FCC Part 1 Subpart I
FCC Part 2 Subpart J

MPE EVALUATION REPORT

FOR

WPT (Wireless Power Transfer)

MODEL NUMBER: SM-G986B/DS, SM-G986B

FCC ID: A3LSMG986B

REPORT NUMBER: 4789219881-S2V1

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Prepared for
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IAS ACCREDITED

Testing Laboratory

TL-637

Revision History

Rev.	Date	Revisions	Revised By
V1	12/6/2019	Initial Issue	-

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1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS CO.,LTD.
FCC ID	A3LSMG986B
Model Number	SM-G986B/DS, SM-G986B
SERIAL Number	R3CM90FSACX
Applicable Standards	FCC PART 1 SUBPART I FCC PART 2 SUBPART J KDB 680106 D01
Date Tested	12/5/2019
Test Results	Complies

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released By:	Prepared By:
	
Justin Park Operations Leader UL Korea, Ltd. Suwon Laboratory	Sunghoon Kim Test Engineer UL Korea, Ltd. Suwon Laboratory

2. TEST METHODOLOGY

All calculations were made in accordance with FCC OET Bulletin 65 Edition 97-01.

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

Suwon
Shield Room

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.
The full scope of accreditation can be viewed at http://www.iasonline.org/PDF/TL/TL-637.pdf.

4. EQUIPMENT UNDER TEST

4.1. DESCRIPTION OF EUT

The EUT has WPT (Wireless Power Transfer) feature which has inductive charging coil to charge phone or watch. The charging frequency is between 110 kHz to 148 kHz, and the maximum power consumption is 9.0 W in charging status.

4.2. WORST-CASE CONFIGURATION

Test configuration	Description
DUT to Phone test configuration 1	Charging from Phone to DUT
DUT to Phone test configuration 2	Charging from Phone to DUT (TA Charging from DUT)
DUT to Phone test configuration 3	Charging from Phone to DUT
DUT to Phone test configuration 4	Charging from Phone to DUT (TA Charging from DUT)
DUT to Watch test configuration 5	Charging from Watch to DUT
DUT to Watch test configuration 6	Charging from Watch to DUT (TA Charging from DUT)

Note:
Configuration 2, 4 and 6 were tested with the worst case of configuration 1, 3 and 5.

4.3. KDB 680106 D01 v03 SECTION 5.b) EQUIPMENT APPROVAL CONSIDERATIONS

Requirement	Device
(1) Power transfer frequency is less than 1 MHz.	Yes. Operating Frequency is between 110kHz to 148 kHz.
(2) Output power from each primary coil is less than or equal to 15 watts.	Yes. Maximum power is 9.0 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.	Yes.
(4) Client device is placed directly in contact with the transmitter.	Yes.
(5) Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).	Yes.
(6) The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.	Yes. The aggregate field at 15 cm from the device are 7.55 % of the FCC H field limit.

4.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT & PERIPHERALS

SUPPROT EQUIPMENT & PERIPHERALS LIST				
Description	Manufacturer	Model	Serial Numver	FCC ID
Phone	Samsung Electronics Co., Ltd.	SM-N975F	R38M504W9JN	A3LSMN975F
Watch	Samsung Electronics Co., Ltd.	SM-R820N	RFAM90G1V0H	A3LSMR820N
Charger	Samsung Electronics Co., Ltd.	EP-TA800	R37M55W0ZE1SE3	N/A
Data Cable	Samsung Electronics Co., Ltd.	EP-DG977	N/A	N/A

