

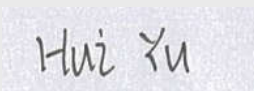
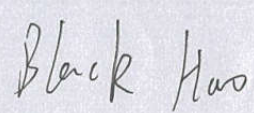


中国认可  
国际互认  
检测  
TESTING  
CNAS L5313

Test report No:  
2070284R-PV-CE-P02V02

## TEST REPORT

### Electromagnetic Compatibility (EMC)

Identification of item tested	Hybrid Inverter
Trademark	AFORE
Model and /or type reference	See models list
Features	N/A
Derived model(s)	N/A
Applicant's name / address	Afore New Energy Technology (Shanghai) Co., Ltd. Build No.7, 333 Wanfang Road, Minhang District, Shanghai, China.
Test method requested, standard	EN 61000-6-1:2007 EN 61000-6-2:2005 EN 61000-6-3:2007+A1:2011+AC:2012 EN 61000-6-4:2007+A1:2011
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Hui Yu/Project Engineer 
Approved by (name / position & signature)	Black Hao/ Engineer Supervisor 
Date of issue	Mar. 02, 2021
Report template No	Template_EN 61000-6-1-2-3-4-EMC-V1.1

## INDEX

---

	page
Competences and Guarantees.....	4
General conditions.....	4
Uncertainty.....	4
Environmental conditions.....	4
Possible test case verdicts .....	5
Definition of symbols used in this test report.....	5
Abbreviations .....	5
Document History .....	6
Remarks and Comments .....	6
1 General Information.....	7
1.1 General Description of the Item(s).....	7
1.2 The environment(s) in which the EUT is intended to be used .....	9
1.3 Test date .....	9
2 Description of Test Setup .....	10
2.1 Operating mode(s) used for tests.....	10
2.2 Port(s) of the EUT .....	10
2.3 Support / Auxiliary equipment / unit / software for the EUT .....	10
2.4 Test Configuration / Block diagram used for tests .....	11
3 Verdict summary section .....	12
3.1 Standards .....	12
3.2 Deviation(s) from the Standard(s) / Test Specification(s).....	12
3.3 Overview of results.....	13
3.4 Test Matrix.....	14
4 Emission Test Results .....	15
4.1 Conducted disturbance voltage – AC mains port(s) .....	15
4.2 Conducted disturbance voltage – DC power port(s).....	18
4.3 Conducted disturbance voltage – Telecommunications network port .....	21
4.4 Radiated electromagnetic disturbances (30 – 1000 MHz).....	23
4.5 Radiated electromagnetic disturbances (above 1 GHz) .....	26
4.6 Discontinuous disturbance (clicks) on AC power leads .....	28
4.7 Harmonic current emissions.....	29

4.8	Voltage changes, voltage fluctuations and flicker .....	32
5	Immunity Test Results .....	34
5.1	Performance (Compliance) criteria .....	34
5.1.1	Performance criteria related to immunity tests .....	34
5.1.2	Manufacturer defined performance criteria .....	34
5.2	Monitored – Checked Functions / Parameters .....	35
5.3	Electrostatic discharge immunity .....	36
5.4	Radio-frequency electromagnetic fields immunity .....	39
5.5	Electrical Fast Transients immunity .....	40
5.6	Surge transient immunity .....	41
5.7	Injected currents (RF common mode) immunity .....	42
5.8	Power frequency magnetic field immunity .....	43
5.9	Power supply interruptions and dips immunity .....	44
6	Identification of the Equipment Under Test .....	45
7	Annex 1 - Measurement Uncertainties .....	49
8	Annex 2 - Test Photos .....	50
9	Annex 3 - EUT Photos .....	56

## COMPETENCES AND GUARANTEES

---

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

**IMPORTANT:** No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

## GENERAL CONDITIONS

---

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

## UNCERTAINTY

---

For all measurements where guidance for the calculation of the instrumentation uncertainty of a measurement is specified in EN 55016-4-2 (CISPR 16-4-2), EN/IEC 61000-4 series or a product standard, the measurement instrumentation uncertainty has been calculated and applied in accordance with these standards.

Uncertainties have been calculated according to the DEKRA internal document PROD-P-EMC-M22. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%. Refer to the Annex 1 for further information.

## ENVIRONMENTAL CONDITIONS

---

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	25 % - 75 %; 30 % - 60 % (ESD)
Atmospheric pressure	86 kPa – 106 kPa

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

## POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

## DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

<input checked="" type="checkbox"/> Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT.			
<input type="checkbox"/> Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.			
Decimal separator used in this report	<input checked="" type="checkbox"/>	Comma (,)	<input type="checkbox"/> Point (.)

## ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	:	Equipment Under Test
QP	:	Quasi-Peak
CAV	:	CISPR Average
AV	:	Average
CDN	:	Coupling Decoupling Network
SAC	:	Semi-Anechoic Chamber
OATS	:	Open Area Test Site
BW	:	Bandwidth
AM	:	Amplitude Modulation
PM	:	Pulse Modulation
HCP	:	Horizontal Coupling Plane
VCP	:	Vertical Coupling Plane
$U_N$	:	Nominal voltage
$T_x$	:	Transmitter
$R_x$	:	Receiver
N/A	:	Not Applicable
N/M	:	Not Measured
TEM	:	Transverse Electromagnetic Mode

## DOCUMENT HISTORY

---

Report nr.	Date	Description
2070284R-PV-CE-P01V02	Aug. 25, 2020	First release.
2070284R-PV-CE-P02V02	Mar. 02, 2021	<ol style="list-style-type: none"><li>1. Update the issued date.</li><li>2. Update the models list, no need to add test items after technical evaluation.</li></ol> <p>The report 2070284R-PV-CE-P02V02 replaces the report 2070284R-PV-CE-P01V02, the report 2070284R-PV-CE-P01V02 is invalid.</p>

## REMARKS AND COMMENTS

---

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. The test results presented in this report relate only to the object tested.
3. This report will not be used for social proof function in China market.
4. 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.

# 1 GENERAL INFORMATION

## 1.1 General Description of the Item(s)

Description of the item .....	Hybrid Inverter
Model / Type number .....	See models list
Serial number .....	N/A
Trademark .....	Afore
Manufacturer .....	Afore New Energy Technology (Shanghai) Co., Ltd.
Address.....	Build No.7, 333 Wanfang Road, Minhang District, Shanghai, China.

Note 1: The EUT information is from customer declaration.

Note 2: This report selects the lowest emission limit and the highest immunity test levels.

Note 3: The test was performed only in PV mode as required by the manufacturer. Therefore, the data in this report only applies to PV mode.

According to the declaration from manufacturer, the differences between these models are showed below:

See next page:

Model	AF3K-SH	AF3.6K-SH	AF4K-SH	AF4.6K-SH	AF5K-SH	AF5.5K-SH	AF6K-SH
<b>Input</b>							
Max. DC Input Power (W)	6600	8000	8000	10000	10000	10000	10000
Rated DC Input Voltage (V)	360						
DC Input Voltage Range (V)	60-580						
MPPT Voltage Range (V)	50-550						
Start-up Voltage (V)	60						
Max. DC Input Current (A)	20*2						
Nr. of MPPT Tracker	2						
<b>EPS</b>							
EPS Nominal Output Power (W)	3000	3600	4000	4600	5000	5500	6000
EPS Nominal Output Voltage (V)	230						
EPS Nominal Output Frequency (Hz)	50/60						
EPS Nominal Output Current (A)	13	16	17.5	20	22	24	26
Peak Output Power	3600w,30s	4000w,30s	4600w,30s	5000w,30s	5500w,30s	6000w,30s	6500w,30s
<b>Output</b>							
Nominal AC Output Power (VA)	3000	3600	4000	4600	5000	5500	6000
Nominal AC Output Current (A)	13	16	17.5	20	22	24	26
Max. AC Output Current (A)	15	18.5	20	23	25.5	27.5	30
Nominal AC Voltage (V)	230						
Nominal AC Frequency (Hz)	50 / 60						
Power Factor	-0.9~+0.9						
THD(Current)	<3%						

Remark: The above models are same in electrical characteristics. AF6K-SH model was selected for the full tests and the corresponding data is representative for other models as well.



Rated power supply .....	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	<input checked="" type="checkbox"/>	Output: 230 Vac, 50/60 Hz	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input checked="" type="checkbox"/>	Input: DC 60-580 V					
	<input type="checkbox"/>	Battery:					
Rated Power .....	N/A						
Clock frequencies .....	< 108 MHz						
Other parameters.....	N/A						
Software version .....	DSP1.00						
Hardware version.....	V03						
Nominal cabinet dimensions in cm (L x W x H).....	58 cm x 45 cm x 17.6 cm						
Mounting position.....	<input checked="" type="checkbox"/>	Table top equipment					
	<input checked="" type="checkbox"/>	Wall/Ceiling mounted equipment					
	<input type="checkbox"/>	Floor standing equipment					
	<input type="checkbox"/>	Hand-held equipment					
	<input type="checkbox"/>	Other:					

**Intended use of the Equipment Under Test (EUT)**

EUT is a single-phase solar hybrid inverter that converts the DC power generated by PV strings into AC power and feeds the power into the power grid. For the further information, refer to the user's manual.

No	Module/parts of test item	Type	Manufacturer
No	Documents as provided by the applicant - Description	File name	Issue date
Modifications to the test item during testing .....	<input type="checkbox"/>	N/A	<input type="checkbox"/> <u>Supplemental information:</u>
Copy of marking plate:			
N/A			

### 1.2 The environment(s) in which the EUT is intended to be used

The equipment under test (EUT) is intended to be used in the following environment(s):

<input checked="" type="checkbox"/>	Residential (domestic) environment.
<input checked="" type="checkbox"/>	Commercial and light-industrial environment.
<input checked="" type="checkbox"/>	Industrial environment.

### 1.3 Test date

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	July.13, 2020
Date (start)	July.14, 2020
Date (finish)	Aug.12, 2020

## 2 DESCRIPTION OF TEST SETUP

### 2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

Operating mode	Operating mode description	Used for testing	
		Emission	Immunity
1	PV Mode	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	N/A	<input type="checkbox"/>	<input type="checkbox"/>
<u>Supplemental information:</u>  The test was performed only in PV mode as required by the manufacturer. Therefore, the data in this report only applies to PV mode.			

### 2.2 Port(s) of the EUT

Port name and description	Connected to / Termination	Cable			
		Length used during test [m]	Attached during test	With Core	Shielded
DC input port	DC Source	1.5m	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
AC output port	AC Power Supply	1.5m	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<u>Supplemental information:</u>					

### 2.3 Support / Auxiliary equipment / unit / software for the EUT

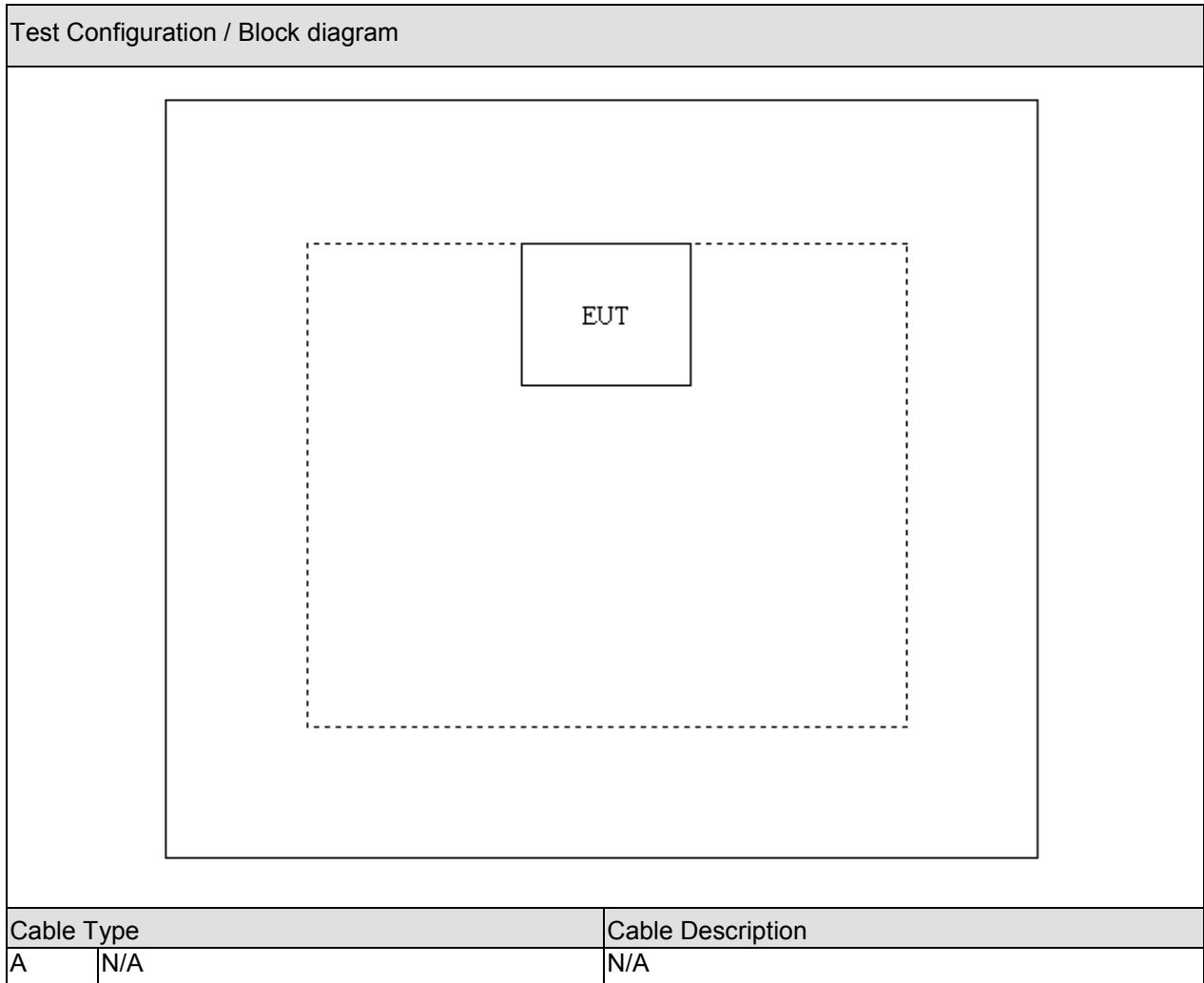
The EUT has been tested with the following auxiliary equipment / unit / software:

Auxiliary equipment / unit / software	Type / Version	Manufacturer	Supplied by
DC Source	N8957APV(1500V/30A/15kW)	Keysight	Applicant
N/A	N/A	N/A	N/A
<u>Supplemental information:</u>			

## 2.4 Test Configuration / Block diagram used for tests

The following test setup / configuration / block diagram has been used during the tests:

Test Item		EMI / EMS			
Product		Manufacturer	Model No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A



### 3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

#### 3.1 Standards

Standard	Year	Description
EN 61000-6-3 +A1 +AC	2007 2011 2012	Generic standards - Emission standard for residential, commercial and light-industrial environments
EN 61000-6-4 +A1	2007 2011	Generic standards - Emission standard for industrial environments
CISPR16-2-1 +A1	2014 2017	Methods of measurement of disturbances and immunity - Conducted disturbance measurements.
CISPR16-2-3	2016	Methods of measurement of disturbances and immunity - Radiated disturbance measurements.
CISPR 22	2008	Emission – Information technology equipment (ITE)
CISPR 14-1	2017	Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission.
IEC 61000-3-2 +A1 +A2	2005 2008 2009	Limits for harmonic current emissions (equipment input current $\leq$ 16 A per phase).
IEC 61000-3-3	2008	Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current $\leq$ 16 A per phase and not subject to conditional connection.
IEC 61000-3-12	2004	Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current $>$ 16 A and $\leq$ 75 A per phase.
IEC 61000-3-11	2000	Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current $\leq$ 75 A and subject to conditional connection.
EN 61000-6-1	2007	Generic standards - Immunity for residential, commercial and light-industrial environments.
EN 61000-6-2	2005	Generic standards – Immunity for industrial environments
IEC 61000-4-2	2008	Electrostatic discharge immunity test.
IEC 61000-4-3 +A1 +A2	2006 2007 2010	Radiated, radio-frequency, electromagnetic field immunity test.
IEC 61000-4-4	2012	Electrical fast transient/burst immunity test.
IEC 61000-4-5 +A1	2014 2017	Surge immunity test.
IEC 61000-4-6 +AC	2013 2015	Immunity to conducted disturbances, induced by radio-frequency fields.
IEC 61000-4-8	2009	Power frequency magnetic field immunity test.
IEC 61000-4-11 +A1	2004 2017	Voltage dips, short interruptions and voltage variations immunity tests.

