



Report No.: SZEM190301142201

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# TEST REPORT

**Application No.:** SZEM1903011422CR **Applicant:** Spigen. Korea Co., Ltd.

Address of Applicant: Spigen HQ-A, 446, Bongeunsa-ro, Gangnam-gu, Seoul, 06153, South Korea.

Manufacturer: Spigen. Korea Co., Ltd.

Address of Manufacturer: Spigen HQ-A, 446, Bongeunsa-ro, Gangnam-gu, Seoul, 06153, South Korea.

**Factory:** Shenzhen Fang Xin Technology Co., Ltd.

Address of Factory: Rm 2406, 24F, Tower A, Xinghe World, No.1, Yabao Rd, Bantian St,

Longgang Dist, Shenzhen, China

**Equipment Under Test (EUT):** 

**EUT Name:** Fast Wireless Charger

Model No.: F303W
Trade mark: Essential

FCC ID: 2AFKNF303WR1 Standard(s): 47 CFR Part 18

**Date of Receipt:** 2019-03-07

**Date of Test:** 2019-03-08 to 2019-04-20

**Date of Issue:** 2019-04-23

Test Result: Pass\*

Keny Xu EMC Laboratory Manager



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<sup>\*</sup> In the configuration tested, the EUT complied with the standards specified above.



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	Revision Record								
Version	Version Chapter Date Modifier Remark								
01		2019-04-23		Original					

Authorized for issue by:		
	fore Boro	
	Powell Bao /Project Engineer	-
	EvicFu	
	Eric Fu /Reviewer	-



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### **Test Summary**

Radio Spectrum Matter Part								
Item	Standard	Method	Requirement	Result				
Conducted disturbance	47 CFR Part 18	FCC MP-5	Part 18.307	Pass				
Radiated emission	47 CFR Part 18	FCC MP-5	Part 18.305	Pass				



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### **General Information**

#### 4.1 Details of E.U.T.

Power supply:	Input: DC9V1.67A, DC12V1.5A				
	Output: 5W/7.5W/10W				
Cable:	USB Cable(Unshielded, 120cm)				
Antenna Type:	Inductive Loop Coil Antenna				
Modulation Type:	Load Modulation				
Operation Frequency:	110.08kHz to 146.80kHz				
Remark:	This device has been tested with the horizontal positioning and vertical positioning and all three load modes, the worse status(10W) was vertical positioning had been recorded in the report.				

### 4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.	
		MDY-10-EH		
Adapter	XIAOMI	XIAOMI Input: AC100-240V,50/60Hz, 0.7A		
Λυαριεί	(Provided by client)	Output: DC5V,3A; DC9V,3A; DC12V,2.25A; DC20V, 1.35A	N/A	
iPhone 8	Apple	A1863	F4GVQ656JC6D	
Mobile phone	SAMSUNG	SM-G9500	R28J9140LPB	

### 4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty		
1	Radio Frequency	± 7.25 x 10 <sup>-8</sup>		
2	Conduction Emission	± 3.0dB (150kHz to 30MHz)		
3	Occupied Bandwidth	± 3%		
	Dadiated Courieus amission test	± 4.5dB (Below 1GHz)		
4	Radiated Spurious emission test	± 4.8dB (Above 1GHz)		
5	Temperature test	± 1 ℃		
6	Humidity test	± 3%		
7	Supply voltages	± 1.5%		
8	Time	± 3%		



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#### 4.4 Test Location

All tests were performed at:

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

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.

