

FCC/ISED NFC REPORT

Certification

Applicant Name:
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Date of Issue:
November 13, 2020

Test Site/Location:
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si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2011-FI018-R2

FCC ID:	A3L-EFNG991
IC:	649E-EFNG991
APPLICANT:	SAMSUNG Electronics Co., Ltd.

Model: EF-NG991
EUT Type: Smart LED view cover
RF Output Field Strength: 17.59 dBuV/m @30 m
Frequency of Operation: 13.56 MHz
FCC Classification: Low Power Communication Device – Transmitter(DXX)
FCC Rule Part(s): FCC Part 15.225 Subpart C
ISED Rule Part(s): RSS-210 Issue 10 (December 2019), RSS-Gen Issue 5_Amendment 1 (March 2019)

Engineering Statement:

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. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC/ISED Rules under normal use and maintenance.

Report No.: HCT-RF-2011-FI018-R2

REVIEWED BY



Report prepared by : Jeong Ho Kim
Engineer of Telecommunication Testing Center

Report approved by : Kwon Jeong
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.

The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

* The report shall not be reproduced except in full(only partly) without approval of the laboratory.

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2011-FI018	November 10, 2020	- First Approval Report
HCT-RF-2011-FI018-R1	November 13, 2020	- Revised the page 5. (revised the Client Device) - Revised the page 14. (99% BW Procedure added) - Revised the page 21. (revised the note content) - Revised the page 28. (table of content revised)
HCT-RF-2011-FI018-R2	November 13, 2020	- Revised the page 21. (revised the note content)

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1. EUT DESCRIPTION

Model	EF-NG991
Additional Model	-
EUT Type	Smart LED view cover
LED COVER Test application	LED BACK COVER TEST APP (beyond)
Client Device	- Model : SM-G991U(FCC) / SM-G991W(ISED) - Manufacturer : SAMSUNG - FCC ID : A3LSMG991U - IC : 649E-SMG991W
Power Supply	DC 3.88 V (Cover input Voltage : 3.0 V)
Battery Information	Model: EB-BG991ABY Type: Li-ion Battery
Travel Adapter Information	Model : EP-TA800 Manufacture: DONGYANG E&P
Data Cable Information	Model : EP-DN980BBE, EP-DN980BBZ Manufacture: RF-Tech
Ear-jack Information	Model : YBD-19HS-026 Manufacture: ALMUS
Frequency of Operation	13.56 MHz (NFC Power transmission)
Transmit Power	17.59 dBuV/m @30 m
Date(s) of Tests	October 26, 2020 ~ November 09, 2020
PMN (Product Marketing Number)	Smart LED view cover
HVIN (Hardware Version Identification Number)	EF-NG991
FVIN (Firmware Version Identification Number)	V00.05
HMN (Host Marketing Name)	N/A

2. 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.

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.

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. / RSS-210 Issue 10 (December 2019)

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 6.6.5 of ANSI C63.10. (Version: 2013).

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.

3. 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 : 2017).

4. FACILITIES AND ACCREDITATIONS

FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

For ISED, test facility was accepted dated February 14, 2019 (CAB identifier: KR0032).

EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned 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."

5. ANTENNA REQUIREMENTS

According to RSS-GEN(Issue 5) Section 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested..

6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

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 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)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05

7. DESCRIPTION OF TESTS

7.1. Radiated Test

Limit (Operation within the band 13.110 MHz – 14.010 MHz)

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
13.553 – 13.567	15,848	30
13.410 ≤ f ≤ 13.553 13.567 ≤ f ≤ 13.710	334	30
13.110 ≤ f ≤ 13.410 13.710 ≤ f ≤ 14.010	106	30

Note:

1. 15,848 uV/m = 84.0 dBuV/m
2. 334 uV/m = 50.47 dBuV/m
3. 106 uV/m = 40.51 dBuV/m

Limit (Radiated Spurious Emissions)

FCC

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	* 100	3
88-216	* 150	3
216-960	* 200	3
Above 960	500	3

※:

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.

ISED

Frequency (MHz)	Field Strength (uA/m)	Measurement Distance (m)
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

