

FCC WPT REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

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Date of Issue:
September 17, 2021

Test Site/Location:
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-
si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2109-FC017

FCC ID: A3LSMG990B

APPLICANT: SAMSUNG Electronics Co., Ltd.

Model: SM-G990E/DS

Additional Model: SM-G990E

EUT Type: Mobile Phone

**Frequency of Operation
& Max. Transmit Power:** 110 kHz ~ 148 kHz(Power sharing) : 5.472 dB μ V/m @300 m

FCC Classification: Part 15 Low Power Transmitter Below 1705 kHz (DCD)

FCC Rule Part(s): FCC Part 15, Subpart C (15.209)

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 No.: HCT-RF-2109-FC017

REVIEWED BY



Report prepared by : Jin Gwan Lee
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-FC017	September 17, 2021	- First Approval Report

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1. EUT DESCRIPTION

Model	SM-G990E/DS
Additional Model	SM-G990E
EUT Type	Mobile Phone
Power Supply	DC 4.20 V
Frequency of Operation	110 kHz ~ 148 kHz(Power sharing)
Max. Transmit Power	5.472 dB μ V/m @300 m
Date(s) of Tests	August 18, 2021 ~ September 10, 2021
Serial number	Radiated: R3CR803NW1R Conducted: R3CR803N9YT

2. TEST METHODOLOGY

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Device (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 15.247 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 below 1 GHz. Above 1 GHz with 1.5 m using absorbers between the EUT and receive antenna. 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).

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's, 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. Worst case configuration

Mode	EUT State	Position of Client device	Battery of Client device	Client device
Power sharing	Charging from EUT to Client device (See Note 3)	Aligned	1 % ~ 20 %	Phone (See Note 2)
			20 % ~ 50 %	
			90 % ~ 100 %	
		Cross	1 % ~ 20 %	
			20 % ~ 50 %	
			90 % ~ 100 %	
	Charging from EUT(Charging from TA) to Client device	Aligned	1 % ~ 20 %	
			20 % ~ 50 %	
			90 % ~ 100 %	
		Cross	1 % ~ 20 %	
			20 % ~ 50 %	
			90 % ~ 100 %	

Note:

1. Client device:

Of Phone and Wearable device, we tested on Phone.

2. Phone(Client device):

- Model : SM-G986B/DS

- Manufacturer : SAMSUNG

- FCC ID : A3LSMG986B

3. EUT can operate the power sharing mode when battery level is over 30 %.

Because test results are not different between fully charged status and battery level 30 % status(EUT condition), test were performed fully charged condition.

4. All position of loop antenna were investigated and the worst position results are reported.

- Position : Horizontal, Vertical, Parallel to the ground plane

- Worst Position : Horizontal

5. The EUT was tested in three orthogonal axis(X, Y, Z) and the worst position results are reported.

- Axis : X, Y, Z

- Worst Axis : X

6. SM-G990E/DS, SM-G990E were tested and the worst case results are reported.

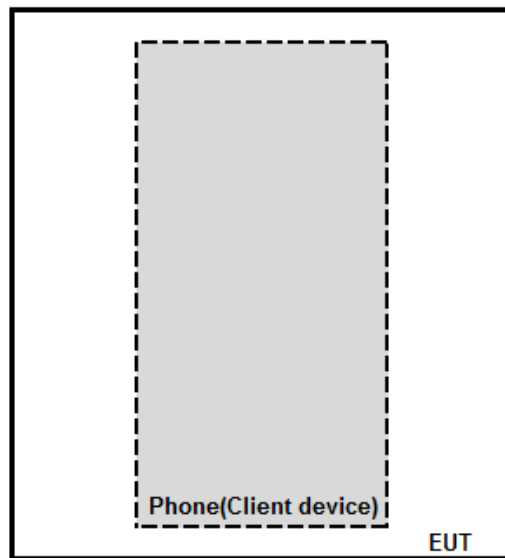
(Worst case : SM-G990E/DS)

AC Power line Conducted Emissions

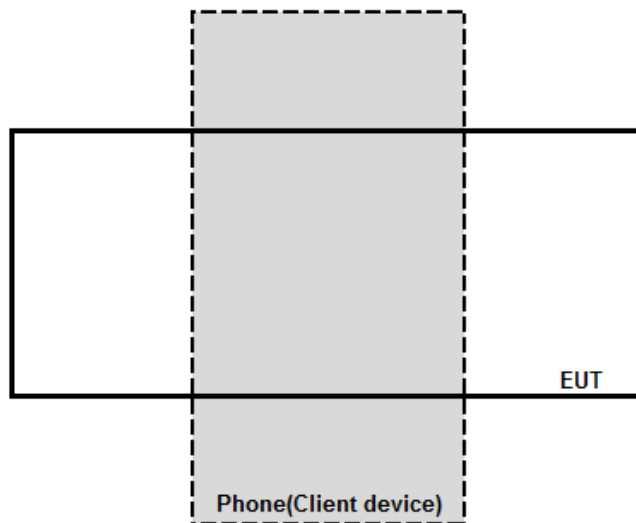
1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : EUT + External accessories(Earphone, etc) + Travel Adapter + Phone(Client device)
 , EUT + Travel Adapter + Phone(Client device)
 - Worst case : EUT + Travel Adapter + Phone(Client device)
2. SM-G990E/DS, SM-G990E were tested and the worst case results are reported.
(Worst case : SM-G990E/DS)

