

EMI TEST REPORT

FCC CERTIFICATION

Applicant:**SAMSUNG Electronics Co., Ltd.**129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do,
16677, Korea**Date of Receipt: November 23, 2017****Date of Issue: November 28, 2017****Test Report No. HCT-E-1711-F020****FCC ID :****A3LSMA730X****Rule Part(s) / Standard(s):** FCC CFR 47 PART 15 Subpart B Class B**FCC Classification:** JBP (Part 15 B – Class B Computing Device Peripheral)**EUT Type:** Mobile Phone**Model Name:** SM-A730X**Date of Test:** November 24, 2017 – November 27, 2017

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 denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 862

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REVISION HISTORY

The revision history for this document is shown in table.

Version	Issue Date	Description
HCT-E-1711-F020	November 28, 2017	Initial Release



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1. GENERAL INFORMATION

1.1 Description of EUT

Its basic purpose is used for communications.

FCC ID	A3LSMA730X
Model	SM-A730X
EUT Type	Mobile Phone
TX/ RX Frequency	2 402 MHz to 2 480 MHz (Bluetooth) 2 412 MHz to 2 462 MHz (WiFi 2.4 GHz) 5 180 MHz to 5 240 MHz (WiFi 5 GHz_UNII 1) 5 260 MHz to 5 320 MHz (WiFi 5 GHz_UNII 2A) 5 500 MHz to 5 720 MHz (WiFi 5 GHz_UNII 2C) 5 745 MHz to 5 825 MHz (WiFi 5 GHz_UNII 3)



1.2 Related Submittal(s) / Grant(s)

Original submittal only.

1.3 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.

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	

1.4 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 equipments, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2006).



1.5 Tested System Details

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

Device Type	Model Name	Serial Number	Manufacturer	FCC ID / DoC
EUT	SM-A730X	-	SAMSUNG	A3LSMA730X
Data cable	EP-DN930CWE	-	Cresyn	-
Earphone	EHS64AVFWE	-	Cresyn	-
Notebook PC	ProBook6560b	5CB2053MXF	HP	DoC
Notebook PC adaptor	Series PPP009L-E	-	LITE-On Technology	-
RJ45 cable	-	-	-	-
Gateway	TL-WR747N	-	TP-LINK	-
Gateway adaptor	T120150-2H1	-	TP-LINK	-
Serial mouse	Serial 2 button mouse	02031069	Radio shack	FSUGMZE3
Micro SD card	Micro SDXC class 10 UHS-1 Pro plus U3	-	SAMSUNG	-



1.6 Cable Description

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

1.7 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
Notebook PC	RJ 45	N	N/A	N	N/A
	Serial (Mouse)	N	N/A	Y	Notebook PC End



2. 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 ($k = 2$)



3. DESCRIPTION OF TEST

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

- 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.
- The EUT was set 3 m away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- 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.
- 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.
- 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 ($\mu\text{V}/\text{m}$)	Quasi-Peak ($\text{dB}(\mu\text{V})/\text{m}$)
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 ($\text{dB}(\mu\text{V})/\text{m}$)	Average ($\text{dB}(\mu\text{V})/\text{m}$)
Above 1 000	3	74	54

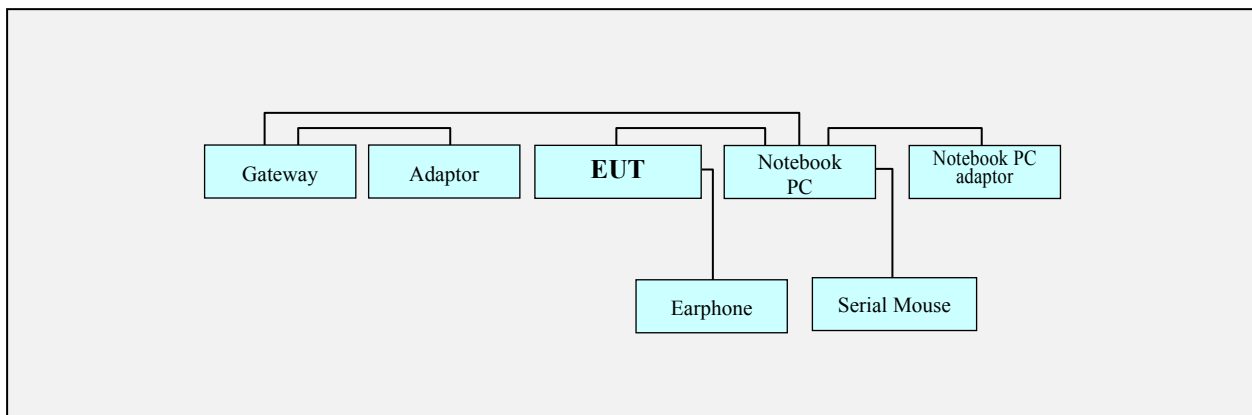


3.2.1 Frequency Range of Radiated Measurements

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 GHz, 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 Data Communication mode, after connecting all peripheral devices.

