





TEST REPORT N°: CNDQ-ESH-P24100704B
EMC TEST REPORT

Applicant :	V-TAC EXPORTS LIMITED
Address :	FLAT/RM D-2 7/F WING CHEONG COMMERCIAL BLDG 19-25 JERVOIS STREET SHEUNG WAN HK
Manufacturer :	LEDXPRESS LIGHTING TECHNOLOGY CO.,LTD
Address :	Floor 1-6, Block E, No.10 Lefengsi Road, Henglan town, Zhongshan City, Guangdong Province, China
Factory :	LEDXPRESS LIGHTING TECHNOLOGY CO.,LTD
Address :	Floor 1-6, Block E, No.10 Lefengsi Road, Henglan town, Zhongshan City, Guangdong Province, China
This document includes : 42 pages	

Product :	Lithium Ion Batteries	
Model name :	VT-12040-1, VT-10240W, VT-10240B, VT-10240B-1	
Trade mark :		
Rated voltage :	51.2Vdc	
Rated capacity :	200Ah, 10.24KWh	
Highest clock frequency :	≤108 MHz	
Protection class :	--	
Tests realised :	On one sample of VT-12040-1	
Test date :	Oct.11 to 14, 2024	
Standards used (date) :	EN IEC 61000-6-4:2019 EN IEC 61000-6-3:2021 EN IEC 61000-6-2:2019 EN IEC 61000-6-1:2019	
Clauses examined :	All Clauses Relevant.	

CONCLUSION :The sample does satisfy the clauses examined .

Test done by:	Approved by:
Name : Able ZHAO <i>Able ZHAO</i>	Name : Wen ZHU <i>Wen ZHU</i>
Date : Nov.7, 2024	Date : Nov.7, 2024

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Page 1 of 42		
TEST REPORT EN IEC 61000-6-3:2021 VER.1.0		



TEST REPORT N°: CNDQ-ESH-P24100704B
Table of Content

Table of Content.....	2
Release control record.....	4
1 Summary of test results	5
2 General information of laboratory.....	6
2.1 Test facility.....	6
2.2 Measurement uncertainty.....	6
3 General product information.....	7
3.1 Specification of product.....	7
3.2 Description of auxiliary equipment and associated equipment	8
3.3 Operation conditions	8
3.4 Photograph of sample	8
4 Test instruments.....	9
5 Test procedure and results for emission.....	10
5.1 Continuous disturbances, AC mains port (150kHz – 30 MHz).....	10
5.1.1 Test condition	10
5.1.2 Test results.....	11
5.2 Continuous disturbances, DC power port (150kHz – 30 MHz).....	12
5.2.1 Test condition	12
5.2.2 Test results.....	13
5.3 Continuous disturbances, other wired ports (150kHz – 30 MHz)	14
5.3.1 Test condition	14
5.3.2 Test results.....	15
5.4 Discontinuous disturbances (9 kHz – 30 MHz).....	16
5.4.1 Test condition	16
5.4.2 Test results.....	16
5.5 Radiated emission (below 1GHz)	17
5.5.1 Test condition	17
5.5.2 Test results.....	18
5.6 Radiated emission (above 1GHz).....	22
5.6.1 Test condition	22
5.6.2 Test results.....	22
5.7 Harmonics current emissions	23
5.7.1 Test condition	23
5.7.2 Test results.....	23
5.8 Voltage fluctuation and flicker.....	24
5.8.1 Test condition	24
5.8.2 Test results.....	24
6 Test condition and results for immunity	25
6.1 General information.....	25
6.2 Electrostatic discharge immunity test (ESD)	26
6.2.1 Test condition	26
6.2.2 Test results.....	27
6.3 Radiated, Radio-frequency, Electromagnetic field immunity test (RS).....	28
6.3.1 Test condition	28
6.3.2 Test results.....	29
6.4 Electrical fast transient/Burst immunity test (EFT).....	30
6.4.1 Test condition	30
6.4.2 Test results.....	31
6.5 Surges.....	32
6.5.1 Test condition	32



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TEST REPORT N°: CNDQ-ESH-P24100704B

6.5.2	Test results.....	32
6.6	Immunity to conducted disturbances induced by RF fields (CS), 0.15 MHz to 80 MHz	33
6.6.1	Test condition	33
6.6.2	Test results.....	33
6.7	Power frequency magnetic field.....	34
6.7.1	Test condition	34
6.7.2	Test results.....	34
6.8	Voltage dips and short interruptions	35
6.8.1	Test condition	35
6.8.2	Test results.....	35
7	Conclusion	36
	Appendix A: Photograph of sample	37



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TEST REPORT N°: CNDQ-ESH-P24100704B
Release control record

Report No.	Description	Date Issued
CNDQ-ESH-P24100704B	Original release	07/11/2024

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TEST REPORT N°: CNDQ-ESH-P24100704B

1 Summary of test results

No.	Item	Result
Emission part:		
1	Continuous disturbances	N/A
2	Discontinuous disturbances	N/A
3	Radiated emission	PASS
4	Harmonic current emission	N/A
5	Voltage fluctuation and flicker	N/A
Immunity part:		
6	Electrostatic discharge	PASS
7	RF electromagnetic fields	PASS
8	Electrical fast transient/Burst	PASS
9	Surge	N/A
10	Injected current	N/A
11	Power frequency magnetic field	PASS
12	Voltage dips and short interruptions	N/A



TEST REPORT N°: CNDQ-ESH-P24100704B

2 General information of laboratory

2.1 Test facility

- The tests done in this report are subcontracted to :
Laboratory name: KSiGN(Guangdong) Testing Co., Ltd.
Testing location: West Side of 1/F., Building C, Zone A, Fuyuan New Factory, Jiujiu Industrial Park, Minzhu, Shatou, Shajing, Bao'an District, Shenzhen, Guangdong, China (CNAS L13261)

2.2 Measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.

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

This lab's measurement uncertainty U_{Lab}, is low than UC_{Cispr}, Table 1 – Values of UC_{Cispr} of CISPR 16-4-2, therefore compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.