Test Setup Diagram:

Aligned



Cross



8. TEST SUMMARY

Test Description	FCC Rule	Limit	Condition	Result
Radiated emission	§15.209	cf. Section 9	Radiated	Pass
AC Power Line Conducted Emission	§15.207	cf. Section 10		Pass
Emission bandwidth.	§2.1049	<u>See note1</u>		<u>See note1</u>

Note:

1. For reporting purposes only.

9. RADIATED EMISSION MEASUREMENT

Test Settings

1. Analyzer frequency set to the frequency of the radiated spurious emission of interest.
2. RBW :
 - 9 kHz – 150 kHz : 300 Hz
 - 150 kHz – 30 MHz : 10 kHz
 - 30 MHz – 1G Hz : 100 kHz
3. VBW : $\geq 3 \times$ RBW
4. Sweep time : Auto couple
5. Detector : Peak
6. Trace : Maxhold
7. Trace was allowed to stabilize

Limit(FCC)

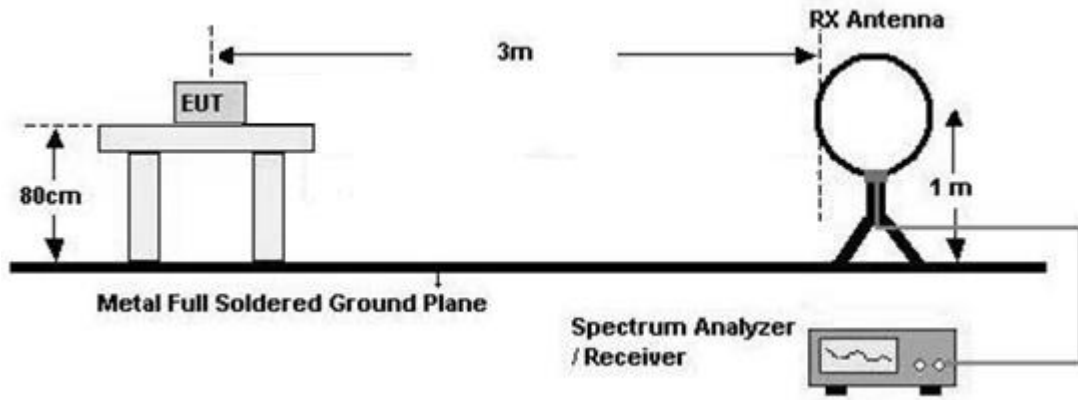
Except as provided elsewhere in this paragraph the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

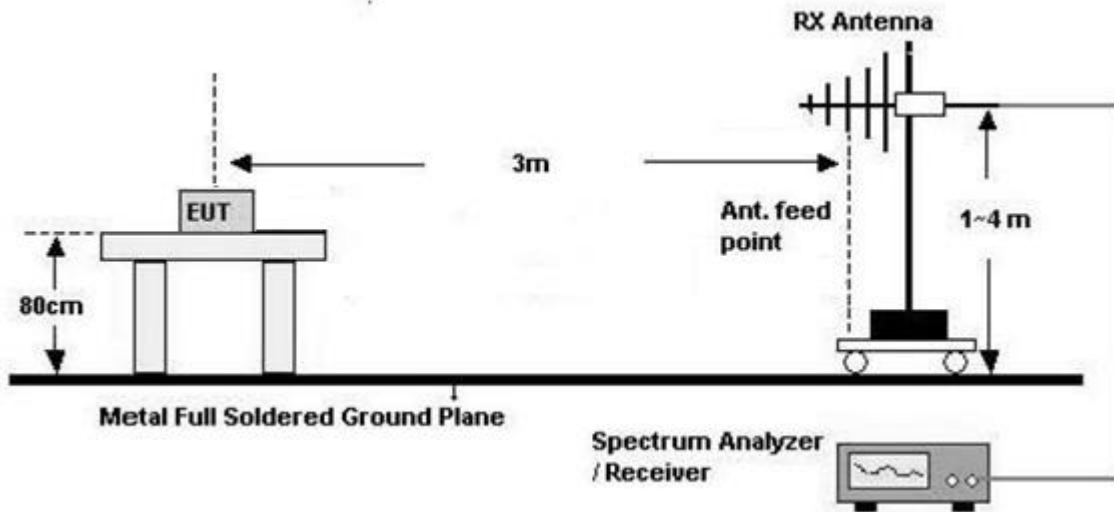
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

Test Set-up

Below 30 MHz



30 MHz - 1 GHz



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 limit is converted from microvolts/meter to decibel microvolts/meter. Sample Calculation:
 - * Result level(dB μ V/m@30 m)
= Measured level(dB μ V/m@3 m) + Ant factor(dB/m) + Cable Loss(dB) – Distance Correction Factor.
6. Distance Correction
 - * 0.009 MHz – 0.490 MHz :
 $40\log(3\text{ m}/300\text{ m}) = - 80\text{ dB}$
 - * 0.490 MHz – 30 MHz :
 $40\log(3\text{ m}/30\text{ m}) = - 40\text{ dB}$
7. Plots were taken without using any correction factors.
8. The worst case plots are reported.

