

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: Nov.30, 2021

Test Report No.: HCT-SR-2111-FC008

Test Site: HCT CO., LTD.

FCC ID:

A3LSMX706B

Equipment Type:

Tablet

Application Type

Certification

FCC Rule Part(s):

KDB 680106 D01

Model Name:

SM-X706B

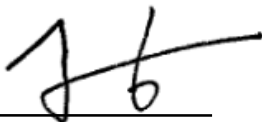
Date of Test:

10/27/2021

This device has been shown to be capable of compliance for the above standards 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



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Technical Manager
SAR Team
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DOCUMENT HISTORY

Rev.	DATE	DESCRIPTION
0	Nov. 30, 2021	First Approval Report

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1. Test Methodology

Per FCC Guidance, SPEN WPT Function 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 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:	SM-X706B
EUT Type:	Tablet
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)	530 kHz
Maximum output Power(mW)	50
Charging Type	Inductive wireless Power transfer

Description of S-PEN:(EJ-PT870: FCC ID: A3LEJPT870)

The device supports S-Pen. The S-Pen is accessories such as touch pen. Usually built into the device, but user take it out, when user uses to note or control on device using BLE mode. The S-Pen is also an electronic product and charges through the device. In this case, S-Pen is charged by WPT(Wireless Power Transfer) function. Charging is the way in which power is transferred from "FPCB's coil in device" to "S-Pen's coil"..

Battery in the EJ-PT870 will be charged wirelessly from Tablet via 530 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 were 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	11/22/2021

The Narda EHP-200AC has physical dimensions of 92 x 92 x 109mm. So the center of the probe would be at 46 x 46 x 54mm. When the probe measures the H-field of the device,, the long axis of the probe (109mm) is perpendicular to the rear surface of the DUT. So when the probe is in direct contact with the rear of the device, the center of the probe would be 54mm away.

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 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

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

H-Field Measurement (A/m)						
The Direct contact from the edge of the Device to the center of the measurement Probe	Rear	Front	Left	Right	Top	Bottom
5.4 cm	0.1708	0.0419	0.0136	0.0669	0.0549	0.0137

Note: All measurement sides are taken into account with respect to the front side of the DUT.
The contact distance between the device and the probe is 5.4 cm from the center of the probe.

6.2 H-field measurement results

H-Field Results Measurement (A/m) :Rear Side		
The Distance from the Rear of the device to the center of the measurement probe (cm)	H-Field Meas. (A/m)	FCC H-Field Limit (A/m)
5.4	0.1708	1.63
6.4	0.0884	
7.4	0.0506	
8.4	0.0335	
9.4	0.0209	
10.4	0.0166	
11.4	0.0143	
12.4	0.0138	
13.4	0.0132	
14.4	0.0136	
15.4	0.0136	

6.3 FCC SUMMARYOF RESULTS

1) Measurement Results

Measurement procedure was performed per FCC Guidance.

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

FCC RF Exposure H-Field Limit [A/m]	Maximum meas data (A/m)	Percentage(%)
1.63	0.1708	10.5

