

TEST REPORT

of

FCC Part 15 Subpart C §15.209

FCC ID: NYOMBECWPC2310

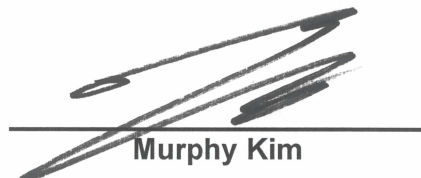
Equipment Under Test : UNIT ASSY-WIRELESS CHARGING
Model Name : MBECWPC2310
Variant Model Name(s) : -
Applicant : MOBASE ELECTRONICS CO., LTD.
Manufacturer : MOBASE ELECTRONICS CO., LTD.
Date of Receipt : 2023.05.24
Date of Test(s) : 2023.05.29 ~ 2023.09.08
Date of Issue : 2023.09.08

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

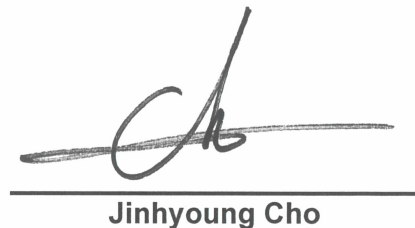
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- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
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- 4) The data marked ※ in this report was provided by the customer and may affect the validity of the test results.

We are responsible for all the information of this test report except for the data(※) provided by the customer.

Tested by:


Murphy Kim

Technical Manager:


Jinhyoung Cho

SGS Korea Co., Ltd. Gunpo Laboratory

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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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Phone No. : +82 31 688 0901

Fax No. : +82 31 688 0921

1.2. Details of Applicant

Applicant : MOBASE ELECTRONICS CO., LTD.

Address : 100, Saneop-ro 156beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do,
South Korea, 16648

Contact Person : Ryu, Hee-tack

Phone No. : +82 31 8090 2611

1.3. Details of Manufacturer

Company : Same as applicant

Address : Same as applicant

1.4. Description of EUT

Kind of Product	UNIT ASSY-WIRELESS CHARGING		
Model Name	MBECWPC2310		
Serial Number	001		
Power Supply	DC 12 V		
Operation Mode	5 W, 7.5 W, 10 W		
Frequency Range	5 W	Ant. 1	114 ~ 116 kHz
		Ant. 2	
		Ant. 3	
	7.5 W	Ant. 1	126 ~ 128 kHz
		Ant. 2	
		Ant. 3	
	10 W	Ant. 1	114 ~ 116 kHz
		Ant. 2	
		Ant. 3	
	Idle		114 ~ 116 kHz
Antenna Type	Coil Antenna		
Antenna Part Number	N/A		
H/W Version	1.0		
S/W Version	1.0		

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Spectrum Analyzer	R&S	FSV30	103210	Dec. 07, 2022	Annual	Dec. 07, 2023
DC Power Supply	R&S	HMP2020	020089489	May 11, 2023	Annual	May 11, 2024
Signal Generator	R&S	SMA100B	106887	Oct. 13, 2022	Annual	Oct. 13, 2023
Amplifier	H.P.	8447F	2944A03909	Aug. 04, 2023	Annual	Aug. 04, 2024
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 21, 2023	Biennial	Aug. 21, 2025
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	01126	Feb. 09, 2023	Annual	Feb. 09, 2024
Test Receiver	R&S	ESU26	100109	Jan. 18, 2023	Annual	Jan. 18, 2024
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.
Antenna Mast	Innco systems GmbH	MA4640-XP-ET	MA4640/536/3 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	RFONE	PL360P-292M292M-1.5M -A	20200324002	Apr. 14, 2023	Semi-Annual	Oct. 14, 2023
Coaxial Cable	RFONE	MWX221-NMSNMS (4 m)	J1023142	Apr. 04, 2023	Semi-Annual	Oct. 04, 2023
Coaxial Cable	Qualwave Inc.	QA500-18-NN-10 (10 m)	22200114	Apr. 04, 2023	Semi-Annual	Oct. 04, 2023

► Support Equipment

Description	Manufacturer	Model	FCC ID
SAMSUNG Mobile Phone	Samsung Electronics Co., Ltd.	SM-N981U	A3LSMN981U
Apple Mobile Phone	Apple Inc.	A1897	BCG-E3174A

Note;

- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15 Subpart C		
Section	Test Item(s)	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	N/A ¹⁾

Note;

1) The AC power line test was not performed because the EUT use battery power for operation and which do not operate from the AC power lines.

1.7. Test Procedure(s)

The measurement procedures described in the American National Standard of Procedure for Compliance Testing of unlicensed Wireless Devices (ANSI C63.10-2013).

1.8. 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) + (AMP (dB))

1.9. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL004366	2023.09.08	Initial

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	0.01 kHz	
Radiated Emission, 9 kHz to 30 MHz	H	3.40 dB
	V	3.40 dB
Radiated Emission, below 1 GHz	H	4.50 dB
	V	5.10 dB

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence.

1.11. Worst Case of Test Configurations

Charging mode With client device		Mode		Description
Model	FCC ID			
SM-N918U	A3LSMN981U	5 W, 10 W	114 ~ 116 kHz	1 % of battery 50 % of battery 99 % of battery
A1897	BCG-E3174A	7.5 W	126 ~ 128 kHz	

Mode	Ant.	Battery	Frequency (kHz)	Detect Mode	Reading (dBμV)	
5 W	1	1 %	114 ~ 116	Average	<u>58.92</u>	
		50 %			58.50	
		99 %			58.50	
7.5 W		1 %	126 ~ 128	Average	<u>46.30</u>	
					50 %	46.01
					99 %	46.00
10 W		1 %	114 ~ 116	Average	<u>59.00</u>	
					50 %	58.50
					99 %	58.30
5 W	2	1 %	114 ~ 116	Average	<u>50.30</u>	
		50 %			50.20	
		99 %			50.20	
7.5 W		1 %	126 ~ 128	Average	<u>45.30</u>	
					50 %	45.20
					99 %	45.20
10 W		1 %	114 ~ 116	Average	<u>50.30</u>	
					50 %	50.20
					99 %	50.20
5 W	3	1 %	114 ~ 116	Average	<u>49.30</u>	
		50 %			49.10	
		99 %			49.10	
7.5 W		1 %	126 ~ 128	Average	<u>49.30</u>	
					50 %	45.80
					99 %	49.30
10 W		1 %	114 ~ 116	Average	<u>49.43</u>	
					50 %	49.30
					99 %	49.30

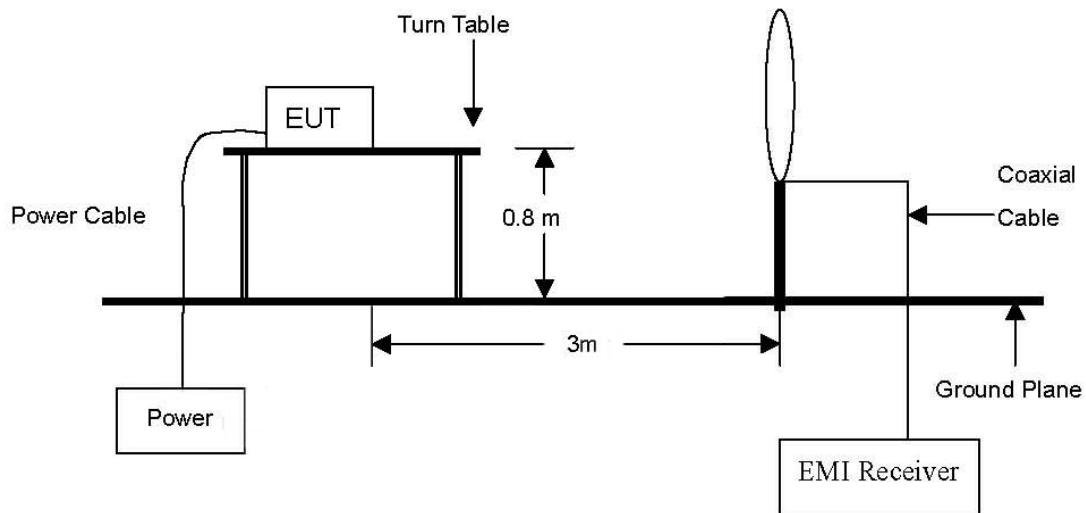
Note;

- EUT was investigated with client device under normal charging condition as above then worst value of each antenna were only reported.

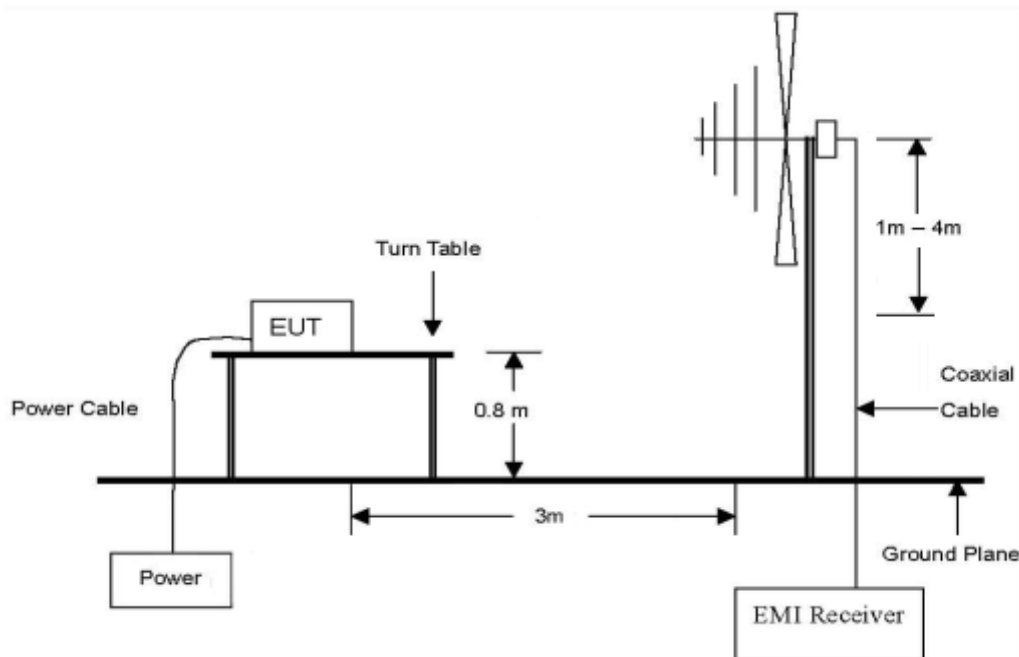
2. Field Strength of Fundamental and Spurious Emission

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.



