EMC Test Report

Applicant: Shanghai Elecnova Energy Storage Co., Ltd.

Product: Energy Storage System

Model: ECO-E101WX

In accordance with EN IEC 61000-6-2, EN IEC 61000-6-4

Add value.
Inspire trust.

Prepared for: Shanghai Elecnova Energy Storage Co., Ltd.
T1-3F, Hongqiao Hui No. 990 Shenchang Road, Minhang District
214400 Shanghai PEOPLE'S REPUBLIC OF CHINA

COMMERCIAL-IN-CONFIDENCE

Report Number: 4840824381100

RESPONSIBLE FOR	NAME	SIGNATURE	DATE
Approved By	Dingpeng Xia	Dingpeng Xia	2024-11-15
Prepared By	Jin Cai	Jin Cai	2024-11-15

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

EXECUTIVE SUMMARY
A sample of this product was tested and found to be compliant with EN IEC 61000-6-2:2019, EN IEC 61000-6-4:2019.

TÜV SÜD Certification and Testing (China) Co., Ltd.
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ID Number: EMC_WUX_F_25.43E
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Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2024.11.15

1.2 Introduction

The information contained in this report is intended to show verification of the EMC Qualification Approval Testing of the requirements of the standards for the tests listed in Section 1.3.

Applicant	Shanghai Elecnova Energy Storage Co., Ltd.
Address	T1-3F, Hongqiao Hui No. 990 Shenchang Road, Minhang District 214400 Shanghai PEOPLE'S REPUBLIC OF CHINA
Manufacturer	Shanghai Elecnova Energy Storage Co., Ltd.
Address	T1-3F, Hongqiao Hui No. 990 Shenchang Road, Minhang District 214400 Shanghai PEOPLE'S REPUBLIC OF CHINA
Model	ECO-E101WX
Parameters	Rated DC Voltage: DC 844.8V Rated Capacity: 120Ah Rated AC Voltage: 3/N/PE, AC 230/400V Maximum AC Current: AC 148A Rated maximum power:100kW
Sample(s) Tested	ECO-E101WX
Test Specification	EN IEC 61000-6-2:2019, EN IEC 61000-6-4:2019.
Date of Receipt of EUT	2024.10.23
Start of Test	2024.10.23
Finish of Test	2024.10.31
Name of Engineer(s)	Jin Cai

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with EN IEC 61000-6-2, EN IEC 61000-6-4.

Section	Specification	Clause	Test Description	Result	Comments/Base Standard
Power on					
2.1	EN IEC 61000-6-4:2019	9 Table 3, 3.1,	Emission - Enclosure Port	Pass	--
2.2	EN IEC 61000-6-4:2019	9 Table 4, 4.1,	Emission - Conducted Disturbance	Pass	--
2.3	EN IEC 61000-6-2:2019	9 Table 1, 1.4,	Immunity - Enclosure Port - Electrostatic Discharge	Pass	IEC 61000-4-2
2.4	EN IEC 61000-6-2:2019	9 Table 1, 1.2,1.3	Immunity - Enclosure ports - Radio-frequency electromagnetic field. Amplitude modulated	Pass	IEC 61000-4-3
2.5	EN IEC 61000-6-2:2019	9 Table 1, 1.1	Immunity - Enclosure ports - Power-frequency magnetic field	Pass	IEC 61000-4-8
2.6	EN IEC 61000-6-2:2019	9 Table 4, 4.5	Immunity - Fast transients	Pass	IEC 61000-4-4
2.7	EN IEC 61000-6-2:2019	9 Table 4, 4.4	Immunity - Surges	Pass	IEC 61000-4-5
2.8	EN IEC 61000-6-2:2019	9 Table 4 4.1	Immunity - Radio-frequency common mode	Pass	IEC 61000-4-6
2.9	EN IEC 61000-6-2:2019	9 Table 4 4.2, 4.3	Voltage dips, short interruptions and voltage variations immunity tests	Pass	IEC 61000-4-11

1.4 Product Information

1.4.1 Technical Description

The Equipment Under Test (EUT) is Energy Storage System.

1.4.2 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
AC Main power port	--	Main power	L1, L2, L3, N, PE	No

1.4.3 Test Configuration

Configuration	Description
1	Power on, normal working, with Magnet Ring, Keep EUT monitoring and data running continual, by process control

1.4.4 Modes of Operation

Mode	Description
1	discharge mode: Keep EUT monitoring and data running continual, by software.
2	charging mode: Keep EUT monitoring and data running continual, by notebook software

1.4.5 Monitoring of Performance

The EUT works normally. Keep EUT monitoring and data running continual, by process control.

1.4.6 Performance Criteria

Performance criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonable expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however no change of actual operating state or stored data is allowed to persist after test. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and from what the user may reasonable expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

1.6 Test Location

Suzhou Institute of Product Quality Supervision and Inspection.

Address: No.6, Xiexing Road, Caohu Street, Xiangcheng District, Suzhou, Jiangsu, China.

Test Name	Name of Engineer(s)
Emission - Enclosure port	Jin Cai
Emission - Conducted Disturbance	Jin Cai
Immunity - Enclosure ports - Electrostatic Discharge	Jin Cai
Immunity - Enclosure ports - Radio-frequency electromagnetic field. Amplitude modulated	Jin Cai
Immunity - Enclosure ports - Power-frequency magnetic field	Jin Cai
Immunity - Fast transients	Jin Cai
Immunity - Surges	Jin Cai
Immunity - Radio-frequency common mode	Jin Cai
Immunity - Voltage dips, short interruptions and voltage variations immunity tests	Jin Cai

2 Test Details

2.1 Emission - Enclosure port

2.1.1 Specification Reference

EN IEC 61000-6-4:2019, Clause 9 Table 3, 3.1,

2.1.2 Equipment Under Test

ECO-E101WX

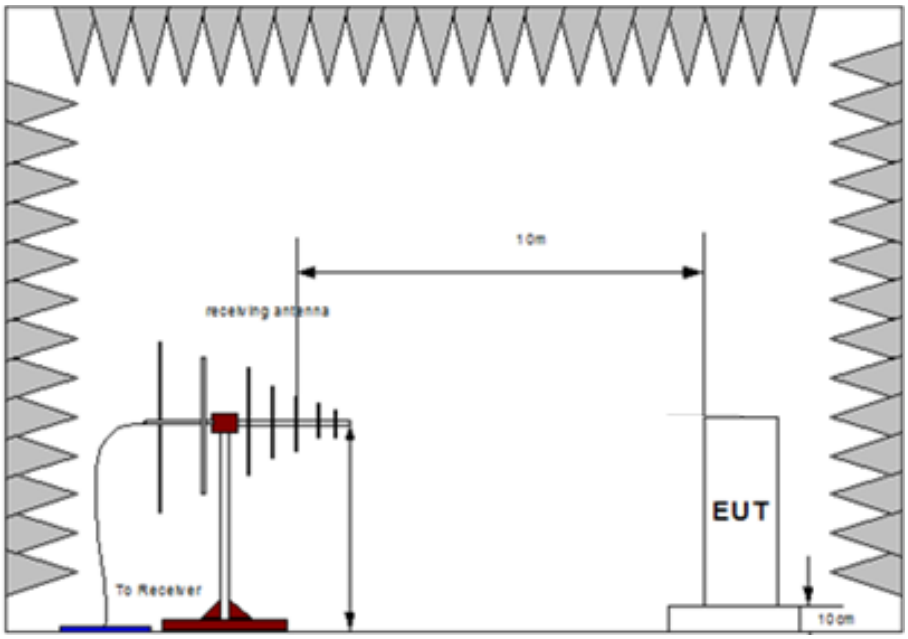
2.1.3 Date of Test

2024.10.23

2.1.4 Test Method

The EUT was set up in a semi-anechoic chamber on a remotely controlled turntable and placed on a non-conductive support 0.1m above a reference ground plane.
A prescan of the EUT emissions profile was made while varying the antenna-to-EUT azimuth and antenna-to-EUT polarization using a peak detector; measurements were taken at a 10m distance. Using the prescan list of the highest emissions detected, their bearing and associated antenna polarization, the EUT was then formally measured using Quasi-Peak and Average detectors, as appropriate. The readings were maximized by adjusting the antenna height, polarization and turntable azimuth, in accordance with the specification

30 MHz-1000MHz



2.1.5 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	52 %
Atmospheric Pressure	1012.5 mbar

2.1.6 Specification Limits

Port	Frequency range	Limits	Remarks
Enclosure Test facility: OATS or SAC	30 MHz to 230 MHz 230 MHz to 1000 MHz	40 dB(µV/m) quasi-peak at 10 m 47 dB(µV/m) quasi-peak at 10 m	May be measured at 3 m distance using the limits increased by 10 dB.
Enclosure Test facility: OATS, SAC or FAR	1 GHz to 3 GHz	76 dB(µV/m) peak at 3 m 56 dB(µV/m) average at 3 m	May be measured at greater distance with the limits decreased by 20 dB/decade (relative to distance)
	3 GHz to 6 GHz	80 dB(µV/m) peak at 3 m 60 dB(µV/m) average at 3 m	
NOTE: For apparatus containing devices operating at frequencies less than 9 kHz measurements only need to be performed up to 230 MHz. If the highest internal frequency of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz. If the highest internal frequency of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz. If the highest internal frequency of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz. If the highest internal frequency of the EUT is above 1 GHz, the measurement shall be made up to 6 GHz. Where the highest internal frequency if not known, tests shall be performed up to 6 GHz. At transitional frequencies the lower limit applies.			

2.1.7 Test Results

Results for Configuration and Mode: Configuration 1, Mode1, 2

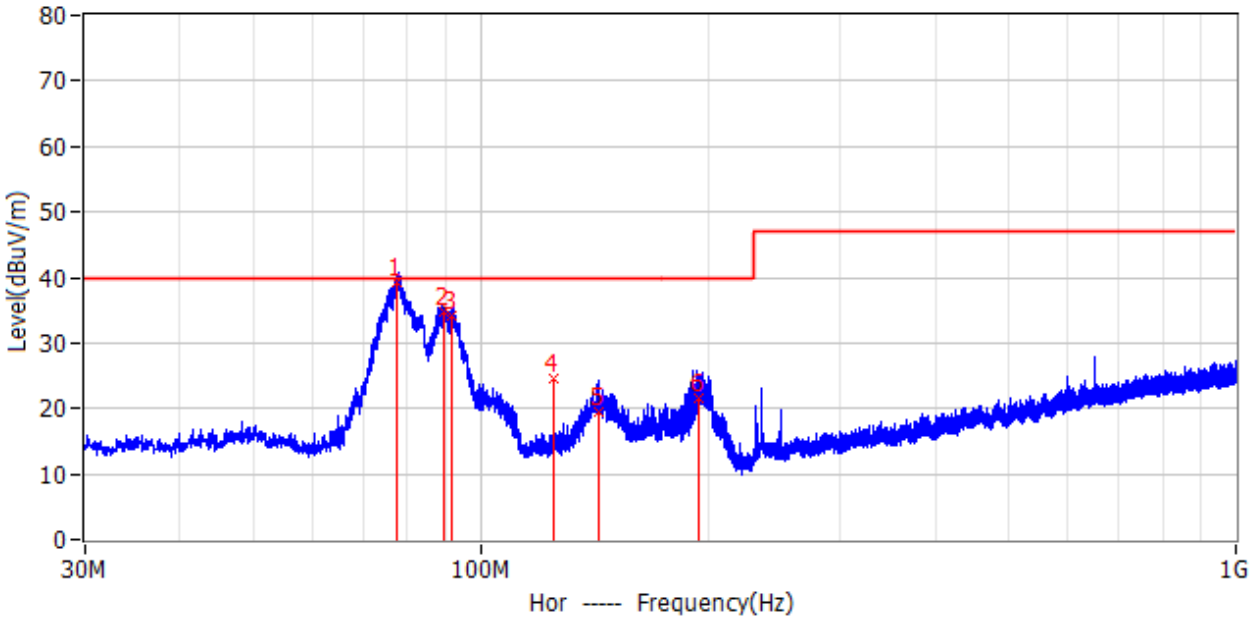
Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

The highest internal frequency of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.

