CERTIFICATION TEST REPORT

Report Number : 4790089626-E10V3

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	SM-S906B/DS
FCC ID	:	A3LSMS906B
EUT Description	:	GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC, WPT and UWB
Test Standard(s)	:	FCC 47 CFR PART 1 SUBPART I FCC 47 CFR PART 2 SUBPART J

Date Of Issue:
2021-12-21

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IAS ACCREDITED
TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2021-11-09	Initial issue	Sungeun Lee
V2	2021-11-19	Updated to address TCB's question	Sungeun Lee
V3	2021-12-21	Added Version 2 and 3 data	Sungeun Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

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

MODEL: SM-S906B/DS

SERIAL NUMBER: R3CR80TBW0F (RADIATED, Version 1)
R3CRB0P2MER (RADIATED, Version 2)
R3CRB0P333F (RADIATED, Version 3)

DATE TESTED: 2021-10-28 ~ 2021-12-21;

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 1 SUBPART I	Complies
FCC PART 2 SUBPART J	

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 For
UL Korea, Ltd. By:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Sungeun Lee
Suwon Lab Engineer
UL Korea, Ltd.

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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.

This report covers the Samsung model SM-S906B/DS version1, 2 and 3.
These versions are identical in all hardware except WPT Chipset.
Therefore MPE was full tested each version.

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

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4.3. KDB 680106 D01 v03 R01SECTION 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 17.13 % of the FCC H field limit.

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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-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	-

TEST SETUP

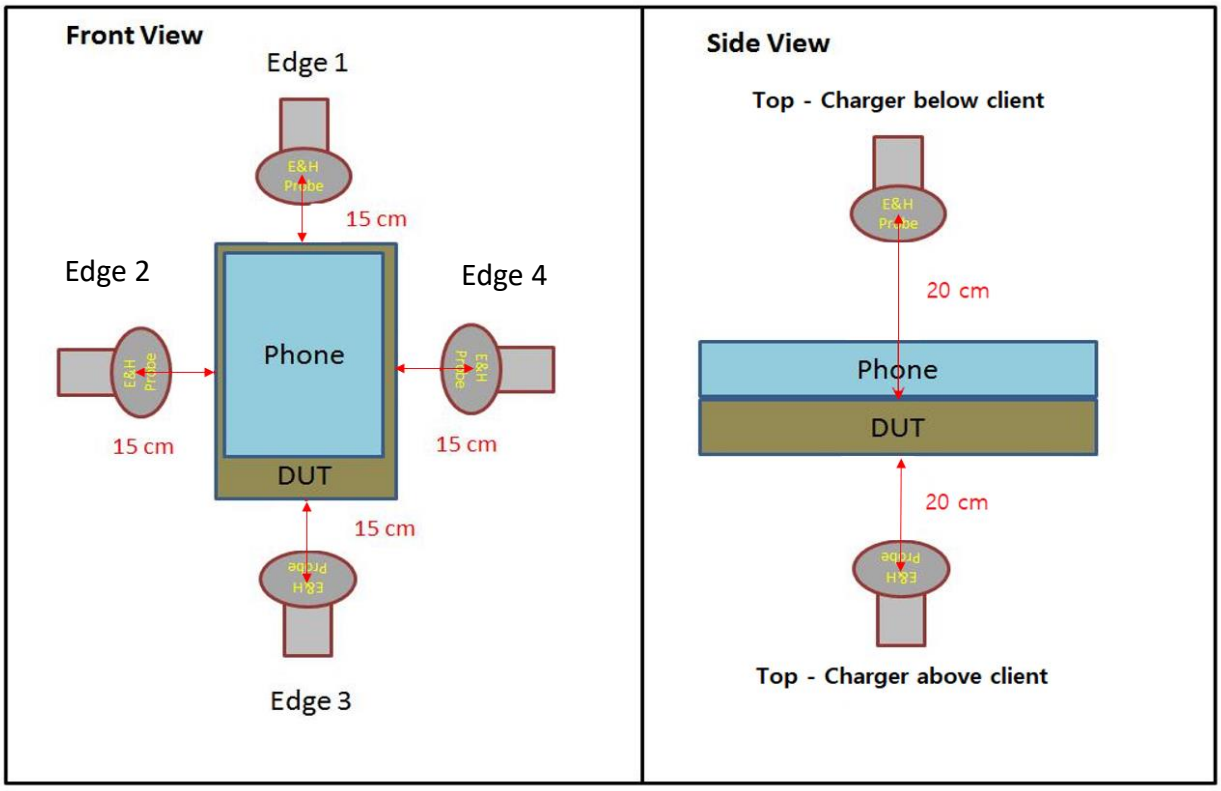
The following three modes are tested in test configurations;

