

Shenzhen Reecoo Electronic Co., Ltd.

TEST REPORT

SCOPE OF WORK

FCC Testing–DVX46

REPORT NUMBER

211210071SZN-001

ISSUE DATE

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Shenzhen Reecoo Electronic Co., Ltd.

Application
For
Certification

FCC ID: 2AZMB-DVX46**Vacuum Cleaner(Automatic battery-operated cleaner for household use)****Model: DVX46****Brand Name: yeedi**

Part 15 Class B Digital Devices

Report No.: 211210071SZN-001

Prepared and Checked by:**Approved by:****Draven Li**
Project Engineer

Sewen Guo
Senior Project Engineer
Date: 27 January 2022

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Intertek Testing Service Shenzhen Ltd. Longhua Branch

101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.
Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751

MEASUREMENT / TECHNICAL REPORT

This report concerns (check one:) Original Grant ☒ Class I Change ☐

Equipment Type: JAB - Part 15 Class B Digital Devices

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ☐ No ☒

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes ☐ No ☒

If no, assumed Part 15, Subpart B for unintentional radiator – the new 47 CFR [10-01-20 Edition] provision.

Report prepared by:

Draven Li
Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue,
Zhangkengjing Community, GuanHu Subdistrict, LongHua
District, Shenzhen, P.R. China
Phone: 86-755-8614 0684
Fax: 86-755-8601 6751

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Test Report

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1.0 SUMMARY OF TEST RESULT

Grantee: Shenzhen Reecoo Electronic Co., Ltd.

Grantee Address: Building 5-6, ShangLiLang Science and Technology Park, ShangLiLang community,
NanWan Street, LongGang district, ShenZhen city, Guangdong province, China**Model: DVX46****FCC ID: 2AZMB-DVX46**☒ Charging ☒ Cleaning

Test Specification	Reference	Results
Radiated Emission	15.107	Pass
Conducted Emission	15.109	Pass

2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a digital device, named Vacuum Cleaner(Automatic battery-operated cleaner for household use). The device is powered by Input: 100-240V~, 50-60Hz,70W; Output: 20VDC 2A via Dock Station or DC 14.4V rechargeable battery. For more detail information pls. refer to the user manual.

The EUT has multiple schemes of Drive motor, Side brush motor, Vacuum motor, Roller-motor and Strong mop brushless motor, they have same electric schematic and hardware, only difference in manufacturer. All schemes had been tested, but only worst-case(Drive motor model: PRI-365SV-14175, Side brush motor model: JLS-500K-11530, Vacuum motor model: BL2413O-007, Roller-motor model: 390PH-20143, Strong mop brushless motor model: BL3657I-019) data was reported in the report. Details as follows:

Component name	Model no.	Manufacturer
Drive motor	PRI-365SV-14175	PEAK INDUSTRIAL LTD.
	365SH-14165	DONGGUAN JILAISHENG MOTOR CO., LTD
Side brush motor	JLS-500K-11530	DONGGUAN JILAISHENG MOTOR CO., LTD
	PR-500EV-10470	PEAK INDUSTRIAL LTD.
Vacuum motor	BL2413O-007	DONGGUAN COUNTRY DREAM MOTOR CO., LTD
	20N704P110	NIDEC CORPORATION
Roller-motor	390PH-20143	DONGGUAN JILAISHENG MOTOR CO., LTD
	PR390-ST/20143/DV	STANDARD MOTOR
Strong mop brushless motor	BL3657I-019	DONGGUAN COUNTRY DREAM MOTOR CO., LTD
	BL3657	Nichibo Motor (Shenzhen) Co., Ltd

2.2 Related Submittal(s) Grants

This is an application for certification of Class B digital devices for the Vacuum Cleaner(Automatic battery-operated cleaner for household use).

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2014). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst-case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.4 Test Facility

The Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, ShenZhen, P.R. China. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

3.0 System Test Configuration

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2014).

The device was powered by DC 14.4V rechargeable battery with fully-charged during the test. Only the worst-case data was reported in the report.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. The step by step procedure for maximizing emissions led to the data reported in Section 4.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on turn table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

The frequency ranges from 30MHz to 12.5GHz was searched for spurious emissions from the device. Only those emissions reported were detected. All other emissions were at least 20 dB below the applicable limits.

