

FCC NFC REPORT

Certification

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Date of Issue:
November 05, 2021

Test Site/Location:
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Report No.: HCT-RF-2109-FC046-R1

FCC ID: A3LSMS901B

APPLICANT: SAMSUNG Electronics Co., Ltd.

Model: SM-S901B/DS

EUT Type: Mobile Phone

RF Output Field Strength: 17.53 dB μ V/m @30 m

Frequency of Operation: 13.56 MHz

Modulation type: ASK

FCC Classification: Low Power Communication Device Transmitter (DXX)

FCC Rule Part(s): FCC Part 15.225 Subpart C

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 Rules under normal use and maintenance.

Report No.: HCT-RF-2109-FC046-R1

REVIEWED BY



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

Report approved by : Jong Seok Lee
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)

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2109-FC046	October 28, 2021	- First Approval Report
HCT-RF-2109-FC046-R1	November 05, 2021	- Additional Model delete

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1. EUT DESCRIPTION

Model	SM-S901B/DS
Additional Model	-
EUT Type	Mobile Phone
Power Supply	DC 3.88 V
Frequency of Operation	13.56 MHz
Transmit Power	17.53 dB μ V/m @30 m
Modulation Type	ASK
Date(s) of Tests	September 24, 2021 ~ October 28, 2021
Serial number	Radiated: R3CR90EYFYM

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.

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 30 MHz 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 equipment, 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).

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 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."

- (1) The antennas of this E.U.T are permanently attached.
- (2) The E.U.T Complies with the requirement of §15.203

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 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05 (Confidence level about 95 %, k=2)

7. DESCRIPTION OF TESTS

7.1. Radiated Test

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

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
13.553 – 13.567	15,848	30
13.410 \leq f \leq 13.553 13.567 \leq f \leq 13.710	334	30
13.110 \leq f \leq 13.410 13.710 \leq f \leq 14.010	106	30

Note:

1. 15,848 $\mu\text{V/m}$ = 84.0 dB $\mu\text{V/m}$
2. 334 $\mu\text{V/m}$ = 50.47 dB $\mu\text{V/m}$
3. 106 $\mu\text{V/m}$ = 40.51 dB $\mu\text{V/m}$

Limit (Radiated Spurious Emissions)

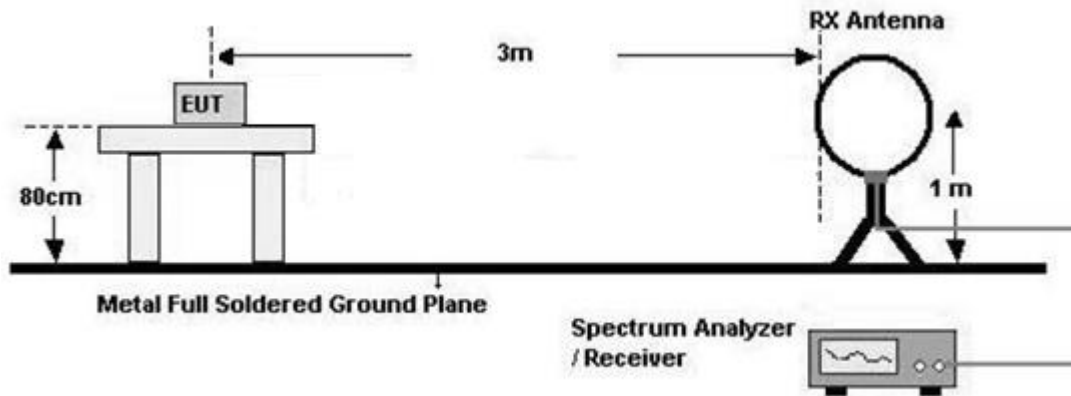
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	* 100	3
88-216	* 150	3
216-960	* 200	3
Above 960	500	3

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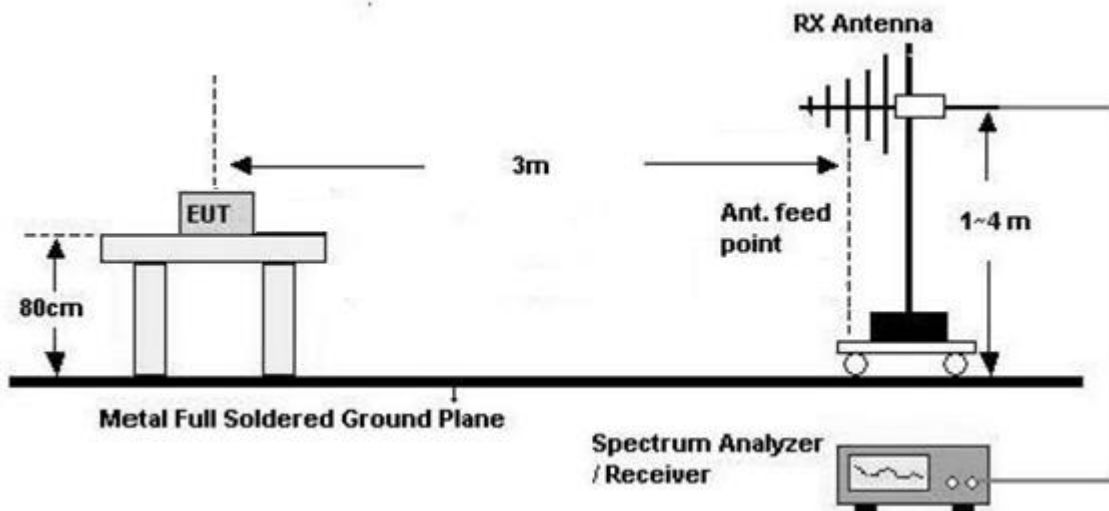
Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

