Test Report issued under the responsibility of:

TEST REPORT
IEC 60255-27
Measuring relays and protection equipment –
Part 27: Product safety requirements

Report Number.....:	6066884.50
Date of issue .....:	2019-11-15
Total number of pages.....	65 pages
Name of Testing Laboratory preparing the Report.....:	DEKRA Testing and Certification (Shanghai) Ltd.
Applicant's name .....:	Hitachi Hi-Rel Power Electronics Pvt. Ltd.
Address .....:	SM 3&4, Sanand – II GIDC, Industrial Estate, Boll Village, Sanand – 382 110, Gujarat, India.
Test specification:	
Standard.....:	IEC 60255-27:2013 (Second Edition)
Test procedure.....:	Type test
Non-standard test method.....:	N/A
Test Report Form No. .....:	IEC60255_27A
Test Report Form(s) Originator ....:	IMQ S.p.A.
Master TRF .....:	2014-09

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General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
This report is only for reference and is not used for legal proof function in China market.
The information provided by the customer in this report may affect the validity of the results, the test lab is not responsible for it.

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Test item description..... :	Grid-connected PV Inverter
Trade Mark..... :	HITACHI
Manufacturer..... :	Hitachi Hi-Rel Power Electronics Pvt. Ltd. SM 3&4, Sanand – II GIDC, Industrial Estate, Boll Village, Sanand – 382 110, Gujarat, India.
Model/Type reference..... :	Hiverter Si-3.3K, Hiverter Si-4.4K, Hiverter Si-5K, Hiverter Si-5.5K, Hiverter Si-6.6K, Hiverter Si-8.8K, Hiverter Si-11K, Hiverter Si-12K
Ratings..... :	Hiverter Si-3.3K: PV input: Max.1000 Vdc, MPPT voltage range: 160-960 Vdc, max 11/11 A, Isc PV: 14/14 A Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 3000 W, max 3300 VA, max 3x4.8 A Hiverter Si-4.4K: PV input: Max.1000 Vdc, MPPT voltage range: 160-960 Vdc, max 11/11 A, Isc PV: 14/14 A Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 4000 W, max 4400 VA, max 3x6.4 A Hiverter Si-5K: PV input: Max.1000 Vdc, MPPT voltage range: 160-960 Vdc, max 11/11 A, Isc PV: 14/14 A Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 5000 W, max 5000 VA, max 3x8.0 A Hiverter Si-5.5K: PV input: Max.1000 Vdc, MPPT voltage range: 160-960 Vdc, max 11/11 A, Isc PV: 14/14 A Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 5000 W, max 5500 VA, max 3x8.0 A Hiverter Si-6.6K: PV input: Max.1000 Vdc, MPPT voltage range: 160-960 Vdc, max 11/11 A, Isc PV: 14/14 A Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 6000 W, max 6600 VA, max 3x9.6 A Hiverter Si-8.8K: PV input: Max.1000 Vdc, MPPT voltage range: 160-960 Vdc, max 11/11 A, Isc PV: 14/14 A Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 8000 W, max 8800 VA, max 3x12.8 A Hiverter Si-11K: PV input: Max.1000 Vdc, MPPT voltage range: 160-960 Vdc, max 11/11 A, Isc PV: 14/14 A Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 10000 W, max 11000 VA, max 3x15.9 A Hiverter Si-12K: PV input: Max.1000 Vdc, MPPT voltage range: 160-960 Vdc, max 11/11 A, Isc PV: 14/14 A Output: 400 Vac, 3/N/PE, 50/60 Hz, nominal 12000 W, max 13200 VA, max 3x19.1 A
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):	

☒	**Testing Laboratory:**	DEKRA Testing and Certification (Shanghai) Ltd.	
Testing location/ address..... :		3F, #250 Jiangchangsan Road, Building 16, Headquarter Economy Park Shibei Hi-Tech Park, Zhabei District, Shanghai 200436, China	
☒	**Associated Testing Laboratory:**	Suzhou Longce Testing Technology Service Co., Ltd.	
Testing location/ address..... :		Building 5, No.369, Lushan Road, New District, Suzhou, China	
Tested by (name, function, signature) :		Jason Guo	
Approved by (name, function, signature) :		Allan Chen	
☐	~~**Testing procedure: TMP/CTF Stage 1:**~~		
~~**Testing location/ address..... :**~~			
~~**Tested by (name, function, signature) :**~~			
~~**Approved by (name, function, signature) :**~~			
☐	~~**Testing procedure: WMT/CTF Stage 2:**~~		
~~**Testing location/ address..... :**~~			
~~**Tested by (name + signature) ..... :**~~			
~~**Witnessed by (name, function, signature) ..... :**~~			
~~**Approved by (name, function, signature) :**~~			
☐	~~**Testing procedure: SMT/CTF Stage 3 or 4:**~~		
~~**Testing location/ address..... :**~~			
~~**Tested by (name, function, signature) :**~~			
~~**Witnessed by (name, function, signature) ..... :**~~			
~~**Approved by (name, function, signature) :**~~			
~~**Supervised by (name, function, signature) ..... :**~~			

List of Attachments (including a total number of pages in each attachment): Attachment 1: Vibration, Shock, Bump, Seismic test report (19 pages) Attachment 2: Pictures (6 pages)	
Summary of testing:	
Tests performed (name of test and test clause): All applicable clauses test according standards IEC 60255-27:2013 were performed DEKRA Testing and Certification (Shanghai) Ltd. except below tests was performed in Suzhou Longce Testing Technology Service Co., Ltd.: 10.6.2.1 Vibration 10.6.2.2 Shock 10.6.2.3 Bump 10.6.2.4 Seismic	**Testing location:** DEKRA Testing and Certification (Shanghai) Ltd. 3F, #250 Jiangchangsan Road, Building 16, Headquarter Economy Park Shibei Hi-Tech Park, Zhabei District, Shanghai 200436, China Suzhou Longce Testing Technology Service Co., Ltd. Building 5, No.369, Lushan Road, New District, Suzhou, China
Summary of compliance with National Differences: **List of countries addressed** N/A ☒ **The product fulfils the requirements of IEC 60255-27:2013 (Second Edition)**	

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.

HITACHI

Solar Grid Tied Inverter

Model No.	Hiverter Si-3.3K
Max. DC Input Voltage	1000V
Operating MPPT Voltage Range	160~960V
Max. Input Current	2x11A
Max. PV Isc	2x14A
Nominal Grid Voltage	3/N/PE,230/400V~
Max. Output Current	3x4.8A
Nominal Grid Frequency	50Hz/60Hz
Nominal Output Power	3000W
Max. Output Power	3300VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~+60°C
Protective Class	Class I

Hitachi Hi-Rel Power Electronics Pvt. Ltd.

SM 3 & 4, Sanand - II GIDC, Industrial Estate, Bol Village, Sanand - 382 110, Gujarat, India., www.hitachi-hirel.com

HITACHI

Solar Grid Tied Inverter

Model No.	Hiverter Si-4.4K
Max. DC Input Voltage	1000V
Operating MPPT Voltage Range	160~960V
Max. Input Current	2x11A
Max. PV Isc	2x14A
Nominal Grid Voltage	3/N/PE,230/400V~
Max. Output Current	3x6.4A
Nominal Grid Frequency	50Hz/60Hz
Nominal Output Power	4000W
Max. Output Power	4400VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~+60°C
Protective Class	Class I

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HITACHI

Solar Grid Tied Inverter

Model No.	Hiverter Si-5K
Max. DC Input Voltage	1000V
Operating MPPT Voltage Range	160~960V
Max. Input Current	2x11A
Max. PV Isc	2x14A
Nominal Grid Voltage	3/N/PE,230/400V~
Max. Output Current	3x8.0A
Nominal Grid Frequency	50Hz/60Hz
Nominal Output Power	5000W
Max. Output Power	5000VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~+60°C
Protective Class	Class I

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HITACHI

Solar Grid Tied Inverter

Model No.	Hiverter Si-5.5K
Max. DC Input Voltage	1000V
Operating MPPT Voltage Range	160~960V
Max. Input Current	2x11A
Max. PV Isc	2x14A
Nominal Grid Voltage	3/N/PE,230/400V~
Max. Output Current	3x8.0A
Nominal Grid Frequency	50Hz/60Hz
Nominal Output Power	5000W
Max. Output Power	5500VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~+60°C
Protective Class	Class I

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HITACHI

Solar Grid Tied Inverter

Model No.	Hiverter Si-6.6K
Max. DC Input Voltage	1000V
Operating MPPT Voltage Range	160~960V
Max. Input Current	2x11A
Max. PV Isc	2x14A
Nominal Grid Voltage	3/N/PE,230/400V~
Max. Output Current	3x9.6A
Nominal Grid Frequency	50Hz/60Hz
Nominal Output Power	6000W
Max. Output Power	6600VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~+60°C
Protective Class	Class I

Hitachi Hi-Rel Power Electronics Pvt. Ltd.

SM 3 & 4, Sanand - II GIDC, Industrial Estate, Bol Village, Sanand - 382 110, Gujarat, India., www.hitachi-hirel.com

HITACHI

Solar Grid Tied Inverter

Model No.	Hiverter Si-8.8K
Max. DC Input Voltage	1000V
Operating MPPT Voltage Range	160~960V
Max. Input Current	2x11A
Max. PV Isc	2x14A
Nominal Grid Voltage	3/N/PE,230/400V~
Max. Output Current	3x12.8A
Nominal Grid Frequency	50Hz/60Hz
Nominal Output Power	8000W
Max. Output Power	8800VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~+60°C
Protective Class	Class I

Hitachi Hi-Rel Power Electronics Pvt. Ltd.

SM 3 & 4, Sanand - II GIDC, Industrial Estate, Bol Village, Sanand - 382 110, Gujarat, India., www.hitachi-hirel.com

HITACHI

Solar Grid Tied Inverter

Model No.	Hiverter Si-11K
Max. DC Input Voltage	1000V
Operating MPPT Voltage Range	160~960V
Max. Input Current	2x11A
Max. PV Isc	2x14A
Nominal Grid Voltage	3/N/PE,230/400V~
Max. Output Current	3x15.9A
Nominal Grid Frequency	50Hz/60Hz
Nominal Output Power	10000W
Max. Output Power	11000VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~+60°C
Protective Class	Class I

Hitachi Hi-Rel Power Electronics Pvt. Ltd.

SM 3 & 4, Sanand - II GIDC, Industrial Estate, Bol Village, Sanand - 382 110, Gujarat, India., www.hitachi-hirel.com

HITACHI

Solar Grid Tied Inverter

Model No.	Hiverter Si-12K
Max. DC Input Voltage	1000V
Operating MPPT Voltage Range	160~960V
Max. Input Current	2x11A
Max. PV Isc	2x14A
Nominal Grid Voltage	3/N/PE,230/400V~
Max. Output Current	3x19.1A
Nominal Grid Frequency	50Hz/60Hz
Nominal Output Power	12000W
Max. Output Power	13200VA
Power Factor	>0.99(adjustable+/-0.8)
Ingress Protection	IP65
Operating Temperature Range	-25°C ~+60°C
Protective Class	Class I

Hitachi Hi-Rel Power Electronics Pvt. Ltd.

SM 3 & 4, Sanand - II GIDC, Industrial Estate, Bol Village, Sanand - 382 110, Gujarat, India., www.hitachi-hirel.com

Test item particulars.....:	Grid-connected PV Inverter
Classification of installation and use .....:	Fixed
Supply Connection.....:	Permanent connection
External operating temperature range.....:	-25 to 60 º C
Altitude during operation (m) .....:	2000m
Supply fluctuations…….....:	According to the specified supply range
Over voltage category (OVC) Mains .....:	[] OVC I [] OVC II [x] OVC III [] OVC IV [] other:
Over voltage category (OVC) PV.....:	[] OVC I [x] OVC II [] OVC III [] OVC IV [] other:
External pollution degree (PD) .....:	[] PD 1 [] PD 2 [x] PD 3
Class of equipment .....:	[x] Class I [] Class II [] Class III [] Not classified
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..... :	2018-10-15 (samples provided by applicant)
Date (s) of performance of tests ..... :	2018-10-15 to 2019-02-25
General remarks:	
"(See Enclosure #)" refers to additional information appended to the report. **"(See appended table)" refers to a table appended to the report.** **The test results presented in this report relate only to the object tested.** **This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.** **This report is only for reference and is not used for legal proof function in China market.** **The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.** **Throughout this report a ☐ comma / ☒ point is used as the decimal separator.**	
Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:	
The application for obtaining a CB 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..... :	☐ **Yes** ☒ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies)..... :	Dongguan SOFAR SOLAR Co., Ltd. 1F - 6F, Building E, No. 1 JinQi Road, Bihu Industrial Park, Wulian Village, Fenggang Town, Dongguan City, China.

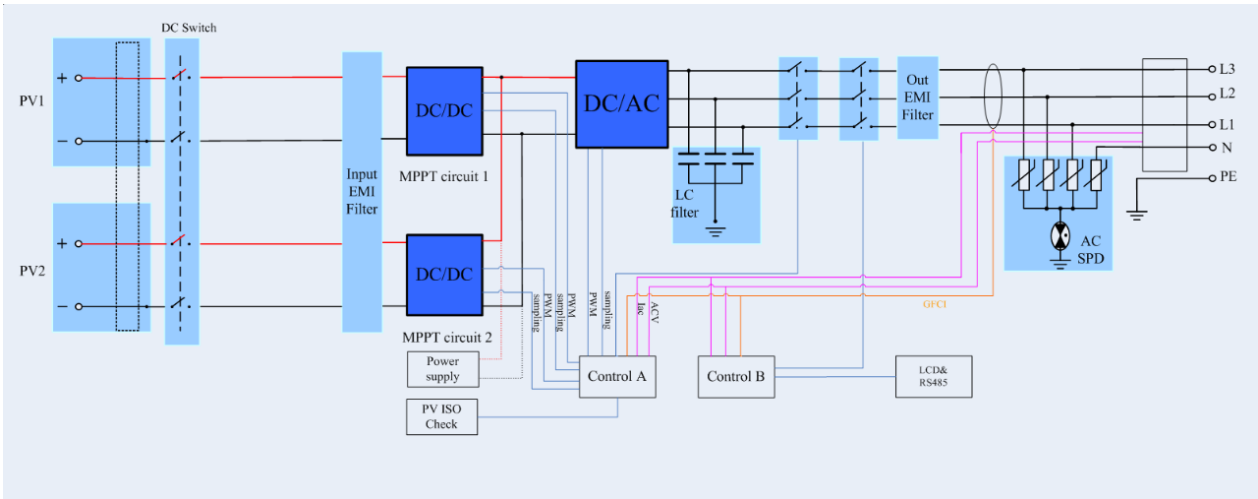
General product information:

For the models Hiverter Si-3.3K, Hiverter Si-4.4K, Hiverter Si-5K, Hiverter Si-5.5K and Hiverter Si-6.6K, they are identical on hardware except the rated power changed by the software, and the models Hiverter Si-8.8K, Hiverter Si-11K and Hiverter Si-12K are identical on hardware except the rated power changed by the software.

The only differences on hardware between the models Hiverter Si-6.6K and Hiverter Si-12K are those
1. There is only 2 BUS cap of 75uF/600V for model Hiverter Si-6.6K while there are 4 used for model Hiverter Si-12K.
2. The main output inductor is NPS226060*2 2.2Φ*1P*67Ts L=1.24mH for model Hiverter Si-6.6K while it's NPS226060*2+NPF226060*1 2.0Φ*2P*42Ts L=0.73mH for model Hiverter Si-12K.

There is a LCD screen to monitor the status of the inverter by proprietary software, meanwhile a communication RS485 to the computer also can monitor the status of the inverter by proprietary and control the PCE.
The maximum ambient temperature permitted by the manufacturer's specification is 60°C and derate the output power from 45°C.

Block Diagram



The product was tested on:
Hardware version: V1.00
Software version: V1.60

Model difference:

All the models have identical mechanical and electrical construction except some componnents and some parameter of the software architecture in order to control the max output power. And refer to the following table for detail.