Measurement		Value
Disturbance voltage		3.16 dB
Radiated disturbance (3 m)	30 MHz ~200 MHz	4.51 dB
	200 MHz ~1000 MHz	5.01 dB
	1 GHz ~ 6 GHz	3.74 dB
	6 GHz ~ 18 GHz	3.66 dB



TEST REPORT N°: CNDQ-ESH-P24100704B

3 General product information

3.1 Specification of product

- Operating modes:
- Mode A: Charging mode.
 - Mode B: Discharging mode.
 - Mode C:

- Types of port:
- AC power port
 - DC power port
 - wired network port: LAN port for BMS
 - signal/control port
 - enclosure port

Special comments: All models are similar as each other except the mechanical components and color. So all EMC tests were performed on model VT-12040-1 without WIFI function, the test result is applicable to all models.

Rating label:

V-TAC
Meaningful Innovation.

Product	Lithium Ion Batteries
Product Model	VT-12040-1
SKU No.	11447-1
Nominal Voltage	51.2V
Rated Capacity	200Ah
Nominal Energy	10.24kWh
Operating Voltage Range	43.2V-58.4V
Max. Charge Current	100A@25°C
Max. Discharge Current	100A@25°C
Communication	CAN
Dimension(W*D*H)	458*265*805mm
Protection Level	IP20
Production date	2024.09

CAUTION:

- Do not disassemble or alter the battery in any way.
- Do not use the battery for purposes not described in its documentation.
- Do not drop, strike, puncture, or step on the battery.
- In case of electrolyte leakage, keep leaked electrolyte away from contact with eyes or skin, immediately clean with water and seek help from a doctor.
- Do not put the battery into a fire.
- Do not use it or leave it in a place near fire, heaters, or high temperature sources.
- Do not submerge the battery in water, or expose it to moisture.
- Do not allow the terminals to contact exposed wire or metal.
- The battery is heavy and can cause injury if not handled safely.
- Keep out of reach of children or animals.
- DISPOSAL OF BATTERIES SHOULD FOLLOW LOCAL REGULATIONS
IFP56/175/206[1P16S]M/-20+50/95
0010011

S.N:

MADE IN CHINA

3 800170 1226890

RoHS



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3.2 Description of auxiliary equipment and associated equipment

N/A

3.3 Operation conditions

The EUT operating and testing at below conditions:

Ambient conditions:	Temperature	:	24.5.0-25.5 °C
	Relative humidity	:	45.0-50.0 %
	Atmospheric pressure	:	101.0 kPa

3.4 Photograph of sample

Refer to Appendix A



TEST REPORT N°: CNDQ-ESH-P24100704B

4 Test instruments

Radiated Emissions Measurement At Frequencies Between 30 MHz to 1GHz						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Used this time
1	Ultra-Broadband logarithmic period Antenna	Schwarzbeck	VULB 9163	01230	01/29/2025	√
2	Pre-Amplifier	Schwarzbeck	BBV 9745	9745#129	01/21/2025	√
3	EMI Test Receiver	R&S	ESR3	102525	01/21/2025	√

Electrostatic Discharge Immunity						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Used this time
1	ESD Simulator	TESEQ	NSG 437	1364	01/22/2025	√

Radio-frequency electromagnetic field. (RS)						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Used this time
1	RF Switch	JS TOYO	NS 4903	1901-214	01/21/2025	√
2	Signal Generator	Agilent	N5181A	MY50141283	01/21/2025	√
3	Power Meter	Agilent	E4419	GB40202778	01/21/2025	√
4	Power Sensor	Agilent	E9304A	MY50390009	01/21/2025	√
5	Power Sensor	Agilent	E9300A	MY41498315	01/21/2025	√
6	Transmit Antenna	Schwarzbeck	VULP 9118 E	00996	01/22/2025	√
7	Transmit Antenna	Schwarzbeck	STLP 9149	00652	01/22/2025	√
8	Power Amplifier	Vectawave	VBA1000-150	123821	01/21/2025	√
9	Dual Directional Coupler	Werlatone	C5597-10	118142	01/21/2025	√
10	Power Amplifier	Milmega	AS0706-50	1085571	01/21/2025	√

Electrical Fast Transient/burst Immunity						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Used this time
1	Test Host	LIONCEL	LSG-433C-05AC	433C05AC -0231102	01/21/2025	√
2	Coupled network	LIONCEL	CDN-4320H-200AC	CDN-4320H-200AC-0230901	01/21/2025	√

Power Frequency Magnetic Field Immunity						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until	Used this time
1	Test Host	EMC partner	IMU4000 F-S-D	106754-2085	01/21/2025	√
2	Magnetic Field Coil	EMC partner	MF1000-1	1605	01/21/2025	√



TEST REPORT N°: CNDQ-ESH-P24100704B

5 Test procedure and results for emission

5.1 Continuous disturbances, AC mains port (150kHz – 30 MHz)

5.1.1 Test condition

Applicable Standard:	EN IEC 61000-6-4:2019, EN IEC 61000-6-3:2021	
Test setup description:	<input type="checkbox"/>	Setup Type A (40 cm distance to vertical ground plane, 80 cm over ground plane)
	<input type="checkbox"/>	Setup Type B (40 cm distance to horizontal ground plane)
	<input type="checkbox"/>	Floor standing equipment setup (10 cm over ground plane)
	<input type="checkbox"/>	Other: --
	<input type="checkbox"/>	Artificial hand applied
Test method applied:	<input type="checkbox"/>	Artificial mains network
	<input type="checkbox"/>	Other: --
Remark:	--	

Limits for conducted emissions - low voltage AC mains port		
Frequency range (MHz)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15-0.5	79	66
0.5-30	73	60

Limits for conducted emissions - low voltage AC mains port		
Frequency range (MHz)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15-0.5	66-56	56-46
0.5-5	56	46
5-30	60	50



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TEST REPORT N°: CNDQ-ESH-P24100704B

