TEST REPORT

Applicant	:	Shenzhen Cumark Sci. & Tech. Co., Ltd.
Address	:	3F, Cumark Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen
Manufacturer	:	Shenzhen Cumark Sci. & Tech. Co., Ltd.
Address	:	3F, Cumark Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen
Product Name	:	3~380V Low Voltage AC Single Drive
Trade Mark	:	cumark
Model No.	:	See the model list on page 5-6
Ratings	:	See rating label
Standard	:	Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy EN 61800-5-1:2007+A11:2021
Date of Receiver	:	April 28, 2024
Date of Test	:	July 25, 2024 to August 03, 2024
Date of Issue	:	September 21, 2024
Test Report Form No	:	NTCS-EN 61800-5-1-A2-E
Test Result	:	Pass *

This Test Report is Issued Under the Authority of :

Compiled by

Leo Xia / Engineer

Approved by

Jason Tong / Manager

*Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot bereproduced, except in full, without prior written permission of Shenzhen Nore Testing Center Co., Ltd. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Revision History of This Test Report

Report Number	Description	Issued Date
SZNTC2409076SV00	Initial Issue	2024-09-21

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Warning label

Note:

- The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
- The CE marking and WEEE symbol should be at least 5.0mm and 7.0mm respectively in height.
-The information above is stated in the user's manual.
- The manufacturer and importer information should be marked in manual or attachments when this product import to European Marketing.
- Above labels are only representative, other model labels are the same design, except model name and rating.

Summary of testing:

The submitted samples were found to comply with the above standard.

• Maximum ambient temperature: +50°C

• Tested for moderate conditions

Test item particulars..... :		
Equipment under test ..... :	☐ PDS ☒ CDM ☐ BDM ☐ Other:	
Equipment location ..... :	☒ stand alone ☐ for building-in (open type)	
Mains supply overvoltage category (OVC) ..... :	☐ OVC I☐ OVC II ☒ OVC III ☐ OVC IV	
Reduction of OVC for basic insulation used .....:	☐ No ☐ Yes, by:	
Supply earthing systems and system voltage (V) :	Supply earthing system	System voltage
	☒ TN-S, TN-C, TN-CS, TT (not corner earthed)	3~208-240V for suffix "2B" 3~380V-500V for other
	☐ TN-S, TT (corner earthed)	
	☐ TN-C (middle point earthed)	
	☐ IT (not corner referenced)	
	☐ IT (corner referenced)	
	☐ other: HV Power System (Main power port)	
DVC D circuits/terminals (other than mains) .....:	N/A	
DVC C circuits/terminals (other than mains) .....:	☒ TN-S, TN-C, TN-CS, TT (not corner earthed)	3~208-240V for suffix "2B" 3~380V-500V for other
DVC B circuits/terminals ..... :	N/A	
DVC A circuits/terminals ..... :	Communication terminal and SELV circuits	
Potential free circuits/terminals (voltage, OVC) ... :	N/A	
Class of equipment .....:	☒ Class I ☐ Class II ☐ Class 0 ☐ Class III	
Pollution degree ..... :	☐ PD 1: ☒ PD 2: ☐ PD 3: ☐ PD 4:	
IP protection classes .....:	IP20	
Ambient temperature during operation (°C) with/without derating ..... :	50°C	
Liquid cooling temperature during operation (°C) with/without derating ..... :	N/A	
Maximum operation altitude (m) ..... :	2000m	
Altitude of test laboratory (m) ..... :	<500m	
Other particulars..... :	N/A	

Motor overload and overtemperature protection .:	☐ Thermal or electronic overload relay ☐ Electronic motor overload protection with thermal memory retention ☐ Electronic motor overload protection with speed sensivity ☐ Monitoring and automatic reduction of motor current based on thermal sensor in or on motor ☐ Embedded motor thermal protection disconnecting the motor ☒ Other: Electronic motor overload protection ☐ None
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item.....:	April 28, 2024
Date (s) of performance of tests.....:	July 25, 2024 to August 03, 2024

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies).....:	**Factory**: Shenzhen Cumark Sci. & Tech. Co., Ltd. **Address**: 3F, Cumark Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen

General product information and other remarks:

1. Double/reinforced insulation provided between primary circuits and SELV circuits by safety isolation optical coupler and sufficient clearances and creepage distances within the unit.
2. The device under test is external protected by AC breaker.
3. The specified Max. operation temperature is +50℃.
4. The equipment is intended to be operated under altitude under to 2000m.
5. All models are same except model name and rating power, and all others tested were tested on ES710-R3-037G-3B4 representative other models.
6. The mass of product is 7.15kg(Max).

Remark: This report is updated based on the report No. SZNTC2404176SV00 issued by Shenzhen Nore Testing Center Co., Ltd. on August 16, 2024.
Added the model number.

Model list:

ES710-R3-037G-3B4, ES610-R3-018G-3B, ES710-R3-018G-3B,

ES710S-R3-018G-3B, ES610-R3-022G-3B, ES710-R3-022G-3B,
ES710S-R3-022G-3B, ES610-R3-030G-3B4, ES710-R3-030G-3B4,
ES710S-R3-030G-3B4, ES610-R3-030G-3B, ES710-R3-030G-3B,
ES710S-R3-030G-3B, ES610-R3-037G-3B4, ES710S-R3-037G-3B4,
ES610-R3-011G-2B, ES710-R3-011G-2B, ES610-R3-015G-2B4,
ES710-R3-015G-2B4, ES610-R3-015G-2B, ES710-R3-015G-2B,
ES610-R3-018G-2B4, ES710-R3-018G-2B4, ES610H-R3-018G-3B,
ES710H-R3-018G-3B, ES610H-R3-022G-3B,ES710H-R3-022G-3B,
ES610H-R3-030G-3B4, ES710H-R3-030G-3B4, ES610H-R3-030G-3B,
ES710H-R3-030G-3B, ES610H-R3-037G-3B4,ES710H-R3-037G-3B4,
ES610H-R3-011G-2B,ES710H-R3-011G-2B, ES610H-R3-015G-2B4,
ES710H-R3-015G-2B4, ES610H-R3-015G-2B,ES710H-R3-015G-2B,
ES610H-R3-018G-2B4, ES710H-R3-018G-2B4

EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
4	**PROTECTION AGAINST ELECTRIC SHOCK, THERMAL, AND ENERGY HAZARDS**		P
4.1	**General**	Considered	P
4.2	**Fault conditions**	Considered	P
4.3	**Protection against electric shock**		P
4.3.1	Decisive voltage classification		P
4.3.1.1	Use of decisive voltage class (DVC) .....:	According to Table 3 correlates the limits of the working voltage within the circuit.	P
4.3.1.2	Limits of DVC		P
4.3.1.3	Requirements for protection	There is double insulation protective separation between DVC C circuit and DVC A circuit, between DVC C circuit and plastic enclosure.	P
4.3.1.4	Circuit evaluation		P
4.3.1.4.1	General		P
4.3.1.4.2	A.C. working voltage		P
4.3.1.4.3	D.C. working voltage		P
4.3.1.4.4	Pulsating working voltage		N/A
4.3.2	Protective separation .....:	The protective separation was fully and effectively maintained under all conditions of intended use.	P
4.3.3	Protection against direct contact		P
4.3.3.1	General	See 4.3.3.2 and 4.3.3.3	P
4.3.3.2	Protection by means of insulation of live parts	Plastic enclosure	P
4.3.3.3	Protection by means of enclosures and barriers	Live parts DVC C located behind the plastic enclosure.	P
4.3.4	Protection in case of direct contact		P
4.3.4.1	General		P
4.3.4.2	Protection using DVC A .....:	Plastic enclosure, double insulation was used between live part and communication terminal.	P
4.3.4.3	Protection by means of protective impedance		P
4.3.4.4	Protection by means of using limited voltages		N/A
4.3.5	Protection against indirect contact		P
4.3.5.1	General .....:		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.5.2	Insulation between live parts and accessible conductive parts	Plastic enclosure	P
4.3.5.3	Protective bonding circuit		P
4.3.5.3.1	General		P
4.3.5.3.2	Rating of protective bonding ..... :	Detail see table 5.2.3.9	P
4.3.5.3.3	Protective bonding impedance		P
4.3.5.4	Protective earthing conductor ..... :	The power cord was not provided, the requirement of earthing conductor detail see instruction.	N/A
4.3.5.5	Means of connection for the protective earthing conductor		P
4.3.5.5.1	General	The protective shields of cables complied with requirement of IEC 60204-11 and IEC61800-4, and the protective bonding concept detail see instruction.	P
4.3.5.5.2	Touch current in case of failure of protective earthing conductor ..... :	Detail see table 5.2.3.5	P
4.3.5.6	Special features in equipment for protective class II		N/A
4.3.6	Insulation		P
4.3.6.1	General		P
4.3.6.1.1	Influencing factors		P
4.3.6.1.2	Pollution degree ..... :	PD 2	P
4.3.6.1.3	Overvoltage category ..... :	OVC III	P
4.3.6.1.4	Supply earthing systems .....:	TN-S, TN-C, TN-CS, TT	P
4.3.6.1.5	Insulation voltages	4000V	P
4.3.6.2	Insulation to the surroundings		P
4.3.6.2.1	General		P
4.3.6.2.2	Circuits connected directly to the supply mains ...:		P
4.3.6.2.3	Circuits not connected directly to the supply mains ..... :		N/A
4.3.6.2.4	Insulation between circuits ..... :	The insulation of between Primary parts and plastic enclosure meet double insulation. The insulation of between Primary parts and SELV circuit meet reinforce insulation.	P
4.3.6.3	Functional insulation	See appended table 5.2.3.1.	P
4.3.6.4	Clearance distances	See appended table 5.2.2.1.	P

