TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID : A3LEPN6100

Equipment Under Test	:	WIRELESS CHARGER
Model Name	:	EP-N6100
Applicant	:	Samsung Electronics Co., Ltd.
Manufacturer	:	Samsung Electronics Co., Ltd.
Date of Receipt	:	2018.04.25
Date of Test(s)	:	2018.05.14 ~ 2018.05.24
Date of Issue	:	2018.05.28

In the configuration tested, the EUT complied with the standards specified above.

Tested By: **Date:** **2018.05.28**

Nancy Park

Technical Manager: **Date:** **2018.05.28**

Hyunchae You

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1. General information

1.1. Testing laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
-Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
-Designation number: KR0150
All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.
Phone No. : +82 31 688 0901
Fax No. : +82 31 688 0921

1.2. Details of applicant

Applicant : Samsung Electronics Co., Ltd.
Address : 19 Chapin Rd., Building D, Pine Brook, New Jersey, United States, 07058
Contact Person : Youn, Chan-Ho
Phone No. : +1 973 808 6362

1.3. Details of manufacturer

Company : Samsung Electronics Co., Ltd.
Address : Yen Phong 1 Industrial park, Yen Phong District Ninh Province, VIETNAM

1.4. Description of EUT

Kind of Product	WIRELESS CHARGER	
Model Name	EP-N6100	
Power Supply	DC 12.0 V	
Frequency Range	Normal charging (DC 5.0 V)	Fast charging (DC 9.0 V)
	Ant. 1: 110 ㎑ ~ 148 ㎑ Ant. 2: 110 ㎑ ~ 148 ㎑ Ant. 3: 110 ㎑ ~ 148 ㎑ Ant. 4: 110 ㎑ ~ 148 ㎑	Ant. 1: 115 ㎑ ~ 148 ㎑ Ant. 2: 125 ㎑ ~ 148 ㎑ Ant. 3: 125 ㎑ ~ 148 ㎑
Antenna Type	Inductive loop coil antenna	
H/W Version	REV 0.5	
S/W Version	-	

1.5. Declaration by the manufacturer

- Operating voltage: DC 10.8 V ~ DC 13.2 V
- Operating temperature: -20 ℃ ~ 70 ℃
- The EUT has 4 inductive loop coil antennas and can be operating maximum 2 antennas simultaneously. (For the details, please refer to Test setup photo)
- EUT is operated with input DC 12.0 V but internal circuit of EUT can divide DC 5.0 V and DC 9.0 V depend on client devices.

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1.6. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
E-Field Probe	D.A.R.E!! Instruments	RadiSense 4	13I00444SNO04	Jun. 22, 2017	Annual	Jun. 22, 2018
Magnetic Field Sensor	HIOKI	0850-C1	3472	Jun. 26, 2017	Annual	Jun. 26, 2018
Magnetic Field Hitester	HIOKI	FT3470-50	140430999	Jun. 12, 2017	Annual	Jun. 12, 2018
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N.C.R.	N/A	N.C.R.

▶ Support equipment

Description	Manufacturer	Model	FCC ID
Samsung Mobile Phone	Samsung Electronics Co., Ltd.	SM-G960U	A3LSMG960U
Smart Wearable Device	Samsung Electronics Co., Ltd.	SM-R775U	A3LSMR775U

1.7. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL012717	2018.05.28	Initial

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1.8. Worst case of test configurations

Antenna	Frequency	H-field [dBμV/300m]	
		Normal charging (DC 5 V)	Fast charging (DC 9 V)
1	125 ㎑	1.65	**5.05**
2	136 ㎑	2.15	**7.65**
3	136 ㎑	0.35	**4.25**

Note;

For simultaneous operating condition, the test mode with the highest H-field level was tested.

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

Charging mode with client device	Mode		Description
Model: SM-G960U FCC ID: A3LSMG960U Model: SM-R775U FCC ID: A3LSMR775U	SISO		1 % of battery 50 % of battery 99 % of battery
	Operating DC 5 V	Operating DC 9 V	
	(Ant. 1) (Ant. 2) (Ant. 3) (Ant. 4)	(Ant. 1) (Ant. 2) (Ant. 3)	
	MIMO		1 % of battery 50 % of battery 99 % of battery
	(Ant. 1 + 3) (Ant. 1 + 4) (Ant. 2 + 3) (Ant. 2 + 4)		

Note;

EUT was investigated with client device under normal charging condition as above then worst value was only reported.

