



TEST REPORT

FCC Part 15C

Equipment under test Wireless Power Bank

Model name GB-WL3000

FCC ID 2BA5M-GB-WL3000

Applicant HiggsKorea CO.,LTD

Manufacturer DIGIWAY ELECTRONICS CO., LTD

Date of test(s) 2023.03.22 ~ 2023.04.03

Date of issue 2023.06.26

Issued to

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Test and report completed by :	Report approval by :
	
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This test report is not related to KS Q ISO/IEC 17025 and KOLAS

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Revision history

Revision	Date of issue	Test report No.	Description
-	2023.06.26	KES-RF-23T0089	Initial

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1. General information

Applicant HiggsKorea CO.,LTD
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Test site KES Co., Ltd.
Test site address 3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
 473-29, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea
Test Facility FCC Accreditation Designation No.: KR0100, Registration No.: 444148
FCC rule part(s): Part 15C
FCC ID: 2BA5M-GB-WL3000
Test device serial No. Production Pre-production Engineering

1.1. EUT description

Equipment under test Wireless Power Bank
5 W : 0.127 MHz ~ 0.148 MHz
Frequency 7.5 W : 0.128 MHz
10 W : 0.121 MHz ~ 0.138 MHz
Inductive charging technique Magnetic Induction
Model: GB-WL3000
Antenna specification Internal type (Coil antenna)
Power source DC 3.7 V (Battery)
S/W Version DHW2204_WXC_V1.0
H/W version GBHW2304_3000_V2.03

1.2. Test configuration

The **HiggsKorea CO.,LTD / Wireless Power Bank / GB-WL3000 / FCC ID: 2BA5M-GB-WL3000** 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 V03

1.3. Test frequency

		Frequency Range
Power source	DC 3.7 V(Battery)	5 W : 0.127 MHz ~ 0.148 MHz 7.5 W : 0.128 MHz 10 W : 0.121 MHz ~ 0.138 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	4.42 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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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

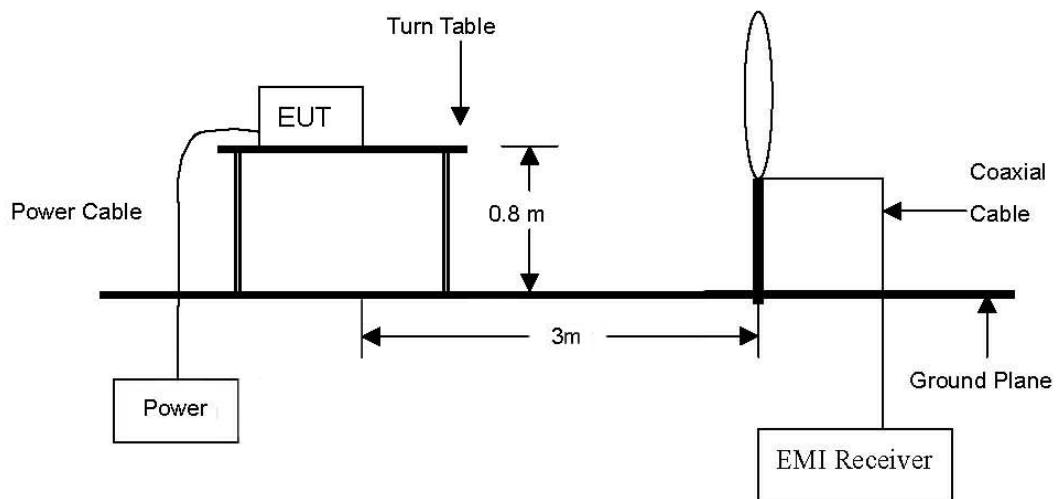
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3. Test results

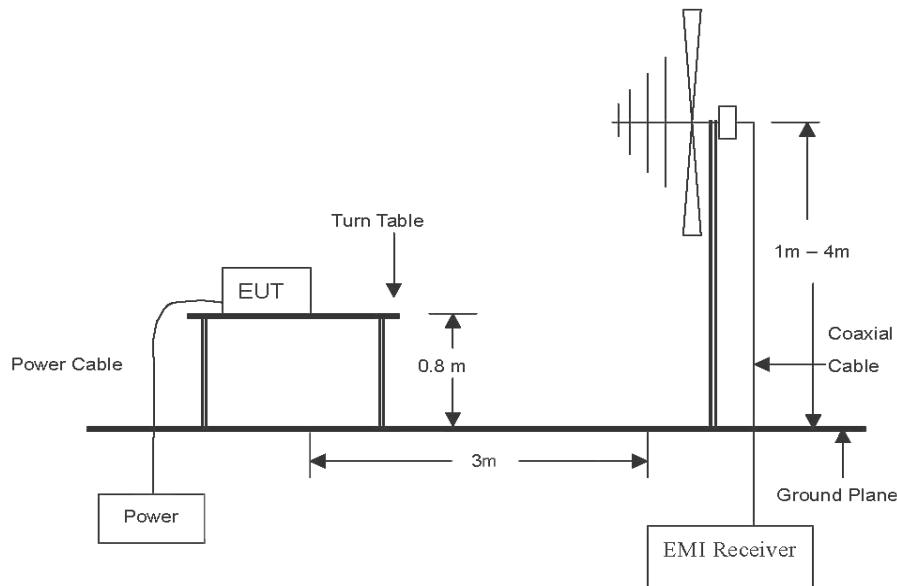
3.1. Radiated spurious emission

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.





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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 are 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 :

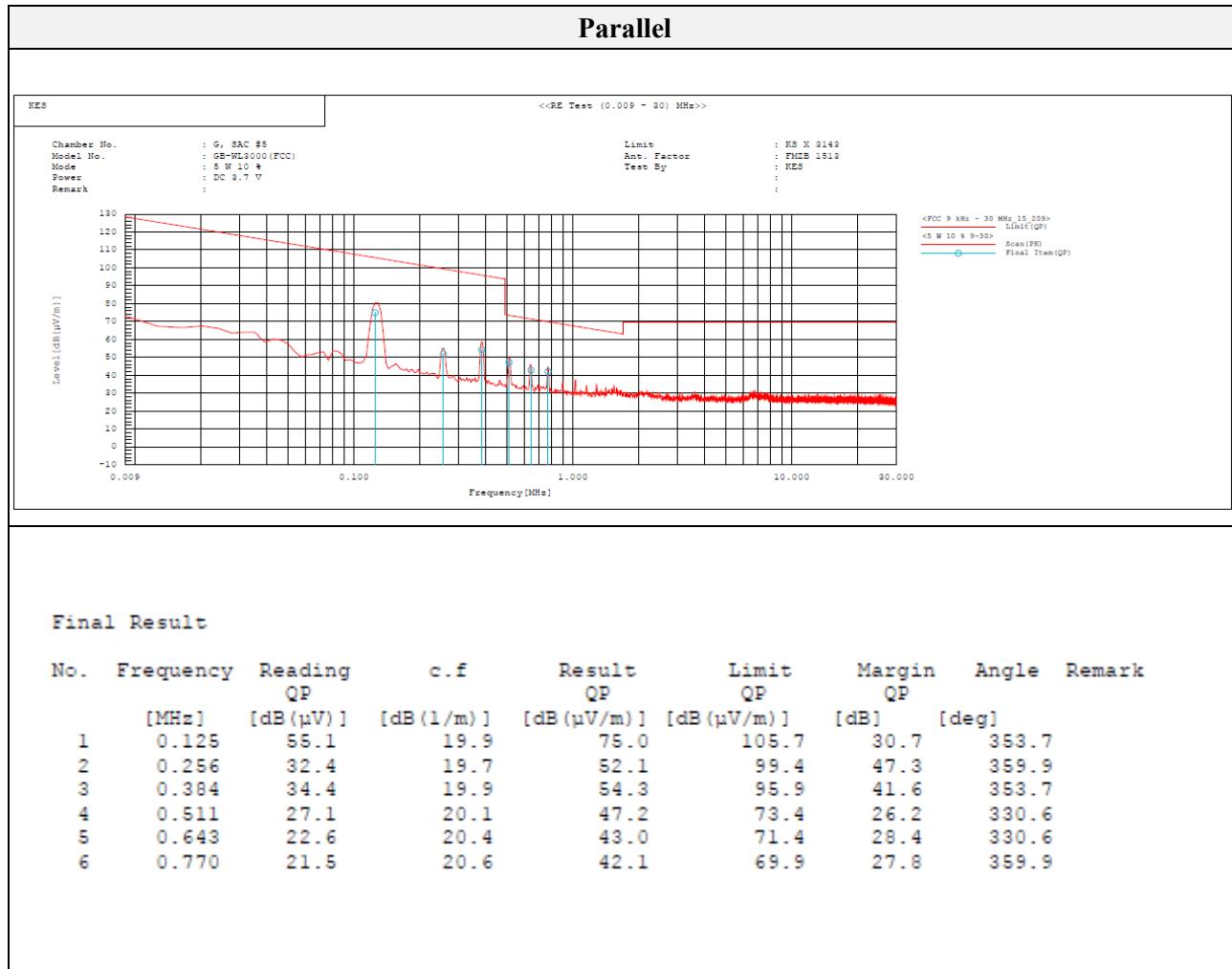
Frequency (MHz)	Distance (Meters)	Radiated (μ N/m)
0.009 ~ 0.490	300	2400 / F(kHz)
0.490 ~ 1.705	30	24000 / F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

**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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**Test results (Below 30 MHz)**Mode: 5 W // 10 % chargerDistance of measurement: 3 meter**Parallel****Final Result**