Model list table:

MODELS LIST		Hiverter Si-3.3K	Hiverter Si-4.4K	Hiverter Si-5K	Hiverter Si-5.5K	Hiverter Si-6.6K	Hiverter Si-8.8K	Hiverter Si-11K	Hiverter Si-12K
PV INPUT	V_{MAX} PV [Vdc]	1000	1000	1000	1000	1000	1000	1000	1000
	I_{SC} PV [A]	14A/14A	14A/14A	14A/14A	14A/14A	14A/14A	14A/14A	14A/14A	14A/14A
	MPPT Voltage Range V_{MPP} [Vdc]	160-960	160-960	160-960	160-960	160-960	160-960	160-960	160-960
	Max. Input Current I_{MAX} [A] (A/B) (each MPPT if more than 1)	11A/11A	11A/11A	11A/11A	11A/11A	11A/11A	11A/11A	11A/11A	11A/11A
	MPPT Full Power Voltage Range [Vdc]	160-850	190-850	240-850	240-850	290-850	380-850	480-850	575-850
	Overvoltage Category (OVC)	II	II	II	II	II	II	II	II
AC OUTPUT	Rated Output Voltage Ur [Vac]	3/N/PE 400	3/N/PE 400	3/N/PE 400	3/N/PE 400	3/N/PE 400	3/N/PE 400	3/N/PE 400	3/N/PE 400
	Operating Voltage Adjustable Range Un [Vac]	184-275	184-275	184-275	184-275	184-275	184-275	184-275	184-275
	Rated Output Frequency FNETZ [Hz]	50	50	50	50	50	50	50	50
	Rated Output Power PE [kW]	3000W	4000W	5000W	5000W	6000W	8000W	10000W	12000W
	Max. Output Power PEmax [kW]	3300W	4000W	5000W	5000W	6000W	8000W	10000W	12000W
	Max. Apparent power SEmax [VA]	3300VA	4400VA	5500VA	5000VA	6600VA	8800VA	11000VA	13200VA
	PGS SEmax [kVA]	No limit	No limit	No limit	No limit	No limit	No limit	No limit	No limit
	Rated Output Current Ir [A]	4.8A	6.4A	8.0A	8.0A	9.6A	12.8A	15.9A	19.1A
	Max. Output Current Imax [A]	4.8A	6.4A	8.0A	8.0A	9.6A	12.8A	15.9A	19.1A
	Power Factor cosφ [λ]	1 (adjustable +/-0.8)							
	Efficiency max. ηmax	98%	98%	98%	98%	98%	98.3%	98.3%	98.3%
	Night Power Consumption [W]	<0.5W	<0.5W	<0.5W	<0.5W	<0.5W	<0.5W	<0.5W	<0.5W
	THD [V / I] (100% full power)	<3%	<3%	<3%	<3%	<3%	<3%	<3%	<3%
	Acoustic Noise [dB]	<35	<35	<35	<35	<35	<35	<35	<35
	Overvoltage Category (OVC)	III							

PV &GRID CONNECTION	Array Insulation Resistance Detection [Ω]	100k (> V_{MAX} PV/30mA)							
	The accuracy of resistance measurement [%/Ω]	1%							
CONSTRUCTION	Type of inverter	Non-insulated							
	Type of NS Protection	Integrated							
	Separated by	Transformerless							
	MPPT strings	2							
	MPPT tracking	2							
	Protective Class	I							
	Enclosure Protection (IP)	IP65							
	Operating Temperature Range [ºC]	-25 to 60 (> 45 derating)							
	Pollution degree (PD)	PD 2(inside), PD3(outside)							
	Altitude [m]	2000							
	Size [mm]	483*452*200	483*452*200	483*452*200	483*452*200	483*452*200	483*452*200	483*452*200	483*452*200
	Weight [kg]	21	21	21	21	21	22	22	22

All tests are conducted on models Hiverter Si-12K to represent all the models. The tests of PV inverter were carried out under the most unfavorable combination within the manufacturer's operating specifications of the following parameters:

-DC input voltage Max. 1000Vd.c.
-operating temperature, Max. Ambient temperature 60°C declared by the client.
-operating mode: continuous.
- AC output: the AC output: the highest output is 100% of rated voltage. The input voltage range of MPPT with full load see model list for detail.

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

4	**General safety requirements**		-
4.1	General		P
4.2	Earthing requirements		P

5	**Protection against electric shock**		-
5.1	General		P
5.1.1	Introductory remark		P
5.1.2	Protection from contact with hazardous live parts		P
5.1.2.1	General		P
5.1.2.2	Insulation		P
5.1.2.3	Equipment case and barriers	IP65 enclosure and no opening in the case.	P
	Hazardous live parts	Hazardous live parts were separated from the accessible part.	P
	Top surfaces of barriers accessible in normal use..:	No opening of EUT and the cover only can be removed with tool by trained personnel.	P
	Protection in service access areas		P
	- with rigid test finger and a force of 10 N		N/A
	- with jointed test finger		N/A
5.1.2.4	Hazardous live terminations using stranded wire		P
5.1.3	Discharge of capacitors		-
	Compliance checked by calculation		P
	Measured voltage (V); time-constant (s)		P
	Residual charge (µC)		P
5.1.4	Protective impedance	No protective impedance used.	-
	Requirements of 5.1.5.3.2 in normal and to level of 5.2.4.1.2 in single fault condition		N/A
	The protective impedance consists of one or more of the following:		N/A
	appropriate high-integrity single component		N/A
	combination of components		N/A
	combination of basic insulation and a current- or voltage-limiting device		N/A
	Voltage test for double/reinforced insulation		N/A

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict
	Components and associated basic insulation checked after a single-fault condition assessment or test according to 10.6.5.5.		N/A
	Clearance, creepage distance between terminations of the impedance meet requirements of double or reinforced insulation of Annex C of this standard and 6.7 of IEC 61010-1:2010:		N/A
5.1.5	Accessible parts		-
5.1.5.1	General	All accessible metal parts were earthed and separated from live parts by basic insulation. All external accessible circuit were separated from live parts by reinforce insulation.	P
5.1.5.2	Determination of accessible parts		-
5.1.5.2.1	General		P
	Normal operational use, with or without the aid of a tool which will increase the accessibility	See 5.1.5.2.2 to 5.1.5.2.4 or test by inspection	P
5.1.5.2.2	General examination	No opening of EUT and the cover only can be removed with tool by trained personnel.	-
	Test with jointed test finger		N/A
	Test with rigid test finger (force of 10 N)		N/A
5.1.5.2.3	Openings above parts, enclosed by the case, which are hazardous live	No opening of EUT and the cover only can be removed with tool by trained personnel.	-
	Test with test pin (100mm, Ø4mm)		N/A
5.1.5.2.4	Openings for pre-set controls	No opening of EUT and the cover only can be removed with tool by trained personnel.	-
	Test with test pin (100mm, Ø3mm)		N/A
5.1.5.2.5	ELV rated or live parts accessible when cover removed		-
	Removing the cover without tools	No opening of EUT and the cover only can be removed with tool by trained personnel.	N/A
	- Symbol 14		N/A
	- Symbol 12		N/A
5.1.5.2.6	Wiring terminals		-
	IP1X according to 5.1 of IEC 60529		P
	- Symbol 12		P
5.1.1.3	Permissible limits for accessible parts		-

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict
5.1.5.3.1	General		P
	Values of 5.1.5.3.2 in normal operational condition and nor those of 5.2.4.1.2 in single-fault condition.		P
5.1.5.3.2	Values under normal conditions		-
	a) Voltage limits less than 33 V r.m.s. or 70 V d.c. :		P
	for wet locations voltage limits less than 25 V r.m.s. or 37.5V d.c.	Communication port was accessible conductive part that voltage less than 25 V r.m.s. or 37.5 V d.c.	P
	Voltages are not hazardous live the levels of	Communication port.	P
	b) Current less than 0,5 mA r.m.s. for sinusoidal, 0,7 mA peak non-sinusoidal or mixed frequencies or 2 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz		N/A
	for wet locations measuring circuit A.4 used		N/A
	70 mA r.m.s. when measured with circuit A.3 for higher frequencies :		N/A
	c) Levels of capacitive charge or energy less:		N/A
	1) 45 µC for voltages up to 15 kV peak or d.c. or line A of Figure 3 of IEC 61010-1:2010		N/A
	2) 350 mJ stored energy for voltages above 15 kV peak or d.c.		N/A
5.1.6	Bonding to the protective conductor		-
5.1.6.1	Insulation between live parts and accessible conductive parts		P
	Accessible conductive parts		P
	Unearthed accessible conductive parts		P
	separated from by double insulation or reinforced insulation, or		P
	Equipment of class I protection		P
5.1.6.2	Protective bonding		P
	Accessible conductive parts bonded, or		P
	EVL circuit protected in case of direct contact of 5.1.5		P
	magnetic cores are used		P
	parts of small dimensions separated from hazardous live parts by at least basic insulation		P
5.1.6.3	Bonding of parts connected to the protective conductor		P
5.1.6.4	Protection against corrosion		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.1.6.5	Interruption of protective bonding	No such protective bonding.	N/A
5.1.7	Protective conductor connection		P
	means of connection		P
	suitable for use		P
	not be used as a part of the mechanical assembly.:		P
5.1.8	High leakage current	Measured continuous leakage current was 2.54 mA, and the EUT was permanently connected equipment.	N/A
5.1.9	Solid insulation		-
5.1.9.1	General		P
5.1.9.2	Requirements	(see appended table 10.6.4.2/ 10.6.4.3)	P
5.1.10	Clearances and creepage distances		-
5.1.10.1	General		P
5.1.10.2	Clearances		P
5.1.10.2.1	General		P
5.1.10.2.2	Clearances for primary circuits	(see appended table 10.6.3)	P
5.1.10.2.3	Clearances for non-primary circuits	(see appended table 10.6.3)	P
5.1.10.2.4	Creepage distances:	(see appended table 10.6.3)	P
5.1.11	Functional earthing:		P
	Requirements:		P
	Connection to protective conductor terminal permitted:		P
	separated by a functional insulation:		P
	separated from parts at hazardous voltage by:		P
	1) double insulation or reinforced insulation : or		P
	2) a protectively earthed screen or another protectively earthed conductive part, separated from parts at hazardous voltages by at least basic insulation :		P
5.2	Single-fault conditions		-
5.2.1	Testing in single-fault condition	(see appended table 5.2)	P
	not risk of electric shock or fire after a single-fault test:		P
5.2.2	Application of single-fault condition		P
5.2.2.1	General:		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.2.2	Protective impedance:		N/A
5.2.2.3	Transformers:		P
5.2.2.4	Outputs:		P
5.2.2.5	Insulation between circuits and parts:		P
5.2.2.6	Primary circuits and hazardous voltage non-primary circuits:		P
5.2.2.7	Overloads:		P
5.2.2.8	Intermittently rated resistors:	No such resistors used.	N/A
5.2.2.9	DC inputs:		P
5.2.3	Duration of tests:	(see appended table 5.2)	P
5.2.4	Compliance		-
5.2.4.1	Compliance with requirements for electric shock protection		-
5.2.4.1.1	General:		P
5.2.4.1.2	Values in single-fault condition	(see appended table 5.2.4.1.2)	P
	a) Voltage limits less than 55 V r.m.s. or 140 Vd.c. :		P
	For temporary voltages, limits less than 55 V r.m.s. and 78 V peak or 140 V d.c.		P
	for wet locations voltage limits less than 33V r.m.s. or 70d.c.	Communication port was accessible conductive part that voltage less than 33 V r.m.s. or 70 V d.c.	P
	b) Current less than 3,5 mA r.m.s. for sinusoidal, 5 mA peak non-sinusoidal or mixed frequencies or 15 mA d.c. when measured with measuring circuit A.1 or A.2 if less than 100 Hz or 500mA r.m.s (Figure with *R*B = 75 Ω Relates to possible burns in the frequency range 30 kHz to 500 kHz)		N/A
	for wet locations measuring circuit A.4 used (with RS = 375 Ω (instead of 1 500 Ω) :		N/A
	Current less than 3,5 mA r.m.s. for sinusoidal, 5mA peak non-sinusoidal or mixed frequencies or 15 mA d.c		N/A
	c) capacitance level is that defined in Figure 3. curve B in IEC 61010-1:2010:		N/A
5.2.4.2	Compliance with requirements for temperature protection:		P

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Clause	Requirement + Test	Result - Remark	Verdict
5.2.4.3	Compliance with requirements for protection against the spread of fire:		P
5.2.4.4	Compliance with requirements for hazardous gases and chemicals:		P
5.2.4.5	Compliance with requirements for mechanical protection		P
6	**Mechanical aspects**		**-**
6.1	Protection against mechanical hazards		-
6.1.1	Stability:		P
6.1.2	Moving parts:		P
6.1.3	Edges and corners:		P
6.2	Mechanical requirements		P
	Mechanical tests requirements of 10.6.2.1 to 10.6.2.4		P
	Higher severity levels:		N/A
6.3	Mechanical security of terminations	(see Annex E)	P
7	**Flammability and resistance to fire**		-
7.1	General		P
	reducing the risk of fire by one of the following means:		-
	Eliminating or reducing the sources of ignition within the equipment:		P
	Reducing the amount of combustible (or flammable) materials within the equipment:		P
	Containment of a fire within the equipment:		P
7.2	Rationale		P
	Risk of fire in normal and single fault condition:		P
	In order for a risk of fire within the equipment to exist, all three of the following basic elements shall exist:		P
	The equipment circuits shall have sufficient power or energy to be an ignition source		P
	There shall be oxygen present (air is about 21 % oxygen) :		P
	There shall be combustible materials present to support the combustion process:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Conformity is checked by minimum one or a combination of the following (see Figure 1):		P
	Equipment temperature limits of 7.3.1:		P
	Single Fault test of 7.11 and 10.6.5.5:		P
	Minimization of fire risk and reducing sources of ignition of 7.4 and 7.4.2:		P
	Containment of a fire within equipment of 7.10:		P
7.3	General hazards from overheating and fire		-
7.3.1	Equipment temperature limits:		P
	In normal conditions:	(See appended table 7.3)	P
	In single-fault condition (limits of clause 7.11) :	(See appended table 5.2)	P
	Symbol 13 of Table 10:		P
	Symbol 14 of Table 10:		P
7.3.2	Hazardous gases and chemicals	No gases and chemicals used.	-
	Manufacturer’s documentation:		N/A
7.4	Minimization of fire risk		-
7.4.1	General		P
	Critical components of primary circuits and circuits exceeding ELV voltage limits. Compliance with Annex D:		P
7.4.2	Eliminating or reducing the sources of ignition within the equipment		P
	a) Either 1) or 2)		P
	1) Limited-energy circuit as specified in 7.12		P
	2) Insulation between parts at different potentials, compliance with clause 7.11		P
	b) circuits designed to produce heat in compliance with clause 5.2:		N/A
	Circuits not classified as limited-energy circuits. Method i) or ii) below shall be used.		P
	i) Testing in the single-fault conditions in compliance with clause 5.2:		P
	ii) Verifying as in 7.11 that if a fire occurs it will be contained within the equipment:		P
7.5	Cabling and fusing		P
	Manufacturer's recommendations:		P
	Connection cables: minimum cross-section and voltage rating:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Protection devices:		P
7.6	Flammability of materials and components		-
7.6.1	General:		P
	Conformity is checked by inspection:		P
	Tests in compliance with IEC 60695-11-10:		P
7.6.2	Materials for components and other parts inside fire enclosures:		P
7.6.3	Materials for fire enclosures:		P
7.6.4	Materials for components and other parts outside fire enclosures:		P
7.7	Fire ignition sources:		P
7.8	Conditions for a fire enclosure	Metal enclosure used.	-
7.8.1	General:		P
7.8.2	Parts requiring a fire enclosure:		P
7.8.3	Parts not requiring a fire enclosure:		P
7.9	Requirements for primary circuits and circuits exceeding ELV limits:		P
7.10	Fire enclosures and flame barriers		-
	Enclosure meets following requirements:	No opening in the metal enclosure.	P
	Bottom:		P
	no openings, or:		P
	to the extent in Figure 3, shall be constructed with baffles as specified in Figure 2, or:		N/A
	be made of metal, perforated as specified in Table 6, or:		N/A
	be a metal screen with a mesh not exceeding 2 mm × 2 mm centre to centre and a wire diameter of at least 0,45 mm :		N/A
	The sides shall have no openings within the area that is included within the inclined line C in Figure 3 or:		N/A
	Case and baffle or flame barrier:		N/A
7.11	Assessment of the fire risk due to a single-fault condition		-
7.11.1	Guidelines for maximum acceptable temperatures when subjecting a circuit or component to a single-fault condition		P
7.11.2	Temperature of windings under a normal condition or a single-fault condition	(See appended table 7.3 and 5.2)	P

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Clause	Requirement + Test	Result - Remark	Verdict
7.11.3	Compliance of equipment with requirements for protection against the spread of fire		P
7.12	Limited-energy circuit	Not applied.	N/A
	a) Potential not more than 33 r.m.s. or 70 V dc		N/A
	b) Current limited by one of following means:		N/A
	3) Inherently or by impedance (see Table 8); or		N/A
	4) Overcurrent protective device (see Table 9); or		N/A
	5) A regulating network limits also in single fault condition (see Table 8)		N/A
	c) Is separated by at least basic insulation		N/A
	Fuse or a nonadjustable electromechanical device is used		N/A
8	**General and fundamental design requirements for safety**		**-**
8.1	Climatic conditions for safety		P
	Environmental ranges declared by the manufacturer:		P
	temperature, operation and storage:		P
	humidity, non-condensing:		P
	atmospheric pressure:		P
8.2	Electrical connections		P
	electrical terminations and connection points:		P
	protective bonding:	(See appended table 10.6.4.5)	P
	wires and cables:		P
	Conductors:		P
	electrical connections:		P
8.3	Components		-
8.3.1	General	(See appended table 8.3)	P
8.3.2	High-integrity part or component		P
8.4	Connection to telecommunication networks Requirements according to IEC 62151:	Not connect to telecommunication networks	N/A
8.5	Connection to other equipment Requirements in accordance with Table A.1:		P
8.6	Laser sources Requirements in accordance with IEC 60825-1:	No such device.	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.7	Explosion		-
8.7.1	General:		P
8.7.2	Components at risk of explosion		-
8.7.2.1	General:	(see clause 5.2.4.5)	P
8.7.2.2	Batteries	No battery used	N/A
	Compliance with Annex F:		N/A
	Marking and warning:		N/A
	Rechargeable batteries:		N/A
	Battery compartment:		N/A
	Batteries intended to be replaced by the user:		N/A

