

FCC WPT REPORT

Certification

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Date of Issue:
June 15, 2021

Test Site/Location:
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Report No.: HCT-RF-2105-FC036-R2

FCC ID:	A3LSMG990U
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APPLICANT:	SAMSUNG Electronics Co., Ltd.
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Model: SM-G990U

Additional Model: SM-G990U1/DS, SM-G990U1

EUT Type: Mobile Phone

**Frequency of Operation
& Max. Transmit Power:** 110 kHz ~ 148 kHz(Power sharing) : -19.22 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)

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-2105-FC036-R2

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-2105-FC036	May 26, 2021	- First Approval Report
HCT-RF-2105-FC036-R1	June 11, 2021	- Revised on page 23~30. (Test Result & Plot)
HCT-RF-2105-FC036-R2	June 15, 2021	- Added the Additional Model.

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1. EUT DESCRIPTION

Model	SM-G990U
Additional Model	SM-G990U1/DS, SM-G990U1
EUT Type	Mobile Phone
Power Supply	DC 3.88 V
Frequency of Operation	110 kHz ~ 148 kHz(Power sharing)
Max. Transmit Power	-19.22 dBuV/m @300 m
Date(s) of Tests	April 01, 2021 ~ May 26, 2021
Serial number	Radiated: UDE0597M Conducted: UDJ0410M

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 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m 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 equipments, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

4. FACILITIES AND ACCREDITATIONS

FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil,

Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

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

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
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05

7. 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 %	
Charging from EUT(Charging from TA) to Client device	Cross	1 % ~ 20 %	Watch (See Note 2)	
		20 % ~ 50 %		
		90 % ~ 100 %		

Note:

1. Client device:

Of Phone and Wearable device, we tested on Phone and Watch.

2. Client device information:

Phone	Watch
- Model : SM-G986B/DS	- Model : SM-R835F
- Manufacturer : SAMSUNG	- Manufacturer : SAMSUNG
- FCC ID : A3LSMG986B	- FCC ID : A3LSMR835

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-G990U, SM-G990U1/DS, SM-G990U1 were tested and the worst case results are reported.

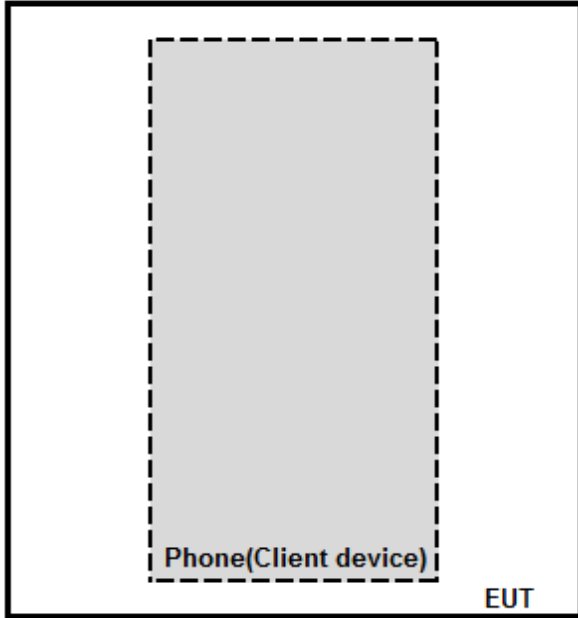
(Worst case : SM-G990U)

AC Power line Conducted Emissions

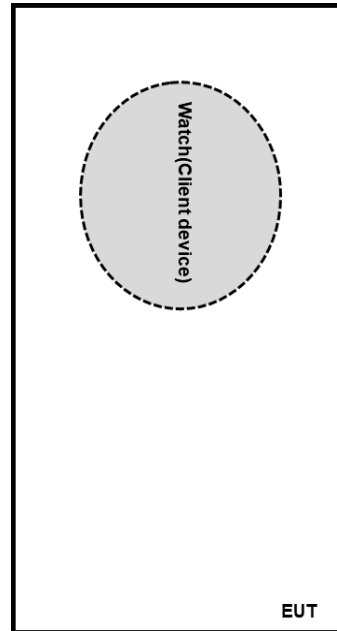
1. All modes of operation were investigated and the worst case configuration results are reported.
 - Mode : EUT + External accessories(Earphone, etc) + Travel Adapter + Phone(Client device)
 , EUT + Travel Adapter + Phone(Client device)
 - Worstcase : EUT + Travel Adapter + Phone(Client device)
2. SM-G990U, SM-G990U1/DS, SM-G990U1 were tested and the worst case results are reported.
(Worst case : SM-G990U)

Test Setup Diagram:

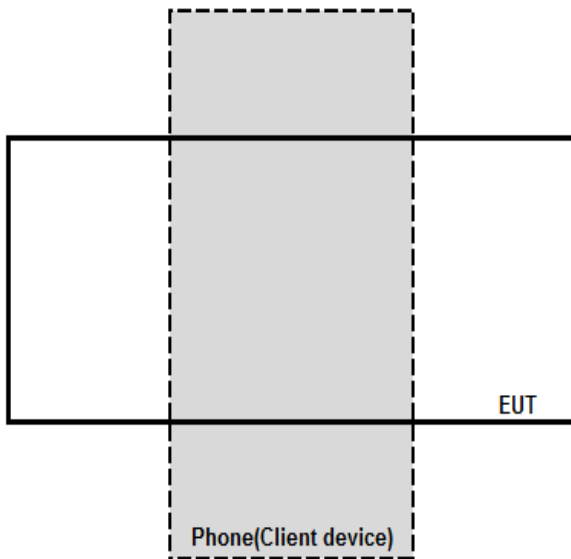
Aligned(Phone to Phone)



