HCT CO.,LTD.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
TEL: +82-31-645-6300 FAX: +82-31-645-6401

EMI TEST REPORT
FCC CERTIFICATION

Applicant: **SAMSUNG Electronics Co., Ltd.** **129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea**	**Date of Issue: September 17, 2018** **Test Report No. HCT-EM-1809-FC007-R1** **Test Site: HCT CO., LTD.**

FCC ID : **A3LSMJ610F**

Applicable Standards	: FCC CFR 47 PART 15 Subpart B Class B ANSI C63.4-2014
Type of Device	: Class B Personal Computers and Peripherals
EUT Type	: Mobile Phone
Model Name	: SM-J415F/DS
Additional Model Name	: SM-J415F
Date of Test	: September 06, 2018 to September 14, 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
EMC Team
Certification Division

REVISION HISTORY

The revision history for this document is shown in table.

Report No.	Issue Date	Information About Changes
HCT-EM-1809-FC007	September 14, 2018	Initial Release
HCT-EM-1809-FC007-R1	September 17, 2018	Revised text in Clause 4.2, NOTE

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1. GENERAL INFORMATION

1.1 Description of EUT

Its basic purpose is used for communications.

FCC ID	A3LSMJ610F
Model	SM-J415F/DS
Additional Model	SM-J415F
EUT Type	Mobile Phone
Frequency Band	GSM 850/1900, WCDMA 850/1900, LTE B5/41, Bluetooh 4.2, WLAN 2.4 GHz, ANT+
Manufacturer	Samsung India Electronics PVT. Ltd. NOIDA uttar Pradeshe, Indio 201-305

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-J415F/DS	-	SAMSUNG	A3LSMJ610F
Notebook PC	ProBook6560b	5CB2053MXF	HP	-
Notebook PC Adaptor	Series PPP009L-E	-	LITE-ON TECHNOLOGY (CHANGZHOU)	
Gateway	TL-WR747N	-	TP Link	
Gateway Adaptor	T090060-2H1	-	TP Link	
Serial Mouse	Serial 2 Button mouse	02031069	Radio Shack	
RJ45 cable	-	-	-	
Data Cable	ECB-DU68WE	-	SAMSUNG	
Earphone	EHS61ASFWE	-	SAMSUNG	
Micro SD Card	64 GB	-	SAMSUNG	

1.3 Cable Description

Product Name	Port	Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (m)
EUT	Micro USB	Y	Y	(P,D) 1.0
	Earphone	N/A	N	(D) 1.2
Notebook PC	RJ 45	N/A	N	(D) 1.6
	Serial(Mouse)	N/A	Y	(D) 1.8
	DC IN	N	N/A	(P) 1.8
Gateway	DC IN	N	N/A	(P) 1.8

* 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	Micro USB	N	N/A	Y	Both End
	Earphone	N	N/A	Y	EUT End
Notebook PC	RJ 45	N	N/A	N	N/A
	Serial(Mouse)	N	N/A	Y	Notebook 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 ($k = 2$)
Radiated Emissions (30 MHz to 1 GHz)	5.20 dB ($k = 2$)
Radiated Emissions (1 GHz to 18 GHz)	5.24 dB ($k = 2$)
Radiated Emissions (18 GHz to 40 GHz)	5.40 dB ($k = 2$)

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	12.20.2017
☒ LISN	Rohde & Schwarz	ENV216	100073	1 year	05.03.2018
☒ 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	-
☐ EMI Test Receiver	Rohde & Schwarz	ESU26	100241	1 year	08.14.2018
☐ Antenna master	INNCO Systems	MA4000-EP	MA4000/283	N/A	-
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☒ 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	296	2 year	10.12.2016
☒ Low Noise Amplifier	TESTEK	TK-PA18H	170034-L	1 year	03.06.2018
☐ Power Amplifier	TESTEK	TK-PA1840H	170030-L	1 year	12.20.2017
☐ Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170#786	2 year	12.05.2017
☐ Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
☐ Power Amplifier	CERNEX	CBLU1183540	21691	1 year	06.25.2018
☐ Antenna master	HD GmbH	MA240	240/520	N/A	-
☐ EMI Test Receiver	Rohde & Schwarz	ESU26	100241	1 year	08.14.2018
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☒ 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]

