

TEST REPORT

of

FCC Part 15 Subpart C §15.209

FCC ID: A3LEPN5105

Equipment Under Test : WIRELESS CHARGER
Model Name : EP-N5105
Applicant : Samsung Electronics Co., Ltd.
Manufacturer : Samsung Electronics Co., Ltd.
Date of Receipt : 2019.07.19
Date of Test(s) : 2019.07.24 ~ 2019.08.05
Date of Issue : 2019.08.06

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

Tested By:



Nancy Park

Date:

2019.08.06

Technical
Manager:



Hyunchoe You

Date:

2019.08.06

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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 6362

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-N5105	
Power Supply	DC 9.0 V	
Operation Mode	5 W	9 W
Frequency Range	Ant. 1: 120.5 kHz, 126.7 ~ 128.7 kHz Ant. 2: 120.5 kHz, 126.7 ~ 128.7 kHz	Ant. 1: 126.7 ~ 128.7 kHz Ant. 2: 126.7 ~ 128.7 kHz
Antenna Type	Loop Coil Antenna	

1.5. Declaration by the Manufacturer

- The EUT has 2 loop coil antennas, and only one antenna can transmit at once.
- The EUT operates at 120.5 kHz only in specific models(SM-N970U, SM-N971U).

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1.6. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Spectrum Analyzer	R&S	FSV30	100768	Mar. 08, 2019	Annual	Mar. 08, 2020
Signal Generator	R&S	SMBV100A	259067	Jun. 10, 2019	Annual	Jun. 10, 2020
Test Receiver	R&S	ESU26	100109	Jan. 31, 2019	Annual	Jan. 31, 2020
Amplifier	H.P.	8447F	2944A03909	Aug. 11, 2017	Annual	Aug. 23, 2019
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2017	Biennial	Aug. 23, 2019
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	396	Mar. 21, 2019	Biennial	Mar. 21, 2021
Antenna Master	Innco systems GmbH	MA4640-XP-ET	MA4640/536/3 8330516/L	N.C.R.	N/A	N.C.R.
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	Jul. 20, 2019	Semi-annual	Jan. 20, 2020
Coaxial Cable	SUCOFLEX	104 (10 m)	MY3145814	Jul. 20, 2019	Semi-annual	Jan. 20, 2020
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
Samsung Mobile Phone	Samsung Electronics Co., Ltd.	SM-G973U	A3LSMG973U

1.7. 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)

1.8. Worst Case of Test Configurations

Charging mode with client device	Mode		Description
Model: SM-G973U FCC ID: A3LSMG973U	5 W	9 W	1 % of battery 50 % of battery 99 % of battery
	(Ant. 1) (Ant. 2)	(Ant. 1) (Ant. 2)	

Note;

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

1.9. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15 Subpart C		
Section	Test Item	Result
15.209	Radiated Emission, Spurious Emission and Field Strength of Fundamental	Complied
2.1049	20 dB Bandwidth	Complied
15.207	AC Power Line Conducted Emission	Complied

Note;

Due to the frequency range of the device is less than 1 MHz, so we didn't perform Lowest and Highest frequency according to 15.31 requirement.

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1.10. Measurement Uncertainty

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

Parameter	Uncertainty
20 dB Bandwidth	± 9.66 kHz
AC Conducted Emission	± 3.30 dB
Radiated Disturbance, 9 kHz to 30 MHz	± 3.59 dB
Radiated Disturbance, below 1 GHz	± 5.88 dB

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

1.11. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501/RF-RTL014180	2019.08.06	Initial

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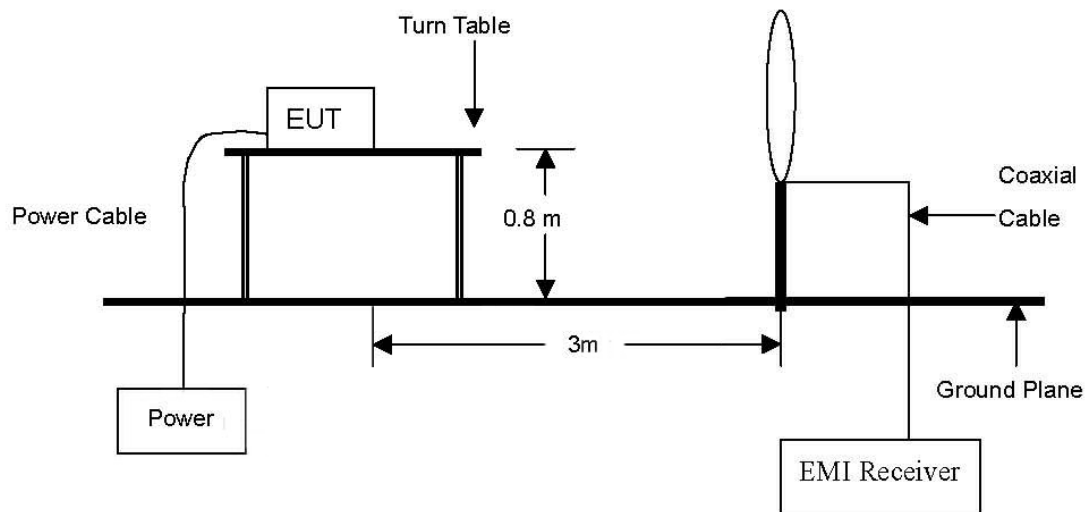
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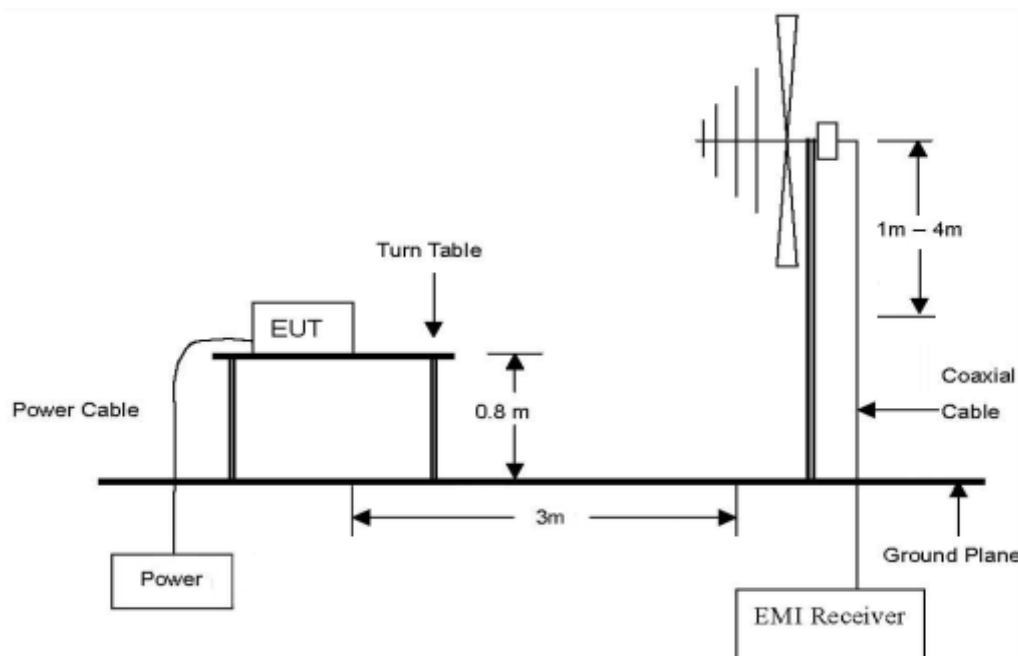
2. Field Strength of Fundamental and Spurious Emission

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.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz.



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2.2. Limit

2.2.1. Radiated emission limits, general requirements

According to §15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009-0.490	2 400/F(kHz)	300
0.490-1.705	24 000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

** Except as provided in paragraph (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

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2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.10:2013.

2.3.1. Test Procedures for emission from 9 kHz to 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. Then antenna is a loop antenna is fixed at one 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 Quasi Peak and Average Detect Function and Specified Bandwidth with Maximum Hold Mode.

2.3.2. Test Procedures for emission from 30 MHz to 1 000 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. During performing radiated emission test, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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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.

Test Condition: 5 W 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)
Ant. 1 (120.5 kHz, 126.7 ~ 128.7 kHz)									
0.121	66.50	Average	H	19.69	0.06	86.25	6.25	25.95	19.70
0.128	64.20	Average	H	19.69	0.07	83.96	3.96	25.46	21.50
Ant. 2 (120.5 kHz, 126.7 ~ 128.7 kHz)									
0.121	67.01	Average	H	19.69	0.06	86.76	6.76	25.95	19.19
0.128	65.90	Average	H	19.69	0.07	85.66	5.66	25.46	19.80

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Test Condition: 9 W 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)
Ant. 1 (126.7 ~ 128.7 kHz)									
0.127	53.60	Average	H	19.69	0.07	73.36	-6.64	25.53	32.17
Ant. 2 (126.7 ~ 128.7 kHz)									
0.127	54.60	Average	H	19.69	0.07	74.36	-5.64	25.53	31.17

Remark;

- According to §15.31(f)(2),
- 300 m Result (dB μ V/m) = 3 m Result (dB μ V/m) - 40log (300/3) (dB μ V/m).
- According to field strength table of general requirement in §15.209(a), field strength limits below 1.705 MHz were calculated as below.
- 9 kHz to 490 kHz: 20log (2 400 / F (kHz)) at 300 m (dB μ V/m)
- 490 kHz to 1.705 MHz: 20log (24 000 / F (kHz)) at 30 m (dB μ V/m)
- According to §15.209(d), the measurements were tested by using Quasi peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1 GHz in these three bands on measurements employing an average detector.
- The limit above was calculated based on table of §15.209(a).

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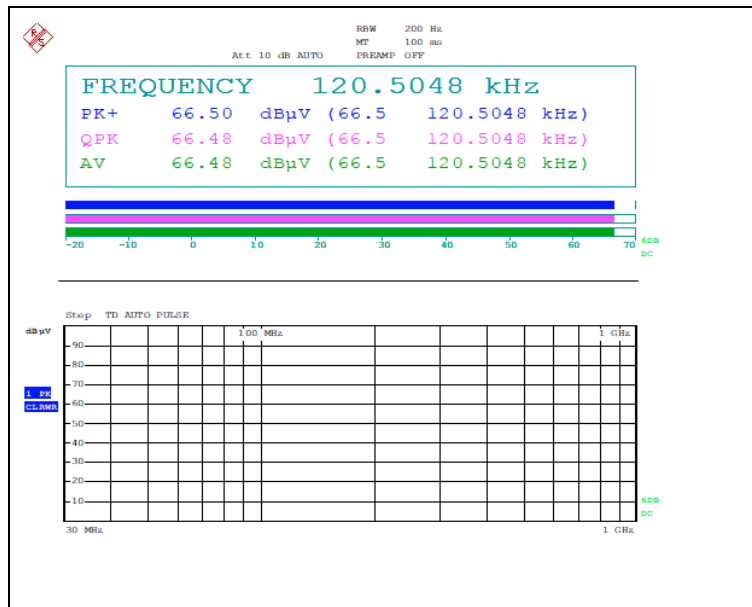
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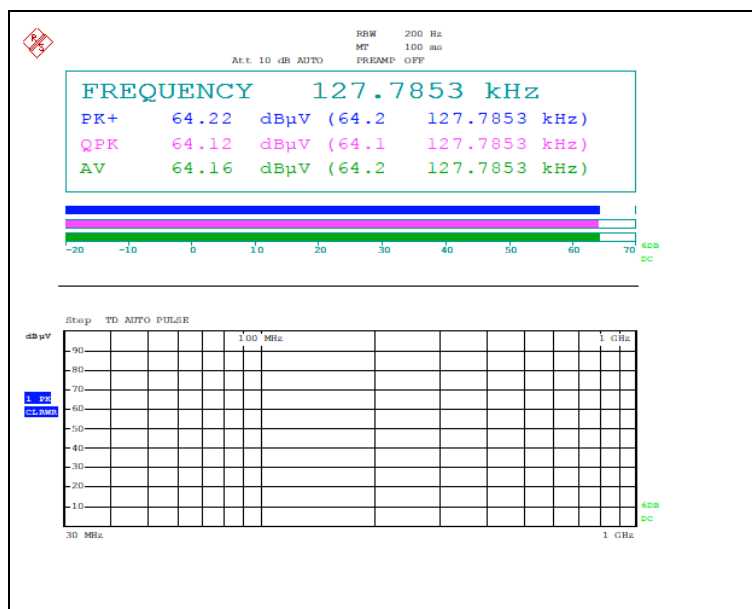
- Test plots

Test Condition: 5 W Operating mode with client device (1 % battery status of client device)

Ant. 1 (120.5 kHz)



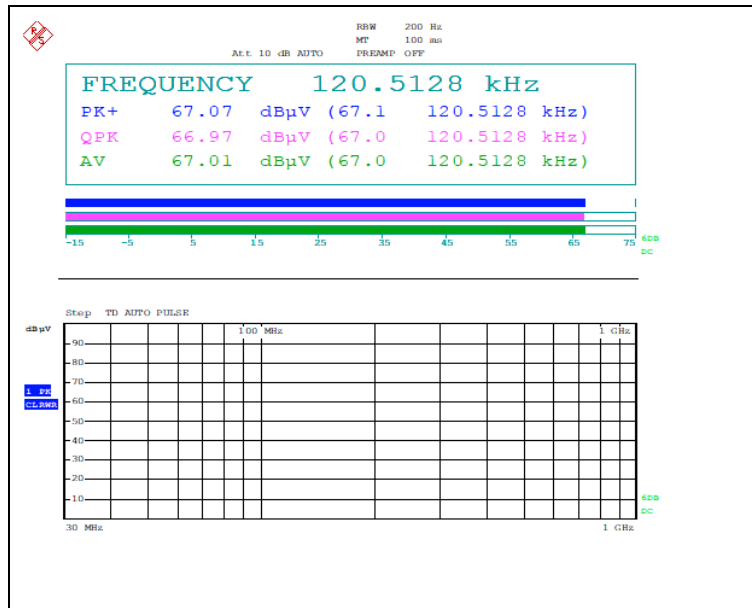
Ant. 1 (126.7 ~ 128.7 kHz)



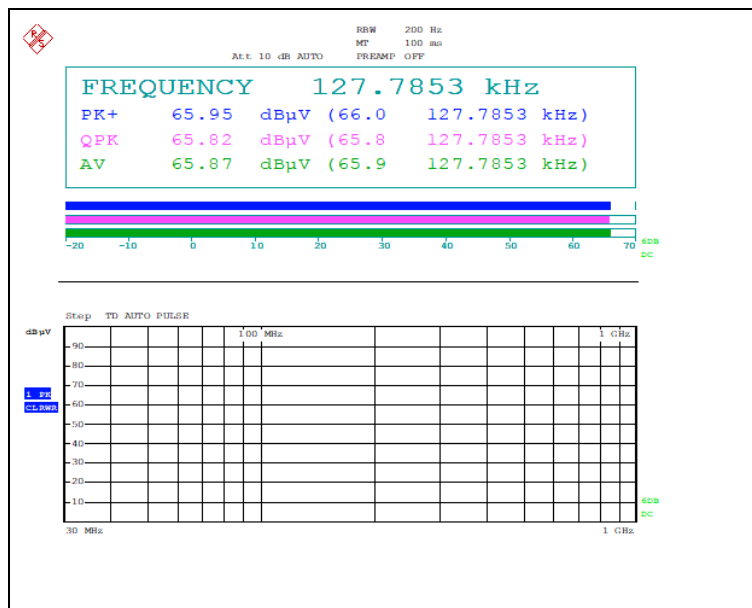
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Ant. 2 (120.5 kHz)



Ant. 2 (126.7 ~ 128.7 kHz)



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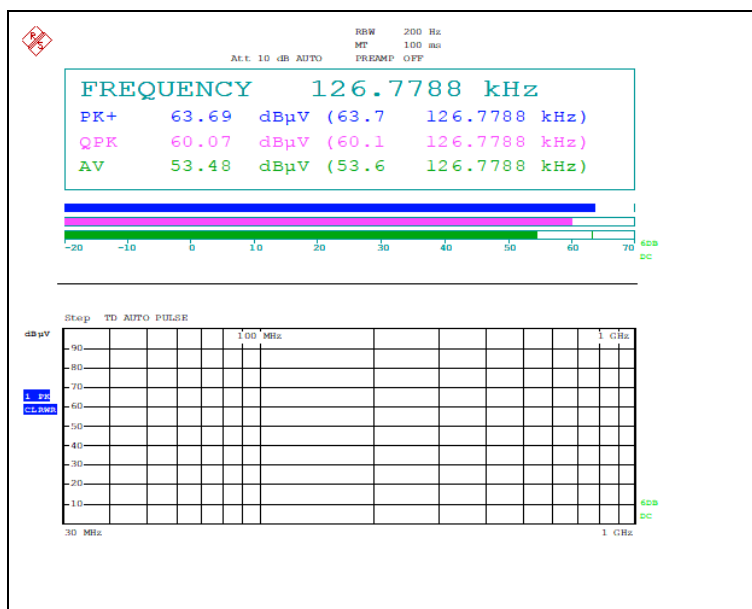
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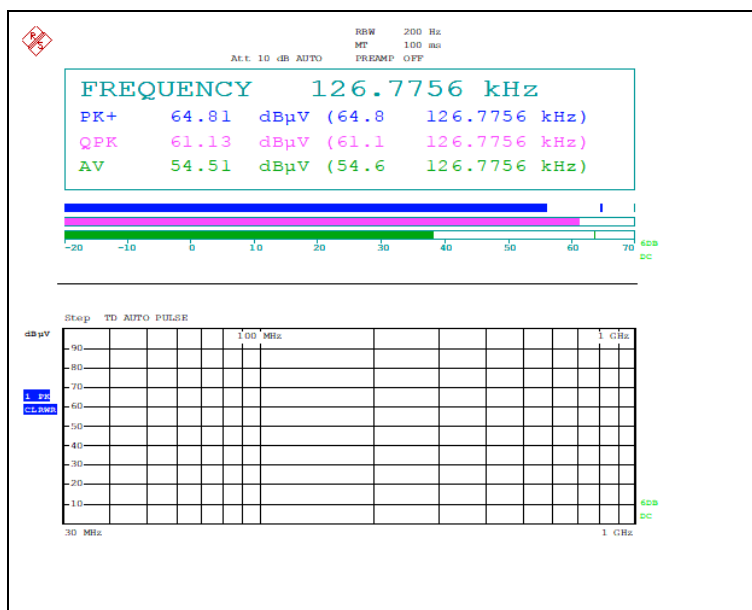
A4(210 mm x 297 mm)

Test Condition: 9 W Operating mode with client device (1 % battery status of client device)

Ant. 1 (126.7 ~ 128.7 kHz)



Ant. 2 (126.7 ~ 128.7 kHz)



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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.