3.2 EUT Exercising Software

N/A

3.3 Special Accessories

N/A

3.4 Equipment Modification

Any modifications installed previous to testing by Shenzhen Reecoo Electronic Co., Ltd. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

3.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

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Measurement Uncertainty	Uncertainty
AC conducted Emission	$\pm 3.6\text{dB}$
Radiated Emission (Up to 1GHz)	$\pm 4.8\text{dB}$
Radiated Emission (1GHz to 6GHz)	$\pm 4.8\text{dB}$
Radiated Emission (6GHz to 18GHz)	$\pm 5.1\text{dB}$

3.6 Support Equipment List and Description

Description	Manufacturer	Model No.
Docking Station (Self-cleaning Station)	Reecoo	CH2028
AC Power cable	N/A (Provided by Client)	N/A (Unshielded, Length $1.85 \pm 0.03\text{m}$)

4.0 Emission Results

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

4.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG$$

where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB/m

AG = Amplifier Gain in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG$$

Example

Assume a receiver reading of 62.0dB μ V is obtained. The antenna factor of 7.4dB/m and cable factor of 1.6dB is added. The amplifier gain of 29dB is subtracted. The net field strength for comparison to the appropriate emission limit is 42dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0\text{dB}\mu\text{V}$$

$$AF = 7.4\text{dB/m}$$

$$CF = 1.6\text{dB}$$

$$AG = 29.0\text{dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 = 42\text{dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(42\text{dB}\mu\text{V/m})/20] = 125.9\mu\text{V/m}$$

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4.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
At
10229.900000MHz (Charging Mode)

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf.

4.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 9.2dB margin (Charging Mode)

TEST PERSONNEL:

Sign on file

Draven Li, Project Engineer
Typed/Printed Name

23 December 2021
Date

Test Report

Intertek Report No.: 211210071SZN-001

Applicant: Shenzhen Reecoo Electronic Co., Ltd.

