



TEST REPORT



Report No. : KES-RF-23T0169
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KES Co., Ltd.
3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si,
Gyeonggi-do, 14057, Korea
Tel : +82-31-425-6200, Fax : +82-31-425-6200

■ FCC TEST REPORT

1. Client

- Name : KEYTH INTERNATIONAL
- Address : 06021 B2-#2, Horim Art Center Building 1, 317, Dosan-daero, Gangnam-gu, Seoul, Republic of Korea
- Product item : Merch Box #14
- Model name : MerchBox14
- Manufacturer etc. : Dongguan Youwei Smart Home Co.,Ltd

3. Date of test : 2023.12.11 ~ 2023.12.13

4. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

- Address : 473-29, Gayeo-ro, Yeosu-si, Gyeonggi-do, Korea

5. Test method used : Part 15C

6. Test result : PASS

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This laboratory is not accredited for the test results marked*.

This test report is not related to KOLAS accreditation.

Affirmation	Tested by	Technical Manager
	Name : Bong-Seok Kim (Signature)	Name : Yeong-Jun Cho (Signature)

2023 . 12. 27.

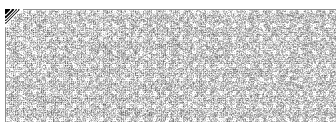
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REPORT REVISION HISTORY

Date	Test Report No.	Revision History
2023.12.27	KES-RF-23T0169	Initial

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Use of uncertainty of measurement for decisions on conformity (decision rule):

☒ No decision rule is specified by the standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other (to be specified, for example when required by the standard or client)

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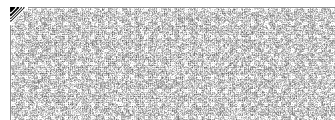
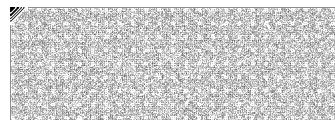


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1. Summary of tests

Applicant KEYTH INTERNATIONAL
 Applicant address 06021 B2-#2, Horim Art Center Building 1, 317, Dosan-daero, Gangnam-gu, Seoul, Republic of Korea
 Test site KES Co., Ltd.
 Test site address ☐ 3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea43
☒ 473-29, Gayeo-ro, Yeosu-si, Gyeonggi-do, Korea
 Test Facility FCC Accreditation Designation No.: KR0100, Registration No.: 444148
 FCC rule part(s): Part 15C
 FCC ID: 2AZWB-MERCHBOX14
 Test device serial No. ☒ Production ☐ Pre-production ☐ Engineering

1.1. Test configuration

Equipment under test Merch Box #14
 5 W : 0.126 MHz ~ 0.134 MHz
 Frequency 7.5 W : 0.128 MHz
 10 W : 0.125 MHz ~ 0.136 MHz
 15 W : 0.125 MHz ~ 0.140 MHz
 Inductive charging technique Magnetic Induction
 Model: MerchBox14
 Antenna specification Internal type (Coil antenna)
 Power source AC 120 V (Adapter Output DC 5,9 V)
 S/W Version DHW2204_WXC_V1.0
 H/W version GBHW2304_3000_V2.03

1.2. Test configuration

The **KEYTH INTERNATIONAL / Merch Box #14 / MerchBox14 / FCC ID: 2AZWB-MERCHBOX14W** was tested according to the specification of EUT, the EUT must comply with following standards.

FCC Part 15C
 ANSI C63.10-2013
 KDB 680106 D01 V04

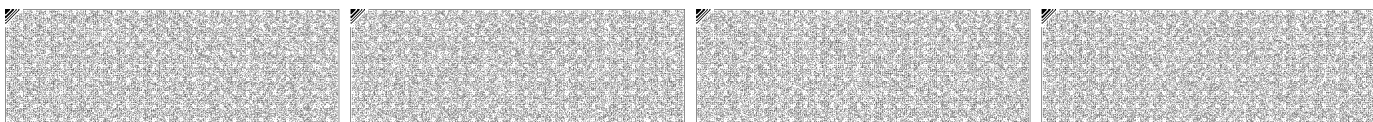
1.3. Test frequency

		Frequency Range
Power source	AC 120 V	5 W : 0.126 MHz ~ 0.134 MHz 7.5 W : 0.128 MHz 10 W : 0.125 MHz ~ 0.136 MHz 15 W : 0.125 MHz ~ 0.140 MHz

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1.4. Test mode

Mode	Charging current	Description
Charging mode With load	90%	Using Max load
	50%	Using Mid load
	10%	Using Min load

1.5. Information about derivative model

N/A

1.6. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
-	-	-	-	-

1.7. Measurement Uncertainty`

Test Item		Uncertainty
Uncertainty for Conduction emission test		2.22 dB (SHIELD ROOM #6)
Uncertainty for Radiation emission test (include Fundamental emission)	Below 1GHz	4.04 dB (SAC #6)
	Above 1GHz	5.32 dB (SAC #5)
Note. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		

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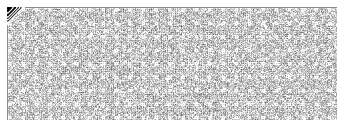
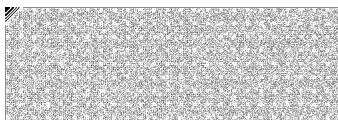
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2. Summary of tests

FCC Part Sections	Parameter	Test results
15.209	Radiated spurious emission	Pass
2.1049	20 dB Bandwidth	Pass
15.207	AC conducted emissions	Pass

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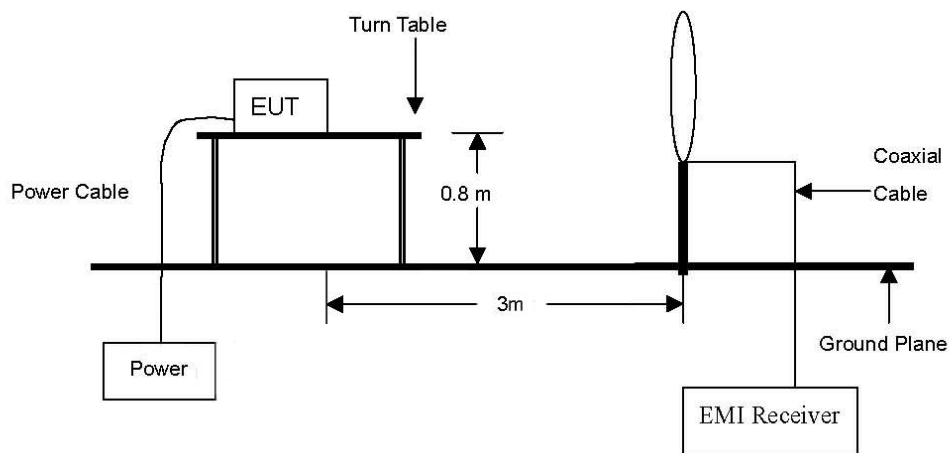
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3. Test results

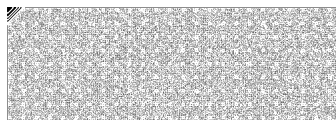
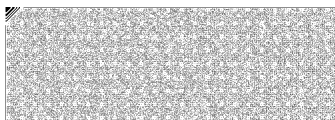
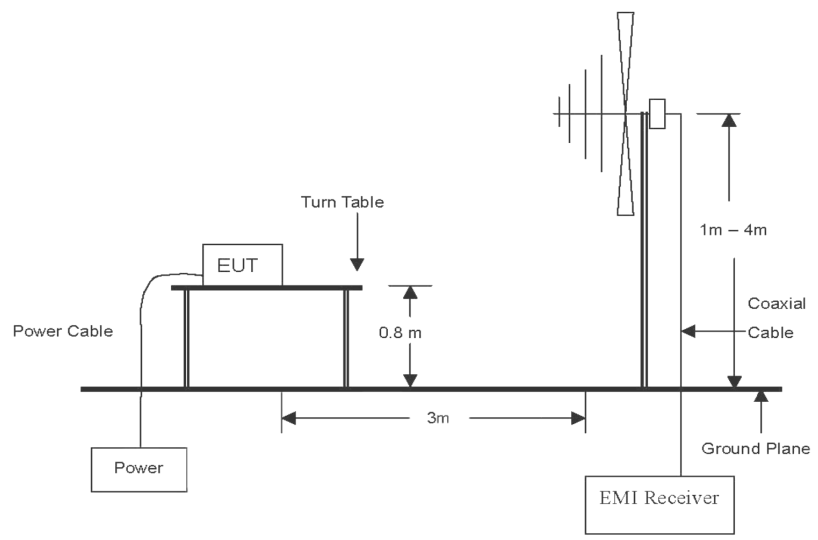
3.1. Radiated spurious emission

Test setup

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



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



Test procedure

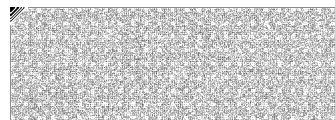
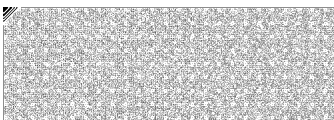
[9 kHz to 30 MHz]

The EUT was placed on the top of a rotating table 0.8 meter 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 and ground parallel 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 function and specified bandwidth with maximum hold mode.

[30 MHz to 1 GHz]

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.



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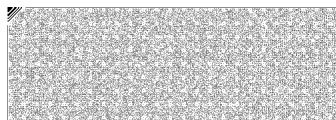
Note:

1. According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz.
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
2. Measurement distance : 3 m.
3. Field strength = Level + Correction factor + F_d
4. $F_d = 40\log(D_m / D_s)$
Where:
 F_d = Distance factor in dB
 D_m = Measurement distance in meters
 D_s = Specification distance in meters
 For 300m: $40\log(300/3) = 80$ dB for frequency band 0.009 MHz to 0.490 MHz
 For 30m: $40\log(30/3) = 40$ dB for frequency band 0.490 MHz to 30 MHz
5. No significant emissions were found in the 90 - 110kHz restricted band.

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Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

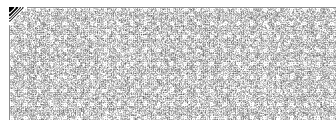
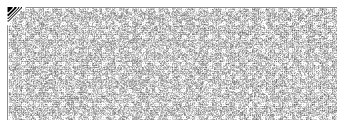
Frequency (MHz)	Distance (Meters)	Radiated ($\mu\text{V/m}$)
0.009 ~ 0.490	300	2400 / F(kHz)
0.490 ~ 1.705	30	24000 / F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

**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., Sections 15.231 and 15.241.

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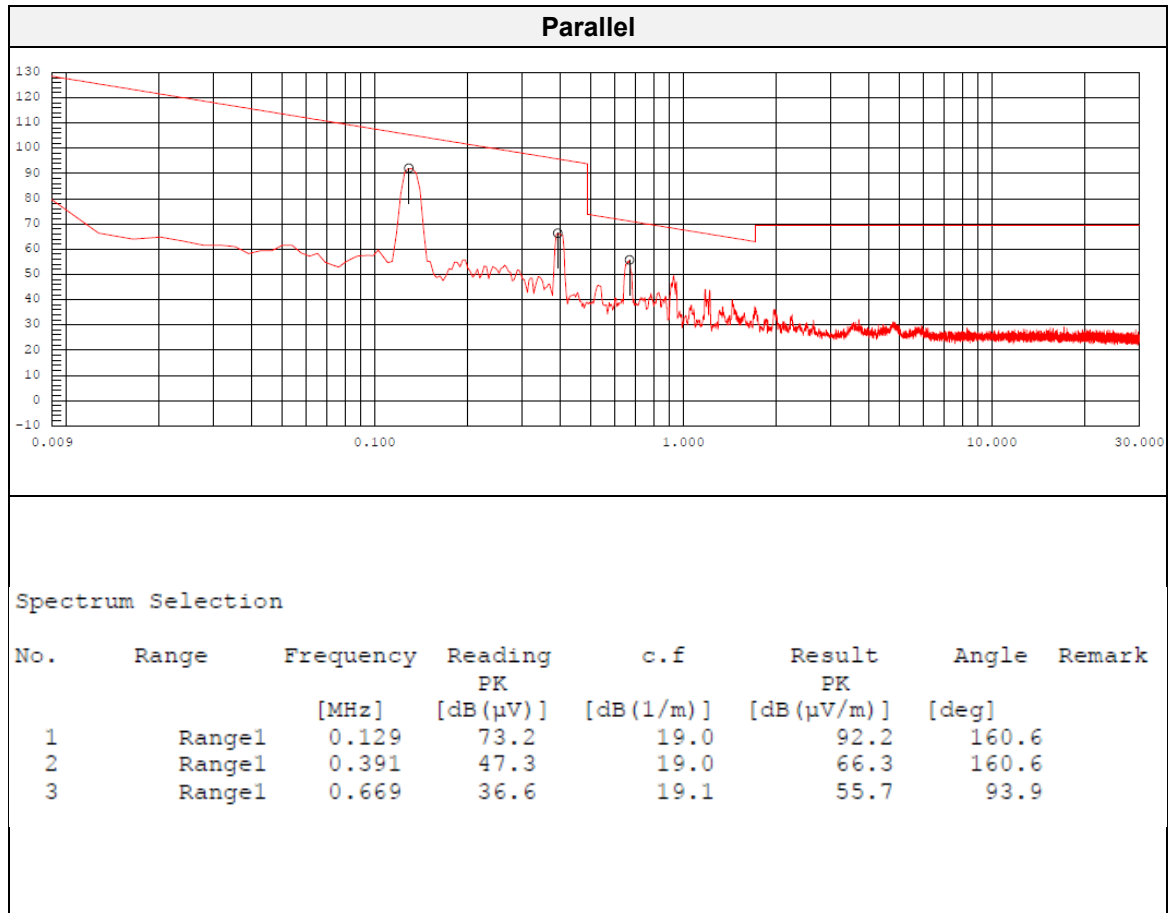
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Test results (Below 30 MHz)