Operation Mode: ☒ Data Communication mode

4. 2 Radiated Emission Test

It was tested Data Communication mode, after connecting all peripheral devices.

Operation Mode: ☒ Data Communication mode



5. CONDUCTED AND RADIATED EMISSION TEST SUMMARY

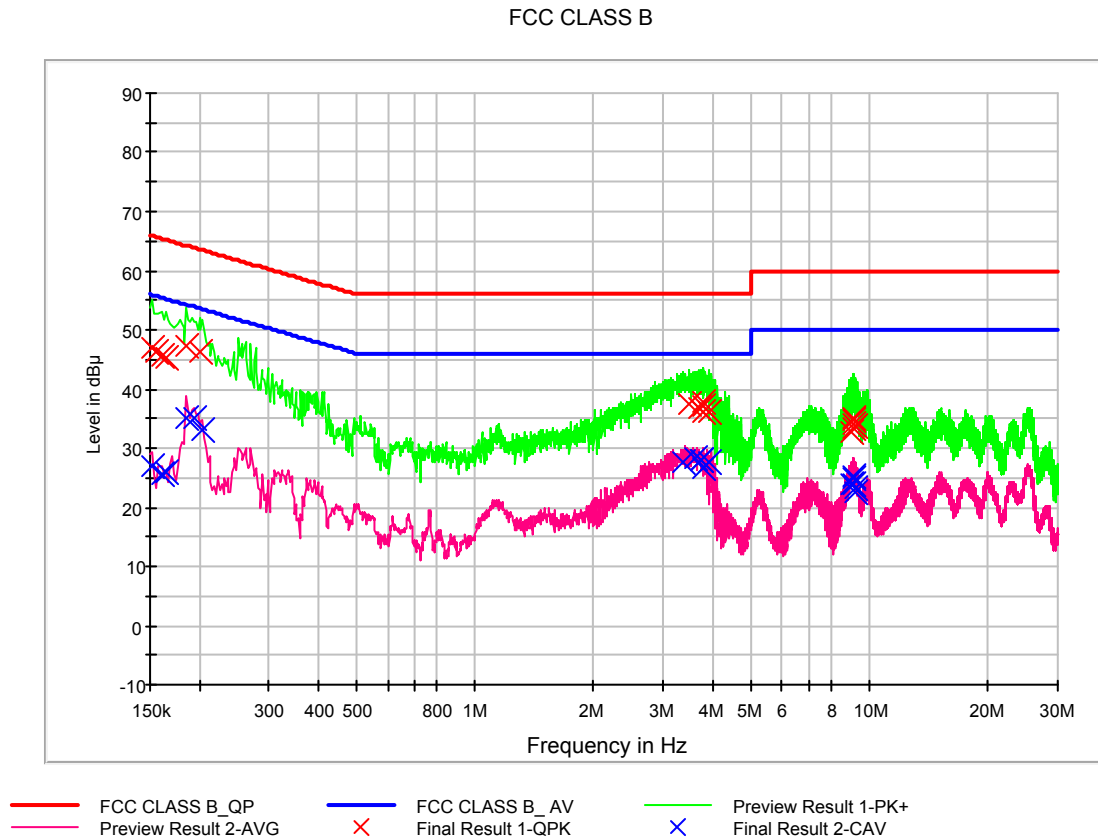
5.1 Conducted Emission Test

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

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak, CISPR-Average
Bandwidth	9 kHz (6 dB)
Operation Mode	Data Communication mode
Kind of Test Site	Shielded Room
Temperature	22.2 °C
Relative Humidity	46.2 %
Test Date	November 25, 2017

- 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, Data Communication Mode, Line (L1)**



