MPE TEST REPORT

OF

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

FCC ID: A3LEPPG920IW

Equipment Under Test	: WIRELESS CHARGER
Model Name	: EP-PG920I
Applicant	: Samsung Electronics Co., Ltd.
Manufacturer	: Samsung Electronics Co., Ltd.
Date of Test(s)	: 2015.02.13 ~ 2015.02.14
Date of Issue	: 2015.02.14

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

Tested By: **Youngmin Park** **Date:** **2015.02.14**

Approved By: **Hyunchae You** **Date:** **2015.02.14**

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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, 435-837

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1.2. Details of applicant

Applicant : Samsung Electronics Co., Ltd.
Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Republic of Korea
Contact Person : Lee, Woo-Ram
Phone No. : +82 31 301 5379

1.3. Description of EUT

Kind of Product	WIRELESS CHARGER
Model Name	EP-PG920I
Power Supply	DC 5 V
Frequency Range	115 ㎑ ~ 205 ㎑
Operating Conditions	-20 ℃ ~ 60 ℃
Antenna Type	Inductive loop coil antenna

1.4. Declarations by the manufacturer

- Operation temperature : -20 ℃ ~ 60 ℃

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal Date	Cal Interval	Cal Due.
Spectrum Analyzer	R&S	FSV30	100768	Mar. 27, 2014	Annual	Mar. 27, 2015
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Jul. 09, 2013	Biennial	Jul. 09, 2015
E-Field Probe	D.A.R.E!! Instruments	RadiSense 4	13I00444SNO04	Apr. 29, 2014	Annual	Apr. 29, 2015
Magnetic Field Hitester	HIOKI	FT3470-50	140430999	Jul. 15, 2014	Annual	Jul. 15, 2015
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.
Mobile Test Unit	R&S	CMW500	144035	Mar. 03, 2014	Annual	Mar. 03, 2015

1.6. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL008426	2015.02.14	Initial

1.7. Worst case of 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 configuration	Charging current (㎃)	Mobile phone	Description
Charging Mode[1)] with resistive load	145		Maximum resistive load
	350		Medium resistive load
	645		Minimum resistive load
Charging Mode[2)] with client device (FCC ID : A3LSMN910V)		SM-N910V	Less than 1 % of battery
		SM-N910V	Less than 50 % of battery
		SM-N910V	100 % full charging of battery

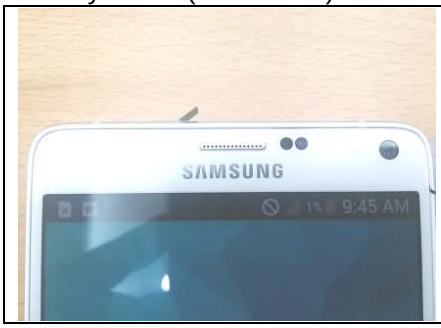
1) Test Jig was used during the test to satisfy each current status by using resistive loads.
Output voltage = DC 5 V, Output current = 145 ㎃ / 350 ㎃ / 645 ㎃
- (Maximum load) 34.48 Ω = 5 V / 0.145 A
- (Medium load) 14.29 Ω = 5 V / 0.350 A
- (Minimum load) 7.75 Ω = 5 V / 0.645 A

2) WPC device with client device was investigated each battery status and compared in two operating configurations.

Battery status during charging condition :

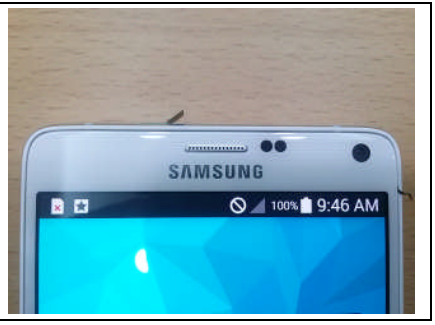
- Less than 1 % of battery
- Less than 50 % of battery
- 100 % of battery

Galaxy Note4 (SM-N910V)