TEST SETUP

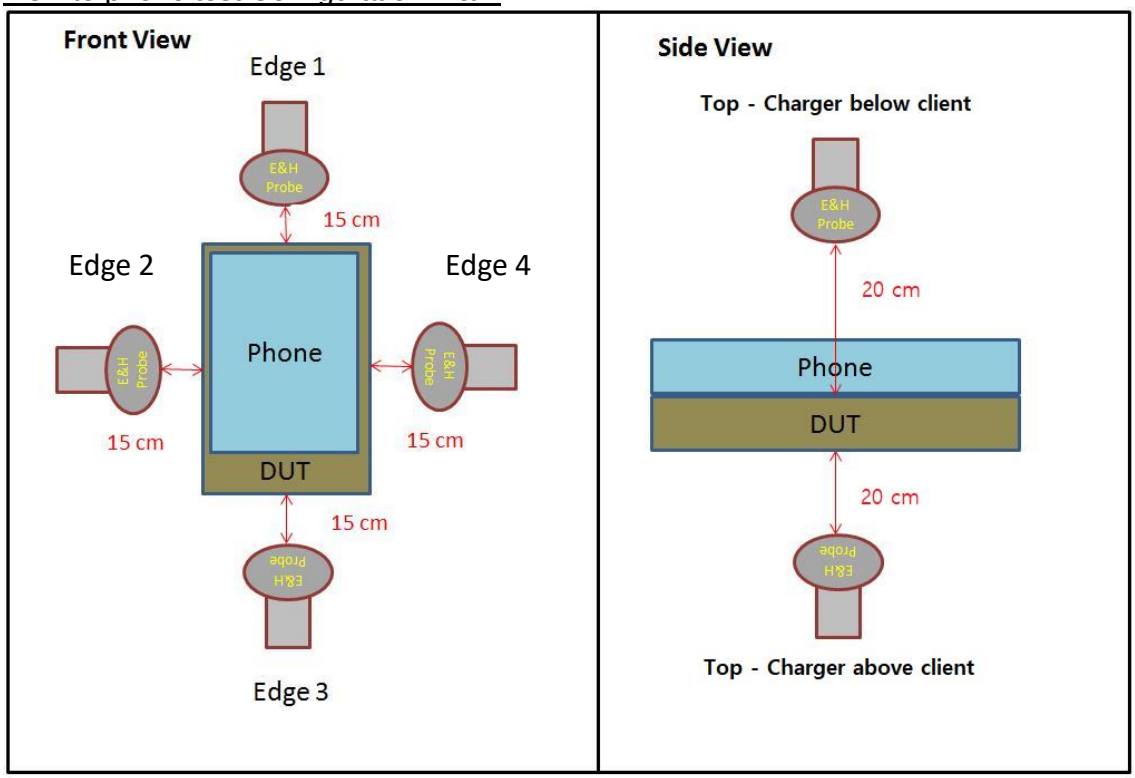
The following three modes are tested in test configurations;

Mode
Operating (SUPPORT Equipment, <10% Power Charging)
Operating (SUPPORT Equipment, 50~55% Power Charging)
Operating (SUPPORT Equipment, 90~95% Power Charging)

