



TEST REPORT
IEC/EN 61800-5-1

Adjustable speed electrical power drive systems – Part 5-1:
Safety requirements – Electrical, thermal and energy



Report Number.....: CHTSE24010219

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Testing Laboratory.....: **Shenzhen Huatongwei International Inspection Co., Ltd.**

Testing location/ address.....: Building 7, Baiwang Idea Factory, No.1051, Songbai Road,
 Yangguang Community, Xili Subdistrict, Nanshan District,
 Shenzhen, Guangdong, China

Applicant's name.....: **China Leadshine Technology Co.,Ltd.**

Address.....: 15-20/F, Block B, Nanshan I Valley, No.3157, Shahe West Road,
 Nanshan District, Shenzhen

Manufacturer's name.....: **Same as applicant**

Address.....: Same as applicant

Test specification:

Standard.....: IEC 61800-5-1: 2007; AMD1:2016
 EN 61800-5-1: 2007; AMD1:2017

Test procedure: Type test

Non-standard test method.....: N/A

Test Report Form No.: IEC61800_5_1C

Test Report Form(s) Originator.....: SGS Fimko Ltd.

Master TRF.....: Dated 2018-05-18


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Test item description	EL7-EC Series AC Servo Drives
Manufacturer.....	Same as applicant
Address.....	Same as applicant
Trademark.....	
Model/Type No.	L7N-(a)100(b)(c), EL7-EC100(a)(b), L6N-(a)100(b)(c), EL6-EC100(a)(b), L7N-(a)400(b)(c), EL7-EC400(a)(b), L6N-(a)400(b)(c), EL6-EC400(a)(b), L7N-(a)750(b)(c), EL7-EC750(a)(b), L6N-(a)750(b)(c), EL6-EC750(a)(b), L7N-(a)1000(b)(c), EL7-EC1000(a)(b), L6N-(a)1000(b)(c), EL6-EC1000(a)(b)
Rating(s).....	See page 4 for details

Summary of testing:	
Tests performed (name of test and test clause): The submitted samples were found to comply with the requirements of: - EN 61800-5-1: 2007; AMD1:2017	Testing location: Shenzhen Huatongwei International Inspection Co., Ltd. Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China

Copy of marking plate:	
	
Remark: The marking fo other models is the same as above, except for model designation and rated value.	

Test item particulars:		
Equipment under test	<input type="checkbox"/> PDS <input type="checkbox"/> CDM <input checked="" type="checkbox"/> BDM <input type="checkbox"/> Other:	
Intended equipment location	<input type="checkbox"/> stand alone <input checked="" type="checkbox"/> for building-in	
Mains supply overvoltage category (OVC)	<input type="checkbox"/> OVC I <input type="checkbox"/> OVC II <input checked="" type="checkbox"/> OVC III <input type="checkbox"/> OVC IV	
Reduction of OVC for basic insulation used	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes, by:	
Supply earthing systems and system voltage (V)	Supply earthing system	System voltage
	<input checked="" type="checkbox"/> TN-S, TN-C, TN-CS, TT (not corner earthed)	200-240V
	<input type="checkbox"/> TN-C (middle point earthed)	
	<input type="checkbox"/> TN-S, TT (corner earthed)	
	<input type="checkbox"/> IT (not corner earthed)	
	<input type="checkbox"/> IT (corner earthed)	
	<input type="checkbox"/> other:	
DVC D circuits/terminals (other than mains)	N/A	
DVC C circuits/terminals (other than mains)	Output terminal U, V, W; All primary circuits directly connected to input/output terminals	
DVC B circuits/terminals	N/A	
DVC A circuits/terminals	All accessible terminals on control board	
Potential free circuits/terminals (voltage, OVC)	OVC III	
Class of equipment	<input checked="" type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class 0 <input type="checkbox"/> Class III	
Pollution degree	<input type="checkbox"/> PD 1: <input checked="" type="checkbox"/> PD 2: <input type="checkbox"/> PD 3: <input type="checkbox"/> PD 4:	
IP protection classes	IPX0	
Ambient temperature during operation (°C) with/without derating	55	
Liquid cooling temperature during operation (°C) with/without derating	N/A	
Max. operation altitude (m)	2000m	
Altitude of test laboratory (m)	<500m	
Other particulars	N/A	
Motor overload and overtemperature protection	<input type="checkbox"/> Thermal or electronic overload relay <input checked="" type="checkbox"/> Electronic motor overload protection with thermal memory retention <input type="checkbox"/> Electronic motor overload protection with speed sensivity <input type="checkbox"/> Monitoring and automatic reduction of motor current based on thermal sensor in or on motor <input type="checkbox"/> Embedded motor thermal protection disconnecting the motor <input type="checkbox"/> None	

Possible test case verdicts:

- test case does not apply to the test object..... : N/A (Not applicable)
- test object does meet the requirement..... : P (Pass)
- test object does not meet the requirement..... : F (Fail)

Testing:

Date of receipt of test item..... : 2023-12-25

Date(s) of performance of tests..... : 2023-12-25 to 2024-01-16

General remarks:

The test results presented in this report relate only to the object tested.
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“(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.

General product information:

1. When installing the equipment, all requirements of the mentioned standard must be fulfilled and it should be suitably installed in closed electrical operation area, and fire/mechanical protection enclosure should be provided.
2. Maximum operating temperature is 55°C.
3. The input and output circuits were considered as DVC C circuits and signal circuit was considered as DVC A circuit.
4. The equipment has no overcurrent protection device. For safety operation, a suitable external circuit breaker must be employed before installation.
5. Refer to the installation and operating instruction from manufacturer for the details of loading and operating conditions.
6. Unless otherwise specified, the model L7N-1000S were chosen as representative models to perform all the tests.
7. Model list:

Model	Rated input	Rated output
L7N-(a)100(b)(c), EL7-EC100(a)(b), L6N-(a)100(b)(c), EL6-EC100(a)(b)	1PH AC 200-240VAC, 50/60Hz, 1.7A	3PH AC 0-240VAC, 0-500Hz, 1.2A
L7N-(a)400(b)(c), EL7-EC400(a)(b), L6N-(a)400(b)(c), EL6-EC400(a)(b)	1PH AC 200-240VAC, 50/60Hz, 5.0A	3PH AC 0-240VAC, 0-500Hz, 3.5A
L7N-(a)750(b)(c), EL7-EC750(a)(b), L6N-(a)750(b)(c), EL6-EC750(a)(b)	1PH AC 200-240VAC, 50/60Hz, 7.9A	3PH AC 0-240VAC, 0-500Hz, 5.5A
L7N-(a)1000(b)(c), EL7-EC1000(a)(b), L6N-(a)1000(b)(c), EL6-EC1000(a)(b)	1PH AC 200-240VAC, 50/60Hz, 8.8A	3PH AC 0-240VAC, 0-500Hz, 7A

Remark:

1. (a): The model number may include a suffix “XXXXXXXXXX”, where “XXXXXXXXXX” can be blank or combination of any alphanumeric and/or symbols that represents customer identity.
2. (b): The model number may include a suffix “XXXXXXXXXX”, where “XXXXXXXXXX” can be blank or combination of any alphanumeric and/or symbols that represents customer identity.
3. (c): The model number may include a suffix “XXXXXXXXXX”, where “XXXXXXXXXX” can be blank or combination of any alphanumeric and/or symbols that represents customer identity.

- | |
|---|
| <p>4. Model L7N-(a)100(b)(c), EL7-EC100(a)(b), L6N-(a)100(b)(c), EL6-EC100(a)(b) are identical except for model name.</p> <p>5. Model L7N-(a)400(b)(c), EL7-EC400(a)(b), L6N-(a)400(b)(c), EL6-EC400(a)(b) are identical except for model name.</p> <p>6. Model L7N-(a)750(b)(c), EL7-EC750(a)(b), L6N-(a)750(b)(c), EL6-EC750(a)(b) are identical except for model name.</p> <p>7. Model L7N-(a)1000(b)(c), EL7-EC1000(a)(b), L6N-(a)1000(b)(c), EL6-EC1000(a)(b) are identical except for model name.</p> |
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Clause	Requirement + Test	Result - Remark	Verdict

4	PROTECTION AGAINST ELECTRIC SHOCK, THERMAL, AND ENERGY HAZARDS		P
4.1	General		P

4.2	Fault conditions		P
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4.3	Protection against electric shock		P
4.3.1	Decisive voltage classification		P
4.3.1.1	Use of decisive voltage class (DVC):	DVC A and DVC C	P
4.3.1.2	Limits of DVC		P
4.3.1.3	Requirements for protection		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		P

4.3.2	Protective separation.....:		P
4.3.3	Protection against direct contact		P
4.3.3.1	General		P
4.3.3.2	Protection by means of insulation of live parts		P
4.3.3.3	Protection by means of enclosures and barriers		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 :	For communication interfaces	P
4.3.4.3	Protection by means of protective impedance		P
4.3.4.4	Protection by means of using limited voltage		N/A
4.3.5	Protection against indirect contact		P
4.3.5.1	General :	Comply with the requirements for protective class I	P
4.3.5.2	Insulation between live parts and accessible conductive parts	Basic insulation	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 :	Comply with 5.2.3.9	P
4.3.5.3.3	Protective bonding impedance		P
4.3.5.4	Protective earthing conductor :	Same as phase	P