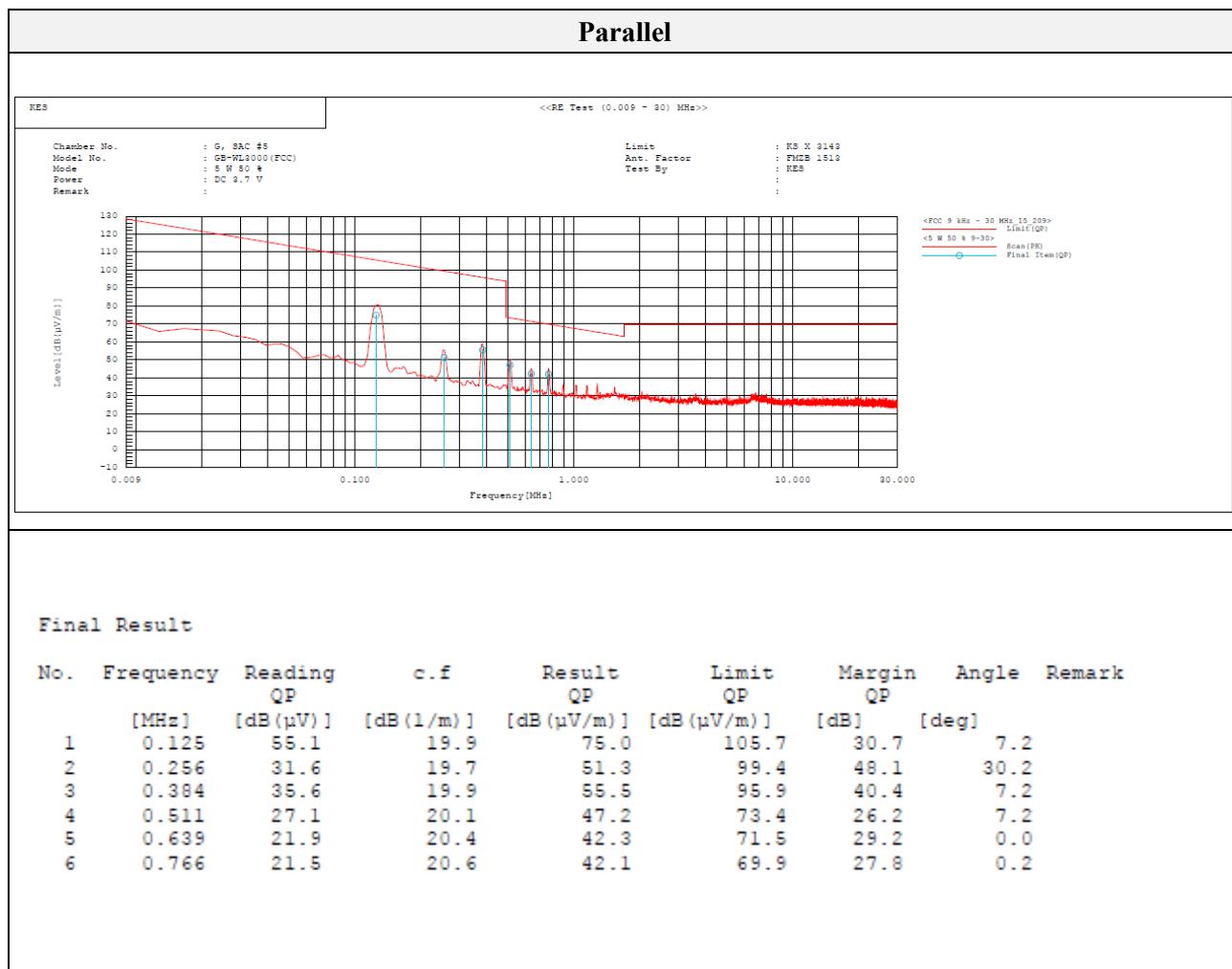
No.	Frequency	Reading	c.f	Result	Limit	Margin	Angle	Remark
	QP	QP	QP	QP	QP	QP	QP	
1	0.125	55.1	19.9	75.0	105.7	30.7	353.7	
2	0.256	32.4	19.7	52.1	99.4	47.3	359.9	
3	0.384	34.4	19.9	54.3	95.9	41.6	353.7	
4	0.511	27.1	20.1	47.2	73.4	26.2	330.6	
5	0.643	22.6	20.4	43.0	71.4	28.4	330.6	
6	0.770	21.5	20.6	42.1	69.9	27.8	359.9	

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



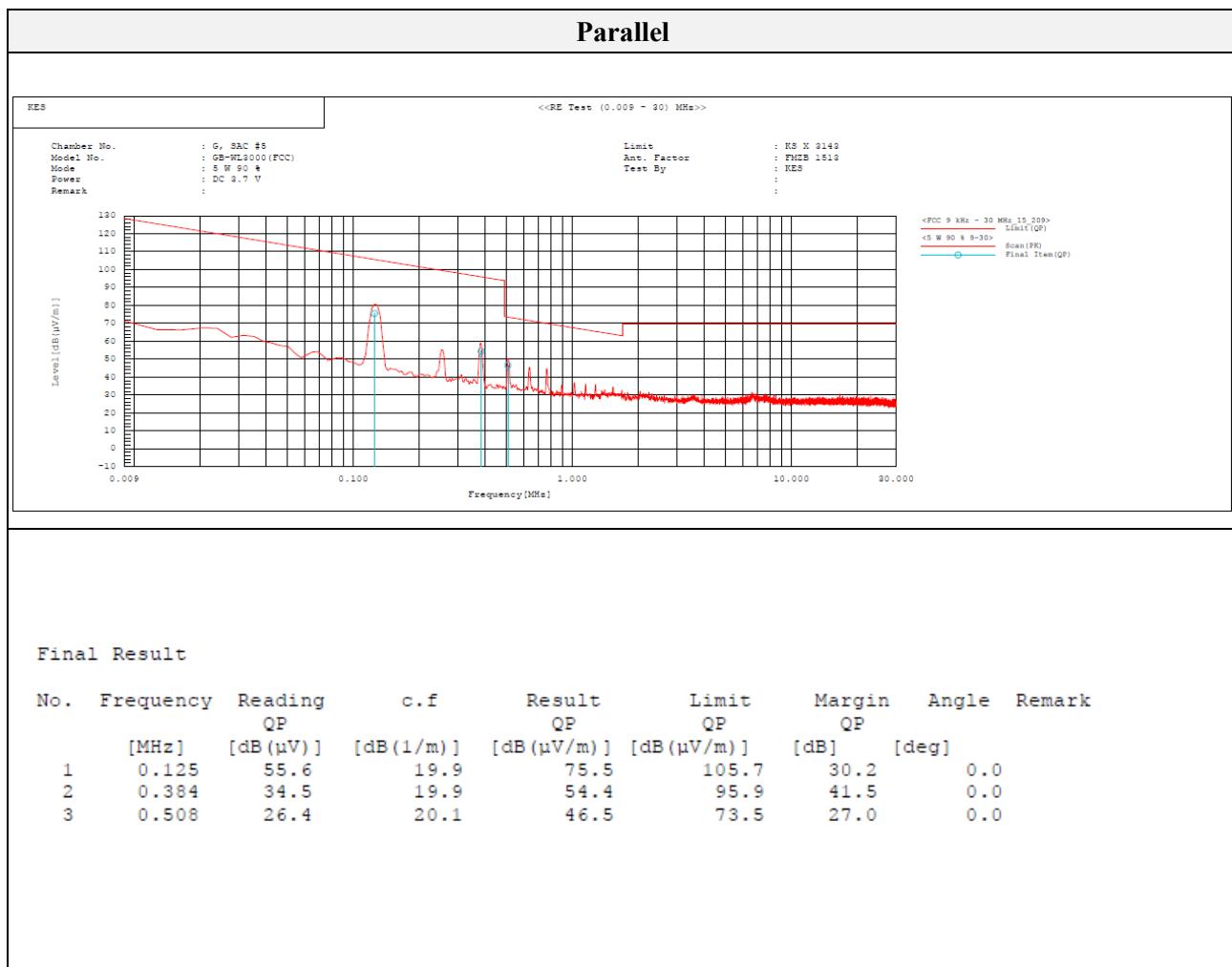


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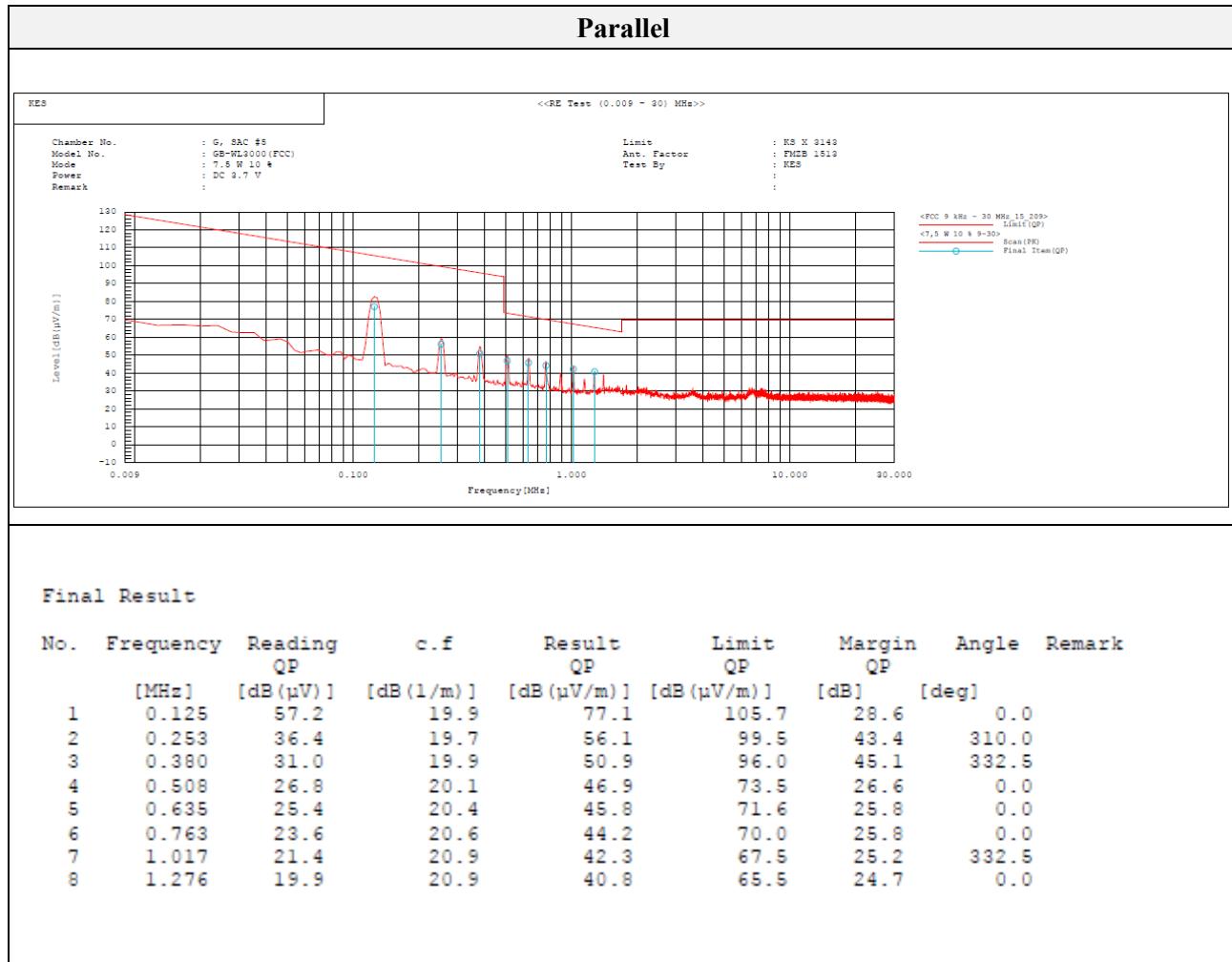
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Mode: 5 W // 90 % charge
Distance of measurement: 3 meter