Test Condition: 5 W Operating mode with client device (1 % battery status of client device)

Ant. 1 (120.5 kHz)

Below 30 MHz

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 or 30 m	Limit (dB μ V/m) at 300 m or 30 m	Margin (dB)
0.019	26.10	Average	H	19.97	0.01	46.08	-33.92	42.03	75.95
0.361	42.60	Average	H	19.60	0.24	62.44	-17.56	16.45	34.01
0.604	34.40	Quasi Peak	H	19.62	0.37	54.39	14.39	31.98	17.59
0.844	28.10	Quasi Peak	H	19.67	0.50	48.27	8.27	29.08	20.81

Above 30 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
38.65	42.80	Peak	V	19.43	-26.59	35.64	40.00	4.36
60.07	40.90	Peak	V	18.08	-26.14	32.84	40.00	7.16
83.71	38.30	Peak	V	12.88	-25.51	25.67	40.00	14.33
85.74	38.90	Peak	H	13.60	-25.43	27.07	40.00	12.93
137.83	42.40	Peak	V	14.10	-25.39	31.11	43.50	12.39
157.39	42.70	Peak	H	14.24	-25.34	31.60	43.50	11.90
Above 200.00	Not detected	-	-	-	-	-	-	-

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Ant. 1 (126.7 ~ 128.7 kHz)
Below 30 MHz

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 or 30 m	Limit (dB μ V/m) at 300 m or 30 m	Margin (dB)
0.018	24.10	Average	H	19.98	0.01	44.09	-35.91	42.50	78.41
0.384	40.70	Average	H	19.60	0.25	60.55	-19.45	15.92	35.37
0.639	33.10	Quasi Peak	H	19.63	0.39	53.12	13.12	31.49	18.37
0.895	26.60	Quasi Peak	H	19.68	0.52	46.80	6.80	28.57	21.77

Above 30 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
38.00	40.80	Peak	V	19.10	-26.62	33.28	40.00	6.72
52.84	37.40	Peak	V	19.82	-26.33	30.89	40.00	9.11
59.10	38.80	Peak	V	18.28	-26.17	30.91	40.00	9.09
85.74	35.30	Peak	H	13.60	-25.43	23.47	40.00	16.53
148.50	38.10	Peak	V	13.80	-25.40	26.50	43.50	17.00
159.82	38.50	Peak	H	14.38	-25.31	27.57	43.50	15.93
Above 200.00	Not detected	-	-	-	-	-	-	-

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Ant. 2 (120.5 kHz)
Below 30 MHz

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 or 30 m	Limit (dB μ V/m) at 300 m or 30 m	Margin (dB)
0.019	28.00	Average	H	19.97	0.01	47.98	-32.02	42.03	74.05
0.361	43.30	Average	H	19.60	0.24	63.14	-16.86	16.45	33.31
0.602	36.00	Quasi Peak	H	19.62	0.37	55.99	15.99	32.01	16.02
0.844	29.00	Quasi Peak	H	19.67	0.50	49.17	9.17	29.08	19.91

Above 30 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
38.21	41.00	Peak	V	19.21	-26.61	33.60	40.00	6.40
52.47	36.90	Peak	V	19.85	-26.35	30.40	40.00	9.60
86.46	34.30	Peak	H	13.84	-25.39	22.75	40.00	17.25
136.86	35.80	Peak	V	14.11	-25.39	24.52	43.50	18.98
154.36	34.90	Peak	H	14.10	-25.36	23.64	43.50	19.86
831.10	32.30	Peak	H	27.14	-23.16	36.28	46.00	9.72
Above 900.00	Not detected	-	-	-	-	-	-	-

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Ant. 2 (126.7 ~ 128.7 kHz)
Below 30 MHz

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 or 30 m	Limit (dB μ V/m) at 300 m or 30 m	Margin (dB)
0.019	28.30	Average	H	19.97	0.01	48.28	-31.72	42.03	73.75
0.384	41.50	Average	H	19.60	0.25	61.35	-18.65	15.92	34.57
0.639	35.40	Quasi Peak	H	19.63	0.39	55.42	15.42	31.49	16.07
0.895	28.30	Quasi Peak	H	19.68	0.52	48.50	8.50	28.57	20.07

Above 30 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
38.57	40.50	Peak	V	19.39	-26.60	33.29	40.00	6.71
45.24	34.40	Peak	V	20.60	-26.48	28.52	40.00	11.48
52.35	36.70	Peak	V	19.87	-26.35	30.22	40.00	9.78
86.58	36.20	Peak	H	13.87	-25.39	24.68	40.00	15.32
138.07	36.10	Peak	V	14.10	-25.39	24.81	43.50	18.69
161.60	35.20	Peak	H	14.46	-25.31	24.35	43.50	19.15
Above 200.00	Not detected	-	-	-	-	-	-	-

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Test Condition: 9 W Operating mode with client device (1 % battery status of client device)

Ant. 1 (126.7 ~ 128.7 MHz)

Below 30 MHz

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 or 30 m	Limit (dBμV/m) at 300 m or 30 m	Margin (dB)
0.019	30.40	Average	H	19.97	0.01	50.38	-29.62	42.03	71.65
0.380	37.90	Average	H	19.60	0.25	57.75	-22.25	16.01	38.26
0.640	32.80	Quasi Peak	H	19.63	0.39	52.82	12.82	31.48	18.66
0.901	25.90	Quasi Peak	H	19.68	0.53	46.11	6.11	28.51	22.40

Above 30 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
41.72	36.20	Peak	V	20.27	-26.53	29.94	40.00	10.06
59.35	43.20	Quasi Peak	V	18.23	-26.16	35.27	40.00	4.73
87.19	36.60	Peak	V	14.06	-25.37	25.29	40.00	14.71
151.01	37.20	Peak	H	13.90	-25.40	25.70	43.50	17.80
175.70	34.40	Peak	H	14.87	-25.34	23.93	43.50	19.57
735.11	36.80	Peak	V	26.31	-23.28	39.83	46.00	6.17
Above 800.00	Not detected	-	-	-	-	-	-	-

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Ant. 2 (126.7 ~ 128.7 kHz)

Below 30 MHz

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 or 30 m	Limit (dBμV/m) at 300 m or 30 m	Margin (dB)
0.019	26.20	Average	H	19.97	0.01	46.18	-33.82	42.03	75.85
0.382	40.00	Average	H	19.60	0.25	59.85	-20.15	15.96	36.11
0.639	35.11	Quasi Peak	H	19.63	0.39	55.13	15.13	31.49	16.36
0.894	27.90	Quasi Peak	H	19.68	0.52	48.10	8.10	28.58	20.48

Above 30 MHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
38.57	38.30	Peak	V	19.39	-26.60	31.09	40.00	8.91
55.34	37.60	Peak	V	19.30	-26.27	30.63	40.00	9.37
84.28	37.60	Peak	V	13.08	-25.47	25.21	40.00	14.79
87.47	36.40	Peak	H	14.14	-25.35	25.19	40.00	14.81
136.46	37.70	Peak	V	14.15	-25.39	26.46	43.50	17.04
162.16	39.80	Peak	H	14.48	-25.31	28.97	43.50	14.53
Above 200.00	Not detected	-	-	-	-	-	-	-

Remark;

- According to §15.31(f)(2),
- 300 m Result (dBμV/m) = 3 m Result (dBμV/m) - 40log (300/3) (dBμV/m)
- 30 m Result (dBμV/m) = 3 m Result (dBμV/m) - 40log (30/3) (dBμV/m)
- According to field strength table of general requirement in §15.209(a), field strength limits below 1.705 MHz were calculated as below.
- 9 kHz to 490 kHz: 20log (2 400 / F (kHz)) at 300 m (dBμV/m)
- 490 kHz to 1.705 MHz: 20log (24 000 / F (kHz)) at 30 m (dBμV/m)
- According to §15.209(d), the measurements were tested by using Quasi peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1 GHz in these three bands on measurements employing an average detector.
- The limit above was calculated based on table of §15.209(a).

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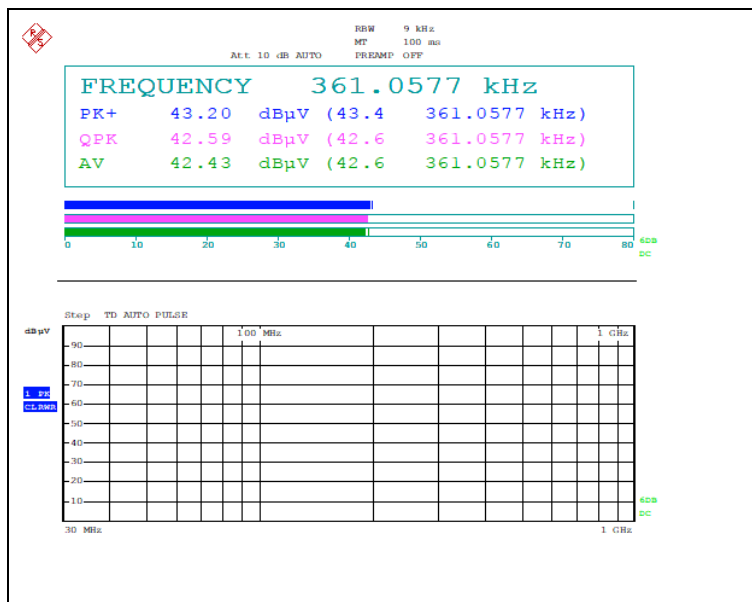
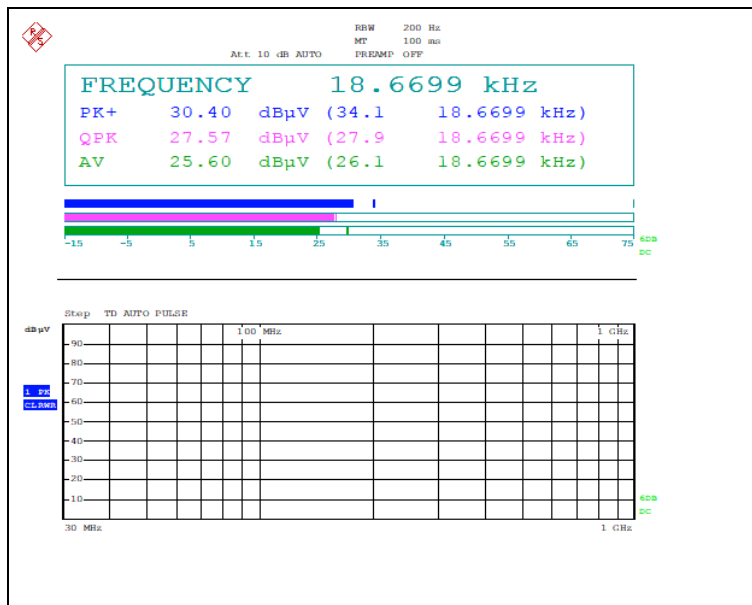
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- Test plots

Test Condition: 5 W Operating mode with client device (1 % battery status of client device)

Ant. 1 (120.5 kHz)

Below 30 MHz



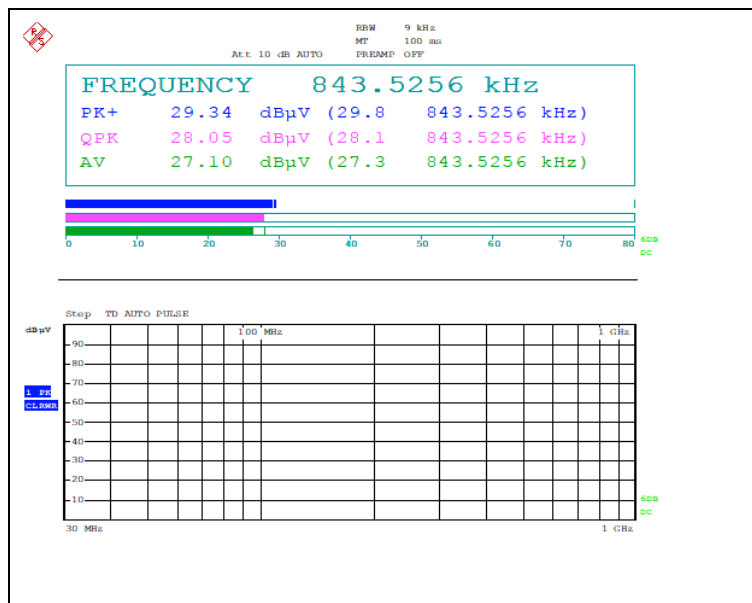
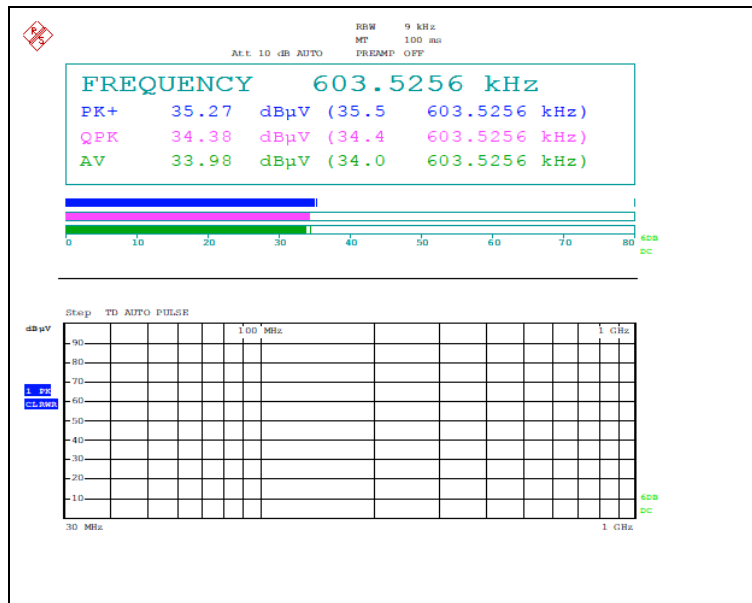
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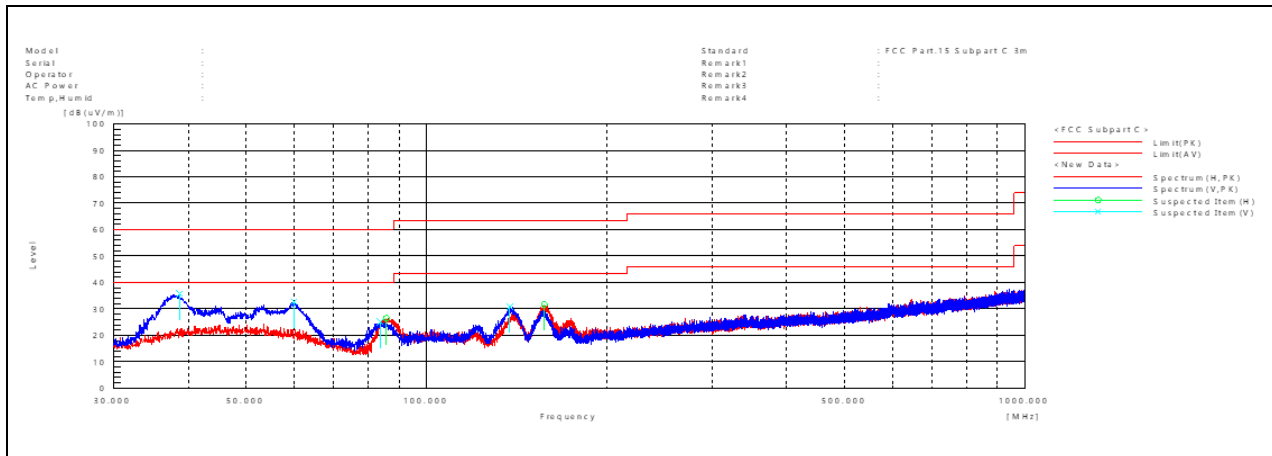
A4(210 mm x 297 mm)



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Above 30 MHz



Remark;

- Traces shown in the plot were made by using a peak detector.