Date of Test: 23 December 2021

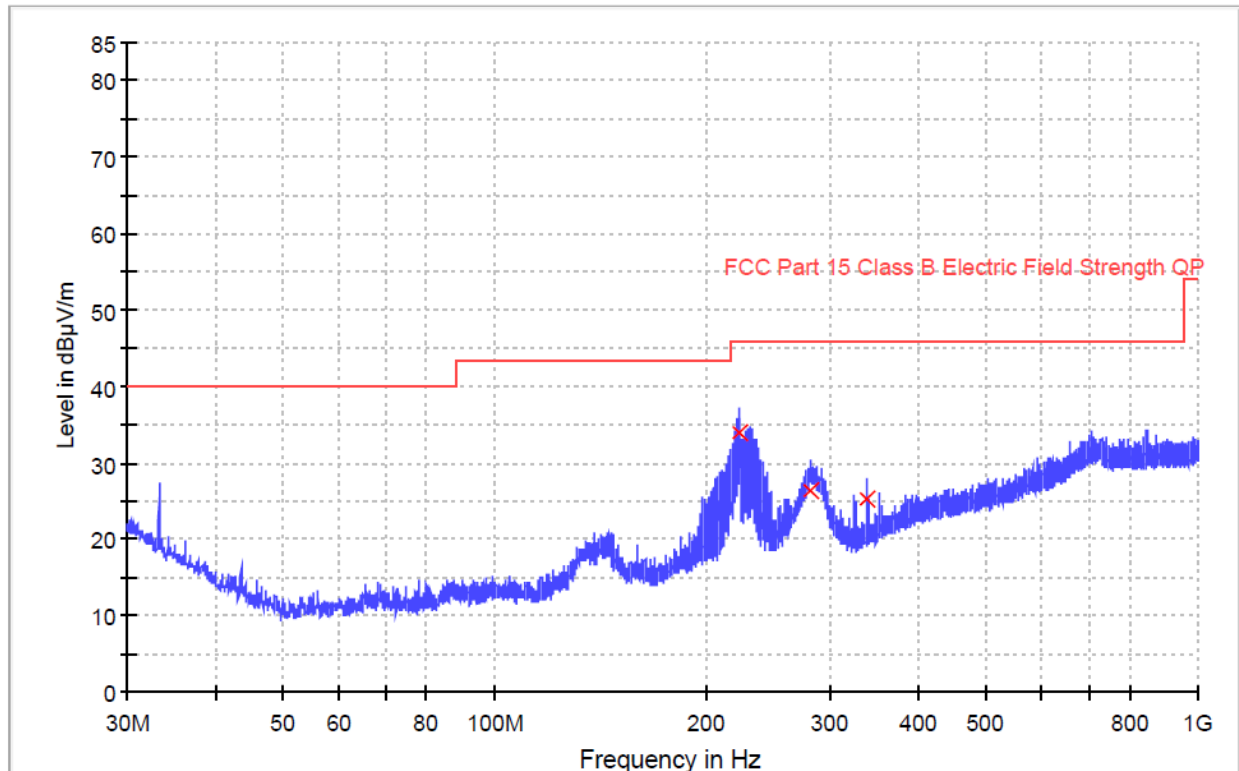
Model: DVX46

Worst Case Operating Mode:

Charging

Radiated Emission 30M-1GHz

Horizontal



Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
223.062333	34.0	1000.0	120.000	100.0	H	19.7	12.0	46.0
281.812000	26.3	1000.0	120.000	100.0	H	20.2	19.7	46.0
339.268333	25.3	1000.0	120.000	100.0	H	22.2	20.7	46.0

Remark:

1. Corr. (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBμV/m) = Corr. (dB/m) + Read Level (dBμV)
3. Margin (dB) = Limit Line(dBμV/m) – Level (dBμV/m)

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Intertek Report No.: 211210071SZN-001

Applicant: Shenzhen Reecoo Electronic Co., Ltd.