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 R01 and RF Exposure Procedures (Wireless Power Transfer) in TCB Workshop October, 2018.

DUT to phone test Configuration 1 & 2



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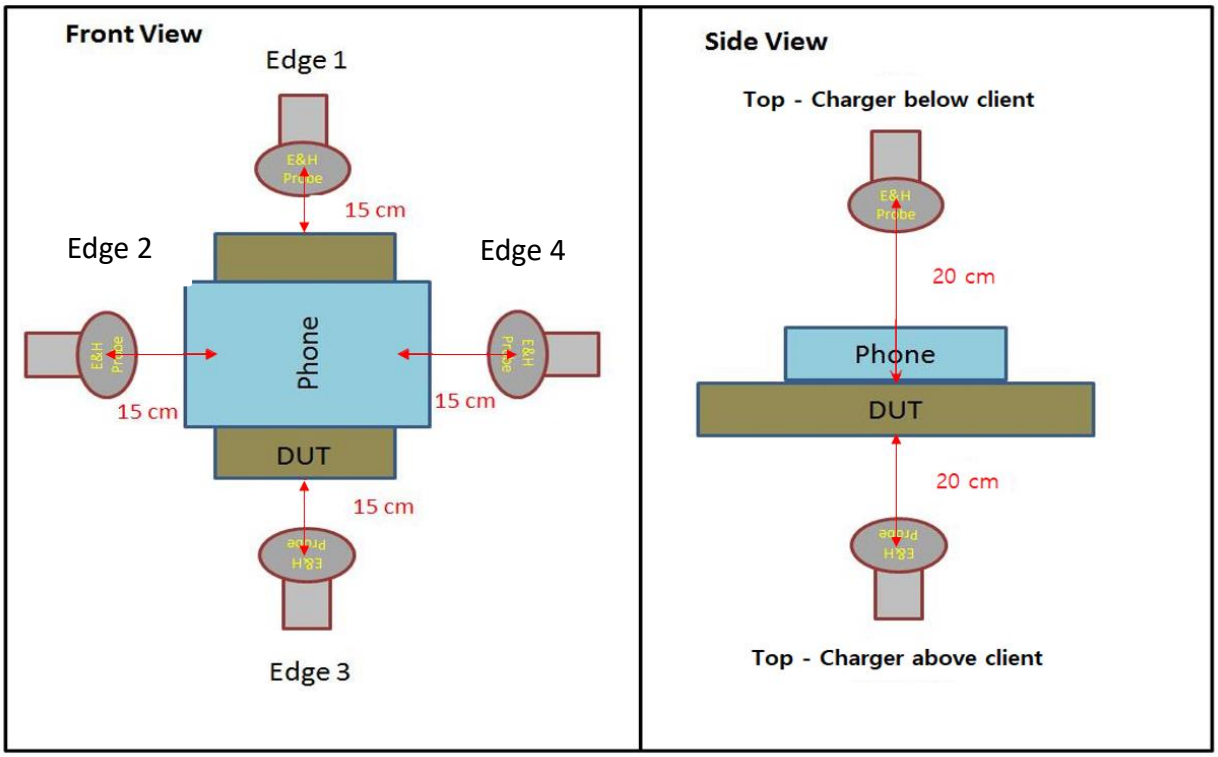
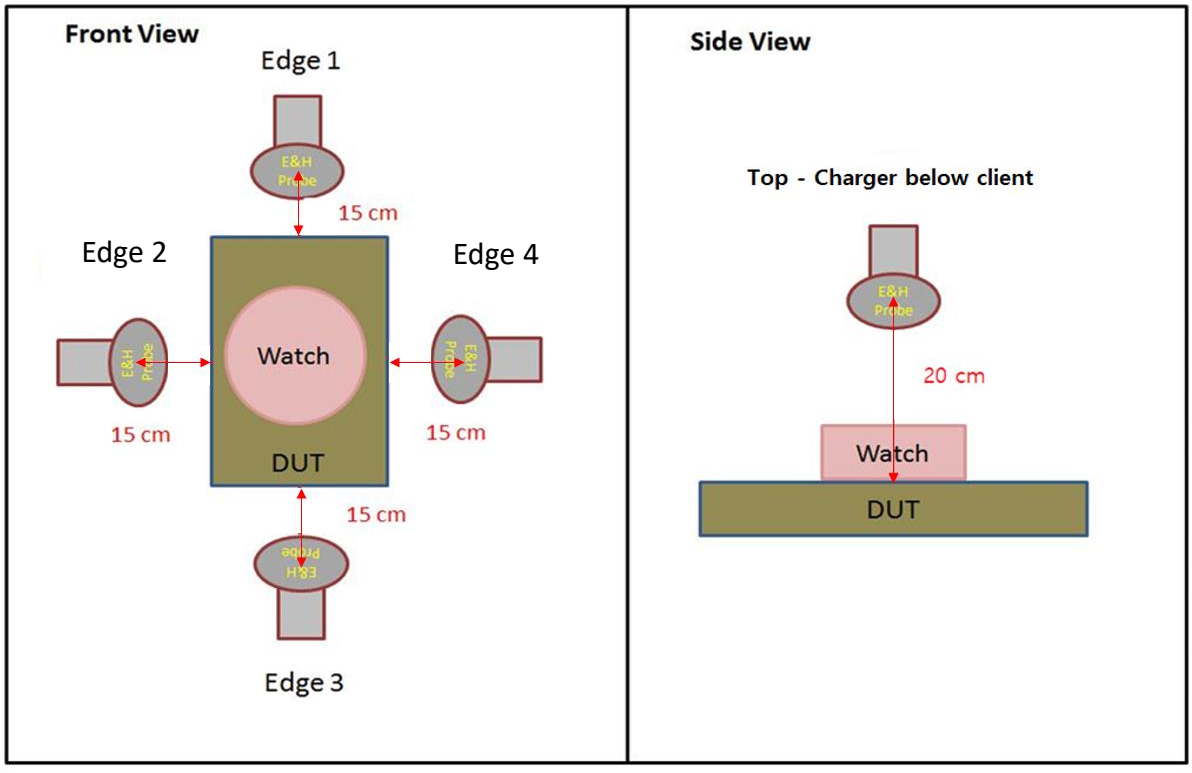
DUT to phone test Configuration 3 & 4