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.

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

- 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.
- 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.
- 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.
- 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 below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.
- 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.
- f. For measurements below 1 GHz resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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 between 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.	AF (dB/m)	CL (dB)	Actual (dBμV/m) at 3 m	Actual (dBμV/m) at 300 m	Limit (dBμV/m) at 300 m	Margin (dB)
Ant. 1 (114 ~ 116 kHz)									
0.115	58.92	Average	H	18.20	0.03	77.15	-2.85	26.39	29.24
Ant. 2 (114 ~ 116 kHz)									
0.115	50.30	Average	H	18.20	0.03	68.53	-11.47	26.39	37.86
Ant. 3 (114 ~ 116 kHz)									
0.115	49.30	Average	H	18.20	0.03	67.53	-12.47	26.39	38.86

Test Condition: 7.5 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.	AF (dB/m)	CL (dB)	Actual (dBμV/m) at 3 m	Actual (dBμV/m) at 300 m	Limit (dBμV/m) at 300 m	Margin (dB)
Ant. 1 (126 ~ 128 kHz)									
0.128	46.30	Average	H	18.20	0.03	64.53	-15.47	25.46	40.93
Ant. 2 (126 ~ 128 kHz)									
0.128	45.30	Average	H	18.20	0.03	63.53	-16.47	25.46	41.93
Ant. 3 (126 ~ 128 kHz)									
0.128	49.30	Average	H	18.20	0.03	67.53	-12.47	25.46	37.93

Test Condition: 10 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.	AF (dB/m)	CL (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 (114 ~ 116 kHz)									
0.115	59.00	Average	H	18.20	0.03	77.23	-2.77	26.39	29.16
Ant. 2 (114 ~ 116 kHz)									
0.115	50.30	Average	H	18.20	0.03	68.53	-11.47	26.39	37.86
Ant. 3 (114 ~ 116 kHz)									
0.115	49.43	Average	H	18.20	0.03	67.66	-12.34	26.39	38.73

Test Condition: Idle mode

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (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)
Operating frequency (114 ~ 116 kHz)									
0.115	68.10	Average	H	18.20	0.03	86.33	6.33	26.39	20.06

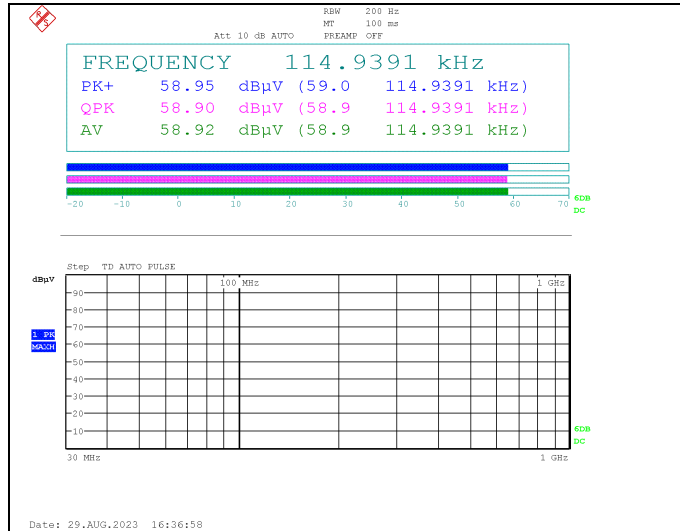
Remark;

- 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).

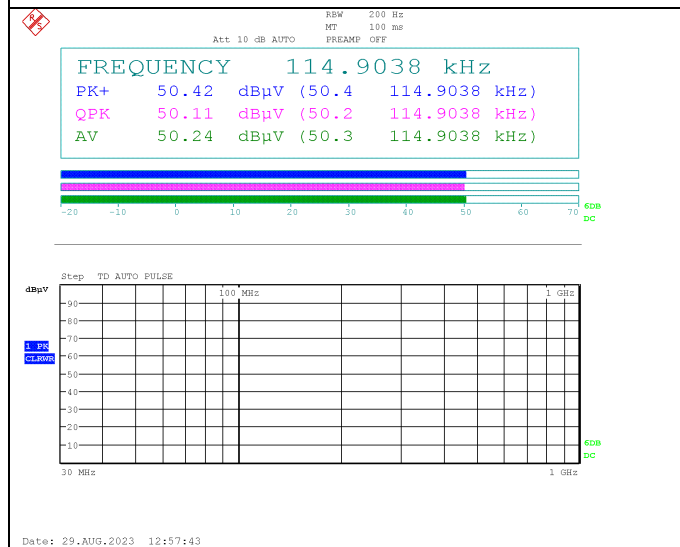
- Test plots

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

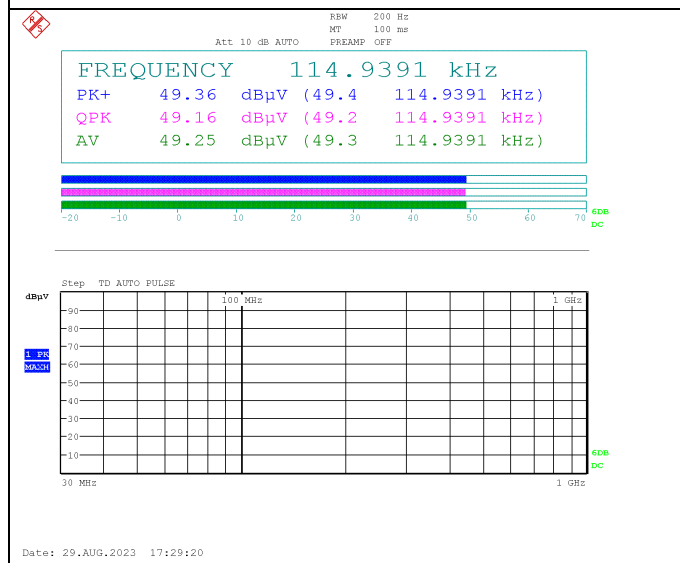
Ant. 1



Ant. 2

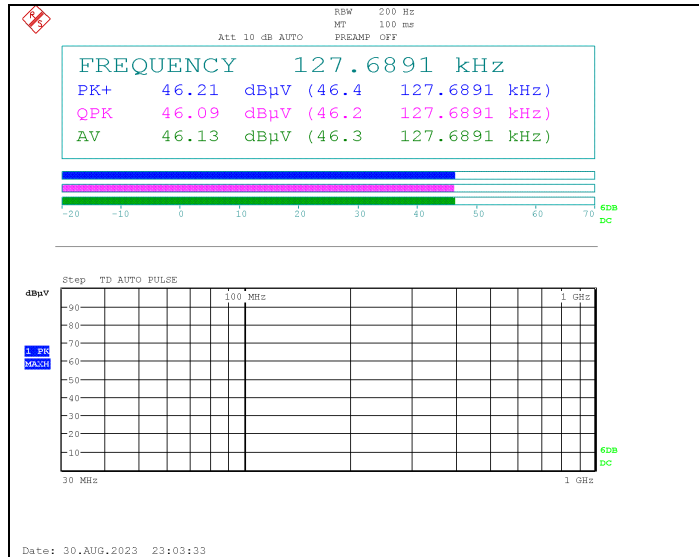


Ant. 3

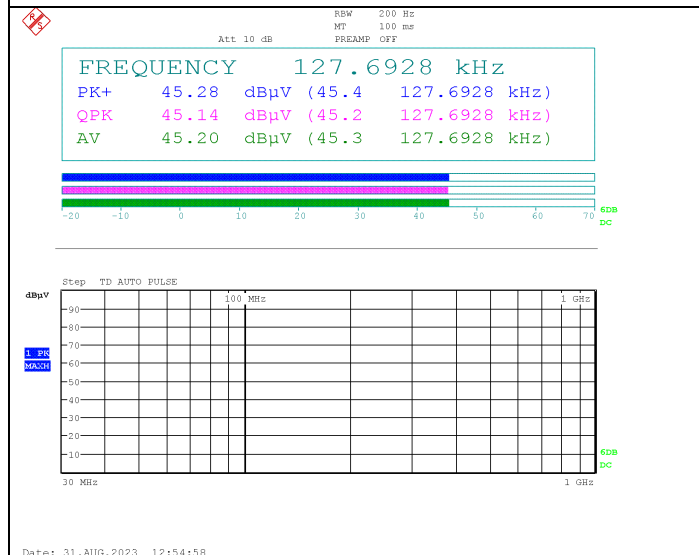


Test Condition: 7.5 W Operating mode with client device (1 % battery status of client device)

