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Report No.: SZEM130900527201  
Page: 1 of 16

## FCC Test Report

**Application No.:** SZEM1309005272RF

**Applicant/Manufacturer/** SEA Electronics Ltd.

**Factory:**

**Address of Applicant/** Unit G-F, 10/F, Blk A, Lianjian Bldg, Chanping Railway Station, Dongguan  
**Manufacturer/Factory:** Guangdong.

**Equipment Under Test (EUT):**

EUT Name: SEA Wireless Charger

Item No.: SEA012

**FCC ID:** 2AA8R-SEA012

**Standards:** 47 CFR PART 18: 2012

**Date of Receipt:** 2013-09-22

**Date of Test:** 2013-10-18 to 2013-10-31

**Date of Issue:** 2013-11-04

<b>Test Result :</b>	PASS*
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\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang  
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

## 2 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Conducted Emission (150 kHz to 30 MHz)	47 CFR PART 18: 2012	FCC OST/ MP-5:1986	18.307(a)	PASS
Radiated Emission (9 kHz to 1GHz)	47 CFR PART 18: 2012	FCC OST/ MP-5:1986	18.305(b)	Pass

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## 4 General Information

### 4.1 Client Information

Applicant:	SEA Electronics Ltd.
Address of Applicant:	Unit G-F, 10/F, Blk A, Lianjian Bldg, Chanping Railway Station, Dongguan Guangdong.
Manufacturer:	SEA Electronics Ltd.
Address of Manufacturer:	Unit G-F, 10/F, Blk A, Lianjian Bldg, Chanping Railway Station, Dongguan Guangdong.
Factory:	SEA Electronics Ltd.
Address of Factory:	Unit G-F, 10/F, Blk A, Lianjian Bldg, Chanping Railway Station, Dongguan Guangdong.

### 4.2 General Description of EUT

Name:	SEA Wireless Charger
Model No.:	SEA012
Sample Type:	Mobile production
Wireless Charging Operation Frequency	105kHz~205kHz
Power Supply:	MODEL NO.:SWPP-19000500-US INPUT:100-240VAC 50/60Hz 0.5A OUTPUT:19V 500mA
Test Voltage:	AC 120V~60Hz
DC Line:	105cm(Unshielded)

### 4.3 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.
Resistance	Supply by Client	N/A

### 4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch E&E Lab,

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057.

Tel: +86 755 2601 2053      Fax: +86 755 2671 0594

No tests were sub-contracted.

#### **4.5 Test Facility**

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

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **VCCI**

The 3m Semi-anechoic chamber, Full-anechoic Chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197, G-416, T-1153 and C-2383 respectively.

- **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical 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 our files. Registration No.: 556682.

- **Industry Canada (IC)**

Two 3m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1 & 4620C-2.

#### **4.6 Deviation from Standards**

None.

#### **4.7 Abnormalities from Standard Conditions**

None.

## 5 Equipment List

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	Shielding Room	ZhongYu Electron	GB-88	SEL0042	2014-06-10
2	LISN	Rohde & Schwarz	ENV216	SEL0152	2014-10-24
3	LISN	ETS-LINDGREN	3816/2	SEL0021	2014-05-16
4	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	EMC0120	2013-11-10
5	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	EMC0121	2013-11-10
6	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2013-11-10
7	EMI Test Receiver	Rohde & Schwarz	ESCI	SEL0022	2014-05-16
8	Coaxial Cable	SGS	N/A	SEL0025	2014-05-29

RE in Chamber					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2014-06-10
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEL0023	2014-05-16
3	EMI Test software	AUDIX	E3	SEL0050	N/A
4	Coaxial cable	SGS	N/A	SEL0028	2014-05-29
5	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0014	2014-10-24
6	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2014-05-16
7	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2014-10-24
8	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2014-10-24
9	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2014-10-24
10	Band filter	Amindeon	Asi 3314	SEL0094	2014-05-16
11	Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2014-10-24