DUT to Watch test Configuration 5 & 6



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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	S/N	Cal Due
E-H Field Analyzer	Narda	EHP-200AC	170WX91008	2022-08-06

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.

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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)		
					Version 1	Version 2	Version 3
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	0.1944	0.1951	0.1993
			Top - charger below client		0.1940	0.2013	0.1987
			Edge 1		0.2011	0.1953	0.2004
			Edge 2		0.1987	0.1969	0.1948
			Edge 3		0.1944	0.1975	0.1969
			Edge 4		0.1980	0.1987	0.1953
			Max		0.2011	0.2013	0.2004
	Operating Real Product (Power 50~55% charging)		Top - charger above client		0.1963	0.1965	0.2007
			Top - charger below client		0.1975	0.2011	0.1985
			Edge 1		0.2130	0.1965	0.2013
			Edge 2		0.1993	0.1977	0.1952
			Edge 3		0.1984	0.1963	0.1960
			Edge 4		0.2006	0.1988	0.1949
			Max		0.2130	0.2011	**0.2013**
	Operating Real Product (Power 90~95% charging)		Top - charger above client		0.1995	0.1960	0.2001
			Top - charger below client		0.2017	0.2015	0.1995
			Edge 1		0.2025	0.1944	0.2012
			Edge 2		0.2019	0.1966	0.1952
			Edge 3		0.1990	0.1982	0.1979
			Edge 4		0.1986	0.1987	0.1950
			Max		0.2025	0.2015	0.2012
Configuration 2	Worst case mode		Worst position		0.2142	0.2019	0.2004
			Max		**0.2142**	**0.2019**	0.2004

