FCC 47 CFR § 2.1091

RF EVALUATION REPORT (MPE)

FOR

GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC, WPT and UWB

MODEL NUMBER: SM-F956U, SM-F956U1

FCC ID: A3LSMF956U

REPORT NUMBER: 4791196575-S4V2

ISSUE DATE: 5/3/2024

Prepared for
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Testing Laboratory

TL-637

Revision History

Rev.	Date	Revisions	Revised By
V1	4/26/2024	Initial Issue	--
V2	5/3/2024	Revised typo.	Sunghoon Kim

Table of Contents

1. Attestation of SAR Characterization

Applicant Name	SAMSUNG ELECTRONICS CO.,LTD.
FCC ID	A3LSMF956U
Model Number	SM-F956U, SM-F956U1
Applicable Standards	FCC 47 CFR § 2.1091 KDB 680106 D01 RF Exposure Wireless Charging Apps
Date Tested	4/23/2024
Test Results	Pass

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 Senior Laboratory 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 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Shield Room 1

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.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 WPT charging test considerations

Test configuration	Descriptions
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 (Cross position)	Charging from Phone to DUT
DUT to Phone test configuration 4 (Cross position)	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:

1. Configuration 2, 4 and 6 were tested with the worst case of configuration 1, 3 and 5.
2. All test configurations considered for each Folder open and Folder close conditions.

4.3 KDB 680106 D01 EQUIPMENT APPROVAL CONSIDERATIONS

Requirement	Device informations
(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 or 20cm from the device are 16.37 % of the FCC H field limit.

4.4 Description of Test setup

SUPPORT EQUIPMENTS & PERIPHERALS

SUPPROT EQUIPMENT & PERIPHERALS LIST				
Description	Manufacturer	Model	Serial Numver	FCC ID
Phone	Samsung Electronics Co., Ltd.	SM-G986B/DS	R3CMB0C70XN	A3LSMG986B
Watch	Samsung Electronics Co., Ltd.	SM-R835F	RFAM90ZXFTF	A3LSMR835
Traver Adapter	Samsung Electronics Co., Ltd.	EP-TA800	R37N9BV0382HM3	DoC
USB Data Cable	Samsung Electronics Co., Ltd.	EP-DN980BBE	N/A	-

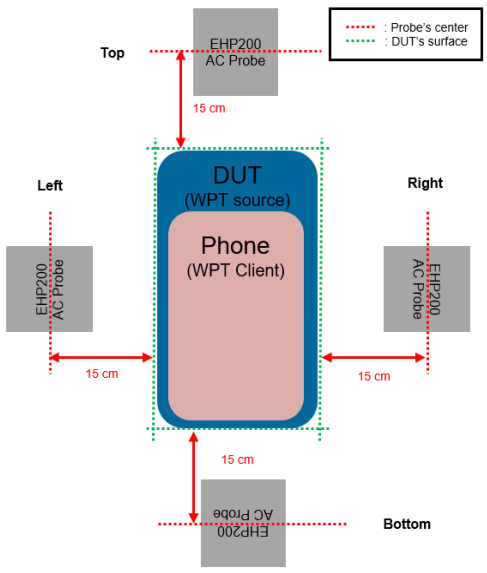
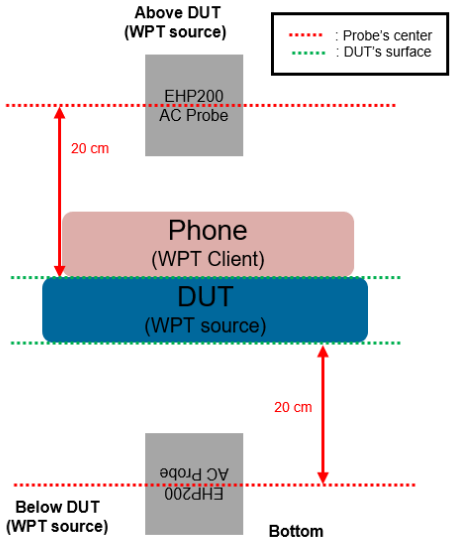
MEASUREMENT TEST SETUP

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.