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(Below 1 GHz)

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 3 m 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
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.

Test Result

Frequency (kHz)	Measured Level (dB μ V/m)@3 m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
10.001	32.722	19.00	0.47	-80.00	-27.808	47.60	75.41
#123.35	58.316	19.30	0.47	-80.00	-1.914	25.78	27.70
125.3	26.734	19.30	0.47	-80.00	-33.496	25.65	59.14
369.45	38.862	19.20	0.47	-80.00	-21.468	16.25	37.72
5295	13.402	19.50	0.47	-40.00	-6.628	29.54	36.17

Note

1. “#” Fundamental Frequency
2. EUT Mode: Charging from EUT to Phone
3. Position: Aligned
4. 30 MHz – 1 GHz : No Critical peaks found
5. The fundamental frequency(110 kHz – 148 kHz) varies depending on the position of client device.
All fundamental frequency were investigated and the worst results are reported.

Frequency (kHz)	Measured Level (dB μ V/m)@3 m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
9.41	31.889	18.90	0.47	-80.00	-28.741	48.13	76.87
#113.05	59.424	19.30	0.47	-80.00	-0.806	26.54	27.34
115	29.341	19.30	0.47	-80.00	-30.889	26.39	57.28
339.5	38.588	19.20	0.47	-80.00	-21.742	16.99	38.73
5092.5	11.778	19.50	0.47	-40.00	-8.252	29.54	37.79

Note

1. “#” Fundamental Frequency
2. EUT Mode: Charging from EUT to Phone
3. Position: Cross
4. 30 MHz – 1 GHz : No Critical peaks found
5. The fundamental frequency(110 kHz – 148 kHz) varies depending on the position of client device.
All fundamental frequency were investigated and the worst results are reported.

Frequency (kHz)	Measured Level (dB μ V/m)@3 m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
28.0645	40.221	19.30	0.47	-80.00	-20.009	38.64	58.65
#113.05	58.640	19.30	0.47	-80.00	-1.590	26.54	28.13
114.1	24.671	19.30	0.47	-80.00	-35.559	26.46	62.02
345.2	38.332	19.20	0.47	-80.00	-21.998	16.84	38.84
5.403	11.990	19.50	0.47	-40.00	-8.040	29.54	37.58

Note

1. “#” Fundamental Frequency
2. EUT Mode: Charging from EUT(Charging from TA) to Phone
3. Position: Aligned
4. 30 MHz – 1 GHz : No Critical peaks found
5. The fundamental frequency(110 kHz – 148 kHz) varies depending on the position of client device.
All fundamental frequency were investigated and the worst results are reported.

Frequency (kHz)	Measured Level (dB μ V/m)@3 m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
32.0658	41.084	19.30	0.47	-80.00	-19.146	37.48	56.63
#113.1	65.702	19.30	0.47	-80.00	5.472	26.53	21.06
115.1	30.777	19.30	0.47	-80.00	-29.453	26.38	55.84
339.5	44.548	19.20	0.47	-80.00	-15.782	16.99	32.77
5.0925	12.198	19.50	0.47	-40.00	-7.832	29.54	37.37

Note

1. “#” Fundamental Frequency
2. EUT Mode: Charging from EUT(Charging from TA) to Phone
3. Position: Cross
4. 30 MHz – 1 GHz : No Critical peaks found
5. The fundamental frequency(110 kHz – 148 kHz) varies depending on the position of client device.
All fundamental frequency were investigated and the worst results are reported.

Test Plot

In order to simplify the report, the worst case results are reported.