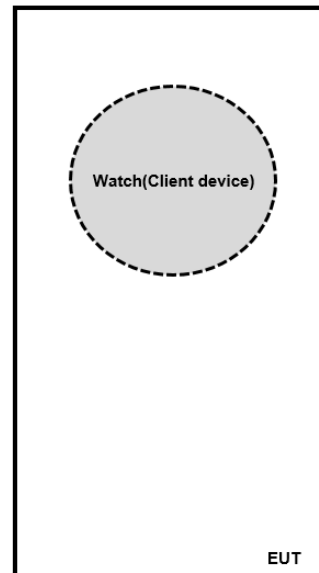
Aligned(Phone to Watch)



Cross (Phone to Phone)



Cross (Phone to Watch)



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 emissipn of interst
2. RBW :
 - 9kHz – 150kHz : 300Hz
 - 150kHz – 30MHz : 10kHz
 - 30MHz – 1GHz : 100kHz
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)

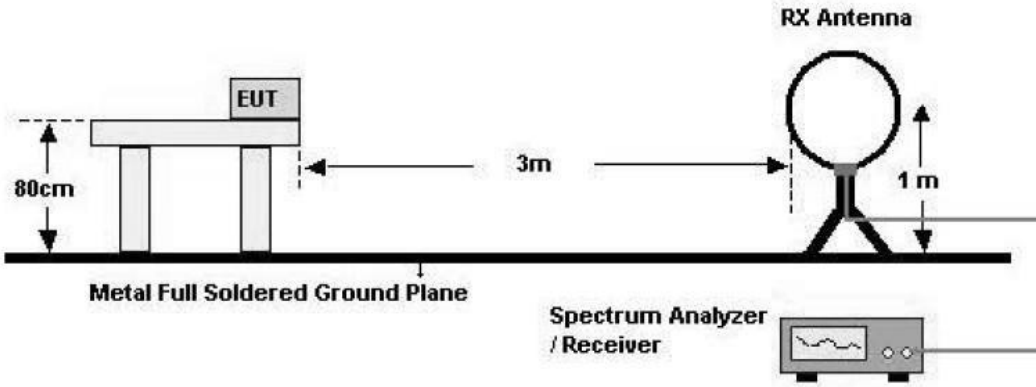
Except as provided elsewhere in this paragraph the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

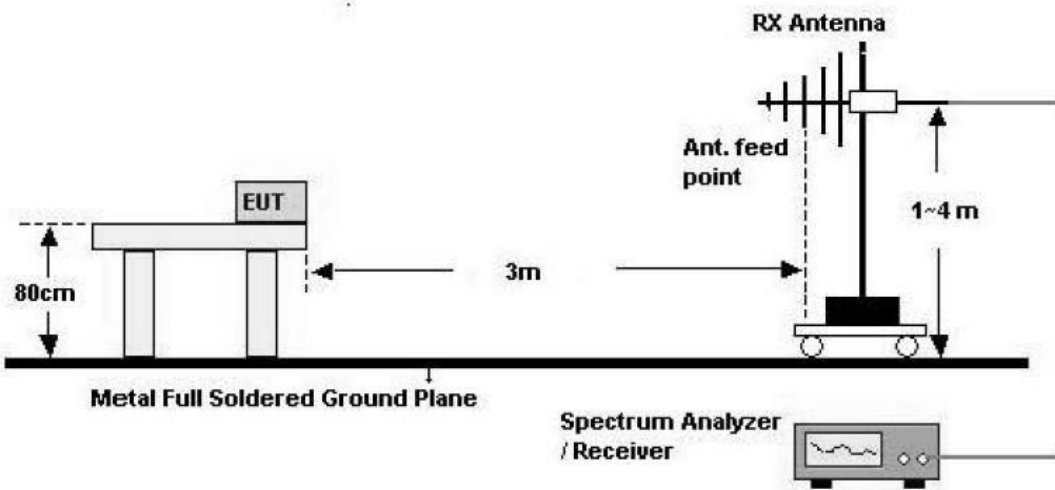
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

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 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The limit is converted from microvolts/meter to decibel microvolts/meter. Sample Calculation:
 - * Result level(dB μ V/m@30m)
= Reading level(dB μ V/m@3m) + 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 – 30MHz :
 $40\log(3\text{ m}/30\text{ m}) = - 40\text{ dB}$
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 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

■ Test Result

Frequency (kHz)	Reading Level (dBuV/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
9.720	11.8	17.90	0.69	-80.00	-49.61	47.85	97.46
#113.495	33.51	17.10	0.69	-80.00	-28.70	26.50	55.20
114.653	8.16	17.10	0.69	-80.00	-54.05	26.42	80.47
337.70	26.40	17.10	0.69	-80.00	-35.81	17.03	52.84
498.50	30.10	17.20	0.69	-40.00	7.99	33.65	25.66
8568.0	13.11	18.00	0.69	-40.00	-8.20	29.54	37.74

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 (dBuV/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
9.46	9.27	17.90	0.69	-80.00	-52.14	48.09	100.23
#113.495	33.79	17.10	0.69	-80.00	-28.42	26.50	54.92
127.533	5.68	17.10	0.69	-80.00	-56.53	25.49	82.02
341.80	25.00	17.10	0.69	-80.00	-37.21	16.93	54.14
515.00	25.76	17.20	0.69	-40.00	3.65	33.37	29.72
8607.0	12.47	18.00	0.69	-40.00	-8.84	29.54	38.38

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 (dBuV/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
9.2	11.15	17.90	0.69	-80.00	-50.26	48.33	98.59
# 113.495	42.99	17.10	0.69	-80.00	-19.22	26.50	45.72
341.8	33.20	17.10	0.69	-80.00	-29.01	16.93	45.94
564.5	29.40	17.20	0.69	-40.00	7.29	32.57	25.28
5794.0	13.93	18.00	0.69	-40.00	-7.38	29.54	36.92

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 (dBuV/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
9.07	9.18	17.90	0.69	-80.00	-52.23	48.45	100.68
#113.495	37.59	17.10	0.69	-80.00	-24.62	26.51	51.13
127.605	4.70	17.10	0.69	-80.00	-57.51	25.49	83.00
337.7	27.15	17.10	0.69	-80.00	-35.06	17.04	52.10
568.6	25.39	17.20	0.69	-40.00	3.28	32.51	29.23
12319.0	11.72	18.00	0.69	-40.00	-9.59	29.54	39.13

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.