Plot#1 – less than 1 % of battery

Plot#2 – less than 50 % of battery

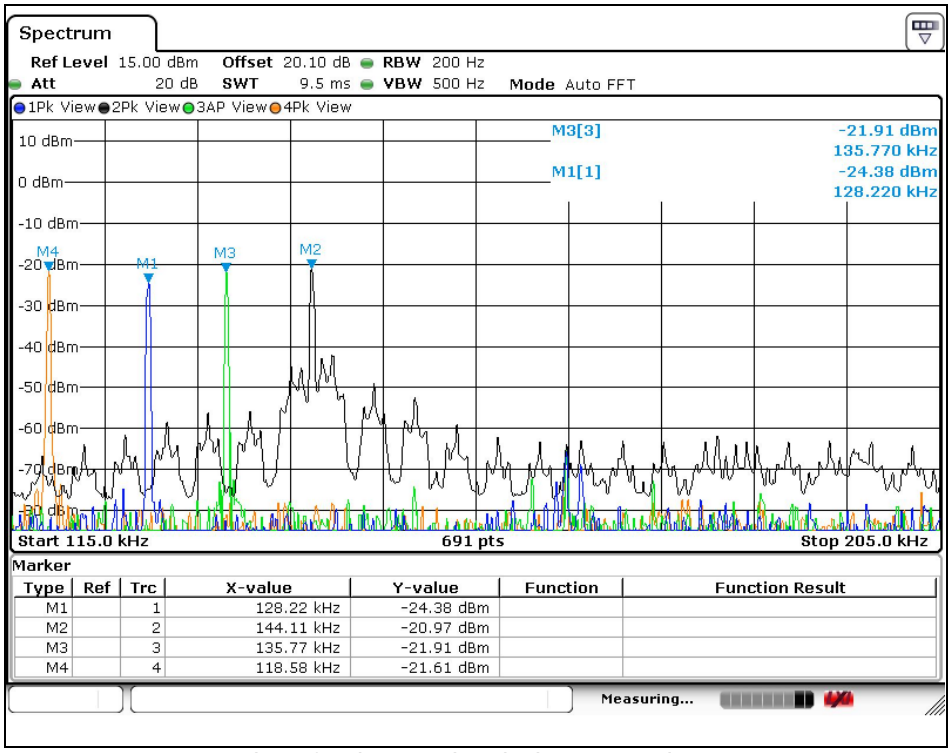


Plot#3 – 100 % of battery

Operating configurations :

Galaxy Note4 (SM-N910V)

- While the client device was in airplane mode (Trace#1 “M1”)
- While the client device was connected to an active data connection (Trace#2 “M2”)
  The device was tested under all modes and bands like 2G and 3G.
  In the result, **PCS GSM / GPRS1900 / 1 TX** was found in **High channel**.
- While the wireless charger is charging without the client device. (Trace#3 “M3”)
- While the wireless charger is charging with the client device turned off. (Trace#4 “M4”)

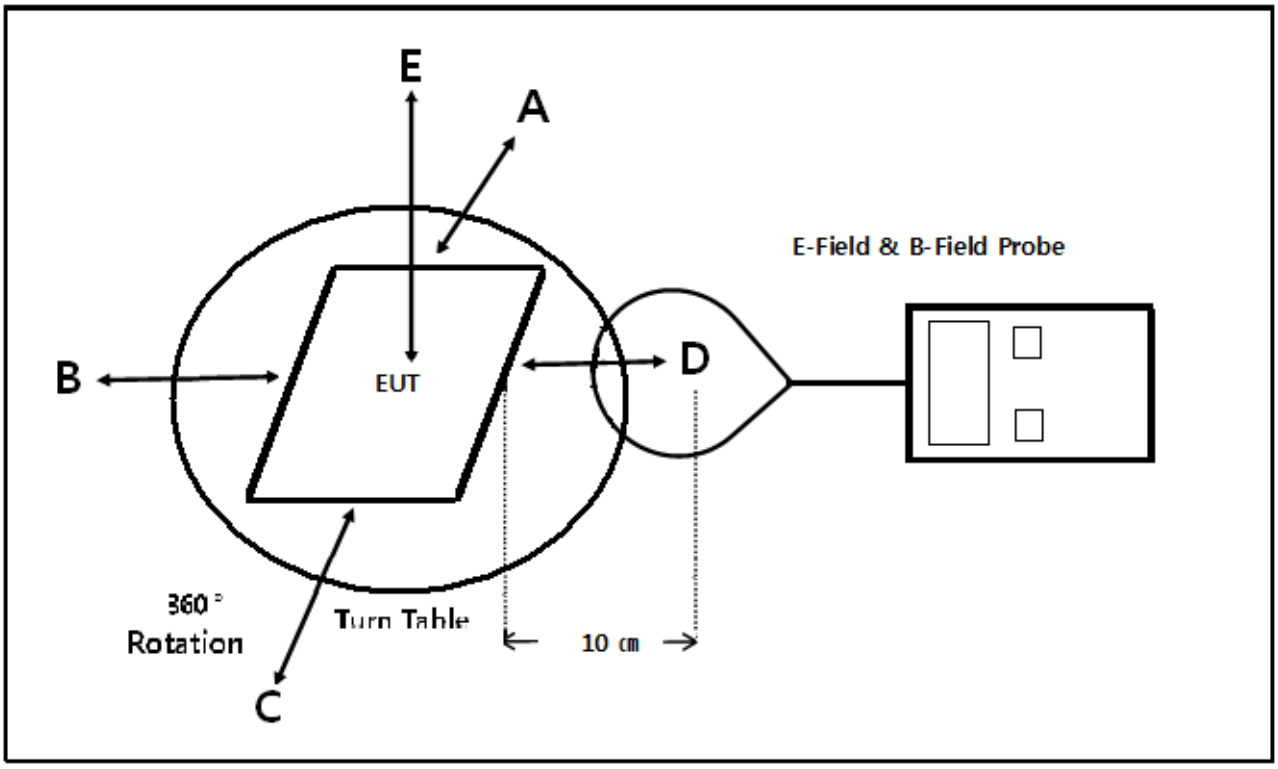


Plot – fundamental emission comparison

- The level of Trace#2 was more than Trace#1, 3 and 4 so Trace#2 was selected.
- Trace#2 as **PCS GSM / GPRS1900 / 1 TX** which was found in **High channel** should be tested with the client device as a worst case.