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.6.4.1	Determination		P
4.3.6.4.2	Electric field homogeneity		N/A
4.3.6.4.3	Clearance to conductive enclosures .....:	Complied with Clause 5.2.2.5	P
4.3.6.5	Creepage distances	See appended table 5.2.2.1.	P
4.3.6.5.1	General		P
4.3.6.5.2	Materials .....:	Group IIIb	P
4.3.6.6	Coating		N/A
4.3.6.7	PWB spacings for functional insulation .....:	PWB: V-0, Group IIIb, and complied with 5.2.2.2.	P
4.3.6.8	Solid insulation	See appended table 4.3.6.8.	P
4.3.6.8.1	General		P
4.3.6.8.2	Requirements for electrical withstand capability	Detail see table 5.2.3.1 and 5.2.3.2	P
4.3.6.8.2.1	Basic or supplementary insulation		P
4.3.6.8.2.2	Double and reinforced insulation		P
4.3.6.8.2.3	Functional insulation		P
4.3.6.8.3	Thin sheet or tape material		P
4.3.6.8.3.1	General		P
4.3.6.8.3.2	Material thickness not less than 0,2 mm	Plastic enclosure: 2.0mm	P
4.3.6.8.3.3	Material thickness less than 0,2 mm	2 layers insulation tape was used in transformer	P
4.3.6.8.3.4	Compliance		P
4.3.6.8.4	Printed wiring boards (PWBs)		P
4.3.6.8.4.1	General		P
4.3.6.8.4.2	Use of coating materials		N/A
4.3.6.8.5	Wound components	Detail see table 5.2.3.1 and 5.2.3.2	P
4.3.6.8.6	Potting materials		N/A
4.3.6.9	Insulation requirements above 30 kHz		N/A
4.3.7	Enclosures		P
4.3.7.1	General .....:	See cl. 4.4.3, 5.2.2.5.3, 5.2.2.4.	P
4.3.7.2	Cast metal .....:		N/A
4.3.7.3	Sheet metal .....:		N/A
4.3.8	Wiring and connections		P

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.8.1	General	The insulation, conductors and routing of all wires of the equipment were suitable for the electrical, mechanical, thermal and environmental conditions of use	P
4.3.8.2	Routing	Smooth, well-rounded bushing was provided. Routed away from sharp edges and similar parts, which abrade the wire insulation	P
4.3.8.3	Colour coding		P
4.3.8.4	Splices and connections		P
4.3.8.5	Accessible connections		P
4.3.8.6	Interconnections between parts of the PDS		P
4.3.8.7	Supply connections		P
4.3.8.8	Terminals	Copper platoon or terminal	P
4.3.8.8.1	Construction requirements		P
4.3.8.8.2	Connecting capacity		P
4.3.8.8.3	Connection		P
4.3.8.8.4	Wire bending space for wires 10 mm² and greater ..... :		P
4.3.9	Output short circuit requirements ..... :	Detail see table 5.2.3.6	P
4.3.10	Residual current-operated protective (RCD) or monitoring (RCM) device compatibility		N/A
4.3.11	Capacitor discharge .....:	Detail see table 5.2.3.7	P
4.3.12	Access conditions for high-voltage PDS		N/A
4.4	**Protection against thermal hazards**		P
4.4.1	Minimizing the risk of ignition	Plastic enclosure: V-0	P
4.4.2	Insulating materials		P
4.4.2.1	General	See appended table 5.2.3.8.	P
4.4.2.2	Material requirements	See cl. 5.2.5.1, 5.2.5.2 and appended table 1.	P
4.4.3	Flammability of enclosure materials	Plastic enclosure: V-0	N/A
4.4.4	Temperature limits		P
4.4.4.1	Internal parts		P
4.4.4.2	External parts of CDM		P
4.4.5	Specific requirements for liquid cooled PDS		N/A
4.4.5.1	Coolant		N/A
4.4.5.2	Design requirements		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.4.5.2.1	Corrosion resistance		N/A
4.4.5.2.2	Tubing, joints and seals		N/A
4.4.5.2.3	Provision for condensation		N/A
4.4.5.2.4	Leakage of coolant		N/A
4.4.5.2.5	Loss of coolant		N/A
4.4.5.2.6	Conductivity of coolant		N/A
4.4.5.2.7	Insulation requirements for coolant hoses		N/A
4.4.6	Motor overload and overtemperature protection		P
4.4.6.1	Means of protection		P
4.4.6.2	CDM/BDM with electronic motor overload protection		P
4.4.6.3	CDM/BDM with electronic motor overload protection with thermal memory retention		N/A
4.4.6.4	CDM/BDM with electronic motor overload protection which is speed sensitive		N/A
4.4.6.5	CDM/BDM providing monitoring and automatic reduction of motor current by means of thermal sensors		N/A
4.5	**Protection against energy hazards**		P
4.5.1	Electrical energy hazards ..... :		P
4.5.2	Mechanical energy hazards		P
4.5.2.1	General		P
4.5.2.2	Critical torsional speed		N/A
4.5.2.3	Transient torque analysis		N/A
4.5.3	Acoustic noise emission		N/A
4.6	**Protection against environmental stresses**		P
5	**TEST REQUIREMENTS**		P
5.1	**General**		P
5.1.1	Test objectives and classification ..... :	Type tests	P
5.1.2	Selection of test samples ..... :		P
5.1.3	Sequence of tests		P
5.1.4	Earthing conditions ..... :	Neutral to earth;	P
5.1.5	Compliance	See below. Verified by suitable examination, visual inspection, and/or measurement	P
5.1.6	Test Overview	Type tests followed the specification of table 17.	—
5.2	**Test specifications**		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.1	Visual inspections (type test, sample test and routine test)		P
5.2.2	Mechanical tests		P
5.2.2.1	Clearance and creepage distances (type test)	See appended table 5.2.2.1.	P
5.2.2.2	PWB short-circuit test (type test)		N/A
5.2.2.3	Non-accessibility test (type test) .....:		P
5.2.2.4	Enclosure integrity test (type test) .....:	Complied with requirement of IP20.	P
5.2.2.5	Deformation tests		P
5.2.2.5.1	General		P
5.2.2.5.2	Deflection test (type test) .....:	Steel rod (12.7mmx12.7mm), steady force of 250N, applied for 5s for plastic enclosure, no hazard.	P
5.2.2.5.3	Impact test (type test), temperature (°C) .....:	Steel sphere (weight: 500g) fall (height: 1300mm) test on surface of enclosure. No cracks, no accessible live parts.	P
5.2.3	Electrical tests		P
5.2.3.1	Impulse voltage test (type test and sample test)	See appended table 5.2.3.1.	P
5.2.3.2	A.C. or d.c. voltage test (type and routine test)	See appended table 5.2.3.2.	P
5.2.3.2.1	Purpose of test		P
5.2.3.2.2	Value and type of test voltage		P
5.2.3.2.3	Performing the voltage test		P
5.2.3.2.4	Duration of the a.c. or d.c. voltage test		P
5.2.3.2.5	Verification of the a.c. or d.c. voltage test		P
5.2.3.3	Partial discharge test (type test, sample test)		N/A
5.2.3.4	Protective impedance (type test and routine test) :		P
5.2.3.5	Touch current measurement (type test)	See appended table 5.2.3.5.	P
5.2.3.6	Short-circuit test and Breakdown of components test (type tests)		P
5.2.3.6.1	General		P
5.2.3.6.2	Test configuration		P
5.2.3.6.2.1	Supply voltage and current	110% of the rated input voltage and or rated input frequency	P
5.2.3.6.3	Short-circuit test	See appended table 5.2.3.6.3.	P
5.2.3.6.3.1	Load conditions	Creates the more severe condition.	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.3.6.3.2	Short-circuit between phase terminals of power outputs		P
5.2.3.6.3.3	Short-circuit between phase terminals of power output and protective earth		P
5.2.3.6.4	Breakdown of components test	See appended table 5.2.3.6.4.	P
5.2.3.6.4.1	Load conditions	Creates the more severe condition.	P
5.2.3.6.4.2	Application of short-circuit or open-circuit		P
5.2.3.6.5	Test sequence		P
5.2.3.6.6	Pass criteria		P
5.2.3.7	Capacitor discharge (type test) .....:		P
5.2.3.8	Temperature rise test (type test)	See appended table 5.2.3.8.	P
5.2.3.9	Protective bonding (type test and routine test)	See appended table 5.2.3.9.	P
5.2.4	Abnormal operation tests	See appended table 5.2.4.	P
5.2.4.1	General		P
5.2.4.2	Test duration	Performed until terminated by a protective devices or mechanism, a component failure occurs, or the temperature stabilizes.	P
5.2.4.3	Pass criteria	No emission of flame, no deformation of enclosure, no hazard.	P
5.2.4.4	Loss of phase (type test)	See appended table 5.2.4.4.	P
5.2.4.5	Cooling failure tests (type tests)	See appended table 5.2.4.5.	P
5.2.4.5.1	General		P
5.2.4.5.2	Inoperative blower motor		P
5.2.4.5.3	Clogged filter		P
5.2.4.5.4	Loss of coolant		P
5.2.5	Material tests	See appended table 5.2.5.	P
5.2.5.1	High current arcing ignition test (type test)		N/A
5.2.5.2	Glow-wire test (type test)		P
5.2.5.3	Hot wire ignition test (type test – alternative to Glow-wire test)		N/A
5.2.5.4	Flammability test (type test)		N/A
5.2.6	Environmental tests (type tests)		P
5.2.6.1	General		P
5.2.6.2	Acceptance criteria		P
5.2.6.3	Climatic tests		P

EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
5.2.6.3.1	Dry heat test (steady state)	Test according to IEC 60068-2-2. Operating at rated conditions. 40°C, 16 hours.	P
5.2.6.3.2	Damp heat test (steady state)	Test according to IEC60068-2-78. Power supply unconnected. 40°C, 93%RH, 96 hours.	P
5.2.6.4	Vibration test (type test)	Test according to IEC60068-2-6. Power supply unconnected. Sinusoidal motion, Vibration amplitude/acceleration:10 Hz ≤ f ≤ 57 Hz (0,075 mm amplitude); 57 Hz < f ≤ 150 Hz(1g). Vibration duration: 10 sweep cycles per axis on each of three mutually perpendicular axes.	P
5.2.7	Hydrostatic pressure test (type test and routine test) .....:		N/A
5.2.8	Electronic motor overload protection test (type test)	See appended Table 5.2.8.	P
5.2.8.1	General requirements		P
5.2.8.2	Test set-up		P
5.2.8.3	Pass criteria		P
5.2.8.4	CDM/BDM electronic motor overload protection test (type test)		P
5.2.8.5	CDM/BDM electronic motor thermal memory retention shutdown test (type test)		N/A
5.2.8.6	CDM/BDM electronic motor thermal memory retention loss of power test (type test)		N/A
5.2.8.7	CDM/BDM electronic motor thermal speed sensitivity test (type test)		N/A
5.2.9	Circuit functionality evaluation (routine and/or sample test)		N/A
6	**INFORMATION AND MARKING REQUIREMENTS**		P
6.1	**General**		P
6.2	**Information for selection**	See appended table 6, part 6.2.	P
6.3	**Information for installing and commissioning**	See appended table 6, part 6.3.	P
6.3.1	General		P
6.3.2	Mechanical considerations		P
6.3.3	Environment		P

EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
6.3.4	Handling and mounting		P
6.3.5	Motor and driven equipment		N/A
6.3.5.1	Motor selection		N/A
6.3.5.2	Motor integrated sensors		N/A
6.3.5.3	Critical torsional speeds		N/A
6.3.5.4	Transient torque analysis		N/A
6.3.6	Connections		P
6.3.6.1	General		P
6.3.6.2	Interconnection and wiring diagrams		P
6.3.6.3	Conductor (cable) selection		P
6.3.6.4	Terminal capacity and identification .....:		P
6.3.6.5	Protection requirements		P
6.3.6.6	Earthing		P
6.3.6.7	Protective earthing conductor current	<3.5mA	P
6.3.6.8	Special requirements		P
6.3.7	Overcurrent and short-circuit protection		P
6.3.8	Motor overload protection and overtemperature protection		P
6.3.8.1	CDM/BDM not incorporating internal electronic motor overload and overtemperature protection		N/A
6.3.8.2	CDM/BDM incorporating internal electronic motor overload and overtemperature protection		N/A
6.3.9	Commissioning		P
6.4	**Information for use**	See appended table 6, part 6.4.	P
6.4.1	General		P
6.4.2	Adjustment		P
6.4.3	Labels, signs and signals		P
6.4.3.1	General		P
6.4.3.2	Isolators		P
6.4.3.3	Visual and audible signals		P
6.4.3.4	Hot surfaces		N/A
6.4.3.5	Equipment marking		P
6.5	**Information for maintenance**	See appended table 6, part 6.5.	P
6.5.1	General		P
6.5.2	Capacitor discharge		P
6.5.3	Auto restart/bypass connection		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
6.5.4	PT/CT connection		P
6.5.5	Other hazards		P
Annex A	Examples of protection in case of direct contact		**P**
Annex B	Examples of overvoltage category reduction		**P**
Annex C	Measurement of clearance and creepage distances		P
Annex D	Altitude correction for clearances		—
Annex E	Clearance and creepage distance determination for frequencies greater than 30 kHz		**P**
Annex F	Cross-sections of round conductors		**P**
Annex G	Guidelines for RCD compatibility		—
Annex H	Symbols referred to in this part of IEC 61800		**P**

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Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: List of materials and components separately evaluated				P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity[1)]
ES710-CON-STO					
PCB	Pingxiang Lianjincheng Technology Co., Ltd.	LJC-4 (ASP 1) (Note 1)	V-0, 130°C	UL 94	UL E465011
Terminal (J2, J17)	DONGGUAN TERMINAL ELECTRONIC TECHNOLOGY CO LTD	EMD 1.5	300V 10A -40~120°C	UL 1059	UL E346560
OptoCoupler (U17)	LITE-ON ELECTRONICS (TIANJIN) CO., LTD.	LTV-356T	Dti.≥ 0.5mm Int. DCr≥ 6.0mm Ext. DCr ≥ 6.0mm -55~110°C	IEC/EN 60747-17	VDE 138213
OptoCoupler (U2,U26)	SHARP CORPORATION	PC457L	Dti.≥ 0.5mm Int. DCr≥ 6.0mm Ext. DCr ≥ 6.0mm -55~110°C	IEC/EN 60747-17	VDE 40009162
OptoCoupler (U15,U16,U19, U20,U21,U22, U32,U47,U49)	EVERLIGHT ELECTRONICS CO LTD	EL3H7	Dti.≥ 0.5mm Int. DCr≥ 5.5mm Ext. DCr ≥ 5.5mm -55~110°C	IEC/EN 60747-17	VDE 40028116
Relay (RE1, RE2)	Xiamen Hongfa Electroacoustic Co Ltd	HF41F 12V ZSTG	6A, 250Vac/300Vdc, -40℃~85℃	EN 61810-1	VDE 40006318
ES710-30K					
Varistors ((VR1,VR2,VR3 ,VR4)	CENTRA SCIENCE CORP	CNR-10D820K	820V 125°C	IEC 61643-11 EN 61643-11	VDE 40008220
X-cap. (C1,C2,C3)	XIAMEN FARATRONIC CO LTD	MKP62	305VAC, 0.47uF±10%, -40~+110°C	IEC/EN 60384-14	VDE 40000358
X-cap. (C4)	XIAMEN FARATRONIC CO LTD	MKP62	2.2uF, 305VAC 110°C	IEC/EN 60384-14	VDE 40000358
Y-cap. (CY3)	TDK Electronics Co., Ltd	CD	Y1, 4700pF, 440VAC, 125°C	IEC/EN 60384-14	VDE 40017931
ES710-30K-3B-DRV					

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Clause	Requirement + Test	Result - Remark	Verdict

Relay (RE1, RE2, RE3)	DONGGUAN CHUROD ELECTRONICS CO LTD	CHSO1-b-1ccLA2	24V, 40A, -40~+85°C	IEC 61810-1	TUV R50271657
Transformer (T1)	SHEN ZHEN YOUYAN ELECTRONICS CO.,LTD.	ES710-30R-POW-T1-ETD34	130°C	IEC 61800-5-1 EN 61800-5-1	Tested with appliance
-Bobbin	SUMITOMO BAKELITE CO LTD	PM-8920	150°C	UL 94	UL E41429
-Core	TDG HOLDING CO.,LTD	ETD34 TP4	130°C	IEC 61800-5-1 EN 61800-5-1	Tested with appliance
-Alt.	DMEGC LTD CO.,LTD	ETD34 DMR40	130°C	IEC 61800-5-1 EN 61800-5-1	Tested with appliance
-Insulation tape	JINGJIANG FUWEI ADHESIVE PRODUCT CO LTD	FW	130°C	UL 510A	UL E302608
-Wire	NINGBO JINTIAN NEW MATERIAL CO LTD	UEW/F	155°C	UL 1446	UL E227047
-Varnishe	YUEYANG GREEN TECHNOLOGY CO LTD	YY-155-1	155°C	UL 1446	UL E328930
-Tube	Dongguan Lingfei Hardware and Plastic Products Co., Ltd	CB-TT-T	200°C	UL 224	UL E352366
-Triple insulated wire	Guangzhou Wanbao Electronic Material Co Ltd	Wanbao DTM	130°C	UL 2353	UL E473507
OptoCoupler (U8,U9,U13)	Broadcom Limited	ACPL-331J	Dti≥ 0.5mm Int.Dcr/cl≥ 8.3mm Ext.Dcr/cl≥ 8.3mm 40~105°C	IEC/EN 60747-17	VDE 40009379
OptoCoupler (U16,U18)	Shanghai Chipanalog Microelectronics Co Ltd	CA-IS130	Dti.≥ 0.5mm Int. DCr≥ 8.0mm Ext. DCr ≥ 8.0mm -40~125°C	IEC/EN 60747-17	VDE 40057278
OptoCoupler (U6,U7,U10)	Novosense Micro Electronic Co., Ltd	NSi6801(TB;TC;LC;HC)-DDBR	Dti.≥ 0.5mm Int. DCr≥ 8.0mm Ext. DCr ≥ 8.0mm -40~125°C	IEC/EN 60747-17	VDE 40052820

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Clause	Requirement + Test	Result - Remark	Verdict

OptoCoupler (U1,U4,U12,U17,U22)	CT Micro Electronics Co., Ltd.	CT817C(V)SL-T1	Dti.≥ 0.5mm Int. DCr≥ 7.5mm Ext. DCr ≥ 7.5mm -55~110°C	IEC/EN 60747-17	VDE - EN60747-5-5(VDE0884-5)
Fans	NINGBO SHENGJIU THERMAL TECH CO.,LTD	SE241238-U1	DC24V -10°C ~ 80°C	IEC 61800-5-1 EN 61800-5-1	UL E471112
Supplementary information: 1) An asterisk indicates a mark which assures the agreed level of surveillance					

