

# 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 01, 2016  
**Test Site/Location:**  
HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majang-  
myeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA  
**Report No.:** HCT-R-1611-F032  
**HCT FRN:** 0005866421

**FCC ID** : A3LSMA320F

**APPLICANT** : SAMSUNG Electronics Co., Ltd.

**Model(s):** SM-A320F/DS  
**Additional Model(s):** SM-A320F  
**EUT Type:** Mobile Phone  
**RF Output Field Strength:** 15.40 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)



**Report prepared by**  
**: Seoul Ki Lee**  
**Test Engineer of RF Team**



**Approved by**  
**: Yong Hyun Lee**  
**Manager of RF Team**

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## Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1611-F032	November 30, 2016	- First Approval Report

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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:** A3LSMA320F  
**EUT Type:** Mobile Phone  
**Model (s):** SM-A320F/DS  
**Additional Model(s):** SM-A320F  
**Date(s) of Tests:** October 17, 2016 ~ November 30, 2016  
**Place of Tests:** HCT Co., Ltd.  
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

## 2. EUT DESCRIPTION

<b>Model</b>	SM-A320F/DS
<b>Additional Model(s):</b>	SM-A320F
<b>EUT Type</b>	Mobile Phone
<b>Power Supply</b>	DC 3.85 V
<b>Battery Information</b>	Model: EB-BA320ABE Type: Li-ion Battery
<b>Frequency of Operation</b>	13.56 MHz
<b>Transmit Power</b>	15.40 dBuV/m @30 m
<b>Modulation Type</b>	ASK
<b>Antenna Specification</b>	Manufacturer: Hansol Technics Inc. 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  $U_{\text{CISPR}}$  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

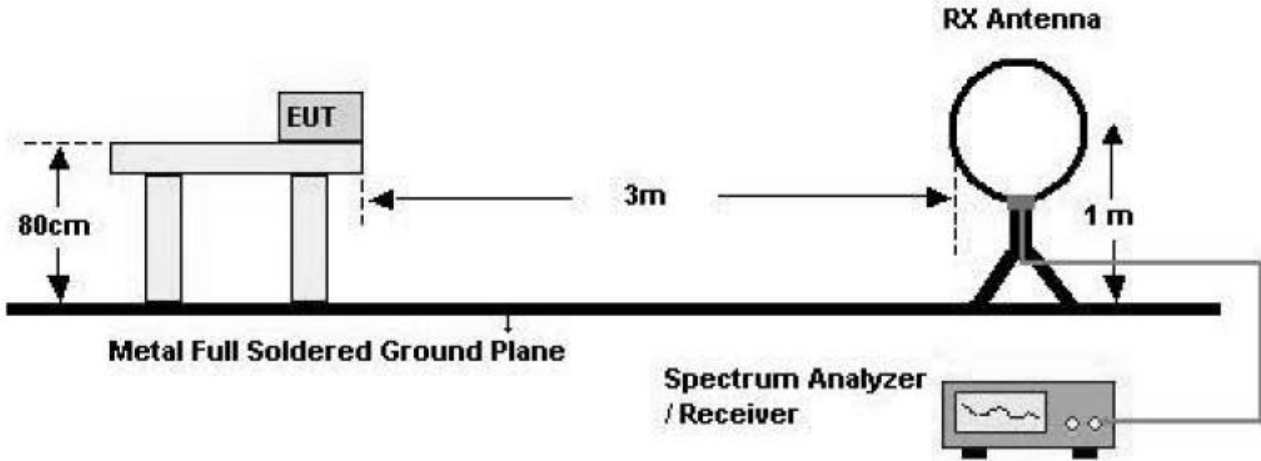
\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

### 15.225 Operation within the band 13.110 MHz – 14.010 MHz

- (a) 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.
- (b) 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.
- (c) 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.
- (d) 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.
- (e) 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.
- (f) 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 $\mu$ 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)	34.07	21.33	-40.00	15.40	84.00	68.60
13.5597(V)	29.96	21.33	-40.00	11.29	84.00	72.71