Mode: 5 W // 10 % charger

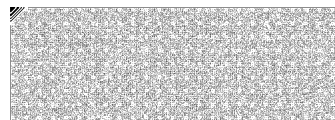
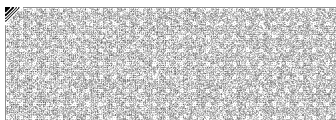
Distance of measurement: 3 meter



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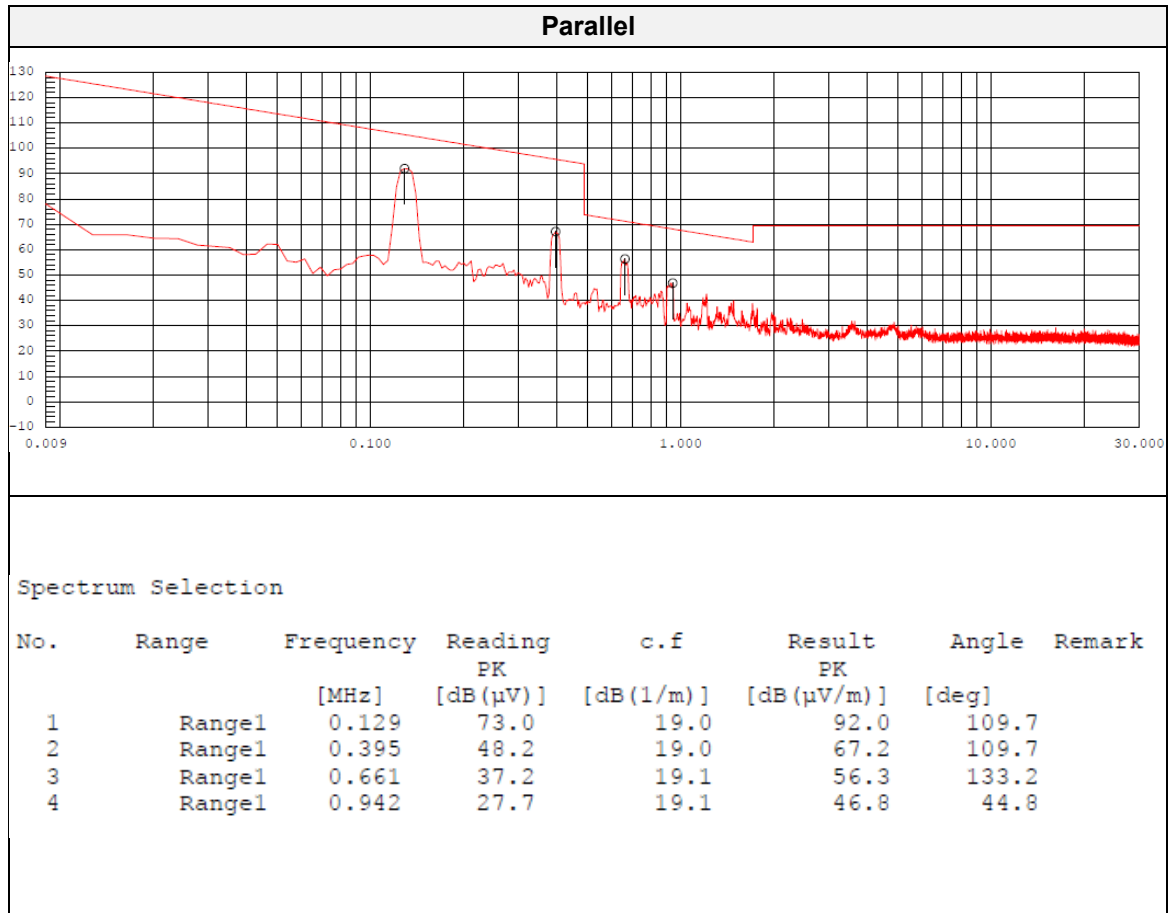


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Mode: 5 W // 50 % charger

Distance of measurement: 3 meter



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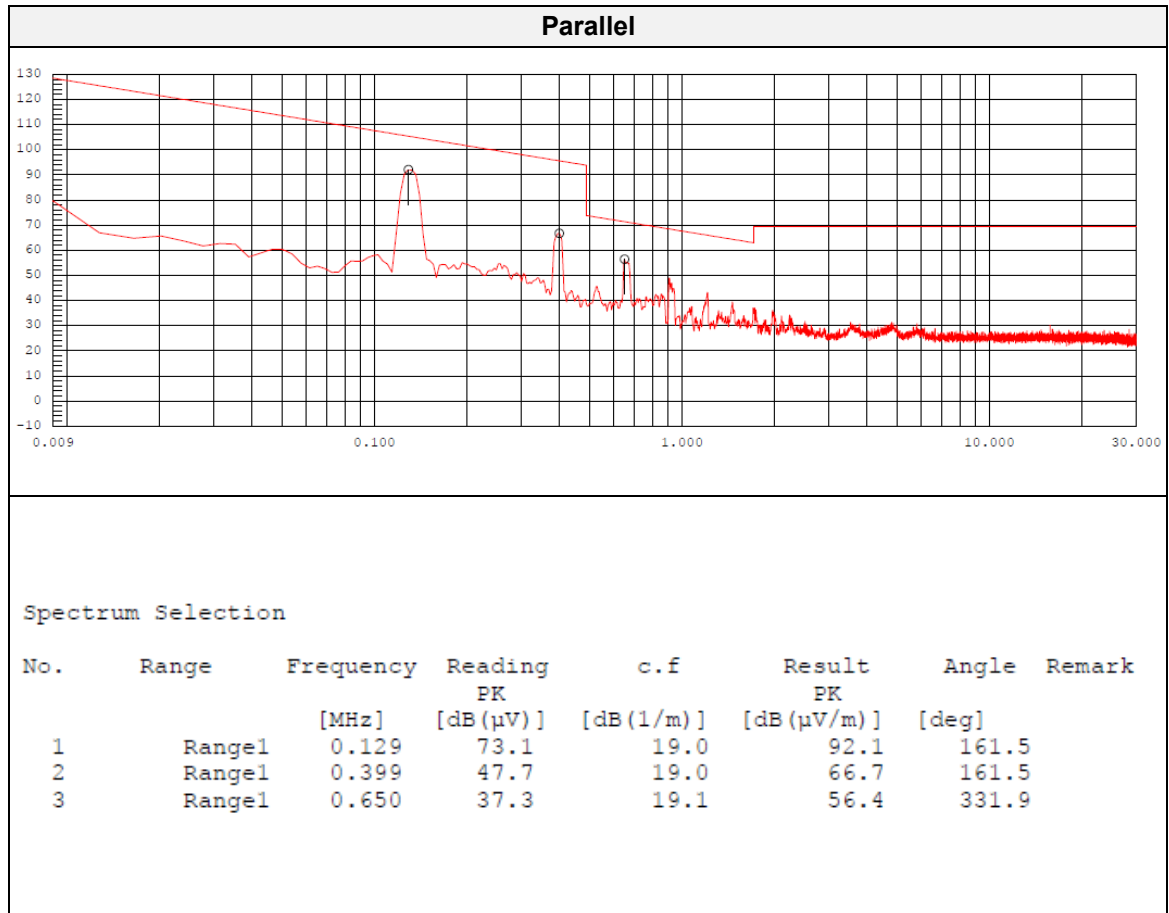
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Mode: 5 W // 90 % charge
 Distance of measurement: 3 meter



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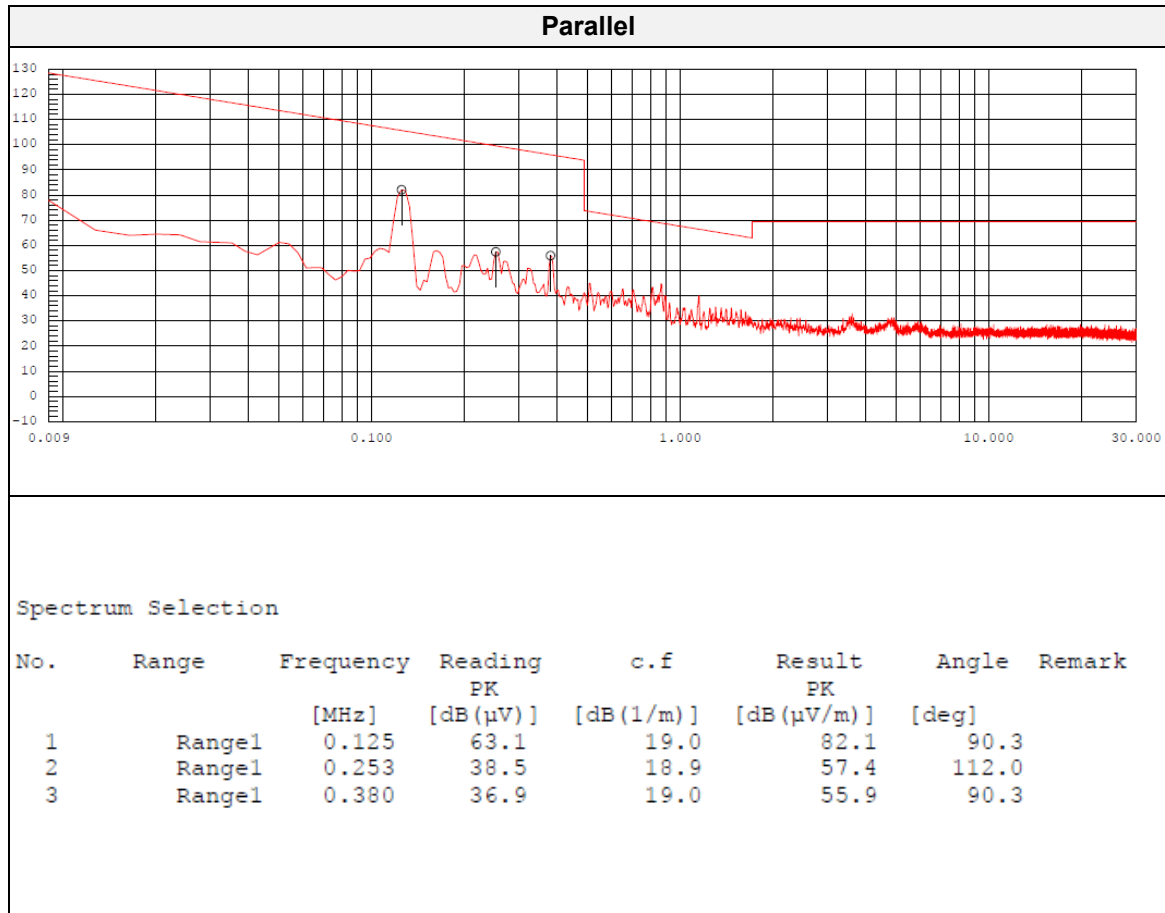
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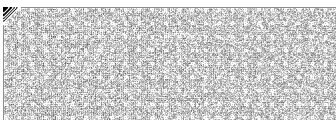
Mode: 7.5 W // 10 % charger
 Distance of measurement: 3 meter



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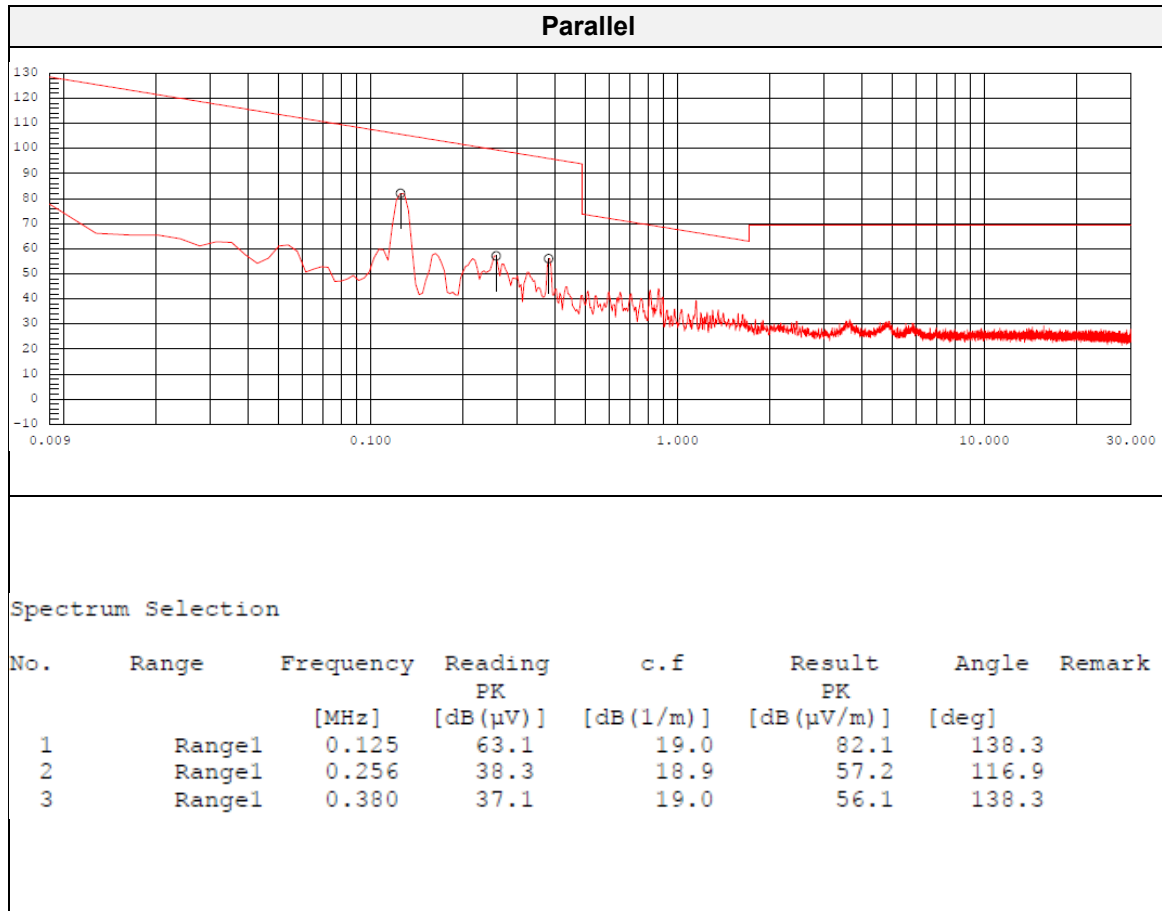
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Mode: 7.5 W // 50 % charger
Distance of measurement: 3 meter



