FCC EMC Test Report

Report No.:	JYTSZ-R01-2400016
Applicant:	FuelBox INC DBA The Empower Project
Address of Applicant:	1311 Anacapa St, Santa Barbara, CA 93101, USA

Equipment Under Test (EUT)

Product Name:	Empower Dock
Model No.:	EDC100123, EDS100123
Trade Mark:	The Empowerr Project
FCC ID:	2BEWO-EDC100123
Applicable Standards:	FCC CFR Title 47 Part 15B
Date of Sample Receipt:	16 Jan., 2024
Date of Test:	17 Jan., to 01 Feb., 2024
Date of report Issued:	01 Feb., 2024
Test Result:	PASS

Project by:	Logan Li	***Date:***	*01 Feb., 2024*
	Project Engineer		
Reviewed by:	Peter Wang	***Date:***	*01 Feb., 2024*
	Senior Engineer		
Approved by:	Janet Wei	***Date:***	*01 Feb., 2024*
	Manager		

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

1 Version

Version No.	Date	Description
00	*01 Feb., 2024*	*Original*

2 Contents

Page

3 General Information

3.1 Client Information

Applicant:	FuelBox INC DBA The Empower Project
Address:	1311 Anacapa St, Santa Barbara, CA 93101, USA
Manufacturer/Factory:	Shenzhen Wayto Technology Co., Ltd
Address:	3rd Floor, Building B, Jinkaijin Industrial Zone, Shilongzai, Shiyan, Bao'an, Shenzhen, GD, CN (518108)

3.2 General Description of E.U.T.

Product Name:	Empower Dock
Model No.:	EDC100123, EDS100123
Power Supply:	Input: 5V, 3A / 9V, 2.22A / 12V, 1.67A Output: 5W, 7.5W, 10W, 15W
Test Sample Condition:	The test samples were provided in good working order with no visible defects.
Remark:	EDC100123, EDS100123 were identical inside, the electrical circuit design, layout, components used and internal wiring, with only different color.

3.3 Test Mode

Operating Mode	Detail Description
Working mode	Keep the EUT in Working mode
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

3.4 Description of Test Auxiliary Equipment

Manufacturer	Description	Model	S/N	FCC ID/DoC
Shenzhen Baijunda Electronics Co., LTD	Adapter	235C-020A-1A1C	N/A	DoC

3.5 Description of Cable Used

Cable Type	Description	Length	From	To
N/A	N/A	N/A	N/A	N/A

3.6 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Conducted Emission for LISN (9kHz ~ 150kHz)	3.57 dB
Conducted Emission for LISN (150kHz ~ 30MHz)	3.14 dB
Radiated Emission (30MHz ~ 200MHz) (10m SAC)	4.3 dB
Radiated Emission (200MHz ~ 1000MHz) (10m SAC)	4.3 dB
Note: *All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.*	

3.7 Additions to, Deviations, or Exclusions from the Method

No

3.8 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

- **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

3.9 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.
Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info-JYTee@lets.com, Website: http://jyt.lets.com

