

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

EMI TEST REPORT FCC CERTIFICATION

Applicant:

SAMSUNG Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea Date of Issue: December 26, 2018

Test Report No. HCT-EM-1812-FC030

Test Site: HCT CO., LTD.

FCC ID:

A3LSMM205F

Applicable Standards

: FCC CFR 47 PART 15 Subpart B Class B

ANSI C63.4-2014

EUT Type

: Mobile Phone

Model Name

: SM-M205F/DS

Series Model Name

SM-M205F, SM-M205G/DS

Date of Test

: December 24, 2018 to December 26, 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

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Reviewed By

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Certification Division

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FCC ID: A3LSMM205F Report No.: HCT-EM-1812-FC030



REVISION HISTORY

The revision history for this document is shown in table.

Report No.	Issue Date	Information About Changes
HCT-EM-1812-FC030	December 26, 2018	Initial Release



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1. GENERAL INFORMATION

1.1 Description of EUT

Its basic purpose is used for communications.

FCC ID	A3LSMM205F
Model	SM-M205F/DS
EUT Type	Mobile Phone
Frequency Band	GSM 850/1900, WCDMA 850/1900, LTE B5/41, BT/WLAN 2.4 GHz

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-M205F/DS	-	SAMSUNG	A3LSMM205F
TA	EP-TA200	-	ELENTEC	-
Data Cable	EP-DR140AWE	-	KSDCO	-
Earphone	EHS64ASFWE	-	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
EUI	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
EUI	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	90001	

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.

Espectially, 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



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2. LIST OF TEST EQUIPMENT

	<u>Type</u>	<u>Manufacturer</u>	Model Name	Serial Number	Calibration Cycle	CAL Date
Con	ducted Emission					
	EMI Test Receiver LISN LISN Radio communication analyzer Antenna (for Communication) Software	Rohde & Schwarz Rohde & Schwarz Rohde & Schwarz ANRITSU Schwarzbeck Rohde & Schwarz	ESCI ENV216 ENV216 MT8820C USLP9142 EMC32 VER8.54.0	100584 102245 100073 6201138643 VSLP 9142-200	1 year 1 year 1 year 1 year	06.25.2018 12.12.2018 05.03.2018 08.21.2018
Radi	ated Emission					
-For	measurement below	1 GHz				
	EMI Test Receiver Trilog Antenna Antenna master	Rohde & Schwarz Schwarzbeck INNCO Systems	ESU40 VULB 9168 MA4640-XP-ET	100524 760	1 year 2 year N/A	07.27.2018 04.06.2017
\boxtimes	Antenna master controller	INNCO Systems	CO 3000	CO3000/870/ 35990515/L	N/A	-
\boxtimes	Turn Table	INNCO Systems	1060-2M	- CO2000/005/	N/A	-
\boxtimes	Turn Table controller	INNCO Systems	CO2000	CO2000/095/ 7590304/L	N/A	-
\boxtimes	Radio communication analyzer	ANRITSU	MT8820C	6201138643	1 year	08.21.2018
\boxtimes	Antenna (for Communication)	Schwarzbeck	USLP9142	VSLP 9142-200	-	-
\boxtimes	Software	Rohde & Schwarz	EMC32 VER8.40.0	-	-	-
-For	measurement above	1 GHz				
\boxtimes	EMI Test Receiver Antenna master	Rohde & Schwarz INNCO Systems	ESU40 MA4640-XP-ET	100524	1 year N/A	07.27.2018
	Antenna master controller	-	CO3000	CO3000/870/ 35990515/L	N/A	-
\boxtimes	Turn Table	INNCO Systems	1060-2M	-	N/A	-
\boxtimes	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
님	Power Amplifier Horn Antenna	TESTEK	TK-PA1840H	170030-L	1 year	12.17.2018
	Radio communication	Schwarzbeck	BBHA 9170	BBHA9170#786	2 year	12.05.2017
\bowtie	analyzer	ANRITSU	MT8820C	6201138643	1 year	08.21.2018
	Antenna (for Communication)	Schwarzbeck	USLP9142	VSLP 9142-200	-	-
	Highpass Filter	Wainwright Instruments		42	1 year	08.02.2018
\boxtimes	Software	Rohde & Schwarz	EMC32 VER8.40.0	-	-	-

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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.