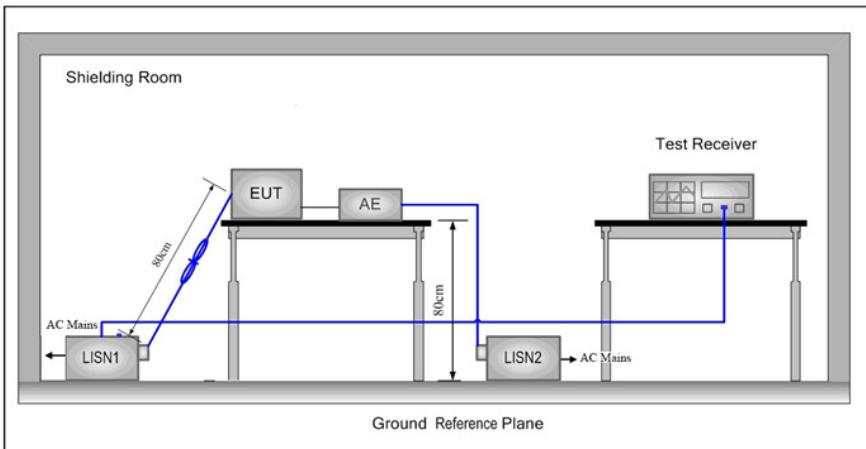
General used equipment					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)
1	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0102 to SEL0103	2014-10-24
2	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	SEL0101	2014-10-24
3	Barometer	ChangChun	DYM3	SEL0088	2014-05-17

**Note: The calibration interval is one year, all the instruments are valid.**

## 6 Test Results

### 6.1 Conducted Emissions

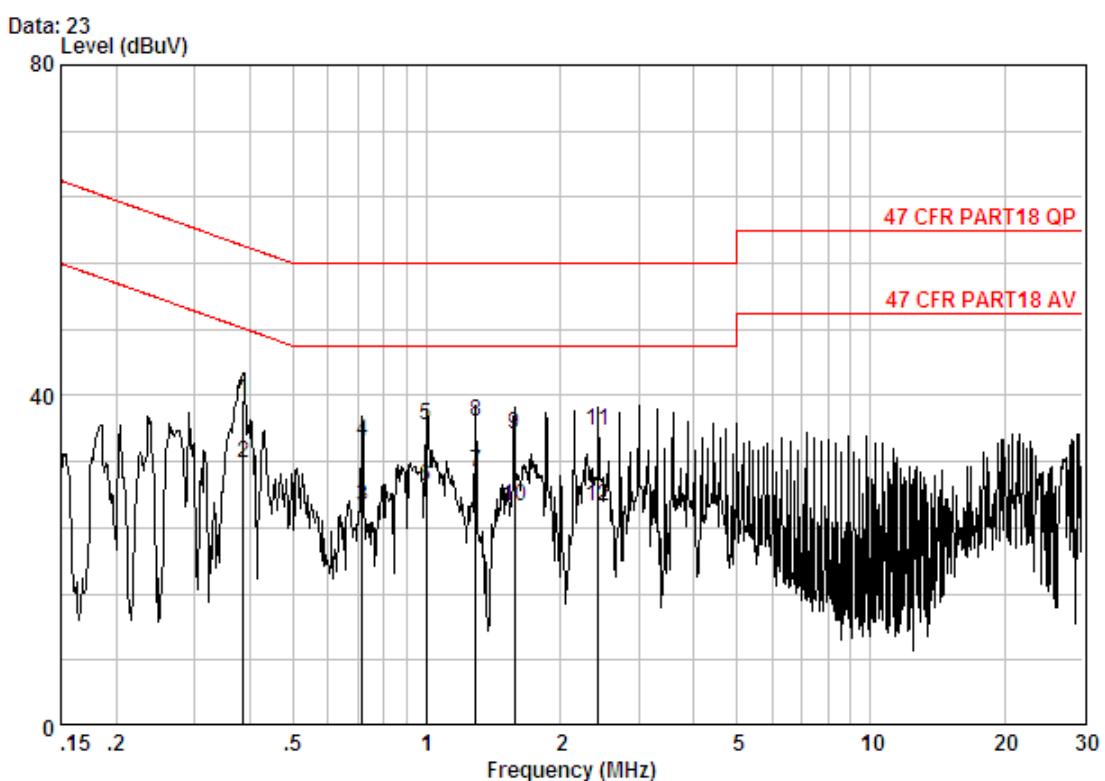
Test Requirement:	47 CFR PART 18		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test Procedure:	<ol style="list-style-type: none"><li>1) The mains terminal disturbance voltage test was conducted in a shielded room.</li><li>2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a <math>50\Omega/50\mu\text{H} + 5\Omega</math> linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.</li><li>3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,</li><li>4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li><li>5) 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: 2009 on conducted measurement.</li></ol>		

