

FCC NFC REPORT

FCC Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si,
Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:

December 29, 2016

Test Site/Location:

HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-R-1612-F054-1

HCT FRN: 0005866421

FCC ID : A3LSMA320FL

APPLICANT : SAMSUNG Electronics Co., Ltd.

Model(s): SM-A320FL
EUT Type: Mobile Phone
RF Output Field Strength: 15.36 dBuV/m @30 m
Frequency of Operation: 13.56 MHz
Modulation type: ASK
FCC Classification: Low Power Communication Device – Transmitter
FCC Rule Part(s): FCC Part 15.225 Subpart C

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S.C. 853(a)



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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1612-F054	December 15, 2016	- First Approval Report
HCT-R-1612-F054-1	December 29, 2016	- Retest all test case

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1. GENERAL INFORMATION

Applicant: SAMSUNG Electronics Co.,Ltd.
Address: 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID: A3LSMA320FL
EUT Type: Mobile Phone
Model (s): SM-A320FL
Date(s) of Tests: December 29, 2016
Place of Tests: HCT Co., Ltd.
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

2. EUT DESCRIPTION

Model	SM-A320FL
EUT Type	Mobile Phone
Power Supply	DC 3.85 V
Battery Information	Model: EB-BA320ABE Type: Li-ion Battery
Frequency of Operation	13.56 MHz
Transmit Power	15.36 dBuV/m @30 m
Modulation Type	ASK
Antenna Specification	Manufacturer: AQ corporation Antenna type: Internal Antenna

3. TEST METHODOLOGY

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) is used in the measurement of the test device.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.225 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.3 of ANSI C63.10. (Version: 2013).

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's 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).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The 10 m semi anechoic chamber used to collect the Conducted and Radiated data is located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. Those measurement facilities are constructed in conformance with the requirements of ANSI C63.4 (Version: 2014). Detailed description of test facilities was submitted to the Commission and accepted dated July 07, 2015 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned loop, dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

* The antennas of this E.U.T are permanently attached.

* The E.U.T Complies with the requirement of §15.203

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 ($\pm$ dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	6.07

8. TEST SUMMARY

The results in this report apply only to sample tested

Regulation	Test Type	Range	Result
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(a)	Radiated Electric Field Emissions	13.553MHz to 13.567MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(b)	Radiated Electric Field Emissions	13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(c)	Radiated Electric Field Emission	13.110 MHz to 13.410 MHz and 13.710 MHz to 14.010 MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.209 (d)	Radiated Electric Field Emissions	9kHz to 30MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.209	Radiated Electric Field Emissions	30MHz to 1GHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.207	AC power conducted emissions	150kHz to 30MHz	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.225(e)	Frequency Stability	0.01% of nominal	Pass
Title 47 of the CFR: Part 15 Subpart (c), Clause 15.215(c)	20 dB Bandwidth	-	Pass

9. RADIATED EMISSION MEASUREMENT

Requirement(s): 15.209, 15.225

Except as provided elsewhere in this paragraph the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Minimum Standard: FCC Part 15.225 / 15.209

Rule Part	Frequency (MHz)	Limit
Part 15.209	0.009 ~ 0.490	2400/F(kHz) uV/m@300 m
	0.490 ~1.705	24000/F(kHz) uV/m@30 m
	1.705 ~ 30	30 uV/m@30 m
	30 ~ 88	100 ** uV/m@3 m
	88 ~ 216	150 ** uV/m@3 m
	216 ~ 960	200 ** uV/m@3 m
	Above 960	500 uV/m@3 m

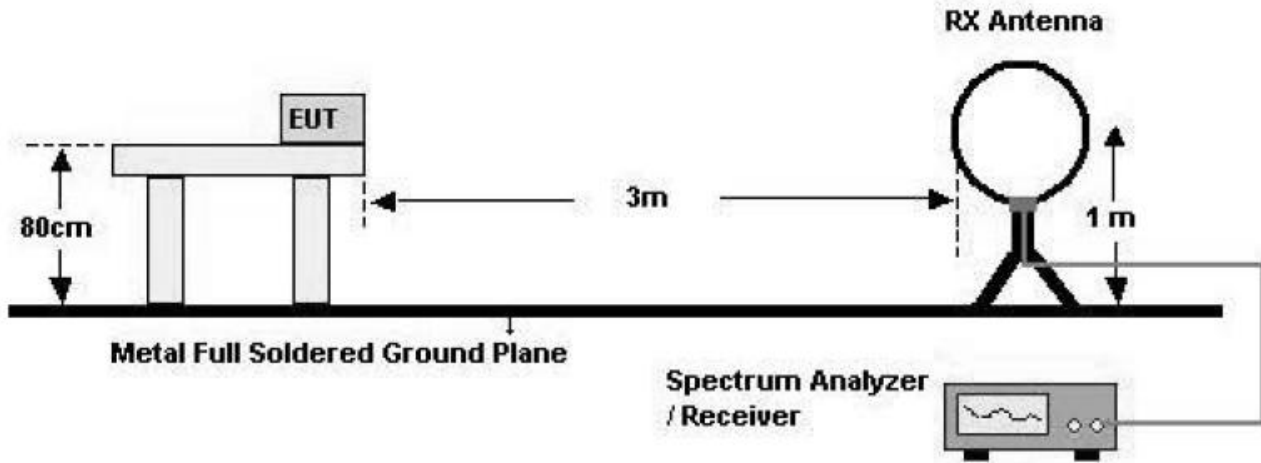
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