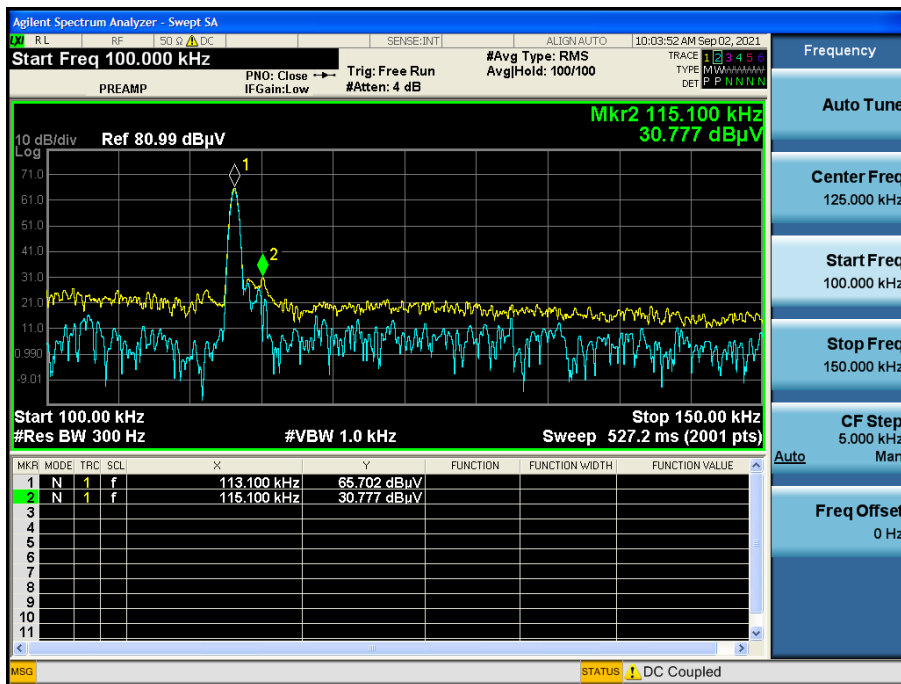
Worst case

- EUT Mode: Charging from EUT(Charging from TA) to Phone
- Position: Cross

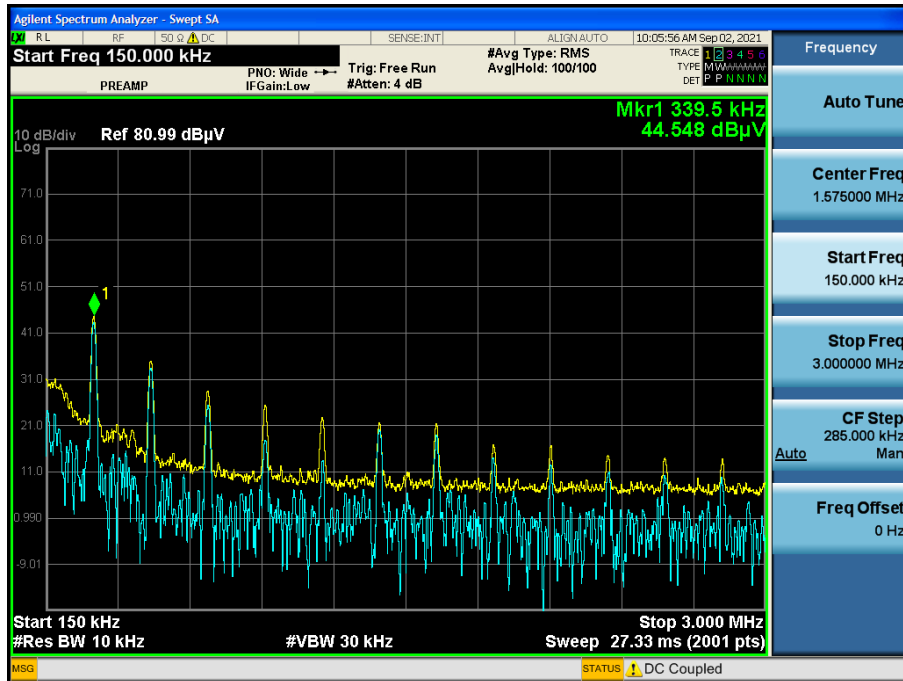
Frequency Range : 9 kHz – 100 kHz



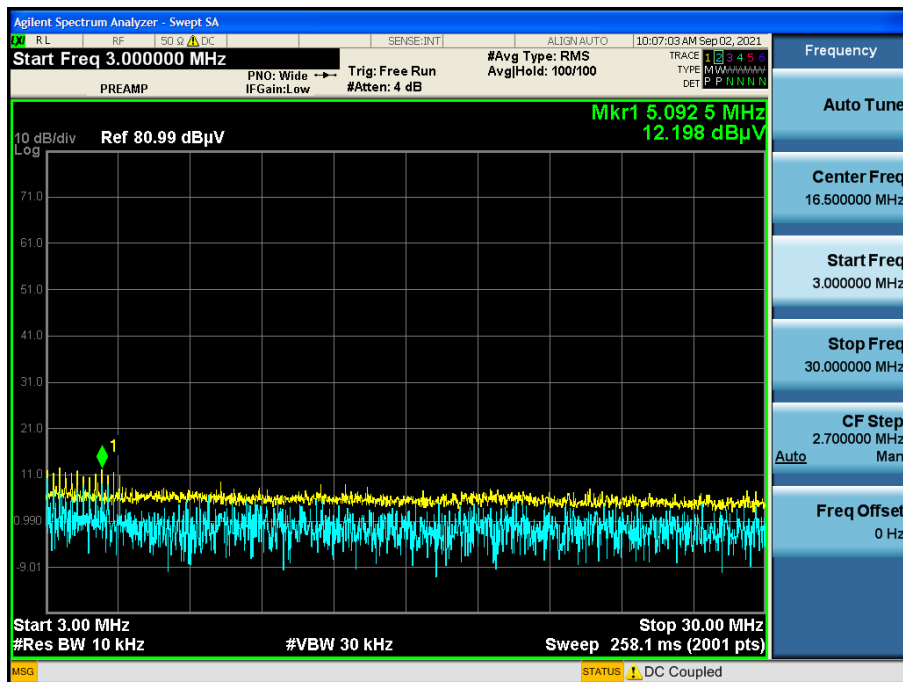
Frequency Range : 100 kHz – 150 kHz



Frequency Range : 150 kHz – 3 MHz



Frequency Range : 3 MHz – 30 MHz



(30 MHz – 1 GHz : No Critical peaks found)

