

TEST REPORT

of

FCC Part 15 Subpart C §15.209

FCC ID: NYOMBECWPC2503

Equipment Under Test : Wireless Charging System
Model Name : MBECWPC2503
Variant Model Name(s) : -
Applicant : MOBASE ELECTRONICS CO., LTD.
Manufacturer : MOBASE ELECTRONICS CO., LTD.
Date of Receipt : 2024.12.12
Date of Test(s) : 2024.12.12 ~ 2025.02.24
Date of Issue : 2025.02.28

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

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
- 3) This test report cannot be reproduced, except in full, without prior written permission of the Company.
- 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:



Ethan Lim

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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1.2. Details of Applicant

Applicant : MOBASE ELECTRONICS CO., LTD.

Address : 100, Saneop-ro 156beon-gil, Gwonseon-gu, Suwon-si, Gyeonggi-do,
 Korea (Republic Of), 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	Wireless Charging System		
Model Name	MBECWPC2503		
Serial Number	001		
Power Supply	DC 12 V		
Operation Mode	5 W, 7.5 W, 15 W		
Frequency Range	5 W	114 ~ 116 kHz	
	7.5 W	119 ~ 121 kHz	
	15 W	114 ~ 116 kHz	
	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
Signal Generator	R&S	SMBV100A	259067	Jun. 19, 2024	Annual	Jun. 19, 2025
DC Power Supply	R&S	HMP2020	102130	May 02, 2024	Annual	May 02, 2025
Spectrum Analyzer	R&S	FSV30	103210	Mar. 27, 2024	Annual	Mar. 27, 2025
Loop Antenna	Schwarzbeck Mess-Elektronik	HFRAE 5161	5161-028	Nov. 06, 2024	Annual	Nov. 06, 2025
Amplifier	H.P.	8447F	2944A03909	Aug. 09, 2024	Annual	Aug. 09, 2025
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 21, 2023	Biennial	Aug. 21, 2025
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB 9163	9163-396	Apr. 02, 2024	Biennial	Apr. 02, 2026
EMI Test Receiver	R&S	ESU26	100109	Jan. 13, 2025	N/A	Jan. 13, 2026
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	SENSORVIEW	NMST-13A26-NMST-5 m	TPC24021900 04	Oct. 04, 2024	Semi-annual	Apr. 04, 2025
Coaxial Cable	SENSORVIEW	NMST-13A26-NMST-10 m	TPC24021900 01	Oct. 04, 2024	Semi-annual	Apr. 04, 2025
Coaxial Cable	RADIALL	TESTPRO 3	182287	Oct. 11, 2024	Semi-annual	Apr. 11, 2025

► 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	Pass
2.1049	20 dB Bandwidth	Pass
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/m) + Cable loss (dB) + (AMP (dB))

1.9. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL005800	2025.02.28	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	4.60 dB
	V	5.00 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-N981U	A3LSMN981U	5 W, 15 W	114 ~ 116 kHz	1 % of battery 50 % of battery 99 % of battery
A1897	BCG-E3174A	7.5 W	119 ~ 121 kHz	

Mode	Battery	Frequency (kHz)	Detect Mode	Reading (dBμV)
5 W	1 %	114 ~ 116	Average	69.60
	50 %			68.90
	99 %			68.30
7.5 W	1 %	119 ~ 121	Average	53.20
	50 %			51.40
	99 %			50.10
15 W	1 %	114 ~ 116	Average	69.30
	50 %			68.60
	99 %			67.90

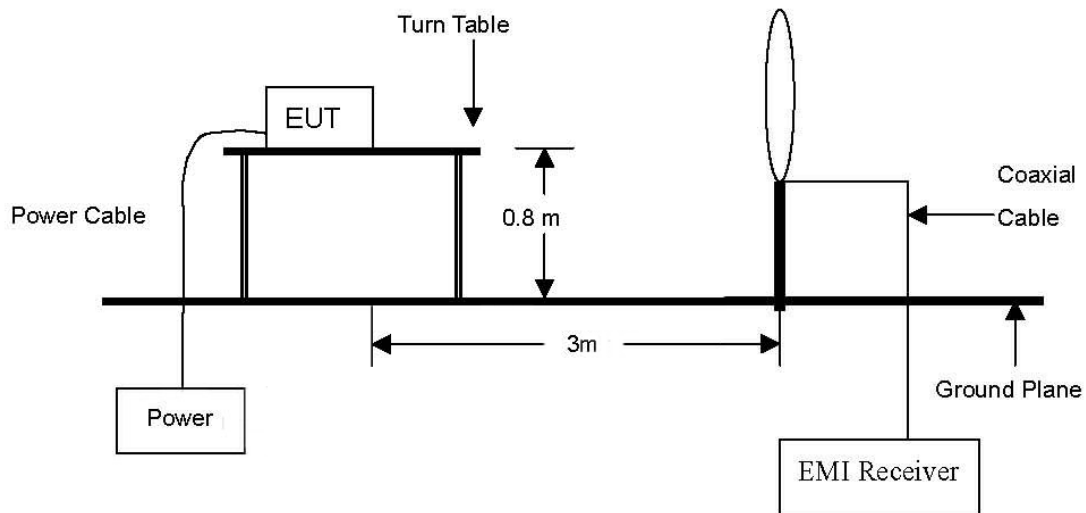
Note;

