



TEST REPORT EN 61800-5-1 Adjustable speed electrical power drive systems – Part 5-1: Safety requirements – Electrical, thermal and energy	
Report Number	CCT2022110405SR
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Total number of pages	30
Name of Testing Laboratory preparing the Report	Shenzhen CCT Testing Technology Co., Ltd.
Applicant's name	SHENZHEN SINOVO ELECTRIC TECHNOLOGIES CO.,LTD.
Address	5th Floor, No. D Building, Huafeng International Robot Industry Park, Xixiang Street, Hangcheng Road, Baoan District, Shenzhen City
Test specification:	
Standard	EN 61800-5-1:2007+A1:2017+A11:2021
Test procedure	CE-LVD
Non-standard test method	N/A
Test Report Form No.	IEC61800_5_1C
Test Report Form(s) Originator	SGS FIMKO Ltd
Master TRF	Dated 2021



Test item description	Inverter	
Trade Mark	N/A	
Manufacturer	SHENZHEN SINOVO ELECTRIC TECHNOLOGIES CO.,LTD.	
Model/Type reference	SD60-4T-4.0G , SD60-2S-0.7G,SD60-2S-1.5G,SD60-2S-2.2G,SD60-2S-4.0G,SD60-2S-5.5G,SD60-4T-0.7G,SD60-4T-1.5G,SD60-4T-2.2G,SD60-4T-5.5G,SD60-4T-7.5G,SD60-4T-11G,SD60-4T-15G,SD60-4T-18.5G,SD60-4T-22G	
Ratings	Input: AC3PH 380V, 50/60Hz, 13.9A Output: AC3PH 380V, 0-500Hz, 13A	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
<input type="checkbox"/> Testing Laboratory:	Shenzhen CCT Testing Technology Co., Ltd.	
Testing location/ address	3F, Huafeng Business Building, Pu'an Industrial Zone, Bao'an District,Shenzhen, China	
Tested by (name, function, signature)	Kizard Zhang (Tester)	
Reviewed by (name, function, signature) ..	Liberal Li (Director)	
Approved by (name, function, signature) ..	Andy Lin (Manager)	
<input type="checkbox"/> Testing procedure: CTF Stage 1:		
Testing location/ address		
Tested by (name, function, signature)		
Approved by (name, function, signature) ..		
<input type="checkbox"/> Testing procedure: CTF Stage 2:		
Testing location/ address		
Tested by (name + signature)		
Witnessed by (name, function, signature) .		
Approved by (name, function, signature) ..		
<input type="checkbox"/> Testing procedure: CTF Stage 3:		
<input type="checkbox"/> Testing procedure: CTF Stage 4:		
Testing location/ address		

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Tested by (name, function, signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature) .. :		
Supervised by (name, function, signature) :		

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List of Attachments (including a total number of pages in each attachment): Attachment 1: 12 pages (Photo)	
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+A1:2017+A11:2021	Testing location: Shenzhen CCT Testing Technology Co., Ltd. 3F, Huafeng Business Building, Pu'an Industrial Zone, Bao'an District, Shenzhen, China
Summary of compliance with National Differences (List of countries addressed): No National differences	
<input type="checkbox"/> The product fulfils the requirements of <u>EN 61800-5-1:2007+A1:2017+A11:2021</u>	

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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.



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Test item particulars	Inverter	
Equipment under test	<input checked="" type="checkbox"/> PDS <input type="checkbox"/> CDM <input type="checkbox"/> BDM <input type="checkbox"/> Other:	
Equipment location	<input checked="" type="checkbox"/> stand alone <input type="checkbox"/> for building-in (open type)	
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 type="checkbox"/> No <input checked="" type="checkbox"/> Yes, by:heat-shrinkable tubing	
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)	
	<input type="checkbox"/> TN-S, TT (corner earthed)	
	<input type="checkbox"/> TN-C (middle point earthed)	
	<input type="checkbox"/> IT (not corner referenced)	
	<input type="checkbox"/> IT (corner referenced)	
	<input type="checkbox"/> other:	
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	IP20	
Ambient temperature during operation (°C) with/without derating	10-40°C	
Liquid cooling temperature during operation (°C) with/without derating	10-40°C	
Maximum operation altitude (m)	2000m	
Altitude of test laboratory (m)	2000m	
Other particulars		
Motor overload and overtemperature protection ... :	<input type="checkbox"/> Thermal or electronic overload relay <input type="checkbox"/> Electronic motor overload protection with thermal memory retention <input type="checkbox"/> Electronic motor overload protection with speed sensitivity <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 checked="" type="checkbox"/> 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)		

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Testing	
Date of receipt of test item : 2022-10-27	
Date (s) of performance of tests : 2022-10-27 to 2022-11-24	
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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60060-2:	
The application for obtaining a Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : SHENZHEN SINOVO ELECTRIC TECHNOLOGIES CO.,LTD. 5th Floor, No. D Building, Huafeng International Robot Industry Park, Xixiang Street, Hangcheng Road, Baoan District, Shenzhen City	
General product information and other remarks:	
This equipment is a Interactive Flat Panel for Inverter. The Clearances and Creepage Distances have additionally been assessed for suitability up to 2000 m. Tropical condition has been considered and complied. The product was submitted and evaluated for use at the maximum ambient temperature (Tma) permitted by the manufacturer's specification of: 35°C.	