5.2.2.1	TABLE: General selection and information of supply earthing systems for clearance distances											P
Network systems	**TN-S, TN-C, TN-CS, TT (not corner earthed)(for Auxiliary power)**		**TN-S, TT (corner earthed)**		**TN-C (middle point earthed)**		**IT (not corner referenced) (HV main power)**		**IT (corner referenced)**		**HV Power System (Main power port)**	
Rated voltage (V)	3~208-240V for suffix "2B" 3~380V-500V for other		--		--		--		--		--	
Max. altitude (m)	2000		--		--		--		--		--	
System voltage for impulse / TOV (V)	2120		--		--		--		--		--	
	BI/SI	**RI**	**BI/SI**	**RI**	**BI/SI**	**RI**	**BI/SI**	**RI**	**BI/SI**	**RI**	**BI/SI**	**RI**
Rated Impulse voltage (kV)	4	6	--	--	--	--	--	--	--	--	--	--
Temporary overvoltage (V rms / V peak)	2120 Vpeak / 1500 Vrms	4240 Vpeak / 1800 Vrms	--	--	--	--	--	--	--	--	--	--
Clearance (mm)	3.0	5.5	--	--	--	--	--	--	--	--	--	--
Test impulse voltage for clearance (kV)	4	6	--	--	--	--	--	--	--	--	--	--
Supplementary information:												

5.2.2.1	TABLE: Working voltage measurements for clearance and creepage distances						P
Conditio	**Between**	**TN-S, TN-C, TN-CS, TT (not corner earthed)**	**TN-S, TT (corner earthed)**	**TN-C (middle point earthed)**	**IT (not corner referenced)**	**IT (corner referenced)**	**HV Power System (Main power port)**

EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict

		Peak (V)	Rms (V)	peak	rms	peak	rms	peak	rms	peak	rms	Peak (V)	Rms (V)
N	Input R to PE	500	275	--	--	--	--	--	--	--	--	--	--
N	Input S to PE	500	280	--	--	--	--	--	--	--	--	--	--
N	Input T to PE	500	281	--	--	--	--	--	--	--	--	--	--
N	Input R to S	780	480	--	--	--	--	--	--	--	--	--	--
N	Input S to T	780	480	--	--	--	--	--	--	--	--	--	--
N	Input R to T	780	480	--	--	--	--	--	--	--	--	--	--
N	Output U to PE	550	340	--	--	--	--	--	--	--	--	--	--
N	Output V to PE	550	340	--	--	--	--	--	--	--	--	--	--
N	Output W to PE	550	340	--	--	--	--	--	--	--	--	--	--
N	Output U to W	800	514	--	--	--	--	--	--	--	--	--	--
N	Output U to V	800	514	--	--	--	--	--	--	--	--	--	--
N	Output V to W	800	512	--	--	--	--	--	--	--	--	--	--
N	BUS + to PE	540	367	--	--	--	--	--	--	--	--	--	--
N	BUS - to PE	190	59	--	--	--	--	--	--	--	--	--	--
N	T1 pin1-17	520	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin1-18	580	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin1-20	240	47	--	--	--	--	--	--	--	--	--	--
N	T1 pin1-22	180	42	--	--	--	--	--	--	--	--	--	--
N	T1 pin1-24	520	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin1-25	580	319	--	--	--	--	--	--	--	--	--	--
N	T1 pin1-26	580	319	--	--	--	--	--	--	--	--	--	--
N	T1 pin1-30	820	666	--	--	--	--	--	--	--	--	--	--
N	T1 pin1-32	1000	709	--	--	--	--	--	--	--	--	--	--
N	T1 pin2-17	520	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin2-18	560	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin2-20	180	46	--	--	--	--	--	--	--	--	--	--
N	T1 pin2-22	200	48	--	--	--	--	--	--	--	--	--	--
N	T1 pin2-24	540	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin2-25	560	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin2-26	580	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin2-30	820	660	--	--	--	--	--	--	--	--	--	--
N	T1 pin2-32	1000	700	--	--	--	--	--	--	--	--	--	--
N	T1 pin3-17	530	318	--	--	--	--	--	--	--	--	--	--

EN 61800-5-1													
Clause	Requirement + Test							Result - Remark					Verdict
N	T1 pin3-18	570	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin3-20	200	51	--	--	--	--	--	--	--	--	--	--
N	T1 pin3-22	180	50	--	--	--	--	--	--	--	--	--	--
N	T1 pin3-24	540	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin3-25	560	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin3-26	580	319	--	--	--	--	--	--	--	--	--	--
N	T1 pin3-30	800	598	--	--	--	--	--	--	--	--	--	--
N	T1 pin3-32	1000	699	--	--	--	--	--	--	--	--	--	--
N	T1 pin4-17	540	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin4-18	580	319	--	--	--	--	--	--	--	--	--	--
N	T1 pin4-20	180	48	--	--	--	--	--	--	--	--	--	--
N	T1 pin4-22	180	48	--	--	--	--	--	--	--	--	--	--
N	T1 pin4-24	580	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin4-25	580	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin4-26	580	318	--	--	--	--	--	--	--	--	--	--
N	T1 pin4-30	800	600	--	--	--	--	--	--	--	--	--	--
N	T1 pin4-32	1000	701	--	--	--	--	--	--	--	--	--	--
N	T1 pin7-17	580	341	--	--	--	--	--	--	--	--	--	--
N	T1 pin7-18	580	340	--	--	--	--	--	--	--	--	--	--
N	T1 pin7-20	560	330	--	--	--	--	--	--	--	--	--	--
N	T1 pin7-22	520	329	--	--	--	--	--	--	--	--	--	--
N	T1 pin7-24	540	209	--	--	--	--	--	--	--	--	--	--
N	T1 pin7-25	560	339	--	--	--	--	--	--	--	--	--	--
N	T1 pin7-26	600	343	--	--	--	--	--	--	--	--	--	--
N	T1 pin7-30	820	478	--	--	--	--	--	--	--	--	--	--
N	T1 pin7-32	1000	535	--	--	--	--	--	--	--	--	--	--
N	T1 pin8-17	620	340	--	--	--	--	--	--	--	--	--	--
N	T1 pin8-18	540	339	--	--	--	--	--	--	--	--	--	--
N	T1 pin8-20	580	330	--	--	--	--	--	--	--	--	--	--
N	T1 pin8-22	520	329	--	--	--	--	--	--	--	--	--	--
N	T1 pin8-24	600	338	--	--	--	--	--	--	--	--	--	--
N	T1 pin8-25	540	338	--	--	--	--	--	--	--	--	--	--
N	T1 pin8-26	560	340	--	--	--	--	--	--	--	--	--	--
N	T1 pin8-30	740	468	--	--	--	--	--	--	--	--	--	--

EN 61800-5-1													
Clause	Requirement + Test							Result - Remark					Verdict
N	T1 pin8-32	1040	539	--	--	--	--	--	--	--	--	--	--
N	T1 pin11-17	580	341	--	--	--	--	--	--	--	--	--	--
N	T1 pin11-18	560	339	--	--	--	--	--	--	--	--	--	--
N	T1 pin11-20	580	330	--	--	--	--	--	--	--	--	--	--
N	T1 pin11-22	600	332	--	--	--	--	--	--	--	--	--	--
N	T1 pin11-24	580	332	--	--	--	--	--	--	--	--	--	--
N	T1 pin11-25	580	332	--	--	--	--	--	--	--	--	--	--
N	T1 pin11-26	580	332	--	--	--	--	--	--	--	--	--	--
N	T1 pin11-30	840	475	--	--	--	--	--	--	--	--	--	--
N	T1 pin11-32	1000	532	--	--	--	--	--	--	--	--	--	--
N	T1 pin12-17	620	339	--	--	--	--	--	--	--	--	--	--
N	T1 pin12-18	600	329	--	--	--	--	--	--	--	--	--	--
N	T1 pin12-20	620	339	--	--	--	--	--	--	--	--	--	--
N	T1 pin12-22	600	329	--	--	--	--	--	--	--	--	--	--
N	T1 pin12-24	600	329	--	--	--	--	--	--	--	--	--	--
N	T1 pin12-25	600	329	--	--	--	--	--	--	--	--	--	--
N	T1 pin12-26	580	320	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-30	820	503	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-32	1000	573	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-17	560	328	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-18	560	320	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-20	580	338	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-22	560	320	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-24	580	328	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-25	560	528	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-26	560	520	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-30	760	475	--	--	--	--	--	--	--	--	--	--
N	T1 pin15-32	980	521	--	--	--	--	--	--	--	--	--	--
N	T1 pin16-17	620	320	--	--	--	--	--	--	--	--	--	--
N	T1 pin16-18	620	320	--	--	--	--	--	--	--	--	--	--
N	T1 pin16-20	600	312	--	--	--	--	--	--	--	--	--	--
N	T1 pin16-22	620	320	--	--	--	--	--	--	--	--	--	--
N	T1 pin16-24	620	320	--	--	--	--	--	--	--	--	--	--
N	T1 pin16-25	600	312	--	--	--	--	--	--	--	--	--	--

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Clause	Requirement + Test	Result - Remark	Verdict

N	T1 pin16-26	600	312	--	--	--	--	--	--	--	--	--	--
N	T1 pin16-30	740	468	--	--	--	--	--	--	--	--	--	--
N	T1 pin16-32	1000	534	--	--	--	--	--	--	--	--	--	--
N	U4 pin 1-3	580	352	--	--	--	--	--	--	--	--	--	--
N	U4 pin 1-4	560	358	--	--	--	--	--	--	--	--	--	--
N	U4 pin 2-3	520	345	--	--	--	--	--	--	--	--	--	--
N	U4 pin 2-4	520	344	--	--	--	--	--	--	--	--	--	--