#### 3.2 Deviation(s) from the Standard(s) / Test Specification(s)

No deviation.

### 3.3 Overview of results

EMISSION TESTS – EN 61000-6-3			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Conducted disturbance voltage at AC power port(s)	CISPR 16-2-1	PASS	---
Conducted disturbance voltage at DC power port(s)	CISPR 16-2-1	PASS	---
Conducted disturbance voltage at Telecommunications / network port(s)	CISPR 22, CISPR 16-2-1	N/A	See 2)
Radiated electromagnetic disturbances (30 MHz to 1000 MHz)	CISPR 16-2-3	PASS	---
Radiated electromagnetic disturbances (above 1 GHz)	CISPR 16-2-3	N/A	See 3)
Discontinuous disturbance (clicks) on AC power leads	CISPR 14-1	N/A	See 4)
Harmonic current emissions	EN 61000-3-2 EN 61000-3-12	PASS	---
Voltage changes, voltage fluctuations and flicker	EN 61000-3-3 EN 61000-3-11	PASS	---
<b>Supplementary information:</b>			
1) The EUT does not have a AC power port. 2) The wired network port of the EUT only for internal software upgrade, not connected to the external network,so it needs not to perform the test item. 3) The highest internal frequency of the EUT is less than 108 MHz. 4) Exemptions from click measurements applicable (clause 4.2.3).			

IMMUNITY TESTS – EN 61000-6-2			
Requirement – Test case	Basic standard(s)	Verdict	Remark
Electrostatic discharge	IEC 61000-4-2	PASS	---
Radio-frequency electromagnetic fields	IEC 61000-4-3	PASS	---
Fast transients	IEC 61000-4-4	PASS	---
Surge transient	IEC 61000-4-5	PASS	---
Injected currents (radio-frequency common mode)	IEC 61000-4-6	PASS	---
Power frequency magnetic fields	IEC 61000-4-8	PASS	---
Voltage dips and short interruptions	IEC 61000-4-11	N/A	See 1&2)
<b>Supplementary information:</b>			
1) Applicable only to input ports. 2) Not applicable because no test requirements have been specified for DC/battery powered apparatus.			

### 3.4 Test Matrix

EMISSION TESTS	Model / Type	
	Mode 1	Mode 2
Conducted disturbance voltage at AC power port(s) (150 KHz – 30 MHz)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conducted disturbance voltage at DC power port(s) (150 KHz – 30 MHz)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conducted disturbance voltage at telecommunications/ network port (150 KHz – 30 MHz)	<input type="checkbox"/>	<input type="checkbox"/>
Radiated electromagnetic disturbances (30 MHz to 1000 MHz)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated electromagnetic disturbances (above 1 GHz)	<input type="checkbox"/>	<input type="checkbox"/>
Discontinuous disturbance (clicks) on AC power leads	<input type="checkbox"/>	<input type="checkbox"/>
Harmonic current emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Voltage changes, voltage fluctuations and flicker	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<u>Supplementary: Information:</u>		

IMMUNITY TESTS	Model / Type	
	Mode 1	Mode 2
Electrostatic discharge	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radio-frequency electromagnetic fields	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Fast transients	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Surges	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Injected currents (radio-frequency common mode)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Power frequency magnetic field immunity	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Voltage dips and short interruptions	<input type="checkbox"/>	<input type="checkbox"/>
<u>Supplementary: Information:</u>		

## 4 EMISSION TEST RESULTS

<b>4.1 Conducted disturbance voltage – AC mains port(s)</b>	<b>VERDICT: PASS</b>
---	----------------------

Standard	EN 61000-6-3
Basic standard(s)	CISPR 16-2-1

### Limits

Frequency range [MHz]	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	IF BW	Detector(s)
0,15 - 0,50	66 – 56 <sup>2)</sup>	56 - 46 <sup>2)</sup>	9 KHz	QP, CAV
0,50 - 5,0	56	46	9 KHz	QP, CAV
5,0 - 30	60	50	9 KHz	QP, CAV

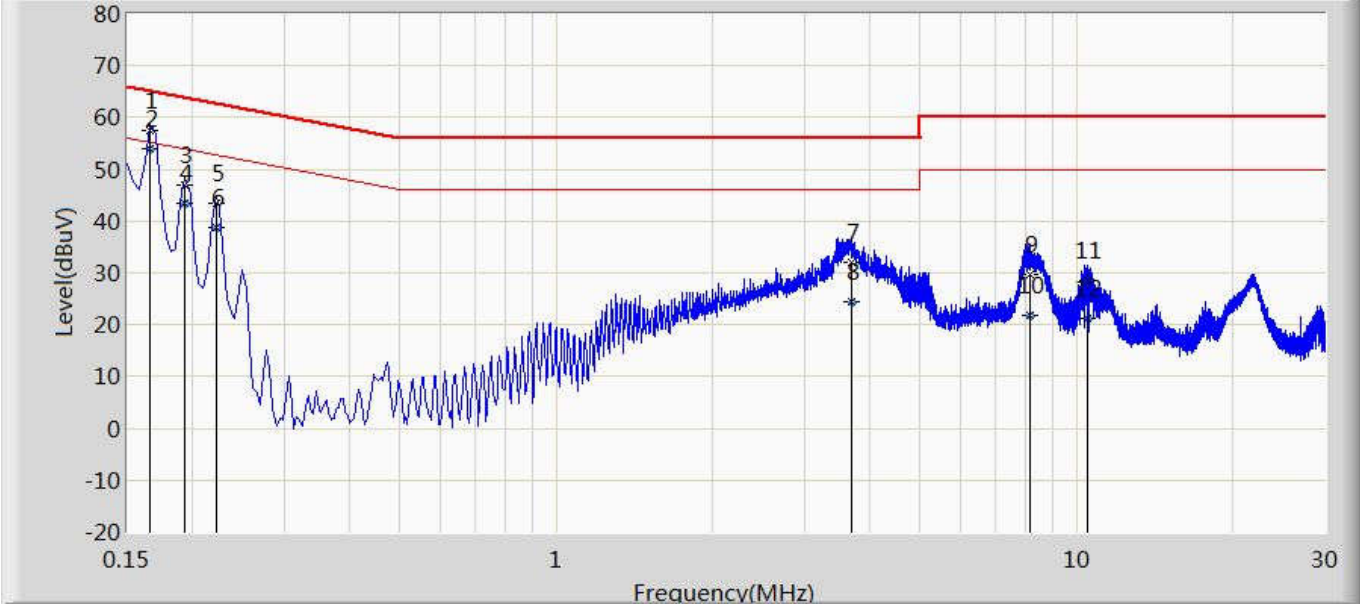
<sup>1)</sup> At the transition frequency, the lower limit applies.

<sup>2)</sup> The limit decreases linearly with the logarithm of the frequency.

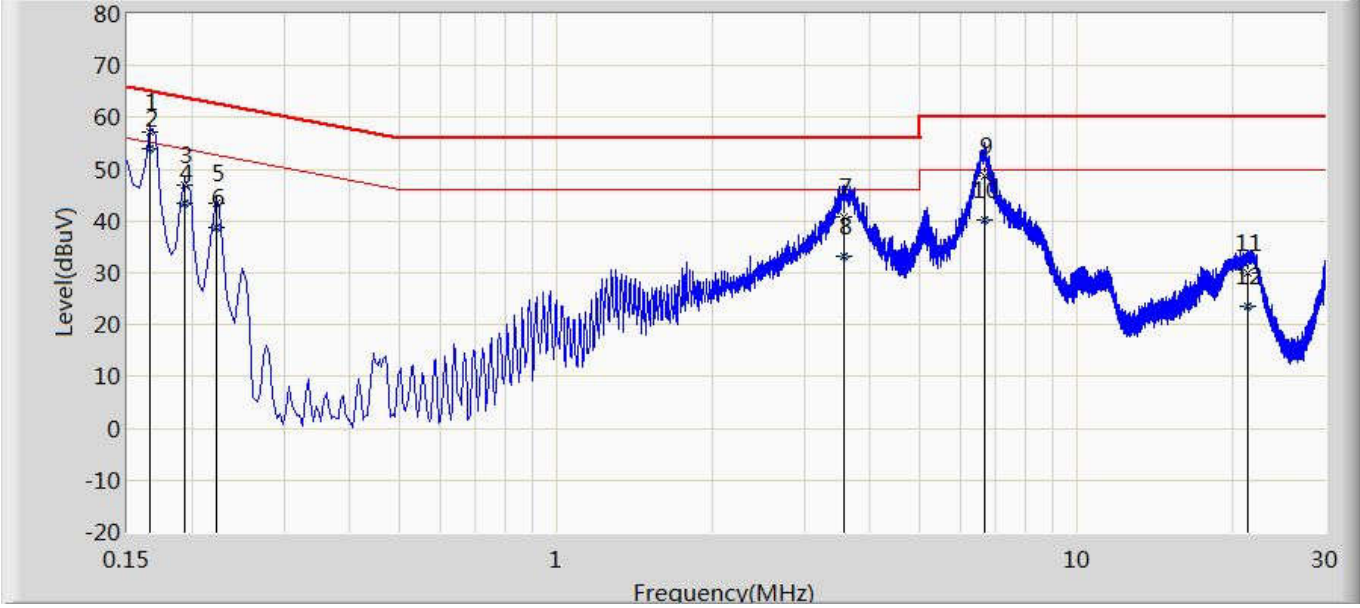
### Performed measurements

Port under test	Terminal					
<input checked="" type="checkbox"/> AC output port	<input checked="" type="checkbox"/> N	<input checked="" type="checkbox"/> L1	<input type="checkbox"/> L2	<input type="checkbox"/> L3		
<input type="checkbox"/> Other:	<input type="checkbox"/> N	<input type="checkbox"/> L1	<input type="checkbox"/> L2	<input type="checkbox"/> L3		
Voltage – Mains [V]	Input: 400 Vdc, Output: 230 Vac, 50 Hz					
Frequency – Mains [Hz]	50 Hz					
Test method applied	<input checked="" type="checkbox"/>	Artificial mains network				
	<input type="checkbox"/>	Voltage probe				
Test setup	<input checked="" type="checkbox"/>	Table top	<input type="checkbox"/>	Artificial hand applied		
	<input type="checkbox"/>	Floor standing	<input type="checkbox"/>	Other:		
	Refer to the Annex 2 for test setup photo(s).					
Operating mode(s) used	Mode 1					
Remark	---					

See next page.

Measurement data		Port under test	AC mains output power							
Operating mode / voltage		Mode 1/ Input: 400 Vdc, Output: 230 Vac, 50 Hz								
Engineer: Aaron										
Site: AC1		Time: 2020/07/25								
Limit: EN 61000-6-3_CE_AC mains port		Margin: 0								
Probe: NSLK 8129(0.009-30MHz)		Polarity: Line								
EUT: Hybrid inverter		Power: Input: 400 Vdc, Output: 230 Vac, 50 Hz								
Note: Normal Operation										
										
No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.166	57.354	57.294	-7.804	65.158	0.032	0.028	0.000	QP
2	*	0.166	54.007	53.946	-1.151	55.158	0.032	0.028	0.000	AV
3		0.194	47.096	47.036	-16.768	63.864	0.031	0.028	0.000	QP
4		0.194	43.385	43.325	-10.479	53.864	0.031	0.028	0.000	AV
5		0.222	43.423	43.362	-19.321	62.744	0.031	0.029	0.000	QP
6		0.222	38.713	38.653	-14.030	52.744	0.031	0.029	0.000	AV
7		3.694	31.946	31.744	-24.054	56.000	0.080	0.122	0.000	QP
8		3.694	24.448	24.246	-21.552	46.000	0.080	0.122	0.000	AV
9		8.126	29.749	29.426	-30.251	60.000	0.142	0.181	0.000	QP
10		8.126	21.848	21.525	-28.152	50.000	0.142	0.181	0.000	AV
11		10.474	28.550	28.167	-31.450	60.000	0.177	0.206	0.000	QP
12		10.474	21.295	20.912	-28.705	50.000	0.177	0.206	0.000	AV
Note: 1. " * ", means this data is the worst emission level. 2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).										
Remark										



Measurement data		Port under test	AC mains output power							
Operating mode / voltage		Mode 1/ Input: 400 Vdc, Output: 230 Vac, 50 Hz								
Engineer: Aaron										
Site: AC1		Time: 2020/07/25								
Limit: EN 61000-6-3_CE_AC mains port		Margin: 0								
Probe: NSLK 8129(0.009-30MHz)		Polarity: Neutral								
EUT: Hybrid inverter		Power: Input: 400 Vdc, Output: 230 Vac, 50 Hz								
Note: Normal Operation										
										
No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.166	57.226	57.166	-7.932	65.158	0.032	0.028	0.000	QP
2	*	0.166	53.908	53.848	-1.250	55.158	0.032	0.028	0.000	AV
3		0.194	47.059	47.000	-16.804	63.864	0.031	0.028	0.000	QP
4		0.194	43.400	43.340	-10.464	53.864	0.031	0.028	0.000	AV
5		0.222	43.338	43.278	-19.406	62.744	0.031	0.029	0.000	QP
6		0.222	38.739	38.678	-14.005	52.744	0.031	0.029	0.000	AV
7		3.586	40.905	40.699	-15.095	56.000	0.085	0.121	0.000	QP
8		3.586	33.146	32.940	-12.854	46.000	0.085	0.121	0.000	AV
9		6.654	48.777	48.479	-11.223	60.000	0.135	0.164	0.000	QP
10		6.654	40.163	39.864	-9.837	50.000	0.135	0.164	0.000	AV
11		21.330	29.936	29.255	-30.064	60.000	0.383	0.299	0.000	QP
12		21.330	23.709	23.027	-26.291	50.000	0.383	0.299	0.000	AV
Note: 1. " * ", means this data is the worst emission level. 2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).										
Remark										

<b>4.2 Conducted disturbance voltage – DC power port(s)</b>	<b>VERDICT: PASS</b>
---	----------------------

Standard	EN 61000-6-3
Basic standard(s)	CISPR16-2-1

**Limits**

Frequency range [MHz]	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	IF BW	Detector(s)
0,15 - 0,50	79	66	9 KHz	QP, CAV
0,50 - 30	73	60	9 KHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

<sup>2)</sup> Applicable only to ports intended for connection to a local DC power network, or a local battery by a connecting cable exceeding a length of 30 m.

