

TEST REPORT

OF

FCC Part 18 Subpart C § 18.305

FCC ID: A3LEPOR825

Equipment Under Test : WIRELESS CHARGER
Model Name : EP-OR825
Applicant : Samsung Electronics Co., Ltd.
Manufacturer : Samsung Electronics Co., Ltd.
Date of Receipt : 2019.05.14
Date of Test(s) : 2019.05.14 ~ 2019.05.27
Date of Issue : 2019.06.04

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Murphy Kim

Date:

2019.06.04

Technical
Manager:



Jungmin Yang

Date:

2019.06.04

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

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1.2. Details of Applicant

Applicant : Samsung Electronics Co., Ltd.
Address : 19 Chapin Rd., Building D, Pine Brook, New Jersey, United States, 07058
Contact Person : Chun, Jenni
Phone No. : +1 973 808 6375

1.3. Details of Manufacturer

Company : Samsung Electronics Co., Ltd.
Address : Yen Phong 1 Industrial park, Yen Phong District Ninh Province, VIETNAM

1.4. Description of EUT

Kind of Product	WIRELESS CHARGER
Model Name	EP-OR825
Power Supply	DC 5.0 V
Frequency Range	110 kHz ~ 148 kHz
Antenna Type	Inductive loop coil antenna

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1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Spectrum Analyzer	R&S	FSV30	103210	Dec. 05, 2018	Annual	Dec. 05, 2019
Signal Generator	R&S	SMBV100A	259067	Jun. 15, 2018	Annual	Jun. 15, 2019
Test Receiver	R&S	ESU26	100109	Jan. 31, 2019	Annual	Jan. 31, 2020
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2017	Biennial	Aug. 23, 2019
Turn Table	Innco systems GmbH	DS 1200 S	N/A	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/3 8330516/L	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	SUCOFLEX	104 (3 m)	MY3258414	Jan. 04, 2019	Semi-annual	Jul. 04, 2019
Coaxial Cable	SUCOFLEX	104 (10 m)	MY3145814	Jan. 04, 2019	Semi-annual	Jul. 04, 2019
Test Receiver	R&S	ESCI 7	100911	Feb. 20, 2019	Annual	Feb. 20, 2020
Two-Line V-Network	R&S	ENV216	100190	May 14, 2019	Annual	May 14, 2020
Shield Room	SY Corporation	L × W × H (6.5 m × 3.5 m × 3.5 m)	N/A	N.C.R.	N/A	N.C.R.

► Support Equipment

Description	Manufacturer	Model	FCC ID
SMART WATCH	Samsung Electronics Co., Ltd.	SM-R500	A3LSMR500
TRAVEL ADAPTER	Samsung Electronics Co., Ltd.	EP-TA50KWK	-

1.6. Sample Calculation

Where relevant, the following sample calculation is provided:

Field strength level (dB μ V/m) = Measured level (dB μ V) + Antenna factor (dB) + Cable loss (dB)

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A4(210 mm × 297 mm)

1.7. Worst Case of Test Configurations

EUT was evaluated with appropriate under each charging condition as below table.

Charging Mode With Client Device	Description
Model: SM-R500 FCC ID: A3LSMR500	1 % of battery 50 % of battery 99 % of battery

Note;

EUT was investigated with client device under normal charging condition as above then worst value was only reported.

1.8. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 18 Subpart C		
Section	Test Item	Result
18.305	Field Strength of Fundamental and Spurious Emissions	Complied
18.307	AC Conducted Power Line Emissions	Complied

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1.9. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty (dB)
AC Conducted Emission	± 3.30
Radiated Disturbance, 9 kHz to 30 MHz	± 3.59

Uncertainty figures are valid to a confidence level of 95 %.