15.225 Operation within the band 13.110 MHz – 14.010 MHz

- The field strength of any emissions within the band 13.553 MHz-13.567 MHz shall not exceed 15,848 microvolts/meter (= 84 dBuV/m) at 30 meters.
- Within the bands 13.410-13.553 MHz and 13.567 MHz-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (=50.5dBuV/m) at 30 meters.
- Within the bands 13.110-13.410 MHz and 13.710 MHz-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter (=40.5 dBuV/m) at 30 meters.
- The field strength of any emissions appearing outside of the 13.110 MHz-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.
- The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.
- In the case of radio frequency powered tags designed to operate with a device authorized under this section, the tag may be approved with the device or be considered as a separate device subject to its own authorization. Powered tags approved with a device under a single application shall be labeled with the same identification number as the device.

9.1. RADIATED EMISSION 9 kHz – 30 MHz

Test Set-up



Test Procedure

The EUT was placed on a non-conductive table located on semi-anechoic chamber.

The loop antenna was placed at a location 3m from the EUT. Radiated emissions were measured with the loop antenna both parallel and perpendicular to the plane of the EUT loop antenna and with x, y, z planes in EUT.

The limit is converted from microvolts/meter to decibel microvolts/meter. Sample Calculation:

Corrected Amplitude = Raw Amplitude(dB μ V/m) + ACF(dB) + Cable Loss(dB) – Distance Correction Factor

The spectrum analyzer is set to:

Frequency Range = 9 kHz ~ 1 GHz

RBW = 9 kHz (9 kHz ~ 30 MHz)

= 120 kHz (30 MHz ~ 1 GHz)

Trace Mode = max hold

Detector Mode = peak / Quasi-peak

Sweep time = auto

■ Test Results (Worst case : Z-H)

13.553 MHz-13.567 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5600(H)	34.03	21.33	-40	15.36	84	68.64
13.5613(V)	33.44	21.33	-40	14.77	84	69.23

13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5530	21.82	21.33	-40	3.15	50.47	47.32
13.5670	21.54	21.33	-40	2.87	50.47	47.6

13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.3476	15.66	21.33	-40	-3.01	40.51	43.52
13.7700	14.58	21.33	-40	-4.09	40.51	44.60

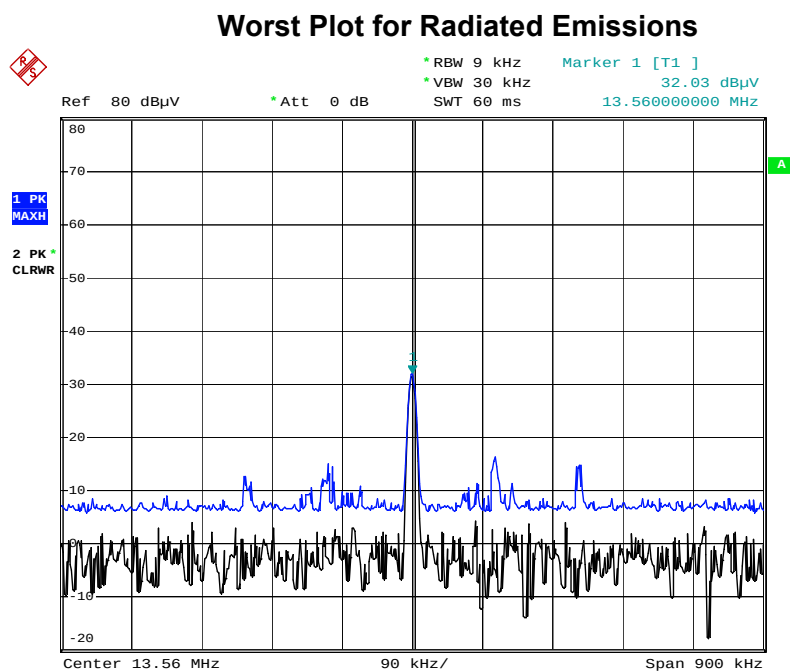
9 kHz -30 MHz						
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor+Cable Loss (dB/m)	Distance Correction (dB)	Result Level (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
10.0521	17.92	21.37	-40	-0.71	29.54	30.25
15.4236	9.13	21.33	-40	-9.54	29.54	39.08
27.2640	7.78	21.75	-40	-10.47	29.54	40.01
26.9160	7.18	21.75	-40	-11.07	29.54	40.61

Note : The test results for below 30 MHz is correlated to an open site.