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.5.5	Means of connection for the protective earthing conductor		P
4.3.5.5.1	General		P
4.3.5.5.2	Touch current in case of failure of protective earthing conductor		P
4.3.5.6	Special features in equipment for protection class II	Class I equipment	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	2	P
4.3.6.1.3	Overvoltage Category	III	P
4.3.6.1.4	Supply earthing systems	TN	P
4.3.6.1.5	Insulation voltages	System voltage: 200-240V	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	Overvoltage Category III	P
4.3.6.2.3	Circuits not connected directly to the supply mains	Overvoltage Category II	P
4.3.6.2.4	Insulation between circuits		P
4.3.6.3	Functional insulation		P
4.3.6.4	Clearance distances	(See appended table 5.2.2.1)	P
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	See 4.3.6.4.1 & 5.2.2.5	P
4.3.6.5	Creepage distance	(See appended table 5.2.2.1)	P
4.3.6.5.1	General		P
4.3.6.5.2	Materials	IIIb	P
4.3.6.6	Coating	No such coating	N/A
4.3.6.7	PWB spacings for functional insulation		N/A
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		P
4.3.6.8.2.1	Basic or supplementary insulation	(See appended table 4.3.6.8)	P
4.3.6.8.2.2	Double and reinforced insulation	(See appended table 4.3.6.8)	P
4.3.6.8.2.3	Functional insulation		P
4.3.6.8.3	Thin sheet or tape material	(See appended table 4.3.6.8)	P
4.3.6.8.3.1	General		P
4.3.6.8.3.2	Material thickness not less than 0,2 mm		P

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Clause	Requirement + Test	Result - Remark	Verdict

4.3.6.8.3.3	Material thickness less than 0,2 mm		N/A
4.3.6.8.3.4	Compliance		P
4.3.6.8.4	Printed wiring boards		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		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, cl. 5.2.2.4 and cl.5.2.2.5.3	P
4.3.7.2	Cast metal	Plastic	N/A
4.3.7.3	Sheet metal	Plastic	N/A

4.3.8	Wiring and connections		P
4.3.8.1	General		P
4.3.8.2	Routing		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		N/A
4.3.8.8.1	Construction requirements		N/A
4.3.8.8.2	Connecting capacity		N/A
4.3.8.8.3	Connection		N/A
4.3.8.8.4	Wire bending space for wires 10 mm ² and greater		N/A

4.3.9	Output short circuit requirements	(See appended table 5.2.3.6)	P
4.3.10	Residual current-operated protective (RCD) or monitoring (RCM) device compatibility	No RCD or RCM provided	N/A
4.3.11	Capacitor Discharge	Capacitor discharge to 60 V within 5s.	P
4.3.12	Access conditions for high-voltage PDS	Not high-voltage PDS	N/A

4.4	Protection against thermal hazards		P
4.4.1	Minimizing the risk of ignition	(See appended table 1)	P

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Clause	Requirement + Test	Result - Remark	Verdict

4.4.2	Insulation 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		N/A
4.4.4	Temperature limits		P
4.4.4.1	Internal parts	(See appended table 5.2.3.8)	P
4.4.4.2	External parts of CDM		N/A
4.4.5	Specific requirements for liquid cooled PDS	No coolant used	N/A
4.4.5.1	Coolant		N/A
4.4.5.2	Design requirements		N/A
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		N/A
4.5.1	Electrical energy hazards :	Check in PDS	N/A
4.5.2	Mechanical energy hazards		N/A
4.5.2.1	General		N/A
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
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Clause	Requirement + Test	Result - Remark	Verdict

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	See General product information	P
5.1.3	Sequence of tests		P
5.1.4	Earthing Conditions	Neutral to earth	P
5.1.5	Compliance		P
5.1.6	Test Overview		P

5.2	Test specifications		P
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)	(See appended table 5.2.2.2)	P
5.2.2.3	Non-accessibility test (type test)	IPX0	N/A
5.2.2.4	Enclosure integrity test (type test)	IPX0	N/A
5.2.2.5	Deformation tests		Building-in equipment
5.2.2.5.1	General		N/A
5.2.2.5.2	Deflection test (type test)		N/A
5.2.2.5.3	Impact test (type test), temperature (°C)	55	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	5s	P
5.2.3.2.5	Verification of the a.c. or d.c. voltage test	No any electrical breakdown occurs	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) :		N/A
5.2.3.5	Touch current measurement (type test)		N/A
5.2.3.6	Short-circuit test and Breakdown of components test (type tests)	(See appended table 5.2.3.6)	P
5.2.3.6.1	General		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.3.6.2	Test configuration		P
5.2.3.6.2.1	Supply voltage and current	Rated supply voltage used	P
5.2.3.6.3	Short-circuit test		P
5.2.3.6.3.1	Load conditions		P
5.2.3.6.3.2	Location of short-circuit		P
5.2.3.6.3.3	Short-circuit between phase terminals of power output and protective earth		
5.2.3.6.4	Breakdown of component test		P
5.2.3.6.4.1	Load condition	Normal load conditions	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)	Capacitor discharge to 60 V within 5s	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		P
5.2.4.3	Pass criteria		P
5.2.4.4	Loss of phase (type test)		N/A
5.2.4.5	Cooling failure tests (type tests)		P
5.2.4.5.1	General		P
5.2.4.5.2	Inoperative blower motor (type test)		P
5.2.4.5.3	Clogged filter (type test)		P
5.2.4.5.4	Loss of coolant	No coolant used	N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.6.3.1	Dry heat test (steady state)		P
5.2.6.3.2	Damp heat test (steady state)		P
5.2.6.4	Vibration test (type test)		P
5.2.7	Hydrostatic pressure test (type test and routine test) :	No such liquid	N/A
5.2.8	Electronic motor overload protection test (type test)		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
6.3.4	Handling and mounting		P
6.3.5	Motor and driven equipment		P
6.3.5.1	Motor selection		P
6.3.5.2	Motor integrated sensors		N/A
6.3.5.3	Critical torsional speeds	Checked in PDS	N/A
6.3.5.4	Transient torque analysis	Checked in PDS	N/A
6.3.6	Connections		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.3.6.1	General		P
6.3.6.2	Interconnection and wiring diagrams	Provided in the user manual	P
6.3.6.3	Conductor (cable) selection	Provided in the user manual	P
6.3.6.4	Terminal capacity and identification	Provided in the user manual	P
6.3.6.5	Protection requirements		P
6.3.6.6	Earthing	Provided in the user manual	P
6.3.6.7	Protective earthing conductor current		P
6.3.6.8	Special requirements		N/A
6.3.7	Overcurrent and short-circuit protection		P
6.3.8	Motor overload protection	Provided in the user manual	P
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	Warning for high voltage	P
6.4.3.1	General		P
6.4.3.2	Isolators	No isolator	N/A
6.4.3.3	Visual and audible signals		P
6.4.3.4	Hot surfaces		P
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	Cl. 4.3.11 was complied, instruction provided	P
6.5.3	Auto restart/bypass connection		P
6.5.4	PT/CT connection		N/A
6.5.5	Other hazards		N/A
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	2000m	P
Annex E	Clearance and creepage distance determination for frequencies greater than 30 kHz		P
Annex F	Cross sections of round conductors		P

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Clause	Requirement + Test	Result - Remark	Verdict
Annex G	Guidelines for RCD compability		N/A
Annex H	Symbols referred to in this part of IEC 61800		P

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Clause	Requirement + Test	Result - Remark	Verdict
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1	TABLE: List of materials and components separately evaluated					P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity	
Plastic enclosure	SABIC INNOVATIVE PLASTICS US L L C	C2950(GG)	V-0, 85°C, min. 1.0mm thickness	UL 94, UL 746	UL E121562	
Ventilation fan	Dongguan Hongtai Huachang Electronic Technology Co. , Ltd.	HA3010M24B	24VDC, 0.15A	UL 507	UL E536988	
PCB	SHENZHEN SHENKAI ELECTRONICS CO LTD	SK-4	V-0, 130°C	UL 796	UL E319204	
(Alternative)	Interchangeable	Interchangeable	V-0, 130°C	UL 796	UL	
Terminal block (CN8)	DEGSON TECHNOLOGY CO.,LTD.	9EDGRC-5.0- 09P-	300V, 14.5A, 115°C	UL 1059	UL E228872	
Y capacitor (C214, C222)	Jyh Chung Electronic Co., Ltd.	JD	400V, 4700pF, 85°C, Y1 type	EN 60384- 14:2013/A1:2016 IEC 60384- 14:2013 IEC 60384- 14:2013/AMD1:2 016 EN 60384- 14:2013-08	VDE 137027	
Y capacitor (C217, C218)	Jyh Chung Electronic Co., Ltd.	JY	Min. 300V, 470pF, 85°C, Y2 type	EN 60384- 14:2013/A1:2016 IEC 60384- 14:2013 IEC 60384- 14:2013/AMD1:2 016 EN 60384- 14:2013-08	VDE 123326	
Varistor (RV1)	Thinking Electronic Industrial Co., Ltd.	TVR10471KSY	470V, 85°C	EN IEC 61051- 2:2021 IEC 61051- 1:2018 IEC 61051- 2:2021 IEC 61051-2- 2:1991 EN IEC 61051- 1:2018	VDE 005944	