Note :

In order to simplify the report, attached plots were only the worstcase

10. POWERLINE 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

Test Result & Plot (Position: Aligned)
Conducted Emissions (Line 1)

Test

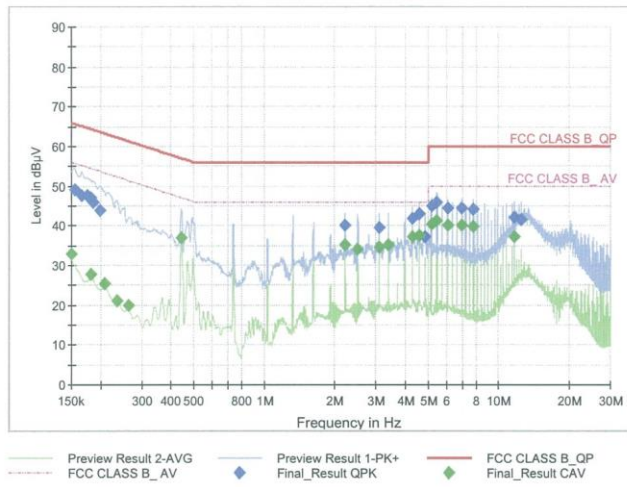
1 / 2

Test Report

Common Information

EUT : SM-G990E/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WPT L1 ALIGNED
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	49.08	65.75	16.68	9.000	L1	OFF	9.6
0.1658	47.68	65.17	17.49	9.000	L1	OFF	9.6
0.1748	47.48	64.73	17.25	9.000	L1	OFF	9.6
0.1815	47.04	64.42	17.38	9.000	L1	OFF	9.6
0.1860	45.74	64.21	18.47	9.000	L1	OFF	9.6
0.1995	43.83	63.63	19.80	9.000	L1	OFF	9.6
2.2123	40.20	56.00	15.80	9.000	L1	OFF	9.7
3.0965	39.55	56.00	16.45	9.000	L1	OFF	9.8
4.2778	41.86	56.00	14.14	9.000	L1	OFF	9.8
4.5725	42.84	56.00	13.16	9.000	L1	OFF	9.9
4.8695	37.12	56.00	18.88	9.000	L1	OFF	9.9
5.1620	44.93	60.00	15.07	9.000	L1	OFF	9.9
5.4568	45.93	60.00	14.07	9.000	L1	OFF	9.9
6.0485	44.35	60.00	15.65	9.000	L1	OFF	9.9
6.9328	44.37	60.00	15.63	9.000	L1	OFF	9.9
7.8170	44.05	60.00	15.95	9.000	L1	OFF	10.0
11.6533	41.98	60.00	18.02	9.000	L1	OFF	10.1
12.5375	41.66	60.00	18.34	9.000	L1	OFF	10.1

Final_Result_CAV

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Test

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Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	32.84	56.00	23.16	9.000	L1	OFF	9.6
0.1815	27.58	54.42	26.84	9.000	L1	OFF	9.6
0.2085	25.47	53.27	27.79	9.000	L1	OFF	9.6
0.2355	21.06	52.25	31.19	9.000	L1	OFF	9.6
0.2625	19.83	51.35	31.52	9.000	L1	OFF	9.6
0.4425	36.87	47.02	10.15	9.000	L1	OFF	9.6
2.2123	35.32	46.00	10.68	9.000	L1	OFF	9.7
2.5070	34.07	46.00	11.93	9.000	L1	OFF	9.8
3.0965	34.67	46.00	11.33	9.000	L1	OFF	9.8
3.3935	35.30	46.00	10.70	9.000	L1	OFF	9.8
4.2778	37.13	46.00	8.87	9.000	L1	OFF	9.8
4.5725	37.56	46.00	8.44	9.000	L1	OFF	9.9
5.1620	40.41	50.00	9.59	9.000	L1	OFF	9.9
5.4568	41.39	50.00	8.61	9.000	L1	OFF	9.9
6.0485	40.00	50.00	10.00	9.000	L1	OFF	9.9
6.9328	39.96	50.00	10.04	9.000	L1	OFF	9.9
7.8170	39.90	50.00	10.10	9.000	L1	OFF	10.0
11.6533	37.11	50.00	12.89	9.000	L1	OFF	10.1

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Conducted Emissions (Line 2)