9	**Marking, documentation and packaging**		**-**
9.1	Marking		-
9.1.1	General		P
	Removable parts:		P
	Symbols according to table 9:		P
	Rack or panel equipment:		P
	Voltages, currents, frequency and their tolerances according to IEC 60255-6:		P
9.1.2	Identification		-
	Equipment is identified on the equipment by:		P
	a) Manufacturer's or supplier's name or trademark		P
	b) Model or type reference:		P
	Manufacturing location identified:		P
9.1.3	Auxiliary supplies, VT, CT, I/O9	No such device.	-
9.1.3.1	General requirements for marking		-
	For marking the following should be taken into account:		N/A
	a) a.c. – with symbol 2 of Table 9 and rated frequency or frequency range:		N/A
	b) d.c. – with symbol 1 of Table 9 :		N/A
	c) symbol 3 of Table 9 on equipment for a.c. and d.c. supply:		N/A
	d) symbol 4 of Table 9 on equipment for 3 phase a.c. supply:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	e) a hyphen (-) shall be used to separate the lower and upper nominal voltages, for example, 125 V-230V:		N/A
	f) for measurands either a hyphen (-) or an ellipse (…) shall be used to separate the lower and upper voltages:		N/A
	g) for selectable voltage or current markings:		-
	the lower and upper selectable values shall be separated by means of a solidus, i.e. forward slash (/) :		N/A
	voltages or frequencies where switching is automatic then the markings shall be according to symbol 15 of Table 9 or the word “AUTO” :		N/A
	operating voltage achieved using an external, separate device, use +EXT.R.:		N/A
	h) the burden in watts (active power) or volt-amperes (apparent power) or the rated input current, with all accessories or plug-in modules connected:		N/A
	The documentation shall specify the burden:		N/A
	The measured value shall not exceed the marked value by more than 10 %:		N/A
	i) the rated supply voltage(s) or the rated supply voltage range:		N/A
	voltage range more than 20 % of the mean value:		N/A
	different rated supply voltages:		N/A
9.1.3.2	Auxiliary supply		-
	The following information shall be provided:		-
	a) on the equipment and in the documentation:		N/A
	a.c. and/or d.c. supply:		N/A
	the rated values:		N/A
	b) in the documentation:		N/A
	the burden:		N/A
9.1.3.3	Measurands		-
	The following information shall be provided:		N/A
	a) on the equipment and in the documentation:		N/A
	the nominal values, for example, voltage, current, frequency:		N/A
	b) in the documentation:		N/A
	the burden:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	the overload withstand:		N/A
9.1.3.4	Inputs		-
	The following information shall be provided in the documentation:		N/A
	a) a.c. and/or d.c. supply:		N/A
	b) the rated values:		N/A
	c) burden on the supply input:		N/A
9.1.3.5	Outputs		-
	The following information shall be provided in the documentation:		N/A
	a) the kind of output, for example, relay, optocoupler etc:		N/A
	b) burden on the supply input:		N/A
	c) the switching capability on/off:		N/A
	d) the switching voltage:		N/A
	e) the permissible current, continuous value and short time value for 1s:		N/A
	f) withstand voltage across open contacts:		N/A
9.1.4	Fuses	No such device used.	-
	Operator replaceable fuse marking:		N/A
	Not replaceable by the user:		N/A
9.1.5	Measuring circuit terminals		-
	Marking shall be adjacent to the measuring terminals:		N/A
	If insufficient space, symbol 14 used:		N/A
	Symbol 14 and/or 12 of Table 9:		N/A
	Voltage 33 V a.c. or 70 V d.c		N/A
	Exceptions:		N/A
9.1.6	Terminals and operating devices		-
	Safety markings:		P
	AC or d.c. supply:		P
	Operating device markings:		P
	Functional earth terminals:		N/A
	Protective conductor terminals:		P
	Marking place:		P
	Plug/socket device:		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Marking for accessible terminals:		P
	Marking for lasers or high-intensity infra-red diodes of class 2 rating or higher:		N/A
9.1.7	Equipment protected by double or reinforced insulation:		N/A
9.1.8	Batteries		-
9.1.8.1	Replaceable batteries:	No battery used.	N/A
	Battery accessible to the user:		N/A
	Battery not accessible to the user:		N/A
	Polarity of the battery:		N/A
9.1.8.2	Charging:		N/A
9.1.9	Test voltage marking:		N/A
9.1.10	Warning markings		-
	Rack- or panel-mounted equipment:	Wall mounted equipment.	P
	Access in normal use:		P
	Equipment documentation:		P
	Batteries:		N/A
	Warning markings size:		N/A
9.1.11	Marking durability:		P
9.2	Documentation		-
9.2.1	General:		P
	Explanation of warning symbols:		P
	Protective conductor connections:		P
	Equipment ratings, operating instructions and installation instructions:		P
	Information specified in 9.2.2 to 9.2.5:		P
	Intended use:		P
9.2.2	Equipment ratings	See rating label	-
9.2.2.1	General		P
	Overvoltage category:	OVC III for MAINS; OVC II for PV	P
	Rated voltage(s) or voltage range(s) (V) :		P
	Rated frequency or rated frequency range (Hz) :		P
	Rated power (W) rated current (mA or A) :		P
	Nominal functional value:		P
	Input and output connections:		P

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Clause	Requirement + Test	Result - Remark	Verdict
9.2.2.2	Fuses and external protective devices		-
	Fuse ratings:		N/A
	External device:	According to user manual the circuit breaker should use in final Installation.	P
9.2.2.3	Environmental requirement		-
	IP rating:	IP65	P
	Pollution degree:	PD2 (Inside); PD3 (Outside)	P
	Insulation class:	Class I	P
9.2.3	Equipment installation		-
	Safe mounting:		P
	Protective earthing		P
	Ventilation requirements:		P
	Digital input circuits and output relays:		N/A
	Wire:		P
	External devices:		P
9.2.4	Equipment commissioning and maintenance		-
	Fault-finding and repair:		P
	Equipment part:		P
	Safe methods for changing and disposal of:		-
	Accessible fuses:		N/A
	Replaceable batteries:		N/A
	Re-charging and/or replacement for re-chargeable batteries:		N/A
	Fibre-optic output devices:		N/A
9.2.5	Equipment operation		-
	Operating instructions:		-
	CT circuits:		N/A
	Responsibility of the user:		P
	pictures and symbols used:		P
9.3	Packaging		P

10	**Type tests and routine tests**		-
10.1	General:		P
10.2	Safety type tests:		P

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Clause	Requirement + Test	Result - Remark	Verdict
10.3	Routine testing or sample testing:		N/A
10.4	Conditions for testing:	Considered.	P
10.5	Verification procedure:	Considered.	P
10.6	Tests		-
10.6.1	Climatic environmental tests		-
10.6.1.1	Dry-heat test – operational. Tests according to IEC 60255-1		P
10.6.1.2	Cold test – operational. Tests according to IEC 60255-1		P
10.6.1.3	Dry heat test at maximum storage temperature. Tests according to IEC 60255-1		P
10.6.1.4	Cold test at minimum storage temperature. Tests according to IEC 60255-1		P
10.6.1.5	Damp-heat test. Tests according to IEC 60255-1		P
10.6.1.6	Cyclic temperature with humidity test. Tests according to IEC 60255-1		P
10.6.2	Mechanical tests	See attachment 1: Vibration, Shock, Bump, Seismic test report	-
10.6.2.1	Vibration Tests according to IEC 60255-21-1		P
10.6.2.2	Shock Tests according to IEC 60255-21-2:		P
10.6.2.3	Bump Tests according to IEC 60255-21-2:		P
10.6.2.4	Seismic Tests according to IEC 60255-21-3:		P
10.6.2.5	Accessible parts test	(See clause 5.1.5)	P
10.6.2.6	Dust/water ingress protection Tests according to IEC 60529:	IP65	P
10.6.3	Clearances and creepage distances		-
	Complance with Annex C:	(see appended table 10.6.3)	P
	Compliance with clause 5.1.10.2.2:	(see appended table 10.6.3)	P
	Transient suppressor used to reduce the overvoltage. Tests according to IEC 60255-26:		N/A
10.6.4	Safety-related electrical tests		-

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Clause	Requirement + Test	Result - Remark	Verdict
10.6.4.1	General:		P
10.6.4.2	Impulse voltage test		-
10.6.4.2.1	General:		P
10.6.4.2.2	Test procedures:		P
10.6.4.2.3	Waveform and generator characteristics:		P
10.6.4.2.4	Selection of impulse test voltage:		P
10.6.4.2.4.1	General:		P
	Altitudes(m) :		P
10.6.4.2.4.2	Equipment to tested at 5 kV peak nominal		P
10.6.4.2.4.3	Equipment to tested at 1 kV peak nominal		N/A
	auxiliary (power supply) circuits:		P
	equipment power supply:		P
	I/O circuits:		P
10.6.4.2.5	Performing of tests		P
	test performed between the followings part:	(see appended table 10.6.4.2)	P
	between each circuit specified for the same impulse voltage:		P
	between independent circuits:		P
	across the terminals of a given circuit:		P
	Equipment with an insulated case:		P
10.6.4.2.6	Test acceptance criteria		-
	During the tests:		P
	After the tests:		P
10.6.4.2.7	Repetition of the impulse voltage test:		P
10.6.4.3	AC or d.c. dielectric voltage test		-
10.6.4.3.1	General:		P
10.6.4.3.2	Performing the dielectric voltage test:	(see appended table 10.6.4.3)	-
10.6.4.3.2.1	Type tests		-
	test performed between the followings part:		P
	between each circuit and the accessible conductive parts:		P
	between independent circuits:		P
	dielectric voltage withstand, for open metallic contacts:		P

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Clause	Requirement + Test	Result - Remark	Verdict
10.6.4.3.2.2	Routine tests:		N/A
10.6.4.3.2.3	Routine tests by sampling:		N/A
10.6.4.3.3	Value of the dielectric test voltage:		P
10.6.4.3.4	Test voltage source:		P
10.6.4.3.5	Test method:		P
10.6.4.3.6	Test acceptance criteria:		P
10.6.4.3.7	Repetition of the dielectric voltage test:		P
10.6.4.4	Insulation resistance:	(See appended table 10.6.4.4)	P
10.6.4.5	Protective bonding tests	(See appended table 10.6.4.5)	P
10.6.5	Electrical environment and flammability		-
10.6.5.1	Maximum temperature of parts and materials:		P
10.6.5.2	Flammability of insulating materials, components and fire enclosures:		N/A
10.6.5.3	Thermal short-time test		-
	Overvoltage:		N/A
	Overcurrent:		N/A
10.6.5.4	Output relay parameters Parametres in according to IEC 60255-26:		N/A
10.6.5.5	Single-fault condition:		N/A
10.6.6	Reverse polarity and slow ramp test:	(See appended table 5.2)	P

A	**ANNEX A, ISOLATION CLASS REQUIREMENTS AND EXAMPLE DIAGRAMS (NORMATIVE) (see 5.1.2; 5.1.6.2; 5.1.10)**	**P**

B	**ANNEX B, RATED IMPULSE VOLTAGES (NORMATIVE) (see 5.1.2.2)**	**P**

C	**ANNEX C, GUIDANCE FOR THE DETERMINATION OF CLEARANCE, CREEPAGE DISTANCE AND WITHSTAND VOLTAGES (NORMATIVE) (see 5.1.2.2; 5.1.4; 5.1.10; 10.6.3)**	**P**

D	**ANNEX D, COMPONENTS (INFORMATIVE) (see 7.4.1; 8.3; 8.7.1)**	**P**

E	**ANNEX E, EXTERNAL WIRING TERMINATIONS (NORMATIVE) (see 6.3)**		-
E.1	General		P
E.2	Permanently connected equipment		P
	a) a set of terminals; or		P
	b) a non-detachable power supply cable.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	terminals:		P
	screws and nuts:		P
	power supply cables:		N/A
	a) two independent fixings:		N/A
	b) mechanical fixing of the cables:		N/A
E.3	Conductors		N/A
	Connection of conductors in compliance with Table E1. :		N/A
E.4	Terminals		P
	Contact pressure size in compliance with Table E2. :		P
	Terminals contact pressure:		P
	Slipping of the conductor:		P
	Terminals shall be so fixed that when the means of clamping the conductor is tightened or loosened:		P
	a) the terminal itself does not work loose:		P
	b) internal wiring is not subjected to stress:		P
	Ordinary non-detachable power supply cables:		N/A
	c) creepage distances and clearances are not reduced below the values specified in Annex C. :		P

F	**ANNEX F, EXAMPLES OF BATTERY PROTECTION (INFORMATIVE) (see 8.7.2.2)**	**N/A**

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

5.2	**TABLE: Fault condition tests**						**P**
Component No.	Fault	Supply voltage (V)	Test time	Fuse #	Fuse current (A)	Comments/ Observation	
Control board CD-U2							
CY3	s-c	600	1min	--	--	PCE Shutdown, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18 damaged. No hazard.	
EC2	s-c	600	1min	--	--	PCE Shutdown, C43, C44 damaged. No hazard.	
R131	s-c	600	1min	--	--	LCD displays ‘ID27’ for three times and than displays ‘ID69’. Recoverable. No hazard, no damaged.	
R132	s-c	600	1min	--	--	LCD displays ‘ID27’ for three times and than displays ‘ID69’. Recoverable. No hazard, no damaged.	
R150	s-c	600	1min	--	--	LCD displays ‘ID27’ for three times and than displays ‘ID69’. Recoverable. No hazard, no damaged.	
R151	s-c	600	1min	--	--	LCD displays ‘ID27’ for three times and than displays ‘ID69’. Recoverable. No hazard, no damaged.	
C3	s-c	600	1min	--	--	LCD displays ‘ID02’. Recoverable. No hazard, no damaged.	
R21	s-c	600	1min	--	--	Work as normal. No hazard, no damaged.	
R20	o-c	600	1min	--	--	Work as normal. No hazard, no damaged.	
R27	s-c	600	1min	--	--	LCD displays ‘ID24’ for three times and than displays ‘ID67’. Recoverable. No hazard, no damaged.	
R26	o-c	600	1min	--	--	LCD displays ‘ID02’. Recoverable. No hazard, no damaged.	
R33	s-c	600	1min	--	--	LCD displays ‘ID24’ for three times and than displays ‘ID67’. Recoverable. No hazard, no damaged.	
R32	o-c	600	1min	--	--	LCD displays ‘ID02’. Recoverable. No hazard, no damaged.	
R39	s-c	600	1min	--	--	LCD displays ‘ID24’ for three times and than displays ‘ID67’. Recoverable. No hazard, no damaged.	
R38	o-c	600	1min	--	--	LCD displays ‘ID02’. Recoverable. No hazard, no damaged.	
R45	s-c	600	1min	--	--	LCD displays ‘ID27’. Recoverable. No hazard, no damaged.	
R44	o-c	600	1min	--	--	LCD displays ‘ID27’. Recoverable. No hazard, no damaged.	