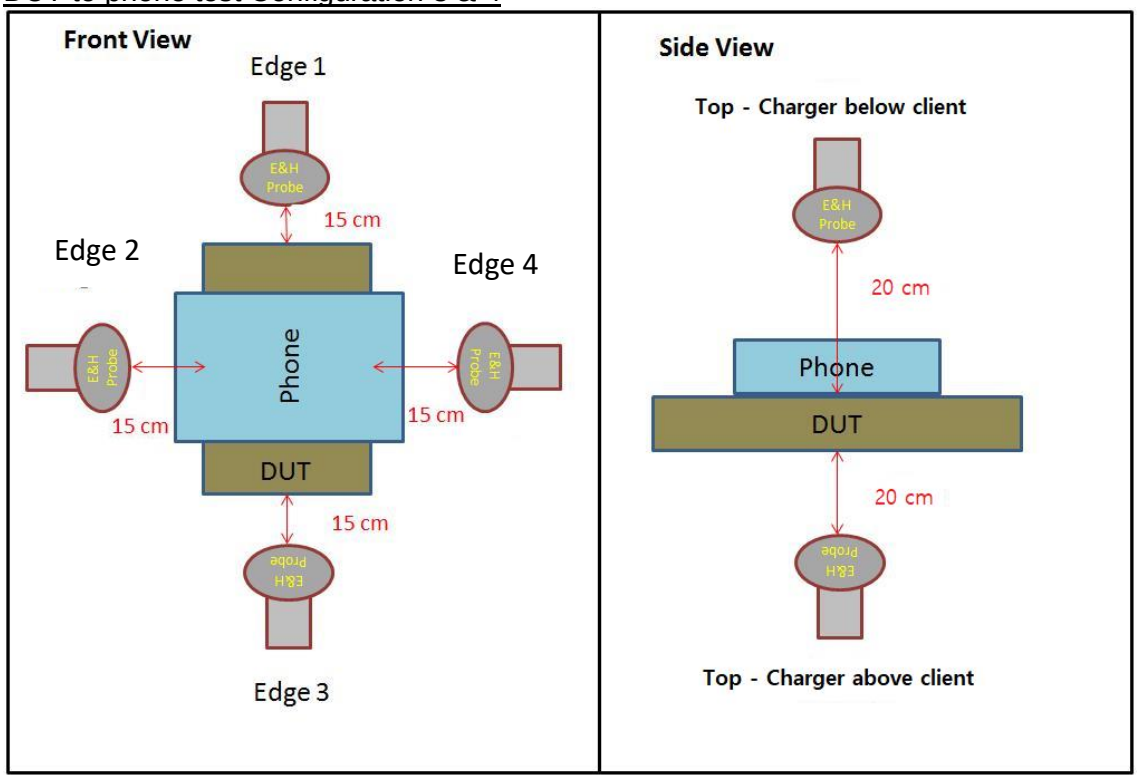
MEASUREMENT TEST SETUP

The measurement was taken using a probe placed 15 cm surrounding the device and 20 cm above the top surface of the EUT. Measurements were taken the top (charger below/above client) and all sides of the EUT per KDB680106 D01 v03 and RF Exposure Procedures (Wireless Power Transfer) in TCB Workshop October, 2018.

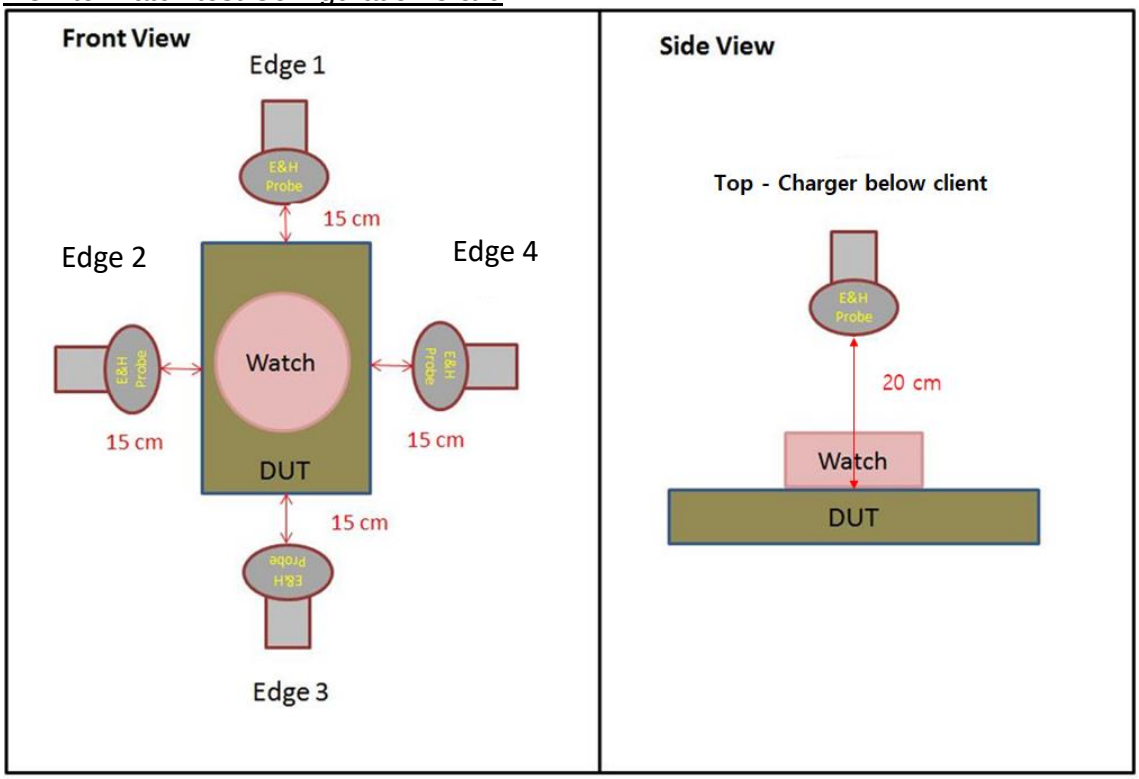
DUT to phone test Configuration 1 & 2



DUT to phone test Configuration 3 & 4



DUT to Watch test Configuration 5 & 6



5. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was used for the tests documented in this report;

Test Equipment List					
Description	Manufacturer	Model	Serial Numver	Cal Date	Cal Due
Electric and Magnetic Field Probe	Narda	EHP-200A	170WX80301	8-26-2019	8-26-2020

6. Maximum PERMISSIBLE RF EXPOSURE

6.1. FCC LIMITS AND SUMMARY

6.1.1. FCC LIMITS

§ 1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental 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 § 2.1093 of this chapter.