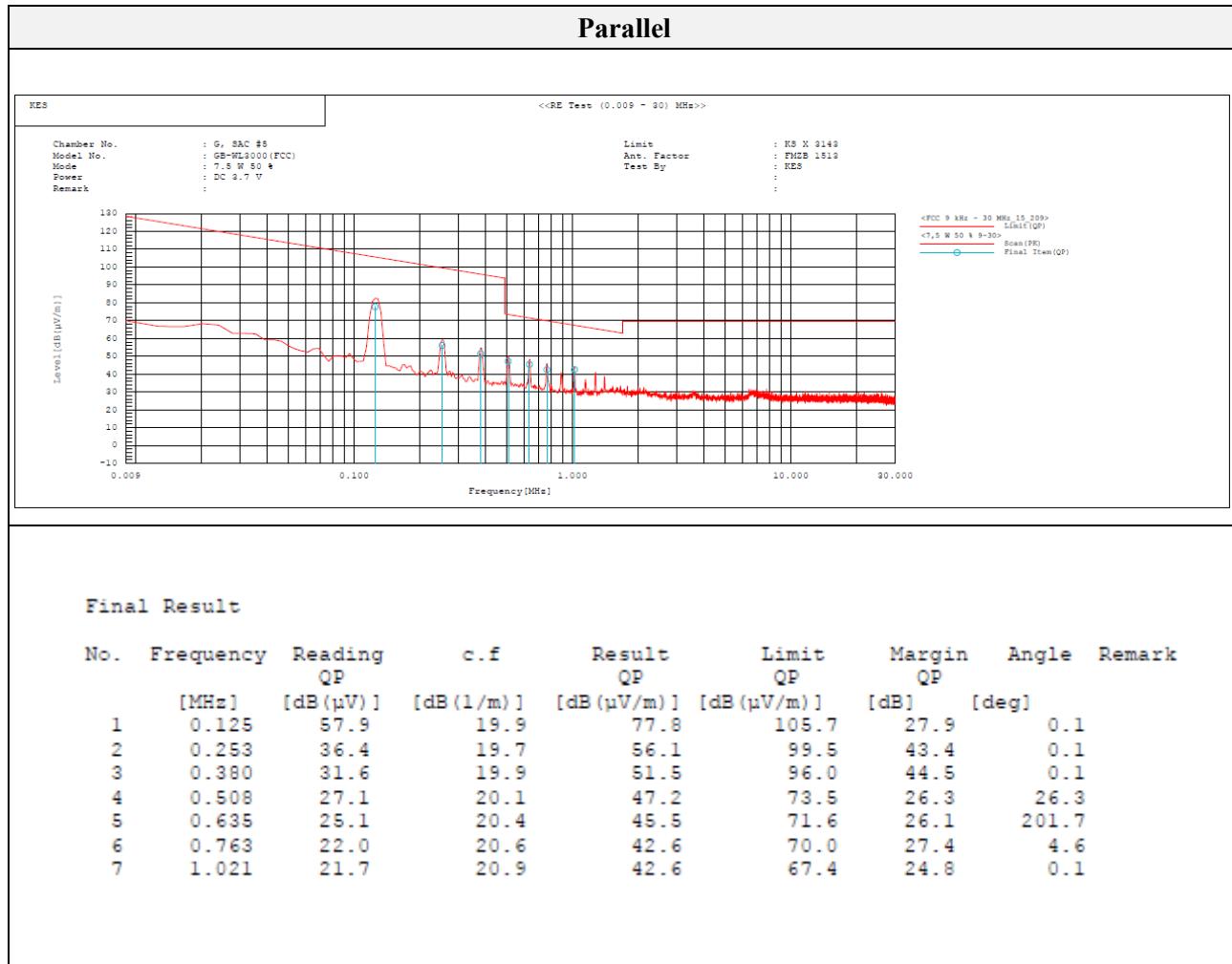


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Mode: 7.5 W // 10 % charger
 Distance of measurement: 3 meter



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



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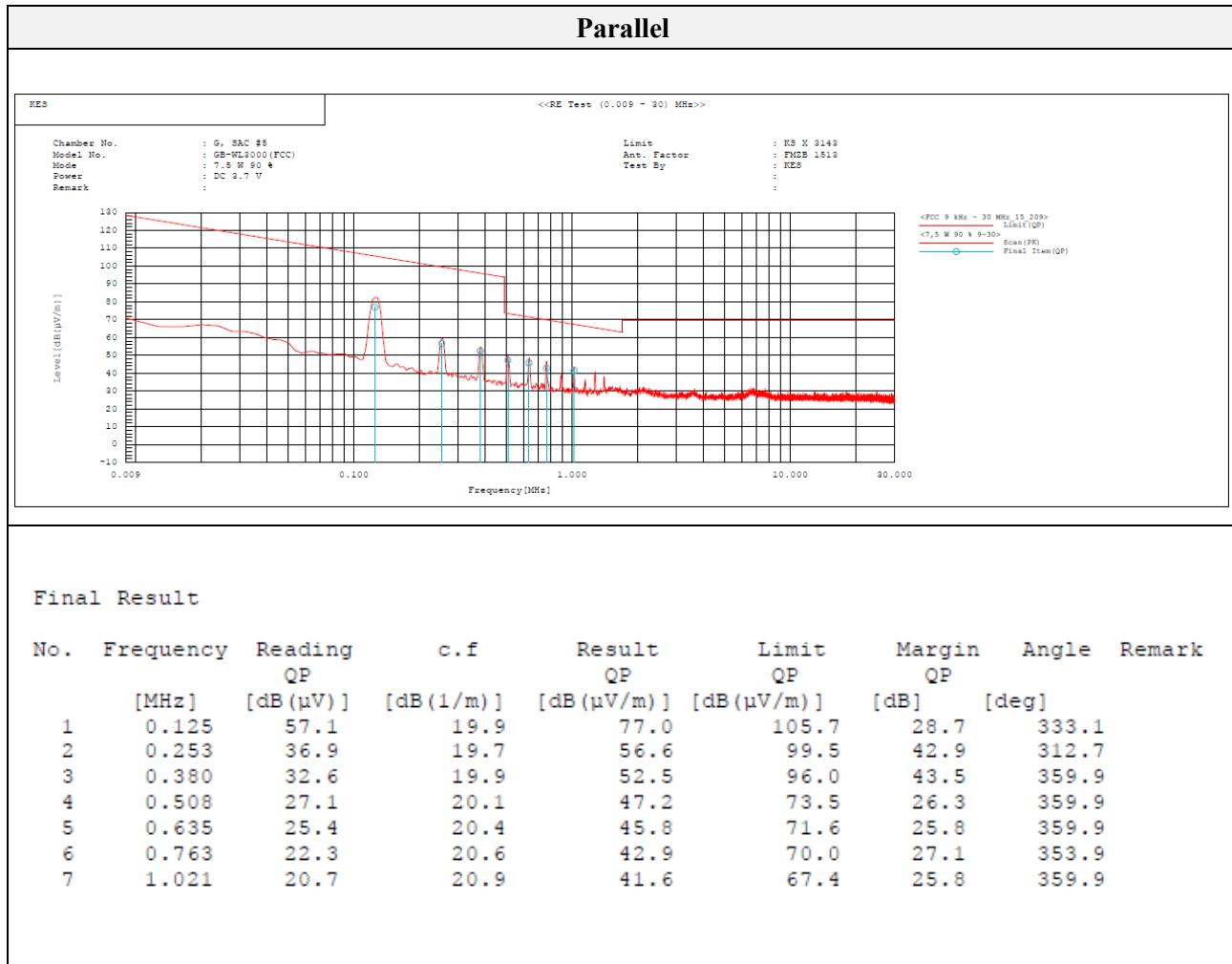


