

Shenzhen Reecoo Electronic Co., Ltd.

TEST REPORT

SCOPE OF WORK

FCC Testing-CH2028

REPORT NUMBER

211210066SZN-001

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Shenzhen Reecoo Electronic Co., Ltd.

Application
For
Certification

FCC ID: 2AZMB-CH2028

Docking Station (Self-cleaning Station)

Model: CH2028

Brand Name: **yeedi**

Part 15 Class B Digital Devices

Report No.: 211210066SZN-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

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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
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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: CH2028

FCC ID: 2AZMB-CH2028

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

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2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a digital device, named Docking Station (Self-cleaning Station). The device is used to charge for Vacuum Cleaner, and is powered by Input: 100-240V~, 50-60Hz, 70W; Output: 20VDC 2A. For more detail information pls. refer to the user manual.

The EUT has multiple schemes of Air pump and Fan motor, they have same electric schematic and hardware, only difference in manufacturer. All schemes had been tested, but only worst-case (Air pump model: CJVP60-AA12A, Fan motor model: 07520GS-12NAT-02) data was reported in the report. Details as follows:

Component name	Model no.	Manufacturer
Air pump	CJVP60-AA12A6	Xiamen conjoin electronics technology Co., Ltd
	DQB500-FB	SHENZHEN DYX TECHNOLOGY CO. LTD
	SC6001PM	SKOOCOM ELECTRONIC CO., LTD
Fan motor	07520GS-12NAT-02	MinebeaMitsumi Inc.
	G75G12MS3ZZ-53ZB3	NIDEC CORPORATION

2.2 Related Submittal(s) Grants

This is an application for certification of Class B digital devices for the Docking Station (Self-cleaning Station).

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 AC 120V/60Hz 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.
Vacuum Cleaner	Reeco (Provided by Client)	DVX46
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
11174.325000MHz (Charging and washing 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 7.3dB margin (Charging and washing Mode)

TEST PERSONNEL:

Sign on file

Draven Li, Project Engineer
Typed/Printed Name

23 December 2021
Date

Test Report

Intertek Report No.: 211210066SZN-001

Applicant: Shenzhen Reecoo Electronic Co., Ltd.