The result on OATS is about 2 dB higher than semi-anechoic chamber(10 m chamber)

1. Distance Correction Below 30 MHz = $40\log(3 \text{ m}/30 \text{ m}) = -40 \text{ dB}$
Measurement Distance : 3 m (Below 30 MHz)
2. Factor = Antenna Factor + Cable Loss
3. Result Level = Read Level + Factor + Distance Correction
4. Margin = Limit – Result Level
5. We have done x, y, z planes in EUT
6. Antenna rotated about its vertical/horizontal axis for maximum response at each azimuth position around the EUT.
7. Worst case of operating mode is type A, analog mode and 106 kbps.

RESULT PLOTS

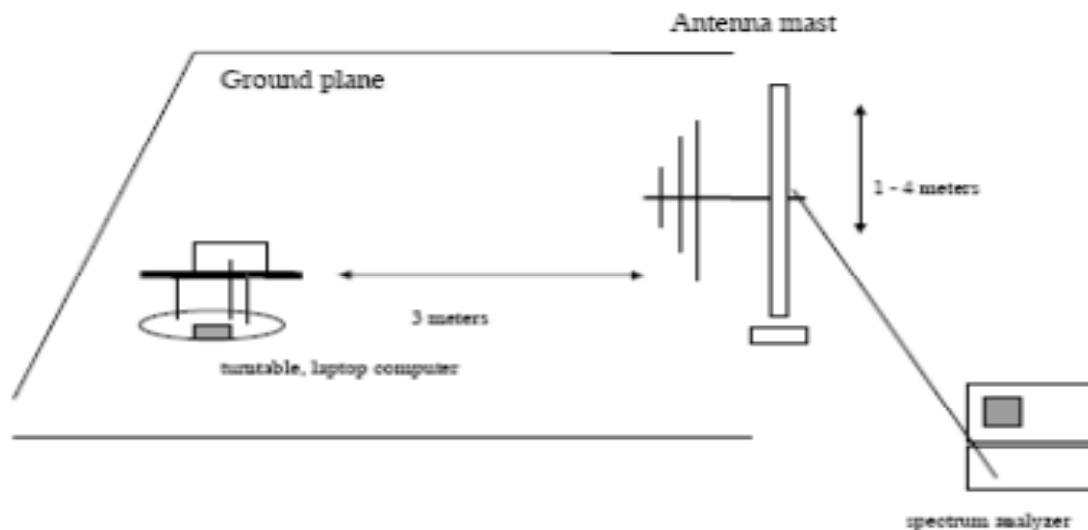


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Note : Only the worst case plots for Radiated Emissions.

9.2. RADIATED EMISSION 30 MHz – 1000 MHz

Test Set-up



Test Procedures: Radiated emissions were measured according to ANSI C63.10.

The EUT was set to transmit at the highest output power.

The EUT was set 3 meter away from the measuring antenna.

■ Test Results

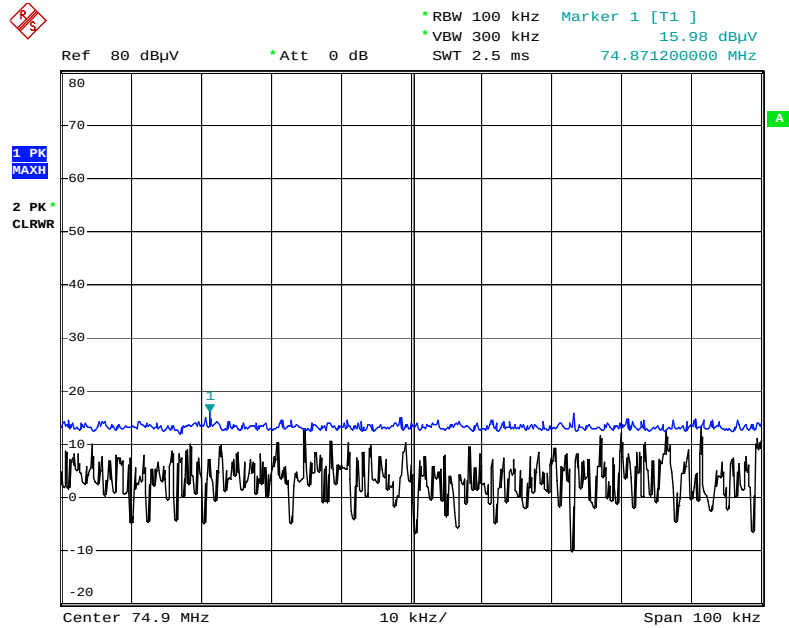
Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV	dB/m	dB	(H/V)	dBuV/m	dBuV/m	dB
42.4578	13.86	12.11	0.66	H	26.63	40.0	13.37
61.3432	14.92	11.82	0.74	H	27.48	40.0	12.52
*74.8712	15.98	9.25	0.77	V	26.00	40.0	14.00
*110.1876	15.62	10.45	0.79	H	26.86	43.5	16.64
*137.4938	15.30	12.84	0.92	H	29.06	43.5	14.44
160.2882	14.69	13.41	0.95	V	29.05	43.5	14.45

Remark

1. Result Level = Read Level + (Antenna Factor+ Cable Loss)
2. Margin = Limit – Result Level
3. '*' is the result for restricted band.