Date of Test: 23 December 2021

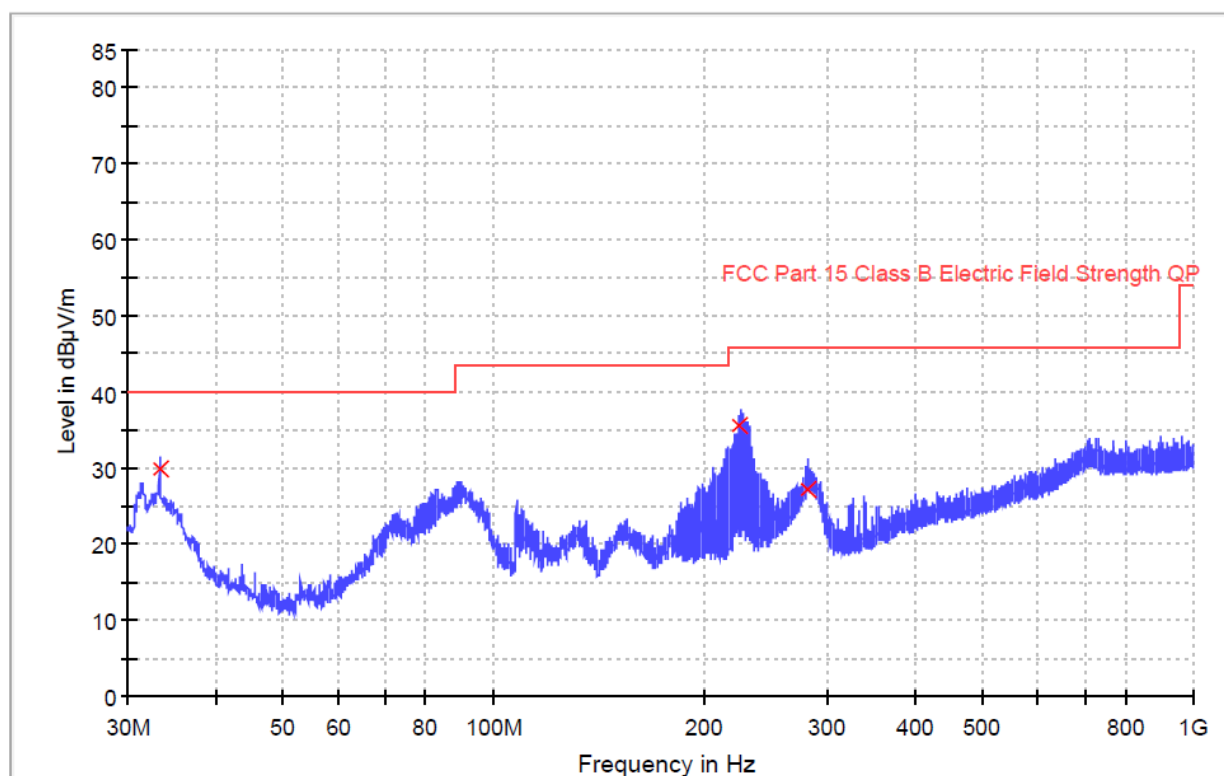
Model: DVX46

Worst Case Operating Mode:

Charging

Radiated Emission 30M-1GHz

Vertical



Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBμV/m)
33.298000	29.8	1000.0	120.000	100.0	V	20.8	10.2	40.0
224.064667	35.5	1000.0	120.000	100.0	V	19.7	10.5	46.0
280.777333	27.3	1000.0	120.000	100.0	V	20.2	18.7	46.0

Remark:

1. Corr. (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBμV/m) = Corr. (dB/m) + Read Level (dBμV)
3. Margin (dB) = Limit Line(dBμV/m) – Level (dBμV/m)

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Applicant: Shenzhen Reecoo Electronic Co., Ltd.

Date of Test: 23 December 2021

Model: DVX46

Worst Case Operating Mode:

Charging

Table 1

Above 1GHz

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)	Detector
Horizontal	4851.925000	45.9	36.6	28.9	38.2	74.0	-35.8	PK
Horizontal	6575.200000	43.9	36.3	37.0	44.6	74.0	-29.4	PK
Horizontal	9591.650000	44.9	36.4	39.3	47.8	74.0	-26.2	PK
Horizontal	4851.925000	40.0	36.6	28.9	32.3	54.0	-21.7	AV
Horizontal	6575.200000	38.2	36.3	37.0	38.9	54.0	-15.1	AV
Horizontal	9591.650000	40.2	36.4	39.3	43.1	54.0	-10.9	AV
Vertical	4306.825000	43.4	36.3	28.5	35.6	74.0	-38.4	PK
Vertical	6609.125000	44.0	36.5	36.8	44.3	74.0	-29.7	PK
Vertical	10229.900000	46.9	36.4	39.5	50.0	74.0	-24.0	PK
Vertical	4306.825000	38.1	36.3	28.5	30.3	54.0	-23.7	AV
Vertical	6609.125000	39.7	36.5	36.8	40.0	54.0	-14.0	AV
Vertical	10229.900000	41.7	36.4	39.5	44.8	54.0	-9.2	AV

Notes:

1. Quasi-Peak detector is used for frequency up to 1GHz, Peak detector and Average detector are used for frequency from 1GHz to 12.5GHz.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. All other emissions were at least 20 dB below the applicable limits.

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4.4 Conducted Emission at Mains Terminal

4.4.1 Conducted Emission Configuration Photograph

Worst Case Conducted Configuration
at
0.306000 MHz (Charging Mode)

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

4.5 Conducted Emission Data

Judgement: Passed by 12.5 dB margin(Charging Mode)

TEST PERSONNEL:

Sign on file

Draven Li, Project Engineer
Typed/Printed Name

23 December 2021
Date

Test Report

Intertek Report No.: 211210071SZN-001

Applicant: Shenzhen Reecoo Electronic Co., Ltd.