3.10 Test Instruments List

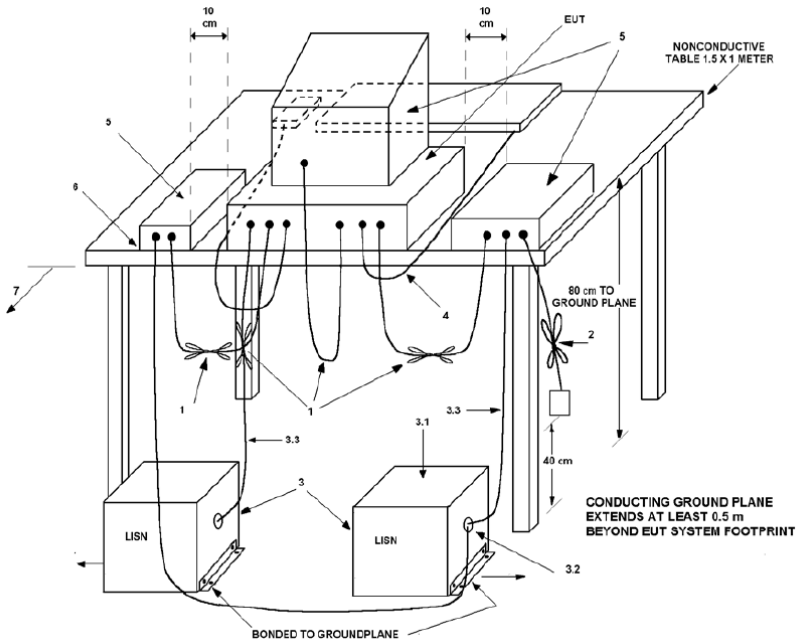
Radiated Emission(10m SAC):					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
10m SAC	ETS	RFSD-100-F/A	WXJ090	04-28-2021	04-27-2024
BiConiLog Antenna	SCHWARZBECK	VULB 9168	WXJ090-1	12-28-2023	12-27-2024
BiConiLog Antenna	SCHWARZBECK	VULB 9168	WXJ090-2	12-28-2023	12-27-2024
EMI Test Receiver	R&S	ESR 3	WXJ090-3	12-27-2023	12-26-2024
EMI Test Receiver	R&S	ESR 3	WXJ090-4	12-27-2023	12-26-2024
Low Pre-amplifier	Bost	LNA 0920N	WXJ090-6	12-27-2023	12-26-2024
Low Pre-amplifier	Bost	LNA 0920N	WXJ090-7	12-27-2023	12-26-2024
Cable	Bost	JYT10M-1G-NN-10M	WXG002-7	01-18-2023	01-17-2024
				01-17-2024	01-16-2025
Cable	Bost	JYT10M-1G-NN-10M	WXG002-8	01-18-2023	01-17-2024
				01-17-2024	01-16-2025
Test Software	R&S	EMC32	Version: 10.50.40		

Conducted Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Manage No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
EMI Test Receiver	Rohde & Schwarz	ESR3	WXJ003-2	07-05-2023	07-04-2024
LISN	Schwarzbeck	NSLK 8127	QCJ001-13	12-27-2023	12-26-2024
LISN	Rohde & Schwarz	ESH3-Z5	WXJ005-1	12-27-2023	12-26-2024
LISN Coaxial Cable (9kHz ~ 30MHz)	JYTSZ	JYTCE-1G-NN-2M	WXG003-1	01-18-2023	01-17-2024
				01-17-2024	01-16-2025
RF Switch	TOP PRECISION	RSU0301	WXG003	N/A	
Test Software	AUDIX	E3	Version: 6.110919b		

4 Measurement Setup and Procedure

4.1 Test Setup

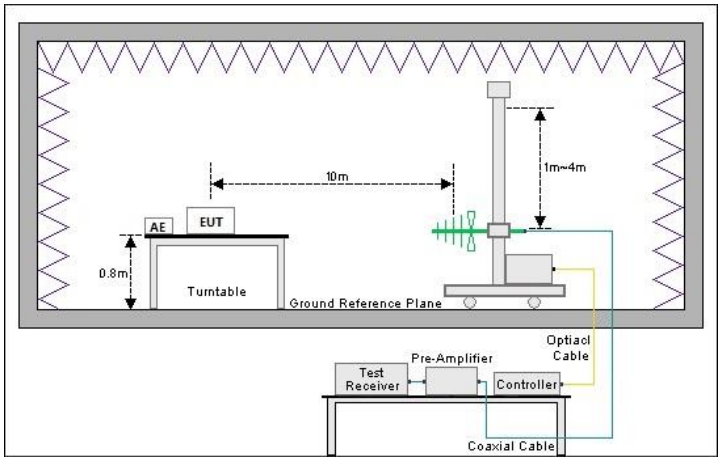
1) Conducted emission measurement:



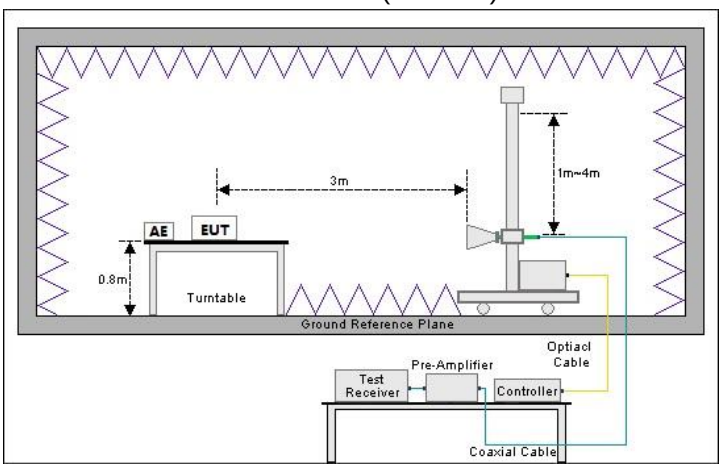
Note: The detailed descriptions please refer to Figure 8 of ANSI C63.4:2014.