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 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
300–1500			f/300	6
1500–100,000			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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = 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.

6.2. TEST RESULTS

6.2.1. FCC RF EXPOSURE

H-FIELD MEASUREMENTS

Note: Peak measurement were performed. RMS values were calculated from the peak measurement. Please refer to the formula for calculating the RMS values: [Field Strength x √Duty Cycle].

Additional test was performed in each Test mode by moving the probe surrounding the device to find the maximum exposure.

TEST results of DUT to phone test Configuration 1 & 2

FCC RF Exposure Result					
Test Configuration	Test mode	Test distance	Test Position	H-Field Limit (A/m)	H-Field meas data (A/m)
Configuration 1	Operating Real Product (Power <10% charging)	**15 cm** probe to edges of EUT and **20 cm** probe to top surface of the EUT	Top - charger above client	1.63	0.051
			Top - charger below client		0.051
			Edge 1		0.052
			Edge 2		0.052
			Edge 3		0.051
			Edge 4		0.051
			max		0.052
	Operating Real Product (Power 50~55% charging)		Top - charger above client		0.051
			Top - charger below client		0.051
			Edge 1		0.051
			Edge 2		0.051
			Edge 3		0.051
			Edge 4		0.051
			max		0.051
	Operating Real Product (Power 90~95% charging)		Top - charger above client		0.051
			Top - charger below client		0.051
			Edge 1		0.051
			Edge 2		0.053
			Edge 3		0.051
			Edge 4		0.051
			max		**0.053**
Configuration 2	Operating Real Product (Power 50~55% charging)		Edge 2		0.051
			max		0.051

TEST results of DUT to phone test Configuration 3 & 4

FCC RF Exposure Result					
Test Configuration	Test mode	Test distance	Test Position	H-Field Limit (A/m)	H-Field meas data (A/m)
Configuration 3	Operating Real Product (Power <10% charging)	**15 cm** probe to edges of EUT and **20 cm** probe to top surface of the EUT	Top - charger above client	1.63	0.051
			Top - charger below client		0.051
			Edge 1		0.054
			Edge 2		0.118
			Edge 3		0.062
			Edge 4		0.086
			max		**0.123**
	Operating Real Product (Power 50~55% charging)		Top - charger above client		0.051
			Top - charger below client		0.051
			Edge 1		0.053
			Edge 2		0.094
			Edge 3		0.062
			Edge 4		0.075
			max		0.096
	Operating Real Product (Power 90~95% charging)		Top - charger above client		0.051
			Top - charger below client		0.051
			Edge 1		0.051
			Edge 2		0.101
			Edge 3		0.058
			Edge 4		0.070
			max		0.118
Configuration 4	Operating Real Product (Power 50~55% charging)		Edge 2		0.102
			max		0.107

TEST results of DUT to phone test Configuration 5 & 6

FCC RF Exposure Result					
Test Configuration	Test mode	Test distance	Test Position	H-Field Limit (A/m)	H-Field meas data (A/m)
Configuration 5	Operating Real Product (Power <10% charging)	**15 cm** probe to edges of EUT and **20 cm** probe to top surface of the EUT	Top - charger below client	1.63	0.060
			Edge 1		0.056
			Edge 2		0.065
			Edge 3		0.088
			Edge 4		0.068
			max		**0.095**
	Operating Real Product (Power 50~55% charging)		Top - charger below client		0.063
			Edge 1		0.059
			Edge 2		0.067
			Edge 3		0.077
			Edge 4		0.051
			max		0.077
	Operating Real Product (Power 90~95% charging)		Top - charger below client		0.059
			Edge 1		0.051
			Edge 2		0.066
			Edge 3		0.078
			Edge 4		0.051
			max		0.080
Configuration 6	Operating Real Product (Power 50~55% charging)		Edge 3		0.108
			max		0.110

6.2.2. FCC SUMMARY OF RESULTS

H-Field Limit		
FCC RF Exposure	Maximum meas data (A/m)	Percentage (%)
1.63	0.123	**7.55**

Conclusion:

H-Field result is less than 50% of the MPE limit.

Appendixes

Refer to separated files for the following appendixes.

4789219881-S2V1 FCC Report MPE_App A_Test Setup Photos

END OF REPORT