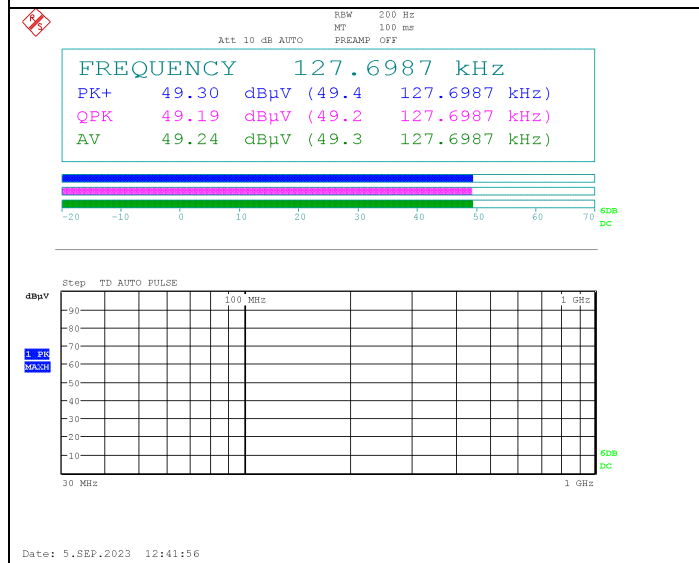
Ant. 1



Ant. 2

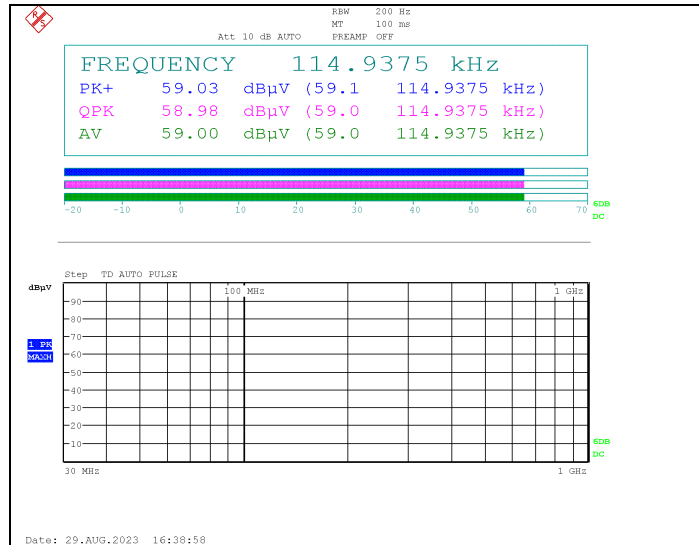


Ant. 3

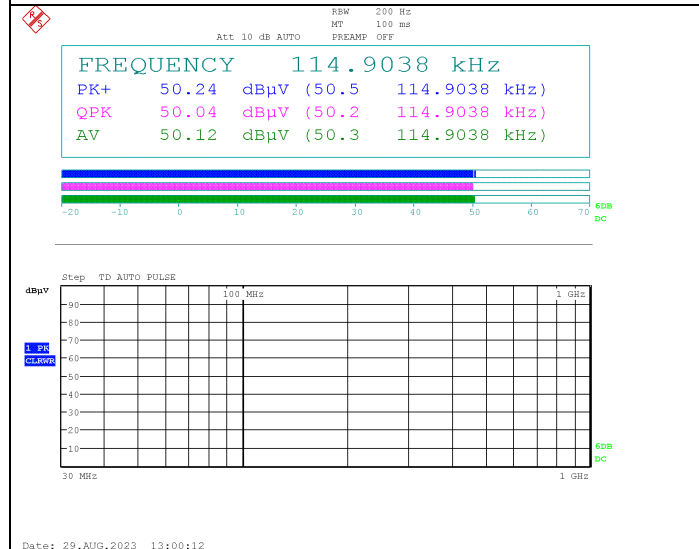


Test Condition: 10 W Operating mode with client device (1 % battery status of client device)

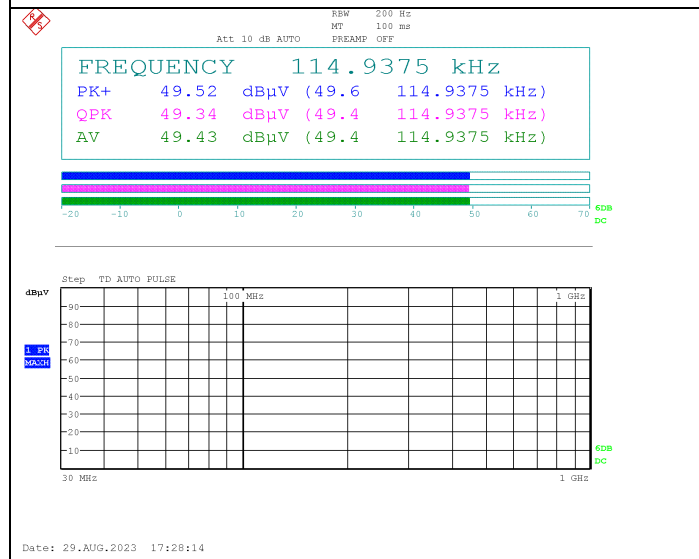
Ant. 1



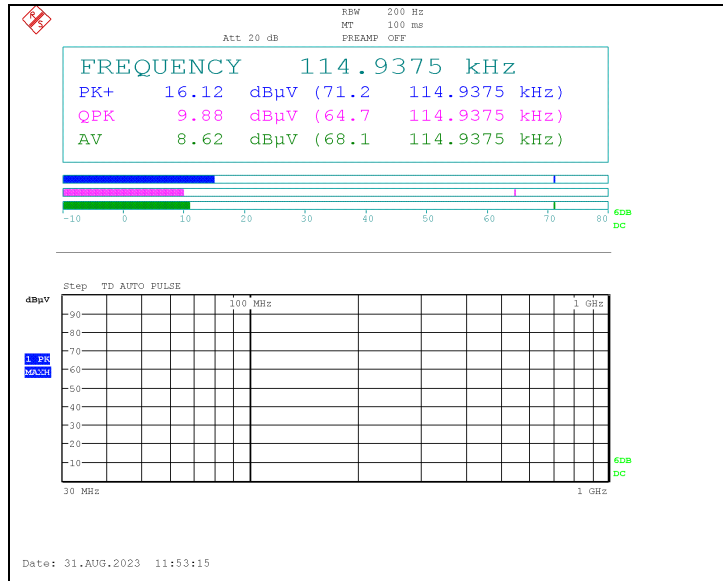
Ant. 2



Ant. 3



Test Condition: Idle mode



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 between polarizations of horizontal and vertical.

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

Ant. 1 (114 ~ 116 kHz)

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (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)
0.018	28.80	Average	H	18.76	0.02	47.58	-32.42	42.50	74.92
0.034	40.40	Average	H	18.39	0.02	58.81	-21.19	36.97	58.16
0.090	22.50	Average	H	18.23	0.02	40.75	-39.25	28.53	67.78
1.112	16.60	Quasi Peak	H	18.42	0.77	35.79	-4.21	26.68	30.89
2.519	9.70	Quasi Peak	H	18.70	0.65	29.05	-10.95	29.54	40.49
Above 3.000	Not detected	-	-	-	-	-	-	-	-

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)
43.87	39.20	Peak	V	19.27	-28.01	30.46	40.00	9.54
49.40	31.10	Peak	H	19.66	-27.94	22.82	40.00	17.18
176.19	37.10	Peak	V	14.82	-26.91	25.01	43.50	18.49
889.54	32.40	Peak	H	27.70	-24.80	35.30	46.00	10.70
913.63	32.60	Peak	V	28.08	-24.87	35.81	46.00	10.19

Ant. 2 (114 ~ 116 MHz)

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (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	28.80	Average	H	18.76	0.02	47.58	-32.42	42.50	74.92
0.034	40.70	Average	H	18.39	0.02	59.11	-20.89	36.97	57.86
0.581	10.80	Quasi Peak	H	18.32	0.55	29.67	-10.33	32.32	42.65
1.134	17.50	Quasi Peak	H	18.43	0.77	36.70	-3.30	26.51	29.81
Above 2.000	Not detected	-	-	-	-	-	-	-	-

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)
43.54	39.50	Peak	V	19.21	-28.01	30.70	40.00	9.30
60.03	31.30	Peak	H	18.30	-27.77	21.83	40.00	18.17
176.07	36.90	Peak	V	14.81	-26.91	24.80	43.50	18.70
920.91	32.00	Peak	V	28.20	-24.89	35.31	46.00	10.69
931.58	31.90	Peak	H	28.10	-24.59	35.41	46.00	10.59

Ant. 3 (114 ~ 116 MHz)

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (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	29.80	Average	H	18.76	0.02	48.58	-31.42	42.50	73.92
0.034	40.40	Average	H	18.39	0.02	58.81	-21.19	36.97	58.16
0.090	21.90	Average	H	18.23	0.02	40.15	-39.85	28.55	68.40
0.581	15.30	Quasi Peak	H	18.32	0.55	34.17	-5.83	32.32	38.15
1.154	16.90	Quasi Peak	H	18.43	0.77	36.10	-3.90	26.36	30.26
2.637	8.20	Quasi Peak	H	18.73	0.62	27.55	-12.45	29.54	41.99
Above 3.000	Not detected	-	-	-	-	-	-	-	-

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)
49.32	36.90	Peak	V	19.67	-27.94	28.63	40.00	11.37
65.85	35.00	Peak	V	16.63	-27.70	23.93	40.00	16.07
176.23	36.50	Peak	V	14.82	-26.90	24.42	43.50	19.08
327.47	33.10	Peak	V	19.77	-26.14	26.73	46.00	19.27
428.31	32.50	Peak	H	22.00	-25.65	28.85	46.00	17.15
Above 500.00	Not detected	-	-	-	-	-	-	-

Test Condition: 7.5 W Operating mode with client device (1 % battery status of client device)

Ant. 1 (126 ~ 128 kHz)