2) Radiated emission measurement:

Below 1GHz (10m SAC)



Above 1GHz (3m SAC)



4.2 Test Procedure

Test method	Test step
Conducted emission	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.
Radiated emission	**For below 1GHz:** 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m or 10 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m or 10 m. 2. EUT works in each mode of operation that needs to be tested，and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data. **For above 1GHz:** 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested，and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.

5 Test Results

5.1 Summary

5.1.1 Clause and data summary

Test items	Standard clause	Test data	Result
Conducted Emission	Part 15.107	See Section 5.2	Pass
Radiated Emission	Part 15.109	See Section 5.3	Pass

Remark:

1. *The EUT is a **Class B** digital device.*
2. *Pass: The EUT complies with the essential requirements in the standard.*
3. *N/A: Not Applicable.*

Test Method:	*ANSI C63.4:2014*

5.1.2 Test Limit

Test items: Conducted Emission

Limit

Frequency (MHz)	Class A Limit (dBµV)		Class B Limit (dBµV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15 – 0.5	79	66	66 to 56 Note 1	56 to 46 Note 1
0.5 – 5	73	60	56	46
5 – 30	73	60	60	50

Note 1: The limit level in dBµV decreases linearly with the logarithm of frequency.
Note 2: The more stringent limit applies at transition frequencies.

Test items: Radiated Emission

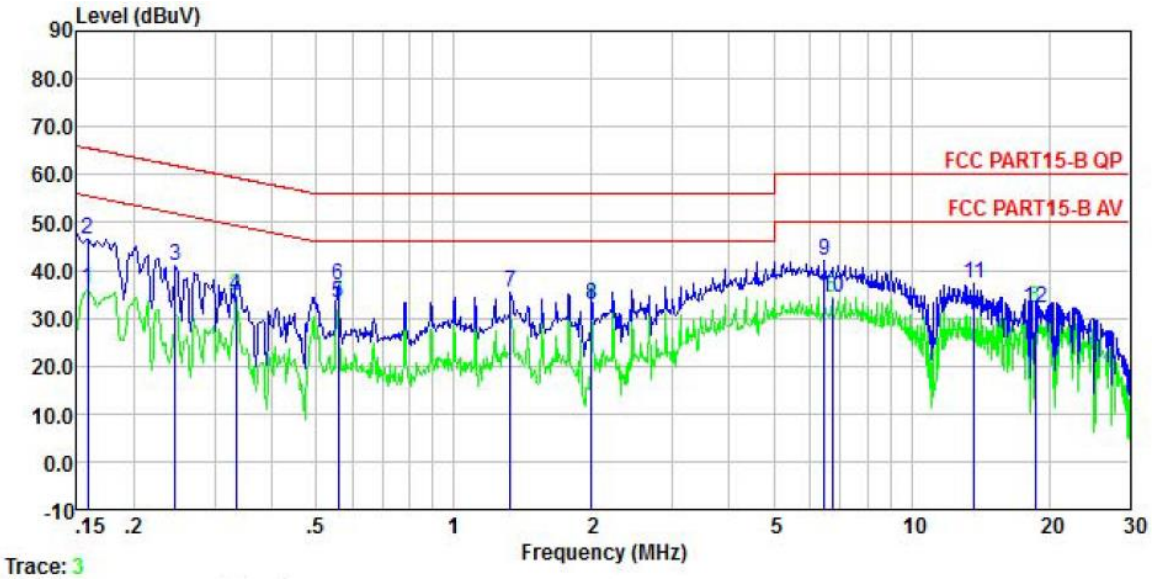
Limit

Frequency (MHz)	Class A Limit (dBµV/m)		Class B Limit (dBµV/m)	
	Quasi-Peak @ 3m	Quasi-Peak @ 10m	Quasi-Peak @ 3m	Quasi-Peak @ 10m
30 – 88	49.0	39.0	40.0	30.0
88 – 216	53.5	43.5	43.5	33.5
216 – 960	56.0	46.0	46.0	36.0
960 – 1000	60.0	50.0	54.0	44.0

Note: The more stringent limit applies at transition frequencies.