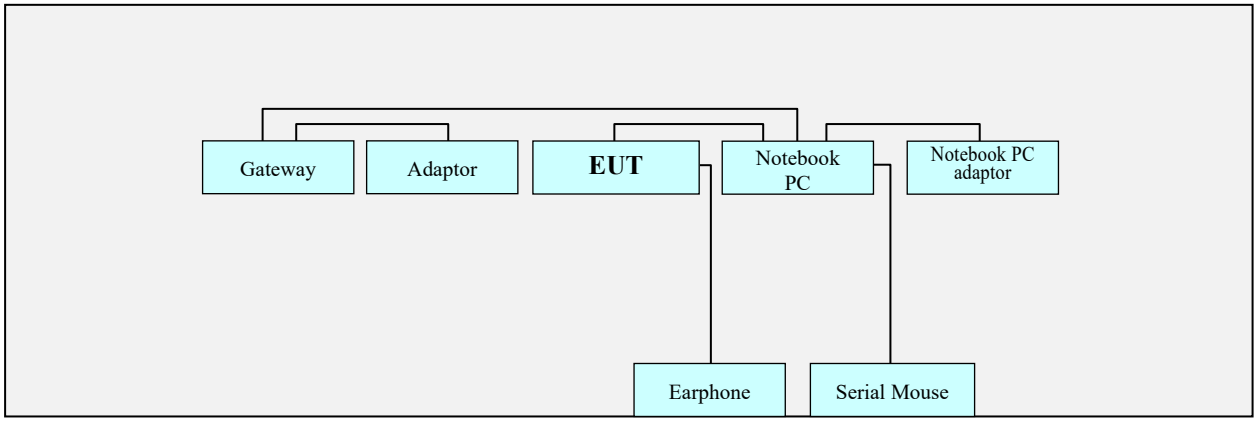
Frequency (MHz)	Antenna Distance (m)	Field Strength (μV/m)	Quasi-Peak (dB(μV)/m)
30 to 88	3	100	40.0
88 to 216	3	150	43.5
216 to 960	3	200	46.0
Above 960	3	500	54.0
Frequency (MHz)	Antenna Distance (m)	Peak (dB(μV)/m)	Average (dB(μV)/m)
Above 1 000	3	74	54

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



Non-Conductive Table
Power Line: 120 VAC, 60 Hz

4. PRELIMINARY TEST

4.1 Conducted Emission Test

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

Operation Mode: ☒ Data communication mode (READ)
☒ Data communication mode (WRITE)

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

4. 2 Radiated Emission Test

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

Operation Mode: ☒ Data communication mode (READ)
☒ Data communication mode (WRITE)