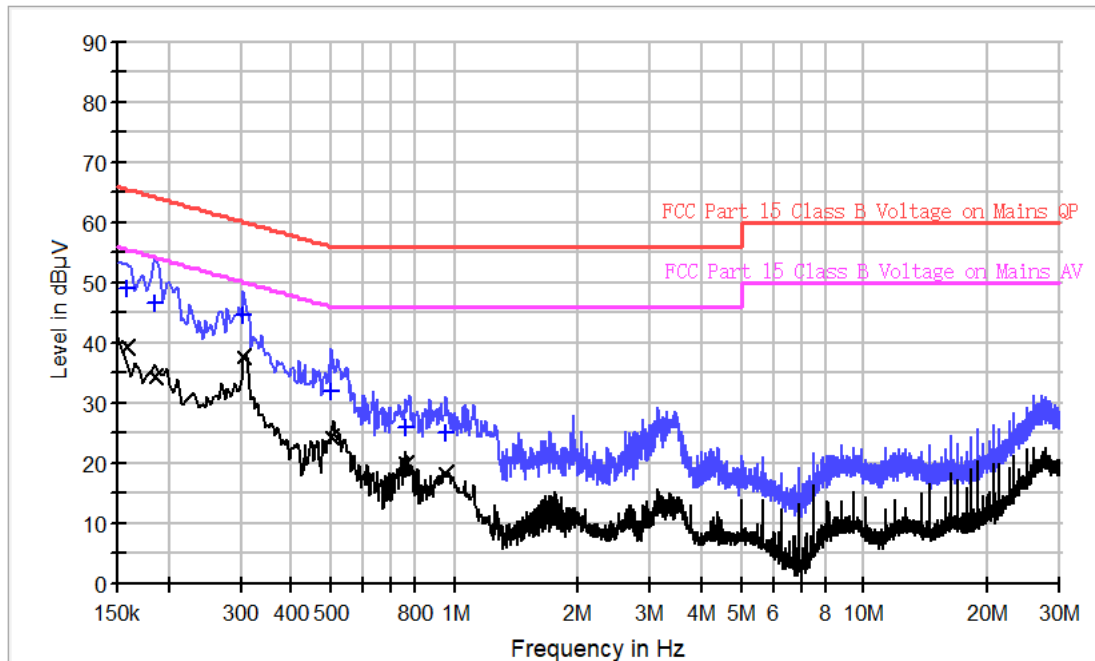
Date of Test: 23 December 2021

Model: DVX46

Operating Mode: Charging

Phase: Live

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	48.9	L	9.6	16.7	65.6
0.186000	46.8	L	9.6	17.4	64.2
0.306000	44.8	L	9.6	15.3	60.1
0.502000	32.0	L	9.6	24.0	56.0
0.754000	26.0	L	9.6	30.0	56.0
0.954000	25.0	L	9.6	31.0	56.0

Result Table AV

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.158000	39.3	L	9.6	16.3	55.6
0.186000	34.2	L	9.6	20.0	54.2
0.306000	37.6	L	9.6	12.5	50.1
0.502000	24.4	L	9.6	21.6	46.0
0.754000	20.1	L	9.6	25.9	46.0
0.954000	18.2	L	9.6	27.8	46.0

Test Engineer: Draven Li

Test Report

Intertek Report No.: 211210071SZN-001

Applicant: Shenzhen Reecoo Electronic Co., Ltd.

