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EMI TEST REPORT
FCC CERTIFICATION

Applicant: **SAMSUNG Electronics Co., Ltd.** **129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea**	**Date of Issue: January 04, 2019** **Test Report No. HCT-EM-1901-FC001** **Test Site: HCT CO., LTD.**

FCC ID : **A3LSMM205FN**

Applicable Standards	: FCC CFR 47 PART 15 Subpart B Class B ANSI C63.4-2014
EUT Type	: Mobile Phone
Model Name	: SM-M205FN/DS
Date of Test	: December 27, 2018 to December 31, 2018

The device bearing the trade name and model specified above, has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2014. (See Test Report if any modifications were made for compliance)
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.
HCT certifies that no party to application has been denial the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

Tested By

Na-Eun Song
Test Engineer
EMC Team
Certification Division

Reviewed By

Jin-Pyo Hong
Technical Manager
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REVISION HISTORY

The revision history for this document is shown in table.

Report No.	Issue Date	Information About Changes
HCT-EM-1901-FC001	January 04, 2019	Initial Release

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1. GENERAL INFORMATION

1.1 Description of EUT

Its basic purpose is used for communications.

FCC ID	A3LSMM205FN
Model	SM-M205FN/DS
EUT Type	Mobile Phone
Frequency Band	GSM 850/1900, WCDMA 850/1900, LTE B5/41, BT/WLAN 2.4 GHz, NFC

1.2 Equipment Units Tested

All equipment descriptions used in the tested system (including inserted cards) are:

Device Type	Model Name	Serial Number	Manufacturer	FCC ID / DoC
EUT	SM-M205FN/DS	-	SAMSUNG	A3LSMM205FN
TA	EP-TA200	-	SOLUM	-
Data Cable	EP-DR140AWE	-	KSDCO	-
Earphone	EHS61ASFWE	-	CRESYN	-

1.3 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	USB type C	Y	N/A	(P) 1.0
	Earphone	N/A	N	(D) 1.2

* The marked “(D)” means the data cable and “(P)” means the power cable.

1.4 Noise Suppression Parts on Cable (I/O Cable)

Product Name	Port	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
EUT	USB type C	N	N/A	Y	Both End
	Earphone	N	N/A	Y	EUT End

1.5. Test Facility

Test site is located at 74, SEOICHEON-RO, 578BEON-GIL, MAJANG-MYEON, ICHEON-SI, GYEONGGI-DO, SOUTH KOREA. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4-2014. The Normalized site attenuations (30 MHz to 1 GHz) and Site validation (1 GHz to 18 GHz) were performed in accordance with the standard in ANSI C63.4-2014

Measurement Facilities	Registration Number
Radiated Field strength measurement facility 3 m Semi Anechoic chamber	90661
Radiated Field strength measurement facility 10 m Semi Anechoic chamber	

1.6 Calibration of Measuring Instrument

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturers recommendations for utilizing calibration equipment, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).

1.7 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.
All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Emission (0.15 MHz to 30 MHz)	1.82 dB
Radiated Emissions (30 MHz to 1 GHz)	5.20 dB
Radiated Emissions (1 GHz to 18 GHz)	5.24 dB
Radiated Emissions (18 GHz to 40 GHz)	5.40 dB