IEC 60255-27							
Clause	Requirement + Test					Result - Remark	Verdict
C112	s-c	600	1min	--	--	The monitor shutdown. Recoverable. No hazard, no damaged.	
CY5	s-c	600	1min	--	--	Work as normal. No hazard, no damaged.	
R246	s-c	600	1min	--	--	LCD displays ‘ID27’. Recoverable. No hazard, no damaged.	
R271	s-c	180	1min	--	--	The EUT cannot start, LCD displays “ID56’. Recoverable. No hazard, no damaged.	
R269	s-c	180	1min	--	--	The EUT cannot start, LCD displays “ID56’. Recoverable. No hazard, no damaged.	
R268	o-c	180	1min	--	--	The EUT cannot start, LCD displays “ID56’. Recoverable. No hazard, no damaged.	
R283	s-c	180	1min	--	--	The EUT cannot start, LCD displays “ID56’. Recoverable. No hazard, no damaged.	
R282	o-c	180	1min	--	--	The EUT cannot start, LCD displays “ID56’. Recoverable. No hazard, no damaged.	
R88	s-c	600	10min	--	--	PCE makes noisy. No hazard, no damaged.	
R90	s-c	600	10min	--	--	PCE makes noisy. No hazard, no damaged.	
R201	s-c	600	1min	--	--	LCD displays ‘ID52’. Recoverable. No hazard, no damaged.	
R214	s-c	600	1min	--	--	LCD displays ‘ID52’. Recoverable. No hazard, no damaged.	
Q25 pin1-2	s-c	600	1min	--	--	LCD displays ‘ID52’. Recoverable. No hazard, no damaged.	
R50	s-c	500	1min	--	--	PCE Shutdown, U1 damaged. No hazard.	
R47	s-c	500	1min	--	--	PCE Shutdown, no damaged. No hazard.	
C20	s-c	600	1min	--	--	PCE Shutdown, D1, D3 damaged. No hazard.	
R167	s-c	600	1min	--	--	LCD displays ‘ID24’. Recoverable. No hazard, no damaged.	
RL1 Pin3-4	s-c	600	1min	--	--	The EUT cannot start, LCD displays “ID55’. Recoverable. No hazard, no damaged.	
RL3 Pin3-4	s-c	600	1min	--	--	The EUT cannot start, LCD displays “ID55’. Recoverable. No hazard, no damaged.	

IEC 60255-27							
Clause	Requirement + Test					Result - Remark	Verdict
RL5 Pin3-4	s-c	600	1min	--	--	The EUT cannot start, LCD displays “ID55’. Recoverable. No hazard, no damaged.	
C394	s-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID53’. Recoverable. No hazard, no damaged.	
RC609	s-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID53’. Recoverable. No hazard, no damaged.	
RC649	o-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID53’. Recoverable. No hazard, no damaged.	
CC209	s-c	600	1min	--	--	PCE Shutdown, Q9 damaged. No hazard.	
CC224	s-c	600	1min	--	--	PCE Shutdown, Q12 damaged. No hazard.	
CC234	s-c	600	1min	--	--	PCE Shutdown, Q15 damaged. No hazard.	
CC243	s-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID53’. Recoverable. No hazard, no damaged.	
CC207	s-c	600	1min	--	--	PCE Shutdown, Q7 damaged. No hazard.	
C208	s-c	600	1min	--	--	PCE Shutdown, Q8 damaged. No hazard.	
CC222	s-c	600	1min	--	--	LCD displays ‘ID55’. Recoverable. No hazard, no damaged.	
UC609A Pin4-5	s-c	600	1min	--	--	Work as normal. No hazard, no damaged.	
UC637 Pin12-13	s-c	600	1min	--	--	Work as normal. No hazard, no damaged.	
UC634 pin5-6	s-c	600	1min	--	--	Work as normal. No hazard, no damaged.	
CC132	s-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID49’. Recoverable. No hazard, no damaged.	
Qc40 D-S	s-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID14’. Recoverable. No hazard, no damaged.	
RC459	s-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID59’. Recoverable. No hazard, no damaged.	
RL6	s-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID55’. Recoverable. No hazard, no damaged.	
RL4	s-	600	1min	--	--	PCE Shutdown, LCD displays ‘ID55’. Recoverable. No hazard, no damaged.	
RL	s-c	600	1mi	--	--	PCE Shutdown, LCD displays ‘ID55’. Recoverable. No hazard, no damaged.	
R162	s-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID24’. Recoverable. No hazard, no damaged.	
R177	o-c	60	1min	--	--	PCE Shutdown, LCD displays ‘ID24’. Recoverable. No hazard, no damaged.	
R187	o-c	600	1min	--	--	PCE Shutdown, LCD displays ‘ID24’. Recoverable. No hazard, no damaged.	

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
s-c: short-circuited, o-c: open-circuited, o-l: overload. During the test:

The tests are conducted on the model Hiverter Si-12K to represent all the other models. The unit passed 2120Vdc electric strength test between primary and accessible output connector, 2120Vdc between input & output to earth after single fault test above.

7.3	**TABLE: Heating Test**				**P**
	Test voltage (V)..... :		-		**—**
	Ambient (ºC) .....:		-		**—**
Thermocouple Locations	**Max. temperature measured, (ºC)**				**Max. temperature limit, (ºC)**
Test Condition	Test 1	Test 2	Test 3	Test 4	--
PV input terminal	60.4	70.8	61.6	69.8	85
DC Switch	55.5	68.3	56.3	66.8	85
Internal wire to the input terminal	60.4	70.9	63.5	70.7	105
Cap C116	59.3	70.3	59.9	68.7	85
Inductor L7	72.2	79.5	76.9	82.1	85
Cap C117	71.8	79.6	74.5	80.7	85
Cap C113	70.1	78.1	72.9	79.8	85
Y-cap CY8	71.0	80.0	72.6	79.2	105
Body of U13	75.0	82.2	79.0	84.8	105
Q16	91.5	91.9	78.2	85.6	130
Internal ambient	74.7	81.9	78.4	84.2	Ref.
Boost inductor 1	77.2	82.4	91.0	94.8	110
Boost inductor 2	83.3	87.8	96.0	99.7	110
Q2	73.8	85.4	102.2	108.5	130
D1	84.7	97.3	103.3	110.6	130
D3	86.3	99.1	102.0	109.3	130
Q6	78.6	91.3	109.9	117.0	130
Q18	98.0	111.6	103.6	111.4	130
Q12	89.2	101.8	86.6	94.3	130
Q15	88.3	100.9	84.2	92.0	130
Q9	100.0	114.1	99.2	107.8	130
Q13	88.5	103.6	80.3	87.5	130
Q10	87.0	102.2	78.6	85.9	130
Q11	86.0	100.6	78.4	85.7	130
Q14	84.5	99.4	78.3	85.8	130

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

Q8	88.3	102.5	87.6	95.1	130
C4	73.1	81.2	71.8	79.0	85
Main inductor	109.1	109.3	99.3	103.4	110
Q7	76.4	89.6	74.2	82.3	130
Q17	94.3	109.9	92.3	99.9	130
C71	93.2	97.3	86.4	91.7	105
L1	100.3	104.1	99.3	104.1	110
C70	92.8	96.4	85.9	91.0	105
Ambient of Relay RL3	78.5	81.5	79.6	80.6	85
L2	91.4	97.1	89.7	95.5	110
Cap EC4	74.1	80.5	73.4	79.9	85
Cap EC1	72.8	79.7	71.6	78.3	85
Cap C8	63.7	74.9	63.9	71.4	85
Cap C6	73.1	79.5	72.0	78.6	85
Ambient of Relay RL7	72.5	76.1	76.3	76.7	85
MOV4	68.3	77.9	68.0	75.1	85
Internal wire to the output	59.1	70.0	59.1	67.6	105
U1	85.8	92.5	83.6	89.7	105
UT3	66.0	77.2	66.1	74.4	130
Button	61.5	66.5	62.0	64.5	85
Heatsink	67.2	80.8	67.1	75.5	90
CT3	62.0	73.1	62.1	70.7	Ref.
C609	72.0	81.0	73.3	80.2	85
QC5	81.0	91.7	77.0	85.3	Ref.
TC1	67.4	77.6	66.9	75.5	Ref.
UC20	81.3	90.4	82.2	89.3	Ref.
UC73	79.3	88.3	80.0	87.2	Ref.
C313	61.1	72.4	59.5	69.5	85
C57	62.5	72.9	62.8	71.5	95
Middle of the cover	58.7	69.2	58.7	67.7	85
Display	50.9	69.0	51.4	67.5	85
Ambient	46.3	62.0	47.7	62.3	--

Supplementary information:

	Ambient temperature (°C)	Input voltage (Vdc)	Output voltage (Vac)	Output power (W)
Test 1	45	850	230	12000
Test 2	60	850	230	8450
Test 3	45	575	230	12000

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

Test 4	60		575	230	8450
Temperature rise of winding	**R_1 (Ω)**	**R_2 (Ω)**	**ΔT (K)**	**Max. dT (K)**	**Insulation class**
--	--	--	--	--	--
Supplementary information:					

7.6	**TABLE: Flammability of materials and components**				**N/A**
Object/ Part No./ Material	Manufacturer/ trademark	Duration of application of test flame (ta); (s)	Ignition of specified layer Yes/No	Duration of burning (tb) (s)	Verdict
--	--	--	--	--	--
Supplementary information:					

Part	Manufacturer of material	Type of material	Thickness (mm)	Flammability class	Evidence
--	--	--	--	--	--
Supplementary information:					

8.3	**TABLE: Critical components information**				**P**
Object / part No.	**Manufacturer/ trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Whole product					
Metal Enclosure	Xingchengyuan	SPCC	material：SPCC size: 446X 413X136 mm, thickness: 1.5mm	IEC 60255-27	Tested with appliance
Heat sink	Hongxingfu	6063	material：6063 aluminium size:403 X444 X 60 mm, thickness: 10 mm	IEC 60255-27	Tested with appliance

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

LCD screen cover	Jingning	Makrolon:6557	115x93.5x4.4	UL 746D	UL E41613
PV Input terminal	MC	MC4 Series	1000Vdc, 39A,	EN 50521	TUV R60028286 UL E343181
	Amphenol Industrial Operations	Helios H4	Max. 90°C, IP68 1000Vdc, 40A, Max. 90°C, IP68	UL 6703 EN 50521 UL 6703	TUV R50157783 UL E339277
Output terminal	Shanghai Vaconn electronic	VPAC07EW-5S2	400/690Vac, 25A, 90°C	EN 61984	TUV R50243672
PV input switch	Santon	XB3410/2	1000Vdc,16A	EN 60947-3	KEMA 2152871.01
PV input internal wire	Shenzhen WeiHuaXing electronic	12AWG 10AWG	12AWG 105°C, 600V 10AWG 105°C, 600V	UL 758	UL E341104
AC output internal wire	Shenzhen WeiHuaXing electronic	12AWG	12AWG 105°C, 600V	UL 758	UL E341104
Internal wire to input Boost inductor	LTK wire co.,LTD	10AWG	UL1015 600V 105°C	UL 758	UL E148000
	Guangdong Haerkn New energy co.,LTD	10AWG	UL1015 600V 105°C	UL 758	UL E300956
	3Q Wire &Cable co.,LTD	10AWG	UL1015 600V 105°C	UL 758	UL E341104
Internal wire to output inductor	LTK wire co.,LTD	10AWG	UL1015 600V 105°C	UL 758	UL E148000
	Guangdong Haerkn New energy co.,LTD	10AWG	UL1015 600V 105°C	UL 758	UL E300956
	3Q Wire &Cable co.,LTD	10AWG	UL1015 600V 105°C	UL 758	UL E341104
Main output inductor	Huizhou baohui co.,LTD	115-17-016	Class B,0.73mH	IEC 60255-27	Tested with appliance
Main power board					
Y-cap	SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD	CDY112Y5V1D 472MB	4700pF, 400Vac, 125°C	UL 60384-14, IEC 60384-14	UL E208107 VDE 40025754

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

	VISHAY	VY1	4700PF, 500Vac, 125°C	UL 60384-14, IEC 60384-14	UL E183844, VDE 40012673
Boost inductor	Huizhou baohui co., LTD	115-17-017	Class B,2000uH	IEC 60255-27	Tested with appliance
Wire	Shanghai Asia Pacific electric co., LTD	EIW WIRE	180°C	UL 1446	UL E214423
	Tai-I electric wire&cable co., LTD	EIW WIRE	180°C	UL 1446	UL E85640
Input Resonance inductor	Huizhou baohui co., LTD	SH-L026	Class B ,1.05mH	IEC 60255-27	Tested with appliance
Insulation sheet under the inverter transistor	YOUBOER co., LTD	K10	35*47*0.152mm ,V-0,130°C	UL 746C	UL E59150
Output relay Rly1,2	Hong Fa	HF161F-W/12- HT	Air gap 31A/250VAC/12 VDC /85 °C	VDE 0435	VDE 40023067
	PANASONIC	ALFG2PF12	31A/250VAC/12 VDC/85 °C	VDE 0435	VDE 40031410
Output current transducer	LEM	CASR 15-NP	15A/CASR 15- NP	UL508	UL E189713
	VACUUMSCHMELZE GMBH & CO. KG	T60404-N4646- X662	15A/+5V/0.7%/22.2x12.7x24mm	UL508	UL E317483
RCD detective inductor	Huizhou baohui co., LTD	GFCI Module/W539/V AC	GFCI Module/W539/V AC	IEC 60255-27	Tested with appliance
output Varistor RV1, RV2	LITTELFUSE	V1000LA160BP	1000Vac,1200V dc, 85 °C	UL 1414 IEC/EN 61051-1, IEC/EN 61051-2	UL E320116 VDE 116895
	THINKING ELECTRONIC INDUSTRIAL CO., LTD.	TVR20561KSY	1000Vac, 85°C	UL 1414	UL E314979
Output voltage detective resistor	YAGEO	RC1206FR-071M5L	1.5M/1/4W/F/126	IEC 60255-27	Tested with appliance

IEC 60255-27				
Clause	Requirement + Test	Result - Remark		Verdict

Output X cap.	SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD	MPX	X2, 2.2uF, 305Vac	UL 60384-14 IEC 60384-14	UL E208107 VDE 40034679
PCB	SHANTOU LUCKY STAR PCB CO LTD	WS666	130°C, V-0, CTI: min.175	UL796	UL E301869
output inductor L1	Huizhou baohui co., LTD	SH-L004	Class B,2.3mH	IEC 60255-27	Tested with appliance
Wire	Shanghai Asia Pacific electric co., LTD	EIW WIRE	180°C	UL 1446	UL E214423
	Tai-I electric wire&cable co., LTD	EIW WIRE	180°C	UL 1446	UL E85640
	Dongguan Yida industrial co., LTD	EIW WIRE	180°C	UL 1446	UL E344055
Tape	Jingjiang yahua pressure sensitive glue	Tape	180°C	UL 1446	UL E165111
Output gastube	SHENZHEN BENCENT ELECTRONIC CO LTD	B8G1500M	1200-1800Vdc, -40-90°C	UL 1449	UL E337906
Output Y-cap	SHANTOU HIGH-NEW TECHNOLOGY DEVELOPMNT ZONE SONGTIAN ENTERPRISE CO LTD	CY1101KE1IEB 45WSTO	100pF/400Vac, -25-125°C	IEC 60384-14 EN 60384-14	VDE 40025748
Control board					
Isolated transformer TC1	Huizhou baohui co., LTD	ETD39H/PC40	Class B ,3.3mH	IEC 60255-27	Tested with appliance
Wire	Shanghai Asia Pacific electric co., LTD	EIW WIRE	180°C	UL 1446	UL E214423
	Tai-I electric wire & cable co., LTD	EIW WIRE	180°C	UL 1446	UL E85640
Tape	Jingjiang yahua pressure sensitive glue	Tape	180°C	UL 1446	UL E165111

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

Opto coupler UC11, UC12, UC63, UC64, UC67, UC68, UC70, UC71	TOSHIBA	TLP785F	Isolation voltage: 5000Vrms 85 °C External creepage 8mm External clearance 8mm	UL 1577	UL E67349
Supplementary information: [1)] an asterisk indicates a mark which assures the agreed level of surveillance.					

10.6.3	**TABLE: Clearance And Creepage Distance Measurements**					**P**
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
On control board 150-303000-2						
Pri. trace to Sec. of isolated opto- coupler UC70(R)	1000	1000	6.1	8.9	10.0	10.1
Pri. trace to Sec. of isolated Isolated transformer TC1 on PCB(R)	1000	1000	6.1	26.0	10.0	26.0
From Pri. Trace to the meatal enclosure(B)	1000	1000	3.6	8.3	10.0	>10.0
From pri. Trace to erthing screw M4	1000	1000	3.6	6.1	5.0	6.1
On main power board						
From body of cap C19 to erthing terminal SC4 on the PCB(B)	1000	1000	3.6	4.1	5.0	4.1
Trace between Y-cap CY1 (B)	1000	1000	3.6	5.8	5.0	5.8
Trace between Y-cap CY11 (B)	1000	1000	3.6	5.9	5.0	5.9
Trace between Y-cap CY4 (B)	1000	1000	3.6	5.4	5.0	5.4
Trace between Y-cap CY4 (B)	1000	1000	3.6	5.6	5.0	5.6
From Pri. trace to erthing terminal SC5 on the PCB(B)	1000	1000	3.6	5.6	5.0	5.6
From trace of earthing below C3	1000	1000	3.6	5.1	5.0	5.1
From IGBT body to earthed heatsink (B)	1000	1000	3.6	12	10.0	12

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

Body of transistor to the metal enclosure (B)	1000	1000	3.6	5.9	3.2	5.9
From the trace of the main board to the below earthed hetsink(B)	1000	1000	3.6	8.6	10	>10.0
Whole unit						
From transformer of Device board to trace of COM board(R)	1000	1000	6.1	7.2	20.0	>20.0
From the winding of the main inductor to the eathed enclosure (B)	1000	1000	3.6	11.0	10.0	>10.0

Supplementary information:

F=functional insulation, B=basic insulation, S=supplementary insulation, R=reinforced insulation. When determine the clearance:

For DC input circuits: Overvoltage Category II applied(impulse withstand voltage 4000V)

For AC output circuits (connected to AC mains): Overvoltage Category III applied (impulse withstand voltage 4000V, temporary overvoltage 2120Vpeak considered.)