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Clause	Requirement + Test			Result - Remark	Verdict
Varistor (RV2)	Thinking Electronic Industrial Co., Ltd.	TVR10102KSY	1000V, 85°C	EN IEC 61051-2:2021 IEC 61051-1:2018 IEC 61051-2:2021 IEC 61051-2:1991 EN IEC 61051-1:2018	VDE 005944
Transformer (T1)	Sichuan Zhongguang Lightning Protection Technologies Co., Ltd.	EFD20S18	Class B	IEC/EN 61800-5-1	Test with equipment
- Bobbin	SUMITOMO BAKELITE CO LTD	PM-9630	V-0, 150°C, min. 0.4mm thickness	UL 94, UL 746	UL E41429
- Magnet wire	ELEKTRISOLA HANGZHOU CO LTD	P180	180°C	UL 1446	UL E258243
(Alternative)	Interchangeable	Interchangeable	Min. 130°C	UL 1446	UL
- Insulation tape	P LEO & CO LTD	1K7170	220°C	UL 510A	UL E126174
- Margin tape	P LEO & CO LTD	1H860	130°C	UL 510A	UL E126174
- Tube	GREAT HOLDING INDUSTRIAL CO LTD	TFT	200°C	UL 224	UL E156256
-Vanish	Interchangeable	Interchangeable	Min. 130° C	UL 1446	UL
Bus capacitor (DC1, DC2)	CAPXON ELECTRONIC (SHEN ZHEN) CO.,LTD	UJ681M400P35 0A	400V, 680uF, 35*35mm, 105°C	IEC/EN 61800-5-1	Test with equipment
IGBT (U31)	HANGZHOU SILAN MICROELECTRONICS CO LTD	SDM30G60FC	600V, 30A	UL 1577	UL E505071
(Alternative)	MITSUBISHI ELECTRIC CORP	PSS30S92F6-AG	600V, 30A	UL 1577	UL E323585
Relay (JK1)	Xiamen Hongfa Electroacoustic Co., Ltd.	HF32F-G/024-HS3	277VAC, 10A, 85°C	EN 61810-1:2015/A1:2020 IEC 61810-1:2015 IEC 61810-1:2015/AMD1:2019	VDE 40012204

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Clause	Requirement + Test			Result - Remark	Verdict
				EN 61810-1:2015	
Relay (JK2)	Xiamen Hongfa Electroacoustic Co., Ltd.	HF115F/024-2ZS4AF	250VAC, 8A, 85°C	EN 61810-1:2015/A1:2020 IEC 61810-1:2015 IEC 61810-1:2015/AMD1:2019 EN 61810-1:2015	VDE 116934
Opto-coupler (U32)	Skyworks Solutions, Inc.	Si8660BD-B-IS	Isolation voltage 5000V DTI≥0.4mm, ext dcr≥7.6mm, 125°C	EN 62368-1:2014 EN 62368-1:2014/A11:2017 IEC 62368-1:2014	VDE 40050431
(Alternative)	Suzhou Novosense Microelectronics Co.,Ltd	NSI8260W0-DSWR	Isolation voltage 8000V DTI≥0.4mm, ext dcr≥8.0mm, 125°C	EN IEC 60747-17:2020+AC:2021	VDE 40052820
(Alternative)	Shanghai Chipanalog Microelectronics Co., Ltd	CA-IS3760LW	Isolation voltage 8000V DTI≥0.4mm, ext dcr≥8.0mm, 125°C	EN IEC 60747-17:2020+AC:2021	VDE 40052786
(Alternative)	Texas Instruments Deutschland GmbH	ISO6760FDWR	Isolation voltage 8000V DTI≥0.4mm, ext dcr≥8.0mm, 125°C	EN IEC 60747-17:2020+AC:2021	VDE 40040142
Opto-coupler (U33,U38,U41, U45,U48,U49, U51)	Lite-On Technology Corporation	LTV-817S-TA1-B	Isolation voltage 5000V DTI≥0.4mm, ext dcr≥7.6mm, 110°C	EN IEC 60747-5:2020 IEC 60747-5:2020	VDE 40015248
(Alternative)	EVERLIGHT ELECTRONICS CO LTD	EL817S1	Isolation voltage 5000V DTI≥0.4mm, ext dcr≥7.6mm, Min. 110°C	UL 1577	UL E214129
Opto-coupler (U35)	Lite-On Technology Corporation	LTV-814S-TP-B	Isolation voltage 5000V DTI≥0.4mm, ext dcr≥7.6mm, 110°C	EN IEC 60747-5:2020 IEC 60747-5:2020	VDE 40015248
(Alternative)	Xiamen Hualian Semiconductor Technology Co., Ltd	HPC814	Isolation voltage 5000V DTI≥0.4mm, ext dcr≥7.6mm, Min. 110°C	UL 1577	UL E178703
Opto-coupler	Texas Instruments	AMC1306M25D	Isolation voltage 8000V	EN IEC 60747-17:2020+AC:2021	VDE

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Clause	Requirement + Test			Result - Remark	Verdict
(U36, U39)	Deutschland GmbH	WVR	DTI≥0.4mm, ext dcr≥8.0mm, 125°C	1	40040142
(Alternative)	Suzhou Novosense Microelectronics Co.,Ltd	NSI1306M25-DSWVR	Isolation voltage 8000V DTI≥0.4mm, ext dcr≥8.0mm, 125°C	EN IEC 60747-17:2020+AC:202 1	VDE 40052820
(Alternative)	Texas Instruments Deutschland GmbH	TLA8062DWVR	Isolation voltage 8000V DTI≥0.4mm, ext dcr≥8.0mm, 125°C	EN IEC 60747-17:2020+AC:202 1	VDE 40040142
Opto-coupler (U40)	Suzhou Novosense Microelectronics Co.,Ltd	NSI6801C-DSWFR	Isolation voltage 8000V DTI≥0.4mm, ext dcr≥8.0mm, 125°C	EN IEC 60747-17:2020+AC:202 1	VDE 40052820
(Alternative)	Shanghai Sillumin Semiconductor Co., Ltd.	SiLM5343TCR-DG	Isolation voltage 5000V DTI≥0.4mm, ext dcr≥7.6mm, Min. 110°C	UL 1577	UL E521801
(Alternative)	Toshiba Electronic Devices & Storage Corporation	TLP5702(D4-TP4,E	Isolation voltage 5000V DTI≥0.4mm, ext dcr≥7.6mm, Min. 110°C	UL 1577	UL E67349
Supplementary information:					

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Clause	Requirement + Test	Result - Remark	Verdict

5.2.2.1	General selection and information of supply earthing systems for clearance distances										-
Network systems	TN-S, TN-C, TN-CS, TT (not corner earthed)		TN-S, TT (corner earthed)		TN-C (middle point earthed)		IT (not corner earthed)		IT (corner earthed)		
Rated voltage (V)	200-240		Not evaluated		Not evaluated		Not evaluated		Not evaluated		
Max. altitude (m)	2000		--		--		--		--		
System voltage	200-240/300		--		--		--		--		
	B/S	D/R	B/S	D/R	B/S	D/R	B/S	D/R	B/S	D/R	
Rated Impulse voltage (kV)	4.0	6.0	--	--	--	--	--	--	--	--	
Temporary overvoltage (V)	1500/2120	3000/4240	--	--	--	--	--	--	--	--	
Clearance (mm)	3.0	5.5	--	--	--	--	--	--	--	--	
Test impulse voltage for clearance (kV)	4.0	6.0	--	--	--	--	--	--	--	--	
Supplementary information:											

5.2.2.1	TABLE: Working voltage measurements for clearance and creepage distances										-
Condition #	Between	TN-S, TN-C, TN-CS, TT (not corner earthed)		TN-S, TT (corner earthed)		TN-C (middle point earthed)		IT (not corner earthed)		IT (corner earthed)	
		peak	rms	peak	rms	peak	rms	peak	rms	peak	rms
1.	Terminals of bus capacitor	360	326	Not apply	Not apply	Not apply	Not apply	Not evaluated	Not evaluated	Not evaluated	Not evaluated
IT corner earthed, simulated impedance (MΩ):						1kΩ according to IEC 60990.					
Supplementary information:											

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Clause	Requirement + Test	Result - Remark	Verdict

