

Prüfbericht-Nr.: <i>Test report no.:</i>	CN23JLA3 001	Auftrags-Nr.: <i>Order no.:</i>	48217568 (P01027958)	Seite 1 von 43 Page 1 of 43
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	238067413	Auftragsdatum: <i>Order date:</i>	28 Mar. 2023	
Auftraggeber: <i>Client:</i>	New Century Products Co., Ltd. 15F.-8, No. 97, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221, Taiwan			
Prüfgegenstand: <i>Test item:</i>	Electric Motor Power System			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	Model-D			
Auftrags-Inhalt: <i>Order content:</i>	TÜV Rheinland - EMC service			
Prüfgrundlage: <i>Test specification:</i>	EN IEC 61000-6-1:2019 EN IEC 61000-6-3:2021 EN IEC 61000-3-2:2019+A1:2021 EN 61000-3-3:2013+A1:2019+A2:2021			
Wareneingangsdatum: <i>Date of sample receipt:</i>	29 Mar. 2023			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003445634-001			
Prüfzeitraum: <i>Testing period:</i>	11 Apr. 2023 to 14 Apr. 2023			
Ort der Prüfung: <i>Place of testing:</i>	Taoyuan Testing Laboratories			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Taiwan Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>reviewed by:</i>	genehmigt von: <i>authorized by:</i>			
Datum: 11 May 2023 <i>Date:</i>			Datum: 11 May 2023 <i>Date:</i>	
Stellung / Position: Webber C. C. Chung/ Project Manager			Stellung / Position: Hugo Z. H. Chang/ Manager	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Details in the previous section</i>		
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend 5 = mangelhalt N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specifications(s)	2 = good F(ail) = failed a.m. test specifications(s)	3 = satisfactory N/A = not applicable	4 = sufficient 5 = poor N/T = not tested
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

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1. Test Site

Laboratory:

TÜV Rheinland Taiwan Ltd. Taoyuan Testing Laboratories
4F-1, No. 38, Huaya 1st Road, Guishan District, Taoyuan City 333

Test Facility:

TÜV Rheinland Taiwan Ltd.
No. 458-19, Sec. 2, Fenliao Rd., Linkou Dist., New Taipei City 244, Taiwan, R.O.C.

1.1. Measurement Uncertainty

Testing Item	Frequency Range	Uncertainty
Conducted Emission (LISN)	9kHz - 30MHz	2.10 dB
Radiated Emission (966 Chamber: 3m)	30MHz - 1000MHz	3.82 dB

Note:

The uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

2. Description of the Test Sample

2.1. General Description of Equipment

The tested sample is "**Electric Motor Power System**" with type designation as described on the cover page for new approval. The subject sample consists of the following critical constructions, electric motor power unit, control panel, rechargeable lithium-ion battery, DC/DC converter board circuits (with power switch type or without power switch type). One representative sample with power switch type was tested and recorded in this report.

2.2. Rating and Physical Characteristics

Type Designation: Model-D
Input Rating: 42Vdc, 8A
Safety Protection Class: Class III
For details, refer to user manual and rating label.

Rechargeable Lithium-ion Battery

Manufacturer: Adept Industries Ltd.
Type Designation: 10Li-ion18650NPX2
Charge Voltage: 42Vdc
Output Rating: 37Vdc, 5200mAh, 192.4Wh

AC/DC Charger

Manufacturer: Jin Xin Yu Power (ShenZhen) Supply Co., Ltd.
Type Designation: XVE-4200150
Input Rating: 100 - 240Vac, 50/60Hz, 1.5A MAX
Output Rating: 42.0Vdc, 1.5A, 63.0W

2.3. Sources of Interference

- 1) Circuits Design
- 2) IC Circuits
- 3) Electric Motor

Please refer to Attachment Photo Documentation for details.

2.4. Noise Suppression Parts

- 1) EMI Ferrite Core on DC Input Cable

Please refer to Attachment Photo Documentation for details.

2.5. Submitted Documents

- 1) User Manual
- 2) Circuit Diagram
- 3) Rating Label

3. Measurement Conditions

3.1. Modes of Operation

The tests reported herein were performed according to the method specified by client.

The sample was tested in the following configurations:

The tested sample was connected to an AC/DC charger for charge mode and work level to "low-speed", "high-speed" and standby for all tests as described in this report.

The worst mode for conducted emissions, harmonic current emissions, voltage fluctuations and flicker, electrical fast transients/burst, surges, continuous induced radio-frequency disturbance, voltage dips and interruptions test listed in this report:

Charge mode

The pre-test mode for radiated emissions test listed:

- A. Charge mode
- B. Standby mode
- C. Low-speed mode
- D. High-speed mode

The worst mode for radiated emissions test listed in this report:

Standby mode

The test mode for electrostatic Discharge, radio-frequency electromagnetic field disturbances and power frequency magnetic field test listed in this report:

- A. Charge mode
- B. Standby mode
- C. High-speed mode

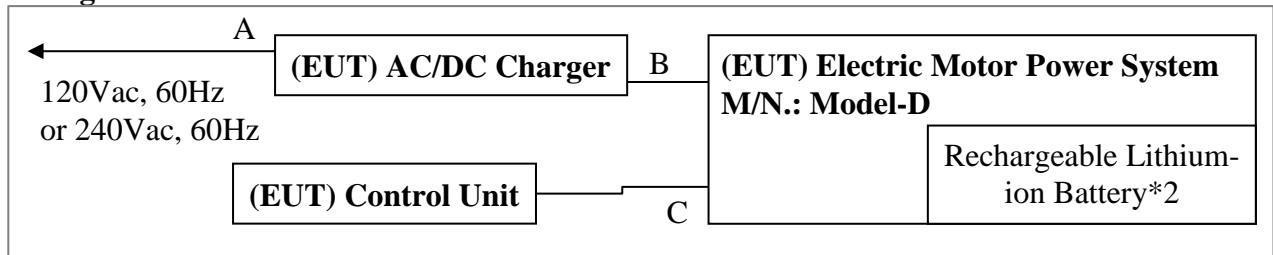
3.2. Additional Equipment

The subject sample was tested as an independent unit without any additional accessory.

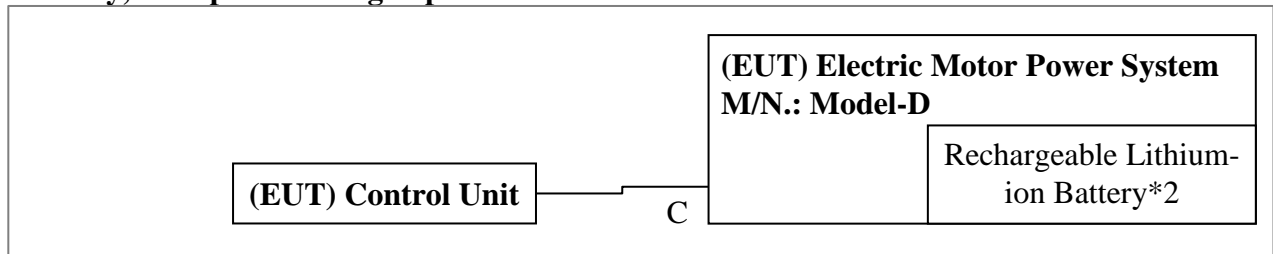
3.3. Test Setup

The test setup was realized on a non-conducted table of 10cm or 80cm height during all the tests. The test arrangement is configured and set according to manufacturer's installations.

Charge mode



Standby, low-speed and high-speed mode



Cable Description:

No.	Signal Cable Type	Signal Cable Description
A	AC Power Extension Cord (2 Pin)	Non-shielded, 1.8m
B	DC Power Cable	Non-shielded, 1.0m
C	Control Cable	Non-shielded, 0.55m

3.4. List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment
For EMI/Conducted Measurement (Shield Room A)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
1	EMI Test Receiver	Rohde & Schwarz	ESCI 3	101094	2022/11/24	2023/11/24
2	Two-Line V-Network (for EUT)	Rohde & Schwarz	ENV216	101938	2022/10/17	2023/10/17
3	Two-Line V-Network	Schwarzbeck	NSLK 8127	8127-00976	2022/11/22	2023/11/22
4	Test Software	Audix	e3	160224a	N/A	N/A

For EMI/Radiated Measurement (966 Semi-Anechoic Chamber A)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
1	EMI Test Receiver	Rohde & Schwarz	ESCI 7	101097	2022/07/19	2023/07/19
2	Pre-Amplifier	Hewlett Packard	8447D	2944A06641	2023/02/20	2024/02/20
3	Bilog Antenna	TESEQ	CBL 6111D	29803	2022/06/11	2023/06/11
4	Test Software	Audix	e3	160224a	N/A	N/A

For Harmonic Current/Voltage Fluctuations and Flicker Measurement (Shield Room A)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
1	Harmonic & Flicker Test System	Schaffner	CCN 1000-1	72334	2022/05/04	2023/05/04
2	AC Power Source	TESEQ	5001IX-208-TSQ	163A02064	2022/05/04	2023/05/04
3	Test Software	AMETEK	CTS 4	Ver. 4.29.0	N/A	N/A

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For EMS/Electrostatic Discharge Test (Shield Room F)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
1	ESD Simulator	TESEQ	NSG437	1259	2022/11/14	2023/11/14

For EMS/Radio-Frequency Electromagnetic Field Test (Fully-Anechoic Chamber)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
1	Signal Generator	Rohde & Schwarz	SMB-100A	115659	2023/03/10	2024/03/09
2	Broadband Amplifier (80MHz to 1GHz)	Rohde & Schwarz	BBA150-BC500	103417	N.C.R.	N.C.R.
3	Broadband Amplifier (0.69GHz to 6GHz)	Rohde & Schwarz	BBA150-D110E100	103533	N.C.R.	N.C.R.
4	Ultra-Broadband Antenna (30MHz to 3GHz)	FRANKONIA	BTA-M	8009	N.C.R.	N.C.R.
5	Double Stacked Log-Periodic Antenna (0.7GHz to 10.5GHz)	FRANKONIA	MAX-9	MAX-9-801	N.C.R.	N.C.R.
6	Power Meter	Rohde & Schwarz	NRX	100822	2022/04/26	2023/04/26
7	Average Power Sensor	Rohde & Schwarz	NRP6A	102023/102024	2022/04/26	2023/04/26
8	Open Switch and Control Platform	Rohde & Schwarz	OSP 130	101297	N.C.R.	N.C.R.
9	Test Software	Audix	i2	19926a V5	N/A	N/A

For EMS/Power Frequency Magnetic Field Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
1	Inductive Coil	EMC-PARTNER	MF-1000-1	191	2022/12/06	2023/12/06
2	ELF Magnetic Field Meter	F.W. BELL	4190	1635004	2022/08/18	2023/08/18
3	AC/DC Clamp Meter	Chauvin Arnoux	F403	415112	2022/12/28	2023/12/28

For EMS/EFT/Surges/Voltage Dips and Interruptions Test (Shield Room E)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
1	EMC Immunity Generator	TESEQ	NSG 3060A-FULL	P1946234906	2023/01/07	2024/01/07
2	Automated Variable Transformer	TESEQ	VAR 3005A-S16	P1944234534	2023/01/07	2024/01/07
3	Test Software	Ametek CTS	IEC. Control	Ver. 9.2.5	N/A	N/A

For EMS/Continuous Induced Radio-Frequency Disturbance Test (Shield Room E)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
1	Conducted Immunity Test System	TESEQ	NSG 4070C-80	47994	2022/05/04	2023/05/04
2	CDN M2/M3	Fischer Custom Communications	FCC-801-M2/M3-16A	101347	2022/12/27	2023/12/27
3	6 dB Attenuator	TESEQ	ATN6150	17063008	N.C.R.	N.C.R.
4	Test Software	TESEQ	NSG 4070 Control Program	Ver. 1.3.1.2	N/A	N/A

3.5. Abbreviations

PASS means 'complied with requirement'	N/A means 'not applicable'
FAIL means 'not complied'	N.C.R. means 'no calibration required'

3.6. Decision rule of conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in this test report, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty.