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

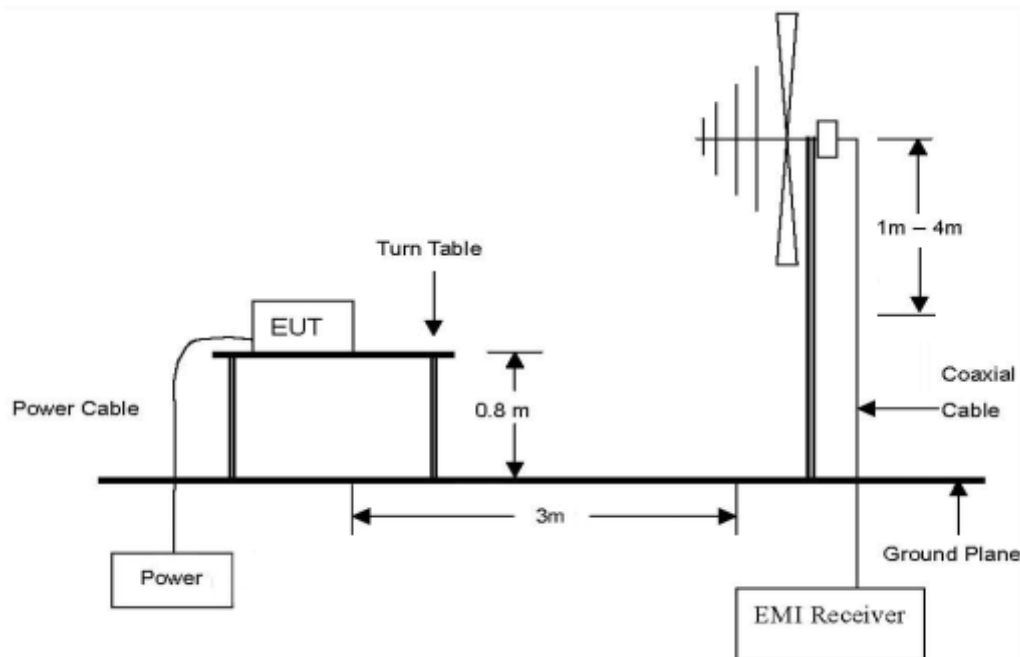
2. Field Strength of Fundamental and Spurious Emission

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

According to §15.209(d), The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1 000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

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

1. 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.
2. 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.
3. 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.
4. The test-receiver system was set to Quasi Peak and Average Detect Function and Specified Bandwidth with Maximum Hold Mode.
5. To get a maximum emission level from the EUT, the EUT is manipulated through three orthogonal planes (X, Y, Z). Worst orthogonal plan of EUT is X – axis during radiation test.

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.

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

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (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)
Operating Frequency: 114 ~ 116 kHz									
0.115	69.60	Average	H	18.20	0.05	87.85	7.85	26.39	18.54

Test Condition: 7.5 W Operating mode with client device

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (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)
Operating Frequency: 119 ~ 121 kHz									
0.120	53.20	Average	H	18.20	0.05	71.45	-8.55	26.02	34.57

Test Condition: 15 W Operating mode with client device

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (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)
Operating Frequency: 114 ~ 116 kHz									
0.115	69.30	Average	H	18.20	0.05	87.55	7.55	26.39	18.84

Test Condition: Idle mode

Radiated Emissions			Ant.	Correction Factors		Total		Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (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)
Operating Frequency: 114 ~ 116 kHz									
0.115	49.40	Average	H	18.20	0.05	67.65	-12.35	26.39	38.74

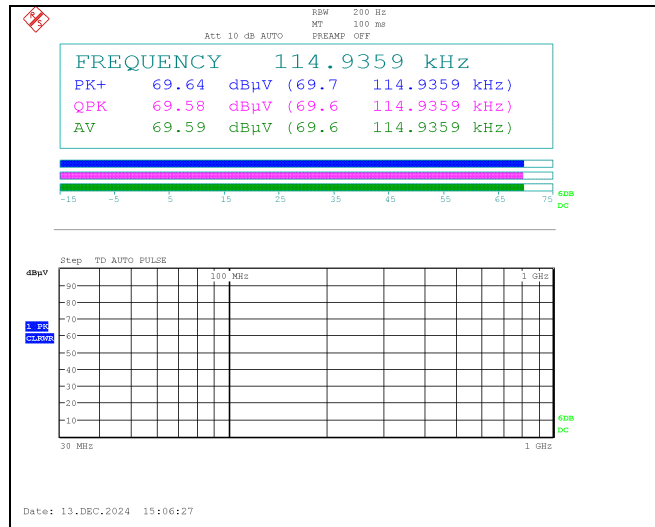
Remark;

1. 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).
2. 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)
3. 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.
4. The limit above was calculated based on table of §15.209(a).
5. Actual (dB μ V/m) at 3 m = Reading (dB μ V) + AF (dB/m) + CL (dB).

- Test plots

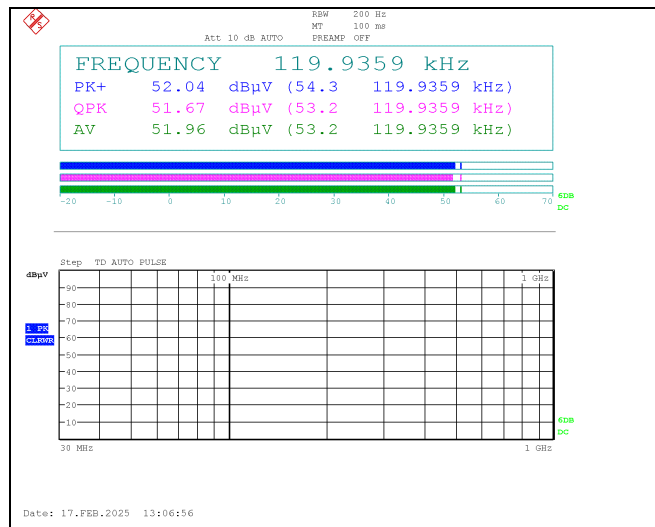
Test Condition: 5 W Operating mode with client device

