TEST REPORT

WPT Test for SM-S931B/DS
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-SR-2410-FC009

DATE OF ISSUE
October 29, 2024

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TEST REPORT

FCC WPC RF Exposure Test for certification

REPORT NO.
HCT-SR-2410-FC009

DATE OF ISSUE
Oct. 29, 2024

FCC ID
A3LSMS931B

Applicant	SAMSUNG Electronics Co., Ltd 129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677, Korea
Product Name	Mobile Phone
Model Name	SM-S931B/DS
Multi Model Name	SM-S931B
Date of Test	Oct. 08, 2024
Location of Test	■ Permanent Testing Lab ☐ On Site Testing Lab (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si,
FCC Rule Part(s)	FCC Part 1 SUBPART I FCC Part 2 SUBPART J KDB 680106 D01
Test Results	PASS

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	Oct. 29, 2024	Initial Release

Notice

Content
The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated. The test results have only been applied with the test methods required by the standard(s). The laboratory is not accredited for the test results marked *. Information provided by the applicant is marked **. Test results provided by external providers are marked ***. When confirmation of authenticity of this test report is required, please contact www.hct.co.kr The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

CONTENTS

1. Test Methodology

The DUT was assessed in accordance with 680106 D01 Wireless Power Transfer v04.

2. Test Location

2.1 Test Laboratory

Company Name	HCT Co., Ltd.
Address	2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea
Telephone	031-645-6300
Fax.	031-645-6401

2.2 Test Facilities

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Korea	National Radio Research Agency (Designation No. KR0032)
	KOLAS (Testing No. KT197)

3. DEVICE UNDER TEST DESCRIPTION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Model Name	SM-S931B/DS
Multi Model Name	SM-S931B
EUT Type:	Mobile Phone
Application Type:	Certification

3.1 Description of DUT

The DUT is a mobile phone with a WPT (Wireless Power Transfer) feature using an inductive charging coil to charge a phone and a watch. The charging frequency is between 110 ㎑ to 148 ㎑, and the maximum transfer power consumption is 9 W in charging status.

3.2 Test Configurations

Test configurations	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 Phone test configuration 5	Charging from Watch to DUT
DUT to Phone test configuration 6	Charging from Watch to DUT (TA Charging from DUT)
DUT to Phone test configuration 7	Charging from Ear buds to DUT
DUT to Phone test configuration 8	Charging from Ear buds to DUT (TA Charging from DUT)

Note:

1. Configuration 2,4,6 and 8 were tested with the worst case of configuration 1,3,5 and 7

3.3 KDB 680106 D01 Wireless Power Transfer v04. SECTION 5.2)

Requirement	Device
(1) Power transfer frequency is less than 1 ㎒.	Yes. Operation Frequency is between 110 ㎑ to 148 ㎑.
(2) Output power from each primary coil is less than or equal to 15 watts.	Yes. Maximum power is 9 Watts.
(3) A client device providing the maximum permitted load is placed in physical contact with the transmitter (i.e., the surfaces of the transmitter and client device enclosures need to be in physical contact)	Yes.
(4) Only § 2.1091-Mobile exposure conditions apply	Yes.
(5) The E-field and H-field strengths, at and beyond 20 cm surrounding the device surface, are demonstrated to be less than 50% of the applicable MPE limit, per KDB 447498, Table 1.	Yes. The aggregate field strengths at 20 cm from the device is 3.74 % of the H field and 0.69 % of the E-Field Limit
(6) For systems with more than one radiating structure, the conditions specified in (5) must be met when the system is fully loaded (i.e., clients absorbing maximum power available), and with all the radiating structures operating at maximum power at the same time, as per design conditions. If the design allows one or more radiating structures to be powered at a higher level while other radiating structures are not powered, then those cases must be tested as well. For instance, a device may use three RF coils powered at 5 W, or one coil powered at 15 W: in this case, both scenarios shall be tested	No, it is a single radiating structure.