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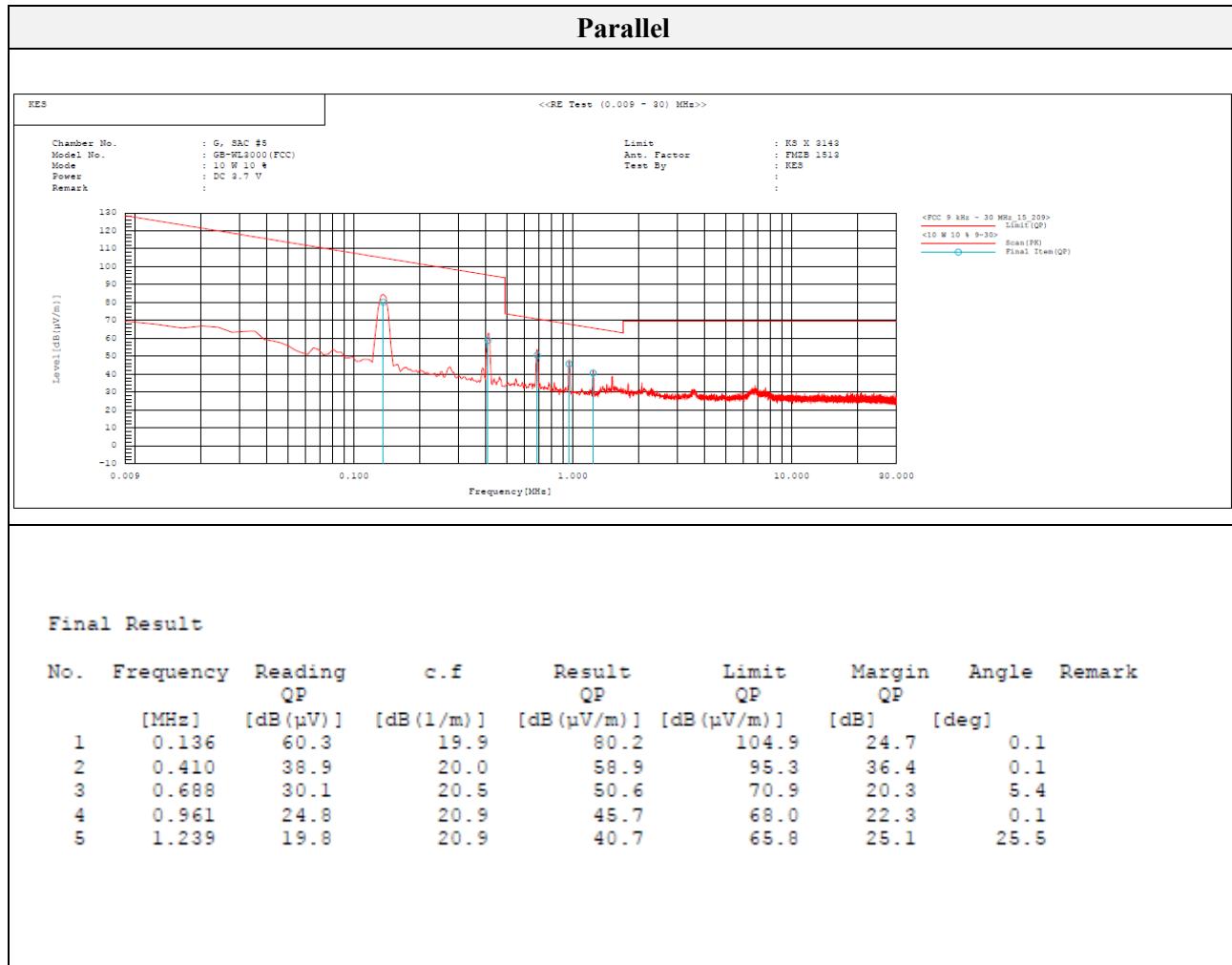
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Mode: 7.5 W // 90 % charge
Distance of measurement: 3 meter

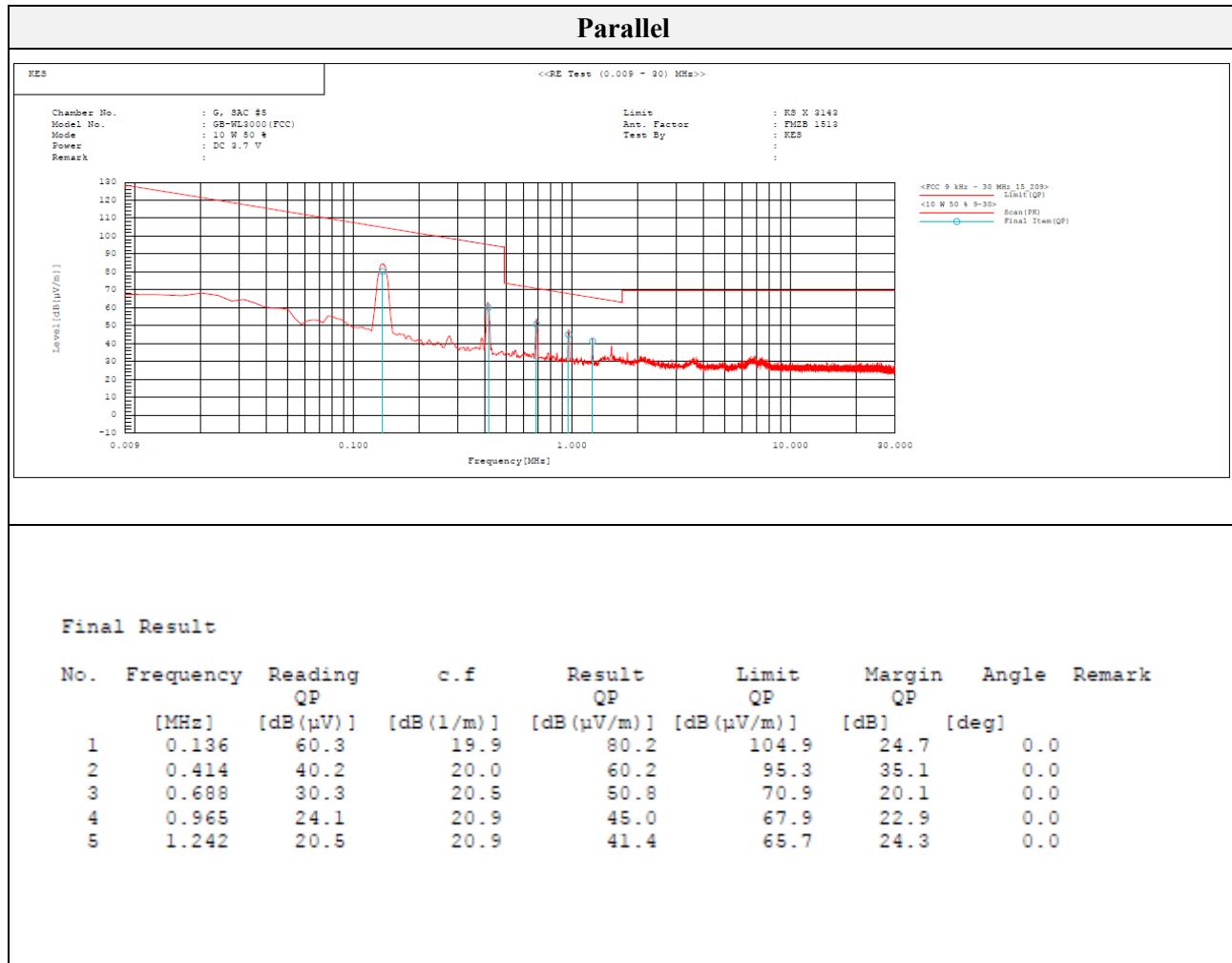


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Mode: 10 W // 10 % charger
 Distance of measurement: 3 meter