Test Setup:	
Test Mode:	Wireless charge mode
Instruments Used:	Refer to section 5 for details
Test Results:	Pass

**Measurement Data**

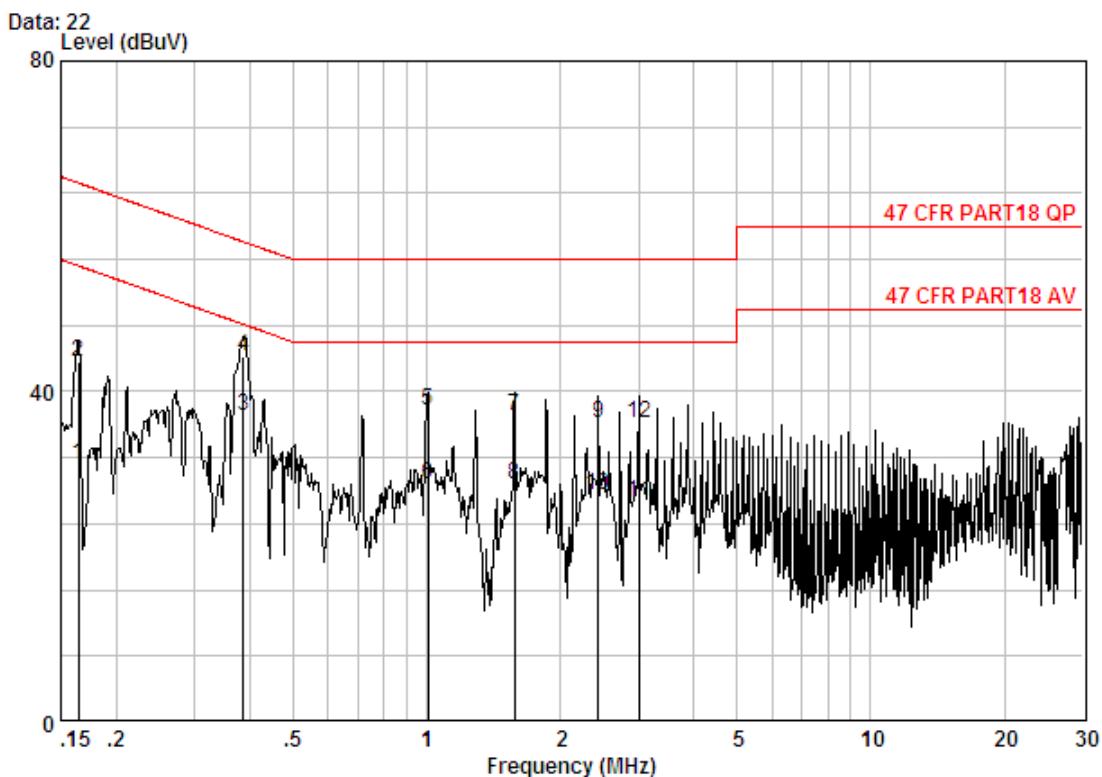
An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

**Live Line:**

Site : Shielding Room  
Condition : 47 CFR PART18 QP CE LINE  
Job No. : 5272RF  
Test mode : wireless charge mode