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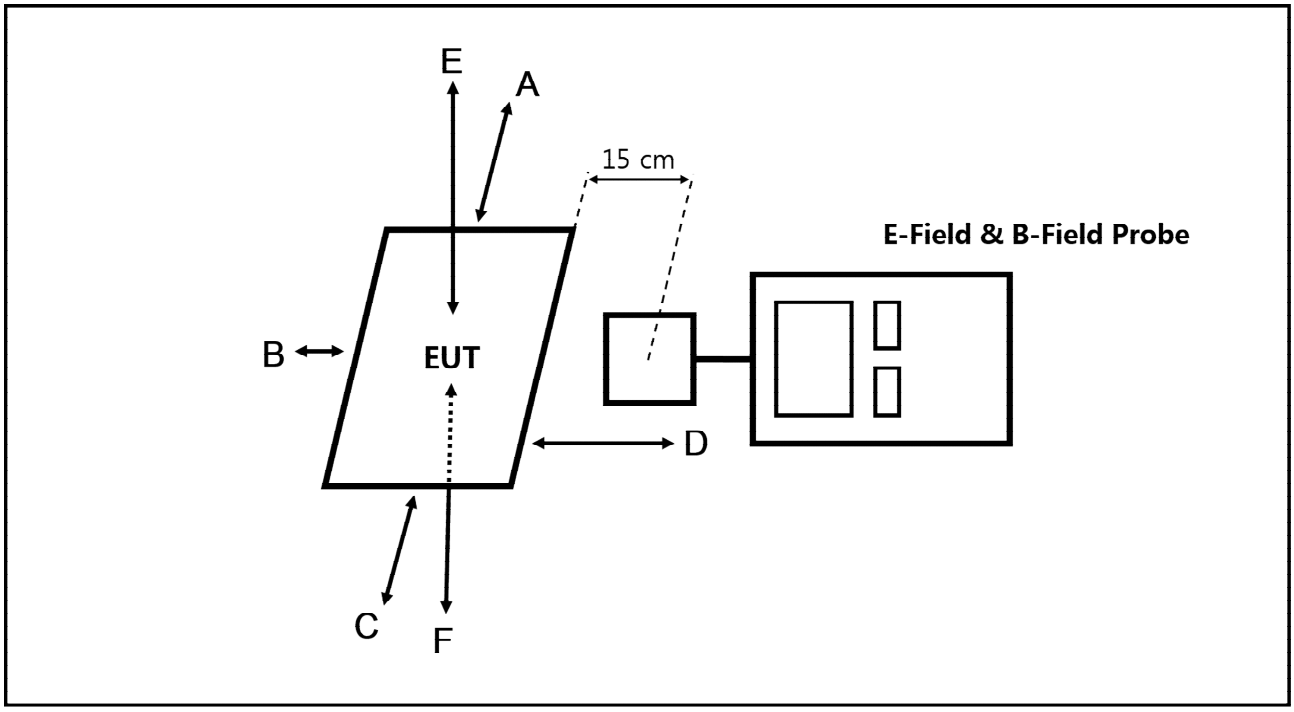
2. Test Result

2.1. Test Setup



2.2. Measurement procedure

a) The RF exposure test was performed in anechoic chamber.
b) The measurement probe was placed at test distance (15 ㎝) which is between the edge of the charger and the geometric center of probe.
c) The highest emission level was recorded and compared with limit as soon as measurement of each points (A, B, C, D, E, F) were completed.
d) The EUT was measured according to the dictates of KDB 680106 D01 v03.

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2.3. Equipment Approval Considerations item 5 b) of KDB 680106 D01 v03.

(1) Power transfer frequency is less that 1 ㎒.
- The device operates at a frequency range 110 ㎑ to 148 ㎑

(2) Output power from each primary coil is less than or equal to 15 watts.
- Output power from primary coil: 15 watts.

(3) The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.
- The transfer system including a charging system with multiple primary coils are to detect and allow only between individual pairs of coils.

(4) Client device is placed directly in contact with the transmitter.
- Client device is placed directly in contact with the transmitter.

(5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
- Mobile exposure conditions only.

(6) The aggregate H-field strengths at 15 ㎝ surrounding the device and 20 ㎝ above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50 % of the MPE limit.
- Refer to following test results.