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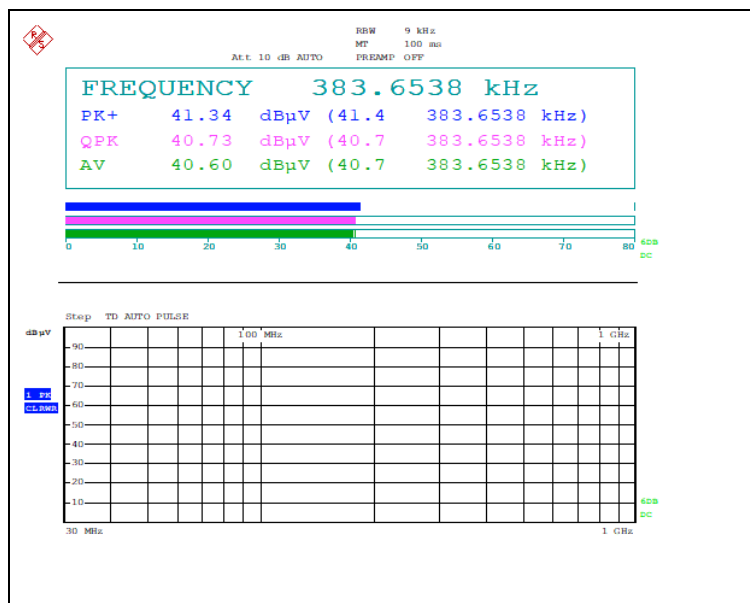
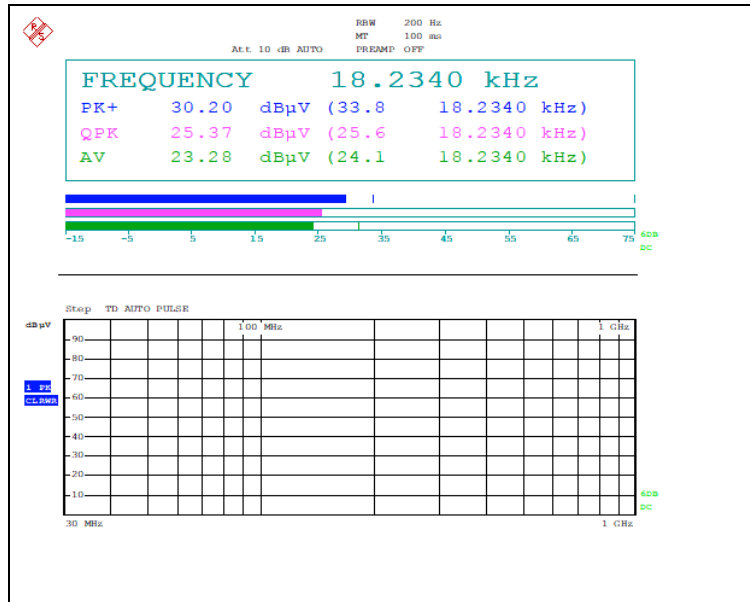
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A4(210 mm x 297 mm)

Ant. 1 (126.7 ~ 128.7 kHz)

Below 30 MHz



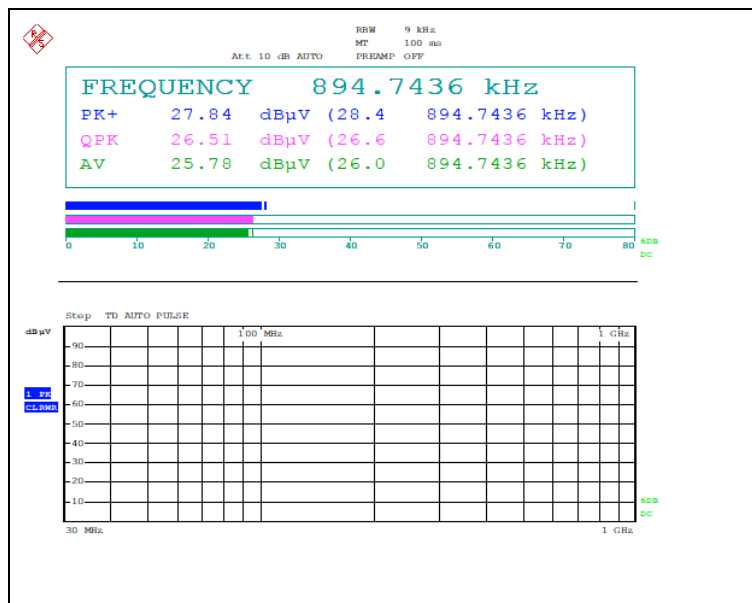
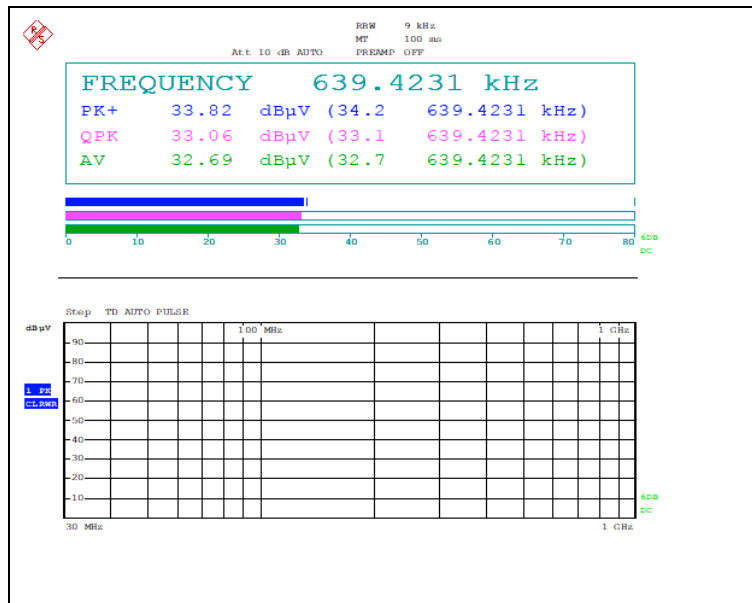
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A4(210 mm x 297 mm)



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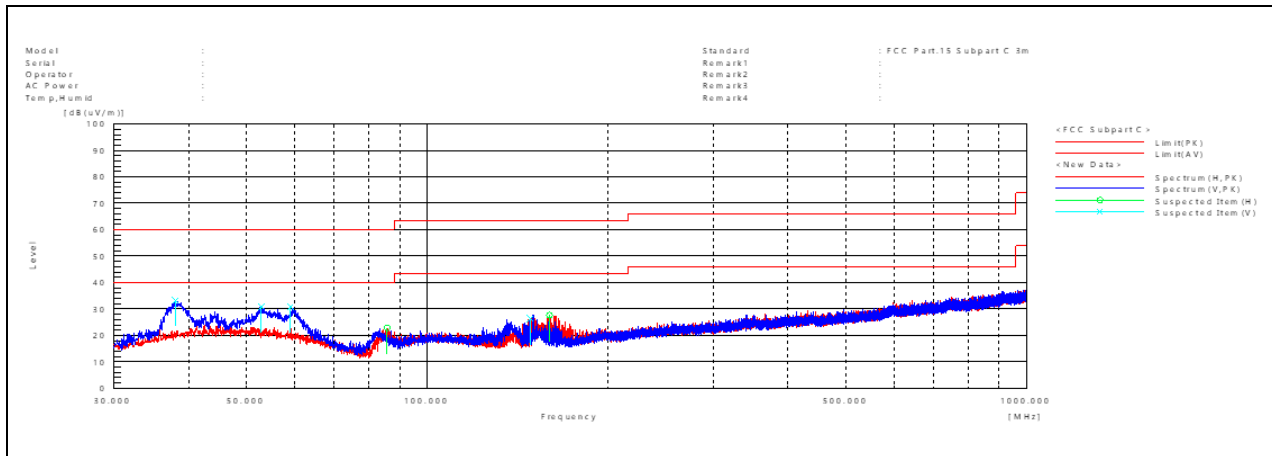
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A4(210 mm x 297 mm)

Above 30 MHz



Remark;

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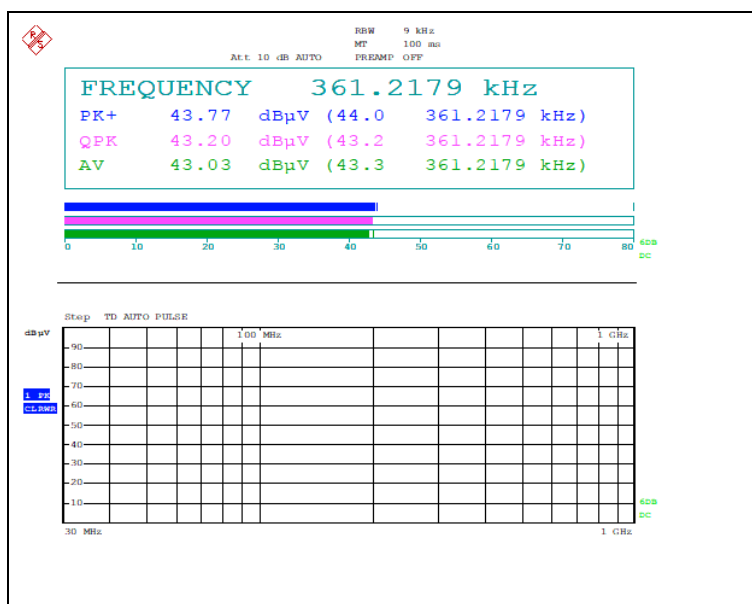
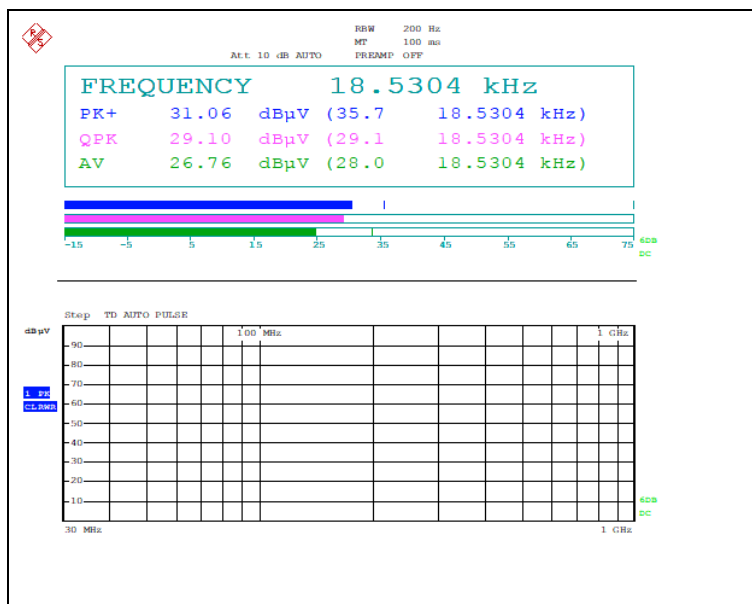
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A4(210 mm x 297 mm)

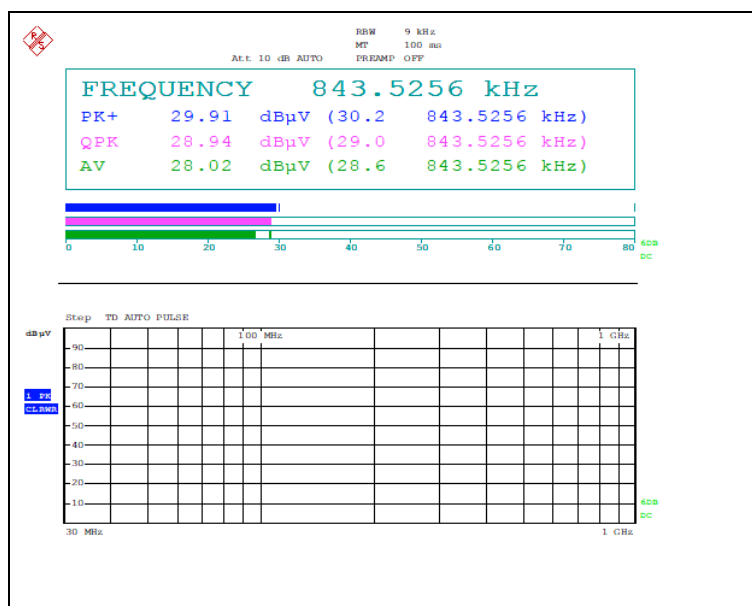
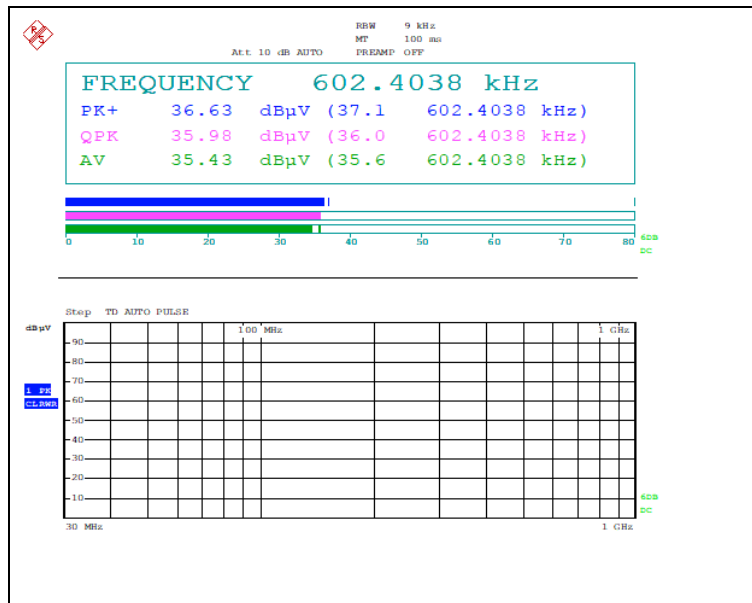
Ant. 2 (120.5 kHz)

Below 30 MHz



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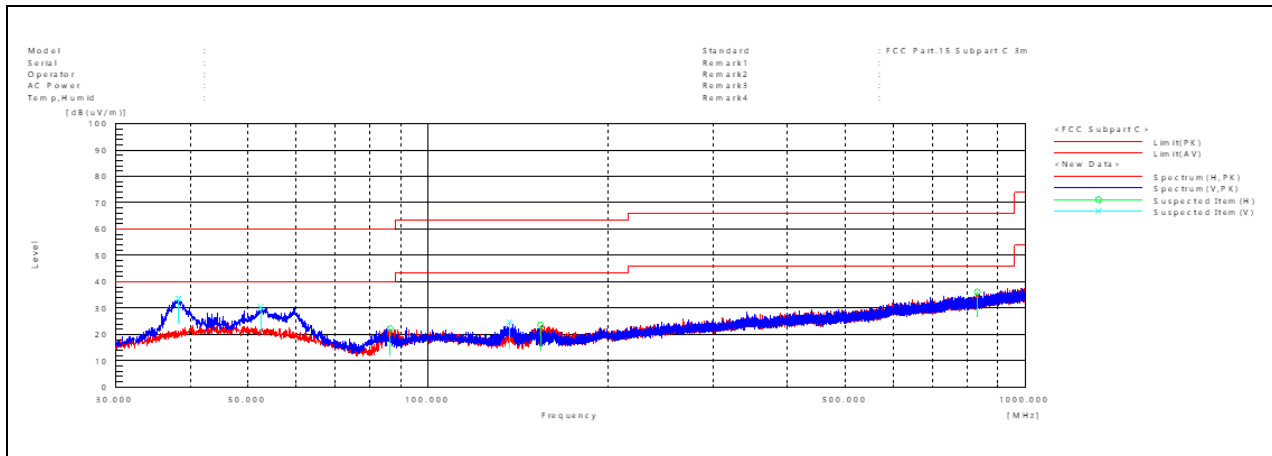
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A4(210 mm x 297 mm)