■ **RESULT PLOTS**

Worst Plot for Radiated Emissions



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Note : Only the worst case plots for Radiated Emissions.

10. EMISSION BANDWIDTH PLOT

Requirement(s):

Test Set-up: The EUT was connected to a spectrum analyzer.

Test Procedure: The 20 dB bandwidth was measured by using a spectrum analyzer.

RBW = Auto

VBW = Auto

Span = Adequately in the operating Tx.

Detector = Peak

Trace mode = Max hold

Allow the trace to stabilize



11. FREQUENCY TOLERANCE

Procedure: Part 15.225, ANSI 63.10 (Version : 2013)

If required, the operating or transmitting frequency of an intentional radiator should be measured in accordance with the following procedure to ensure that the device operates outside certain precluded frequency bands and within the frequency range. No modulation needs to be supplied to the intentional radiator during these tests, unless modulation is required to produce an output, e.g., single-sideband suppressed carrier transmitters.

The frequency stability of the transmitter is measured by:

- a) Temperature: The temperature is varied from -20°C to + 50°C using an environmental chamber.
- b) For battery operated equipment, the equipment tests shall be performed using a new battery.
- c) Test Procedure
 - Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.
 - Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.
 - While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.
- d) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

Note : Below the measurement result is worst value of the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized

Startup

Measurement Result:

PERATING FREQUENCY: 13.56 MHz
REFERENCE VOLTAGE: 3.85 VDC
DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.560180	180	0.0013274
100		-10	13.560173	173	0.0012758
100		0	13.560164	164	0.0012094
100		+10	13.560144	144	0.0010619
100		+20(Ref.)	13.560118	118	0.0008702
100		+30	13.560112	112	0.0008260
100		+40	13.560084	84	0.0006195
100		+50	13.560077	77	0.0005678
Maximum	4.40	+20	13.560141	141	0.0010398
End point	3.40	+20	13.560123	123	0.0009071

2 minutes

Measurement Result:

PERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.85 VDC
 DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.560190	190	0.0014012
100		-10	13.560176	176	0.0012979
100		0	13.560170	170	0.0012537
100		+10	13.560143	143	0.0010546
100		+20(Ref.)	13.560122	122	0.0008997
100		+30	13.560111	111	0.0008186
100		+40	13.560098	98	0.0007227
100		+50	13.560088	88	0.0006490
Maximum	4.40	+20	13.560140	140	0.0010324
End point	3.40	+20	13.560154	154	0.0011357

5 minutes

Measurement Result:

PERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.85 VDC
 DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.560196	196	0.0014454
100		-10	13.560186	186	0.0013717
100		0	13.560180	180	0.0013274
100		+10	13.560165	165	0.0012168
100		+20(Ref.)	13.560145	145	0.0010693
100		+30	13.560127	127	0.0009366
100		+40	13.560118	118	0.0008702
100		+50	13.560105	105	0.0007743
Maximum	4.40	+20	13.560135	135	0.0009956
End point	3.40	+20	13.560160	160	0.0011799

10 minutes

Measurement Result:

PERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.85 VDC
 DEVIATION LIMIT: 0.01 % = 1356 Hz

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.560194	194	0.0014307
100		-10	13.560185	185	0.0013643
100		0	13.560178	178	0.0013127
100		+10	13.560163	163	0.0012021
100		+20(Ref.)	13.560141	141	0.0010398
100		+30	13.560123	123	0.0009071
100		+40	13.560114	114	0.0008407
100		+50	13.560101	101	0.0007448
Maximum	4.40	+20	13.560132	132	0.0009735
End point	3.40	+20	13.560158	158	0.0011652

12. POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.
5. The EUT is the device operating below 30 MHz.
 - For unterminated the Antenna, the AC line conducted tests are performed with the antenna connected
 - For terminated the Antenna, the AC line conducted tests are performed with a dummy load connected to the EUT antenna output terminal.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

Test Plots

Underminate the Antenna

Conducted Emissions (Line 1)