**Performed measurements**

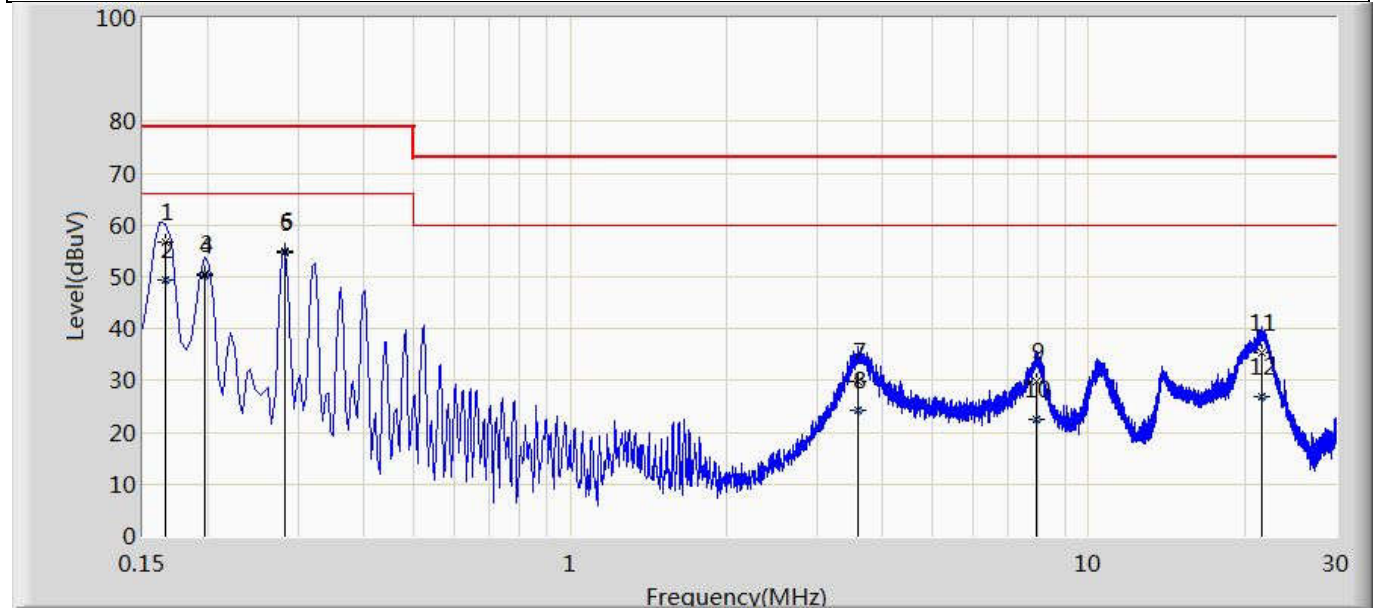
Port under test		Terminal			
<input checked="" type="checkbox"/>	DC power input port	<input checked="" type="checkbox"/>	Positive (+)	<input checked="" type="checkbox"/>	Negative (-)
<input type="checkbox"/>	Other:	<input type="checkbox"/>	Positive (+)	<input type="checkbox"/>	Negative (-)
Voltage – Input [VDC]		400 Vdc			
Voltage – Output [V <sub>DC</sub> ]					
Test method applied	<input checked="" type="checkbox"/>	Artificial mains network			
	<input type="checkbox"/>	Voltage probe			
Test setup	<input checked="" type="checkbox"/>	Table top	<input type="checkbox"/>	Artificial hand applied	
	<input type="checkbox"/>	Floor standing	<input type="checkbox"/>	Other:	
	Refer to the Annex 2 for test setup photo(s).				
Operating mode(s) used		Mode 1			
Remark		---			

See next page.

<b>Measurement data</b>	Port under test	DC mains port(Positive)
-------------------------	-----------------	-------------------------

Operating mode / voltage	Mode 1/ Input: 400 Vdc, Output: 230 Vac, 50 Hz
--------------------------	--

Engineer: Aaron	
Site: AC1	Time: 2020/07/25
Limit: EN 61000-6-3_CE_DC mains port	Margin: 0
Probe: NNHV 8123(0.15-30MHz)	Polarity: Positive
EUT: Hybrid inverter	Power: Input: 400 Vdc, Output: 230 Vac, 50 Hz
Note: Normal Operation	

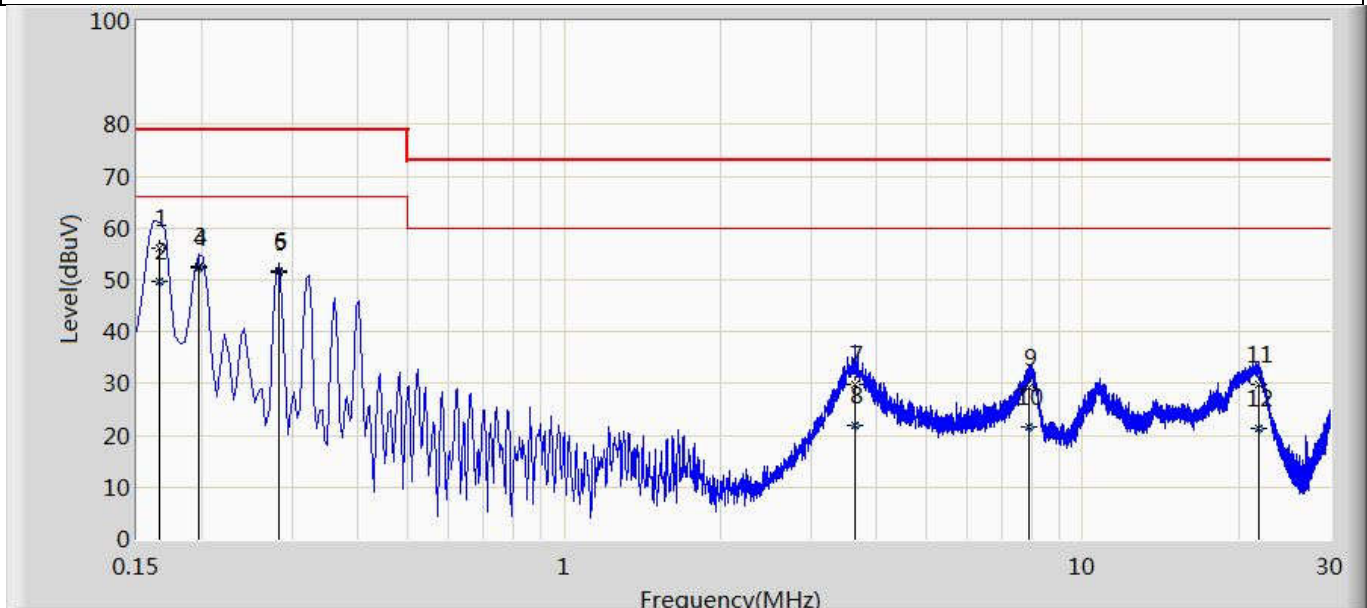


No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.166	56.815	56.755	-22.185	79.000	0.032	0.028	0.000	QP
2		0.166	49.427	49.367	-16.573	66.000	0.032	0.028	0.000	AV
3		0.198	50.569	50.509	-28.431	79.000	0.031	0.029	0.000	QP
4		0.198	50.177	50.118	-15.823	66.000	0.031	0.029	0.000	AV
5		0.282	54.659	54.594	-24.341	79.000	0.032	0.033	0.000	QP
6	*	0.282	54.951	54.886	-11.049	66.000	0.032	0.033	0.000	AV
7		3.602	29.943	29.744	-43.057	73.000	0.078	0.121	0.000	QP
8		3.602	24.250	24.051	-35.750	60.000	0.078	0.121	0.000	AV
9		7.930	29.954	29.635	-43.046	73.000	0.139	0.180	0.000	QP
10		7.930	22.586	22.267	-37.414	60.000	0.139	0.180	0.000	AV
11		21.558	35.267	34.629	-37.733	73.000	0.338	0.300	0.000	QP
12		21.558	26.827	26.189	-33.173	60.000	0.338	0.300	0.000	AV

**Note:**

1. " \* ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).

Remark	
--------	--

Measurement data		Port under test	DC mains port(Negative)							
Operating mode / voltage		Mode 1/ Input: 400 Vdc, Output: 230 Vac, 50 Hz								
Engineer: Aaron										
Site: AC1		Time: 2020/07/25								
Limit: EN 61000-6-3_CE_DC mains port		Margin: 0								
Probe: NNHV 8123(0.15-30MHz)		Polarity: Negative								
EUT: Hybrid inverter		Power: Input: 400 Vdc, Output: 230 Vac, 50 Hz								
Note: Normal Operation										
										
No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Probe (dB)	Cable (dB)	Amp (dB)	Type
1		0.166	56.217	56.157	-22.783	79.000	0.032	0.028	0.000	QP
2		0.166	49.792	49.732	-16.208	66.000	0.032	0.028	0.000	AV
3		0.198	52.686	52.627	-26.314	79.000	0.031	0.029	0.000	QP
4	*	0.198	52.308	52.249	-13.692	66.000	0.031	0.029	0.000	AV
5		0.282	51.544	51.478	-27.456	79.000	0.032	0.033	0.000	QP
6		0.282	51.849	51.783	-14.151	66.000	0.032	0.033	0.000	AV
7		3.638	29.781	29.581	-43.219	73.000	0.079	0.121	0.000	QP
8		3.638	22.003	21.803	-37.997	60.000	0.079	0.121	0.000	AV
9		7.902	29.265	28.947	-43.735	73.000	0.139	0.179	0.000	QP
10		7.902	21.653	21.335	-38.347	60.000	0.139	0.179	0.000	AV
11		21.846	29.776	29.135	-43.224	73.000	0.339	0.302	0.000	QP
12		21.846	21.295	20.654	-38.705	60.000	0.339	0.302	0.000	AV
Note: 1. " * ", means this data is the worst emission level. 2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).										
Remark										

<b>4.3 Conducted disturbance voltage – Telecommunications network port</b>	<b>VERDICT: N/A</b>
--	---------------------

Standard	EN 61000-6-3
Basic standard(s)	CISPR 22, CISPR16-2-1

**Limits**

Frequency range [MHz]	Limit: QP [dB(μV) <sup>1)</sup>	Limit: AV [dB(μV) <sup>1)</sup>	IF BW	Detector(s)
0,15 - 0,50	84 – 74 <sup>2)</sup>	74 – 64 <sup>2)</sup>	9 KHz	QP, CAV
0,50 - 30	74	64	9 KHz	QP, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

<sup>2)</sup> The limit decreases linearly with the logarithm of the frequency.

**Performed measurements**

Port under test			
<input type="checkbox"/>	LAN / Ethernet	<input type="checkbox"/>	Other:
<input type="checkbox"/>	Other:	<input type="checkbox"/>	Other:
Voltage – Mains [V]			
Frequency – Mains [Hz]			
Test method applied	<input type="checkbox"/>	ISN – Impedance Stabilisation Network	
	<input type="checkbox"/>	Voltage probe	
	<input type="checkbox"/>	Current probe	
	<input type="checkbox"/>	Artificial mains network	
	<input type="checkbox"/>	Other:	
Test setup	<input type="checkbox"/>	Table top	<input type="checkbox"/> Artificial hand applied
	<input type="checkbox"/>	Floor standing	<input type="checkbox"/> Other:
	Refer to the Annex 2 for test setup photo(s).		
Operating mode(s) used			
---			
Remark			
---			

See next page.

Measurement data	Port under test	
Operating mode / voltage / frequency used during the test		
<p>The wired network port of the EUT only for internal software upgrade, not connected to the external network,so it needs not to perform the test item.</p>		
Remark		

<b>4.4 Radiated electromagnetic disturbances (30 – 1000 MHz)</b>	<b>VERDICT: PASS</b>
--	----------------------

Standard	EN 61000-6-3
Basic standard(s)	CISPR 16-2-3
Test method	Antenna method according to CISPR16-2-3 standard.
Supplementary information:	

**Limits**

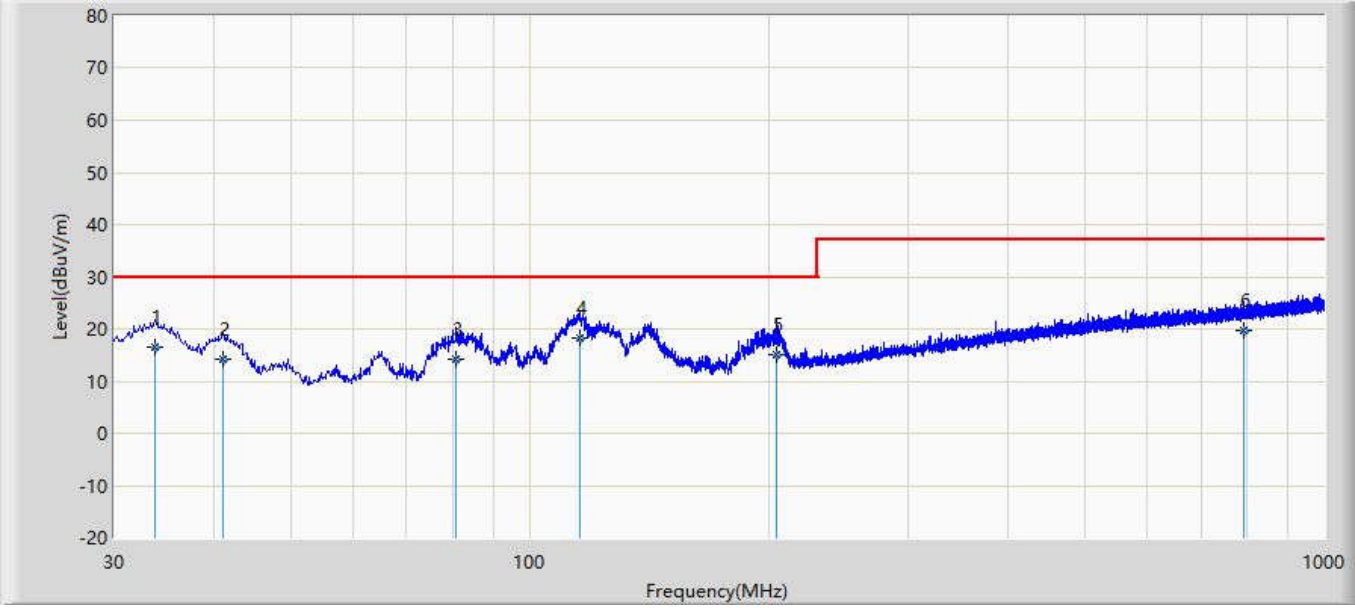
Frequency [MHz]	Limit: QP [dB(μV/m) <sup>1)</sup> ]		IF BW	Detector
	@3 m.	@10 m.		
30 - 230	40	30	120 KHz	QP
230 - 1000	47	37	120 KHz	QP

<sup>1)</sup> At the transition frequency, the lower limit applies.

