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RF EXPOSURE EVALUATION
Maximum Permissible Exposure (MPE)

Applicant Name:
Samsung Electronics Co., Ltd.
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Date of Testing:
1/18 - 2/15/2016
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
0Y1601290226-R1.A3L

FCC ID:	**A3LSMG930US**
APPLICANT:	**Samsung Electronics Co., Ltd.**

EUT Type:	Portable Handset
FCC Rule Part(s):	FCC Part 1 (§1.1310) and Part 2 (§2.1091)
FCC Classifications:	PCS Licensed Transmitter Held to Ear (PCE)
Test Procedure:	KDB 680106 D01 v02
Class II Perm. Change:	Adding Wireless Charging Battery Pack Accessory
Original Grant Date:	2/3/2016

The device bearing the FCC Identifier specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and has been tested in accordance with the measurement procedures specified in KDB 680106 D01 v02. These measurements were performed with no deviation from the standards. Test results reported herein relate only to the item(s) tested.

This revised Test Report (S/N: 0Y1601290226-R1.A3L) supersedes and replaces the previously issued test report (S/N: 0Y1601290226.A3L) on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

I authorize and attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

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1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 Introduction

This document is prepared on behalf of Samsung Electronics Co., Ltd. to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations and RSS-102 of Industry Canada in two operating conditions of the EUT: (1) AC adapter mode and (2) standalone battery mode. AC adapter mode MPE testing was performed to demonstrate compliance with the MPE limits for the mobile use condition. Standalone battery mode E and H Field strength measurements were performed to justify the exclusion of SAR testing in the 140 – 190kHz range.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310 and RSS-102: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
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
300-1500	…	…	f/300	6
1500-100,000	…	…	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
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
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

Table 1-1. Limits for Maximum Permissible Exposure (MPE)

Note:

Per KDB 680106 D01 v02, when a limit is not specified for a frequency of operation below 300kHz, the 300kHz limit shall apply. For this MPE evaluation, the 300kHz E-field limit of 614 V/m and H-field limit of 1.63 A/m are used to assess compliance in the 140 – 190kHz operating range.

1.2 EUT Description

The EUT consists of a Samsung Wireless Charging Battery Pack (WCBP), Model: EP-TG930 that attaches to a host handset (previously certified under FCC ID: A3LSMG930US). The handset is charged wirelessly by the WCBP via magnetic coupling. The WCBP contains charging circuitry that operates in the frequency range of 140kHz – 190kHz. The WCBP is designed to be used with the host in a portable held-to-head use configuration.

1.3 MPE Requirements Overview

Three different categories of transmitters are defined by the FCC in KDB 680106 D01 v02. These categories are fixed installation, mobile, and portable and are defined as follows:

- **Fixed Installations:** fixed location means that the device, including its antenna, is physically secured at a permanent location and is not able to be easily moved to another location. Additionally, distance to humans from the antenna is maintained to at least 2 meters.

- **Mobile Devices:** a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structures and the body of the user or nearby persons. Transmitters designed to be used by consumers or workers that can be easily re-located, such as a wireless modem operating in a laptop computer, are considered mobile devices if they meet the 20 centimeter separation requirement. The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR §2.1091.

- **Portable Devices:** a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user. Portable device requirements are found in Section 2.1093 of the FCC's Rules (47 CFR§2.1093).

The FCC also categorizes the use of the device as based upon the user's awareness and ability to exercise control over his or her exposure. The two categories defined are Occupational/ Controlled Exposure and General Population/Uncontrolled Exposure. These two categories are defined as follows:

- **Occupational/Controlled Exposure:** In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program. If appropriate, warning signs and labels can also be used to establish such awareness by providing prominent information on the risk of potential exposure and instructions on methods to minimize such exposure risks.

- **General Population/Uncontrolled Exposure:** The general population / uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

The **Samsung Portable Handset FCC ID: A3LSMG930US** is evaluated to the "General Population/Uncontrolled Exposure" limits for two different exposure conditions: (1) AC adapter mode (mobile condition) and (2) standalone battery mode (portable condition), as described in Section 1.1 above.