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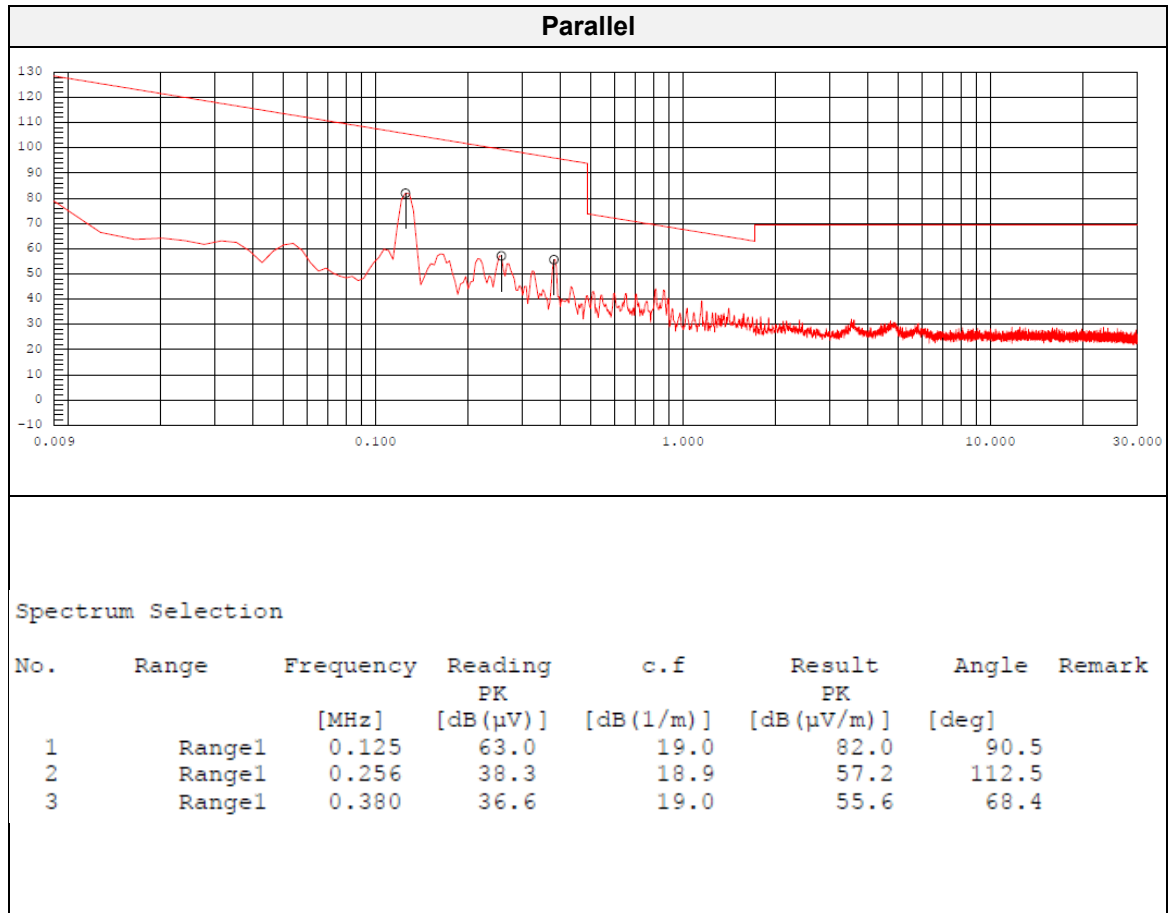
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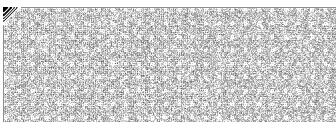
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Mode: 7.5 W // 90 % chargeDistance of measurement: 3 meter

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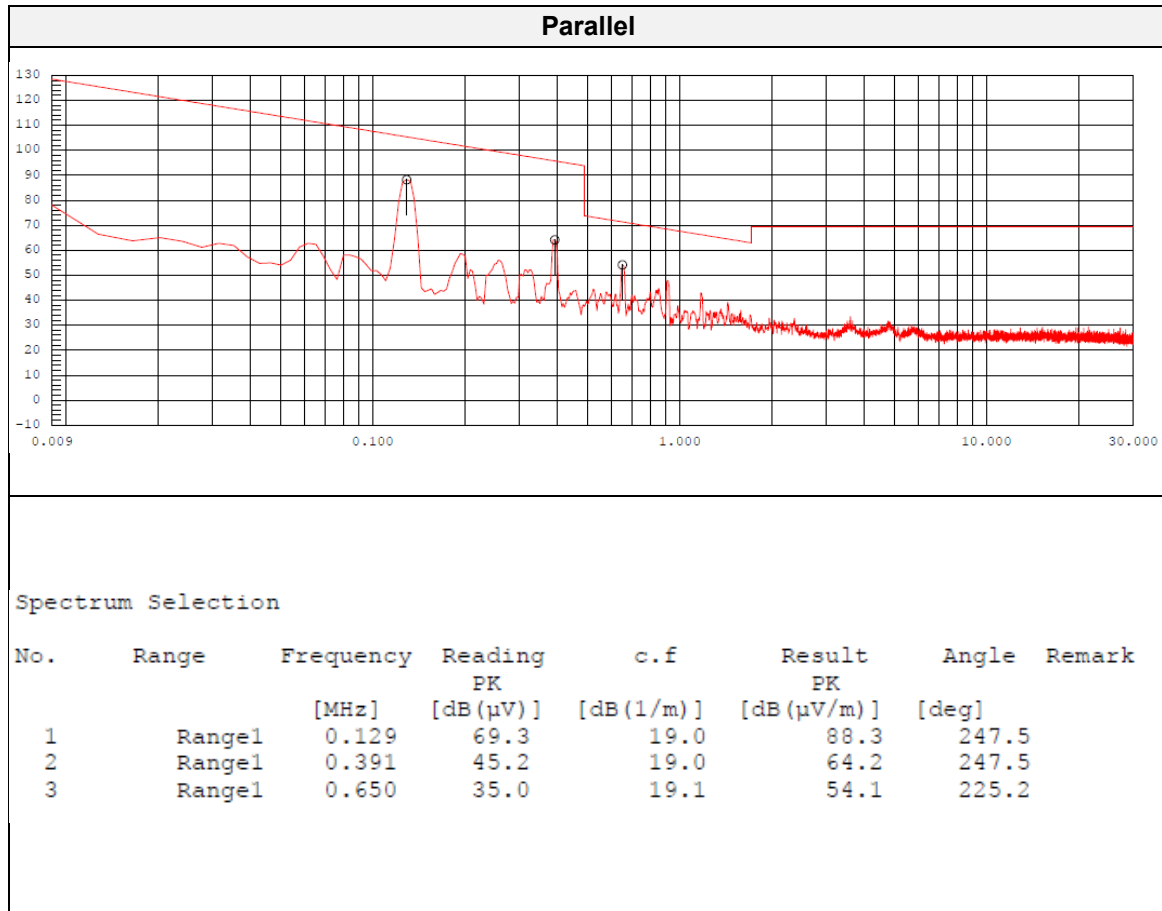


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Mode: 10 W // 10 % charger

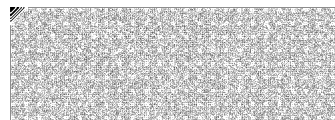
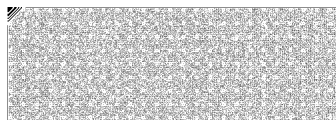
Distance of measurement: 3 meter



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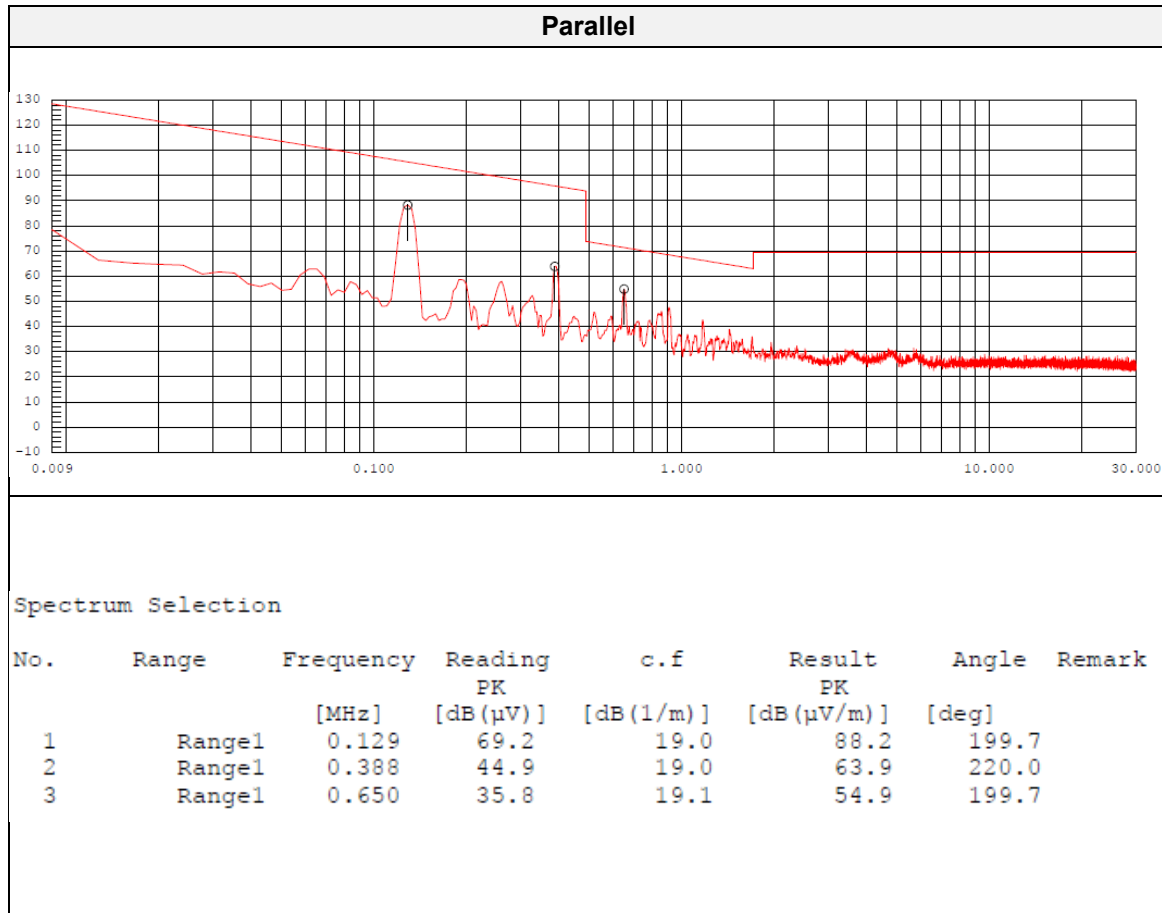
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Mode: 10 W // 50 % charger
Distance of measurement: 3 meter