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	22.00	21.33	-40.00	3.33	50.47	47.14
13.5670	21.07	21.33	-40.00	2.40	50.47	48.07

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)
13.3506	15.29	21.33	-40.00	-3.38	40.51	43.89
13.7688	13.74	21.33	-40.00	-4.93	40.51	45.44

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)
9.1457	6.58	21.39	-40.00	-12.03	29.54	41.57
14.1236	6.39	21.33	-40.00	-12.28	29.54	41.82
27.7040	7.46	21.75	-40.00	-10.79	29.54	40.33
27.3580	7.14	21.75	-40.00	-11.11	29.54	40.65

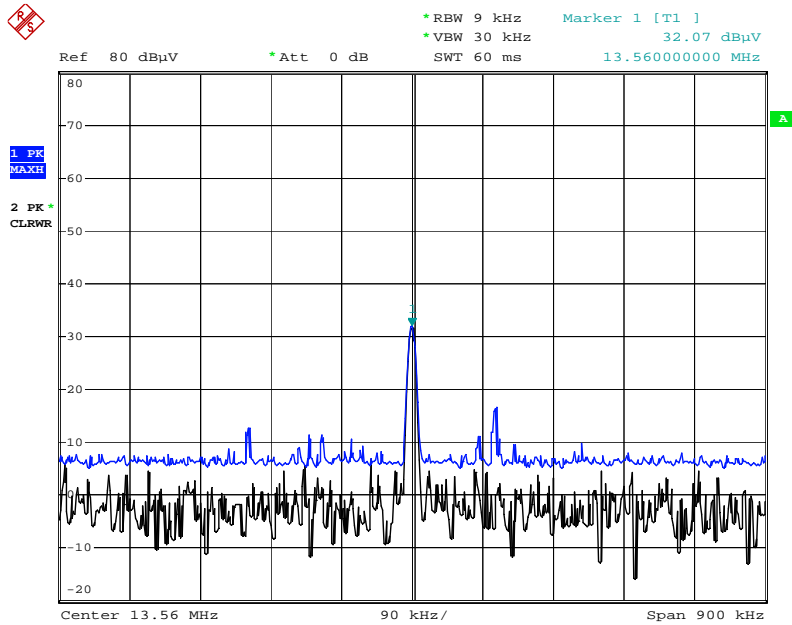
Note : The test results for below 30 MHz is correlated to an open site.

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

**Worst Plot for Radiated Emissions**

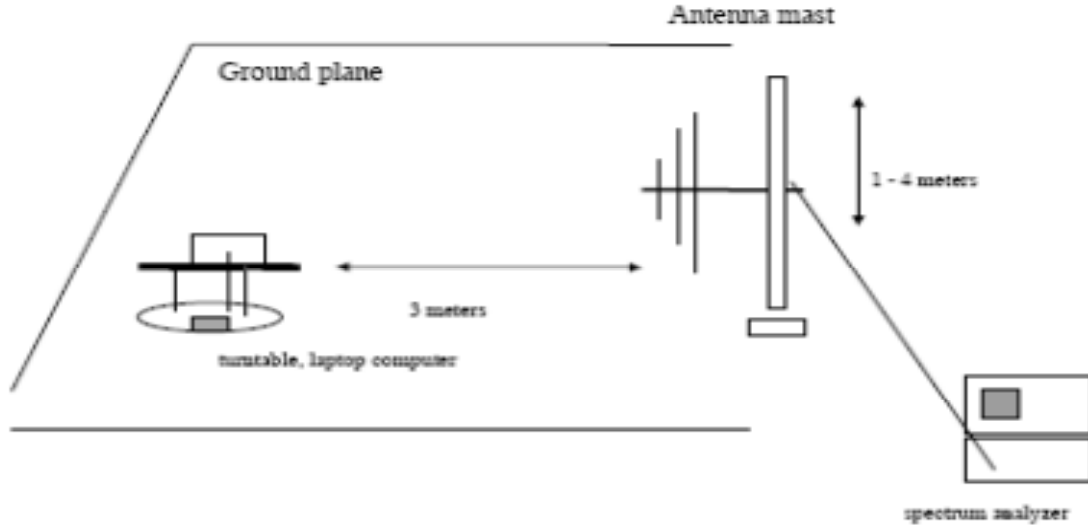


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**Note : Only the worst case plots for Radiated Emissions.**