3.4 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT & PERIPHERALS

SUPPORT EQUIPMENT & PERIPHERALS LIST			
Description	Manufacturer	Model	Serial Number
Watch	SAMSUNG Electronics Co., Ltd.	SM-R840N	RFANC0N5S2A
Ear Buds	SAMSUNG Electronics Co., Ltd	SM-R530	RFAX82HVFEH
Phone	SAMSUNG Electronics Co., Ltd.	SM-S931B/DS	XHS0004M

TEST SETUP

The following three modes are tested in test configuration;

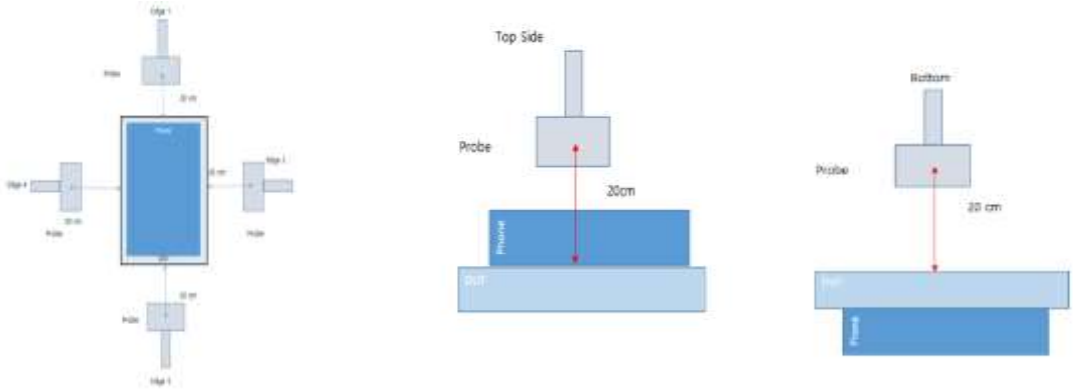
All Position of client device were investigated and the worst position results are reported.

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

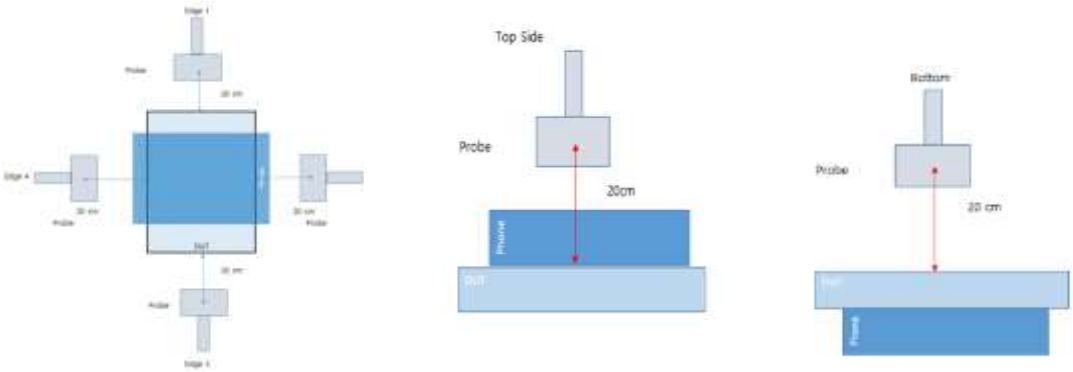
MEASUREMENT TEST SETUP

The measurement was taken using a probe place 20 cm from the all edges of DUT above the DUT. Measurement were from the top and all sides of the DUT per 680106 D01 Wireless Power Transfer v04. Additionally, as the DUT to phone configuration could result with the DUT place either above or below the phone, measurements were performed 'below' the DUT by flipping the DUT/phone so that the DUT was uppermost.

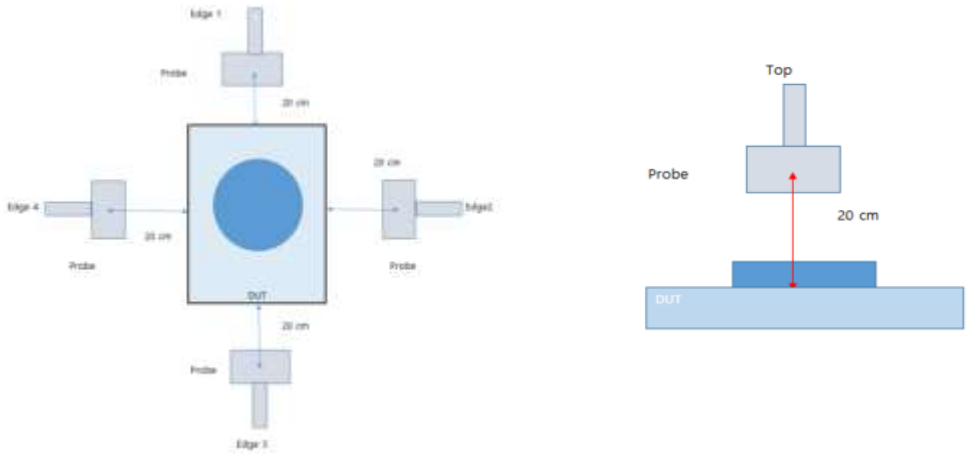
The probe was moved along the edges or above the DUT to a position that showed the maximum field strength. This position was used for the reported result.