IT network, simulated impedance (Ω)..... :	1 kΩ according to IEC 60990.
Supplementary information: Condition #: N: normal working	

5.2.2.1	TABLE: Clearances and creepage distances								P
clearance cl and creepage distance cr at/between:	**PWB layer**	**CTI (V)**	**U peak (V)**	**U rms (V)**	**Req. cl (mm)**	**Meas. cl (mm)**	**Req. cr (mm)**	**Meas. cr (mm)**
Sub-assembly / PWB / part								
General								
--	--	--	--	--	--	--	--	--
Functional insulation								
--	--	--	--	--	--	--	--	--
Basic / supplementary insulation								
L of input terminal to earth	--	--	800V	514V	3.0	3.3	5.2	13.4
Reinforced insulation								
Primary part (live part) to accessible part of enclosure (RI)	--	--	<420	289V	5.5	>5.8	5.8	>5.8
T1 primary winding to secondary pin (RI)	--	--	1040	709V	5.5	>16	16	>16
Primary trace to secondary trace of (U4) (RI)	--	--	<420	289V	5.5	6.5	5.5	6.5
Primary part to secondary (COM pin to U4) (RI)	--	--	<420	289V	5.5	>5.5	5.5	>5.5
After deflection and impact test:								
Primary part (live part) to accessible part of enclosure (RI)	--	--	<420	289V	5.5	>5.8	5.8	>5.8
Supplementary information:								

4.3.6.8	**TABLE: Solid insulation**	**P**
5.2.3.1	**Impulse voltage test**	
5.2.3.2	**A.C. or d.c. voltage test**	
5.2.3.3	**Partial discharge test**	

EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict

Test voltage applied between:	DTI (mm)	Impulse test (kV, circuit)	Electric strength test (VAC)	Partial discharge test (V)	Result
Functional insulation (circuit characteristics)					
--	--	--	--	--	--
Basic / supplementary insulation					
Core and secondary winding/pin of transformer T1	--	4000	1500	--	No breakdown
Core and primary winding/pin of transformer T1	--	4000	1500	--	No breakdown
Reinforced insulation					
L/N to plastic enclosure with metal foil	--	6000	3000	--	No breakdown
Primary winding/pin and secondary winding/pin of transformer T1	--	6000	3000	--	No breakdown
One layer of insulation tape of T1	--	6000	3000	--	No breakdown
After deflection and impact test:					
L/N to plastic enclosure with metal foil	--	6000	3000	--	No breakdown
After dry heat test:					
Core and secondary winding/pin of transformer T1	--	4000	1500	--	No breakdown
Core and primary winding/pin of transformer T1	--	4000	1500	--	No breakdown
L/N to plastic enclosure with metal foil	--	6000	3000	--	No breakdown
Primary winding/pin and secondary winding/pin of transformer T1	--	6000	3000	--	No breakdown
One layer of insulation tape of T1	--	6000	3000	--	No breakdown
After damp heat test:					
Core and secondary winding/pin of transformer T1	--	4000	1500	--	No breakdown
Core and primary winding/pin of transformer T1	--	4000	1500	--	No breakdown
L/N to plastic enclosure with metal foil	--	6000	3000	--	No breakdown
Primary winding/pin and secondary winding/pin of transformer T1	--	6000	3000	--	No breakdown

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Clause	Requirement + Test	Result - Remark	Verdict

One layer of insulation tape of T1	--	6000	3000	--	No breakdown
After vibration test:					
Core and secondary winding/pin of transformer T1	--	4000	1500	--	No breakdown
Core and primary winding/pin of transformer T1	--	4000	1500	--	No breakdown
L/N to plastic enclosure with metal foil	--	6000	3000	--	No breakdown
Primary winding/pin and secondary winding/pin of transformer T1	--	6000	3000	--	No breakdown
One layer of insulation tape of T1	--	6000	3000	--	No breakdown
Supplementary information:					

5.2.3.5	TABLE: Touch current measurement							P
Single phase equipment								
L – N TN-S, TN-C, TN-CS, TT (not corner earthed) Figure 6	**L – L TN-C, TT (middle point earthed) Figure 7**	**L – L TN, TT (not corner earthed) Figure 8**	**L – N IT (not corner refe-renced) Figure 9**	**L – N IT (corner refe-renced) Figure 9**	**L – L IT (not corner refe-renced) Figure 10**	**L – L IT (corner refe-renced) Figure 10**	**Limit for 50 Hz (mA)**	**Limit for 60 Hz (mA)**
--	--	--	--	--	--	--	3,5	3,5
Three-phase equipment								
TN-S, TN-C, TN-CS, TT (not corner earthed) Figure 11	**IT (star point referenced) Figure 12**	**IT (corner referenced) Figure 12**	**TN, TT (corner earthed) Figure 13**	**TN, TT (middle point earthed) Figure 14**			**Limit for 50 Hz (mA)**	**Limit for 60 Hz (mA)**
LCD panel to earth: 0.005mA Enclosure to earth: 0.31mA Communication terminal to earth:0.005mA	--	--	--	--			3,5	3,5
Supplementary information: Measurements have been carried out according to figures of IEC 60990.								

EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict

5.2.3.6.3 **5.2.3.6.4** **5.2.4.4** **5.2.4.5** **5.2.8**	**TABLE: Short-circuit test** **Breakdown of components test** **Loss of phase test** **Cooling failure tests** **Electronic motor overload protection test**	P

Tested item	Fault (SC, OC, OL)	Supply voltage (V) 3PH	PS CC (kA)	Test time	Test environment (ambient, fuse etc.) and observation	Result
Output U-V	S-C	500Vac	--	10mins	Unit trip off, recoverable, no damaged, no hazard.	Pass
Output U-W	S-C	500Vac	--	10mins	Unit trip off, recoverable, no damaged, no hazard.	Pass
Output W-V	S-C	500Vac	--	10mins	Unit trip off, recoverable, no damaged, no hazard.	Pass
Output U-PE	S-C	500Vac	--	10mins	Unit trip off, recoverable, no damaged, no hazard.	Pass
Output V-PE	S-C	500Vac	--	10mins	Unit trip off, recoverable, no damaged, no hazard.	Pass
Output R-PE	S-C	500Vac	--	10mins	Unit trip off, recoverable, no damaged, no hazard.	Pass
Motor	Overload	500Vac	--	2hrs	Unit overload to rated power of 115%, unit shutdown, fault warning: output side Overcurrent protection; No damaged components; No hazard.	Pass
T1 pin 30-32	S-C	500Vac	--	10mins	Unit shutdown immediately, Circuit breaker open; Q1 damaged components. No hazard	Pass
T1 pin 1-2	S-C	500Vac	--	10mins	Unit shutdown immediately, LCD panel not wore, recoverable, no damaged, no hazard.	Pass
T1 pin 11-12	S-C	500Vac	--	10mins	Unit shutdown immediately, recoverable, no damaged, no hazard.	Pass
T1 pin 11-12	O-L	500Vac	--	30mins	Unit shutdown immediately, recoverable, no damaged, no hazard.	Pass
T1 pin 3-4	S-C	500Vac	--	10mins	Unit shutdown immediately, recoverable, no damaged, no hazard.	Pass
T1 pin 17-18	S-C	500Vac	--	10mins	Unit shutdown immediately, recoverable, no damaged, no hazard.	Pass
T1 pin 20-22	S-C	500Vac	--	10mins	Unit shutdown immediately, recoverable, no damaged, no hazard.	Pass
T1 pin 24-25	S-C	500Vac	--	10mins	Unit shutdown immediately, recoverable, no damaged, no hazard.	Pass
T1 pin 25-26	S-C	500Vac	--	10mins	Unit shutdown immediately, recoverable, no damaged, no hazard.	Pass

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Clause	Requirement + Test				Result - Remark	Verdict
Q1 G-S	S-C	500Vac	--	10mins	Unit shutdown immediately, Circuit breaker open; Q1 damaged components. No hazard	Pass
Q1 G-D	S-C	500Vac	--	10mins	Unit shutdown immediately, Circuit breaker open; Q1 damaged components. No hazard	Pass
Q1 D-S	S-C	500Vac	--	10mins	Unit shutdown immediately, Circuit breaker open; Q1 damaged components. No hazard	Pass
R20	S-C	500Vac	--	10mins	Normal working, no damaged, no hazard.	Pass
C10	S-C	500Vac	--	10mins	Unit shutdown immediately, recoverable, no damaged, no hazard.	Pass
R31	S-C	500Vac	--	10mins	Unit shutdown immediately, Circuit breaker open; Z5 damaged components. No hazard	Pass
R36	S-C	500Vac	--	10mins	Normal working, no damaged, no hazard.	Pass
Z9	S-C	500Vac	--	10mins	Unit shutdown immediately, LCD panel not wore, recoverable, no damaged, no hazard.	Pass
D18	S-C	500Vac	--	10mins	Unit shutdown immediately, Circuit breaker open; IGBT damaged components. No hazard	Pass
Q7 pin 1-2	S-C	500Vac	--	10mins	Normal working, no damaged, no hazard.	Pass
Q7 pin 1-3	S-C	500Vac	--	10mins	Normal working, no damaged, no hazard.	Pass
Q7 pin 2-3	S-C	500Vac	--	10mins	Normal working, no damaged, no hazard.	Pass
R	Lack of phase	500Vac	--	10mins	Unit shutdown immediately, no damaged, no hazard.	Pass
S	Lack of phase	500Vac	--	10mins	Unit shutdown immediately, no damaged, no hazard.	Pass
T	Lack of phase	500Vac	--	10mins	Unit shutdown immediately, no damaged, no hazard.	Pass
Fan	Locked	500Vac	--	20mins	Unit shutdown after 20mins, no damaged, no hazard.	Pass
Opening	Blocked	500Vac	--	27mins	Unit shutdown after 27mins, no damaged, no hazard.	Pass
Supplementary information:						