## 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

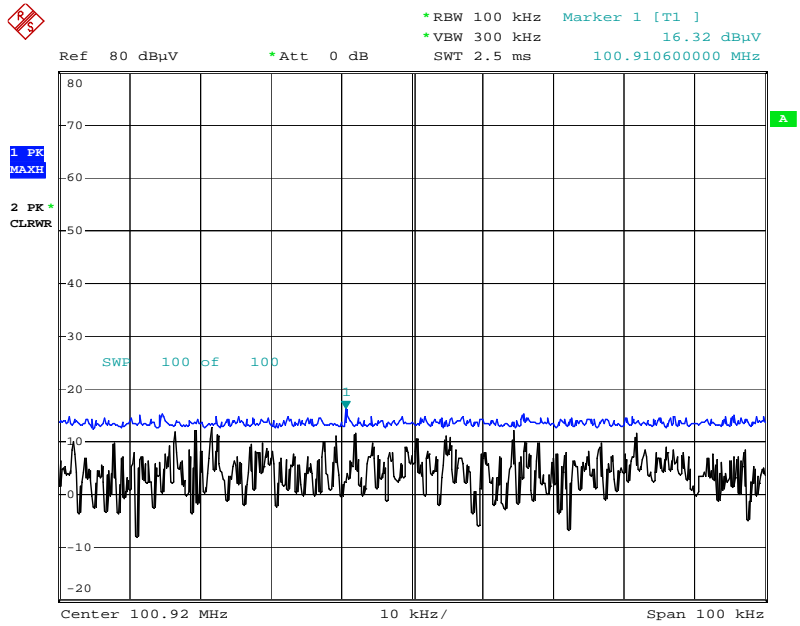
Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV	dB/m	dB	(H/V)	dBuV/m	dBuV/m	dB
30.6718	14.56	11.24	0.58	H	26.38	40	13.62
55.855	14.93	12.1	0.72	H	27.75	40	12.25
*75.0326	13.73	9.25	0.77	V	23.75	40	16.25
100.9106	16.32	9.27	0.77	H	26.36	43.5	17.14
*126.6174	15.36	11.64	0.84	H	27.84	43.5	15.66
*163.352	15.18	13.41	0.95	V	29.54	43.5	13.96