1.10. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501/RF-RTL013901	2019.06.04	Initial

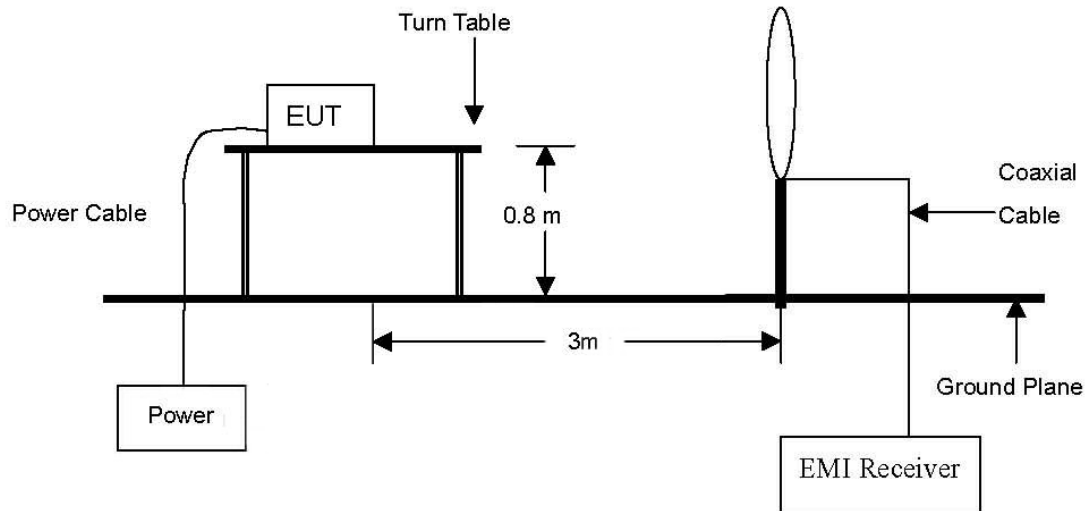
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2. Field Strength of Fundamental and Spurious Emissions

2.1. Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz.



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2.2. Radiated Emission Limit

According to §18.305 (b), The field strength levels of emissions which lie outside the bands specified in §18.301, unless otherwise indicated, shall not exceed the following:

Equipment	Operating frequency	RF power generated by equipment (watts)	Field strength limit ($\mu\text{V/m}$)	Distance (meter)
Any type unless otherwise specified(miscellaneous)	Any ISM frequency	Below 500 500 or more	25 25 x SQRT (power/500)	300 ¹ 300
	<u>Any non-ISM frequency</u>	<u>Below 500</u> 500 or more	<u>15</u> 15 x SQRT (power/500)	<u>300</u> ¹ 300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 (²)	1600 (²)
Medical diathermy	Any ISM frequency Any non-ISM Frequency	Any Any	25 15	300 300
Ultrasonic	Below 490 kHz	Below 500 500 or more	2,400/F(kHz) 2,400/F(kHz) x SQRT(power/500)	300 ³ 300
	490 to 1,600 kHz Above 1,600 kHz	Any Any	24,000/F(kHz) 15	30 30
Induction cooking ranges	Below 90 kHz On or above 90 kHz	Any Any	1,500 300	⁴ 30 ⁴ 30

¹Field strength may not exceed 10 $\mu\text{V/m}$ at 1 600 meters. Consumer equipment operating below 1 000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

²Reduced to the greatest extent possible.

³Field strength may not exceed 10 $\mu\text{V/m}$ at 1 600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

⁴Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

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2.3. Test Procedures for Emission from 9 kHz to 30 MHz

Radiated emissions from the EUT were measured according to the dictates of MP-5 measurement.

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. Then antenna is a loop antenna is set from 1 meter to 2 meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
- c. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- d. The test-receiver system was set to average detect function and specified bandwidth with maximum hold mode.
- e. The test data of the worst-case condition was recorded.

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2.4. Field Strength of Fundamental Test Result

Ambient temperature : (23 ± 1) °C
Relative humidity : 47 % R.H.

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical. The field strength of spurious emission was measured in one orthogonal EUT position (X-axis).