2. Test Result

2.1. Test Setup



2.2. Measurement procedure

a) The RF exposure test was performed on 360 degree turn table in anechoic chamber.
b) The measurement probe was placed at test distance (10 ㎝) which is between the edge of the charger and the geometric center of probe.
c) The turn table was rotated 360 degree to search of highest strength
d) the highest emission level was recorded and compared with limit as soon as measurement of each points (A, B, C, D, E) were completed.
e) The EUT were measured according to the dictates of KDB 680106 D01v02.

2.3. Equipment Approval Considerations.

The EUT does comply with item 5.2 of KDB 680106 D01v02.

a) Power transfer frequency is less that 1 ㎒.
- The device operates in the frequency range from 115 ㎑ to 205 ㎑.

b) Output power from each primary coil is less than 5 watts.
- The maximum field strength of the fundamental : 78.10 ㏈㎶/m at 3 m. The EIRP calculation is reference to KDB 789033.
  * EIRP[㏈ m] = E[㏈㎶/m] + 20log(d[meters]) - 104.77 - 4.8 ㏈, d = 3 m.
  * 78.10 ㏈㎶/m - 95.2 - 4.8 = -21.9 ㏈ m EIRP .
  * The output power from primary coil is 0.006 457 ㎽.

c) 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 includes only single primary and secondary coils. Refer to a photo in the Internal photos.

d) Client device is inserted in or placed directly in contact with the transmitter.
- Client device is placed directly in contact with the transmitter. Refer to a photo in the External photos.

e) The maximum coupling surface area of the transmit (charging) device:
- The EUT coupling surface area : 9.7 cm(W) x 9.7 cm(H) = 94.09 cm^2, 60 cm^2 < 94.09 cm^2 < 400 cm^2.

f) Aggregate leakage fields at 10 cm surrounding the device from all simultaneous transmitting coils are demonstrated to be less than 30 % of the MPE limit.
- The EUT field strength levels are 30 % x MPE limit < Level < MPE limit. Refer to following test results. 0.489 A/m < 0.76 A/m (max.) < 1.63 A/m.

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.

2.5. E and H field strength

Ambient temperature : (24 ± 1) ℃
Relative humidity : 47 % R.H.

Test Mode : Charging mode with resistive loads

2.5.1. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (145 ㎃ status)

Frequency Range (㎑)	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)	Limits (V/m)
115 ~ 205	7.84	13.80	7.05	6.82	10.56	614.00

2.5.2. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (350 ㎃ status)

Frequency Range (㎑)	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)	Limits (V/m)
115 ~ 205	7.03	14.70	7.46	6.02	10.57	614.00

2.5.3. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (645 ㎃ status)

Frequency Range (㎑)	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)	Limits (V/m)
115 ~ 205	7.90	13.70	7.62	6.36	10.92	614.00

Test Mode : Charging mode with client device _Galaxy Note4 (SM-N910V)

2.5.4. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (less than 1 % battery status)

Frequency Range (㎑)	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)	Limits (V/m)
115 ~ 205	11.30	15.00	9.31	8.11	13.30	614.00

2.5.5. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (less than 50 % battery status)

Frequency Range (㎑)	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)	Limits (V/m)
115 ~ 205	10.20	14.60	9.52	7.80	9.68	614.00

2.5.6. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (100 % battery status)

Frequency Range (㎑)	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)	Limits (V/m)
115 ~ 205	9.82	14.10	10.10	7.26	12.50	614.00

Test Mode : Charging mode with resistive loads

2.5.7. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (145 ㎃ status)

Frequency Range (㎑)	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)	Limits (A/m)
115 ~ 205	0.10	0.09	0.09	0.11	0.35	1.63

2.5.8. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (350 ㎃ status)

Frequency Range (㎑)	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)	Limits (A/m)
115 ~ 205	0.18	0.19	0.10	0.17	0.76	1.63

2.5.9. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (645 ㎃ status)

Frequency Range (㎑)	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)	Limits (A/m)
115 ~ 205	0.14	0.12	0.13	0.11	0.46	1.63

Test Mode : Charging mode with client device _Galaxy Note4 (SM-N910V)

2.5.10. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (less than 1 % battery status)

Frequency Range (㎑)	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)	Limits (A/m)
115 ~ 205	0.05	0.04	0.05	0.04	0.05	1.63

2.5.11. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (less than 50 % battery status)

Frequency Range (㎑)	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)	Limits (A/m)
115 ~ 205	0.04	0.04	0.05	0.03	0.05	1.63

2.5.12. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (100 % battery status)

Frequency Range (㎑)	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)	Limits (A/m)
115 ~ 205	0.04	0.04	0.05	0.04	0.06	1.63