Interpolation is used.

For reinforced insulation: 4000V applied.

Requirement about creepage distances for main battery discharging transformer and for the distance to the metal enclosure come from columns 7 and 8 of Table 14. Requirement about creepage distances for other parts come from column 3 of table 14.

PCB with min. CTI 175 used.

10.6.4.2/ 10.6.4.3	**TABLE: Impulse voltage test/Dielectric Strength**	**P**

Test voltage applied between:	impulse withstand voltage (kV) 1.2/50 µs	Test voltage (Vdc)	Breakdown / flashover (Yes/No)
PV input terminals to metal enclosure	6.0	2120	No
AC output terminals to metal enclosure	6.0	2120	No
PV input terminals to communication ports	8.0	4240	No
AC output terminals to communication ports	8.0	4240	No
PV input terminals to LCD screen	8.0	4240	No
AC output terminals to LCD screen	8.0	4240	No

Supplementary information:

Based on the system voltage 1000V for DC input and 230V L to N for AC mains.

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

10.6.4.4	**TABLE: insulation resistance measurements**		**P**
Insulation resistance R between:	R (MΩ)	Required R (MΩ)	
Between mains poles (primary fuse disconnected)	>100	10	
Between parts separated by basic or supplementary insulation	>100	10	
Between parts separated by double or reinforced insulation	>100	10	
Supplementary information:			

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

Attachment 1: Vibration, Shock, Bump, Seismic test report

LCJC-JL-708-02 A/0

Report No.: LCJC201902005YW003-1
Date Issued: Nov. 12, 2019

苏州茏测检测技术服务有限公司

Suzhou Longce Testing Technology Service Co., Ltd.

检 测 报 告

Test Report

Test Items: Vibration ,Shock, Bump, Seismic test

Sample Name: PV Inverter

Consigner: DEKRA Testing and Certification (Shanghai) Ltd.

Test Type: Entrust Test

Prepared By: Yao Jun **Checked By:** zhang baike **Approved By:** Li Jianxian

Authorized signatory

Suzhou Longce Testing Technology Service Co., Ltd.
http://www.szlcjc.com

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

LCJC-JL-708-02 A/0

1. GENERAL INFORMATION

Equipment Under Test (EUT)	PV Inverter
Model	Hiverter Si-3.3K, Hiverter Si-4.4K, Hiverter Si-5K, Hiverter Si-5.5K，Hiverter Si- 6.6K，Hiverter Si-8.8K，Hiverter Si-11K，Hiverter Si-12K
Quantity of Tested Samples	1 PCS
Samples Code	LCJC2019021400203
Entrust unit name	DEKRA Testing and Certification (Shanghai) Ltd.
Entrust unit address	3F, #250 Jiangchangsan Road, Building 16, Headquarter Economy Park Shibei Hi-Tech Park, Zhabei District, Shanghai 200436, China
Manufacture unit name	Hitachi Hi-Rel Power Electronics Pvt. Ltd.
Manufacture unit address	SM 3 & 4, Sanand – II GIDC, Industrial Estate, Boll Village, Sanand – 382 110, Gujarat, India.
Sample delivery personnel information	Stone.Wang@dekra.com
Sample status	Conform to the requirements of the test
Received the sample date	Feb. 14, 2019
Test date	Feb. 18, 2019～Feb. 20, 2019
Test standard	IEC 60255-27:2013 Measuring relays and protection equipment - Part 27: Product safety requirements; IEC60255-21-1:1988 Vibration, shock, bump and seismic tests on measuring relays and protection equipment. Section 1 : Vibration tests (sinusoidal) ; IEC60255-21-2:1988 Vibration, shock, bump and seismic tests on measuring relays and protection equipment. Section 2: Shock and bump tests; IEC60255-21-3:1993 Vibration, shock, bump and seismic tests on measuring relays and protection equipment. Section 3: Seismic tests.
Test engineer	LiZhen
Temperature	25±5℃
Humidity	<70%RH

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

2. TEST ITEMS AND RESULT

No.	Test Item	Test Information	Test Result	Verdict
1	Vibration response test	1.Frequency: 10～150Hz; 2.Cross-over Frequency: 58～60Hz; 3.Peak Displacement: 0.035mm; 4.Acceleration: 0.5g; 5.Cycle Time: 8min /axis; 6.Direction: X, Y, Z axis.	The appearance of the sample was normal.	Pass
	Vibration endurance test	1.Frequency: 10～150Hz; 2.Acceleration: 1g; 3.Cycle Time: 8min /axis, total 20 cycles/axis; 4.Direction: X, Y, Z axis.	The appearance of the sample was normal.	Pass
2	Shock response test	1.Acceleration: 5g; 2.Duration: 11ms; 3.Times: 3times/direction, total 18times. 4.Direction: ±X, ±Y, ±Z axis.	The appearance of the sample was normal.	Pass
	Shock withstand test	1.Acceleration: 15g; 2.Duration: 11ms; 3.Times: 3times/direction, total 18times. 4.Direction: ±X, ±Y, ±Z axis.	The appearance of the sample was normal.	Pass
3	Bump test	1.Acceleration: 10g; 2.Duration: 16ms; 3.Number: 1000 times/direction; 4.Direction: ±X, ±Y, ±Z axis.	The appearance of the sample was normal.	Pass
4	Seismic test	1.Frequency: 1～35Hz; 2.Cross-over Frequency: 8～9Hz; 3.Horizontal (X, Y) : Peak Displacement: 3.5mm; Acceleration: 1.0g; 4.Vertical (Z) : Peak Displacement: 1.5mm; Acceleration:0.5g; 5.Cycle Time: 10min /axis; 6.Direction: X, Y, Z axis.	The appearance of the sample was normal.	Pass

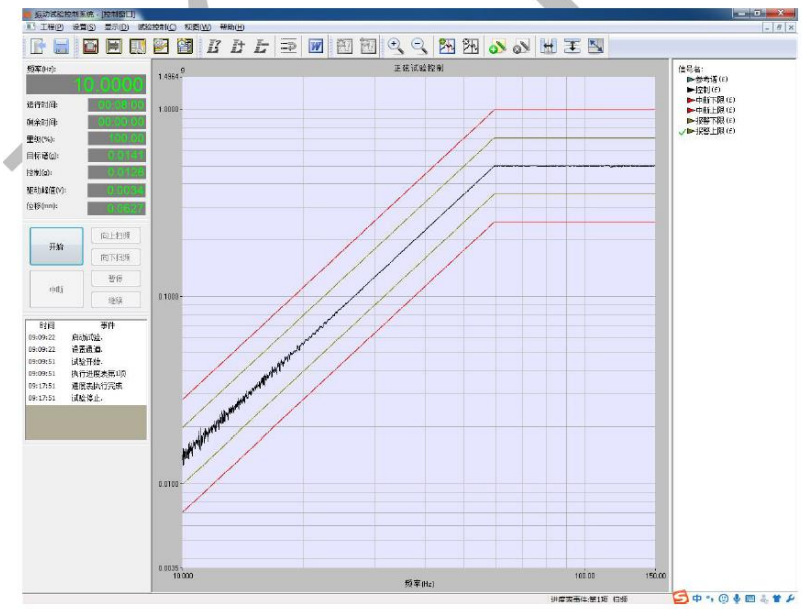
Remark:
The tests were performed on model Hiverter Si-12K and the test result are also applicable for all other models stated in this report due to they have same hardware and construction enclosure.

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

3. TEST SAMPLE PICTURES

Sample Picture before test

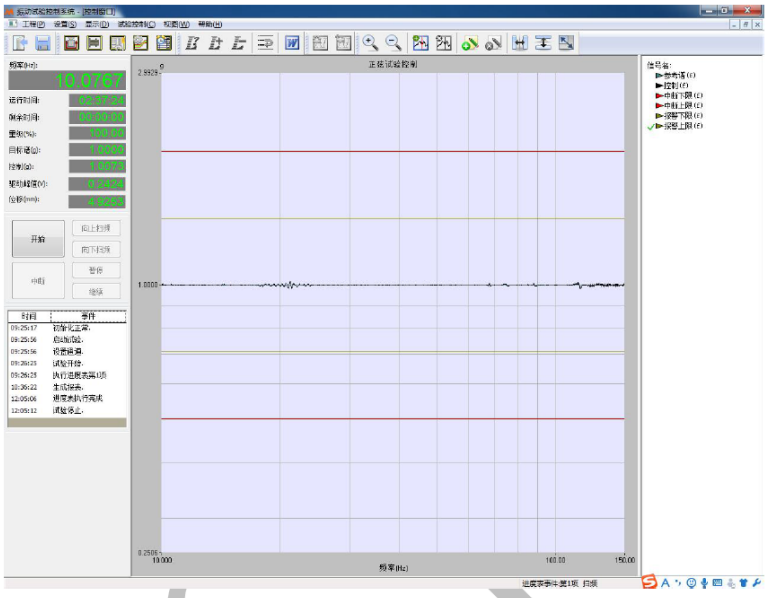
The curves of vibration response test (Z-axis)



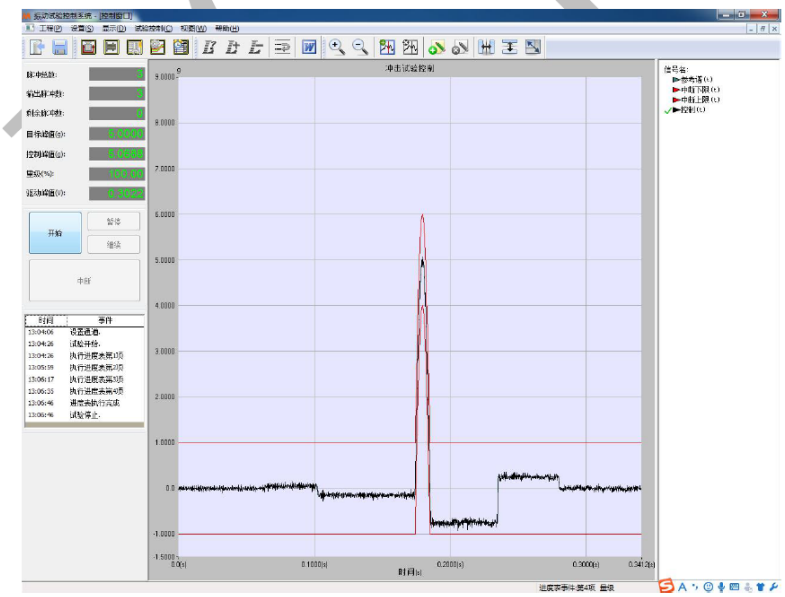
IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

LCJC-JL-708-02 A/0

The curves of vibration endurance test(Z-axis）

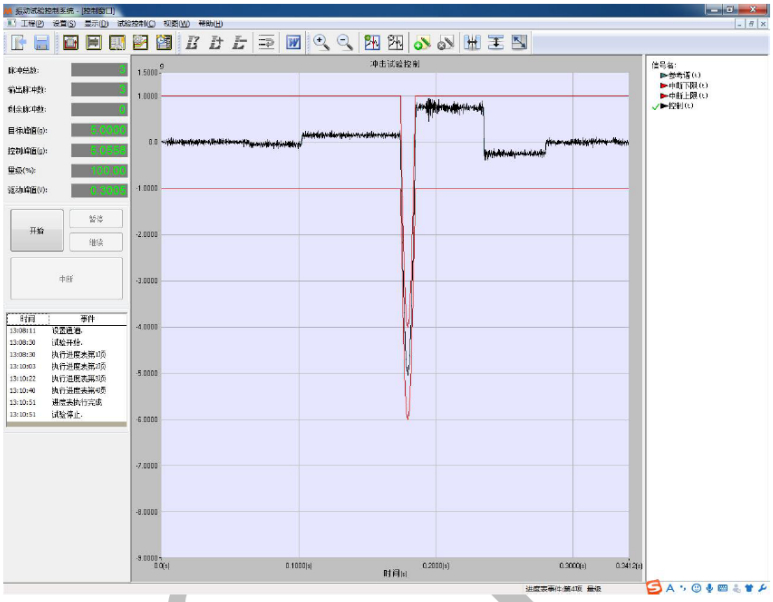


The curve of shock response test (+Z-axis）

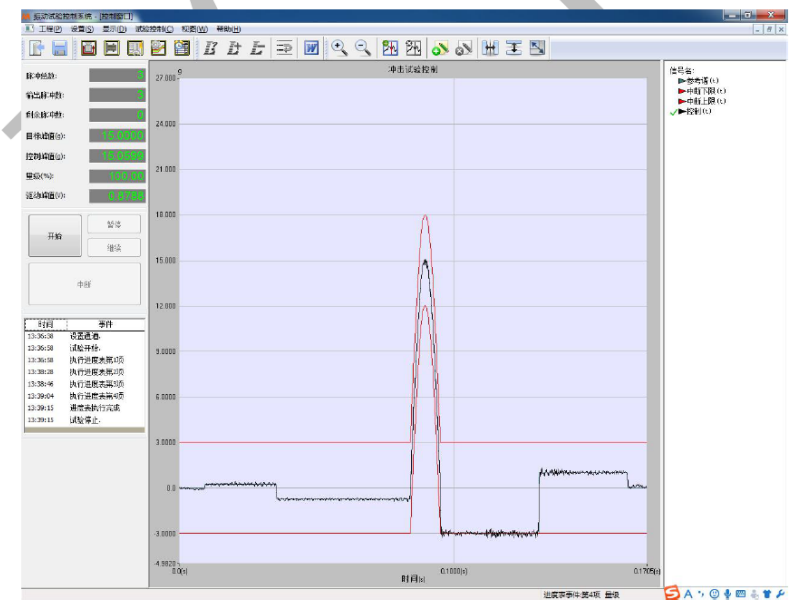


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curve of shock response test (-Z-axis)

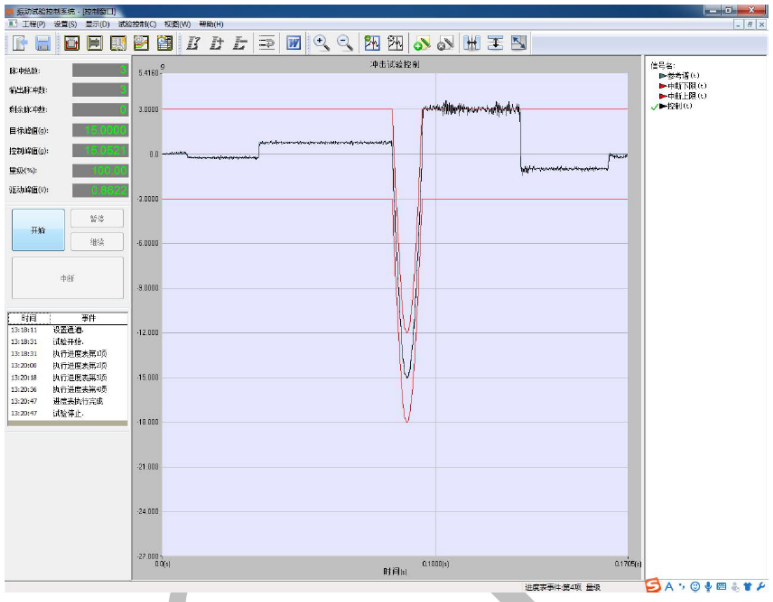


The curve of shock withstand test (+Z-axis)

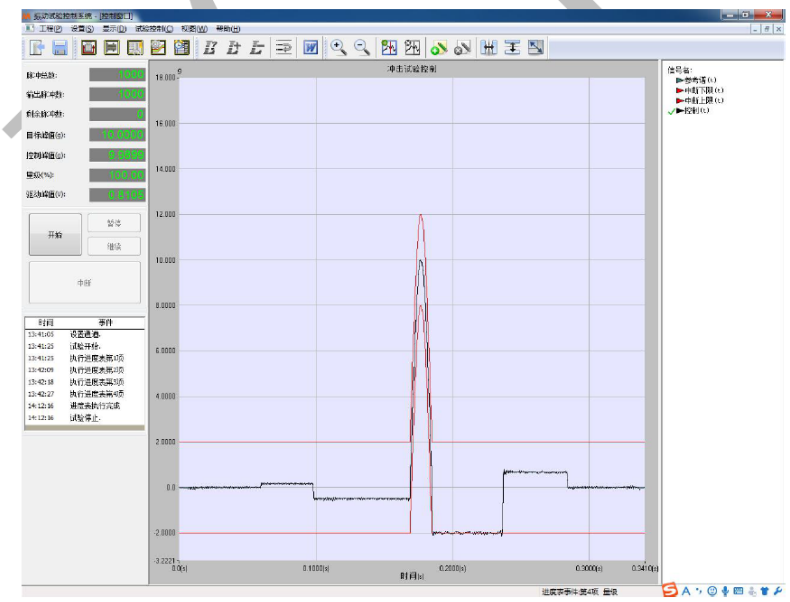


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curve of shock withstand test (-Z-axis)