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



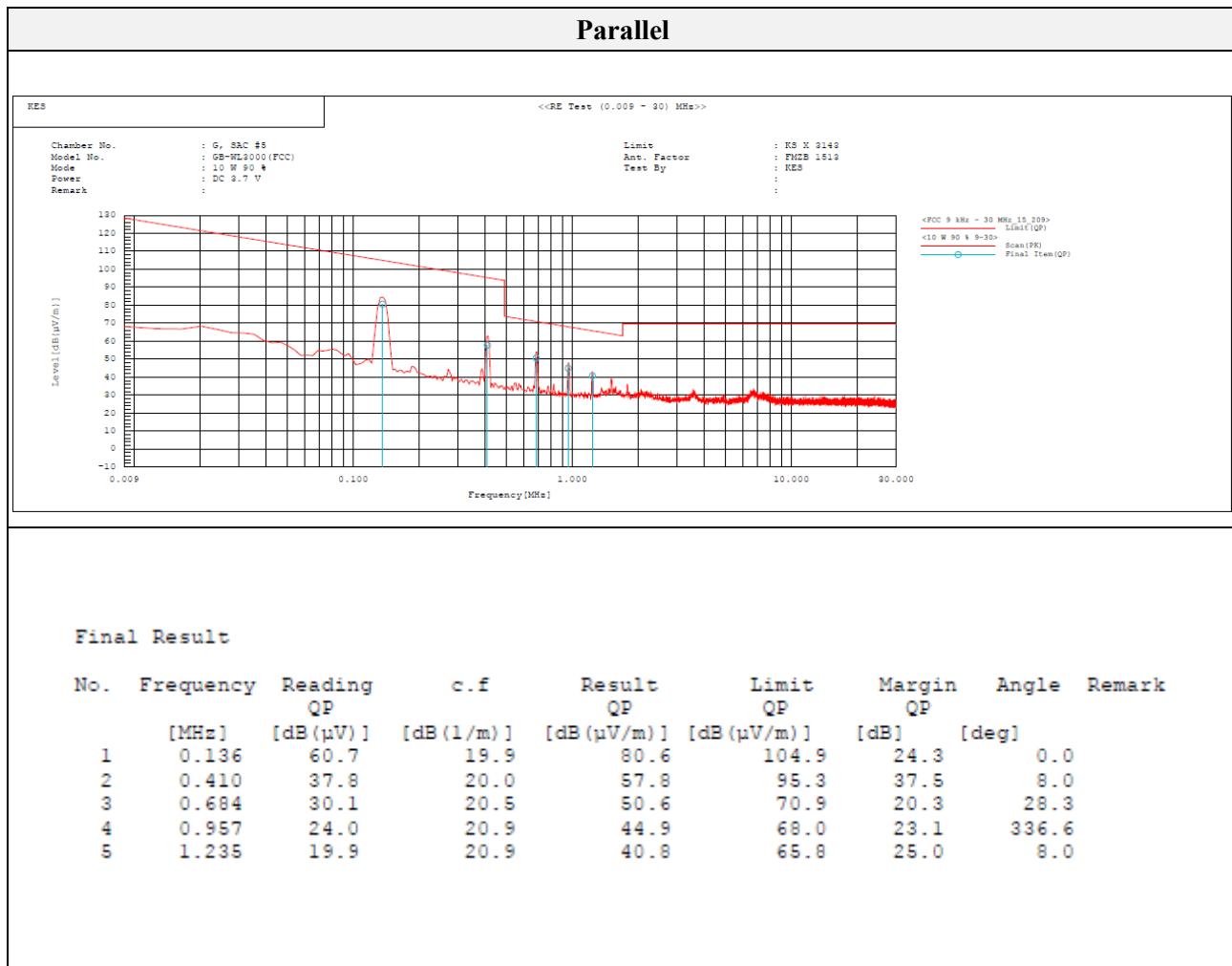
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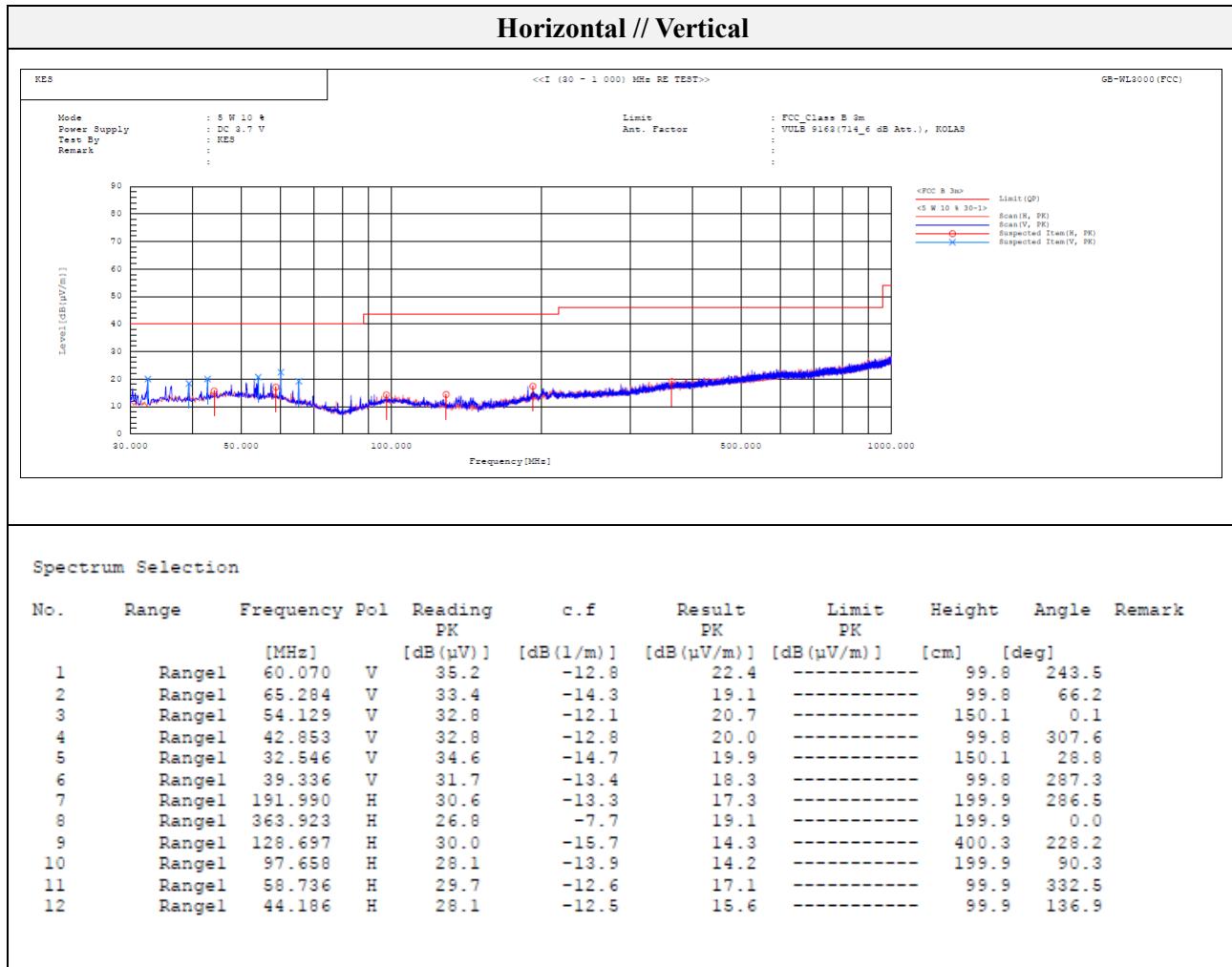
Mode: 10 W // 90 % charge
Distance of measurement: 3 meter



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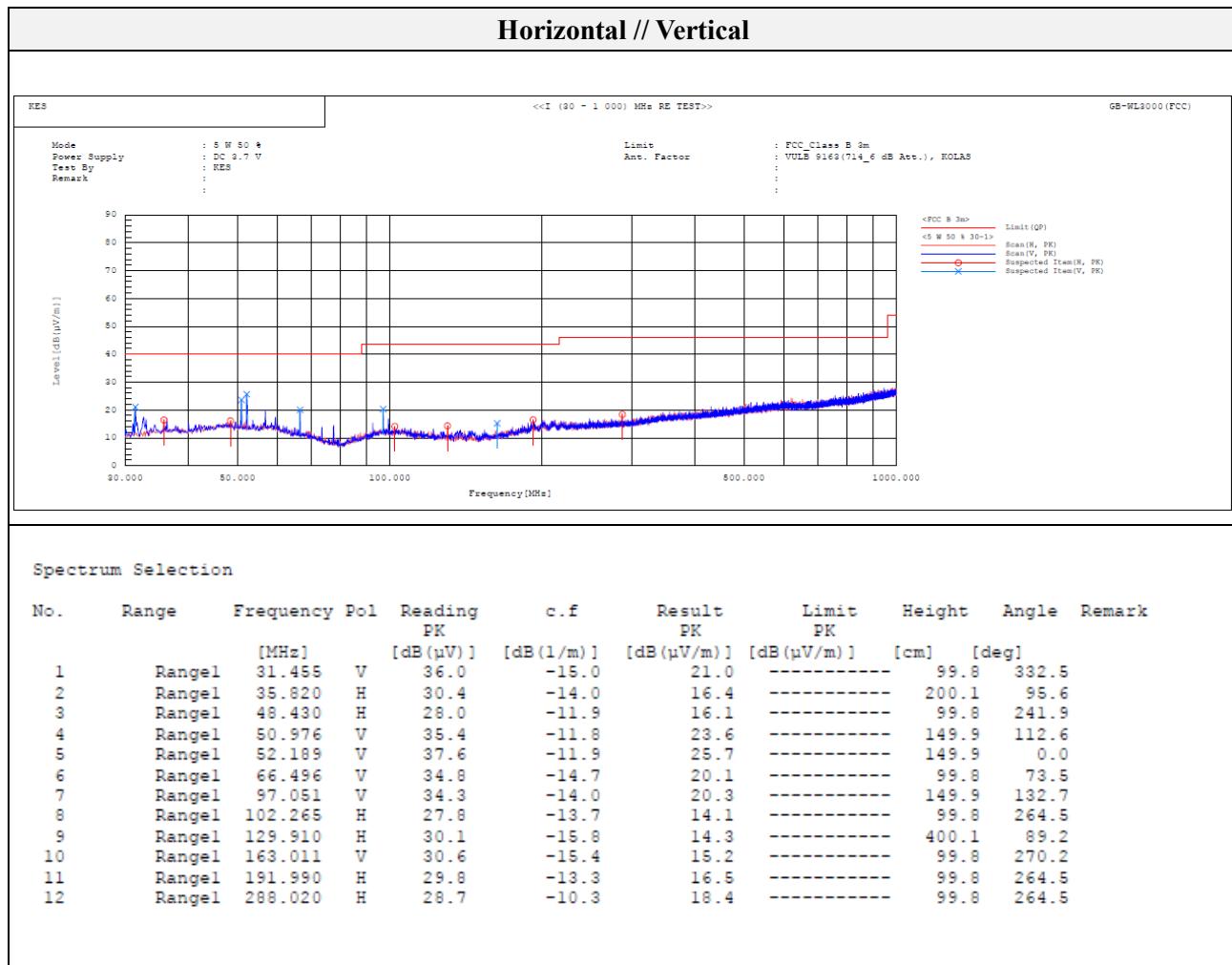
**Test results (Below 1 000 MHz)**Mode: 5 W // 10 % chargeDistance of measurement: 3 meter