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EN 61800-5-1

Clause	Requirement + Test	Result - Remark	Verdict
4	PROTECTION AGAINST ELECTRIC SHOCK, THERMAL, AND ENERGY HAZARDS		P
4.1	General	See below	P
4.2	Fault conditions	See below	P
4.3	Protection against electric shock	See 5.2.3.6.4	P
4.3.1	Decisive voltage classification	See table 4.3.1	P
4.3.1.1	Use of decisive voltage class (DVC) :		P
4.3.1.2	Limits of DVC		N/A
4.3.1.3	Requirements for protection		P
4.3.1.4	Circuit evaluation	Circuit evaluated by three cases of waveforms	P
4.3.1.4.1	General		P
4.3.1.4.2	A.C. working voltage	AC working voltage Class A : work voltage _____V<25Vrms Class B: work voltage _____V<50Vrms Class C: work voltage 250Vrms /329Vpeak<1000Vrms for input circuit	P
4.3.1.4.3	D.C. working voltage	DC working voltage Class A : work voltage 29.8Vdc<60Vdc for control circuit Class B: work voltage _____V< 120Vdc Class C: work voltage 348Vdc<1500Vdc for generatrix circuit	P
4.3.1.4.4	Pulsating working voltage	Pulsating working voltage Class A : work voltage _____V<42.4Vpeak Class B: work voltage _____V<71Vpeak Class C: work voltage 369Vpeak/256Vrms <4500Vpeak for output circuit	P

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EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.2	Protective separation	Protective separation used for between ELV and other circuits	P
4.3.3	Protection against direct contact	Comply with the requirements	P
4.3.3.1	General	See below	P
4.3.3.2	Protection by means of insulation of live parts	Basic insulation used between accessible parts conductive and live parts, and then connected to protective bonding	P
4.3.3.3	Protection by means of enclosures and barriers	Protection by metal enclosures, at least IP2X	P
4.3.4	Protection in case of direct contact	Comply with the requirements	P
4.3.4.1	General	See below	P
4.3.4.2	Protection using DVC A		N/A
4.3.4.3	Protection by means of protective impedance	Protective impedance used for between L,N and PE. See Table 5.2.3.1 and Table 5.2.3.2 and Table 5.2.3.5	P
4.3.4.4	Protection by means of using limited voltages		N/A
4.3.5	Protection against indirect contact	Comply with the requirements	P
4.3.5.1	General	Class I	P
4.3.5.2	Insulation between live parts and accessible conductive parts	No exposed conductive parts used Reinforced insulation used for between live parts and exposed nonconductive parts and then clearances>3.0mm	N/A
4.3.5.3	Protective bonding circuit	The equipment provided protective earthing bonding point, but not provided PBC and not provided exposed conductive parts. So the protective bonding resistance can't been measured	N/A
4.3.5.3.1	General		P
4.3.5.3.2	Rating of protective bonding		P
4.3.5.3.3	Protective bonding impedance		P

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EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.5.4	Protective earthing conductor		P
4.3.5.5	Means of connection for the protective earthing conductor	Comply with the requirements	P
4.3.5.5.1	General	The means of connection is corrosion-resistance and not use as a part of mechanical assembly, cross-sectional area of protective conductor is not less than 2.5mm ²	P
4.3.5.5.2	Touch current in case of failure of protective earthing conductor	Leakage current is 0.86mA <3.5mA Provision of two terminals for a protective conductor of the same cross-sectional area as the original protective conductor.	P
4.3.5.6	Special features in equipment for protective class II	Class I equipment	P
4.3.6	Insulation	See below	P
4.3.6.1	General	Comply with the requirements	P
4.3.6.1.1	Influencing factors		P
4.3.6.1.2	Pollution degree	Pollution degree 2	P
4.3.6.1.3	Overvoltage category		N/A
4.3.6.1.4	Supply earthing systems	TN systems	P
4.3.6.1.5	Insulation voltages		P
4.3.6.2	Insulation to the surroundings	Comply with the requirements	P
4.3.6.2.1	General	For creepage distance, the r.m.s.value of the working voltage is used; for clearance distances and solid insulation, the recurring peak value is used. The impulse voltage is 4000V	P
4.3.6.2.2	Circuits connected directly to the supply mains ...	No circuits energized directly from the supply mains	N/A
4.3.6.2.3	Circuits not connected directly to the supply mains	Insulation designed according to the impulse voltage, or the working voltage Overvoltage Category III	P
4.3.6.2.4	Insulation between circuits	Designed according to more severe requirements	P

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EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
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	Insulating material group IIIa 400>CTI \geq 175 Insulating material group IIIb 175>CTI \geq 100	P
4.3.6.6	Coating	Coating used to provide insulation Comply with IEC60664-3 approved component	P
4.3.6.7	PWB spacings for functional insulation		P
4.3.6.8	Solid insulation	See appended table 4.3.6.8.	P
4.3.6.8.1	General	Comply with the requirements	P
4.3.6.8.2	Requirements for electrical withstand capability	See table 5.2.3.1,5.2.3.2,5.2.3.3	P
4.3.6.8.2.1	Basic or supplementary insulation	See table 5.2.3.1,5.2.3.2,5.2.3.3 Test with a.c. or d.c. voltage 1500Vac/2120Vdc	P
4.3.6.8.2.2	Double and reinforced insulation	See table 5.2.3.1,5.2.3.2,5.2.3.3 Impulse withstand voltage 4000V Test with a.c. or d.c. voltage 3000Vac/4240Vdc	P
4.3.6.8.2.3	Functional insulation		P
4.3.6.8.3	Thin sheet or tape material	Tape insulation used ,See table: list of critical components for transformer	N/A
4.3.6.8.3.1	General		N/A
4.3.6.8.3.2	Material thickness not less than 0,2 mm		N/A
4.3.6.8.3.3	Material thickness less than 0,2 mm		N/A
4.3.6.8.3.4	Compliance		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
4.3.6.8.4	Printed wiring boards (PWBs)	See table: list of critical components	P
4.3.6.8.4.1	General		P
4.3.6.8.4.2	Use of coating materials		P
4.3.6.8.5	Wound components	Varnish material used, See table: list of critical components for transformer	P
4.3.6.8.6	Potting materials	No potting materials	P
4.3.6.9	Insulation requirements above 30 kHz		N/A
4.3.7	Enclosures		P
4.3.7.1	General	Plastic enclosure	P
4.3.7.2	Cast metal	Not cast metal	N/A
4.3.7.3	Sheet metal		N/A
4.3.8	Wiring and connections	See below	P
4.3.8.1	General	No mechanical damage and comply with relevant standard, See table: list of critical components	P
4.3.8.2	Routing	Comply with the requirements	P
4.3.8.3	Colour coding	Comply with the requirements Protective bonding used for EMC Green and yellow bicolour	P
4.3.8.4	Splices and connections	All splices connection is mechanically secure No wire-binding screw used	P
4.3.8.5	Accessible connections		P
4.3.8.6	Interconnections between parts of the PDS	Comply with the requirements Rubber bushing used for protective cable damaged	P
4.3.8.7	Supply connections	No loosen hazard	P
4.3.8.8	Terminals		P
4.3.8.8.1	Construction requirements	Comply with the requirements	P
4.3.8.8.2	Connecting capacity	Comply with the requirements	P