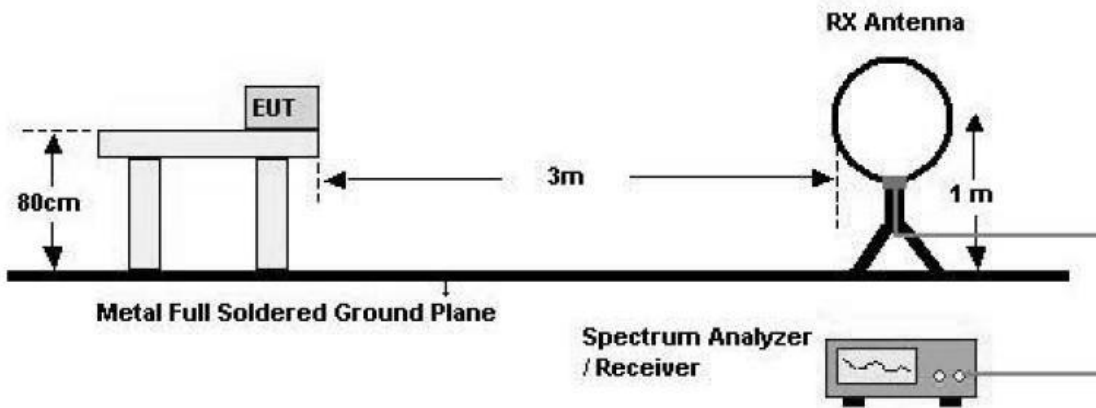
FCC&ISED

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

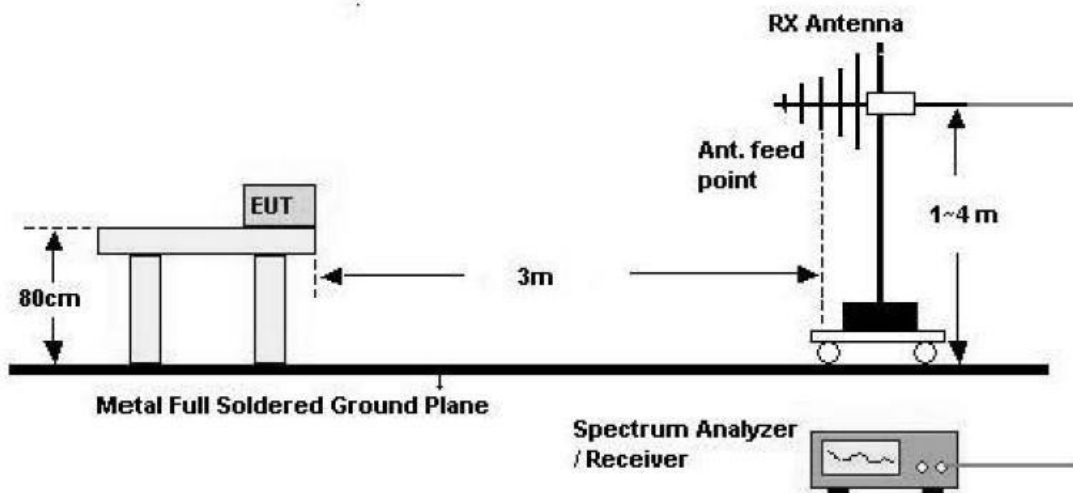
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Test Configuration

Below 30 MHz



30 MHz - 1 GHz



Test Procedure of inband

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor = $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$
Measurement Distance : 3 m (Below 30 MHz)
7. Spectrum Setting

- Detector = Peak
- Trace = Maxhold
- RBW = 9 kHz
- VBW $\geq 3 \times$ RBW

8. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = $40\log(3 \text{ m}/300 \text{ m}) = - 80 \text{ dB}$
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = $40\log(3 \text{ m}/30 \text{ m}) = - 40 \text{ dB}$
Measurement Distance : 3 m
8. Spectrum Setting
 - Frequency Range = 9 kHz ~ 30 MHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 9 kHz
 - VBW $\geq 3 \times$ RBW
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Above 30 MHz)

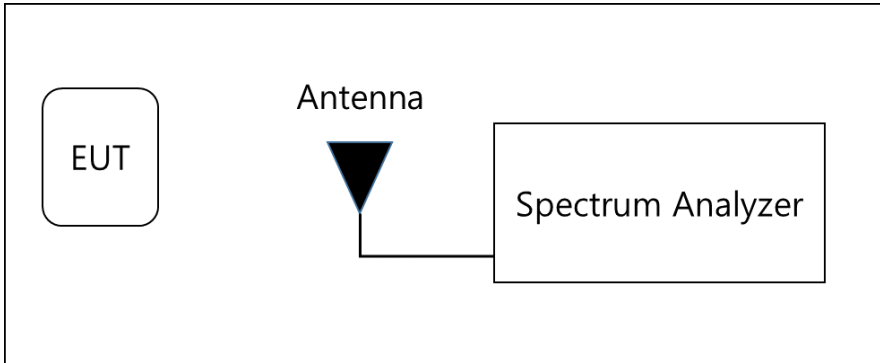
1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out

the highest emissions.

4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
 - Frequency Range = 30 MHz ~ 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

7.2. 20 dB Bandwidth & 99 % Bandwidth

Test Configuration



Test Procedure

The 20 dB bandwidth was measured by using a spectrum analyzer. (By connecting the measuring antenna)
(Procedure 6.9.2 in ANSI 63.10-2013)

- 1) RBW = 1%~5% of the OBW (★10kHz)
- 2) VBW = approximately three times RBW (★30kHz)
- 3) Span = between two times and five times the OBW
- 4) Detector = Peak
- 5) Trace mode = Max hold
- 6) Allow the trace to stabilize

Note :

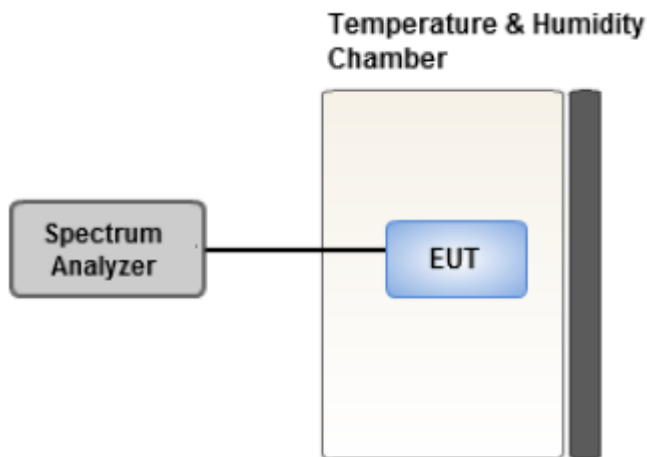
★Fundamental Signal is CW for this reason 150 kHz ~ 30 MHz RBW setting value(10kHz) apply.

7.3. Frequency Stability

Limit

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.

Test Configuration



Test Procedure

For battery operated equipment, the equipment tests shall be performed using a new battery.

- 1) Turn the EUT OFF and place it inside the environmental temperature chamber.
For devices that have oscillator heaters, energize only the heater circuit.
- 2) 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.
- 3) 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.
- 4) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.

Note:

- 1) Temperature:
The temperature is varied from -20°C to $+50^{\circ}\text{C}$ using an environmental chamber.
- 2) Primary Supply Voltage :
The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment.
For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

7.4. AC Power line Conducted Emissions

Limit

For an intentional radiator that 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 the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56 ^(a)	56 to 46 ^(a)
0.50 to 5	56	46
5 to 30	60	50

^(a)Decreases with the logarithm of the frequency.