NFC UNTERM L1

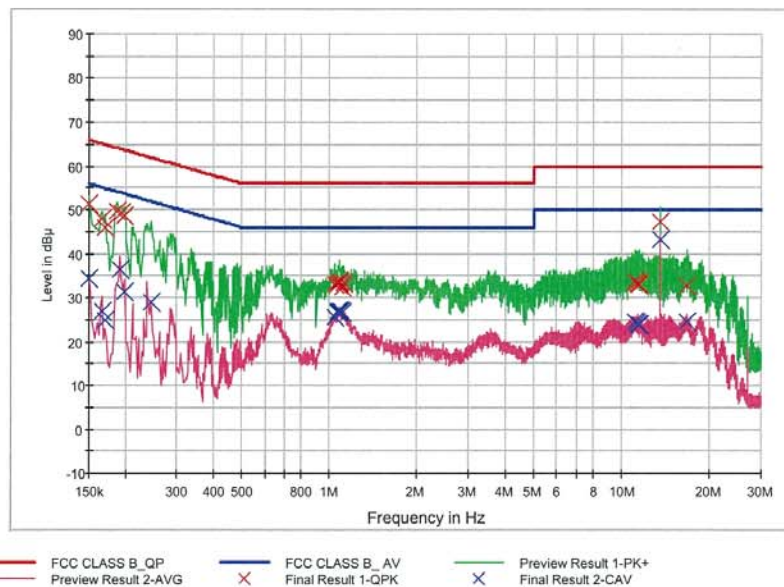
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HCT TEST Report

Common Information

EUT: SM-A320FL
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: NFC MODE(UNTERMINATION)

FCC CLASS B



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	51.2	9.000	Off	L1	9.6	14.8	66.0
0.166000	48.0	9.000	Off	L1	9.6	17.2	65.2
0.170000	45.8	9.000	Off	L1	9.6	19.1	65.0
0.188000	49.8	9.000	Off	L1	9.6	14.4	64.1
0.194000	49.5	9.000	Off	L1	9.6	14.4	63.9
0.198000	48.6	9.000	Off	L1	9.6	15.0	63.7
1.040000	32.9	9.000	Off	L1	9.7	23.1	56.0
1.074000	33.2	9.000	Off	L1	9.7	22.8	56.0
1.080000	33.8	9.000	Off	L1	9.7	22.2	56.0
1.084000	33.4	9.000	Off	L1	9.7	22.6	56.0
1.110000	32.4	9.000	Off	L1	9.7	23.6	56.0
1.124000	33.2	9.000	Off	L1	9.7	22.8	56.0
11.152000	33.6	9.000	Off	L1	10.1	26.4	60.0
11.204000	33.4	9.000	Off	L1	10.1	26.6	60.0
11.382000	33.1	9.000	Off	L1	10.1	26.9	60.0
11.538000	33.1	9.000	Off	L1	10.1	26.9	60.0
13.562000	47.3	9.000	Off	L1	10.2	12.7	60.0
16.716000	32.7	9.000	Off	L1	10.3	27.3	60.0

2016-12-29

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NFC UNTERM L1

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Final Result 2

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	34.4	9.000	Off	L1	9.6	21.6	56.0
0.166000	27.0	9.000	Off	L1	9.6	28.2	55.2
0.170000	24.8	9.000	Off	L1	9.6	30.1	55.0
0.192000	36.6	9.000	Off	L1	9.6	17.3	53.9
0.198000	31.3	9.000	Off	L1	9.6	22.4	53.7
0.244000	28.9	9.000	Off	L1	9.6	23.1	52.0
1.040000	25.6	9.000	Off	L1	9.7	20.4	46.0
1.068000	26.6	9.000	Off	L1	9.7	19.4	46.0
1.074000	27.1	9.000	Off	L1	9.7	18.9	46.0
1.082000	27.1	9.000	Off	L1	9.7	18.9	46.0
1.098000	27.0	9.000	Off	L1	9.7	19.0	46.0
1.110000	26.6	9.000	Off	L1	9.7	19.4	46.0
11.152000	24.4	9.000	Off	L1	10.1	25.6	50.0
11.240000	24.3	9.000	Off	L1	10.1	25.8	50.0
11.382000	23.9	9.000	Off	L1	10.1	26.1	50.0
11.538000	23.8	9.000	Off	L1	10.1	26.2	50.0
13.562000	43.3	9.000	Off	L1	10.2	6.7	50.0
16.716000	24.7	9.000	Off	L1	10.3	25.3	50.0

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Conducted Emissions (Line 2)