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



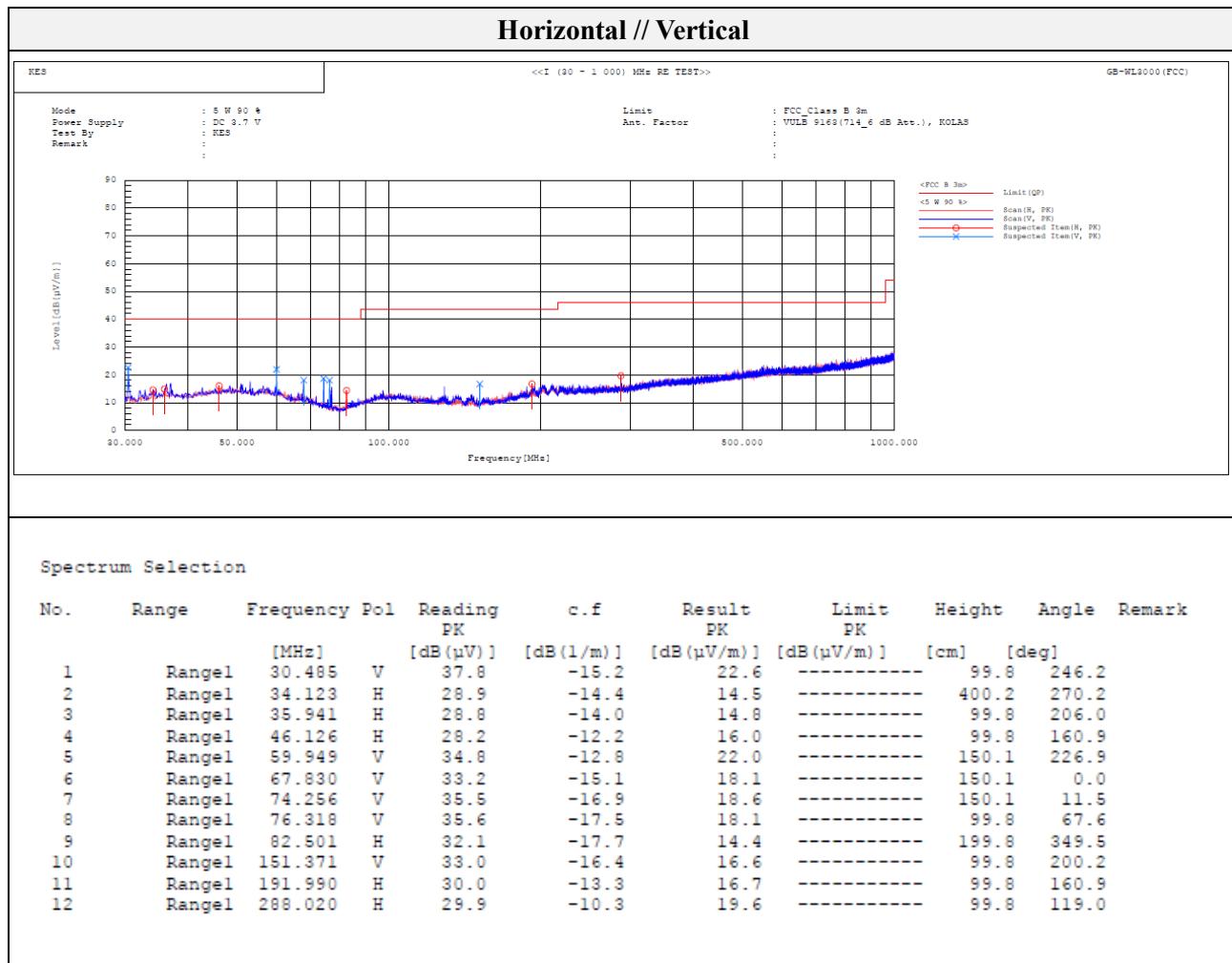
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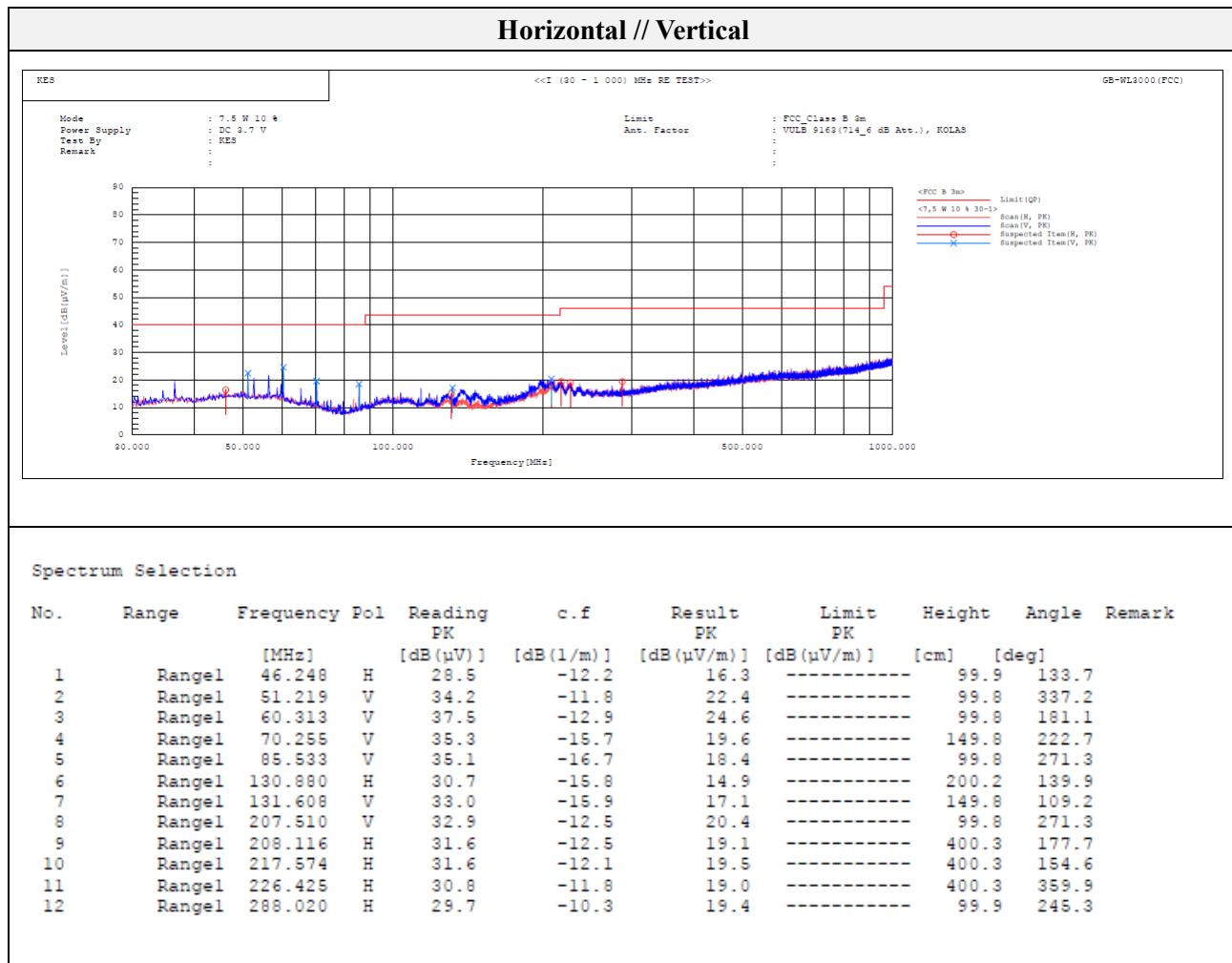
Mode: 5 W // 90 % charge

Distance of measurement: 3 meter



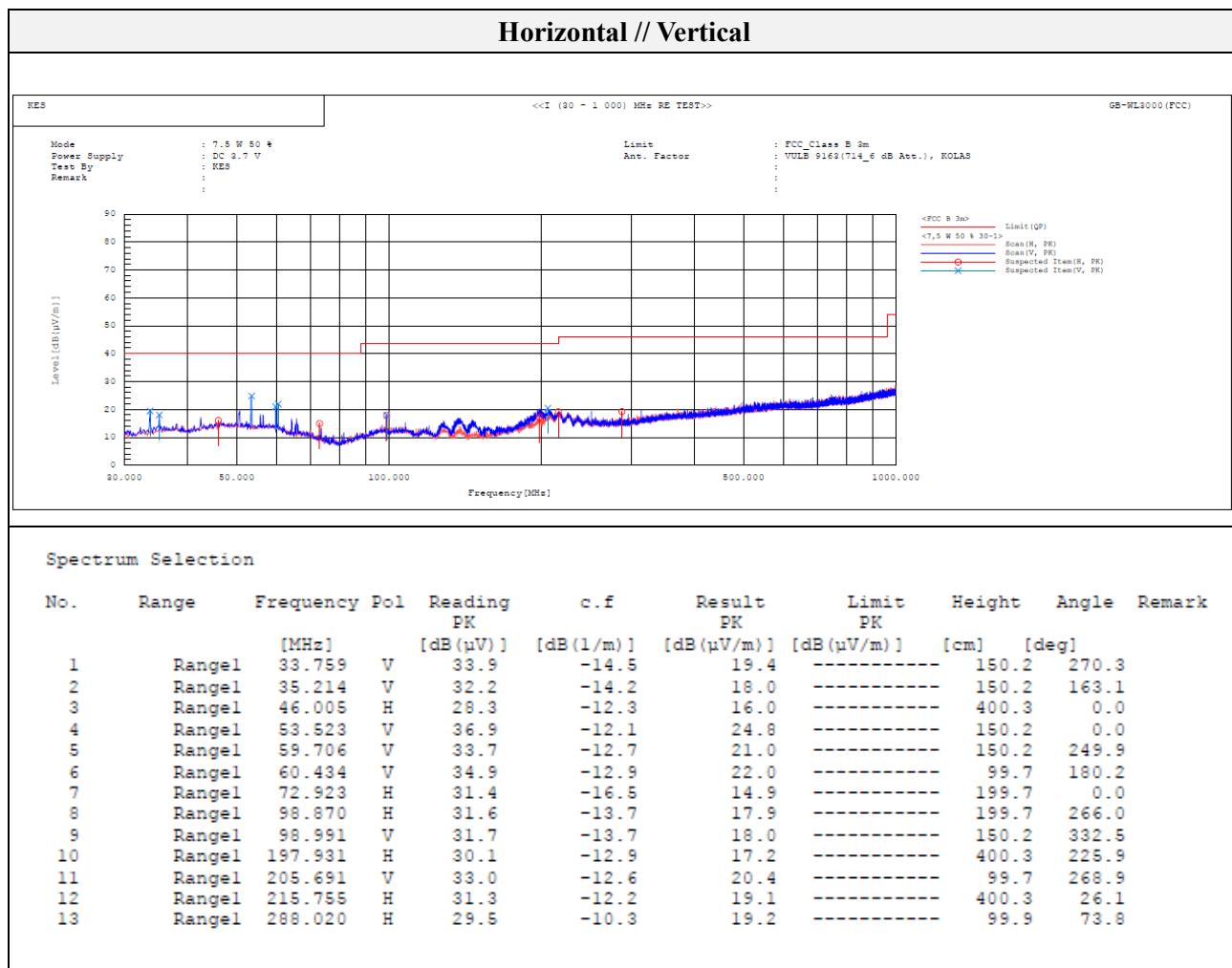
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Mode: 7.5 W // 10 % charge
 Distance of measurement: 3 meter