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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	Field Strength (μV/m)	Quasi-Peak (dB(μV)/m)
,	(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	Antenna Distance	Peak	Average
(MHz)	(m)	$(dB(\mu V)/m)$	$(dB(\mu V)/m)$
Above 1 000	3	74	54

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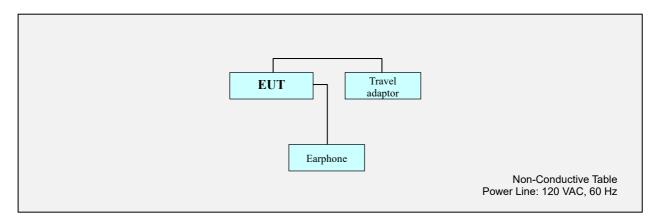


3.2.1 Frequency Range of Radiated Measurements

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 GHz, whichever is lower

3.3 Configuration of Tested System



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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)

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

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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	21.1 / 22.5 °C
Relative Humidity	40.3 / 41.6 %
Test Date	December 26 / December 26, 2018

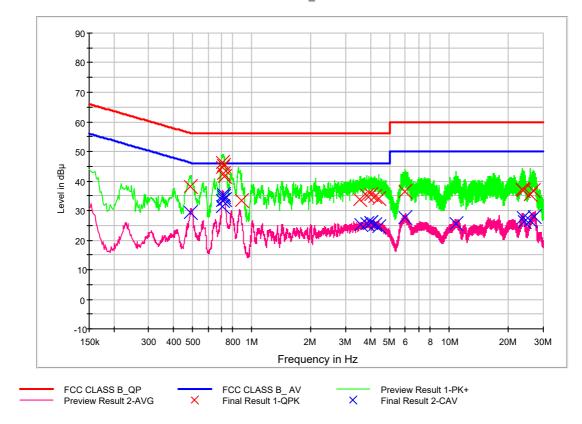
- Calculation Formula:

- 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)

FCC CLASS B_Exten Cable



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QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV
0.488000	38.3	9.000	L1	9.8	17.9	56.2
0.708000	44.6	9.000	L1	9.8	11.4	56.0
0.712000	46.4	9.000	L1	9.8	9.6	56.0
0.716000	45.2	9.000	L1	9.8	10.8	56.0
0.722000	42.5	9.000	L1	9.8	13.5	56.0
0.726000	41.5	9.000	L1	9.8	14.5	56.0
0.890000	33.5	9.000	L1	9.8	22.5	56.0
3.516000	33.6	9.000	L1	9.9	22.4	56.0
3.818000	35.1	9.000	L1	10.0	20.9	56.0
4.010000	35.6	9.000	L1	10.0	20.4	56.0
4.200000	34.6	9.000	L1	10.0	21.4	56.0
4.412000	34.2	9.000	L1	10.0	21.8	56.0
5.994000	36.3	9.000	L1	10.1	23.7	60.0
23.506000	37.2	9.000	L1	10.7	22.8	60.0
23.548000	37.2	9.000	L1	10.7	22.8	60.0
23.672000	36.9	9.000	L1	10.7	23.1	60.0
25.870000	35.5	9.000	L1	10.8	24.5	60.0
26.566000	36.6	9.000	L1	10.8	23.4	60.0



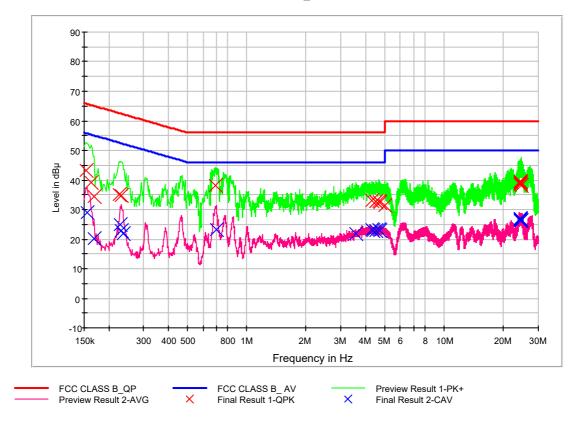
CAverage Final Result, Line (L1)

Frequency (MHz)			Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	
0.490000	29.4	9.000	L1	9.8	16.8	46.2	
0.708000	31.2	9.000	L1	9.8	14.8	46.0	
0.712000	33.3	9.000	L1	9.8	12.7	46.0	
0.716000	35.6	9.000	L1	9.8	10.4	46.0	
0.720000	34.7	9.000	L1	9.8	11.3	46.0	
0.724000	33.8	9.000	L1	9.8	12.2	46.0	
3.556000 25.2		9.000	L1	9.9	20.8	46.0	
3.818000	25.6	9.000	L1	10.0	20.4	46.0	
4.010000	26.0	9.000	L1	10.0	20.0	46.0	
4.022000 25.8		9.000	L1	10.0	20.2	46.0	
4.200000	25.2	9.000	L1	10.0	20.8	46.0	
4.412000	24.6	9.000	L1	10.0	21.4	46.0	
5.994000	27.5	9.000	L1	10.1	22.5	50.0	
10.894000	25.8	9.000	L1	10.3	24.2	50.0	
23.672000	27.6	9.000	L1	10.7	22.4	50.0	
23.976000	26.4	9.000	L1	10.7	23.6	50.0	
25.870000	26.8	9.000	L1	10.8	23.2	50.0	
26.962000	28.1	9.000	L1	10.8	21.9	50.0	