Operating Frequency: 114 ~ 116 kHz



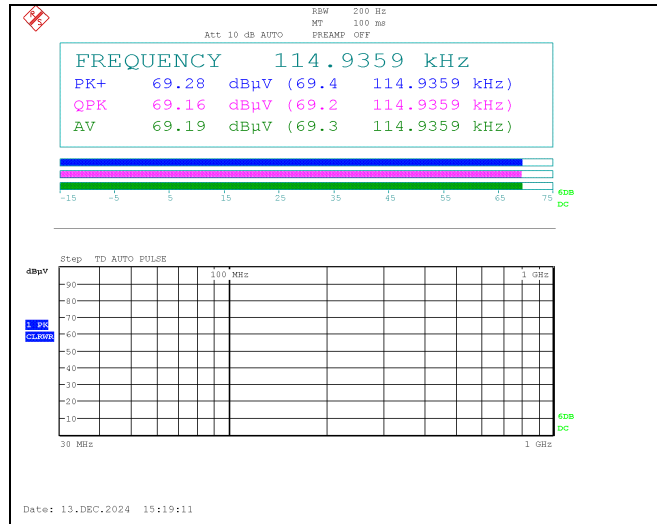
Test Condition: 7.5 W Operating mode with client device

Operating Frequency: 119 ~ 121 kHz



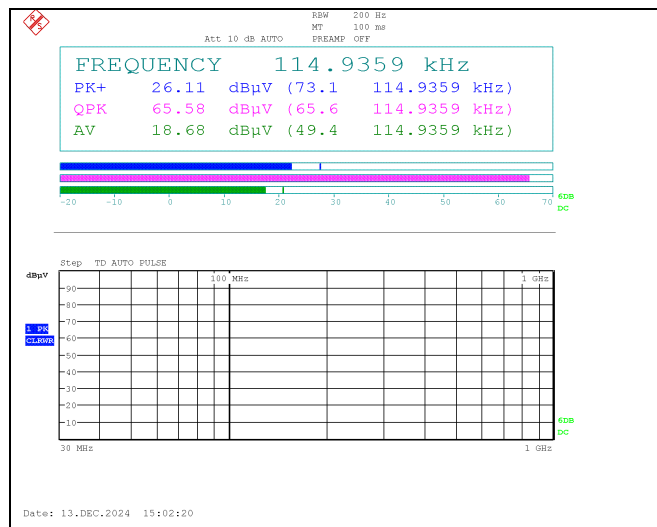
Test Condition: 15 W Operating mode with client device

Operating Frequency: 114 ~ 116 kHz



Test Condition: Idle mode

Operating Frequency: 114 ~ 116 kHz



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

Operating Frequency: 114 ~ 116 MHz

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)
0.034	38.30	Average	H	18.39	0.03	56.72	-23.28	36.97	60.25
1.628	33.30	Quasi Peak	H	18.53	0.62	52.45	12.45	23.37	10.92
Above 2.000	Not detected	-	-	-	-	-	-	-	-

Above 30 MHz

Radiated Emissions			Ant.	Correction (dB/m)	Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.		Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
283.04	33.11	Quasi Peak	H	-6.26	26.85	46.00	19.15
365.85	33.00	Quasi Peak	H	-4.79	28.21	46.00	17.79
503.94	29.20	Quasi Peak	V	-2.38	26.82	46.00	19.18
Above 600.00	Not detected	-	-	-	-	-	-

Test Condition: 7.5 W Operating mode with client device

Operating Frequency: 119 ~ 121 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)
0.020	40.30	Average	V	18.70	0.03	59.03	-20.97	41.58	62.55
1.630	31.00	Quasi Peak	V	18.53	0.62	50.15	10.15	23.36	13.21
14.256	20.80	Quasi Peak	V	18.91	0.58	40.29	0.29	29.54	29.25
Above 2.000	Not detected	-	-	-	-	-	-	-	-

Above 30 MHz

Radiated Emissions			Ant.	Correction (dB/m)	Total	Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.		Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
276.90	37.68	Quasi Peak	H	-6.46	31.22	46.00	14.78
367.85	34.30	Quasi Peak	H	-4.69	29.61	46.00	16.39
Above 400.00	Not detected	-	-	-	-	-	-

Test Condition: 15 W Operating mode with client device

Operating Frequency: 114 ~ 116 MHz

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)
0.034	38.10	Average	H	18.39	0.03	56.52	-23.48	36.97	60.45
1.651	32.80	Quasi Peak	H	18.53	0.61	51.94	11.94	23.25	11.31
Above 2.000	Not detected	-	-	-	-	-	-	-	-

Above 30 MHz

Radiated Emissions			Ant.	Correction (dB/m)	Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.		Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
276.74	35.87	Quasi Peak	H	-6.47	29.40	46.00	16.60
366.20	33.41	Quasi Peak	H	-4.77	28.64	46.00	17.36
502.94	29.99	Quasi Peak	V	-2.36	27.63	46.00	18.37
Above 600.00	Not detected	-	-	-	-	-	-

Test Condition: Idle mode

Operating Frequency: 114 ~ 116 MHz

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	46.70	Average	V	18.73	0.03	65.46	-14.54	42.03	56.57
1.626	32.20	Quasi Peak	V	18.53	0.62	51.35	11.35	23.38	12.03
Above 2.000	Not detected	-	-	-	-	-	-	-	-

Above 30 MHz

Radiated Emissions			Ant.	Correction (dB/m)	Total	Limit	
Frequency (MHz)	Reading (dBμV)	Detect Mode	Pol.		Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
201.40	32.69	Quasi Peak	H	-8.89	23.80	43.50	19.70
251.68	34.84	Quasi Peak	H	-6.83	28.01	46.00	17.99
276.70	33.89	Quasi Peak	H	-6.47	27.42	46.00	18.58
367.33	32.35	Quasi Peak	H	-4.71	27.64	46.00	18.36
520.21	29.86	Quasi Peak	V	-2.27	27.59	46.00	18.41
Above 600.00	Not detected	-	-	-	-	-	-