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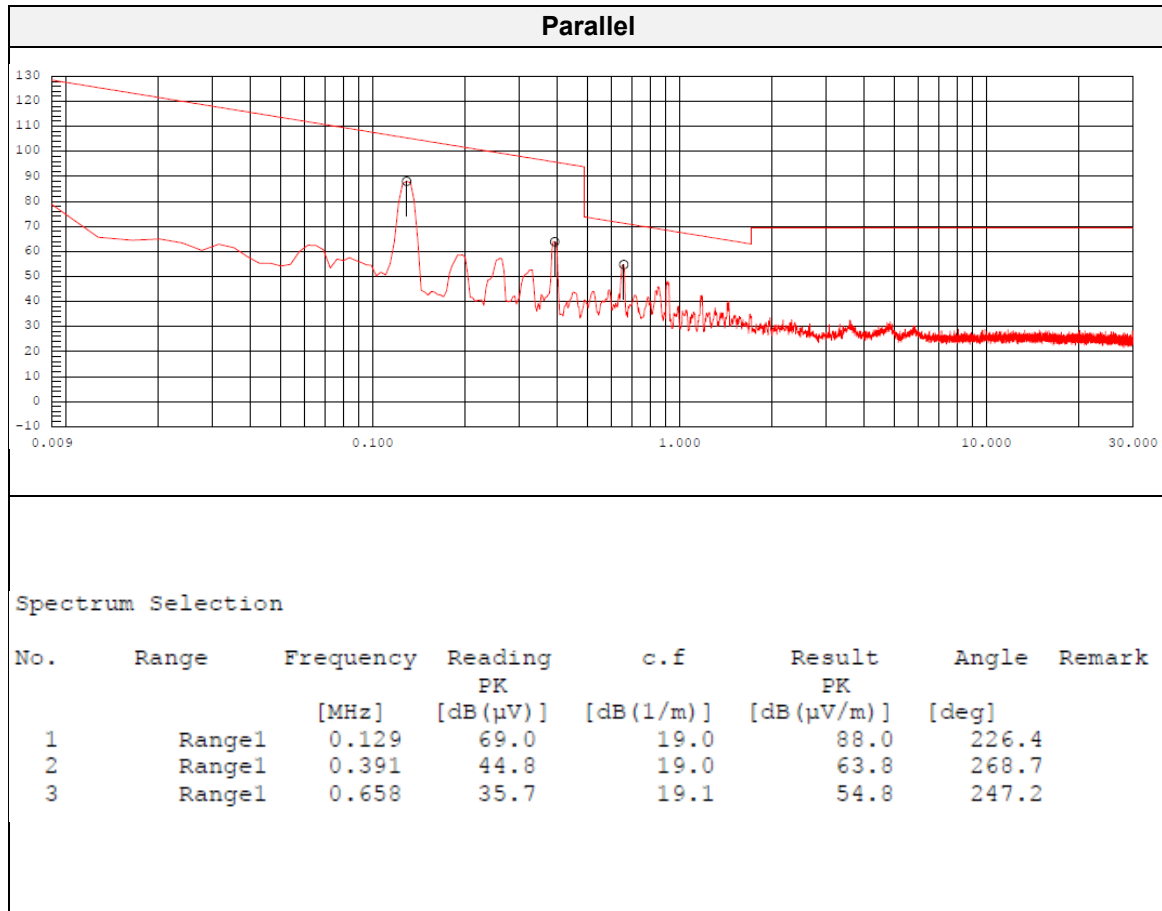


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Mode: 10 W // 90 % charge

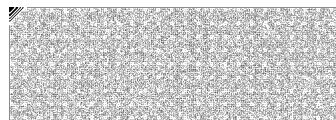
Distance of measurement: 3 meter



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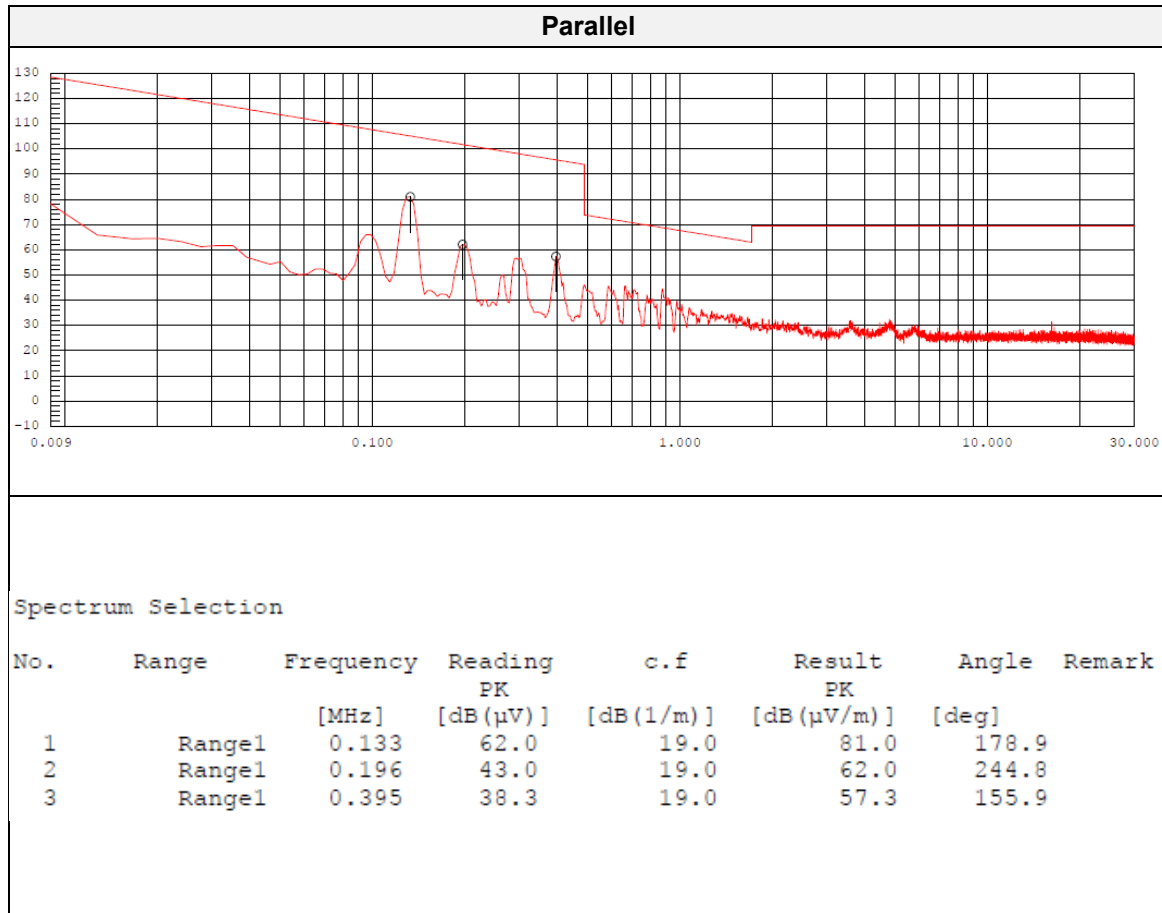


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Mode: 15 W // 10 % charger

Distance of measurement: 3 meter



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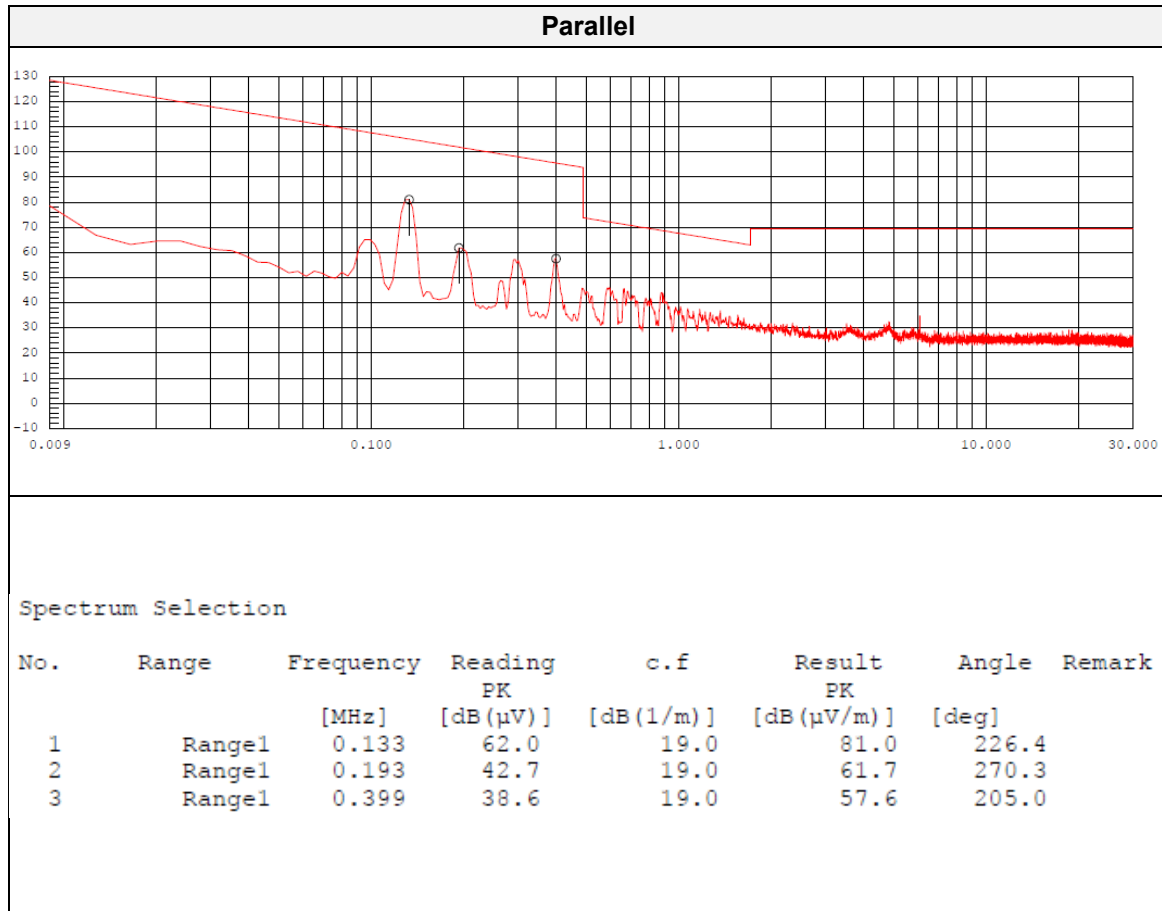
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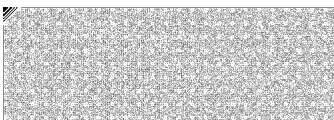
Mode: 15 W // 50 % charger
Distance of measurement: 3 meter



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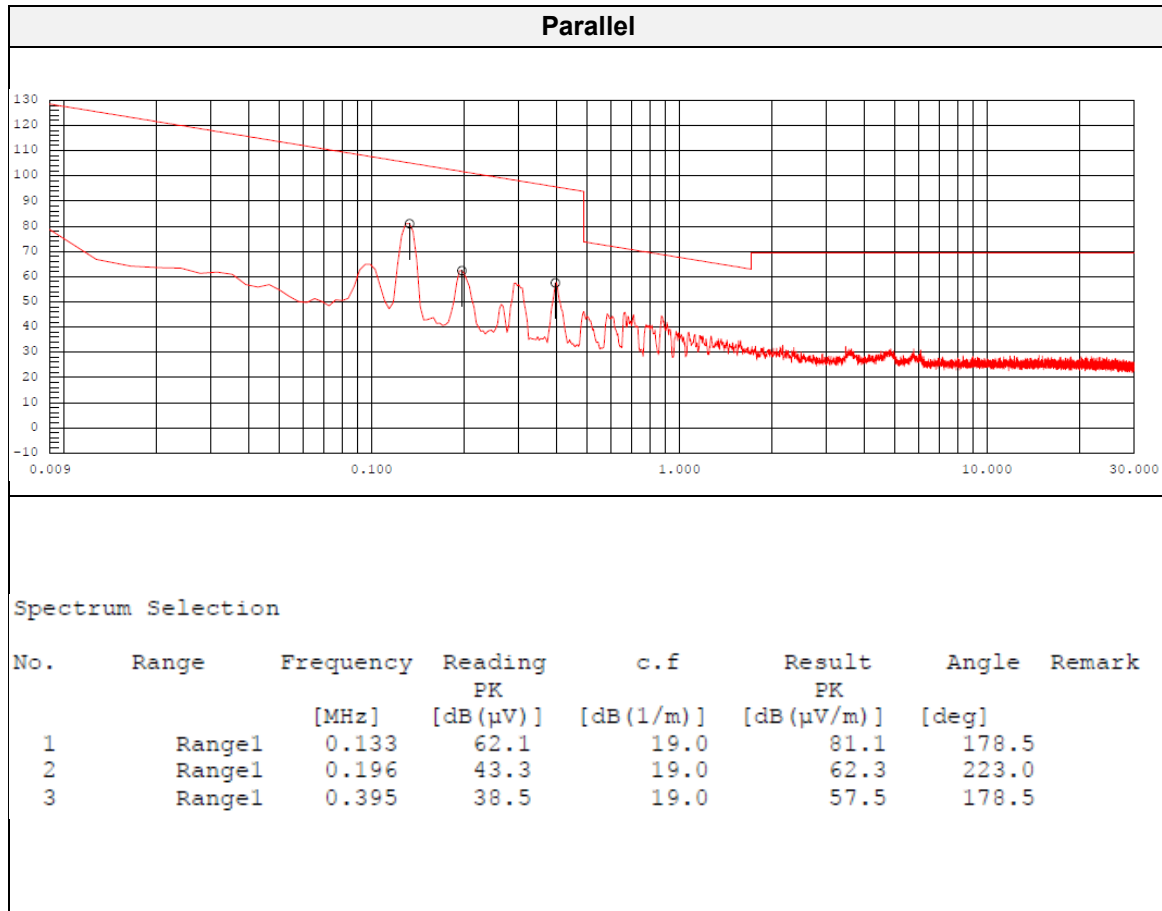