Common Information

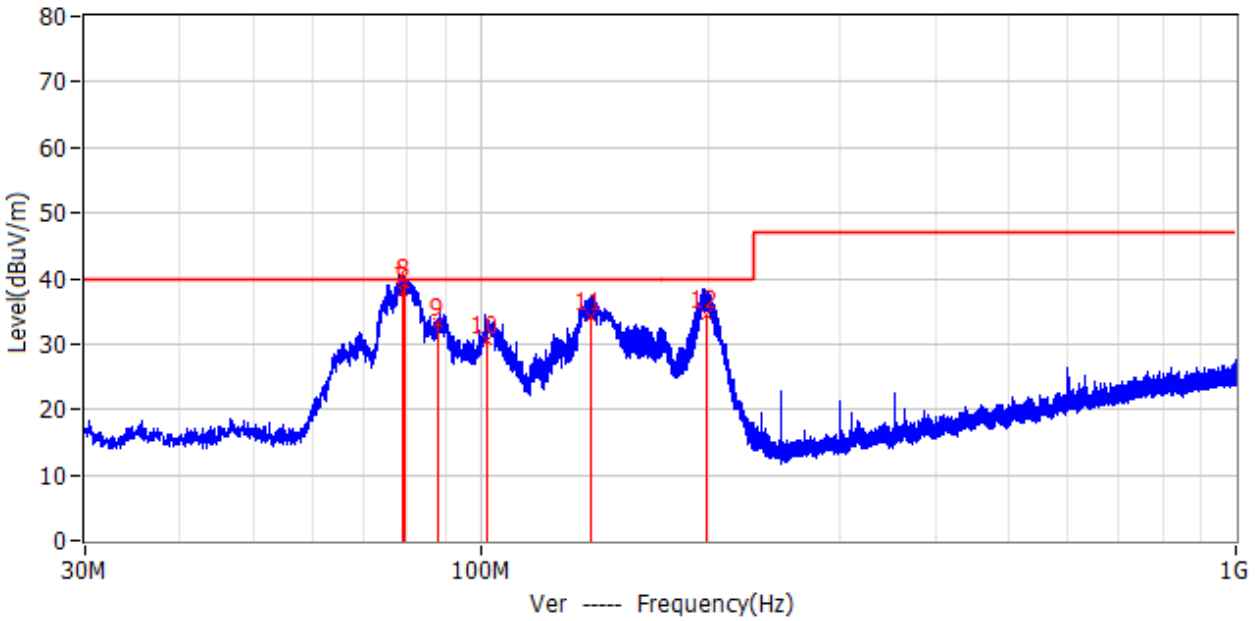
Test Description:	30-1000MHz Radiated Emission
EUT:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 1
Operator Name:	Jin Cai
Test Standard:	EN IEC 61000-6-4
Comment:	Horizontal,



No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Angle deg
1	77.703MHz	40.0	39.3	0.7	53.4	-14.1	QP	Hor	0.0
2	89.503MHz	40.0	34.8	5.2	50.7	-15.9	QP	Hor	65.0
3	91.490MHz	40.0	34.1	5.9	49.9	-15.8	QP	Hor	1.0
4	124.989MHz	40.0	24.5	15.5	36.9	-12.4	QP	Hor	46.0
5	143.269MHz	40.0	19.6	20.4	30.1	-10.5	QP	Hor	32.0
6	194.815MHz	40.0	21.6	18.4	34.7	-13.1	QP	Hor	27.0

Common Information

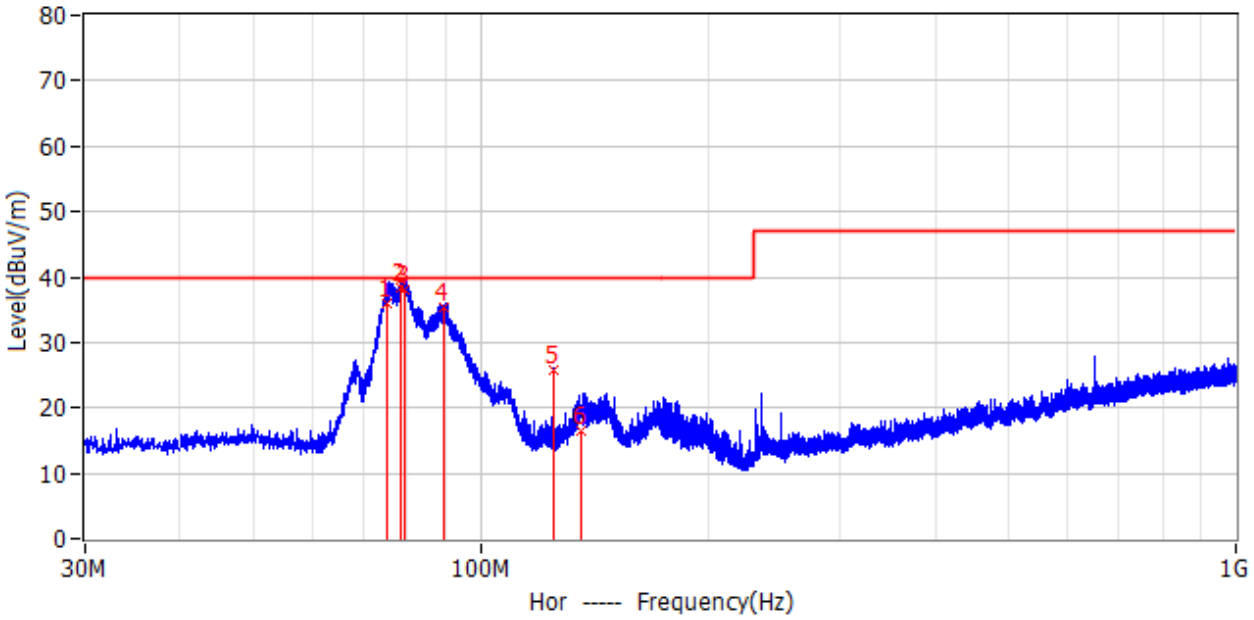
Test Description:	30-1000MHz Radiated Emission
EUT:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 1
Operator Name:	Jin Cai
Test Standard:	EN IEC 61000-6-4
Comment:	Vertical



No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Angle deg
1	78.901MHz	40.0	38.0	2.0	52.5	-14.5	QP	Ver	201.0
2	79.536MHz	40.0	39.3	0.7	54.0	-14.7	QP	Ver	212.0
3	87.676MHz	40.0	33.3	6.7	49.5	-16.2	QP	Ver	185.0
4	101.786MHz	40.0	30.6	9.4	44.9	-14.3	QP	Ver	160.0
5	140.464MHz	40.0	34.2	5.8	44.9	-10.7	QP	Ver	4.0
6	198.771MHz	40.0	34.5	5.5	47.7	-13.2	QP	Ver	359.0

Common Information

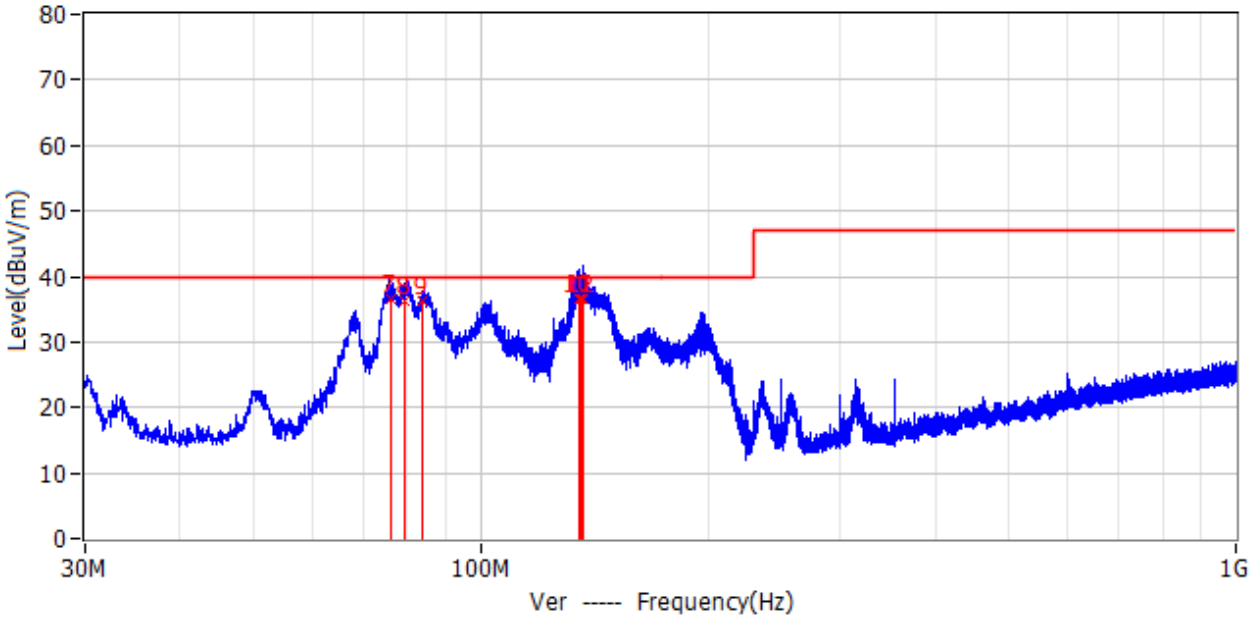
Test Description:	30-1000MHz Radiated Emission
EUT:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 2
Operator Name:	Jin Cai
Test Standard:	EN IEC 61000-6-4
Comment:	Horizontal,



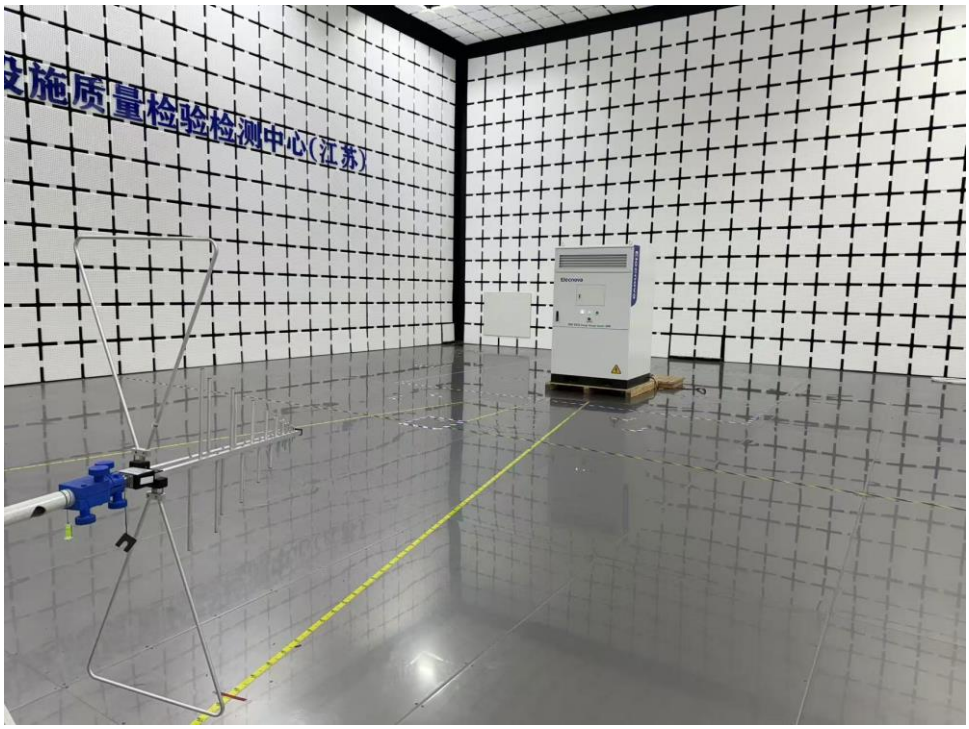
No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Angle deg
1	75.361MHz	40.0	36.1	3.9	49.6	-13.5	QP	Hor	2.0
2	78.433MHz	40.0	38.3	1.7	52.7	-14.4	QP	Hor	0.0
3	79.379MHz	40.0	38.0	2.0	52.6	-14.6	QP	Hor	0.0
4	89.576MHz	40.0	35.5	4.5	51.4	-15.9	QP	Hor	56.0
5	125.009MHz	40.0	25.8	14.2	38.2	-12.4	QP	Hor	50.0
6	135.873MHz	40.0	16.6	23.4	27.8	-11.2	QP	Hor	212.0

Common Information

Test Description:	30-1000MHz Radiated Emission
EUT:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 2
Operator Name:	Jin Cai
Test Standard:	EN IEC 61000-6-4
Comment:	Vertical



No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Angle deg
1	76.339MHz	40.0	36.5	3.5	50.2	-13.7	QP	Ver	195.0
2	79.355MHz	40.0	36.3	3.7	50.9	-14.6	QP	Ver	12.0
3	84.037MHz	40.0	36.4	3.6	52.1	-15.7	QP	Ver	343.0
4	135.048MHz	40.0	36.5	3.5	47.8	-11.3	QP	Ver	354.0
5	135.690MHz	40.0	36.6	3.4	47.8	-11.2	QP	Ver	0.0
6	136.550MHz	40.0	36.5	3.5	47.6	-11.1	QP	Ver	359.0



Test Setup

2.1.8 Test Location

This test was carried out in Suzhou Institute of Product Quality Supervision and Inspection.