Test Configuration

Below 30 MHz



30 MHz - 1 GHz



Test Procedure of in-band

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m 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 = Max Hold
- RBW = 9 kHz
- VBW $\geq 3 \times$ RBW

8. Total = Measured 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 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m 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 = Max hold
 - RBW = 9 kHz
 - VBW $\geq 3 \times$ RBW
9. Total = Measured 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.

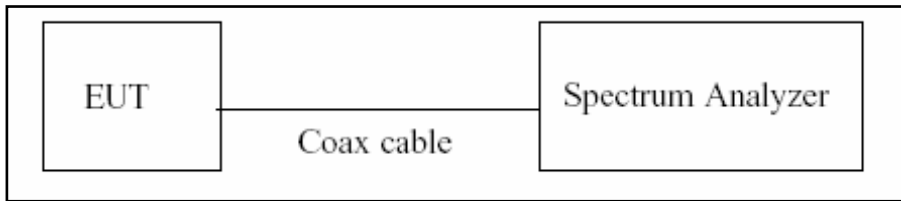
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

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 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m 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 = Max hold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
7. Total = Measured 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

Test Configuration



Test Procedure

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

(Procedure 6.9.2 in ANSI 63.10-2013)

- 1) RBW = 1 % ~ 5 % of the OBW
- 2) VBW = approximately three times RBW
- 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 :

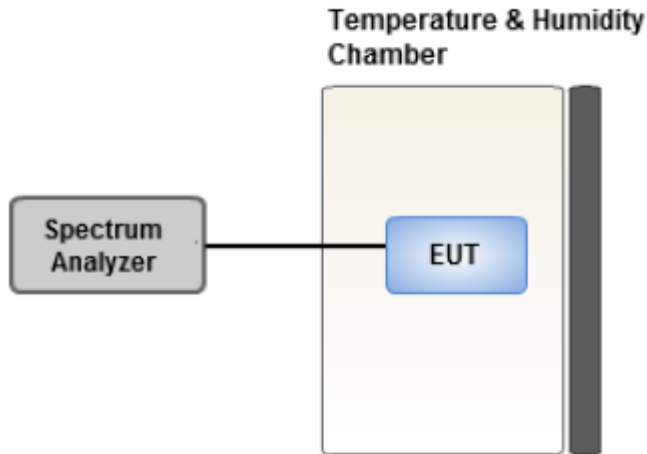
We tested Occupied Bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

7.3. Frequency Stability

Limit

The frequency tolerance of the carrier signal shall be maintained within ± 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 ± 0.01 % of the operating frequency.

Note:

- 1) Temperature:
The temperature is varied from -20 °C to $+50$ °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) = Measured Value + Correction Factor

7.5. 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, Stand alone + external accessories(Earphone, etc)
 - Worstcase : Stand alone
2. EUT Axis : Z
3. All type and bitrate were investigated and the worst case results are reported.
 - Worstcase : Type A, 106 kbps
4. All mode of without tag and with tag were investigated and the worst case configuration results are reported.
 - Worstcase : Without Tag
5. 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 + Earphone + Travel Adapter, Stand alone + Travel Adapter
 - Worstcase : Stand alone + Travel Adapter
2. All modes(For unterminated the Antenna, terminated the Antenna) of operation were investigated and the worst case configuration results are reported.
 - Worstcase : Unterminated the Antenna