	Freq	Cable	LISN	Read	Limit	Over	Remark
		MHz	dB	dB	dBuV	dBuV	
1	0.38724	0.01	9.79	29.59	39.39	58.12	-18.73 QP
2	0.38724	0.01	9.79	21.93	31.73	48.12	-16.39 Average
3	0.71597	0.02	9.80	16.72	26.54	46.00	-19.46 Average
4	0.71597	0.02	9.80	24.54	34.36	56.00	-21.64 QP
5	0.99968	0.02	9.80	26.48	36.30	56.00	-19.70 QP
6	0.99968	0.02	9.80	19.25	29.07	46.00	-16.93 Average
7 @	1.289	0.02	9.80	21.01	30.83	46.00	-15.17 Average
8	1.289	0.02	9.80	26.92	36.74	56.00	-19.26 QP
9	1.577	0.02	9.80	25.59	35.41	56.00	-20.59 QP
10	1.577	0.02	9.80	16.73	26.55	46.00	-19.45 Average
11	2.435	0.02	9.82	25.87	35.71	56.00	-20.29 QP
12	2.435	0.02	9.82	16.65	26.49	46.00	-19.51 Average

**Neutral Line:**

Site : Shielding Room  
 Condition : 47 CFR PART18 QP CE NEUTRAL  
 Job No. : 5272RF  
 Test mode : wireless charge mode

	Freq	Cable	LISN	Read	Limit	Over	Remark
		Loss	Factor	Level	Level	Line	
	MHz	dB	dB	dBuV	dBuV	dBuV	dB
1	0.16414	0.02	9.70	21.56	31.28	55.25	-23.97 Average
2	0.16414	0.02	9.70	33.81	43.53	65.25	-21.72 QP
3 @	0.38700	0.01	9.79	27.30	37.10	48.13	-11.03 Average
4 @	0.38700	0.01	9.79	34.50	44.30	58.13	-13.83 QP
5	1.005	0.02	9.80	27.81	37.63	56.00	-18.37 QP
6	1.005	0.02	9.80	18.98	28.80	46.00	-17.20 Average
7	1.577	0.02	9.80	27.26	37.08	56.00	-18.92 QP
8	1.577	0.02	9.80	19.05	28.87	46.00	-17.13 Average
9	2.435	0.02	9.82	26.32	36.16	56.00	-19.84 QP
10	2.435	0.02	9.82	17.53	27.37	46.00	-18.63 Average
11	3.009	0.02	9.85	16.62	26.49	46.00	-19.51 Average
12	3.009	0.02	9.85	26.37	36.24	56.00	-19.76 QP



## 6.2 Radiated Emissions

Test Requirement:	47 CFR PART 18			
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)			
Receiver Setup:	Frequency	Detector	RBW	VBW
	9kHz~150kHz	Quasi-peak	200Hz	≥RBW
	150kHz~30MHz	Quasi-peak	9kHz	≥RBW
	30MHz~1GHz	Quasi-peak	100kHz	≥RBW
Limit:	Frequency	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009-30MHz	103.5	Quasi-peak	3
	30MHz-88MHz	40.0	Quasi-peak	3
	88MHz-216MHz	43.5	Quasi-peak	3
	216MHz-960MHz	46.0	Quasi-peak	3
	960MHz-1GHz	54.0	Quasi-peak	3
Test Setup:				