2.2 Emission - Conducted Disturbance

2.2.1 Specification Reference

EN IEC 61000-6-4:2019, Clause 9 Table 4, 4.1

2.2.2 Equipment Under Test

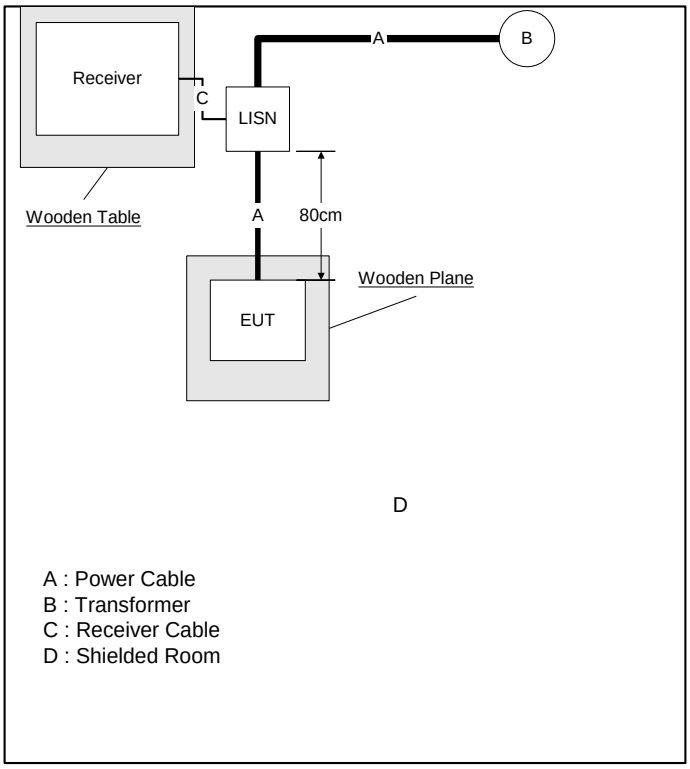
ECO-E101WX

2.2.3 Date of Test

2024.10.23

2.2.4 Test Method

The EUT was placed on a non-conductive support 0.1 m above a reference ground plane
All power was connected to the EUT through an Artificial Mains Network (AMN). Conducted disturbance voltage measurements on mains lines were made at the output of the AMN. The AMN was placed 0.8 m from the boundary of the EUT and bonded to the reference ground plane.



2.2.5 Environmental Conditions

Ambient Temperature	21.2 °C
Relative Humidity	52 %
Atmospheric Pressure	1012.5 mbar

2.2.6 Specification Limits

Port	Frequency range	Limits	Remarks
AC Power	0.15 MHz to 0.5 MHz	79 dB(µV) quasi-peak a* 66 dB(µV) average a*	-
	0.5 MHz to 30 MHz	73 dB(µV) quasi-peak 60 dB(µV) average	-
			-
a*: The limits decrease linearly with the logarithm of the frequency. At transitional frequencies the lower limit applies.			

2.2.7 Test Results

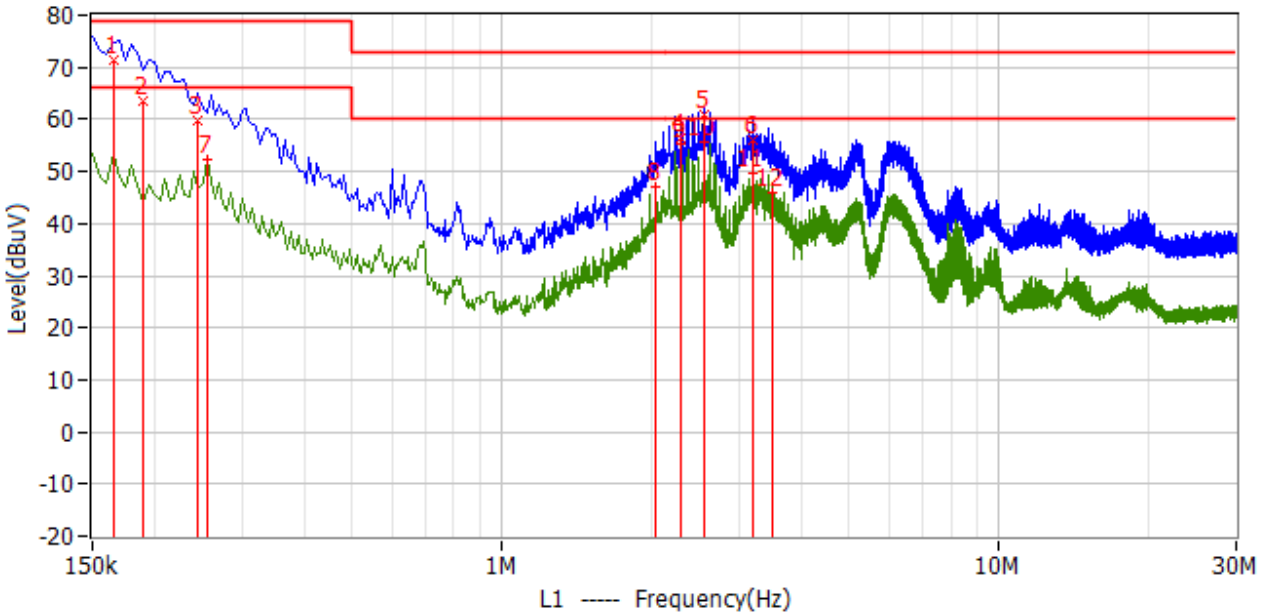
Results for Configuration and Mode: Configuration 1, Mode1, 2.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

EUT Information

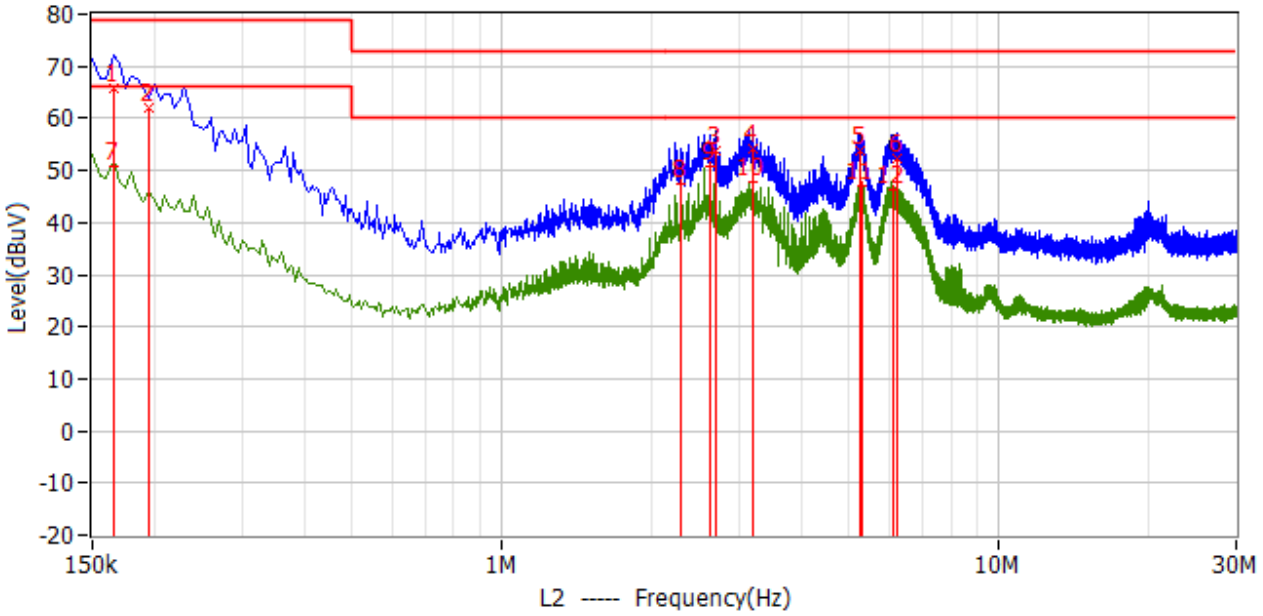
Test Description:	0.15-30MHz Conducted Emission Test
Eut:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 1
Operator Name:	Jin Cai
Test Sandard：	EN IEC 61000-6-4
Comment：	AC main power, Phase L1



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	165.000kHz	79.0	71.4	-7.6	40.1	31.3	QP	L1
2	190.000kHz	79.0	63.4	-15.6	32.2	31.2	QP	L1
3	245.000kHz	79.0	59.6	-19.4	28.2	31.4	QP	L1
4	2.295MHz	73.0	56.5	-16.5	25.5	31.0	QP	L1
5	2.555MHz	73.0	60.9	-12.1	29.8	31.1	QP	L1
6	3.195MHz	73.0	55.9	-17.1	24.7	31.2	QP	L1
7	255.000kHz	66.0	52.1	-13.9	20.8	31.3	CAV	L1
8	2.045MHz	60.0	46.9	-13.1	15.9	31.0	CAV	L1
9	2.300MHz	60.0	55.3	-4.7	24.3	31.0	CAV	L1
10	2.555MHz	60.0	55.7	-4.3	24.6	31.1	CAV	L1
11	3.195MHz	60.0	49.5	-10.5	18.3	31.2	CAV	L1
12	3.510MHz	60.0	46.1	-13.9	14.8	31.3	CAV	L1

EUT Information

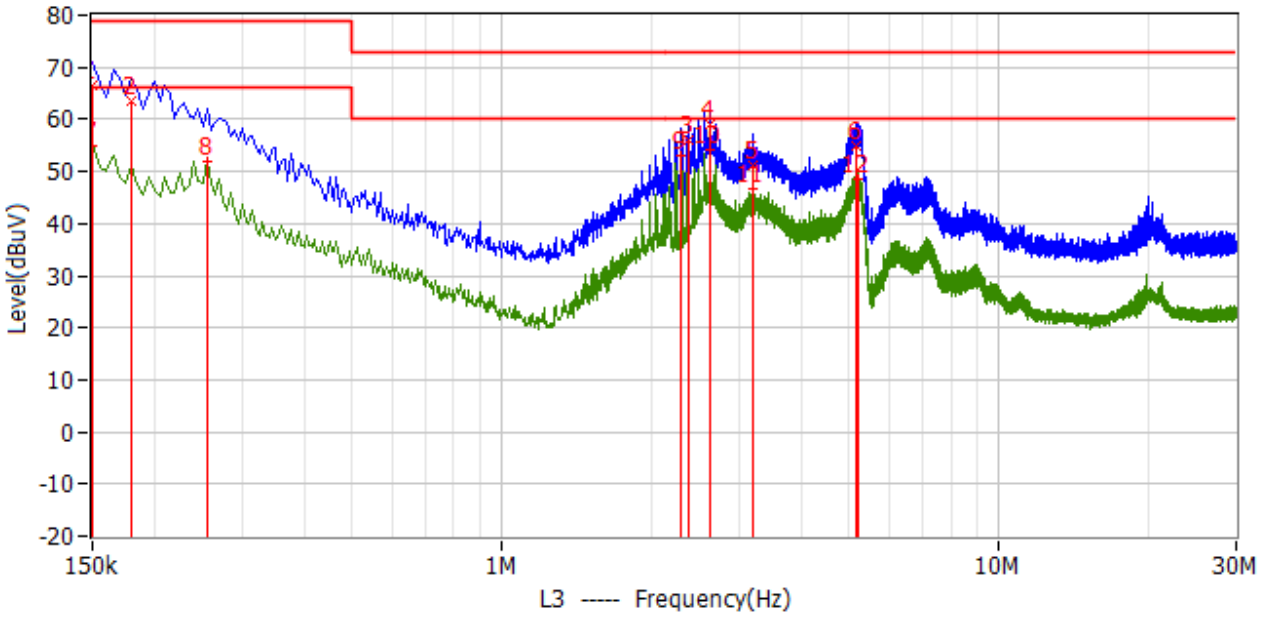
Test Description:	0.15-30MHz Conducted Emission Test
Eut:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 1
Operator Name:	Jin Cai
Test Sandard：	EN IEC 61000-6-4
Comment：	AC main power, Phase L2



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	165.000kHz	79.0	65.6	-13.4	34.3	31.3	QP	L2
2	195.000kHz	79.0	61.9	-17.1	30.6	31.3	QP	L2
3	2.685MHz	73.0	53.6	-19.4	22.5	31.1	QP	L2
4	3.195MHz	73.0	54.1	-18.9	22.9	31.2	QP	L2
5	5.265MHz	73.0	53.8	-19.2	22.2	31.6	QP	L2
6	6.225MHz	73.0	52.3	-20.7	20.6	31.7	QP	L2
7	165.000kHz	66.0	50.9	-15.1	19.6	31.3	CAV	L2
8	2.300MHz	60.0	47.4	-12.6	16.4	31.0	CAV	L2
9	2.620MHz	60.0	50.7	-9.3	19.6	31.1	CAV	L2
10	3.195MHz	60.0	47.9	-12.1	16.7	31.2	CAV	L2
11	5.280MHz	60.0	47.2	-12.8	15.6	31.6	CAV	L2
12	6.105MHz	60.0	46.2	-13.8	14.5	31.7	CAV	L2

