

FCC WPT REPORT

Certification

Applicant Name: SAMSUNG Electronics Co., Ltd.	Date of Issue: May 19, 2022
Address: 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea	Test Site/Location: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon- si, Gyeonggi-do, 17383 KOREA
	Report No.: HCT-RF-2205-FC014-R1

FCC ID:	A3LSMG990U2
APPLICANT:	SAMSUNG Electronics Co., Ltd.

Model:	SM-G990U2
Additional Model:	SM-G990U3/DS
EUT Type:	Mobile Phone
Frequency of Operation & Max. Transmit Power:	110 kHz ~ 148 kHz(Power sharing) : 5.621 dBuV/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)

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-2205-FC014-R1

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)

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

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2205-FC014	May 13, 2022	- First Approval Report
HCT-RF-2205-FC014-R1	May 19, 2022	- Page 9, Added client device S/N

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1. EUT DESCRIPTION

Model	SM-G990U2
Additional Model	SM-G990U3/DS
EUT Type	Mobile Phone
Power Supply	DC 3.88 V
Frequency of Operation	110 kHz ~ 148 kHz(Power sharing)
Max. Transmit Power	5.621 dBuV/m @300 m
Date(s) of Tests	April 06, 2022 ~ May 10, 2022
Serial number	Radiated: R3CT30Q0R8W

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 15.205, 15.207 and 15.209 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)	2.00 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.40 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.51 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.92 (Confidence level about 95 %, $k=2$)
Radiated Disturbance (Above 40 GHz)	5.48 (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
- S/N : R5CN1003ZRA

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

4. SM-G990U2, SM-G990U3/DS were tested and the worst case results are reported. (Worst case : SM-G990U2)

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.

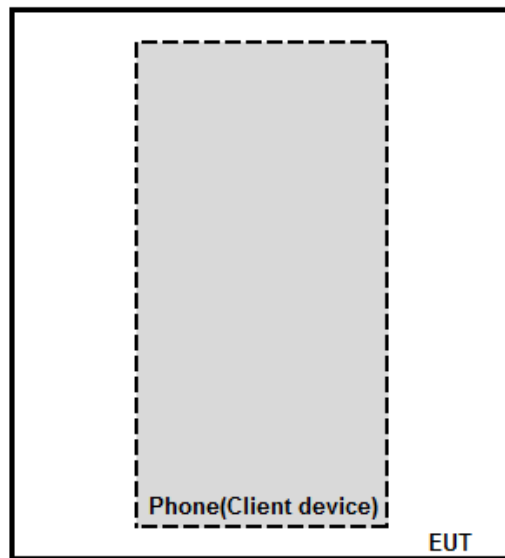
- Mode : EUT + External accessories(Earphone, etc) + Travel Adapter + Phone(Client device)
 , EUT + Travel Adapter + Phone(Client device)

- Worst case : EUT + Travel Adapter + Phone(Client device)

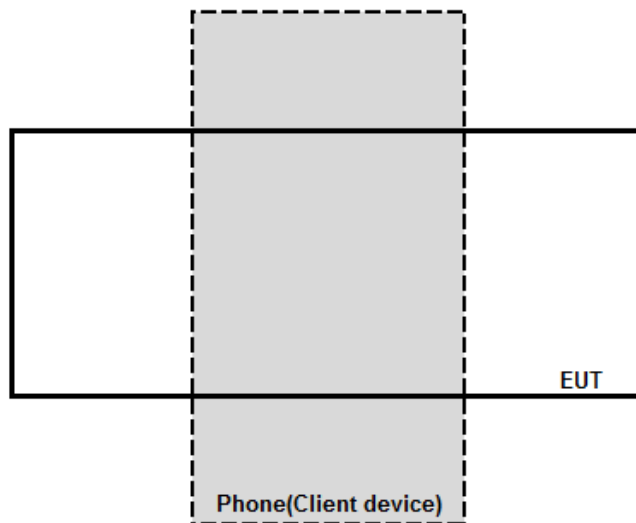
2. SM-G990U2, SM-G990U3/DS were tested and the worst case results are reported. (Worst case : SM-G990U2)