Test Condition: Operating Mode with Client Device (1 % Battery Status of Client Device)

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dB μ V/m) at 3 m	Actual (dB μ V/m) at 300 m	Limit (dB μ V/m) at 300 m	Margin (dB)
0.126	48.00	Average	H	19.69	0.07	67.76	-12.24	23.52	35.76

Remark;

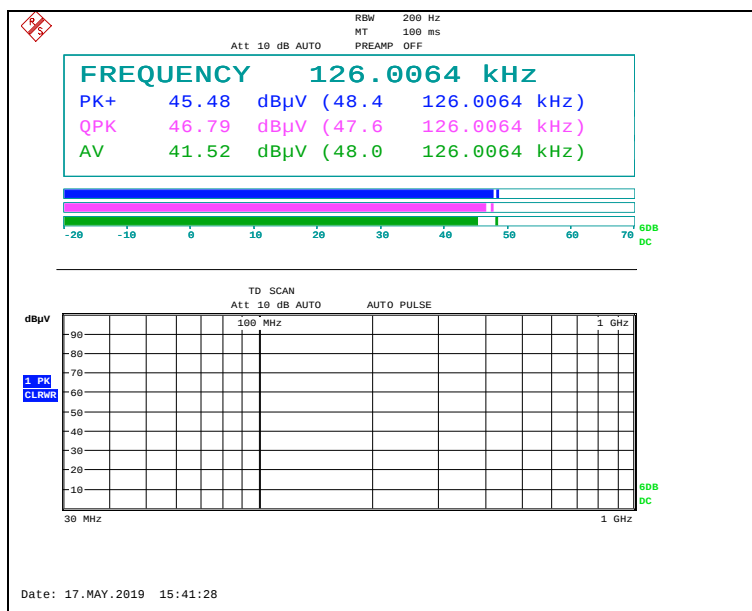
1. Result at 300 m [dB μ V/m]= Actual at 3 m [dB μ V/m] + 40 log (300/3)
2. According to clause 2.2.2. of MP-5(1986). The detector function selector shall be set to average.
3. The limit above was calculated based on table §18.305(b)

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- Test plot

Test Condition: Operating Mode with Client Device (1 % Battery Status of Client Device)



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2.5. Spurious Emission Test Result

Ambient temperature : (23 ± 1) °C

Relative humidity : 47 % R.H.

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical from 9 kHz to 30 MHz.

Test Condition: Operating Mode with Client Device (1 % Battery Status of Client Device)

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dBμV/m) at 3 m	Actual (dBμV/m) at 300 m	Limit (dBμV/m) at 300 m	Margin (dB)
0.019	31.30	Average	H	19.97	0.01	51.28	-28.72	23.52	52.24
0.378	23.10	Average	H	19.60	0.29	42.99	-37.01	23.52	60.53
Above 1.000	Not detected	-	-	-	-	-	-	-	-

Remark;