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

5. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

5.1 Conducted Emission Test

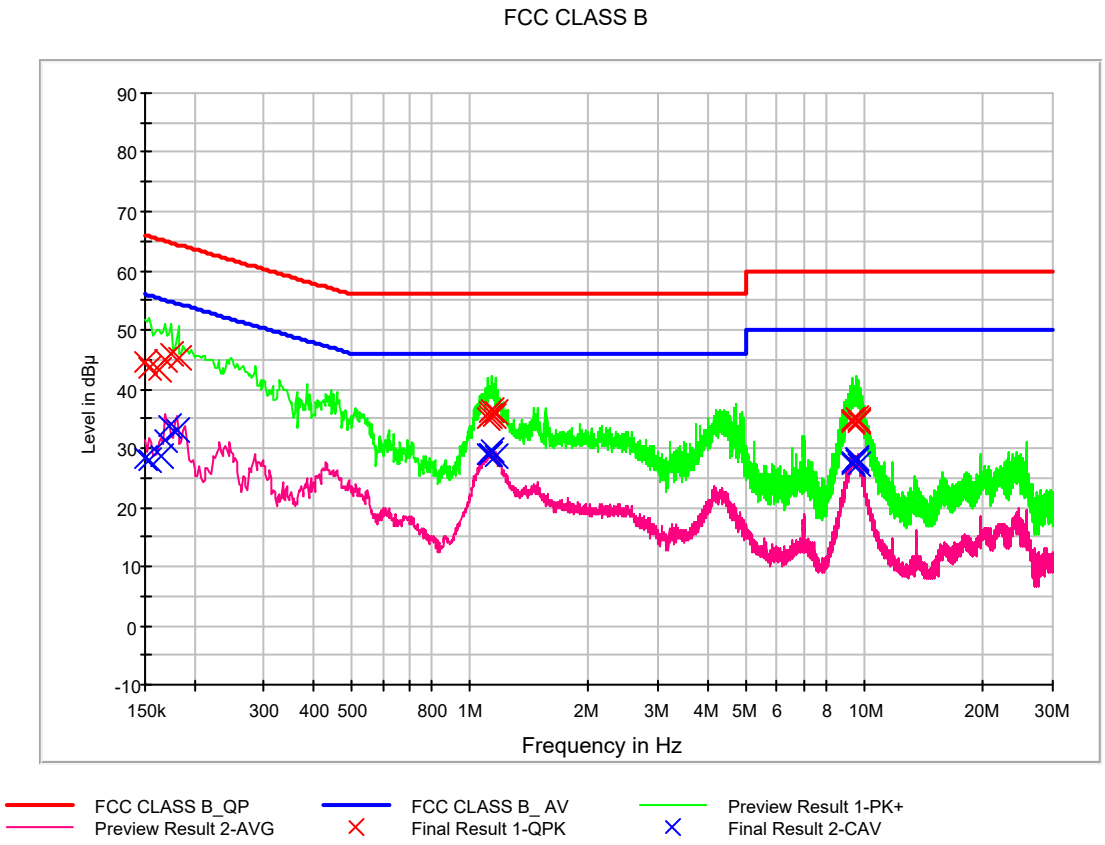
The test results of conducted emission at mains ports provide the following information:

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 Operation Mode	Data communication mode (READ)
Kind of Test Site	Shielded Room
Temperature	23.6-24.7 °C
Relative Humidity	48.0-50.2 %
Test Date	September 10, 2018- September 14, 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, AC Main Port, Line (L1)