Frequency (kHz)	Reading Level (dBuV/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
9.200	9.16	17.90	0.69	-80.00	-52.25	48.33	100.58
127.533	4.92	17.10	0.69	-80.00	-57.29	25.49	82.78
#137.301	34.11	17.10	0.69	-80.00	-28.10	33.12	61.22
502.6	25.59	17.20	0.69	-40.00	3.48	33.58	30.10
1616.2	21.38	17.50	0.69	-40.00	-0.43	23.43	23.86
11303.0	11.44	18.00	0.69	-40.00	-9.87	29.54	39.41

Note

1. “#” Fundamental Frequency
2. EUT Mode: Charging from EUT(Charging from TA) to Watch
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.

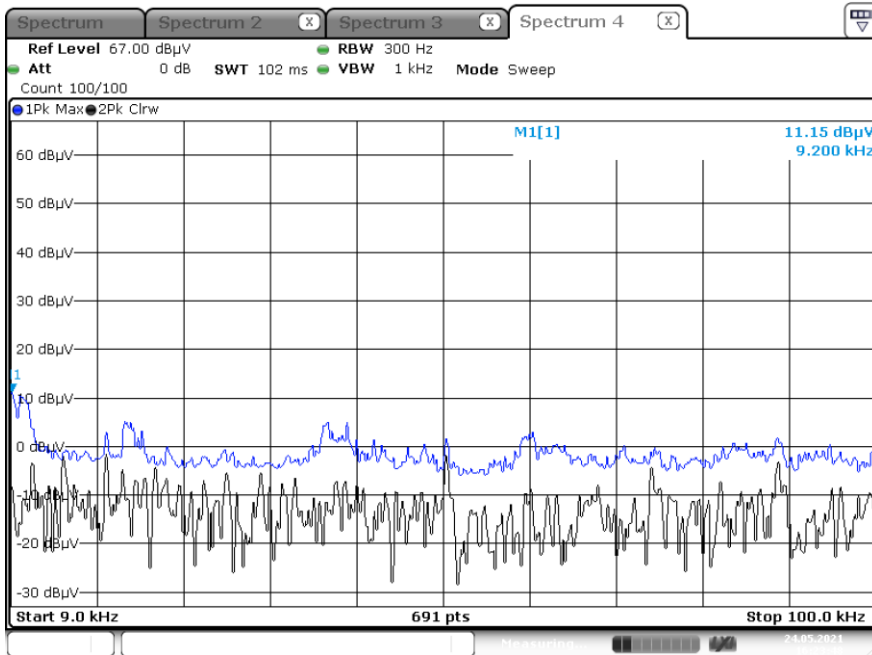
Test Plot

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

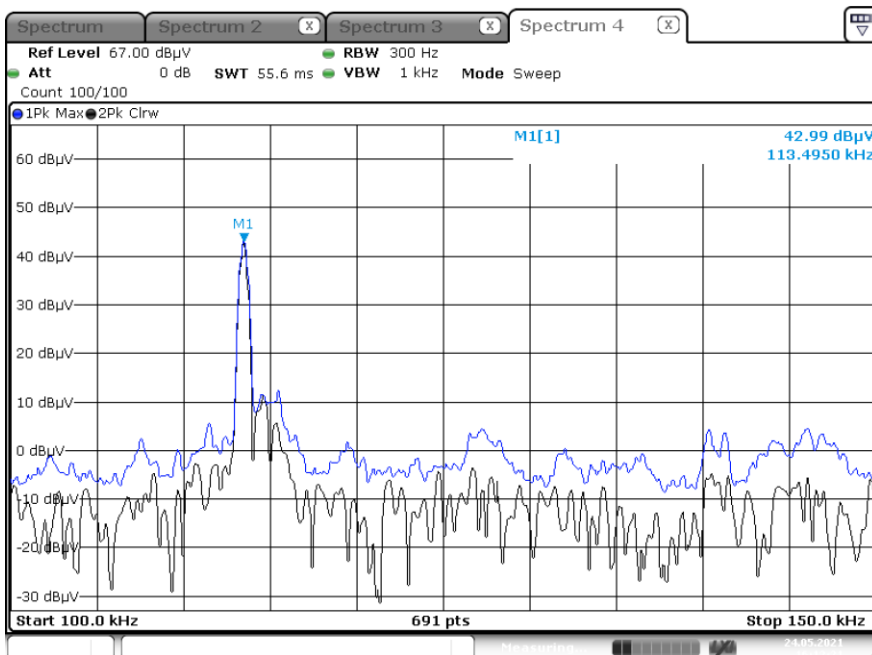
Worst case

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

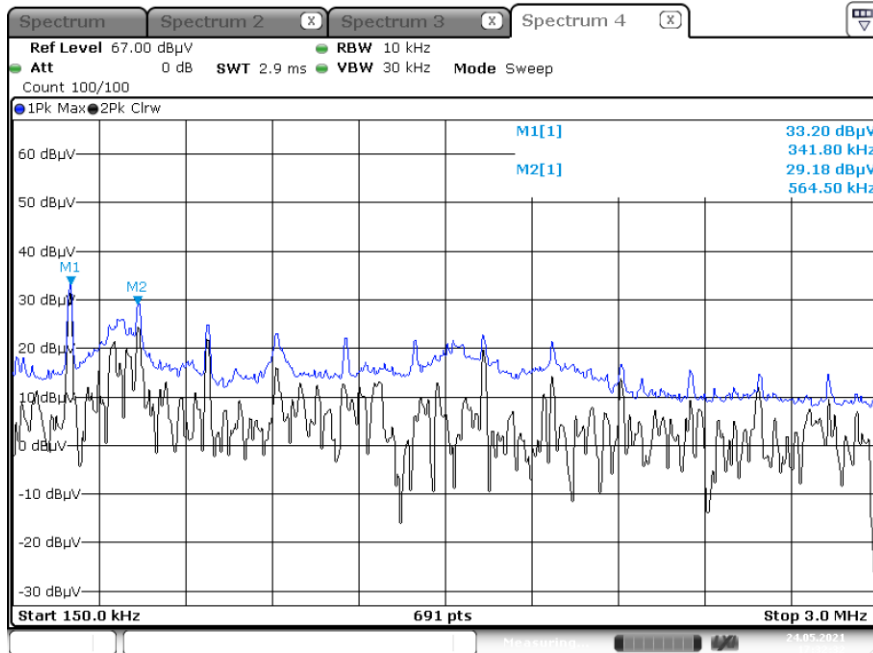
Frequency Range : 9 kHz – 100kHz



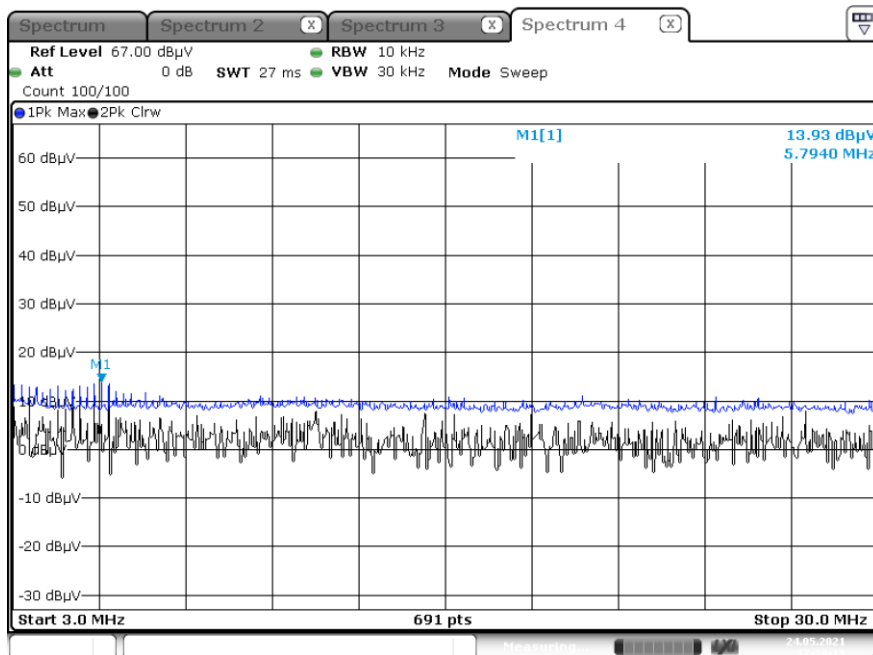
Frequency Range : 100 kHz – 150kHz



Frequency Range : 150 kHz – 3 MHz



Frequency Range : 3 MHz – 30 MHz



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) = Reading Value + Correction Factor