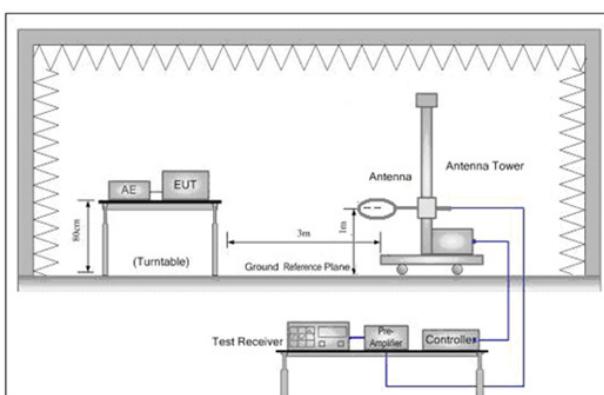


Figure 1. Below 30MHz

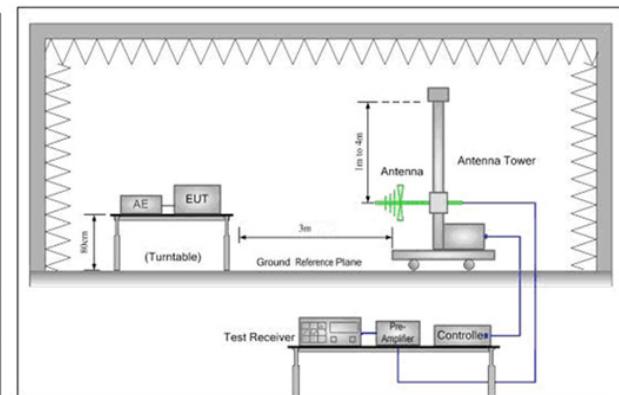
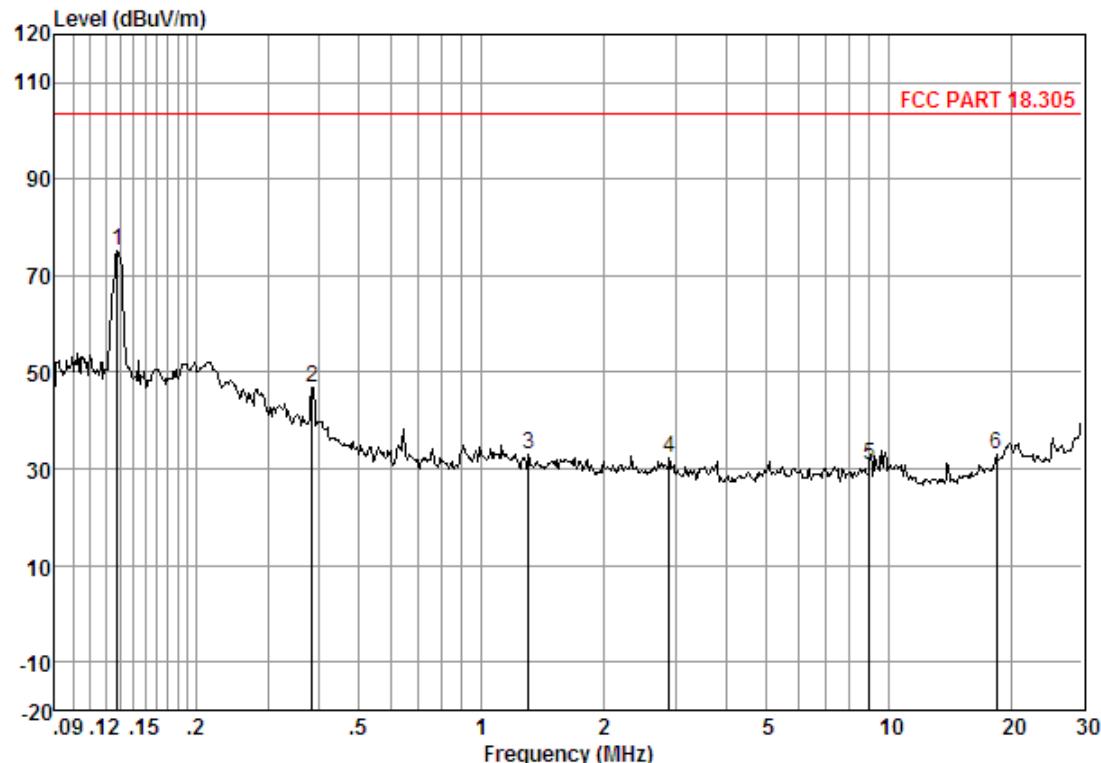


Figure 2. 30MHz to 1GHz

Test Procedure:	<ol style="list-style-type: none"> <li>The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>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.</li> <li>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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> </ol>
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	<ul style="list-style-type: none"><li>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li><li>f. 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.</li><li>g. Repeat above procedures until all frequencies measured was complete.</li></ul>
Test Mode:	wireless charge mode
Instruments Used:	Refer to section 5 for details
Test Results:	Pass