5.2.3.8	TABLE: Temperature rise test, thermocouple method			P
	Supply voltage (V)..... :	342Vac	550Vac	—
	Supply frequency (Hz) ... :	60Hz	50Hz	—
	Load (V, A) ..... :	37KW	37KW	—
	Ambient (°C) ..... :	50.0	50.0	—
Thermocouple Location		**Temperature measured (°C)**		**Limit (°C)**
Whole unit				

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Clause	Requirement + Test	Result - Remark	Verdict

LCD panel	55.2	54.5	85
Button body	57.9	56.4	85
Plastic enclosure near main board	75.6	74.4	85
Mounting surface	69.5	67.6	90
11010337 board			
AC input/output terminal	63.3	63.2	95
X-cap. (CX1)	69.5	69.4	100
Y-cap. (CY3)	65.2	65.1	125
Varistors (VR1)	72.6	72.0	85
11010333 board			
T1 core	89.1	88.5	Ref.
T1 coil	85.8	86.2	130
OptoCoupler (U17)	73.1	72.6	100
Relay body (RE1)	67.3	66.5	110
E-cap. (E19)	70.7	71.8	105
11010296 board			
Terminal	68.3	68.6	95
Relay boay (RE1)	68.3	69.5	130
Ambient	50.0	50.0	--
Supplementary information:			

5.2.3.8	**TABLE: Temperature rise test, resistance method**							**N/A**
	Test voltage (V).....:							—
	Supply frequency (Hz) ....:							—
	Load (V, A) ..... :							—
Winding		**t1 (°C)**	**r1 (Ω)**	**t2 (°C)**	**r2 (Ω)**	**T (°C)**	**Limit Tmax (°C)**	**Insu-lation class**
--		--	--	--	--	--	--	--
Supplementary information:								

5.2.3.9	**TABLE: Protective bonding**					P
Points of application		**Current (A)**	**Voltage (V)**	**Resistance (mΩ)**	**Test time (min)**	**Result**
PE terminal of AC input to PE terminal of AC output		10A	12VDC	14.86	10min	P
After dry heat test:						

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Clause	Requirement + Test	Result - Remark	Verdict

PE terminal of AC input to PE terminal of AC output	10A	12VDC	14.86	10min	P
After damp heat test:					
E terminal of AC input to PE terminal of AC output	10A	12VDC	14.86	10min	P
After vibration test:					
PE terminal of AC input to PE terminal of AC output	10A	12VDC	14.86	10min	P
Supplementary information:					

5.2.5	**TABLE: Material test**		**P**
Object / Part No. / Material	**Manufacturer / trademark / type designation**	**Test procedure**	**Result**
Plastic enclosure	See table 1	Glow-wire tested, tested condition: 850°C, < 1s, no hazard.	Pass
Supplementary information:			

6	**TABLE: Information and marking requirements**					P
		Product	Package	Installation	User	Maintenance
6.2	Information for selection					
- Name or trademark of the manufacturer, supplier or importer ..... :		√	√	√	√	√
- Catalogue number or equivalent ..... :		√	√	√	√	√
- Input voltage rating ..... :		√	-	√	√	√
- Input current rating ..... :		√	-	√	-	√
- Input power rating ..... :		√	-	√	-	√
- Input frequency ..... :		√	-	√	-	√
- Input number of phases ..... :		√	-	√	-	√
- Output voltage rating ..... :		√	-	√	√	√
- Output current rating ..... :		√	-	√	-	√
- Output power rating ..... :		√	-	√	-	√
- Output frequency ..... :		√	-	√	-	√
- Output number of phases ..... :		√	-	√	-	√
- Protective class ..... :		Class I				
- Type of electrical supply system ..... :		TN, TT				
- Prospective short-circuit current and protective device characteristics .....:		See 6.3.7				
- Field supply requirements (if any) .....:		See 6.3.3				
- Coolant type and design pressure ..... :		-	-	√	-	√
- IP rating ..... :		√	-	√	-	√
- Operating and storage environment ..... :		See 6.3.3.				

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Clause	Requirement + Test			Result - Remark		Verdict
- Reference to relevant standards .....:		-	-	√	-	-
- Date code or serial number .....:		√	-	-	-	-
- Reference to instructions .....:		-	-	√	√	√
6.3	Information for installation and commissioning					
6.3.2: Mechanical considerations		-	√	√	-	√
- Dimensional drawing (SI units) .....:		-	-	√	-	√
- Mass (SI units) .....:		-	√	√	-	√
- Mounting drawing (SI units) .....:		-	-	√	-	√
6.3.3: Environment (operation, transport, storage) .....:		-	-	√	-	√
- Temperature .....:		-	-	√	-	√
- Humidity .....:		-	-	√	-	√
- Altitude .....:		-	-	√	-	√
- Pollution .....:		-	-	√	-	√
- Ultra violet light .....:		-	-	N/A	-	N/A
- Type of electrical supply system .....:		-	-	√	-	-
- Field supply requirements (if any) .....:		-	-	√	-	-
- Other .....:		-	-	√	-	-
6.3.4: Handling and mounting .....:		-	√	√	-	√
- Packing and unpacking .....:		-	√	√	-	√
- Moving .....:		-	√	√	-	√
- Lifting .....:		-	√	√	-	√
- Strength and rigidity of mounting surface ....:		-	√	√	-	√
- Fastening .....:		-	√	√	-	√
- Provision of adequate access for operation, adjustment and maintenance .....:		-	√	√	-	√
- Warning regarding combustibility if mounting surface exceeds 90 °C .....:		-	-	N/A	-	-
6.3.5: Motor and driven equipment				N/A	N/A	N/A
6.3.5.1: Motor selection .....:		-	-	N/A	N/A	N/A
6.3.5.2: Motor integrated sensors .....:		-	-	N/A	N/A	N/A
6.3.5.3: Critical torsional speeds .....:		-	-	N/A	N/A	N/A
6.3.5.4: Transient torque analysis .....:		-	-	N/A	N/A	N/A
6.3.6: Connections		√	-	√	√	√
6.3.6.1: General .....:		-	-	√	-	√
6.3.6.2: Interconnection and wiring diagrams :		-	-	√	-	√
6.3.6.3: Conductor (cable) selection .....:		-	-	√	-	√
6.3.6.4: Terminal capacity and identification ..:		√	-	√	-	√
6.3.6.5: Protection requirements .....:		-	-	√	√	√
- Protective class 0 .....:		N/A	-	N/A	N/A	N/A
- Interface details .....:		-	-	√	-	√

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Clause	Requirement + Test			Result - Remark		Verdict
- Terminals with protective separation .....:		-	-	√	√	√
6.3.6.6: Earthing .....:		-	-	√	-	√
- High-voltage PDS: Earthing switch .....:		-	-	√	-	√
- Symbol IEC 60417-5019, PE or green-yellow .....:		√	-	-	-	-
- Symbol IEC 6417-5172 for Class II .....:		N/A	-	-	-	-
6.3.6.7: Protective earthing conductor current .....:		√	-	√	√	√
- Symbol ISO 7000-0434 and instruction.....:		√	-	√	-	√
- RCD compability .....:		-	-	√	-	√
- RCD/RCM caution notice and marking ISO 7000-0434 .....:		N/A	-	-	√	-
6.3.6.8: Special requirements .....:		-	-	√	-	√
6.3.7: Overcurrent or short-circuit protection .:		-	-	√	-	√
- Electronic power output short-circuit protection circuitry conditions .....:		-	-	√	-	-
6.3.8: Motor overload protection and overtemperature protection .....:		-	-	√	-	√
6.3.8.1: CDM/BDM not incorporating internal electronic motor overload and overtemperature protection .....:		-	-	N/A	-	-
6.3.8.2: CDM/BDM incorporating internal electronic motor overload and overtemperature protection.....:		-	-	N/A	-	N/A
6.3.9: Commissioning .....:		-	-	√	-	-
6.4	Information for use					
6.4.1: General .....:		-	-	√	√	√
6.4.2: Adjustment .....:		√	-	√	√	√
6.4.3: Labels, signs, and signals .....:		√	-	√	√	√
6.4.3.1: General .....:		√	-	√	√	√
6.4.3.2: Isolators .....:		√	-	-	-	-
6.4.3.3: Visual and audible signals .....:		√	-	-	√	-
6.4.3.4: Hot surfaces, symbol IEC 60417-5041 .....:		N/A	-	-	N/A	-
6.4.3.5: Equipment marking .....:		√	-	√	√	√
- Control devices .....:		√	-	√	√	√
- Indicating devices .....:		√	-	√	√	√
- Replaceable fuses .....:		N/A	-	√	√	√
- Movable connectors .....:		N/A	-	N/A	N/A	N/A
- Test points .....:		√	-	√	√	√
- Polarized devices .....:		√	-	√	√	√
- Pre-set controls .....:		N/A	-	√	√	√
6.5	Information for maintenance					
6.5.1: General.....:		-	-	-	√	√

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Clause	Requirement + Test	Result - Remark	Verdict