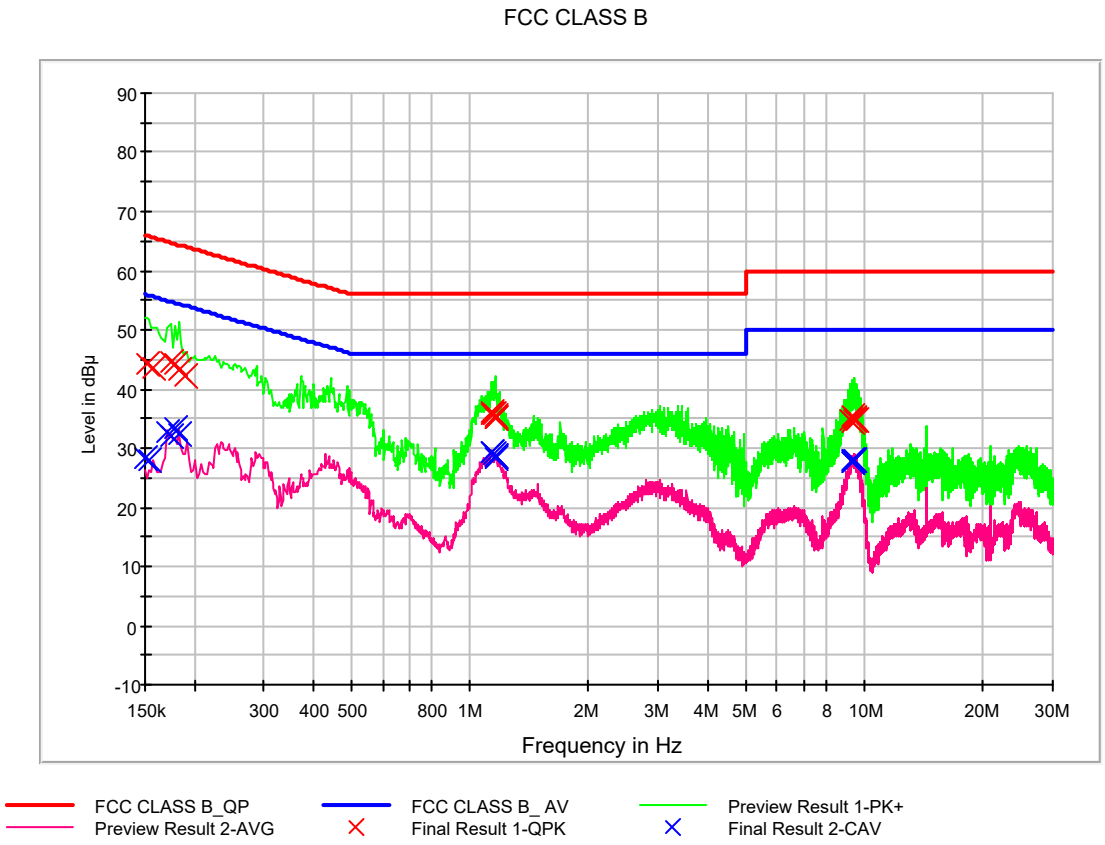
QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	44.6	9.000	L1	9.6	21.4	66.0
0.154000	43.4	9.000	L1	9.6	22.4	65.8
0.162000	43.3	9.000	L1	9.6	22.1	65.4
0.168000	45.0	9.000	L1	9.6	20.1	65.1
0.174000	45.9	9.000	L1	9.6	18.9	64.8
0.182000	45.2	9.000	L1	9.6	19.2	64.4
1.112000	35.1	9.000	L1	9.7	20.9	56.0
1.120000	36.0	9.000	L1	9.7	20.0	56.0
1.128000	35.6	9.000	L1	9.7	20.4	56.0
1.138000	36.5	9.000	L1	9.7	19.5	56.0
1.144000	35.6	9.000	L1	9.7	20.4	56.0
1.160000	36.0	9.000	L1	9.7	20.0	56.0
9.282000	34.5	9.000	L1	10.0	25.5	60.0
9.346000	34.7	9.000	L1	10.0	25.3	60.0
9.366000	34.7	9.000	L1	10.0	25.3	60.0
9.528000	34.9	9.000	L1	10.0	25.1	60.0
9.600000	34.8	9.000	L1	10.0	25.2	60.0
9.684000	34.4	9.000	L1	10.0	25.6	60.0

CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	28.3	9.000	L1	9.6	27.7	56.0
0.154000	28.1	9.000	L1	9.6	27.7	55.8
0.164000	28.7	9.000	L1	9.6	26.5	55.3
0.168000	31.4	9.000	L1	9.6	23.6	55.1
0.172000	33.6	9.000	L1	9.6	21.3	54.9
0.180000	33.0	9.000	L1	9.6	21.5	54.5
1.112000	28.9	9.000	L1	9.7	17.1	46.0
1.120000	28.8	9.000	L1	9.7	17.2	46.0
1.124000	29.0	9.000	L1	9.7	17.0	46.0
1.128000	29.0	9.000	L1	9.7	17.0	46.0
1.138000	29.5	9.000	L1	9.7	16.5	46.0
1.160000	28.7	9.000	L1	9.7	17.3	46.0
9.288000	27.4	9.000	L1	10.0	22.6	50.0
9.346000	27.7	9.000	L1	10.0	22.3	50.0
9.496000	28.2	9.000	L1	10.0	21.8	50.0
9.564000	28.2	9.000	L1	10.0	21.8	50.0
9.574000	28.0	9.000	L1	10.0	22.0	50.0
9.684000	27.4	9.000	L1	10.0	22.6	50.0

Figure 2: Conducted Emission, AC Main Port, Line (N)



QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	44.4	9.000	N	9.6	21.5	65.9
0.158000	43.5	9.000	N	9.6	22.1	65.6
0.174000	44.6	9.000	N	9.6	20.1	64.8
0.178000	44.2	9.000	N	9.6	20.3	64.6
0.184000	43.3	9.000	N	9.6	21.0	64.3
0.190000	42.2	9.000	N	9.7	21.8	64.0
1.132000	35.8	9.000	N	9.8	20.2	56.0
1.140000	36.2	9.000	N	9.8	19.8	56.0
1.152000	35.7	9.000	N	9.8	20.3	56.0
1.156000	35.6	9.000	N	9.8	20.4	56.0
1.162000	34.9	9.000	N	9.8	21.1	56.0
1.166000	34.9	9.000	N	9.8	21.1	56.0
9.248000	34.9	9.000	N	10.0	25.1	60.0
9.322000	35.3	9.000	N	10.0	24.7	60.0
9.338000	34.4	9.000	N	10.0	25.6	60.0
9.440000	34.8	9.000	N	10.0	25.2	60.0
9.468000	34.9	9.000	N	10.0	25.1	60.0
9.506000	34.6	9.000	N	10.0	25.4	60.0

CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	28.4	9.000	N	9.6	27.6	56.0
0.154000	28.0	9.000	N	9.6	27.8	55.8
0.170000	32.8	9.000	N	9.6	22.2	55.0
0.174000	32.0	9.000	N	9.6	22.7	54.8
0.178000	33.3	9.000	N	9.6	21.3	54.6
0.182000	32.5	9.000	N	9.6	21.9	54.4
1.132000	29.2	9.000	N	9.8	16.8	46.0
1.140000	29.4	9.000	N	9.8	16.6	46.0
1.148000	28.9	9.000	N	9.8	17.1	46.0
1.156000	28.5	9.000	N	9.8	17.5	46.0
1.162000	28.6	9.000	N	9.8	17.4	46.0
1.166000	28.3	9.000	N	9.8	17.7	46.0
9.296000	27.6	9.000	N	10.0	22.4	50.0
9.304000	27.6	9.000	N	10.0	22.4	50.0
9.338000	27.9	9.000	N	10.0	22.1	50.0
9.348000	27.9	9.000	N	10.0	22.1	50.0
9.386000	27.9	9.000	N	10.0	22.1	50.0
9.450000	27.9	9.000	N	10.0	22.1	50.0

5.2 Radiated Emission Test

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 Operation Mode	Data communication mode (READ)
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.0-24.6 °C
Relative Humidity	48.3-49.5 %
Test Date	September 06, 2018- September 14, 2018

Frequency (MHz)	Quasi Peak (dBµV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.776000	24.2	100.0	V	270.0	18.8	15.8	40.0
265.516000	31.2	100.0	H	290.0	19.4	12.3	43.5
600.072800	38.7	99.7	H	8.0	27.5	7.3	46.0
711.116000	40.9	99.9	H	76.0	28.9	5.1	46.0
800.018400	40.3	99.7	H	44.0	30.2	5.7	46.0
959.983200	42.7	99.7	H	154.0	31.7	3.3	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 Operation Mode	Data communication mode (READ)
Kind of Test Site	3 m semi anechoic chamber
Temperature	24.0-24.6 °C
Relative Humidity	48.3-49.5 %
Test Date	September 06, 2018- September 14, 2018

Frequency (MHz)	Peak (dBµV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1400.010000	48.2	249.9	V	222.0	-28.5	25.8	74.0
1994.240000	51.1	100.0	V	49.0	-27.0	22.9	74.0
2592.385000	54.6	350.0	V	49.0	-24.1	19.4	74.0
4481.220000	41.6	113.4	V	0.0	-19.7	32.4	74.0
5999.150000	45.9	349.9	V	106.0	-16.5	28.1	74.0
9247.240000	42.3	100.0	V	126.0	-11.1	31.7	74.0

Frequency (MHz)	CAverage (dBµV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1400.010000	46.9	249.9	V	222.0	-28.5	7.1	54.0
1994.240000	35.1	100.0	V	49.0	-27.0	18.9	54.0
2592.385000	35.0	350.0	V	49.0	-24.1	19.0	54.0
4481.220000	25.9	113.4	V	0.0	-19.7	28.1	54.0
5999.150000	27.4	349.9	V	106.0	-16.5	26.6	54.0
9247.240000	30.0	100.0	V	126.0	-11.1	24.0	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: A3LSMJ610F, Model: SM-J415F/DS** complies with §15.107 and §15.109 of the FCC rules.

7. APPENDIX A. TEST SETUP PHOTOGRAPHS

Please refer to Appendix A