5.1.2 Test results

N/A

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Page 11 of 42		
TEST REPORT EN IEC 61000-6-3:2021 VER.1.0		



TEST REPORT N°: CNDQ-ESH-P24100704B

5.2 Continuous disturbances, DC power port (150kHz – 30 MHz)

5.2.1 Test condition

Applicable Standard:	EN IEC 61000-6-4:2019, EN IEC 61000-6-3:2021	
Test setup description:	<input type="checkbox"/>	Setup Type A (40 cm distance to vertical ground plane, 80 cm over ground plane)
	<input type="checkbox"/>	Setup Type B (40 cm distance to horizontal ground plane)
	<input type="checkbox"/>	Floor standing equipment setup (10 cm over ground plane)
	<input type="checkbox"/>	Other: --
	<input type="checkbox"/>	Artificial hand applied
Test method applied:	<input type="checkbox"/>	Artificial mains V-network
	<input type="checkbox"/>	Artificial Δ -network
	<input type="checkbox"/>	Other: --
Remark:	The total length of the cable which connected to DC power port does not exceed 3 m according to the manufacturer's functional specification.	

EN IEC 61000-6-4:2019 Limits for conducted emissions - DC power port		
Frequency range (MHz)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15-0.5	89	76
0.5-30	83	70

EN IEC 61000-6-3:2021 Limits for conducted emissions - DC power port		
Measurement network: V-AN		
Frequency range (MHz)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15-0.5	79	66
0.5-30	73	60
Measurement network: Δ -AN		
Frequency range (MHz)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15-0.5	84-74	74-64
0.5-30	74	64



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TEST REPORT N°: CNDQ-ESH-P24100704B

5.2.2 Test results

N/A

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Page 13 of 42		
TEST REPORT EN IEC 61000-6-3:2021 VER.1.0		



TEST REPORT N°: CNDQ-ESH-P24100704B

5.3 Continuous disturbances, other wired ports (150kHz – 30 MHz)

5.3.1 Test condition

Applicable Standard:	EN IEC 61000-6-3:2021	
Test setup description:	<input type="checkbox"/>	Setup Type A (40 cm distance to vertical ground plane, 80 cm over ground plane)
	<input type="checkbox"/>	Setup Type B (40 cm distance to horizontal ground plane)
	<input type="checkbox"/>	Floor standing equipment setup (10 cm over ground plane)
	<input type="checkbox"/>	Other: --
	<input type="checkbox"/>	Artificial hand applied
Test method applied:	<input type="checkbox"/>	Current probe
	<input type="checkbox"/>	Capacitive voltage probe (CVP)
	<input type="checkbox"/>	ISN
	<input type="checkbox"/>	Other: --
Remark:	The total length of the cable which connected to LAN port for BMS does not exceed 3 m according to the manufacturer's functional specification.	

EN IEC 61000-6-3:2021 Limits for conducted emissions - other wired ports				
Frequency range (MHz)	Voltage limits		Current limits	
	Quasi-peak (dBµV)	Average (dBµV)	Quasi-peak (dBµA)	Average (dBµA)
0.15-0.5	84-74	74-64	40-30	30-20
0.5-30	74	64	30	20



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TEST REPORT N°: CNDQ-ESH-P24100704B

5.3.2 Test results

N/A

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TEST REPORT N°: CNDQ-ESH-P24100704B

5.4 Discontinuous disturbances (9 kHz – 30 MHz)

5.4.1 Test condition

Applicable Standard:	EN IEC 61000-6-4:2019 / EN IEC 55014-1:2021 EN IEC 61000-6-3:2021 / EN IEC 55014-1:2021	
Test setup description:	<input type="checkbox"/>	Setup Type A (40 cm distance to vertical ground plane, 80 cm over ground plane)
	<input type="checkbox"/>	Setup Type B (40 cm distance to horizontal ground plane)
	<input type="checkbox"/>	Floor standing equipment setup (10 cm over ground plane)
	<input type="checkbox"/>	Other: --
	<input type="checkbox"/>	Artificial hand applied
CDN applied:	<input type="checkbox"/>	Artificial mains network
	<input type="checkbox"/>	Other: --
Applied method for discontinuous disturbances:	<input type="checkbox"/>	Click rate determined on base of switching operations
	<input type="checkbox"/>	Click rate determined on base of clicks measurements
	<input type="checkbox"/>	Other: --
Remark:	The EUT is powered by DC.	

5.4.2 Test results

N/A



TEST REPORT N°: CNDQ-ESH-P24100704B

5.5 Radiated emission (below 1GHz)

5.5.1 Test condition

Applicable Standard:	EN IEC 61000-6-4:2019, EN IEC 61000-6-3:2021	
Test set up description:	<input checked="" type="checkbox"/>	Equipment on a table of 80 cm height
	<input type="checkbox"/>	Equipment on the floor (isolated from ground plane)
	<input type="checkbox"/>	Other (e.g. height of pallet):
Supplementary test set-up description for SAC:	Measurements were made in semi-anechoic chamber that complies to CISPR 16. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements with quasi-peak detector for below 1GHz were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Test method applied (30 MHz to 1000 MHz):	<input checked="" type="checkbox"/>	OATS or SAC with measurement distance [m]: 3 m
	<input type="checkbox"/>	TEM Waveguide according to IEC 61000-4-20
	<input type="checkbox"/>	FAR with measurement distance [m]: 3 m
Remark:	--	

EN IEC 61000-6-4:2019 Limits for SAC 3 m distance	
Frequency range (MHz)	Quasi-peak (dBµV/m)
30-230	50
230-1000	57