#### A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

#### VCCI

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

#### FCC –Designation Number: CN1178

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

#### • Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None



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# **Equipment List**

Conducted disturbance									
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date				
Shielding Room	ChangZhou ZhongYu	GB-88	SEM001-06	2017-05-10	2020-05-09				
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A				
Coaxial Cable	SGS	N/A	SEM024-01	2018-07-12	2019-07-11				
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018-09-25	2019-09-24				
LICN	ETC LINDODEN	0010/0	CEM007.00	2018-04-02	2019-04-01				
LISN	ETS-LINDGREN	3816/2	SEM007-02	2019-04-01	2020-03-31				
EMI Test Dession	D 1 1 0 0 1	ESCI	SEM004.00	2018-04-02	2019-04-01				
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019-04-01	2020-03-31				

Radiated emission					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMIC:		SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6- 27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2018-07-12	2019-07-11
EMI Test Receiver	Rohde & Schwarz	ESR	SEM004-03	2018-04-02	2019-04-01
(9kHz-7GHz)			3LIVI004-03	2019-04-01	2020-03-31
Trilog-Broadband Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2016-06-29	2019-06-28
Due emplifies	Sonoma Instrument	01001	CEMODE 04	2018-04-13	2019-04-12
Pre-amplifier	Co	310N	SEM005-04	2019-04-12	2020-04-11
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

General used equipment							
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date		
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2018-09-27	2019-09-26		
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2018-09-27	2019-09-26		
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2018-09-27	2019-09-26		
	Changchun			2018-04-05	2019-04-04		
Barometer	Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03		



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#### 6 **Radio Spectrum Matter Test Results**

#### 6.1 Conducted disturbance

Test Requirement Part 18.307 FCC MP-5 Test Method:

Limit:

	Conducte	d limit (dBμV)
Frequency of emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

<sup>\*</sup>Decreases with the logarithm of the frequency.

#### 6.1.1 E.U.T. Operation

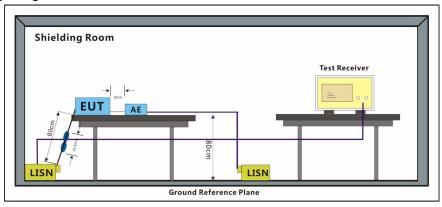
Operating Environment:

Temperature: 21.2 °C Humidity: 58 % RH Atmospheric Pressure: 1015 mbar

a:Charge mode Keep the EUT charging(5W) Pretest these modes to find b:Charge mode Keep the EUT charging(7.5W) the worst case: c:Charge mode Keep the EUT charging(10W) c:Charge mode\_Keep the EUT charging(10W) The worst case

for final test:

#### 6.1.2 Test Setup Diagram



#### 6.1.3 Measurement Procedure and Data



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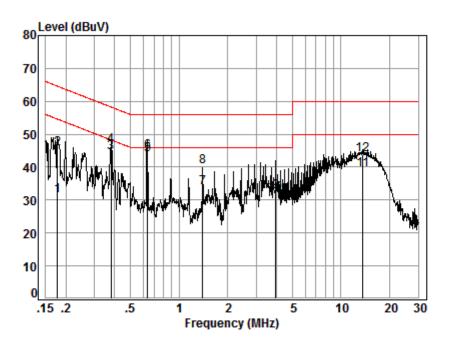
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Mode:c; Line:Live Line



Site : Shielding Room

Condition: Line Job No. : 11422CR

Test mode: c

		Cable	LISN	Read		Limit	0ver	
	Freq	Loss	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.18	0.02	9.66	21.76	31.44	54.59	-23.15	Average
2	0.18	0.02	9.66	36.01	45.69	64.59	-18.90	QP
3	0.38	0.05	9.67	34.63	44.35	48.25	-3.90	Average
4	0.38	0.05	9.67	36.79	46.51	58.25	-11.74	QP
5	0.64	0.07	9.67	34.14	43.88	46.00	-2.12	Average
6	0.64	0.07	9.67	35.01	44.75	56.00	-11.25	QP
7	1.40	0.12	9.73	23.99	33.84	46.00	-12.16	Average
8	1.40	0.12	9.73	30.21	40.06	56.00	-15.94	QP
9	3.94	0.16	9.72	22.68	32.56	46.00	-13.44	Average
10	3.94	0.16	9.72	22.12	32.00	56.00	-24.00	QP
11	13.62	0.20	10.23	28.74	39.17	50.00	-10.83	Average
12	13.62	0.20	10.23	33.51	43.94	60.00	-16.06	QP