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 Annex A 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

7.5. Receiver Spurious Emissions

Limit

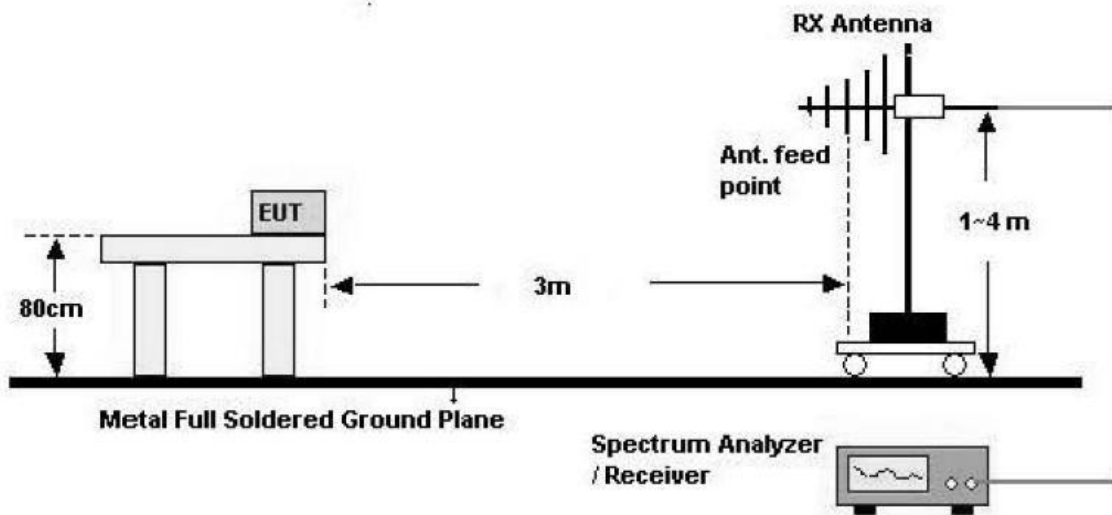
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

Measurements for compliance with the limits in table may be performed at distances other than 3 metres.

Test Configuration

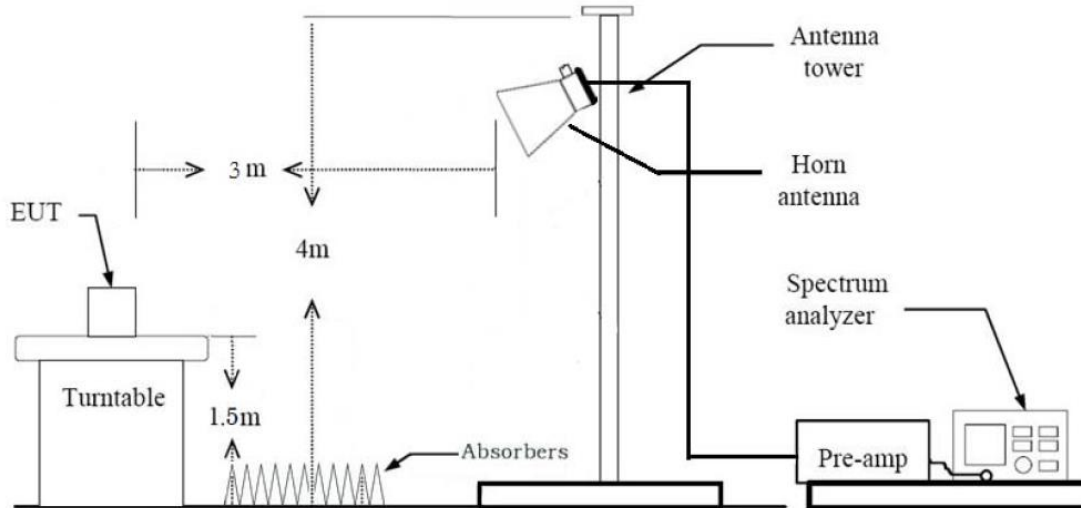
30 MHz - 1 GHz



Test Procedure of Receiver Spurious Emissions (Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

Above 1 GHz



Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW \geq 3 x RBW

(2) Measurement Type(Average):

- We performed using a reduced video BW method was done with the analyzer in linear mode
- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz

- $VBW \geq 1/\tau$ Hz, where τ = pulse width in seconds

The actual setting value of VBW = 1 kHz

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

10. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

7.6. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone(with Smart LED view cover),
Stand alone(with Smart LED view cover), + external accessories(Earphone, etc)
 - Worstcase : Stand alone(with Smart LED view cover)
2. EUT Axis : Z
3. LED test mode app using
 - LED BACK COVER Test app On → LED VIEW → RF Test mode
4. All position of loop antenna were investigated and the worst case configuration results are reported.
 - Position : Horizontal, Vertical, Parallel to the ground plane
 - Worstcase : Horizontal

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : Stand alone(with Smart LED view cover)+Earphone+Travel Adapter,
Stand alone(with Smart LED view cover)+Travel Adapter
 - Worstcase : Stand alone(with Smart LED view cover)+Travel Adapter
- 2.. LED test mode App using
 - LED BACK COVER Test app On → LED BACK → RF Test mode

20dB Bandwidth & Frequency Stability

1. LED test mode app using
 - LED BACK COVER Test app On → LED VIEW → RF Test mode

Note:

1. Test by running the application with the LED cover attached.
2. Client device:

Phone(Client)	LED COVER
- Model : SM-G991U(FCC) / SM-G991W(ISED)	- Model : EF-NG991
- Manufacturer : SAMSUNG	- Manufacturer : SAMSUNG
- FCC ID : A3LSMG991U	- FCC ID: A3L-EFNG991
- IC : 649E-SMG991W	- IC: 649E-EFNG991

8. TEST SUMMARY

FCC

Requirement	FCC Part Section(s)	Result
Radiated Electric Field Emissions (13.553MHz to 13.567MHz)	Part 15.225 (a)	Pass
Radiated Electric Field Emissions ($13.410 \leq f \leq 13.553$, $13.567 \leq f \leq 13.710$)	Part 15.225 (b)	Pass
Radiated Electric Field Emissions ($13.110 \leq f \leq 13.410$, $13.710 \leq f \leq 14.010$)	Part 15.225 (c)	Pass
Radiated Electric Field Emissions (9kHz to 30MHz)	Part 15.209	Pass
Radiated Electric Field Emissions (30MHz to 1GHz)	Part 15.209	Pass
Frequency Stability	Part 15.225 (e)	Pass
AC power conducted emissions (150kHz to 30MHz)	Part 15.207	Pass
20 dB Bandwidth	Part 15.215 (c)	Pass