Remark;

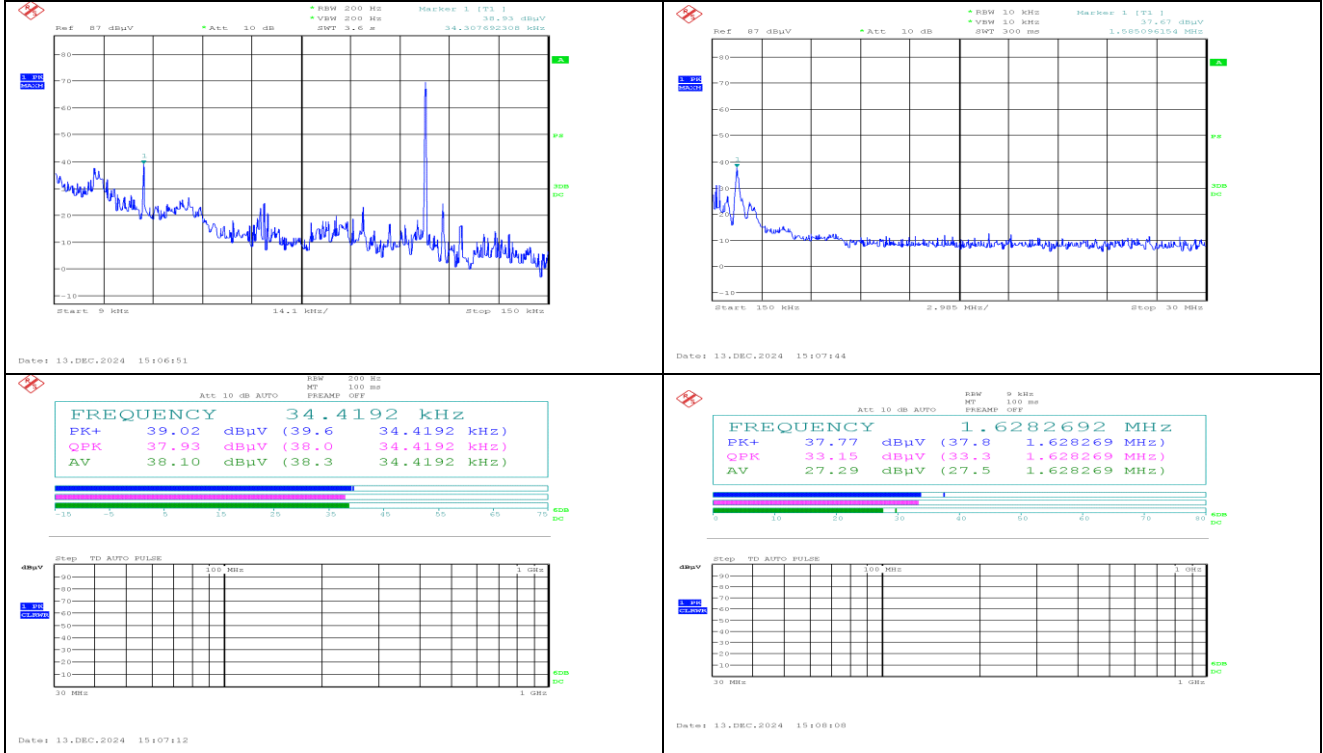
- According to §15.31 (f)(2),
- 300 m Result (dBμV/m) = 3 m Result (dBμV/m) - 40log (300/3) (dBμV/m)
- 30 m Result (dBμV/m) = 3 m Result (dBμV/m) - 40log (30/3) (dBμV/m)
- According to field strength table of general requirement in §15.209 (a), field strength limits below 1.705 MHz were calculated as 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).
- Actual (dBμV/m) at 3 m were calculated as below.
- Below 30 MHz : Reading (dBμV) + AF (dB/m) + CL (dB)
- Above 30 MHz : Actual = Reading + Correction (Correction = Antenna Factor + AMP Factor + Cable Loss)
- According to §15.31(o), emission levels are not report much lower than the limits by over 20 dB.
- Test from 30 MHz to 1 000 MHz was performed using the software of ELEKTRAT(V5.02) from Rohde & Schwarz GmbH & Co. KG.

- Test plots

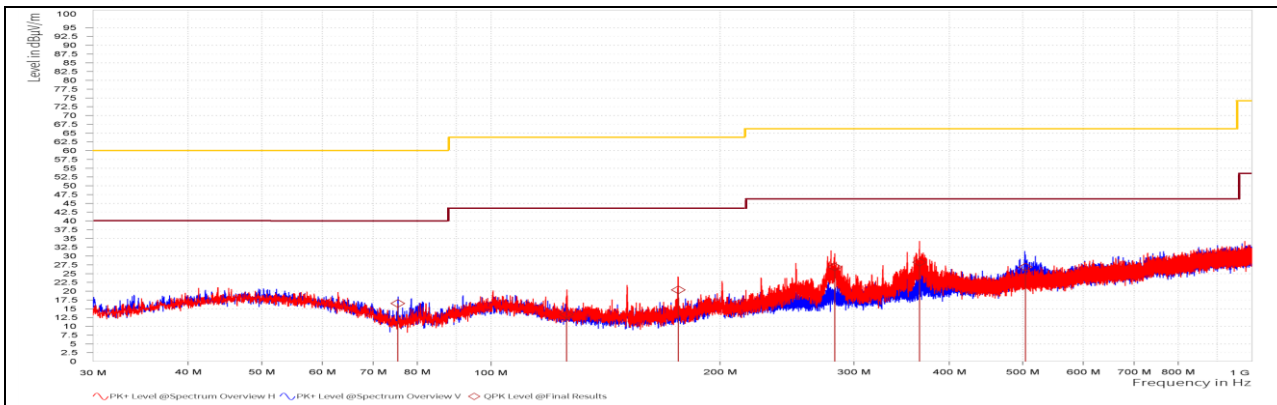
Test Condition: 5 W Operating mode with client device