Date of Test: 23 December 2021

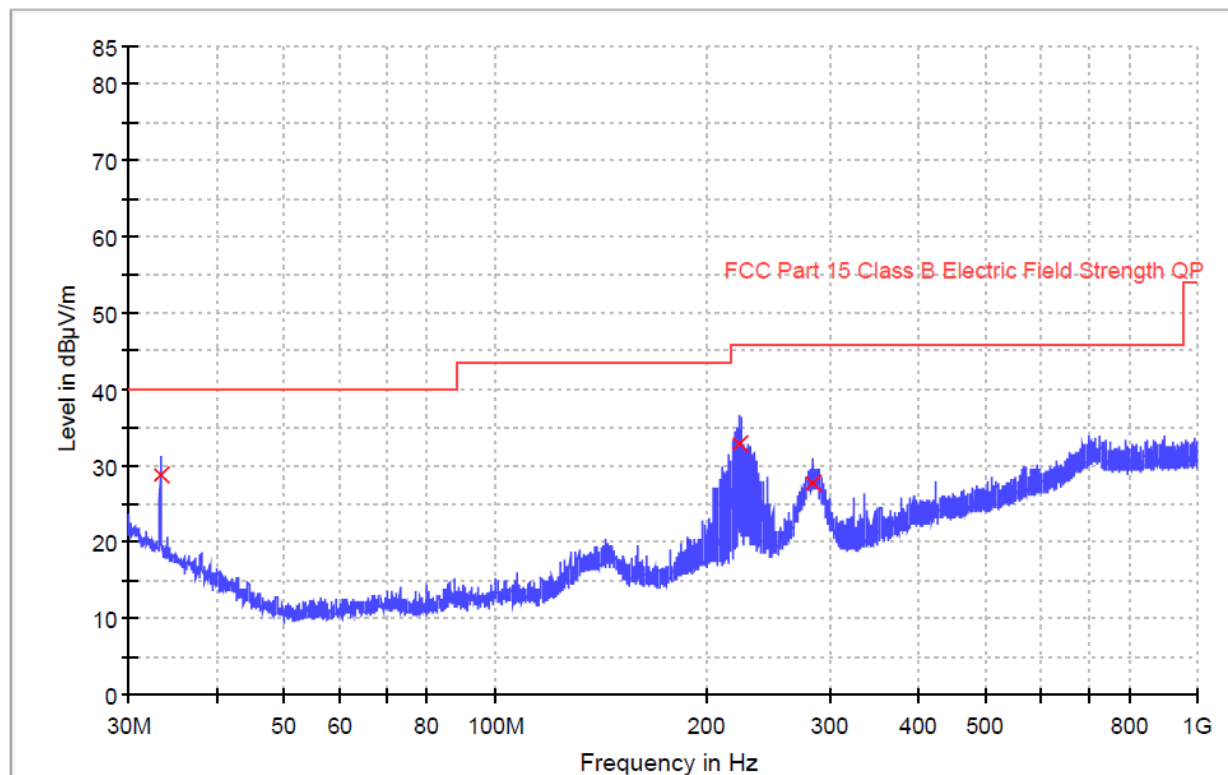
Model: CH2028

Worst Case Operating Mode:

Charging and washing

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)
33.298000	28.9	1000.0	120.000	100.0	H	20.8	11.1	40.0
222.480333	33.0	1000.0	120.000	100.0	H	19.7	13.0	46.0
283.946000	27.8	1000.0	120.000	100.0	H	20.2	18.2	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.: 211210066SZN-001

Applicant: Shenzhen Reecoo Electronic Co., Ltd.

Date of Test: 23 December 2021

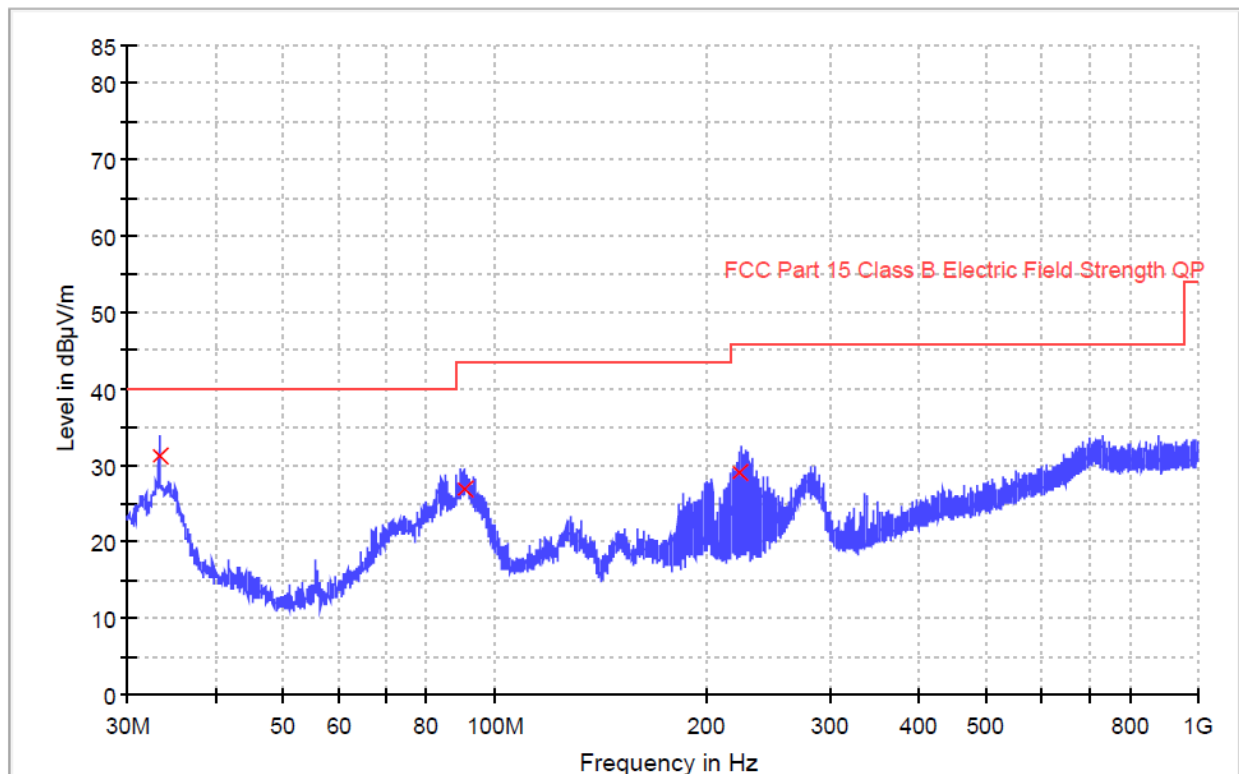
Model: CH2028

Worst Case Operating Mode:

Charging and washing

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)
33.330333	31.2	1000.0	120.000	100.0	V	20.8	8.8	40.0
90.883667	26.8	1000.0	120.000	100.0	V	13.9	16.7	43.5
222.448000	28.9	1000.0	120.000	100.0	V	19.7	17.1	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: CH2028

Worst Case Operating Mode:

Charging and washing

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	6026.000000	53.2	36.6	28.9	45.5	74.0	-28.5	PK
Horizontal	9509.350000	51.6	36.3	37.0	52.3	74.0	-21.7	PK
Horizontal	12102.575000	50.9	36.4	39.3	53.8	74.0	-20.2	PK
Horizontal	6026.000000	45.2	36.6	28.9	37.5	54.0	-16.5	AV
Horizontal	9509.350000	42.4	36.3	37.0	43.1	54.0	-10.9	AV
Horizontal	12102.575000	42.7	36.4	39.3	45.6	54.0	-8.4	AV
Vertical	6959.000000	52.9	36.3	28.5	45.1	74.0	-28.9	PK
Vertical	8792.012500	46.5	36.5	36.8	46.8	74.0	-27.2	PK
Vertical	11174.325000	49.3	36.4	39.5	52.4	74.0	-21.6	PK
Vertical	6959.000000	45.6	36.3	28.5	37.8	54.0	-16.2	AV
Vertical	8792.012500	42.5	36.5	36.8	42.8	54.0	-11.2	AV
Vertical	11174.325000	43.6	36.4	39.5	46.7	54.0	-7.3	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
0.154000 MHz (Charging and washing 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 12.2 dB margin(Charging and washing Mode)

TEST PERSONNEL:

Sign on file

Draven Li, Project Engineer
Typed/Printed Name

23 December 2021
Date

Test Report

Intertek Report No.: 211210066SZN-001

Applicant: Shenzhen Reecoo Electronic Co., Ltd.

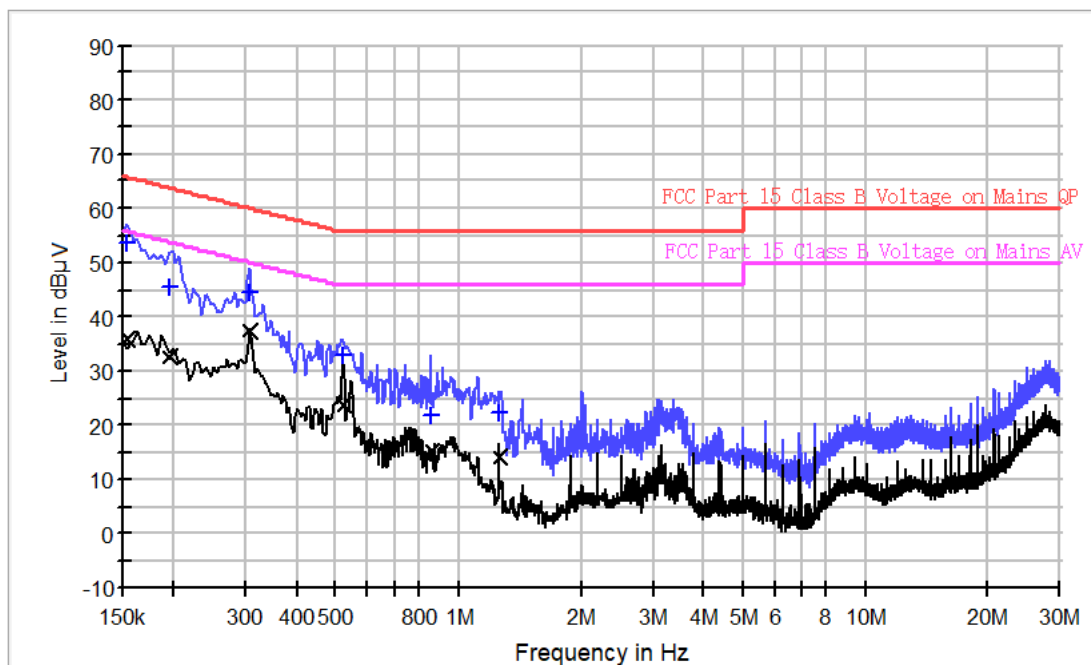
Date of Test: 23 December 2021

Model: CH2028

Operating Mode: Charging and washing

Phase: Live

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	53.6	L	9.6	12.2	65.8
0.194000	45.7	L	9.6	18.2	63.9
0.306000	44.3	L	9.6	15.8	60.1
0.522000	32.9	L	9.6	23.1	56.0
0.858000	21.7	L	9.6	34.3	56.0
1.258000	22.1	L	9.6	33.9	56.0