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4. Test Results EMISSION

Result:
PASS

4.1. Continuous Interference

4.1.1. Conducted Emission (Low Voltage AC Mains Port)

Port: AC Mains Ports
 Basic Standard: CISPR 16-2-1, Clause 7
 Frequency Range: 0.15 - 30 MHz
 Limits: EN IEC 61000-6-3, Table 4.3

Result:
PASS

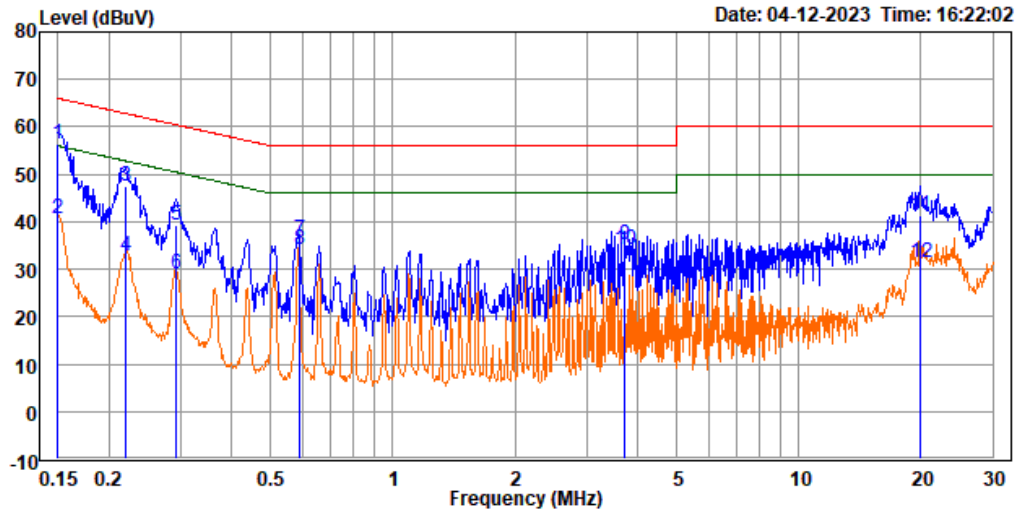
Test Setup

Date of Test: 06 Mar. 2023
 Input Voltage: 230Vac, 50Hz (for AC/DC Charger)
 Operational Mode: See 3.1
 Earthing: See 2.2
 Temperature: 19.3 °C
 Relative Humidity: 48 %

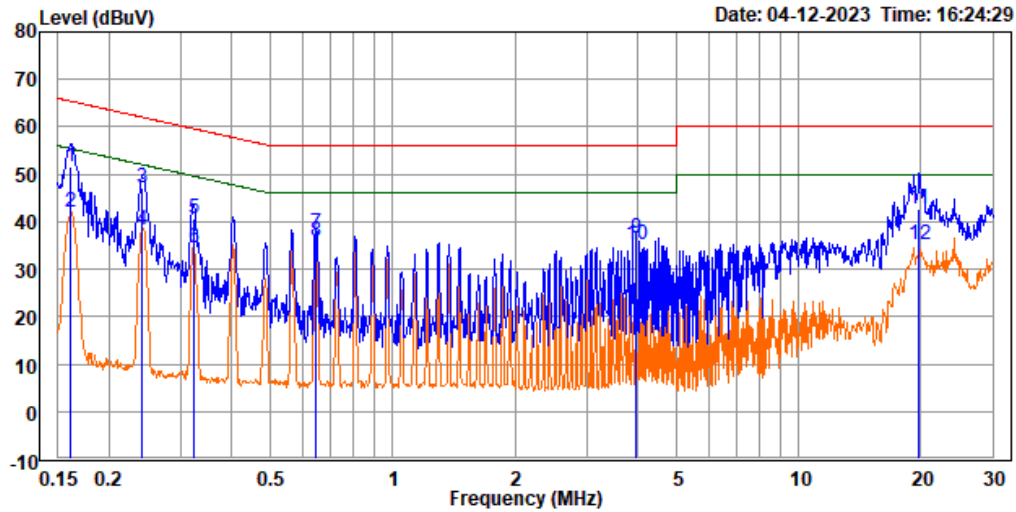
Table 2: Conducted Emission, Low Voltage AC Mains Port; 0.15 - 30 MHz Settings

Frequency		Settings	
Start	Stop	IF Bandwidth	Detector
0.15 MHz	30 MHz	9 kHz	Quasi-Peak/Average

Note 1: Emission Level = Read Level + Factor
 Over Limit = Emission Level – Limit Line
 Note 2: Factor = LISN Insertion Loss + Cable Loss

Figure 1: Conducted Emission, Low Voltage AC Mains Port; 0.15 - 30 MHz
Charge mode
Line


	Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Detector (PK/QP/AV)
1	0.150	46.62	9.62	56.24	66.00	-9.76	QP
2	0.150	31.02	9.62	40.64	56.00	-15.36	Average
3	0.219	37.74	9.62	47.36	62.85	-15.49	QP
4	0.219	23.12	9.62	32.74	52.85	-20.11	Average
5	0.293	29.53	9.62	39.15	60.45	-21.30	QP
6	0.293	19.47	9.62	29.09	50.45	-21.36	Average
7	0.588	26.44	9.63	36.07	56.00	-19.93	QP
8	0.588	24.54	9.63	34.17	46.00	-11.83	Average
9	3.735	25.60	9.68	35.28	56.00	-20.72	QP
10	3.735	24.43	9.68	34.11	46.00	-11.89	Average
11	19.836	31.58	9.77	41.35	60.00	-18.65	QP
12	19.836	21.54	9.77	31.31	50.00	-18.69	Average

Charge mode
Neutral


	Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Detector (PK/QP/AV)
1	0.161	42.02	9.62	51.64	65.42	-13.78	QP
2	0.161	32.28	9.62	41.90	55.42	-13.52	Average
3	0.242	37.53	9.62	47.15	62.03	-14.88	QP
4	0.242	28.79	9.62	38.41	52.03	-13.62	Average
5	0.323	31.05	9.62	40.67	59.62	-18.95	QP
6	0.323	24.95	9.62	34.57	49.62	-15.05	Average
7	0.646	27.89	9.63	37.52	56.00	-18.48	QP
8	0.646	26.06	9.63	35.69	46.00	-10.31	Average
9	3.965	26.96	9.69	36.65	56.00	-19.35	QP
10	3.965	25.58	9.69	35.27	46.00	-10.73	Average
11	19.737	32.73	9.86	42.59	60.00	-17.41	QP
12	19.737	25.38	9.86	35.24	50.00	-14.76	Average

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4.1.2. Conducted Emission (DC Power Port)

Port: DC Power Port
Basic Standard: CISPR 16-2-1, Clause 7
Frequency Range: 0.15 - 30 MHz
Limits: EN IEC 61000-6-3, Table 5

Result:

N/A

Note: There are no DC network power lines on subject sample. The DC input port is used from AC/DC charger. Therefore, this test is not applicable.

4.1.3. Conducted Emission (Other Wired Ports)

Port: Other Wired Ports
Basic Standard: CISPR 32, Annex A
Frequency Range: 0.15 - 30 MHz
Limits: EN IEC 61000-6-3, Table 6

Result:

N/A

Note: There is no any wired network, optical fibre, broadcast receiver tuner and antenna ports on subject sample. Therefore, this test is not applicable.

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4.1.4. Radiated Emission (Below 1GHz)

Port: Enclosure
 Basic Standard: CISPR 16-2-3, Clause 7.3
 Frequency Range: 30 - 1000 MHz
 Limits: EN IEC 61000-6-3, Table 3.1 (Measurement distance: 3m)

Result:	PASS
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Test Setup

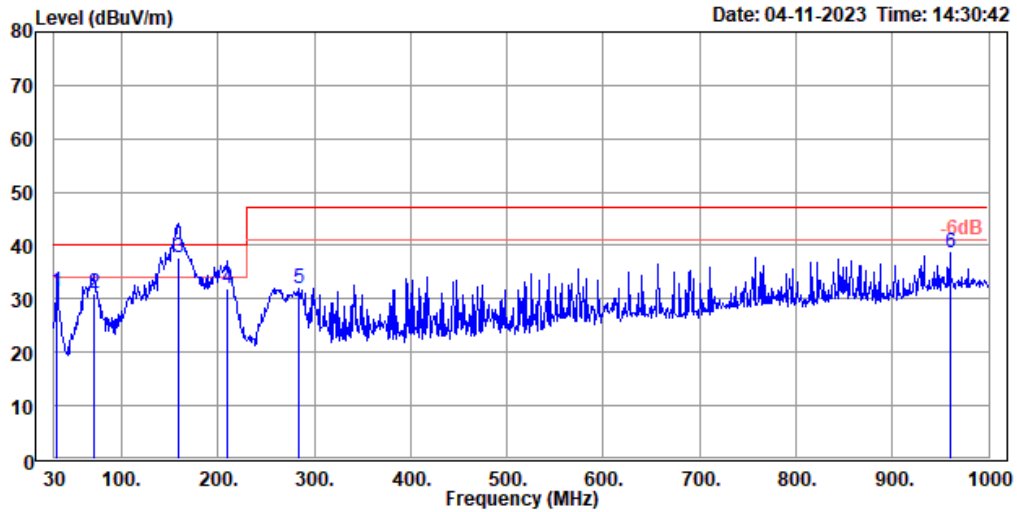
Date of Test: 11 Apr. 2023
 Input Voltage: 230Vac, 50Hz (for AC/DC Charger);
 37Vdc (for standby, low-speed and high-speed mode)
 Operational Mode: See 3.1
 Earthing: See 2.2
 Temperature: 22.0 °C
 Relative Humidity: 54 %

Table 3: Radiated Emission; 30 - 1000 MHz Settings

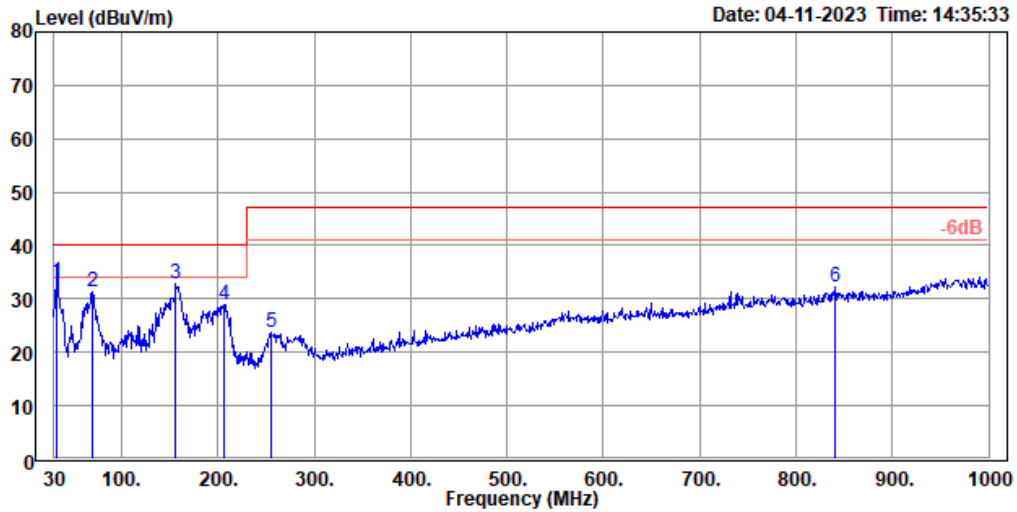
Frequency		Settings	
Start	Stop	IF Bandwidth	Detector
30 MHz	1 GHz	120 kHz	Quasi-Peak

Note 1: Result = Reading + Correction Factor
 Over Limit = Result – Limits

Note 2: Factor = Antenna factor + Cable loss

Figure 2: Radiated Emission, 30 - 1000 MHz
Low-speed mode (Worst mode)
Horizontal


	Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Emission Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Antenna Height (cm)	Table Angle (deg)	Detector (PK/QP/AV)
1	32.910	35.60	-4.14	31.46	40.00	-8.54	397	74	QP
2	71.710	45.49	-14.40	31.09	40.00	-8.91	381	100	QP
3	159.010	47.49	-9.87	37.62	40.00	-2.38	180	5	QP
4	210.420	43.20	-11.22	31.98	40.00	-8.02	162	214	QP
5	284.140	38.82	-6.77	32.05	47.00	-14.95	100	7	QP
6	960.230	32.56	6.01	38.57	47.00	-8.43	100	11	QP

Low-speed mode (Worst mode)
Vertical


	Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Emission Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Antenna Height (cm)	Table Angle (deg)	Detector (PK/QP/AV)
1	32.910	37.30	-4.14	33.16	40.00	-6.84	102	155	QP
2	69.770	45.82	-14.58	31.24	40.00	-8.76	231	4	QP
3	156.100	42.50	-9.68	32.82	40.00	-7.18	300	286	QP
4	206.540	40.04	-11.16	28.88	40.00	-11.12	200	70	QP
5	255.040	30.59	-6.82	23.77	47.00	-23.23	200	299	QP
6	840.920	28.56	3.69	32.25	47.00	-14.75	100	34	QP

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4.1.5. Radiated Emission (Above 1GHz)

Port: Enclosure
Basic Standard: CISPR 16-2-3, Clause 7.6
Frequency Range: 1000 - 6000 MHz
Limits: EN IEC 61000-6-3, Table 3.4

Result:

N/A

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes.