Figure 2: Conducted Emission, Line (N)

FCC CLASS B_Exten Cable





FCC ID: A3LSMM205F

QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	43.1	9.000	N	9.8	22.7	65.8
0.162000	39.2	9.000	N	9.8	26.2	65.4
0.168000	34.3	9.000	N	9.8	30.8	65.1
0.226000	34.9	9.000	N	9.9	27.6	62.6
0.232000	34.6	9.000	N	9.9	27.8	62.4
0.692000	38.2	9.000	N	9.9	17.8	56.0
4.298000	33.0	9.000	N	10.2	23.0	56.0
4.492000	32.6	9.000	N	10.2	23.4	56.0
4.532000	32.8	9.000	N	10.2	23.2	56.0
4.646000	32.7	9.000	N	10.2	23.3	56.0
4.734000	32.3	9.000	N	10.2	23.7	56.0
4.992000	31.4	9.000	N	10.2	24.6	56.0
24.168000	39.4	9.000	N	11.0	20.6	60.0
24.224000	39.4	9.000	N	11.0	20.6	60.0
24.248000	39.3	9.000	N	11.0	20.7	60.0
24.268000	38.9	9.000	N	11.0	21.1	60.0
24.372000	38.6	9.000	N	11.0	21.4	60.0
24.668000	38.1	9.000	N	11.0	21.9	60.0



FCC ID: A3LSMM205F

CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.156000	28.9	9.000	N	9.8	26.8	55.7
0.168000	20.1	9.000	N	9.8	35.0	55.1
0.228000	25.0	9.000	N	9.9	27.5	52.5
0.232000	22.9	9.000	N	9.9	29.5	52.4
0.236000	21.9	9.000	N	9.9	30.3	52.2
0.702000	23.3	9.000	N	9.9	22.7	46.0
3.590000	22.0	9.000	N	10.1	24.0	46.0
4.298000	23.2	9.000	N	10.2	22.8	46.0
4.348000	23.0	9.000	N	10.2	23.0	46.0
4.492000	22.8	9.000	N	10.2	23.2	46.0
4.646000	23.1	9.000	N	10.2	22.9	46.0
4.734000	22.9	9.000	N	10.2	23.1	46.0
24.224000	26.8	9.000	N	11.0	23.2	50.0
24.248000	26.7	9.000	N	11.0	23.3	50.0
24.268000	26.4	9.000	N	11.0	23.6	50.0
24.372000	26.8	9.000	N	11.0	23.2	50.0
24.376000	26.8	9.000	N	11.0	23.2	50.0
24.566000	26.1	9.000	N	11.0	23.9	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	21.0 °C
Relative Humidity	41.1 %
Test Date	December 24, 2018

Frequency (MHz)	Quasi Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
31.020800	27.4	100.0	V	339.0	18.8	12.6	40.0
33.904800	28.5	100.0	V	73.0	19.1	11.5	40.0
100.869600	24.9	100.0	V	8.0	15.6	18.6	43.5
141.234400	21.9	274.8	Н	8.0	19.7	21.6	43.5
190.347200	22.1	100.0	V	303.0	17.7	21.4	43.5
230.003200	21.7	100.0	V	354.0	18.0	24.3	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	21.0 °C
Relative Humidity	41.1 %
Test Date	December 24, 2018

Frequency (MHz)	Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1065.110000	32.7	219.4	V	219.0	-29.6	41.3	74.0
1733.520000	31.0	249.9	V	240.0	-27.3	43.0	74.0
2151.675000	31.3	150.0	V	160.0	-26.2	42.7	74.0
6046.570000	37.2	99.9	V	147.0	-16.9	36.8	74.0
7311.065000	40.2	350.0	Н	287.0	-13.4	33.8	74.0
9143.770000	43.7	99.8	V	10.0	-11.0	30.3	74.0

Frequency (MHz)	CAverage (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1065.110000	17.2	219.4	V	219.0	-29.6	36.8	54.0
1733.520000	18.2	249.9	V	240.0	-27.3	35.8	54.0
2151.675000	18.1	150.0	V	160.0	-26.2	35.9	54.0
6046.570000	24.4	99.9	V	147.0	-16.9	29.6	54.0
7311.065000	27.6	350.0	Н	287.0	-13.4	26.4	54.0
9143.770000	30.6	99.8	V	10.0	-11.0	23.4	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

FCC ID: A3LSMM205F Report No.: HCT-EM-1812-FC030



6. CONCLUSION

The data collected shows that the EUT Type: Mobile Phone, FCC ID: A3LSMM205F,

Model: SM-M205F/DS complies with §15.107 and §15.109 of the FCC rules.



7. APPENDIX A. TEST SETUP PHOTOGRAPHS

Please refer to Appendix A