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EN 61800-5-1			
Clause	Requirement + Test	Result - Remark	Verdict
4.3.8.8.3	Connection	Terminals for connection to external conductors is accessible during installation, no clamping screws and nuts serve to fix any other component	P
4.3.8.8.4	Wire bending space for wires 10 mm ² and greater	Comply with the requirements	P
4.3.9	Output short circuit requirements		P
4.3.10	Residual current-operated protective (RCD) or monitoring (RCM) device compatibility	No such capacitor	N/A
4.3.11	Capacitor discharge	No high voltage product	N/A
4.3.12	Access conditions for high-voltage PDS	See below	P
4.4	Protection against thermal hazards	Comply with the requirements	P
4.4.1	Minimizing the risk of ignition		P
4.4.2	Insulating materials	with relevant standard See table: list of critical components The insulating material comply with the glow-wire test described in 5.2.5.3 at a test temperature of 850 °C. The alternative hot wire ignition test of 5.2.5.4 may be used. HWI=3 The insulating material have a CTI of 100 or greater.	P
4.4.2.1	General		P
4.4.2.2	Material requirements		P
4.4.3	Flammability of enclosure materials	Metal enclosure used	N/A
4.4.4	Temperature limits	Comply with the requirements	P
4.4.4.1	Internal parts	See table: 5.2.3.9	P
4.4.4.2	External parts of CDM	See table: 5.2.3.9	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		P
4.4.5.2.1	Corrosion resistance		P

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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		N/A
4.4.6.1	Means of protection		N/A
4.4.6.2	CDM/BDM with electronic motor overload protection		N/A
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	See below	P
4.5.1	Electrical energy hazards :	No such hazards	P
4.5.2	Mechanical energy hazards	No such hazards	P
4.5.2.1	General	See below	P
4.5.2.2	Critical torsional speed	See instruction	P
4.5.2.3	Transient torque analysis	See instruction	P
4.5.3	Acoustic noise emission		N/A
4.6	Protection against environmental stresses		N/A
5	TEST REQUIREMENTS		P
5.1	General		P
5.1.1	Test objectives and classification :	EUT tested according type tests	P
5.1.2	Selection of test samples :		P
5.1.3	Sequence of tests		P
5.1.4	Earthing conditions :	This EUT include : L phase to earth.N phase to earth. Between L,N, and earth have voltage resistance.	P
5.1.5	Compliance	Comply with the requirements	P