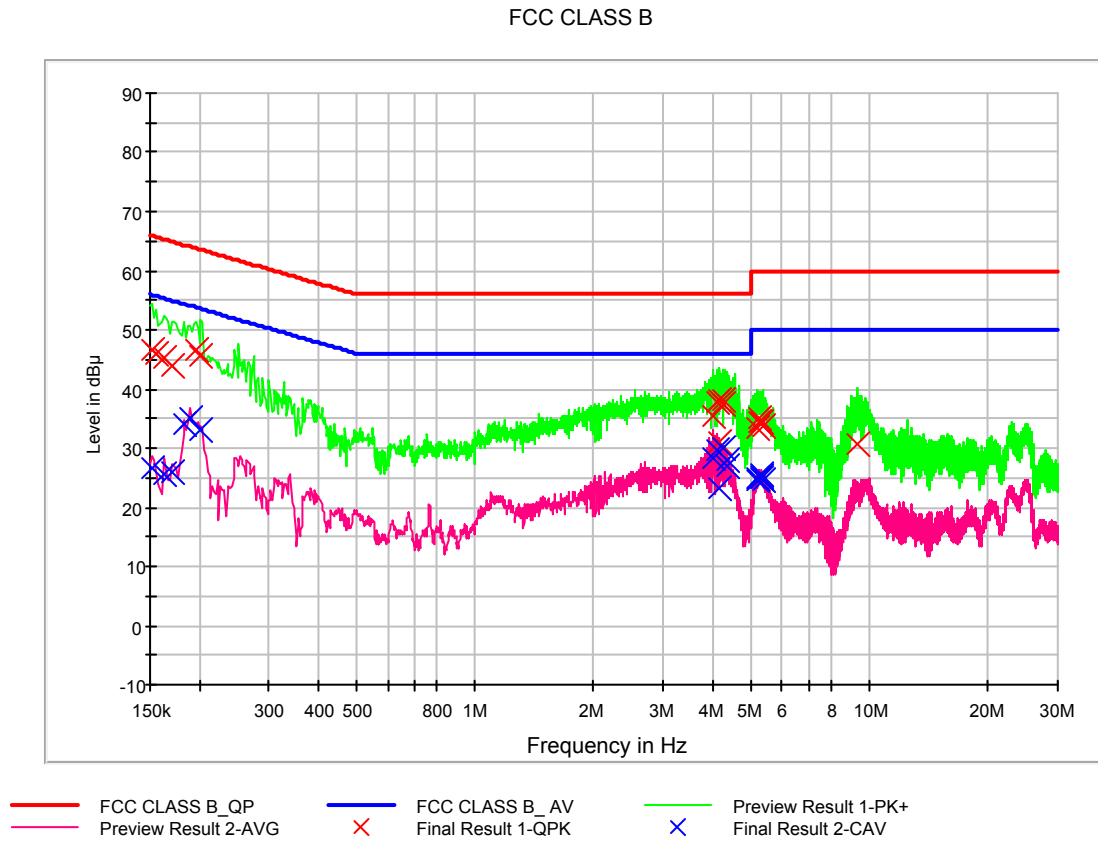
QuasiPeak Final Result, Line (L1)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	46.9	9.000	L1	9.6	19.0	65.9
0.156000	46.3	9.000	L1	9.6	19.4	65.7
0.160000	45.7	9.000	L1	9.6	19.8	65.5
0.164000	45.2	9.000	L1	9.6	20.1	65.3
0.186000	47.2	9.000	L1	9.6	17.1	64.2
0.200000	46.3	9.000	L1	9.6	17.4	63.6
3.496000	37.4	9.000	L1	9.8	18.6	56.0
3.676000	36.6	9.000	L1	9.8	19.4	56.0
3.774000	37.1	9.000	L1	9.8	18.9	56.0
3.786000	36.2	9.000	L1	9.8	19.8	56.0
3.804000	37.8	9.000	L1	9.8	18.2	56.0
3.898000	36.0	9.000	L1	9.8	20.0	56.0
8.982000	32.7	9.000	L1	10.0	27.3	60.0
9.092000	34.9	9.000	L1	10.0	25.1	60.0
9.120000	33.5	9.000	L1	10.0	26.5	60.0
9.134000	35.0	9.000	L1	10.0	25.0	60.0
9.152000	33.9	9.000	L1	10.0	26.1	60.0
9.236000	33.7	9.000	L1	10.0	26.3	60.0