Mode: **7.5 W // 50 % charge**

Distance of measurement: **3 meter**

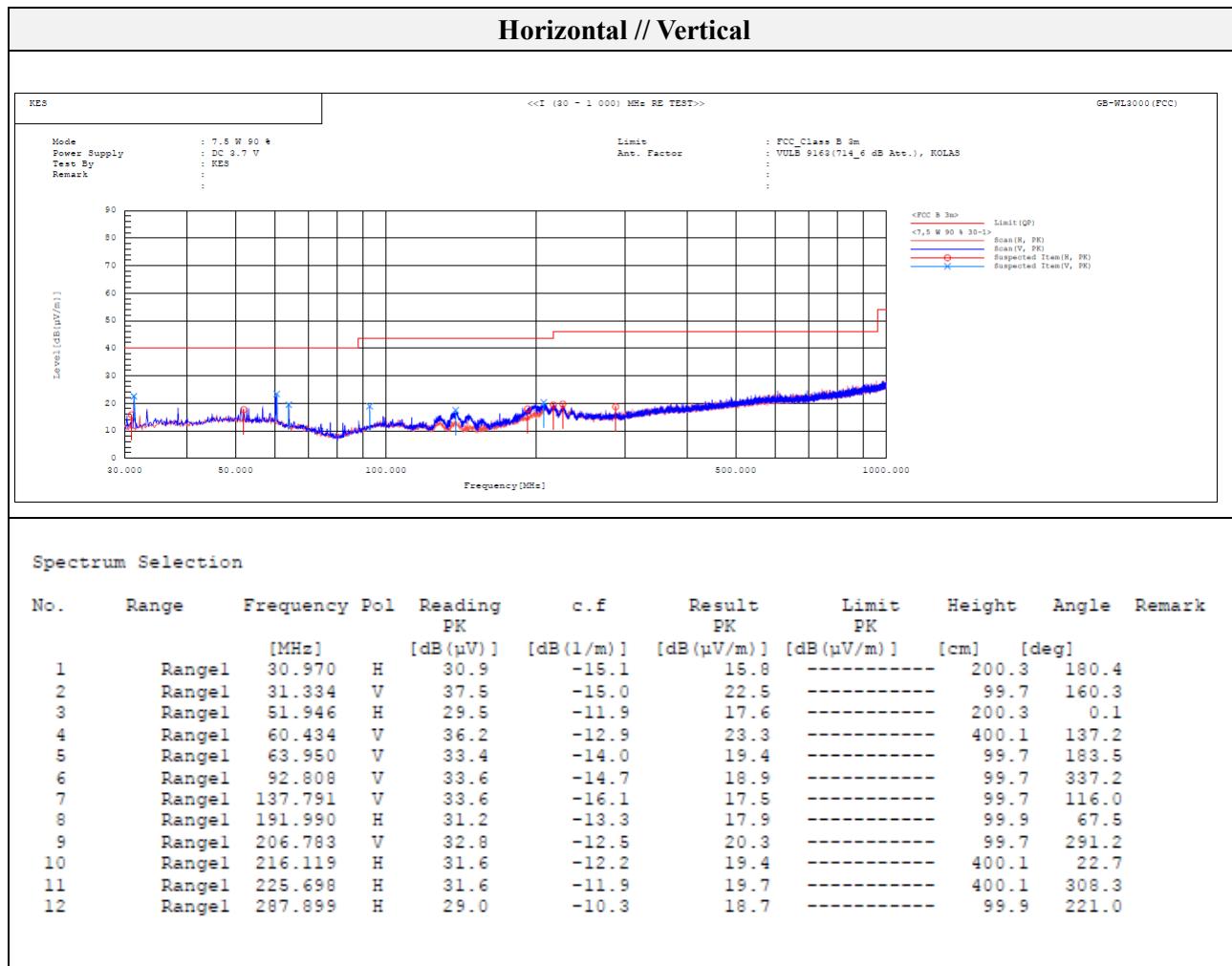


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Mode: 7.5 W // 90 % charge
 Distance of measurement: 3 meter



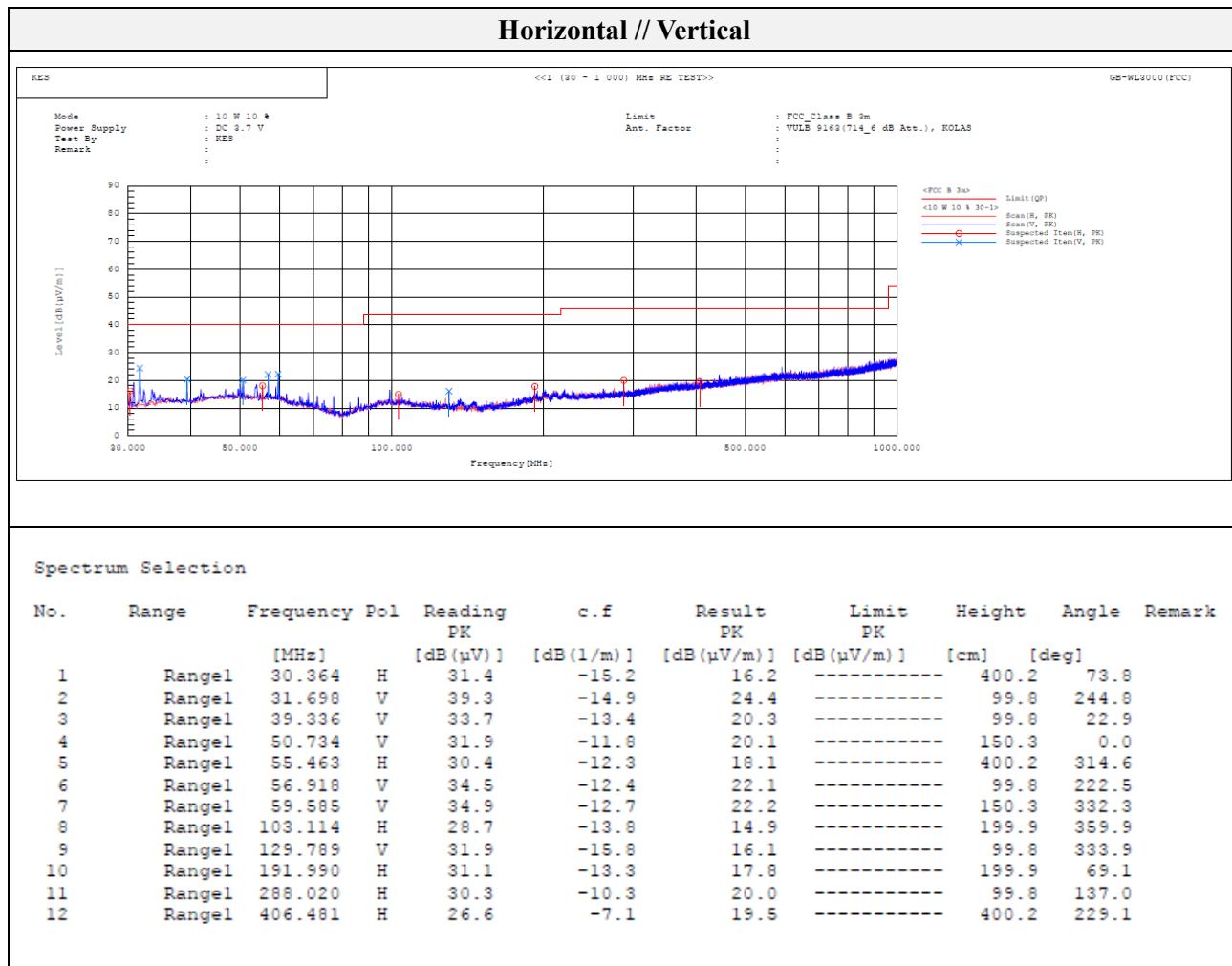


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Mode: 10 W // 10 % charge
Distance of measurement: 3 meter



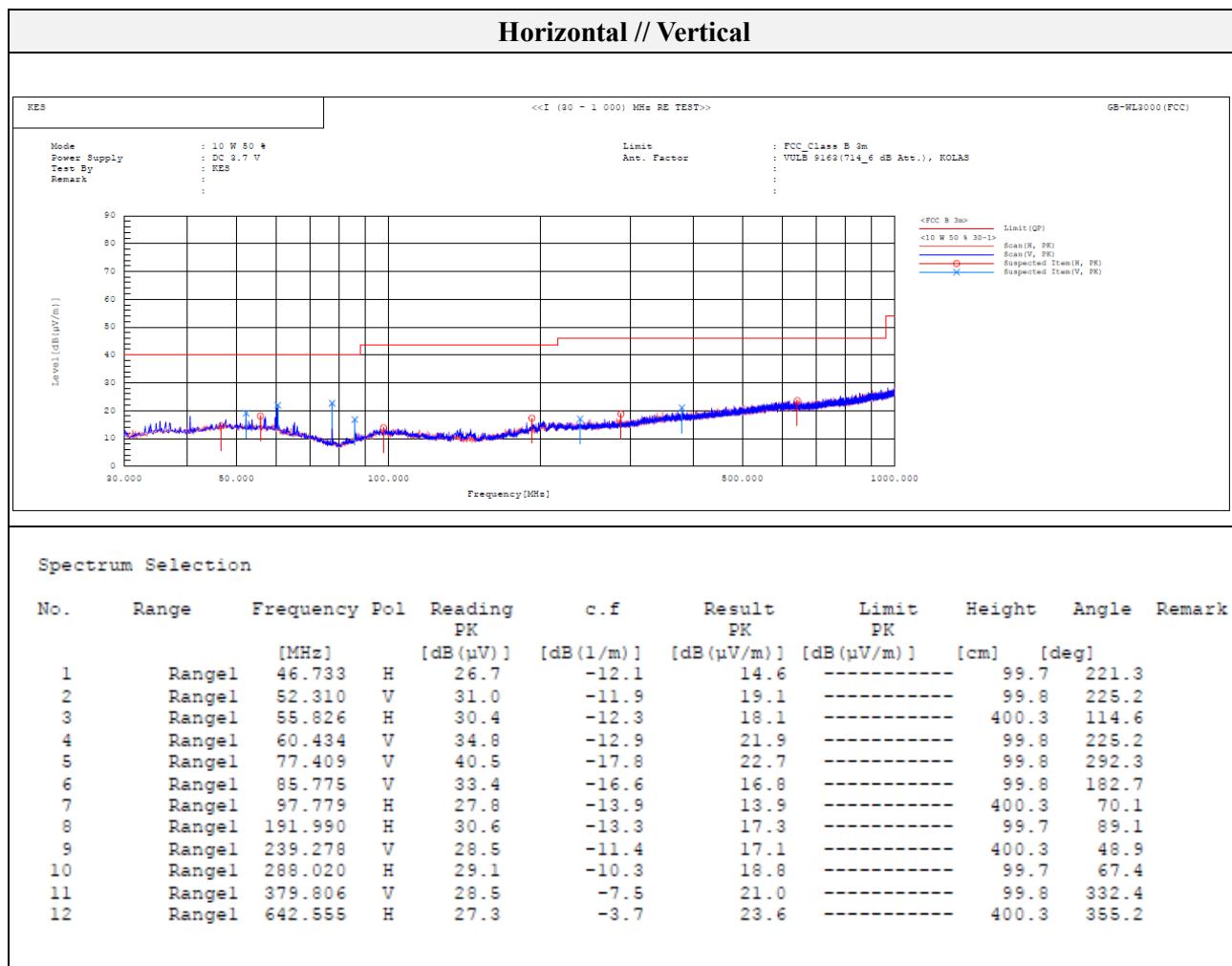
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Mode: **10 W // 50 % charge**