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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)		
					Version 1	Version 2	Version 3
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	0.1994	0.2011	0.1969
			Top - charger below client		0.1981	0.2013	0.1985
			Edge 1		0.2027	0.2015	0.1997
			Edge 2		0.1980	0.2787	0.2011
			Edge 3		0.1944	0.1963	0.1985
			Edge 4		0.1963	0.1994	0.1989
			Max		0.2027	0.2787	0.2011
	Operating Real Product (Power 50~55% charging)		Top - charger above client		0.2001	0.2024	0.1973
			Top - charger below client		0.1992	0.2023	0.1996
			Edge 1		0.2165	0.1997	0.2013
			Edge 2		0.2007	0.2793	0.2035
			Edge 3		0.1982	0.1966	0.1969
			Edge 4		0.1974	0.1968	0.1952
			Max		0.2165	**0.2793**	**0.2035**
	Operating Real Product (Power 90~95% charging)		Top - charger above client		0.1980	0.1986	0.1970
			Top - charger below client		0.1993	0.1995	0.1989
			Edge 1		0.2059	0.2011	0.2002
			Edge 2		0.2013	0.2740	0.2029
			Edge 3		0.1999	0.1965	0.1974
			Edge 4		0.1989	0.1983	0.1983
			Max		0.2059	0.2740	0.2029
Configuration 4	Worst case mode		Worst position		0.2177	0.2759	0.2024
			Max		**0.2177**	0.2759	0.2024

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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)		
					Version 1	Version 2	Version 3
Configuration 5	Operating Real Product (Power <10% charging)	15 cm probe to edges of EUTand 20 cm probe to top surface of the EUT	Top - charger below client	1.63	0.2036	0.1953	0.2140
			Edge 1		0.1992	0.1944	0.1947
			Edge 2		0,1969	0.1986	0.1953
			Edge 3		0.2012	0.1969	0.1985
			Edge 4		0.1987	0.1975	0.1994
			Max		0.2036	0.1986	0.2140
	Operating Real Product (Power 50~55% charging)		Top - charger below client		0.2148	0.1960	0.2152
			Edge 1		0.2007	0.1948	0.1953
			Edge 2		0.1963	0.1972	0.1946
			Edge 3		0.1987	0.1953	0.1983
			Edge 4		0.1993	0.1977	0.1975
			Max		0.2148	0.1977	**0.2152**
	Operating Real Product (Power 90~95% charging)		Top - charger below client		0.2031	0.1961	0.2143
			Edge 1		0.1992	0.1950	0.1959
			Edge 2		0.1893	0.1965	0.1981
			Edge 3		0.2012	0.1963	0.1979
			Edge 4		0.2018	0.1966	0.1966
			Max		0.2031	0.1966	0.2143
Configuration 6	Worst case mode		Worst position		0.2157	0.1984	0.2129
			Max		**0.2157**	**0.1984**	0.2129

6.2.2. FCC SUMMARY OF RESULTS

H-Field Limit		
FCC RF Exposure	Maximum meas data (A/m)	Percentage (%)
1.63	0.279	**17.13**

Conclusion:

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

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7. Mobile exposure conditions for simultaneous transmission operations.