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.6	Test Overview	EUT tested according to type test	¾
5.2	Test specifications		P
5.2.1	Visual inspections (type test, sample test and routine test)	Visual inspections has been made before starting testing	P
5.2.2	Mechanical tests	See below	P
5.2.2.1	Clearance and creepage distances (type test)		P
5.2.2.2	PWB short-circuit test (type test)		P
5.2.2.3	Non-accessibility test (type test)		P
5.2.2.4	Enclosure integrity test (type test)	IP20	P
5.2.2.5	Deformation tests	Comply with the requirements	P
5.2.2.5.1	General		P
5.2.2.5.2	Deflection test (type test)	250N for 5s, no damage	P
5.2.2.5.3	Impact test (type test), temperature (°C)	A solid smooth steel sphere of 500g, 50mm in diameter applied, no damage	P
5.2.3	Electrical tests		P
5.2.3.1	Impulse voltage test (type test and sample test)		N/A
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	Test circuits connected directly to the mains 1500V for basic insulation, 3000V for supplementary damage and reinforced insulation	P
5.2.3.2.3	Performing the voltage test	See table 5.2.3.2	P
5.2.3.2.4	Duration of the a.c. or d.c. voltage test	60s	P
5.2.3.2.5	Verification of the a.c. or d.c. voltage test	No 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) :		P
5.2.3.5	Touch current measurement (type test)	See table 5.2.3.5	P
5.2.3.6	Short-circuit test and Breakdown of components test (type tests)	See below	P
5.2.3.6.1	General		P
5.2.3.6.2	Test configuration		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.3.6.2.1	Supply voltage and current		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	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		P
5.2.3.6.4.1	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)	No such capacitor	N/A
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)		P
5.2.4	Abnormal operation tests	See below	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)	No clogged filter	N/A
5.2.4.5	Cooling failure tests (type tests)		N/A
5.2.4.5.1	General		N/A
5.2.4.5.2	Inoperative blower motor		N/A
5.2.4.5.3	Clogged filter		N/A
5.2.4.5.4	Loss of coolant		N/A
5.2.5	Material tests	Materials comply with relevant standard	P
5.2.5.1	High current arcing ignition test (type test)		N/A
5.2.5.2	Glow-wire test (type test)	850 °C.	P
5.2.5.3	Hot wire ignition test (type test – alternative to Glow-wire test)	HWI=3	P
5.2.5.4	Flammability test (type test)	UL94-5VA/VB	P
5.2.6	Environmental tests (type tests)		P
5.2.6.1	General		P
5.2.6.2	Acceptance criteria		N/A
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)		N/A
5.2.6.3.2	Damp heat test (steady state)	40°C, 93%, 120h	P
5.2.6.4	Vibration test (type test)		N/A
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.	N/A
5.2.8.1	General requirements		N/A
5.2.8.2	Test set-up		N/A
5.2.8.3	Pass criteria		N/A
5.2.8.4	CDM/BDM electronic motor overload protection test (type test)		N/A
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	See below	P
6.2	Information for selection	See below	P
6.3	Information for installing and commissioning	See below	P
6.3.1	General	See instruction	P
6.3.2	Mechanical considerations	See instruction	P
6.3.3	Environment	-10°C-40°C, humidity 5%-95%	P
6.3.4	Handling and mounting	See instruction and packaging	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		P
6.3.5.4	Transient torque analysis		P
6.3.6	Connections	See instruction	P
6.3.6.1	General	See instruction	P
6.3.6.2	Interconnection and wiring diagrams	See instruction	P
6.3.6.3	Conductor (cable) selection		P
6.3.6.4	Terminal capacity and identification		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.3.6.5	Protection requirements		P
6.3.6.6	Earthing		N/A
6.3.6.7	Protective earthing conductor current		N/A
6.3.6.8	Special requirements		N/A
6.3.7	Overcurrent and short-circuit protection		N/A
6.3.8	Motor overload protection and overtemperature protection		N/A
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		N/A
6.4	Information for use	See instruction	P
6.4.1	General	See instruction	P
6.4.2	Adjustment	See instruction	P
6.4.3	Labels, signs and signals	Comply with the requirements ISO 3864-B.3.1 and ISO 3864- B.3.6 signals provided	P
6.4.3.1	General	See instruction	P
6.4.3.2	Isolators		N/A
6.4.3.3	Visual and audible signals	ISO 3864-B.3.1 and ISO 3864- B.3.6 signals provided	P
6.4.3.4	Hot surfaces	No exceed temperature limits	N/A
6.4.3.5	Equipment marking	See instruction and marking	P
6.5	Information for maintenance	See instruction	P
6.5.1	General	See instruction	P
6.5.2	Capacitor discharge	60V after 1s ISO 3864-B.3.6 signals provided	P
6.5.3	Auto restart/bypass connection	See instruction	P
6.5.4	PT/CT connection		N/A
6.5.5	Other hazards	See instruction	P
Annex A	Examples of protection in case of direct contact	Considered	¾
Annex B	Examples of overvoltage category reduction		¾
Annex C	Measurement of clearance and creepage distances	Considered	P
Annex D	Altitude correction for clearances	Considered	¾
Annex E	Clearance and creepage distance determination for frequencies greater than 30 kHz		¾

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Clause	Requirement + Test	Result - Remark	Verdict
Annex F	Cross-sections of round conductors		¾
Annex G	Guidelines for RCD compatibility		¾
Annex H	Symbols referred to in this part of IEC 61800		¾

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	
PCB	KINGBOARD LAMINATES HOLDINGS LTD	KB-6160	V-0, 130°C, 1.2mm, thickness	ANSI/UL 746 ANSI/UL 94	ULE123995	
Transformer	ZhongShan ZhiNiu Electronics Co.,Ltd	EQ3214-Z003	Class B	EN 61800-5-1	Test with appliance	
-Bobbin	CHANG CHUN PLASTICS CO.,LTD	T375J	150°C	ANSI/UL 94 ANSI/UL 1694 ANSI/UL 723 ANSI/UL 746	ULE59481	
-TEFLON TUBE	FUREDA PLASTIC CO LTD	FRD-TT-S	200°C	ANSI/UL 224	E254113	
-WIRE	SHANTOU SHENGANG ELECTRICAL INDUSTRIAL CO LTD	xUEW/130, QA-x/130	130°C	ANSI/UL 1446	E239508	
-TAPE	SUZHOU MAILADUONA ELECTRIC MATERIAL CO LTD	JY312(#)	130°C	UL 510	E188295	
Internal wire	SHENZHEN YIMEITE ELECTRIC CABLE CO LTD	1571	300V, 80°C	ANSI/UL 758; CSA-C22.2 No. 210	E318342	
Supplementary information:						

4.3.1	Table: Decisive voltage class (in normal conditions)					P
Location of between	Circuit type	Decisive voltage class	Work voltage(measured)	Work voltage(limitd)	Condition/stat us	Verdict

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Clause	Requirement + Test			Result - Remark		Verdict
--	AC working voltage	Class A	--	<25Vrms	380V/50Hz normal load	P
--	--	Class B	--	<50Vrms	--	--
Input circuit	--	Class C	253Vrms/389Vpeak	<1000Vrms	380V/50Hz normal load	P
Control circuit	DC working voltage	Class A	29.3Vdc	<60Vdc	380V/50Hz normal load	P
--	--	Class B	---	< 120Vdc		--
Generatrix circuit	--	Class C	448Vdc	<1500Vdc	380V/50Hz normal load	P
--	Pulsating working voltage	Class A	---	<42.4Vpeak	--	--
--	--	Class B	--	<71Vpeak	--	--
Output circuit	--	Class C	439Vpeak/246Vrms	<4500Vpeak	380V/50Hz normal load	P
Supplementary information:						

4.3.6.6 and 4.3.6.7	TABLE: Clearances and creepage distances					P
clearance cl and creepage distance dcr at/of:	Work voltage UVr.m.s./Vpeak	required cl (mm)	cl (mm) measured	Required dcr (mm)	Dcr(mm) measured	
Between primary and second of transformer	380	5.5	8.2	5.5	8.2	
Between primary L and N of Transformer	380	3.8	6.0	3.8	6.0	
Between primary and second of PWB's	380	5.5	8.2	5.5	8.2	
Between primary L and N of PWB's	380	3.8	6.0	3.8	6.0	
Supplementary information:						