20 dB Bandwidth & Frequency Stability

1. All type and bitrate were investigated and the worst case results are reported.
 - Worstcase : Type A, 106 kbps

8. TEST SUMMARY

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

9. TEST RESULT

9.1. Operation within the band 13.110 MHz – 14.010 MHz

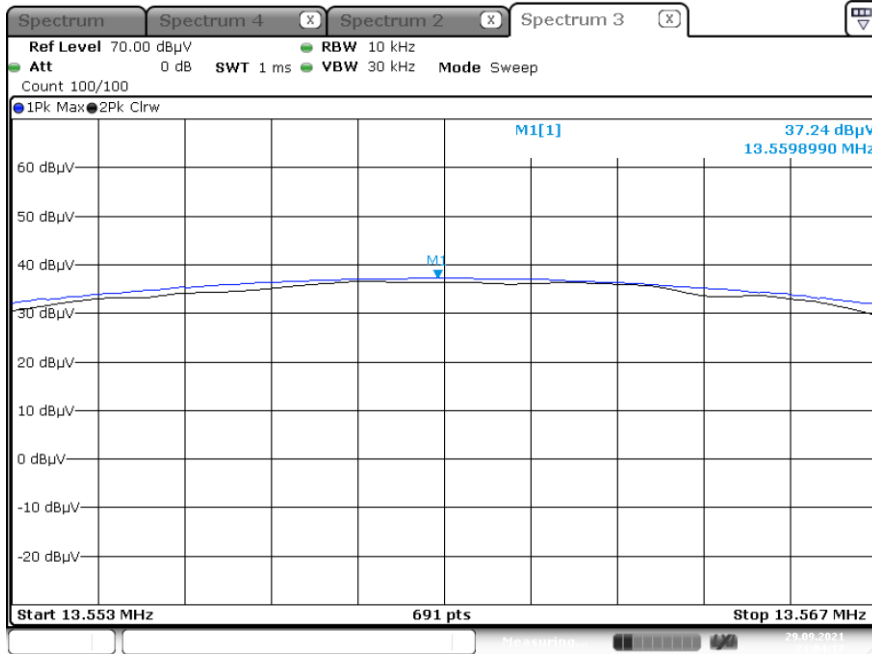
Measured Frequency Range : 13.553 MHz-13.567 MHz							
Frequency (MHz)	Measured Value (dBμV/m) @3 m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dBμV/m) @30 m	Limit (dBμV/m) @30 m	Margin (dB)
13.5599	37.24	20.29	-40.00	X-H	17.53	84.00	66.47
13.5596	32.15	20.29	-40.00	X-V	12.44	84.00	71.56

Measured Frequency Range : 13.410 MHz-13.553 MHz and 13.567 MHz-13.710 MHz							
Frequency (MHz)	Measured Value (dBμV/m) @3 m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dBμV/m) @30 m	Limit (dBμV/m) @30 m	Margin (dB)
13.5529	32.35	20.29	-40.00	X-H	12.64	50.47	37.83
13.5671	31.97	20.29	-40.00	X-H	12.26	50.47	38.21

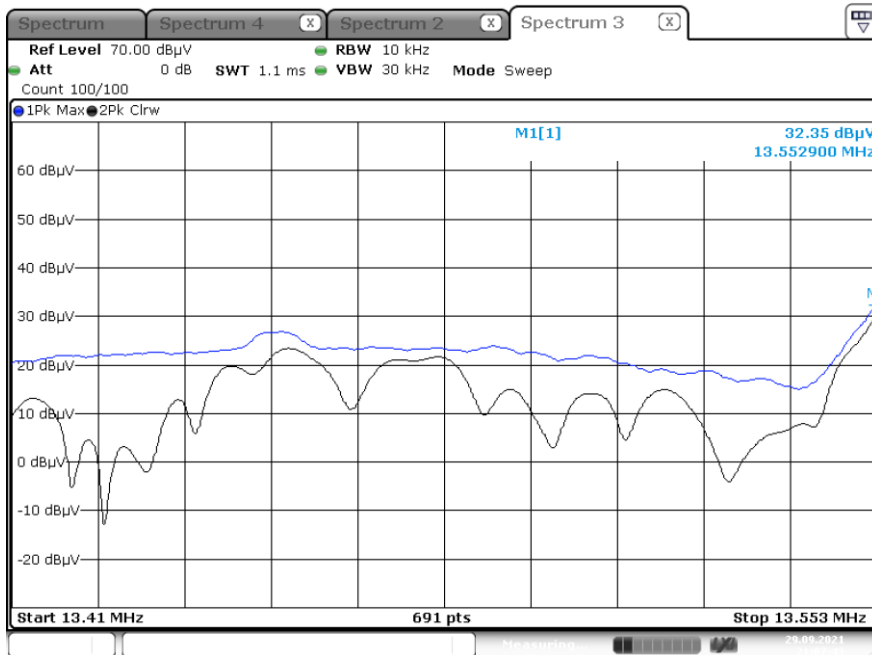
Measured Frequency Range : 13.110 MHz – 13.410 MHz and 13.710 MHz-14.010 MHz							
Frequency (MHz)	Measured Value (dBμV/m) @3 m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dBμV/m) @30 m	Limit (dBμV/m) @30 m	Margin (dB)
13.3477	23.13	20.29	-40.00	X-H	3.42	40.51	37.09
13.7723	22.47	20.29	-40.00	X-H	2.76	40.51	37.75

Test Plot

13.553 MHz ~ 13.567 MHz



Worst Case (13.410 MHz-13.553 MHz)



Note:

Plot of worst case are only reported.