EUT Information

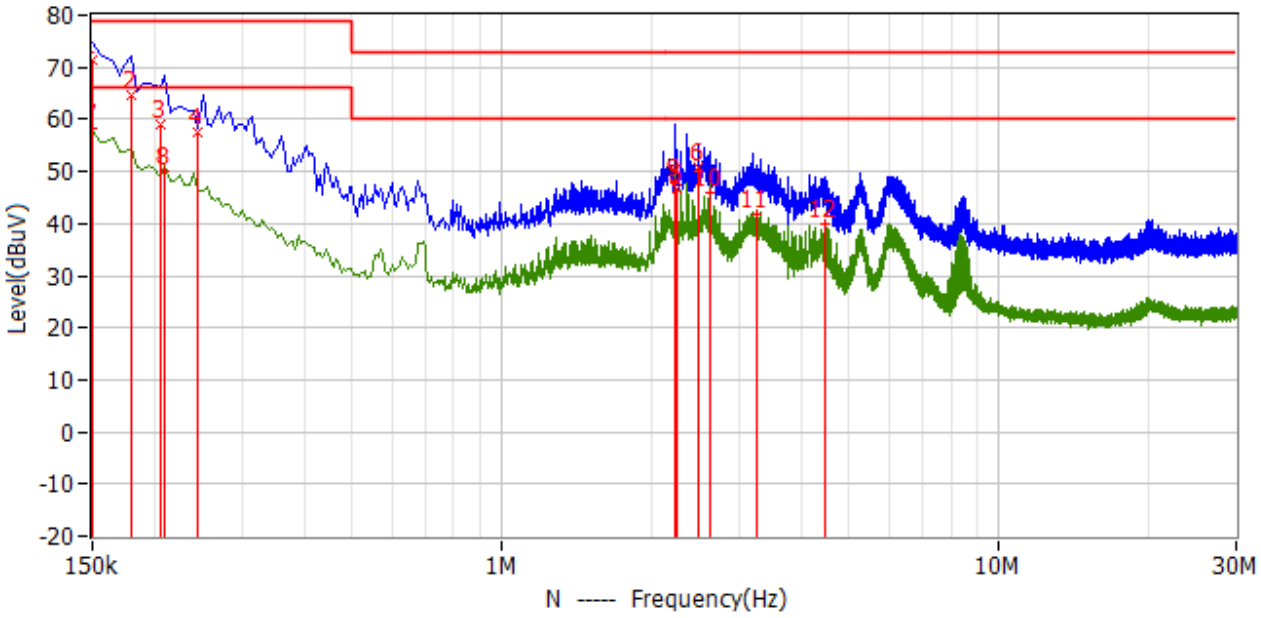
Test Description:	0.15-30MHz Conducted Emission Test
Eut:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 1
Operator Name:	Jin Cai
Test Sandard：	EN IEC 61000-6-4
Comment：	AC main power, Phase L3



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	150.000kHz	79.0	66.5	-12.5	35.0	31.5	QP	L3
2	180.000kHz	79.0	63.5	-15.5	32.2	31.3	QP	L3
3	2.365MHz	73.0	56.1	-16.9	25.0	31.1	QP	L3
4	2.620MHz	73.0	58.9	-14.1	27.8	31.1	QP	L3
5	3.210MHz	73.0	51.1	-21.9	19.9	31.2	QP	L3
6	5.160MHz	73.0	55.0	-18.0	23.4	31.6	QP	L3
7	150.000kHz	66.0	54.9	-11.1	23.4	31.5	CAV	L3
8	255.000kHz	66.0	51.8	-14.2	20.3	31.5	CAV	L3
9	2.300MHz	60.0	53.2	-6.8	22.1	31.1	CAV	L3
10	2.620MHz	60.0	54.0	-6.0	22.9	31.1	CAV	L3
11	3.195MHz	60.0	46.6	-13.4	15.4	31.2	CAV	L3
12	5.220MHz	60.0	48.6	-11.4	16.9	31.7	CAV	L3

EUT Information

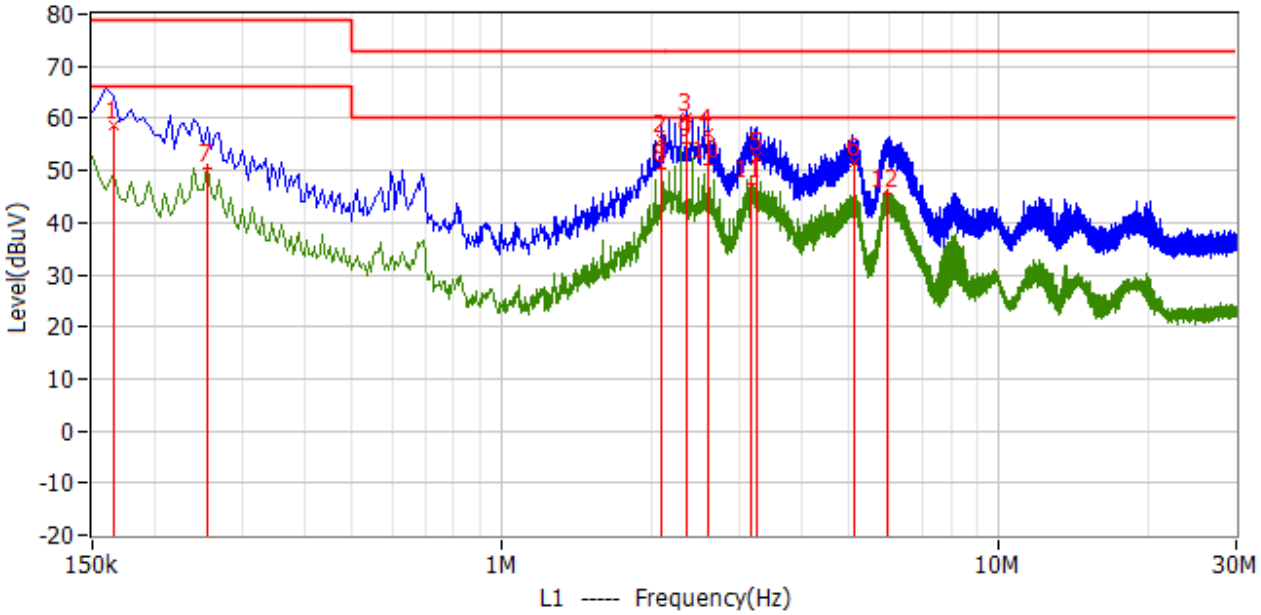
Test Description:	0.15-30MHz Conducted Emission Test
Eut:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 1
Operator Name:	Jin Cai
Test Sandard:	EN IEC 61000-6-4
Comment:	AC main power, Phase N



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	150.000kHz	79.0	71.3	-7.7	39.7	31.6	QP	N
2	180.000kHz	79.0	64.7	-14.3	33.3	31.4	QP	N
3	205.000kHz	79.0	58.9	-20.1	27.3	31.6	QP	N
4	245.000kHz	79.0	57.4	-21.6	25.8	31.6	QP	N
5	2.250MHz	73.0	46.7	-26.3	15.7	31.0	QP	N
6	2.490MHz	73.0	50.9	-22.1	19.8	31.1	QP	N
7	150.000kHz	66.0	58.1	-7.9	26.5	31.6	CAV	N
8	210.000kHz	66.0	50.1	-15.9	18.5	31.6	CAV	N
9	2.235MHz	60.0	47.7	-12.3	16.7	31.0	CAV	N
10	2.620MHz	60.0	46.0	-14.0	14.9	31.1	CAV	N
11	3.255MHz	60.0	41.8	-18.2	10.6	31.2	CAV	N
12	4.470MHz	60.0	39.9	-20.1	8.4	31.5	CAV	N

EUT Information

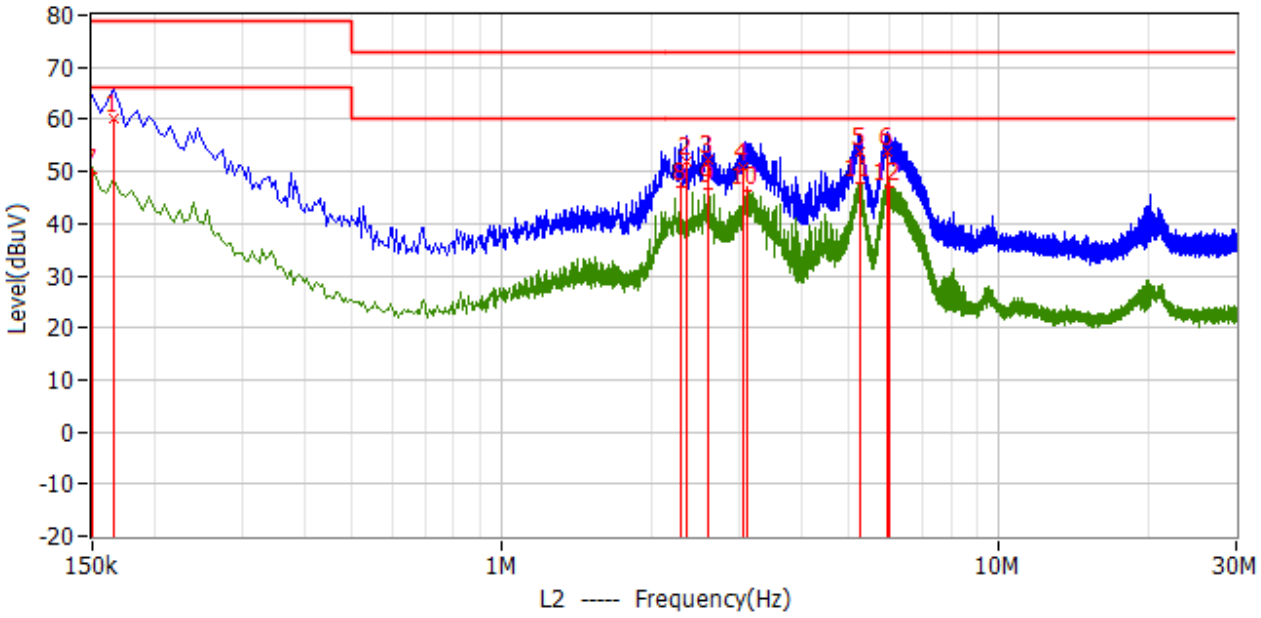
Test Description:	0.15-30MHz Conducted Emission Test
Eut:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 2
Operator Name:	Jin Cai
Test Sandard：	EN IEC 61000-6-4
Comment：	AC main power, Phase L1



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	165.000kHz	79.0	58.7	-20.3	27.4	31.3	QP	L1
2	2.100MHz	73.0	56.1	-16.9	25.1	31.0	QP	L1
3	2.355MHz	73.0	60.0	-13.0	28.9	31.1	QP	L1
4	2.610MHz	73.0	57.0	-16.0	25.9	31.1	QP	L1
5	3.255MHz	73.0	52.7	-20.3	21.5	31.2	QP	L1
6	5.115MHz	73.0	51.6	-21.4	20.0	31.6	QP	L1
7	255.000kHz	66.0	50.3	-15.7	19.0	31.3	CAV	L1
8	2.100MHz	60.0	50.4	-9.6	19.4	31.0	CAV	L1
9	2.355MHz	60.0	55.3	-4.7	24.2	31.1	CAV	L1
10	2.610MHz	60.0	51.3	-8.7	20.2	31.1	CAV	L1
11	3.180MHz	60.0	47.4	-12.6	16.2	31.2	CAV	L1
12	5.955MHz	60.0	45.5	-14.5	13.8	31.7	CAV	L1

EUT Information

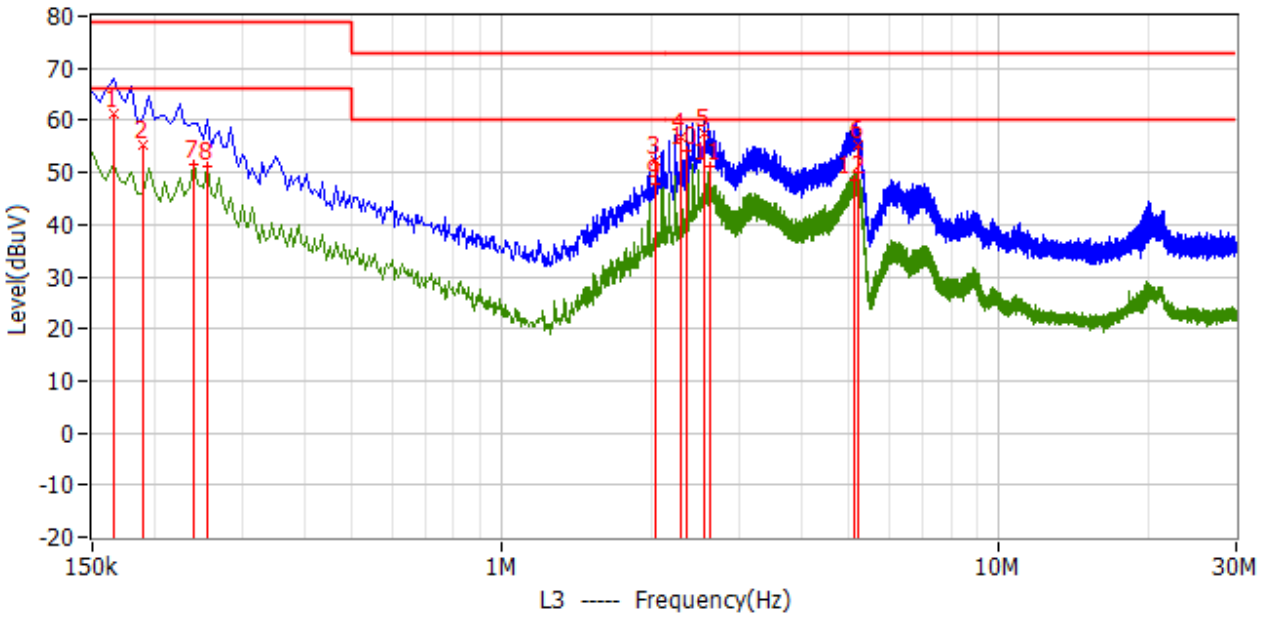
Test Description:	0.15-30MHz Conducted Emission Test
Eut:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 2
Operator Name:	Jin Cai
Test Sandard：	EN IEC 61000-6-4
Comment：	AC main power, Phase L2