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Clause	Requirement + Test	Result - Remark		Verdict	
5.2.3.1 5.2.3.2 5.2.3.3	TABLE: Impulse voltage test AC or DC voltage test Partial Discharge Test			P	
	Test voltage applied between:	Voltage (V)	impulse withstand voltage (V)	partial discharge extinction voltage (V)	Breakdown (Yes/No)
	Exposed conductive part (connected to earth)--> each circuit sequentially R/S/T and U/V/W and +/PB/+ pin	1500a.c.r.m.s/2120 d.c/5s (B)	--	--	No
	Accessible surface (non conductive or conductive but not connected to earth)- each circuit sequentially R/S/T and U/V/W and +/PB/+ pin	3000a.c.r.m.s/4240 d.c/5s (R)	--	--	No
	PELV or SELV decisive voltage class A circuit each adjacent circuit sequentially R/S/T and U/V/W and +/PB/+ pin	3000a.c.r.m.s/4240 d.c/5s (R)	--	--	No
	Between primary and secondary of transformer	3000a.c.r.m.s/4240 d.c/5s (R)	--	--	No
Supplementary information:					

5.2.3.5	TABLE: Leakage current		P
	Three phase system shall be operated at rated voltage and connected motor with unloaded..... :	380Vac/50Hz	--
	Without any connection to the earth :	--	--
	Leakage current between	I (mA)	Max. allowed I (mA)
	R/S/T- GND	0.6	3.5mA ac or 10mA dc
	SELV Circuit -- GND	0.42	3.5mA ac or 10mA dc
	R/S/T- accessible enclosure	0.14	3.5mA ac or 10mA dc
10mA dc For appliances intended to be connected in star connection only, the neutral is not connected			

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.3.6	TABLE: Short-circuit tests		P
	the outer enclosure and normally earthed or exposed dead metal parts are isolated from earth and connected through a 30 A fuse to the supply circuit pole least at risk of arcing to earth :	380V/50Hz	--
	for earthed control circuits, the enclosure and normally earthed or exposed dead metal parts are isolated from earth and connected through the 30 A fuse to earth. :	--	--
	150% of rated output current /1min 180% of rated output current /10s 200% of rated output current /0.5s	---	---
	Requirements	Result	Verdict
	the cotton indicator shall not have ignited	Not ignited	P
	the earth fuse shall not have opened	Not opened	P
	the door or cover shall not have blown open	Not blown open	P
	the door or cover shall be able to be opened	Not opened	P
	SELV and PELV circuits will not exhibit voltages greater than those of decisive voltage class A	29.9Vdc	P
	Observation: one of the following:		
	The operation of solid state short-circuit protection circuitry	IGBT disconnected	P
	The opening of a suitable branch circuit short-circuit protection fuse	---	---
	The opening of a suitable branch circuit short-circuit protection circuit breaker	---	---
	U/V/W phase short circuit, during 1s disconnected power supply	---	---
	(+)/PB/(-) pin short circuit, during 1s disconnected power supply	---	---
	Supplementary information:		

5.2.3.6.4		Table: Breakdown of Components test and abnormal operation(type test)					P
		Simulated after the BDM/CDM is fully energized and in operation	Input 380V/50Hz Output :normal load 5.8KW				¾
		ambient temperature (°C)	30°C				¾
No.	component No.	fault	test voltage (V)	test time	Observation	Result	
1	Rectifier	Shortcircuit	380Vdc	1s	Shutdown, fuse opened	Disconnected power supply	

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Clause	Requirement + Test			Result - Remark	Verdict
2	Transformer secondary	Shortcircuit	380Vdc	1s	Shutdown, fuse opened Disconnected power supply
Supplementary information:					

5.2.3.8	TABLE: Temperature rise test		P
	Test voltage (V).....:	380V~	¾
	Supply frequency (Hz):	50Hz	¾
	Ambient Temp (°C): Test before: 30.0:	Test after:30.2	¾
	Thermocouple locations	T (°C)	Max.T (°C)
	Terminal block	60.4	105
	PCB	87.6	130
	T1 Coil	88.7	110
	T1 core	82.4	110
	Internal wire	41.0	80
	Enclosure	42.3	65
Note: the PDS is to be tested with at least 1,2 m of wire attached to each user terminal Test until steady condition- temperature change not more than 1°C/hour			

5.2.3.9	TABLE: Protective bonding		P
	A current of 25 A ,from a source having a maximum no-load voltage of 60 V d.c	25A/60Vdc	---
	The current should run until steady state conditions are reached	N/A	---
	Protective bonding resistance between	R(Ω)	Max. allowed R(Ω)
	From the main protective conductor (terminal) to the different exposed conductive parts in turn	0.02	0.1

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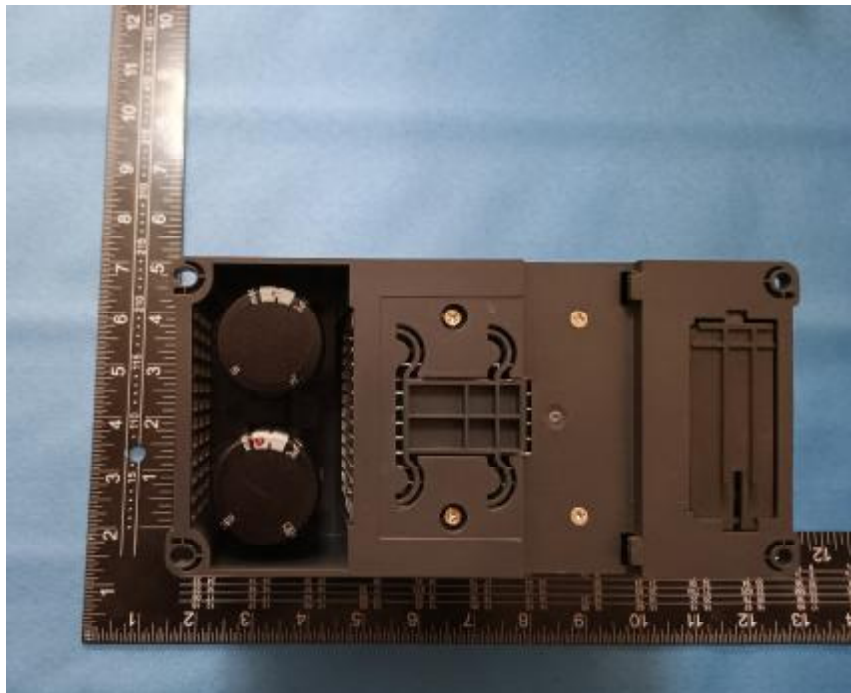
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Photo 1 General Appearance of the EUT**Photo 2 General Appearance of the EUT**