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

WPT WATCH CORSS MODE_L1_150k-30M

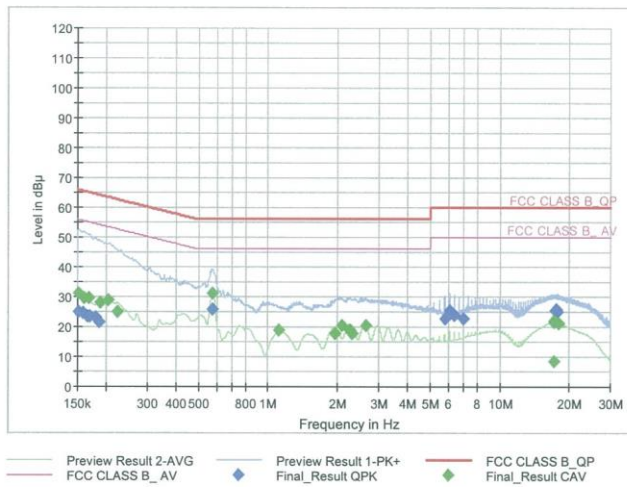
1 / 2

Test Report

Common Information

EUT : SM-G990U
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WPT WATCH CROSS MODE_L1

Full Spectrum



Final Result_QPK

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	24.94	65.88	40.94	9.000	L1	OFF	9.6
0.1590	24.63	65.52	40.88	9.000	L1	OFF	9.6
0.1658	23.60	65.17	41.57	9.000	L1	OFF	9.6
0.1703	23.54	64.95	41.40	9.000	L1	OFF	9.6
0.1793	22.94	64.52	41.58	9.000	L1	OFF	9.6
0.1860	21.58	64.21	42.63	9.000	L1	OFF	9.6
0.5753	25.61	56.00	30.39	9.000	L1	OFF	9.6
5.7840	22.84	60.00	37.16	9.000	L1	OFF	9.9
6.0810	25.47	60.00	34.53	9.000	L1	OFF	9.9
6.3758	23.88	60.00	36.12	9.000	L1	OFF	9.9
6.9720	22.68	60.00	37.32	9.000	L1	OFF	9.9
17.4143	25.23	60.00	34.77	9.000	L1	OFF	10.3
17.5560	25.65	60.00	34.35	9.000	L1	OFF	10.3
17.8125	25.18	60.00	34.82	9.000	L1	OFF	10.3
17.8598	25.00	60.00	35.00	9.000	L1	OFF	10.3