- highest frequency is less than 108MHz, measurement shall only be made up to 1GHz
- highest frequency is between 108 & 500MHz, measurement shall only be made up to 2GHz
- highest frequency is between 500 & 1GHz, measurement shall only be made up to 5GHz
- highest frequency is above 1GHz, measurement shall be made up to 5 times the highest frequency or 6GHz, whichever is less.

Note: The highest frequency is 48MHz.

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4.2. Discontinuous Disturbance

Port: Low Voltage AC Mains Port
Basic Standard: CISPR 14-1, Clause 4.4
Frequency Range: 0.15 MHz - 30 MHz
Limits: EN IEC 61000-6-3, Table 4.4 (CISPR 14-1, Clause 4.4 and 5.4.2)

Result:

N/A

Note: As the sample works in a continuous configuration during charge mode condition no such test is to be applied.

4.3. Disturbances in Supply Systems

4.3.1. Harmonic Current Emissions

Port: AC Mains
 Basic Standard: EN IEC 61000-3-2 or EN/IEC 61000-3-2
 Limits: EN IEC 61000-3-2, Clause 7

Result:
PASS

Test Setup

Date of Test: 12 Apr. 2023
 Input Voltage: 230Vac, 50Hz (for AC/DC Charger)
 Operational Mode: See 3.1
 Earthing: See 2.2
 Temperature: 20.8 °C
 Relative Humidity: 58 %

Table 4: Harmonic Current Emissions

Charge mode
Test Result: Pass **Source qualification: Normal**
THC(A): 0.435 **I-THD(%): 155.2** **POHC(A): 0.061** **POHC Limit(A): 0.251**

Highest parameter values during test:

V_{RMS} (Volts): 229.96	Frequency(Hz): 50.00
I_{Peak} (Amps): 2.105	I_{RMS} (Amps): 0.552
I_{Fund} (Amps): 0.280	Crest Factor: 4.168
Power (Watts): 62.2	Power Factor: 0.490

Note: Due to the EUT measured active input power is less than 75W, therefore, no limits apply for this equipment according to EN IEC 61000-3-2.

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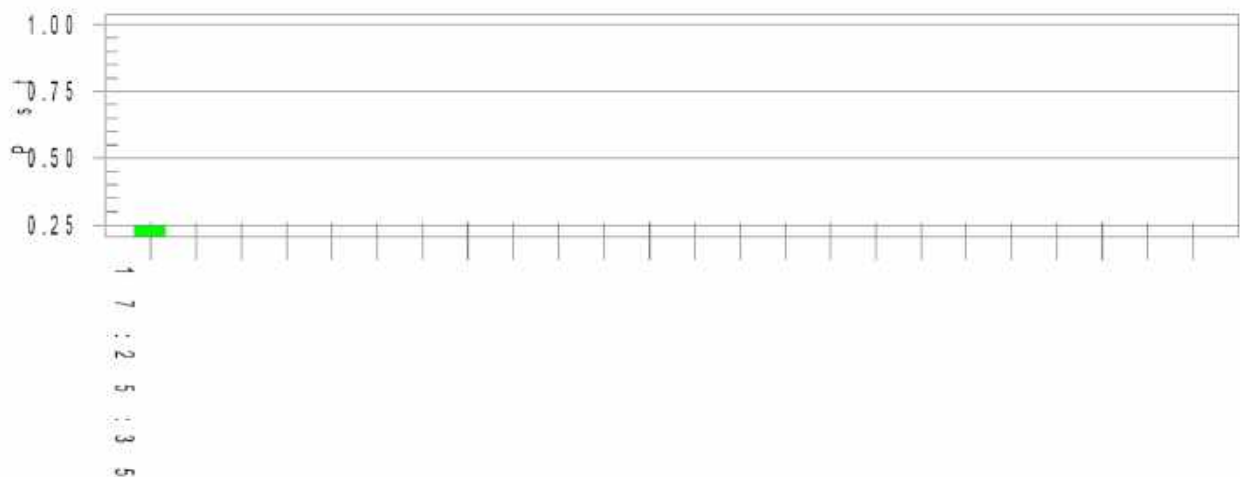
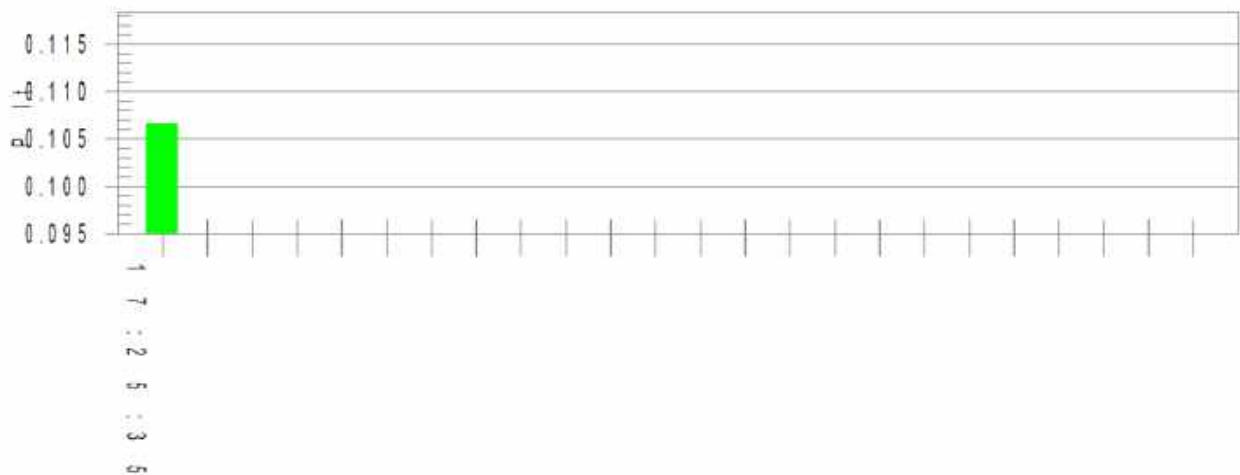
4.3.2. Voltage Fluctuations and Flicker

Port: AC Mains
Basic Standard: EN/IEC 61000-3-3
Limits: EN 61000-3-3, Clause 5

Result:**PASS**

Test Setup

Date of Test: 12 Apr. 2023
Input Voltage: 230Vac, 50Hz (for AC/DC Charger)
Operational Mode: See 3.1
Earthing: See 2.2
Temperature: 20.8 °C
Relative Humidity: 58 %

Table 5: Voltage Fluctuations and Flicker
Charge mode
Test Result: Pass
Status: Test Completed
Pst_i and limit line
European Limits

Plt and limit line

Parameter values recorded during the test:
Vrms at the end of test (Volt): 229.90

Highest dt (%):
T-max (mS): 0

Highest dc (%): 0.00

Highest dmax (%): 0.00

Highest Pst (10 min. period): 0.244

Test limit (%):
Test limit (mS): 500.0 **Pass**
Test limit (%): 3.30 **Pass**
Test limit (%): 4.00 **Pass**
Test limit: 1.000 **Pass**

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5. Test Results IMMUNITY

Result:

PASS

5.1. Enclosure Port

5.1.1. Electrostatic Discharge

Port: Enclosure

Basic Standard: EN/IEC 61000-4-2

Performance Criteria: B

Test Specification: EN IEC 61000-6-1

Voltage:

8 kV (Air Discharge)

4 kV (Contact Discharge)

Horizontal Coupling Plane (HCP) and

Vertical Coupling Plane (VCP)

Result:

PASS

Test Setup

Date of Test: 14 Apr. 2023

Input Voltage: 230Vac, 50Hz (for AC/DC Charger);
37Vdc (for standby, high-speed mode)