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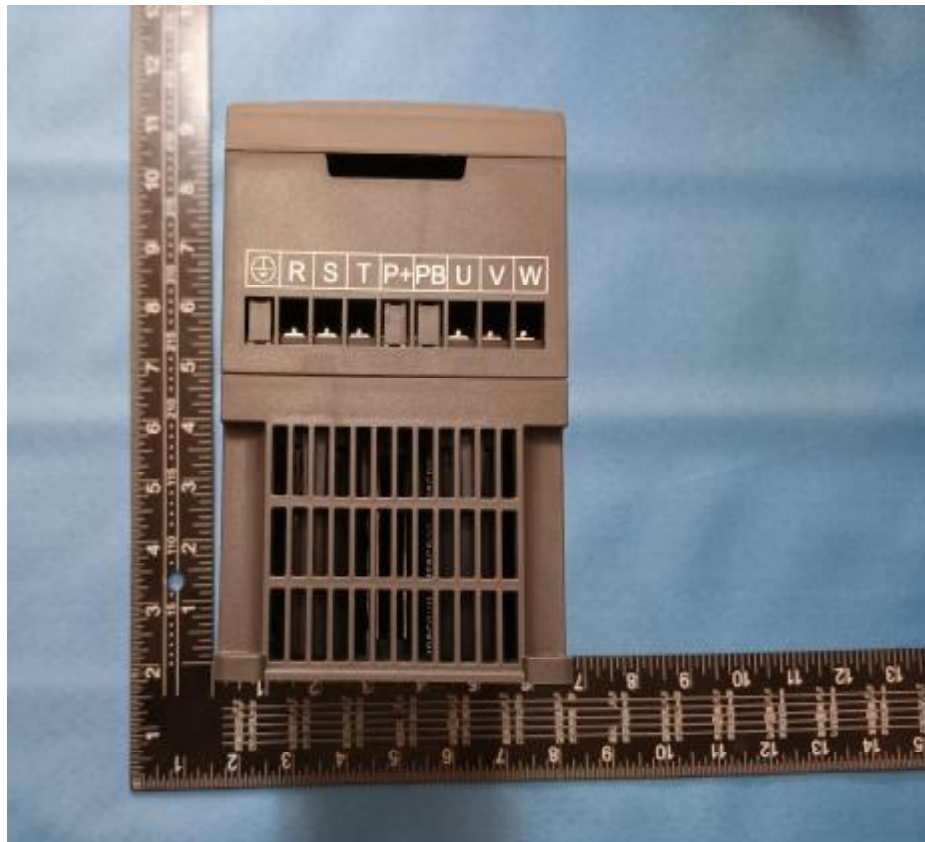
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Photo 3 General Appearance of the EUT**Photo 4 General Appearance of the EUT**

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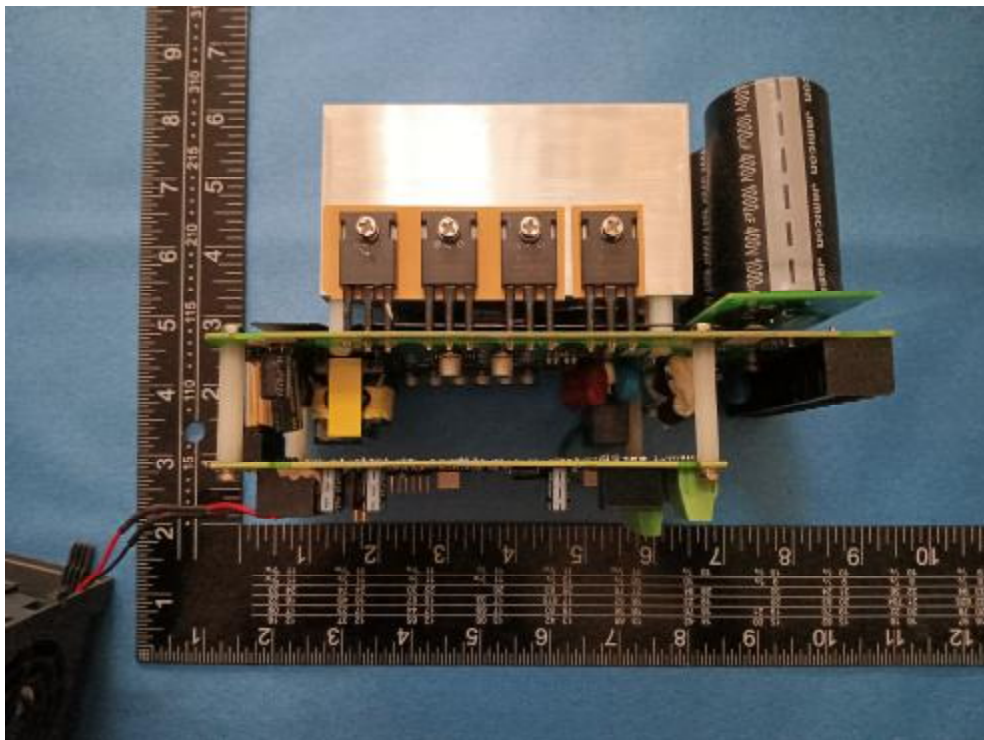
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Photo 5 General Appearance of the EUT**Photo 6 General Appearance of the EUT**