CAverage Final Result, Line (L1)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	26.8	9.000	L1	9.6	29.0	55.9
0.160000	25.7	9.000	L1	9.6	29.8	55.5
0.164000	26.0	9.000	L1	9.6	29.3	55.3
0.186000	35.0	9.000	L1	9.6	19.2	54.2
0.194000	35.1	9.000	L1	9.6	18.7	53.9
0.204000	33.0	9.000	L1	9.6	20.4	53.4
3.374000	27.6	9.000	L1	9.8	18.4	46.0
3.620000	28.4	9.000	L1	9.8	17.6	46.0
3.736000	28.0	9.000	L1	9.8	18.0	46.0
3.744000	27.9	9.000	L1	9.8	18.1	46.0
3.786000	26.6	9.000	L1	9.8	19.4	46.0
3.898000	27.5	9.000	L1	9.8	18.5	46.0
8.982000	23.8	9.000	L1	10.0	26.2	50.0
9.092000	24.9	9.000	L1	10.0	25.1	50.0
9.120000	24.1	9.000	L1	10.0	25.9	50.0
9.134000	25.2	9.000	L1	10.0	24.8	50.0
9.236000	22.6	9.000	L1	10.0	27.4	50.0
9.252000	23.2	9.000	L1	10.0	26.8	50.0

**Figure 2: Conducted Emission, AC Main Port, Data Communication Mode, Line (N)**



QuasiPeak Final Result, Line (N)

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	46.5	9.000	N	9.6	19.4	65.9
0.156000	46.0	9.000	N	9.6	19.7	65.7
0.162000	45.1	9.000	N	9.6	20.3	65.4
0.170000	43.7	9.000	N	9.6	21.2	65.0
0.196000	46.6	9.000	N	9.6	17.1	63.8
0.202000	45.8	9.000	N	9.6	17.8	63.5
4.002000	35.6	9.000	N	9.8	20.4	56.0
4.130000	37.9	9.000	N	9.8	18.1	56.0
4.144000	38.0	9.000	N	9.8	18.0	56.0
4.166000	31.0	9.000	N	9.8	25.0	56.0
4.262000	38.3	9.000	N	9.8	17.7	56.0
4.272000	37.4	9.000	N	9.8	18.6	56.0
5.188000	33.5	9.000	N	9.9	26.5	60.0
5.234000	35.2	9.000	N	9.9	24.8	60.0
5.264000	34.3	9.000	N	9.9	25.7	60.0
5.294000	34.5	9.000	N	9.9	25.5	60.0
5.376000	33.7	9.000	N	9.9	26.3	60.0
9.290000	30.6	9.000	N	10.1	29.4	60.0



CAverage Final Result, Line (N)

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	26.5	9.000	N	9.6	29.4	55.9
0.162000	25.5	9.000	N	9.6	29.9	55.4
0.170000	26.0	9.000	N	9.6	29.0	55.0
0.184000	33.9	9.000	N	9.6	20.4	54.3
0.190000	35.2	9.000	N	9.6	18.9	54.0
0.202000	33.1	9.000	N	9.6	20.4	53.5
4.002000	28.3	9.000	N	9.8	17.7	46.0
4.130000	29.8	9.000	N	9.8	16.2	46.0
4.166000	23.3	9.000	N	9.8	22.7	46.0
4.262000	30.0	9.000	N	9.8	16.0	46.0
4.334000	28.1	9.000	N	9.8	17.9	46.0
4.342000	27.1	9.000	N	9.8	19.0	46.0
5.180000	25.0	9.000	N	9.9	25.0	50.0
5.188000	24.7	9.000	N	9.9	25.3	50.0
5.298000	25.6	9.000	N	9.9	24.4	50.0
5.310000	25.1	9.000	N	9.9	24.9	50.0
5.320000	25.0	9.000	N	9.9	25.0	50.0
5.376000	24.6	9.000	N	9.9	25.4	50.0



5.2 Radiated Emission Test

The test results of radiated emission provide the following information:

-For Measurement Below 1 GHz

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Quasi-Peak
Bandwidth	120 kHz (6 dB)
Operation Mode	Data Communication mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	22.0 °C
Relative Humidity	45.3 %
Test Date	November 24, 2017

Frequency (MHz)	Quasi Peak (dB μ V/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
47.827200	32.1	100.0	V	326.0	23.2	7.9	40.0
81.190400	32.1	250.0	H	308.0	18.6	7.9	40.0
125.016000	32.8	100.0	V	263.0	21.5	10.7	43.5
375.017600	37.6	100.0	H	26.0	26.0	8.4	46.0
500.008800	39.7	100.0	H	172.0	28.9	6.3	46.0
600.008800	40.7	100.0	V	1.0	31.3	5.3	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

Rule Part / Standard	FCC PART 15 Subpart B Class B
Detector	Peak mode: Peak (RBW: 1 MHz, VBW: 3 MHz) CISPR-Average mode: Peak (RBW: 1 MHz, VBW: 10 Hz)
Highest Operating Frequency	5 825 MHz
Upper Frequency	1 GHz to 29.125 GHz
Operation Mode	Data Communication mode
Kind of Test Site	3 m semi anechoic chamber
Temperature	21.9 °C
Relative Humidity	45.0 %
Test Date	November 27, 2017