Above 30 MHz



Remark;

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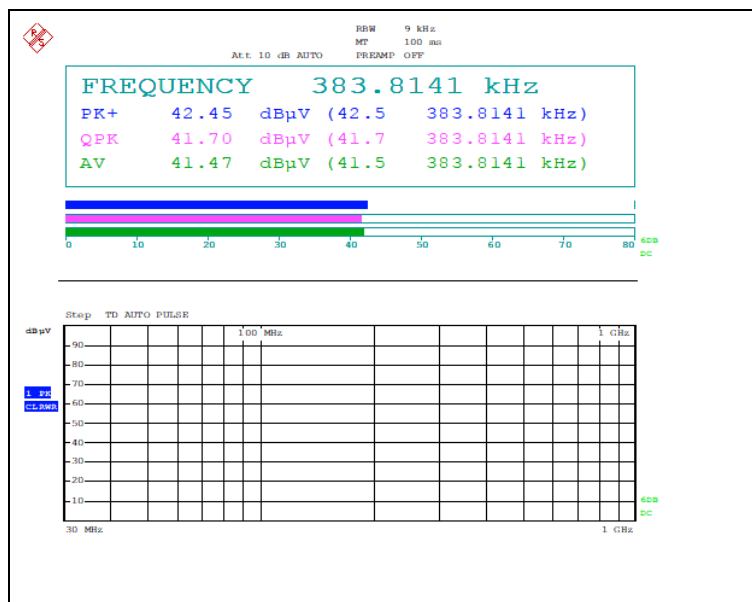
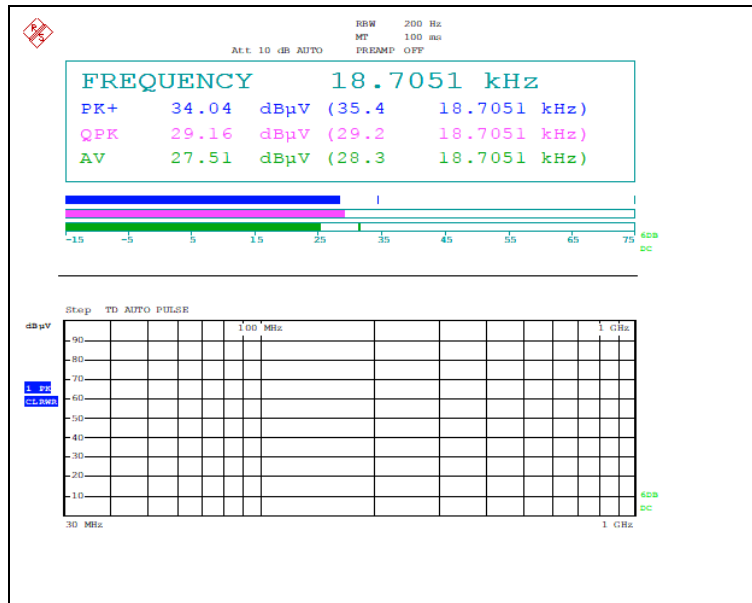
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A4(210 mm x 297 mm)

Ant. 2 (126.7 ~ 128.7 kHz)

Below 30 MHz



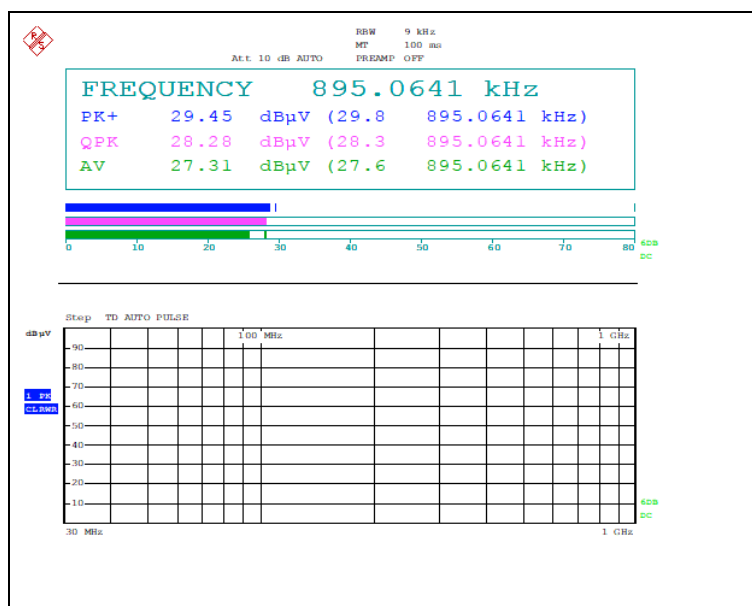
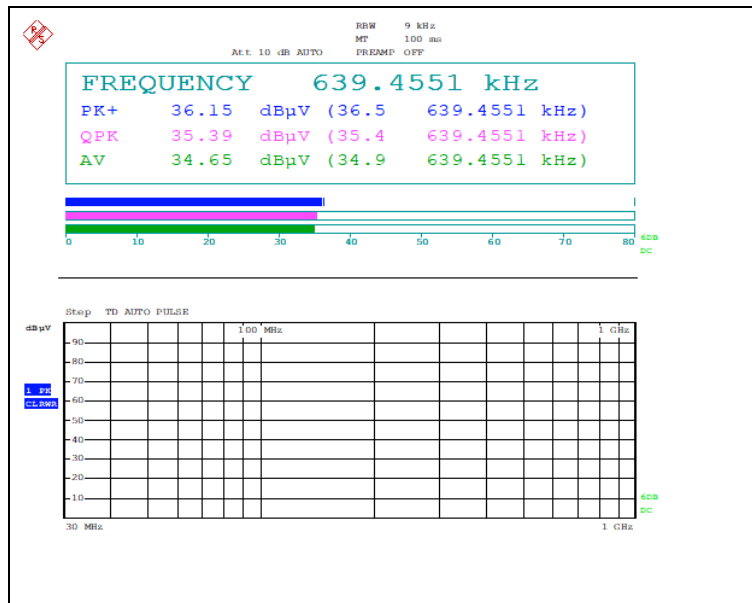
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A4(210 mm x 297 mm)



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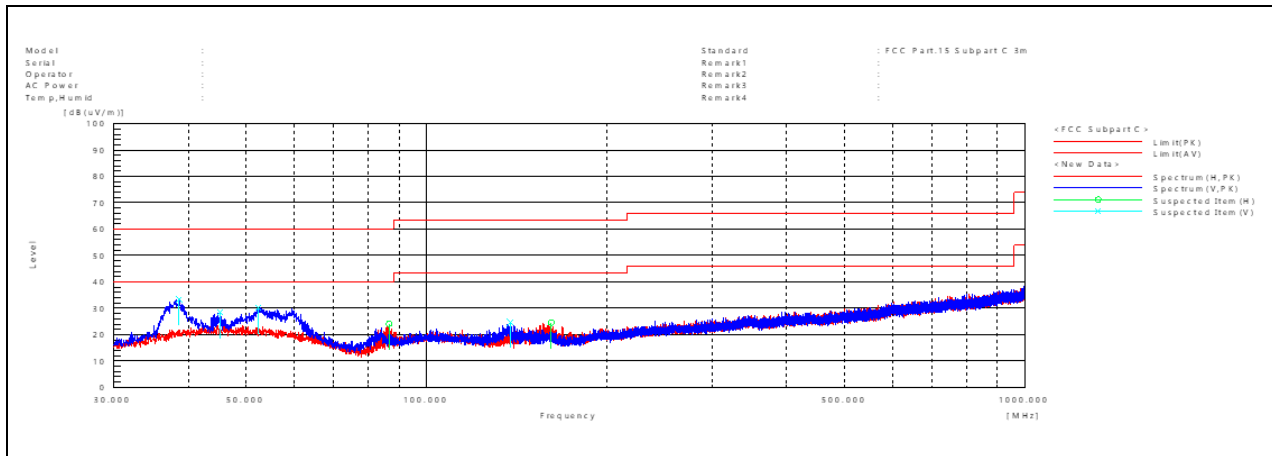
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A4(210 mm x 297 mm)

Above 30 MHz



Remark;

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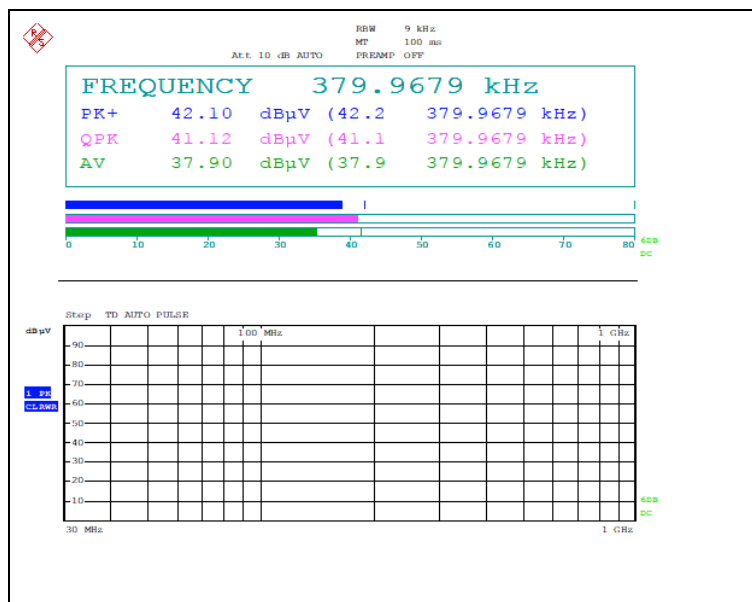
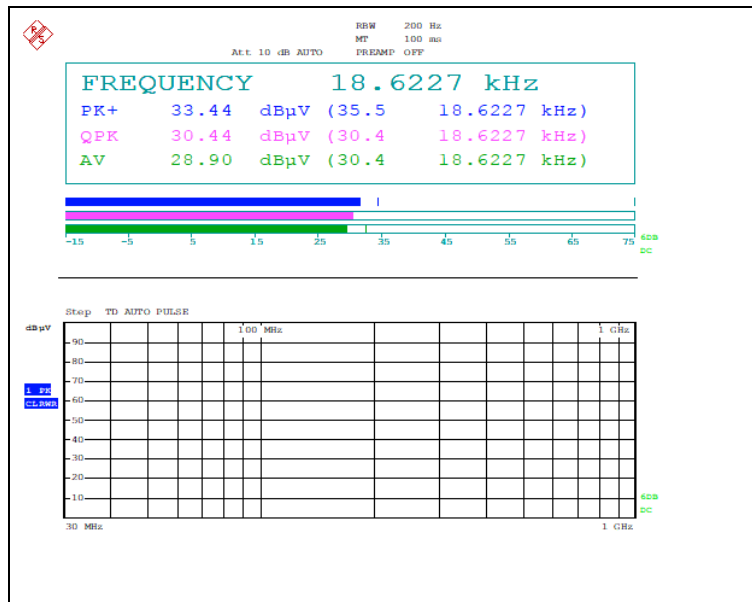
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A4(210 mm x 297 mm)

Test Condition: 9 W Operating mode with client device (1 % battery status of client device)

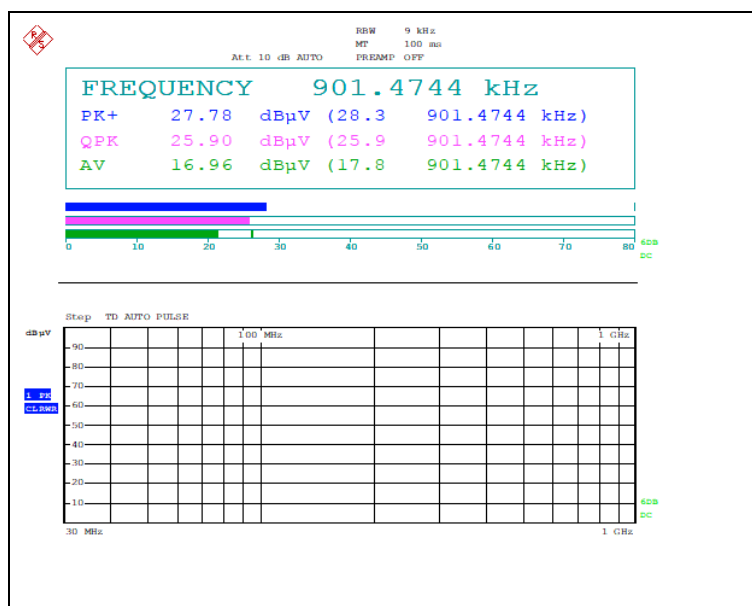
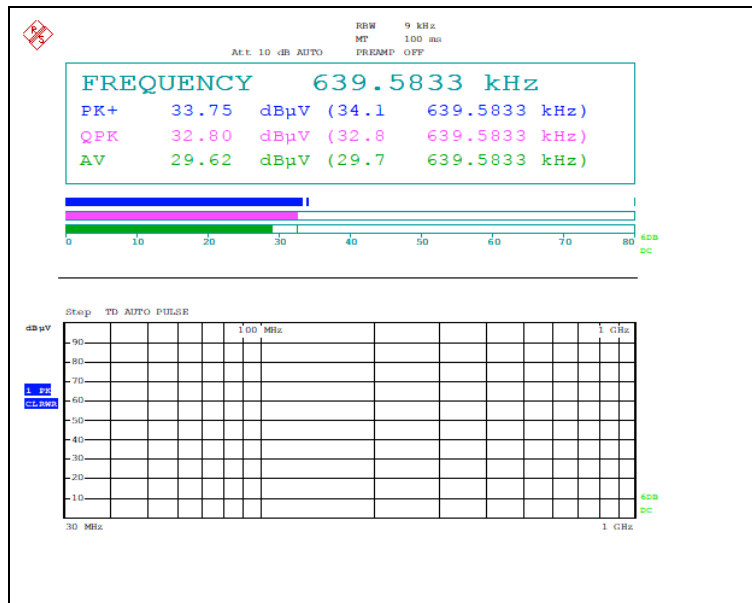
Ant. 1 (126.7 ~ 128.7 kHz)

Below 30 MHz



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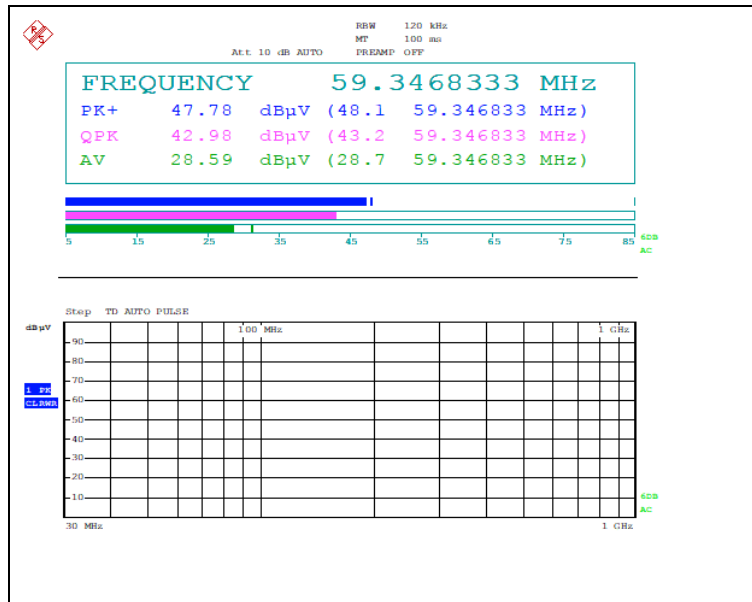
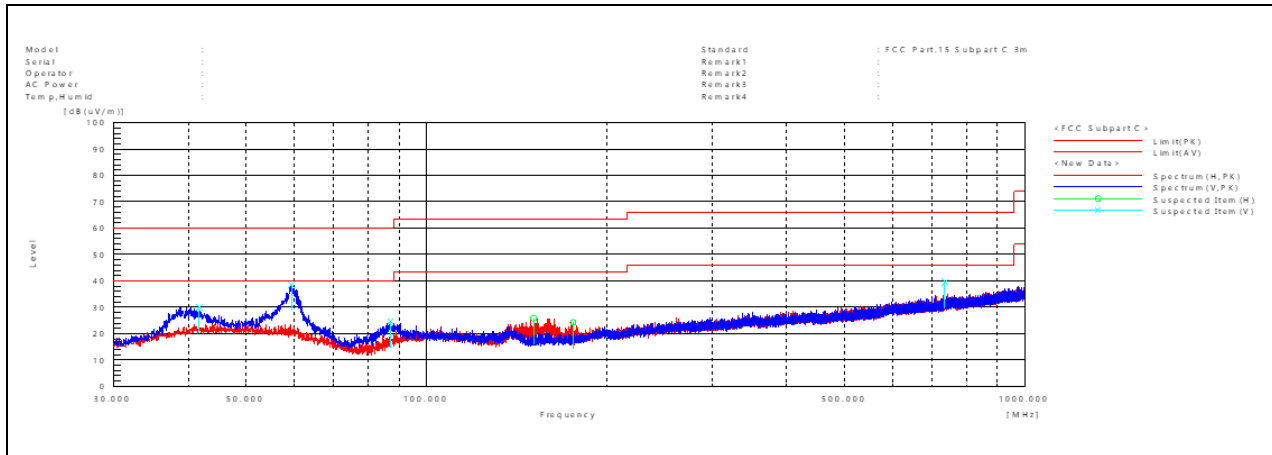
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Above 30 MHz