Operational Mode: See 3.1

Earthing: See 2.2

Temperature: 21.9 °C

Relative Humidity: 49 %

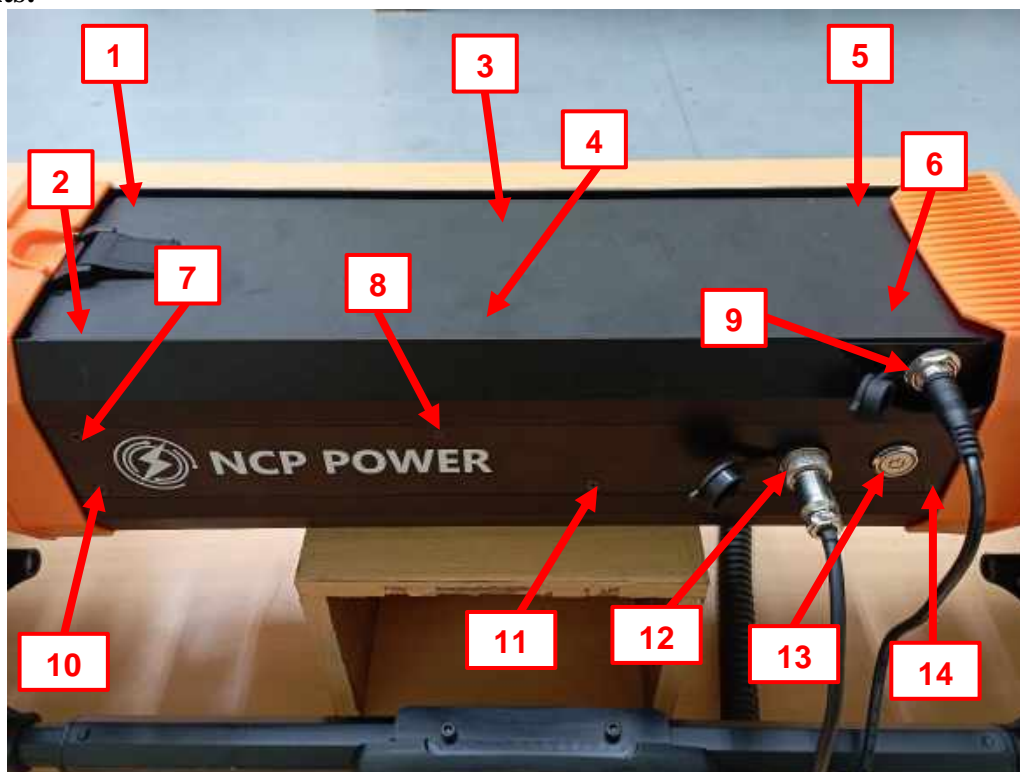
Atmospheric Pressure: 986 mbar

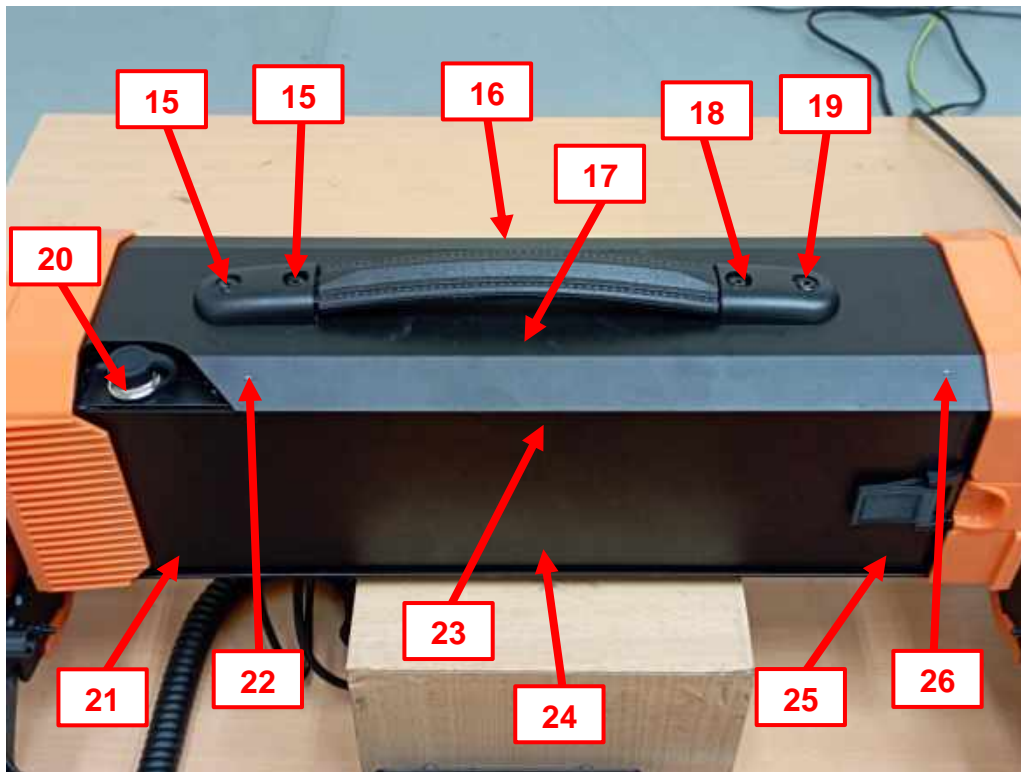
Table 6: Electrostatic Discharge
Charge, standby and high-speed mode

Test point	Polarity	No. of Discharges	Observation	Result
Vertical Coupling Plane	+/- 4 kV	20	Normal Function	PASS
Point 1 to 26 (Contact Discharge)	+/- 4 kV	20	Normal Function	PASS

Note 1: Normal function means no degradation in performance was monitored during and directly after the test.

Note 2: The testing was performed by air and contact method but there was no discharge to the equipment under test (EUT) except for points in the table shown above.

Test Points:




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5.1.2. Radio-Frequency Electromagnetic Field

Port: Enclosure
 Basic Standard: EN/IEC 61000-4-3
 Performance Criteria: A
 Test Specification: EN IEC 61000-6-1
 Frequency Range & Field Strength: 80 - 1000 MHz, 3V/m
 1400 - 6000 MHz, 3V/m
 Modulation: AM 80%, 1kHz
 Test Distance: 3m

Result:
PASS

Test Setup

Date of Test: 12 Apr. 2023
 Input Voltage: 230Vac, 50Hz (for AC/DC Charger);
 37Vdc (for standby, high-speed mode)
 Operational Mode: See 3.1
 Earthing: See 2.2
 Temperature: 22.6 °C
 Relative Humidity: 56 %

Table 7: Radio-Frequency Electromagnetic Field Settings (charge, standby and high-speed mode)

Frequency			Settings			
Start	Stop	Step Size	Field Strength	Sweep Mode	Dwell Time	Modulation
80 MHz	1000 MHz	1% of the Preceding Frequency	3V/m	Auto	3000 ms	1kHz, AM 80%
1400 MHz	6000 MHz					

Note: No degradation in performance was monitored during and directly after the test.

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5.1.3. Power Frequency Magnetic Field

Port: Enclosure
 Basic Standard: EN/IEC 61000-4-8
 Performance Criteria: A
 Test Specification: EN IEC 61000-6-1
 Frequency: 50Hz and 60Hz
 Magnetic Field Strength: 3 A/m

Result:
PASS

Test Setup

Date of Test: 12 Apr. 2023
 Input Voltage: 230Vac, 50Hz (for AC/DC Charger);
 37Vdc (for standby, high-speed mode)
 Operational Mode: See 3.1
 Earthing: See 2.2
 Temperature: 24.6 °C
 Relative Humidity: 56 %

Table 8: Power Frequency Magnetic Field Charge, standby and high-speed mode

Test point	Test Frequency	Test level	Compliance level
X axis	50Hz	3A/m	3A/m
Y axis	50Hz	3A/m	3A/m
Z axis	50Hz	3A/m	3A/m
X axis	60Hz	3A/m	3A/m
Y axis	60Hz	3A/m	3A/m
Z axis	60Hz	3A/m	3A/m

Note: No degradation in performance was monitored during and directly after the test.

5.2. Input and Output AC Power Ports

5.2.1. Electrical Fast Transients/Burst

Port:	Input AC Power Port		
Basic Standard:	EN/IEC 61000-4-4		
Performance Criteria:	B		
Test Specification:	EN IEC 61000-6-1		
	Peak Voltage:	1,0 kV	
	Tr/Th:	5/ 50ns	
	Rep. Frequency:	5 kHz	

Result:
PASS

Test Setup

Date of Test:	12 Apr. 2023
Input Voltage:	230Vac, 50Hz (for AC/DC Charger)
Operational Mode:	See 3.1
Earthing:	See 2.2
Temperature:	22.2 °C
Relative Humidity:	56 %

Table 9: Electrical Fast Transients/Burst on Input AC Power Port
Charge mode

Test point	Polarity	Observation	Result
L+N	+/- 1kV	Normal Function	PASS

Note: Normal function means no degradation in performance was monitored during and directly after the test.

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5.2.2. Surges

Port: Input AC Power Port
 Basic Standard: EN/IEC 61000-4-5
 Performance Criteria: B
 Test Specification: EN IEC 61000-6-1
 Peak Voltage: 1 kV for differential mode
 2 kV for common mode
 Tr/Th: 1,2/ 50µs (8/ 20µs)

Result:
PASS

Test Setup

Date of Test: 14 Apr. 2023
 Input Voltage: 230Vac, 50Hz (for AC/DC Charger)
 Operational Mode: See 3.1
 Earthing: See 2.2
 Temperature: 23.7 °C
 Relative Humidity: 54 %

Table 10: Surges on Input AC Power Port
Charge mode

Test point	Voltage	Polarity	No. of Pulse	Phase	Observation
L-N	1 kV	Positive	40	0°, 90°, 180°, 270°	Normal Function
L-N	1 kV	Negative	40	0°, 90°, 180°, 270°	Normal Function

Note: Normal function means no degradation in performance was monitored during and directly after the test.

5.2.3. Continuous Induced Radio-Frequency Disturbance

Port: Input AC Power Port
 Basic Standard: EN/IEC 61000-4-6
 Performance Criteria: A
 Test Specification: EN IEC 61000-6-1
 Frequency Range: 0.15 - 80 MHz
 Voltage Level: 3 Vrms (Unmodulated)
 Modulation: AM 80%, 1kHz Sine Wave

Result:
PASS

Test Setup

Date of Test: 12 Apr. 2023
 Input Voltage: 230Vac, 50Hz (for AC/DC Charger)
 Operational Mode: See 3.1
 Earthing: See 2.2
 Coupling: Coupling Network CDN M2
 Temperature: 22.2 °C
 Relative Humidity: 56 %

Table 11: Continuous Induced Radio-Frequency Disturbance on Input AC Power Port Settings (charge mode)

Frequency			Settings			
Start	Stop	Step Size	Field Strength	Sweep Mode	Dwell Time	Modulation
150 kHz	80 MHz	1% of the Preceding Frequency	3 Vrms	Auto	3000 ms	1kHz, AM 80%

Note: No degradation in performance was monitored during and directly after the test.

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5.2.4. Voltage Dips and Interruptions

Port: AC Mains
 Basic Standard: EN/IEC 61000-4-11
 Performance Criteria: B (for 0% Residual Voltage, 0.5 Cycle)
 B (for 0% Residual Voltage, 1 Cycle)
 C (for 70% Residual Voltage, 25/30 Cycle at 50/60Hz)
 C (for 0% Residual Voltage, 250/300 Cycle at 50/60Hz)
 Test Specification: EN IEC 61000-6-1
 Test Level: 0% Residual Voltage, 0.5 Cycle
 0% Residual Voltage, 1 Cycle
 70% Residual Voltage, 25/30 Cycle at 50/60Hz
 0% Residual Voltage, 250/300 Cycle at 50/60Hz

Result:	PASS
----------------	-------------

Test Setup

Date of Test: 12 Apr. 2023
 Input Voltage: 100Vac, 50Hz and 240Vac, 50Hz (for AC/DC Charger)
 Operational Mode: See 3.1
 Earthing: See 2.2
 Temperature: 22.2 °C
 Relative Humidity: 56 %

Table 12: Voltage Dip and Interruptions

Voltage Dips	Cycle	Observation	Result
70%	25	Normal Function	PASS
0%	0.5	Normal Function	PASS
0%	1	Normal Function	PASS
Interruption	Cycle	Observation	Result
0%	250	@	PASS

Note 1: Normal function means no degradation in performance was monitored during and directly after the test.

Note 2: "@" The EUT lost input voltage during test and recovered after test stop.

5.3. Signal/ Control Ports

Result:	N/A
----------------	-----

Note 1: This test is applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification exceed 3m. All wired network cables of the sample are not exceeding 3m during normal operation. Therefore, this test is not applicable (for fast transients and radio-frequency common mode tests).

Note 2: This test is applicable only to ports interfacing with cables whose total length according to the manufacturer's functional specification exceed 30m. All wired network cables of the sample are not exceeding 30m during normal operation. Therefore, this test is not applicable (for surges test).

5.4. Input and Output DC Power Ports

Result:	N/A
----------------	-----

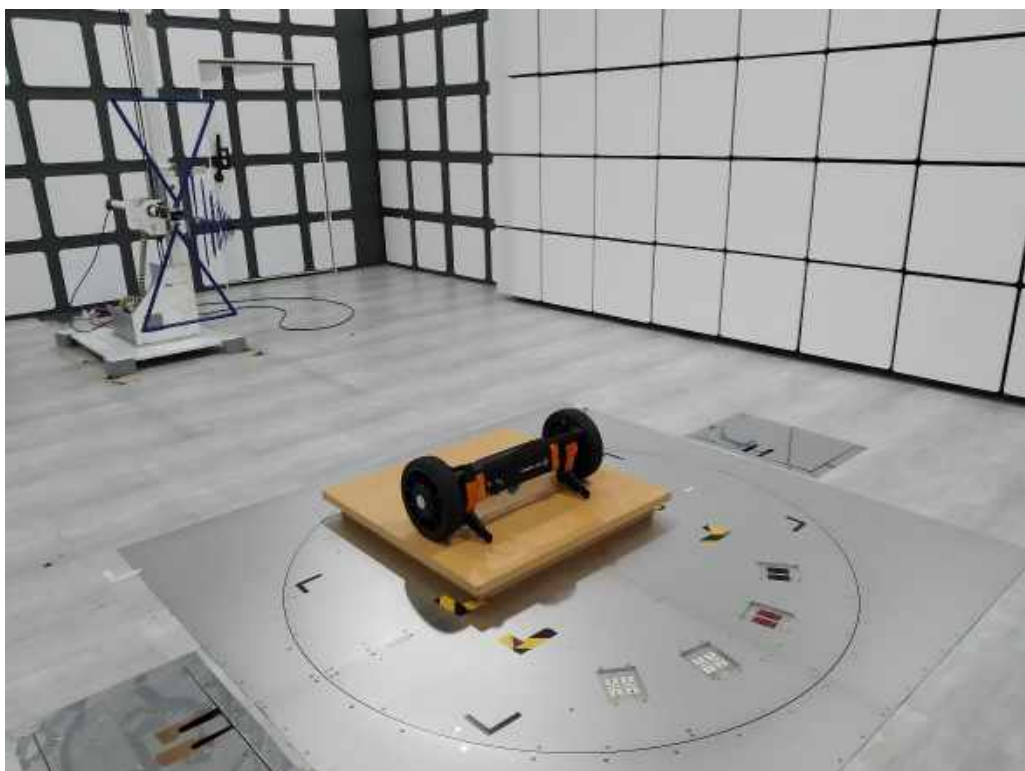
Note: Note: There are no DC network power lines on subject sample. The DC input port is used from AC/DC charger. Therefore, this test is not applicable.