Tech	Band	Antenna	Antenna Gain (dBi)	Maximum averaged Power (dBm)	Maximum averaged EIRP (dBm)	Maximum averaged EIRP (mW)	Power density at 20cm (mW/cm^2)	MPE Limit (mW/cm^2)	ER ratio (Power density / MPE Limit)
WWAN	GSM 850	Main 1 Ant	-3.5	26.0	22.50	177.8	0.035	0.549	0.064
	GSM 1900	Main 1 Ant	-2.3	23.5	21.20	131.8	0.026	1.000	0.026
	WCDMA Band II	Main 1 Ant	-2.3	25.0	22.70	186.2	0.037	1.000	0.037
	WCDMA Band IV	Main 1 Ant	-2	24.5	22.50	177.8	0.035	1.000	0.035
	WCDMA Band V	Main 1 Ant	-3.5	25.5	22.00	158.5	0.032	0.549	0.057
	LTE Band 2	Main 1 Ant	-2.3	25.0	22.70	186.2	0.037	1.000	0.037
	LTE Band 2	Main 3 Ant	-2.3	22.0	19.70	93.3	0.019	1.000	0.019
	LTE Band 4	Main 1 Ant	-2	25.0	23.00	199.5	0.040	1.000	0.040
	LTE Band 4	Main 3 Ant	-2	22.0	20.00	100.0	0.020	1.000	0.020
	LTE Band 5	Main 1 Ant	-3.5	25.5	22.00	158.5	0.032	0.549	0.057
	LTE Band 12	Main 1 Ant	-3.8	25.5	21.70	147.9	0.029	0.466	0.063
	LTE Band 13	Main 1 Ant	-3.3	25.5	22.20	166.0	0.033	0.518	0.064
	LTE Band 17	Main 1 Ant	-3.8	25.5	21.70	147.9	0.029	0.469	0.063
	LTE Band 25	Main 1 Ant	-2.3	25.0	22.70	186.2	0.037	1.000	0.037
	LTE Band 26	Main 1 Ant	-3.5	25.5	22.00	158.5	0.032	0.549	0.057
	LTE Band 41 (PC3)	Main 2 Ant	-3.3	23.0	19.70	93.3	0.019	1.000	0.019
	LTE Band 41 (PC2)	Main 2 Ant	-3.3	22.9	19.60	91.2	0.018	1.000	0.018
	LTE Band 66	Main 1 Ant	-2	25.0	23.00	199.5	0.040	1.000	0.040
	NR Band n5	Main 1 Ant	-3.5	25.0	21.50	141.3	0.028	0.549	0.051
	NR Band n66	Main 1 Ant	-2	25.0	23.00	199.5	0.040	1.000	0.040
	NR Band n66	Main 3 Ant	-2	23.0	21.00	125.9	0.025	1.000	0.025
WLAN	2.4GHz	WLAN Ant.1	-6.4	19.0	12.60	18.2	0.004	1.000	0.004
	2.4GHz	WLAN Ant.2	-1.9	19.0	17.10	51.3	0.010	1.000	0.010
	Bluetooth	BT Ant.1	-6.4	19.0	12.60	18.2	0.004	1.000	0.004
	Bluetooth	BT Ant.2	-1.9	19.0	17.10	51.3	0.010	1.000	0.010
	5GHz	WLAN Ant.1	-5.7	18.0	12.30	17.0	0.003	1.000	0.003
	5GHz	WLAN Ant.2	-3.5	18.0	14.50	28.2	0.006	1.000	0.006
	6GHz	WLAN Ant.1	-3.5	10.0	6.50	4.5	0.001	1.000	0.001
	6GHz	WLAN Ant.2	-5.6	10.0	4.40	2.8	0.001	1.000	0.001
UWB		ANT2	-3.94	-10.37	-14.31	0.037	0.000	1.000	0.000

TER calculation

Worst Main Configurations	Main	DTS Ant1	DTS Ant2	BT Ant1	BT Ant2	UNII 5G Ant1	UNII 5G Ant2	UNII 6G Ant1	UNII 6G Ant2	UWB	WPT	TER
Single Main (GSM 850)	0.064	0.004	0.01	0.004	0.01	0.003	0.006	0.001	0.001	0.000	0.171	0.274
ULCA (LTE B12 + LTE B66)	0.103	0.004	0.01	0.004	0.01	0.003	0.006	0.001	0.001	0.000	0.171	0.313
EN-DC (LTE B13 + NR n66)	0.104	0.004	0.01	0.004	0.01	0.003	0.006	0.001	0.001	0.000	0.171	0.314

Conclusion:

Considering the all the EIRP performance listed in the table above, the aggregated (All antennas' power density / MPE limit) is smaller than 1.0. So According to 47 CFR 2.1091, the RF exposure analysis concludes that the RF exposure is FF compliant.

END OF TEST REPORT

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