Remark;

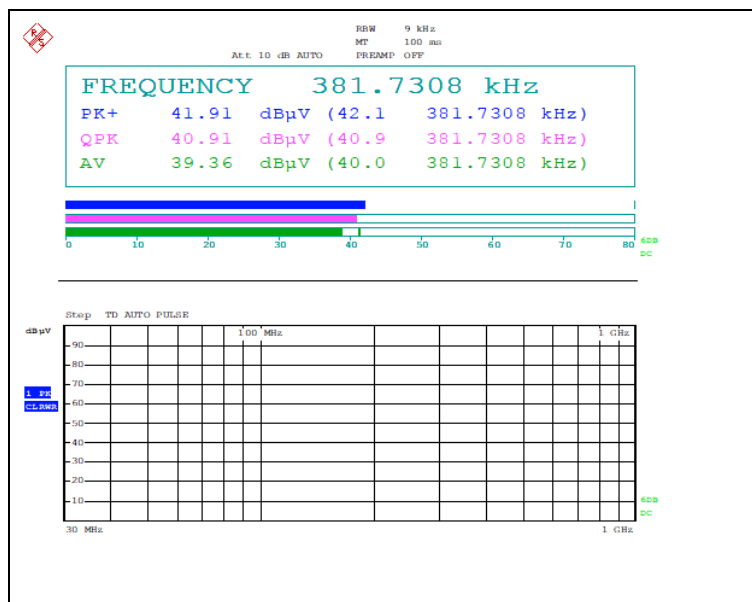
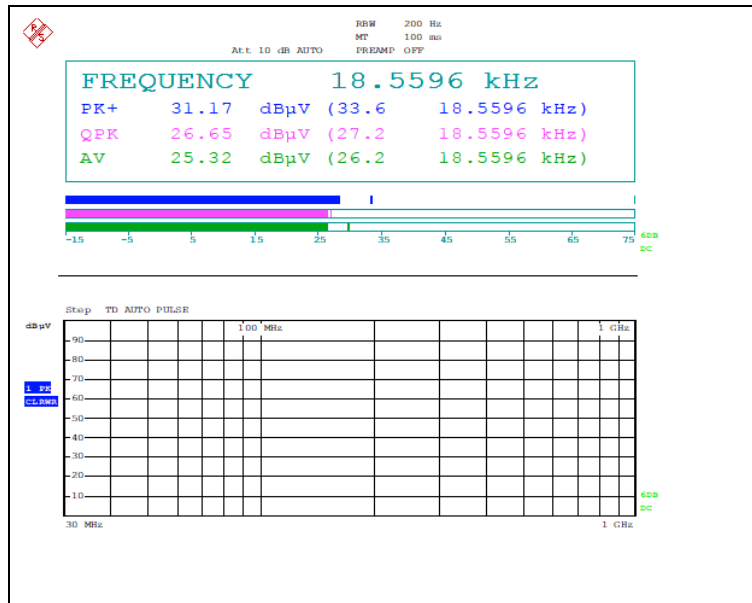
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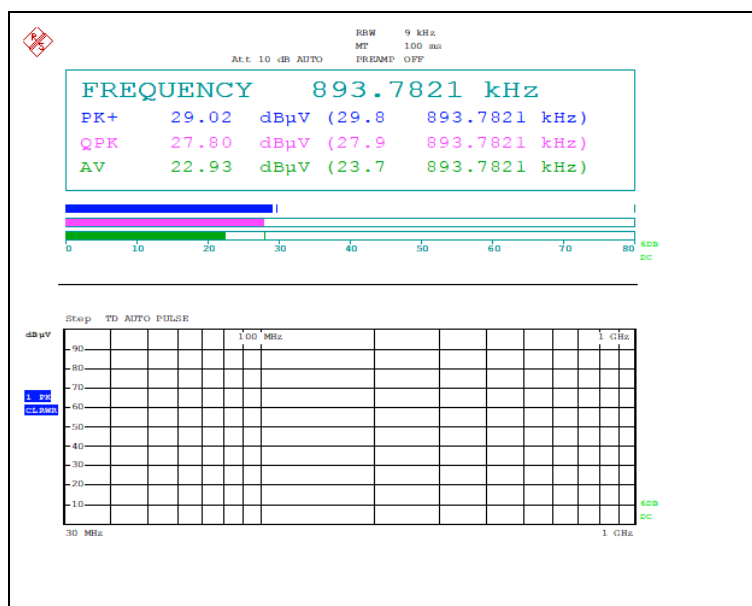
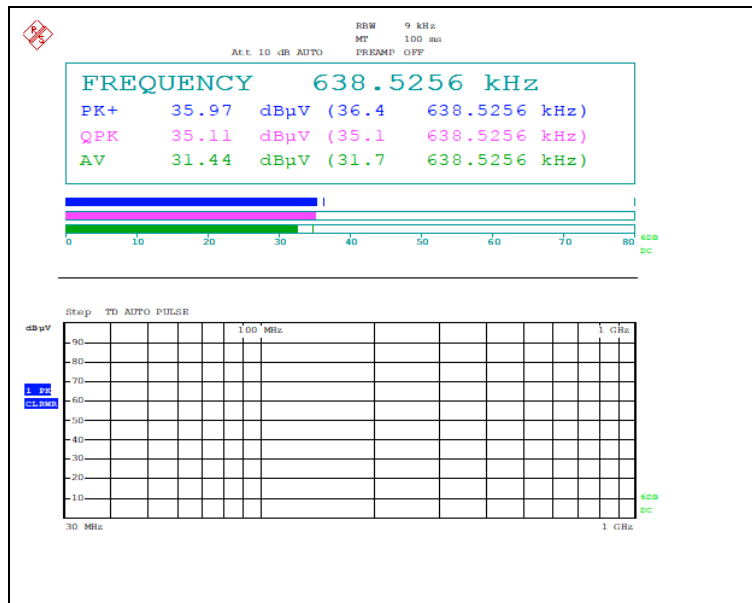
Ant. 2 (126.7 ~ 128.7 kHz)

Below 30 MHz



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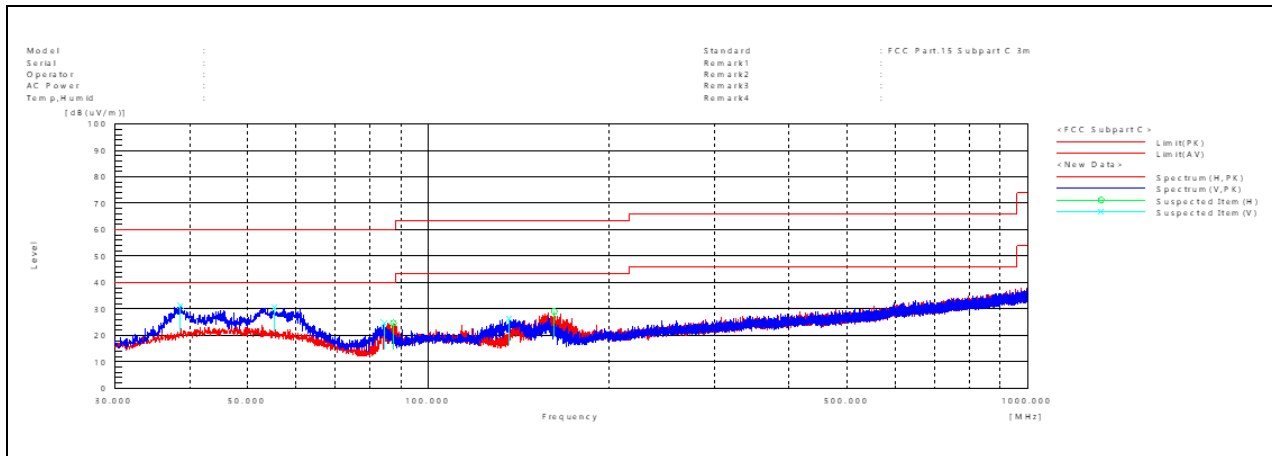
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Above 30 MHz



Remark;

- Traces shown in the plot were made by using a peak detector.

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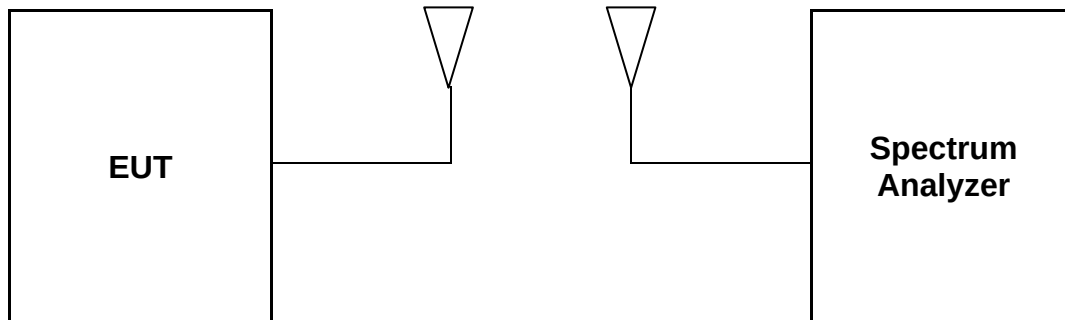
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A4(210 mm x 297 mm)

3. 20 dB Bandwidth

3.1. Test Setup



3.2. Limit

None; for reporting purposed only

3.3. Test Procedure

- a. Span = set to capture all products of the modulation process, including the emission skirts.
RBW = 200 Hz, VBW = 200 Hz, Sweep = auto, Detector = peak, Trace = max hold.
- b. The marker-to-peak function to set the mark to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is 20 dB bandwidth of the emission.

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A4(210 mm x 297 mm)

3.4. Test Result

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

Test Condition		EUT Status	20 dB Bandwidth (kHz)	Limit
5 W	Ant. 1	With client device (1 % battery status of client device)	0.519	Reporting proposed only
			0.529	
	Ant. 2		0.509	
			0.519	
9 W	Ant. 1		0.519	
	Ant. 2		0.529	

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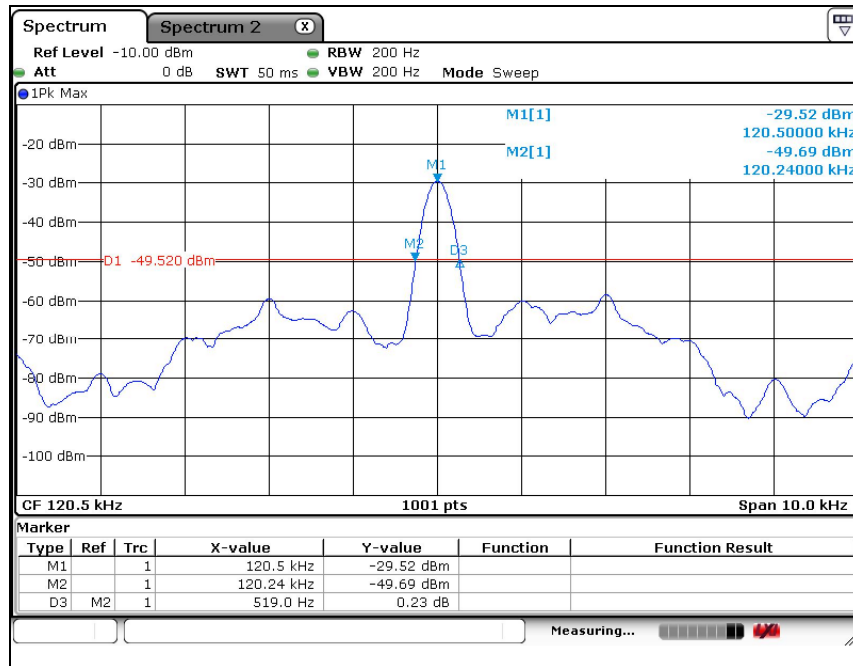
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A4(210 mm x 297 mm)

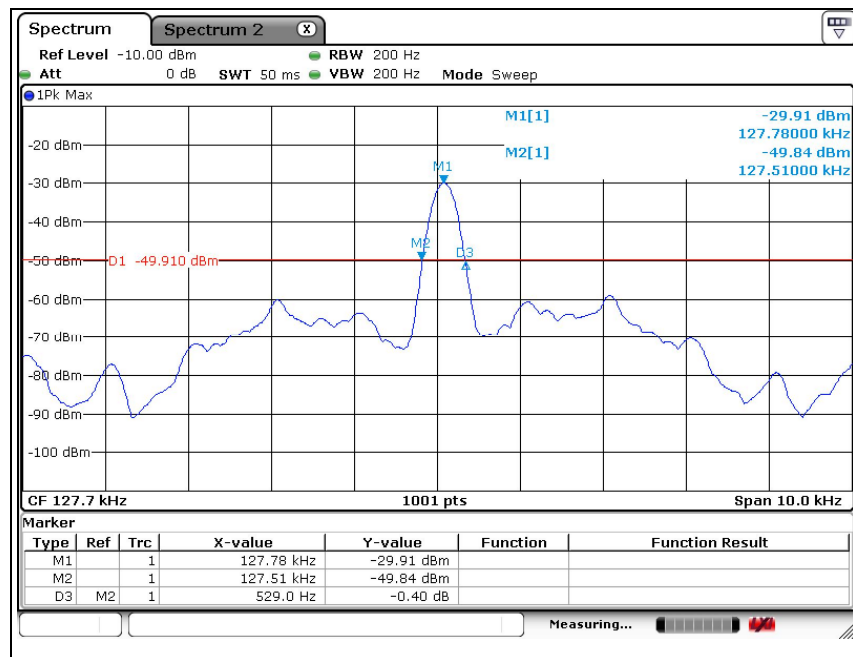
- Test plots

Test Condition: 5 W Operating mode with client device (1 % battery status of client device)

Ant. 1 (120.5 kHz)



Ant. 1 (126.7 ~ 128.7 kHz)



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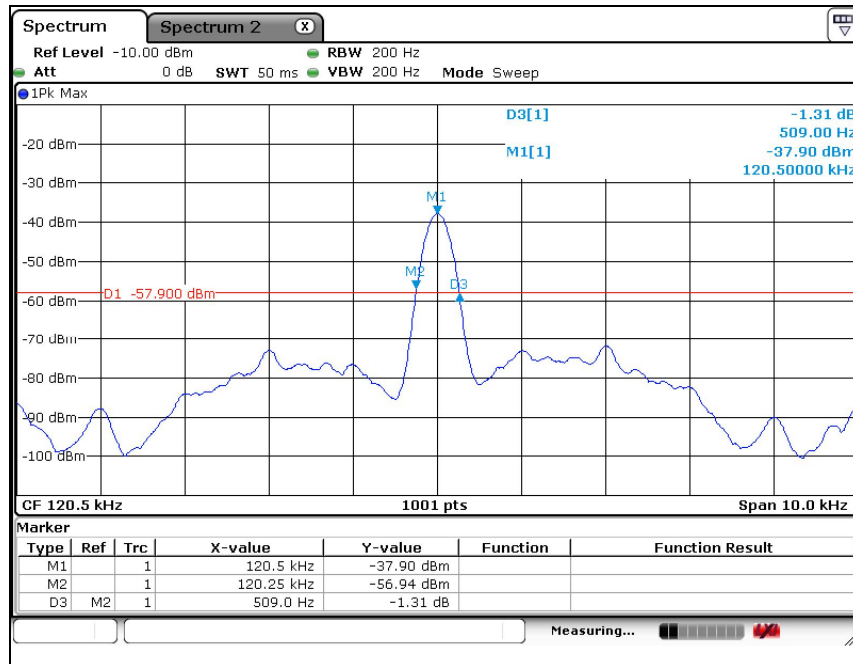
SGS Korea Co., Ltd. (Gunpo Laboratory) 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 <http://www.sgsgroup.kr>

RTT5041-19(2019.04.24)(1)