The EUT H-Field Strength levels at 15 ㎝ < 50 % of the MPE H-Field Strength limit 1.63 A/m
0.540 A/m (Max. at 15 ㎝) < 0.815 A/m

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2.4. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

§1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of FCC part 2.1093 of this chapter

TABLE 1 - LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (㎒)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (㎽/㎠)	Average Time (minutes)
(A) Limits for Occupational /Control Exposures				
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 / Uncontrol Exposures				
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/1 500	30
1 500-100 000			1.0	30

f = frequency in ㎒
* = Plane wave equivalent power density

Note 1 to Table 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

Note 2 to Table 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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2.5. E and H field strength

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

2.5.1. E-Field Strength at from the edges surrounding the EUT

Test Condition: DC 5 V Operating mode with client device (1 % battery status of client device)

Frequency Range (㎑)	Antenna	Probe Position A (V/m)	Probe Position B (V/m)	Probe Position C (V/m)	Probe Position D (V/m)	Probe Position E (V/m)	Probe Position F (V/m)	Limits (V/m)
110 ~ 148	1	8.15	7.01	6.13	5.84	9.31	5.64	614.00
	2	10.04	7.28	7.04	5.27	8.56	8.03	
	3	11.09	5.65	5.81	5.28	8.61	8.92	
	4	12.30	7.12	6.13	5.27	8.54	8.12	

Test Condition: DC 9 V Operating mode with client device (1 % battery status of client device)

Frequency Range (㎑)	Antenna	Probe Position A (V/m)	Probe Position B (V/m)	Probe Position C (V/m)	Probe Position D (V/m)	Probe Position E (V/m)	Probe Position F (V/m)	Limits (V/m)
115 ~ 148	1	8.21	7.32	6.40	6.01	9.43	5.97	614.00
125 ~ 148	2	10.31	7.52	7.15	5.50	8.84	8.31	
	3	11.30	5.82	5.94	5.40	8.89	9.13	

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Test Condition: MIMO Operating mode with client device (1 % battery status of client device)

Frequency Range (㎑)	Antenna	Probe Position A (V/m)	Probe Position B (V/m)	Probe Position C (V/m)	Probe Position D (V/m)	Probe Position E (V/m)	Probe Position F (V/m)	Limits (V/m)
110 ~ 148	1 + 3	10.68	7.56	6.63	5.03	9.25	8.47	614.00
	1 + 4	9.21	6.38	6.01	5.65	9.48	6.29	
	2 + 3	10.44	7.54	7.34	6.01	8.99	9.63	
	2 + 4	8.39	7.34	6.34	5.04	8.01	8.21	

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2.5.2. H-Field Strength at from the edges surrounding the EUT

Test Condition: DC 5 V Operating mode with client device (1 % battery status of client device)

Frequency Range (㎑)	Antenna	Probe Position A (A/m)	Probe Position B (A/m)	Probe Position C (A/m)	Probe Position D (A/m)	Probe Position E (A/m)	Probe Position F (A/m)	Limits (A/m)
110 ~ 148	1	0.27	0.21	0.17	0.12	0.51	0.23	1.63
	2	0.33	0.17	0.18	0.15	0.19	0.18	
	3	0.29	0.13	0.16	0.10	0.35	0.31	
	4	0.16	0.13	0.28	0.18	0.47	0.16	

Test Condition: DC 9 V Operating mode with client device (1 % battery status of client device)

Frequency Range (㎑)	Antenna	Probe Position A (A/m)	Probe Position B (A/m)	Probe Position C (A/m)	Probe Position D (A/m)	Probe Position E (A/m)	Probe Position F (A/m)	Limits (A/m)
115 ~ 148	1	0.29	0.23	0.19	0.14	0.54	0.24	1.63
125 ~ 148	2	0.34	0.20	0.19	0.17	0.22	0.20	
	3	0.31	0.14	0.18	0.12	0.39	0.33	

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Test Condition: MIMO Operating mode with client device (1 % battery status of client device)

Frequency Range (㎑)	Antenna	Probe Position A (A/m)	Probe Position B (A/m)	Probe Position C (A/m)	Probe Position D (A/m)	Probe Position E (A/m)	Probe Position F (A/m)	Limits (A/m)
110 ~ 148	1 + 3	0.43	0.26	0.18	0.19	0.34	0.34	1.63
	1 + 4	0.36	0.23	0.17	0.09	0.33	0.20	
	2 + 3	0.39	0.26	0.18	0.17	0.31	0.48	
	2 + 4	0.37	0.15	0.23	0.13	0.25	0.22	

Remark;

1. H-field strength (A/m) = B-field (μT) / 1.25

- End of the Test Report -

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