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (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)
0.018	29.50	Average	H	18.76	0.02	48.28	-31.72	42.50	74.22
0.034	40.40	Average	H	18.39	0.02	58.81	-21.19	36.97	58.16
0.090	23.70	Average	H	18.23	0.02	41.95	-38.05	28.53	66.58
0.441	8.40	Average	H	18.27	0.37	27.04	-52.96	14.72	67.68
0.887	19.60	Quasi Peak	H	18.38	0.79	38.77	-1.23	28.65	29.88
2.446	11.10	Quasi Peak	H	18.69	0.68	30.47	-9.53	29.54	39.07
Above 3.000	Not detected	-	-	-	-	-	-	-	-

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)
44.07	31.70	Peak	H	19.31	-28.01	23.00	40.00	17.00
48.63	40.70	Peak	V	19.70	-27.95	32.45	40.00	7.55
176.27	36.10	Peak	V	14.83	-26.90	24.03	43.50	19.47
865.37	33.20	Peak	H	27.30	-25.17	35.33	46.00	10.67
910.56	31.70	Peak	V	28.00	-24.84	34.86	46.00	11.14

Ant. 2 (126 ~ 128 MHz)

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (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	27.10	Average	H	18.76	0.02	45.88	-34.12	42.50	76.62
0.034	41.20	Average	H	18.39	0.02	59.61	-20.39	36.97	57.36
1.145	17.00	Quasi Peak	H	18.43	0.77	36.20	-3.80	26.43	30.23
Above 2.000	Not detected	-	-	-	-	-	-	-	-

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)
46.73	30.90	Peak	H	19.60	-27.97	22.53	40.00	17.47
49.48	39.40	Peak	V	19.65	-27.94	31.11	40.00	8.89
176.19	36.70	Peak	V	14.82	-26.91	24.61	43.50	18.89
891.08	32.10	Peak	V	27.70	-24.82	34.98	46.00	11.02
927.41	31.50	Peak	H	28.10	-24.67	34.93	46.00	11.07

Ant. 3 (126 ~ 128 MHz)

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (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	30.50	Average	H	18.73	0.02	49.25	-30.75	42.03	72.78
0.034	40.70	Average	H	18.39	0.02	59.11	-20.89	36.97	57.86
0.090	24.80	Quasi Peak	H	18.23	0.02	43.05	-36.95	28.52	65.47
1.151	18.50	Quasi Peak	H	18.43	0.77	37.70	-2.30	26.38	28.68
2.392	11.80	Quasi Peak	H	18.68	0.69	31.17	-8.83	29.54	38.37
Above 3.000	Not detected	-	-	-	-	-	-	-	-

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)
48.51	31.00	Peak	H	19.70	-27.95	22.75	40.00	17.25
48.63	36.50	Peak	V	19.70	-27.95	28.25	40.00	11.75
201.49	33.50	Peak	V	16.78	-26.68	23.60	43.50	19.90
884.33	33.10	Peak	V	27.60	-24.92	35.78	46.00	10.22
907.20	32.00	Peak	H	27.90	-24.88	35.02	46.00	10.98

Test Condition: 10 W Operating mode with client device (1 % battery status of client device)

Ant. 1 (114 ~ 116 kHz)

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (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)
0.010	21.80	Average	H	19.00	0.02	40.82	-39.18	47.60	86.78
0.013	24.90	Average	H	18.91	0.02	43.83	-36.17	45.33	81.50
0.019	28.60	Average	H	18.73	0.02	47.35	-32.65	42.03	74.68
0.034	40.30	Average	H	18.39	0.02	58.71	-21.29	36.97	58.26
1.147	18.90	Quasi Peak	H	18.43	0.77	38.10	-1.90	26.41	28.31
2.417	10.80	Quasi Peak	H	18.68	0.68	30.16	-9.84	29.54	39.38
Above 3.000	Not detected	-	-	-	-	-	-	-	-

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)
44.03	38.20	Peak	V	19.30	-28.01	29.49	40.00	10.51
50.98	30.90	Peak	H	19.70	-27.91	22.69	40.00	17.31
176.19	36.60	Peak	V	14.82	-26.91	24.51	43.50	18.99
462.90	33.30	Peak	H	21.90	-25.40	29.80	46.00	16.20
939.38	32.10	Peak	V	28.00	-24.62	35.48	46.00	10.52

Ant. 2 (114 ~ 116 MHz)

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (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	29.10	Average	H	18.73	0.02	47.85	-32.15	42.03	74.18
0.034	41.00	Average	H	18.39	0.02	59.41	-20.59	36.97	57.56
0.591	24.70	Quasi Peak	H	18.32	0.56	43.58	3.58	32.17	28.59
1.108	16.30	Quasi Peak	H	18.42	0.77	35.49	-4.51	26.71	31.22
Above 2.000	Not detected	-	-	-	-	-	-	-	-

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)
43.58	39.30	Peak	V	19.22	-28.01	<u>30.51</u>	40.00	9.49
44.47	31.50	Peak	H	19.35	-28.00	22.85	40.00	17.15
80.24	35.90	Peak	V	12.72	-27.62	21.00	40.00	19.00
176.15	37.10	Peak	V	14.82	-26.91	25.01	43.50	18.49
496.21	32.00	Peak	H	22.90	-25.83	29.07	46.00	16.93
967.06	33.00	Peak	H	27.90	-24.76	36.14	54.00	17.86

Ant. 3 (114 ~ 116 MHz)

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (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	28.90	Average	H	18.73	0.02	47.65	-32.35	42.03	74.38
0.034	42.20	Average	H	18.39	0.02	60.61	-19.39	36.97	56.36
0.090	22.90	Average	H	18.23	0.02	41.15	-38.85	28.52	67.37
0.622	24.10	Quasi Peak	H	18.32	0.59	43.01	3.01	31.73	28.72
1.158	18.10	Quasi Peak	H	18.43	0.77	37.30	-2.70	26.33	29.03
2.569	10.20	Quasi Peak	H	18.71	0.64	29.55	-10.45	29.54	39.99
Above 3.000	Not detected	-	-	-	-	-	-	-	-

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)
43.58	32.30	Peak	H	19.22	-28.01	23.51	40.00	16.49
44.03	39.10	Peak	V	19.30	-28.01	30.39	40.00	9.61
176.11	36.10	Peak	V	14.81	-26.91	24.00	43.50	19.50
924.91	31.90	Peak	H	28.15	-24.76	35.29	46.00	10.71
953.97	32.50	Peak	V	27.90	-24.69	35.71	46.00	10.29

Test Condition: Idle mode

Below 30 MHz

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (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	29.10	Average	H	18.73	0.02	47.85	-32.15	42.03	74.18
0.034	36.70	Average	H	18.39	0.02	55.11	-24.89	36.97	61.86
0.347	29.20	Average	H	18.22	0.25	47.67	-32.33	16.80	49.13
1.144	17.60	Quasi Peak	H	18.43	0.77	36.80	-3.20	26.44	29.64
Above 2.000	Not detected	-	-	-	-	-	-	-	-

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)
49.40	33.70	Peak	V	19.66	-27.94	25.42	40.00	14.58
58.86	31.40	Peak	H	18.54	-27.79	22.15	40.00	17.85
176.15	36.80	Peak	V	14.82	-26.91	24.71	43.50	18.79
201.45	32.60	Peak	H	16.78	-26.68	22.70	43.50	20.80
453.32	35.50	Peak	V	21.90	-25.40	32.00	46.00	14.00
918.76	32.00	Peak	H	28.20	-24.91	35.29	46.00	10.71

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).
- Radiated spurious emission measurement as below 30 MHz.
(Actual (dBμA/m) at 3m = Reading (dBμV) + AF (dB/m) + CL (dB))
- Radiated spurious emission measurement as above 30 MHz.
(Actual (dBμA/m) = Reading (dBμV) + AF (dB/m) + CL (dB) + AMP (dB))
- According to §15.31(o), emission levels are not report much lower than the limits by over 20 dB.

- Test plots

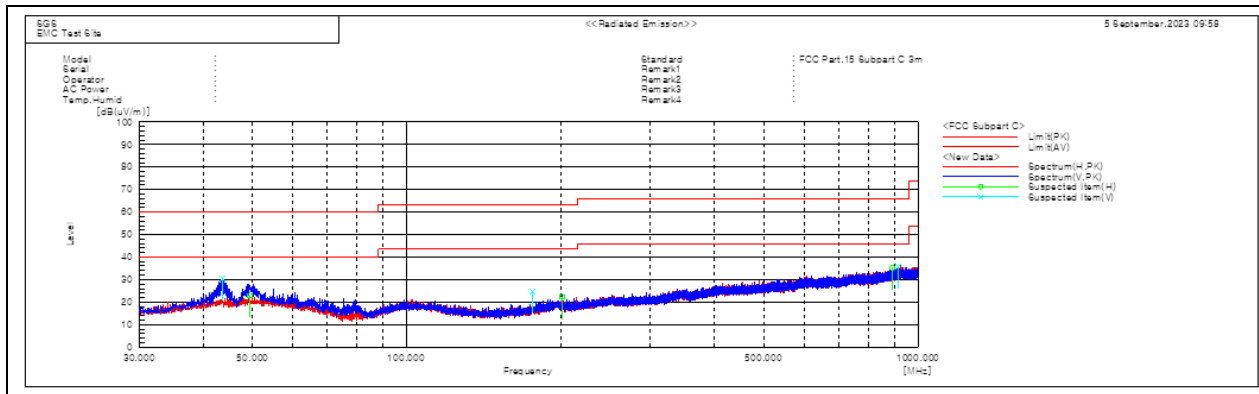
Test Condition: 5 W Operating mode with client device (1 % battery status of client device)