Operating Frequency: 114 ~ 116 MHz

Below 30 MHz

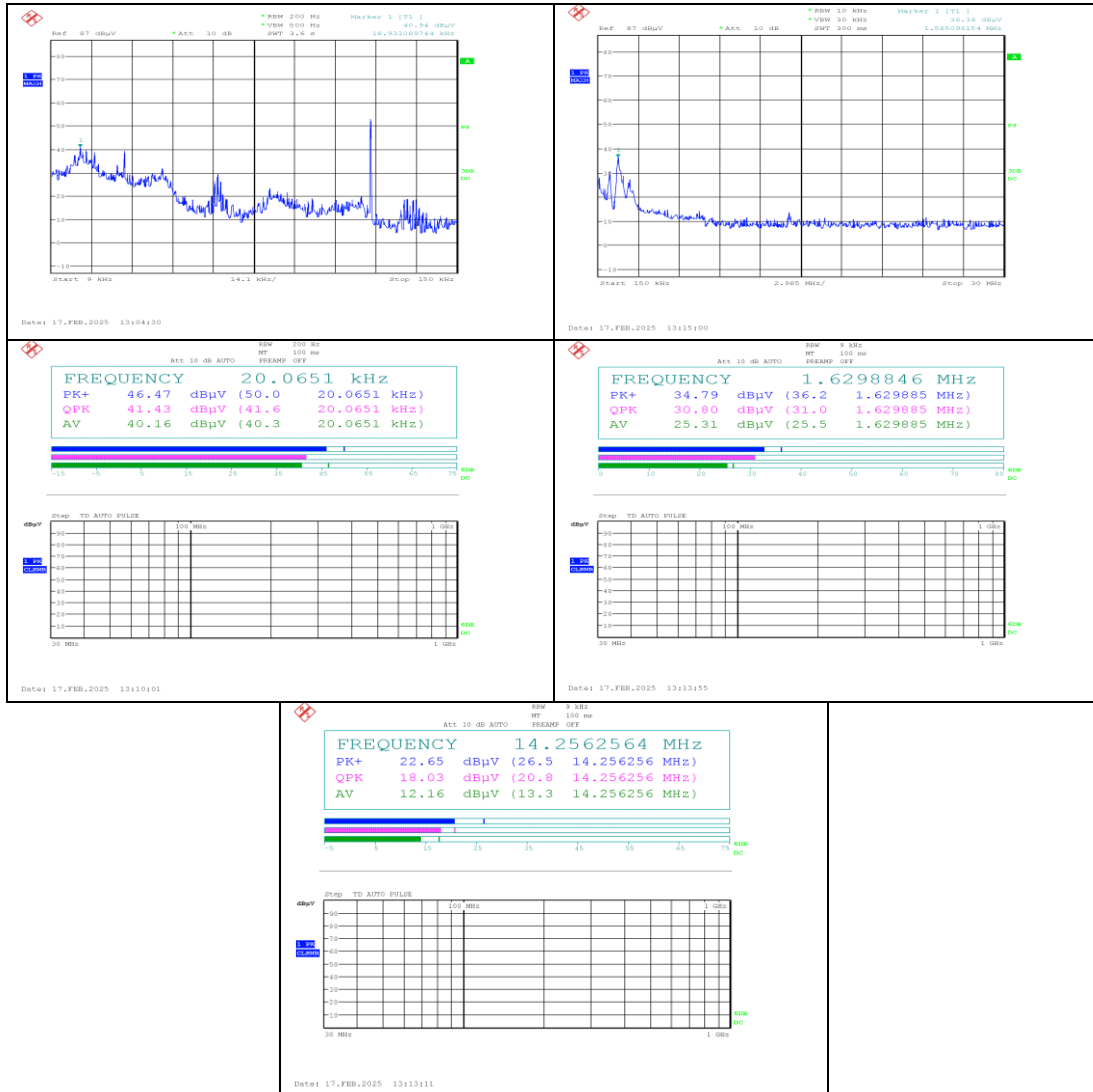


Above 30 MHz

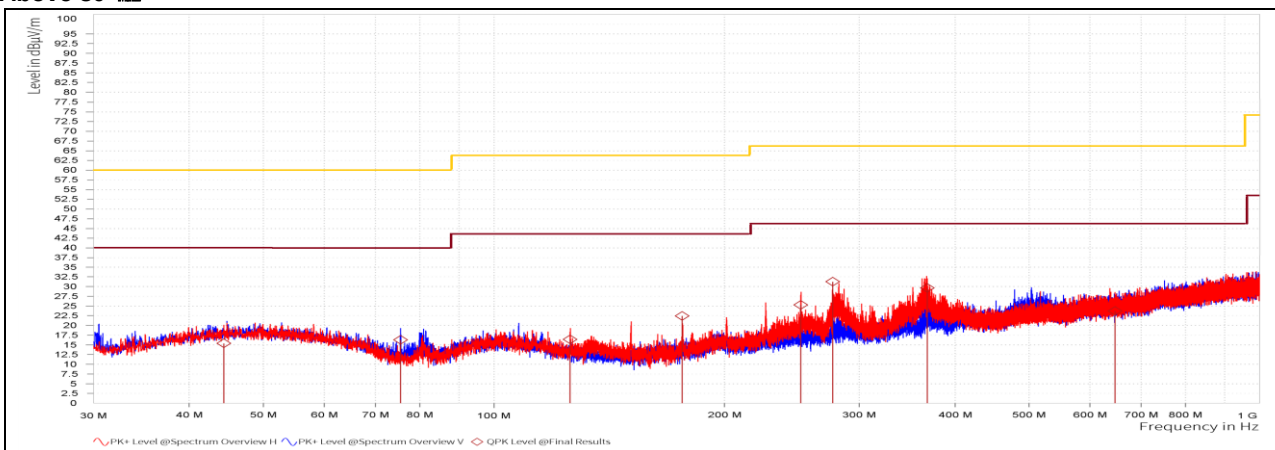


Test Condition: 7.5 W Operating mode with client device
Operating Frequency: 119 ~ 121 MHz