1.4 Test Equipment

Test equipment calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Narda	EHP-200A	EM Field Probe	11/16/2015	Annual	11/16/2016	170WX50922

Table 1-2. Test Equipment List

1.5 Test Setup

Maximum E-field and H-field measurements were made on each of the six sides of the EUT. The six sides are defined as follows: Top (A), Left (B), Bottom (C), Right (D), Front (E), and Back (F). Refer to the test position diagram below.

Portable Condition

Probe	Condition	Test Distance (cm)
E-field	Portable	Variable
H-field	Portable	Variable

Mobile Condition

Probe	Condition	Test Distance (cm)
E-field	Mobile	10
H-field	Mobile	10

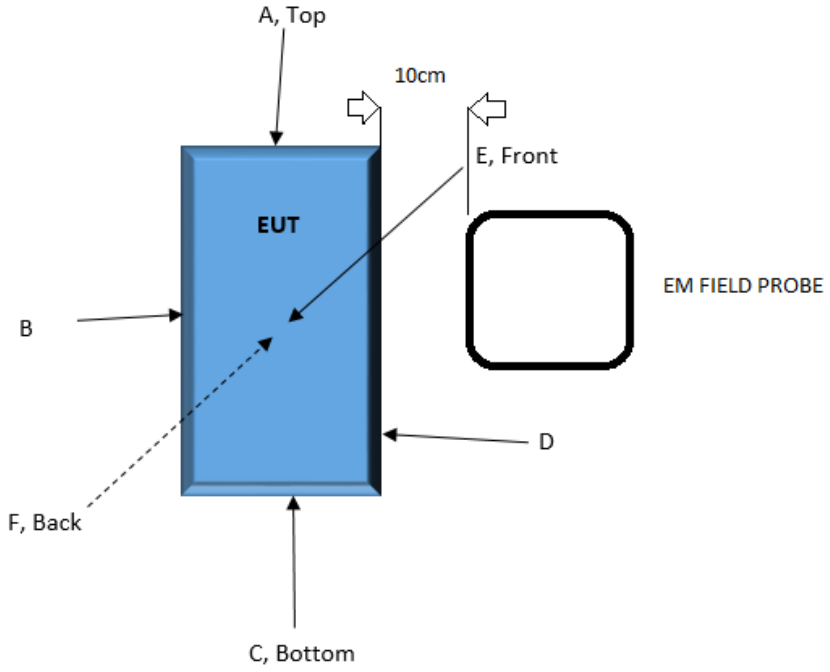

Figure 1. Test Positions and Probe Distance

1.6 Portable Condition Field Strength Measurements

The procedure used to determine the RF power density for the portable condition was based upon H-field measurements recorded using calibrated probes. All measurements were recorded with the EUT attached to the portable handset in a standalone configuration (i.e. “battery mode”).

The field strength of the H-field was measured at an EUT-to-probe-measurement-axis distance as shown in Section 1.5 using the equipment listed in Section 1.4 for supporting the SAR test exclusion of the charging frequency in the portable condition. During measurements, the WCBP was wirelessly charging the host portable handset (FCC ID: A3LSMG930US). The Samsung portable handset was equipped with wireless charging circuitry.

Care was exercised to ensure that the host device was still being charged during testing. The field strength data in the tables below are shown with these test configurations.

During testing, the WCBP with the handset was placed on a non-conductive (composite plastic) table top. The probe was positioned at the location where there is maximum field strength on each side of the EUT. The maximum H-field is reported below for each configuration.

The H-field test results provided in this section are applicable to portable use of the host device while the WCBP is attached and charging the host.