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Mode: 15 W // 90 % charge

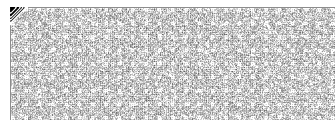
Distance of measurement: 3 meter



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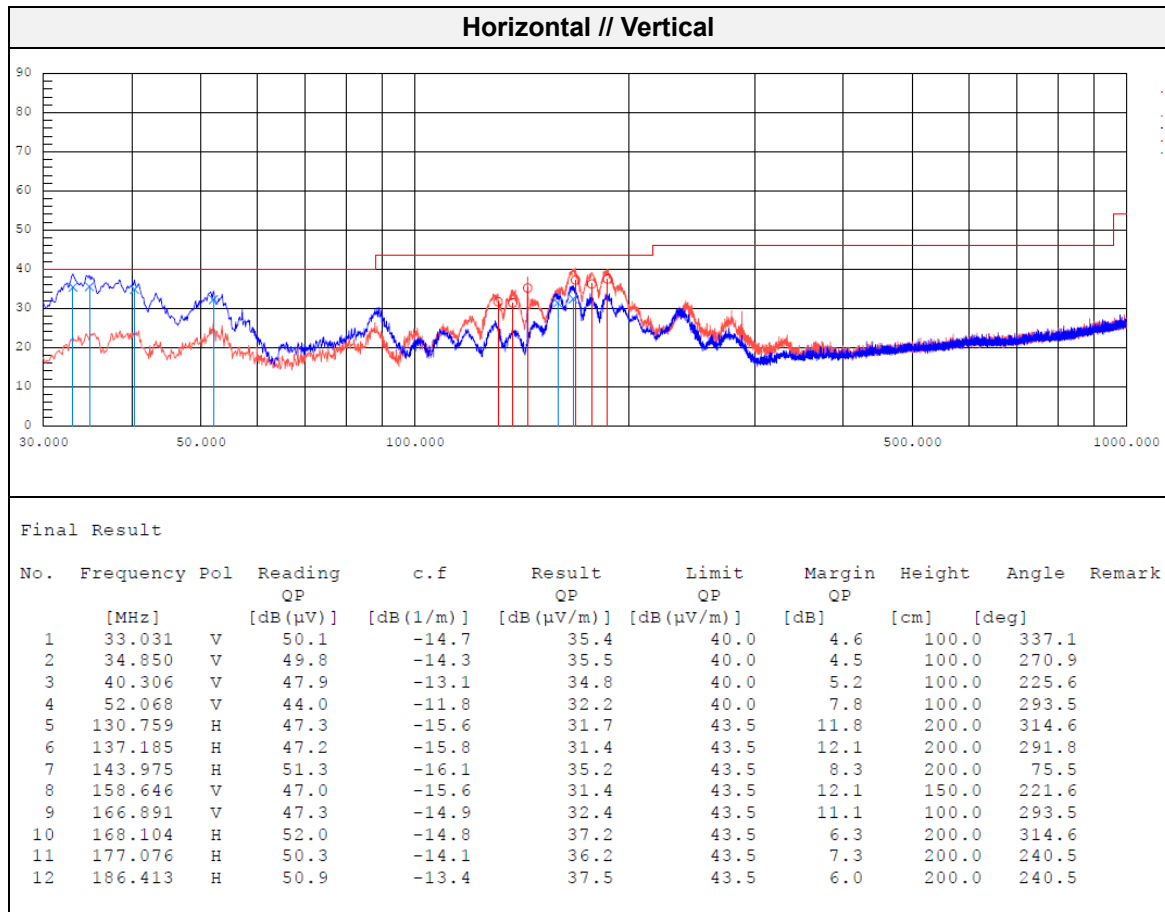


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Test results (Below 1 000 MHz)

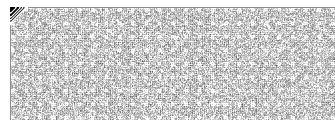
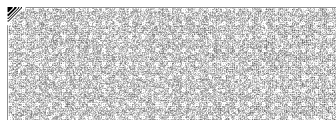
Mode: 5 W // 10 % charge
 Distance of measurement: 3 meter



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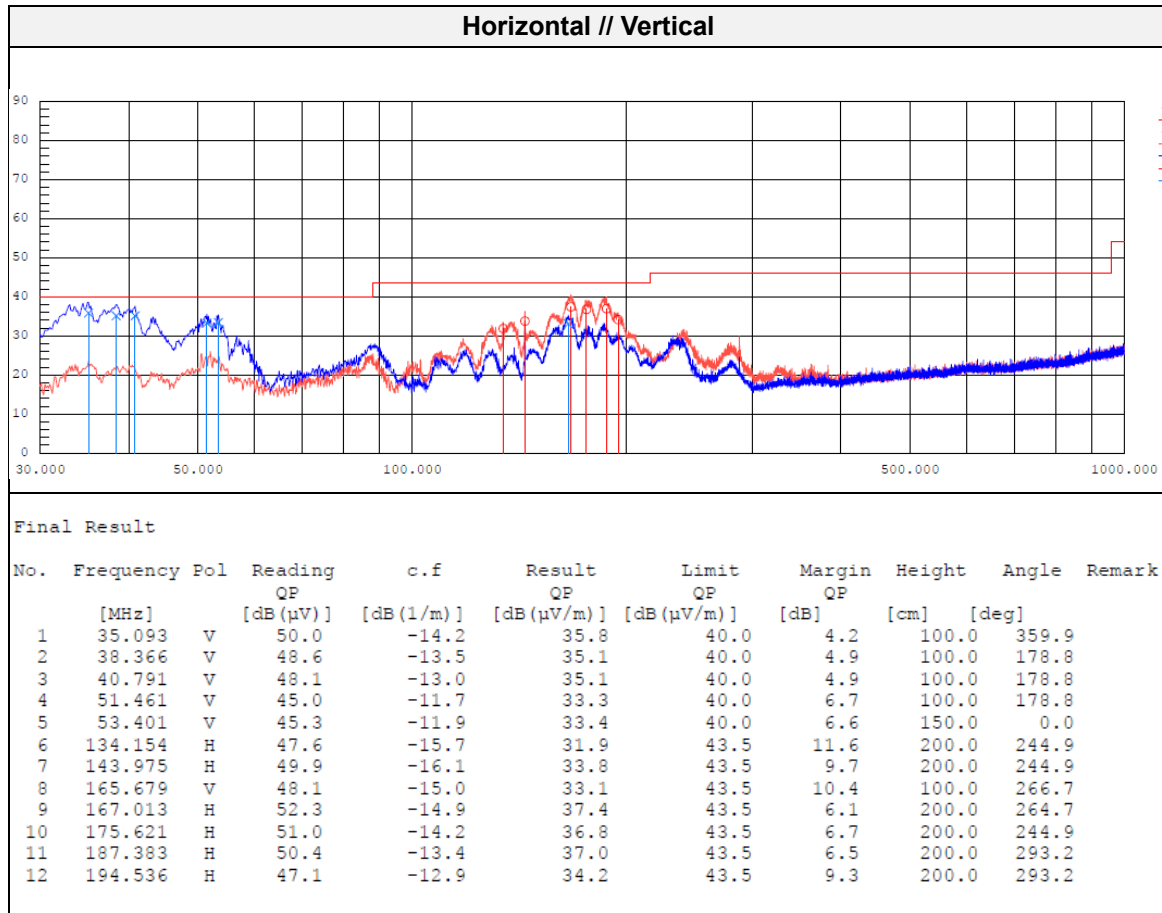
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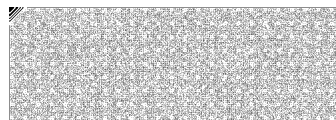
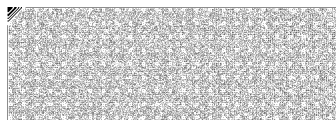
Mode: 5 W // 50 % charge
 Distance of measurement: 3 meter



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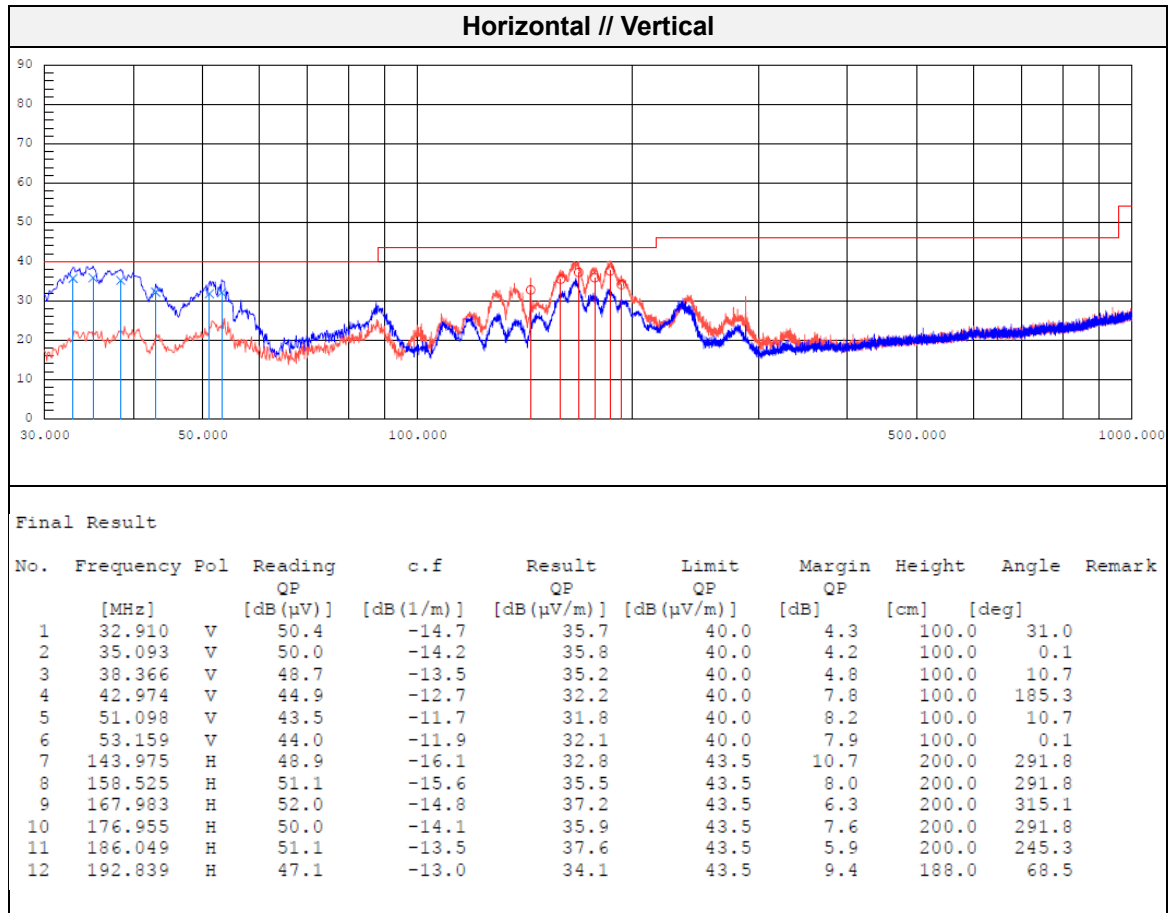


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Mode: 5 W // 90 % charge

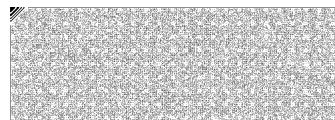
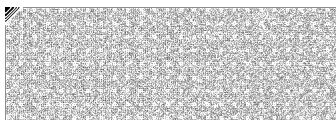
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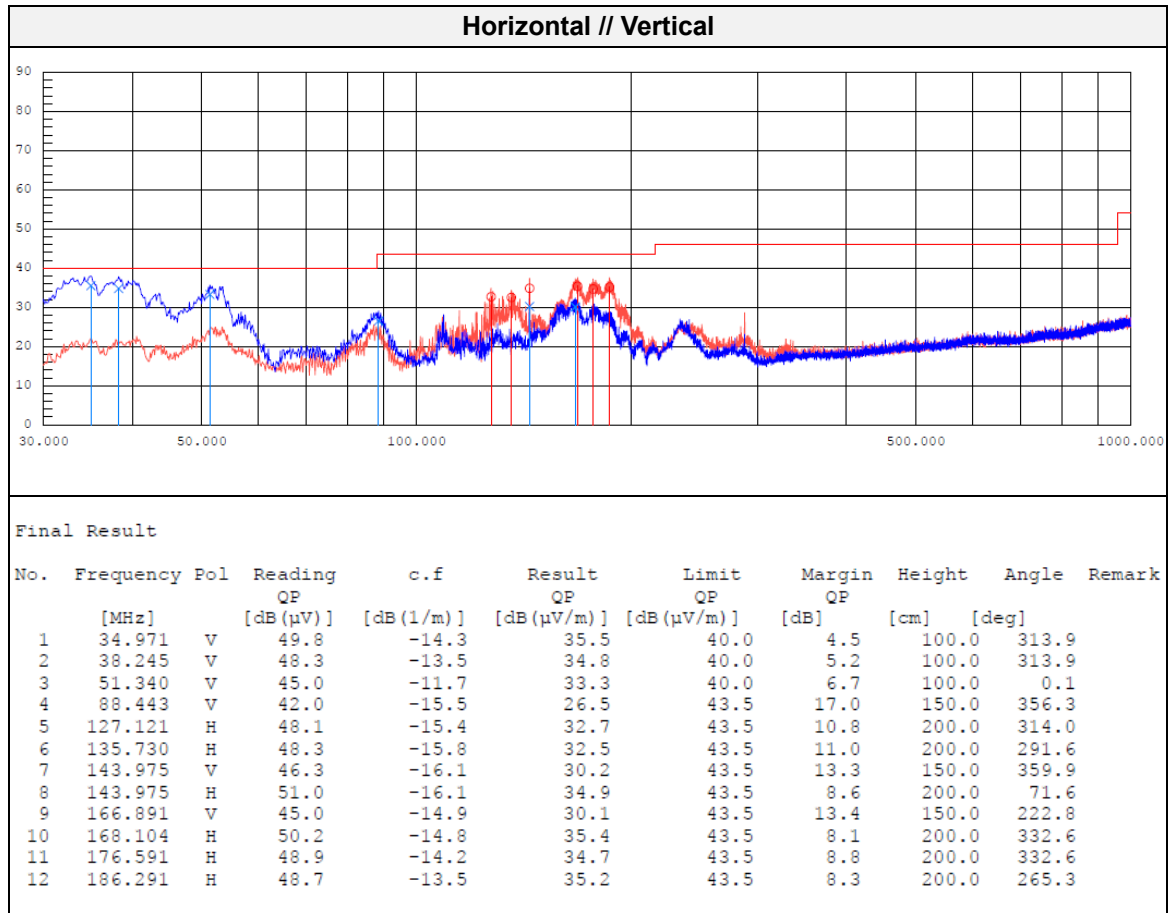


