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RF Exposure Report

Applicant Name: **SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677 Rep. of Korea	**Date of Issue:** Jul. 09, 2020 **Test Report No.: HCT-SR-2006-FC022-R1** **Test Site: HCT CO., LTD.**

FCC ID: A3LSMN980F

Equipment Type:	Mobile Phone
Application Type	Certification
FCC Rule Part(s):	KDB 680106 D01
Model Name:	**SM-N980F/DS**
Additional Model Name:	**SM-N980F**
Date of Test:	06/23/2020

This device has been shown to be capable of compliance for the above standars for uncontrolled environment/general population exposure limits specified in FCC KDB procedures and had been tested in accordance with the measurement procedures specified in FCC KDB procedures.

I 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.

Tested By

Jung Hun , Park
Test Engineer
SAR Team
Certification Division

Reviewed By

Yun-jeang, Heo
Technical Manager
SAR Team
Certification Division

DOCUMENT HISTORY

Rev.	DATE	DESCRIPTION
0	06. 30, 2020	First Approval Report
R1	07. 09. 2020	Revised page 5,7

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1. Test Methodology

Per FCC Guidance,WPT Fuction was evaluated for portable exposure condition.

2. Test Location.

2.1 Test Laboratory.

Company Name:	HCT Co., LTD
Address:	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of Korea
Telephone:	+82 31 645 6300
Fax.:	+82 31 645 6401

2.2 Test Facillities

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 (Tesing No. KT197)

3. DEVICE UNDER TEST DESCRIPTION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Model:	SM-N980F/DS
Additional Model Name:	SM-N980F
EUT Type:	Mobile Phone
Application Type:	Certification

The device uses only magnetic induction which is a technology that charges a battery by generating a magnetic field by flowing a current through the transmitter coil, and then entering a magnetic field into the receiver coil to generate an induced current again.

Therefore, RF exposure through measurement and calculation of H-field were investigated.

- Test mode: power is transferred from “Phone coil” to “S-pen coil”

Operating Frequency(MHz)	590 kHz ~ 625 kHz
Maximum output Power(mW)	50
Charging Type	Inductive wireless Power transfer
Operating duty factor	0.3333

Description Of S-PEN:(EJ-PN980: FCC ID: A3LEJPN980)

S-Pen (EJ-PN980) is specifically designed for SM-N980F/DS, SM-N980F
Battery in the EJ-PN980 will be charged wirelessly from mobile phone via 590 kHz ~ 625 kHz frequency
More detail description, Please refer to Operational description document.

All Position of S-Pen were investigated and the worst position results are reported.

For S-Pen, both fully charged and non-fully charged condition were investigated. Test wer performed non-fully charged condition as worst case.

4. TEST AND MEASUREMENT EQUIPMENT

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

Manufacturer	Model namr	Description	S/N	Calib. Date	Calib.Due
Narda	EHP-200AC	Electric and Magnetic Field Probe	170WX91009	11/22/2019	11/22/2020

5. MAXIMUM PERMISSIBLE RE EXPOSURE

5.1 FCC RULES

1.13010 The criteria listed in Table 1 shall be used to evaluate the envirimental impact of human exposure to radio-frequency(RF) ragiation as specified in 1.1307(b), except in the case of portable devices which shall ge evaluated according th 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 consequenoe of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

6. TEST RESULTS

6.1 H-Field measurement results of DUT's 6 sides

H-Field Measurement (A/m)						
Test Configuration	Rear	Front	Left	Right	Top	Bottom
0 cm	**0.9869**	0.2323	0.4349	0.0445	0.0488	0.025

Note: All measurement sides are taken into account with respect to the front side of the DUT.

6.2 H-field measurement results from 0cm to 10cm at Rear side

H-Field Results Measurement (A/m) :Rear Side			
Test Distance (cm)	H-Field Meas. (A/m)	H-Field meas data * (Duty Factor) (A/m)	FCC H-Field Limit (A/m)
0	0.9869	0.3290	1.63
1	0.5000	0.1667	
2	0.2476	0.0825	
3	0.1612	0.0537	
4	0.0946	0.0315	
5	0.0578	0.0193	
6	0.0407	0.0136	
7	0.0248	0.0083	
8	0.0155	0.0052	
9	0.0156	0.0052	
10	0.0143	0.0048	

Corrected H-Field measurement

• 0.9869 A/m * 0.333 =0.3290 A/m

Operational Correction Factor

The EUT charges for 10 minutes at maximum illumination to full charge. Therefore the operational correction factor is:
Correction Factor (applied over 30 minutes) = 10/30 = 0.333.

Description of Test Setup

Testing was performed with a calibrated field probe.
Measurement was performed on each side of the EUT as described per Sec 6.1
Measurement procedure was performed per FCC Guidance.

6.3 FCC SUMMARYOF RESULTS

Measurement procedure was performed per FCC Guidance.
All Position of S-Pen were investigated and the worst position results a reported

H-Field Limit		
FCC RF Exposure	Maximum meas data (A/m)	Percentage(%)
1.63	0.3290	20.18

H-Field test result was less than 50% of MPE limit