Distance (cm)	EUT SIDES					
	A (A/m)	B (A/m)	C (A/m)	D (A/m)	E (A/m)	F (A/m)
10	0.080	0.100	0.070	0.147	0.073	0.106
8	0.097	0.131	0.080	0.153	0.095	0.233

Table 1-3. H-field Measurements for Decremental Test Distances

1.7 Mobile Condition MPE

The procedure used to determine the RF power density for the mobile condition was based upon E-field and H-field measurements recorded using calibrated probes. All measurements were recorded with the WCBP charging the host handset while the WCBP itself was being charged by an AC adapter.

The field strength of both the E-field and the H-field was measured at an EUT-to-probe-measurement-axis distance of 10cm, per KDB 680106 D01 v02, for determining compliance with the MPE requirements of FCC Part 1.1310 in the mobile condition.

The WCBP was tested with the portable handset battery level at 3 different charge states: battery at 1% (depleted), battery at 50% charge, battery near 100% charge. For the case where the battery was near 100% charge, care was exercised to ensure that the host device was still being charged during testing. The MPE data in the tables below are shown with these test configurations.

During testing, the WCBP with the handset was placed on a non-conductive (composite plastic) table top. The probes were 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 for each configuration.

In accordance with KDB 680106 D01 v02, the MPE test results provided in this section are applicable to mobile use of the host device while the WCBP is attached and charging the host and the WCBP is being charged by an AC adapter.

Test Position	Freq. Range	Phone Battery(%)	Value (V/m)	Limit (V/m)
A	140~190	1	0.4721	614
B	140~190	1	0.7772	614
C	140~190	1	1.1	614
D	140~190	1	1.3565	614
E	140~190	1	0.613	614
F	140~190	1	0.7213	614

Table 1-4. E-field Measurements for 1% Battery Charge

Test Position	Freq. Range	Phone Battery(%)	Value (V/m)	Limit (V/m)
A	140~190	50	0.5902	614
B	140~190	50	0.7542	614
C	140~190	50	0.6814	614
D	140~190	50	0.855	614
E	140~190	50	0.9283	614
F	140~190	50	0.4	614

Table 1-5. E-field Measurements for 50% Battery Charge

Test Position	Freq. Range	Phone Battery(%)	Value (V/m)	Limit (V/m)
A	140~190	90	0.47	614
B	140~190	90	0.7	614
C	140~190	90	0.6345	614
D	140~190	90	0.6977	614
E	140~190	90	0.6793	614
F	140~190	90	0.39	614

Table 1-6. E-field Measurements for 90% Battery Charge

Test Position	Freq. Range	Phone Battery(%)	Value (A/m)	Limit (A/m)
A	140~190	1	0.064	1.63
B	140~190	1	0.0867	1.63
C	140~190	1	0.0617	1.63
D	140~190	1	0.1467	1.63
E	140~190	1	0.0713	1.63
F	140~190	1	0.15	1.63

Table 1-7. H-field Measurements for 1% Battery Charge

Test Position	Freq. Range	Phone Battery(%)	Value (A/m)	Limit (A/m)
A	140~190	50	0.0877	1.63
B	140~190	50	0.073	1.63
C	140~190	50	0.0639	1.63
D	140~190	50	0.0831	1.63
E	140~190	50	0.0616	1.63
F	140~190	50	0.1097	1.63

Table 1-8. H-field Measurements for 50% Battery Charge

Test Position	Freq. Range	Phone Battery(%)	Value (A/m)	Limit (A/m)
A	140~190	90	0.0703	1.63
B	140~190	90	0.0837	1.63
C	140~190	90	0.0616	1.63
D	140~190	90	0.1	1.63
E	140~190	90	0.0614	1.63
F	140~190	90	0.1205	1.63

Table 1-9. H-field Measurements for 90% Battery Charge

2.0 CONCLUSION

The E and H Field strength data shown in this report of the wireless charging battery pack used to charge a host device show that the field strength levels for portable use conditions are less than 25% of the MPE limit and, thus, justify the exclusion of SAR testing at the wireless charging frequency. Additionally, the MPE data for AC adapter charging the WCBP shows compliance to the MPE limits at 10cm for the mobile condition.