2. LIST OF TEST EQUIPMENT

	Type	Manufacturer	Model Name	Serial Number	Calibration Cycle	CAL Date
Conducted Emission						
☒	EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	06.25.2018
☒	LISN	Rohde & Schwarz	ENV216	102245	1 year	12.12.2018
☐	LISN	Rohde & Schwarz	ENV216	100073	1 year	05.03.2018
☒	Radio communication analyzer	ANRITSU	MT8820C	6201138643	1 year	08.21.2018
☒	Antenna (for Communication)	Schwarzbeck	USLP9142	VSLP 9142-200	-	-
☒	Software	Rohde & Schwarz	EMC32 VER8.54.0	-	-	-
Radiated Emission						
-For measurement below 1 GHz						
☒	EMI Test Receiver	Rohde & Schwarz	ESU40	100524	1 year	07.27.2018
☒	Trilog Antenna	Schwarzbeck	VULB 9168	760	2 year	04.06.2017
☒	Antenna master	INNCO Systems	MA4640-XP-ET	-	N/A	-
☒	Antenna master controller	INNCO Systems	CO 3000	CO3000/870/ 35990515/L	N/A	-
☒	Turn Table	INNCO Systems	1060-2M	-	N/A	-
☒	Turn Table controller	INNCO Systems	CO2000	CO2000/095/ 7590304/L	N/A	-
☒	Radio communication analyzer	ANRITSU	MT8820C	6201138643	1 year	08.21.2018
☒	Antenna (for Communication)	Schwarzbeck	USLP9142	VSLP 9142-200	-	-
☒	Software	Rohde & Schwarz	EMC32 VER8.40.0	-	-	-
-For measurement above 1 GHz						
☒	EMI Test Receiver	Rohde & Schwarz	ESU40	100524	1 year	07.27.2018
☒	Antenna master	INNCO Systems	MA4640-XP-ET	-	N/A	-
☒	Antenna master controller	INNCO Systems	CO3000	CO3000/870/ 35990515/L	N/A	-
☒	Turn Table	INNCO Systems	1060-2M	-	N/A	-
☒	Turn Table controller	INNCO Systems	CO2000	CO2000/095/ 7590304/L	N/A	-
☒	Horn Antenna	Schwarzbeck	BBHA 9120D	01836	2 year	05.14.2018
☒	Low Noise Amplifier	TESTEK	TK-PA18H	170034-L	1 year	03.06.2018
☐	Power Amplifier	TESTEK	TK-PA1840H	170030-L	1 year	12.17.2018
☐	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170#786	2 year	12.05.2017
☒	Radio communication analyzer	ANRITSU	MT8820C	6201138643	1 year	08.21.2018
☒	Antenna (for Communication)	Schwarzbeck	USLP9142	VSLP 9142-200	-	-
☒	Highpass Filter	Wainwright Instruments	WHKX1.0/15G-12SS	42	1 year	08.02.2018
☒	Software	Rohde & Schwarz	EMC32 VER8.40.0	-	-	-

3. DESCRIPTION OF MEASUREMENTS

3.1 Measurement of Conducted Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 7.3

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN).
If the EUT is connected to the PC through USB, the AC power-line adapter of the PC is directly connected to a line impedance stabilization network (LISN).
Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration.
c. The frequency range from 150 kHz to 30 MHz was searched.

[Conducted Emission Limits]

Frequency (MHz)	Resolution Bandwidth (kHz)	Quasi-Peak (dB(μV))	Average (dB(μV))
0.15 to 0.5	9	66 to 56*	56 to 46*
0.5 to 5	9	56	46
5 to 30	9	60	50

**Decreases with the logarithm of the frequency.*

3.2 Measurement of Radiated Emission

The test procedure was in accordance with ANSI C63.4-2014, Clause 8.3

a. The EUT was placed on the top of a turn table 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from 1 m to 4 m above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 m to 4 m and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Quasi-Peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to Peak and Average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
g. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.(1 GHz to 40 GHz)

[Radiated Emission Limits]

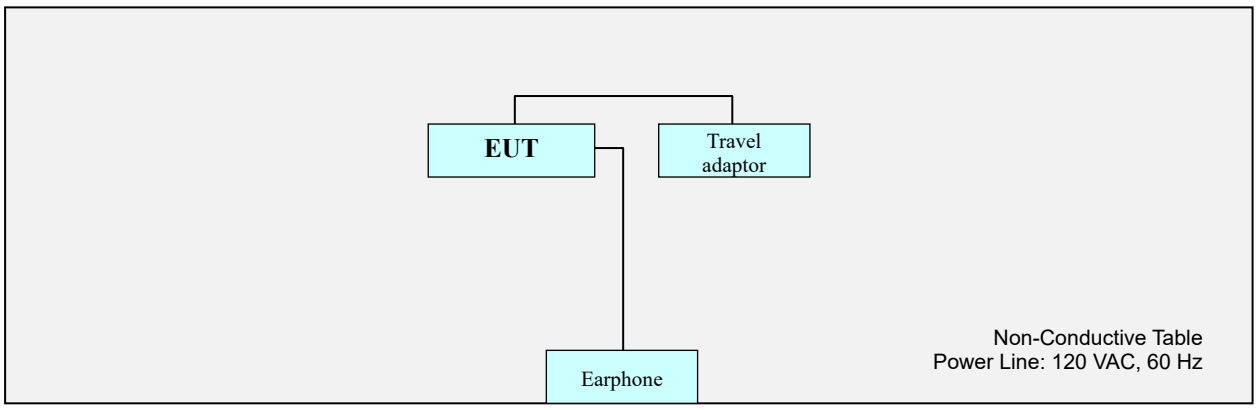
Frequency (MHz)	Antenna Distance (m)	Field Strength (μV/m)	Quasi-Peak (dB(μV)/m)
30 to 88	3	100	40.0
88 to 216	3	150	43.5
216 to 960	3	200	46.0
Above 960	3	500	54.0
Frequency (MHz)	Antenna Distance (m)	Peak (dB(μV)/m)	Average (dB(μV)/m)
Above 1 000	3	74	54