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	165.000kHz	79.0	60.0	-19.0	28.7	31.3	QP	L2
2	2.355MHz	73.0	51.9	-21.1	20.9	31.0	QP	L2
3	2.610MHz	73.0	52.4	-20.6	21.3	31.1	QP	L2
4	3.045MHz	73.0	50.7	-22.3	19.5	31.2	QP	L2
5	5.250MHz	73.0	53.7	-19.3	22.1	31.6	QP	L2
6	5.985MHz	73.0	53.6	-19.4	21.9	31.7	QP	L2
7	150.000kHz	66.0	49.8	-16.2	18.5	31.3	CAV	L2
8	2.295MHz	60.0	46.9	-13.1	15.9	31.0	CAV	L2
9	2.610MHz	60.0	46.7	-13.3	15.6	31.1	CAV	L2
10	3.120MHz	60.0	46.4	-13.6	15.2	31.2	CAV	L2
11	5.235MHz	60.0	47.7	-12.3	16.1	31.6	CAV	L2
12	6.030MHz	60.0	47.1	-12.9	15.4	31.7	CAV	L2

EUT Information

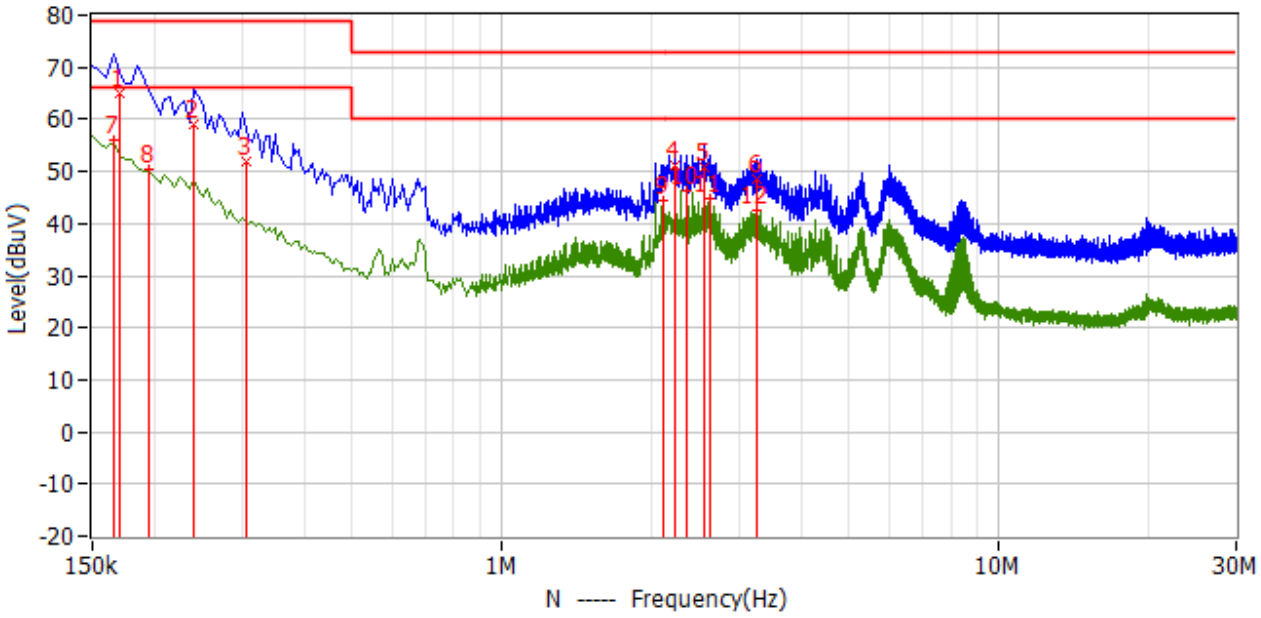
Test Description:	0.15-30MHz Conducted Emission Test
Eut:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 2
Operator Name:	Jin Cai
Test Sandard：	EN IEC 61000-6-4
Comment：	AC main power, Phase L3



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	165.000kHz	79.0	61.3	-17.7	29.8	31.5	QP	L3
2	190.000kHz	79.0	55.4	-23.6	24.0	31.4	QP	L3
3	2.040MHz	73.0	52.1	-20.9	21.1	31.0	QP	L3
4	2.295MHz	73.0	56.8	-16.2	25.7	31.1	QP	L3
5	2.550MHz	73.0	57.5	-15.5	26.4	31.1	QP	L3
6	5.205MHz	73.0	55.3	-17.7	23.6	31.7	QP	L3
7	240.000kHz	66.0	51.6	-14.4	20.1	31.5	CAV	L3
8	255.000kHz	66.0	51.1	-14.9	19.6	31.5	CAV	L3
9	2.040MHz	60.0	47.8	-12.2	16.8	31.0	CAV	L3
10	2.360MHz	60.0	54.2	-5.8	23.1	31.1	CAV	L3
11	2.615MHz	60.0	51.1	-8.9	20.0	31.1	CAV	L3
12	5.100MHz	60.0	48.7	-11.3	17.1	31.6	CAV	L3

EUT Information

Test Description:	0.15-30MHz Conducted Emission Test
Eut:	Energy Storage System
Model:	ECO-E101WX
Client:	Shanghai Elecnova Energy Storage Co., Ltd.
Operating Conditions:	Power on, Mode 2
Operator Name:	Jin Cai
Test Sandard:	EN IEC 61000-6-4
Comment:	AC main power, Phase N



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	170.000kHz	79.0	65.0	-14.0	33.5	31.5	QP	N
2	240.000kHz	79.0	59.0	-20.0	27.4	31.6	QP	N
3	305.000kHz	79.0	51.9	-27.1	20.5	31.4	QP	N
4	2.235MHz	73.0	51.1	-21.9	20.1	31.0	QP	N
5	2.550MHz	73.0	50.7	-22.3	19.6	31.1	QP	N
6	3.255MHz	73.0	48.7	-24.3	17.5	31.2	QP	N
7	165.000kHz	66.0	56.0	-10.0	24.4	31.6	CAV	N
8	195.000kHz	66.0	50.4	-15.6	18.9	31.5	CAV	N
9	2.105MHz	60.0	44.3	-15.7	13.3	31.0	CAV	N
10	2.360MHz	60.0	46.4	-13.6	15.3	31.1	CAV	N
11	2.615MHz	60.0	44.9	-15.1	13.8	31.1	CAV	N
12	3.255MHz	60.0	42.7	-17.3	11.5	31.2	CAV	N

Test Setup

2.2.8 Test Location

This test was carried out in Suzhou Institute of Product Quality Supervision and Inspection.

2.3 Immunity - Enclosure port - Electrostatic discharge

2.3.1 Specification Reference

EN IEC 61000-6-2:2019, Clause 9 Table 1, 1.4,

2.3.2 Equipment Under Test

ECO-E101WX

2.3.3 Date of Test

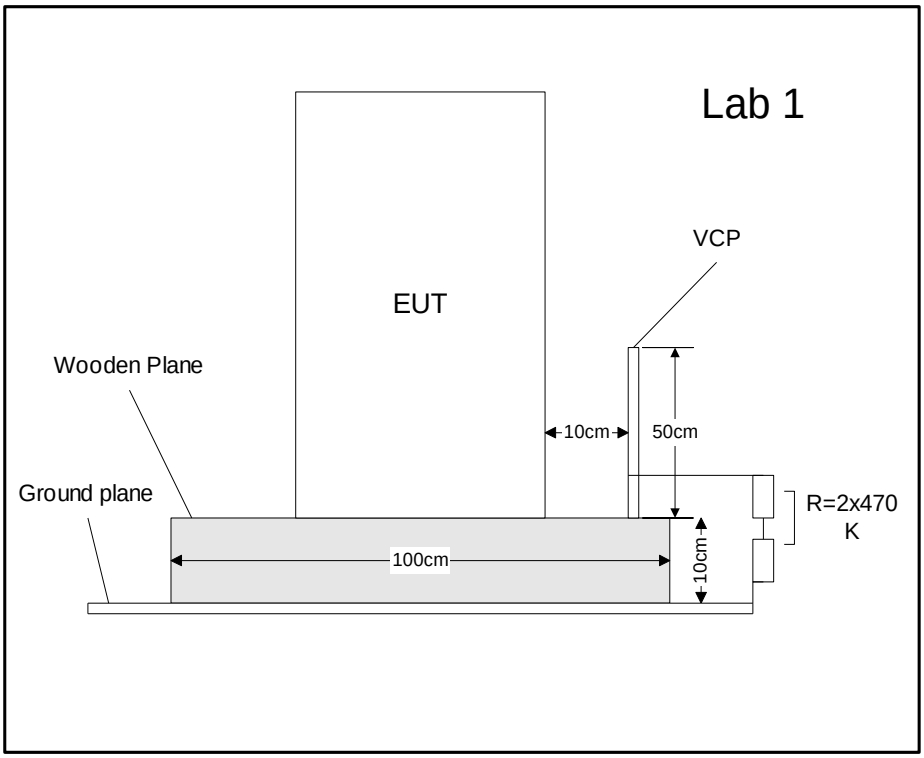
2024.10.31

2.3.4 Test Method

The equipment under test including associated cabling was configured on but insulted from, using a 0.5mm isolator, a horizontal coupling plane fitted to the top of a 0.8 m non-conductive table for table-top equipment; and on a 0.1 m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using the air discharge method for non-metallic parts, contact discharge method for metallic parts with both vertical and horizontal couple plane discharge methods for the sides of the equipment under test, the required electrostatic discharge voltage levels in both voltage polarities were applied at the detailed pulse repartition rate.

During this testing any anomalies in the equipment under tests performance was recorded.



2.3.5 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	52 %
Atmospheric Pressure	1012.5 mbar

2.3.6 Specification Limits

Environmental phenomena		Test specifications	Units	Remarks	Performance criteria
Electrostatic discharge	Contact discharge	±4 (charge voltage)	kV	-	B
	Air discharge	±8 (charge voltage)	kV	-	B

2.3.7 Test Results

Results for Configuration and Mode: Configuration 1, Mode 1, 2**.**

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

ID	Test Point	Discharge	Results: Pass PC A									
			2kV		4kV		6kV		8kV		15kV	
			+	-	+	-	+	-	+	-	+	-
1	VCP	Contact	✓	✓	✓	✓						
2	Metal Enclosure, Metal screws	Contact	✓	✓	✓	✓						
3	Gaps, Buttons,	Air	✓	✓	✓	✓			✓	✓		

Key to Results	
✓	The EUTs performance was not impacted when the ESD pulse was applied.
✓*	No discharge occurred at this point when the ESD pulse was applied
O1	Observation
Fx	Failed
N/A	Not Applicable

Test setup

2.3.8 Test Location

This test was carried out in Suzhou Institute of Product Quality Supervision and Inspection.

2.4 Immunity - Enclosure port - Radio-frequency electromagnetic field. Amplitude modulated

2.4.1 Specification Reference

EN IEC 61000-6-2:2019, Clause 9 Table 1, 1.2, 1.3

2.4.2 Equipment Under Test

ECO-E101WX

2.4.3 Date of Test

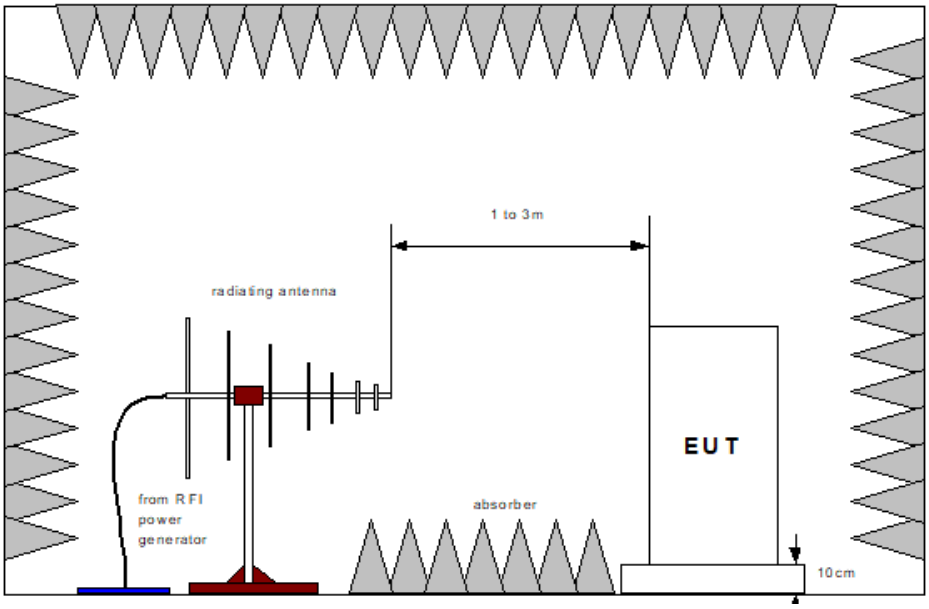
2024.10.31

2.4.4 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment; with a pre-calibrated semi anechoic chamber.