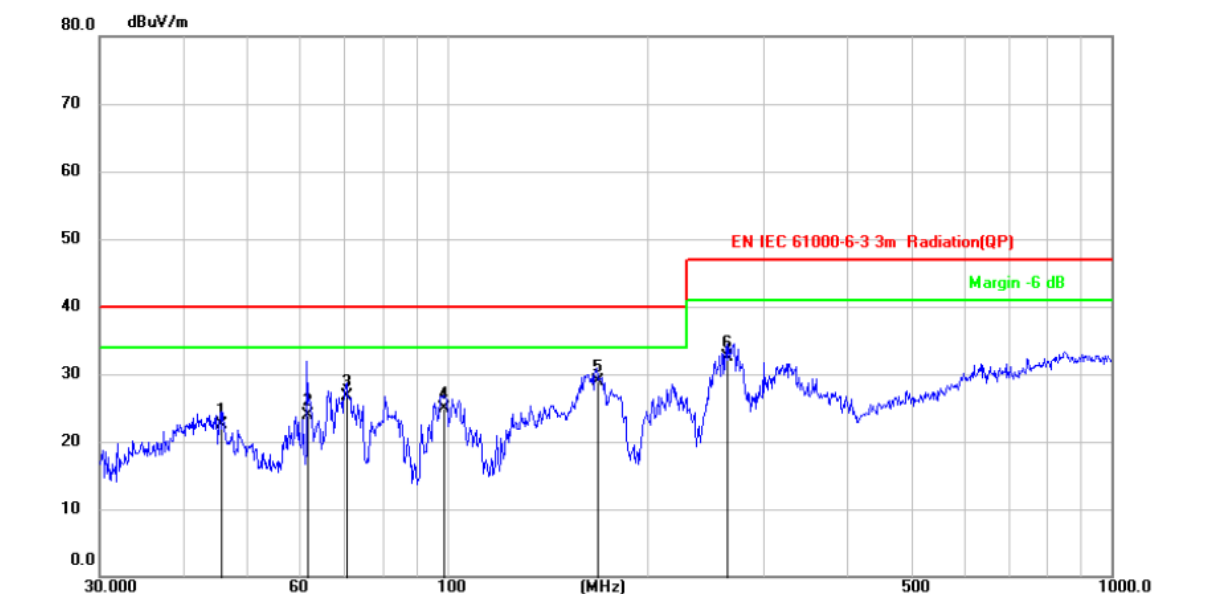
EN IEC 61000-6-3:2021 Limits for SAC 3 m distance	
Frequency range (MHz)	Quasi-peak (dBµV/m)
30-230	40
230-1000	47



TEST REPORT N°: CNDQ-ESH-P24100704B

5.5.2 Test results

Model:	VT-12040-1
Test mode:	Mode A
Test voltage:	DC 58.4V
Remark:	Horizontal



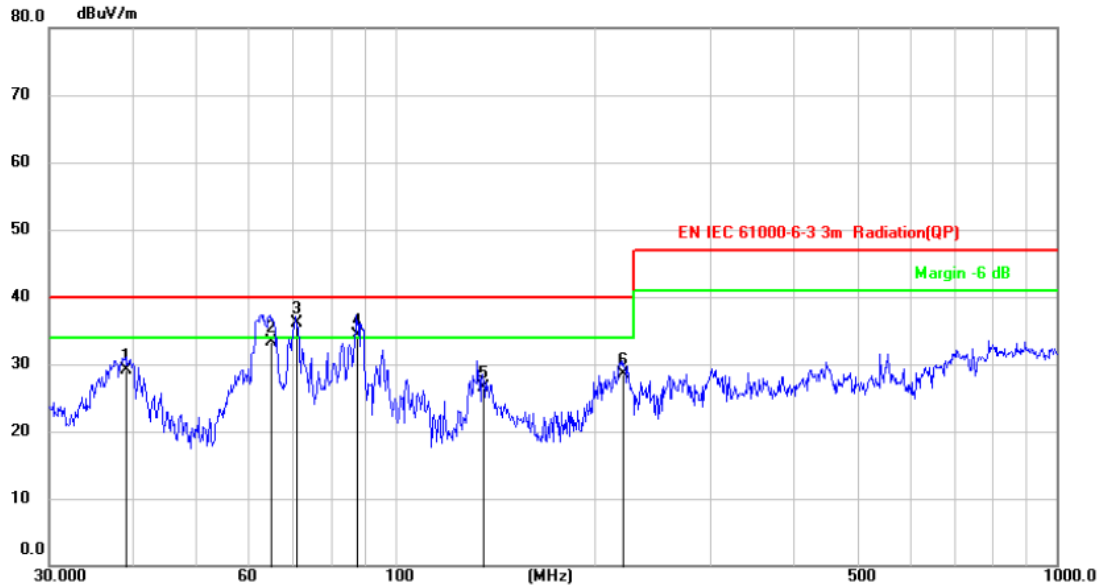
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		45.8230	33.23	-10.75	22.48	40.00	-17.52	QP
2		61.7563	33.64	-9.76	23.88	40.00	-16.12	QP
3		70.5835	39.10	-12.46	26.64	40.00	-13.36	QP
4		98.8324	36.75	-11.87	24.88	40.00	-15.12	QP
5	*	168.0004	42.13	-13.20	28.93	40.00	-11.07	QP
6		264.0966	42.41	-9.86	32.55	47.00	-14.45	QP



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TEST REPORT N°: CNDQ-ESH-P24100704B