9.2. Radiated Emission 9 kHz – 30 MHz

Measured Frequency Range : 9 kHz - 30 MHz							
Frequency (MHz)	Measured Value (dB μ V/m) @3 m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Ant. POL (H/V)	Total (dB μ V/m) @30 m	Limit (dB μ V/m) @30 m	Margin (dB)
13.0340	14.82	20.29	-40.00	X-H	-4.89	29.54	34.43
14.1140	11.62	20.29	-40.00	X-H	-8.09	29.54	37.63
27.1238	10.48	20.79	-40.00	X-H	-8.73	29.54	38.27
27.1331	9.33	20.79	-40.00	X-V	-9.88	29.54	39.42

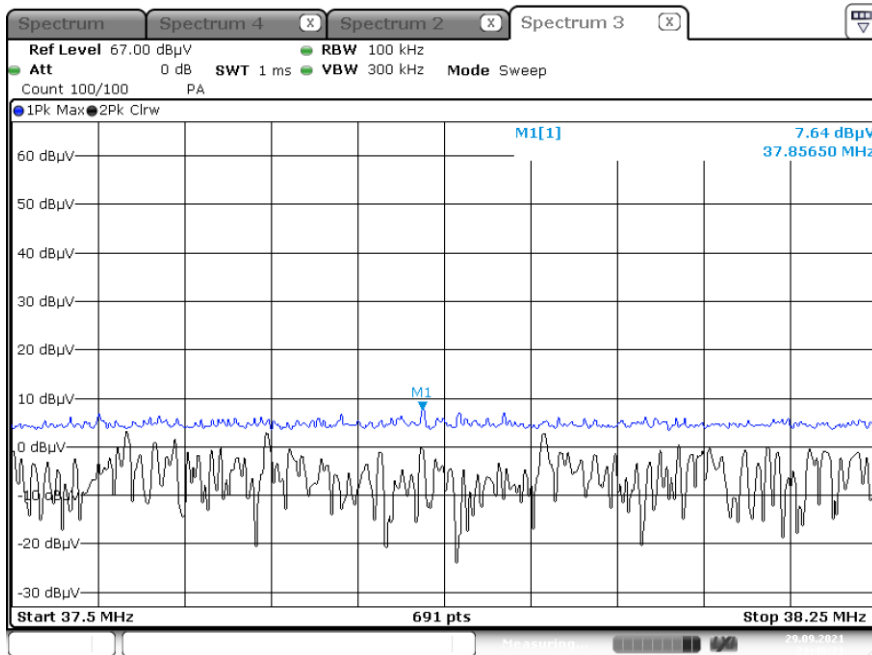
9.3. Radiated Emission 30 MHz – 1000 MHz

Measured Frequency Range : 30 MHz - 1000 MHz							
Frequency (MHz)	Measured Value (dBμV/m) @3 m	Ant.Factor (dB/m)	Cable Loss (dB)	Ant. Pol (H/V)	Total (dBμV/m)	Limit (dBμV/m)	Margin (dB)
34.7920	6.95	18.55	0.72	H	26.22	40.00	13.78
#37.8550	7.64	19.06	0.75	H	27.45	40.00	12.55
94.8280	7.55	13.86	1.13	V	22.54	40.00	17.46
#117.9760	7.35	16.70	1.26	H	25.31	43.50	18.19
#134.6680	7.60	18.27	1.36	H	27.23	43.50	16.27
161.6241	7.08	18.70	1.46	V	27.24	43.50	16.26

Note:

- # is the result for restricted band.

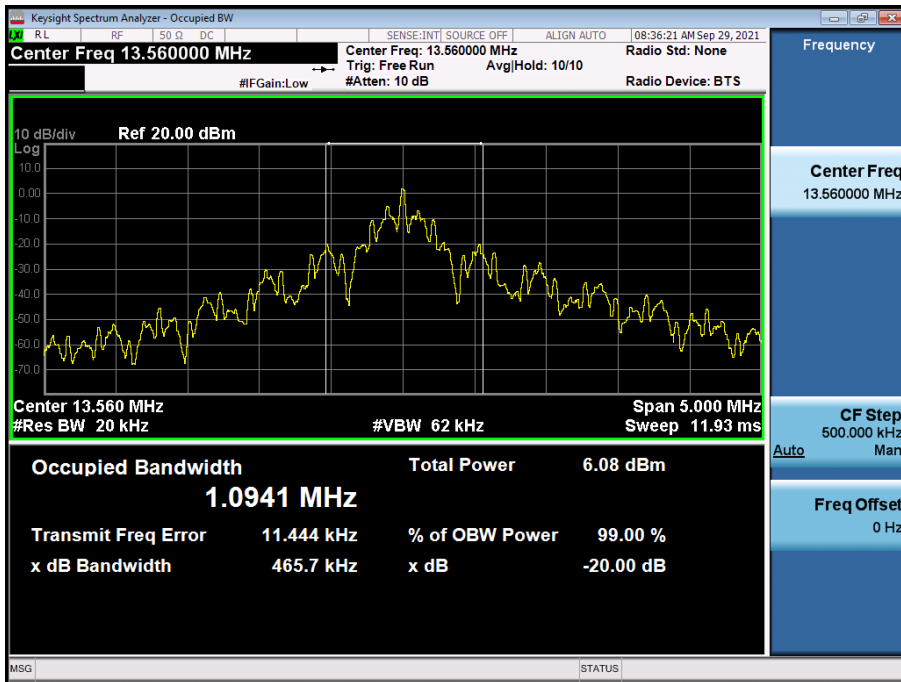
Test Plot



Note:

Plot of worst case are only reported

9.4. 20 dB Bandwidth



9.5. Frequency Stability

Startup

OPERATING 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	13.560057	57	0.0004192
100%		-10	13.560050	50	0.0003706
100%		0	13.560046	46	0.0003423
100%		+10	13.560043	43	0.0003139
100%		+20(Ref.)	13.560040	40	0.0002913
100%		+30	13.560043	43	0.0003136
100%		+40	13.560056	56	0.0004130
100%		+50	13.560058	58	0.0004277
LOW	3.65	+20	13.560058	58	0.0004251
HIGH	4.42	+20	13.560054	54	0.0003967

2 minutesOPERATING FREQUENCY: 13.56 MHzREFERENCE VOLTAGE: 3.88 VDCDEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560060	60	0.0004412
100%		-10	13.560053	53	0.0003942
100%		0	13.560048	48	0.0003569
100%		+10	13.560044	44	0.0003268
100%		+20(Ref.)	13.560043	43	0.0003156
100%		+30	13.560047	47	0.0003439
100%		+40	13.560055	55	0.0004092
100%		+50	13.560059	59	0.0004326
LOW		3.65	+20	13.560063	63
HIGH	4.42	+20	13.560065	65	0.0004794

5 minutesOPERATING FREQUENCY: 13.56 MHzREFERENCE VOLTAGE: 3.88 VDCDEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560064	64	0.0004737
100%		-10	13.560058	58	0.0004243
100%		0	13.560052	52	0.0003868
100%		+10	13.560049	49	0.0003577
100%		+20(Ref.)	13.560046	46	0.0003407
100%		+30	13.560051	51	0.0003761
100%		+40	13.560058	58	0.0004296
100%		+50	13.560065	65	0.0004794
LOW		3.65	+20	13.560064	64
HIGH	4.42	+20	13.560066	66	0.0004867

10 minutesOPERATING FREQUENCY: 13.56 MHzREFERENCE VOLTAGE: 3.88 VDCDEVIATION LIMIT: ±0.01 % = ±1356 Hz

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (MHz)	Frequency Dev. (Hz)	Frequency Dev (%)
100%	3.88	-20	13.560067	67	0.0004953
100%		-10	13.560061	61	0.0004521
100%		0	13.560056	56	0.0004164
100%		+10	13.560052	52	0.0003861
100%		+20(Ref.)	13.560051	51	0.0003761
100%		+30	13.560057	57	0.0004204
100%		+40	13.560068	68	0.0005015
100%		+50	13.560075	75	0.0005531
LOW		3.65	+20	13.560070	70
HIGH	4.42	+20	13.560073	73	0.0005383

9.6. POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

NFC TERM MODE_L1

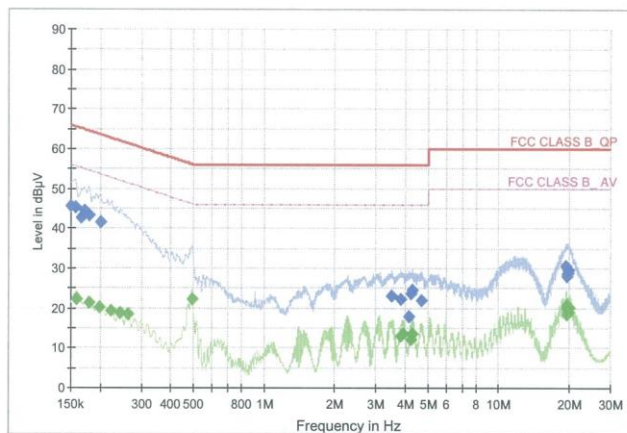
1 / 2

Test Report

Common Information

EUT : SM-S901B/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : NFC TERM MODE_L1

Full Spectrum



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

Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	45.70	66.00	20.30	9.000	L1	OFF	9.6
0.1568	45.29	65.63	20.34	9.000	L1	OFF	9.6
0.1658	42.82	65.17	22.35	9.000	L1	OFF	9.6
0.1725	44.55	64.84	20.29	9.000	L1	OFF	9.6
0.1793	43.35	64.52	21.17	9.000	L1	OFF	9.6
0.2018	41.47	63.54	22.07	9.000	L1	OFF	9.6
3.4880	22.94	56.00	33.06	9.000	L1	OFF	9.8
3.8458	22.09	56.00	33.91	9.000	L1	OFF	9.8
4.1540	17.79	56.00	38.21	9.000	L1	OFF	9.8
4.2350	23.73	56.00	32.27	9.000	L1	OFF	9.8
4.2980	24.52	56.00	31.48	9.000	L1	OFF	9.8
4.6828	21.88	56.00	34.12	9.000	L1	OFF	9.9
19.4383	30.57	60.00	29.43	9.000	L1	OFF	10.4
19.4855	28.09	60.00	31.91	9.000	L1	OFF	10.4
19.6183	28.45	60.00	31.55	9.000	L1	OFF	10.4
19.6925	29.63	60.00	30.37	9.000	L1	OFF	10.4
19.7150	28.90	60.00	31.10	9.000	L1	OFF	10.4
19.8635	29.55	60.00	30.45	9.000	L1	OFF	10.4