ISED

Test Description	ISED Part Section(s)	Test Result
Radiated Electric Field Emissions (13.553MHz to 13.567MHz)	RSS-210, annex B.6(a)(i)	Pass
Radiated Electric Field Emissions (13.410 ≤ f ≤ 13.553, 13.567 ≤ f ≤ 13.710)	RSS-210, annex B.6(a)(ii)	Pass
Radiated Electric Field Emissions (13.110 ≤ f ≤ 13.410, 13.710 ≤ f ≤ 14.010)	RSS-210, annex B.6(a)(iii)	Pass
Radiated Electric Field Emissions (9kHz to 30MHz)	RSS-GEN, 8.9	Pass
Radiated Electric Field Emissions (30MHz to 1GHz)	RSS-GEN, 8.9	Pass
Frequency Stability	RSS-210, annex B.6(a)(iv)	Pass
AC power conducted emissions (150kHz to 30MHz)	RSS-GEN, 8.8	Pass
20 dB Bandwidth	RSS-GEN, 6.7	Pass
Receiver Spurious Emissions	RSS-GEN, 7	Pass

9. TEST RESULT

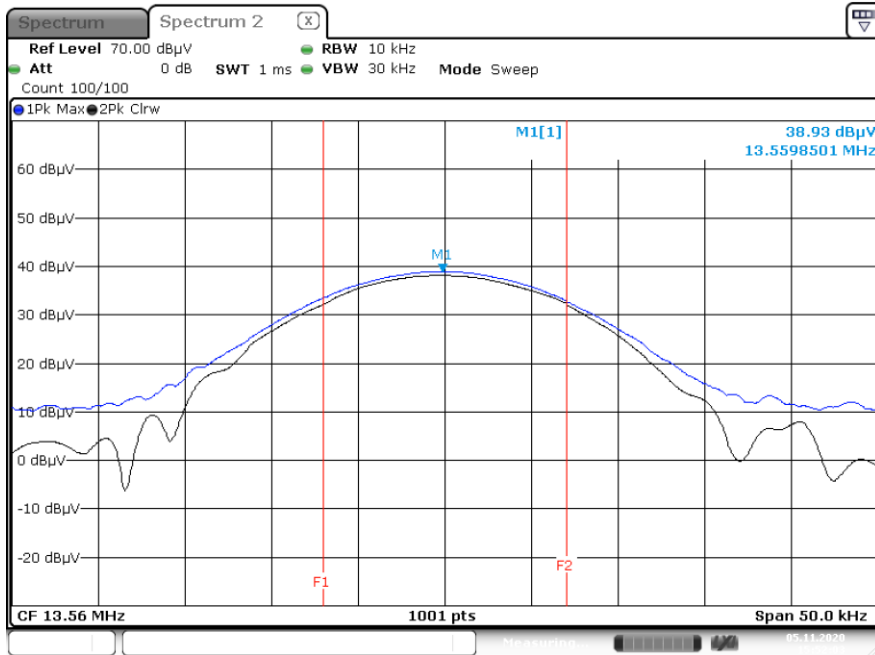
9.1. Operation within the band 13.110 MHz – 14.010 MHz

Measured Frequency Range :							
13.553 MHz-13.567 MHz							
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5599	38.93	18.66	-40.00	Z-H	17.59	84.00	66.41
13.5598	36.48	18.66	-40.00	Z-V	15.14	84.00	68.86

Measured Frequency Range :							
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)	Ant. POL	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5529	33.29	18.66	-40.00	Z-H	11.95	50.47	38.52
13.5670	32.48	18.66	-40.00	Z-H	11.14	50.47	39.33

Measured Frequency Range :							
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)	Ant. POL	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.1665	11.85	18.66	-40.00	Z-H	-9.49	40.51	50.00
13.7302	11.80	18.66	-40.00	Z-H	-9.54	40.51	50.05

■ **Test Plot**



Note:

Plot of worst case are only reported.

9.2. Radiated Emission 9 kHz – 30 MHz

FCC

Measured Frequency Range :							
9 kHz - 30 MHz							
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
7.5805	17.80	18.66	-40.00	Z-H	-3.54	29.54	33.08
15.5830	12.55	18.66	-40.00	Z-H	-8.79	29.54	38.33
27.1116	11.93	19.06	-40.00	Z-H	-9.01	29.54	38.55
27.1182	10.89	19.06	-40.00	Z-V	-10.05	29.54	39.59

ISED

Measured Frequency Range :								
9 kHz - 30 MHz								
Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL	Total		Limit (dBuA/m)@30m	Margin (dB)
					(dBuV/m)@30m	(dBuA/m)@30m		
7.5805	17.80	18.66	-40.00	Z-H	-3.54	-55.04	-21.94	33.10
15.5830	12.55	18.66	-40.00	Z-H	-8.79	-60.29	-21.94	38.35
27.1116	11.93	19.06	-40.00	Z-H	-9.01	-60.51	-21.94	38.57
27.1182	10.89	19.06	-40.00	Z-V	-10.05	-61.55	-21.94	39.61

Note:

1. dB μ A/m = dB μ V/m - 51.5

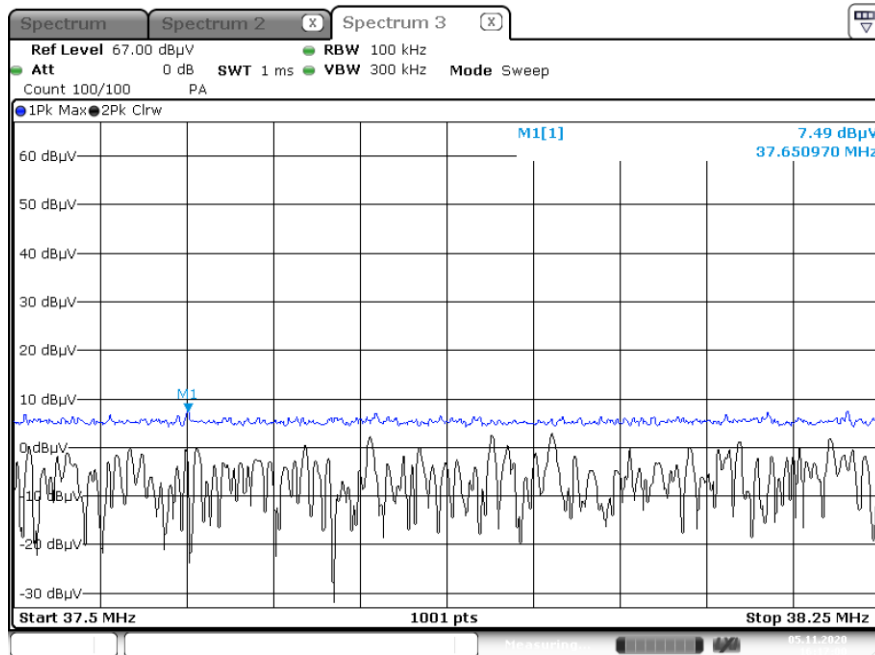
9.3. Radiated Emission 30 MHz – 1000 MHz