Model:	VT-12040-1
Test mode:	Mode A
Test voltage:	DC 58.4V
Remark:	Vertical



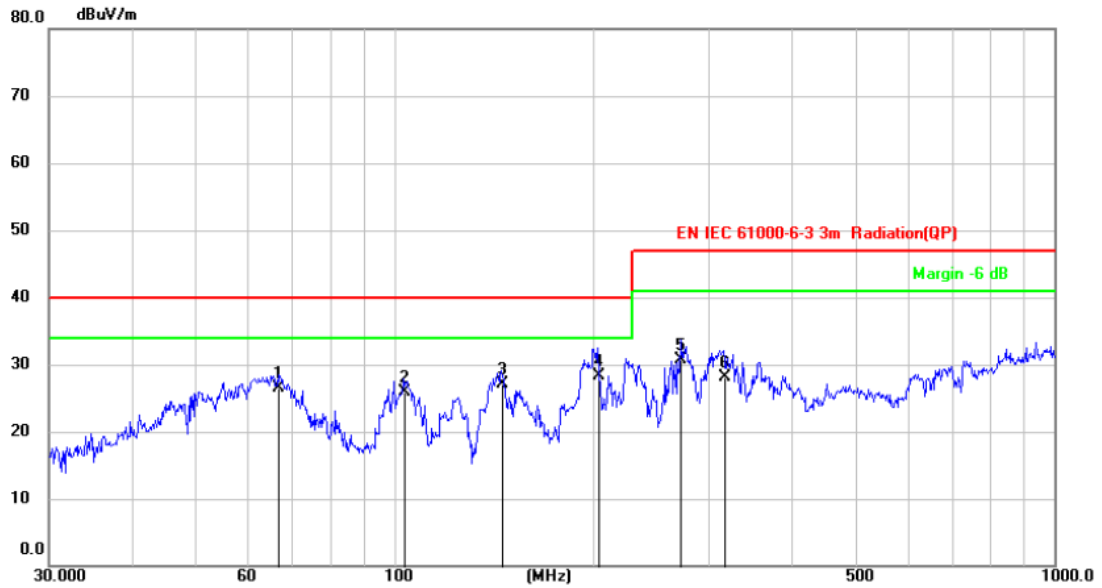
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		39.2714	40.23	-11.22	29.01	40.00	-10.99	QP
2		64.8636	43.65	-10.30	33.35	40.00	-6.65	QP
3	*	71.0554	48.73	-12.61	36.12	40.00	-3.88	QP
4	!	87.4788	48.12	-13.89	34.23	40.00	-5.77	QP
5		135.6012	40.67	-14.23	26.44	40.00	-13.56	QP
6		220.6945	39.59	-11.12	28.47	40.00	-11.53	QP



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TEST REPORT N°: CNDQ-ESH-P24100704B

Model:	VT-12040-1
Test mode:	Mode B
Test voltage:	DC 51.2V
Remark:	Horizontal



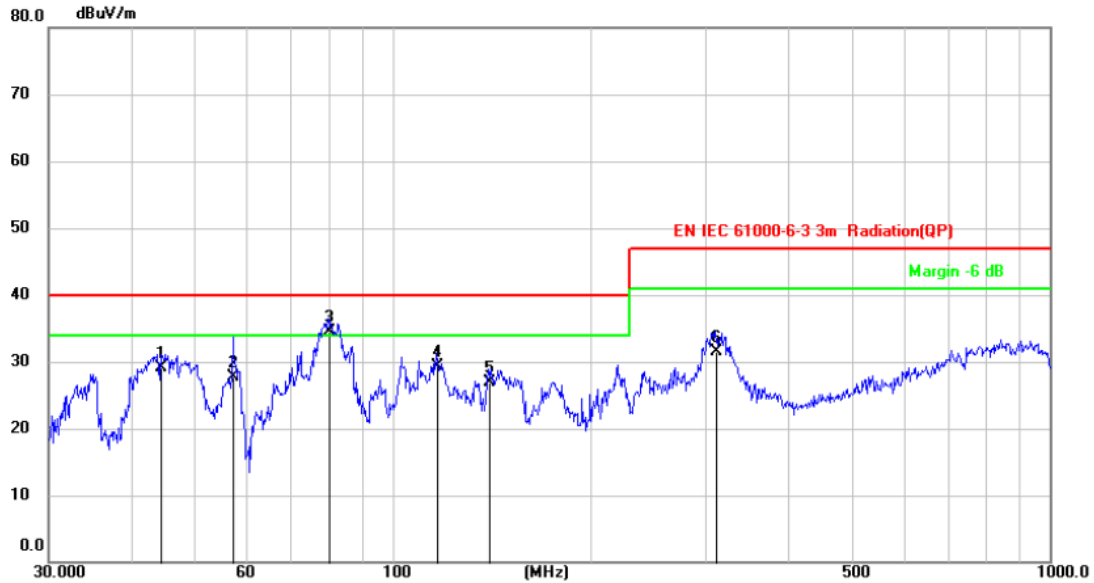
No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		66.9431	37.72	-11.27	26.45	40.00	-13.55	QP
2		103.7326	37.73	-11.76	25.97	40.00	-14.03	QP
3		145.6562	41.18	-13.98	27.20	40.00	-12.80	QP
4	*	203.6655	40.02	-11.62	28.40	40.00	-11.60	QP
5		271.9912	40.12	-9.38	30.74	47.00	-16.26	QP
6		316.0341	35.63	-7.44	28.19	47.00	-18.81	QP



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TEST REPORT N°: CNDQ-ESH-P24100704B

Model:	VT-12040-1
Test mode:	Mode B
Test voltage:	DC 51.2V
Remark:	Vertical



No.	Mk.	Freq. MHz	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
1		44.4463	39.42	-10.33	29.09	40.00	-10.91	QP
2		57.3318	37.64	-10.02	27.62	40.00	-12.38	QP
3	*	79.8281	48.73	-14.25	34.48	40.00	-5.52	QP
4		116.7035	41.58	-12.32	29.26	40.00	-10.74	QP
5		140.0961	40.91	-14.00	26.91	40.00	-13.09	QP
6		310.9775	39.30	-7.71	31.59	47.00	-15.41	QP



TEST REPORT N°: CNDQ-ESH-P24100704B

5.6 Radiated emission (above 1GHz)

5.6.1 Test condition

Applicable Standard:	EN IEC 61000-6-4:2019, EN IEC 61000-6-3:2021	
Test set up description:	<input type="checkbox"/>	Equipment on a table of 80 cm height
	<input type="checkbox"/>	Equipment on the floor (isolated from ground plane)
	<input type="checkbox"/>	Other:
Supplementary test set-up description for SAC :	Measurements were made in semi-anechoic chamber with RF absorber on the RGP which complies to CISPR 16. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements with peak and average detector were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Test method applied (1000 MHz to 6000 MHz):	<input type="checkbox"/>	FSOATS with measurement distance [m]: 3 m
	<input type="checkbox"/>	OATS with measurement distance [m]: 3 m
	<input type="checkbox"/>	FAR with measurement distance [m]: 3 m
	<input type="checkbox"/>	SAC with measurement distance [m]: 3 m
Remark:	The highest operation frequency is below 108MHz.	