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WPT WATCH CORSS MODE_L1_150k-30M

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Final Result CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	31.05	55.88	24.83	9.000	L1	OFF	9.6
0.1613	29.61	55.40	25.79	9.000	L1	OFF	9.6
0.1680	29.76	55.06	25.30	9.000	L1	OFF	9.6
0.1883	27.99	54.11	26.13	9.000	L1	OFF	9.6
0.2040	28.93	53.45	24.52	9.000	L1	OFF	9.6
0.2243	25.01	52.66	27.65	9.000	L1	OFF	9.6
0.5753	31.07	46.00	14.93	9.000	L1	OFF	9.6
1.1175	18.71	46.00	27.29	9.000	L1	OFF	9.7
1.9388	17.58	46.00	28.42	9.000	L1	OFF	9.7
2.0738	20.44	46.00	25.56	9.000	L1	OFF	9.7
2.2695	18.79	46.00	27.21	9.000	L1	OFF	9.7
2.2853	18.20	46.00	27.80	9.000	L1	OFF	9.7
2.3055	17.58	46.00	28.42	9.000	L1	OFF	9.7
2.6363	20.39	46.00	25.61	9.000	L1	OFF	9.8
17.1780	21.94	50.00	28.06	9.000	L1	OFF	10.3
17.2253	8.53	50.00	41.47	9.000	L1	OFF	10.3
17.2388	21.56	50.00	28.44	9.000	L1	OFF	10.3
17.8845	21.23	50.00	28.77	9.000	L1	OFF	10.3

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WPT PHONE CORSS MODE_L1_150k-30M

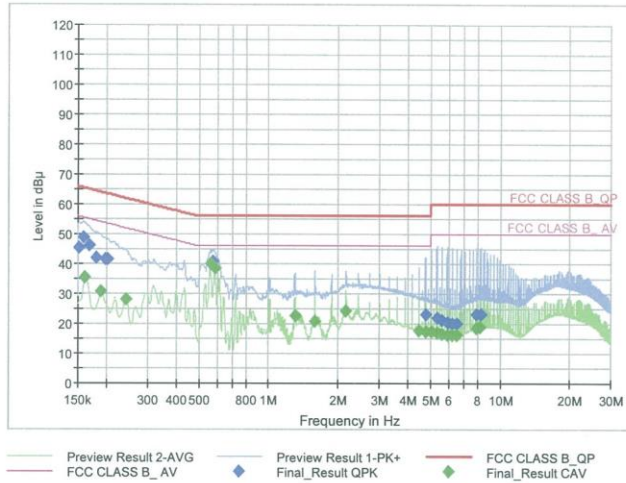
1 / 2

Test Report

Common Information

EUT : SM-G990U
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WPT PHONE CROSS MODE_L1

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	45.34	65.88	20.54	9.000	L1	OFF	9.6
0.1590	48.97	65.52	16.54	9.000	L1	OFF	9.6
0.1680	46.12	65.06	18.94	9.000	L1	OFF	9.6
0.1793	42.05	64.52	22.47	9.000	L1	OFF	9.6
0.1973	41.56	63.73	22.17	9.000	L1	OFF	9.6
0.2018	41.37	63.54	22.17	9.000	L1	OFF	9.6
0.5753	40.87	56.00	15.13	9.000	L1	OFF	9.6
4.7648	22.89	56.00	33.11	9.000	L1	OFF	9.9
5.3430	21.91	60.00	38.09	9.000	L1	OFF	9.9
5.6310	21.01	60.00	38.99	9.000	L1	OFF	9.9
5.9190	20.33	60.00	39.67	9.000	L1	OFF	9.9
6.2093	19.97	60.00	40.03	9.000	L1	OFF	9.9
6.4973	19.87	60.00	40.13	9.000	L1	OFF	9.9
7.9418	23.02	60.00	36.98	9.000	L1	OFF	10.0
8.2320	23.24	60.00	36.76	9.000	L1	OFF	10.0

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WPT PHONE CORSS MODE_L1_150k-30M

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Final Result_CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1613	35.34	55.40	20.06	9.000	L1	OFF	9.6
0.1883	30.70	54.11	23.41	9.000	L1	OFF	9.6
0.2423	27.99	52.02	24.03	9.000	L1	OFF	9.6
0.5595	39.97	46.00	6.03	9.000	L1	OFF	9.6
0.5865	38.58	46.00	7.42	9.000	L1	OFF	9.6
1.2998	22.61	46.00	23.39	9.000	L1	OFF	9.7
1.5878	20.75	46.00	25.25	9.000	L1	OFF	9.7
2.1660	24.22	46.00	21.78	9.000	L1	OFF	9.7
4.4768	17.87	46.00	28.13	9.000	L1	OFF	9.8
4.7648	17.38	46.00	28.62	9.000	L1	OFF	9.9
5.0528	17.37	50.00	32.63	9.000	L1	OFF	9.9
5.3430	17.11	50.00	32.89	9.000	L1	OFF	9.9
5.6310	16.70	50.00	33.30	9.000	L1	OFF	9.9
5.9190	16.24	50.00	33.76	9.000	L1	OFF	9.9
6.2093	16.03	50.00	33.97	9.000	L1	OFF	9.9
6.4973	16.27	50.00	33.73	9.000	L1	OFF	9.9
7.9418	18.54	50.00	31.46	9.000	L1	OFF	10.0
8.2298	18.69	50.00	31.31	9.000	L1	OFF	10.0

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Conducted Emissions (Line 2)