Result Table AV

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.154000	35.8	L	9.6	20.0	55.8
0.194000	32.5	L	9.6	21.4	53.9
0.306000	37.3	L	9.6	12.8	50.1
0.522000	23.7	L	9.6	22.3	46.0
0.858000	15.2	L	9.6	30.8	46.0
1.258000	14.0	L	9.6	32.0	46.0

Test Engineer: Draven Li

Test Report

Intertek Report No.: 211210066SZN-001

Applicant: Shenzhen Reecoo Electronic Co., Ltd.

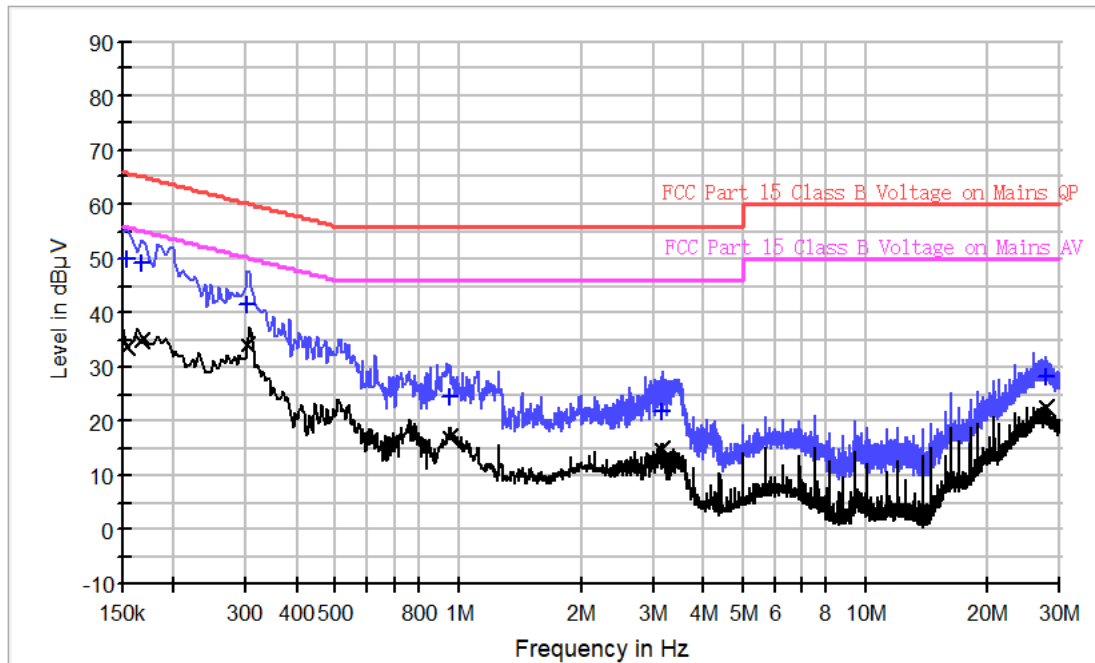
Date of Test: 23 December 2021

Model: CH2028

Operating Mode: Charging and washing

Phase: Neutral

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154000	50.0	N	9.5	15.8	65.8
0.166000	49.1	N	9.5	16.1	65.2
0.302000	41.6	N	9.5	18.6	60.2
0.946000	24.3	N	9.5	31.7	56.0
3.154000	21.8	N	9.5	34.2	56.0
27.678000	28.2	N	10.8	31.8	60.0

Result Table AV

Frequency (MHz)	Average (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154000	33.5	N	9.5	22.3	55.8
0.166000	34.8	N	9.5	20.4	55.2
0.302000	34.0	N	9.5	16.2	50.2
0.946000	17.1	N	9.5	28.9	46.0
3.154000	14.8	N	9.5	31.2	46.0
27.678000	22.8	N	10.8	27.2	50.0

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.

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.

Test Report

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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*****