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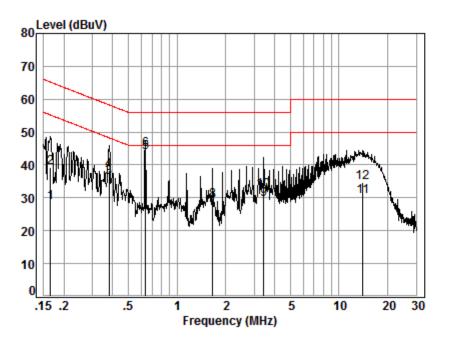
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Mode:c; Line:Neutral Line



Site : Shielding Room

Condition: Neutral Job No. : 11422CR

Test mode: c

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.17	0.01	9.64	19.08	28.73	55.21	-26.48	Average
2	0.17	0.01	9.64	29.71	39.36	65.21	-25.85	QP
3	0.38	0.05	9.65	26.64	36.34	48.25	-11.91	Average
4	0.38	0.05	9.65	28.75	38.45	58.25	-19.80	QP
5	0.64	0.07	9.64	34.16	43.87	46.00	-2.13	Average
6	0.64	0.07	9.64	35.07	44.78	56.00	-11.22	QP
7	1.65	0.14	9.70	17.20	27.04	46.00	-18.96	Average
8	1.65	0.14	9.70	19.48	29.32	56.00	-26.68	QP
9	3.44	0.16	9.68	19.75	29.59	46.00	-16.41	Average
10	3.44	0.16	9.68	22.43	32.27	56.00	-23.73	QP
11	14.06	0.20	10.29	19.79	30.28	50.00	-19.72	Average
12	14.06	0.20	10.29	24.05	34.54	60.00	-25.46	OP



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#### 6.2 Radiated emission

**Test Requirement** Part 18.305 Test Method: FCC MP-5

Measurement Distance: 3m

Limit:

(b) The field strength levels of emissions which lie outside the bands specified in §18.301, unless otherwise indicated, shall not exceed the following:

Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise	Any ISM	Below 500	25	300
specified (miscellaneous)	frequency	500 or more	25 × SQRT(power/500)	<sup>1</sup> 300
	Any non-ISM	Below 500	15	300
	frequency	500 or more	15 × SQRT(power/500)	<sup>1</sup> 300
Industrial heaters and RF	On or below	Any	10	1,600
stabilized arc welders	5,725 MHz Above 5,725 MHz	Any	( <sup>2</sup> )	(²)
Medical diathermy	Any ISM	Any	25	300
	frequency Any non-ISM frequency	Any	15	300
Ultrasonic	Below 490 kHz	Below 500 500 or more	2,400/F(kHz) 2,400/F(kHz) × SQRT (power/500)	300 <sup>3</sup> 300
	490 to 1,600 kHz Above 1,600 kHz	1 -	24,000/F(kHz) 15	30 30
Induction cooking ranges	Below 90 kHz On or above 90 kHz	Any Any	1,500 300	<sup>4</sup> 30 <sup>4</sup> 30

¹Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

<sup>2</sup>Reduced to the greatest extent possible.

<sup>3</sup>Field strength may not exceed 10 µV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

<sup>4</sup>Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.



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#### 6.2.1 E.U.T. Operation

Operating Environment:

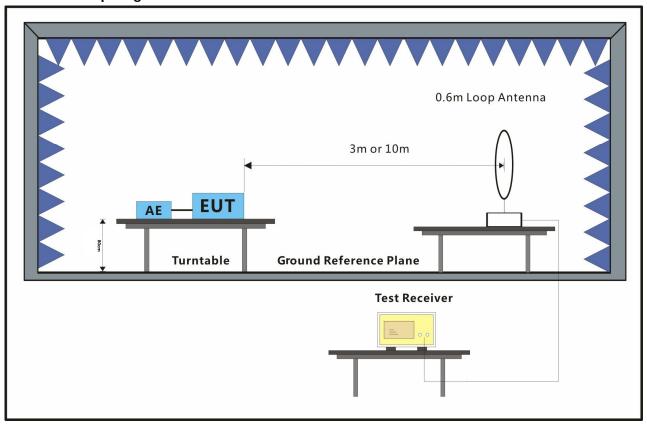
Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

a:Charge mode Keep the EUT charging(5W) Pretest these modes to find b:Charge mode\_Keep the EUT charging(7.5W) the worst case: c:Charge mode\_Keep the EUT charging(10W)

The worst case c:Charge mode\_Keep the EUT charging(10W)

for final test:

#### 6.2.2 Test Setup Diagram





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#### 6.2.3 Measurement Procedure and Data

Test Procedure:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber(30MHz-1000MHz) and 3 meter semi-anechoic chamber(9kHz-30MHz). The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 10 meters(30MHz-1000MHz) and 10 meter (9kHz-30MHz) away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- Above 30MHz: The Analyzer/Receiver scanned from 30MHz to 1000MHz. 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.
- d. Below 30MHz: The Analyzer/Receiver scanned from 9kHz to 30MHz.The antenna height is 2 meters above the ground to determine the maximum value of the field strength.
- e. 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 2 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- h. Repeat above procedures until all frequencies measured was complete.
- Measurement Requirement:
- 1)This product belongs to non-ISM equipment, the field strength limit is 15uV/m at 300 meter distance.
- 2)Limit: 20log(15uV/m) +20log (300/3) =23.52+40=63.52dBuV/m at 3 meters distance.



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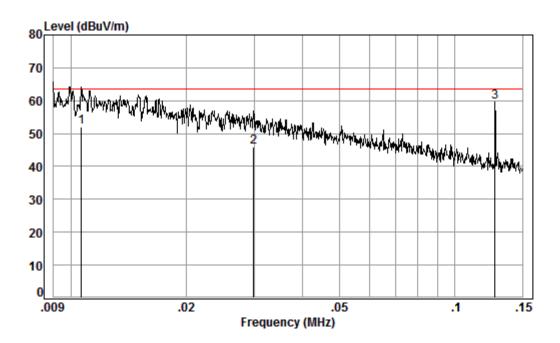
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Mode c: 9kHz-150kHz



Condition: 3m

Job No. : 11422CR

Test Mode: c

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	0.28	18.91	31.43	64.36	52.12	63.52	-11.40	Average
2	0.03	0.18	13.86	32.00	63.97	46.01	63.52	-17.51	Average
3 рр	0.13	0.06	11.82	32.67	80.50	59.71	63.52	-3.81	Average



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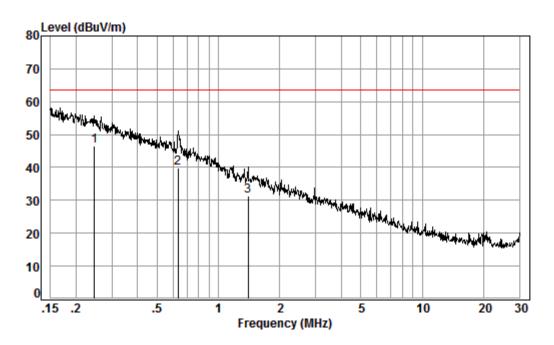
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150kHz-30MHz



Condition: 3m

Job No. : 11422CR

Test Mode: c

	Freq			Preamp Factor					Remark
-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	0.25	0.00	11.99	32.66	67.36	46.69	63.52	-16.83	Average
2	0.63	0.00	11.88	32.65	60.74	39.97	63.52	-23.55	Average
3	1.40	0.00	12.05	32.65	51.88	31.28	63.52	-32.24	Average



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### **Photographs**

#### 7.1 Test Setup

Please refer to setup photos.

### 7.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.

- End of the Report -



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