

TEST REPORT

 CTK Co., Ltd. The Power Leader of Global Regulatory Certification	CTK Co., Ltd. (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Report No.: CTK-2023-00481 Page (1) / (12) Pages	
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1. Applicant

- Name : Spigen Korea Co.,Ltd.
- Address : Spigen HQ-A, 446, Bongeunsa-ro, Gangnam-gu, Seoul, 06153, South Korea
- Date of Receipt : 2023-02-22

2. Manufacturer

- Name : WITS VINA CO.,LTD
- Address : Lot CN7, Diem Thuy Ip (A area), Hong Tien Commune, Pho Yen Town, Thai Nguyen, Province, Vietnam, 24709

3. Use of Report : For FCC Certification

4. Test Sample / Model: ArcField Flex Wireless Charger / PF2201

5. Date of Test : 2023-02-21 to 2023-03-02

6. Test Standard(method) used : FCC 47 CFR part 1 subpart I 1.1307

7. Testing Environment: Temp.: (23 ± 1) °C, Humidity: (48 ± 5) % R.H.

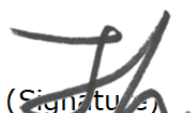
8. Test Results : Compliance

9. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

(Address : (Unhak-Dong) 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yong-in-si,
Gyeonggi-do, Korea)

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

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Approval	Tested by  Ji-Hye, Kim: (Signature)	Technical Manager  Won-Jae, Hwang: (Signature)
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Remark. This report is not related to KOLAS accreditation and relevant regulation.

2023-03-03

CTK Co., Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2023-03-03	Issued (CTK-2023-00481)	all

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1. General Product Description

1.1 Applicant Information

Company	Spigen Korea Co.,Ltd.
Contact Point	Spigen HQ-A, 446, Bongeunsa-ro, Gangnam-gu, Seoul, 06153, South Korea
Contact Person	Name : Woo Sang-Hyup E-mail : shwoo@spigen.com Tel : +82-2-6713-6189 Fax : -

1.2 Product Information

FCC ID	2AFKNPF2201
Product Description	ArcField Flex Wireless Charger
Model name	PF2201
Variant Model name	-
Classification of WPT devices	☐ Type 1 (Interference-causing Equipment)
	☐ Type 2 (Category II Radio Apparatus)
	☒ Type 3 (Category I Radio Apparatus)
Operating Frequency	128 kHz (single frequency)
RF Output Power	88.6 dBμV/m @ 3 m
Antenna type	Coil Antenna
Charging Method	Directly contact
Power Transfer Method	Magnetic induction and only single primary coil coupling secondary coil
Output power from each primary coil	< 15W
That may have multiple primary coils	No
Type of Modulation	ASK
Power Source	DC 9 V (Adapter & USB C type)
Hardware Rev	SS-02-REV07
Software Rev	N/A

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253QPR
AC/DC Adapter	HP	HSTNN-CA40	-
Wireless Charging Test Jig	Shenzhen Yulin Innovation Development Co., Ltd.	YBZ Wireless Charging Test Module	-
AC/DC Adapter	DONGYANG E&P VIETNAM CO., LTD.	EP-TA800 002	-

2. Accreditations

2.1 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A
KOREA	NRRA	KR0025

2.2 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS

3. Test-related content

3.1 Standard Requirement

The following RF exposure procedures are applicable :

- FCC Rules
Part 1.1310 Radiofrequency radiation exposure limits

Table 1 below sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

Table 1—Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Per the guidance of FCC Rule, Emissions between 9 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m.

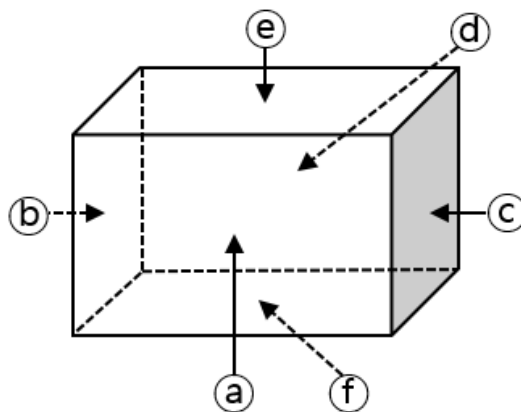
3.2 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
 Coverage factor $k = 2$, Confidence levels of 95 %

Description	Uncertainty
H-field	15 % (C.L. : Approx. 95 %, $k = 2$)
E-field	15 % (C.L. : Approx. 95 %, $k = 2$)

3.3 Test Set-up

3.3.1 EUT Position



Note : (a) : Front, (b) : Left, (c) : Right, (d) : Rear, (e) : Top, (f) : Bottom

3.3.2 Test configurations

In order to check all kinds of possible configurations, EUT was evaluated with appropriate client and under each charging condition as below table.