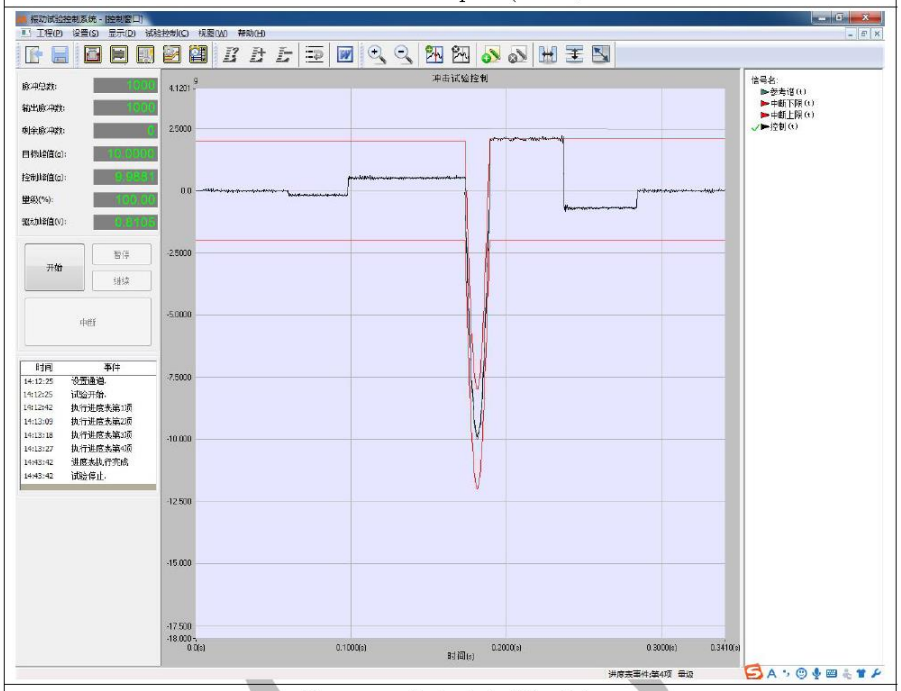


The curves of bump test (+Z-axis)

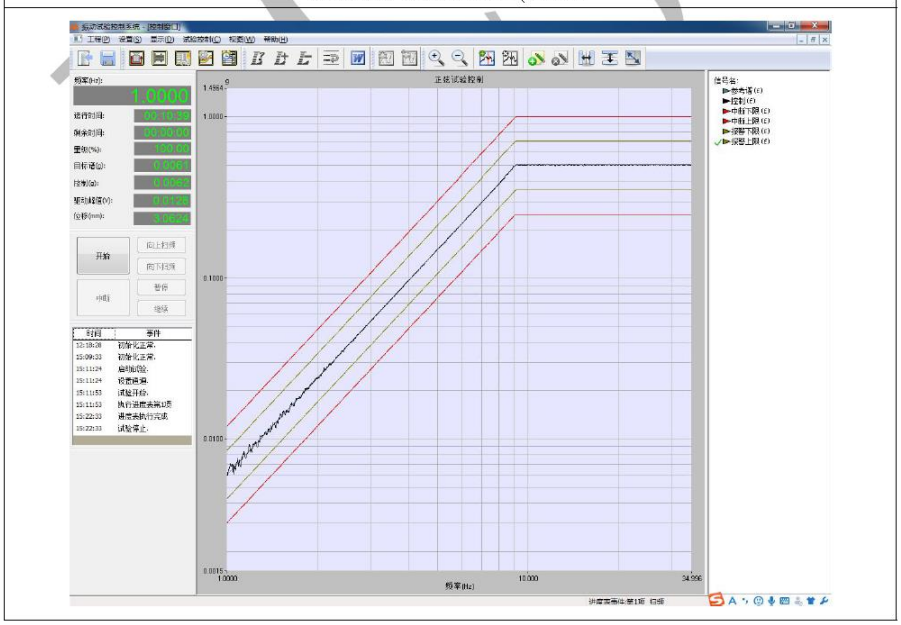


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curves of bump test (-Z-axis）

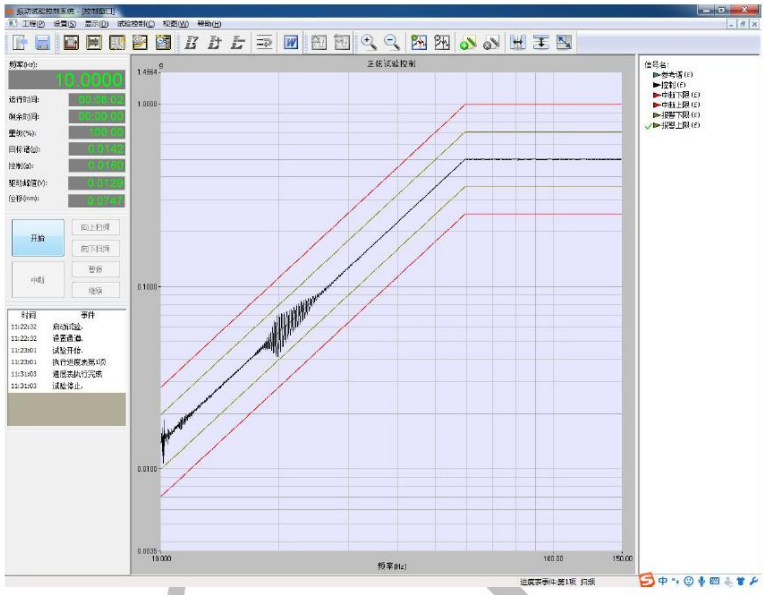


The curves of seismic test(Z-axis）

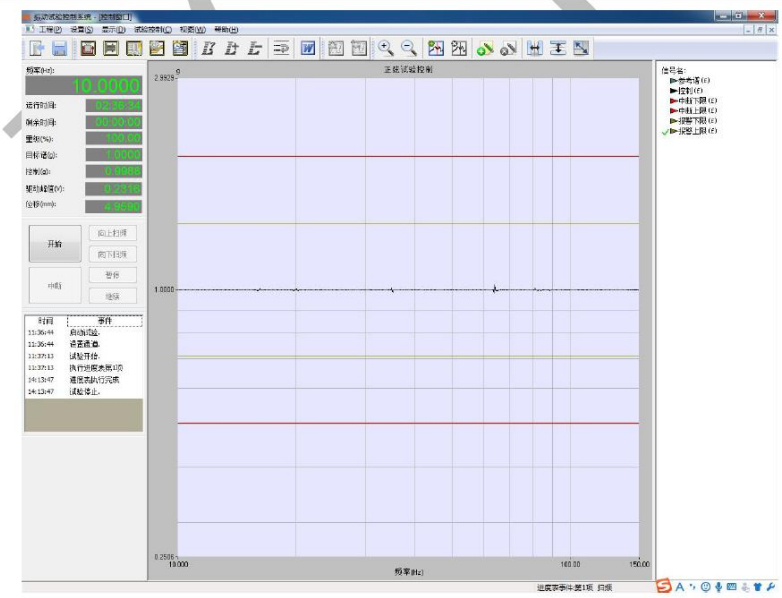


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curve of vibration response test (X-axis)

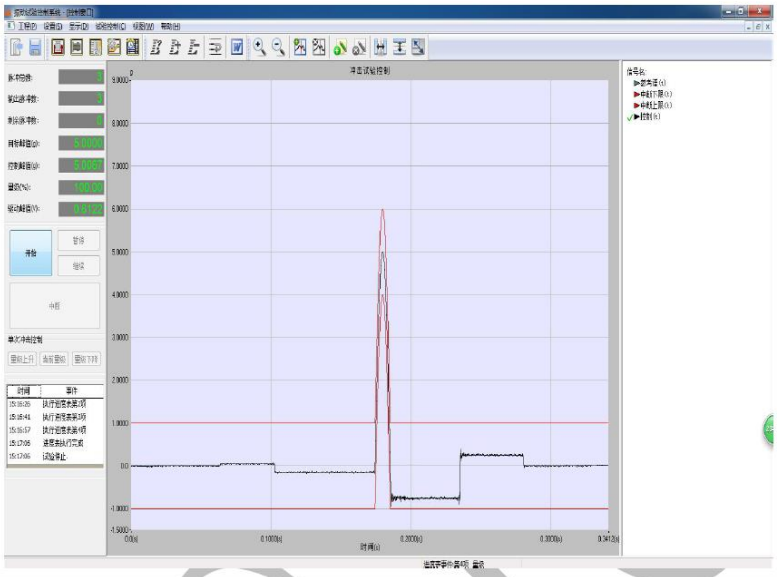


The curve of vibration endurance test(X-axis)

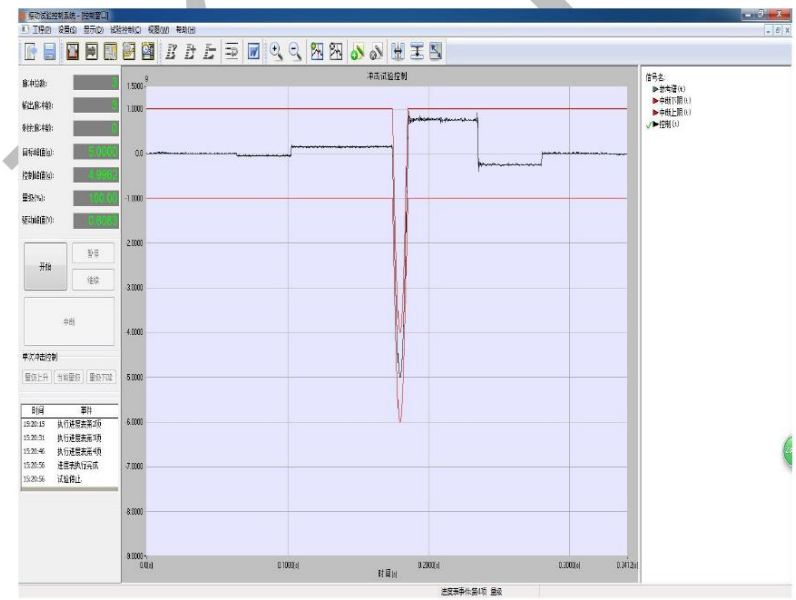


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curve of shock response test (+X-axis)

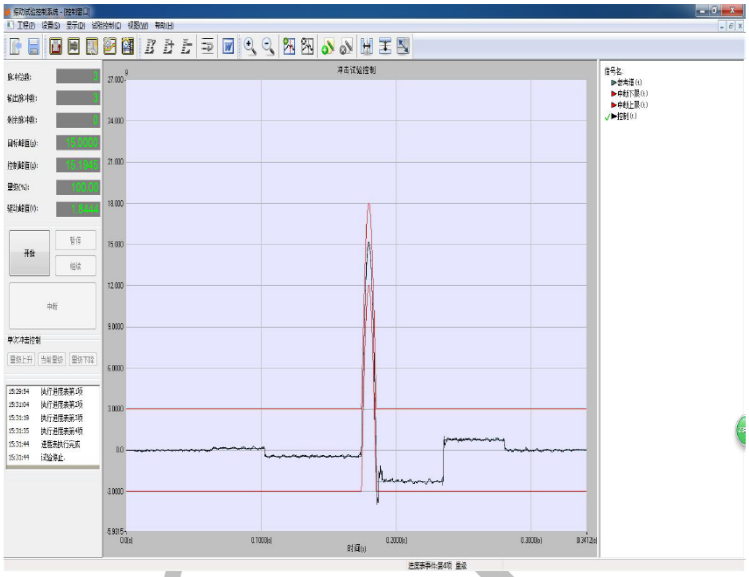


The curve of shock response test (-X-axis)

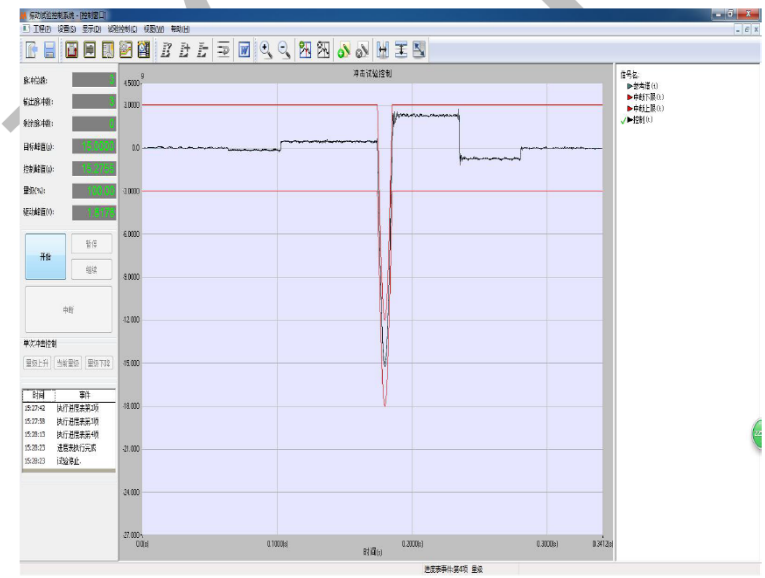


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curve of shock withstand test (+X-axis)

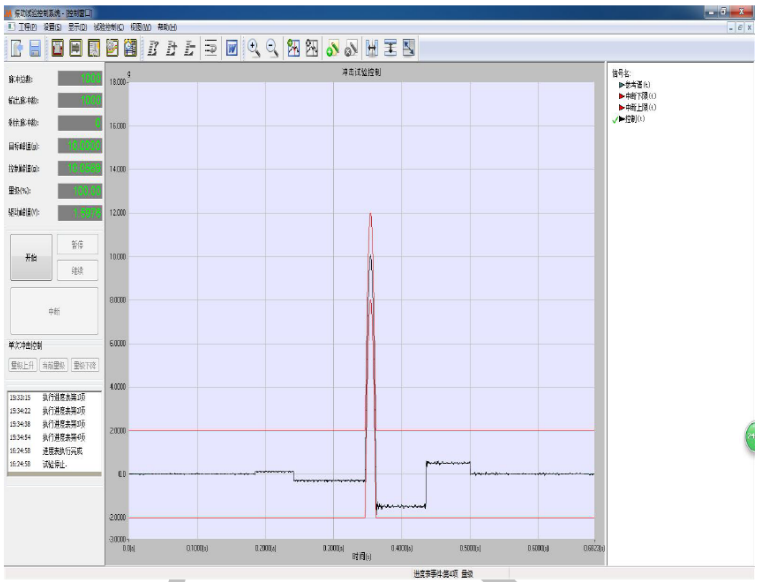


The curve of shock withstand test (-X-axis)

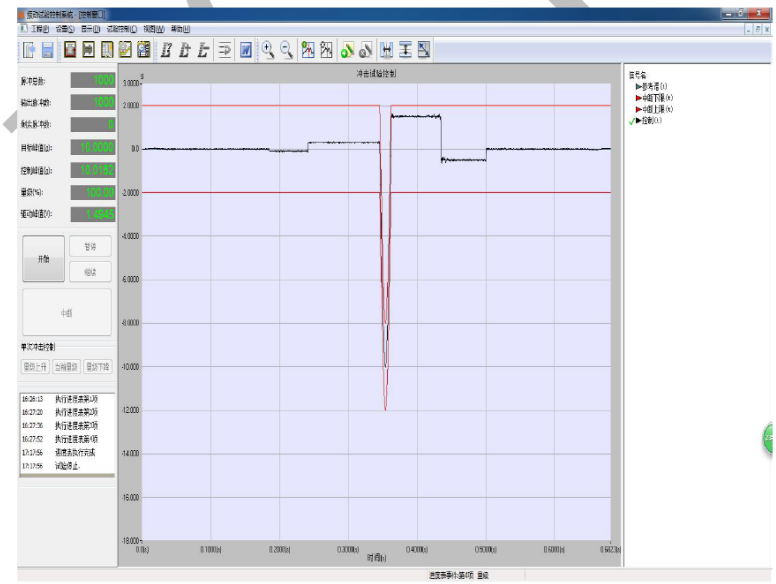


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curves of bump test (+X-axis)