EN IEC 61000-6-4:2019 Limits for 3 m distance		
Frequency range (MHz)	Peak (dBµV/m)	Average (dBµV/m)
1000 – 3000	76	56
3000 – 6000	80	60

EN IEC 61000-6-3:2021 Limits for 3 m distance		
Frequency range (MHz)	Peak (dBµV/m)	Average (dBµV/m)
1000 – 3000	70	50
3000 – 6000	74	54

5.6.2 Test results

N/A



TEST REPORT N°: CNDQ-ESH-P24100704B

5.7 Harmonics current emissions

5.7.1 Test condition

Applicable Standard:	EN IEC 61000-6-3:2021 (EN IEC 61000-3-2:2019+A1:2021)
Test set up description:	Floor standing equipment set-up (10 cm over ground plane)
Limit classification in accordance with the standard:	<input type="checkbox"/> Class A
	<input type="checkbox"/> Class B
	<input type="checkbox"/> Class C, rated power > 25 W
	<input type="checkbox"/> Class C, 5 W ≤ rated power ≤ 25 W
	<input type="checkbox"/> Class D
Observation period	2.5 min
Remark:	The EUT is powered by DC.

5.7.2 Test results

N/A



TEST REPORT N°: CNDQ-ESH-P24100704B

5.8 Voltage fluctuation and flicker

5.8.1 Test condition

Applicable Standard:	EN IEC 61000-6-3:2021 (EN 61000-3-3:2013+A1:2019+A2:2021)	
Test set up description:	Floor standing equipment set-up (10 cm over ground plane)	
Test method:	<input type="checkbox"/>	4.2.2 Flickermeter according to IEC 61000-4-15
	<input type="checkbox"/>	4.2.3 Simulation
	<input type="checkbox"/>	4.2.4 Analytical method
	<input type="checkbox"/>	4.2.5 Use of $P_{st} = 1$ curve
	<input type="checkbox"/>	4.3 Long-Term flicker value P_{ft}
Observation time selected:	<input type="checkbox"/>	10 Minutes
	<input type="checkbox"/>	120 Minutes
	<input type="checkbox"/>	24 times switching
	<input type="checkbox"/>	Other: --
Limit for d_{max} applied:	<input type="checkbox"/>	4 %
	<input type="checkbox"/>	6 %
	<input type="checkbox"/>	7 %
Remark:	The EUT is powered by DC.	

5.8.2 Test results

N/A



TEST REPORT N°: CNDQ-ESH-P24100704B

6 Test condition and results for immunity

6.1 General information

Performance criteria as defined by the standard EN IEC 61000-6-2:2019, EN IEC 61000-6-1:2019	
Criterion	Description from standard
A	The EUT 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 EUT is used as intended. If the performance level is not specified by the manufacturer, this may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
B	The EUT 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 EUT is used as intended. The performance level may be replaced by a permissible loss of performance. However, during the test degradation of performance is allowed but no change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
C	Temporary loss of function is allowed during the test, provided the function is self-recoverable or can be restored by the operation of the controls.
Other:	--



TEST REPORT N°: CNDQ-ESH-P24100704B




6.2 Electrostatic discharge immunity test (ESD)

6.2.1 Test condition

Basic standard:	IEC 61000-4-2:2008 / EN 61000-4-2:2009	
Test set up:	<input type="checkbox"/>	Table-top equipment
	<input type="checkbox"/>	Floor standing equipment
	<input checked="" type="checkbox"/>	Wall or ceiling mounted equipment (Treated as table top)
Supplementary test set up description:	Measurements were made on a ground plane that extends 0.5 m minimum beyond all sides of the system under test and the minimum distance between the equipment under test and any laboratory walls or any other metallic surfaces shall be at least 1 m. Air discharges were applied to non-metallic parts of the system. Contact discharges were applied to all accessible metallic parts. Discharges were also applied to the Horizontal and Vertical Coupling Planes, where applicable.	
Discharge impedance:	330 ohm / 150 pF	
Size of horizontal coupling plate:	1.6 x 0.8 m	
Size of vertical coupling plate:	0.5 x 0.5 m	
Number of discharges for each test point:	10	
Discharge interval:	1 s	
Performance criterion:	B	
Remark:	--	

TEST REPORT N°: CNDQ-ESH-P24100704B

6.2.2 Test results

Operating mode:	Mode A and Mode B			
Ambient temperature:	22.1 °C			
Relative humidity:	53.1 %			
Atmospheric pressure:	101.2 kPa			
Supplementary information:	--			
Location of discharge	Test level (kV)	Polarity	Type	Observations
Vertical coupling plate	2,4	+	Contact discharge	Note 1
Vertical coupling plate	2,4	-	Contact discharge	Note 1
Horizontal coupling plate	2,4	+	Contact discharge	Note 1
Horizontal coupling plate	2,4	-	Contact discharge	Note 1
Points on conductive surface as indicated in the picture below	2,4	+	Contact discharge	Note 1
Points on conductive surface as indicated in the picture below	2,4	-	Contact discharge	Note 1
Points on non-conductive surface as indicated in the picture below	2, 4, 8	+	Air discharge	Note 1
Points on non-conductive surface as indicated in the picture below	2, 4, 8	-	Air discharge	Note 1
Note 1: EUT worked as intended during and after test.				
Photos of test points:				
Symbols identifying discharge applied:		Contact discharge		
		Air discharge		
				