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

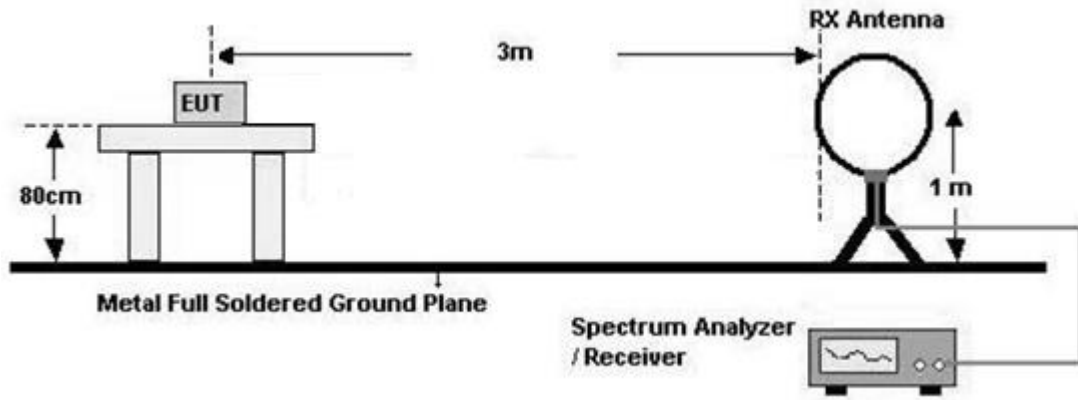
Except as provided elsewhere in this paragraph the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

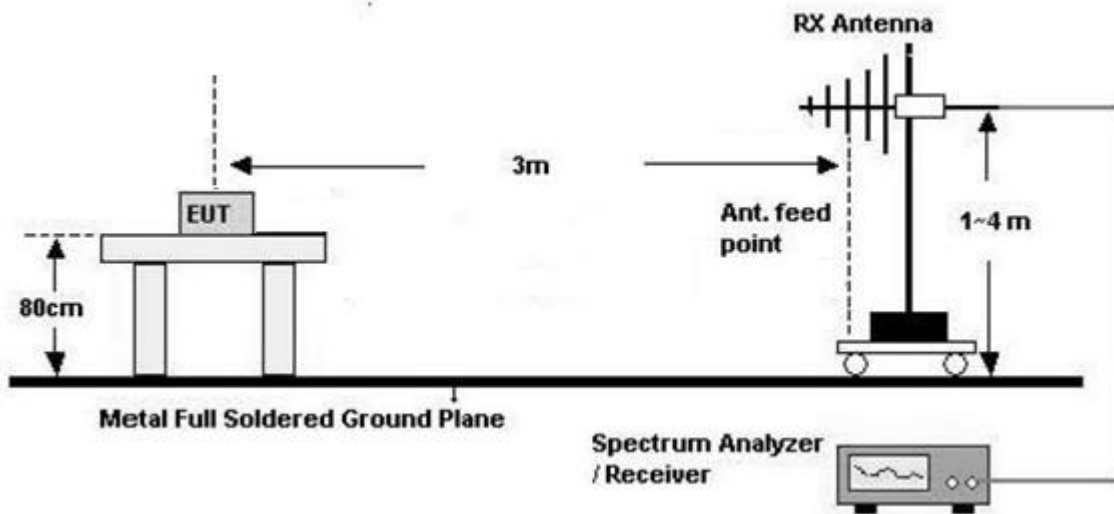
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, 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 Value(dBμV/m@30 m)
 - = Measured Value(dBμV/m@3 m) + Ant factor(dB/m) + Cable Loss(dB)
 - Distance Correction Factor(dB)
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)	Reading Level (dB μ V/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
9.182	32.159	19.2	0.47	-80.00	-28.171	48.35	76.52
#113.325	61.371	19.6	0.47	-80.00	1.441	26.52	25.08
115.325	31.558	19.6	0.47	-80.00	-28.372	26.37	54.74
341.000	41.050	19.5	0.47	-80.00	-18.98	16.95	35.93
5430.000	12.638	19.8	0.47	-40.00	-7.092	29.54	36.63

Note

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

Frequency (kHz)	Reading Level (dB μ V/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
11.048	31.611	19.2	0.47	-80.00	-28.719	46.74	75.46
#113.300	63.447	19.6	0.47	-80.00	3.517	26.52	23.00
115.300	26.922	19.6	0.47	-80.00	-33.008	26.37	59.38
341.000	42.845	19.5	0.47	-80.00	-17.185	16.95	34.13
5106.000	12.796	19.8	0.47	-40.00	-6.934	29.54	36.47

Note

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

Frequency (kHz)	Reading Level (dB μ V/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
27.655	42.406	19.6	0.47	-80.00	-17.524	38.77	56.29
#113.350	63.251	19.6	0.47	-80.00	3.321	26.52	23.19
115.300	33.109	19.6	0.47	-80.00	-26.821	26.37	53.19
339.500	42.224	19.5	0.47	-80.00	-17.806	16.99	34.79
24924.000	12.679	20.1	0.47	-40.00	-6.751	29.54	36.29