### 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

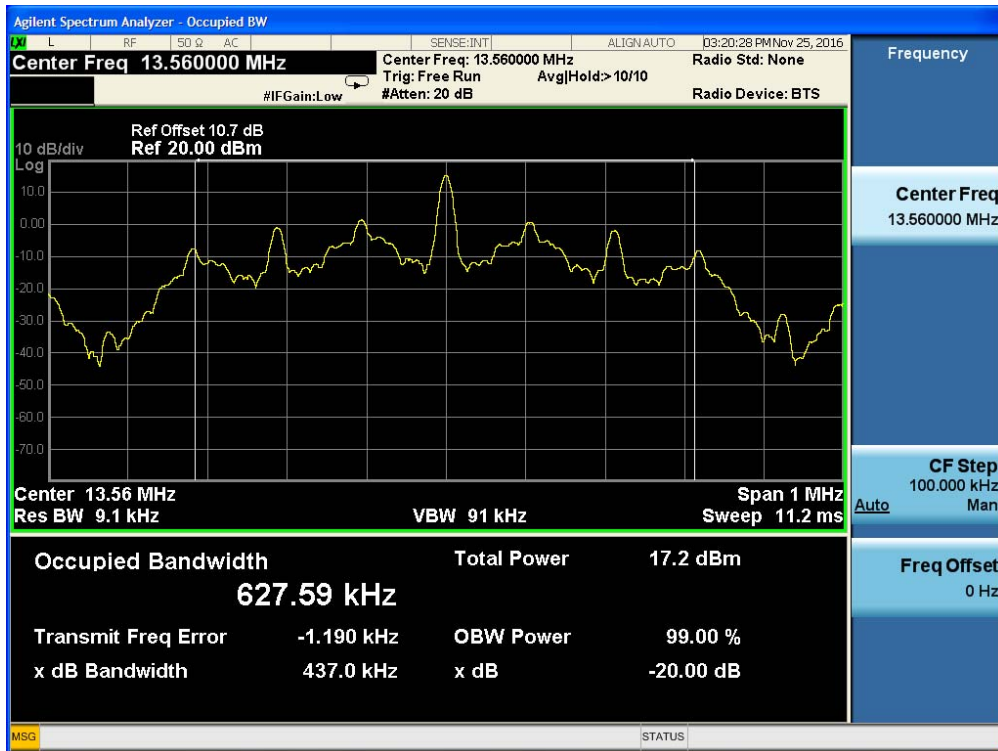
VBW = Auto

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:

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.560185	185	0.0013643
100		-10	13.560172	172	0.0012684
100		0	13.560165	165	0.0012168
100		+10	13.560142	142	0.0010472
100		+20(Ref.)	13.560112	112	0.0008260
100		+30	13.560098	98	0.0007227
100		+40	13.560074	74	0.0005457
100		+50	13.560065	65	0.0004794
Maximum		4.40	+20	13.560132	132
End point	3.40	+20	13.560157	157	0.0011578

**2 minutes**

Measurement Result:

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100	3.85	-20	13.560192	192	0.0014159
100		-10	13.560183	183	0.0013496
100		0	13.560172	172	0.0012684
100		+10	13.560155	155	0.0011431
100		+20(Ref.)	13.560132	132	0.0009735
100		+30	13.560115	115	0.0008481
100		+40	13.560102	102	0.0007522
100		+50	13.560094	94	0.0006932
Maximum		4.40	+20	13.560145	145
End point	3.40	+20	13.560162	162	0.0011947

**5 minutes**

Measurement Result:

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

Voltage (%)	Power (VDC)	Temp. (°C)	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

**10 minutes**

Measurement Result:

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

Voltage (%)	Power (VDC)	Temp. (°C)	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

## 12. POWERLINE CONDUCTE 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**

**Untermine the Antenna**

**Conducted Emissions (Line 1)**

EMI Auto Test(4)

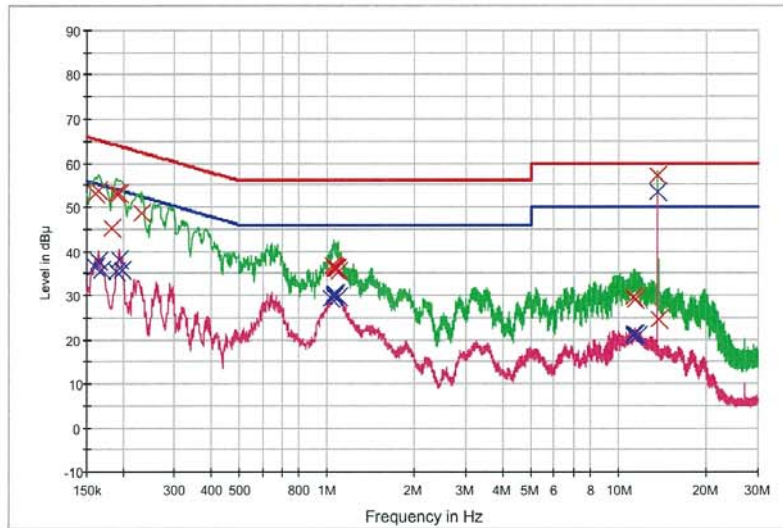
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## HCT TEST Report

**Common Information**

EUT: SM-A320F/DS  
 Manufacturer: SAMSUNG  
 Test Site: SHIELD ROOM  
 Operating Conditions: NFC MODE \_ UNTERMINATION

FCC CLASS B



— FCC CLASS B\_OP     — FCC CLASS B\_AV     — Preview Result 1-PK+  
— Preview Result 2-AVG     x Final Result 1-QPK     x Final Result 2-CAV