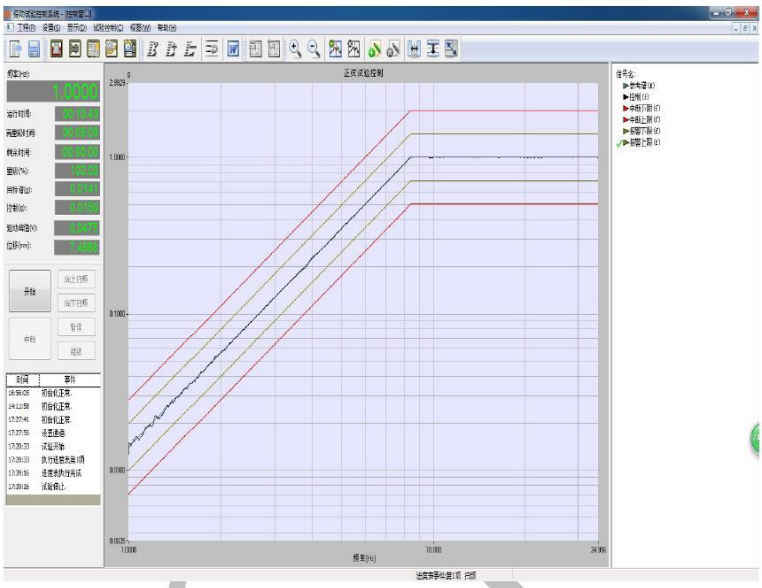


The curves of bump test (-X-axis)

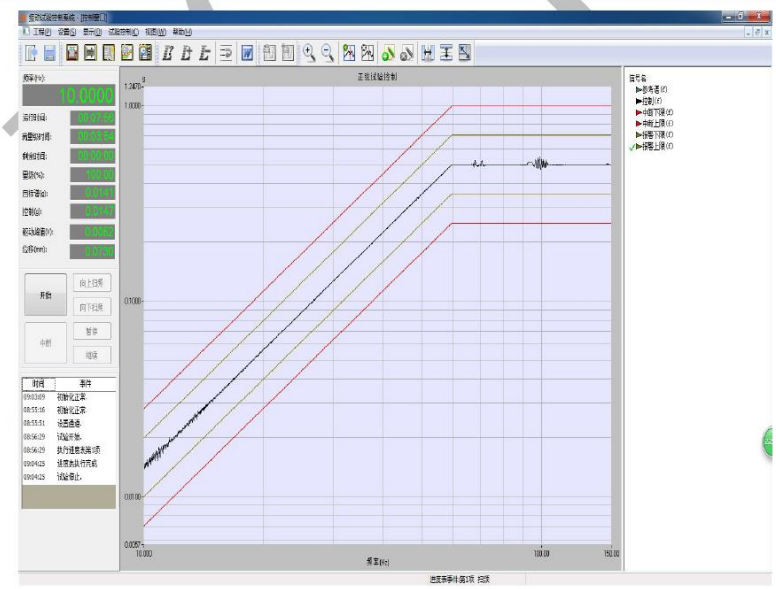


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curves of seismic test(X-axis)

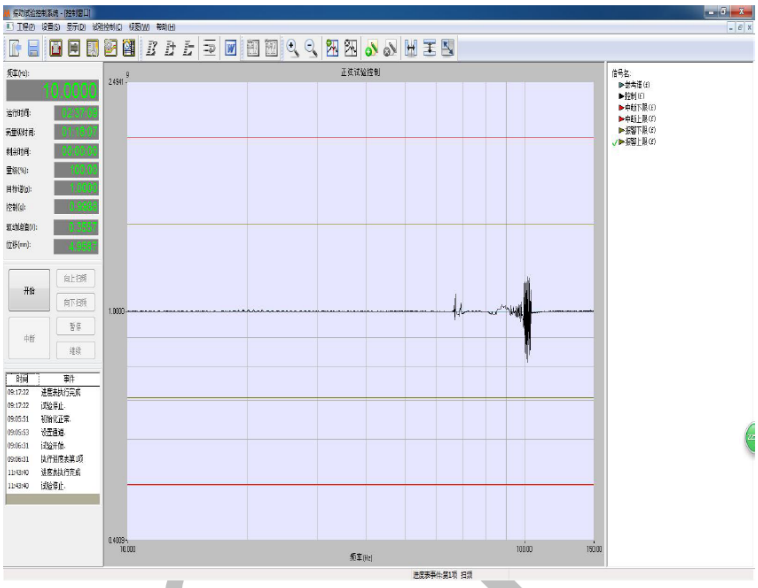


The curve of vibration response test (Y-axis)

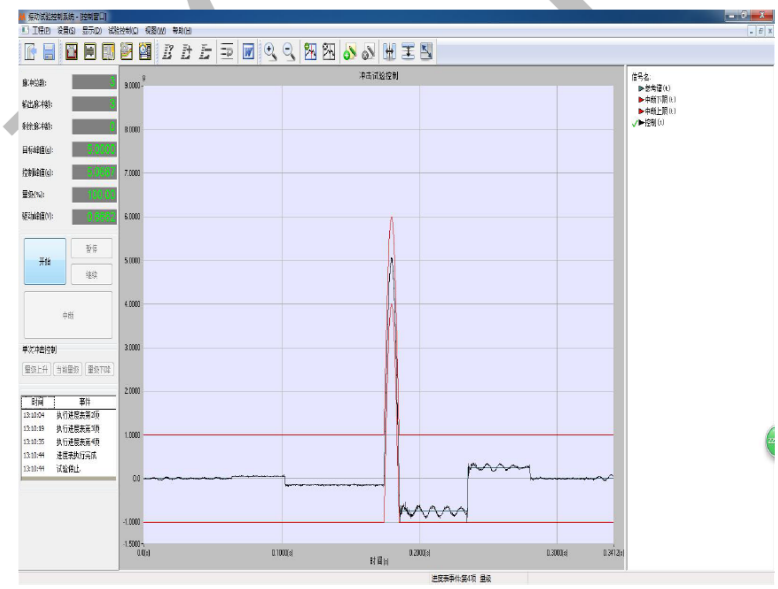


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curve of vibration endurance test(Y-axis)

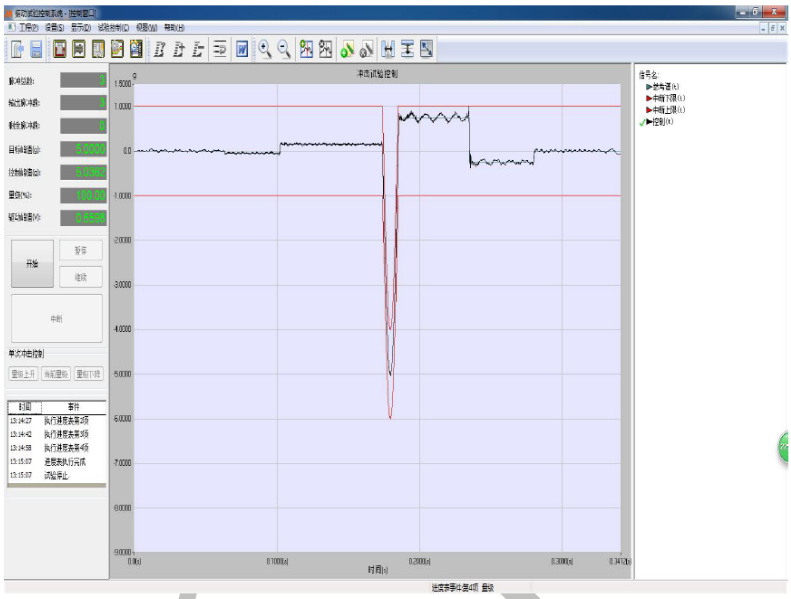


The curve of shock response test (+Y-axis)

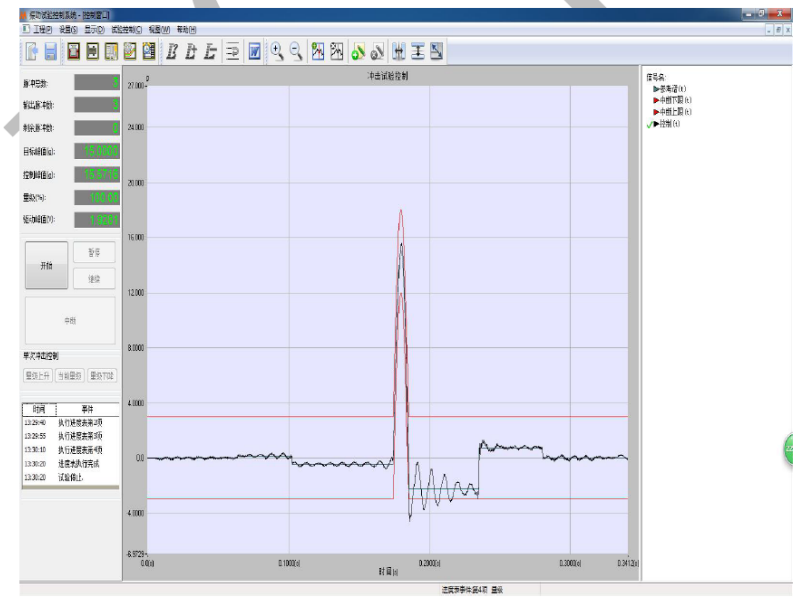


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curve of shock response test (-Y-axis)

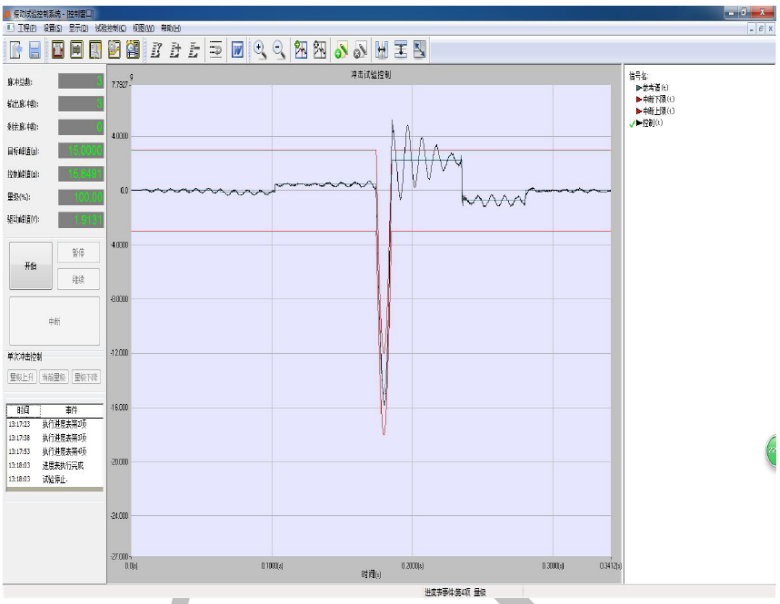


The curve of shock withstand test (+Y-axis)

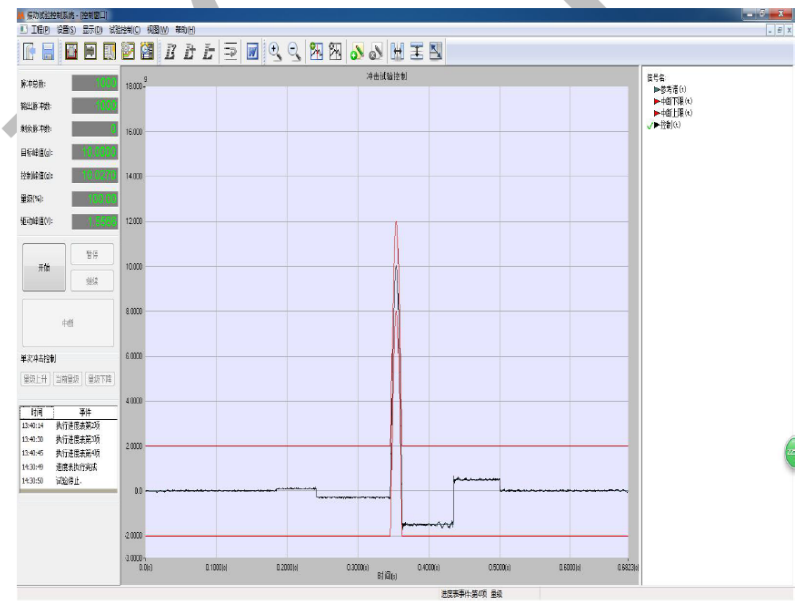


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curve of shock withstand test (-Y-axis)

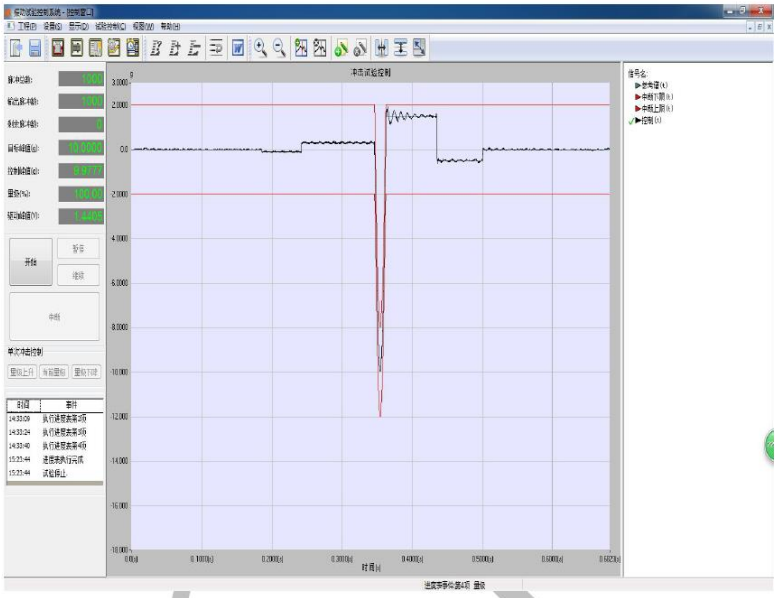


The curves of bump test (+Y-axis)

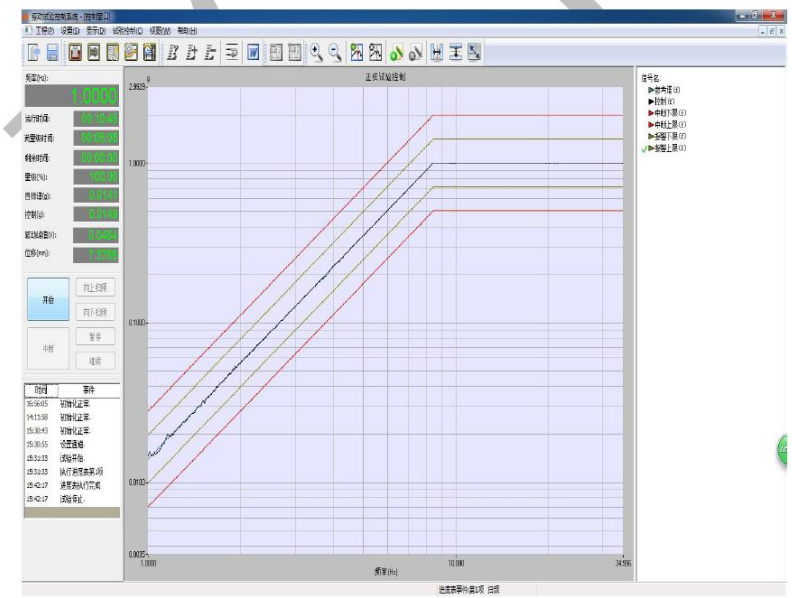


IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

The curves of bump test (-Y-axis)



The curves of seismic test(Y-axis)



IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

Sample Picture after test

4、TEST EQUIPMENT

No.	Equipment Name	Model	Calibration Due Date
1	Vibration test equipment	ES-20-320	Mar. 19, 2019

LCJC

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

LCJC-JL-708-02 A/0

Declaration

1、The LAB have meet the required of CNAS-CL01:2018(Same as ISO/IEC 17025:2017), and have get the authorize from CNAS, CNAS Number: CNAS L8212， Also get the authorize from ISTA, ISTA ID: 10764；

2、The LAB is responsible for the impartiality of all test data and the confidentiality of client information except the customer disclosure；

3、The LAB is only responsible for the test items entrusted by the client；

4、This report is valid in the condition of having sign of approver, special seal of laboratory testing and Connective seal, The report shall not be partial duplicated without written approval from the LAB except fully copy.

5、The Samples were provided by the client, and the authenticity also is borne by the client, the LAB is only responsible for the test data of the sample；

6、If have any objection to the report, please submit it to the LAB in writing within 15 days after receiving the report;

7、The samples must be take back within 3 months,and the LAB will dipose it after the deadline.

8、Subcontractor and Details：NA；

9、The visual inspection used in this test is visual observation, except for non-visual observation.

10、Conclusion language description:

(1) Pass : the samples conform to the requirements of the standard;

(2) Fail: the samples do not conform to the requirements of the standard ;

(3) / : don't judge or no test standard.

11、Disclaimer：The Verdict of the report is only responsible for the appearance, and LAB shall not bear any risk responsibility for the performance data or function data which were provide by client, such as test data, test result and judgment requirements and so on.

LAB: Suzhou Longce Testing Technology Service Co., Ltd.