0.009MHz-30MHz



Condition: FCC PART 18.305 3m ZN30900A

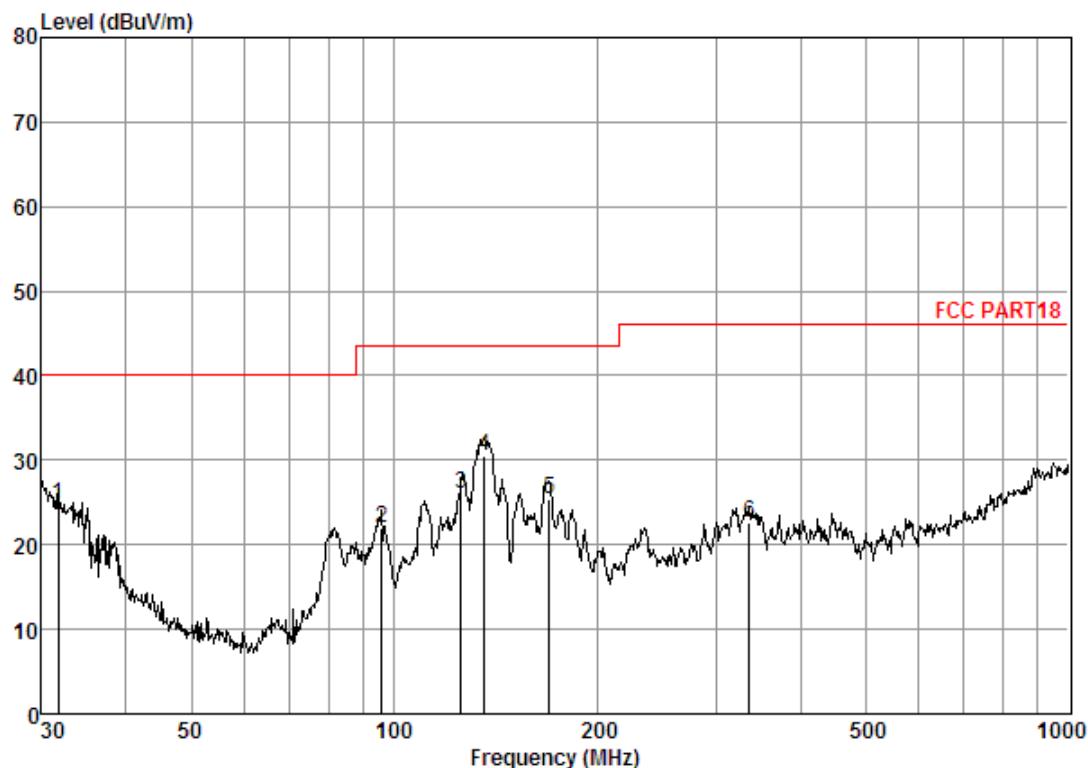
Job No. : 5272RF

Mode : Wireless charge mode

Freq	Cable Loss	Antenna Factor	Read	Limit	Over	Over Limit
			Level	Level	Line	
MHz	dB	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	0.13	0.01	23.51	51.50	75.02	103.50 -28.48
2	0.38	0.02	21.26	25.58	46.86	103.50 -56.64
3	1.31	0.05	20.76	12.06	32.87	103.50 -70.63
4	2.90	0.11	21.34	10.79	32.24	103.50 -71.26
5	9.01	0.31	23.18	7.37	30.86	103.50 -72.64
6	18.42	0.62	26.42	5.88	32.92	103.50 -70.58