**Final Result 1**

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	53.0	9.000	Off	L1	9.7	12.4	65.5
0.164000	53.8	9.000	Off	L1	9.7	11.4	65.3
0.182000	45.1	9.000	Off	L1	9.7	19.3	64.4
0.190000	53.1	9.000	Off	L1	9.7	10.9	64.0
0.194000	53.2	9.000	Off	L1	9.7	10.7	63.9
0.232000	48.5	9.000	Off	L1	9.7	13.9	62.4
1.046000	36.7	9.000	Off	L1	9.8	19.3	56.0
1.056000	36.2	9.000	Off	L1	9.8	19.8	56.0
1.060000	36.5	9.000	Off	L1	9.8	19.5	56.0
1.066000	36.1	9.000	Off	L1	9.8	19.9	56.0
1.078000	36.2	9.000	Off	L1	9.8	19.8	56.0
1.092000	35.3	9.000	Off	L1	9.8	20.7	56.0
11.282000	29.8	9.000	Off	L1	10.1	30.2	60.0
11.296000	29.5	9.000	Off	L1	10.1	30.5	60.0
11.378000	29.1	9.000	Off	L1	10.1	30.9	60.0
11.408000	28.8	9.000	Off	L1	10.1	31.2	60.0
13.560000	57.2	9.000	Off	L1	10.2	2.8	60.0
13.666000	24.6	9.000	Off	L1	10.2	35.4	60.0

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EMI Auto Test(4)

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	36.5	9.000	Off	L1	9.7	19.0	55.5
0.164000	37.7	9.000	Off	L1	9.7	17.6	55.3
0.168000	35.9	9.000	Off	L1	9.7	19.2	55.1
0.190000	35.4	9.000	Off	L1	9.7	18.6	54.0
0.194000	38.0	9.000	Off	L1	9.7	15.9	53.9
0.198000	35.8	9.000	Off	L1	9.7	17.9	53.7
1.036000	29.2	9.000	Off	L1	9.8	16.8	46.0
1.052000	29.9	9.000	Off	L1	9.8	16.1	46.0
1.056000	29.7	9.000	Off	L1	9.8	16.3	46.0
1.060000	30.2	9.000	Off	L1	9.8	15.8	46.0
1.076000	30.4	9.000	Off	L1	9.8	15.6	46.0
1.092000	29.6	9.000	Off	L1	9.8	16.4	46.0
11.274000	20.9	9.000	Off	L1	10.1	29.1	50.0
11.282000	21.0	9.000	Off	L1	10.1	29.0	50.0
11.332000	21.2	9.000	Off	L1	10.1	28.8	50.0
11.408000	21.2	9.000	Off	L1	10.1	28.8	50.0
11.632000	20.8	9.000	Off	L1	10.1	29.2	50.0
13.560000	53.5	9.000	Off	L1	10.2	-3.5	50.0

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**Conducted Emissions (Line 2)**

EMI Auto Test(4)

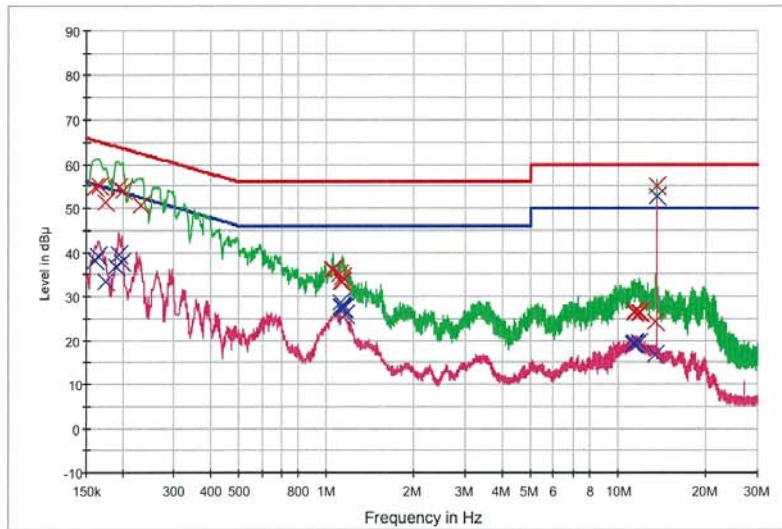
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**HCT TEST Report**