**Performed measurements**

Port under test	Enclosure		
Voltage – Mains [V]	Input: 400 Vdc, Output: 230 Vac, 50 Hz		
Frequency – Mains [Hz]	50 Hz		
Test method applied	<input type="checkbox"/>	OATS or SAC with measurement distance [m]: 3 m.	
	<input checked="" type="checkbox"/>	OATS or SAC with measurement distance [m]: 10 m.	
Test setup	<input checked="" type="checkbox"/>	Equipment on a table of 80 cm height	
	<input type="checkbox"/>	Equipment on the floor (insulated from ground plane)	
	<input type="checkbox"/>	Other:	
	Refer to the Annex 2 for test setup photo(s).		
Operating mode(s) used	Mode 1		
Remark	---		

See next page.

Measurement data		<input checked="" type="checkbox"/>	Horizontal	<input type="checkbox"/>	Vertical							
Operating mode / voltage / frequency used during the test			Input: 400 Vdc, Output: 230 Vac, 50 Hz									
Engineer: Aaron												
Site: AC1			Time: 2020/07/25									
Limit: EN 61000-6-3_RE(10m)			Margin: 0									
Probe: CBL6112B_2931(30-1000MHz)			Polarity: Horizontal									
EUT: Hybrid inverter			Power: Input: 400 Vdc, Output: 230 Vac, 50 Hz									
Note: Normal Operation												
												
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1		33.762	16.596	22.300	-13.404	30.000	14.935	1.023	21.662	100	360	QP
2		41.166	14.343	22.100	-15.657	30.000	12.777	1.139	21.673	200	360	QP
3		80.939	14.205	26.900	-15.795	30.000	7.350	1.647	21.692	400	52	QP
4	*	115.514	18.373	25.700	-11.627	30.000	12.317	2.010	21.653	400	261	QP
5		204.951	15.001	24.300	-14.999	30.000	9.488	2.772	21.560	400	40	QP
6		792.615	19.763	14.400	-17.237	37.000	19.341	6.215	20.193	400	104	QP
Note:												
1. " * ", means this data is the worst emission level.												
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).												
Remark												



<b>Measurement data</b>		<input type="checkbox"/>	<b>Horizontal</b>	<input checked="" type="checkbox"/>	<b>Vertical</b>							
Operating mode / voltage / frequency used during the test			Input: 400 Vdc, Output: 230 Vac, 50 Hz									
Engineer: Aaron												
Site: AC1			Time: 2020/07/25									
Limit: EN 61000-6-3_RE(10m)			Margin: 0									
Probe: CBL6112B_2933(30-1000MHz)			Polarity: Vertical									
EUT: Hybrid inverter			Power: Input: 400 Vdc, Output: 230 Vac, 50 Hz									
Note: Normal Operation												
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Probe (dB/m)	Cable (dB)	Amp (dB)	Ant Pos (cm)	Table Pos (deg)	Type
1	*	33.633	27.877	34.700	-2.123	30.000	14.855	1.144	22.822	100	135	QP
2		64.325	21.673	36.100	-8.327	30.000	6.789	1.626	22.842	200	251	QP
3		84.691	24.433	37.500	-5.567	30.000	7.897	1.884	22.847	200	360	QP
4		93.950	25.861	37.400	-4.139	30.000	9.314	1.999	22.851	100	133	QP
5		113.046	23.326	32.100	-6.674	30.000	11.865	2.211	22.850	100	179	QP
6		140.099	24.454	34.000	-5.546	30.000	10.819	2.491	22.856	100	82	QP
Note:												
1. " * ", means this data is the worst emission level.												
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).												
Remark												

<b>4.5 Radiated electromagnetic disturbances (above 1 GHz)</b>	<b>VERDICT: N/A</b>
--	---------------------

Standard	EN 61000-6-3	
Basic standard(s)	CISPR16-2-3	
Test method	Antenna method according to CISPR16-2-3 standard.	
Required highest frequency for radiated measurement		
	Highest internal frequency [f <sub>x</sub> ]	Highest measured frequency
<input checked="" type="checkbox"/>	f <sub>x</sub> ≤ 108 MHz	1 GHz
<input type="checkbox"/>	108 MHz < f <sub>x</sub> ≤ 500 MHz	2 GHz
<input type="checkbox"/>	500 MHz < f <sub>x</sub> ≤ 1 GHz	5 GHz
<input type="checkbox"/>	f <sub>x</sub> ≥ 1 GHz	5x f <sub>x</sub> or up to 6 GHz

**Limits**

Frequency [GHz]	Limit: PK@3m.[dB(μV/m) <sup>1)</sup>	Limit: AV@3m.[dB(μV/m) <sup>1)</sup>	IF BW	Detector
1 - 3	70	50	1 MHz	PK, CAV
3 - 6	74	54	1 MHz	PK, CAV

<sup>1)</sup> At the transition frequency, the lower limit applies.

**Performed measurements**

Port under test	Enclosure	
Voltage – Mains [V]	---	
Frequency – Mains [Hz]	---	
Test method applied	<input type="checkbox"/>	Absorber-lined OATS or SAC with measurement distance [m]: 3 m.
	<input type="checkbox"/>	Absorber-lined OATS or SAC with measurement distance [m]: 1 m.
Test setup	<input type="checkbox"/>	Equipment on a table of 80 cm height
	<input type="checkbox"/>	Equipment on the floor (insulated from ground plane)
	<input type="checkbox"/>	Other: Refer to the Annex 2 for test setup photo(s).
Operating mode(s) used	---	
Remark	---	

See next page.

Measurement data	<input type="checkbox"/>	Horizontal	<input type="checkbox"/>	Vertical
Operating mode / voltage / frequency used during the test				
The highest internal frequency[f <sub>x</sub> ] of EUT ≤ 108 MHz, so it needs not to perform the test item.				
Remark				

<b>4.6 Discontinuous disturbance (clicks) on AC power leads</b>	<b>VERDICT: N/A</b>
---	---------------------

Standard	EN 55014-1		
Frequency [MHz]	Limit: QP [dB(μV)]	IF BW	Detector
0,15	66	9 KHz	QP
0,50	56	9 KHz	QP
1,40	56	9 KHz	QP
30,0	60	9 KHz	QP

**Performed measurements**

Scan range (0,9 - 1,1 $U_N$ )	<input type="checkbox"/>	198 – 264 V <sub>AC</sub>	<input type="checkbox"/>	207 – 253 V <sub>AC</sub>	<input type="checkbox"/>	V <sub>AC</sub>
Voltage – Mains [V]						
Frequency – Mains [Hz]						
Test method applied	<input type="checkbox"/>	Artificial mains network				
	<input type="checkbox"/>	Voltage probe				
Test setup	<input type="checkbox"/>	Table top	<input type="checkbox"/>	Floor standing		
	<input type="checkbox"/>	Other:				
	Refer to the Annex 2 for test setup photo(s).					
Operating mode(s) used	Exemptions from click measurements applicable (clause 4.2.3).					
Remark	---					

Reason for not performing the test	<input type="checkbox"/>	The amplitudes of the observed disturbances were all below the limit for continuous disturbance, these are not considered to be clicks.						
Measurement results	<input type="checkbox"/>	Neutral	<input type="checkbox"/>	Line 1	<input type="checkbox"/>	Line 2	<input type="checkbox"/>	Line 3
Frequency (MHz)	First Measurement: Determination of the limit $L_q$ – Quasi-peak							
	Limit $L$ (dBμV)	Number of short clicks	Number of long clicks	Number of clicks – $N_1$	Time of meas. (min.)	Click rate $N$	Increased limit (dB)	Increased Limit $L_q$
0,15	66							
0,5	56							
1,4	56							
30	60							
<input type="checkbox"/>	The calculated click rate $N$ is not more than 5 times per minute and all the clicks are classified as short ( $t \leq 10$ ms). Thus, the EUT is deemed to comply with the limits without any further measurement at an increased limit.							
Frequency (MHz)	Second measurement with Limit = $L_q$ (Upper quartile method):							
	Limit $L_q$ (dBμV)	Number of clicks – $N_2$	Number of authorized clicks $N_2 \leq N_1/4$				Verdict	
0,15								
0,5								
1,4								
30								
<u>Supplementary information:</u>								

<b>4.7 Harmonic current emissions</b>	<b>VERDICT: PASS</b>
---------------------------------------	----------------------

Standard	EN 61000-6-3		
Basic standard	IEC 61000-3-2&12		
Exclusions (For these categories of equipment, limits are not specified in the EN 61000-3-2 standard)	<input type="checkbox"/>		Arc welding equipment intended for professional use.
	<input type="checkbox"/>		System(s) with nominal voltage(s) less than 220 V <sub>AC</sub> (line-to-neutral).
	<input type="checkbox"/>		Equipment with rated power of ≤ 75 W (other than lighting equipment).
	<input type="checkbox"/>		Professional equipment with total rated power > 1 kW.
	<input type="checkbox"/>		Symmetrically controlled heating elements with a rated power ≥ 200 W.
	<input type="checkbox"/>		Independent dimmers for incandescent lamps with rated power ≤ 1 kW.

Classification ( $I_{input} \leq 16A$ )			
<input type="checkbox"/>	Class A		All apparatus not classified as Class B, C or D
<input type="checkbox"/>	Class B		Portable tools
<input type="checkbox"/>	Class C	<input type="checkbox"/>	Lighting equipment with active input power > 25 W
		<input type="checkbox"/>	Lighting equipment with active input power ≤ 25 W (First requirement, Table 3 column 2)
		<input type="checkbox"/>	Lighting equipment with active input power ≤ 25 W (Second requirement)
<input type="checkbox"/>	Class D		Personal computers, television receivers

Classification ( $16A \leq I_{input} < 75A$ )			
<input checked="" type="checkbox"/>	Table 2		other than balanced three-phase equipment
<input type="checkbox"/>	Table 3		balanced three-phase equipment
<input type="checkbox"/>	Table 4		balanced three-phase equipment under specified conditions
<input type="checkbox"/>	Table 5		balanced three-phase equipment under specified conditions

**Performed measurements**

Port under test	AC mains power input					
Voltage – Mains [V]	230 Vac					
Frequency – Mains [Hz]	50 Hz					
Observation period	<input type="checkbox"/>	6.5 min.	<input checked="" type="checkbox"/>	2.5 min.	<input type="checkbox"/>	Other:
Version of measurement instrument standard used EN / IEC61000-4-7 (Cl. 7)	<input checked="" type="checkbox"/>	EN 61000-4-7:2002 + AM1:2009 (IEC 61000-4-7:2002+AM1:2008)				
	<input type="checkbox"/>	EN 61000-4-7:1991				
Control principle used in the EUT	<input type="checkbox"/>	Comply with the requirements of the Clause 6.2 (EN / IEC 61000-3-2).				
	<input checked="" type="checkbox"/>	Comply with the requirements of the Clause 5.1 (EN / IEC 61000-3-12).				
	<input type="checkbox"/>	Not comply with the requirements of the Clause 6.2 (EN / IEC 61000-3-2).				
	<input type="checkbox"/>	Not comply with the requirements of the Clause 5.1 (EN / IEC 61000-3-12).				
Operating mode(s) used	Mode 1					
Remark	---					

See next page.

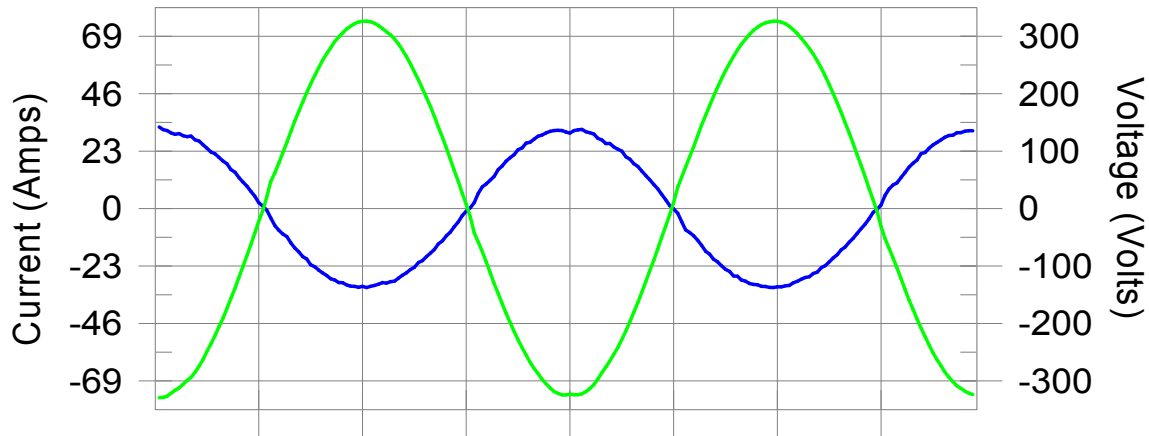
<b>Measurement data</b>	Port under test	AC input power
-------------------------	-----------------	----------------

Operating mode / voltage / frequency used during the test	Mode 1/ Input: 400 Vdc, Output: 230 Vac, 50 Hz
---	--