- Maintenance procedures..... :	-	-	-	-	√
- Maintenance schedules..... :	-	-	-	√	√
- Safety precautions ..... :	-	-	-	-	√
- Location of live parts accessible during maintenance ..... :	-	-	-	-	√
- Adjustment procedures ..... :	-	-	√	√	√
- Repair and replacement procedures ..... :	-	-	-	-	√
- Other relevant information (e.g. special tools list) ..... :	-	-	-	√	√
6.5.2: Capacitor discharge ..... :	√	-	√	-	√
6.5.3: Auto restart/bypass connection ..... :	-	-	N/A	N/A	N/A
6.5.4: Potential Transformer (PT) / Current Transformer (CT) connection ..... :	√	-	√	-	√
6.5.5: Other hazards ..... :	√	-	-	-	√
Supplementary information:					

Photo document

Figure 1

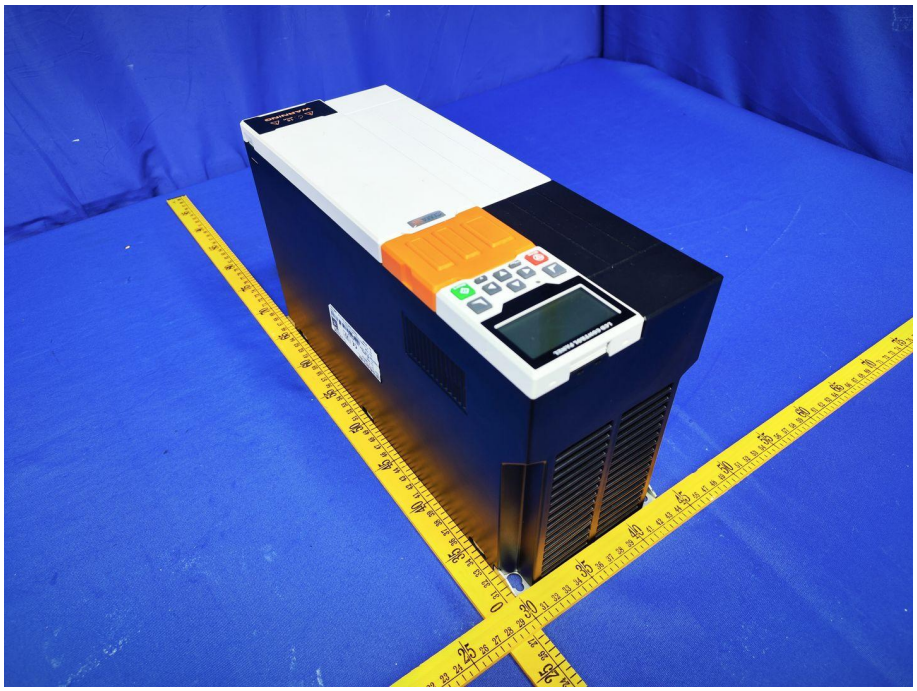

Figure 2

Photo document

Figure 3

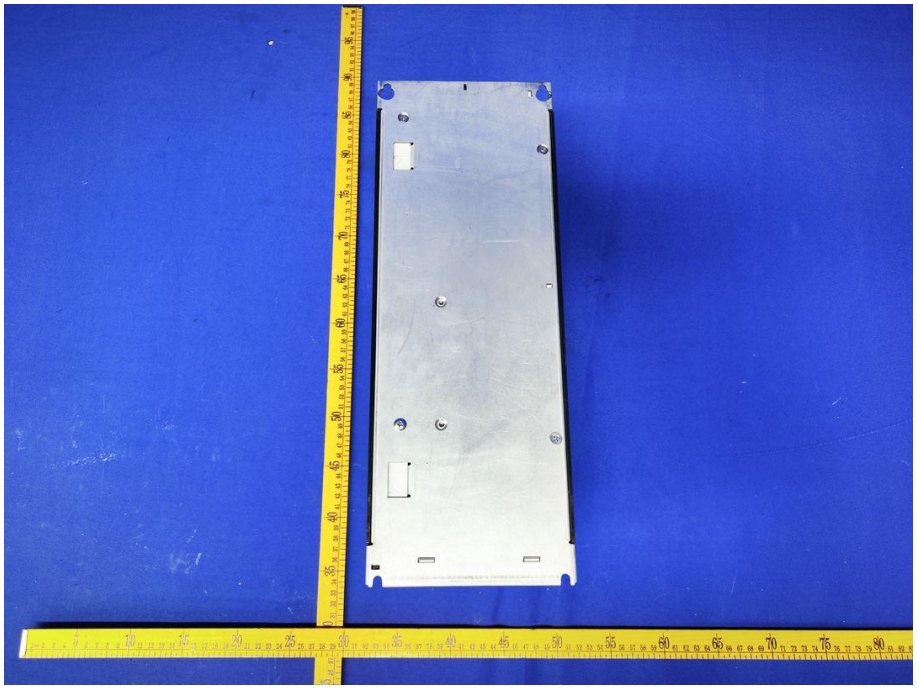

Figure 4

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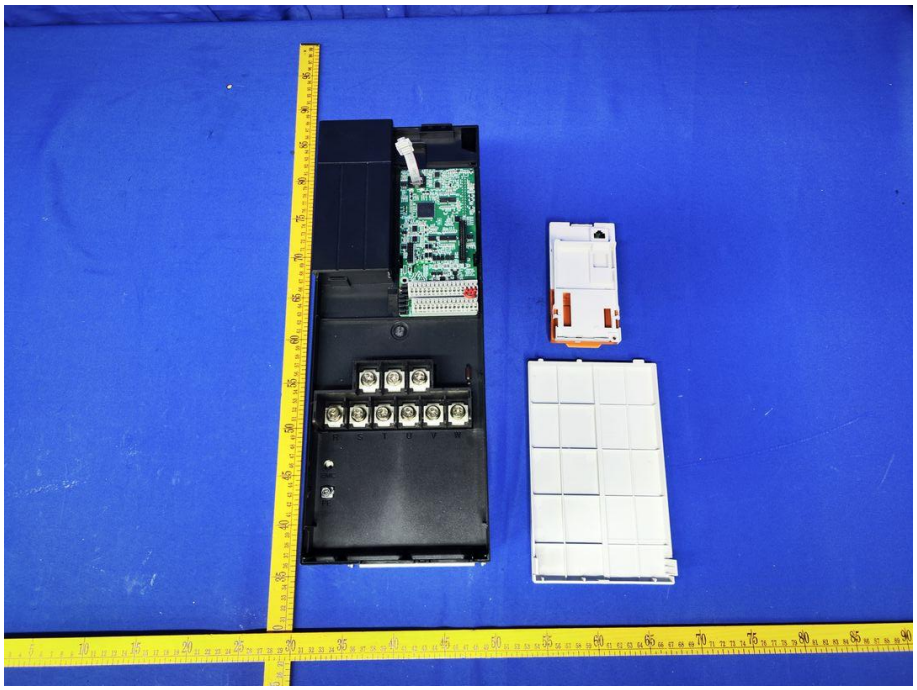