5.2.2.1	TABLE: Clearance and creepage distance measurements						P
Clearance (cl) and creepage distance (cr) at/of/between:	Upeak (V)	Urms (V)	Req. cl. (mm)	Meas. Cl. (mm)	Req. cr. (mm)	Meas. Cr. (mm)	
Basic/supplementary:							
Input terminals to metal enclosure	340	240	3.0	10.8	3.0	10.8	
Output terminals to metal enclosure	340	240	3.0	3.2	3.0	3.2	
Phase W to PE trace	340	240	3.0	3.2	3.0	3.2	
Phase V to PE trace	340	240	3.0	5.9	3.0	5.9	
Phase U to PE trace	340	240	3.0	8.6	3.0	8.6	
Primary parts to earth	340	240	3.0	3.2	3.0	3.2	
Across C214	340	240	3.0	3.2	3.0	3.2	
Across C217	340	240	3.0	5.7	3.0	5.7	
Across C218	340	240	3.0	5.6	3.0	5.6	
Across C222	340	240	3.0	3.8	3.0	3.8	
Reinforce insulation:							
Input terminals to communication ports	340	240	5.5	5.7	5.5	5.7	
Output terminals to communication ports	340	240	5.5	19.2	5.5	>19.2	
Input terminals to accessible parts	340	240	5.5	8.6	5.5	8.6	
Output terminals to accessible parts	340	240	5.5	8.6	5.5	8.6	
Transformer T1 primary pin to secondary pin	340	240	5.5	8.6	5.5	8.6	
Relay JK1 primary pin to secondary pin	340	240	5.5	10.3	5.5	10.3	
Relay JK2 primary pin to secondary pin	340	240	5.5	8.9	5.5	8.9	
Opto-coupler U33 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5	
Opto-coupler U35 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5	
Opto-coupler U38 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5	
Opto-coupler U40 primary pin to secondary pin	340	240	5.5	8.1	5.5	8.1	
Opto-coupler U41 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5	
Opto-coupler U36 primary pin to secondary pin	340	240	5.5	8.7	5.5	8.7	

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Clause	Requirement + Test			Result - Remark		Verdict
Opto-coupler U39 primary pin to secondary pin	340	240	5.5	8.7	5.5	8.7
Opto-coupler U32 primary pin to secondary pin	340	240	5.5	7.4	5.5	7.4
Opto-coupler U45 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5
Opto-coupler U48 primary pin to secondary pin	340	240	5.5	7.6	5.5	7.6
Transformer primary pin to secondary pin	340	240	5.5	7.4	5.5	7.4
Transformer primary winding to secondary winding	340	240	5.5	6.4	5.5	6.4
Transformer primary pin to secondary winding	340	240	5.5	7.6	5.5	7.6
Transformer primary winding to secondary pin	340	240	5.5	7.6	5.5	7.6
Transformer primary pin to core	340	240	3.0	3.7	3.0	3.7
Transformer primary winding to core	340	240	3.0	3.8	3.0	3.8
Transformer core to secondary pin	340	240	3.0	3.7	3.0	3.7
Transformer core to secondary winding	340	240	3.0	3.8	3.0	3.8
After deflection and impact test:						
Basic/supplementary:						
Input terminals to metal enclosure	340	240	3.0	10.8	3.0	10.8
Output terminals to metal enclosure	340	240	3.0	3.2	3.0	3.2
Phase W to PE trace	340	240	3.0	3.2	3.0	3.2
Phase V to PE trace	340	240	3.0	5.9	3.0	5.9
Phase U to PE trace	340	240	3.0	8.6	3.0	8.6
Primary parts to earth	340	240	3.0	3.2	3.0	3.2
Across C214	340	240	3.0	3.2	3.0	3.2
Across C217	340	240	3.0	5.7	3.0	5.7
Across C218	340	240	3.0	5.6	3.0	5.6
Across C222	340	240	3.0	3.8	3.0	3.8
Reinforce insulation:						
Input terminals to communication ports	340	240	5.5	5.7	5.5	5.7
Output terminals to communication ports	340	240	5.5	19.2	5.5	>19.2

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Clause	Requirement + Test			Result - Remark		Verdict
Input terminals to accessible parts	340	240	5.5	8.6	5.5	8.6
Output terminals to accessible parts	340	240	5.5	8.6	5.5	8.6
Transformer T1 primary pin to secondary pin	340	240	5.5	8.6	5.5	8.6
Relay JK1 primary pin to secondary pin	340	240	5.5	10.3	5.5	10.3
Relay JK2 primary pin to secondary pin	340	240	5.5	8.9	5.5	8.9
Opto-coupler U33 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5
Opto-coupler U35 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5
Opto-coupler U38 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5
Opto-coupler U40 primary pin to secondary pin	340	240	5.5	8.1	5.5	8.1
Opto-coupler U41 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5
Opto-coupler U36 primary pin to secondary pin	340	240	5.5	8.7	5.5	8.7
Opto-coupler U39 primary pin to secondary pin	340	240	5.5	8.7	5.5	8.7
Opto-coupler U32 primary pin to secondary pin	340	240	5.5	7.4	5.5	7.4
Opto-coupler U45 primary pin to secondary pin	340	240	5.5	7.5	5.5	7.5
Opto-coupler U48 primary pin to secondary pin	340	240	5.5	7.6	5.5	7.6
Transformer primary pin to secondary pin	340	240	5.5	7.4	5.5	7.4
Transformer primary winding to secondary winding	340	240	5.5	6.4	5.5	6.4
Transformer primary pin to secondary winding	340	240	5.5	7.6	5.5	7.6
Transformer primary winding to secondary pin	340	240	5.5	7.6	5.5	7.6
Transformer primary pin to core	340	240	3.0	3.7	3.0	3.7
Transformer primary winding to core	340	240	3.0	3.8	3.0	3.8
Transformer core to secondary pin	340	240	3.0	3.7	3.0	3.7
Transformer core to secondary winding	340	240	3.0	3.8	3.0	3.8

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

4.3.6.8 5.2.3.1 5.2.3.2 5.2.3.3	TABLE: Solid insulation, Impulse voltage test, A.C. or d.c. voltage test, Partial discharge test				P
Test voltage applied between:	DTI (mm)	Impulse test (kV, circuit)	Electric strength test (V d.c.)	Partial discharge test (V)	Result
Basic/supplementary:					
Input terminals to metal enclosure	--	4.0	2120VDC	--	P
Output terminals to metal enclosure	--	4.0	2120VDC	--	P
Internal wire	--	4.0	2120VDC	--	P
Transformer T1 primary pin/winding to core	--	4.0	2120VDC	--	P
Transformer T1 secondary pin/winding to core	--	4.0	2120VDC	--	P
Reinforced:					
Input terminals to communication ports	--	6.0	4240VDC	--	P
Output terminals to communication ports	--	6.0	4240VDC	--	P
Input terminals to accessible parts	--	6.0	4240VDC	--	P
Output terminals to accessible parts	--	6.0	4240VDC	--	P
Transformer T1 primary pin to secondary pin	--	6.0	4240VDC	--	P
2 layers insulation tape of T1	--	6.0	4240VDC	--	P
After deflection and impact test:					
--	--	--	--	--	--
After dry heat test:					
Basic/supplementary:					
Input terminals to metal enclosure	--	4.0	2120VDC	--	P
Output terminals to metal enclosure	--	4.0	2120VDC	--	P
Internal wire	--	4.0	2120VDC	--	P
Transformer T1 primary pin/winding to core	--	4.0	2120VDC	--	P
Transformer T1 secondary pin/winding to core	--	4.0	2120VDC	--	P
Reinforced:					
Input terminals to communication ports	--	6.0	4240VDC	--	P

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Clause	Requirement + Test		Result - Remark		Verdict
Output terminals to communication ports	--	6.0	4240VDC	--	P
Input terminals to accessible parts	--	6.0	4240VDC	--	P
Output terminals to accessible parts	--	6.0	4240VDC	--	P
Transformer T1 primary pin to secondary pin	--	6.0	4240VDC	--	P
2 layers insulation tape of T1	--	6.0	4240VDC	--	P
After damp heat test:					
Basic/supplementary:					
Input terminals to metal enclosure	--	4.0	2120VDC	--	P
Output terminals to metal enclosure	--	4.0	2120VDC	--	P
Internal wire	--	4.0	2120VDC	--	P
Transformer T1 primary pin/winding to core	--	4.0	2120VDC	--	P
Transformer T1 secondary pin/winding to core	--	4.0	2120VDC	--	P
Reinforced:					
Input terminals to communication ports	--	6.0	4240VDC	--	P
Output terminals to communication ports	--	6.0	4240VDC	--	P
Input terminals to accessible parts	--	6.0	4240VDC	--	P
Output terminals to accessible parts	--	6.0	4240VDC	--	P
Transformer T1 primary pin to secondary pin	--	6.0	4240VDC	--	P
2 layers insulation tape of T1	--	6.0	4240VDC	--	P
After vibration test:					
Basic/supplementary:					
Input terminals to metal enclosure	--	4.0	2120VDC	--	P
Output terminals to metal enclosure	--	4.0	2120VDC	--	P
Internal wire	--	4.0	2120VDC	--	P
Reinforced:					
Input terminals to communication ports	--	6.0	4240VDC	--	P
Output terminals to communication ports	--	6.0	4240VDC	--	P
Input terminals to accessible parts	--	6.0	4240VDC	--	P
Output terminals to accessible parts	--	6.0	4240VDC	--	P
Transformer T1 primary pin to secondary pin	--	6.0	4240VDC	--	P
2 layers insulation tape of T1	--	6.0	4240VDC	--	P

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Clause	Requirement + Test	Result - Remark	Verdict

After hydrostatic pressure test:
Supplementary information:

5.2.3.5	TABLE: Touch current measurement						N/A	
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 earthed) Figure 9	L – N IT (corner earthed) Figure 9	L – L IT (not corner earthed) Figure 10	L – L IT (corner earthed) Figure 10	Measurement limit for 50 Hz (mA)	Measurement 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 earthed) Figure 12	IT (corner earthed) Figure 12	TN, TT (corner earthed) Figure 13	TN, TT (centre earthed) Figure 14			Measurement limit for 50 Hz (mA)	Measurement limit for 60 Hz (mA)
--	--	--	--	--			3.5	3.5
Supplementary information:								
Measurements have been carried out according to figures 11 of IEC 60990.								