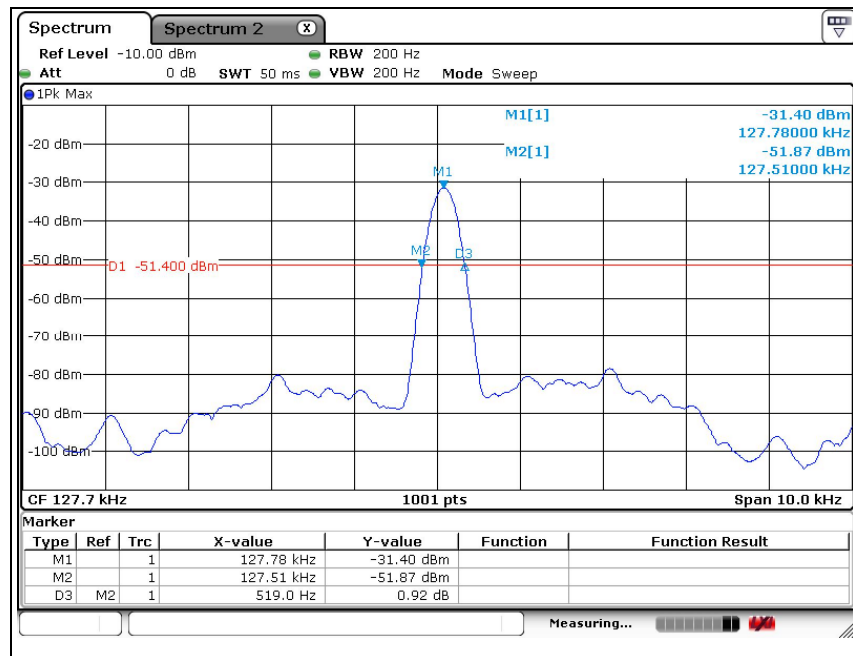
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A4(210 mm x 297 mm)

Ant. 2 (120.5 kHz)



Ant. 2 (126.7 ~ 128.7 kHz)



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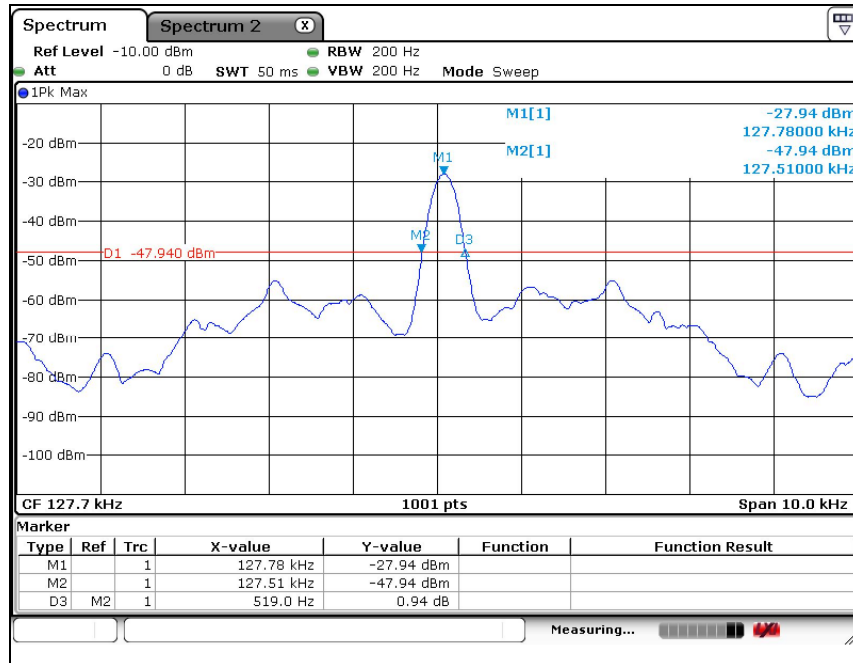
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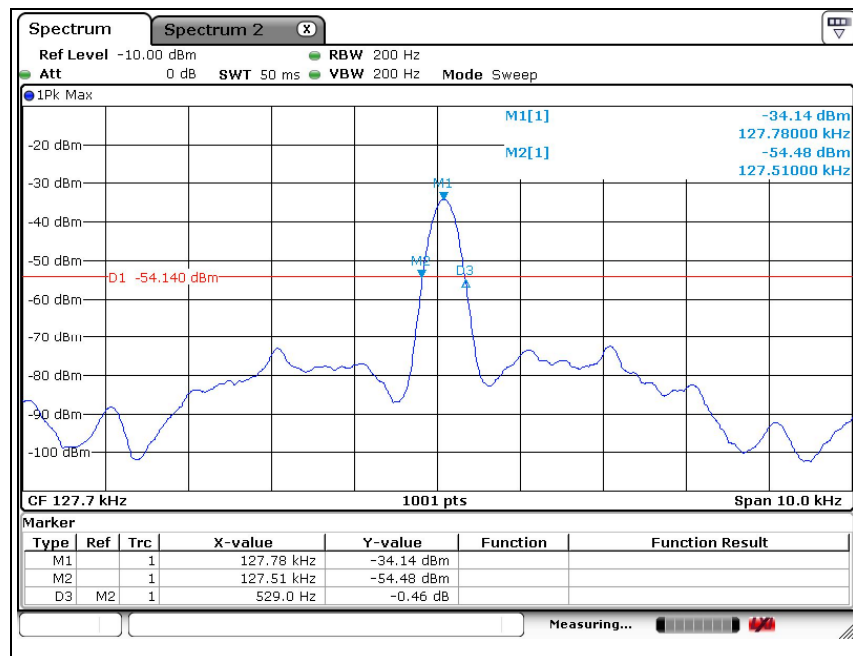
A4(210 mm x 297 mm)

Test Condition: 9 W Operating mode with client device (1 % battery status of client device)

Ant. 1 (126.7 ~ 128.7 kHz)



Ant. 2 (126.7 ~ 128.7 kHz)



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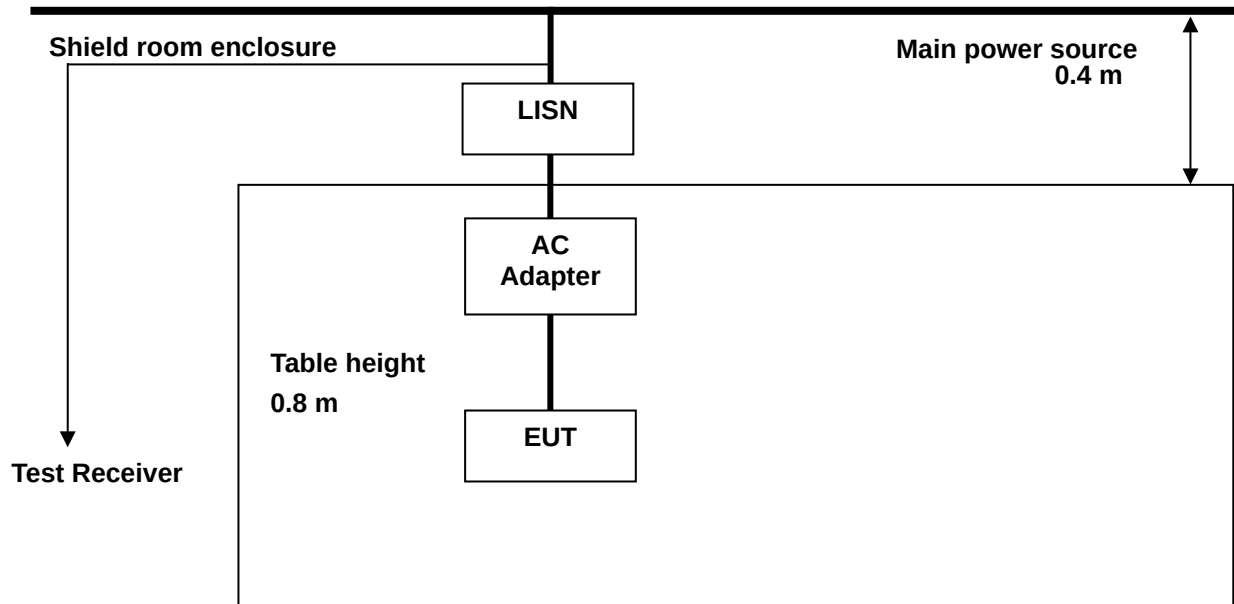
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A4(210 mm x 297 mm)

4. Transmitter AC Power Line Conducted Emission

4.1. Test Setup



4.2. Limit

According to §15.207(a), 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).

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

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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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4.3. Test Procedures

AC conducted emissions from the EUT were measured according to the dictates of ANSI C63.10:2013

1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 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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A4(210 mm × 297 mm)

4.4. 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: 5 W Operating mode with Client device (1 % battery status of client device)

Ant. 1 (120.5 kHz)

FREQ. (MHz)	LEVEL (dBμV)		LINE	LIMIT (dBμV)		MARGIN (dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	46.70	27.30	N	66.00	56.00	19.30	28.70
0.18	45.00	26.20	N	64.49	54.49	19.49	28.29
0.30	38.60	19.60	N	60.24	50.24	21.64	30.64
0.66	26.10	11.40	N	56.00	46.00	29.90	34.60
3.71	21.80	13.90	N	56.00	46.00	34.20	32.10
11.91	30.50	24.50	N	60.00	50.00	29.50	25.50
0.15	46.60	28.20	H	66.00	56.00	19.40	27.80
0.18	44.70	26.90	H	64.49	54.49	19.79	27.59
0.22	40.00	22.40	H	62.82	52.82	22.82	30.42
0.68	30.30	18.80	H	56.00	46.00	25.70	27.20
3.94	28.00	22.20	H	56.00	46.00	28.00	23.80
11.82	35.10	27.60	H	60.00	50.00	24.90	22.40

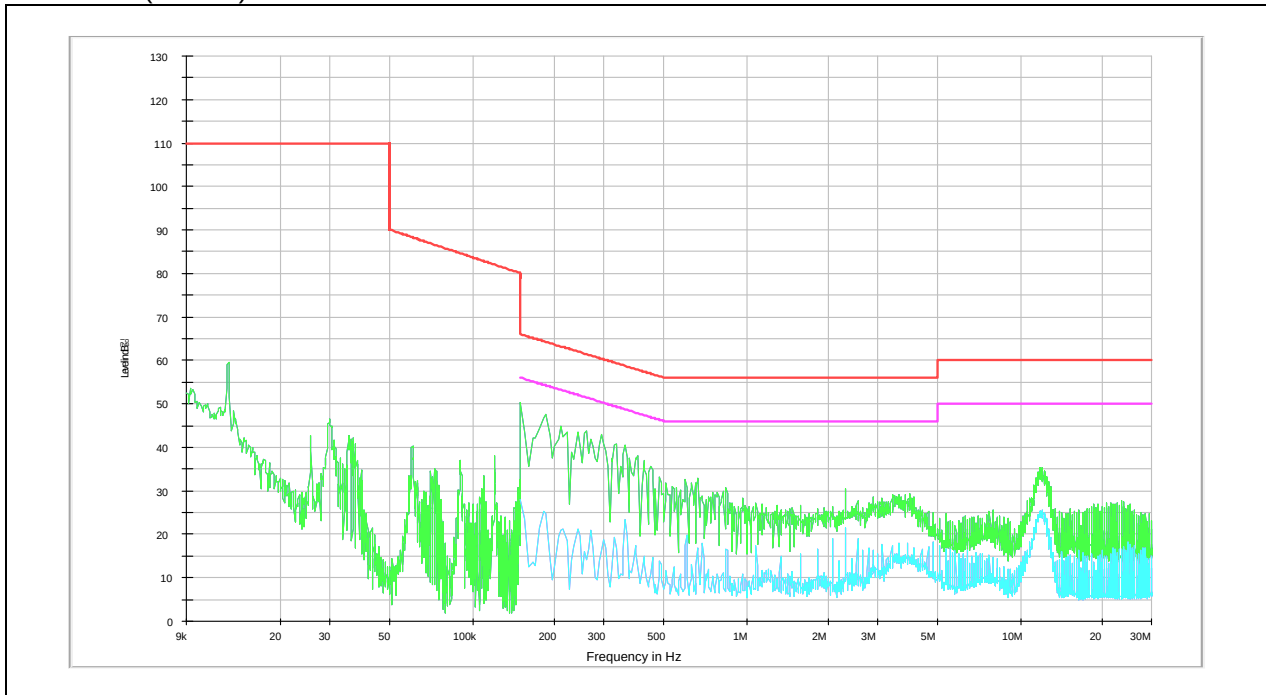
Remark;

- 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 150 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.

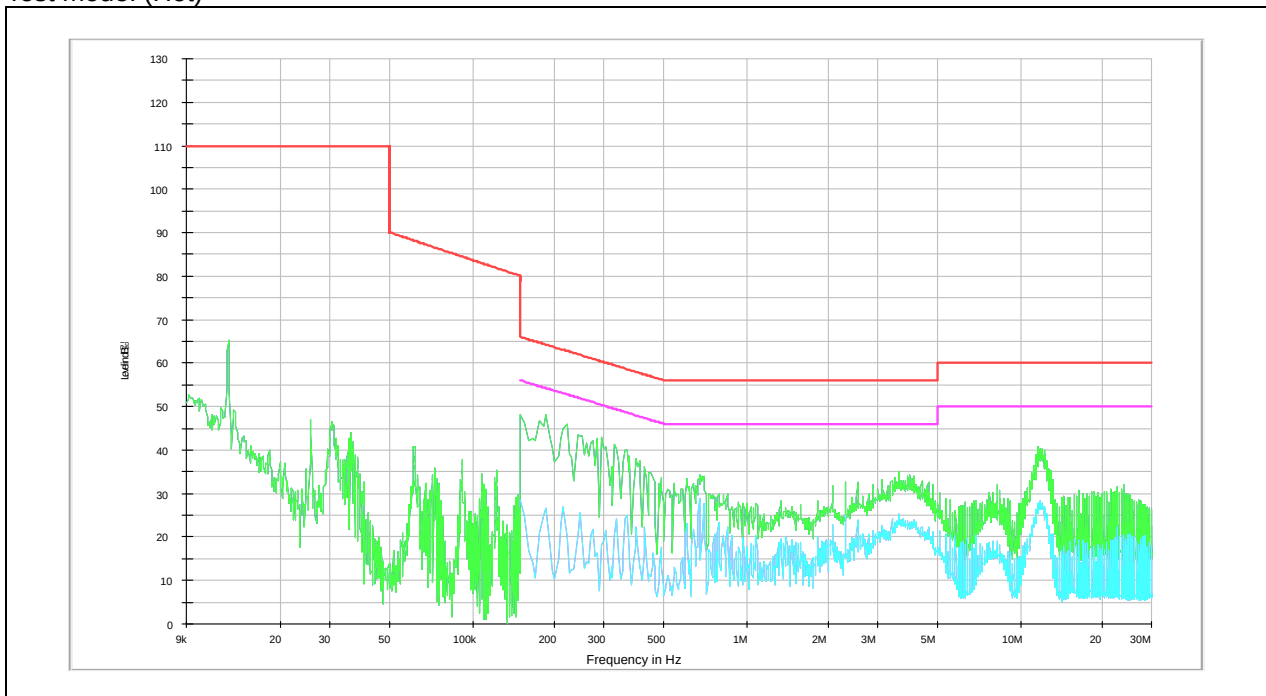
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Test mode: (Neutral)



Test mode: (Hot)



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A4(210 mm x 297 mm)

Ant. 1 (126.7 ~ 128.7 kHz)

FREQ. (MHz)	LEVEL (dBμV)		LINE	LIMIT (dBμV)		MARGIN (dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	43.70	23.20	N	66.00	56.00	22.30	32.80
0.19	40.50	17.50	N	64.04	54.04	23.54	36.54
0.26	37.60	17.10	N	61.43	51.43	23.83	34.33
0.68	28.60	16.40	N	56.00	46.00	27.40	29.60
3.59	23.70	14.80	N	56.00	46.00	32.30	31.20
11.83	30.70	25.00	N	60.00	50.00	29.30	25.00
0.16	42.70	21.10	H	65.46	55.46	22.76	34.36
0.22	38.80	17.30	H	62.82	52.82	24.02	35.52
0.30	36.70	20.10	H	60.24	50.24	23.54	30.14
0.67	30.50	24.60	H	56.00	46.00	25.50	21.40
3.69	28.90	23.40	H	56.00	46.00	27.10	22.60
11.78	35.70	28.10	H	60.00	50.00	24.30	21.90

Remark;

1. Line (H): Hot, Line (N): Neutral
2. 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.
3. The limit for Class B device(s) from 150 kHz to 30 MHz are specified in section of the Title 47 CFR.
4. Traces shown in plot were made by using a peak detector and average detector.
5. Deviations to the Specifications: None.