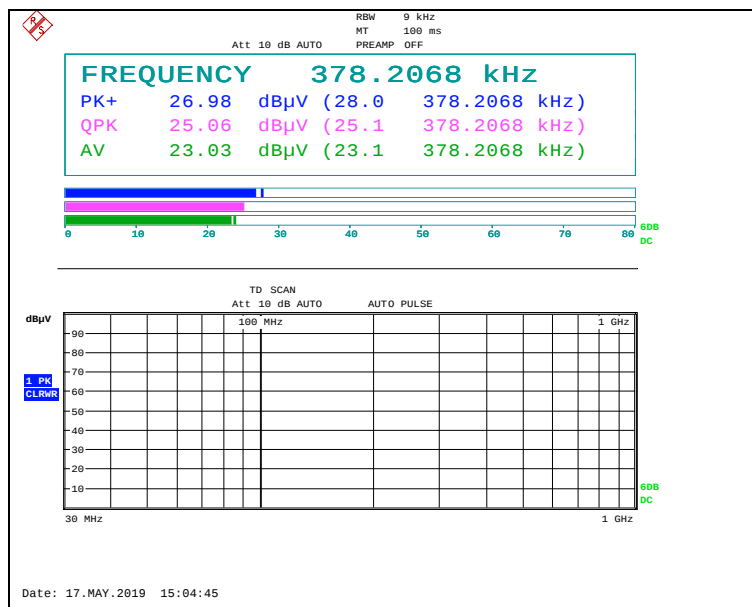
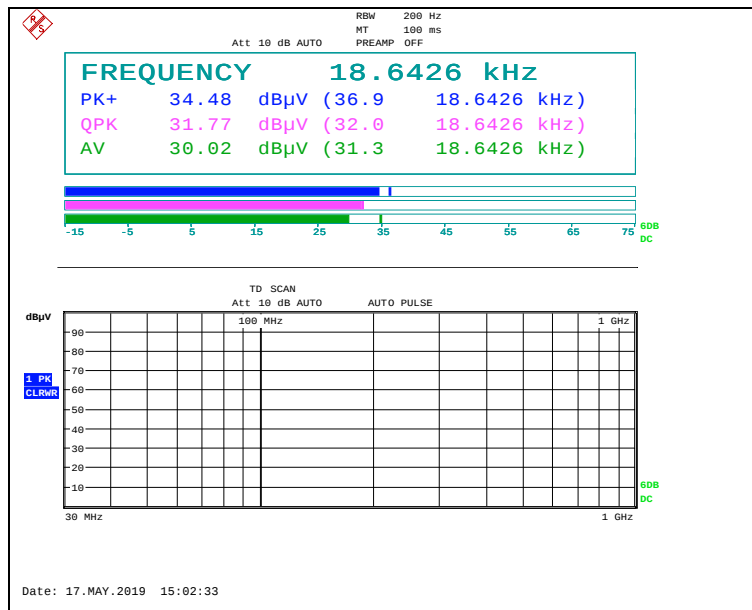
1. Result at 300 m [dBμV/m]= Actual at 3 m [dBμV/m] - 40 log (300/3)
2. According to clause 2.2.2. of MP-5(1986). The detector function selector shall be set to average.
3. The limit above was calculated based on table §18.305(b)

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- Test plots

Test Condition: Operating Mode with Client Device (1 % Battery Status of Client Device)