Measured Frequency Range :							
30 MHz - 1000 MHz							
Frequency (MHz)	Read Level (dBuV/m) @3m	Ant.Factor (dB/m)	Cable Loss (dB)	Ant. Pol (H/V)	Total (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36.2300 [#]	6.78	17.90	0.66	H	25.34	40.00	14.66
37.6509	7.49	17.90	0.76	H	26.15	40.00	13.85
77.6740	7.23	14.90	1.06	V	23.19	40.00	16.81
109.8590 [#]	7.09	16.10	1.26	H	24.45	43.50	19.05
131.0840 [#]	6.82	17.80	1.35	H	25.97	43.50	17.53
234.1610	8.03	16.70	1.83	V	26.56	43.50	16.94

Note:

1. “#” is the result for restricted band.

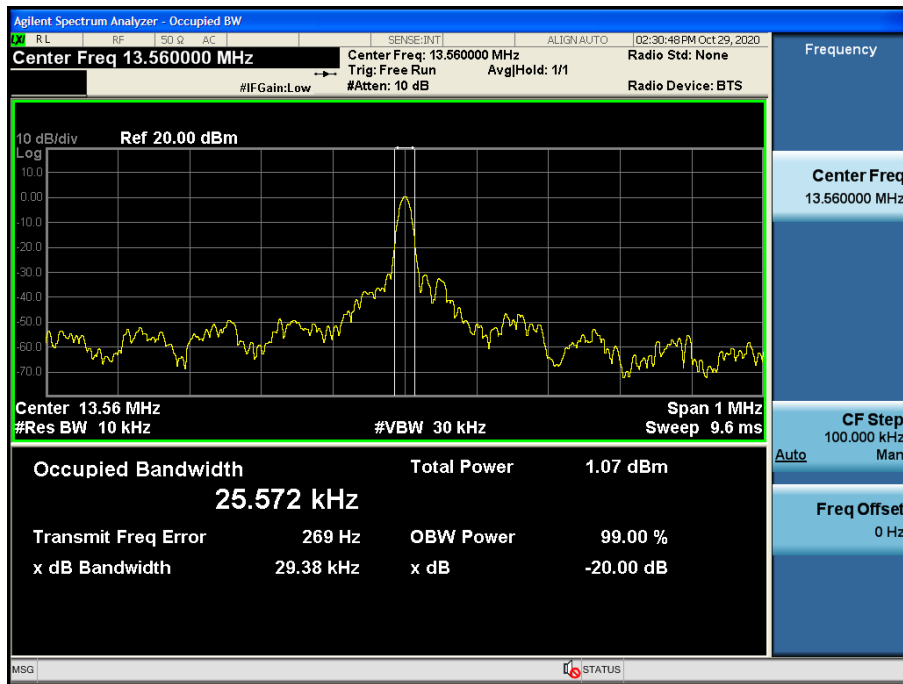
■ **Test Plot**



Note:

Plot of worst case are only reported

9.4. 20 dB Bandwidth & 99 % Bandwidth



Note:

Fundamental Signal is CW for this reason 150 kHz ~ 30 MHz RBW setting value(10kHz) apply.

9.5. Frequency Stability

Startup

PERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.88 VDC
 DEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560098	98	0.0007227
100%		-10	13.560093	93	0.0006889
100%		0	13.560089	89	0.0006580
100%		+10	13.560085	85	0.0006296
100%		+20(Ref.)	13.560082	82	0.0006074
100%		+30	13.560086	86	0.0006329
100%		+40	13.560090	90	0.0006637
100%		+50	13.560092	92	0.0006785
End_point	3.65	+20	13.560095	95	0.0007006

2 minutes

PERATING FREQUENCY: 13.56 MHz

REFERENCE VOLTAGE: 3.88 VDC

DEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560097	97	0.0007149
100%		-10	13.560090	90	0.0006667
100%		0	13.560087	87	0.0006400
100%		+10	13.560084	84	0.0006183
100%		+20(Ref.)	13.560080	80	0.0005912
100%		+30	13.560084	84	0.0006204
100%		+40	13.560094	94	0.0006937
100%		+50	13.560096	96	0.0007080
End_point		3.65	+20	13.560098	98

5 minutes

PERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.88 VDC
 DEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560094	94	0.0006958
100%		-10	13.560089	89	0.0006564
100%		0	13.560085	85	0.0006259
100%		+10	13.560082	82	0.0006043
100%		+20(Ref.)	13.560078	78	0.0005752
100%		+30	13.560081	81	0.0006007
100%		+40	13.560091	91	0.0006742
100%		+50	13.560095	95	0.0006981
End_point	3.65	+20	13.560098	98	0.0007257

10 minutes

PERATING FREQUENCY: 13.56 MHz
 REFERENCE VOLTAGE: 3.88 VDC
 DEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560097	97	0.0007153
100%		-10	13.560096	96	0.0007080
100%		0	13.560094	94	0.0006934
100%		+10	13.560092	92	0.0006771
100%		+20(Ref.)	13.560089	89	0.0006560
100%		+30	13.560092	92	0.0006811
100%		+40	13.560095	95	0.0007006
100%		+50	13.560097	97	0.0007153
End_point	3.65	+20	13.560099	99	0.0007301