All four side of the equipment under test were subjected to the required RF field strength, modulated as described, swept over the frequency range of test with the antenna positioned in both horizontal and vertical polarizations.

During this testing any anomalies in the equipment under tests performance was recorded.



2.4.5 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	52 %
Atmospheric Pressure	1012.5 mbar

2.4.6 Specification Limits

Environmental phenomena	Test specifications	Units	Remarks	Performance criteria
Radio-frequency electromagnetic field. Amplitude modulated	80 to 1000 10 80	MHz V/m % AM (1 kHz)	The frequency range has been selected to cover the frequencies with the highest potential risk of disturbance.	A
Radio-frequency electromagnetic field. Amplitude modulated	1.4 to 6.0 3 80	GHz V/m % AM (1 kHz)	The frequency range has been selected to cover the frequencies with the highest potential risk of disturbance.	A
Supplementary information: Note: The test level specified is the r.m.s. value of the unmodulated carrier.				

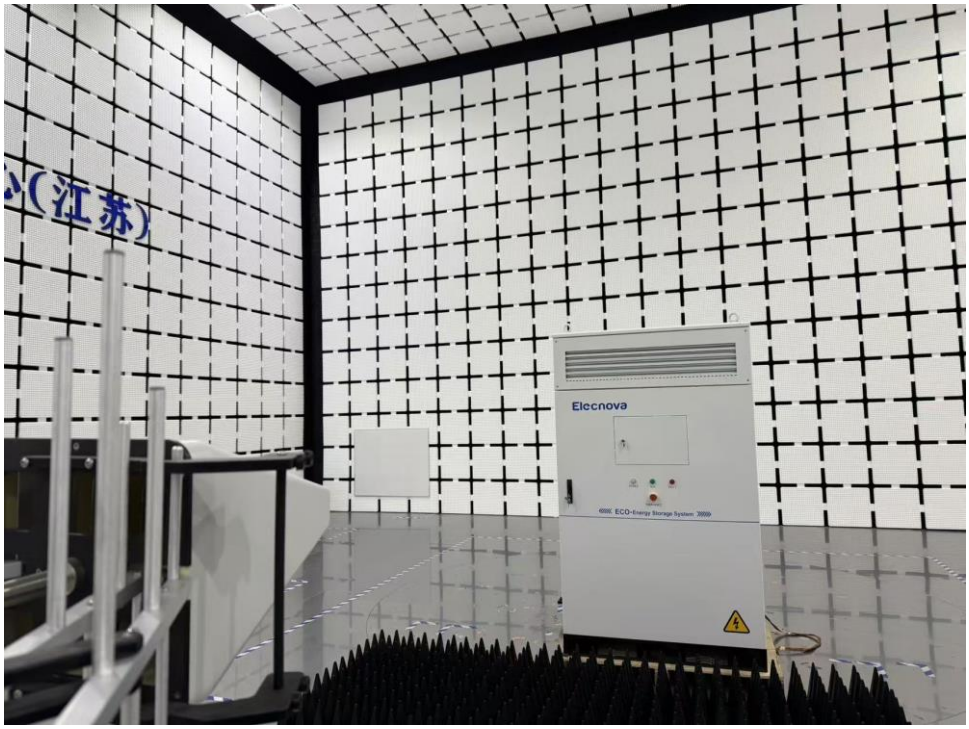
2.4.7 Test Results

Results for Configuration and Mode: Configuration 1, Mode 1, 2.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field				
Step Size	1%			
Dwell Time	3 s			
Modulation	1kHz sine 80% AM			
Frequency Range	Test Face	Antenna Polarization	Test Level (V/m)	Result
80 MHz to 1 GHz	Front	Horizontal and Vertical	10 V/m	Pass PC A
80 MHz to 1 GHz	Rear	Horizontal and Vertical	10 V/m	Pass PC A
80 MHz to 1 GHz	Left	Horizontal and Vertical	10 V/m	Pass PC A
80 MHz to 1 GHz	Right	Horizontal and Vertical	10 V/m	Pass PC A
1.4 GHz to 6 GHz	Front	Horizontal and Vertical	3 V/m	Pass PC A
1.4 GHz to 6 GHz	Rear	Horizontal and Vertical	3 V/m	Pass PC A
1.4 GHz to 6 GHz	Left	Horizontal and Vertical	3 V/m	Pass PC A
1.4 GHz to 6 GHz	Right	Horizontal and Vertical	3 V/m	Pass PC A



Test Setup

2.4.8 Test Location

This test was carried out in Suzhou Institute of Product Quality Supervision and Inspection.

2.5 Immunity - Enclosure port - Power-frequency magnetic field

2.5.1 Specification Reference

EN IEC 61000-6-2:2019, Clause 9 Table 1, 1.1

2.5.2 Equipment Under Test

ECO-E101WX

2.5.3 Date of Test

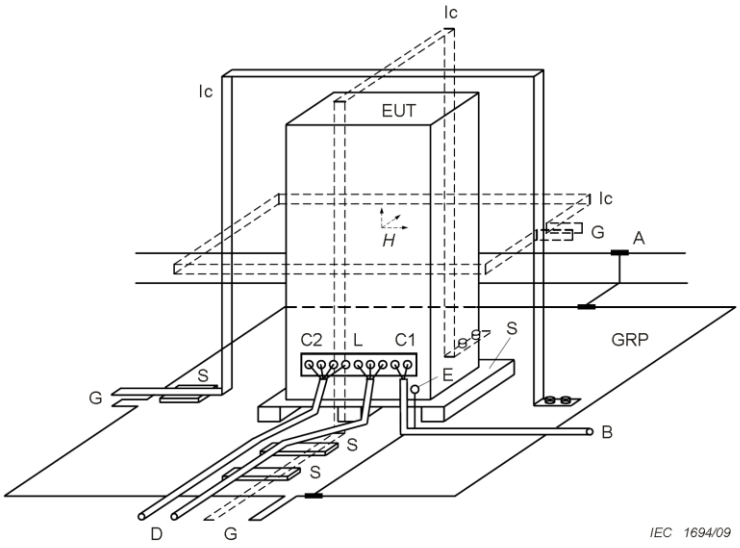
2024.10.31

2.5.4 Test Method

The equipment under test including associated cabling was configured on a non-conductive support at the volumetric center of the immunity coils. A pre calibrated input level was then applied to magnetic immunity coils at the detailed frequency and level for the required test period.

The EUT was retested with the magnetic field applied in all 3 orthogonal planes of the EUT.

During this testing any anomalies in the equipment under tests performance was recorded.



Components

GRP	Ground plane	C1	Power supply circuit
A	Safety earth	C2	Signal circuit
S	Insulating support	L	Communication line
EUT	Equipment under test	B	To power supply source
Ic	Inductive coil	D	To signal source, simulator
E	Earth terminal	G	To the test generator

Figure 5 – Example of test set-up for floor-standing equipment

2.5.5 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	52%
Atmospheric Pressure	1012.5 mbar

2.5.6 Specification Limits

Environmental phenomena	Test specifications	Units	Remarks	Performance criteria
Power-frequency magnetic field	50, 60 30	Hz A/m	Applicable only to apparatus containing devices susceptible to magnetic fields.	A
Supplementary information: Note: The test shall be carried out at the frequencies appropriate to the power supply frequency. Equipment intended for use in areas supplied only at one of these frequencies need only be tested at that frequency.				

2.5.7 Test Results

Results for Configuration and Mode: Configuration 1, Mode 1, 2.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for Power Frequency Magnetic Immunity					
Orientation	Operating Frequency	Test Frequency	Test Level	Duration	Result
X	50,60Hz	50,60Hz	30A/m	1 minutes	Pass PC A
Y	50,60Hz	50,60Hz	30A/m	1 minutes	Pass PC A
Z	50,60Hz	50,60Hz	30A/m	1 minutes	Pass PC A

Test Setup

2.5.8 Test Location

This test was carried out in Suzhou Institute of Product Quality Supervision and Inspection.

2.6 Immunity - Fast transients

2.6.1 Specification Reference

EN IEC 61000-6-2:2019, Clause 9 Table 4, 4.5

2.6.2 Equipment Under Test

ECO-E101WX

2.6.3 Date of Test

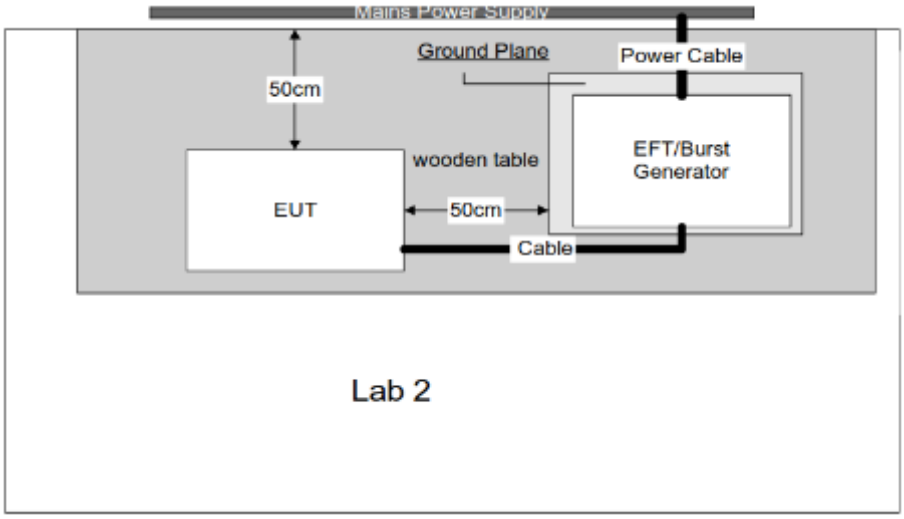
2024.10.31

2.6.4 Test Method

The equipment under test including associated cabling was configured on but insulted from, using a 0.1m isolator, a horizontal coupling plane fitted to the top of a 0.8 m non-conductive table for table-top equipment; and on a 0.1 m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

Using a CDN for power ports, capacitive coupling clamp for signal and control ports and a 33 nF coupling capacitor for earth ports, the required fast transient burst voltage levels in both voltage polarities were applied at the detailed pulse repartition rate and duration of test.

During this testing any anomalies in the equipment under tests performance was recorded.



2.6.5 Environmental Conditions

Ambient Temperature	21.5 °C
Relative Humidity	52 %
Atmospheric Pressure	1012.5 mbar

2.6.6 Specification Limits

Environmental phenomena	Test specifications	Units	Remarks	Performance criteria
Fast transients (AC power ports)	±2 5/50 5 or 100	kV (open circuit test voltage) Tr/Th ns Repetition frequency kHz		B
Supplementary information:				

2.6.7 Test Results

Results for Configuration and Mode: Configuration 1, Mode 1,2

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for Fast Transient Burst Immunity					
Line under test	Test Level (kV)	Repetition Rate	Test Duration	Coupling Method	Result
AC Main Power line	±2	5	120s	CDN	Pass PC A

Test Setup

2.6.8 Test Location

This test was carried out in Suzhou Institute of Product Quality Supervision and Inspection.

2.7 Immunity - Surges

2.7.1 Specification Reference

EN IEC 61000-6-2:2019, Clause 9 Table 4, 4.4

2.7.2 Equipment Under Test

ECO-E101WX

2.7.3 Date of Test

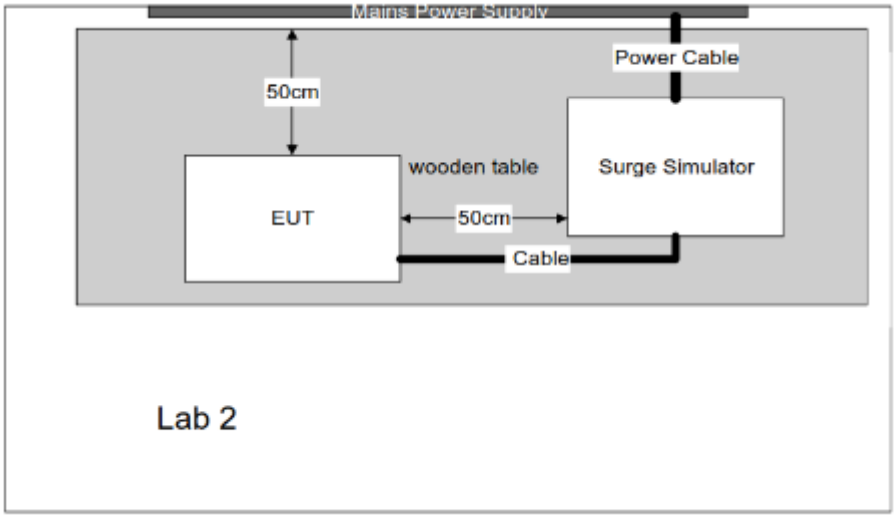
2024.10.31

2.7.4 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using CDNs for power ports and appropriate coupling methods for applicable signal and control ports, the required number of surges was applied for each surge voltage level using both positive and negative surge voltage polarities. Surges were applied at the power line frequency phase angles and repartition rates detailed.