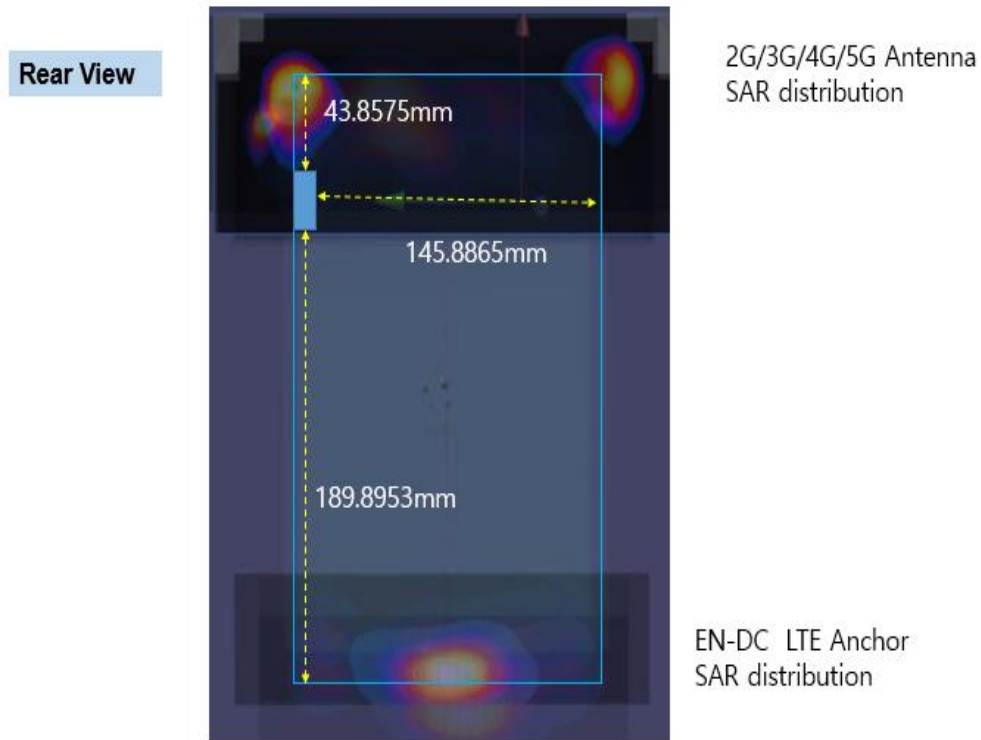
H-Field test result was less than 50% of MPE limit

2) Simultaneous Transmission Analysys.

The Location of the WPT Tx coils of the S-Pen is far enough not to affect considering the position of the SAR distribution plot in the 3G/4G/5GWLAN/BT mode. In addition, when measuring the H-field of WPT of SPEN, it was measured by activating the Tx of other antennas, and the measurement results were lower than 50% of FCC's Limit.

In addition, the SAR measurement results of Main band and WLAN with S-Pen(8mm Width) touched on the DUT were much lower than those measured without S-Pen.

The results of the simultaneous transmission evaluation are as follows



Rear side overlay showing SAR and PD peak distribution

TER Considerations

1.Total Exposure Ratio : SAR +S-PEN WPT

The total TER result obtained by summing the test results of the SAR worst case equipped with S-Pen (8mmwith S-PEN)in the DUT and the WPT test results of S-Pen is 0.368. FCC's limit was satisfied because the TER result is less than 1