Note

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

Frequency (kHz)	Reading Level (dB μ V/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
26.927	39.859	19.6	0.47	-80.00	-20.071	39.00	59.07
106.550	27.92	19.6	0.47	-80.00	-32.010	27.05	59.06
#113.325	65.551	19.6	0.47	-80.00	5.621	26.52	20.90
339.500	44.563	19.5	0.47	-80.00	-15.467	16.99	32.45
4417.500	14.397	19.8	0.47	-40.00	-5.333	29.54	34.87

Note

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

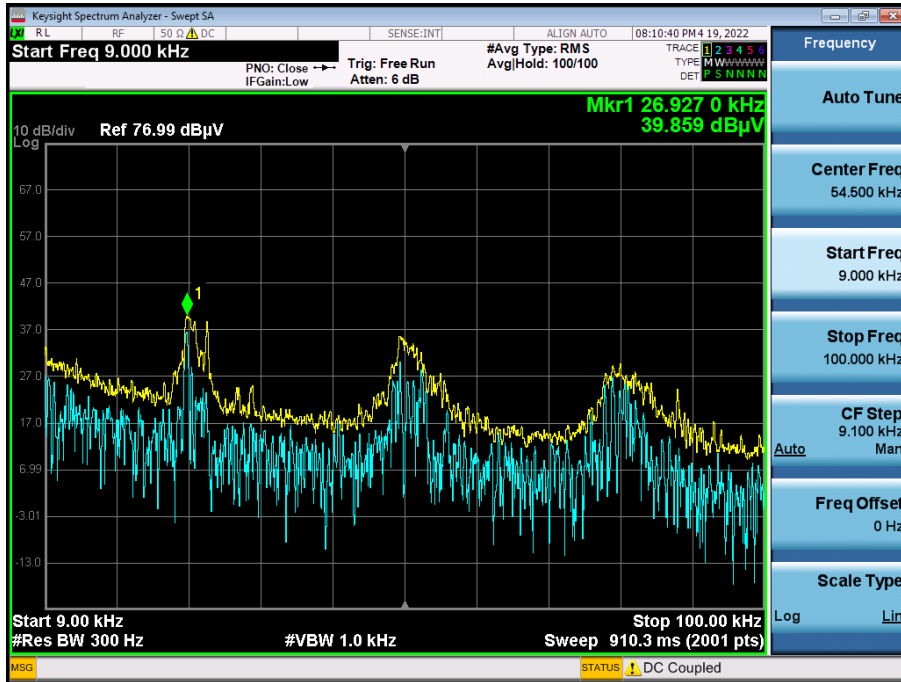