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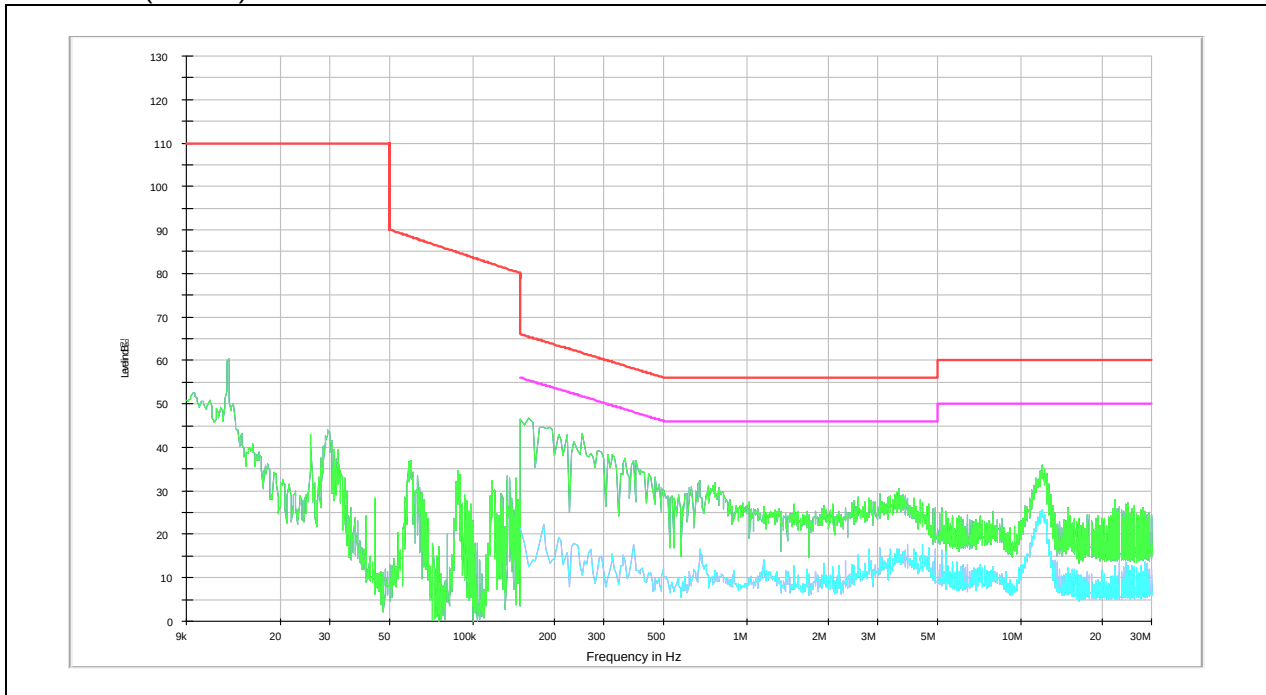
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RTT5041-19(2019.04.24)(1)

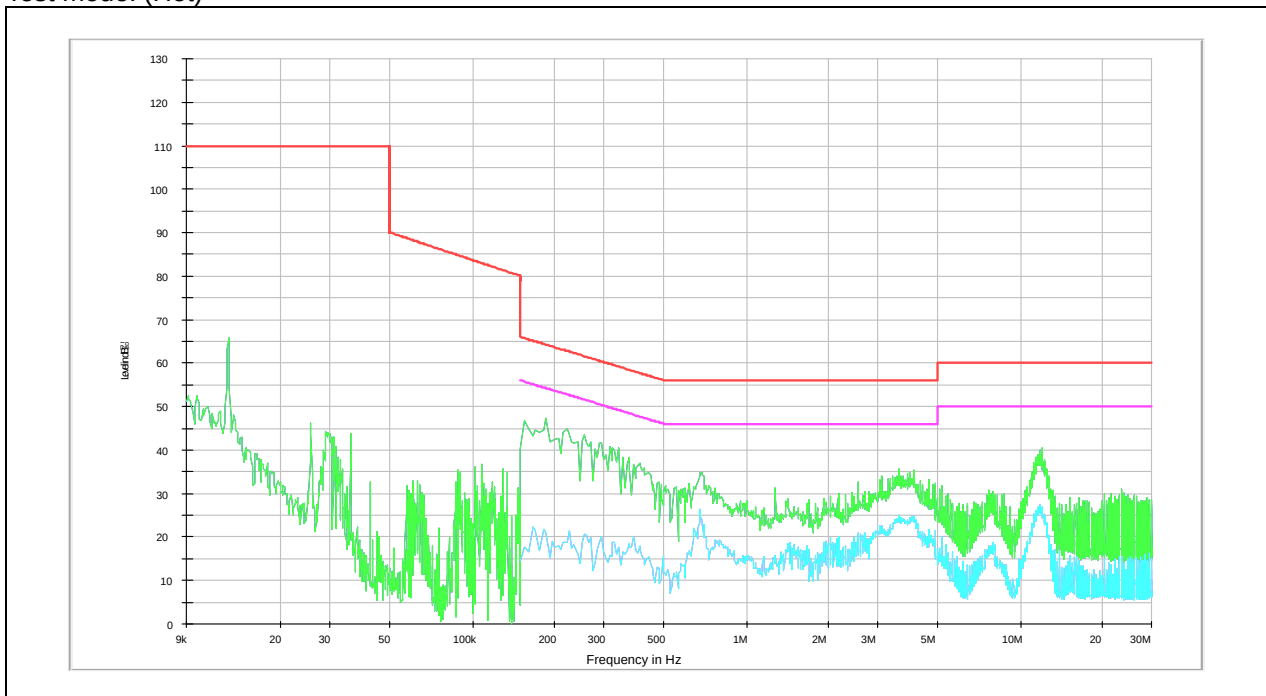
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A4(210 mm x 297 mm)

Test mode: (Neutral)



Test mode: (Hot)



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A4(210 mm x 297 mm)

Ant. 2 (120.5 kHz)

FREQ. (MHz)	LEVEL (dB μ V)		LINE	LIMIT (dB μ V)		MARGIN (dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.18	43.00	23.60	N	64.49	54.49	21.49	30.89
0.23	39.40	20.30	N	62.45	52.45	23.05	32.15
0.35	34.70	16.90	N	58.96	48.96	24.26	32.06
0.69	24.30	12.00	N	56.00	46.00	31.70	34.00
3.51	24.00	16.60	N	56.00	46.00	32.00	29.40
11.65	27.20	20.80	N	60.00	50.00	32.80	29.20
0.18	43.30	25.10	H	64.49	54.49	21.19	29.39
0.35	35.00	20.90	H	58.96	48.96	23.96	28.06
0.41	30.20	18.70	H	57.65	47.65	27.45	28.95
0.70	31.50	27.90	H	56.00	46.00	24.50	18.10
3.65	27.70	23.70	H	56.00	46.00	28.30	22.30
11.90	32.40	24.60	H	60.00	50.00	27.60	25.40

Remark;

1. Line (H): Hot, Line (N): Neutral
2. 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.
3. The limit for Class B device(s) from 150 kHz to 30 MHz are specified in section of the Title 47 CFR.
4. Traces shown in plot were made by using a peak detector and average detector.
5. Deviations to the Specifications: None.

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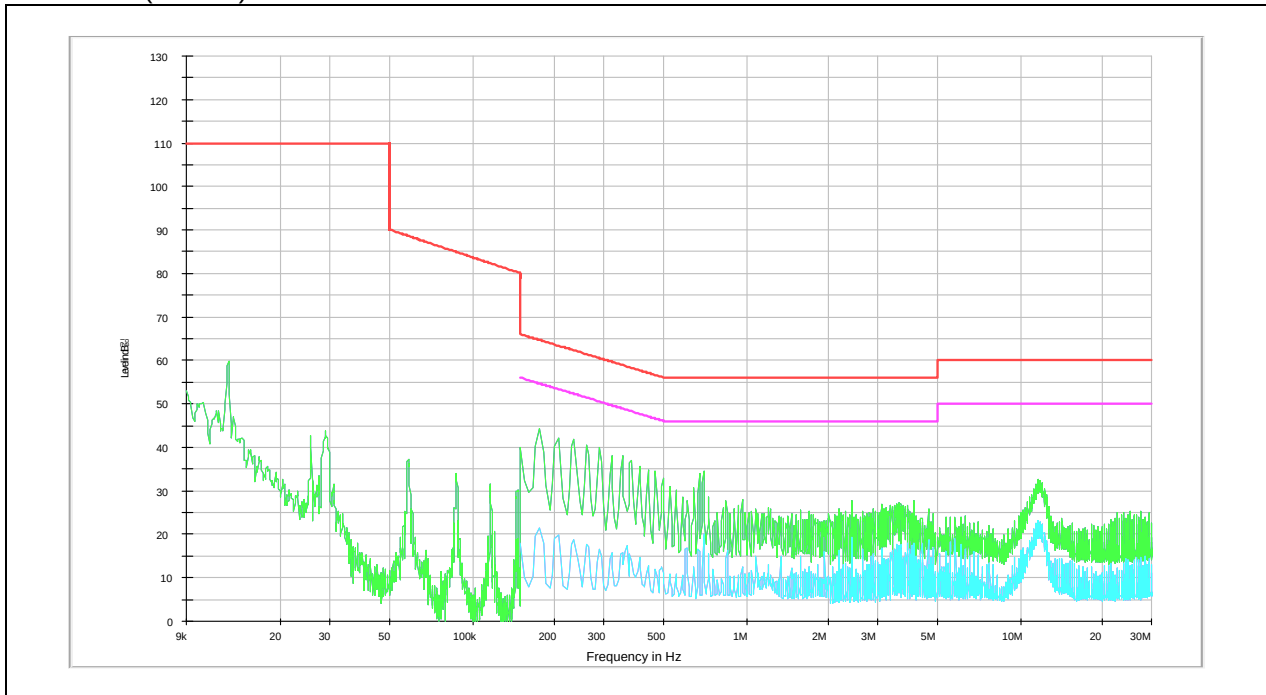
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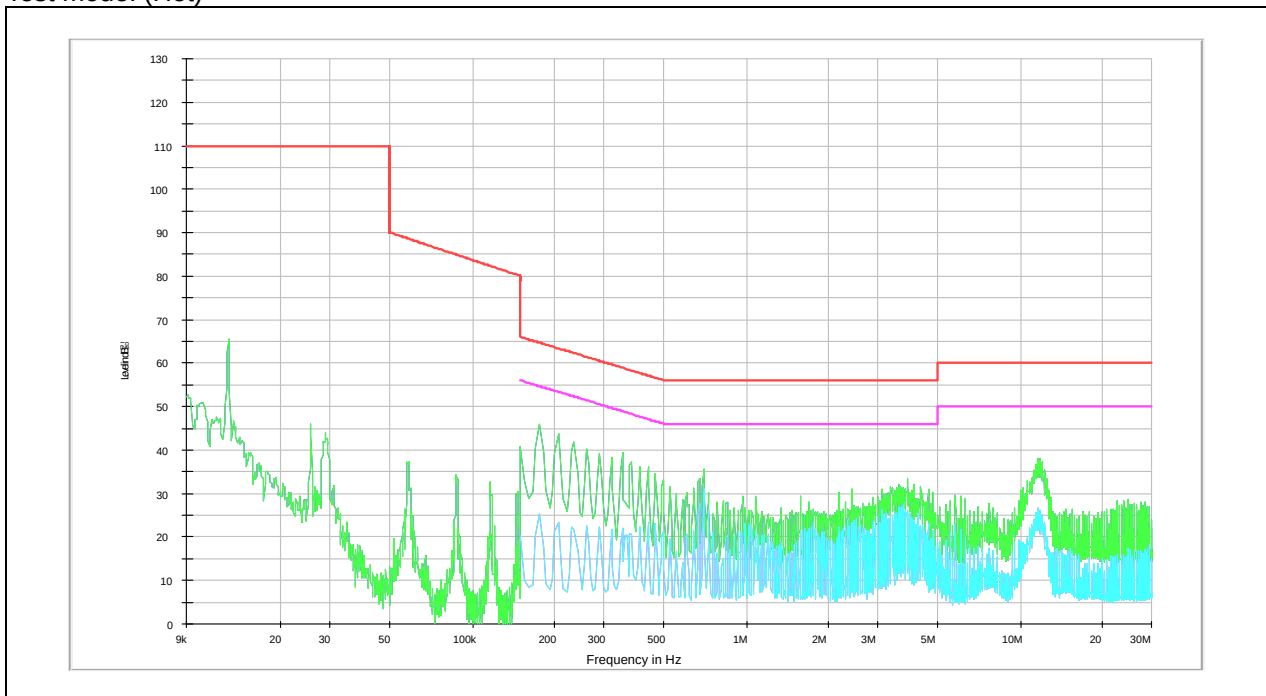
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A4(210 mm x 297 mm)

Test mode: (Neutral)



Test mode: (Hot)



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A4(210 mm x 297 mm)

Ant. 2 (126.7 ~ 128.7 kHz)

FREQ. (MHz)	LEVEL (dB μ V)		LINE	LIMIT (dB μ V)		MARGIN (dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	40.40	20.70	N	66.00	56.00	25.60	35.30
0.18	38.00	18.20	N	64.49	54.49	26.49	36.29
0.21	40.00	20.60	N	63.21	53.21	23.21	32.61
0.70	26.30	18.80	N	56.00	46.00	29.70	27.20
3.67	24.00	15.70	N	56.00	46.00	32.00	30.30
11.69	28.50	22.50	N	60.00	50.00	31.50	27.50
0.15	38.50	20.20	H	66.00	56.00	27.50	35.80
0.21	38.20	22.30	H	63.21	53.21	25.01	30.91
0.30	31.90	17.90	H	60.24	50.24	28.34	32.34
0.71	29.10	24.40	H	56.00	46.00	26.90	21.60
3.69	28.80	21.40	H	56.00	46.00	27.20	24.60
11.75	32.20	24.60	H	60.00	50.00	27.80	25.40

Remark;

1. Line (H): Hot, Line (N): Neutral
2. 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.
3. The limit for Class B device(s) from 150 kHz to 30 MHz are specified in section of the Title 47 CFR.
4. Traces shown in plot were made by using a peak detector and average detector.
5. Deviations to the Specifications: None.

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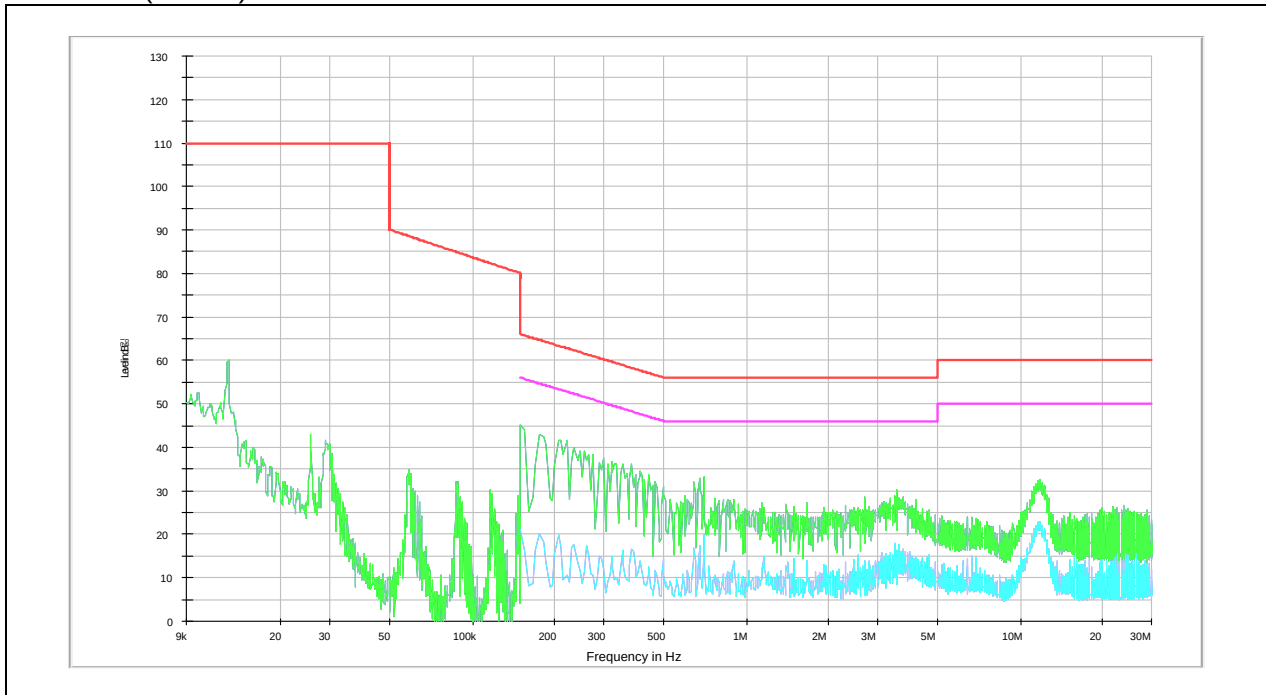
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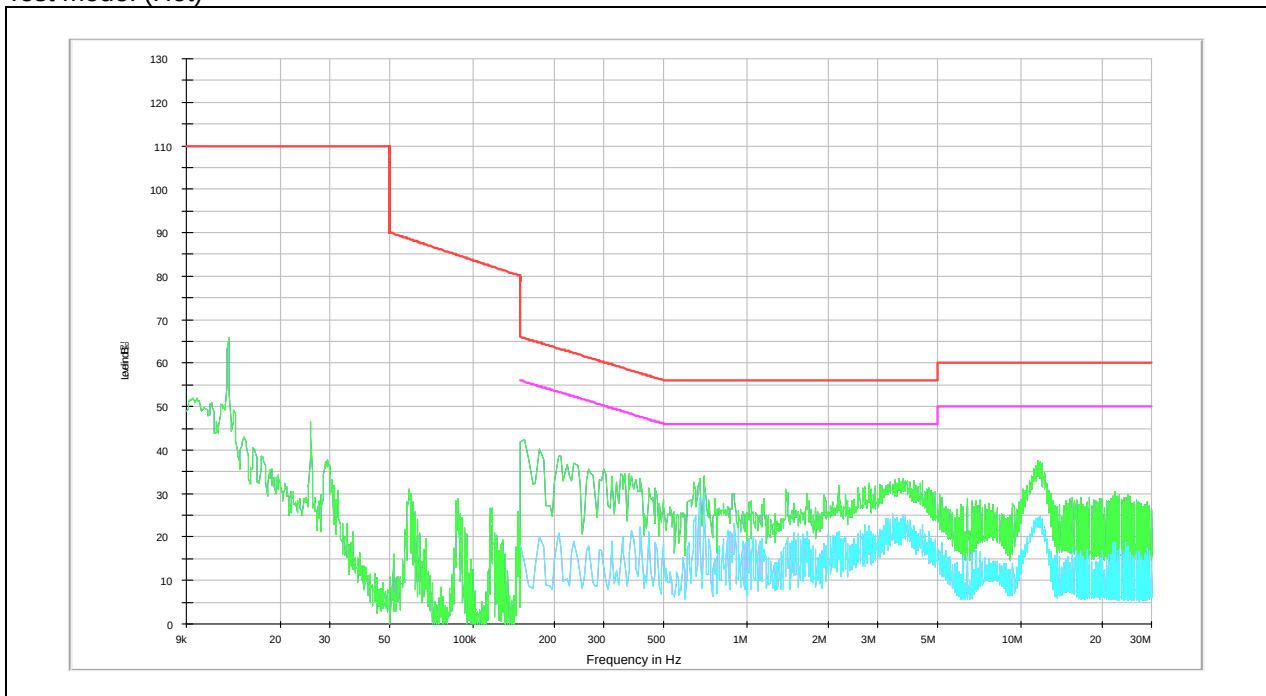
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A4(210 mm x 297 mm)