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Photo 7 General Appearance of the EUT**Photo 8 General Appearance of the EUT (Inside)**

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Photo 10 General Appearance of the EUT (Inside)

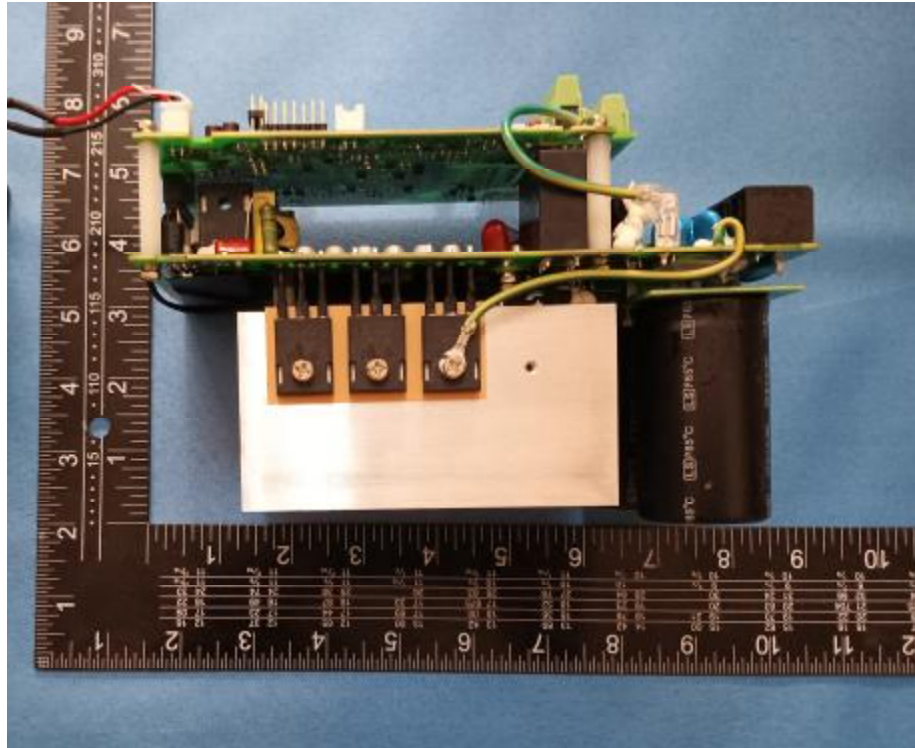
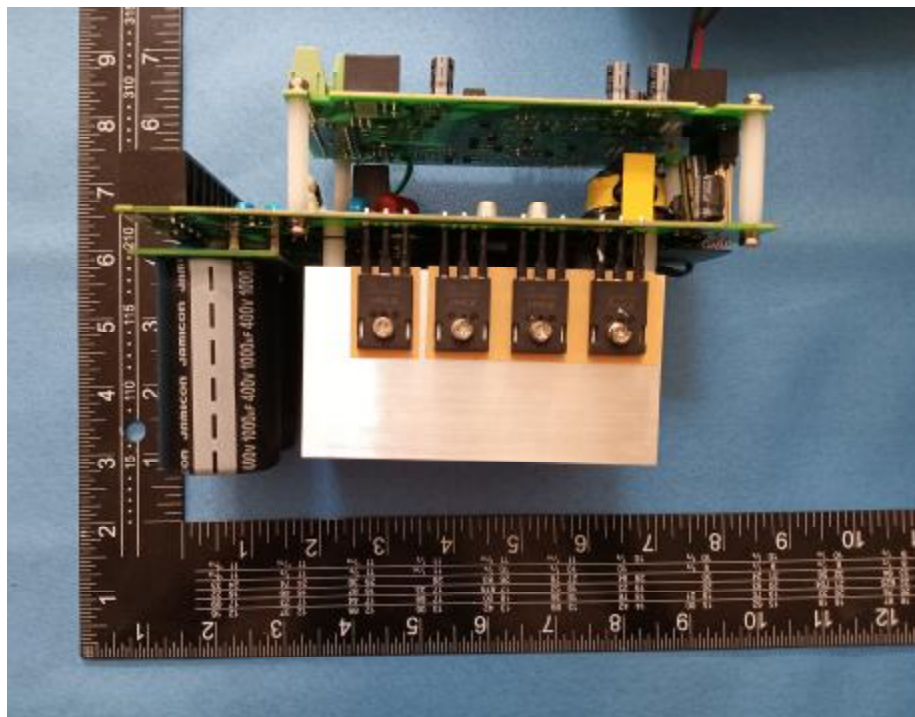