Total Exposure Ratio		H-Field	SAR SAR Measurement Results [W/kg]															TER (SAR + H-Field)														
Band	Configuration	S-PEN Aim	Main	Bluetooth h Ant1	Bluetooth h Ant2	Bluetooth h Ant1 Sub6 On	Bluetooth h Ant2 Sub6 On	2.4GHz Ant2	2.4GHz Ant2 MIMO	2.4GHz Ant2 RSDB-Sub6 On	2.4GHz Ant2 RSDB-Sub6 On	5GHz Ant2	5GHz Ant2 MIMO	5GHz Ant2 RSDB-Sub6 On	5GHz Ant2 RSDB-Sub6 On	Wi-Fi 6E MIMO RSDB-Sub6 On	Wi-Fi 6E MIMO RSDB-Sub6 On	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0+1+3	0+1+3+14	0+1+3+11	0+1+2	0+1+2+14	0+1+2+11	0+1+2+6	0+1+9+15	0+1+9+13	0+1+7	0+1+10	0+1+11	0+1+14	0+1+2+9+13	0+1+2+9+15
		Limit	1.63	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
GSM 850	Rear (8mm)	0.171	0.119	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.157	0.188	0.196	0.150	0.181	0.189	0.213	0.168	0.166	0.182	0.131	0.158	0.150	0.205	0.207
	Limit to Ratio	0.105																0.203	0.223	0.228	0.199	0.218	0.223	0.238	0.210	0.209	0.219	0.187	0.204	0.199	0.233	0.234
GSM 1900	Rear (8mm)	0.171	0.259	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.297	0.328	0.336	0.290	0.321	0.329	0.353	0.308	0.306	0.322	0.271	0.298	0.290	0.345	0.347
	Limit to Ratio	0.105																0.291	0.310	0.315	0.286	0.306	0.311	0.326	0.298	0.296	0.306	0.274	0.291	0.286	0.321	0.322
UMTS Band 5	Rear (8mm)	0.171	0.247	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.285	0.316	0.324	0.278	0.309	0.317	0.341	0.296	0.294	0.310	0.259	0.286	0.278	0.333	0.335
	Limit to Ratio	0.105																0.283	0.303	0.308	0.279	0.298	0.303	0.318	0.290	0.289	0.299	0.267	0.284	0.279	0.313	0.314
UMTS Band 4	Rear (8mm)	0.171	0.289	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.327	0.358	0.366	0.320	0.351	0.359	0.383	0.338	0.336	0.352	0.301	0.328	0.320	0.375	0.377
	Limit to Ratio	0.105																0.309	0.329	0.334	0.305	0.324	0.329	0.344	0.316	0.315	0.325	0.293	0.310	0.305	0.339	0.341
UMTS Band 2	Rear (8mm)	0.171	0.287	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.325	0.356	0.364	0.318	0.349	0.357	0.381	0.336	0.334	0.350	0.299	0.326	0.318	0.373	0.375
	Limit to Ratio	0.105																0.308	0.328	0.333	0.304	0.323	0.328	0.343	0.315	0.314	0.324	0.292	0.309	0.304	0.338	0.339
LTE B2/5	Rear (8mm)	0.171	0.222	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.260	0.291	0.299	0.253	0.284	0.292	0.316	0.271	0.269	0.285	0.234	0.261	0.253	0.308	0.310
	Limit to Ratio	0.105																0.268	0.287	0.292	0.263	0.283	0.288	0.303	0.274	0.273	0.283	0.251	0.268	0.263	0.298	0.299
LTE B4/6	Rear (8mm)	0.171	0.228	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.256	0.297	0.305	0.259	0.290	0.298	0.322	0.277	0.275	0.291	0.240	0.267	0.259	0.314	0.316
	Limit to Ratio	0.105																0.271	0.291	0.296	0.267	0.286	0.291	0.306	0.278	0.277	0.287	0.255	0.272	0.267	0.301	0.303
LTE B5	Rear (8mm)	0.171	0.227	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.265	0.296	0.304	0.258	0.289	0.297	0.321	0.276	0.274	0.290	0.239	0.266	0.258	0.313	0.315
	Limit to Ratio	0.105																0.271	0.290	0.295	0.266	0.286	0.291	0.306	0.278	0.276	0.286	0.254	0.271	0.266	0.301	0.302
LTE B12	Rear (8mm)	0.171	0.141	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.179	0.210	0.218	0.172	0.203	0.211	0.235	0.190	0.188	0.204	0.153	0.180	0.172	0.227	0.229
	Limit to Ratio	0.105																0.217	0.236	0.241	0.213	0.232	0.237	0.252	0.224	0.223	0.233	0.201	0.218	0.213	0.247	0.248
LTE B13	Rear (8mm)	0.171	0.178	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.216	0.247	0.255	0.209	0.240	0.248	0.272	0.227	0.225	0.241	0.190	0.217	0.209	0.264	0.266
	Limit to Ratio	0.105																0.240	0.259	0.264	0.236	0.255	0.260	0.275	0.247	0.246	0.256	0.224	0.241	0.236	0.270	0.271
LTE B26	Rear (8mm)	0.171	0.123	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.161	0.192	0.200	0.154	0.185	0.193	0.217	0.172	0.170	0.186	0.135	0.162	0.154	0.209	0.211
	Limit to Ratio	0.105																0.206	0.225	0.230	0.201	0.221	0.226	0.241	0.213	0.211	0.221	0.189	0.206	0.201	0.236	0.237
LTE B41	Rear (8mm)	0.171	0.151	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.189	0.220	0.228	0.182	0.213	0.221	0.245	0.200	0.198	0.214	0.163	0.190	0.182	0.237	0.239
	Limit to Ratio	0.105																0.223	0.243	0.248	0.219	0.238	0.243	0.268	0.230	0.229	0.239	0.207	0.224	0.219	0.253	0.254