Ant. 1

Below 30 MHz



Above 30 MHz



Remark;

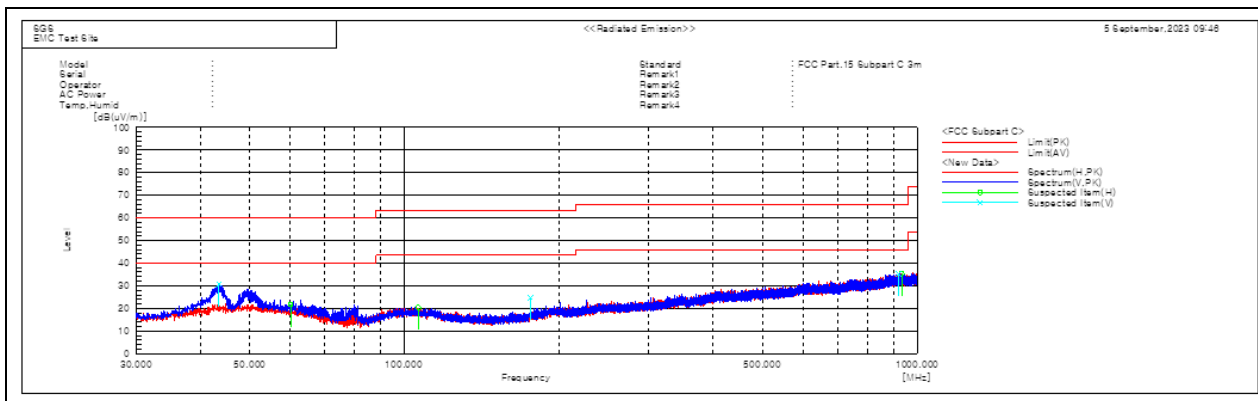
- Traces shown in the plot were made by using a peak detector.

Ant. 2

Below 30 MHz



Above 30 MHz



Remark;

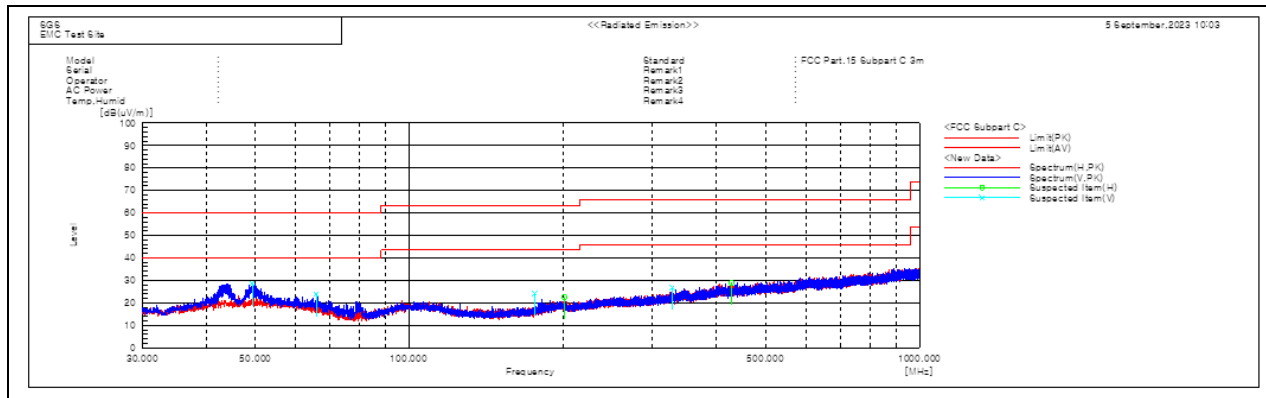
- Traces shown in the plot were made by using a peak detector.

Ant. 3

Below 30 MHz



Above 30 MHz



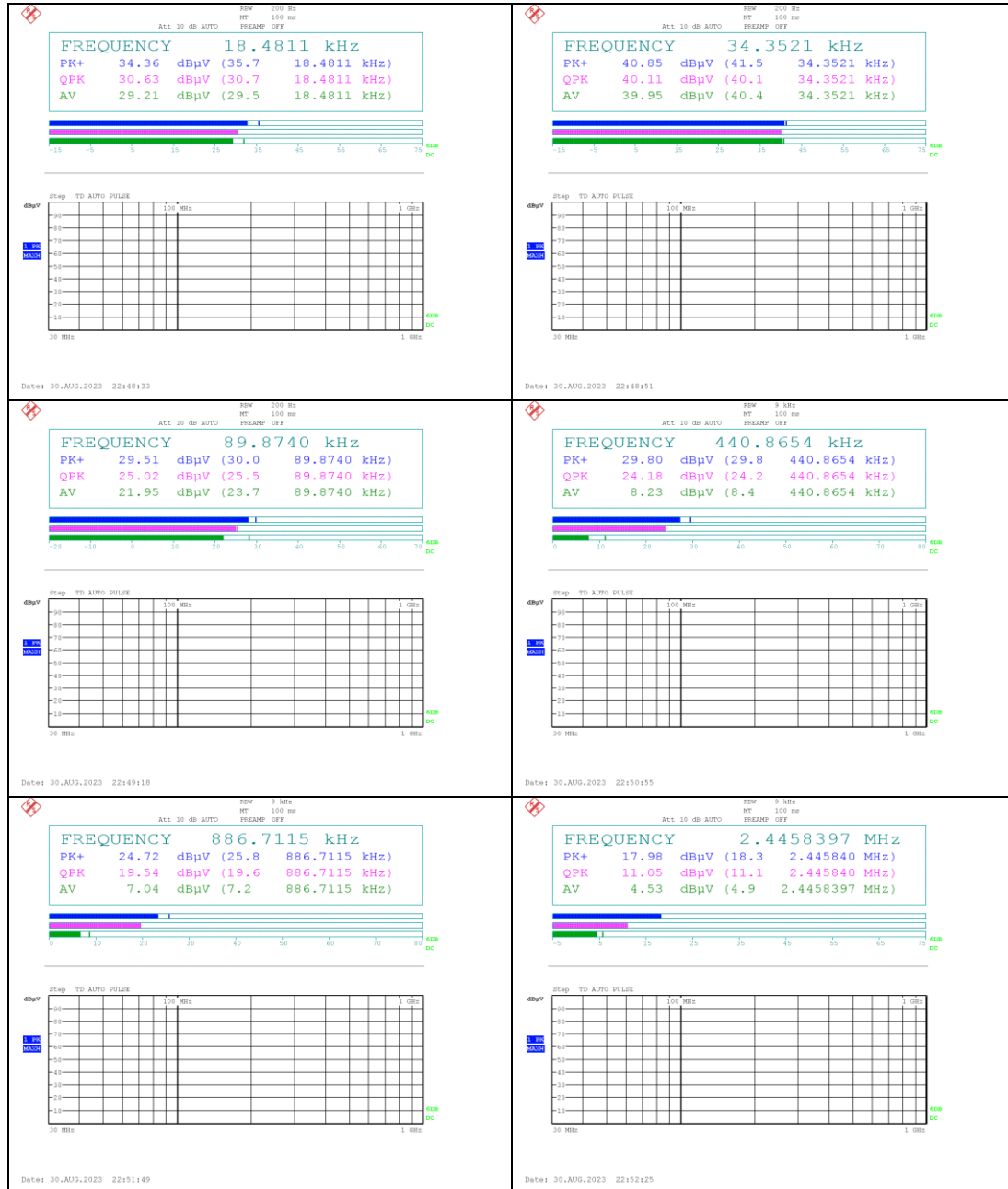
Remark;

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

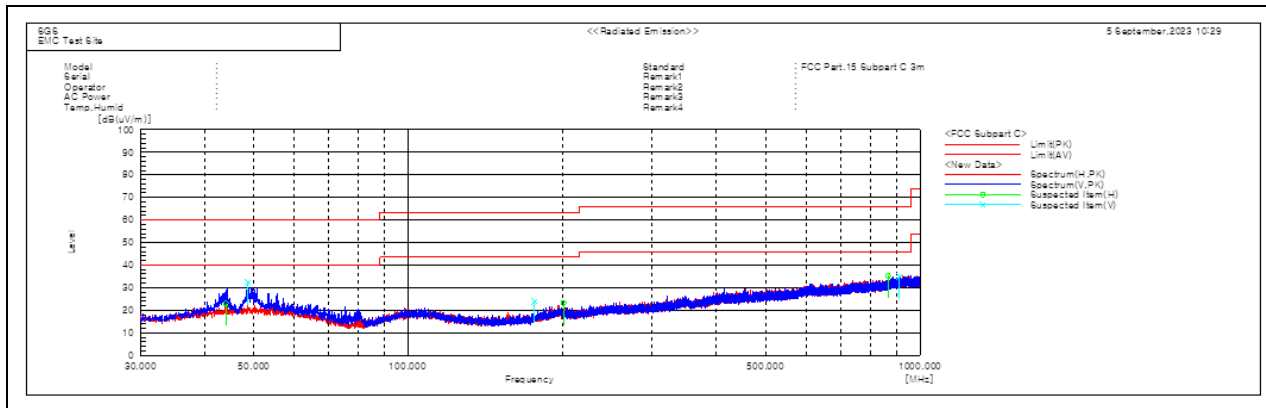
Test Condition: 7.5 W Operating mode with client device (1 % battery status of client device)

Ant. 1

Below 30 MHz



Above 30 MHz



Remark;

