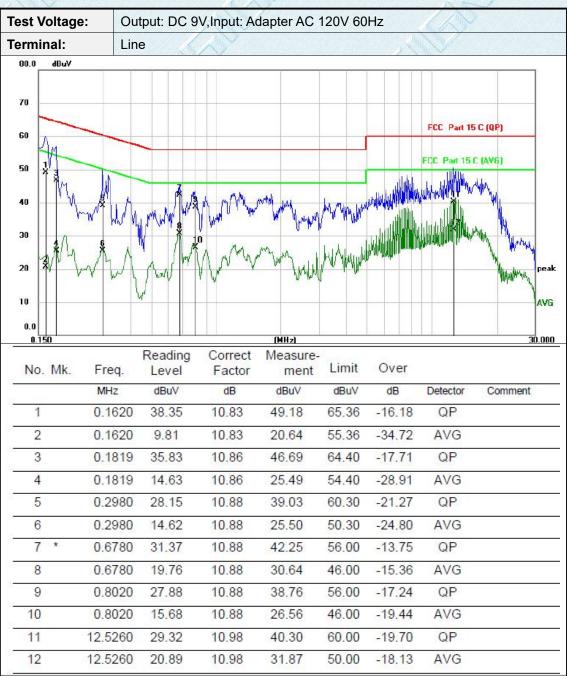




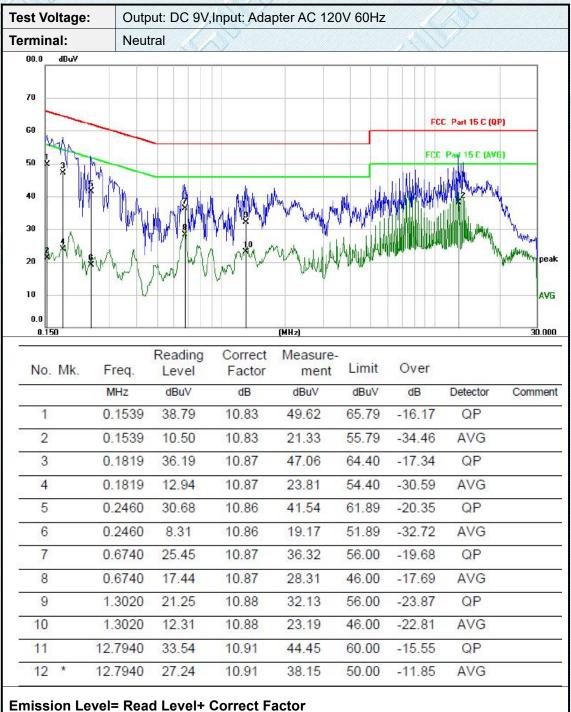
No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.2060	35.65	10.88	46.53	63.37	-16.84	QP	
2	0.2060	11.64	10.88	22.52	53.37	-30.85	AVG	
3	0.2380	30.59	10.86	41.45	62.17	-20.72	QP	
4	0.2380	5.30	10.86	16.16	52.17	-36.01	AVG	
5	0.6860	28.71	10.87	39.58	56.00	-16.42	QP	
6	0.6860	18.91	10.87	29.78	46.00	-16.22	AVG	
7	1.1700	21.87	10.87	32.74	56.00	-23.26	QP	
8	1.1700	11.43	10.87	22.30	46.00	-23.70	AVG	
9	3.4940	24.77	10.93	35.70	56.00	-20.30	QP	
10 *	3.4940	19.80	10.93	30.73	46.00	-15.27	AVG	
11	10.9700	19.25	10.91	30.16	60.00	-29.84	QP	
12	10.9700	11.53	10.91	22.44	50.00	-27.56	AVG	

Emission Level= Read Level+ Correct Factor











3.3. Radiated Spurious Emissions

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209(a) and 15.205(a)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

15.209(a)

Frequencies	Field Strength	Measurement Distance
(MHz)	(micorvolts/meter)	(meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

15.205 Restricted bands of operation:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

Notes

- (1). Measurement was performed at an antenna to the closed point of EUT distance of meters.
- (2). Emission level (dBuV/m)=20log Emission level (uV/m).
- (3).Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of 15.205, and the emissions located in restricted bands also comply with 15.209 limit.
- (4) .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.



FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

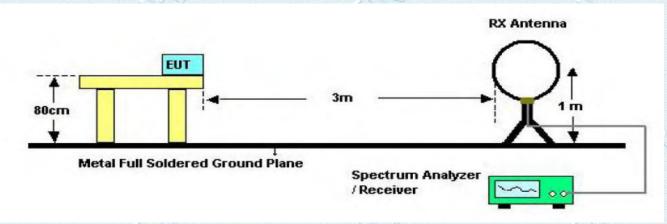
Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

Report No.: KS2009S01005E01

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

Test Configuration



Below 30MHz Test Setup



Turntable

Test
Receiver

Ground Plane

Reference point of antenna calibration

1m to 4m

Coaxial Cable

Report No.: KS2009S01005E01

Below 1GHz Test Setup

Test Procedure

- 1. The EUT was setup and tested according to ANSI C63.10:2013
- 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, 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 to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

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.

(3) From 1 GHz to 10th harmonic:

RBW=1MHz, VBW=3MHz Peak detector for Peak value.

RBW=1MHz, VBW=10Hz Peak detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

□ Passed

Not Applicable

9 KHz~30 MHz and 30MHz~1GHz

From 9 KHz~30 MHz and 30MHz~1GHz: Conclusion: PASS

Note:

1) Final level = Reading level + Correct Factor



EUT: WIRELESS CHARGER Model Name.: WCHAR0001

Test Mode: Mode 1 (Full load) Polarization: X

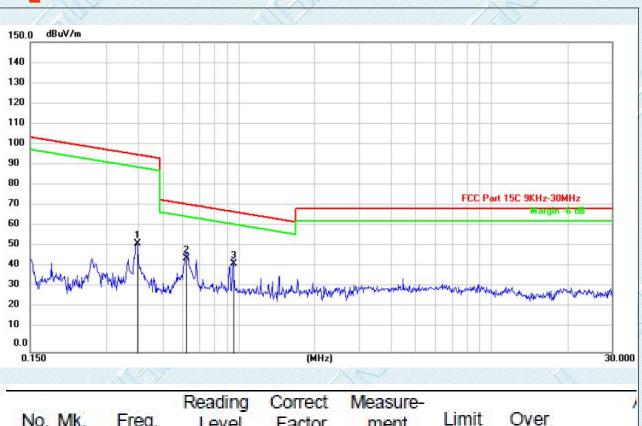
Test Power: Output: DC 5V,Input: Adapter AC 120V 60Hz



No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detecto
1	0.0463	66.22	-8.84	57.38	114.29	-56.91	Avg
2	0.0862	58.76	-8.99	49.77	108.89	-59.12	Avg
3 *	0.1245	74.55	-9.49	65.06	105.70	-40.64	Avg

Remark:





No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector	
1	0.3964	62.12	-9.25	52.87	95.64	-42.77	Avg	
2	0.6188	54.71	-9.20	45.51	71.77	-26.26	QP	
3 *	0.9536	52.19	-9.11	43.08	68.02	-24.94	QP	

Remark:

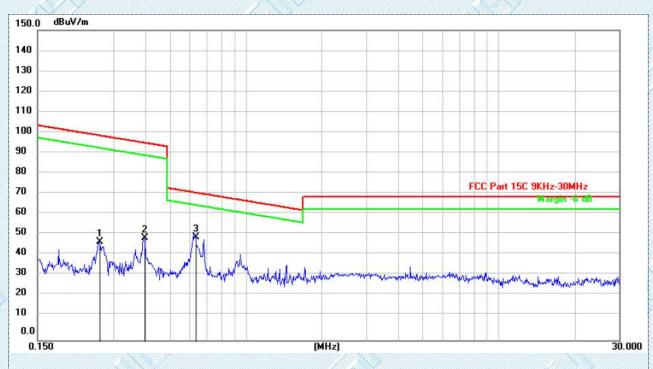




No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	Detector	
	MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		
1	0.0297	49.36	-9.00	40.36	118.15	-77.79	Avg	
2	0.0357	53.39	-8.94	44.45	116.55	-72.10	Avg	
3	0.0463	60.72	-8.84	51.88	114.29	-62.41	Avg	
4	0.0913	56.82	-8.90	47.92	108.39	-60.47	QP	
5 *	0.1245	78.55	-9.49	69.06	105.70	-36.64	Avg	

Remark:





No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector	
া	0.2641	57.22	-9.29	47.93	99.17	-51.24	Avg	
2	0.3964	59.12	-9.25	49.87	95.64	-45.77	Avg	
3 *	0.6320	59.13	-9.19	49.94	71.59	-21.65	QP	