5.2.3.6. 5.2.3.6.4 5.2.4.4 5.2.4.5 5.2.8	TABLE: PWB short-circuit test, Short-circuit test and breakdown of component test, Abnormal operation tests					P
Tested item	Fault (SC, OC, OL)	Supply voltage (V)	PSCC (kA)	Test time	Test environment (ambient, fuse etc.) and observation	Result
Ventilation fan	Locked	240	5	2h04 min	Unit worked normally except fan shut down. No damaged, no hazard. Max. temperature: Heat sink of IGBT U31: 88.9°C Plastic enclosure: 61.9°C Button: 56.4°C T1 winding: 85.4°C Ambient: 55.0°C	P

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Clause	Requirement + Test				Result - Remark	Verdict

Ventilation filter	Clogged filter 100%	240	5	2h30 min	Unit worked normally. No damaged, no hazard. Max. temperature: Heat sink of IGBT U31: 84.0°C Plastic enclosure: 65.1°C Button: 56.9°C T1 winding: 82.7°C Ambient: 55.0°C	P
Motor load	OL 120%	240	5	9mins	Unit overload protection operated at 9mins, No damage, no hazard. Max. temperature: Heat sink of IGBT U31: 72.8°C Plastic enclosure: 61.2°C Button: 54.9°C T1 winding: 65.5°C Ambient: 55.0°C	P
Motor load	OL 150%	240	5	30s	Unit overload protection operated at 30s, No damage, no hazard.	P
Motor load	OL 200%	240	5	10s	Unit overload protection operated at 10s, No damage, no hazard.	P
Output W-V	Short circuit	240Vac	5	10min	Unit shut down by protection and recoverable after fault condition removed, the screen displays error "Er0E4".	P
Output V-PE	Short circuit	240Vac	5	10min	Unit operated normally, no hazard, no damage.	P
Bus capacitor (DC1)	Short circuit	240Vac	5	1s	Unit shut down by protection and recoverable after fault condition removed.	P

IGBT (U31) pin 23 to pin 24	Short circuit	240Vac	5	10min	Unit shut down by protection and recoverable after fault condition removed, the screen displays error "Er0E1".	P
Transistor (Q12) D-S	Short circuit	240Vac	5	1s	Component damage (Q12,R279,C216), no hazard.	P
Transistor (Q12) G-D	Short circuit	240Vac	5	1s	Component damage (Q12,R277,R278), no hazard.	P
Transistor (Q12) G-S	Short circuit	240Vac	5	10min	Unit shut down by protection and recoverable after fault condition removed.	P
Transformer (T1) pin 15- pin 16	Short circuit	240Vac	5	10min	Unit shut down by protection and recoverable after fault condition removed, the screen displays error "Er0E1".	P

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Clause	Requirement + Test	Result - Remark	Verdict
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Opto-coupler (U33) sec. pins	Short circuit	240Vac	5	10min	Unit shut down by protection and recoverable after fault condition removed, the screen displays error "Er0E1".	P
Opto-coupler (U45) sec. pins	Short circuit	240Vac	5	10min	Unit shut down by protection and recoverable after fault condition removed, the screen displays error "Er150".	P
Opto-coupler (U38) sec. pins	Short circuit	240Vac	5	10min	Unit operated normally, no hazard, no damage.	P
T1 pin 1-3	SC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
T1 pin 5-6	SC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
T1 pin 7-8	SC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
T1 pin 9-10	SC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
T1 pin 12-13	SC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
T1 pin 14-15	SC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
T1 pin 14-16	SC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
U33 pin 1	OC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
U33 pin 3	OC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
U45 pin 1	OC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
U45 pin 3	OC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
U38 pin 1	OC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P
U38 pin 3	OC	240	5	10 min	Unit shut down immediately, displaying error, no hazard.	P

Supplementary information:

SC=short circuit, OC= open circuit, OL= over load

5.2.3.8	TABLE: Temperature rise test			P
	Supply voltage (V)	180	264	—
	Supply frequency (Hz)	60	50	—
	Load (V, A)	1000W	1000W	—

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Clause	Requirement + Test	Result - Remark	Verdict

	Ambient (°C)	See below	See below	—
Maximum measured temperature T of part/at::	T (°C)			Allowed T _{max} (°C)
1. Heat sink of IGBT (U31)		72.9	76.0	90
2. Plastic enclosure		64.3	60.8	80
3. Button		56.5	56.5	65
4. Input terminal block (CN8)		65.4	64.1	115
5. Varistor (RV1)		73.0	67.4	85
6. Y capacitor (C217)		70.7	66.3	85
7. Y capacitor (C214)		66.3	63.0	85
8. Bus capacitor (DC1)		71.3	66.3	105
9. Bus capacitor (DC2)		68.9	63.0	105
10. Surface IGBT (U31)		71.0	74.7	150
11. Winding of Transformer (T1)		66.4	75.2	110
12. Core of Transformer (T1)		67.1	73.5	110
13. PCB near IGBT (U31)		71.4	78.3	130
14. PCB near Transformer (T1)		70.6	87.5	130
15. PCB near DBD1		71.6	70.0	130
16. PCB near Q11		76.0	74.6	130
17. PCB near U1		76.3	79.3	130
18. Opto-coupler (U35)		78.1	75.3	110
19. Opto-coupler (U33)		68.6	82.9	110
20. Opto-coupler (U38)		64.4	63.8	110
21. Opto-coupler (U40)		69.7	68.3	110
22. Opto-coupler (U41)		71.1	68.6	110
23. Opto-coupler (U48)		78.9	77.3	110
24. Opto-coupler (U49)		73.5	72.3	110
25. Opto-coupler (U36)		77.4	79.8	110
26. Opto-coupler (U39)		74.2	79.4	110
27. Opto-coupler (U32)		71.8	82.4	110
28. Opto-coupler (U45)		69.8	80.7	110
29. Relay (JK1)		82.9	68.6	85
30. Relay (JK2)		75.6	72.0	85
31. Ambient		55.0	55.0	--

Supplementary information:

1. The maximum ambient temperature permitted by the manufacturer's specification is 55°C.
2. The temperatures were measured under worst normal mode.

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Clause	Requirement + Test	Result - Remark	Verdict
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5.2.3.9	TABLE: Protective bonding				P
	Test current (A)	10A			—
	Points of application	Resistance (mΩ)	Voltage (V)	Test time (s)	Result
	PE terminal to metal enclosure	10	0.1	120	P
After dry heat test:					
	PE terminal to metal enclosure	10	0.1	120	P
After damp heat test:					
	PE terminal to metal enclosure	10	0.1	120	P
After vibration test:					
	PE terminal to metal enclosure	10	0.1	120	P
Supplementary information: limit is 20 mΩ					

5.2.5	TABLE: Material tests				P
	Part	Manufacturer of material/part	Type of material/part	Test	Result
	Terminal block	DEGSON TECHNOLOGY CO.,LTD.	9EDGRC-5.0-09P-	Glow wire, 950°C	P
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	OK	-	OK	-	OK
	- Catalogue number or equivalent	OK	-	OK	-	OK
	- Voltage rating	OK	-	OK	-	OK
	- Current rating	OK	-	OK	-	OK
	- Power rating	OK	-	OK	-	OK
	- Frequency	OK	-	OK	-	OK
	- Number of phases	OK	-	OK	-	OK
	- Reference to standards	-	-	OK	-	-
	- Date code or serial number	OK	-	-	-	-
	- Reference to instructions	-	-	OK	OK	OK
6.3	Information for installation and comissioning					
6.3.2:	Mechanical considerations					
	- Dimensions (SI units)	-	-	OK	-	OK
	- Mass (SI units)	-	-	OK	-	OK
	- Mounting details (SI units)	-	-	OK	-	OK