9.6 RECEIVER SPURIOUS EMISSIONS

Frequency Range : Below 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

Frequency Range : Above 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

9.7. POWERLINE CONDUCTE EMISSIONS

[LED Test Mode : ON] Conducted Emissions (Line 1)

Note : 13.56MHz is Fundamental Signal. Final result is PASS, refer to LED Test mode Off test result

Test

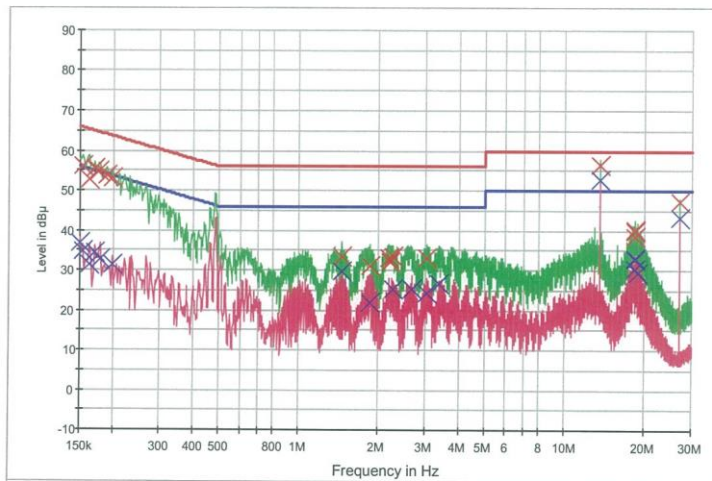
1 / 2

HCT TEST Report

Common Information

EUT: SM-G991U (with EF-NG991)
 Manufacturer: SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions: NFC LED TEST MODE_L1

FCC CLASS B_Exten Cable



— FCC CLASS B_OP — 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 (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	56.3	9.000	Off	L1	9.8	9.5	65.8
0.162000	52.6	9.000	Off	L1	9.8	12.7	65.4
0.170000	55.5	9.000	Off	L1	9.8	9.5	65.0
0.176000	54.7	9.000	Off	L1	9.8	10.0	64.7
0.190000	53.7	9.000	Off	L1	9.8	10.4	64.0
0.198000	52.9	9.000	Off	L1	9.8	10.8	63.7
1.458000	33.5	9.000	Off	L1	9.8	22.5	56.0
1.848000	31.1	9.000	Off	L1	9.9	24.9	56.0
2.186000	33.1	9.000	Off	L1	9.9	22.9	56.0
2.218000	31.9	9.000	Off	L1	9.9	24.1	56.0
2.256000	33.5	9.000	Off	L1	9.9	22.5	56.0
3.046000	33.0	9.000	Off	L1	9.9	23.0	56.0
13.560000	56.3	9.000	Off	L1	10.3	3.7	60.0
18.338000	38.5	9.000	Off	L1	10.5	21.5	60.0
18.342000	39.9	9.000	Off	L1	10.5	20.1	60.0
18.362000	40.1	9.000	Off	L1	10.5	19.9	60.0
18.384000	40.2	9.000	Off	L1	10.5	19.8	60.0
27.120000	47.2	9.000	Off	L1	10.7	12.8	60.0

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Test

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	36.6	9.000	Off	L1	9.8	19.4	56.0
0.154000	34.9	9.000	Off	L1	9.8	20.9	55.8
0.162000	31.4	9.000	Off	L1	9.8	24.0	55.4
0.170000	34.4	9.000	Off	L1	9.8	20.6	55.0
0.178000	32.8	9.000	Off	L1	9.8	21.8	54.6
0.198000	31.5	9.000	Off	L1	9.8	22.2	53.7
1.456000	29.6	9.000	Off	L1	9.8	16.4	46.0
1.848000	22.0	9.000	Off	L1	9.9	24.0	46.0
2.250000	25.1	9.000	Off	L1	9.9	20.9	46.0
2.658000	25.1	9.000	Off	L1	9.9	20.9	46.0
3.046000	24.2	9.000	Off	L1	9.9	21.8	46.0
3.376000	26.7	9.000	Off	L1	9.9	19.3	46.0
13.560000	52.7	9.000	Off	L1	10.3	-2.7	50.0
18.338000	30.5	9.000	Off	L1	10.5	19.5	50.0
18.342000	32.8	9.000	Off	L1	10.5	17.2	50.0
18.362000	33.1	9.000	Off	L1	10.5	16.9	50.0
18.758000	29.4	9.000	Off	L1	10.5	20.6	50.0
27.120000	43.1	9.000	Off	L1	10.7	6.9	50.0

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[LED Test Mode : ON] Conducted Emissions (Line 2)

Note : 13.56MHz is Fundamental Signal. Final result is PASS, refer to LED Test mode Off test result

Test

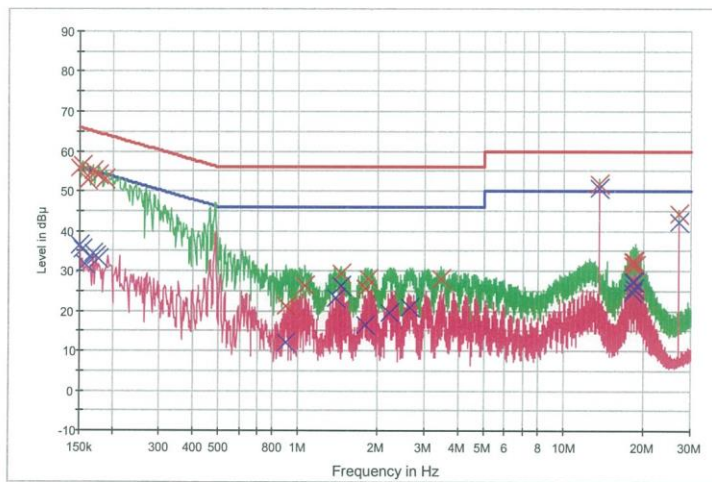
1 / 2

HCT TEST Report

Common Information

EUT: SM-G991U (with EF-NG991)
 Manufacturer: SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions: NFC LED TEST MODE_N