6. Photographs of the Test Set-up

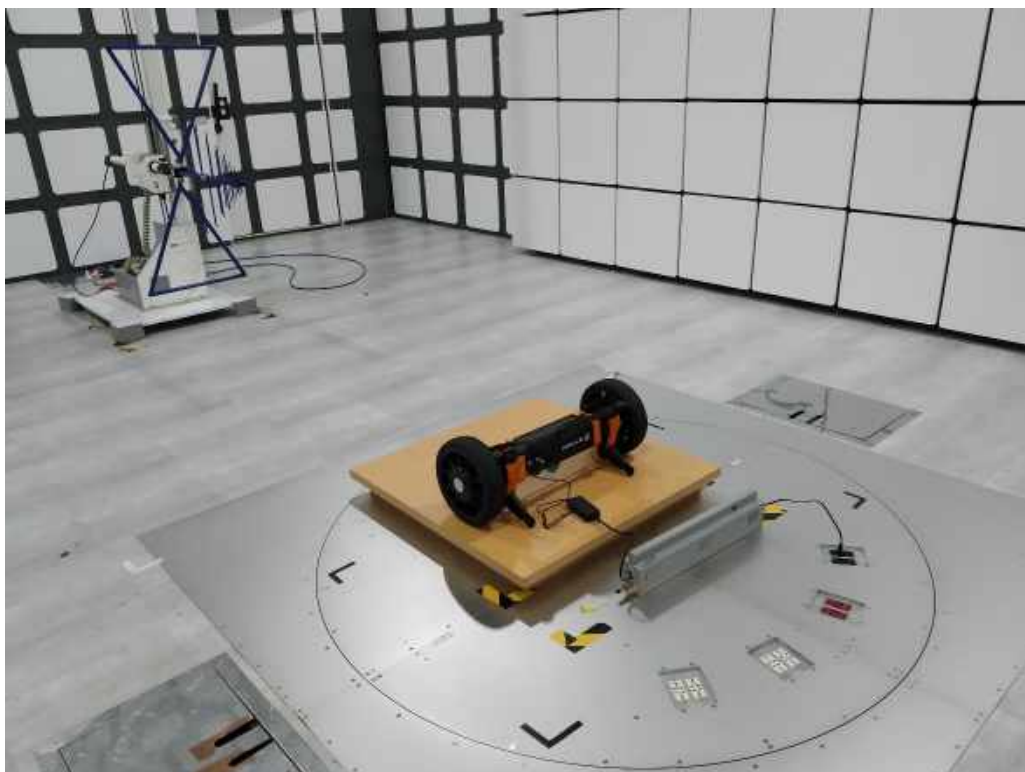
Picture 1: Conducted Emission, Low Voltage AC Mains Port



Picture 2: Radiated Emission, 30 - 1000 MHz
Standby, low-speed and high-speed mode



Charge mode



Picture 3: Harmonic Current Emissions, Voltage Fluctuations and Flicker



Picture 4: Electrostatic Discharge
Standby and high-speed mode



Charge mode



**Picture 5: Radio-Frequency Electromagnetic Field Disturbances
Standby and high-speed mode**



Charge mode



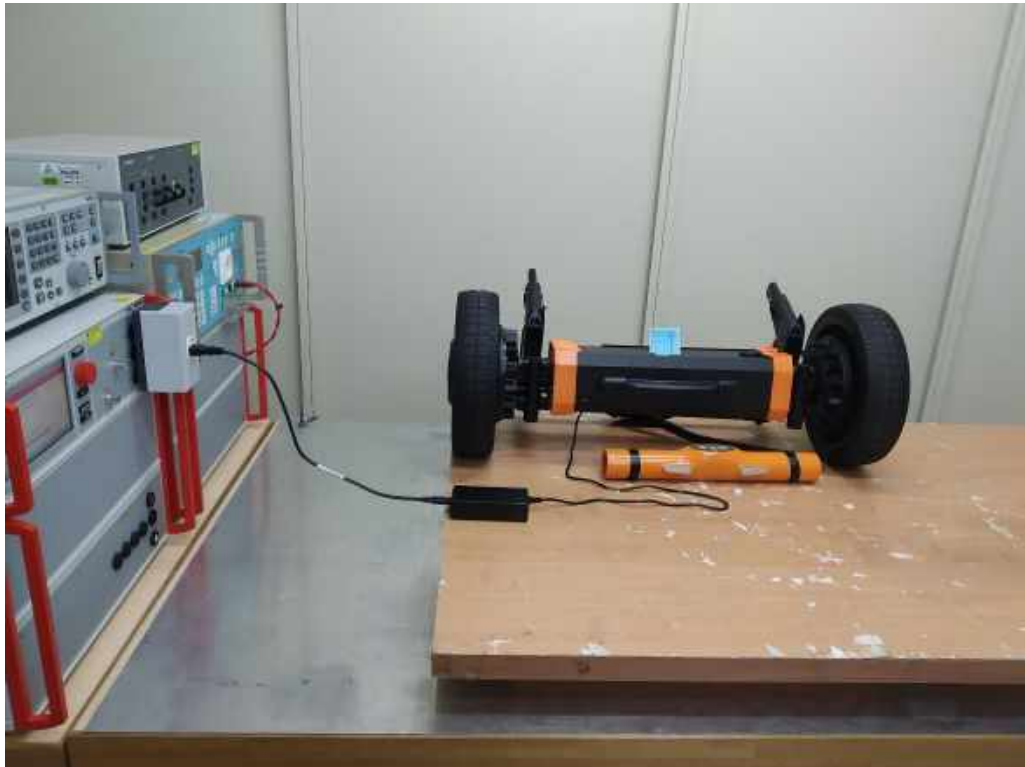
**Picture 6: Power Frequency Magnetic Field
Standby and high-speed mode**



Charge mode



Picture 7: Electrical Fast Transients/Burst



Picture 8: Surges



Picture 9: Continuous Induced Radio-Frequency Disturbance



Picture 10: Voltage Dips and Interruptions



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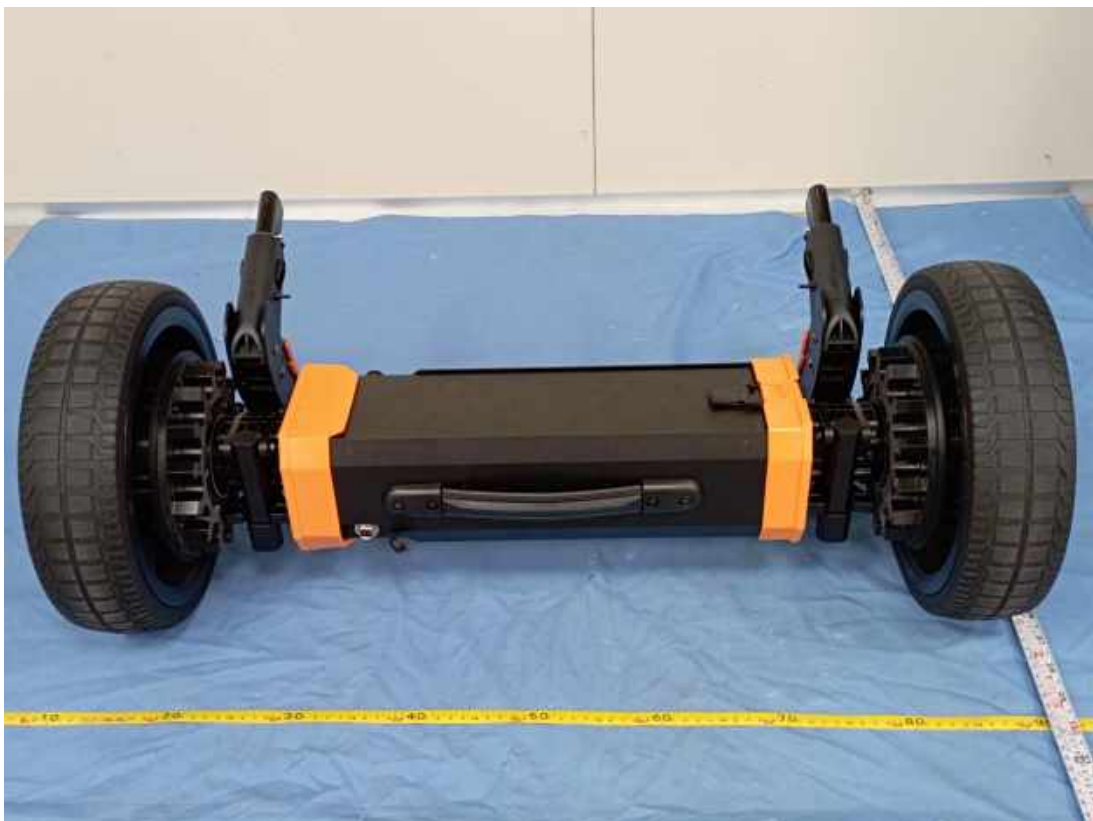
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Type Designation: Model-D