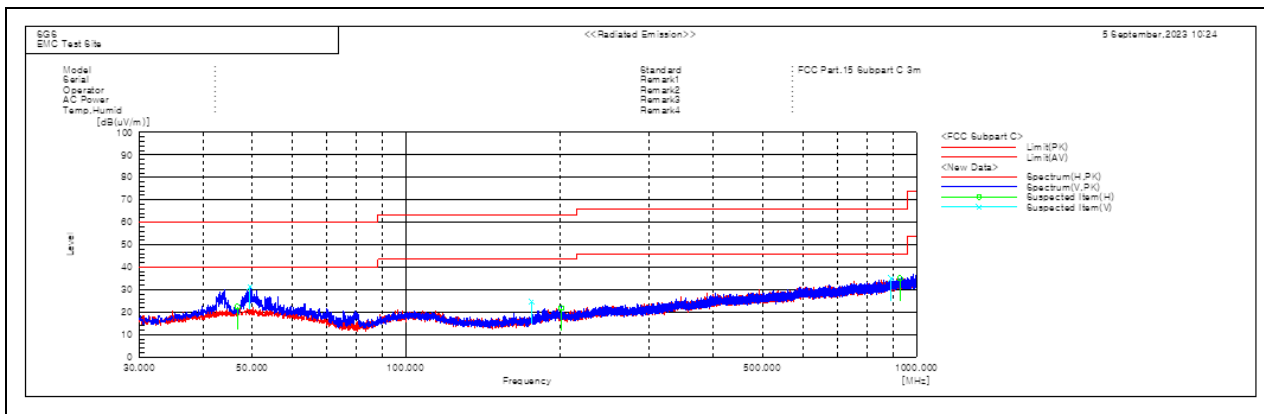
- Traces shown in the plot were made by using a peak detector.

Ant. 2

Below 30 MHz



Above 30 MHz



Remark;

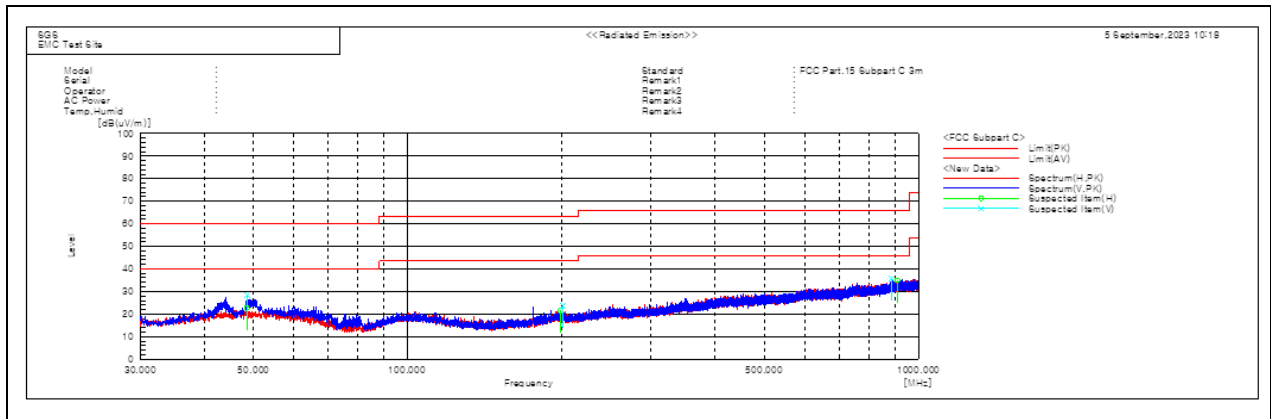
- Traces shown in the plot were made by using a peak detector.

Ant. 3

Below 30 MHz



Above 30 MHz



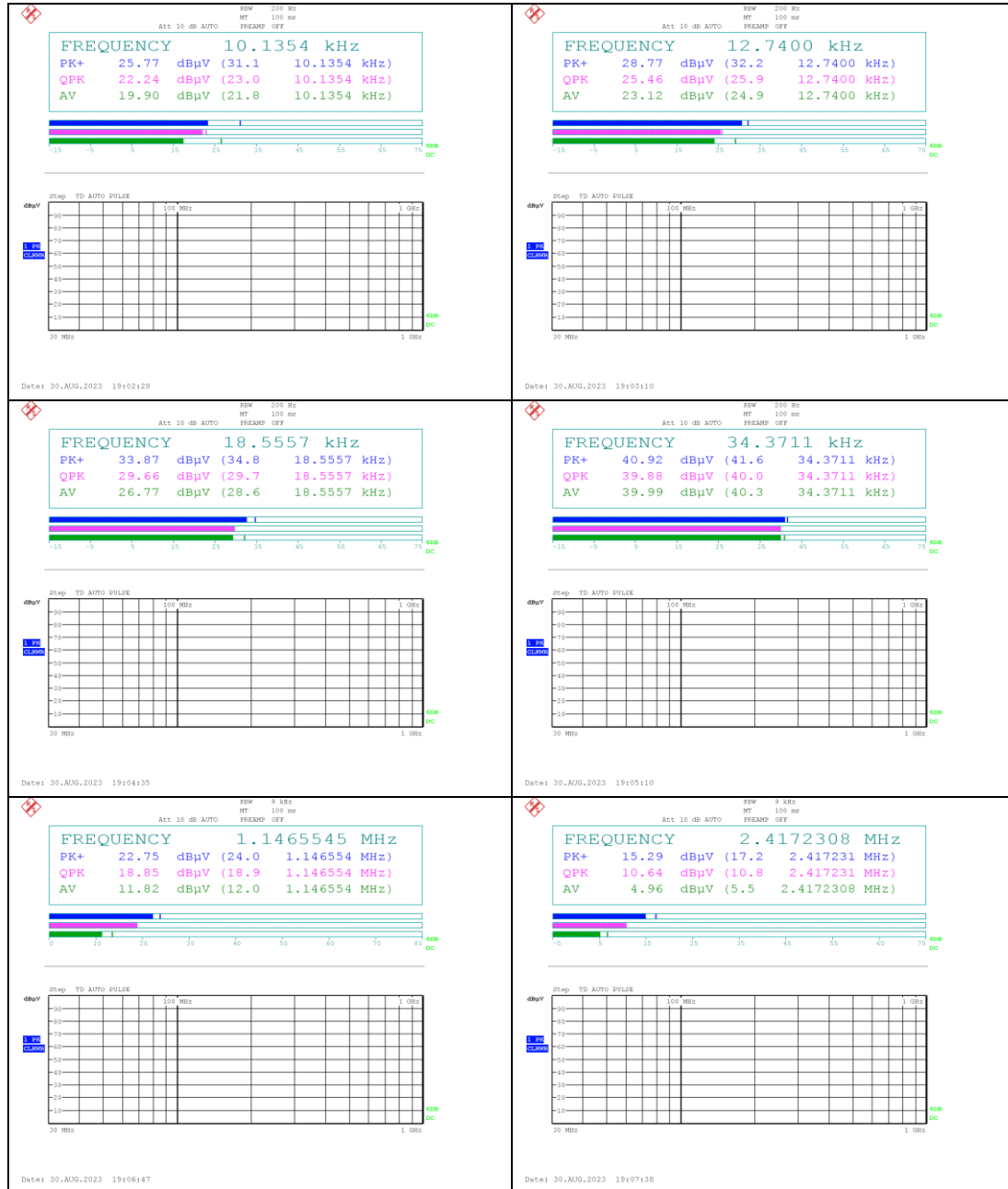
Remark;

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

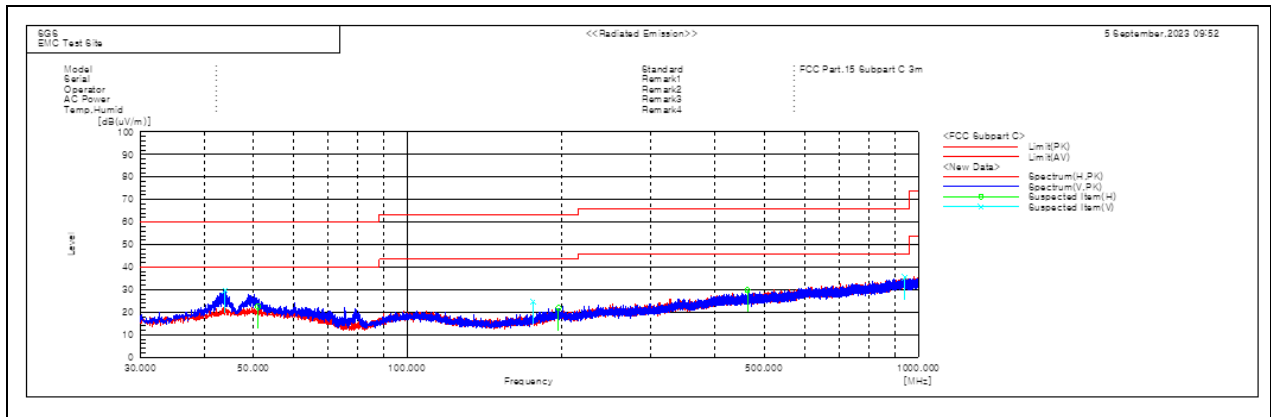
Test Condition: 10 W Operating mode with client device (1 % battery status of client device)

Ant. 1

Below 30 MHz



Above 30 MHz



Remark;

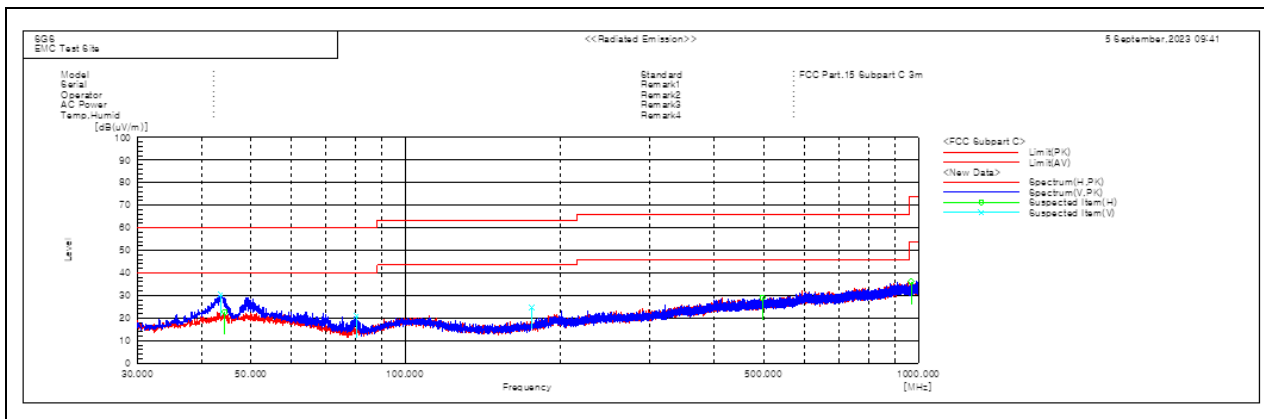
- Traces shown in the plot were made by using a peak detector.