2021-10-01

오전 12:00:33

NFC TERM MODE_L1

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Final Result CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1590	22.22	55.52	33.30	9.000	L1	OFF	9.6
0.1793	21.23	54.52	33.30	9.000	L1	OFF	9.6
0.1995	20.16	53.63	33.47	9.000	L1	OFF	9.6
0.2220	19.37	52.74	33.38	9.000	L1	OFF	9.6
0.2423	18.84	52.02	33.17	9.000	L1	OFF	9.6
0.2625	18.48	51.35	32.87	9.000	L1	OFF	9.6
0.4943	22.33	46.10	23.76	9.000	L1	OFF	9.6
3.8233	13.04	46.00	32.96	9.000	L1	OFF	9.8
3.8773	13.23	46.00	32.77	9.000	L1	OFF	9.8
3.9335	13.51	46.00	32.49	9.000	L1	OFF	9.8
4.2598	12.17	46.00	33.83	9.000	L1	OFF	9.8
4.3003	13.60	46.00	32.40	9.000	L1	OFF	9.8
19.4608	20.22	50.00	29.78	9.000	L1	OFF	10.4
19.4810	20.01	50.00	29.99	9.000	L1	OFF	10.4
19.5823	20.90	50.00	29.10	9.000	L1	OFF	10.4
19.6408	18.40	50.00	31.60	9.000	L1	OFF	10.4
19.8410	18.97	50.00	31.03	9.000	L1	OFF	10.4
19.9963	20.15	50.00	29.85	9.000	L1	OFF	10.4

2021-10-01

오전 12:00:33

NFC UNTERM MODE_L1

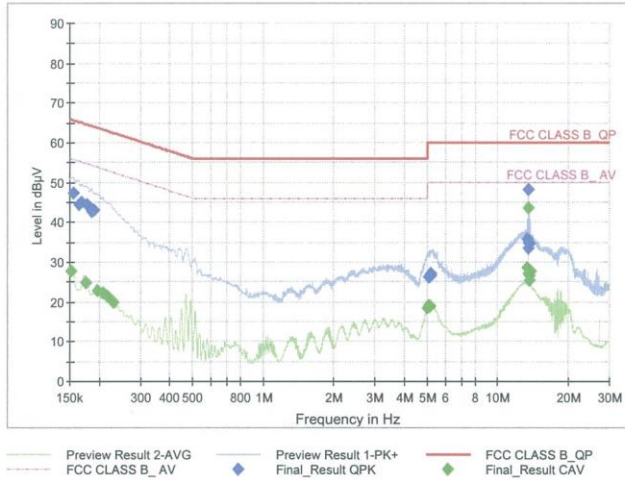
1 / 2

Test Report

Common Information

EUT : SM-S901B/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : NFC UNTERM MODE_L1

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	47.27	65.75	18.48	9.000	L1	OFF	9.6
0.1635	44.29	65.28	20.99	9.000	L1	OFF	9.6
0.1680	45.05	65.06	20.01	9.000	L1	OFF	9.6
0.1770	44.54	64.63	20.08	9.000	L1	OFF	9.6
0.1860	42.69	64.21	21.52	9.000	L1	OFF	9.6
0.1905	43.05	64.02	20.97	9.000	L1	OFF	9.6
5.0608	26.38	60.00	33.62	9.000	L1	OFF	9.9
5.1013	26.33	60.00	33.67	9.000	L1	OFF	9.9
5.1530	26.26	60.00	33.74	9.000	L1	OFF	9.9
5.1620	26.64	60.00	33.36	9.000	L1	OFF	9.9
5.1665	27.20	60.00	32.80	9.000	L1	OFF	9.9
5.1755	26.58	60.00	33.42	9.000	L1	OFF	9.9
13.3475	35.79	60.00	24.21	9.000	L1	OFF	10.2
13.4375	33.55	60.00	26.45	9.000	L1	OFF	10.2
13.4555	34.86	60.00	25.14	9.000	L1	OFF	10.2
13.4735	33.42	60.00	26.58	9.000	L1	OFF	10.2
13.5590	48.30	60.00	11.70	9.000	L1	OFF	10.2
13.6670	34.56	60.00	25.44	9.000	L1	OFF	10.2