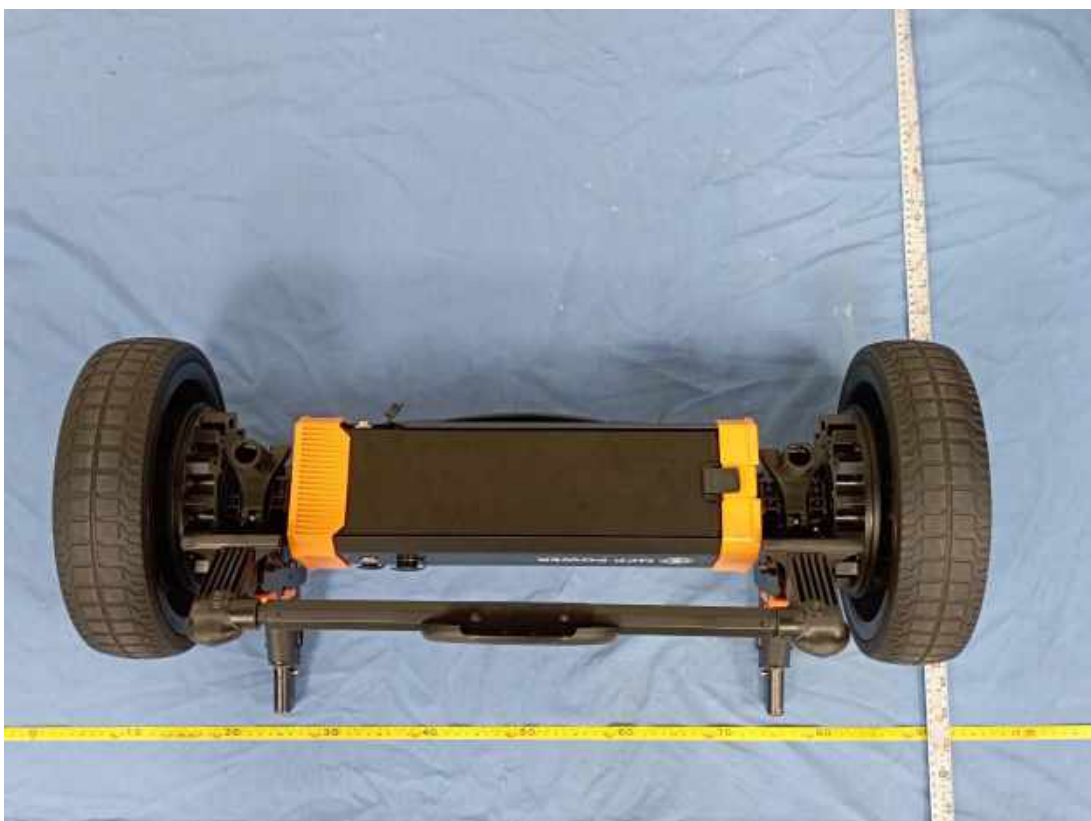
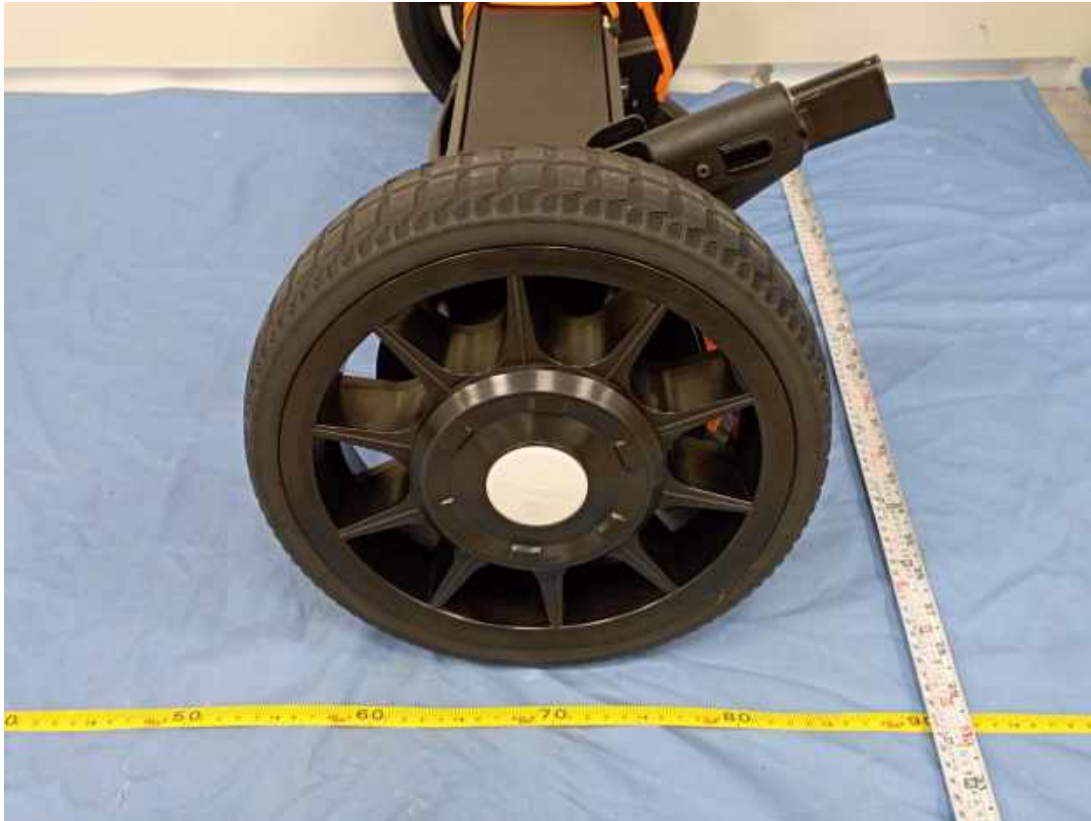
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Type Designation: Model-D



Product: Electric Motor Power System

Type Designation: Model-D



Product: Electric Motor Power System

Type Designation: Model-D

With power switch type



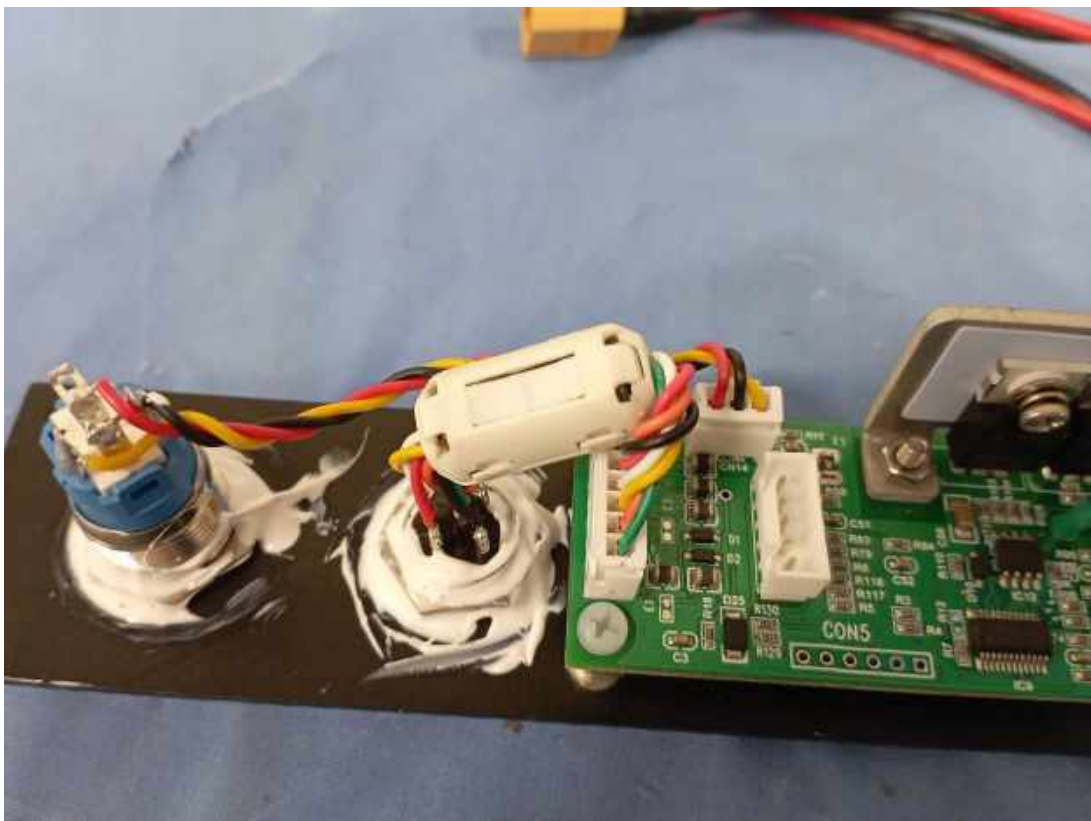
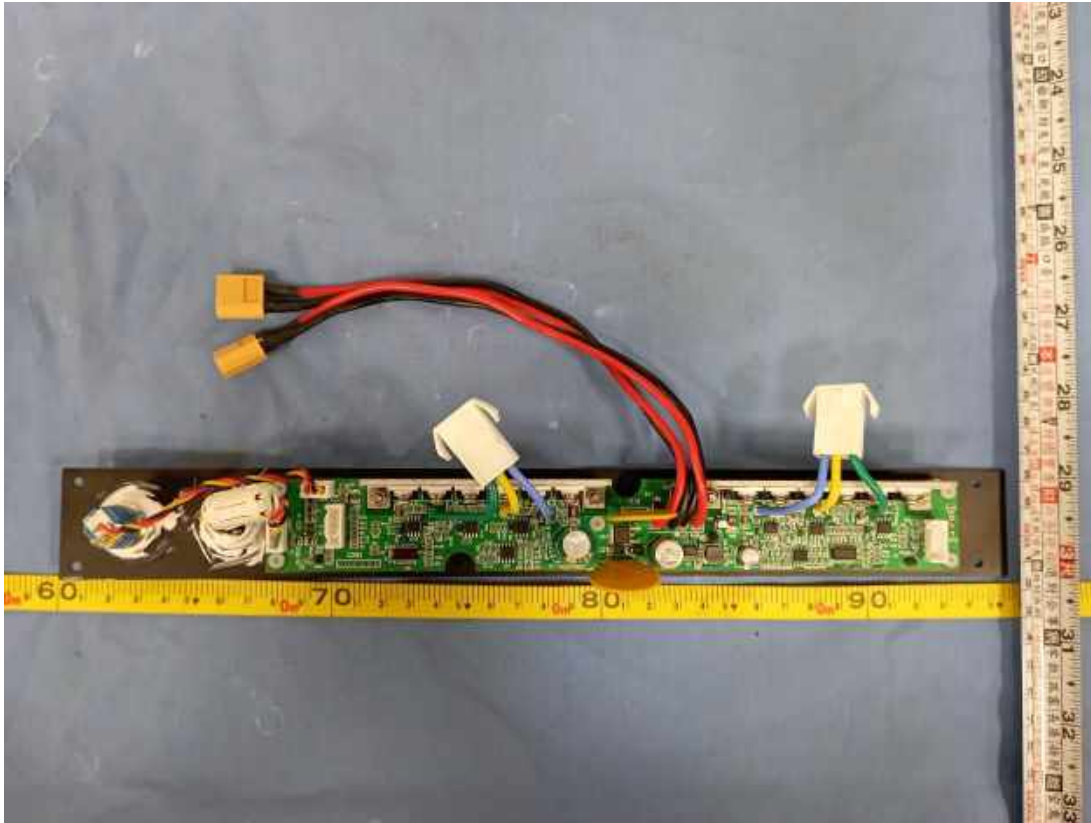
Product: Electric Motor Power System