WPT WATCH CORSS MODE_N_150k-30M

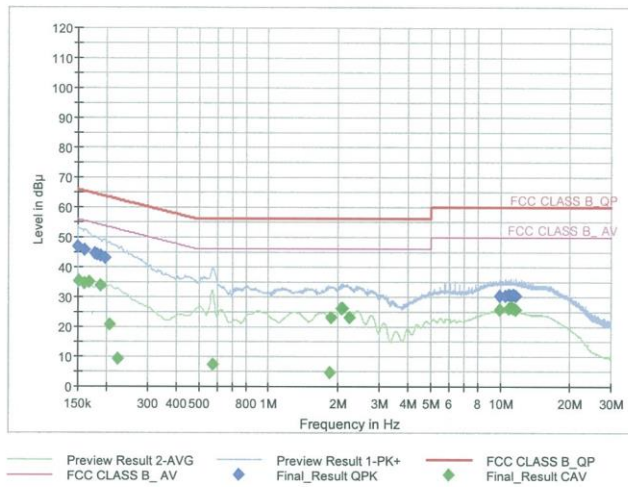
1 / 2

Test Report

Common Information

EUT : SM-G990U
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WPT WATCH CROSS MODE_N

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	46.93	66.00	19.07	9.000	N	OFF	9.6
0.1613	45.76	65.40	19.64	9.000	N	OFF	9.6
0.1770	44.45	64.63	20.18	9.000	N	OFF	9.6
0.1815	44.33	64.42	20.08	9.000	N	OFF	9.6
0.1883	43.84	64.11	20.28	9.000	N	OFF	9.6
0.1973	43.11	63.73	20.61	9.000	N	OFF	9.6
9.9330	30.37	60.00	29.63	9.000	N	OFF	10.1
10.5315	30.48	60.00	29.52	9.000	N	OFF	10.1
10.8263	30.68	60.00	29.32	9.000	N	OFF	10.1
11.1165	30.41	60.00	29.59	9.000	N	OFF	10.2
11.4203	30.77	60.00	29.23	9.000	N	OFF	10.2
11.7128	30.27	60.00	29.73	9.000	N	OFF	10.2

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WPT WATCH CORSS MODE_N_150k-30M

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Final Result CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	35.57	55.88	20.31	9.000	N	OFF	9.6
0.1613	34.64	55.40	20.76	9.000	N	OFF	9.6
0.1680	34.96	55.06	20.10	9.000	N	OFF	9.6
0.1883	33.84	54.11	20.27	9.000	N	OFF	9.6
0.2063	20.72	53.36	32.64	9.000	N	OFF	9.6
0.2243	9.27	52.66	43.39	9.000	N	OFF	9.6
0.5730	7.13	46.00	38.87	9.000	N	OFF	9.6
1.8420	4.47	46.00	41.53	9.000	N	OFF	9.7
1.8668	23.03	46.00	22.97	9.000	N	OFF	9.7
2.0625	26.21	46.00	19.80	9.000	N	OFF	9.7
2.0760	26.20	46.00	19.80	9.000	N	OFF	9.7
2.0805	26.16	46.00	19.84	9.000	N	OFF	9.7
2.2425	22.96	46.00	23.04	9.000	N	OFF	9.7
9.9353	25.94	50.00	24.06	9.000	N	OFF	10.1
10.8263	26.16	50.00	23.84	9.000	N	OFF	10.1
11.1233	26.35	50.00	23.65	9.000	N	OFF	10.2
11.4180	25.97	50.00	24.03	9.000	N	OFF	10.2
11.7150	25.74	50.00	24.26	9.000	N	OFF	10.2

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WPT PHONE CORSS MODE_N_150k-30M

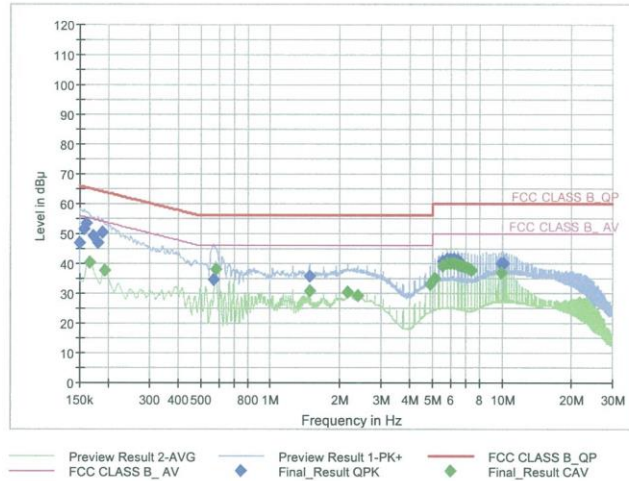
1 / 2

Test Report

Common Information

EUT : SM-G990U
 Manufacturer : SAMSUNG
 Test Site: SHIELD ROOM
 Operating Conditions : WPT PHONE CROSS MODE_N

Full Spectrum



Final Result_QPK

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	47.05	66.00	18.95	9.000	N	OFF	9.6
0.1568	51.49	65.63	14.14	9.000	N	OFF	9.6
0.1613	53.57	65.40	11.83	9.000	N	OFF	9.6
0.1725	49.20	64.84	15.64	9.000	N	OFF	9.6
0.1793	46.87	64.52	17.65	9.000	N	OFF	9.6
0.1883	50.40	64.11	13.71	9.000	N	OFF	9.6
0.5685	34.48	56.00	21.52	9.000	N	OFF	9.6
1.4775	35.64	56.00	20.36	9.000	N	OFF	9.7
5.5680	40.90	60.00	19.10	9.000	N	OFF	9.9
5.7953	41.61	60.00	18.39	9.000	N	OFF	9.9
6.0225	41.73	60.00	18.27	9.000	N	OFF	9.9
6.2498	41.56	60.00	18.44	9.000	N	OFF	9.9
6.4770	41.24	60.00	18.76	9.000	N	OFF	9.9
9.8858	40.03	60.00	19.97	9.000	N	OFF	10.1
10.1130	39.86	60.00	20.14	9.000	N	OFF	10.1