FCC CLASS B_Exten Cable



— 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 (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	55.9	9.000	Off	N	9.8	10.1	66.0
0.154000	56.5	9.000	Off	N	9.8	9.3	65.8
0.160000	52.7	9.000	Off	N	9.8	12.7	65.5
0.168000	55.2	9.000	Off	N	9.8	9.9	65.1
0.176000	54.1	9.000	Off	N	9.8	10.6	64.7
0.188000	52.9	9.000	Off	N	9.8	11.2	64.1
0.894000	21.1	9.000	Off	N	9.8	34.9	56.0
1.062000	26.3	9.000	Off	N	9.8	29.7	56.0
1.456000	29.2	9.000	Off	N	9.8	26.8	56.0
1.780000	25.4	9.000	Off	N	9.8	30.6	56.0
1.836000	27.9	9.000	Off	N	9.8	28.1	56.0
3.444000	27.9	9.000	Off	N	9.9	28.1	56.0
13.560000	51.8	9.000	Off	N	10.4	8.2	60.0
18.206000	31.4	9.000	Off	N	10.6	28.6	60.0
18.236000	32.5	9.000	Off	N	10.6	27.5	60.0
18.304000	32.5	9.000	Off	N	10.6	27.5	60.0
18.632000	31.4	9.000	Off	N	10.6	28.6	60.0
27.120000	44.1	9.000	Off	N	10.9	15.9	60.0

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Test

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Final Result 2

Frequency (MHz)	CAverage (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	36.6	9.000	Off	N	9.8	19.4	56.0
0.154000	35.4	9.000	Off	N	9.8	20.4	55.8
0.158000	31.7	9.000	Off	N	9.8	23.8	55.6
0.168000	34.3	9.000	Off	N	9.8	20.8	55.1
0.172000	33.9	9.000	Off	N	9.8	21.0	54.9
0.176000	33.0	9.000	Off	N	9.8	21.6	54.7
0.894000	12.0	9.000	Off	N	9.8	34.0	46.0
1.390000	23.1	9.000	Off	N	9.8	22.9	46.0
1.454000	26.1	9.000	Off	N	9.8	19.9	46.0
1.780000	16.4	9.000	Off	N	9.8	29.6	46.0
2.222000	19.4	9.000	Off	N	9.9	26.6	46.0
2.624000	21.0	9.000	Off	N	9.9	25.0	46.0
13.560000	50.6	9.000	Off	N	10.4	-0.6	50.0
18.206000	24.5	9.000	Off	N	10.6	25.5	50.0
18.236000	27.2	9.000	Off	N	10.6	22.8	50.0
18.282000	25.7	9.000	Off	N	10.6	24.3	50.0
18.302000	27.2	9.000	Off	N	10.6	22.8	50.0
27.120000	42.3	9.000	Off	N	10.9	7.7	50.0

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[LED Test Mode : OFF] Conducted Emissions (Line 1)

Test

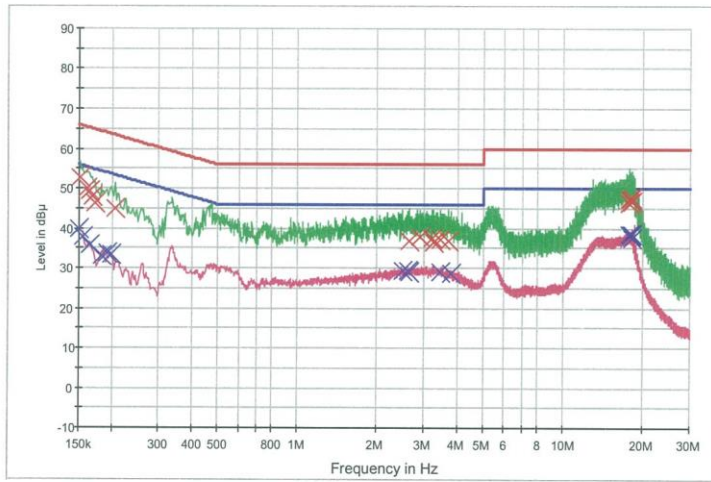
1 / 2

HCT TEST Report

Common Information

EUT: SM-G991U (with EF-NG991)
 Manufacturer: SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions: NFC LED TEST MODE OFF_L1

FCC CLASS B_Exten Cable



— 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	52.6	9.000	Off	L1	9.8	13.3	65.9
0.160000	50.1	9.000	Off	L1	9.8	15.4	65.5
0.164000	49.2	9.000	Off	L1	9.8	16.0	65.3
0.168000	47.9	9.000	Off	L1	9.8	17.2	65.1
0.172000	46.4	9.000	Off	L1	9.8	18.5	64.9
0.206000	45.0	9.000	Off	L1	9.8	18.4	63.4
2.630000	36.8	9.000	Off	L1	9.9	19.2	56.0
2.894000	37.8	9.000	Off	L1	9.9	18.2	56.0
3.206000	37.3	9.000	Off	L1	9.9	18.7	56.0
3.248000	36.4	9.000	Off	L1	9.9	19.6	56.0
3.456000	37.0	9.000	Off	L1	9.9	19.0	56.0
3.698000	36.9	9.000	Off	L1	9.9	19.1	56.0
17.690000	46.3	9.000	Off	L1	10.5	13.7	60.0
17.798000	47.2	9.000	Off	L1	10.5	12.8	60.0
17.882000	47.4	9.000	Off	L1	10.5	12.6	60.0
18.070000	47.7	9.000	Off	L1	10.5	12.4	60.0
18.074000	47.6	9.000	Off	L1	10.5	12.4	60.0
18.168000	46.6	9.000	Off	L1	10.5	13.4	60.0