NFC UNTERM N

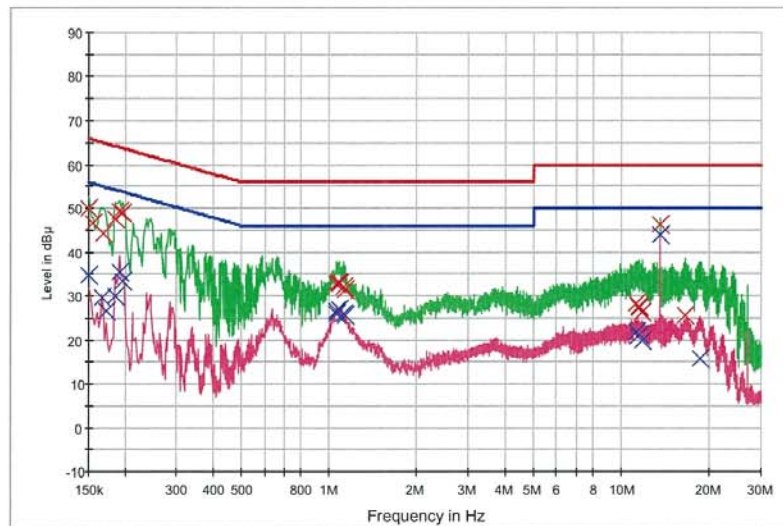
1 / 2

HCT TEST Report

Common Information

EUT: SM-A320FL
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: NFC MODE(UNTERMINATION)

FCC CLASS B



— FCC CLASS B_QP — FCC CLASS B_AV — Preview Result 1-PK+
— Preview Result 2-AVG — Final Result 1-QPK — Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	49.9	9.000	Off	N	9.6	16.1	66.0
0.156000	46.6	9.000	Off	N	9.6	19.1	65.7
0.168000	44.2	9.000	Off	N	9.6	20.9	65.1
0.186000	47.8	9.000	Off	N	9.6	16.4	64.2
0.192000	49.3	9.000	Off	N	9.6	14.6	63.9
0.196000	49.0	9.000	Off	N	9.6	14.8	63.8
1.062000	32.8	9.000	Off	N	9.7	23.2	56.0
1.070000	33.1	9.000	Off	N	9.7	22.9	56.0
1.078000	33.1	9.000	Off	N	9.7	22.9	56.0
1.086000	32.9	9.000	Off	N	9.7	23.1	56.0
1.118000	32.1	9.000	Off	N	9.7	23.9	56.0
1.130000	31.3	9.000	Off	N	9.7	24.7	56.0
11.202000	28.3	9.000	Off	N	10.1	31.7	60.0
11.460000	27.6	9.000	Off	N	10.2	32.4	60.0
11.544000	27.1	9.000	Off	N	10.2	32.9	60.0
11.728000	26.1	9.000	Off	N	10.2	33.9	60.0
13.560000	46.2	9.000	Off	N	10.2	13.8	60.0
16.516000	25.6	9.000	Off	N	10.3	34.4	60.0

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NFC UNTERM N

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Final Result 2

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	34.7	9.000	Off	N	9.6	21.3	56.0
0.166000	29.7	9.000	Off	N	9.6	25.4	55.2
0.172000	26.4	9.000	Off	N	9.6	28.4	54.9
0.186000	30.1	9.000	Off	N	9.6	24.1	54.2
0.192000	35.6	9.000	Off	N	9.6	18.4	53.9
0.196000	33.3	9.000	Off	N	9.6	20.4	53.8
1.056000	25.8	9.000	Off	N	9.7	20.2	46.0
1.062000	26.5	9.000	Off	N	9.7	19.5	46.0
1.080000	26.9	9.000	Off	N	9.7	19.1	46.0
1.086000	26.9	9.000	Off	N	9.7	19.1	46.0
1.118000	25.9	9.000	Off	N	9.7	20.1	46.0
1.130000	25.5	9.000	Off	N	9.7	20.5	46.0
11.202000	21.8	9.000	Off	N	10.1	28.2	50.0
11.380000	20.9	9.000	Off	N	10.2	29.1	50.0
11.460000	21.2	9.000	Off	N	10.2	28.8	50.0
11.728000	19.9	9.000	Off	N	10.2	30.1	50.0
13.560000	43.8	9.000	Off	N	10.2	6.2	50.0
18.662000	15.7	9.000	Off	N	10.3	34.3	50.0

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Terminate the Antenna

Conducted Emissions (Line 1)

NFC TERM L1

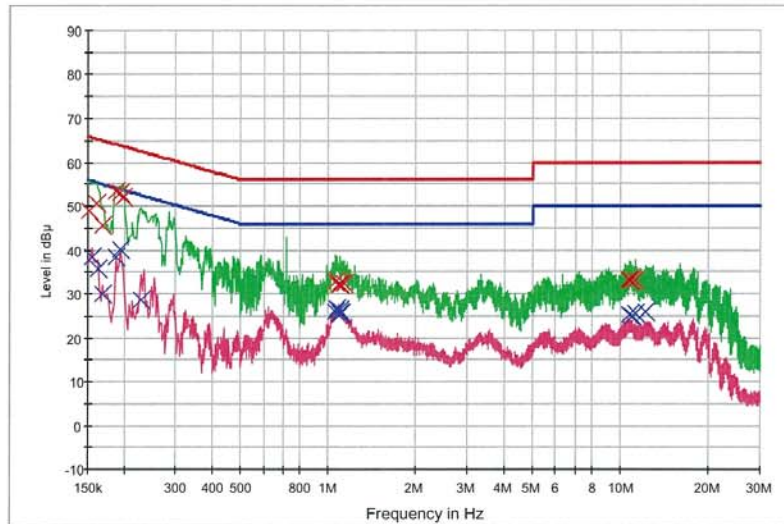
1 / 2

HCT TEST Report

Common Information

EUT: SM-A320FL
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: NFC MODE(TERMINATION)