Distance of measurement: **3 meter**



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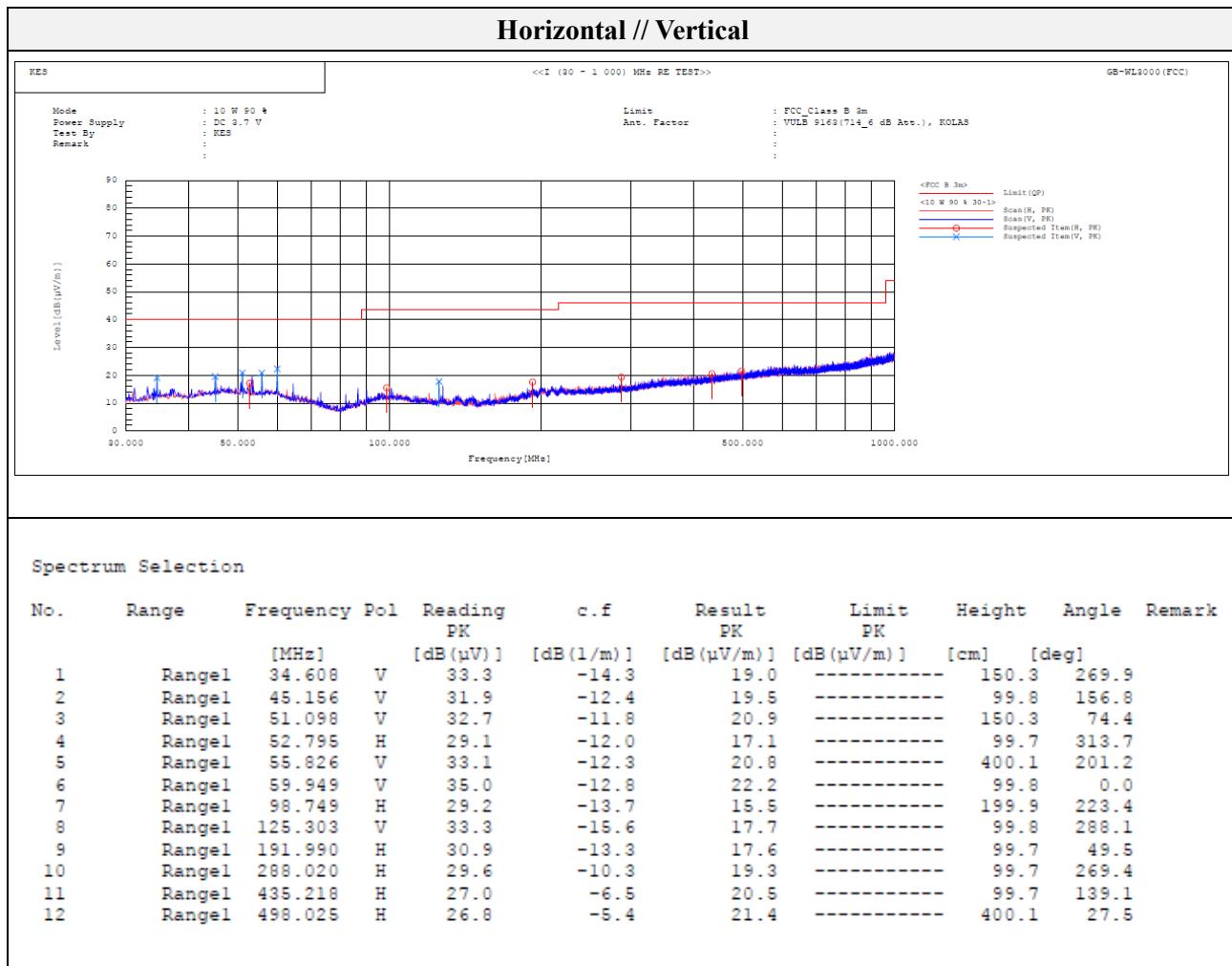


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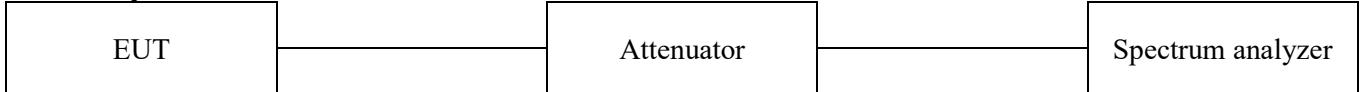
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Mode: 10 W // 90 % charge
Distance of measurement: 3 meter



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3.2. 20 dB Bandwidth

Test setup**Test procedures**

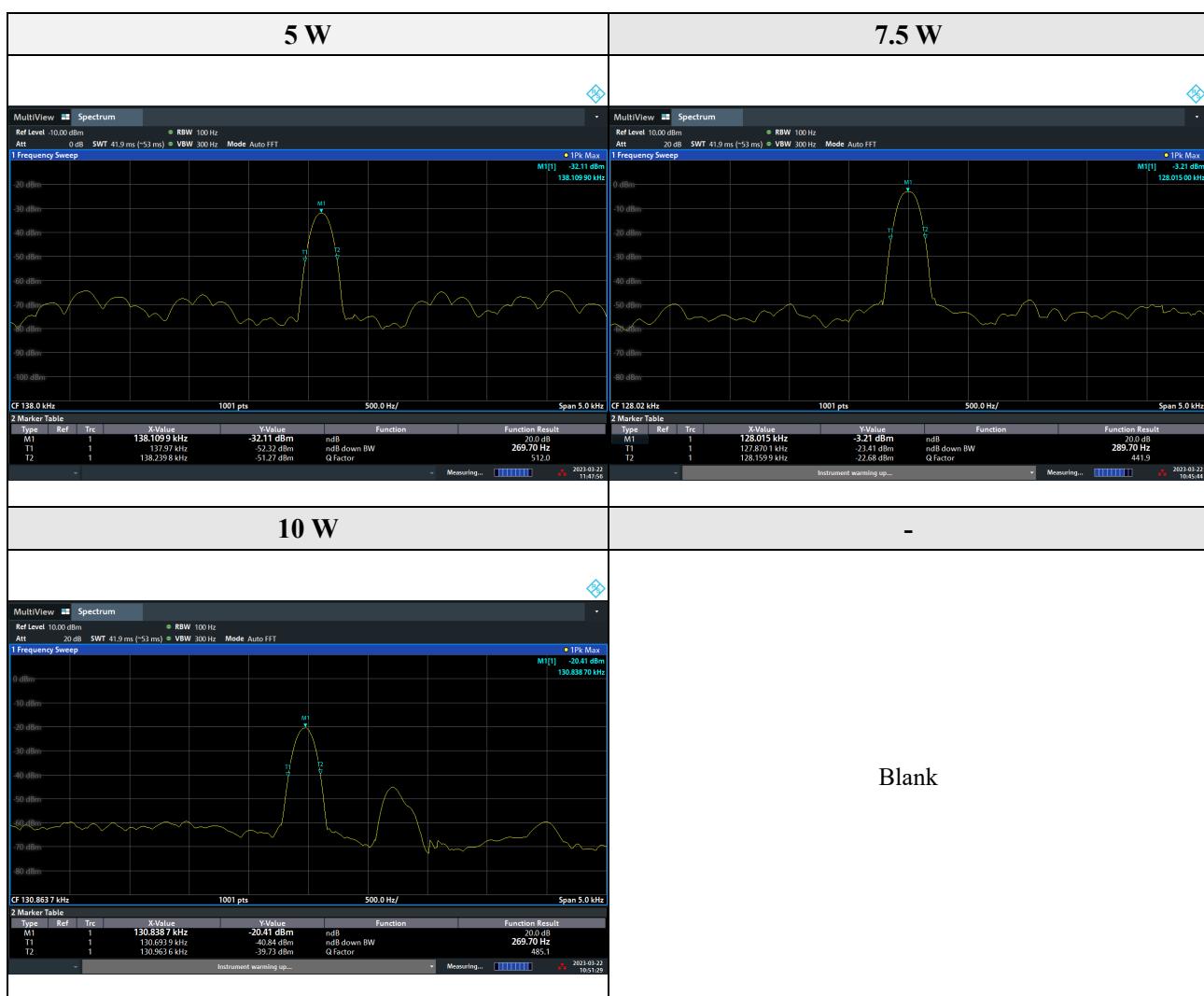
The transmitter output is connected to a spectrum analyzer. The RBW is set to $\geq 1\%$ of the emission bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

Limit

None; for reporting purposes only.

Test results

Test Mode	Frequency(MHz)	Measured bandwidth(kHz)
5 W	0.138	0.270
7.5 W	0.128	0.290
10 W	0.131	0.270



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 approximately 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 50uH/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

Test results

Mode: **10 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	2023.04.27
					2024.04.19
Loop Antenna	Schwarzbeck	FMZB1513	225	2 years	2025.01.16
TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	714	2 years	2024.04.19
Attenuator	HUBER+SUHNER	6806.17.A	-	1 year	2024.03.21
Amplifier	SONOMA INSTRUMENT	310N	186549	1 year	2024.03.21
EMI Test Receiver	R&S	ESU26	100517	1 year	2023.08.01
AC POWER SOURCE/ANALYZER	HP	6813A	3729A00754	1 year	2024.01.12
LISN	ENV216	R & S	101787	1 year	2023.11.10
EMI TEST RECEIVER	ESR3	R & S	101783	1 year	2023.11.11
PULSE LIMITER	ESH3-Z2	R & S	101915	1 year	2023.11.10

Peripheral device

Device	Manufacturer	Model No.	S/N	Note
Test Jig	-	-	-	-

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