During this testing any anomalies in the equipment under tests performance was recorded.



2.7.5 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	52 %
Atmospheric Pressure	1012.5 mbar

2.7.6 Specification Limits

Environmental phenomena	Test specifications	Units	Remarks	Performance criteria
Surges (AC power ports) line-to-earth line-to-line	.2/50 (8/20) ±2 ±1	Tr/Th µs kV (open circuit test voltage) kV (open circuit test voltage)		B
Supplementary information: According to the remark f in table 3 of EN IEC 61000-6-2:2019, the DC power port was excluded because of the specified AC-DC adapter was used, only the AC power input of AC-DC adapter should be tested.				

2.7.7 Test Results

Results for Configuration and Mode: Configuration 1, Mode 1, 2

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for Surge Immunity (Power Ports)							
Line under test	Coupling	Level	Polarity	Phase Angle	No of Pulses	Repetition Rate	Result
AC main power Line	L1/L2/L3-N	1.0kV	NEGATIVE POSITIVE	0,90,180,270	5	60	Pass PC A
AC main power Line	L1/L2/L3/N -GND	2.0kV	NEGATIVE POSITIVE	0,90,180,270	5	60	Pass PC A

Test Setup

2.7.8 Test Location

This test was carried out in Suzhou Institute of Product Quality Supervision and Inspection.

2.8 Immunity - Radio-frequency common mode

2.8.1 Specification Reference

EN IEC 61000-6-2:2019, Clause 9 Table 4, 4.1

2.8.2 Equipment Under Test

ECO-E101WX

2.8.3 Date of Test

2024.10.31

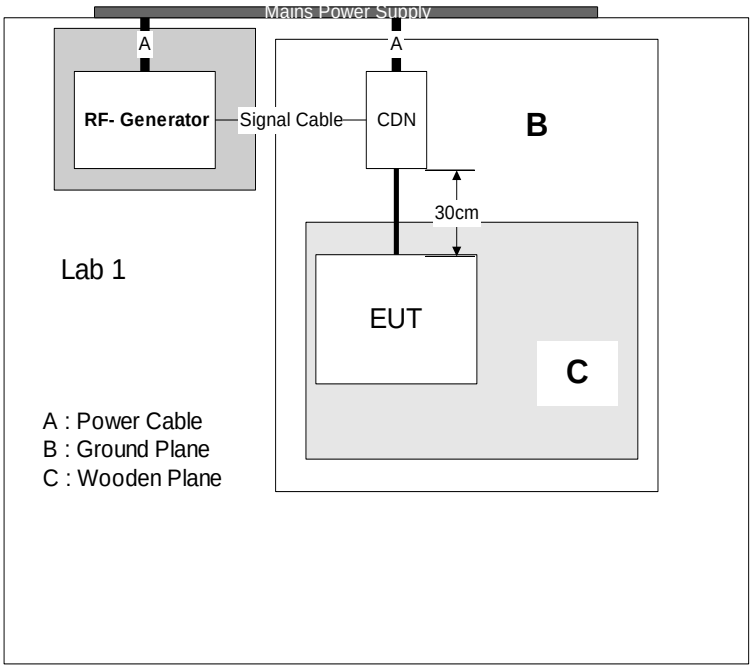
2.8.4 Test Method

The equipment under test was configured, on but insulted from, using a 0.1 m isolator, a horizontal coupling plane fitted to the top of a 0.8 m non-conductive table for table-top equipment; and on a 0.1 m insulated support for floor standing equipment; above a ground reference plane all within a test laboratory.

All associated cabling was configured, on but insulted from, using a 50 mm isolator, the same horizontal coupling plane as the equipment under test.

Using CDNs, EM Clamps or current clamps as appropriate, the power ports and applicable signal and control ports were subjected to the required, pre calibrated RF injected signal strength, modulated as described, swept over the frequency range of test.

During this testing any anomalies in the equipment under tests performance was recorded.



2.8.5 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	52 %
Atmospheric Pressure	1012.5 mbar

2.8.6 Specification Limits

Environmental phenomena	Test specifications	Units	Remarks	Performance criteria
Radio-frequency common mode (AC power ports)	0.15 to 80 10 80	MHz V % AM (1 kHz)	The test level specified is the r.m.s. value of the unmodulated carrier.	A
Supplementary information: a* : The test level can also be defined as the equivalent current into a 150 Ω load.				

2.8.7 Test Results

Results for Configuration and Mode: Configuration 1, Mode 1, 2

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for Conducted Radio Frequency Interference					
Modulation = 80 % AM (1 kHz)		Step Size = 1 %		Dwell = 3 s	
Line Under Test	Frequency Range	Test Level	Coupling Method	Interference Return Path	Result
AC Main Power line	150kHz to 80MHz	10 V	clamp	--	Pass PC A

Test Setup

2.8.8 Test Location

This test was carried out in Suzhou Institute of Product Quality Supervision and Inspection.

2.9 Immunity - Voltage dips, short interruptions and voltage variations immunity tests

2.9.1 Specification Reference

EN IEC 61000-6-2:2019, Clause 9 Table 4, 4.2, 4.3

2.9.2 Equipment Under Test

ECO-E101WX

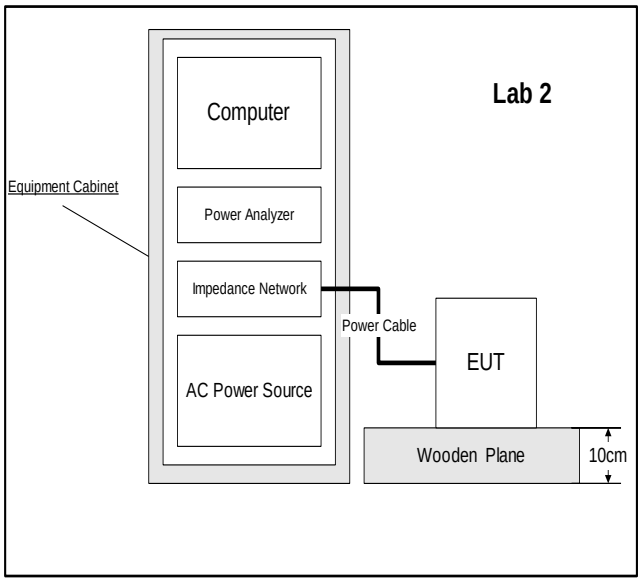
2.9.3 Date of Test

2024.10.31

2.9.4 Test Method

The equipment under test including associated cabling was configured, on a 0.8 m non-conductive table for table-top equipment and on a 0.1 m insulated support for floor standing equipment above a ground reference plane all within a test laboratory.

Using a programmable power supply the equipment under test was subjected to the detailed supply voltage dips and interruptions. The required supply phase synchronization and test repetition rate, detailed, was controlled by the programmable power supply.
During this testing any anomalies in the equipment under tests performance was recorded.



2.9.5 Environmental Conditions

Ambient Temperature	21.3 °C
Relative Humidity	52 %
Atmospheric Pressure	1012.5 mbar

2.9.6 Specification Limits

Voltage dips				
Voltage Dip in % Ut	Test level in % Ut	Duration		Performance Criteria
		50Hz	60Hz	
100	0	1 cycle	1 cycle	B
60	40	10 cycles	12 cycles	C
30	70	25 cycles	30 cycles	C
Ut is the rated voltage of the Equipment Under Test				

Voltage interruptions				
Voltage interruptions in % Ut	Test level in % Ut	Duration		Performance Criteria
		50Hz	60Hz	
100	0	250 cycles	300 cycles	C

2.9.7 Test Results

Results for Configuration and Mode: Configuration 1, Mode 1,2.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for Voltage Dip and Short Interruption					
Line under test	Vnom	Operating Frequency	Test Level	Duration	Result
Power line	400 Vac,	50, 60Hz	0% of Vnom	1cycle	Pass PC A
Power line	400 Vac,	50, 60Hz	40% of Vnom	10 cycles (50Hz) 12 cycles (60Hz)	Pass PC B
Power line	400 Vac,	50, 60Hz	70% of Vnom	25 cycles (50Hz) 30 cycles (60Hz)	Pass PC B
Power line	400 Vac,	50, 60Hz	0% of Vnom	250 cycles (50Hz) 300 cycles (60Hz)	Pass PC B

Result Description	
B	During the test, the EUT would be shut down and after removing the interference it can restore its normal mode by itself.

Test Setup

2.9.8 Test Location

This test was carried out in Suzhou Institute of Product Quality Supervision and Inspection.

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Date	Calibration Due
Emission					
EMI Test Receiver	Rohde & Schwarz	ESR 7	SZZJ-501-996-01	2024.07.14	2025.07.13
Log periodic antenna	Schwarzbeck	VULB 9168	SZZJ-501-996-04	2024.07.19	2025.07.18
10 m semi anechoic chamber	SKET	AC-10m	SZZJ-501-1138	2023.07.02	2028.07.01
Artificial network	Schwarzbeck	NMLK 8130	SZZJ-501-611-24	2024.06.28	2025.06.27
CE test software	--	EMC-I(V 1.5.0.7)	--	--	--
RE test software	--	EMC-I(V 1.5.0.7)	--	--	--
Immunity					
ESD simulator	EM TEST	esd NX30	SZZJ-501-988	2024.03.08	2025.03.07
Electric fast transient pulse group simulator	3C TEST	EFT 800T	SZZJ-501-989-07	2024.02.18	2025.02.17
High-voltage and high-power combined coupling decoupling network	3C TEST	EFTN 15200T	SZZJ-501-989-06	2024.02.18	2025.02.17
Surge generator	3C TEST	CWS 600G	SZZJ-501-989-10	2024.02.18	2025.02.17
High-voltage and high-power combined coupling decoupling network	3C TEST	SPN 15200T	SZZJ-501-989-09	2024.02.18	2025.02.17
Radio frequency conduction immunity test system	3C TEST	CST1075E	SZZJ-501-989-04	2024.02.29	2025.02.28
Electromagnetic clamp	3C TEST	EMCL100	SZZJ-501-989-17	2024.02.29	2025.02.28
attenuator	3C TEST	AT80-6dB-1G-NF-NF-A	SZZJ-501-989-32	2024.07.25	2025.07.24
Signal Generator	Rohde & Schwarz	SMB100B	SZZJ-501-999-01	2024.07.19	2025.07.18
Power Amplifier	Rflight	NTWPA-0081020001000E	SZZJ-501-1162	2024.07.27	2025.07.26
Power Amplifier	Rflight	NTWPA-1060200P	SZZJ-501-999-05	2024.07.24	2025.07.23
power meter	Rohde & Schwarz	NRX	SZZJ-501-999-02	2024.07.24	2025.07.23
Average power probe	Rohde & Schwarz	NRP6A	SZZJ-501-999-03	2024.07.24	2025.07.23
Average power probe	Rohde & Schwarz	NRP6A	SZZJ-501-999-14	2024.07.24	2025.07.23
Three Phase Power Drop Generator	EMTEST	PFS 503N100	SZZJ-501-817	2024.02.18	2025.02.17
Power frequency magnetic field generator	3C test	MFS 1200	SZZJ-501-989-25	2024.02.29	2025.02.28
Power frequency magnetic field module	3C test	MFT1200	SZZJ-501-989-29	2024.02.29	2025.02.28
Power frequency coil	3C test	TCXS113	SZZJ-501-989-28	2024.02.29	2025.02.28

4 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Emission - Conducted Disturbance	150 kHz to 30 MHz, LISN, 2.9dB
Emission - Enclosure port	30 MHz to 1 GHz, 4.2dB
Immunity - Enclosure port - Electrostatic discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2
Immunity - Enclosure port - Radio-frequency electromagnetic field. Amplitude modulated	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-3
Immunity - Fast transients	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4
Immunity - Surges	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5
Immunity - Radio-frequency common mode	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-6
Immunity - Power-frequency magnetic- field	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-8
Immunity - Voltage dips	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11
Immunity - Voltage interruptions	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2023, clause 4.3.3.