FCC CLASS B



— FCC CLASS B_QP — FCC CLASS B_AV — Preview Result 1-PK+
— Preview Result 2-AVG — Final Result 1-QPK — Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.152000	48.9	9.000	Off	L1	9.6	17.0	65.9
0.160000	50.8	9.000	Off	L1	9.6	14.6	65.5
0.168000	45.6	9.000	Off	L1	9.6	19.4	65.1
0.188000	53.5	9.000	Off	L1	9.6	10.6	64.1
0.194000	53.0	9.000	Off	L1	9.6	10.9	63.9
0.198000	52.0	9.000	Off	L1	9.6	11.7	63.7
1.062000	32.7	9.000	Off	L1	9.7	23.3	56.0
1.068000	33.1	9.000	Off	L1	9.7	23.0	56.0
1.076000	33.2	9.000	Off	L1	9.7	22.8	56.0
1.094000	32.5	9.000	Off	L1	9.7	23.5	56.0
1.100000	32.1	9.000	Off	L1	9.7	23.9	56.0
1.138000	32.4	9.000	Off	L1	9.7	23.6	56.0
10.668000	33.5	9.000	Off	L1	10.1	26.5	60.0
10.702000	33.4	9.000	Off	L1	10.1	26.6	60.0
10.748000	33.2	9.000	Off	L1	10.1	26.8	60.0
10.834000	33.0	9.000	Off	L1	10.1	27.0	60.0
10.886000	33.2	9.000	Off	L1	10.1	26.8	60.0
11.220000	33.2	9.000	Off	L1	10.1	26.8	60.0

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NFC TERM L1

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Final Result 2

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.156000	38.5	9.000	Off	L1	9.6	17.1	55.7
0.162000	35.7	9.000	Off	L1	9.6	19.6	55.4
0.168000	29.9	9.000	Off	L1	9.6	25.2	55.1
0.188000	38.5	9.000	Off	L1	9.6	15.6	54.1
0.194000	40.2	9.000	Off	L1	9.6	13.6	53.9
0.228000	28.5	9.000	Off	L1	9.6	24.0	52.5
1.060000	26.0	9.000	Off	L1	9.7	20.0	46.0
1.076000	26.5	9.000	Off	L1	9.7	19.5	46.0
1.094000	25.7	9.000	Off	L1	9.7	20.3	46.0
1.100000	26.2	9.000	Off	L1	9.7	19.8	46.0
1.104000	25.6	9.000	Off	L1	9.7	20.4	46.0
1.110000	25.7	9.000	Off	L1	9.7	20.3	46.0
10.702000	25.2	9.000	Off	L1	10.1	24.8	50.0
10.748000	25.2	9.000	Off	L1	10.1	24.8	50.0
10.920000	25.0	9.000	Off	L1	10.1	25.0	50.0
11.220000	25.5	9.000	Off	L1	10.1	24.5	50.0
12.226000	26.0	9.000	Off	L1	10.2	24.0	50.0
12.260000	26.0	9.000	Off	L1	10.2	24.0	50.0

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Conducted Emissions (Line 2)

EMI Auto Test(6)

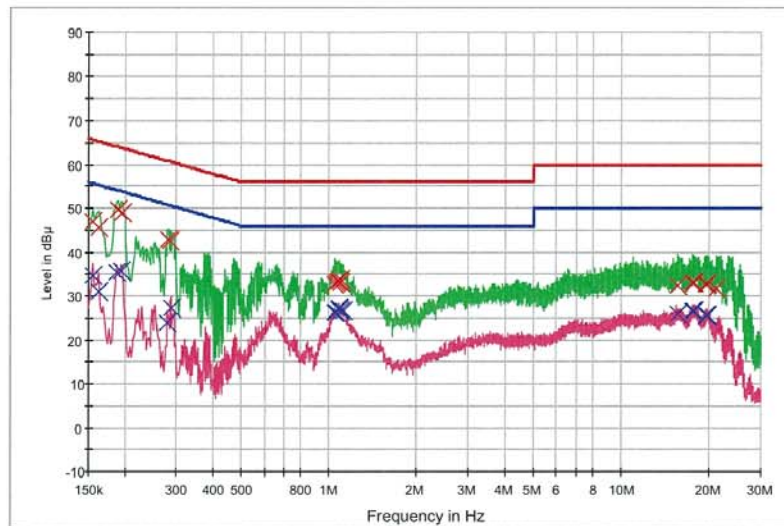
1 / 2

HCT TEST Report

Common Information

EUT: SM-A320FL
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: NFC MODE(TERMINATION)