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Clause	Requirement + Test	Result - Remark			Verdict
6.3.3: Environment (operation, transport, storage)	-	-	OK	-	OK
- Temperature	-	-	OK	-	OK
- Humidity	-	-	OK	-	OK
- Altitude	-	-	OK	-	OK
- Pollution	-	-	OK	-	OK
- Ultra violet light	-	-	N/A	-	N/A
- Type of electrical supply system	-	-	OK	-	-
- Field supply requirements (if any).....	-	-	OK	-	-
- IP rating	--	-	--	-	-
6.3.4: Handling and mounting	-	OK	OK	-	OK
- Packing and unpacking	-	OK	OK	-	OK
- Moving	-	OK	OK	-	OK
- Lifting	-	OK	OK	-	OK
- Strength and rigidity of mounting surface	-	OK	OK	-	OK
- Fastening	-	OK	OK	-	OK
- Coolant type and design pressure for liquid cooled product	-	-	-	-	-
- Provision of adequate access for operation, adjustment and maintenance	-	OK	OK	-	OK
- Warning if mounting surface exceeds 90 °C :	-	-	N/A	-	-
6.3.5.1: Motor selection	-	-	N/A	N/A	N/A
6.3.5.2: Motor integrated transformers	-	-	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
6.3.6.2: Interconnection and wiring diagrams ..	-	-	OK	-	OK
6.3.6.3: Conductor (cable) selection	-	-	OK	-	OK
6.3.6.4: Terminal capacity and identification	OK	-	OK	-	OK
6.3.6.5: Protection requirements	-	-	OK	OK	OK
- Protective class	OK	-	OK	OK	OK
- Interface details	-	-	OK	-	OK
- Terminals with protective separation	-	-	OK	OK	OK
6.3.6.6: Earthing	-	-	OK	-	OK
- Symbol IEC 60417-5019, PE or green-yellow	OK	-	-	-	-
- Symbol IEC 6417-5172 for Class II	N/A	-	-	-	-
6.3.6.7: Protective earthing conductor current	-	-	OK	-	OK
- Symbol ISO 7000-0434 and instruction.....	OK	-	OK	-	OK
- RCD compability	-	-	N/A	-	N/A
6.3.6.8: Special requirements	-	-	OK	-	OK

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Clause	Requirement + Test	Result - Remark			Verdict
6.3.7: Supply overcurrent or short-circuit protection	-	-	OK	-	OK
6.3.8: Motor overload protection	-	-	OK	-	OK
6.3.9: Commissioning	-	-	OK	-	-
6.4	Information for use				
6.4.1: General	-	-	OK	OK	OK
6.4.2: Adjustment	OK	-	OK	OK	OK
6.4.3: Labels, signs, and signals	OK	-	OK	OK	OK
6.4.3.1: General	OK	-	OK	OK	OK
6.4.3.2: Isolators	N/A	-	-	-	-
6.4.3.3: Visual and audible signals	OK	-	-	OK	-
6.4.3.4: Hot surfaces, symbol IEC 60417-5041	N/A	-	-	N/A	-
6.4.3.5: Equipment marking	OK	-	OK	OK	OK
6.5	Information for maintenance				
6.5.1: General.....	-	-	-	OK	OK
- Maintenance procedures and schedules.....	-	-	-	-	OK
- Maintenance schedules	-	-	-	OK	OK
- Safety precautions	-	-	-	-	OK
- Location of live parts accessible during maintenance	-	-	-	-	OK
- Adjustment procedures	-	-	OK	OK	OK
- Repair and replacement procedures	-	-	-	-	OK
- Special tools list	-	-	-	OK	OK
6.5.2: Capacitor discharge	OK	-	OK	-	OK
6.5.3: Auto restart/bypass	-	-	N/A	N/A	N/A
6.5.4: Potential Transformer (PT) / Current Transformer (CT) connection	N/A	-	N/A	-	N/A
6.5.5: Other hazards	OK	-	-	-	OK
Supplementary information:					

ATTACHMENT 1 Photos of Product

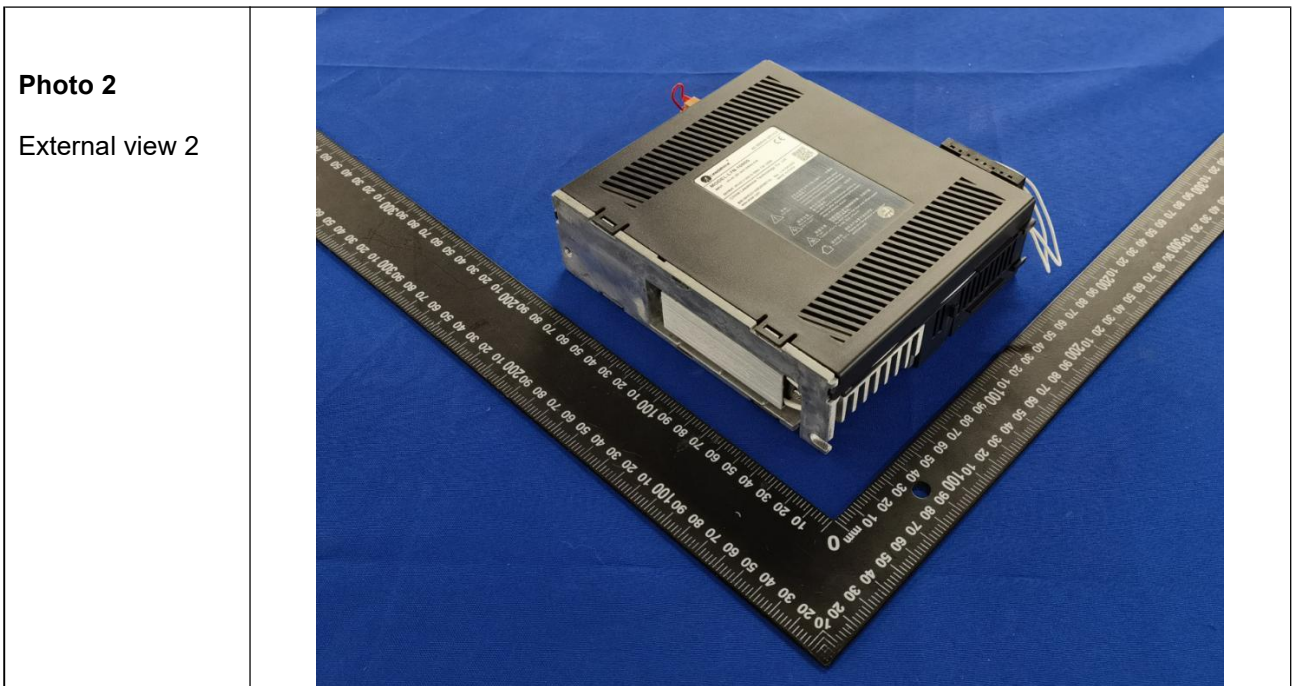
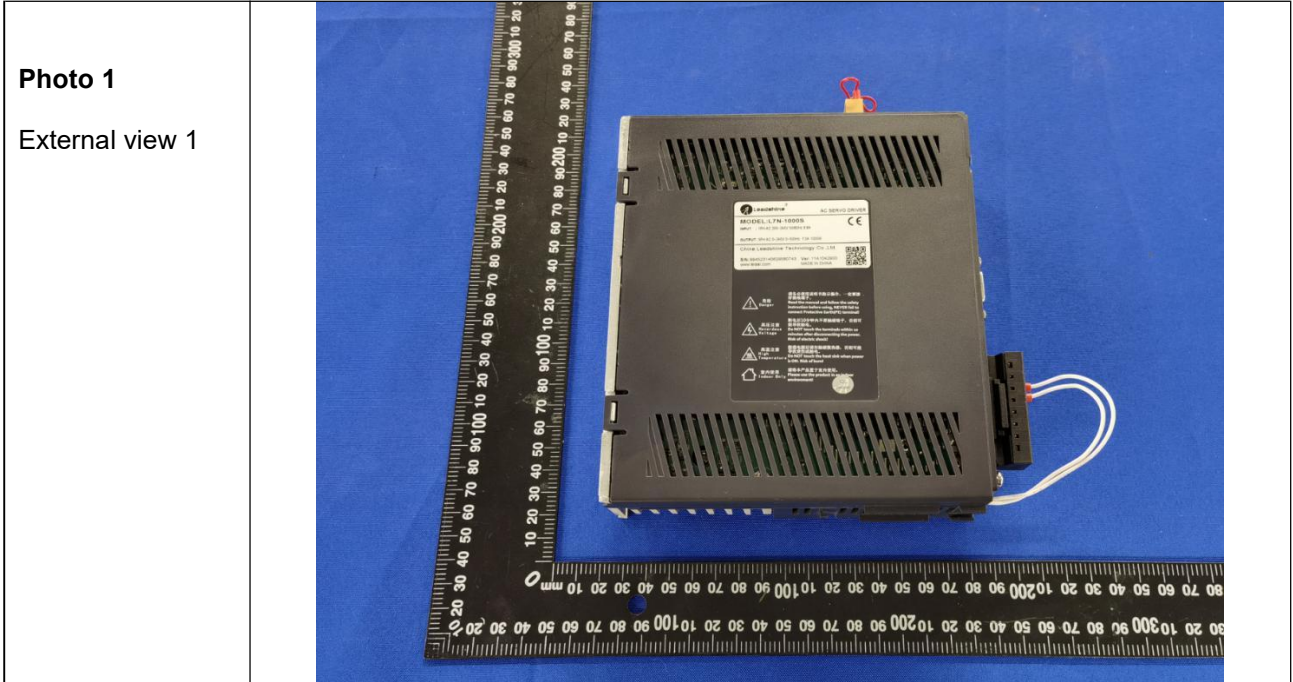