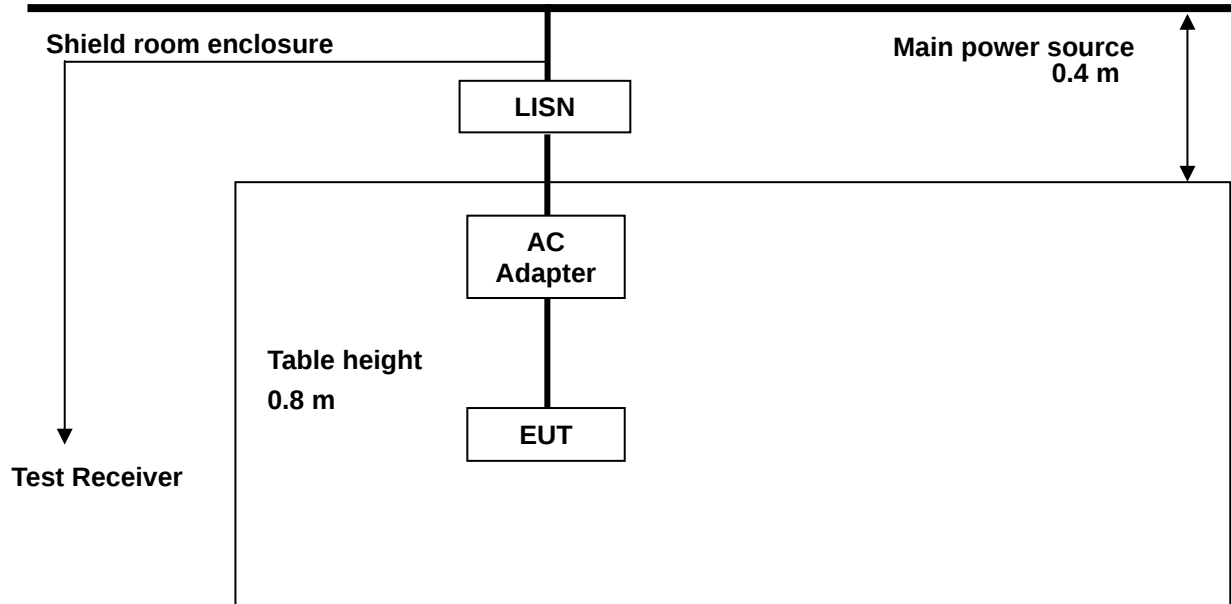


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3. AC Conducted Power Line Emissions

3.1. Test Setup



3.2. Limit

According to §18.307 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 uH/50 ohm line impedance stabilization network(LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

(b) All other part 18 consumer devices:

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

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3.3. Test Procedures

AC conducted emissions from the EUT were measured according to the dictates of MP-5 measurement.

1. The test procedure is performed in a 6.5 m × 3.6 m × 3.6 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m(W) × 1.5 m(L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

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3.4. Test Results

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : (23 ± 1) °C

Relative humidity : 47 % R.H.

Frequency range : 0.15 MHz - 30 MHz

Measured Bandwidth : 9 kHz

Test Condition: Operating Mode with Client Device (1 % Battery Status of Client Device)

FREQ. (MHz)	LEVEL (dBμV)		LINE	LIMIT (dBμV)		MARGIN (dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.19	40.80	28.40	N	64.04	54.04	23.24	25.64
0.40	32.70	27.90	N	57.85	47.85	25.15	19.95
0.80	22.30	16.90	N	56.00	46.00	33.70	29.10
1.03	24.20	21.10	N	56.00	46.00	31.80	24.90
2.21	21.20	17.20	N	56.00	46.00	34.80	28.80
22.82	20.50	12.40	N	60.00	50.00	39.50	37.60
0.41	43.70	42.70	H	57.65	47.65	13.95	4.95
1.03	28.30	23.70	H	56.00	46.00	27.70	22.30
2.80	24.70	19.30	H	56.00	46.00	31.30	26.70
6.33	24.60	18.10	H	60.00	50.00	35.40	31.90
10.75	22.50	16.10	H	60.00	50.00	37.50	33.90
23.99	27.80	18.70	H	60.00	50.00	32.20	31.30

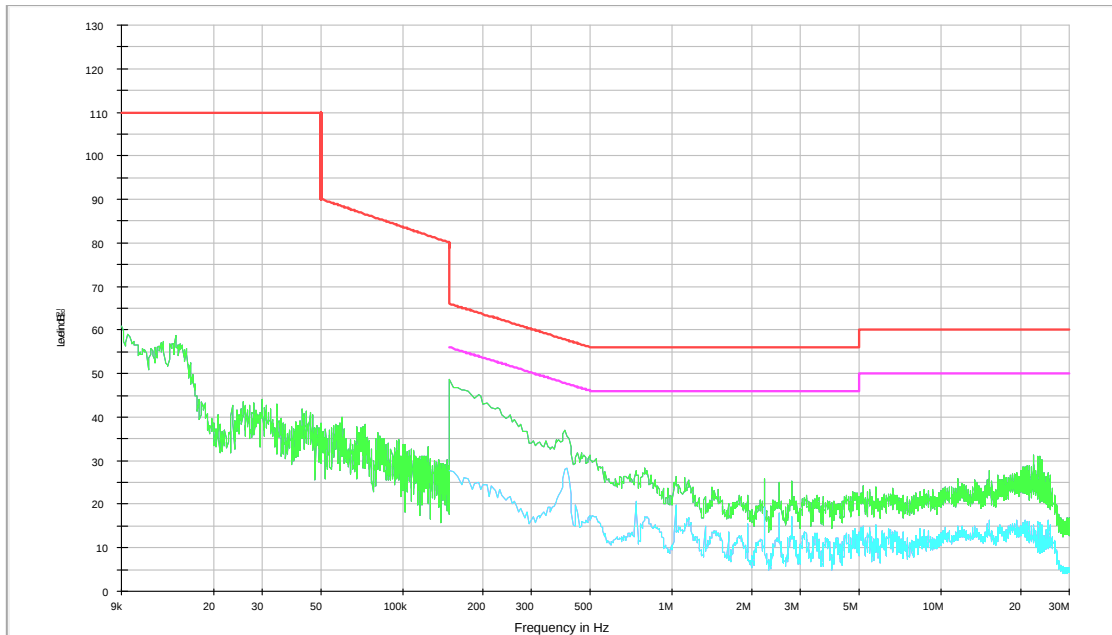
Remark;