5.2 Conducted Emission

Product name:	Empower Dock	**Product model:**	EDC100123
Test by:	Asher	**Test mode:**	Working mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Line
Test voltage:	AC 120 V/60 Hz		

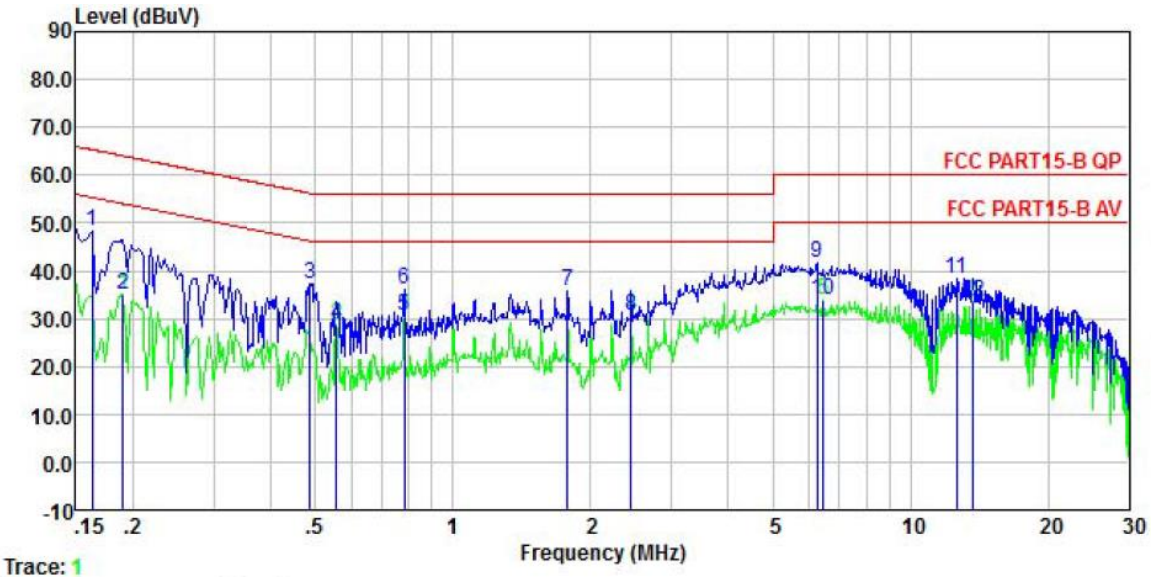


	Freq	Read Level	LISN Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.158	25.35	0.20	10.50	0.01	36.06	55.56	-19.50	Average
2	0.158	35.83	0.20	10.50	0.01	46.54	65.56	-19.02	QP
3	0.246	30.15	0.20	10.50	0.01	40.86	61.91	-21.05	QP
4	0.334	23.94	0.20	10.50	0.02	34.66	49.35	-14.69	Average
5	0.558	22.43	0.20	10.50	0.02	33.15	46.00	-12.85	Average
6	0.558	26.20	0.20	10.50	0.02	36.92	56.00	-19.08	QP
7	1.331	24.66	0.20	10.50	0.12	35.48	56.00	-20.52	QP
8	2.001	21.74	0.20	10.50	0.21	32.65	46.00	-13.35	Average
9	6.454	31.17	0.20	10.50	0.09	41.96	60.00	-18.04	QP
10	6.698	23.58	0.20	10.50	0.10	34.38	50.00	-15.62	Average
11	13.695	26.26	0.20	10.50	0.12	37.08	60.00	-22.92	QP
12	18.622	21.05	0.27	10.50	0.15	31.97	50.00	-18.03	Average

Remark:

1. Level = Read level + LISN Factor + Cable Loss.

Product name:	Empower Dock	Product model:	EDC100123
Test by:	Asher	Test mode:	Working mode
Test frequency:	150 kHz ~ 30 MHz	Phase:	Neutral
Test voltage:	AC 120 V/60 Hz		