3.2.1 Frequency Range of Radiated Measurements

An unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a Radiated Emission limit is specified, up to the frequency shown in the following table

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 to 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5^{th} harmonic of the highest frequency or 40 ㎓, whichever is lower

3.3 Configuration of Tested System



4. PRELIMINARY TEST

During preliminary tests, the following operating mode was investigated.

LTE B5/ WCDMA 850/ GSM 850 Idle (869 MHz to 894 MHz) (Low/Middle/High CH)

4.1 Conducted Emission

It was tested the following operating mode, after connecting all peripheral devices.

Operating Modes:

Charging & Receiver at LTE B5/ WCDMA 850/ GSM 850 Idle (Low/Middle/High CH)

NOTE.
1. The worst case of operating mode is reported.

4.2 Radiated Emission

It was tested the following operating mode, after connecting all peripheral devices.

Operating Modes:

Charging & Receiver at LTE B5/ WCDMA 850/ GSM 850 Idle (Low/Middle/High CH)

NOTE.
1. Three orientations have been investigated and the worst case orientation is reported.
2. The worst case of operating mode is reported.

5. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

5.1 Conducted Emission

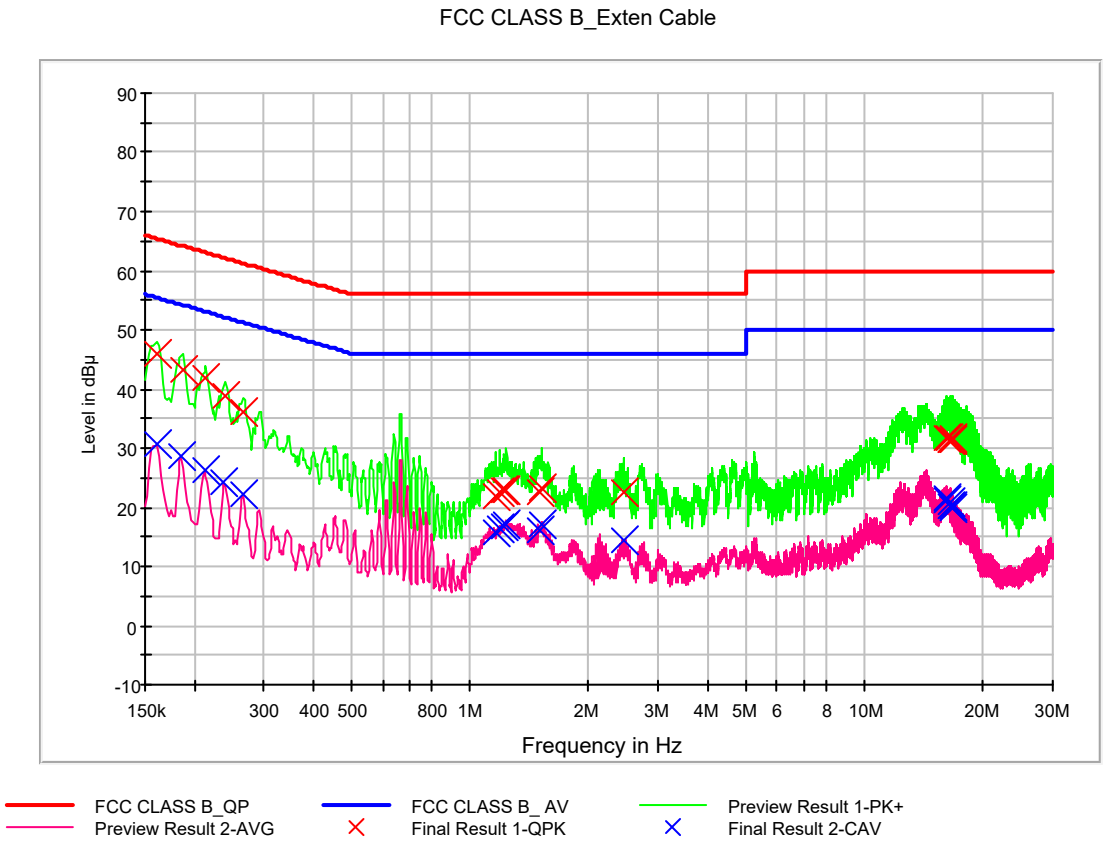
The test results of conducted emission at mains ports provide the following information:

Applicable Standards	FCC PART 15 Subpart B Class B ANSI C63.4-2014
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Worst Case of Operating Mode	Charging & Receiver at LTE B5/ WCDMA 850/ GSM 850 Idle (Low CH)
Kind of Test Site	Shielded Room
Temperature	23.1 °C
Relative Humidity	43.2 %
Test Date	December 28, 2018

- Calculation Formula:

1. Conductor L1 = Hot, Conductor N = Neutral
2. Corr. = LISN Factor + Cable Loss
3. QuasiPeak or CAverage= Receiver Reading + Corr.
4. Margin = Limit – QuasiPeak or CAverage

Figure 1: Conducted Emission, Line (L1)



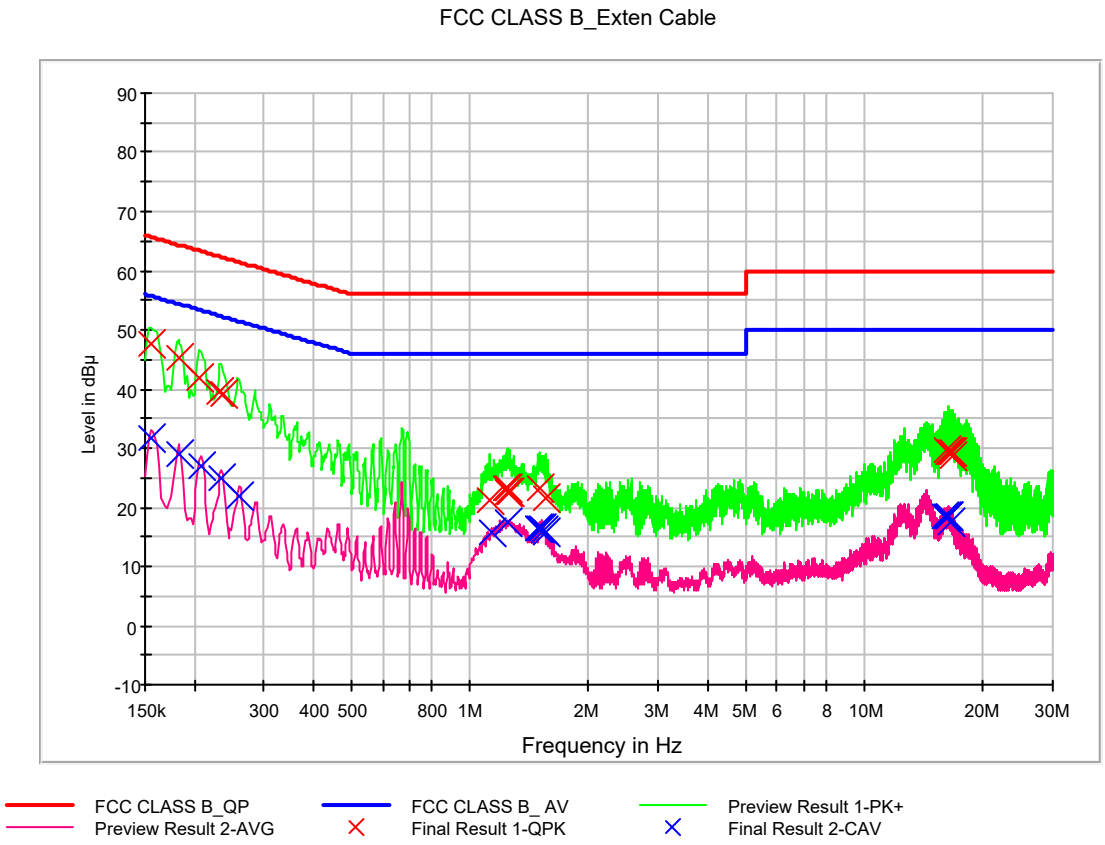
QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	45.9	9.000	L1	9.7	19.5	65.5
0.188000	43.2	9.000	L1	9.7	21.0	64.1
0.214000	41.9	9.000	L1	9.7	21.2	63.0
0.240000	38.9	9.000	L1	9.7	23.2	62.1
0.266000	36.2	9.000	L1	9.7	25.0	61.2
1.164000	21.8	9.000	L1	9.8	34.2	56.0
1.188000	22.4	9.000	L1	9.8	33.6	56.0
1.224000	23.0	9.000	L1	9.8	33.0	56.0
1.238000	22.8	9.000	L1	9.9	33.2	56.0
1.504000	22.5	9.000	L1	9.9	33.5	56.0
1.520000	23.1	9.000	L1	9.9	32.9	56.0
2.450000	22.5	9.000	L1	9.9	33.5	56.0
16.058000	31.6	9.000	L1	10.5	28.4	60.0
16.386000	31.9	9.000	L1	10.5	28.1	60.0
16.492000	31.5	9.000	L1	10.5	28.5	60.0
16.584000	31.5	9.000	L1	10.5	28.5	60.0
16.634000	31.5	9.000	L1	10.5	28.5	60.0
16.764000	31.3	9.000	L1	10.5	28.7	60.0

CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	30.6	9.000	L1	9.7	24.9	55.5
0.186000	28.6	9.000	L1	9.7	25.6	54.2
0.212000	26.4	9.000	L1	9.7	26.7	53.1
0.238000	24.3	9.000	L1	9.7	27.8	52.2
0.266000	22.4	9.000	L1	9.7	28.9	51.2
1.164000	15.6	9.000	L1	9.8	30.4	46.0
1.188000	16.3	9.000	L1	9.8	29.7	46.0
1.222000	16.9	9.000	L1	9.8	29.1	46.0
1.238000	17.0	9.000	L1	9.9	29.0	46.0
1.504000	16.1	9.000	L1	9.9	29.9	46.0
1.520000	17.1	9.000	L1	9.9	28.9	46.0
2.450000	14.3	9.000	L1	9.9	31.7	46.0
16.058000	21.3	9.000	L1	10.5	28.7	50.0
16.080000	21.4	9.000	L1	10.5	28.6	50.0
16.492000	20.7	9.000	L1	10.5	29.3	50.0
16.584000	20.1	9.000	L1	10.5	29.9	50.0
16.634000	20.0	9.000	L1	10.5	30.0	50.0
16.678000	20.1	9.000	L1	10.5	29.9	50.0

Figure 2: Conducted Emission, Line (N)



QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.156000	47.6	9.000	N	9.8	18.1	65.7
0.182000	45.2	9.000	N	9.8	19.1	64.4
0.206000	41.7	9.000	N	9.9	21.6	63.4
0.232000	39.4	9.000	N	9.9	23.0	62.4
0.238000	39.0	9.000	N	9.9	23.1	62.2
1.126000	21.2	9.000	N	10.0	34.8	56.0
1.236000	23.1	9.000	N	10.0	32.9	56.0
1.240000	23.3	9.000	N	10.0	32.7	56.0
1.246000	22.6	9.000	N	10.0	33.4	56.0
1.258000	22.6	9.000	N	10.0	33.4	56.0
1.510000	23.3	9.000	N	10.1	32.7	56.0
1.554000	21.6	9.000	N	10.1	34.4	56.0
16.210000	29.6	9.000	N	10.7	30.4	60.0
16.360000	29.5	9.000	N	10.7	30.5	60.0
16.420000	29.5	9.000	N	10.7	30.5	60.0
16.550000	29.3	9.000	N	10.7	30.7	60.0
16.624000	29.5	9.000	N	10.7	30.5	60.0
16.790000	28.8	9.000	N	10.7	31.2	60.0

CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.156000	31.7	9.000	N	9.8	24.0	55.7
0.182000	29.1	9.000	N	9.8	25.3	54.4
0.208000	26.9	9.000	N	9.9	26.4	53.3
0.234000	24.8	9.000	N	9.9	27.5	52.3
0.260000	21.7	9.000	N	9.9	29.7	51.4
1.138000	15.8	9.000	N	10.0	30.2	46.0
1.240000	17.5	9.000	N	10.0	28.5	46.0
1.492000	16.6	9.000	N	10.1	29.4	46.0
1.510000	16.4	9.000	N	10.1	29.6	46.0
1.514000	16.4	9.000	N	10.1	29.6	46.0
1.544000	16.0	9.000	N	10.1	30.0	46.0
1.554000	15.8	9.000	N	10.1	30.2	46.0
16.042000	18.5	9.000	N	10.7	31.5	50.0
16.106000	18.4	9.000	N	10.7	31.6	50.0
16.344000	18.6	9.000	N	10.7	31.4	50.0
16.360000	18.6	9.000	N	10.7	31.4	50.0
16.364000	18.5	9.000	N	10.7	31.5	50.0
16.550000	17.5	9.000	N	10.7	32.5	50.0

5.2 Radiated Emission

The test results of radiated emission provide the following information:

-For Measurement Below 1 GHz

Applicable Standards	FCC PART 15 Subpart B Class B ANSI C63.4-2014
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Worst Case of Operating Mode	Charging & Receiver at LTE B5/ WCDMA 850/ GSM 850 Idle (Low CH)
Kind of Test Site	3 m semi anechoic chamber
Temperature	21.4 °C
Relative Humidity	42.0 %
Test Date	December 27, 2018

Frequency (MHz)	Quasi Peak (dBµV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
40.211200	27.8	100.0	V	64.0	19.7	12.2	40.0
59.803200	29.3	325.1	H	119.0	19.8	10.7	40.0
90.449600	25.1	391.7	H	156.0	14.4	18.4	43.5
105.518400	24.9	274.7	H	181.0	16.1	18.6	43.5
149.076000	22.6	125.1	H	6.0	19.9	20.9	43.5
534.981600	25.0	100.0	V	342.0	26.0	21.0	46.0

- Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. QuasiPeak = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor + Cable Loss
4. Margin = Limit - QuasiPeak

-For Measurement Above 1 GHz

Applicable Standards	FCC PART 15 Subpart B Class B ANSI C63.4-2014
Detector	Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz) CISPR-Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)
Highest Frequency	2 690 MHz
Tested Frequency Range	1 GHz to 18 GHz
Worst Case of Operating Mode	Charging & Receiver at LTE B5/ WCDMA 850/ GSM 850 Idle (Low CH)
Kind of Test Site	3 m semi anechoic chamber
Temperature	22.4 °C
Relative Humidity	38.7 %
Test Date	December 31, 2018

Frequency (MHz)	Peak (dBµV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1381.205000	30.7	260.5	V	196.0	-28.3	43.3	74.0
1831.195000	30.5	249.9	V	212.0	-27.1	43.5	74.0
2949.400000	34.0	248.4	V	308.0	-23.0	40.0	74.0
3880.000000	35.0	100.0	V	12.0	-21.2	39.0	74.0
7012.995000	40.3	150.0	V	223.0	-14.7	33.7	74.0
8100.790000	42.5	249.9	H	251.0	-12.4	31.5	74.0

Frequency (MHz)	CAverage (dBµV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1381.205000	18.0	260.5	V	196.0	-28.3	36.0	54.0
1831.195000	18.2	249.9	V	212.0	-27.1	35.8	54.0
2949.400000	21.0	248.4	V	308.0	-23.0	33.0	54.0
3880.000000	22.3	100.0	V	12.0	-21.2	31.7	54.0
7012.995000	27.4	150.0	V	223.0	-14.7	26.6	54.0
8100.790000	29.6	249.9	H	251.0	-12.4	24.4	54.0

- Calculation Formula:

1. POL. H = Horizontal, POL. V = Vertical
2. Peak or CAverage = Reading (Receiver Reading) + Corr.
3. Corr. (Correction Factor) = Antenna Factor+ Cable Loss –Amplifier Gain
4. Margin = Limit - Peak or CAverage

6. CONCLUSION

The data collected shows that the **EUT Type: Mobile Phone, FCC ID: A3LSMM205FN, Model: SM-M205FN/DS** complies with §15.107 and §15.109 of the FCC rules.

7. APPENDIX A. TEST SETUP PHOTOGRAPHS

Please refer to Appendix A