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오후 11:46:57

NFC UNTERM MODE_L1

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Final Result CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	27.75	55.88	28.13	9.000	L1	OFF	9.6
0.1748	24.95	54.73	29.79	9.000	L1	OFF	9.6
0.1973	22.82	53.73	30.90	9.000	L1	OFF	9.6
0.2085	22.09	53.27	31.17	9.000	L1	OFF	9.6
0.2175	21.26	52.91	31.66	9.000	L1	OFF	9.6
0.2288	19.97	52.50	32.52	9.000	L1	OFF	9.6
5.0180	18.40	50.00	31.60	9.000	L1	OFF	9.9
5.0765	18.74	50.00	31.26	9.000	L1	OFF	9.9
5.0968	19.10	50.00	30.90	9.000	L1	OFF	9.9
5.1058	18.79	50.00	31.21	9.000	L1	OFF	9.9
5.1395	19.17	50.00	30.83	9.000	L1	OFF	9.9
5.1508	19.06	50.00	30.94	9.000	L1	OFF	9.9
13.3475	28.52	50.00	21.48	9.000	L1	OFF	10.2
13.4533	26.99	50.00	23.01	9.000	L1	OFF	10.2
13.5590	43.53	50.00	6.47	9.000	L1	OFF	10.2
13.6513	25.41	50.00	24.59	9.000	L1	OFF	10.2
13.6648	26.55	50.00	23.45	9.000	L1	OFF	10.2
13.7728	27.61	50.00	22.39	9.000	L1	OFF	10.2

2021-09-30

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Conducted Emissions (Line 2)

NFC TERM MODE_N

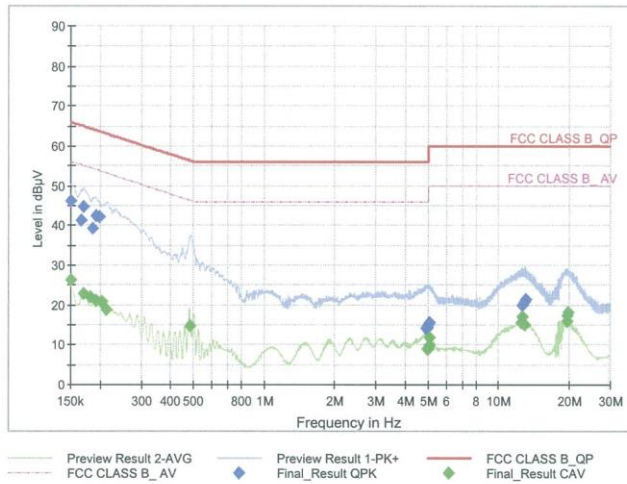
1 / 2

Test Report

Common Information

EUT : SM-S901B/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : NFC TERM MODE_N

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	46.09	66.00	19.91	9.000	N	OFF	9.6
0.1658	41.19	65.17	23.99	9.000	N	OFF	9.6
0.1703	44.66	64.95	20.29	9.000	N	OFF	9.6
0.1860	39.30	64.21	24.91	9.000	N	OFF	9.6
0.1928	42.47	63.92	21.45	9.000	N	OFF	9.6
0.1995	42.14	63.63	21.50	9.000	N	OFF	9.6
4.9280	14.26	56.00	41.74	9.000	N	OFF	9.9
4.9483	14.31	56.00	41.69	9.000	N	OFF	9.9
4.9528	14.17	56.00	41.83	9.000	N	OFF	9.9
4.9708	14.46	56.00	41.54	9.000	N	OFF	9.9
5.0158	14.86	60.00	45.14	9.000	N	OFF	9.9
5.0923	15.71	60.00	44.29	9.000	N	OFF	9.9
12.6613	19.79	60.00	40.21	9.000	N	OFF	10.2
12.6815	19.90	60.00	40.10	9.000	N	OFF	10.2
12.8570	20.69	60.00	39.31	9.000	N	OFF	10.2
12.8885	20.67	60.00	39.33	9.000	N	OFF	10.2
12.9110	20.71	60.00	39.29	9.000	N	OFF	10.2
13.0708	21.45	60.00	38.55	9.000	N	OFF	10.2

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오후 11:55:06

NFC TERM MODE_N

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	26.25	56.00	29.75	9.000	N	OFF	9.6
0.1703	22.79	54.95	32.16	9.000	N	OFF	9.6
0.1815	21.83	54.42	32.59	9.000	N	OFF	9.6
0.1928	21.15	53.92	32.77	9.000	N	OFF	9.6
0.2040	20.65	53.45	32.80	9.000	N	OFF	9.6
0.2130	18.69	53.09	34.39	9.000	N	OFF	9.6
0.4808	14.73	46.33	31.60	9.000	N	OFF	9.6
4.9730	8.86	46.00	37.14	9.000	N	OFF	9.9
4.9865	9.05	46.00	36.95	9.000	N	OFF	9.9
5.0090	8.92	50.00	41.08	9.000	N	OFF	9.9
5.0518	9.86	50.00	40.14	9.000	N	OFF	9.9
5.0945	11.89	50.00	38.11	9.000	N	OFF	9.9
12.5353	15.63	50.00	34.37	9.000	N	OFF	10.2
12.6050	17.14	50.00	32.86	9.000	N	OFF	10.2
12.9088	15.05	50.00	34.95	9.000	N	OFF	10.2
19.4720	15.82	50.00	34.18	9.000	N	OFF	10.4
19.5575	17.22	50.00	32.78	9.000	N	OFF	10.4
19.8230	18.26	50.00	31.74	9.000	N	OFF	10.5