Test Plot

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

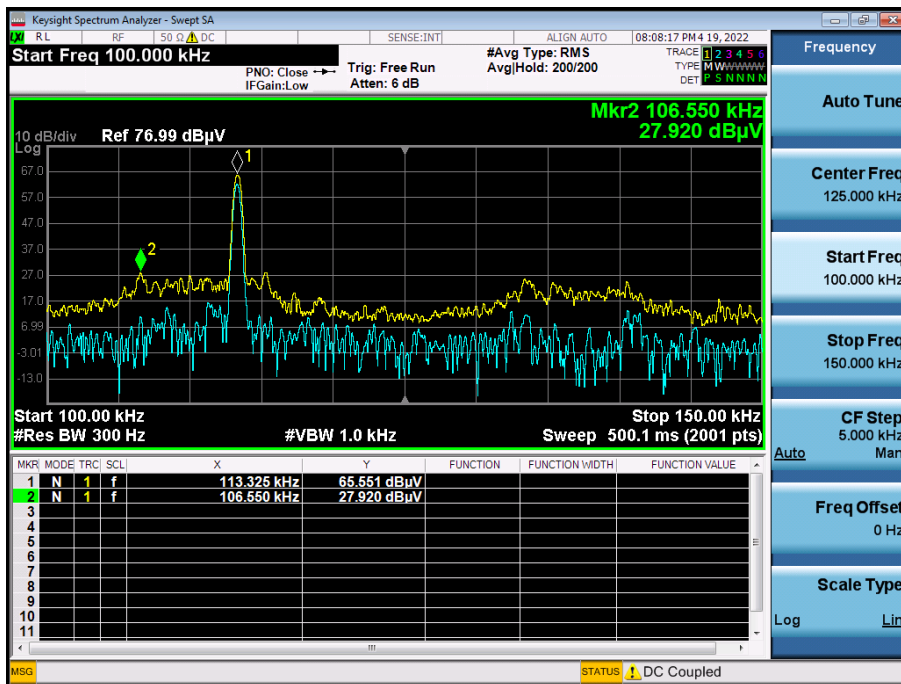
Worst case

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

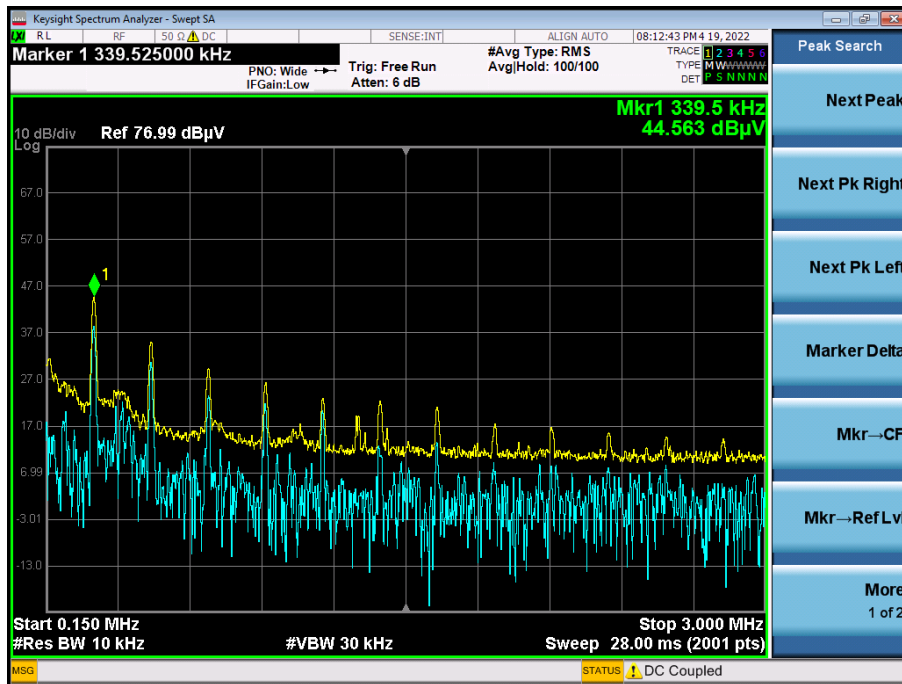
Frequency Range : 9 kHz – 100kHz



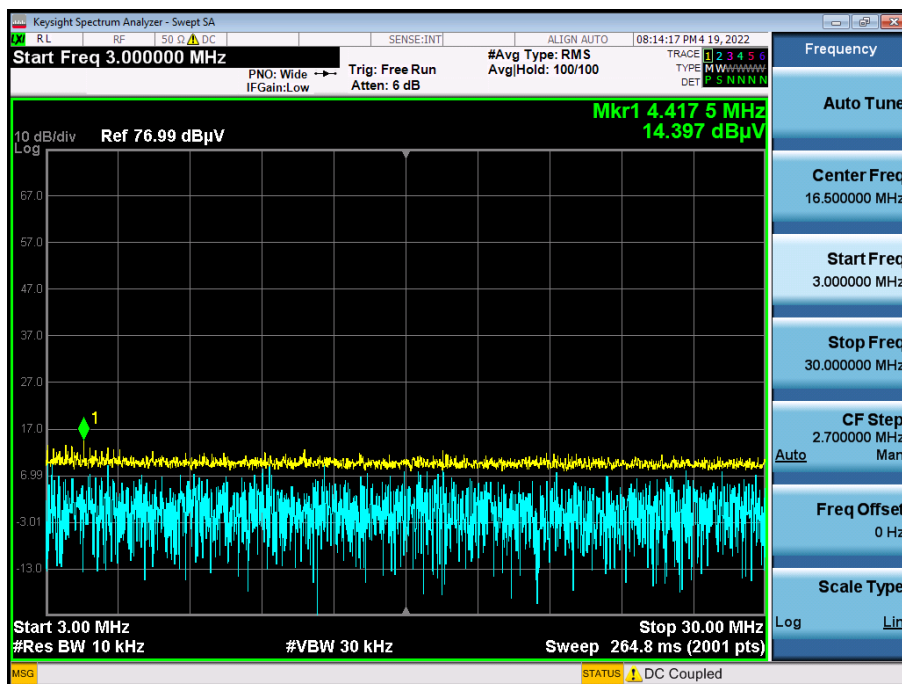
Frequency Range : 100 kHz – 150kHz



Frequency Range : 150 kHz – 3 MHz



Frequency Range : 3 MHz – 30 MHz



Frequency Range : 30 MHz – 1 GHz
 (30 MHz – 1GHz : 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