Below 30 MHz



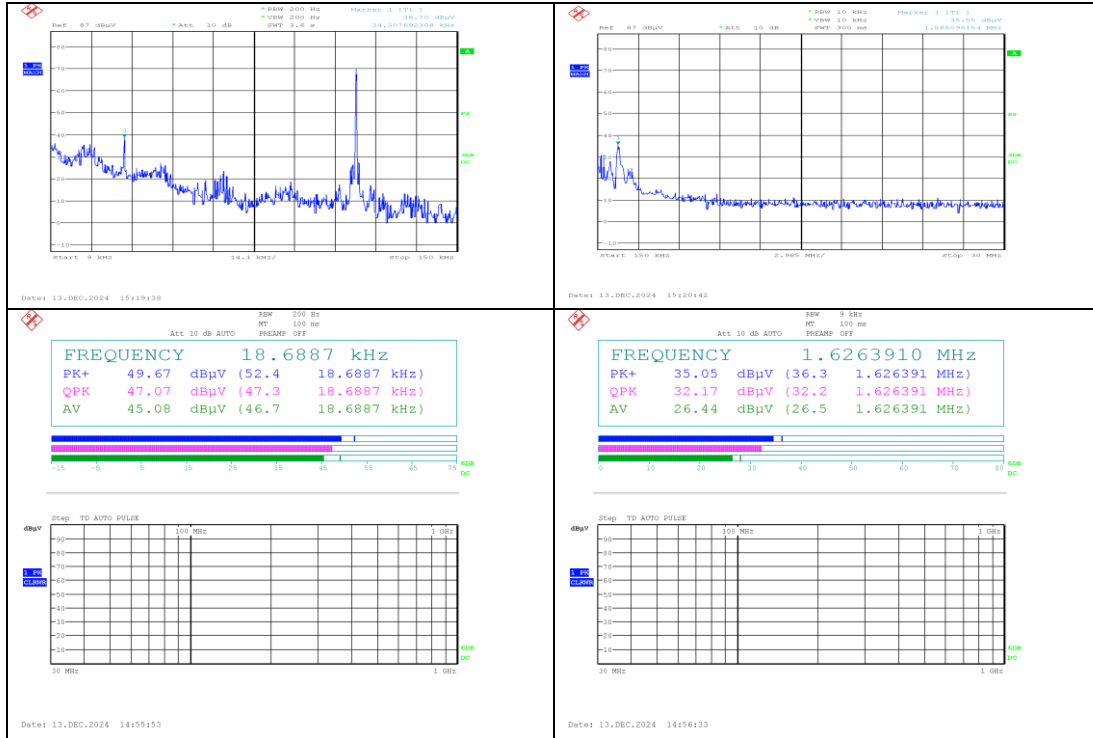
Above 30 MHz



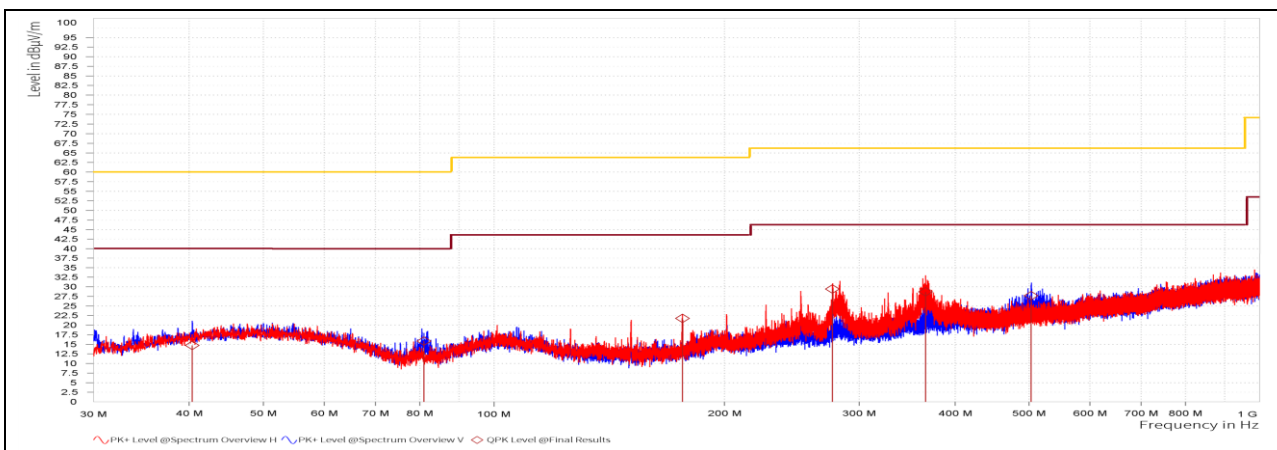
Test Condition: 15 W Operating mode with client device