Charging test modes **:** The following three modes are tested in test configurations

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

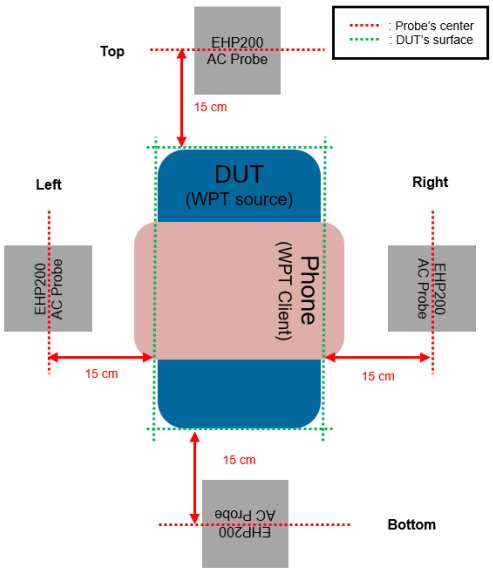
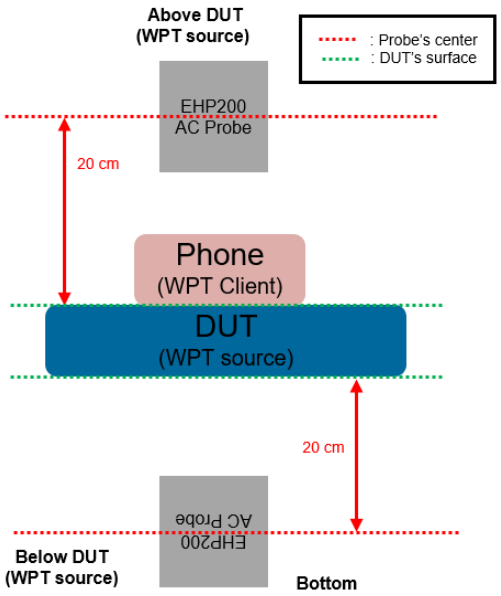
DUT(Folder open/Folder Close) to phone test Configuration 1 & 2

Front view	Side view
	

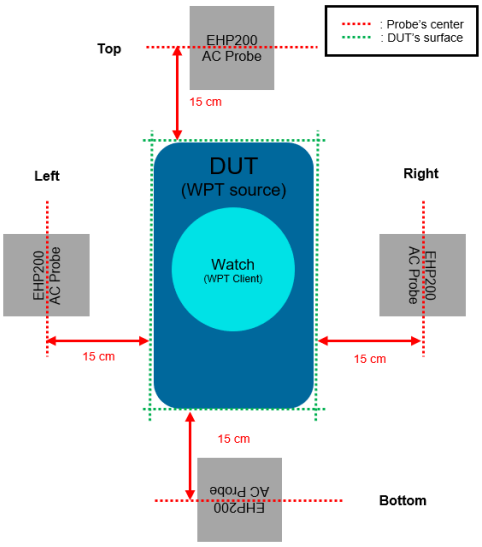
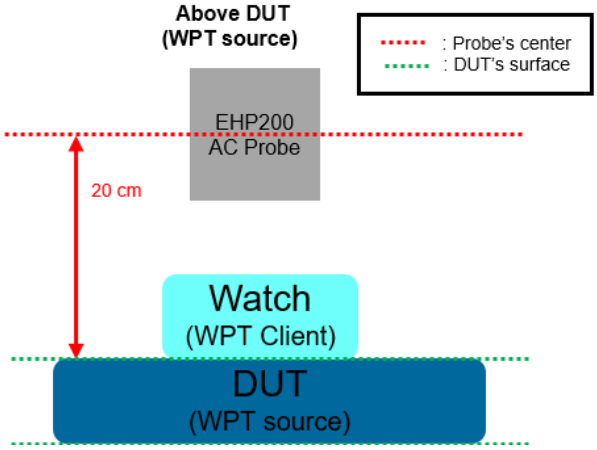
Note:

Test distance is the distance between DUT's surface to center of probe.

DUT(Folder open/Folder Close) to phone test Configuration 3 & 4

Front view	Side view
	

DUT(Folder open/Folder Close) to Watch test Configuration 5 & 6

Front view	Side view
	

Note:

Test distance is the distance between DUT's surface to center of probe.

5. H-field Measurement equipment

The following equipment was used in this report;

Test equipment (Measurement probe)				
Description	**Manufacturer**	**Model**	**S/N**	**Cal due.**
E-H Field Analyzer	**Narda**	**EHP-200AC**	**170WX91008**	**8-11-2024**

6. Maximum Permissive Exposure test Results

6.1 FCC MPE 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 MPE Test Results

H-Field Measurements

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

MPE(H-field) test Result

Folder Close condition

TEST results of DUT(Folder Close) to phone test Configuration 1 & 2

Test configuration	Charging test mode	Test distance	Test positions	H-field meas H-field (A/m)	MPE (H-field) Limit (A/m)
Configuration 1	Operating (WPT Client, <10 % Power Charging)	20cm test distance for Above DUT/Below DUT & 15 cm test distance for Top/Left/Right/Bottom	Above DUT	0.0315	1.63
			Below DUT	0.0296	
			Top	0.0296	
			Left	0.0442	
			Right	0.0370	
			Bottom	0.0470	
Configuration 1	Operating (WPT Client, 50-55 % Power Charging)		Bottom	0.0453	
Configuration 1	Operating (WPT Client, 90-95 % Power Charging)		Bottom	**0.0504**	
Configuration 2	Worst Charging test mode from Configuration 1		Bottom	0.0458	