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Mode: 7.5 W // 10 % charge

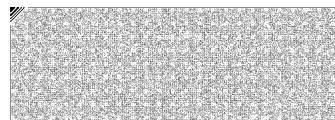
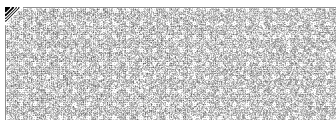
Distance of measurement: 3 meter



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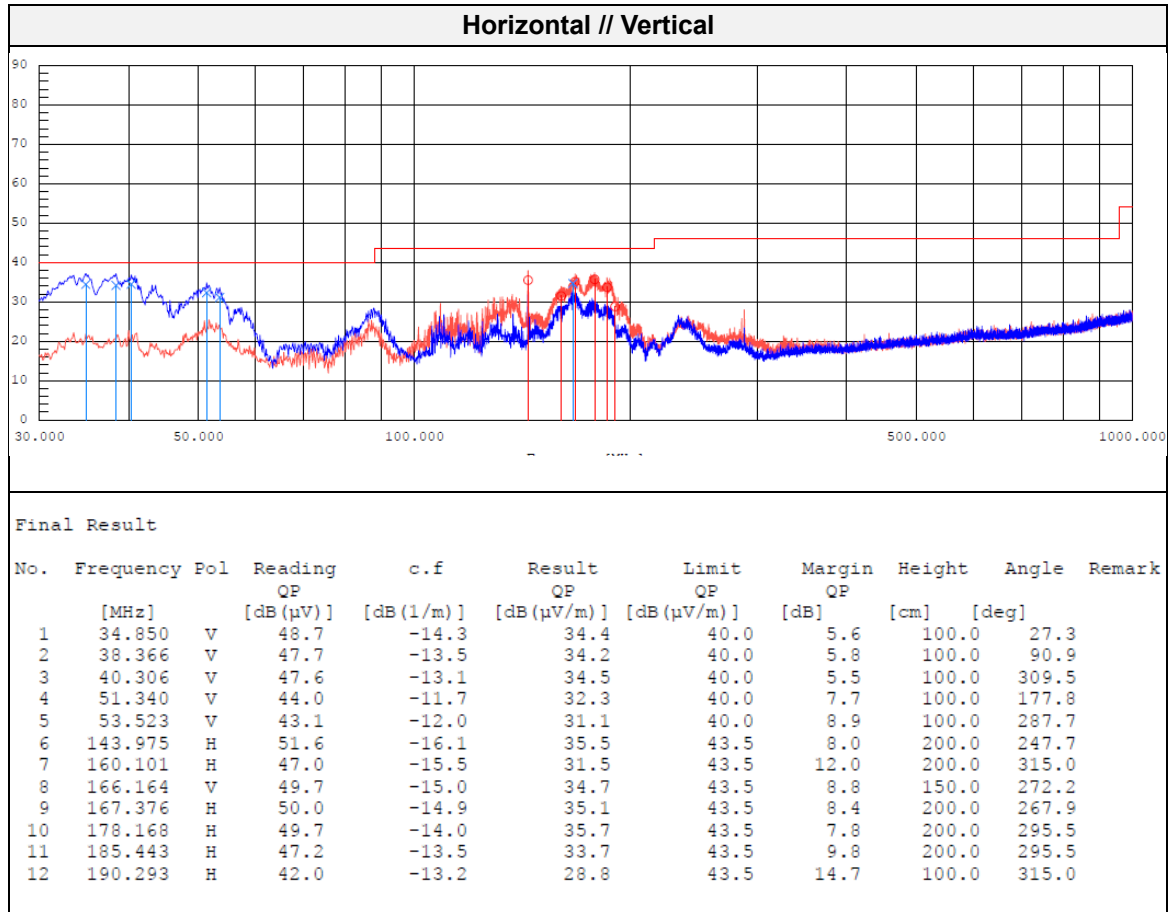


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Mode: 7.5 W // 50 % charge

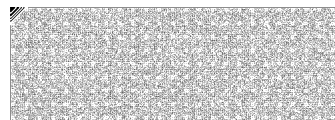
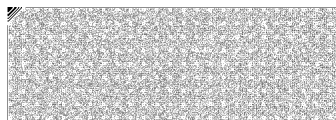
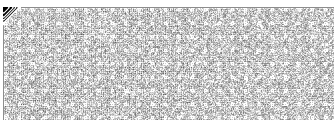
Distance of measurement: 3 meter



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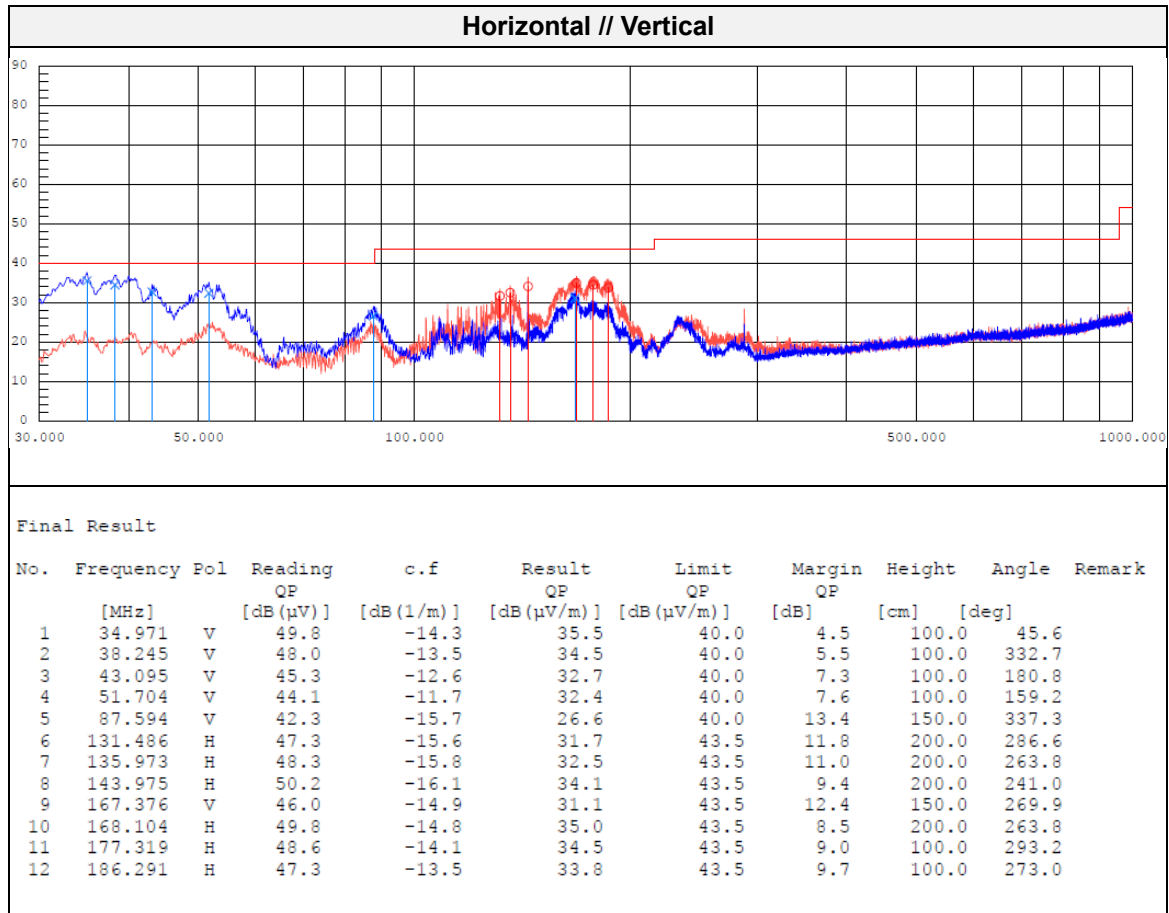


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Mode: 7.5 W // 90 % charge

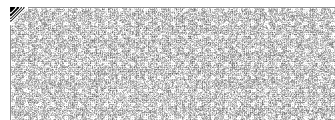
Distance of measurement: 3 meter



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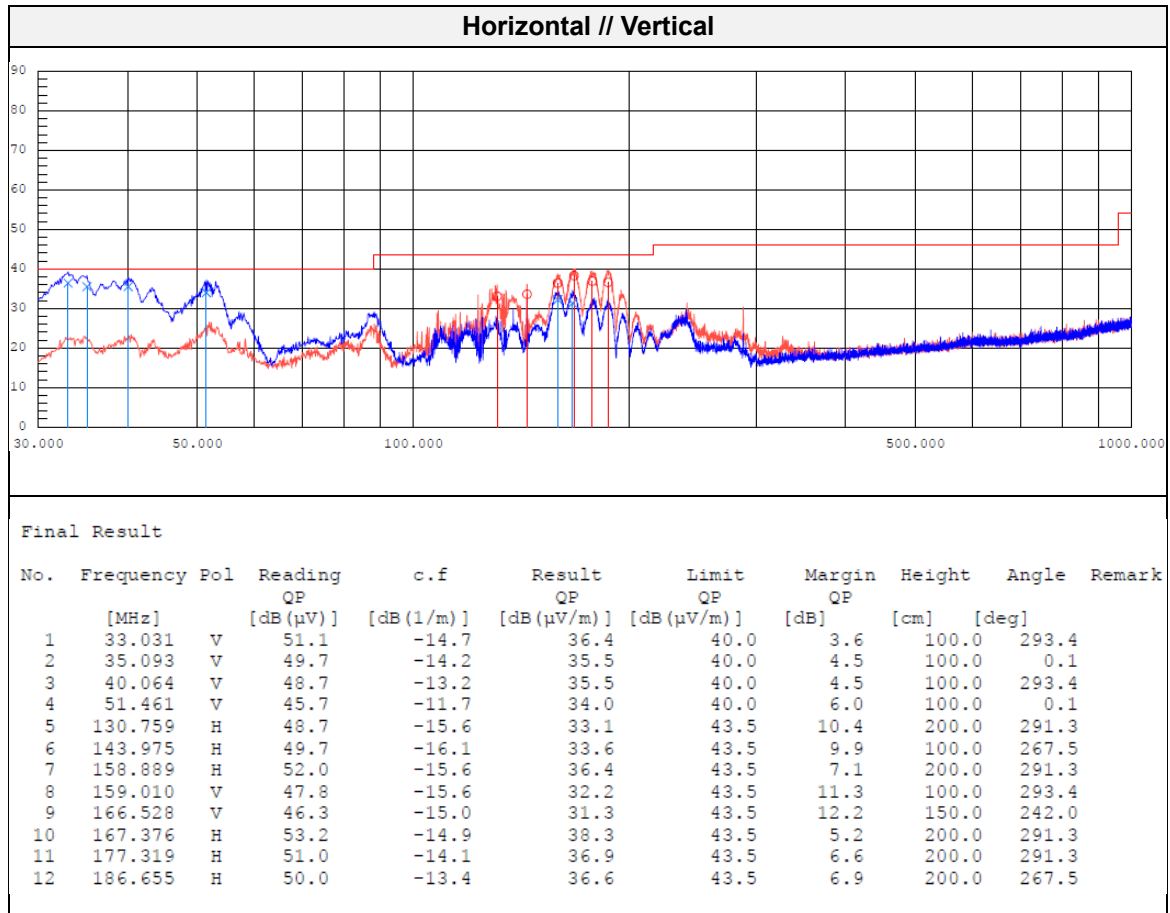
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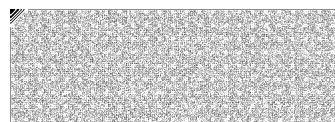
Mode: 10 W // 10 % charge
 Distance of measurement: 3 meter