**Common Information**

EUT: SM-A320F/DS  
 Manufacturer: SAMSUNG  
 Test Site: SHIELD ROOM  
 Operating Conditions: NFC MODE \_ UNTERMINATION

FCC CLASS B



— FCC CLASS B\_OP     — FCC CLASS B\_AV     — Preview Result 1-PK+  
— Preview Result 2-AVG     x Final Result 1-QPK     x Final Result 2-CAV

**Final Result 1**

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	54.8	9.000	Off	N	9.7	10.6	65.5
0.166000	55.1	9.000	Off	N	9.7	10.1	65.2
0.174000	51.4	9.000	Off	N	9.7	13.4	64.8
0.194000	54.9	9.000	Off	N	9.7	9.0	63.9
0.200000	54.0	9.000	Off	N	9.7	9.7	63.6
0.230000	50.7	9.000	Off	N	9.7	11.7	62.4
1.048000	36.1	9.000	Off	N	9.7	19.9	56.0
1.052000	35.9	9.000	Off	N	9.7	20.1	56.0
1.104000	35.1	9.000	Off	N	9.7	20.9	56.0
1.128000	33.2	9.000	Off	N	9.7	22.8	56.0
1.134000	33.3	9.000	Off	N	9.7	22.7	56.0
1.140000	34.4	9.000	Off	N	9.7	21.6	56.0
11.318000	26.5	9.000	Off	N	10.1	33.5	60.0
11.356000	26.3	9.000	Off	N	10.1	33.7	60.0
11.716000	26.3	9.000	Off	N	10.1	33.7	60.0
11.860000	26.4	9.000	Off	N	10.1	33.6	60.0
13.454000	24.2	9.000	Off	N	10.1	35.8	60.0
13.560000	55.2	9.000	Off	N	10.1	4.8	60.0

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EMI Auto Test(4)

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.160000	38.3	9.000	Off	N	9.7	17.2	55.5
0.164000	39.3	9.000	Off	N	9.7	15.9	55.3
0.174000	33.5	9.000	Off	N	9.7	21.3	54.8
0.190000	36.9	9.000	Off	N	9.7	17.2	54.0
0.194000	39.5	9.000	Off	N	9.7	14.4	53.9
0.198000	37.7	9.000	Off	N	9.7	16.0	53.7
1.116000	28.8	9.000	Off	N	9.7	17.2	46.0
1.128000	27.5	9.000	Off	N	9.7	18.5	46.0
1.134000	27.1	9.000	Off	N	9.7	18.9	46.0
1.138000	27.6	9.000	Off	N	9.7	18.4	46.0
1.142000	27.1	9.000	Off	N	9.7	18.9	46.0
1.166000	25.9	9.000	Off	N	9.7	20.1	46.0
11.226000	19.2	9.000	Off	N	10.1	30.8	50.0
11.318000	19.1	9.000	Off	N	10.1	30.9	50.0
11.356000	19.5	9.000	Off	N	10.1	30.5	50.0
11.836000	19.4	9.000	Off	N	10.1	30.6	50.0
13.454000	16.8	9.000	Off	N	10.1	33.2	50.0
13.560000	52.5	9.000	Off	N	10.1	-2.5	50.0

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**Terminate the Antenna  
Conducted Emissions (Line 1)**

EMI Auto Test(4)