Ant. 2

Below 30 MHz



Above 30 MHz



Remark;

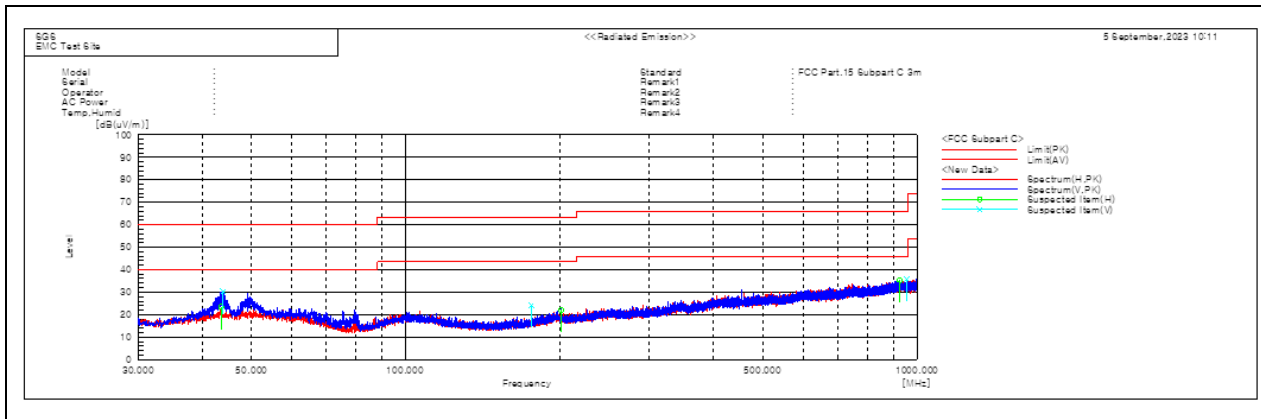
- Traces shown in the plot were made by using a peak detector.

Ant. 3

Below 30 MHz



Above 30 MHz



Remark;

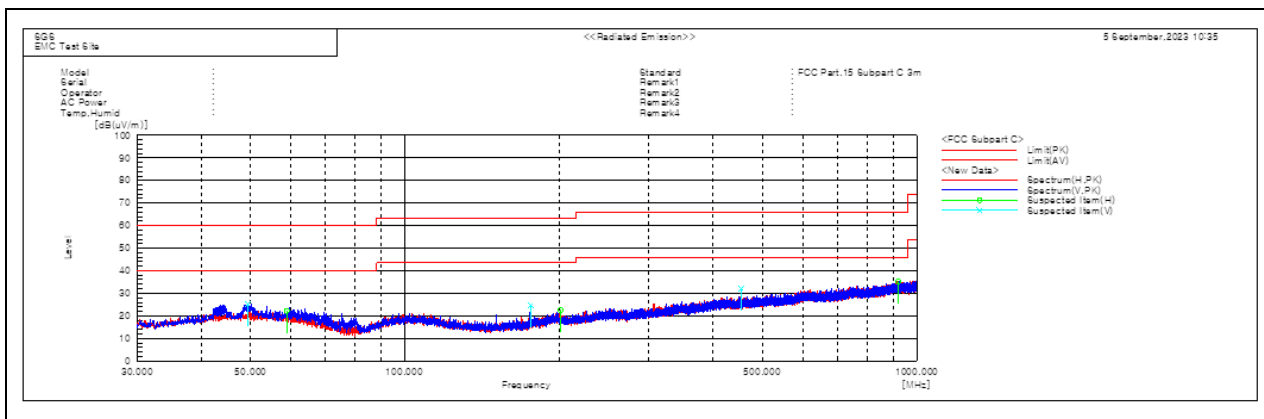
- Traces shown in the plot were made by using a peak detector.

Test Condition: Idle mode

Below 30 MHz



Above 30 MHz

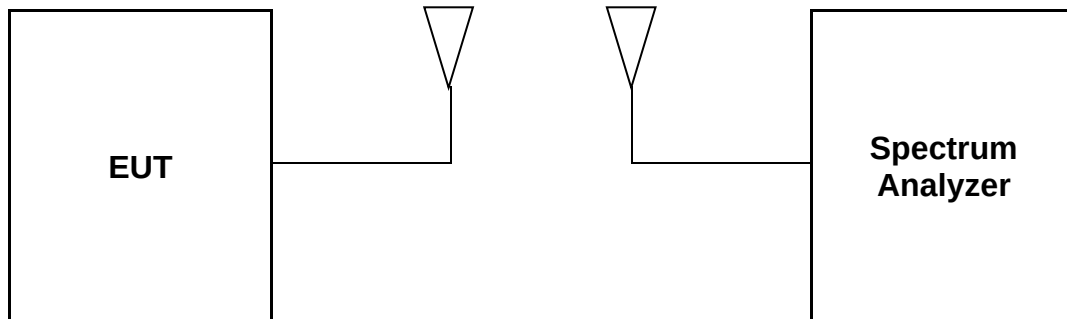


Remark;

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

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.

3.4. Test Result

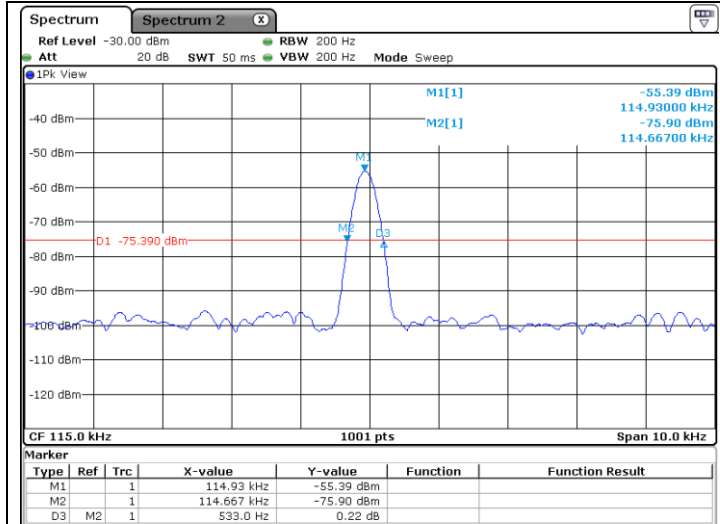
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Test Condition	Ant.	Frequency (kHz)	EUT Status	20 dB Bandwidth (kHz)	Limit
5 W	1	114 ~ 116	With client device (1 % battery status of client device)	0.533	Reporting proposed only
	2			0.539	
	3			0.533	
7.5 W	1	126 ~ 128		0.529	
	2			0.530	
	3			0.529	
10 W	1	114 ~ 116		0.533	
	2			0.529	
	3			0.533	
Idle	-	114 ~ 116	Without client device	0.529	