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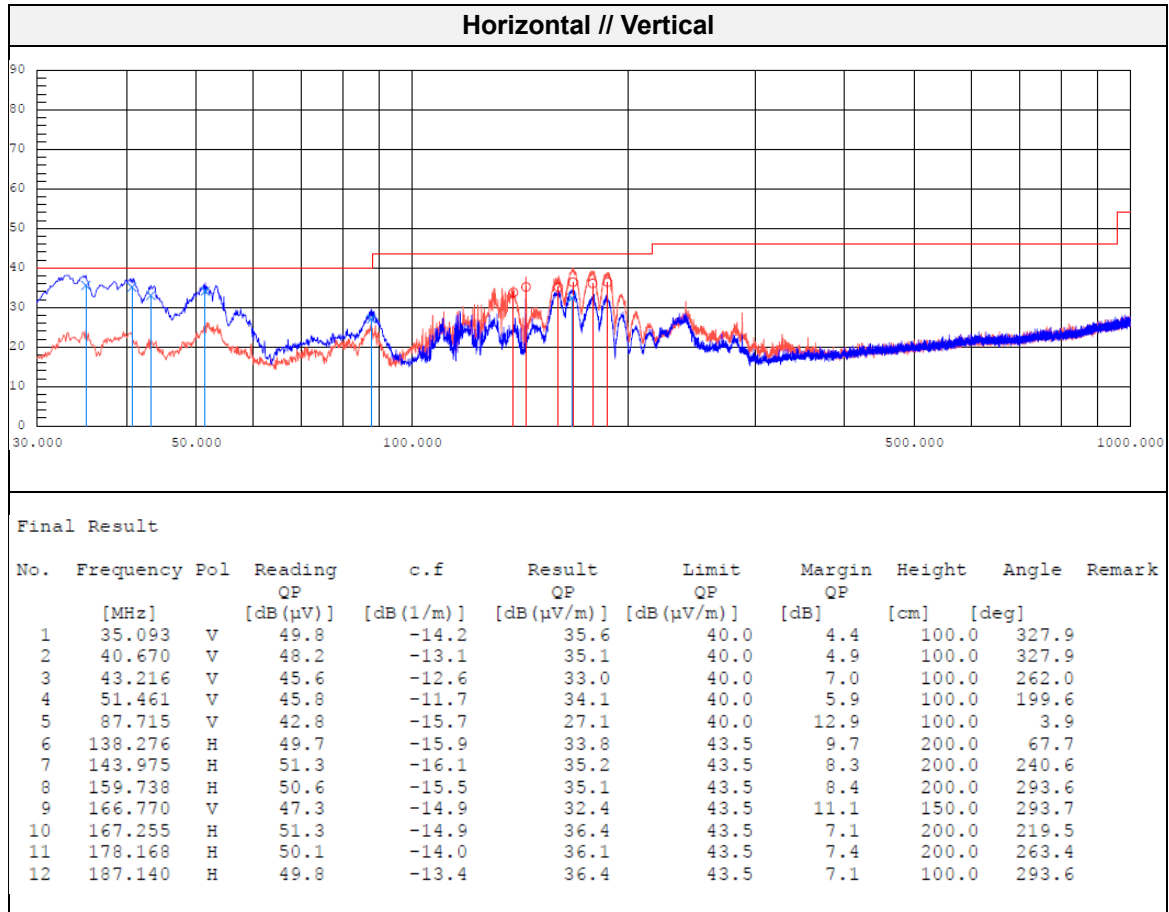


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Mode: 10 W // 50 % charge

Distance of measurement: 3 meter



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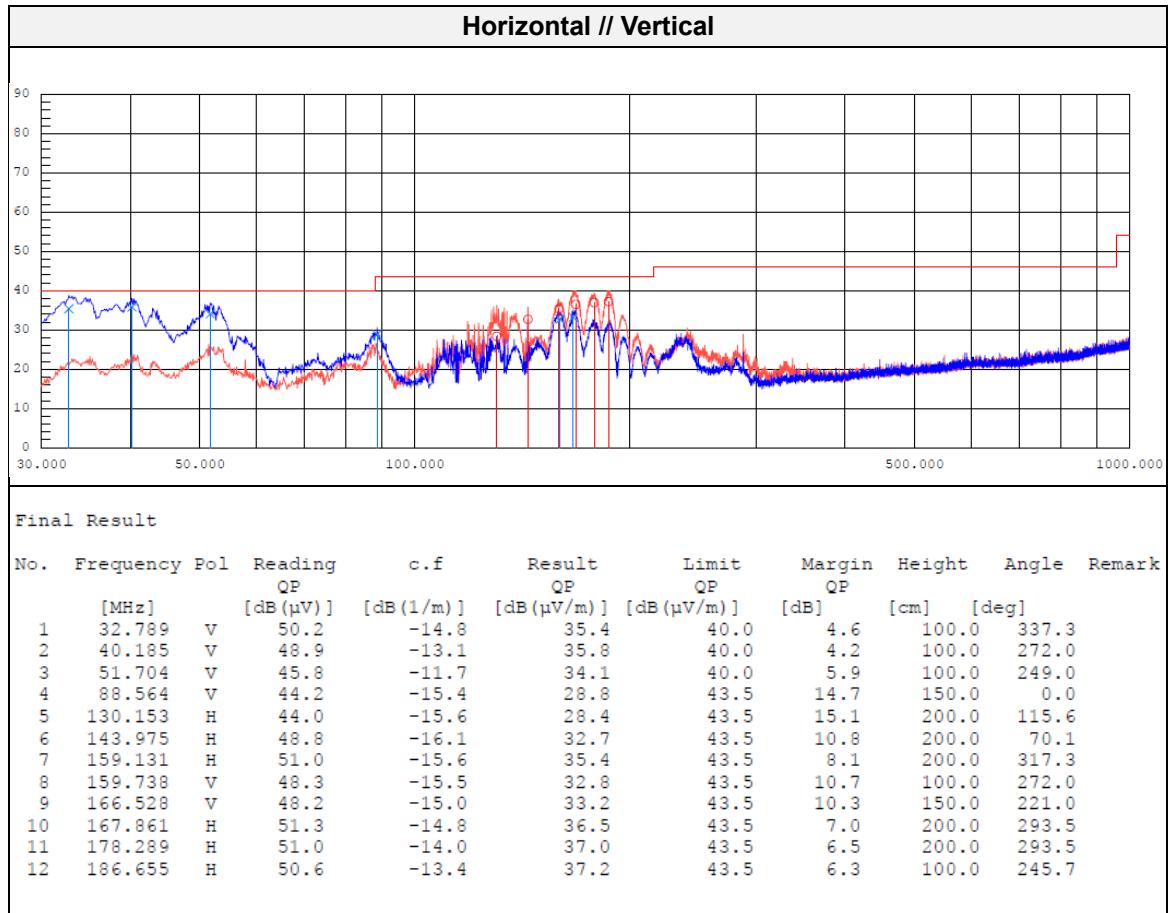


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Mode: 10 W // 90 % charge

Distance of measurement: 3 meter



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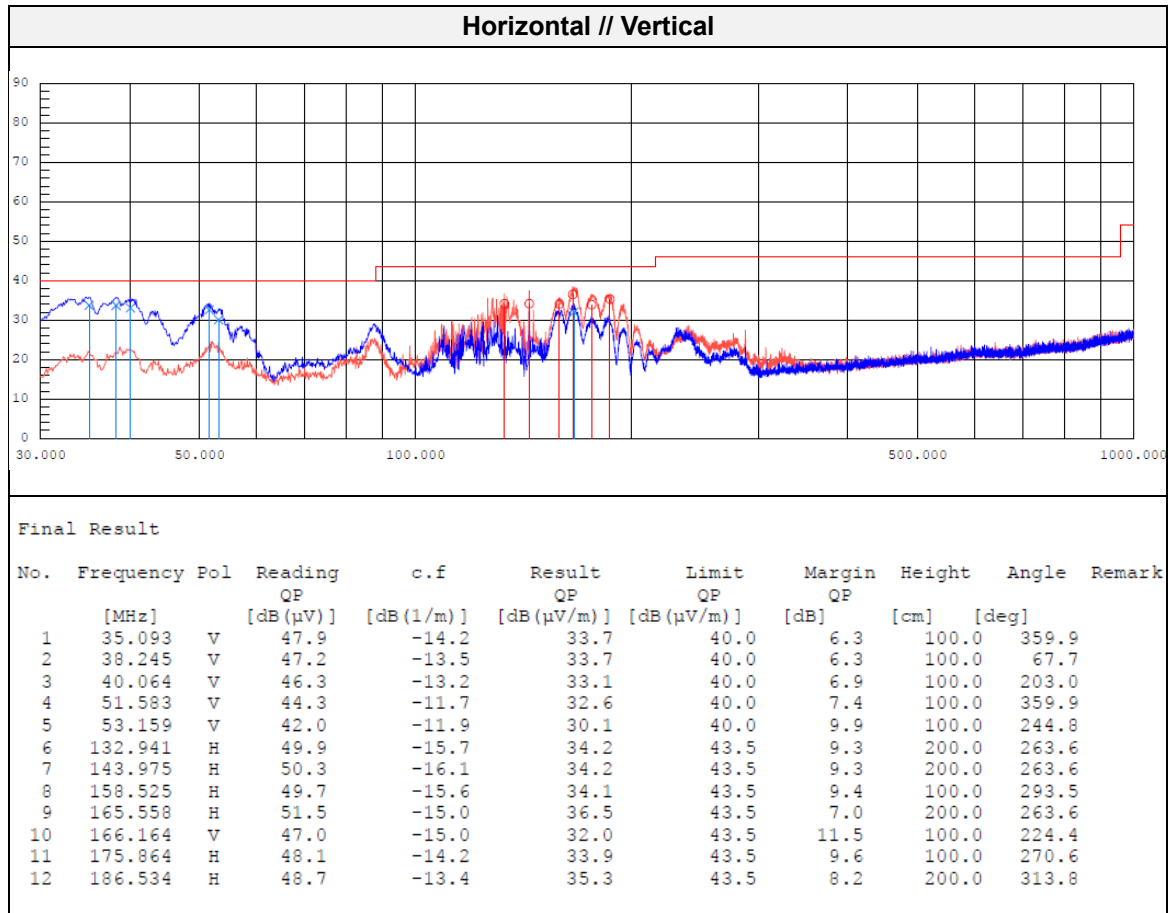
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Mode: 15 W // 10 % charge
 Distance of measurement: 3 meter



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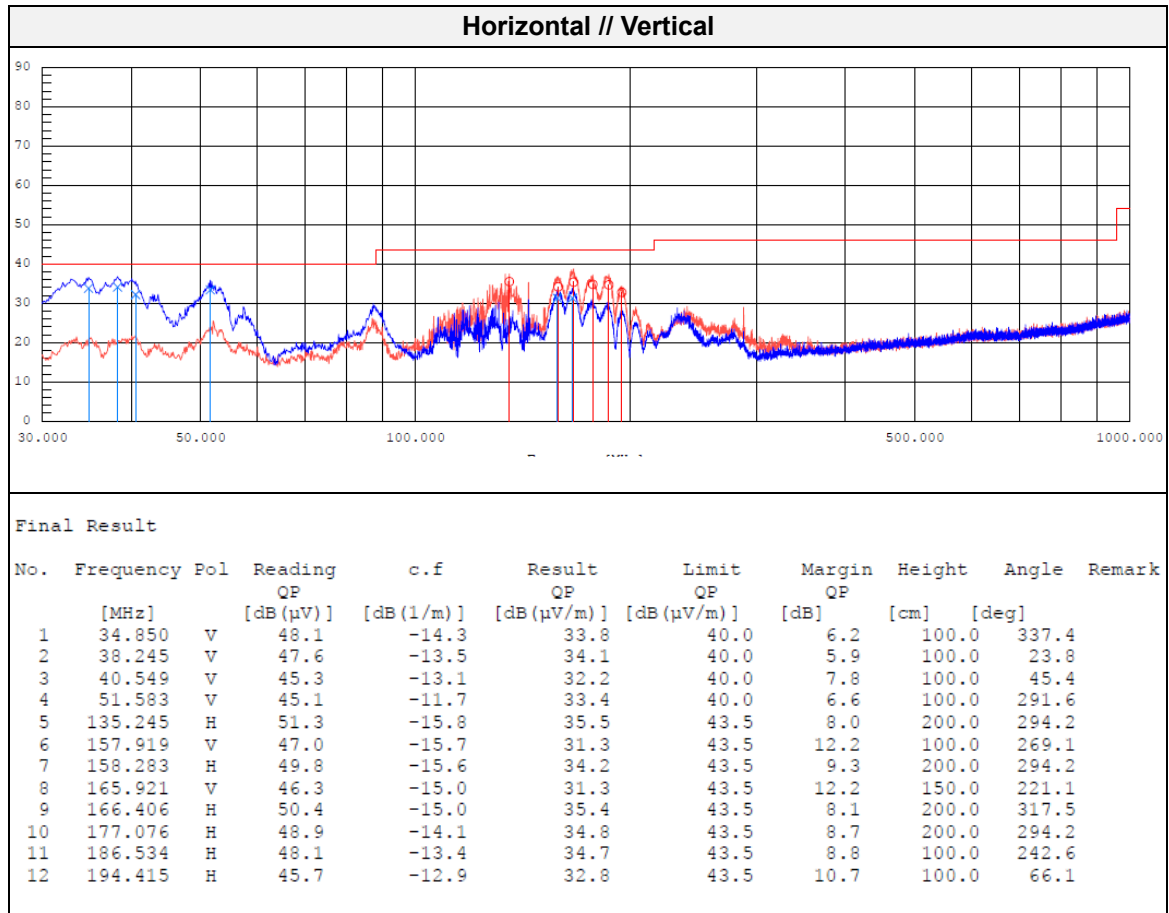