Photo 3
External view 3

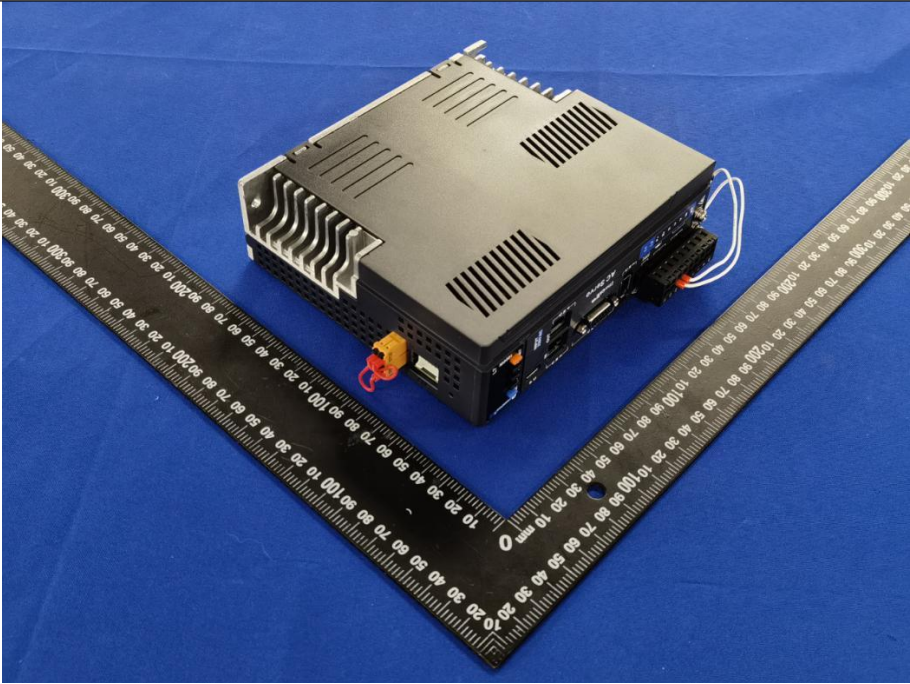


Photo 4
External view 4



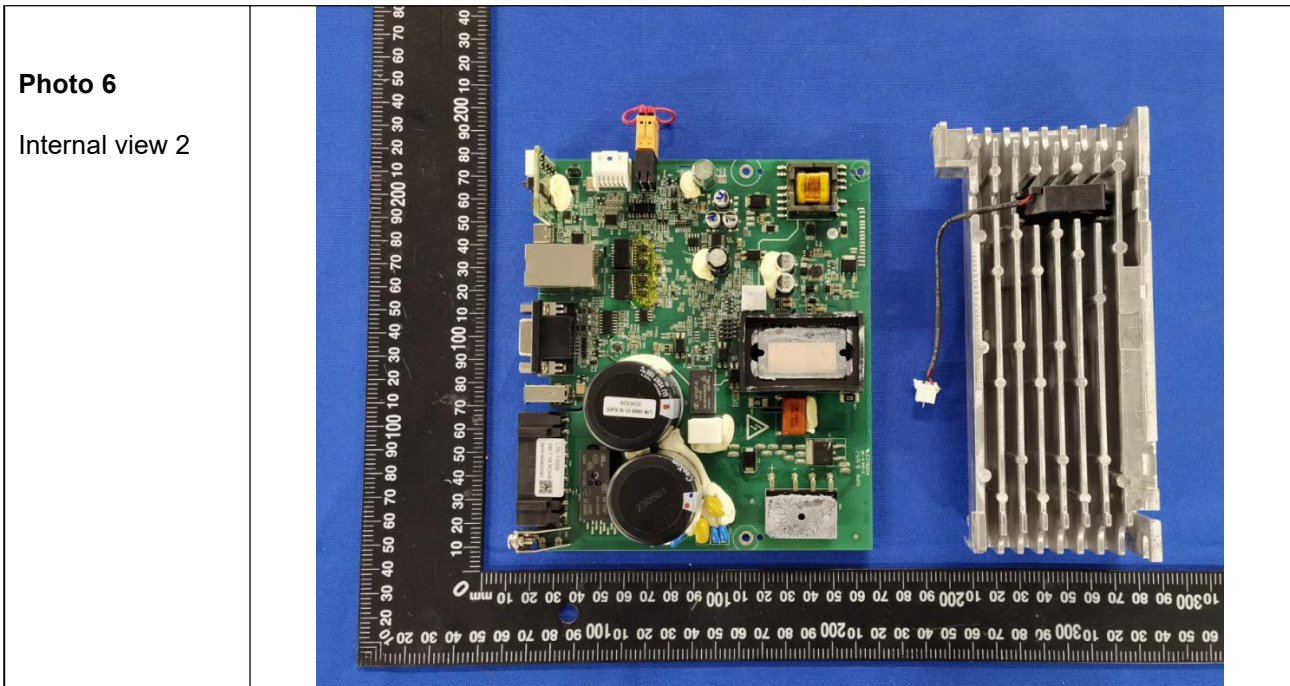
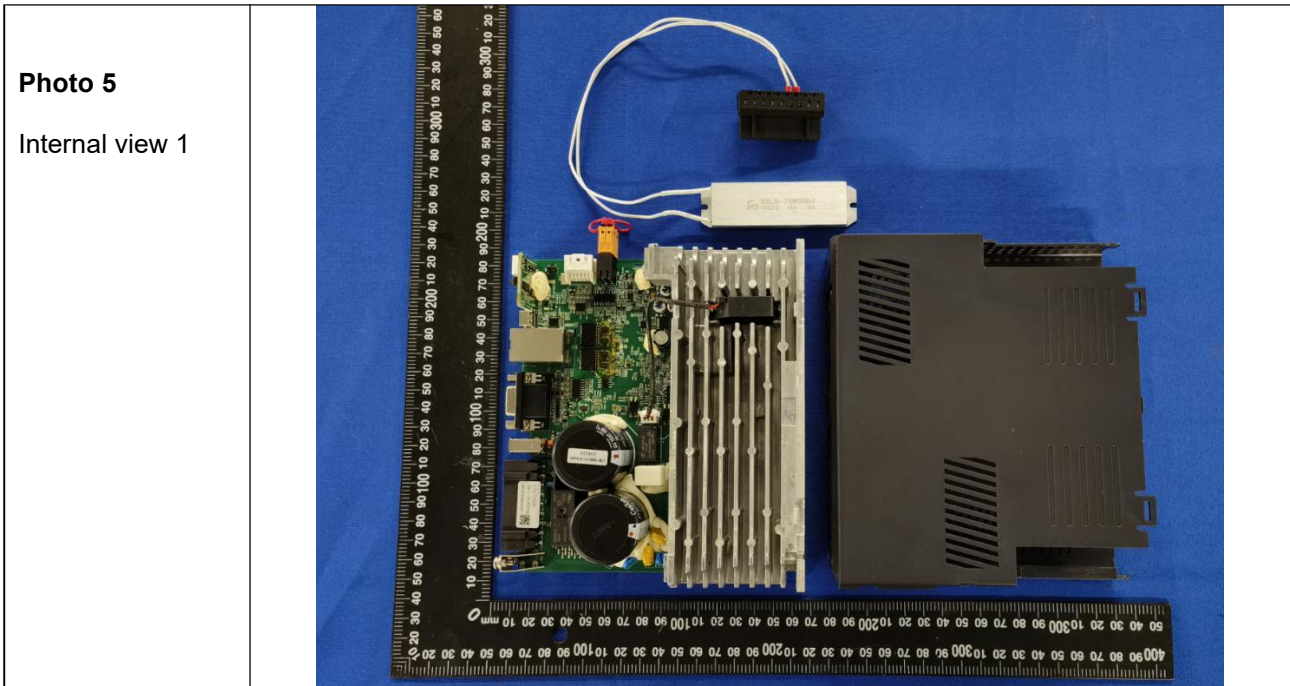