DUT to phone test Configuration 1 & 2



DUT to phone test Configuration 3 & 4



DUT to Watch/Ear buds test Configuration 5 & 6 and 7 & 8

4. TEST AND MEASUREMENT EQUIPMENT

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

Manufacturer	Model name	Description	S/N	Calib. Date	Calib.Due
Narda	EHP 200AC	Electric and Magnetic Field Probe	170WX91009	02/13/2024	02/13/2026

5. MAXIMUM PERMISSIBLE RF EXPOSURE

1.13010 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 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. TEST RESULTS

H-Field Measurements

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

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	Operation Real Product (Power <10% charging)	20 cm	Top	1.63	0.059
			Bottom		0.060
			Edge 1		**0.061**
			Edge 2		0.059
			Edge 3		0.057
			Edge 4		0.056
	Operation Real Product (Power 50~55% charging)	20 cm	Top	1.63	0.060
			Bottom		0.049
			Edge 1		0.060
			Edge 2		0.056
			Edge 3		0.059
			Edge 4		0.054
	Operation Real Product (Power 90~95% charging)	20 cm	Top	1.63	0.049
			Bottom		0.053
			Edge 1		0.052
			Edge 2		0.054
			Edge 3		0.055
			Edge 4		0.060
Configuration 2	Operation Real Product (Power <10% charging)	20 cm	Edge 1	1.63	0.060

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	Operation Real Product (Power <10% charging)	20 cm	Top	1.63	0.059
			Bottom		0.059
			Edge 1		0.059
			Edge 2		0.060
			Edge 3		0.059
			Edge 4		0.055
	Operation Real Product (Power 50~55% charging)	20 cm	Top	1.63	0.060
			Bottom		0.058
			Edge 1		0.060
			Edge 2		0.054
			Edge 3		0.060
			Edge 4		**0.061**
	Operation Real Product (Power 90~95% charging)	20 cm	Top	1.63	0.049
			Bottom		0.058
			Edge 1		0.059
			Edge 2		0.060
			Edge 3		0.061
			Edge 4		0.058
Configuration 4	Operation Real Product (Power 50~55% charging)	20 cm	Edge 4	1.63	0.0610

TEST results of DUT to Watch 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	Operation Real Product (Power <10% charging)	20 cm	Top	1.63	0.059
			Edge 1		0.056
			Edge 2		0.057
			Edge 3		0.056
			Edge 4		0.059
	Operation Real Product (Power 50~55% charging)	20 cm	Top	1.63	0.049
			Edge 1		**0.060**
			Edge 2		0.055
			Edge 3		0.052
			Edge 4		0.052
	Operation Real Product (Power 90~95% charging)	20 cm	Top	1.63	0.052
			Edge 1		0.059
			Edge 2		0.057
			Edge 3		0.055
			Edge 4		0.053
Configuration 6	Operation Real Product (Power 50~55% charging)	20 cm	Edge 1	1.63	0.059

TEST results of DUT to Ear Buds test Configuration 7&8

FCC RF Exposure Result					
Test Configuration	Test mode	Test distance	Test Position	H-Field Limit (A/m)	H-Field meas data (A/m)
Configuration 7	Operation Real Product (Power <10% charging)	20 cm	**Top**	1.63	**0.061**
			Edge 1		0.059
			Edge 2		0.056
			Edge 3		0.057
			Edge 4		0.059
	Operation Real Product (Power 50~55% charging)	20 cm	Top	1.63	0.055
			Edge 1		0.060
			Edge 2		0.057
			Edge 3		0.059
			Edge 4		0.051
	Operation Real Product (Power 90~95% charging)	20 cm	Top	1.63	0.053
			Edge 1		0.055
			Edge 2		0.050
			Edge 3		0.056
			Edge 4		0.055
Configuration 8	Operation Real Product (Power <10% charging)	20 cm	Top	1.63	0.060

E-Field Measurements

Note : peak measurements were performed. RMS values were calculated from the peak measurement.