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오후 11:55:06

NFC UNTERM MODE_N

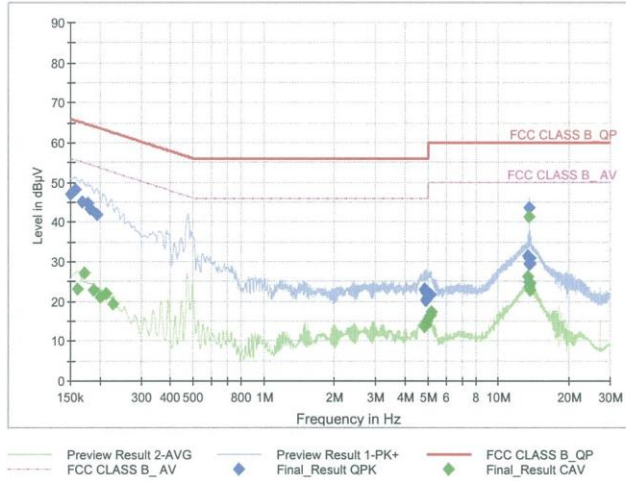
1 / 2

Test Report

Common Information

EUT : SM-S901B/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : NFC UNTERM MODE_N

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	47.03	66.00	18.97	9.000	N	OFF	9.6
0.1568	48.28	65.63	17.35	9.000	N	OFF	9.6
0.1680	45.08	65.06	19.98	9.000	N	OFF	9.6
0.1770	44.58	64.63	20.04	9.000	N	OFF	9.6
0.1815	43.17	64.42	21.25	9.000	N	OFF	9.6
0.1950	41.96	63.82	21.86	9.000	N	OFF	9.6
4.8695	22.72	56.00	33.28	9.000	N	OFF	9.9
4.8763	22.97	56.00	33.03	9.000	N	OFF	9.9
4.9055	22.25	56.00	33.75	9.000	N	OFF	9.9
4.9303	20.29	56.00	35.71	9.000	N	OFF	9.9
4.9618	20.69	56.00	35.31	9.000	N	OFF	9.9
5.1058	21.52	60.00	38.48	9.000	N	OFF	9.9
13.3475	31.47	60.00	28.53	9.000	N	OFF	10.2
13.4555	30.73	60.00	29.27	9.000	N	OFF	10.2
13.4780	29.56	60.00	30.44	9.000	N	OFF	10.2
13.5590	43.48	60.00	16.52	9.000	N	OFF	10.2
13.6648	30.80	60.00	29.20	9.000	N	OFF	10.2
13.6738	29.34	60.00	30.66	9.000	N	OFF	10.2

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오후 11:41:12

NFC UNTERM MODE_N

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Final Result CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1613	23.05	55.40	32.35	9.000	N	OFF	9.6
0.1725	27.11	54.84	27.73	9.000	N	OFF	9.6
0.1883	22.84	54.11	31.27	9.000	N	OFF	9.6
0.2018	21.16	53.54	32.38	9.000	N	OFF	9.6
0.2130	21.88	53.09	31.21	9.000	N	OFF	9.6
0.2265	19.24	52.58	33.33	9.000	N	OFF	9.6
4.8470	13.44	46.00	32.56	9.000	N	OFF	9.9
4.8740	13.71	46.00	32.29	9.000	N	OFF	9.9
4.9010	14.13	46.00	31.87	9.000	N	OFF	9.9
4.9618	15.07	46.00	30.93	9.000	N	OFF	9.9
5.1058	16.54	50.00	33.46	9.000	N	OFF	9.9
5.1598	17.44	50.00	32.56	9.000	N	OFF	9.9
13.3475	26.25	50.00	23.75	9.000	N	OFF	10.2
13.4533	24.68	50.00	25.32	9.000	N	OFF	10.2
13.4668	23.78	50.00	26.22	9.000	N	OFF	10.2
13.5590	41.27	50.00	8.73	9.000	N	OFF	10.2
13.6310	22.87	50.00	27.13	9.000	N	OFF	10.2
13.6648	24.40	50.00	25.60	9.000	N	OFF	10.2

2021-09-30

오후 11:41:12

10. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/23/2022	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	06/17/2022	Annual
Temperature Chamber	SU-642	ESPEC	0093000718	03/15/2022	Annual
Signal Analyzer	N9020A	Agilent	MY51110085	05/03/2022	Annual
DC Power Supply	E3632A	HP	MY40004427	09/15/2022	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C	HP	07560	06/18/2022	Annual
Software	EMC32	Rohde & Schwarz	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

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	EM1000	Audix	060520	N/A	N/A
Turn Table	N/A	Audix	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Schwarzbeck	1513-333	03/19/2022	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-1039	09/03/2023	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-1151	07/29/2023	Biennial
Spectrum Analyzer	FSV(10 Hz ~ 40 GHz)	Rohde & Schwarz	101055	05/14/2022	Annual
Signal Analyzer	N9030A	Agilent	MY49432108	03/09/2022	Annual
Attenuator (3 dB)	2-3	Weinschel	BR0617	09/29/2022	Annual
Attenuator(10 dB)	5910-N-50-010	H+S	None	10/28/2021	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/04/2021	Annual

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-2109-FC046-P