Photo 7
PCB view

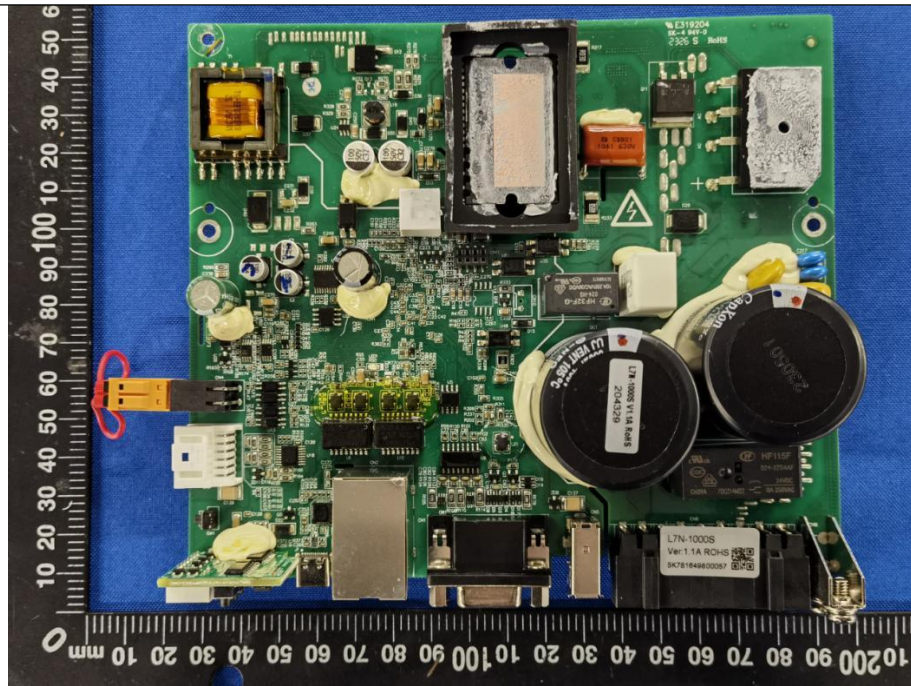
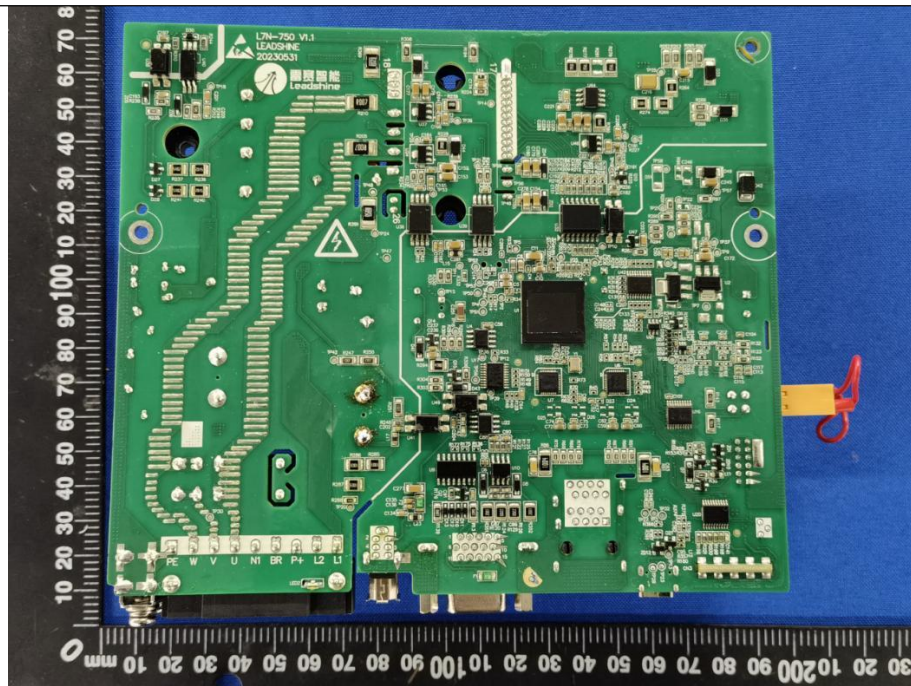
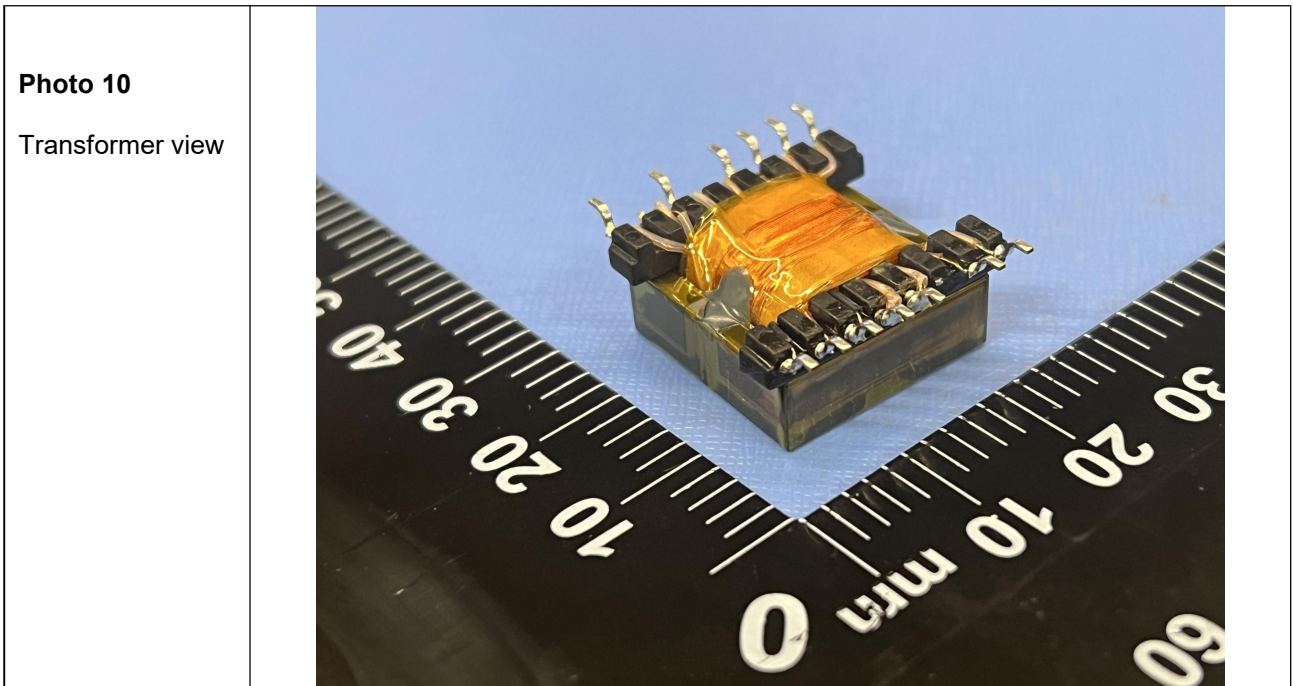
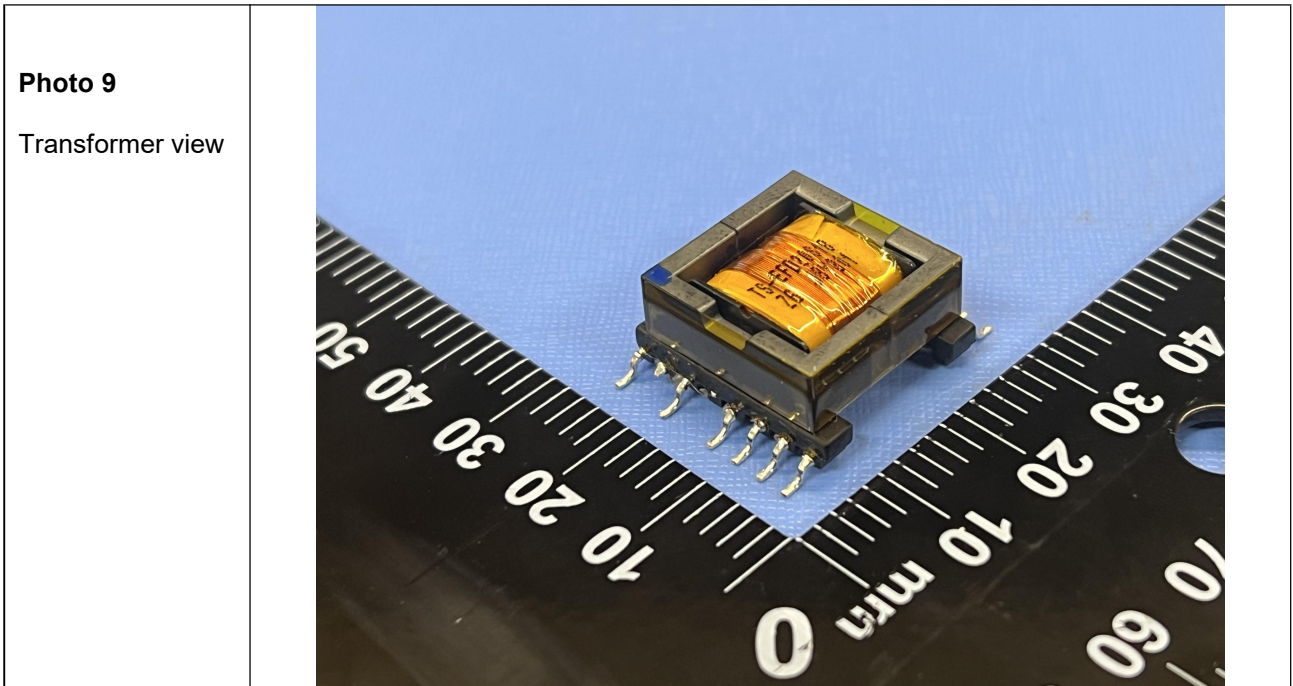


Photo 8
PCB view





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