Please refer to the formula for calculating the RMS value: [Field Strength * √Duty Cycle]

TEST results of DUT to phone test Configuration 1&2

FCC RF Exposure Result					
Test Configuration	Test mode	Test distance	Test Position	E-Field Limit (V/m)	E-Field meas data (V/m)
Configuration 1	Operation Real Product (Power <10% charging)	20 cm	**Top**	614	**1.253**
			Bottom		0.845
			Edge 1		0.373
			Edge 2		0.436
			Edge 3		0.506
			Edge 4		0.497
	Operation Real Product (Power 50~55% charging)	20 cm	Top	614	1.183
			Bottom		0.905
			Edge 1		0.303
			Edge 2		0.486
			Edge 3		0.476
			Edge 4		0.517
	Operation Real Product (Power 90~95% charging)	20 cm	Top	614	1.203
			Bottom		0.945
			Edge 1		0.373
			Edge 2		0.536
			Edge 3		0.486
			Edge 4		0.547
Configuration 2	Operation Real Product (Power <10% charging)	20 cm	Top	614	1.233

TEST results of DUT to phone test Configuration 3&4

FCC RF Exposure Result					
Test Configuration	Test mode	Test distance	Test Position	E-Field Limit (V/m)	E-Field meas data (V/m)
Configuration 3	Operation Real Product (Power <10% charging)	20 cm	**Top**	614	**1.159**
			Bottom		0.802
			Edge 1		0.511
			Edge 2		0.712
			Edge 3		0.593
			Edge 4		1.002
	Operation Real Product (Power 50~55% charging)	20 cm	Top	614	1.150
			Bottom		0.722
			Edge 1		0.451
			Edge 2		0.702
			Edge 3		0.633
			Edge 4		1.012
	Operation Real Product (Power 90~95% charging)	20 cm	Top	614	1.119
			Bottom		0.762
			Edge 1		0.571
			Edge 2		0.702
			Edge 3		0.603
			Edge 4		1.012
Configuration 4	Operation Real Product (Power <10% charging)	20 cm	Top	614	1.154

TEST results of DUT to Watch test Configuration 5&6

FCC RF Exposure Result					
Test Configuration	Test mode	Test distance	Test Position	E-Field Limit (V/m)	E-Field meas data (V/m)
Configuration 5	Operation Real Product (Power <10% charging)	20 cm	Top	614	3.692
			Edge 1		1.028
			Edge 2		0.587
			Edge 3		0.744
			Edge 4		0.596
	Operation Real Product (Power 50~55% charging)	20 cm	**Top**	614	**3.792**
			Edge 1		1.038
			Edge 2		0.647
			Edge 3		0.694
			Edge 4		0.676
	Operation Real Product (Power 90~95% charging)	20 cm	Top	614	3.622
			Edge 1		1.068
			Edge 2		0.607
			Edge 3		0.764
			Edge 4		0.526
Configuration 6	Operation Real Product (Power 50~55% charging)	20 cm	Top	614	3.622

TEST results of DUT to Ear Buds test Configuration 7&8

FCC RF Exposure Result					
Test Configuration	Test mode	Test distance	Test Position	E-Field Limit (V/m)	E-Field meas data (V/m)
Configuration 7	Operation Real Product (Power <10% charging)	20 cm	Top	614	4.146
			Edge 1		0.621
			Edge 2		0.636
			Edge 3		0.632
			Edge 4		0.655
	Operation Real Product (Power 50~55% charging)	20 cm	**Top**	614	**4.216**
			Edge 1		0.541
			Edge 2		0.626
			Edge 3		0.542
			Edge 4		0.565
	Operation Real Product (Power 90~95% charging)	20 cm	Top	614	4.146
			Edge 1		0.621
			Edge 2		0.546
			Edge 3		0.662
			Edge 4		0.755
Configuration 8	Operation Real Product (Power 50~55% charging)	20 cm	Top	614	4.110

7. Conclusion

	H-Field (A/m)	E-Field (V/m)
MPE Limit	1.63	614
Maximum Measurement Result	0.061	4.216
Percentage (%)	3.74	0.69

H-Field, E-Field test result was less than 50% of MPE Limit