ADD:（Building 5, National Environmental New & Hi-tech Industrial Park) No.369, Lushan Road,New District, Suzhou, China

TEL： 0512-68326317，89990816

FAX： 0512-69200365

E-mail： lcjc@szlcjc.com

*****End of the report*****

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

Attachment 2: Pictures

Enclosure – Front View

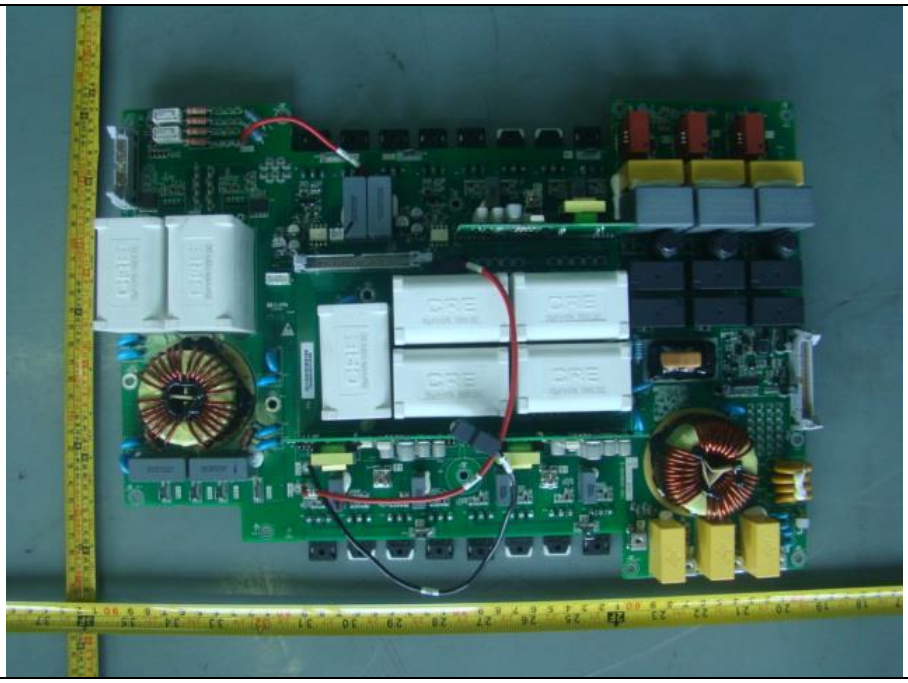
Enclosure – Rear View

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

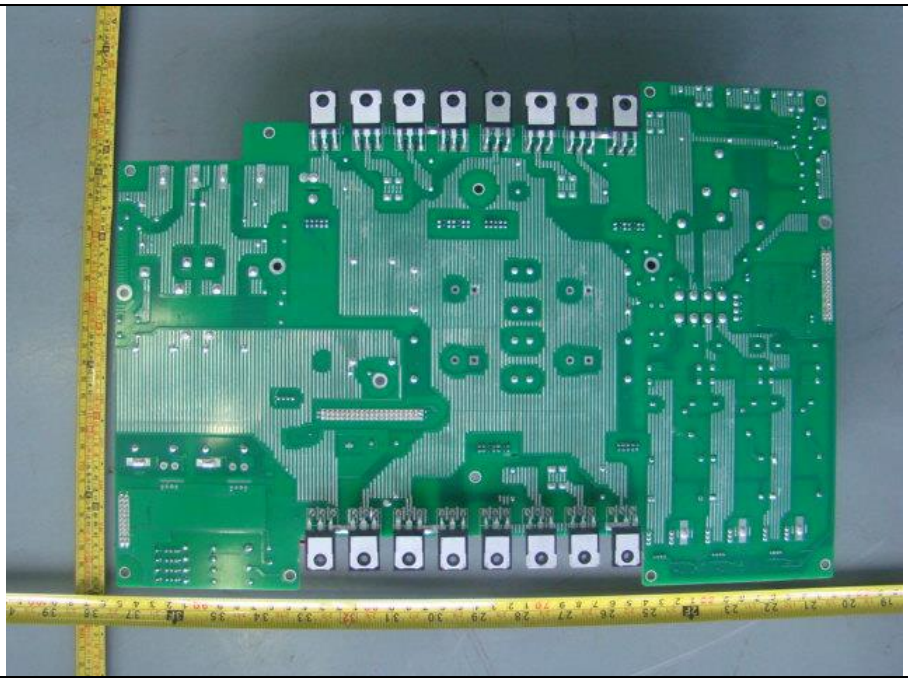
Enclosure – Bottom View

Internal View

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

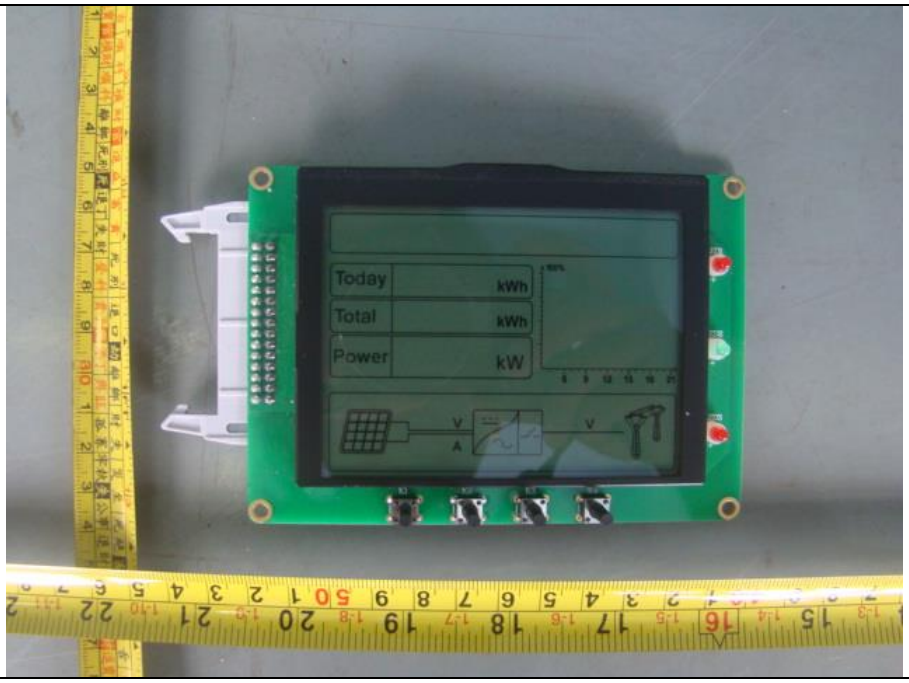


Main Board – Component Side

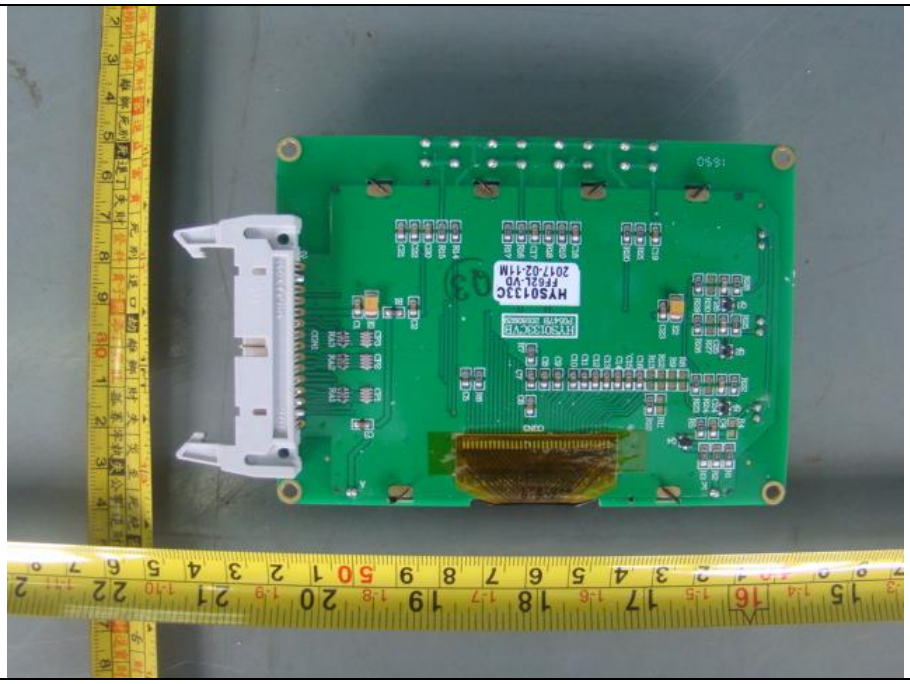


Main Board – Solder Side

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

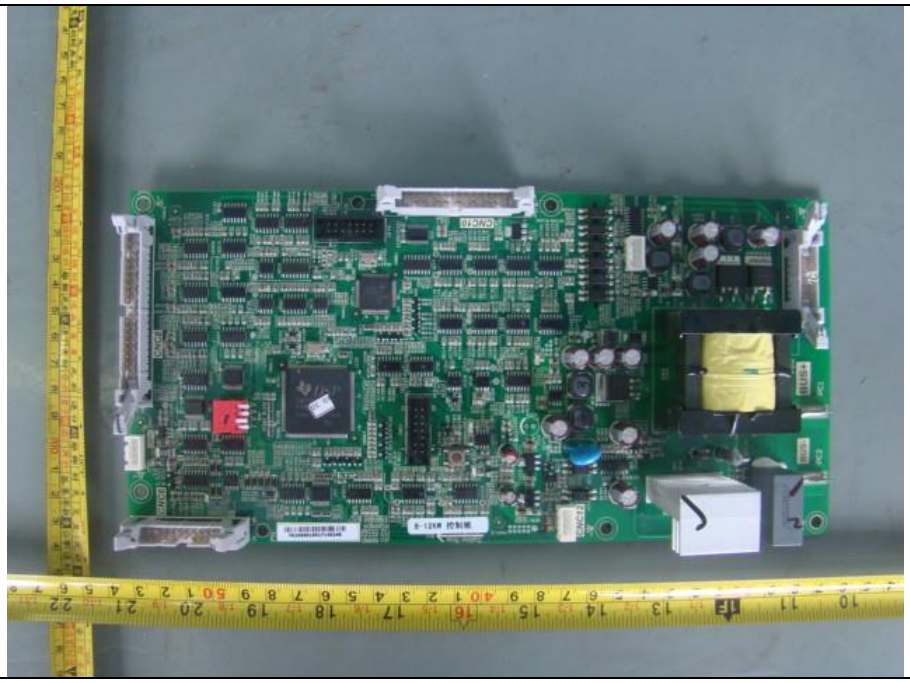


LCD Board – Component Side

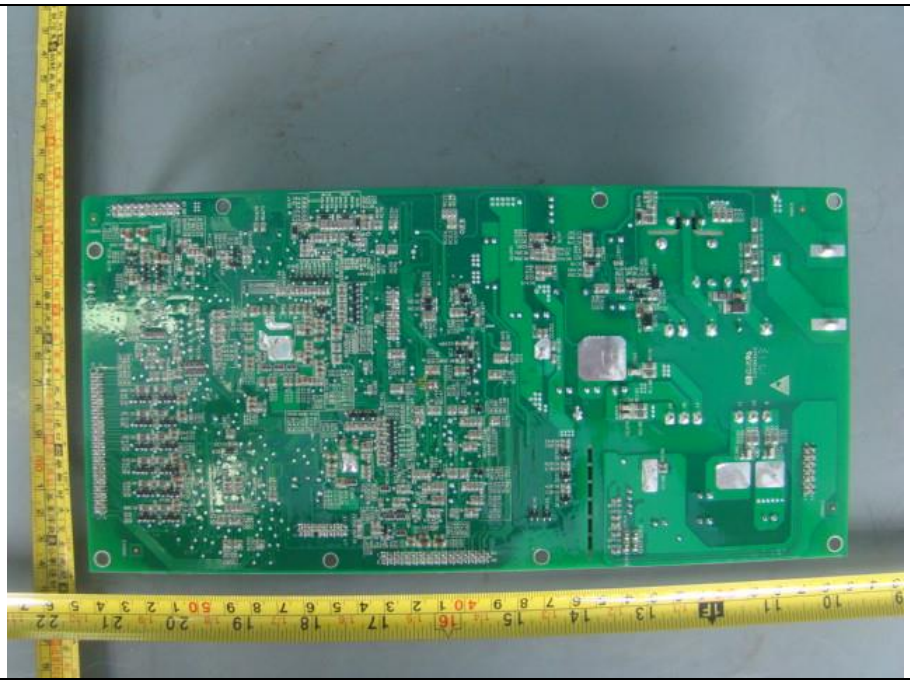


LCD Board – Solder Side

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict

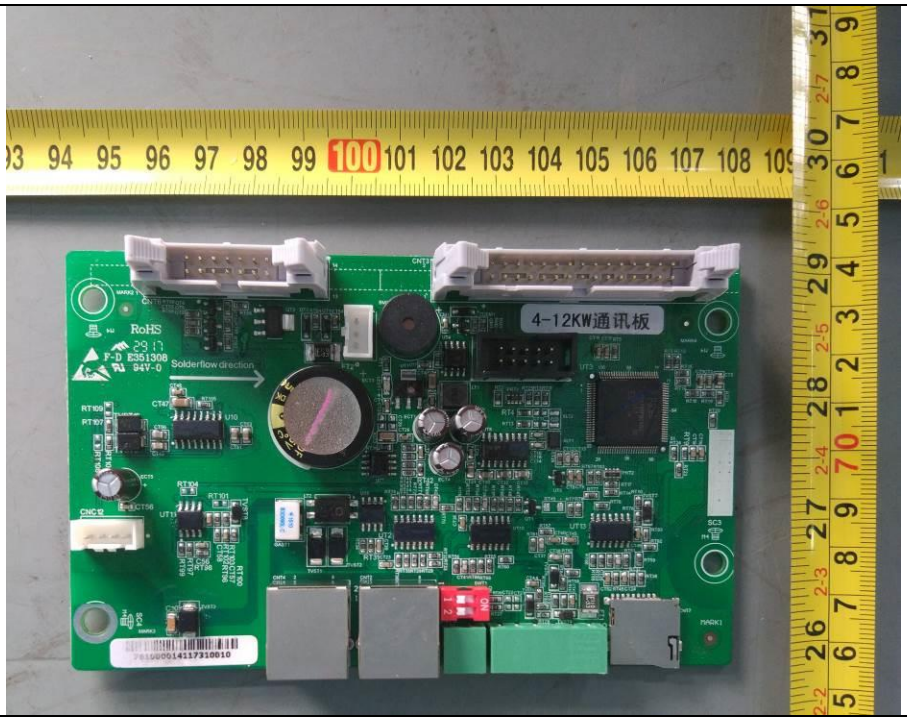


Control Board – Component Side

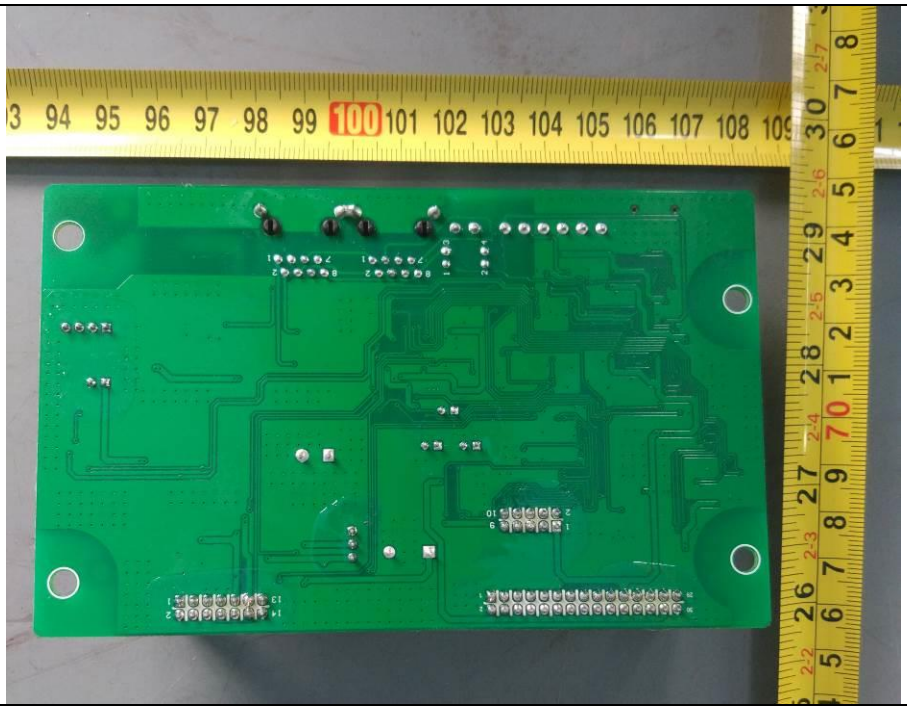


Control Board – Solder Side

IEC 60255-27			
Clause	Requirement + Test	Result - Remark	Verdict



Communication Board – Component Side



Communication Board – Solder Side

----------END----------