Operating Frequency: 114 ~ 116 MHz

Below 30 MHz



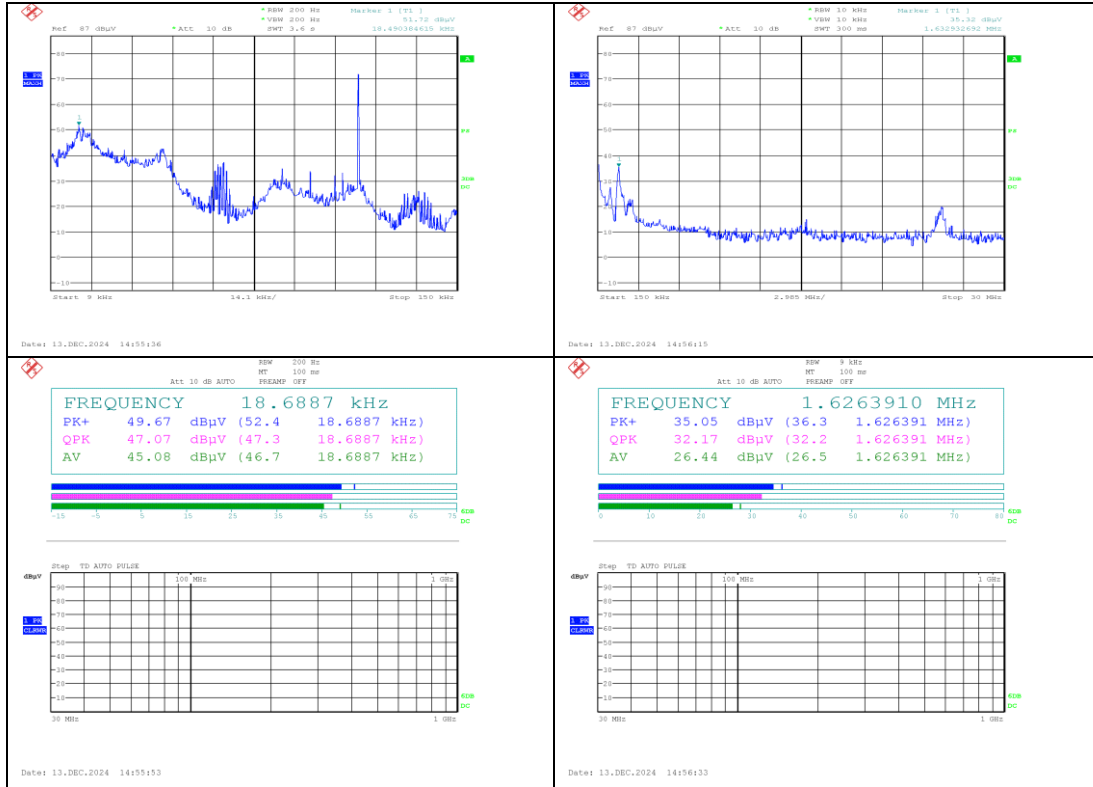
Above 30 MHz



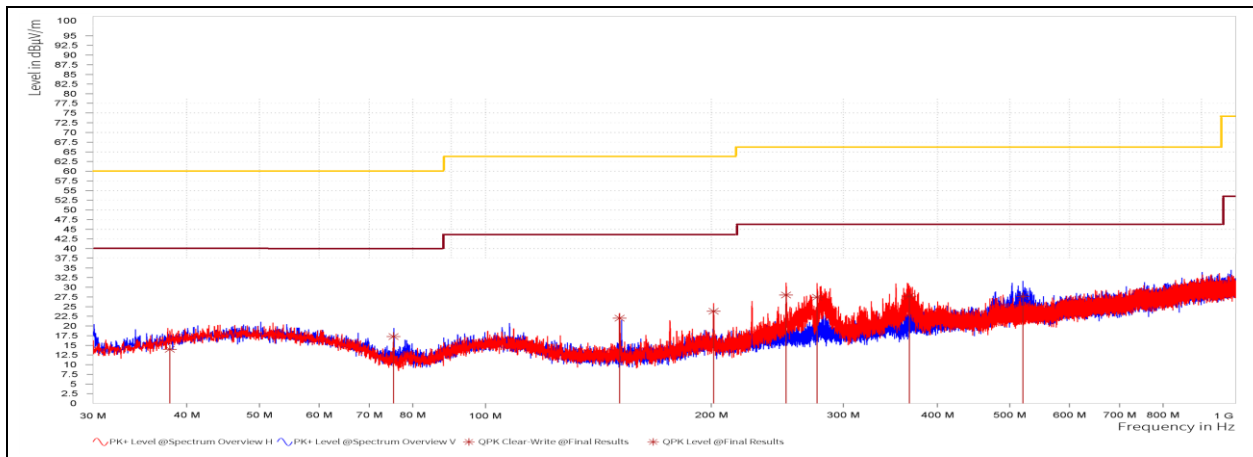
Test Condition: Idle mode

Operating Frequency: 114 ~ 116 MHz

Below 30 MHz

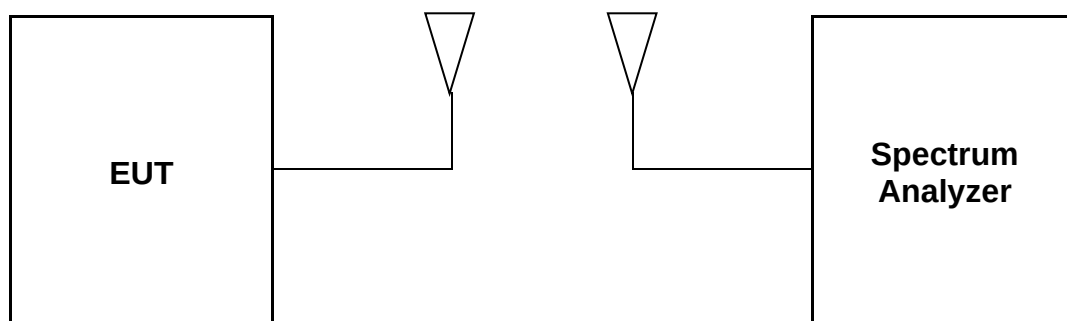


Above 30 MHz



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 : $(23 \pm 1) ^\circ\text{C}$
 Relative humidity : 47 % R.H.