**Test Result: Pass**

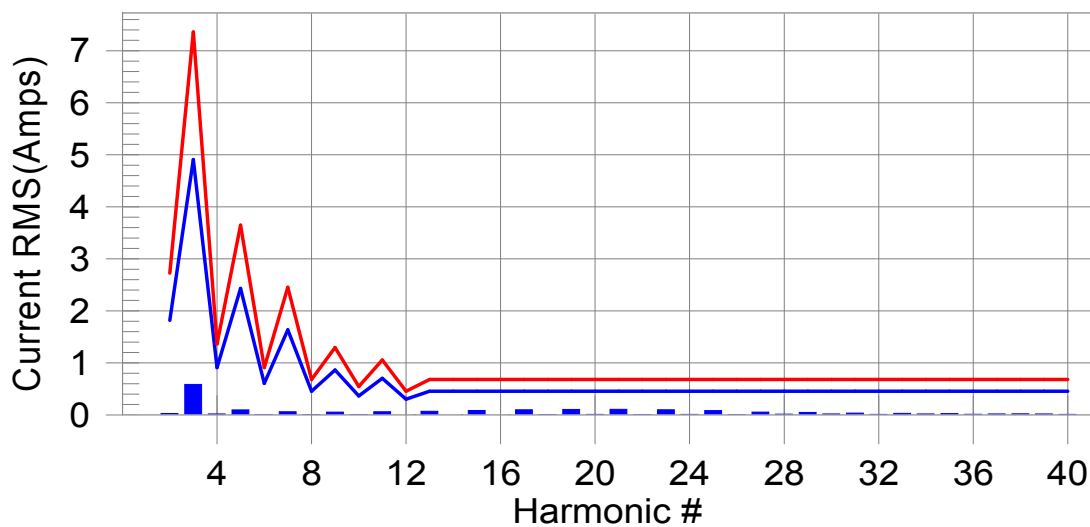
**Source qualification: Normal**

**Current & voltage waveforms**



**Harmonics and Class 2 limit line**

**European Limits**



**Test result: Pass**

Remark	
--------	--

Measurement data				Port under test	AC input power			
Operating mode / voltage / frequency used during the test				Mode 1/ Input: 400 Vdc, Output: 230 Vac, 50 Hz				
<b>Test Result: Pass</b>		<b>Measured Iref: 22.718</b>		<b>Source: Normal</b>				
THC/Iref (%): 2.6		Limit (%): 23.0		PWHC/Iref (%): 0.0		PWHC Limit (%): 23.0		
<b>Highest parameter values during test:</b>								
V_RMS (Volts): 230.83				Frequency (Hz): 50.00				
I_Peak (Amps): 33.563				I_RMS (Amps): 22.756				
I_Fund (Amps): 22.707				Crest Factor: 1.480				
Power (Watts): -5244				Power Factor: -0.998				
Harm#	Harms(avg)	100%Limit	%of Limit	Harms(max)	150%Limit	%of Limit	Status	
2	0.027	1.817	1.5	0.042	2.726	1.6	Pass	
3	0.587	4.907	12.0	0.622	7.361	8.4	Pass	
4	0.019	0.909	2.0	0.028	1.363	2.0	Pass	
5	0.097	2.431	4.0	0.106	3.646	2.9	Pass	
6	0.007	0.606	1.2	0.009	0.909	0.9	Pass	
7	0.060	1.636	3.7	0.068	2.454	2.8	Pass	
8	0.008	0.454	1.7	0.010	0.682	1.5	Pass	
9	0.055	0.863	6.4	0.063	1.295	4.9	Pass	
10	0.008	0.363	2.3	0.010	0.545	1.9	Pass	
11	0.062	0.704	8.8	0.068	1.056	6.5	Pass	
12	0.006	0.303	2.1	0.008	0.454	1.7	Pass	
13	0.069	0.454	15.2	0.073	0.682	10.6	Pass	
14	0.006	N/A	N/A	0.008	N/A	N/A	N/A	
15	0.086	N/A	N/A	0.088	N/A	N/A	N/A	
16	0.006	N/A	N/A	0.007	N/A	N/A	N/A	
17	0.099	N/A	N/A	0.100	N/A	N/A	N/A	
18	0.008	N/A	N/A	0.009	N/A	N/A	N/A	
19	0.105	N/A	N/A	0.107	N/A	N/A	N/A	
20	0.011	N/A	N/A	0.013	N/A	N/A	N/A	
21	0.108	N/A	N/A	0.110	N/A	N/A	N/A	
22	0.008	N/A	N/A	0.009	N/A	N/A	N/A	
23	0.099	N/A	N/A	0.100	N/A	N/A	N/A	
24	0.009	N/A	N/A	0.011	N/A	N/A	N/A	
25	0.082	N/A	N/A	0.083	N/A	N/A	N/A	
26	0.007	N/A	N/A	0.009	N/A	N/A	N/A	
27	0.054	N/A	N/A	0.055	N/A	N/A	N/A	
28	0.014	N/A	N/A	0.015	N/A	N/A	N/A	
29	0.047	N/A	N/A	0.048	N/A	N/A	N/A	
30	0.019	N/A	N/A	0.020	N/A	N/A	N/A	
31	0.034	N/A	N/A	0.035	N/A	N/A	N/A	
32	0.011	N/A	N/A	0.013	N/A	N/A	N/A	
33	0.031	N/A	N/A	0.033	N/A	N/A	N/A	
34	0.019	N/A	N/A	0.021	N/A	N/A	N/A	
35	0.025	N/A	N/A	0.027	N/A	N/A	N/A	
36	0.012	N/A	N/A	0.014	N/A	N/A	N/A	
37	0.018	N/A	N/A	0.019	N/A	N/A	N/A	
38	0.021	N/A	N/A	0.023	N/A	N/A	N/A	
39	0.018	N/A	N/A	0.021	N/A	N/A	N/A	
40	0.009	N/A	N/A	0.013	N/A	N/A	N/A	
<p>1. Dynamic limits were applied for this test. The highest harmonics values in the above table may not occur at the same window as the maximum harmonics/limit ratio.</p> <p>2. According to EN61000-3-2 paragraph 7 the note 1 and 2 are valid for all applications having an active input power &gt;75W. Others the result should be pass.</p>								
Remark								

<b>4.8 Voltage changes, voltage fluctuations and flicker</b>	<b>VERDICT: PASS</b>
--	----------------------

Standard	EN 61000-6-3
Basic standard	IEC 61000-3-3 & 11

**Limits**

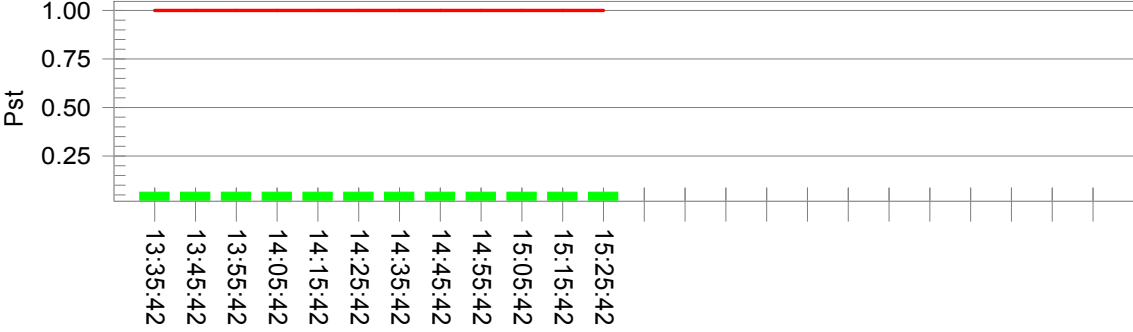
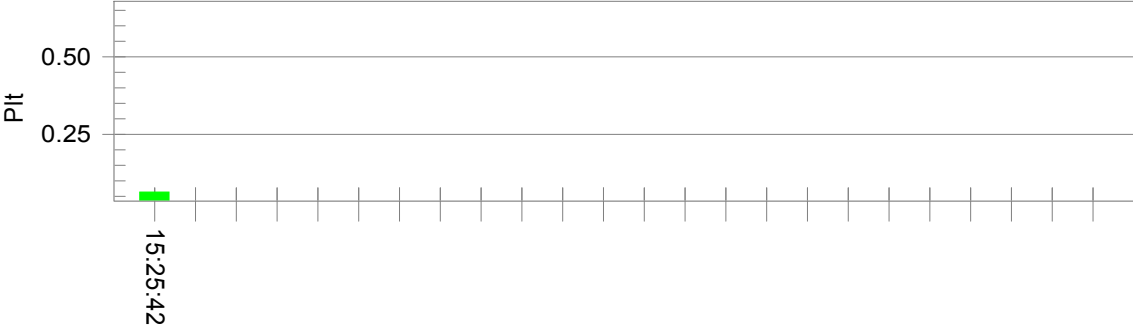
$P_{ST}$ (Short term flicker)	<input checked="" type="checkbox"/>	$\leq 1$	<input type="checkbox"/>	Not Applicable
$P_{LT}$ (Long term flicker)	<input checked="" type="checkbox"/>	$\leq 0,65$	<input type="checkbox"/>	Not Applicable
$d_C$ (Relative Voltage change)	<input checked="" type="checkbox"/>	$\leq 3,3\%$	<input type="checkbox"/>	Not Applicable
$T_{max}$ (Maximum time duration)	<input checked="" type="checkbox"/>	$\leq 500ms$	<input type="checkbox"/>	Not Applicable
$d_{MAX}$ (Max. voltage change)	<input checked="" type="checkbox"/>	$\leq 4\%$	<input type="checkbox"/>	6%
	<input type="checkbox"/>	7%	<input type="checkbox"/>	Not Applicable
<u>Supplemental information:</u>				

**Performed measurements**

Reason for not performing the measurement(s)	<input type="checkbox"/>	Tests are not necessary because the EUT is unlikely to produce significant voltage fluctuations or flicker (clause 6.1).		
Port under test	AC mains power input			
Voltage – Mains [V]	230 Vac			
Frequency – Mains [Hz]	50 Hz			
Test method	<input checked="" type="checkbox"/>	Flickermeter according EN / IEC 61000-4-15:2011		
	<input type="checkbox"/>	Simulation (Clause 4.2.3 of EN / IEC 61000-3-3)		
	<input type="checkbox"/>	Analytical method (Clause 4.2.4 of EN / IEC 61000-3-3)		
	<input type="checkbox"/>	Use of $P_{st} = 1$ curve (Clause 4.2.5 of EN / IEC 61000-3-3)		
Observation period	<input type="checkbox"/>	10 min.	<input checked="" type="checkbox"/>	120 min.
	<input type="checkbox"/>	Other:		
	<input type="checkbox"/>	24 times switching according to Annex B		
Operating mode(s) used	Mode 1			
Remark	---			

See next page.



Measurement data	Port under test	AC input power																									
Operating mode used during the test	Mode 1/ Input: 400 Vdc, Output: 230 Vac, 50 Hz																										
<p><b>Test Result: Pass</b> <span style="float: right;"><b>Status: Test Completed</b></span></p> <p><b>Pst<sub>i</sub> and limit line</b></p>  <p><b>Plt and limit line</b></p>  <p><b>Parameter values recorded during the test:</b></p> <p><b>Vrms at the end of test (Volt): 230.21</b></p> <table> <tr> <td>T-max (mS):</td> <td>0.0</td> <td>Test limit (mS):</td> <td>500.0</td> <td>Pass</td> </tr> <tr> <td>Highest dc (%):</td> <td>0.00</td> <td>Test limit (%):</td> <td>3.30</td> <td>Pass</td> </tr> <tr> <td>Highest dmax (%):</td> <td>-0.15</td> <td>Test limit (%):</td> <td>4.00</td> <td>Pass</td> </tr> <tr> <td>Highest Pst (10 min. period):</td> <td>0.064</td> <td>Test limit:</td> <td>1.000</td> <td>Pass</td> </tr> <tr> <td>Highest Plt (2 hr. period):</td> <td>0.064</td> <td>Test limit:</td> <td>0.650</td> <td>Pass</td> </tr> </table>			T-max (mS):	0.0	Test limit (mS):	500.0	Pass	Highest dc (%):	0.00	Test limit (%):	3.30	Pass	Highest dmax (%):	-0.15	Test limit (%):	4.00	Pass	Highest Pst (10 min. period):	0.064	Test limit:	1.000	Pass	Highest Plt (2 hr. period):	0.064	Test limit:	0.650	Pass
T-max (mS):	0.0	Test limit (mS):	500.0	Pass																							
Highest dc (%):	0.00	Test limit (%):	3.30	Pass																							
Highest dmax (%):	-0.15	Test limit (%):	4.00	Pass																							
Highest Pst (10 min. period):	0.064	Test limit:	1.000	Pass																							
Highest Plt (2 hr. period):	0.064	Test limit:	0.650	Pass																							
Remark																											

## 5 IMMUNITY TEST RESULTS

### 5.1 Performance (Compliance) criteria

[Source: EN 61000-6-2]

Performance criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

#### 5.1.1 Performance criteria related to immunity tests

Immunity test	Performance criteria
Electrostatic discharge	B
Radio-frequency electromagnetic fields	A
Fast transients	B
Surge transient	B
Injected currents (radio-frequency common mode)	A
Power frequency magnetic field immunity	A
Voltage dips and short interruptions	B, C

#### 5.1.2 Manufacturer defined performance criteria

Not provided.

**5.2 Monitored – Checked Functions / Parameters**

During the immunity tests the following functions of the EUT has/have been monitored/checked.

<input type="checkbox"/>	Motor speed	<input type="checkbox"/>	Display data
<input type="checkbox"/>	Switching	<input type="checkbox"/>	Data storage
<input type="checkbox"/>	Standby mode	<input type="checkbox"/>	Sensor functions
<input type="checkbox"/>	Temperature	<input type="checkbox"/>	Audible signals
<input type="checkbox"/>	Power consumption	<input checked="" type="checkbox"/>	Others : Screen
<input type="checkbox"/>	AC mains input current	<input checked="" type="checkbox"/>	Others : Output Voltage
<input type="checkbox"/>	Timing	<input checked="" type="checkbox"/>	Others : Output Current
<input type="checkbox"/>	Illumination	<input type="checkbox"/>	Others :
<u>Supplementary information :</u>			

Immunity test	Monitored - Checked function(s)/parameter(s) during / after the test	Method
Electrostatic discharge	Pass	Visual
Radio-frequency electromagnetic fields	Pass	Camera
Fast transients	Pass	Visual
Surge transient	Pass	Visual
Injected currents (radio-frequency common mode)	Pass	Visual
Power frequency magnetic field immunity	Pass	Visual
Voltage dips and short interruptions	N/A	N/A
<u>Supplementary information :</u>		

<b>5.3 Electrostatic discharge immunity</b>	<b>VERDICT: PASS</b>
---	----------------------

Electrostatic discharges (ESD) are the result of persons or objects that accumulate static electricity due to for instance walking on synthetic carpets. The ESD can influence the operation of equipment or damage its electronics, either by a direct discharge or indirectly by coupling or radiation. Both effects are simulated during the tests.

**Requirements**

Standard	EN 61000-6-2							
Basic standard	IEC 61000-4-2							
Port under test	Enclosure							
Air discharges	<input checked="" type="checkbox"/>	±2 kV	<input checked="" type="checkbox"/>	±4 kV	<input checked="" type="checkbox"/>	±8 kV	<input type="checkbox"/>	kV
Contact discharges	<input checked="" type="checkbox"/>	±2 kV	<input checked="" type="checkbox"/>	±4 kV	<input type="checkbox"/>	±8 kV	<input type="checkbox"/>	kV
Number of discharges	≥ 10 per polarity with ≥ 1 sec interval.							
Performance criterion	B; During the test degradation is allowed. No change of operating state or stored data is allowed. Refer to the chapter 5.1 for details.							