Test

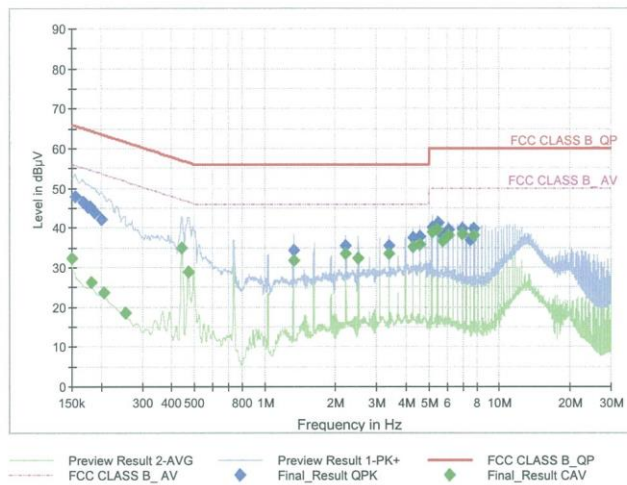
1 / 2

Test Report

Common Information

EUT : SM-G990E/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WPT N ALIGNED
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	47.95	65.75	17.81	9.000	N	OFF	9.6
0.1680	46.39	65.06	18.67	9.000	N	OFF	9.6
0.1748	45.43	64.73	19.30	9.000	N	OFF	9.6
0.1793	45.37	64.52	19.15	9.000	N	OFF	9.6
0.1883	43.73	64.11	20.39	9.000	N	OFF	9.6
0.2018	42.13	63.54	21.41	9.000	N	OFF	9.6
1.3280	34.41	56.00	21.59	9.000	N	OFF	9.7
2.2123	35.54	56.00	20.46	9.000	N	OFF	9.7
3.3935	35.34	56.00	20.66	9.000	N	OFF	9.8
4.2778	37.37	56.00	18.63	9.000	N	OFF	9.8
4.5725	37.80	56.00	18.20	9.000	N	OFF	9.8
5.1620	40.19	60.00	19.81	9.000	N	OFF	9.9
5.4590	41.18	60.00	18.82	9.000	N	OFF	9.9
5.7538	38.19	60.00	21.81	9.000	N	OFF	9.9
6.0485	39.61	60.00	20.39	9.000	N	OFF	9.9
6.9328	39.78	60.00	20.22	9.000	N	OFF	9.9
7.5245	36.92	60.00	23.08	9.000	N	OFF	10.0
7.8170	39.80	60.00	20.20	9.000	N	OFF	10.0

Final Result_CAV

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Test

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Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	32.23	56.00	23.77	9.000	N	OFF	9.6
0.1815	26.33	54.42	28.09	9.000	N	OFF	9.6
0.2063	23.70	53.36	29.66	9.000	N	OFF	9.6
0.2535	18.57	51.64	33.07	9.000	N	OFF	9.6
0.4425	34.87	47.02	12.15	9.000	N	OFF	9.6
0.4718	28.99	46.48	17.49	9.000	N	OFF	9.6
1.3280	31.63	46.00	14.37	9.000	N	OFF	9.7
2.2123	33.40	46.00	12.60	9.000	N	OFF	9.7
2.5070	32.16	46.00	13.84	9.000	N	OFF	9.8
3.3935	33.47	46.00	12.53	9.000	N	OFF	9.8
4.2778	35.25	46.00	10.75	9.000	N	OFF	9.8
4.5725	35.67	46.00	10.33	9.000	N	OFF	9.8
5.1620	39.08	50.00	10.92	9.000	N	OFF	9.9
5.4568	39.58	50.00	10.42	9.000	N	OFF	9.9
5.7538	36.60	50.00	13.40	9.000	N	OFF	9.9
6.0485	38.13	50.00	11.87	9.000	N	OFF	9.9
6.9328	38.28	50.00	11.72	9.000	N	OFF	9.9
7.8170	38.14	50.00	11.86	9.000	N	OFF	10.0

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Test Result & Plot (Position: Cross)
Conducted Emissions (Line 1)