Test Condition: 5 W Operating mode with client device

Frequency (kHz)	EUT Status	20 dB Bandwidth (kHz)	Limit
114 ~ 116	With client device (1 % battery status of client device)	0.521	Reporting proposed only

Test Condition: 7.5 W Operating mode with client device

Frequency (kHz)	EUT Status	20 dB Bandwidth (kHz)	Limit
119 ~ 121	With client device (1 % battery status of client device)	0.530	Reporting proposed only

Test Condition: 15 W Operating mode with client device

Frequency (kHz)	EUT Status	20 dB Bandwidth (kHz)	Limit
114 ~ 116	With client device (1 % battery status of client device)	0.523	Reporting proposed only

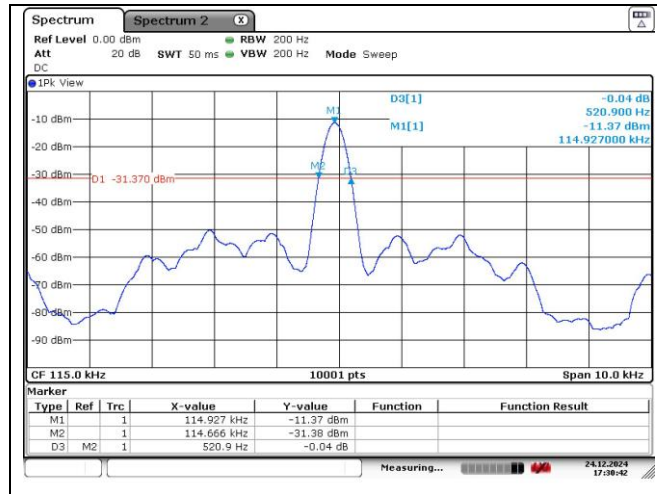
Test Condition: Idle mode

Frequency (kHz)	EUT Status	20 dB Bandwidth (kHz)	Limit
114 ~ 116	Without client device	0.519	Reporting proposed only

- Test plots

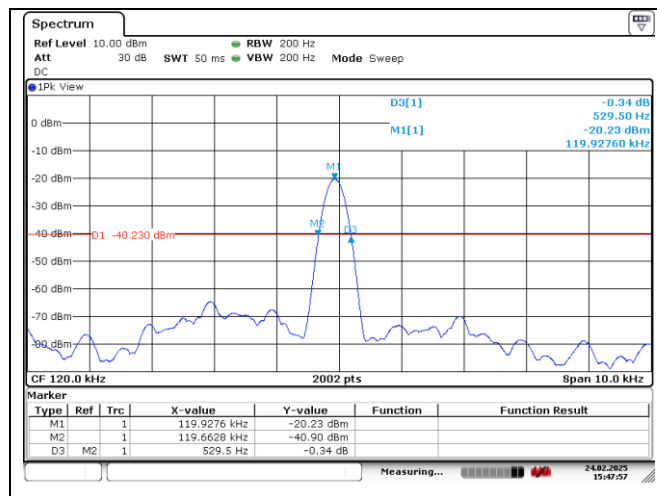
Test Condition: 5 W Operating mode with client device

Operating Frequency: 114 ~ 116 kHz



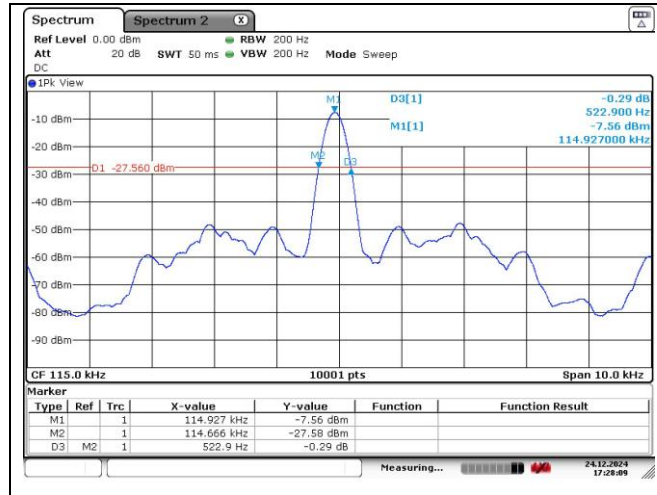
Test Condition: 7.5 W Operating mode with client device

Operating Frequency: 119 ~ 121 kHz



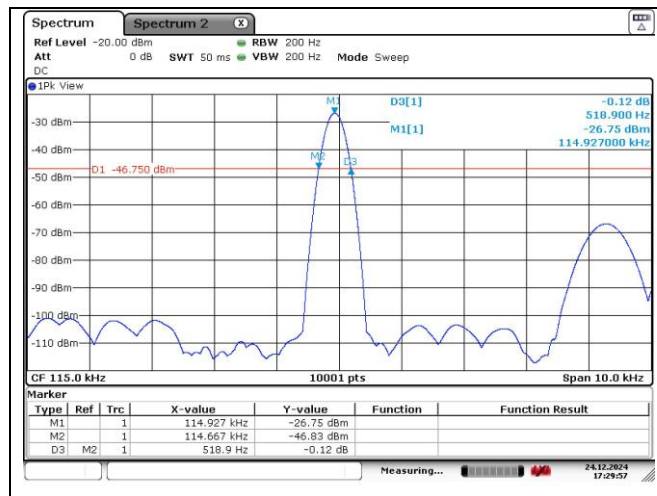
Test Condition: 15 W Operating mode with client device

Operating Frequency: 114 ~ 116 kHz



Test Condition: Idle mode

Operating Frequency: 114 ~ 116 kHz



- End of the Test Report -