TEST REPORT N°: CNDQ-ESH-P24100704B

6.3 Radiated, Radio-frequency, Electromagnetic field immunity test (RS)

6.3.1 Test condition

Basic standard:	IEC 61000-4-3:2020 / EN IEC 61000-4-3:2020	
Test setup:	<input checked="" type="checkbox"/>	Table-top equipment
	<input type="checkbox"/>	Floor standing equipment
	<input type="checkbox"/>	Other: --
Supplementary test set up description:	Measurements were made in a semi or full anechoic chamber or TEM or reverberation chamber and the indicated field strength was pre-calibrated prior to placement of the system under test. For semi or full anechoic chamber the tests were performed in both the horizontal and vertical polarities, where applicable. The antenna was placed between 1 and 3 m from the product under test.	
Antenna height:	1.5 m	
Distance antenna to EUT:	3 m	
Modulation:	80 % AM with 1 kHz	
Dwell time:	3 s	
Step size:	1%	
Applied testing method:	<input checked="" type="checkbox"/>	IEC 61000-4-3 Radiated Field with Antenna
	<input type="checkbox"/>	IEC 61000-4-22 Radiated emission and immunity measurements in fully anechoic rooms (FARs)
	<input type="checkbox"/>	IEC 61000-4-20 Emission and immunity testing in transverse electromagnetic (TEM) waveguides
Performance criterion:	A	
Remark:	--	



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TEST REPORT N°: CNDQ-ESH-P24100704B

6.3.2 Test results

Operating mode:		Mode A and Mode B			
Supplementary information:		--			
Frequency range	Test level (V/m)	Polarization	Azimuth	Modulation	Observations
80 MHz – 1000 MHz	3 & 10	Horizontal/ Vertical	0°	AM 1 kHz, 80 %	Note 1
			90°		
			180°		
			270°		
1.4 GHz – 6 GHz	3	Horizontal/ Vertical	0°	AM 1 kHz, 80 %	Note 1
			90°		
			180°		
			270°		

Note 1: EUT worked as intended during and after test.



TEST REPORT N°: CNDQ-ESH-P24100704B

6.4 Electrical fast transient/Burst immunity test (EFT)

6.4.1 Test condition

Basic standard:	IEC 61000-4-4:2012 / EN 61000-4-4:2012	
Test setup:	<input checked="" type="checkbox"/>	Table-top equipment
	<input type="checkbox"/>	Floor standing equipment
	<input type="checkbox"/>	Artificial hand applied
Supplementary test set up description:	<p>The ground reference plane shall project beyond the EUT by at least 0.1 m on all sides. The minimum distance between the EUT and all other conductive structures (including the generator, AE and the walls of a shielded room), except the ground reference plane, shall be more than 0.5 m. All cables to the EUT shall be placed on the insulation support 0.1 m above the ground reference plane. Cables not subject to test shall be routed as far as possible from the cable under test to minimize the coupling between the cables.</p> <p>Either a direct coupling network or a capacitive clamp shall be used for the application of the test voltages.</p>	
Test time:	1 min	
Repetition frequency:	5 kHz	
Impulse wave shape:	5/50 ns	
Burst duration:	15 ms for 5kHz repetition frequency	
Burst period:	300 ms	
Performance criterion:	B	
Remark:	The total length of the cable which connected to LAN port for BMS does not exceed 3 m according to the manufacturer's functional specification.	



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TEST REPORT N°: CNDQ-ESH-P24100704B

6.4.2 Test results

Operating mode:		Mode A and Mode B			
Supplementary information:		--			
Port	Test line	Test level (kV)	Polarity	Coupling method	Observations
Input and Output DC power ports	Positive/ Negative polarity	0.5 & 1	+/-	CDN	Note 1
Note 1: EUT worked as intended during and after test.					



TEST REPORT N°: CNDQ-ESH-P24100704B

6.5 Surges

6.5.1 Test condition

Basic Standard:	IEC 61000-4-5:2014+A1:2017 / EN 61000-4-5:2014+A1:2017
Test set up description:	Floor standing equipment set-up (10 cm over ground plane)
Supplementary test set up description:	Tests were conducted with the product connected to a Coupling/Decoupling Network (CDN)
Wave-Shape:	1.2/50 μ s open circuit voltage, 8/20 μ s short circuit current
Repetition rate:	60 s
Number of pulses for each coupling:	5 positive and 5 negative
Performance criterion:	B
Remark:	The total length of the cable which connected to LAN port for BMS and DC power port does not exceed 3 m and the cable is inside a building according to the manufacturer's functional specification.

6.5.2 Test results

N/A



TEST REPORT N°: CNDQ-ESH-P24100704B

6.6 Immunity to conducted disturbances induced by RF fields (CS), 0.15 MHz to 80 MHz

6.6.1 Test condition

Basic Standard:	IEC 61000-4-6:2013 / EN 61000-4-6:2014	
Test setup:	<input type="checkbox"/>	Equipment located (0,1 ± 0,05) m above ground plane
	<input type="checkbox"/>	Elevated ground plane.
	<input type="checkbox"/>	Artificial hand applied.
Supplementary test set up description:	Measurements were made on a ground plane that extends 0.5 m minimum beyond all sides of the system under test. The EUT was located 0.1 m above the reference ground plane and any associated cables attached to the EUT were located between 30 - 50mm above the ground plane. The indicated field was pre-calibrated prior to placement of the system under test.	
Modulation:	80 % AM with 1 kHz	
Dwell time:	3 s	
Step size:	1%	
Performance criterion:	A	
Remark:	The total length of the cable which connected to LAN port for BMS and DC power port does not exceed 3 m and the cable is inside a building according to the manufacturer's functional specification.	