Total Exposure Ratio		H-Field		SAR SAR Measurement Results [W/kg]															TER (SAR + H-Field)														
Band	Configuration	S-PEN Aim	Main	Bluetooth h Ant1	Bluetooth h Ant2	Bluetooth h Ant1 Sub6 On	Bluetooth h Ant2 Sub6 On	2.4GHz Ant2	2.4GHz MIMO RSDB-Sub6 On	2.4GHz Ant2 RSDB-Sub6 On	5GHz Ant2	5GHz MIMO	5GHz Ant2 RSDB-Sub6 On	5GHz MIMO RSDB-Sub6 On	Wi-Fi 6E MIMO RSDB-Sub6 On	Wi-Fi 6E MIMO RSDB-Sub6 On	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ	Σ		
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	0+1+5	0+1+5+15	0+1+5+13	0+1+4	0+1+4+15	0+1+4+13	1+4+8	1+9+15	1+9+13	1+9	1+12	1+13	1+15	1+4+9+13	1+4+9+15	
		Limit	1.63	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Sub 1 LTE 2	Rear (8mm)	0.171	0.019	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.049	0.065	0.063	0.048	0.064	0.062	0.089	0.068	0.066	0.052	0.019	0.033	0.035	0.103	0.105	
	Limit to Ratio	0.105																0.136	0.146	0.144	0.135	0.145	0.144	0.161	0.148	0.146	0.138	0.117	0.126	0.127	0.169	0.171	
Sub 1 LTE 66	Rear (8mm)	0.171	0.073	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.103	0.119	0.117	0.102	0.118	0.116	0.143	0.122	0.120	0.106	0.073	0.087	0.089	0.157	0.159	
	Limit to Ratio	0.105																0.169	0.179	0.178	0.169	0.179	0.178	0.194	0.181	0.180	0.171	0.151	0.159	0.161	0.203	0.204	
NR n5	Rear (8mm)	0.171	0.332	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.362	0.378	0.376	0.361	0.377	0.375	0.402	0.381	0.379	0.365	0.332	0.346	0.348	0.416	0.418	
	Limit to Ratio	0.105																0.331	0.341	0.340	0.331	0.341	0.339	0.356	0.343	0.342	0.333	0.313	0.321	0.323	0.365	0.366	
NR n6	Rear (8mm)	0.171	0.335	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.365	0.381	0.379	0.364	0.380	0.378	0.405	0.384	0.382	0.368	0.335	0.349	0.351	0.419	0.421	
	Limit to Ratio	0.105																0.333	0.343	0.342	0.333	0.343	0.341	0.358	0.345	0.344	0.335	0.314	0.323	0.324	0.367	0.368	
NR n7	Rear (8mm)	0.171	0.188	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.219	0.234	0.232	0.217	0.223	0.221	0.258	0.237	0.235	0.221	0.188	0.202	0.204	0.272	0.274	
	Limit to Ratio	0.105																0.241	0.251	0.250	0.241	0.251	0.249	0.266	0.253	0.252	0.243	0.223	0.231	0.233	0.275	0.276	
NR n77 (D0)	Rear (8mm)	0.171	0.095	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.125	0.141	0.139	0.124	0.140	0.138	0.165	0.144	0.142	0.128	0.095	0.109	0.111	0.179	0.181	
	Limit to Ratio	0.105																0.183	0.193	0.192	0.183	0.193	0.191	0.208	0.195	0.194	0.185	0.164	0.173	0.174	0.217	0.218	
NR n 77	Rear (8mm)	0.171	0.088	0.031	0.038	0.029	0.030	0.063	0.063	0.041	0.033	0.012	0.039	0.000	0.014	0.031	0.016	0.118	0.134	0.132	0.117	0.133	0.131	0.158	0.137	0.135	0.121	0.088	0.102	0.104	0.172	0.174	
	Limit to Ratio	0.105																0.179	0.189	0.188	0.178	0.188	0.187	0.204	0.191	0.189	0.181	0.160	0.169	0.170	0.213	0.214	