Type Designation: Model-D



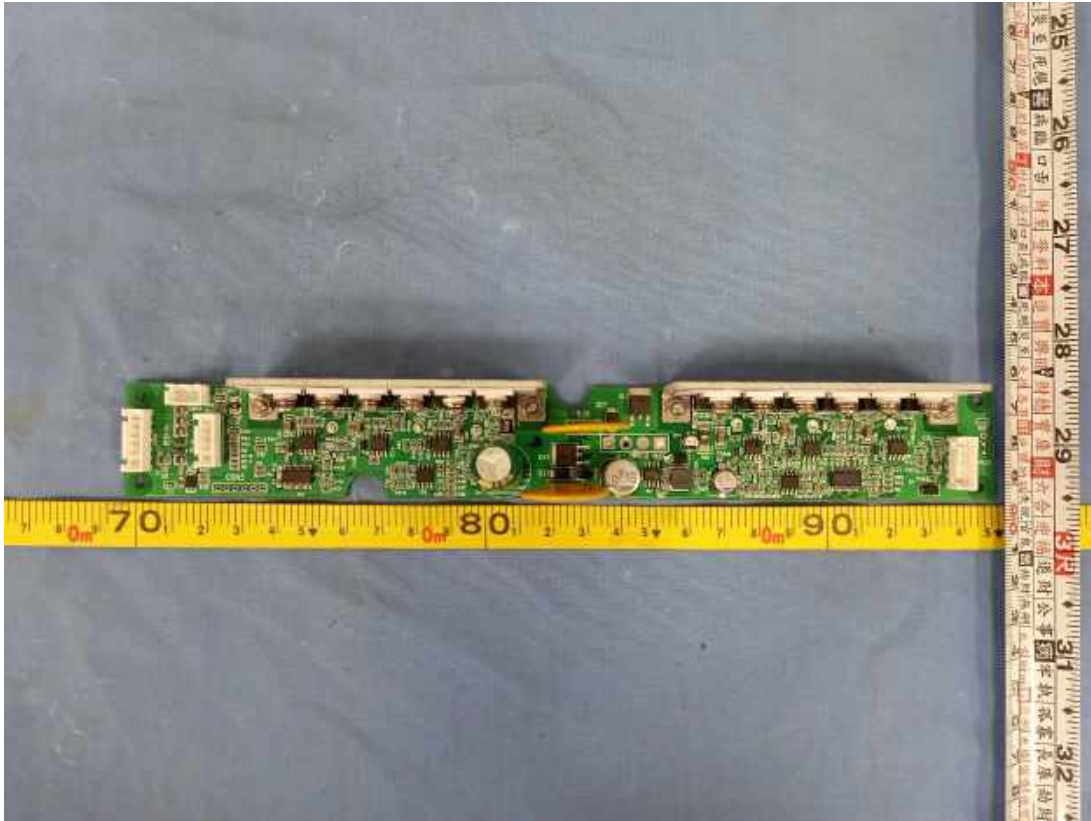
Product: Electric Motor Power System

Type Designation: Model-D



Product: Electric Motor Power System

Type Designation: Model-D



Product: Electric Motor Power System

Type Designation: Model-D



Rechargeable lithium-ion battery



Product: Electric Motor Power System

Type Designation: Model-D



Product: Electric Motor Power System

Type Designation: Model-D



Control panel



Product: Electric Motor Power System

Type Designation: Model-D



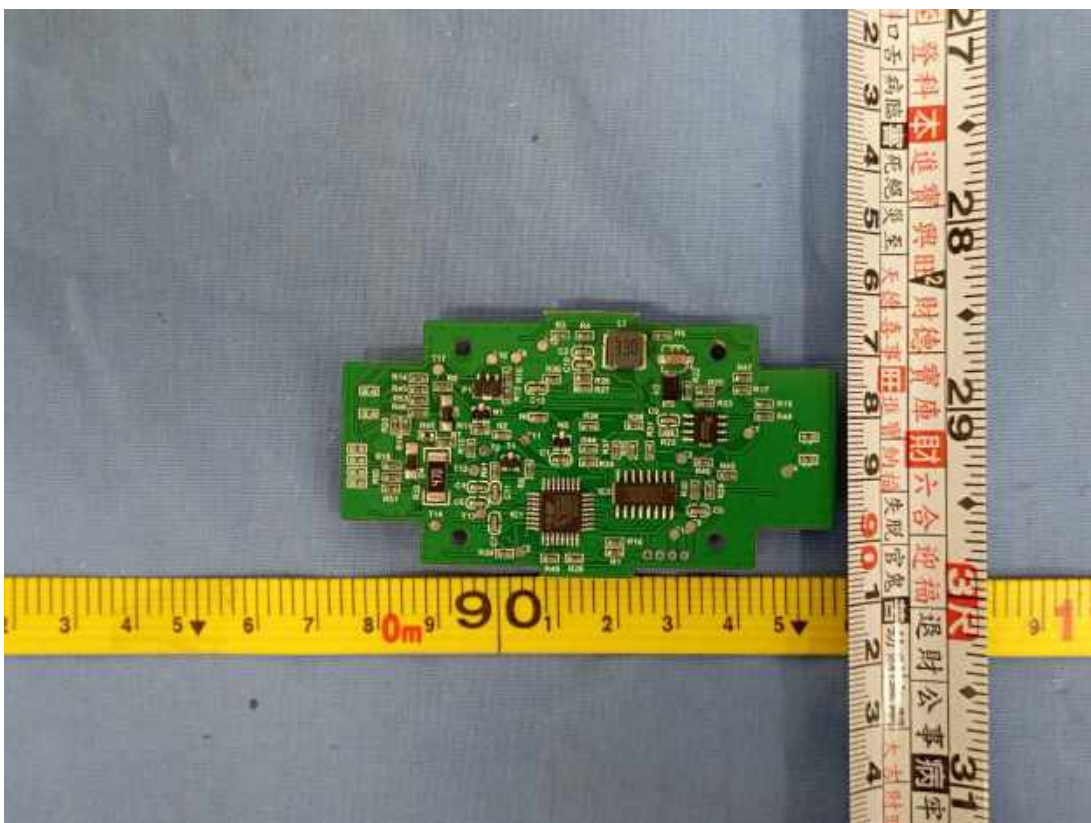
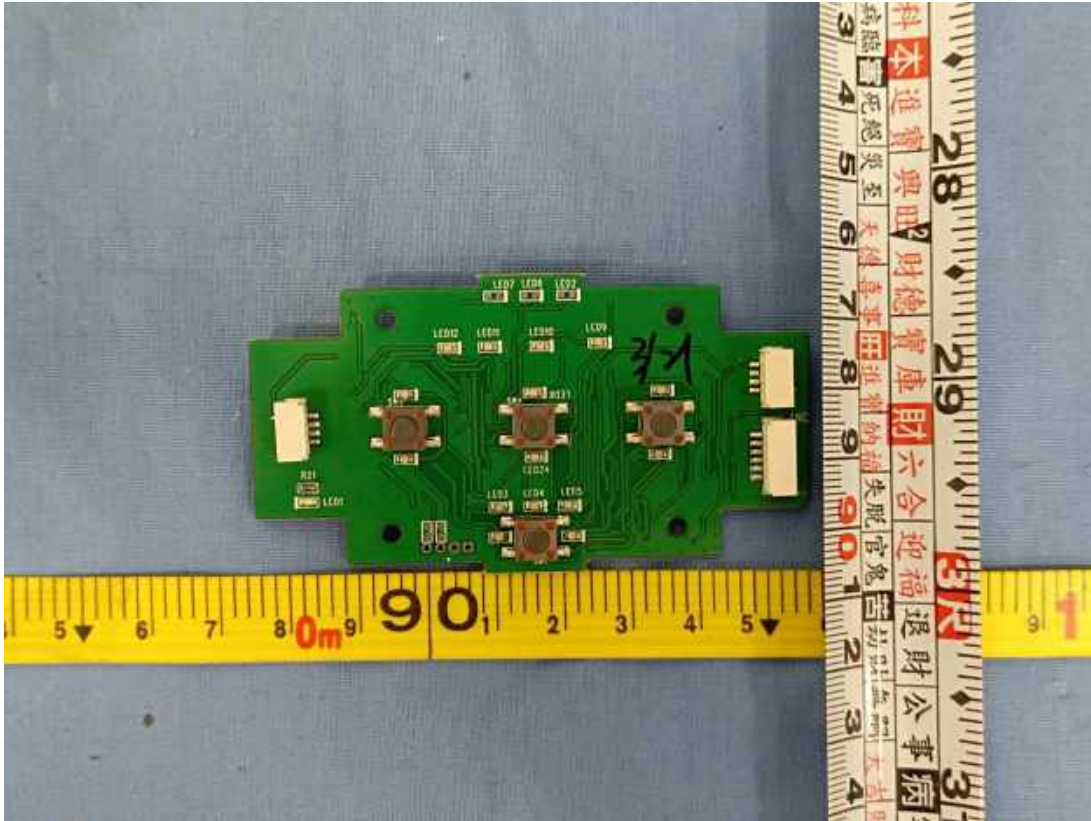
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Type Designation: Model-D



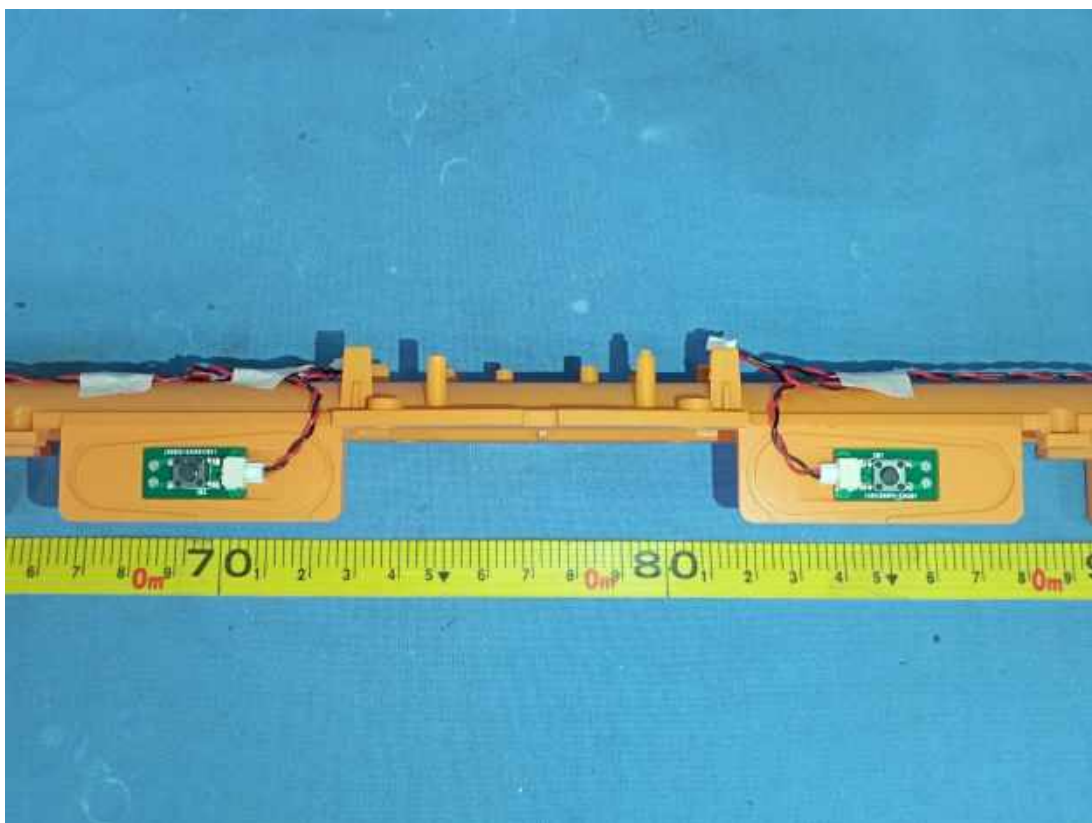
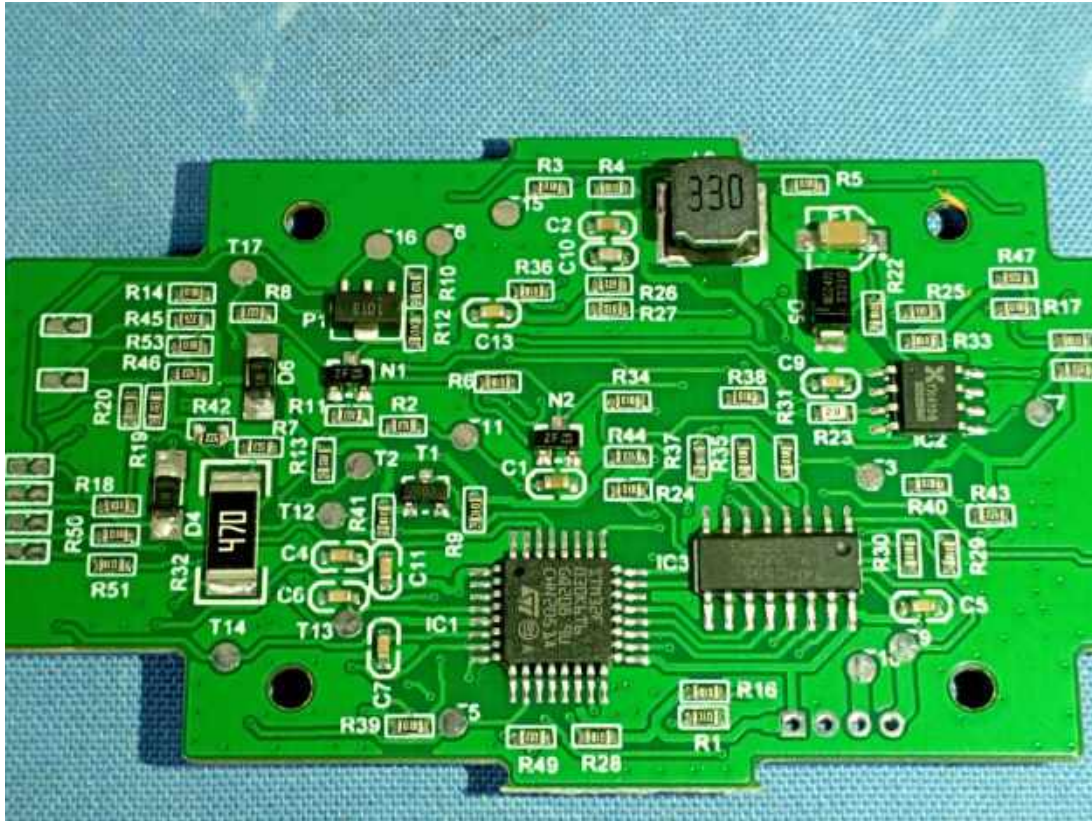
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Type Designation: Model-D