Figure 5

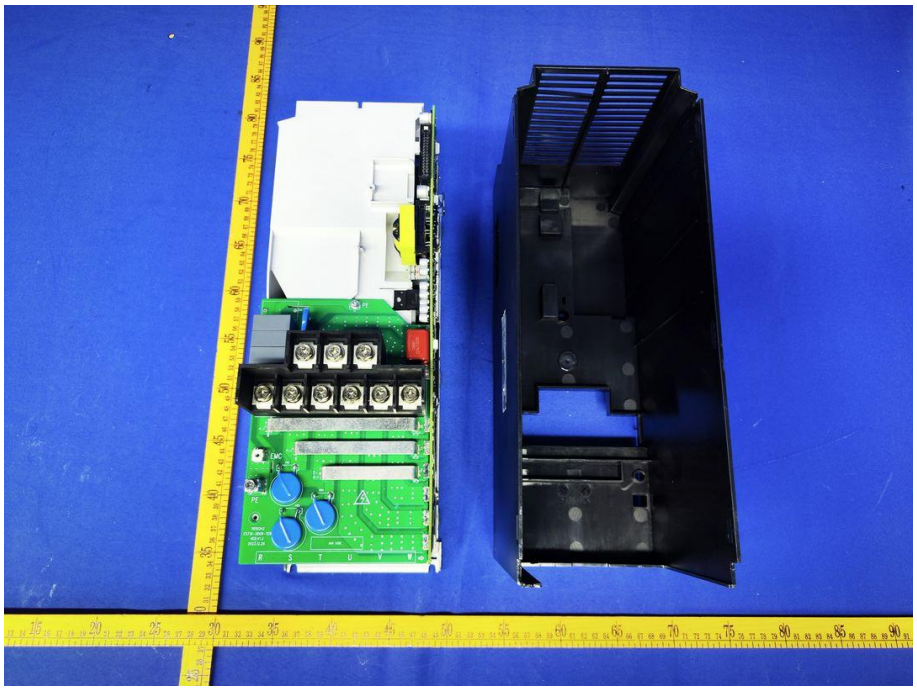

Figure 6

Photo document

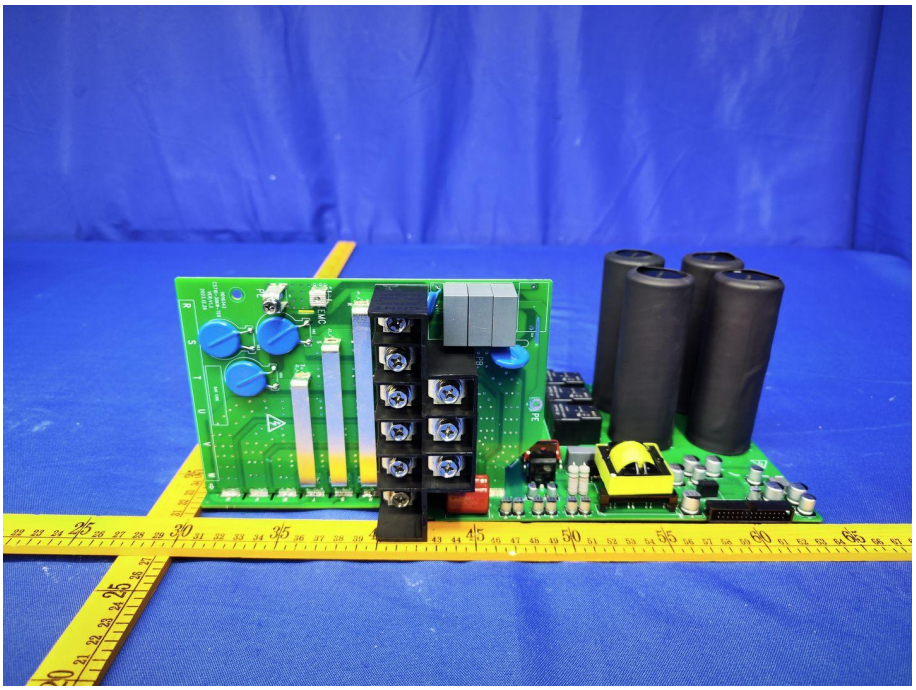

Figure 7

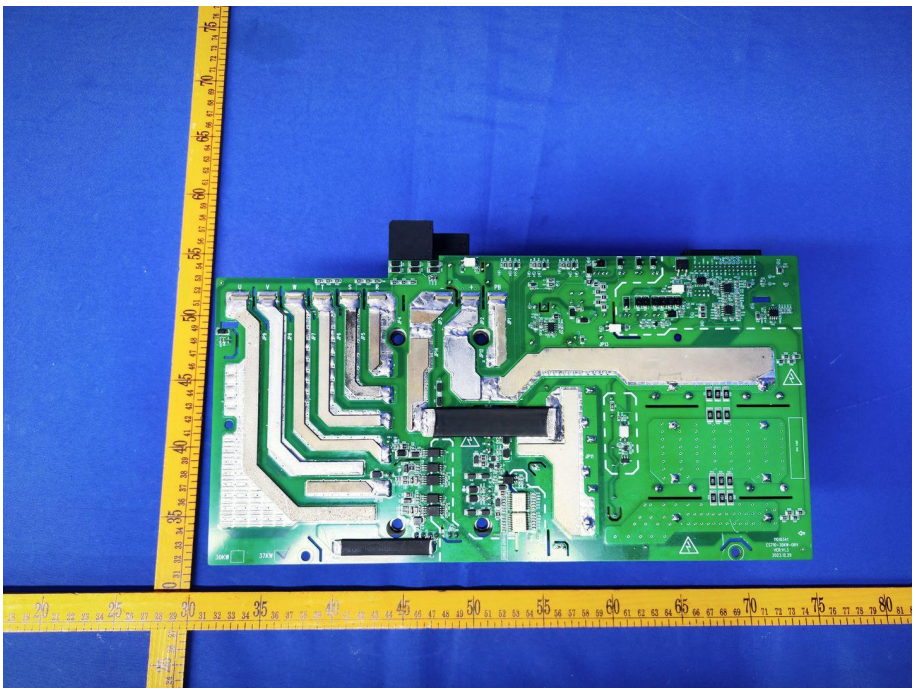

Figure 8

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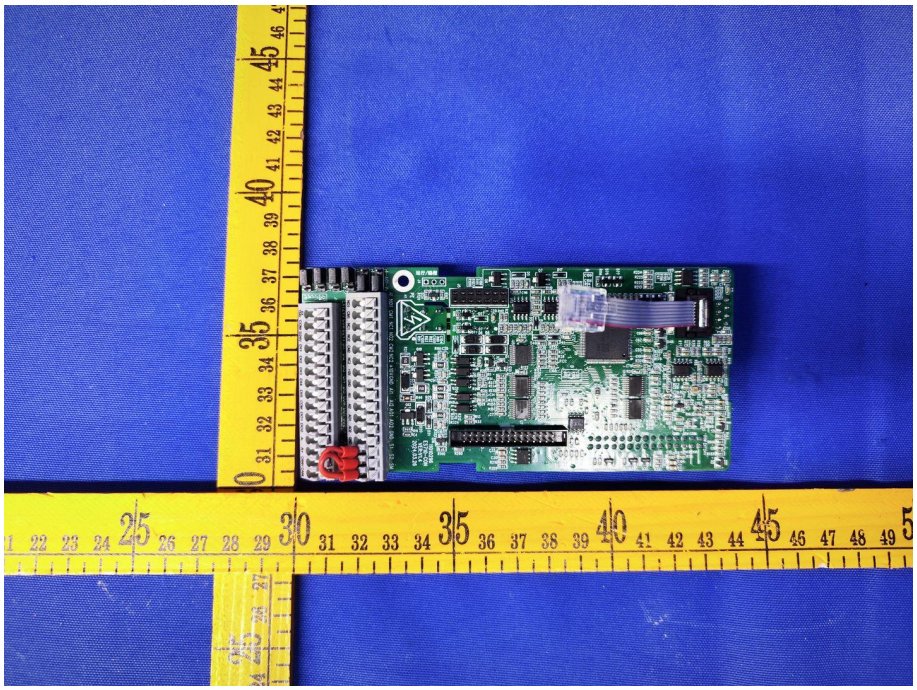

Figure 9

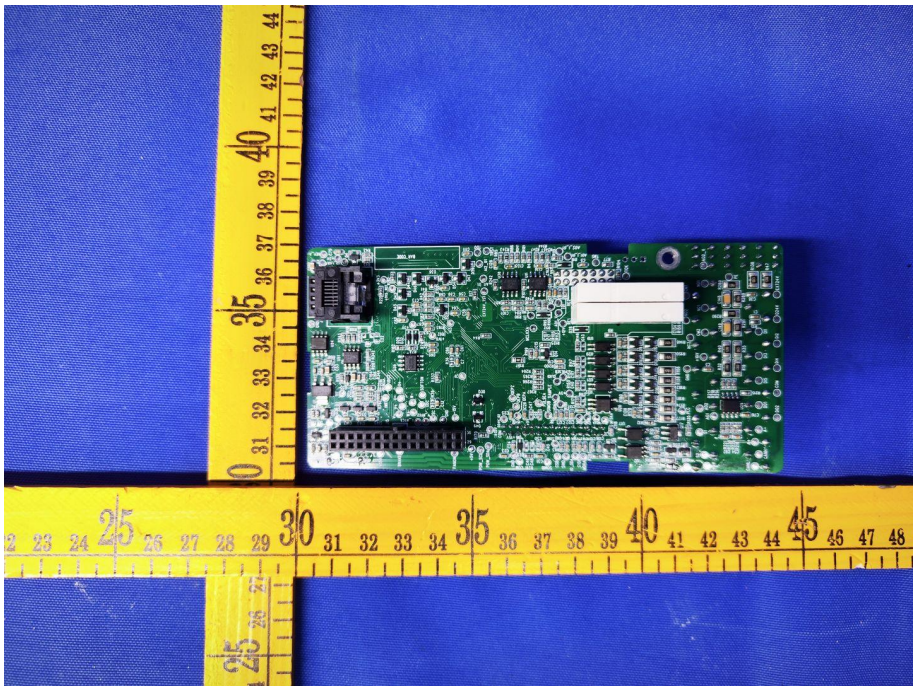

Figure 10

Photo document

Figure 11

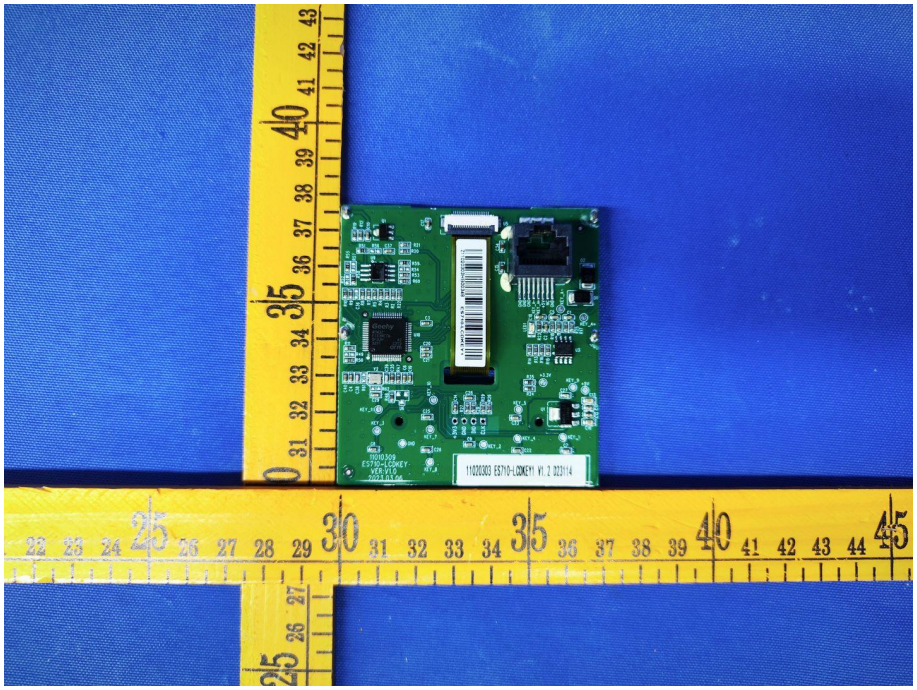

Figure 12

--- End of report ---