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오후 4:46:38

Test

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	39.9	9.000	Off	L1	9.8	16.1	56.0
0.156000	37.7	9.000	Off	L1	9.8	18.0	55.7
0.164000	35.8	9.000	Off	L1	9.8	19.5	55.3
0.182000	33.0	9.000	Off	L1	9.8	21.3	54.4
0.192000	33.7	9.000	Off	L1	9.8	20.3	53.9
0.198000	33.3	9.000	Off	L1	9.8	20.4	53.7
2.490000	29.3	9.000	Off	L1	9.9	16.7	46.0
2.608000	29.3	9.000	Off	L1	9.9	16.7	46.0
2.630000	29.1	9.000	Off	L1	9.9	16.9	46.0
3.456000	29.1	9.000	Off	L1	9.9	16.9	46.0
3.460000	29.1	9.000	Off	L1	9.9	16.9	46.0
3.776000	28.5	9.000	Off	L1	9.9	17.5	46.0
17.798000	38.6	9.000	Off	L1	10.5	11.4	50.0
17.808000	38.5	9.000	Off	L1	10.5	11.5	50.0
17.882000	38.6	9.000	Off	L1	10.5	11.4	50.0
17.938000	38.2	9.000	Off	L1	10.5	11.8	50.0
18.074000	38.6	9.000	Off	L1	10.5	11.4	50.0
18.168000	37.5	9.000	Off	L1	10.5	12.5	50.0

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오후 4:46:38

[LED Test Mode : OFF] Conducted Emissions (Line 2)

Test

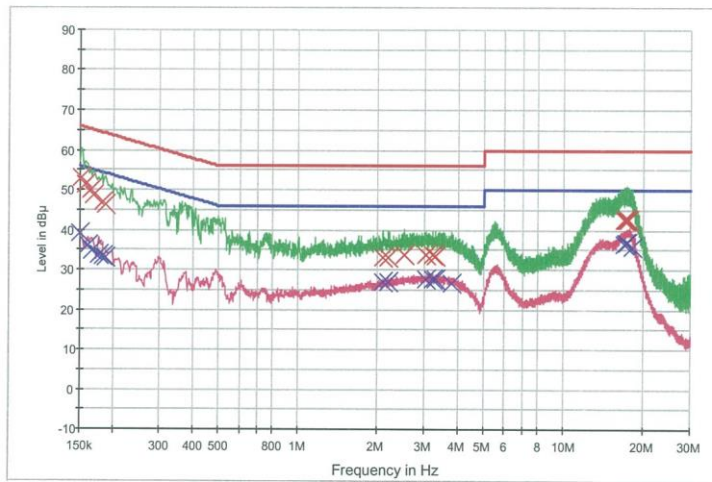
1 / 2

HCT TEST Report

Common Information

EUT: SM-G991U (with EF-NG991)
 Manufacturer: SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions: NFC LED TEST MODE OFF _N

FCC CLASS B_Exten Cable



— 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 (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.152000	53.2	9.000	Off	N	9.8	12.7	65.9
0.158000	51.5	9.000	Off	N	9.8	14.1	65.6
0.164000	50.0	9.000	Off	N	9.8	15.3	65.3
0.168000	48.7	9.000	Off	N	9.8	16.4	65.1
0.182000	46.8	9.000	Off	N	9.8	17.6	64.4
0.188000	46.3	9.000	Off	N	9.8	17.8	64.1
2.096000	33.1	9.000	Off	N	9.9	22.9	56.0
2.176000	33.1	9.000	Off	N	9.9	22.9	56.0
2.520000	33.8	9.000	Off	N	9.9	22.2	56.0
3.026000	33.7	9.000	Off	N	9.9	22.3	56.0
3.218000	33.7	9.000	Off	N	9.9	22.3	56.0
3.302000	33.5	9.000	Off	N	9.9	22.5	56.0
16.902000	42.6	9.000	Off	N	10.5	17.4	60.0
16.982000	42.6	9.000	Off	N	10.5	17.4	60.0
17.210000	42.4	9.000	Off	N	10.6	17.6	60.0
17.310000	42.4	9.000	Off	N	10.6	17.6	60.0
17.326000	42.7	9.000	Off	N	10.6	17.3	60.0
17.614000	42.5	9.000	Off	N	10.6	17.5	60.0

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오후 4:35:27

Test

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	39.0	9.000	Off	N	9.8	17.0	56.0
0.160000	36.1	9.000	Off	N	9.8	19.4	55.5
0.166000	34.9	9.000	Off	N	9.8	20.3	55.2
0.176000	33.8	9.000	Off	N	9.8	20.9	54.7
0.182000	33.4	9.000	Off	N	9.8	21.0	54.4
0.188000	33.1	9.000	Off	N	9.8	21.0	54.1
2.096000	26.8	9.000	Off	N	9.9	19.2	46.0
2.176000	27.0	9.000	Off	N	9.9	19.0	46.0
3.026000	27.7	9.000	Off	N	9.9	18.3	46.0
3.218000	27.7	9.000	Off	N	9.9	18.3	46.0
3.302000	27.5	9.000	Off	N	9.9	18.5	46.0
3.800000	26.7	9.000	Off	N	9.9	19.3	46.0
16.964000	36.3	9.000	Off	N	10.5	13.7	50.0
16.982000	36.4	9.000	Off	N	10.5	13.6	50.0
17.206000	36.7	9.000	Off	N	10.6	13.3	50.0
17.310000	36.8	9.000	Off	N	10.6	13.2	50.0
17.326000	36.9	9.000	Off	N	10.6	13.1	50.0
18.178000	35.7	9.000	Off	N	10.6	14.3	50.0

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10. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/04/2020	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/10/2020	Annual	100584
ESPEC	SU-642 /Temperature Chamber	07/30/2020	Annual	0093000718
Agilent	N9020A / Signal Analyzer	05/11/2020	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	03/23/2020	Annual	MY49432108
HP	E3632A / DC Power Supply	09/16/2020	Annual	MY40004427
HP	8493C / Attenuator(10 dB)(DC-26.5 GHz)	06/26/2020	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

Radiated Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	05/18/2020	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/02/2019	Biennial	01039
Schwarzbeck	BBHA 9120D / Horn Antenna	06/28/2019	Biennial	1300
Rohde & Schwarz	FSP(10 Hz ~ 40 GHz) / Spectrum Analyzer	05/13/2020	Annual	101055
Weinschel	2-3 / Attenuator (3 dB)	10/07/2020	Annual	BR0617
H+S	5910-N-50-010 / Attenuator(10 dB)	10/28/2020	Annual	None
CERNEX	CBL18265035 / Power Amplifier	12/26/2019	Annual	22966

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).

11. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2011-FI018-P