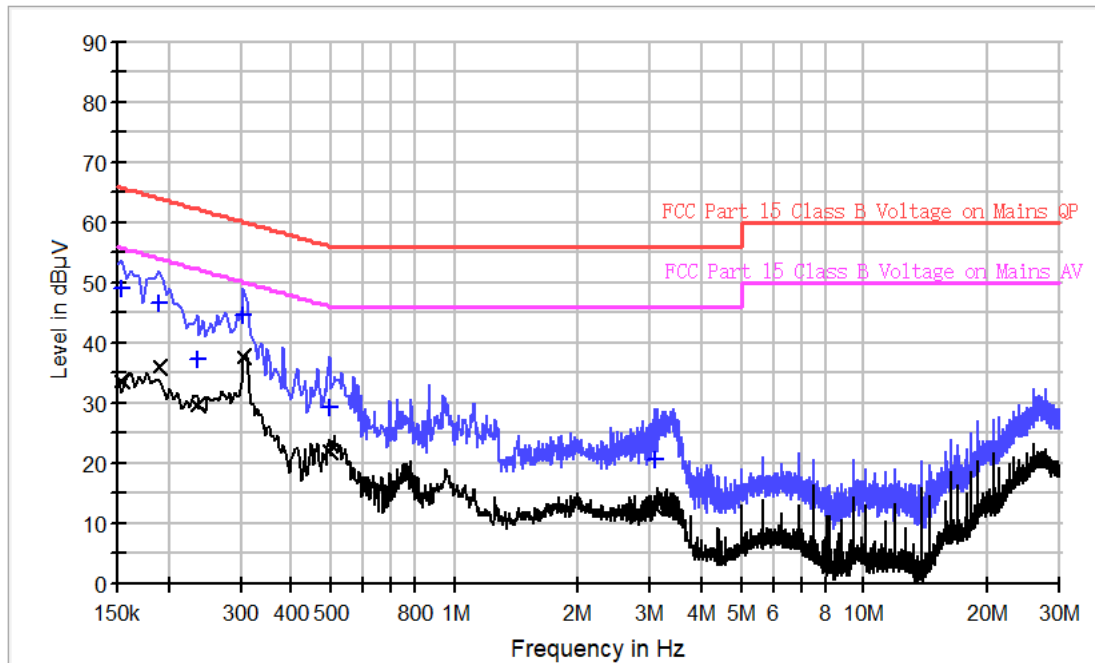
Date of Test: 23 December 2021

Model: DVX46

Operating Mode: Charging

Phase: Neutral

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154000	49.1	N	9.5	16.7	65.8
0.190000	46.5	N	9.5	17.5	64.0
0.234000	37.2	N	9.5	25.1	62.3
0.306000	44.8	N	9.5	15.3	60.1
0.494000	29.2	N	9.5	26.9	56.1
3.102000	20.7	N	9.5	35.3	56.0

Result Table AV

Frequency (MHz)	Average (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154000	33.8	N	9.5	22.0	55.8
0.190000	36.1	N	9.5	17.9	54.0
0.234000	29.6	N	9.5	22.7	52.3
0.306000	37.5	N	9.5	12.6	50.1
0.494000	22.1	N	9.5	24.0	46.1
3.102000	12.8	N	9.5	33.2	46.0

Test Engineer: Draven Li

5.0 Equipment Photographs

For electronic filing, photographs of the tested EUT are saved with filename: external photos.pdf and internal photos.pdf.

6.0 Product Labelling

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram of the tested EUT is saved with filename: block.pdf.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold / leased in the United States.

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9.0 Miscellaneous Information

This miscellaneous information includes emission measuring procedure.

9.1 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of digital devices operating under Part 15, Subpart B rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 – 2014.

The computer peripheral equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter and approximately 0.1 meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The antenna height and polarization are varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions are in QP mode from the frequency band 30MHz to 1GHz with RBW setting 120kHz and in PK & AV mode from frequency band 1GHz to 12.5GHz with RBW setting 1MHz. Detector function for conducted emissions are in QP & AV mode and IFBW setting is 9kHz from the frequency band 150kHz to 30MHz.

For radiated emission, the frequency range scanned is 30MHz to 12.5GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz with RBW setting 9KHz.

The EUT is warmed up for 15 minutes prior to the test.

Conducted measurements are made as described in ANSI C63.4 – 2014.

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10.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	04-Aug-2021	04-Aug-2024
SZ185-03	EMI Receiver	R&S	ESCI	100547	20-Dec-2021	20-Dec-2022
SZ061-08	Horn Antenna	ETS	3115	00092346	05-Sep-2021	05-Sep-2024
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	10-May-2021	10-May-2022
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	10-May-2021	10-May-2022
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	22-Dec-2021	22-Dec-2024
SZ062-23	RF Cable	RADIAL	SF104PE	--	26-Oct-2021	26-Oct-2022
SZ062-35	RF Cable	RADIAL	A50-3.5M3.5M-8M	--	26-Oct-2021	26-Oct-2022
SZ062-30	RF Cable	RADIAL	A50-3.5M3.5M-4.5M	--	26-Oct-2021	26-Oct-2022
SZ062-31	RF Cable	RADIAL	A50-3.5M3.5M-1M		26-Oct-2021	26-Oct-2022
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	12-Jul-2021	12-Jul-2022
SZ187-02	Two-Line V-Network	R&S	ENV216	100072	12-May-2021	12-May-2022
SZ062-16	RF Cable	HUBER+SUHNER	CBL2-BN-1m	110127-2231000	26-Oct-2021	26-Oct-2022
SZ188-03	Shielding Room	ETS	RFD-100	4100	07-Jan-2020	07-Jan-2023

*****End of Report*****