Test

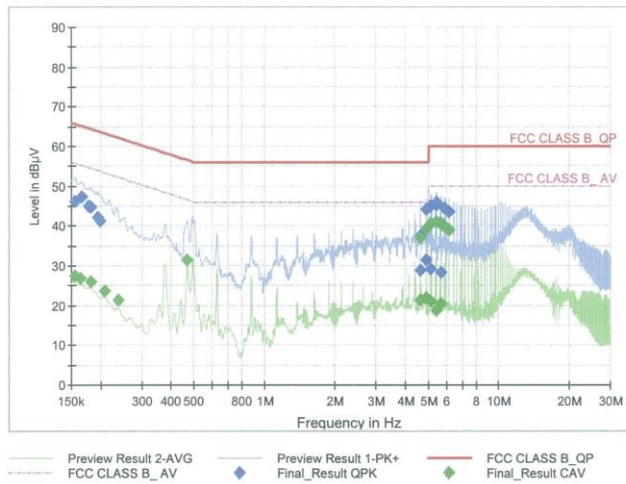
1 / 2

Test Report

Common Information

EUT : SM-G990E/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WPT L1 CROSS
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	46.22	65.75	19.53	9.000	L1	OFF	9.6
0.1658	47.39	65.17	17.78	9.000	L1	OFF	9.6
0.1770	44.87	64.63	19.75	9.000	L1	OFF	9.6
0.1815	44.68	64.42	19.74	9.000	L1	OFF	9.6
0.1950	42.13	63.82	21.69	9.000	L1	OFF	9.6
0.1995	41.39	63.63	22.24	9.000	L1	OFF	9.6
4.6445	37.55	56.00	18.45	9.000	L1	OFF	9.9
4.6558	28.76	56.00	27.24	9.000	L1	OFF	9.9
4.8965	44.19	56.00	11.81	9.000	L1	OFF	9.9
4.9055	31.49	56.00	24.51	9.000	L1	OFF	9.9
5.1463	45.03	60.00	14.97	9.000	L1	OFF	9.9
5.1575	29.20	60.00	30.80	9.000	L1	OFF	9.9
5.3983	45.93	60.00	14.07	9.000	L1	OFF	9.9
5.4095	45.30	60.00	14.70	9.000	L1	OFF	9.9
5.6503	40.59	60.00	19.41	9.000	L1	OFF	9.9
5.6615	28.33	60.00	31.67	9.000	L1	OFF	9.9
5.9000	44.34	60.00	15.66	9.000	L1	OFF	9.9
6.1520	43.62	60.00	16.38	9.000	L1	OFF	9.9

Final_Result_CAV

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Test

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Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	27.34	55.75	28.41	9.000	L1	OFF	9.6
0.1635	26.78	55.28	28.51	9.000	L1	OFF	9.6
0.1815	25.92	54.42	28.50	9.000	L1	OFF	9.6
0.2085	23.68	53.27	29.59	9.000	L1	OFF	9.6
0.2378	21.23	52.17	30.95	9.000	L1	OFF	9.6
0.4695	31.41	46.52	15.12	9.000	L1	OFF	9.6
4.6468	21.37	46.00	24.63	9.000	L1	OFF	9.9
4.6558	36.79	46.00	9.21	9.000	L1	OFF	9.9
4.8965	39.32	46.00	6.68	9.000	L1	OFF	9.9
4.9055	22.00	46.00	24.00	9.000	L1	OFF	9.9
5.1485	40.80	50.00	9.20	9.000	L1	OFF	9.9
5.1575	20.99	50.00	29.01	9.000	L1	OFF	9.9
5.3983	41.10	50.00	8.90	9.000	L1	OFF	9.9
5.4095	18.69	50.00	31.31	9.000	L1	OFF	9.9
5.6503	40.37	50.00	9.63	9.000	L1	OFF	9.9
5.6615	20.36	50.00	29.64	9.000	L1	OFF	9.9
5.9000	39.67	50.00	10.33	9.000	L1	OFF	9.9
6.1520	39.00	50.00	11.00	9.000	L1	OFF	9.9

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Conducted Emissions (Line 2)

Test

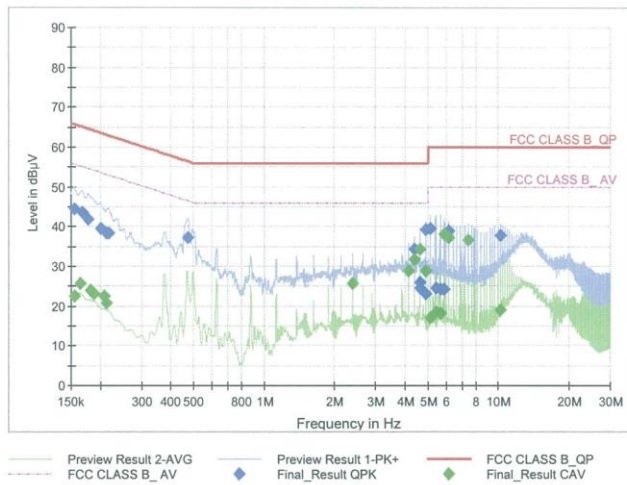
1 / 2

Test Report

Common Information

EUT : SM-G990E/DS
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WPT N CROSS
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	44.32	65.75	21.43	9.000	N	OFF	9.6
0.1680	43.44	65.06	21.62	9.000	N	OFF	9.6
0.1770	41.82	64.63	22.80	9.000	N	OFF	9.6
0.2018	39.40	63.54	24.14	9.000	N	OFF	9.6
0.2130	38.27	63.09	24.82	9.000	N	OFF	9.6
0.2175	38.22	62.91	24.69	9.000	N	OFF	9.6
0.4740	37.25	56.44	19.19	9.000	N	OFF	9.6
4.3948	34.33	56.00	21.67	9.000	N	OFF	9.8
4.6355	26.00	56.00	30.00	9.000	N	OFF	9.9
4.6468	24.40	56.00	31.60	9.000	N	OFF	9.9
4.8853	23.05	56.00	32.95	9.000	N	OFF	9.9
4.8965	39.22	56.00	16.78	9.000	N	OFF	9.9
5.1485	39.39	60.00	20.61	9.000	N	OFF	9.9
5.3983	24.46	60.00	35.54	9.000	N	OFF	9.9
5.6503	24.24	60.00	35.76	9.000	N	OFF	9.9
5.9000	24.35	60.00	35.65	9.000	N	OFF	9.9
6.1520	38.93	60.00	21.07	9.000	N	OFF	9.9
10.1705	37.68	60.00	22.32	9.000	N	OFF	10.1