30MHz-1GHz

Horizontal



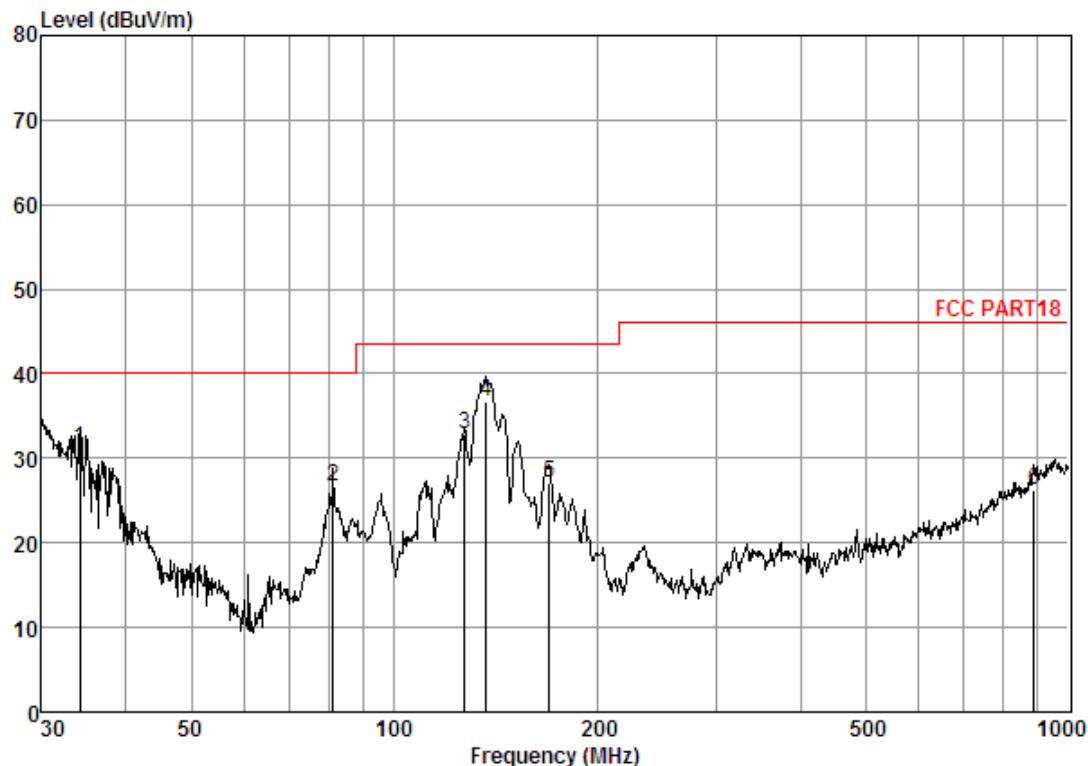
Condition: FCC PART18 3m 3142C HORIZONTAL

Job No. : 5272RF

Mode : Wireless charge mode

Freq	Cable			Antenna	Preamp	Read	Limit	Over	
	Loss	Factor	Factor			Level	Level	Line	Limit
1	31.73	0.67	21.57	25.69	28.10	24.65	40.00	-15.35	
2	95.76	1.42	5.60	25.38	40.43	22.07	43.50	-21.43	
3	125.45	1.61	7.93	25.62	42.05	25.97	43.50	-17.53	
4	135.98	1.73	8.36	25.47	45.92	30.54	43.50	-12.96	
5	169.60	1.94	9.06	24.89	39.36	25.47	43.50	-18.03	
6	336.04	2.95	10.41	24.45	33.66	22.57	46.00	-23.43	

Vertical



Condition: FCC PART18 3m 3142C VERTICAL

Job No. : 5272RF

Mode : Wireless charge mode

Freq	Cable			Antenna		Read	Limit	Over
	Loss	Antenna	Preamp	Factor	Factor	Level		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	34.16	0.72	19.58	25.73	36.64	31.21	40.00	-8.79
2	81.21	1.29	5.36	25.34	45.39	26.70	40.00	-13.30
3	127.22	1.64	8.04	24.88	48.01	32.81	43.50	-10.69
4	136.94	1.73	8.42	24.85	51.42	36.72	43.50	-6.78
5	169.60	1.94	9.06	24.89	41.01	27.12	43.50	-16.38
6	887.61	5.22	20.80	25.55	25.86	26.33	46.00	-19.67