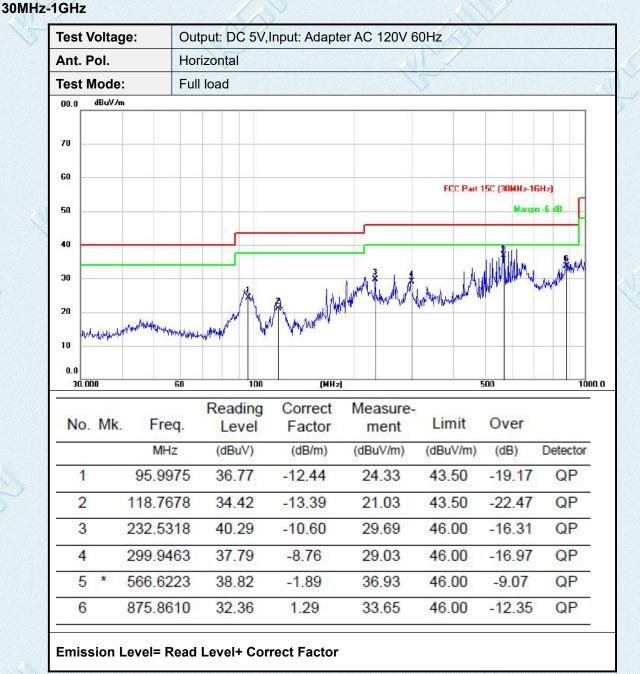
Remark:

Correct Factor=Antenna Factor + Cable Loss -Preamplifier Factor

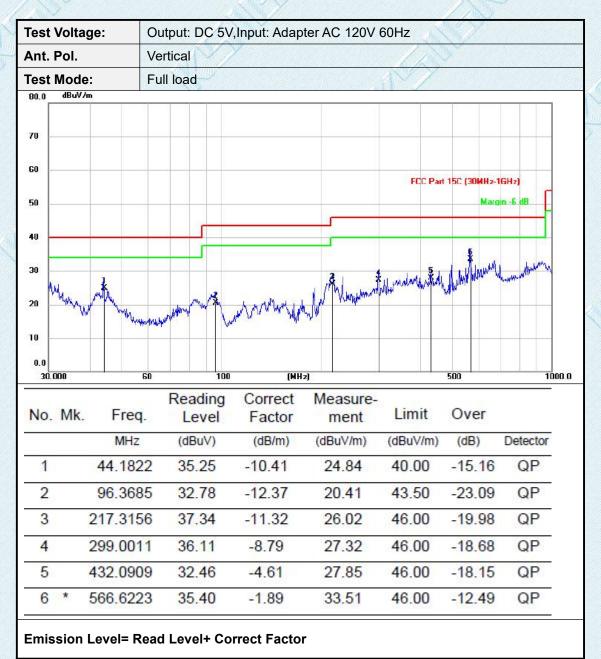
Note:

Below 30MHz, Pre-test the X, Y, Z axis to find X axis is worst case, so only record X axis test data.













No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector	cm	degree	Comment
1		47.2922	32.21	-10.06	22.15	40.00	-17.85	QP			
2		145.6056	45.96	-15.49	30.47	43.50	-13.03	QP			
3		187.7530	45.33	-12.70	32.63	43.50	-10.87	QP			
4	*	263.0799	50.85	-9.61	41.24	46.00	-4.76	QP			
5		367.0804	43.99	-6.07	37.92	46.00	-8.08	QP			
6		746.6965	30.81	-0.66	30.15	46.00	-15.85	QP			

Emission Level= Read Level+ Correct Factor





No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		Antenna Height	Table Degree	
		MHz	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Detector	cm	degree	Comment
1		46.9617	41.46	-10.08	31.38	40.00	-8.62	QP			
2	*	71.6558	46.61	-14.07	32.54	40.00	-7.46	QP			
3		140.5391	43.36	-15.43	27.93	43.50	-15.57	QP			
4	- 1	263.6340	41.83	-9.60	32.23	46.00	-13.77	QP			
5	1	363.8765	34.18	-6.17	28.01	46.00	-17.99	QP			
6		519.7934	34.87	-3.40	31.47	46.00	-14.53	QP			

Emission Level= Read Level+ Correct Factor



4.EUT TEST PHOTOS

Radiated measurements:

9KHz-30MHz,30MHz-1GHz For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.



5.PHOTOGRAPHS OF EUT CONSTRUCTIONAL

For the actual test configuration, please refer to Appendix I: Photographs of the Test Configuration.

KSIGN(Guangdong) Testing Co., Ltd.