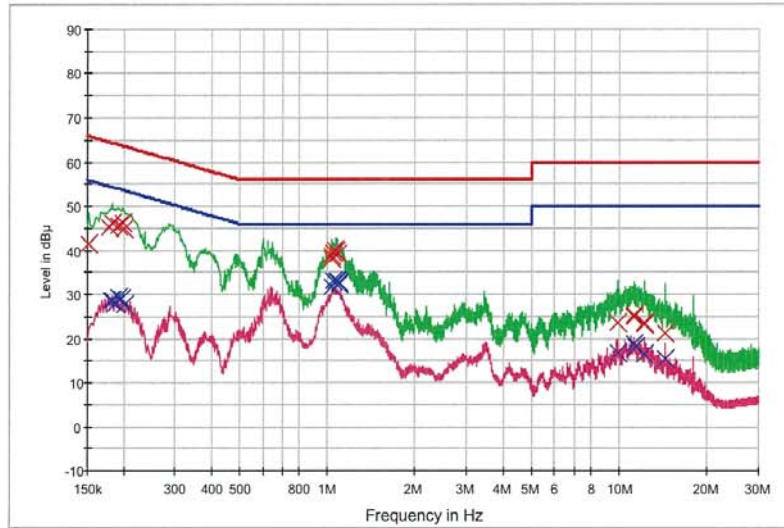
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## HCT TEST Report

### Common Information

EUT: SM-A320F/DS  
 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      x Final Result 1-QPK      x Final Result 2-CAV

### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	41.6	9.000	Off	L1	9.7	24.3	65.9
0.178000	45.1	9.000	Off	L1	9.7	19.4	64.6
0.182000	46.2	9.000	Off	L1	9.7	18.2	64.4
0.192000	45.7	9.000	Off	L1	9.7	18.2	63.9
0.198000	46.2	9.000	Off	L1	9.7	17.5	63.7
0.202000	44.9	9.000	Off	L1	9.7	18.7	63.5
1.030000	38.1	9.000	Off	L1	9.8	17.9	56.0
1.038000	38.9	9.000	Off	L1	9.8	17.1	56.0
1.046000	39.5	9.000	Off	L1	9.8	16.5	56.0
1.062000	40.1	9.000	Off	L1	9.8	15.9	56.0
1.070000	40.0	9.000	Off	L1	9.8	16.0	56.0
1.082000	39.0	9.000	Off	L1	9.8	17.0	56.0
9.834000	23.6	9.000	Off	L1	10.1	36.4	60.0
11.212000	25.2	9.000	Off	L1	10.1	34.8	60.0
11.222000	24.8	9.000	Off	L1	10.1	35.2	60.0
12.160000	23.4	9.000	Off	L1	10.1	36.6	60.0
12.184000	23.1	9.000	Off	L1	10.1	36.9	60.0
14.378000	21.3	9.000	Off	L1	10.2	38.7	60.0

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EMI Auto Test(4)

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.180000	28.8	9.000	Off	L1	9.7	25.7	54.5
0.184000	28.7	9.000	Off	L1	9.7	25.6	54.3
0.188000	28.1	9.000	Off	L1	9.7	26.0	54.1
0.192000	29.3	9.000	Off	L1	9.7	24.6	53.9
0.196000	28.9	9.000	Off	L1	9.7	24.9	53.8
0.202000	27.5	9.000	Off	L1	9.7	26.0	53.5
1.032000	31.8	9.000	Off	L1	9.8	14.2	46.0
1.046000	32.9	9.000	Off	L1	9.8	13.1	46.0
1.064000	33.2	9.000	Off	L1	9.8	12.8	46.0
1.084000	33.0	9.000	Off	L1	9.8	13.0	46.0
1.096000	32.5	9.000	Off	L1	9.8	13.5	46.0
1.100000	32.7	9.000	Off	L1	9.8	13.3	46.0
9.834000	16.7	9.000	Off	L1	10.1	33.3	50.0
11.212000	18.7	9.000	Off	L1	10.1	31.4	50.0
11.342000	18.0	9.000	Off	L1	10.1	32.0	50.0
12.150000	16.3	9.000	Off	L1	10.1	33.7	50.0
12.158000	16.5	9.000	Off	L1	10.1	33.5	50.0
14.378000	15.3	9.000	Off	L1	10.2	34.7	50.0

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### Conducted Emissions (Line 2)