Test mode: (Neutral)



Test mode: (Hot)



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A4(210 mm x 297 mm)

Test Condition: 9 W Operating mode with Client device (1 % battery status of client device)

Ant. 1 (126.7 ~ 128.7 kHz)

FREQ. (MHz)	LEVEL (dBμV)		LINE	LIMIT (dBμV)		MARGIN (dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	44.70	22.00	N	66.00	56.00	21.30	34.00
0.24	38.40	17.40	N	62.10	52.10	23.70	34.70
0.35	32.70	12.70	N	58.96	48.96	26.26	36.26
0.75	25.10	9.70	N	56.00	46.00	30.90	36.30
3.90	22.80	15.60	N	56.00	46.00	33.20	30.40
12.21	30.20	24.20	N	60.00	50.00	29.80	25.80
0.16	42.80	19.80	H	65.46	55.46	22.66	35.66
0.35	32.60	16.70	H	58.96	48.96	26.36	32.26
0.70	29.50	20.80	H	56.00	46.00	26.50	25.20
3.81	28.80	23.00	H	56.00	46.00	27.20	23.00
8.02	23.30	17.70	H	60.00	50.00	36.70	32.30
12.06	35.30	27.60	H	60.00	50.00	24.70	22.40

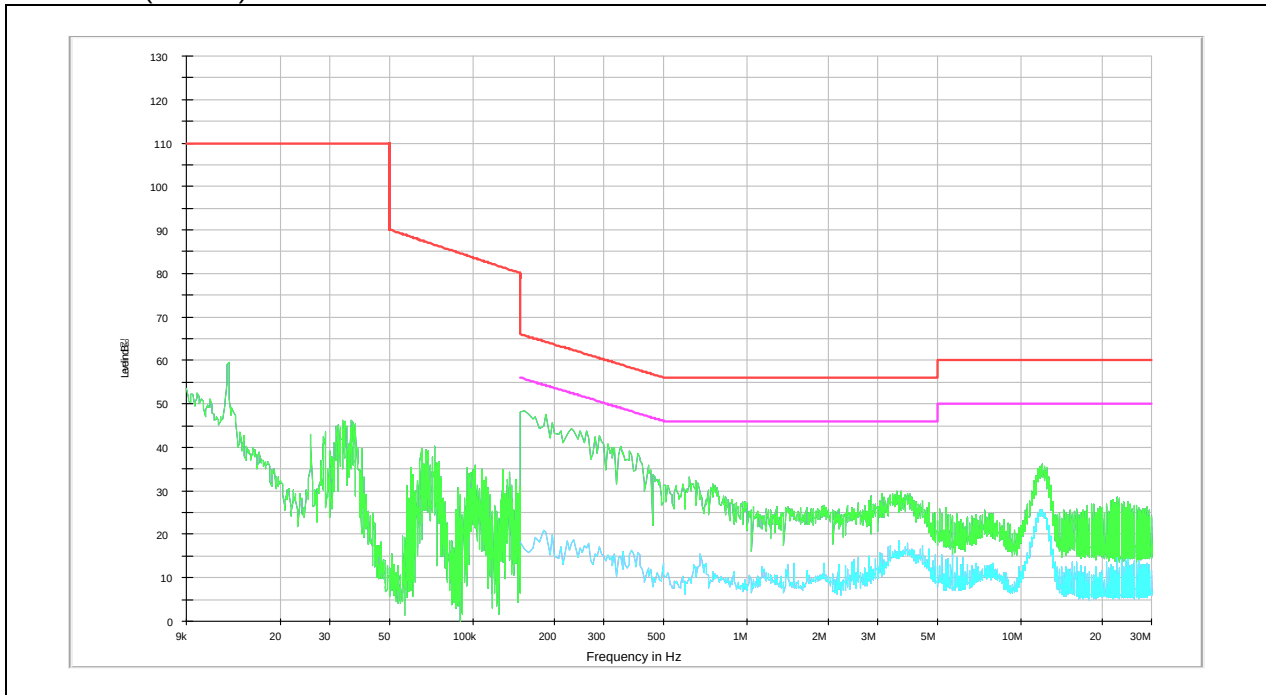
Remark;

1. Line (H): Hot, Line (N): Neutral
2. 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.
3. The limit for Class B device(s) from 150 kHz to 30 MHz are specified in section of the Title 47 CFR.
4. Traces shown in plot were made by using a peak detector and average detector.
5. Deviations to the Specifications: None.

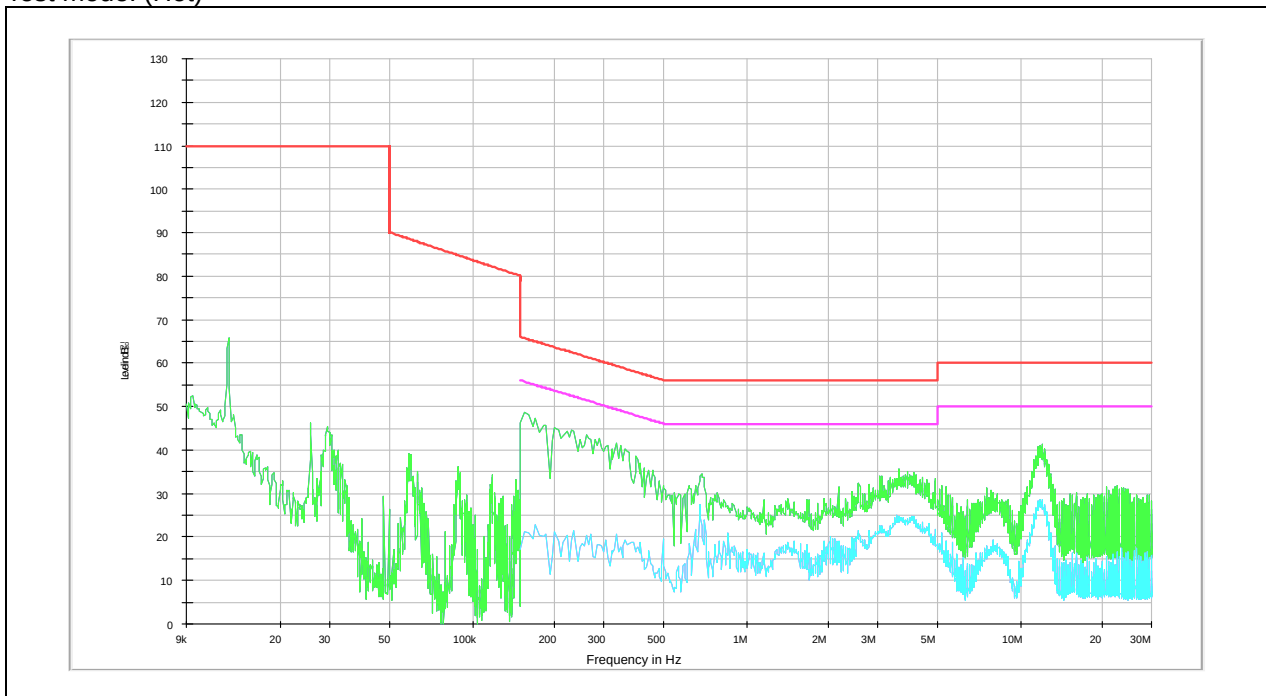
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Test mode: (Neutral)



Test mode: (Hot)



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RTT5041-19(2019.04.24)(1)

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A4(210 mm x 297 mm)

Ant. 2 (126.7 ~ 128.7 kHz)

FREQ. (MHz)	LEVEL (dB μ V)		LINE	LIMIT (dB μ V)		MARGIN (dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	42.60	22.90	N	66.00	56.00	23.40	33.10
0.18	40.00	20.20	N	64.49	54.49	24.49	34.29
0.21	37.60	17.20	N	63.21	53.21	25.61	36.01
0.70	26.70	16.80	N	56.00	46.00	29.30	29.20
3.71	20.90	12.10	N	56.00	46.00	35.10	33.90
11.91	29.10	23.20	N	60.00	50.00	30.90	26.80
0.15	42.20	23.40	H	66.00	56.00	23.80	32.60
0.18	44.10	25.90	H	64.49	54.49	20.39	28.59
0.21	41.90	24.50	H	63.21	53.21	21.31	28.71
0.68	29.50	22.60	H	56.00	46.00	26.50	23.40
3.77	28.10	19.60	H	56.00	46.00	27.90	26.40
11.94	33.50	25.50	H	60.00	50.00	26.50	24.50

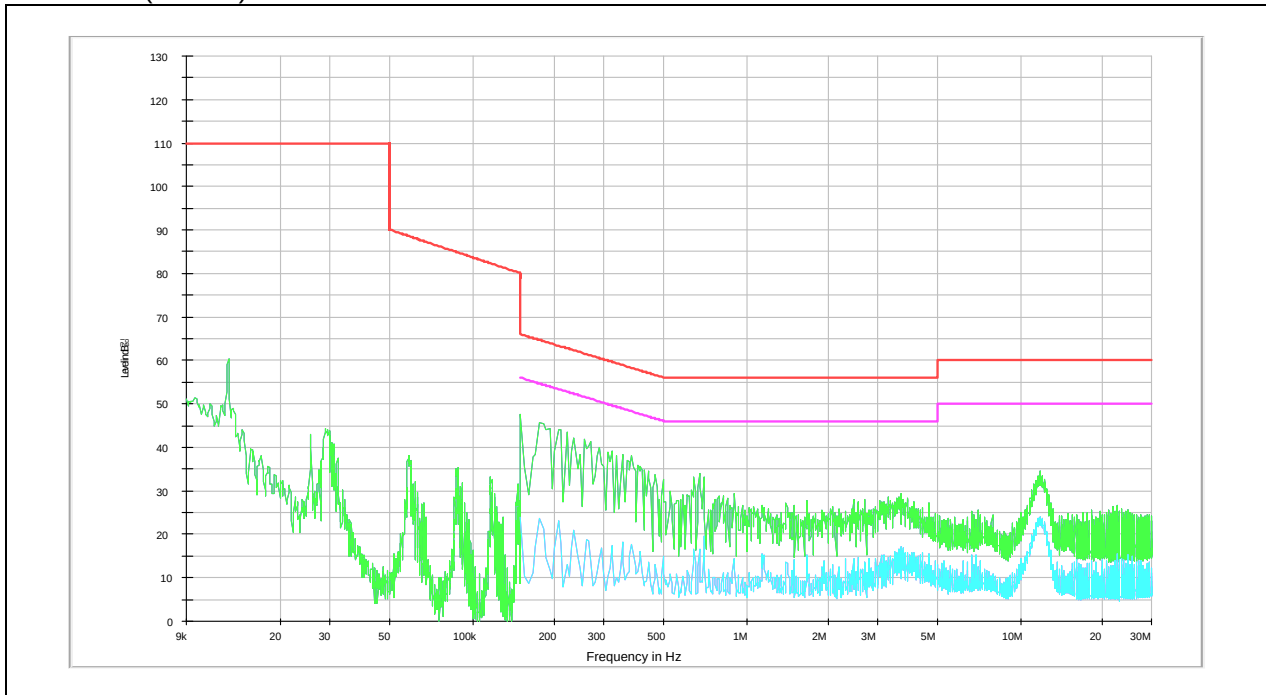
Remark;

1. Line (H): Hot, Line (N): Neutral
2. 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.
3. The limit for Class B device(s) from 150 kHz to 30 MHz are specified in section of the Title 47 CFR.
4. Traces shown in plot were made by using a peak detector and average detector.
5. Deviations to the Specifications: None.

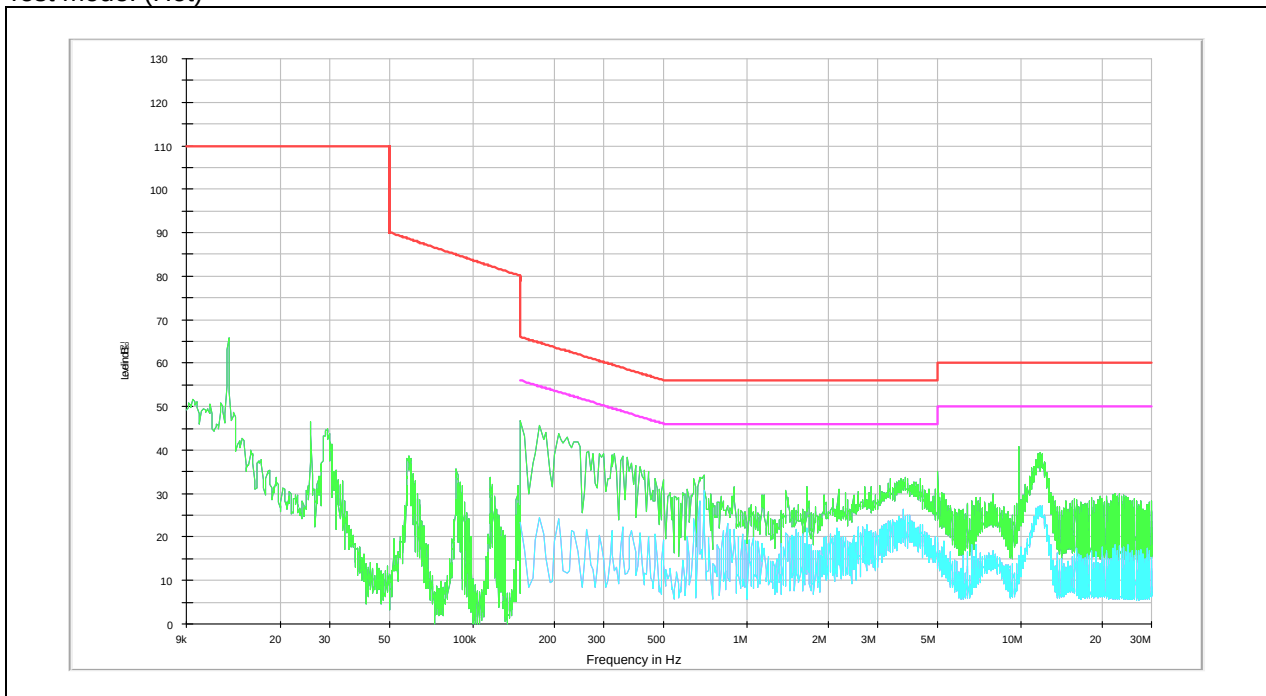
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Test mode: (Neutral)



Test mode: (Hot)



- End of the Test Report -

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A4(210 mm x 297 mm)