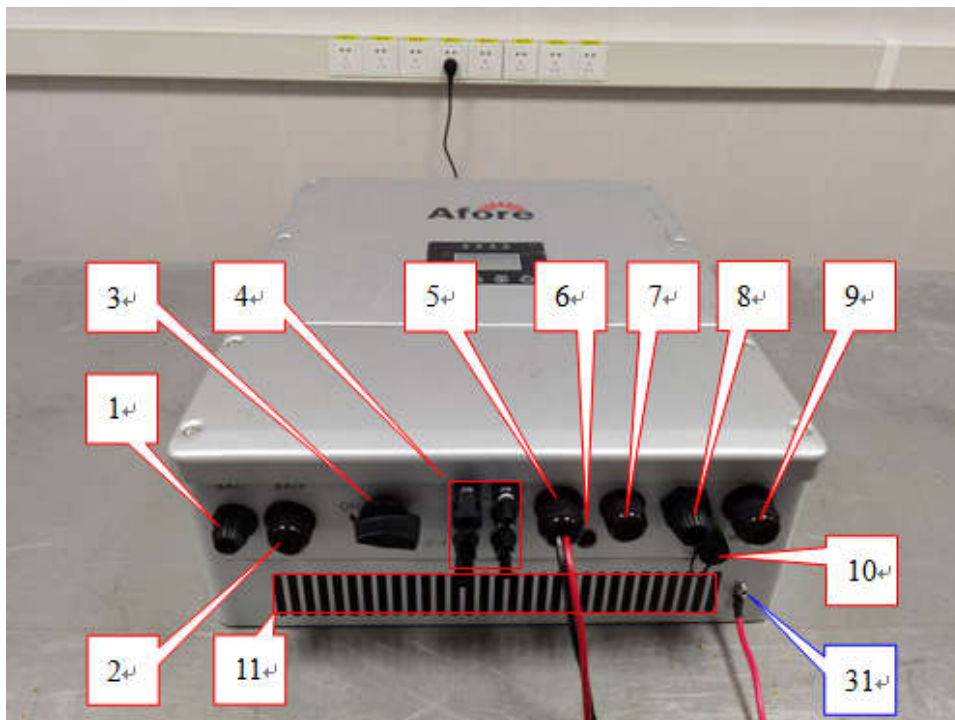
**Performed tests**

Set-up	<input checked="" type="checkbox"/>	Table-top	<input type="checkbox"/>	Floor standing
Ambient temperature [°C]	25°C		Relative Humidity air [%]	48%
Voltage – Mains [V]	Input: 400 Vdc, Output: 230 Vac, 50 Hz			
Frequency – Mains [Hz]	50 Hz			
Operating mode(s) used	Mode 1			

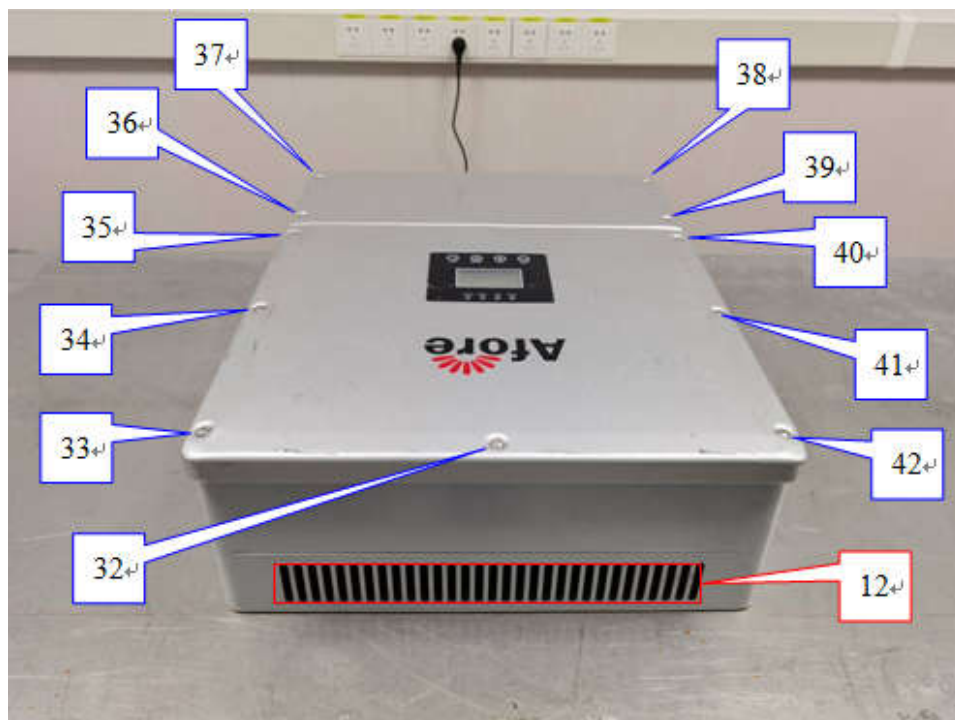
Test Point (Location of discharge, see also photo)	Test Voltage [kV] & Polarity	Coupling type	# of applied discharges / polarity	Discharge interval [s]
<input checked="" type="checkbox"/> Points on conductive surface as indicated in the picture below.	±2 / ±4	Contact	10	1
<input checked="" type="checkbox"/> Points on non-conductive surface as indicated in the picture below.	±2 / ±4 / ±8	Air	10	1
<input checked="" type="checkbox"/> HCP top side.	±4	Contact	10	1
<input checked="" type="checkbox"/> HCP bottom side.	±4	Contact	10	1
<input checked="" type="checkbox"/> VCP right side.	±4	Contact	10	1
<input checked="" type="checkbox"/> VCP left side.	±4	Contact	10	1
<input checked="" type="checkbox"/> VCP front side.	±4	Contact	10	1
<input checked="" type="checkbox"/> VCP rear side.	±4	Contact	10	1
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.			
Supplementary information:				

### Photo of selected test points

Test Dot:



Test Dot:

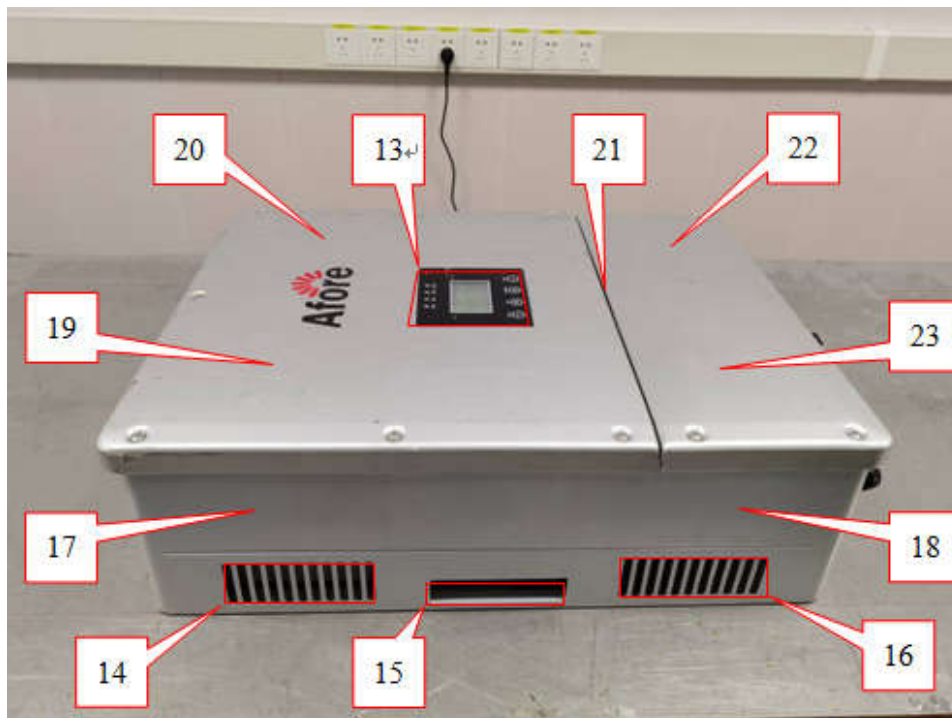


Supplementary information:

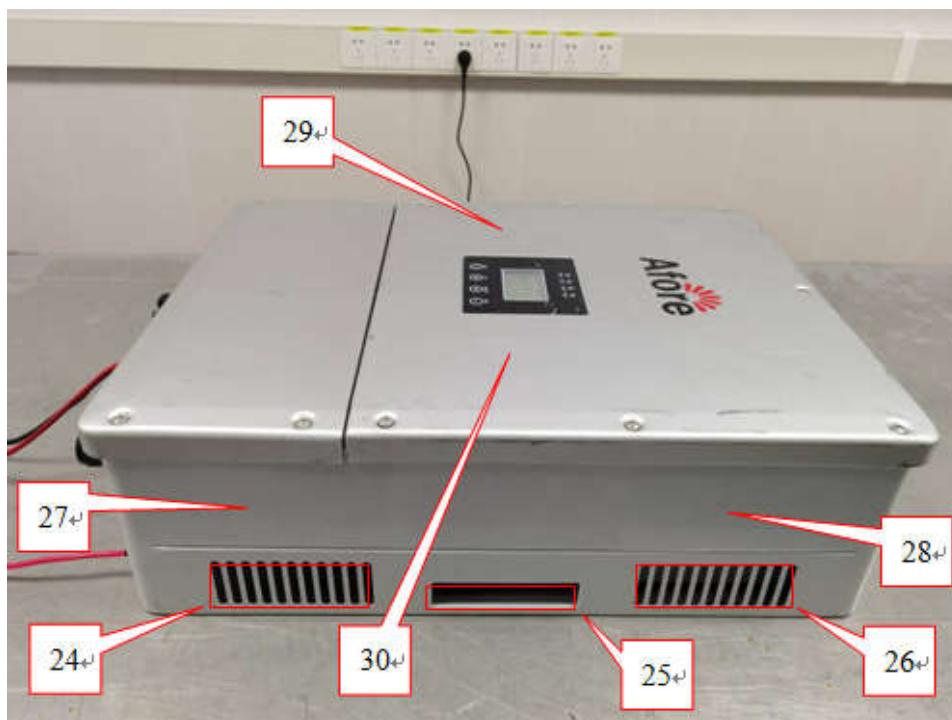
Red: Air Discharge, Blue: Contact Discharge

### Photo of selected test points

Test Dot:



Test Dot:



Supplementary information:

**Red: Air Discharge, Blue: Contact Discharge**

<b>5.4</b>	<b>Radio-frequency electromagnetic fields immunity</b>	<b>VERDICT: PASS</b>
------------	--	----------------------

During the test it is verified if the equipment under test (EUT) has sufficient immunity against radiated electromagnetic fields. Industrial electromagnetic sources, walkie-talkies, radio transmitters, television transmitters and telecommunication equipment including cellular telephones and other emitting devices can generate these fields.

**Requirements**

Standard	EN 61000-6-2			
Basic standard	IEC 61000-4-3			
Port under test	Enclosure			
Frequency range	Test level	Modulation	Dwell time	Step size
80 – 1000 MHz	10 V/m	80% AM (1kHz)	≥ 0,5 s	≤ 1%
1400 – 2000 MHz	3 V/m	80% AM (1kHz)	≥ 0,5 s	≤ 1%
2000 – 2700 MHz	1 V/m	80% AM (1kHz)	≥ 0,5 s	≤ 1%
<u>Supplementary information:</u>				

**Performed tests**

Test method	<input checked="" type="checkbox"/>	IEC 61000-4-3				
Test set-up	<input checked="" type="checkbox"/>	Equipment on the table (0,8 m height)				
(see annex 2 for photo)	<input type="checkbox"/>	Equipment standing on floor (0,05 – 0,15 m height)				
Voltage – Mains [V]	Input: 400Vdc, Output: 230 Vac, 50 Hz		Frequency – Mains [Hz]	50 Hz		
Operating mode(s) used	Mode 1					
Frequency range (applied)	Antenna Polarization	Test level (applied)	Modulation (applied)	Dwell time (applied)	Remark	
80 – 1000 MHz (step size 1%)	H	10 V/m	80% AM (1kHz)	3 s	---	
	V	10 V/m	80% AM (1kHz)	3 s	---	
1400 – 2000 MHz (step size 1%)	H	3 V/m	80% AM (1kHz)	3 s	---	
	V	3 V/m	80% AM (1kHz)	3 s	---	
2000 – 2700 MHz (step size 1%)	H	1 V/m	80% AM (1kHz)	3 s	---	
	V	1 V/m	80% AM (1kHz)	3 s	---	
Exposed side of the EUT	<input checked="" type="checkbox"/>	Front (0°)	<input checked="" type="checkbox"/>	Right (90°)	<input type="checkbox"/>	Top
	<input checked="" type="checkbox"/>	Rear (180°)	<input checked="" type="checkbox"/>	Left (270°)	<input type="checkbox"/>	Bottom
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.					
<u>Supplementary information:</u>						

<b>5.5 Electrical Fast Transients immunity</b>	<b>VERDICT: PASS</b>
--	----------------------

The EFT immunity test simulates disturbances by bursts of very short transients caused for example by switching off loads such as an AC motor or bouncing relay contacts. The transients are likely to disturb electronics but less likely to cause damage.

**Requirements**

Standard	EN 61000-6-2		
Basic standard	IEC 61000-4-4		
Pulse characteristics	5/50 ns		
Port	Test level	Repetition frequency	Duration
AC input-output power	± 2000 V	5 KHz	≥1 min. / polarity
DC input-output power <sup>2)</sup>	± 2000 V	5 KHz	≥1 min. / polarity
Signal ports <sup>1)</sup>	± 1000 V	5 KHz	≥1 min. / polarity
<sup>1)</sup> Only applicable to ports interfacing with cables whose total length may exceed 3 m. <sup>2)</sup> Not applicable to input ports intended for connection to a battery or a rechargeable battery which must be removed or disconnected from the apparatus for recharging. Apparatus with a DC power input port intended for use with an AC-DC power adaptor shall be tested on the AC power input of the AC- DC power adaptor specified by the manufacturer or, where none is so specified, using a typical AC-DC power adaptor. The test is applicable to DC power input ports intended to be connected permanently to cables longer than 3 m.			

**Performed tests**

Voltage – Mains [V]	Input: 150/400 Vdc, Output: 230 Vac, 50 Hz		
Frequency – Mains [Hz]	50 Hz		
Operating mode(s) used	Mode 1		
Test Set-up (see annex 2 for photo)	<input type="checkbox"/>	Equipment standing on floor at (0,1 ± 0,01) m above ground plane	
	<input checked="" type="checkbox"/>	Equipment on the table (0,1 ± 0,01) m above ground plane	
	<input type="checkbox"/>	Artificial hand applied. Location refer to chapter 8.	
Coupling	<input checked="" type="checkbox"/>	Common mode	<input type="checkbox"/> Other:

Port under test	Test Voltage & Polarity	Repetition Frequency	Test duration / polarity	Injection method		
				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DC input port	± 2 kV	5 KHz	60 s	<input checked="" type="checkbox"/>	CDN	<input type="checkbox"/> Clamp
AC output port	± 2 kV	5 KHz	60 s	<input checked="" type="checkbox"/>	CDN	<input type="checkbox"/> Clamp
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.					
Supplementary information:						



<b>5.6</b>	<b>Surge transient immunity</b>	<b>VERDICT: PASS</b>
------------	---------------------------------	----------------------

The surge transient immunity test simulates the surges that are caused by over-voltages due to indirect (induced) lightning transients. The pulse is a slow transient with high-energy contents and due to its long duration may cause damage to an unprotected EUT.