Final Result CAV

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Test

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Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	22.63	55.75	33.12	9.000	N	OFF	9.6
0.1635	25.59	55.28	29.69	9.000	N	OFF	9.6
0.1815	24.02	54.42	30.40	9.000	N	OFF	9.6
0.1883	23.06	54.11	31.05	9.000	N	OFF	9.6
0.2085	22.45	53.27	30.82	9.000	N	OFF	9.6
0.2130	20.64	53.09	32.45	9.000	N	OFF	9.6
2.3855	25.58	46.00	20.42	9.000	N	OFF	9.7
4.1428	28.95	46.00	17.05	9.000	N	OFF	9.8
4.3948	31.81	46.00	14.19	9.000	N	OFF	9.8
4.6468	34.25	46.00	11.75	9.000	N	OFF	9.9
4.8965	28.83	46.00	17.17	9.000	N	OFF	9.9
5.1485	17.12	50.00	32.88	9.000	N	OFF	9.9
5.3983	18.40	50.00	31.60	9.000	N	OFF	9.9
5.6503	18.04	50.00	31.96	9.000	N	OFF	9.9
5.9000	38.10	50.00	11.90	9.000	N	OFF	9.9
6.1520	37.32	50.00	12.68	9.000	N	OFF	9.9
7.4075	36.70	50.00	13.30	9.000	N	OFF	9.9
10.1705	19.05	50.00	30.95	9.000	N	OFF	10.1

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11. EMISSION BANDWIDTH PLOT

Test Settings

1. Analyzer frequency set to the frequency of the radiated spurious emission of interest
2. RBW : 300 Hz
(Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.)
3. VBW : $\geq 3 \times$ RBW
4. Sweep time : Auto couple
5. Detector : Peak
6. Trace : Maxhold
7. Trace was allowed to stabilize

Limit

None

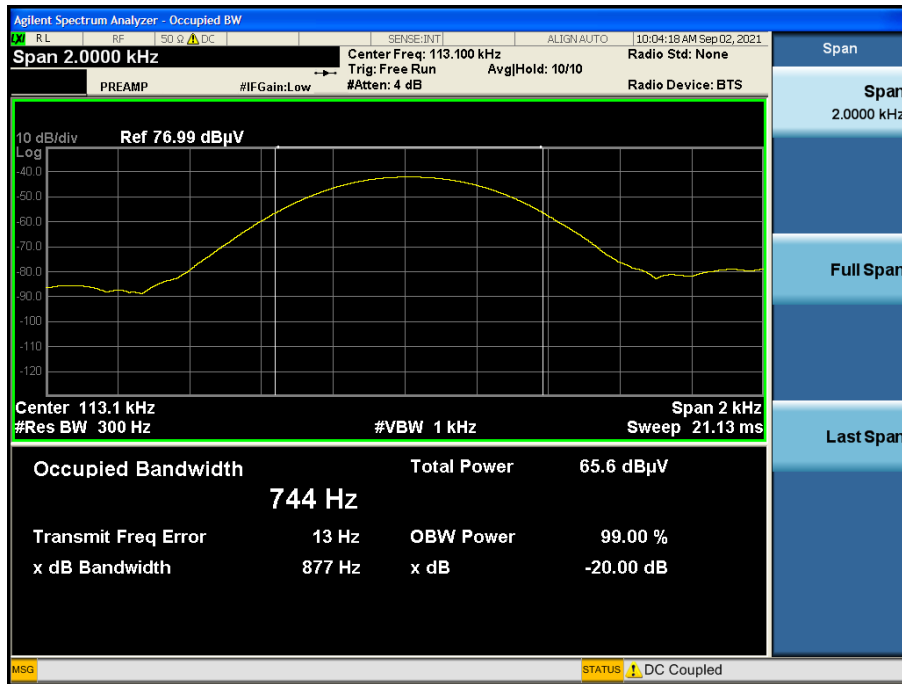
(for reporting purposes only.)

■ **Test Result**

EUT Mode	Position	Test Frequency (kHz)	20 dB Bandwidth (Hz)	Occupied Bandwidth (Hz)
Charging from EUT to Phone	Aligned	123.40	894	762
	Cross	113.05	875	752
Charging from EUT(Charging from TA) to Phone	Aligned	113.05	867	738
	Cross	113.10	877	744

■ Test Plot

Charging from EUT(Charging from TA) to Phone – Position : Cross



Note :

In order to simplify the report, attached plots were only the worstcase

12. LIST OF TEST EQUIPMENT

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
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	Loop Antenna	Rohde & Schwarz	1513-333	03/19/2022	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	09/04/2022	Biennial
Spectrum Analyzer	FSV40-N	Rohde & Schwarz	101068-SZ	09/22/2021	Annual
Signal Analyzer	N9030A	Agilent	MY49431210	01/11/2022	Annual
Attenuator (10 dB)	CBLU1183540B-01	CERNEX	N/A	12/23/2021	Annual
56-10	56-10	WEINSCHEL			
Broadband Low Noise Amplifier	CBL06185030	CERNEX	N/A	12/23/2021	Annual
Attenuator (3 dB)	18B-03	Api tech.			
Power Amplifier	CBL26405040	CERNEX	25956	03/23/2022	Annual

13. Annex A_TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2109-FC017-P