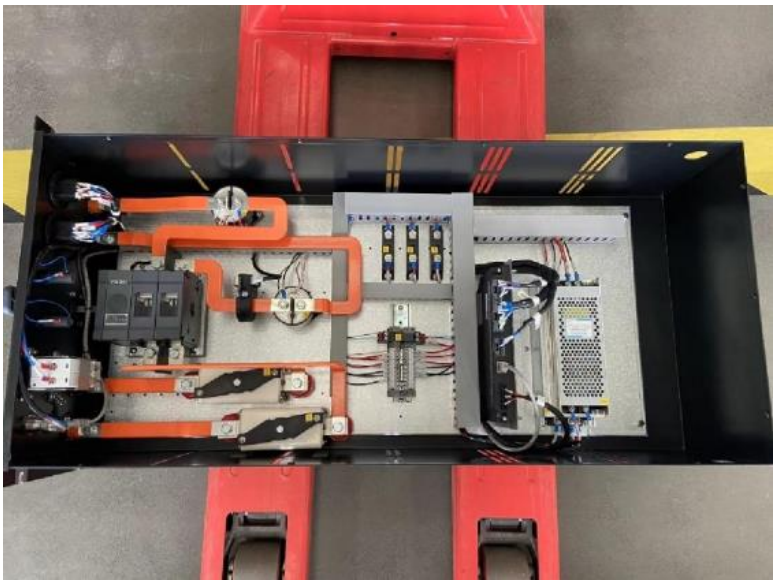
5 Photographs

Model: ECO-E101WX


GBM
QF5
QF3 QF4

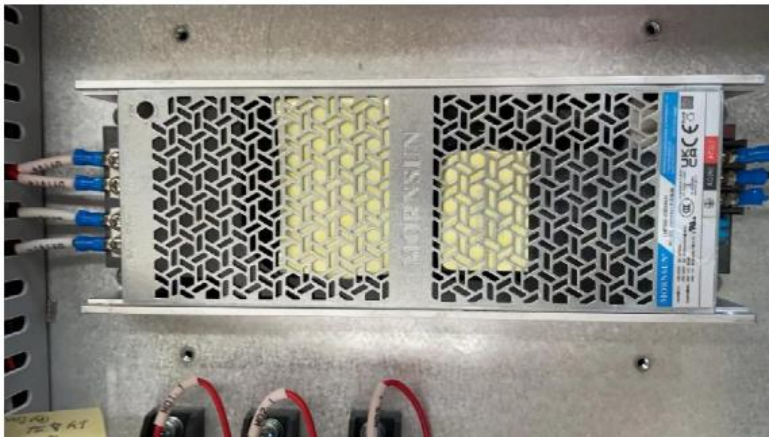

Elccnova
RUN
FAULT


MACURCO
GD-6

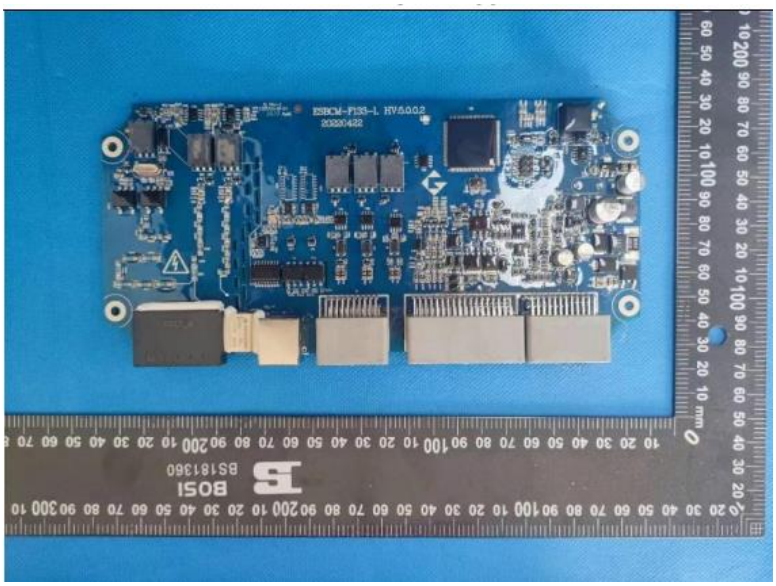


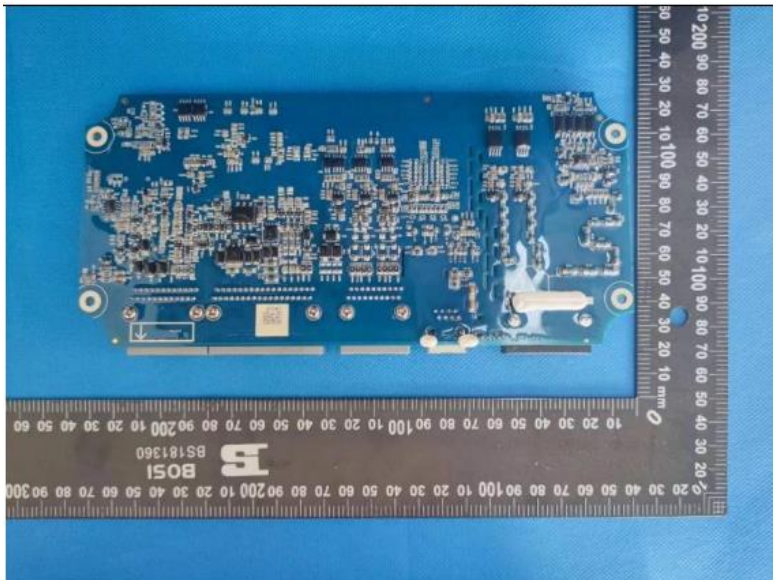

Nader
QF2


DC CONTACTOR
EVHB250A-24B

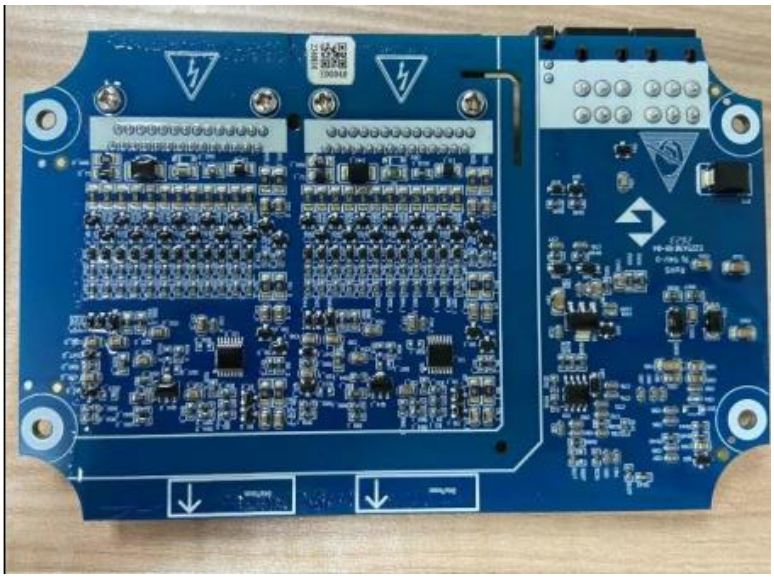



MORNSUN
PV200-29B24R3
RoHS
DY2

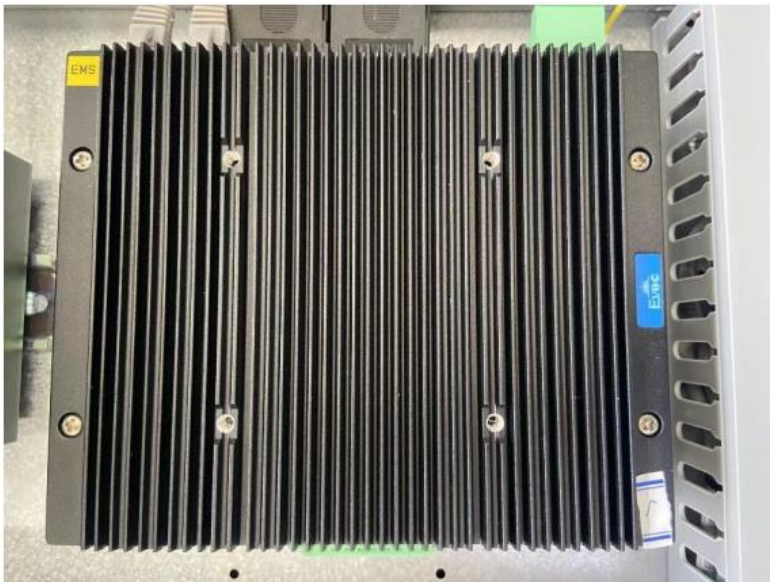


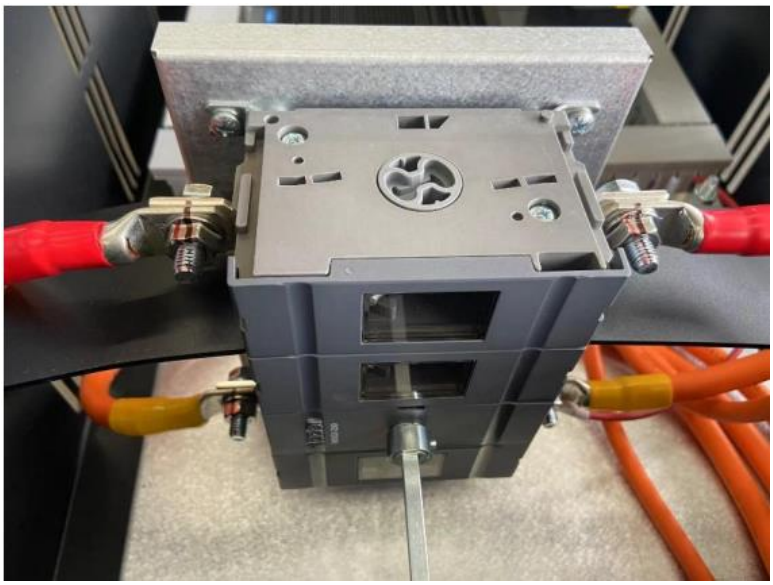



B
A

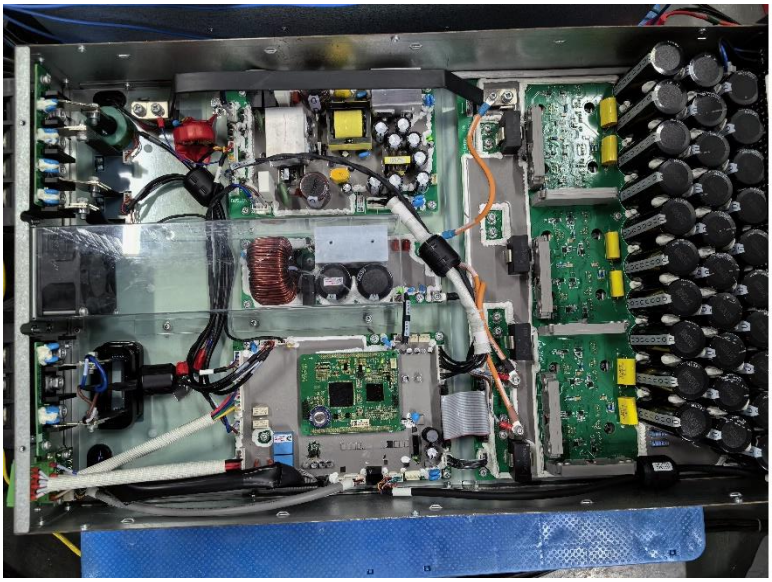


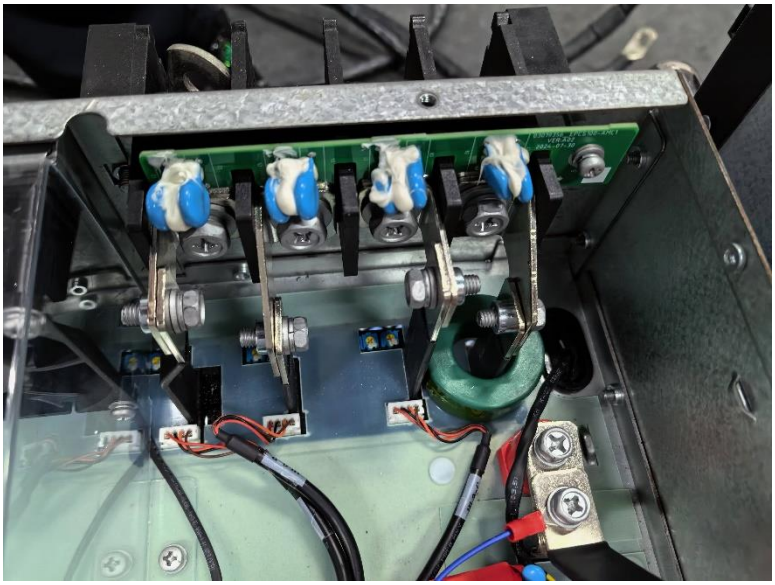

Elecnova
QF3 QF4
LYQ HMI PCS
KAM
KDM


EMS




KA1
KA2
KA7
FU1
HURO®
RT18-32X
Reset
off on





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