**Requirements**

Standard	EN 61000-6-2		
Basic standard	IEC 61000-4-5		
Pulse characteristics	1,2/50µs Voltage; 8/20µs Current		
Repetition rate	≤ 60 secs. (for each test level and phase angle)		
Number of pulses	5 pulses (at each polarity and phase angle)		
Port	Test level & Polarity & Coupling		Phase angle [°]
	Line to Line <sup>1)</sup>	Line to Earth <sup>1)</sup>	
AC input-output power	± 1 kV	± 2 kV	0, 90, 180, 270
DC input-output power <sup>2)</sup>	± 0,5 kV	± 0,5 kV	---
<sup>1)</sup> In addition to the specified test level, all lower test levels as detailed in EN 61000-4-5 should also be satisfied. <sup>2)</sup> Not applicable to input ports intended for connection to a battery or a rechargeable battery which must be removed or disconnected from the apparatus for recharging. Apparatus with a DC power input port intended for use with an AC-DC power adaptor shall be tested on the AC power input of the AC-DC power adaptor specified by the manufacturer or, where none is so specified, using a typical AC-DC power adaptor. DC ports, which are not intended to be connected to a DC distribution network are treated as signal ports.			

**Performed tests**

Voltage – Mains [V]	Input: 150/400 Vdc, Output: 230 Vac, 50 Hz
Frequency – Mains [Hz]	50 Hz
Operating mode(s) used	Mode 1
Repetition rate	60 secs. (for each test level and phase angle)
Number of pulses	5 pulses (at each polarity and phase angle)

Port under test	Coupling	Test level & Polarity	Phase angle [°]	Remark
<input checked="" type="checkbox"/> DC input port	Line to Line	± 0,5 kV	---	---
<input checked="" type="checkbox"/> DC input port	Line to Earth	± 0,5 kV	---	---
<input checked="" type="checkbox"/> AC output port	Line to Line	± 1 kV	0, 90, 180, 270	---
<input checked="" type="checkbox"/> AC output port	Line to Earth	± 2 kV	0, 90, 180, 270	---
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.			
<u>Supplementary information:</u>				

<b>5.7</b>	<b>Injected currents (RF common mode) immunity</b>	<b>VERDICT: PASS</b>
------------	--	----------------------

During this test the immunity of the equipment for induced or conducted electromagnetic fields is checked. Fields generated by radio and other transmitters cause RF voltages in long cables like the mains network. This test reproduces these induced disturbing voltages by injecting them to the EUT via the cabling.

**Requirements**

Standard	EN 61000-6-2			
Basic standard	IEC 61000-4-6			
Frequency range	0,15 – 80 MHz			
Port	Test level, $U_0$	Modulation	Step size	Dwell time
AC input-output power	10 V	80% AM (1kHz)	$\leq 1\%$	$\geq 0,5$ s
DC input-output power <sup>1)</sup>	10 V	80% AM (1kHz)	$\leq 1\%$	$\geq 0,5$ s
Signal port <sup>1)</sup>	10 V	80% AM (1kHz)	$\leq 1\%$	$\geq 0,5$ s
<sup>1)</sup> Only applicable to ports interfacing with cables whose total length, may exceed 3 m.				

**Performed tests**

Test method (applied)	Frequency range (applied)	Modulation (applied)	Step size (applied)	
IEC 61000-4-6	0,15 – 80 MHz	80% AM (1kHz)	1%	
Voltage – Mains [V]	Input: 400 Vdc, Output: 230 Vac, 50 Hz	Frequency – Mains [Hz]	50 Hz	
Operating mode(s) used	Mode 1			
Test set-up (see annex 2 for photo)	<input type="checkbox"/>	Equipment standing on floor at (0,1 ± 0,01) m above ground plane.		
	<input checked="" type="checkbox"/>	Equipment on the table (0,1 ± 0,01) m above ground plane.		
	<input type="checkbox"/>	Artificial hand applied. Location refer to Annex 2.		
Port under test	Test Level (applied)	Injection method	Dwell time (applied)	Remark
DC input port	10 V	Clamp	3 s	---
AC output port	10 V	Clamp	3 s	---
Observation(s)	During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.			
<u>Supplementary information:</u>				

<b>5.8</b>	<b>Power frequency magnetic field immunity</b>	<b>VERDICT: PASS</b>
------------	--	----------------------

Magnetic fields caused by for example nearby mains frequency transformers may disturb equipment with sensitivity for these type of disturbances such as CRT monitors.

**Requirements**

Standard	EN 61000-6-2
Basic standard	IEC 61000-4-8
Port under test	Enclosure
Field strength	30 A/m
Test Frequency	50 / 60 Hz
Notes: Applicable only to apparatus containing devices susceptible to magnetic fields.	

**Performed tests**

Reason for not performing the test	<input type="checkbox"/>	The test is not applicable as the apparatus does not contain any components susceptible to this low-frequency magnetic fields.
Voltage – Mains [V]	Input: 400 Vdc, Output: 230 Vac, 50 Hz	
Frequency – Mains [Hz]	50 Hz	
Operating mode(s) used	Mode 1	
Test set-up (see annex 2 for photo)	<input checked="" type="checkbox"/>	Single Coil. Dimensions: 1 m x 1 m
	<input type="checkbox"/>	Single Coil. Dimensions: 2 m x 2 m
	<input type="checkbox"/>	Homogeneous field (Helmholtz coil). Dimensions: 1 m x 1 m
	<input type="checkbox"/>	0,1 m above metal surface

Axis under test		Tested Field strength	Test Frequency	Test Duration	Remark
<input checked="" type="checkbox"/>	X-axis	30 A/m	50, 60 Hz	60 s	---
<input checked="" type="checkbox"/>	Y-axis	30 A/m	50, 60 Hz	60 s	---
<input checked="" type="checkbox"/>	Z-axis	30 A/m	50, 60 Hz	60 s	---
Observation(s)		During the test no loss of performance was observed. After the test the EUT functioned as intended. No unacceptable loss of performance or data was observed.			
<u>Supplementary information:</u>					

<b>5.9</b>	<b>Power supply interruptions and dips immunity</b>	<b>VERDICT: N/A</b>
------------	---	---------------------

The purpose of the test is to verify the immunity of the equipment against voltage dips and voltage interruptions. It helps to ensure that the equipment functions properly (as expected and safely) with power supply fluctuations. Voltage dips and interruptions are caused by faults in the LV, MV, HV networks (short-circuit or ground faults).

**Requirements**

Standard	EN 61000-6-1			
Basic standard	IEC 61000-4-11			
# of dips & interruptions	3 dips / interruptions for each test level and phase angle			
Interval between events	≥ 10 seconds			
Port under test	Test level <sup>1)</sup>	Period (Cycles)		Performance Criterion
		50 Hz	60 Hz	
AC input power port	U <sub>NOM</sub> – 100%	1	1	B; Refer to the chapter 5.1 for details.
AC input power port	U <sub>NOM</sub> – 60%	10	12	B; Refer to the chapter 5.1 for details.
AC input power port	U <sub>NOM</sub> – 30%	25	30	C; Refer to the chapter 5.1 for details.
AC input power port	U <sub>NOM</sub> – 100%	250	300	C; Refer to the chapter 5.1 for details.
<sup>1)</sup> Changes to the voltage level shall occur at a zero crossing point in the a.c. voltage waveform. <b>NOTE:</b> Where the equipment has a rated voltage range the following shall apply: <ul style="list-style-type: none"> <li>- If the voltage range does not exceed 20% of the lower voltage specified for the rated voltage range. A single voltage within that range may be selected for testing.</li> <li>- In all other cases, the test procedure shall be applied for both the lowest and highest voltages declared in the voltage range.</li> </ul>				

**Performed tests**

U <sub>NOM</sub> [V <sub>AC</sub> ]	Terminal	Test level [% U <sub>NOM</sub> ]	Duration [cycles]		Repetition rate [s]	Number of dips per test	Phase angle [°]
			50 Hz	60 Hz			
1) Applicable only to input ports. 2) Not applicable because no test requirements have been specified for DC/battery powered apparatus.							
Operating mode(s) used		---					
Observation(s)		---					
<u>Supplementary information:</u>							

## 6 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

### Conducted disturbance voltage

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100906	2020.04.18	2021.04.17
Two-Line V-Network	R&S	ENV216	101190	2019.12.28	2020.12.27
Two-Line V-Network	R&S	ENV216	101044	2020.04.18	2021.04.17
Artificial Mains Network	SCHWARZBECK	NNHV 8123	8123-200	2019.08.30	2020.08.29
Artificial Mains Network	SCHWARZBECK	NSLK 8129	8129-282	2020.04.17	2021.04.16
Current Probe	R&S	EZ-17	100678	2020.03.26	2021.03.25
50ohm Termination	SHX	TF2	07081402	2019.09.02	2020.09.01
50ohm Termination	SHX	TF2	07081403	2019.09.02	2020.09.01
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	N/A	N/A
Coaxial Cable	Suhner	RG 223	TR1-C1	2019.09.27	2020.09.26
Coaxial Cable	Suhner	RG 223	TR1-C2	2019.08.21	2020.08.20
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2020.04.18	2021.04.17

### Conducted disturbance voltage(Telecommunications/network port)

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100906	2020.04.18	2021.04.17
Two-Line V-Network	R&S	ENV216	101190	2019.12.28	2020.12.27
Two-Line V-Network	R&S	ENV216	101044	2020.04.18	2021.04.17
Impedance Stabilization Network	Teseq GmbH	ISN T800	30306	2020.05.23	2021.05.22
Impedance Stabilization Network	Teseq GmbH	ISN T8-Cat6	29680	2020.03.03	2021.03.02
50ohm Termination	SHX	TF2	07081402	2019.09.02	2020.09.01
50ohm Termination	SHX	TF2	07081403	2019.09.02	2020.09.01
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	N/A	N/A
Coaxial Cable	Suhner	RG 223	TR1-C1	2019.09.27	2020.09.26
Coaxial Cable	Suhner	RG 223	TR1-C2	2019.09.21	2020.09.20
Temperature/Humidity Meter	RTS	RTS-8S	TR1-TH	2020.04.18	2021.04.17

### Radiated Emission(30MHz – 1GHz)

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Test Receiver	R&S	ESCI	100175	2019.08.30	2020.08.29
EMI Test Receiver	R&S	ESCI	100726	2019.10.26	2020.10.25
EMI Receiver	Agilent	N9038A	MY51210196	2020.04.18	2021.04.17
Preamplifier	Quietek	AP-025C	CHM-0602008	2020.04.11	2021.04.10
Preamplifier	Quietek	AP-025C	CHM-0503006	2020.04.11	2021.04.10
Bilog Antenna	Schaffner	CBL6112B	2931	2020.04.26	2021.04.25
Bilog Antenna	Schaffner	CBL6112B	2933	2020.05.18	2021.05.17
DRG Horn Antenna	ETS-Lindgren	3117	00167055	2020.05.23	2021.05.22
Coaxial Cable	Huber+Suhner	RG 214_U	AC1-L	2020.04.11	2021.04.10
Coaxial Cable	Huber+Suhner	RG 214_U	AC1-R	2020.04.11	2021.04.10
Temperature/Humidity Meter	RTS	RTS-8S	AC1-TH	2020.04.18	2021.04.17

Radiated Emission (Above 1GHz)

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
EMI Receiver	Agilent	N9038A	MY51210196	2020.04.18	2021.04.17
low Noise Amplifier	BXT	NA2651D	LNA17040209	2020.05.24	2021.05.23
DRG Horn Antenna	ETS-Lindgren	3117	00167055	2020.05.23	2021.05.22
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2020.04.11	2021.04.10
Tunable Bandreject filter	Wainwright	WRCG2400/ 2485- 2375/2510- 60/11SS	SUA0500285	2020.06.15	2021.06.14
Temperature/Humidity Meter	RTS	RTS-8S	AC5-TH	2019.09.02	2020.09.01

Harmonic current and flicker emissions( $I \leq 16A$  ,  $16A < I \leq 75A$ )

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Proflin 2145 Harmonics & Flicker and power line immunity test system	Teseq GmbH	Proflin 2145	1736A02510, 1646A, 01490, 1736A02428, 1736A00944, A41547	2019.10.11	2020.10.10
Temperature/Humidity Meter	RTS	RTS-8S	TR20-TH	2019.09.02	2020.09.01

ESD discharge

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
ESD Simulator	EM TEST	Dito	V0616101367	2020.02.27	2021.02.26
ESD Simulator	3C TEST	ESD-30A	EC0261406	2020.07.29	2021.07.28
ESD Simulator	NoiseKen	ESS-B3011	ESS1233485	2020.03.04	2021.03.03
ESD Simulator	EM TEST	NSG 438A	237	2019.09.12	2020.09.11
Barometer	Boji	DYM3	02251	2019.10.23	2020.10.22
Temperature/Humidity Meter	RTS	RTS-8S	TR3-TH	2019.09.02	2020.09.01

Radio-frequency electromagnetic field

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Signal Generator	R&S	SMB100A	114728	2019.09.28	2020.09.27
Power Meter	R&S	NRP2	106362	2019.09.28	2020.09.27
Power Sensor	R&S	NRP6A	101411	2019.09.28	2020.09.27
Power Sensor	R&S	NRP6B	101412	2019.09.28	2020.09.27
RF Switch	R&S	OPS120	101944	N/A	N/A
Power Amplifier	R&S	BBA150 BC500	102912	2019.09.28	2020.09.27
Power Amplifier	R&S	BBA150 D200	102889	2019.09.28	2020.09.27
Power Amplifier	R&S	BBA150 E200	102890	2019.09.28	2020.09.27
LOG Antenna	R&S	HL046E	100257	N/A	N/A
LOG Antenna	R&S	STLP9149	9149-505	N/A	N/A
Filed Probe	AR	FL7006/KIT	350261	2019.10.29	2020.10.28

Temperature/Humidity Meter	RTS	RTS-8S	AC4-TH	2019.09.02	2020.09.01
----------------------------	-----	--------	--------	------------	------------

Electrical fast transients

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	4019	2020.06.29	2021.06.28
CDN	Teseq GmbH	CDN 3061	5010	2020.02.26	2021.02.25
Automatic Step transformer	Teseq GmbH	VAR 3005-S16	3010	2020.05.23	2021.05.22
CDN	Teseq GmbH	CDN 3063	1997	2019.12.28	2020.12.27
CDN	Teseq GmbH	CDN 3425	2029	2019.09.28	2020.09.27
Temperature/Humidity Meter	RTS	RTS-8S	TR2-TH	2019.09.02	2020.09.01