- Line (H): Hot, Line (N): Neutral
- Each charging mode with client device (1 %, 50 % and 99 % of battery) was tested.
As worst condition, charging mode with client device (1 %) is reported.
- The limit for Class B device(s) from 9 kHz to 30 MHz are specified in Section of the Title 47 CFR.
- Traces shown in plot were made by using a peak detector and average detector.
- Deviations to the Specifications: None.

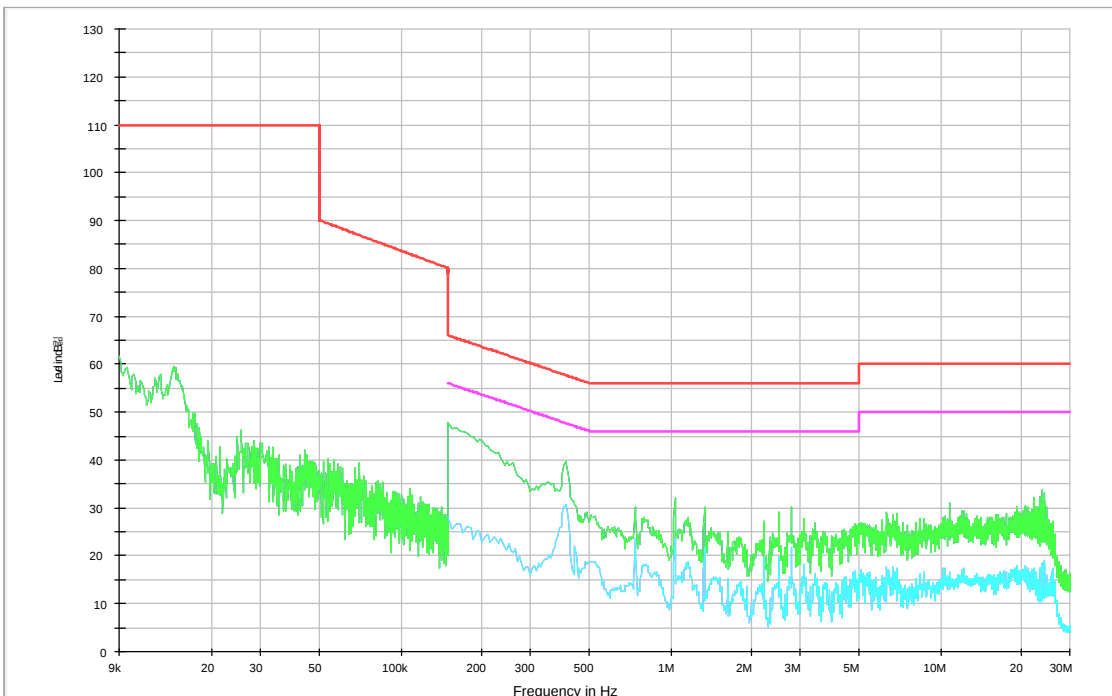
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Test mode: (Neutral)



Test mode: (Hot)



- End of the Test Report -

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