	Freq	Read Level	LISN Factor	Aux2 Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1	0.162	37.51	0.20	10.50	0.01	48.22	65.34	-17.12	QP
2	0.190	24.32	0.20	10.50	0.03	35.05	54.02	-18.97	Average
3	0.486	26.42	0.20	10.50	0.03	37.15	56.23	-19.08	QP
4	0.555	18.19	0.20	10.50	0.02	28.91	46.00	-17.09	Average
5	0.783	20.03	0.20	10.50	0.03	30.76	46.00	-15.24	Average
6	0.783	25.44	0.20	10.50	0.03	36.17	56.00	-19.83	QP
7	1.781	24.84	0.28	10.50	0.18	35.80	56.00	-20.20	QP
8	2.448	19.56	0.30	10.50	0.14	30.50	46.00	-15.50	Average
9	6.252	30.85	0.30	10.50	0.09	41.74	60.00	-18.26	QP
10	6.454	22.97	0.30	10.50	0.09	33.86	50.00	-16.14	Average
11	12.582	27.39	0.40	10.50	0.11	38.40	60.00	-21.60	QP
12	13.695	22.44	0.40	10.50	0.12	33.46	50.00	-16.54	Average

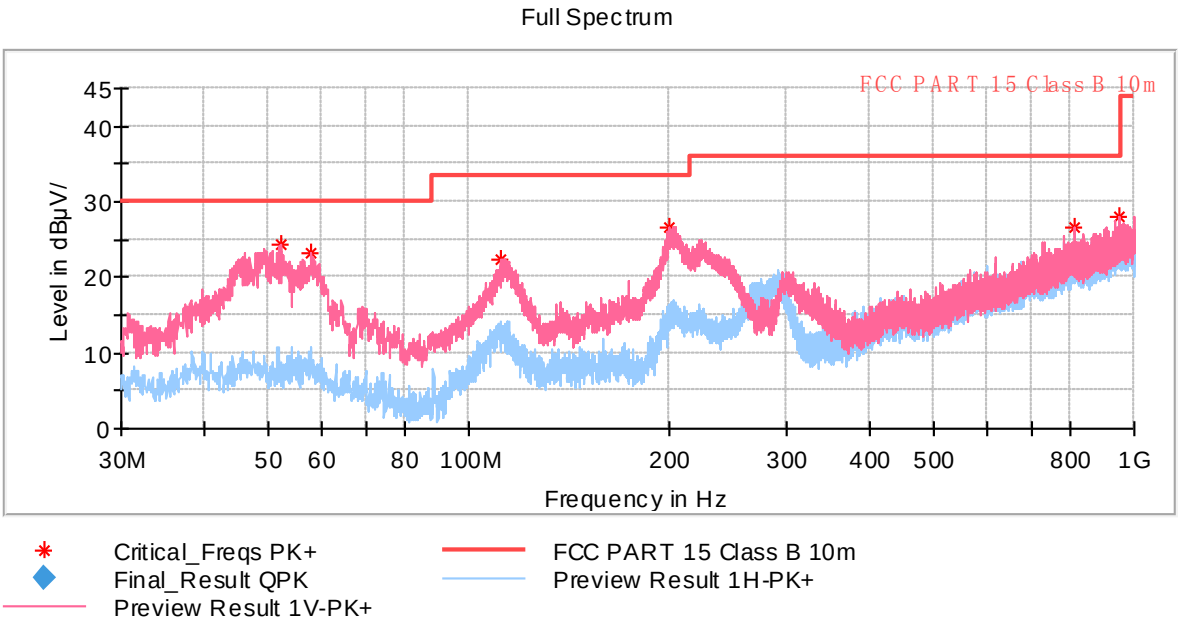
Remark:

1. Level = Read level + LISN Factor + Cable Loss.

5.3 Radiated Emission

Below 1GHz:

Product Name:	Empower Dock	**Product Model:**	EDC100123
Test By:	Asher	**Test mode:**	Working mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical & Horizontal
Test Voltage:	AC 120V/60Hz		



Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
112.013500	22.40	33.50	11.10	100.0	V	192.0	-18.2
52.019000	24.46	30.00	5.54	100.0	V	209.0	-16.4
200.283500	26.70	33.50	6.80	100.0	V	221.0	-18.3
949.269000	27.96	36.00	8.04	100.0	V	254.0	0.1
810.753000	26.49	36.00	9.51	100.0	V	335.0	-1.9
57.790500	23.34	30.00	6.66	100.0	V	340.0	-16.8

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

------End of report------