FCC CLASS B



— FCC CLASS B_QP — FCC CLASS B_AV — Preview Result 1-PK+
— Preview Result 2-AVG — Final Result 1-QPK — Final Result 2-CAV

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.156000	46.9	9.000	Off	N	9.6	18.8	65.7
0.162000	45.4	9.000	Off	N	9.6	19.9	65.4
0.190000	49.6	9.000	Off	N	9.6	14.5	64.0
0.196000	49.1	9.000	Off	N	9.6	14.7	63.8
0.282000	42.9	9.000	Off	N	9.6	17.9	60.8
0.286000	42.6	9.000	Off	N	9.6	18.0	60.6
1.044000	32.7	9.000	Off	N	9.7	23.3	56.0
1.060000	33.0	9.000	Off	N	9.7	23.0	56.0
1.070000	33.5	9.000	Off	N	9.7	22.5	56.0
1.078000	33.2	9.000	Off	N	9.7	22.8	56.0
1.092000	33.0	9.000	Off	N	9.7	23.0	56.0
1.098000	33.8	9.000	Off	N	9.7	22.2	56.0
15.584000	32.2	9.000	Off	N	10.3	27.8	60.0
17.524000	33.0	9.000	Off	N	10.3	27.0	60.0
17.712000	33.2	9.000	Off	N	10.3	26.8	60.0
19.504000	32.9	9.000	Off	N	10.3	27.1	60.0
19.796000	32.8	9.000	Off	N	10.3	27.2	60.0
21.158000	31.8	9.000	Off	N	10.4	28.2	60.0

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EMI Auto Test(6)

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Final Result 2

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.156000	34.9	9.000	Off	N	9.6	20.8	55.7
0.162000	31.1	9.000	Off	N	9.6	24.3	55.4
0.188000	35.4	9.000	Off	N	9.6	18.8	54.1
0.194000	35.8	9.000	Off	N	9.6	18.0	53.9
0.280000	24.1	9.000	Off	N	9.6	26.8	50.8
0.288000	27.2	9.000	Off	N	9.6	23.4	50.6
1.046000	26.2	9.000	Off	N	9.7	19.8	46.0
1.062000	26.4	9.000	Off	N	9.7	19.6	46.0
1.078000	27.0	9.000	Off	N	9.7	19.0	46.0
1.084000	27.3	9.000	Off	N	9.7	18.7	46.0
1.092000	26.7	9.000	Off	N	9.7	19.3	46.0
1.118000	26.6	9.000	Off	N	9.7	19.4	46.0
15.584000	26.1	9.000	Off	N	10.3	23.9	50.0
17.524000	26.7	9.000	Off	N	10.3	23.3	50.0
17.534000	26.6	9.000	Off	N	10.3	23.4	50.0
17.712000	26.7	9.000	Off	N	10.3	23.3	50.0
19.504000	25.7	9.000	Off	N	10.3	24.3	50.0
19.796000	25.6	9.000	Off	N	10.3	24.4	50.0

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13. LIST OF TEST EQUIPMENT

13.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/23/2016	Annual	100073
Rohde & Schwarz	ESCI / Test Receiver	12/23/2016	Annual	100584
Agilent	N9020A / Signal Analyzer	06/24/2016	Annual	MY51110085
Agilent	N1911A / Power Meter	03/11/2016	Annual	MY45100523
Agilent	N1921A / Power Sensor	03/11/2016	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/23/2016	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	06/14/2016	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	03/09/2016	Annual	KR75303962
Agilent	8493C / Attenuator(10 dB)	07/15/2016	Annual	07560

13.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Audix	AM4000 / Antenna Position Tower	N/A	N/A	N/A
Audix	Turn Table	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Rohde & Schwarz	Loop Antenna	02/23/2016	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	04/15/2015	Biennial	255
Schwarzbeck	BBHA 9120D / Horn Antenna	05/07/2015	Biennial	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	09/03/2015	Biennial	BBHA9170541
Rohde & Schwarz	FSP / Spectrum Analyzer	09/10/2016	Annual	100688
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/23/2016	Annual	101068-SZ
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	06/24/2016	Annual	8
Wainwright Instruments	WHFX7.0/18G-8SS / High Pass Filter	05/13/2016	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	07/06/2016	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/26/2016	Annual	2
Agilent	8493C-10 / Attenuator(10 dB)	08/11/2016	Annual	76649
CERNEX	CBLU1183540 / Power Amplifier	07/15/2016	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/15/2016	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	07/11/2016	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	07/11/2016	Annual	25956