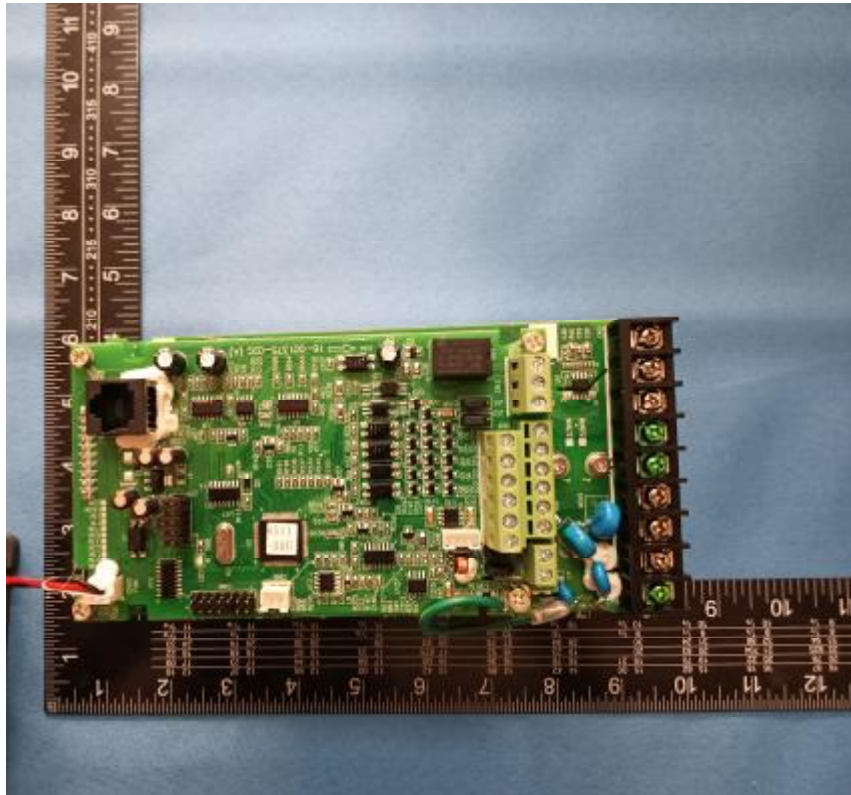
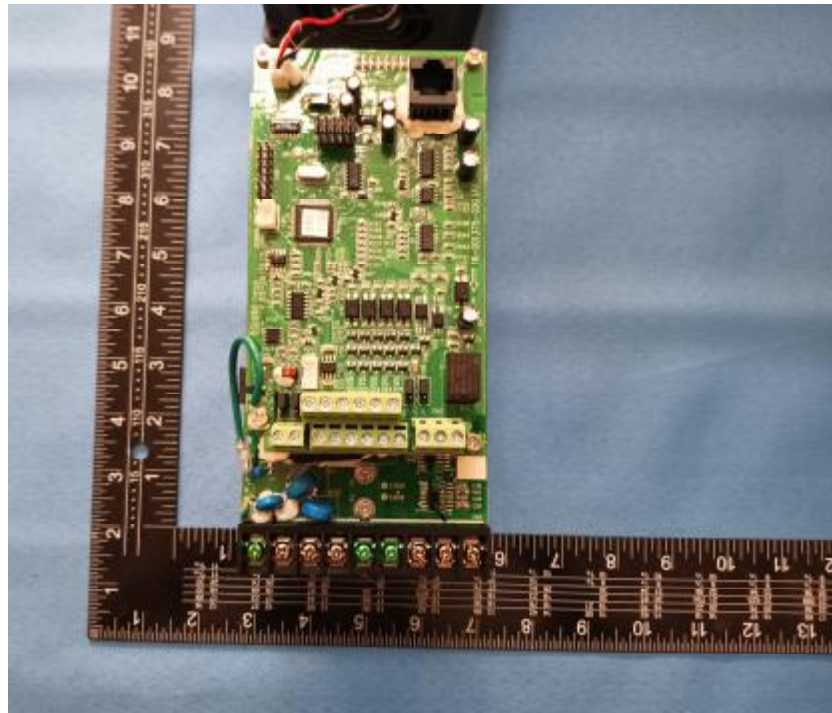
Photo 11 General Appearance of the EUT (Inside)



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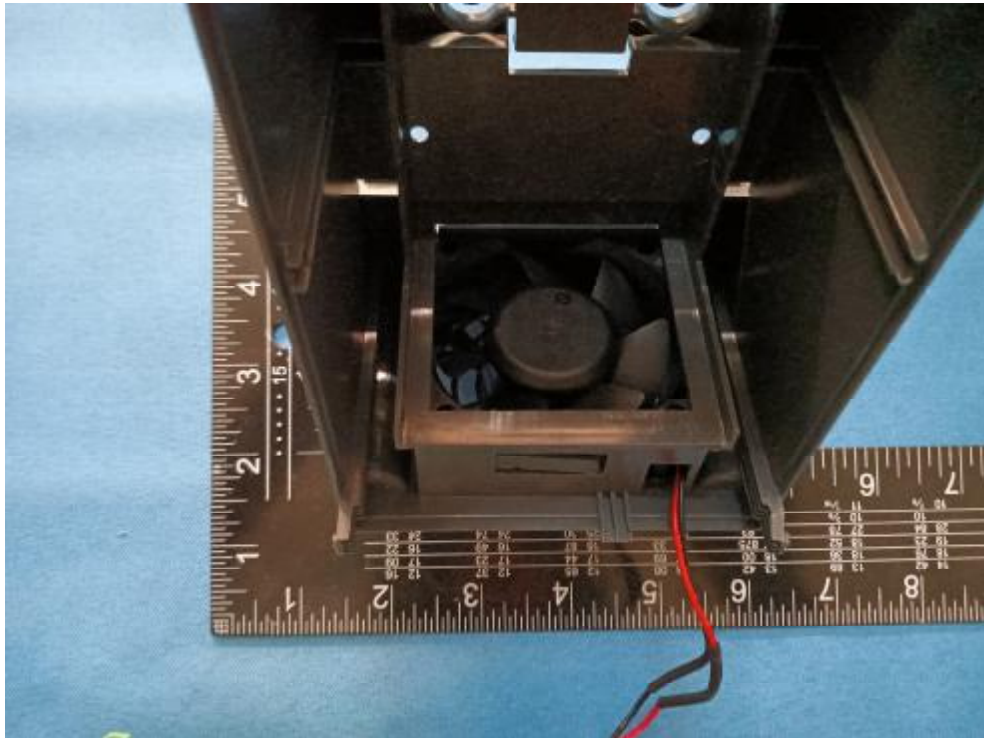
Photo 12 General Appearance of the EUT (Inside)**Photo 13 General Appearance of the EUT (Inside)**

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Photo 14 General Appearance of the EUT (Inside)



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