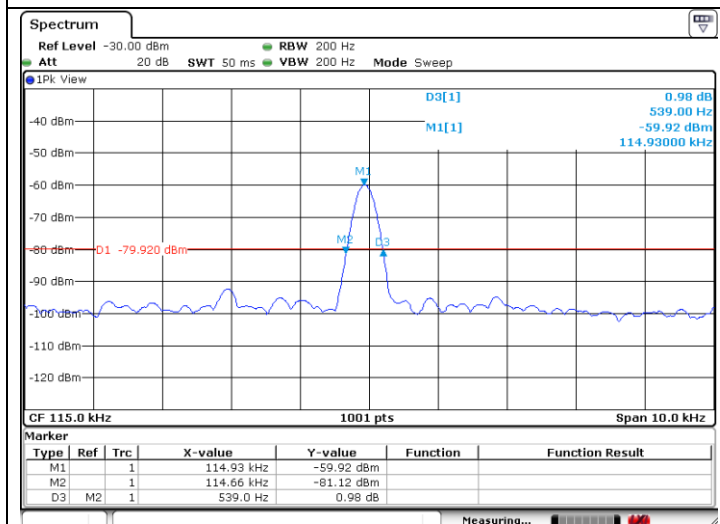
- Test plots

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

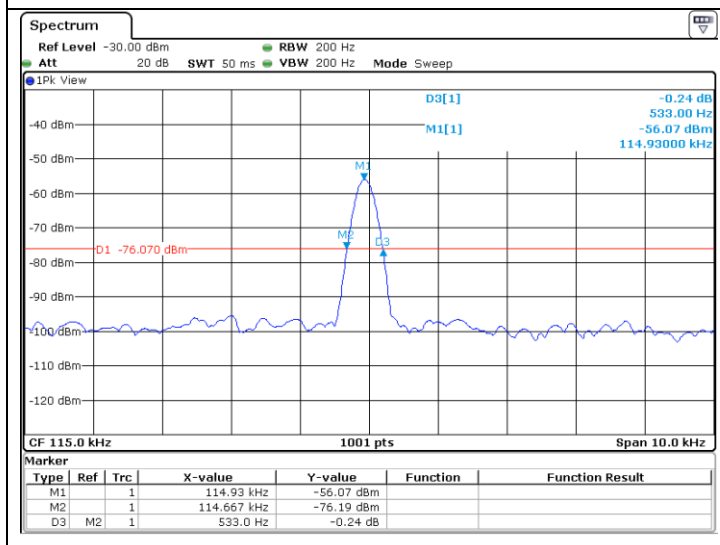
Ant. 1



Ant. 2

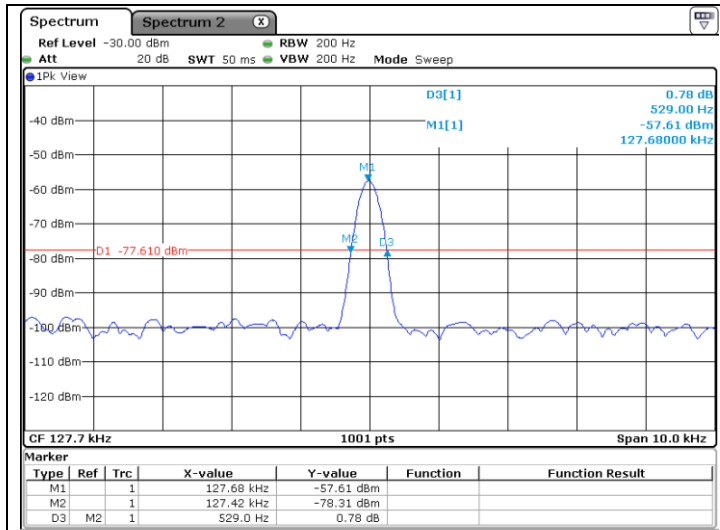


Ant. 3

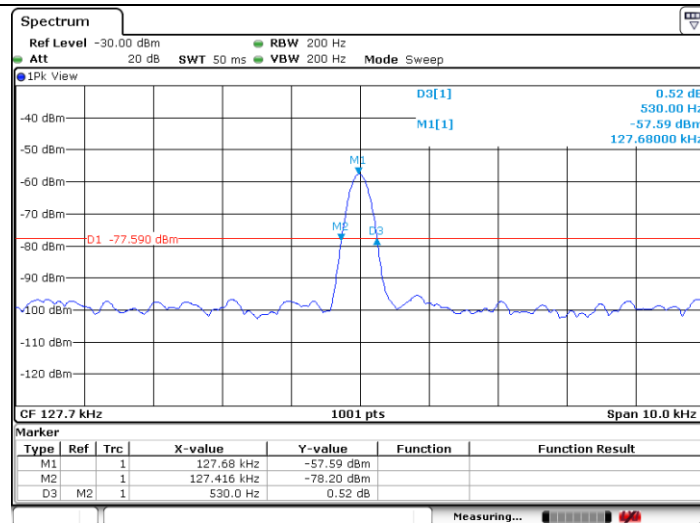


Test Condition: 7.5 W Operating mode with client device (1 % battery status of client device)

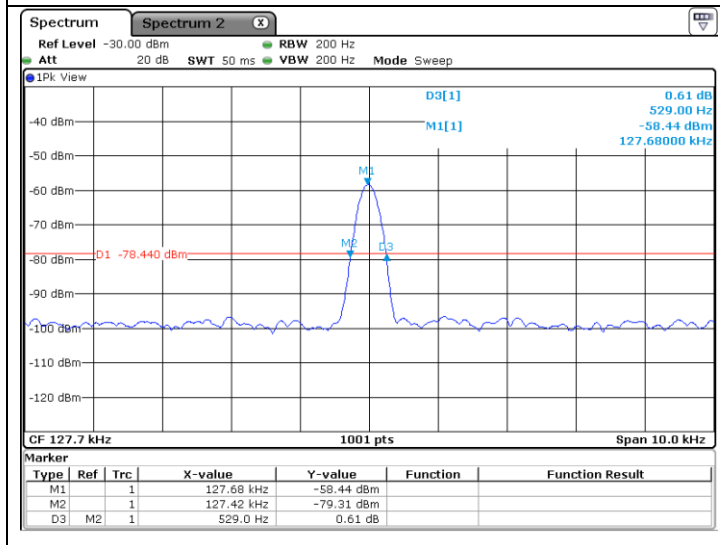
Ant. 1



Ant. 2

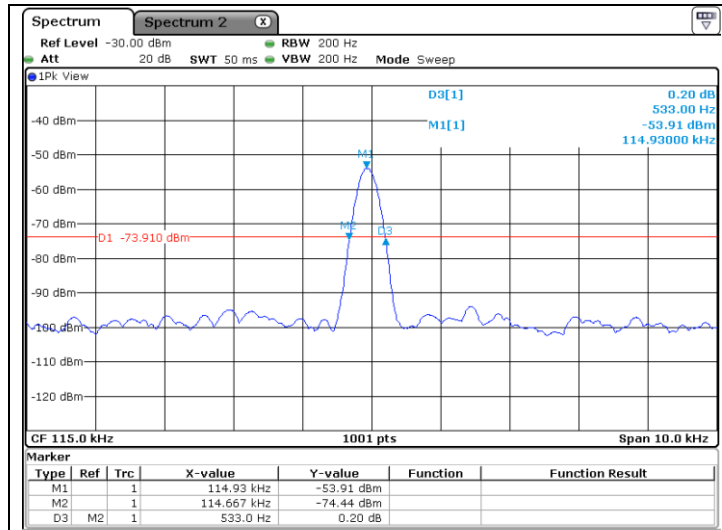


Ant. 3

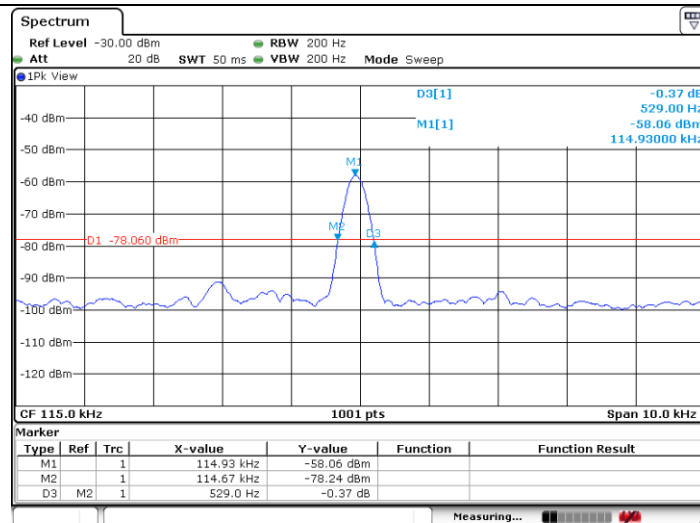


Test Condition: 10 W Operating mode with client device (1 % battery status of client device)

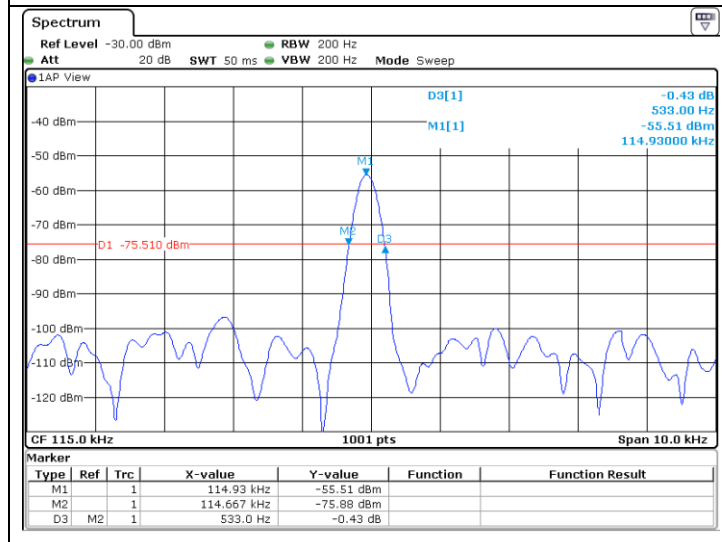
Ant. 1



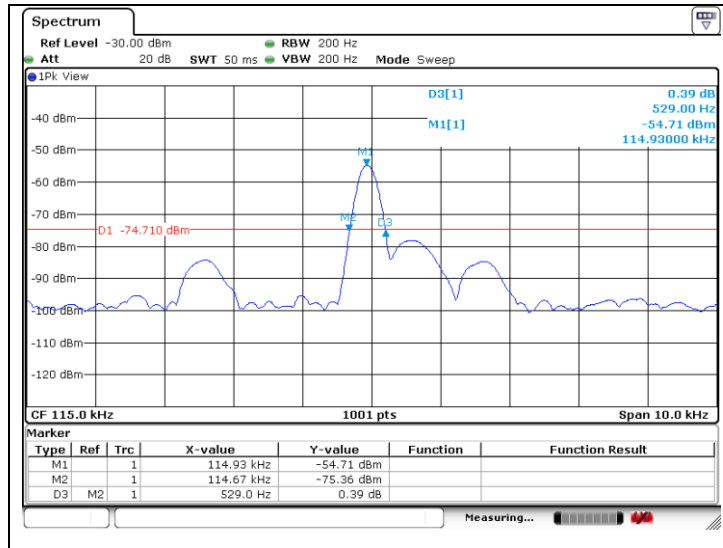
Ant. 2



Ant. 3



Test Condition: Idle mode



- End of the Test Report -