6.6.2 Test results

N/A



TEST REPORT N°: CNDQ-ESH-P24100704B

6.7 Power frequency magnetic field

6.7.1 Test condition

Basic standard:	IEC 61000-4-8:2009 / EN IEC 61000-4-8:2010		
Test setup:	<input checked="" type="checkbox"/>	Single Coil. Dimensions: 1 x 1 m	
	<input type="checkbox"/>	Single Coil. Dimensions: 1 x 2.6 m	
	<input type="checkbox"/>	0,1 m above metal surface	
	<input type="checkbox"/>	Homogeneous field (Helmholtz coil). Dimensions:	
	<input type="checkbox"/>	Radiating loop swept along test item surface	
Supplementary test set up description:	All cables shall be exposed to the magnetic field for 1 m of their length.		
Performance criterion:	A		
Remark:	--		

6.7.2 Test results

Operating mode:	Mode A and Mode B			
Supplementary information:	--			
Axis	Test frequency (Hz)	Test level (A/m)	Duration (s)	Observations
X	50	3 & 30	60	Note 1
Y	50	3 & 30	60	Note 1
Z	50	3 & 30	60	Note 1
Note 1: EUT worked as intended during and after test.				



TEST REPORT N°: CNDQ-ESH-P24100704B

6.8 Voltage dips and short interruptions

6.8.1 Test condition

Basic Standard:	IEC 61000-4-11:2020 / EN IEC 61000-4-11:2020
Test set up description:	Floor standing equipment set-up (10 cm over ground plane)
Supplementary test set up description:	Testing was performed with the product connected directly to a generator capable of simulating the voltage drops.
Repetition rate:	10 s
Number of dips or interruptions:	3
Performance criterion:	B for voltage dips C for voltage interruptions
Remark:	The EUT is powered by DC.

6.8.2 Test results

N/A



TEST REPORT N°: CNDQ-ESH-P24100704B

7 Conclusion

The apparatus Lithium Ion Batteries and models VT-12040-1, VT-10240W, VT-10240B, VT-10240B-1 are in compliance with the requirements of the standards EN IEC 61000-6-4:2019, EN IEC 61000-6-3:2021, EN IEC 61000-6-2:2019 and EN IEC 61000-6-1:2019.



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Page 36 of 42		
TEST REPORT EN IEC 61000-6-3:2021 VER.1.0		



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Appendix A: Photograph of sample

VT-12040-1



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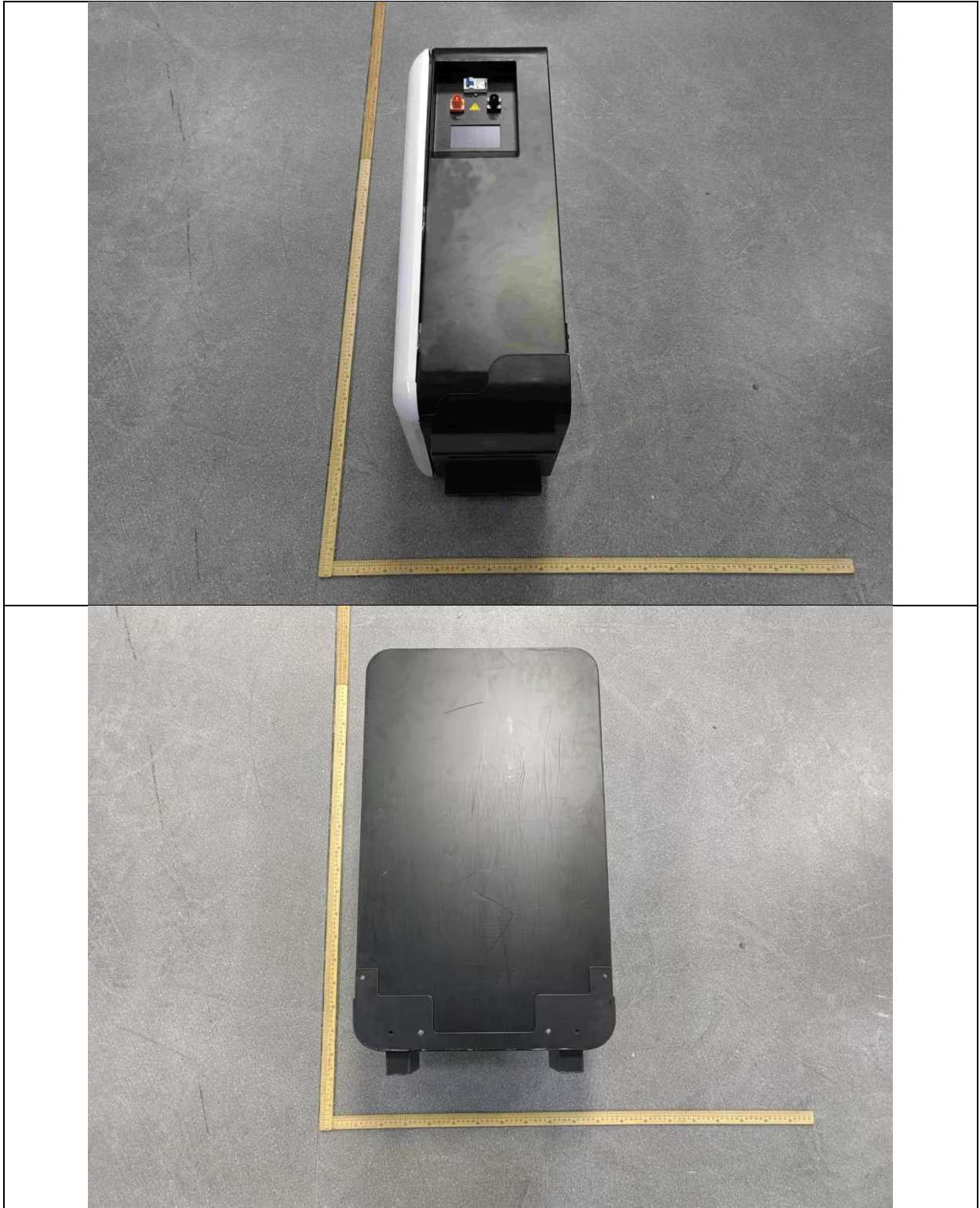
Page 37 of 42

TEST REPORT EN IEC 61000-6-3:2021 VER.1.0



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TEST REPORT N°: CNDQ-ESH-P24100704B



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VT-10240W



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Page 42 of 42		TEST REPORT EN IEC 61000-6-3:2021 VER.1.0