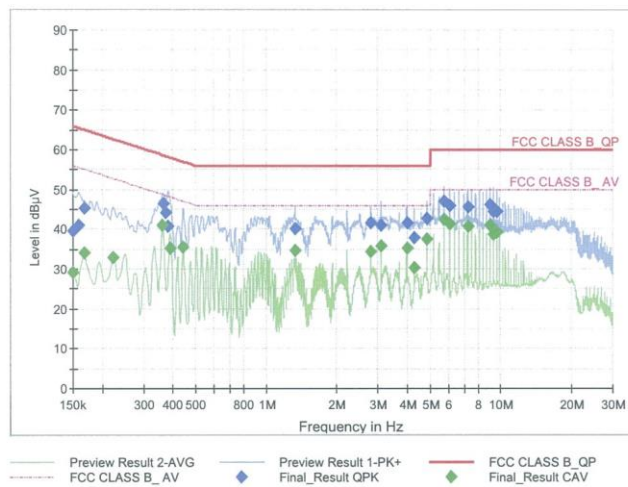
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Test Report

Common Information

EUT : SM-G990U2
 Manufacturer : SAMSUNG Electronics Co., Ltd.
 Test Site: SHIELD ROOM
 Operating Conditions : WPT Aligned_L1
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	39.58	66.00	26.42	9.000	L1	OFF	9.6
0.1590	41.09	65.52	24.43	9.000	L1	OFF	9.6
0.1680	45.18	65.06	19.87	9.000	L1	OFF	9.6
0.3638	46.53	58.64	12.12	9.000	L1	OFF	9.6
0.3728	44.20	58.44	14.24	9.000	L1	OFF	9.6
0.3818	40.78	58.24	17.46	9.000	L1	OFF	9.6
1.3303	40.09	56.00	15.91	9.000	L1	OFF	9.7
2.8040	41.48	56.00	14.52	9.000	L1	OFF	9.8
3.0988	40.99	56.00	15.01	9.000	L1	OFF	9.8
3.9853	41.54	56.00	14.46	9.000	L1	OFF	9.8
4.2800	37.69	56.00	18.31	9.000	L1	OFF	9.8
4.8695	42.74	56.00	13.26	9.000	L1	OFF	9.8
5.7560	46.92	60.00	13.08	9.000	L1	OFF	9.9
6.0508	45.92	60.00	14.08	9.000	L1	OFF	9.9
7.2298	45.52	60.00	14.48	9.000	L1	OFF	9.9
9.0005	46.10	60.00	13.90	9.000	L1	OFF	10.0
9.2953	44.40	60.00	15.60	9.000	L1	OFF	10.0
9.5923	44.51	60.00	15.49	9.000	L1	OFF	10.0

2022-04-30

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Test

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	29.21	56.00	26.79	9.000	L1	OFF	9.6
0.1680	34.05	55.06	21.01	9.000	L1	OFF	9.6
0.2220	32.75	52.74	19.99	9.000	L1	OFF	9.6
0.3615	40.84	48.69	7.85	9.000	L1	OFF	9.6
0.3908	35.22	48.05	12.83	9.000	L1	OFF	9.6
0.4425	35.49	47.02	11.52	9.000	L1	OFF	9.7
1.3280	34.57	46.00	11.43	9.000	L1	OFF	9.7
2.8040	34.47	46.00	11.53	9.000	L1	OFF	9.8
3.0988	35.64	46.00	10.36	9.000	L1	OFF	9.8
3.9853	35.25	46.00	10.75	9.000	L1	OFF	9.8
4.2800	30.29	46.00	15.71	9.000	L1	OFF	9.8
4.8695	37.40	46.00	8.60	9.000	L1	OFF	9.8
5.7560	42.41	50.00	7.59	9.000	L1	OFF	9.9
6.0508	41.27	50.00	8.73	9.000	L1	OFF	9.9
7.2298	40.53	50.00	9.47	9.000	L1	OFF	9.9
9.0005	41.00	50.00	9.00	9.000	L1	OFF	10.0
9.2975	38.64	50.00	11.36	9.000	L1	OFF	10.0
9.5923	39.17	50.00	10.83	9.000	L1	OFF	10.0

2022-04-30

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Conducted Emissions (Line 2)