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WPT PHONE CORSS MODE_N_150k-30M

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Final Result CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1658	40.56	55.17	14.61	9.000	N	OFF	9.6
0.1928	37.77	53.92	16.15	9.000	N	OFF	9.6
0.5820	37.93	46.00	8.07	9.000	N	OFF	9.6
1.4775	30.88	46.00	15.12	9.000	N	OFF	9.7
2.1593	30.25	46.00	15.75	9.000	N	OFF	9.7
2.3865	29.12	46.00	16.88	9.000	N	OFF	9.8
4.8863	32.96	46.00	13.04	9.000	N	OFF	9.9
5.1135	34.97	50.00	15.03	9.000	N	OFF	9.9
5.5680	39.09	50.00	10.91	9.000	N	OFF	9.9
5.7953	40.03	50.00	9.97	9.000	N	OFF	9.9
6.0225	40.04	50.00	9.96	9.000	N	OFF	9.9
6.2498	39.84	50.00	10.16	9.000	N	OFF	9.9
6.4770	39.48	50.00	10.52	9.000	N	OFF	9.9
6.7043	39.25	50.00	10.75	9.000	N	OFF	9.9
6.9315	38.69	50.00	11.31	9.000	N	OFF	10.0
7.1588	38.50	50.00	11.50	9.000	N	OFF	10.0
7.3860	37.77	50.00	12.23	9.000	N	OFF	10.0
9.8858	36.93	50.00	13.07	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 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

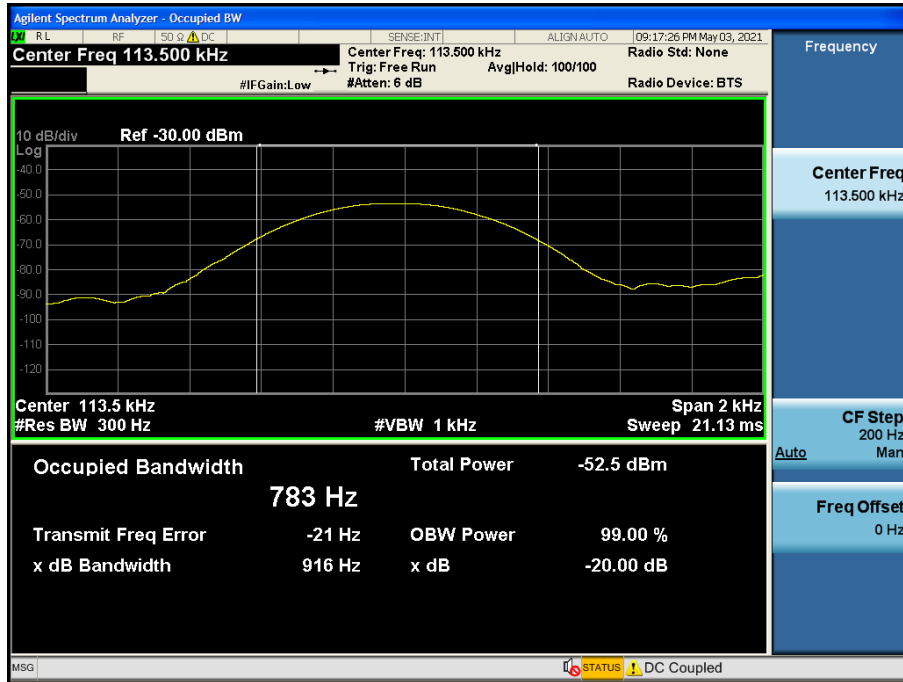
(for reporting purposes only.)

■ Test Result

EUT Mode	Position	Test Frequency (kHz)	20dB Bandwidth (kHz)	Occupied Bandwidth (Hz)
Charging from EUT to Phone	Aligned	113.500	0.916	0.916
	Cross	113.495	0.943	0.834
Charging from EUT(Charging from TA) to Phone	Aligned	113.495	0.897	0.764
	Cross	113.459	1.047	0.767
Charging from EUT to Watch(Charging from TA) to Watch	Cross	137.300	0.881	0.756

Test Plot

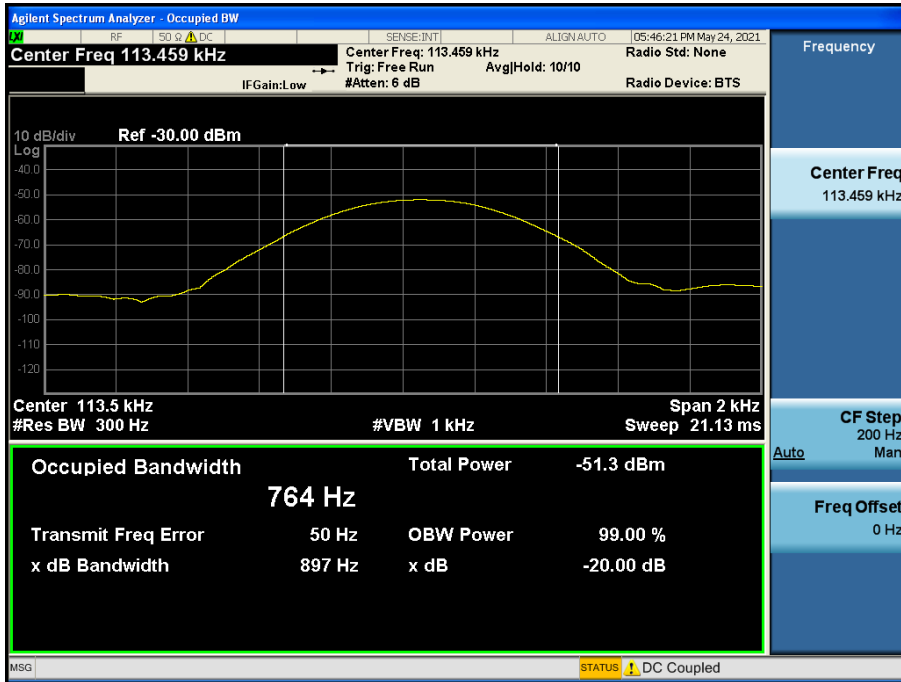
Charging from EUT to Phone – Position : Aligned