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Mode: 15 W // 50 % charge

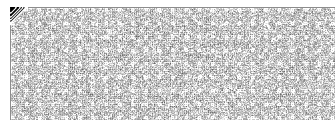
Distance of measurement: 3 meter



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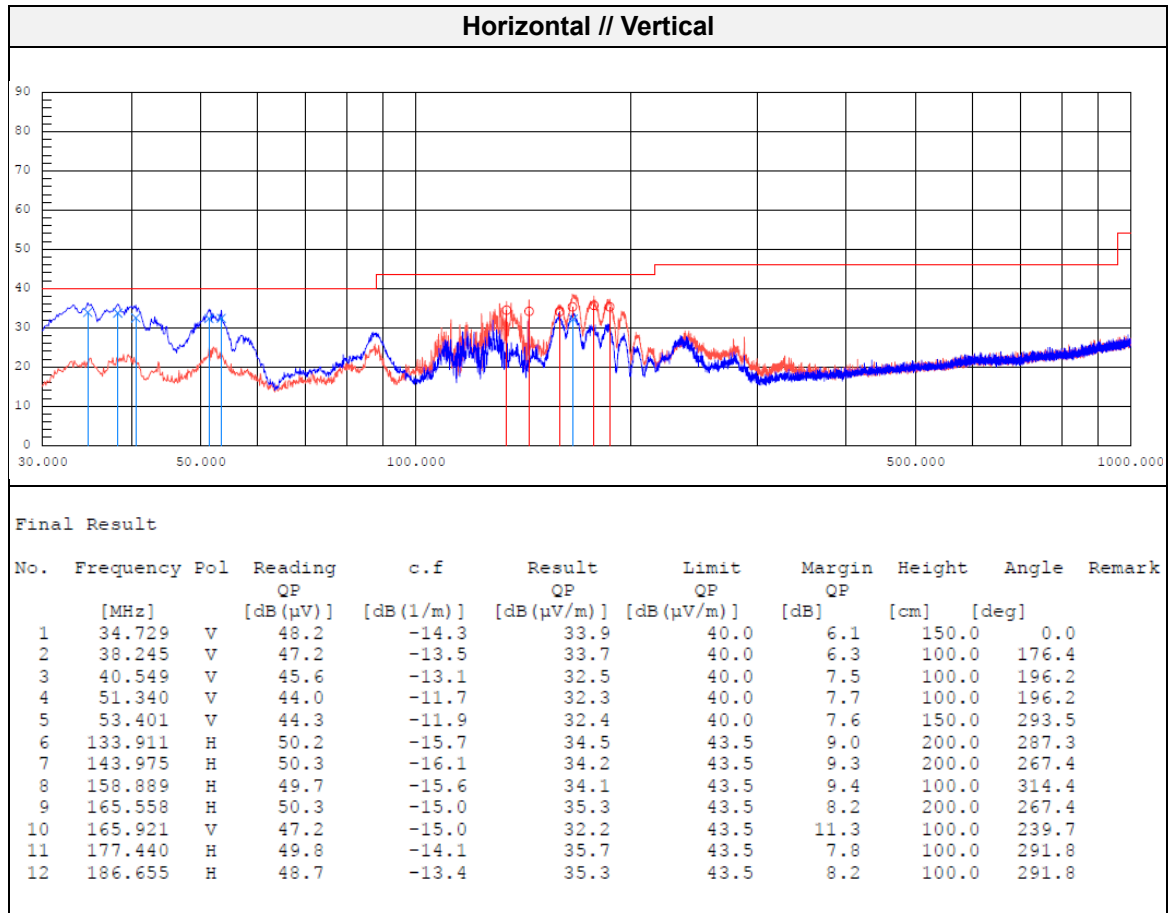


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Mode: 15 W // 90 % charge

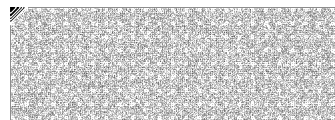
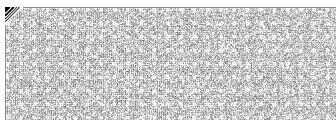
Distance of measurement: 3 meter



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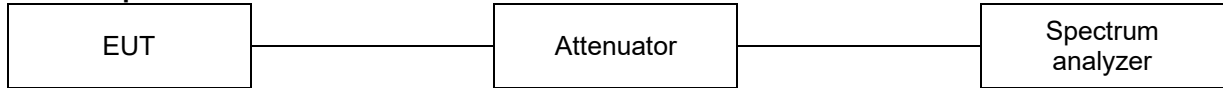
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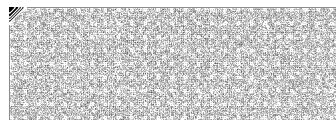
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3.2. 20 dB Bandwidth**Test setup****Test procedures**

The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the emission bandwidth. The VBW is set to $\geq \text{RBW}$. The sweep time is coupled.

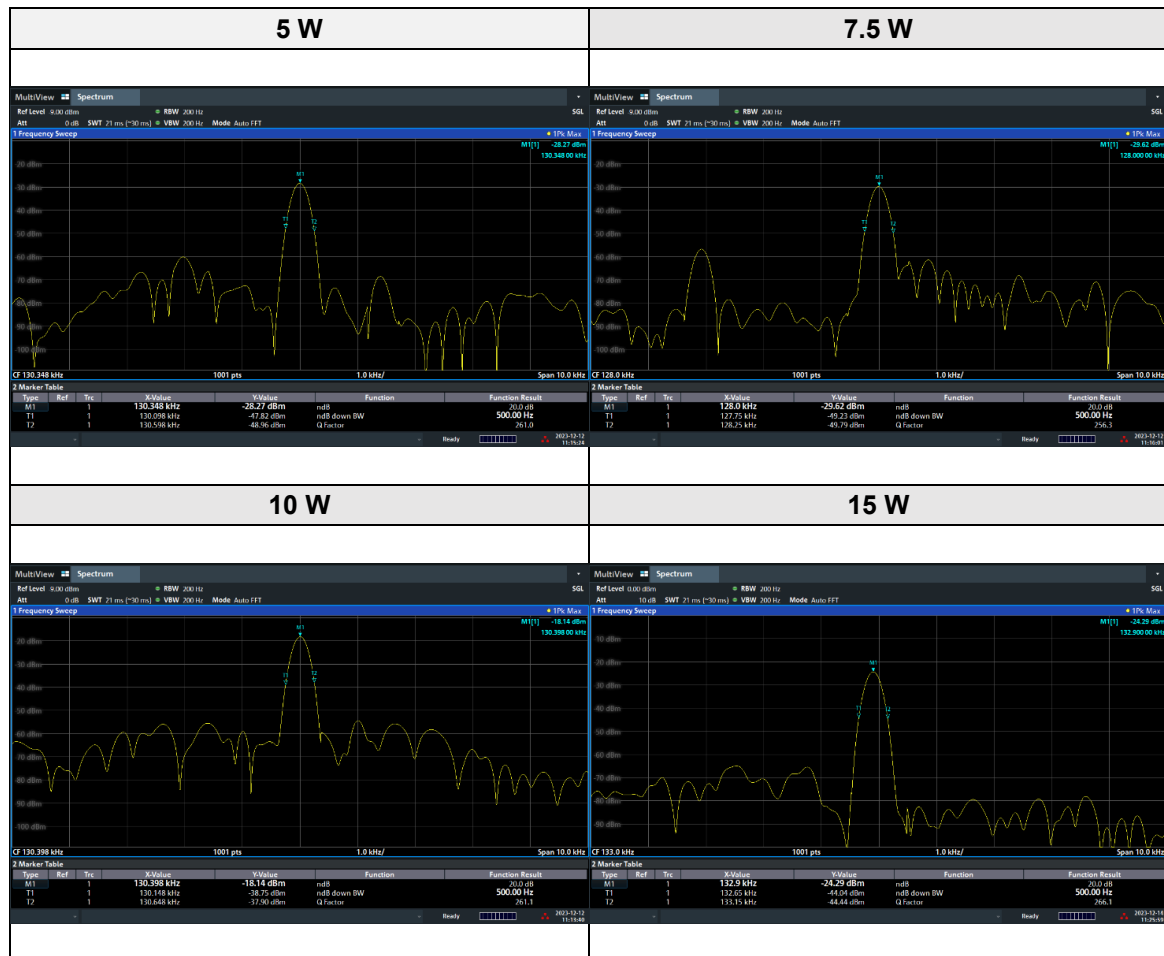
Limit

None; for reporting purposes only.

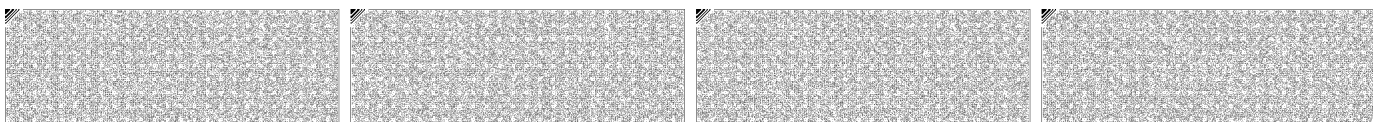


Test results

Test Mode	Frequency(MHz)	Measured bandwidth(kHz)
5 W	0.130	0.261
7.5 W	0.128	0.256
10 W	0.130	0.261
15 W	0.133	0.266

**Note.**

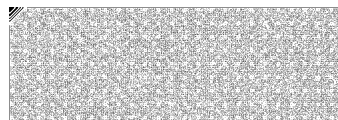
Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be proximately twice the RBW.



3.3. AC conducted emissions**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 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

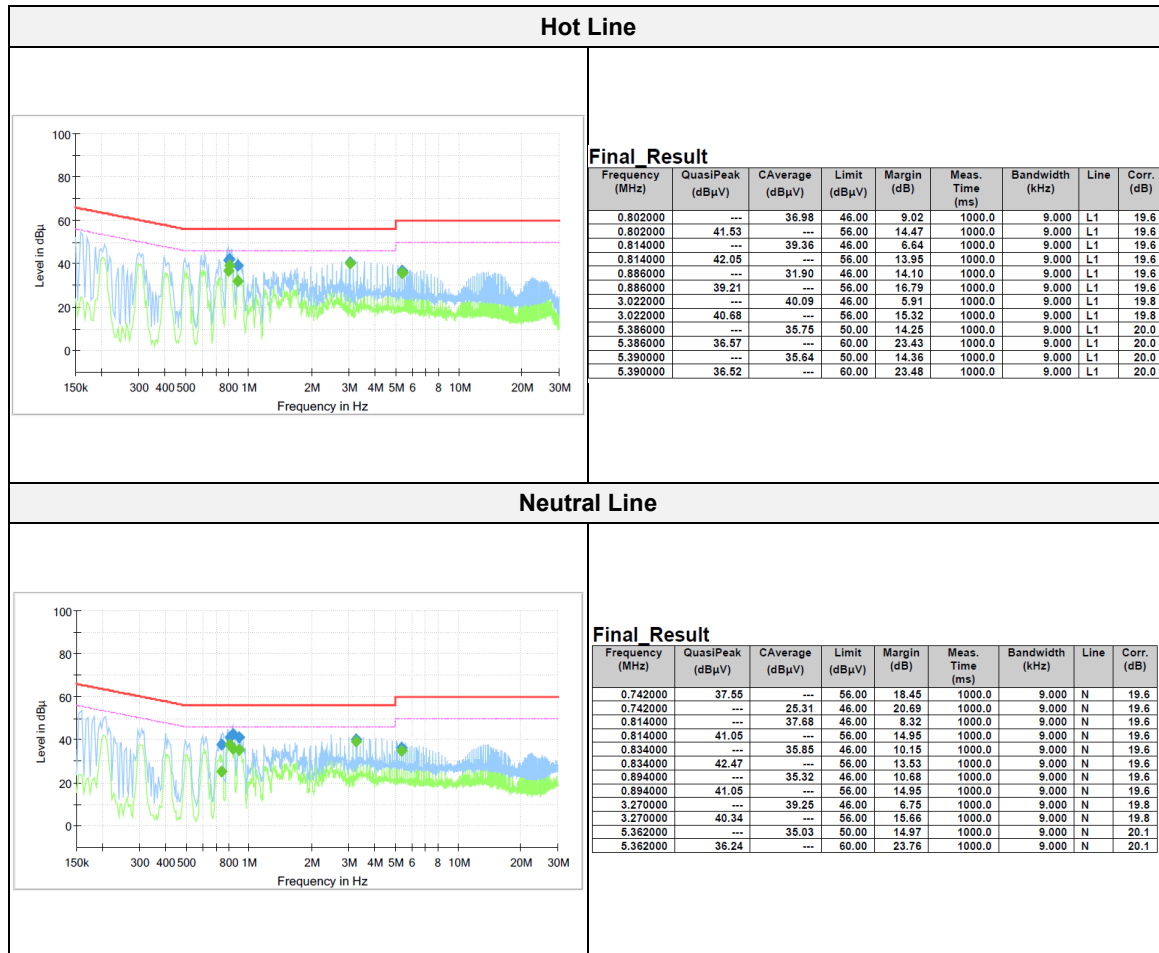


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Test results

Mode: 15 W // 90 % charge
(Worst Case)



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Appendix A. Measurement equipment

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
SPECTRUM ANALYZER	R&S	FSV3044	101272	1 year	2024.03.16
SIGNAL GENERATOR	KEYSIGHT	N5182B	MY59100115	1 year	2024.04.19
AC POWER SOURCE/ ANALYZER	HP	6813A	3729A00754	1 year	2024.01.12
EMI TEST RECEIVER	R&S	ESU26	100517	1 year	2024.07.31
ACTIVE LOOP ANTENNA	Schwarzbeck	HFH2-Z2E	100975	2 years	2025.02.15
BILOG ANTENNA	Schwarzbeck	VULB 9163	714	2 years	2024.04.19
Attenuator	HUBER+SHHNER	6806.17.A	NONE	1 year	2024.03.21
Amplifier	SONOMA INSTRUMENT	310N	186549	1 year	2024.03.21
EMI TEST RECEIVER	ESR3	R & S	101783	1 year	2024.11.08
LISN	ENV216	R & S	101787	1 year	2024.11.08
PULSE LIMITER	ESH3-Z2	R & S	101915	1 year	2024.11.08

* Statement of Traceability: KES Co., Ltd. attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Peripheral devices

Device	Manufacturer	Model No.	Serial No.
Smart Phone	Samsung Electronics Co., Ltd.	SM-A305N	R59M503KX0M

The end of test report

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