Frequency (MHz)	Peak (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1400.020000	49.5	318.3	V	236.0	-12.9	24.5	74.0
1800.170000	42.4	203.7	V	235.0	-12.1	31.6	74.0
1998.060000	51.3	111.3	V	51.0	-11.8	22.7	74.0
2595.755000	52.5	307.5	V	68.0	-9.5	21.5	74.0
2658.530000	42.7	349.7	V	353.0	-9.4	31.3	74.0
5998.050000	43.0	99.8	V	113.0	-2.2	31.0	74.0

Frequency (MHz)	CAverage (dBμV/m)	Antenna Height (cm)	POL. (H/V)	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1400.020000	48.2	318.3	V	236.0	-12.9	5.8	54.0
1800.170000	37.8	203.7	V	235.0	-12.1	16.2	54.0
1998.060000	34.6	111.3	V	51.0	-11.8	19.4	54.0
2595.755000	32.9	307.5	V	68.0	-9.5	21.1	54.0
2658.530000	27.4	349.7	V	353.0	-9.4	26.6	54.0
5998.050000	30.0	99.8	V	113.0	-2.2	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. LIST OF TEST EQUIPMENT

<u>Type</u>	<u>Manufacturer</u>	<u>Model Name</u>	<u>Serial Number</u>	<u>Calibration Cycle</u>	<u>CAL Date</u>
<u>Conducted Emission</u>					
☐ EMI Test Receiver	Rohde & Schwarz	ESCI	100584	1 year	06.20.2017
☒ EMI Test Receiver	Rohde & Schwarz	ESCI	100033	1 year	06.27.2017
☒ LISN	Rohde & Schwarz	ESH3-Z5	100282	1 year	05.22.2017
☒ LISN	Rohde & Schwarz	ENV216	100073	1 year	12.23.2016
☐ LISN	Rohde & Schwarz	ENV216	100073	1 year	07.18.2017
☐ Software	Rohde & Schwarz	EMC32 VER8.54.0	-	-	-
<u>Radiated Emission</u>					
-For measurement below 1 GHz					
☒ EMI Test Receiver	Rohde & Schwarz	ESU40	100524	1 year	08.16.2017
☒ Trilog Antenna	Schwarzbeck	VULB 9168	760	2 year	04.06.2017
☒ Antenna master	HD GmbH	MA240	240/520	N/A	-
☒ Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
☒ Turn Table	INNCO Systems	1060-2M	-	N/A	-
☒ Turn Table controller	INNCO Systems	CO2000	-	N/A	-
☐ EMI Test Receiver	Rohde & Schwarz	ESU26	100241	1 year	08.16.2017
☐ 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	08.16.2017
☒ Antenna master	INNCO Systems	MA4000-XP-ET	-	N/A	-
☒ Antenna master controller	INNCO Systems	CO 3000	CO 3000/870/ 35990515/L	N/A	-
☒ Turn Table	INNCO Systems	1060-2M	-	N/A	-
☒ Turn Table controller	INNCO Systems	CO2000	-	N/A	-
☒ Power Amplifier	CERNEX	CBLU5183530	24348	1 year	06.01.2017
☒ Power Amplifier	CERNEX	CBL18265035	21873	1 year	01.19.2017
☒ Power Amplifier	CERNEX	CBL26405040	19660	1 year	07.11.2017
☒ Horn Antenna	Schwarzbeck	BBHA 9120D	296	2 year	10.12.2016
☒ Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170124	2 year	04.25.2017
☐ Antenna master controller	HD GmbH	HD 100	100/637	N/A	-
☐ Power Amplifier	CERNEX	CBLU1183540	21691	1 year	06.28.2017
☐ Antenna master	HD GmbH	MA240	240/520	N/A	-
☐ Horn Antenna	Schwarzbeck	BBHA 9120D	1300	2 year	06.30.2017
☐ EMI Test Receiver	Rohde & Schwarz	ESU26	100241	1 year	08.16.2017
☐ Turn Table	INNCO Systems	DT3000-3T	DT3000/69	N/A	-
☒ Software	Rohde & Schwarz	EMC32 VER8.40.0	-	-	-



7. CONCLUSION

The data collected shows that the **EUT Type: Mobile Phone, Model: SM-A730X, FCC ID: A3LSMA730X** complies with §15.107 and §15.109 of the FCC rules.



APPENDIX A. TEST SETUP PHOTOGRAPHS

Please refer to Appendix A