Product: Electric Motor Power System

Type Designation: Model-D



Product: Electric Motor Power System

Type Designation: Model-D

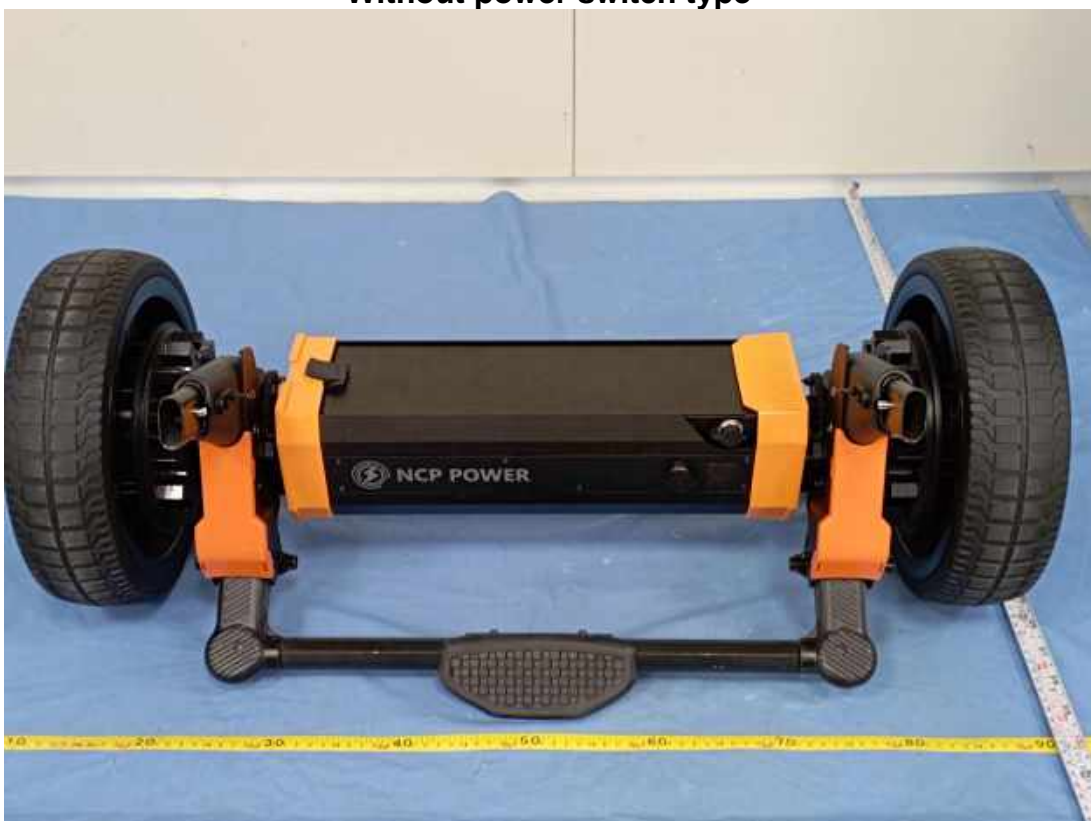


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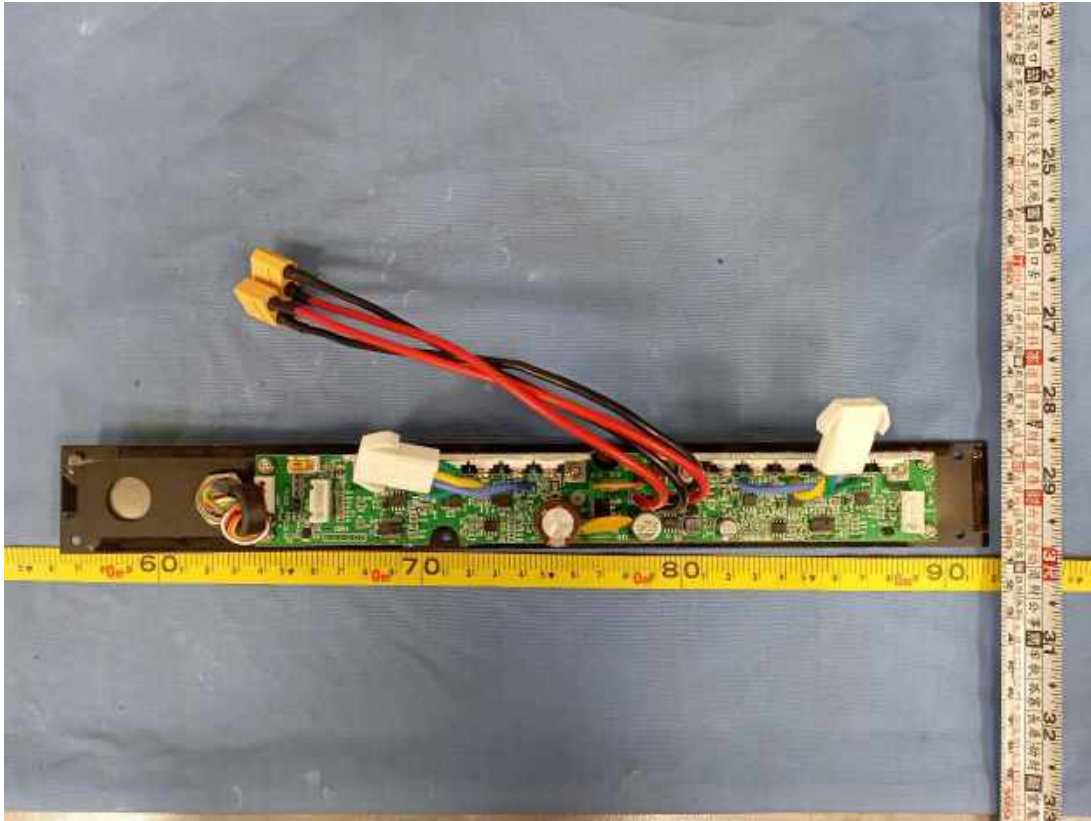


Without power switch type



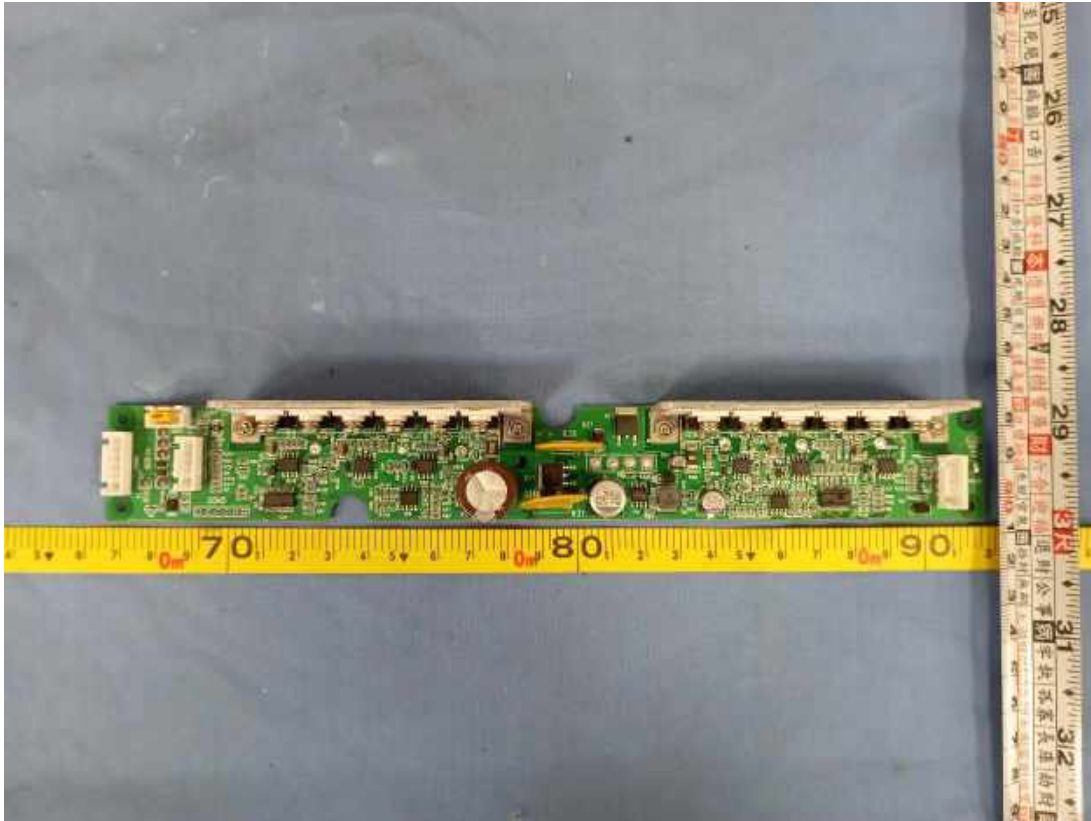
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Product: Electric Motor Power System

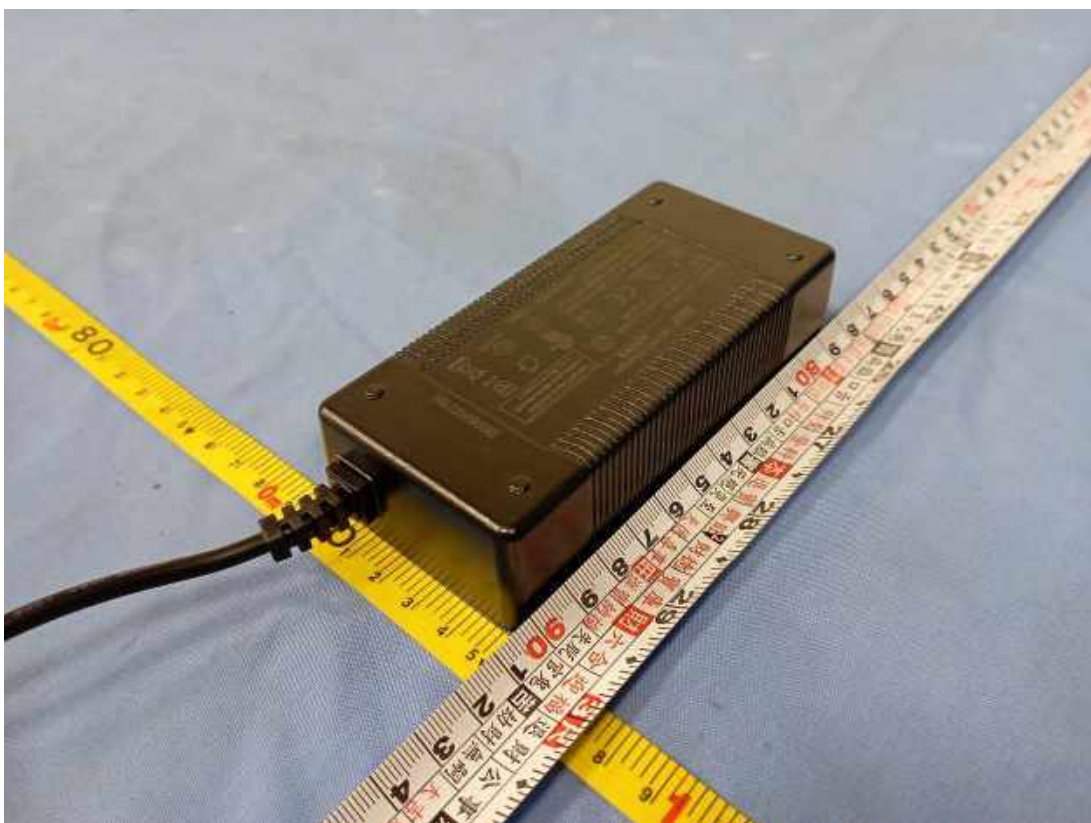
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Product: Electric Motor Power System

Type Designation: Model-D

AC/DC charger



Product: Electric Motor Power System

Type Designation: Model-D



Product: Electric Motor Power System

Type Designation: Model-D