NFC MODE TERM N

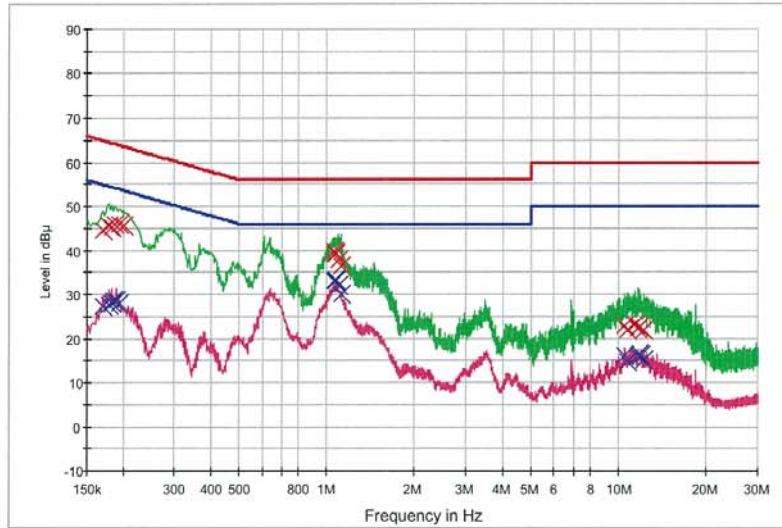
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## HCT TEST Report

### Common Information

EUT: SM-A320F/DS  
 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      X Final Result 1-QPK      X Final Result 2-CAV

### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.170000	44.6	9.000	Off	N	9.7	20.4	65.0
0.178000	45.6	9.000	Off	N	9.7	19.0	64.6
0.182000	45.3	9.000	Off	N	9.7	19.1	64.4
0.188000	45.8	9.000	Off	N	9.7	18.3	64.1
0.194000	46.0	9.000	Off	N	9.7	17.9	63.9
0.200000	45.5	9.000	Off	N	9.7	18.1	63.6
1.054000	39.7	9.000	Off	N	9.7	16.3	56.0
1.068000	39.2	9.000	Off	N	9.7	16.8	56.0
1.072000	39.6	9.000	Off	N	9.7	16.4	56.0
1.090000	37.8	9.000	Off	N	9.7	18.2	56.0
1.098000	37.9	9.000	Off	N	9.7	18.1	56.0
1.124000	36.4	9.000	Off	N	9.7	19.6	56.0
10.522000	22.8	9.000	Off	N	10.1	37.2	60.0
10.718000	21.8	9.000	Off	N	10.1	38.2	60.0
11.300000	23.1	9.000	Off	N	10.1	36.9	60.0
11.678000	22.2	9.000	Off	N	10.1	37.8	60.0
11.730000	22.5	9.000	Off	N	10.1	37.5	60.0
12.254000	21.8	9.000	Off	N	10.1	38.2	60.0

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NFC MODE TERM N

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.170000	27.3	9.000	Off	N	9.7	27.6	55.0
0.178000	27.7	9.000	Off	N	9.7	26.8	54.6
0.182000	28.0	9.000	Off	N	9.7	26.4	54.4
0.186000	28.5	9.000	Off	N	9.7	25.7	54.2
0.190000	28.6	9.000	Off	N	9.7	25.4	54.0
0.194000	28.0	9.000	Off	N	9.7	25.9	53.9
1.056000	33.0	9.000	Off	N	9.7	13.0	46.0
1.068000	33.4	9.000	Off	N	9.7	12.6	46.0
1.072000	33.2	9.000	Off	N	9.7	12.8	46.0
1.076000	33.1	9.000	Off	N	9.7	12.9	46.0
1.096000	31.9	9.000	Off	N	9.7	14.1	46.0
1.124000	30.0	9.000	Off	N	9.7	16.0	46.0
10.522000	16.2	9.000	Off	N	10.1	33.8	50.0
10.718000	14.9	9.000	Off	N	10.1	35.1	50.0
11.678000	16.2	9.000	Off	N	10.1	33.8	50.0
11.730000	16.6	9.000	Off	N	10.1	33.4	50.0
11.874000	16.2	9.000	Off	N	10.1	33.8	50.0
12.254000	15.0	9.000	Off	N	10.1	35.0	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	12/28/2015	Annual	100073
Rohde & Schwarz	ESCI / Test Receiver	12/28/2015	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