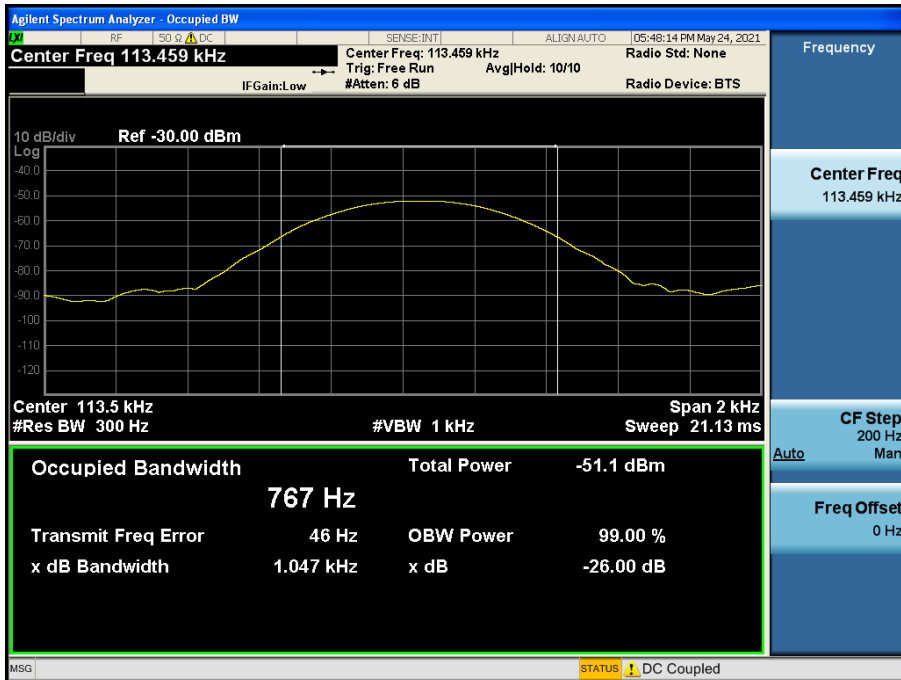
Charging from EUT to Phone – Position : Cross



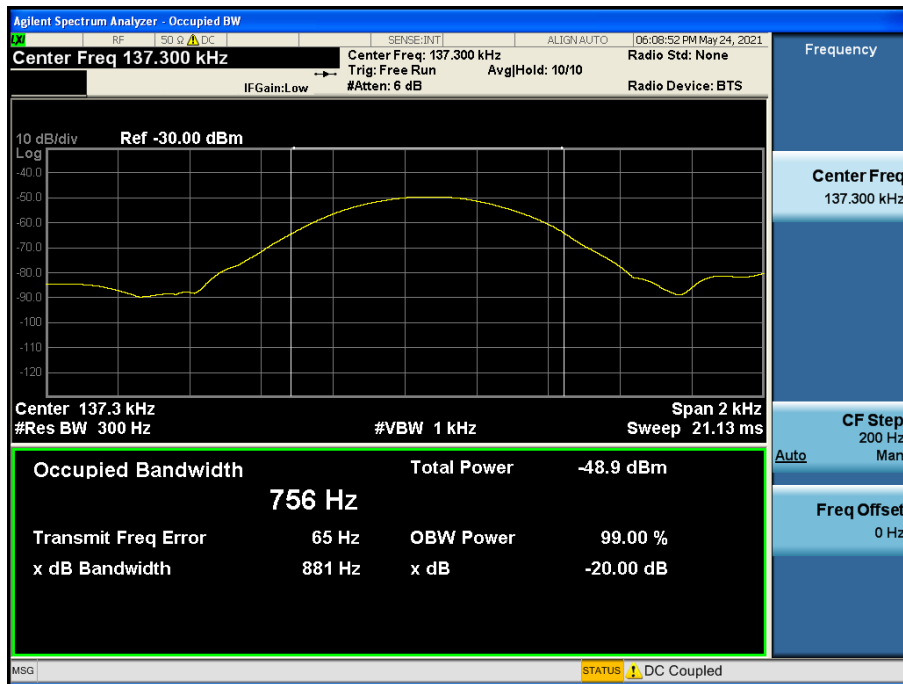
Charging from EUT(Charging from TA) to Phone – Position : Aligned



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



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



12. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/04/2020	Annual	102245
Rohde & Schwarz	ESR / EMI Test Receiver	09/16/2020	Annual	101910
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
Schwarzbeck	Loop Antenna	03/19/2020	Biennial	1513-333
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/02/2019	Biennial	01039
Rohde & Schwarz	FSV(10 Hz ~ 40 GHz) / Spectrum Analyzer	05/14/2021	Annual	101055
Agilent	N9020A / Signal Analyzer	05/03/2021	Annual	MY51110085
Weinschel	2-3 / Attenuator (3 dB)	10/07/2020	Annual	BR0617
H+S	5910-N-50-010 / Attenuator(10 dB)	10/28/2020	Annual	None
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966

13. Annex A_TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2105-FC036-P