TEST results of DUT(Folder Close) to phone test Configuration 3 & 4

Test configuration	Charging test mode	Test distance	Test positions	H-field meas H-field (A/m)	MPE (H-field) Limit (A/m)
Configuration 3	Operating (WPT Client, <10 % Power Charging)	20cm test distance for Above DUT/Below DUT & 15 cm test distance for Top/Left/Right/Bottom	Above DUT	0.0737	1.63
			Below DUT	0.0636	
			Top	0.0486	
			Left	**0.1887**	
			Right	0.0813	
			Bottom	0.0370	
Configuration 3	Operating (WPT Client, 50-55 % Power Charging)		Left	0.1452	
Configuration 3	Operating (WPT Client, 90-95 % Power Charging)		Left	0.1625	
Configuration 4	Worst Charging test mode from Configuration 3		Left	0.1550	

TEST results of DUT(Folder Close) to phone test Configuration 5 & 6

Test configuration	Charging test mode	Test distance	Test positions	H-field meas H-field (A/m)	MPE (H-field) Limit (A/m)
Configuration 5	Operating (WPT Client, <10 % Power Charging)	20cm test distance for Above DUT/Below DUT & 15 cm test distance for Top/Left/Right/Bottom	Above DUT	0.0574	1.63
			Top	0.0498	
			Left	0.0625	
			Right	0.0356	
			Bottom	0.1027	
Configuration 5	Operating (WPT Client, 50-55 % Power Charging)		Bottom	0.0887	
Configuration 5	Operating (WPT Client, 90-95 % Power Charging)		Bottom	0.1007	
Configuration 6	Worst Charging test mode from Configuration 5		**Bottom**	**0.1064**	

Folder Open condition

TEST results of DUT(Folder Open) to phone test Configuration 1 & 2

Test configuration	Charging test mode	Test distance	Test positions	H-field meas H-field (A/m)	MPE (H-field) Limit (A/m)
Configuration 1	Operating (WPT Client, <10 % Power Charging)	20cm test distance for Above DUT/Below DUT & 15 cm test distance for Top/Left/Right/Bottom	Above DUT	0.0306	1.63
			Below DUT	0.0296	
			Top	0.0305	
			Left	0.0284	
			Right	**0.0569**	
			Bottom	0.0357	
Configuration 1	Operating (WPT Client, 50-55 % Power Charging)		Right	0.0547	
Configuration 1	Operating (WPT Client, 90-95 % Power Charging)		Right	0.0552	
Configuration 2	Worst Charging test mode from Configuration 1		Right	0.0462	

TEST results of DUT(Folder Open) to phone test Configuration 3 & 4

Test configuration	Charging test mode	Test distance	Test positions	H-field meas H-field (A/m)	MPE (H-field) Limit (A/m)
Configuration 3	Operating (WPT Client, <10 % Power Charging)	20cm test distance for Above DUT/Below DUT & 15 cm test distance for Top/Left/Right/Bottom	Above DUT	0.0606	1.63
			Below DUT	0.0625	
			Top	0.0899	
			Left	0.2413	
			Right	0.0301	
			Bottom	0.0432	
Configuration 3	Operating (WPT Client, 50-55 % Power Charging)		**Left**	**0.2669**	
Configuration 3	Operating (WPT Client, 90-95 % Power Charging)		Left	0.2657	
Configuration 4	Worst Charging test mode from Configuration 3		Left	0.2652	

TEST results of DUT(Folder Open) to phone test Configuration 5 & 6

Test configuration	Charging test mode	Test distance	Test positions	H-field meas H-field (A/m)	MPE (H-field) Limit (A/m)
Configuration 5	Operating (WPT Client, <10 % Power Charging)	20cm test distance for Above DUT/Below DUT & 15 cm test distance for Top/Left/Right/Bottom	Above DUT	0.0503	1.63
			Top	0.0976	
			Left	0.0730	
			Right	0.0312	
			Bottom	**0.1444**	
Configuration 5	Operating (WPT Client, 50-55 % Power Charging)		Bottom	0.1392	
Configuration 5	Operating (WPT Client, 90-95 % Power Charging)		Bottom	0.1104	
Configuration 6	Worst Charging test mode from Configuration 5		Bottom	0.1243	

6.2.1 Worst H-field result

H-Field Limit		
FCC RF Exposure	Maximum meas data (A/m)	Percentage (%)
1.63	0.2669	**16.37**

Conclusion:

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

Appendixes

Refer to separated files for the following appendixes.

4791196575-S4 FCC Report MPE_App A_Test setup photos

4791196575-S4 FCC Report MPE_App B_Probe Cal. Certificates

END OF REPORT