EUT Mode	Description
Charging (Transmitting mode)	charging test setting 5 W
	charging test setting 7.5 W
	charging test setting 10 W
	charging test setting 15 W
Stand-by (idle mode)	-

3.4 FCC Test-related

3.4.1 Measurement procedure

- a) The measurement was investigated between the edge of the charger and center of the field
 - b) Maximum E-field and H-field measurements were made on each of six sides of the EUT that could come in contact with a user. six sides are defined as follows: Front (㉑), Left(㉒), Right(㉓), Rear(㉔), Top(㉕) and Bottom(㉖) Refer to the test set-up position section 2.1 above.
 - c) According to the guidance of KDB 680106 D01 v03 test distance was 15 cm measured from the center of the probe(s) to the edge of the device
 - d) Equipment approval considerations item 5.b) of KDB 680106 D01 v03
- ※ Equipment approval considerations (Some requirements are not met.)
- (1) Power transfer frequency is less than 1 MHz.
 - meet the requirements.
 - DC 9 V, 128 kHz (single frequency)
 - (2) Output power from each primary coil is less than or equal to 15 watts.
 - meet the requirements.
 - < 15 W
 - (3) The system may consist of more than one source primary coils, charging one or more clients. If more than one primary coil is present, the coil pairs may be powered on at the same time.
 - meet the requirements.
 - Magnetic induction and only single primary coil coupling secondary coil
 - (4) Client device is placed directly in contact with the transmitter.
 - meet the requirements.
 - Client device is placed directly in contact with the transmitter.
 - (5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
 - Not Applicable.

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(6) The aggregate H-field strengths anywhere at or beyond 15 cm surrounding the device, and 20 cm away from the surface from all coils that by design can simultaneously transmit, and while those coils are simultaneously energized, are demonstrated to be less than 50% of the applicable MPE limit.

- The requirements are not met.

Refer to following worst test result (For more detail, please refer to section 3.4.2)

1) The worst E-Field Strength levels at 15 cm < 50 % of the MPE E-Field Strength limit 614 V/m.

- 15 W : 2.06 V/m < 307 V/m

2) The worst H-Field Strength levels at 15 cm < 50 % of the MPE H-Field Strength limit 1.63 A/m.

- 15 W : 0.82 A/m > 0.815 A/m

3.4.2 Test Result

-Complied

The probe was positioned at the location where there is maximum field strength on each side of the EUT. The maximum E-field and H-field is reported below.

- 5 W (128 kHz)

E-field Measurements

Distance (cm)	Position ① (V/m)	Position ② (V/m)	Position ③ (V/m)	Position ④ (V/m)	Position ⑤ (V/m)	Position ⑥ (V/m)	Limit (V/m)
15	0.61	0.79	1.02	0.87	0.39	0.65	614.00

H-field Measurements

Distance (cm)	Position ① (A/m)	Position ② (A/m)	Position ③ (A/m)	Position ④ (A/m)	Position ⑤ (A/m)	Position ⑥ (A/m)	Limit (A/m)
15	0.38	0.29	0.33	0.38	0.21	0.22	1.63

- 7.5 W (128 kHz)

E-field Measurements

Distance (cm)	Position ① (V/m)	Position ② (V/m)	Position ③ (V/m)	Position ④ (V/m)	Position ⑤ (V/m)	Position ⑥ (V/m)	Limit (V/m)
15	1.69	1.02	0.89	1.58	0.56	1.03	614.00

H-field Measurements

Distance (cm)	Position ① (A/m)	Position ② (A/m)	Position ③ (A/m)	Position ④ (A/m)	Position ⑤ (A/m)	Position ⑥ (A/m)	Limit (A/m)
15	0.45	0.28	0.40	0.25	0.21	0.29	1.63

- 10 W (128 kHz)

E-field Measurements

Distance (cm)	Position ① (V/m)	Position ② (V/m)	Position ③ (V/m)	Position ④ (V/m)	Position ⑤ (V/m)	Position ⑥ (V/m)	Limit (V/m)
15	1.39	1.08	1.74	1.52	0.72	0.95	614.00

H-field Measurements

Distance (cm)	Position ① (A/m)	Position ② (A/m)	Position ③ (A/m)	Position ④ (A/m)	Position ⑤ (A/m)	Position ⑥ (A/m)	Limit (A/m)
15	0.63	0.38	0.77	0.41	0.21	0.47	1.63

- 15 W (128 kHz)

E-field Measurements

Distance (cm)	Position Ⓐ (V/m)	Position Ⓑ (V/m)	Position Ⓒ (V/m)	Position Ⓓ (V/m)	Position Ⓔ (V/m)	Position Ⓕ (V/m)	Limit (V/m)
15	1.81	1.47	1.92	2.06	0.70	1.16	614.00

H-field Measurements

Distance (cm)	Position Ⓐ (A/m)	Position Ⓑ (A/m)	Position Ⓒ (A/m)	Position Ⓓ (A/m)	Position Ⓔ (A/m)	Position Ⓕ (A/m)	Limit (A/m)
15	0.65	0.42	0.82	0.41	0.30	0.48	1.63

- Idle (128 kHz)

E-field Measurements

Distance (cm)	Position Ⓐ (V/m)	Position Ⓑ (V/m)	Position Ⓒ (V/m)	Position Ⓓ (V/m)	Position Ⓔ (V/m)	Position Ⓕ (V/m)	Limit (V/m)
15	0.71	0.74	0.82	0.69	0.42	0.48	614.00

H-field Measurements

Distance (cm)	Position Ⓐ (A/m)	Position Ⓑ (A/m)	Position Ⓒ (A/m)	Position Ⓓ (A/m)	Position Ⓔ (A/m)	Position Ⓕ (A/m)	Limit (A/m)
15	0.66	0.28	0.31	0.27	0.21	0.21	1.63

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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Electric and Magnetic Field Analyzer	Narda S.T.S	EHP-200AC	170WX91010	2022-10-14	2023-10-14

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