Test

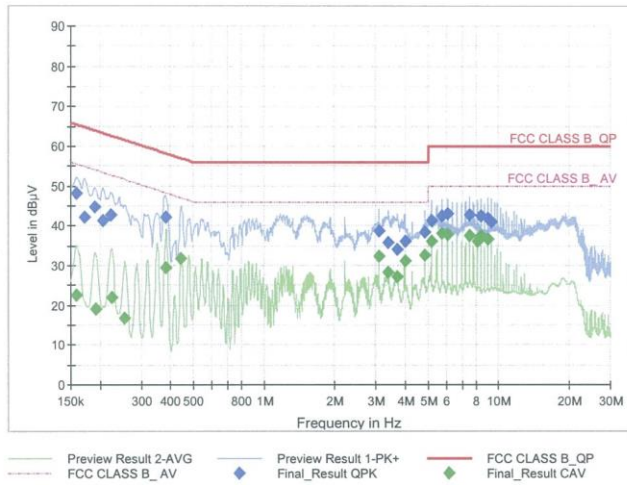
1 / 2

Test Report

Common Information

EUT : SM-G990U2
 Manufacturer : SAMSUNG Electronics Co., Ltd.
 Test Site: SHIELD ROOM
 Operating Conditions : WPT Aligned_N
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1590	48.04	65.52	17.47	9.000	N	OFF	9.6
0.1725	42.04	64.84	22.80	9.000	N	OFF	9.6
0.1905	44.64	64.02	19.38	9.000	N	OFF	9.6
0.2063	41.28	63.36	22.08	9.000	N	OFF	9.6
0.2220	42.60	62.74	20.15	9.000	N	OFF	9.6
0.3795	42.14	58.29	16.15	9.000	N	OFF	9.6
3.0988	38.54	56.00	17.46	9.000	N	OFF	9.8
3.3913	35.80	56.00	20.20	9.000	N	OFF	9.8
3.6905	34.13	56.00	21.87	9.000	N	OFF	9.8
3.9830	36.13	56.00	19.87	9.000	N	OFF	9.8
4.8695	38.34	56.00	17.66	9.000	N	OFF	9.8
5.1643	41.13	60.00	18.87	9.000	N	OFF	9.9
5.7560	42.48	60.00	17.52	9.000	N	OFF	9.9
6.0485	43.09	60.00	16.91	9.000	N	OFF	9.9
7.5245	42.58	60.00	17.42	9.000	N	OFF	10.0
8.4110	42.26	60.00	17.74	9.000	N	OFF	10.0
9.0005	41.93	60.00	18.07	9.000	N	OFF	10.0
9.2975	41.01	60.00	18.99	9.000	N	OFF	10.0

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Test

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1590	22.56	55.52	32.96	9.000	N	OFF	9.6
0.1928	18.93	53.92	34.99	9.000	N	OFF	9.6
0.2243	22.03	52.66	30.63	9.000	N	OFF	9.6
0.2558	16.86	51.57	34.71	9.000	N	OFF	9.6
0.3818	29.34	48.24	18.90	9.000	N	OFF	9.6
0.4425	31.70	47.02	15.31	9.000	N	OFF	9.7
3.0988	32.39	46.00	13.61	9.000	N	OFF	9.8
3.3935	28.30	46.00	17.70	9.000	N	OFF	9.8
3.6883	27.11	46.00	18.89	9.000	N	OFF	9.8
3.9830	31.29	46.00	14.71	9.000	N	OFF	9.8
4.8695	32.54	46.00	13.46	9.000	N	OFF	9.8
5.1643	36.18	50.00	13.82	9.000	N	OFF	9.9
5.7538	38.04	50.00	11.96	9.000	N	OFF	9.9
6.0508	37.65	50.00	12.35	9.000	N	OFF	9.9
7.5245	37.44	50.00	12.56	9.000	N	OFF	10.0
8.1163	36.20	50.00	13.80	9.000	N	OFF	10.0
8.4110	37.51	50.00	12.49	9.000	N	OFF	10.0
9.0005	36.65	50.00	13.35	9.000	N	OFF	10.0

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

Test

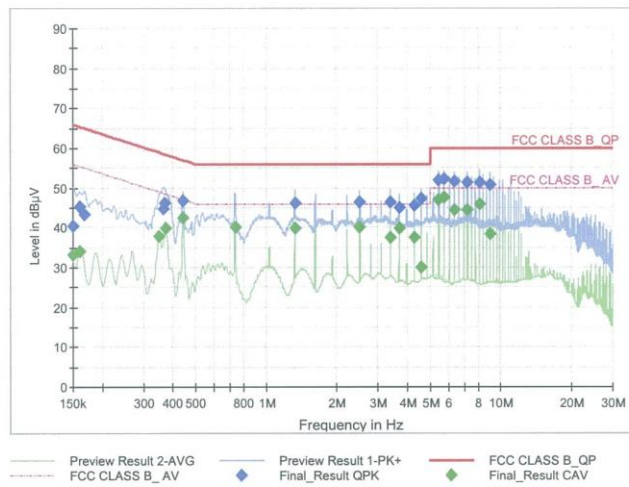
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Test Report

Common Information

EUT : SM-G990U2
 Manufacturer : SAMSUNG Electronics Co., Ltd.
 Test Site: SHIELD ROOM
 Operating Conditions : WPT CROSS_L1
 Operator Name:
 Comment:

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	40.30	66.00	25.70	9.000	L1	OFF	9.6
0.1613	45.15	65.40	20.24	9.000	L1	OFF	9.6
0.1680	43.20	65.06	21.86	9.000	L1	OFF	9.6
0.3638	44.70	58.64	13.94	9.000	L1	OFF	9.6
0.3705	46.24	58.49	12.25	9.000	L1	OFF	9.6
0.4425	46.64	57.02	10.37	9.000	L1	OFF	9.7
1.3280	46.23	56.00	9.77	9.000	L1	OFF	9.7
2.5070	46.38	56.00	9.62	9.000	L1	OFF	9.8
3.3913	46.44	56.00	9.56	9.000	L1	OFF	9.8
3.6883	45.11	56.00	10.89	9.000	L1	OFF	9.8
4.2778	45.57	56.00	10.43	9.000	L1	OFF	9.8
4.5725	47.18	56.00	8.82	9.000	L1	OFF	9.8
5.4568	51.85	60.00	8.15	9.000	L1	OFF	9.9
5.7515	52.18	60.00	7.82	9.000	L1	OFF	9.9
6.3410	51.50	60.00	8.50	9.000	L1	OFF	9.9
7.2275	51.43	60.00	8.57	9.000	L1	OFF	9.9
8.1118	51.37	60.00	8.63	9.000	L1	OFF	10.0
8.9960	50.68	60.00	9.32	9.000	L1	OFF	10.0

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Test

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	33.14	56.00	22.86	9.000	L1	OFF	9.6
0.1613	34.17	55.40	21.22	9.000	L1	OFF	9.6
0.3503	37.83	48.96	11.12	9.000	L1	OFF	9.6
0.3728	39.70	48.44	8.74	9.000	L1	OFF	9.6
0.4425	42.30	47.02	4.71	9.000	L1	OFF	9.7
0.7385	40.07	46.00	5.93	9.000	L1	OFF	9.7
1.3280	39.84	46.00	6.16	9.000	L1	OFF	9.7
2.5070	40.14	46.00	5.86	9.000	L1	OFF	9.8
3.3913	37.52	46.00	8.48	9.000	L1	OFF	9.8
3.6860	39.91	46.00	6.09	9.000	L1	OFF	9.8
4.2778	37.63	46.00	8.37	9.000	L1	OFF	9.8
4.5725	30.13	46.00	15.87	9.000	L1	OFF	9.8
5.4568	46.92	50.00	3.08	9.000	L1	OFF	9.9
5.7515	47.57	50.00	2.43	9.000	L1	OFF	9.9
6.3410	44.42	50.00	5.58	9.000	L1	OFF	9.9
7.2275	44.50	50.00	5.50	9.000	L1	OFF	9.9
8.1118	45.89	50.00	4.11	9.000	L1	OFF	10.0
8.9960	38.30	50.00	11.70	9.000	L1	OFF	10.0

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Conducted Emissions (Line 2)

Test

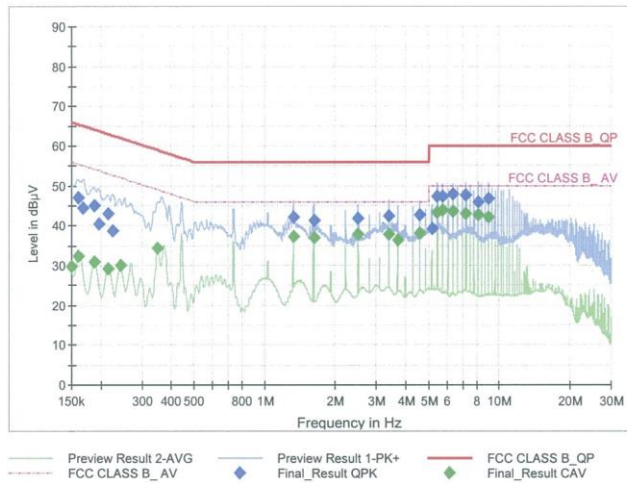
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Test Report

Common Information

EUT : SM-G990U2
 Manufacturer : SAMSUNG Electronics Co., Ltd.
 Test Site: SHIELD ROOM
 Operating Conditions : WPT CROSS_N
 Operator Name:
 Comment:

Full Spectrum



Final Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1613	46.94	65.40	18.46	9.000	N	OFF	9.6
0.1680	44.56	65.06	20.50	9.000	N	OFF	9.6
0.1883	45.14	64.11	18.97	9.000	N	OFF	9.6
0.1973	40.48	63.73	23.24	9.000	N	OFF	9.6
0.2153	42.98	63.00	20.02	9.000	N	OFF	9.6
0.2243	38.67	62.66	23.99	9.000	N	OFF	9.6
1.3280	41.97	56.00	14.03	9.000	N	OFF	9.7
1.6228	41.39	56.00	14.61	9.000	N	OFF	9.7
2.5070	41.95	56.00	14.05	9.000	N	OFF	9.8
3.3913	42.52	56.00	13.48	9.000	N	OFF	9.8
4.5703	42.80	56.00	13.20	9.000	N	OFF	9.8
5.1620	39.20	60.00	20.80	9.000	N	OFF	9.9
5.4545	47.25	60.00	12.75	9.000	N	OFF	9.9
5.7493	47.32	60.00	12.68	9.000	N	OFF	9.9
6.3410	47.99	60.00	12.01	9.000	N	OFF	9.9
7.2253	47.61	60.00	12.39	9.000	N	OFF	9.9
8.1095	45.78	60.00	14.22	9.000	N	OFF	10.0
8.9938	46.70	60.00	13.30	9.000	N	OFF	10.0

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Test

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Final Result CAV

Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	29.61	56.00	26.39	9.000	N	OFF	9.6
0.1613	32.40	55.40	23.00	9.000	N	OFF	9.6
0.1883	30.88	54.11	23.23	9.000	N	OFF	9.6
0.2153	29.25	53.00	23.75	9.000	N	OFF	9.6
0.2423	29.95	52.02	22.07	9.000	N	OFF	9.6
0.3503	34.19	48.96	14.77	9.000	N	OFF	9.6
1.3280	37.09	46.00	8.91	9.000	N	OFF	9.7
1.6228	37.07	46.00	8.93	9.000	N	OFF	9.7
2.5070	37.80	46.00	8.20	9.000	N	OFF	9.8
3.3913	37.74	46.00	8.26	9.000	N	OFF	9.8
3.6860	36.39	46.00	9.61	9.000	N	OFF	9.8
4.5703	38.11	46.00	7.89	9.000	N	OFF	9.8
5.4568	43.32	50.00	6.68	9.000	N	OFF	9.9
5.7515	43.72	50.00	6.28	9.000	N	OFF	9.9
6.3410	43.53	50.00	6.47	9.000	N	OFF	9.9
7.2253	42.98	50.00	7.02	9.000	N	OFF	9.9
8.1118	42.65	50.00	7.35	9.000	N	OFF	10.0
8.9960	42.17	50.00	7.83	9.000	N	OFF	10.0

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11. EMISSION BANDWIDTH PLOT

Test Settings

1. Analyzer frequency set to the frequency of the radiated spurious emissipn of interst
2. RBW : 300 Hz
(Becasuse 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)	20dB Bandwidth (kHz)	Occupied Bandwidth (Hz)
Charging from EUT to Phone	Aligned	113.325	0.904	0.772
	Cross	113.300	0.904	0.766
Charging from EUT(Charging from TA) to Phone	Aligned	113.350	0.921	0.791
	Cross	113.325	0.909	0.772

■ Test Plot

Charging from EUT(Charging from TA) to Phone Position : Aligned



12. 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	0093008124	03/04/2023	Annual
Signal Analyzer	N9030A	Keysight	MY55410508	09/07/2022	Annual
Power Meter	N1911A	Agilent	MY45100523	03/24/2023	Annual
Power Sensor	N1921A	Agilent	MY57820067	03/24/2023	Annual
Directional Coupler	87300B	Agilent	3116A03621	11/02/2022	Annual
Power Splitter	11667B	Hewlett Packard	10545	02/03/2023	Annual
DC Power Supply	E3646A	Agilent	MY40002937	12/14/2022	Annual
Attenuator(10 dB)(DC-26.5 GHz)	5910-N-50-010	H+S	00801	10/29/2022	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	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	EM2090	Emco	060520	N/A	N/A
Turn Table	N/A	Ets	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/17/2024	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	09/04/2022	Biennial
Spectrum Analyzer	FSP(9 kHz ~ 30 GHz)	Rohde & Schwarz	836650/016	09/13/2022	Annual
Spectrum Analyzer	FSV40-N(9 kHz ~ 30 GHz)	Rohde & Schwarz	101068-SZ	09/15/2022	Annual
ATT(3 dB) + LNA2(6~18 GHz)	18B-03, CBL06185030	WEINSCHEL CERNEX	N/A	12/22/2022	Annual
ATT(10 dB) + LNA1(0.1~18 GHz)	56-10, CBLU1183540B-01	Api tech, CERNEX	N/A	12/22/2022	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).

13. Annex A_TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2205-FC014-P