Surges

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	4019	2020.06.29	2021.06.28
CDN	Teseq GmbH	CDN 3061	5010	2020.02.26	2021.02.26
Automatic Step transformer	Teseq GmbH	VAR 3005-S16	3010	2020.05.23	2021.05.22
CDN	Teseq GmbH	CDN 3063	1997	2019.12.28	2020.12.27
CDN	Teseq GmbH	CDN 118	40652	2019.09.28	2020.09.27
CDN	Teseq GmbH	CDN 118	40644	2019.09.28	2020.09.27
CDN	Teseq GmbH	CDN 117	31806	2019.12.28	2020.12.27
Temperature/Humidity Meter	RTS	RTS-8S	TR2-TH	2019.09.02	2020.09.01

Radio-frequency continuous conducted

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
RF-Generator	Teseq GmbH	NSG 4070B-80	43711	2020.05.23	2021.05.22
Attenuation	Woken	/	0080CN1006H	2020.04.12	2021.04.11
Coupling / Decoupling Network	Teseq GmbH	CDN M016	24484	2019.09.04	2020.09.03
Coupling / Decoupling Network	Schaffner	CDN T400	19083	2019.10.16	2020.10.15
Coupling / Decoupling Network	Teseq GmbH	CDN T400	22461	2019.09.28	2020.09.27
Coupling / Decoupling Network	Teseq GmbH	CDN T800	26167	2020.04.17	2021.04.16
Current Injection Probe	FCC	F-120-8	121792	2019.10.16	2020.10.15
EM Clamp	Schaffner	KEMZ 801	21041	2019.09.02	2020.09.01
Temperature/Humidity Meter	RTS	RTS-8S	TR2-TH	2020.05.23	2021.05.22

Power-frequency magnetic field

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	4019	2020.06.29	2021.06.28
CDN	Teseq GmbH	CDN 3061	5010	2020.02.26	2021.02.25
Automatic Step transformer	Teseq GmbH	VAR 3005-S16	3010	2020.05.23	2021.05.22

Magnetic field Coil	Teseq GmbH	INA 702	TR2-TH	2020.07.12	2021.07.11
Magnetic Field Generator	Teseq GmbH	MFO 6502	201	2020.07.12	2021.07.11
Temperature/Humidity Meter	RTS	RTS-8S	TR2-TH	2019.09.02	2020.09.01

Voltage dips and interruptions

Instrument	Manufacturer	Model No.	Serial No.	Cali. Date	Cali. Due Date
Immunity Test System	Teseq GmbH	NSG 3060	4019	2020.06.29	2021.06.28
CDN	Teseq GmbH	CDN 3061	5010	2020.02.26	2021.02.25
Automatic Step transformer	Teseq GmbH	VAR 3005-S16	3010	2020.05.23	2021.05.22
Temperature/Humidity Meter	RTS	RTS-8S	TR2-TH	2019.09.02	2020.09.01



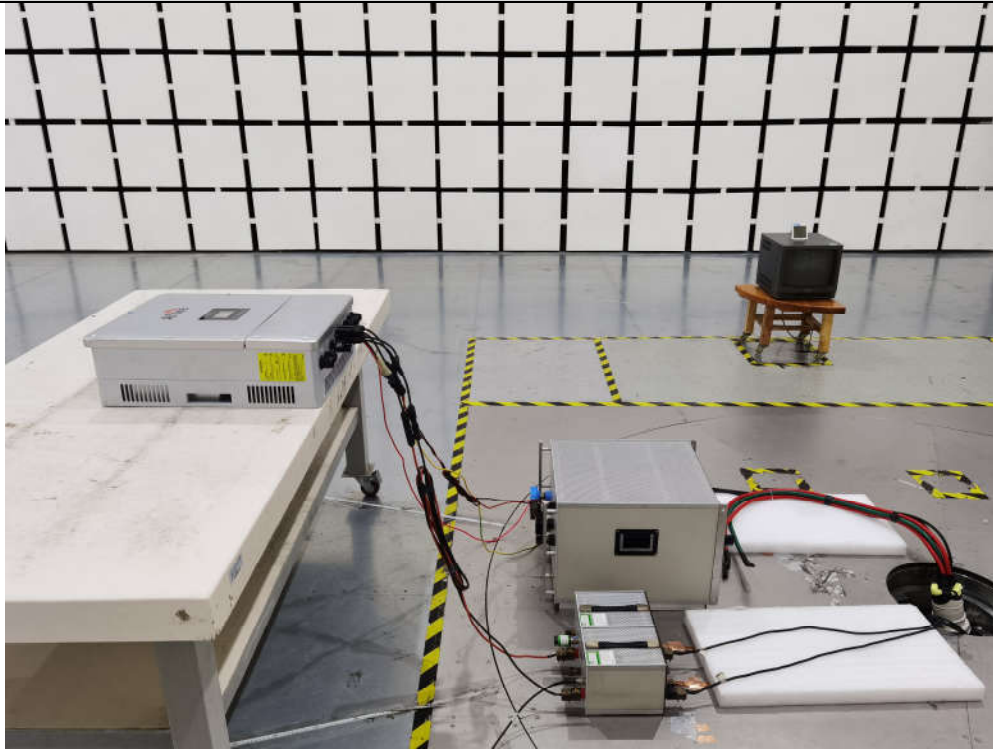
## 7 ANNEX 1 - MEASUREMENT UNCERTAINTIES

The table(s) below show(s) measurement uncertainties of the EMC test set-ups. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

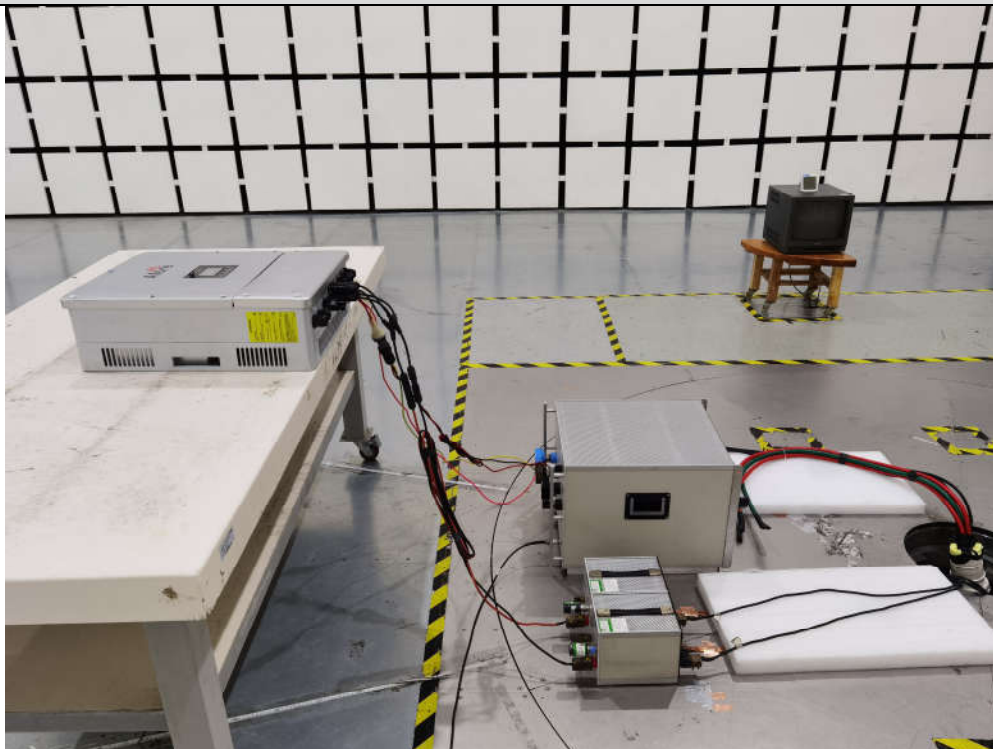
<b>Conducted Emission</b>
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: 2.80dB 150kHz~30MHz: 2.40dB
<b>Asymmetric mode conducted emissions</b>
The maximum measurement uncertainty is evaluated as: ISN T800: 150kHz~30MHz: 3.60 dB ISN T8-Cat6: 150kHz~30MHz: 3.50 dB ISN ST08: 150kHz~30MHz: 3.10 dB
<b>Radiated Emission (30 MHz- 1 GHz)</b>
The maximum measurement uncertainty is evaluated as: Horizontal: 30MHz~300MHz: 3.50 dB 300MHz~1GHz: 3.20 dB Vertical: 30MHz~300MHz: 3.60 dB 300MHz~1GHz: 3.10 dB
<b>Radiated Emission(Above 1 GHz)</b>
The maximum measurement uncertainty is evaluated as: Horizontal: 1GHz~18GHz: 5.00 dB Vertical: 1GHz~18GHz: 4.80 dB
<b>Harmonic current emissions</b>
The maximum measurement uncertainty is evaluated as: 2.1 %.
<b>Voltage fluctuations and flicker</b>
The maximum measurement uncertainty is evaluated as: 1.8 %.
<b>Electrostatic discharge</b>
The maximum measurement uncertainty is evaluated as Rise Time: 6.4 %, Peak Current: 6 %, Current at 30 ns: 6 %, Current at 60 ns: 6 %.
<b>Radio-frequency electromagnetic field</b>
The maximum measurement uncertainty is evaluated as 1.48dB.
<b>Electrical fast transients</b>
The maximum measurement uncertainty is evaluated as Voltage: 4%, Time: 2%.
<b>Surges</b>
The maximum measurement uncertainty is evaluated as Voltage: 4%, Time: 2%.
<b>Radio-frequency continuous conducted</b>
The maximum measurement uncertainty is evaluated as CDN: 1.52dB, EM Clamp: 1.92dB.
<b>Power-frequency magnetic field</b>
The maximum measurement uncertainty is evaluated as 10%.
<b>Voltage dips and interruptions</b>
The maximum measurement uncertainty is evaluated as Voltage: 4%, Time: 2%.

## 8 ANNEX 2 - TEST PHOTOS

**Conducted disturbance voltage at mains terminals-DC input port**



**Conducted disturbance voltage at mains terminals-AC output port**



**Radiated electromagnetic disturbances (30 MHz to 1000 MHz):Front View**



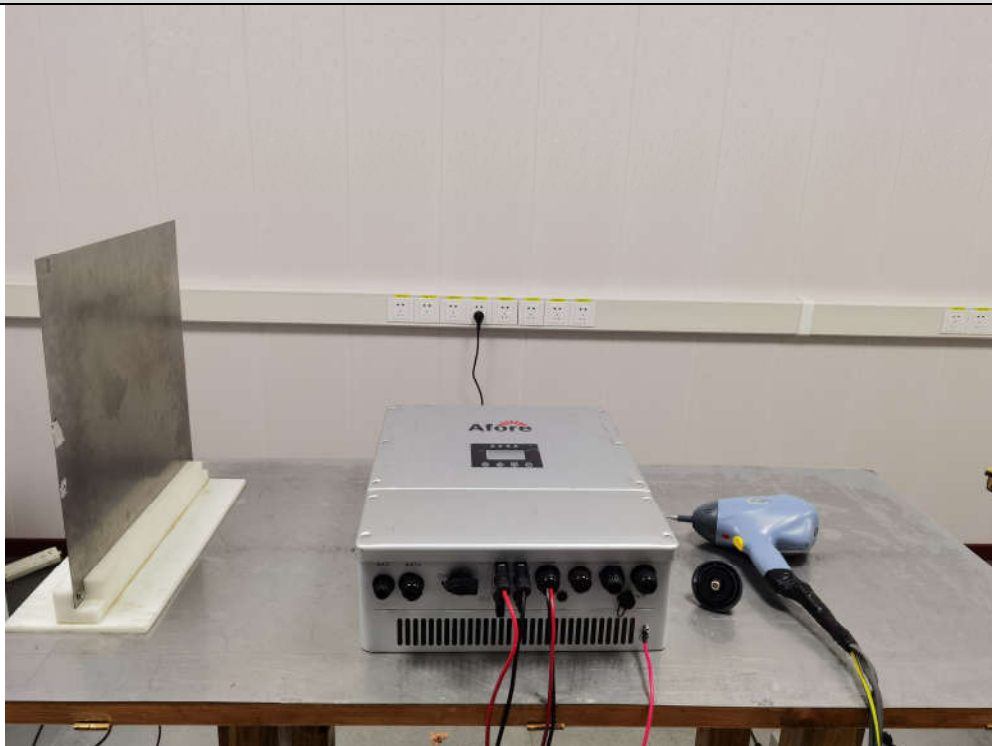
**Radiated electromagnetic disturbances (30 MHz to 1000 MHz):Back View**



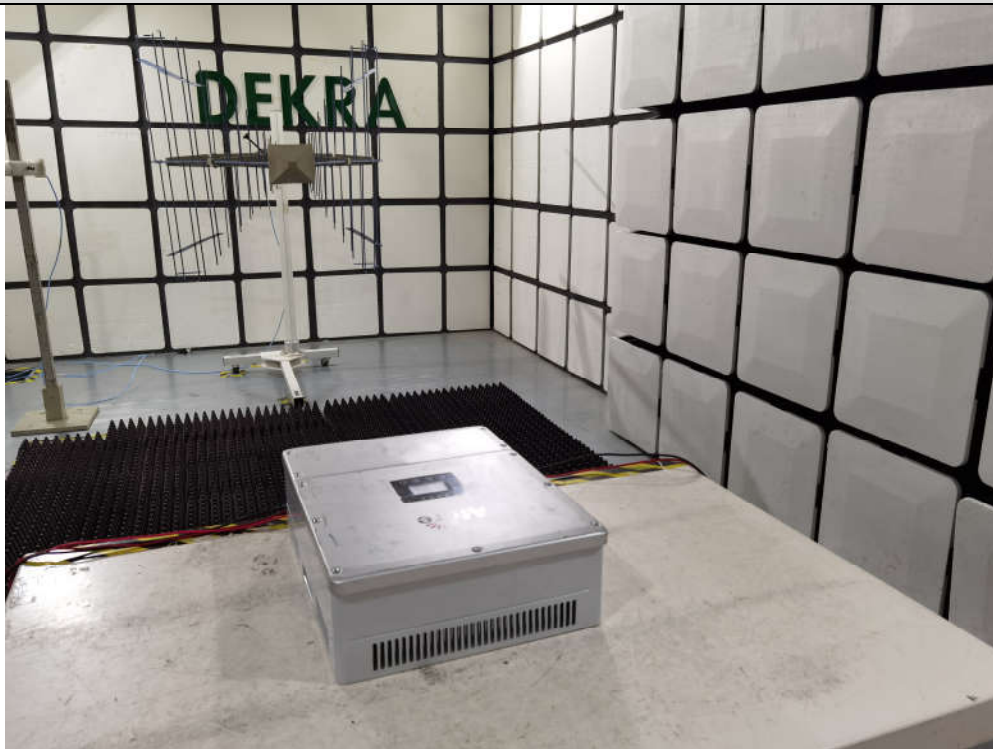
### Harmonic current&flicker emissions



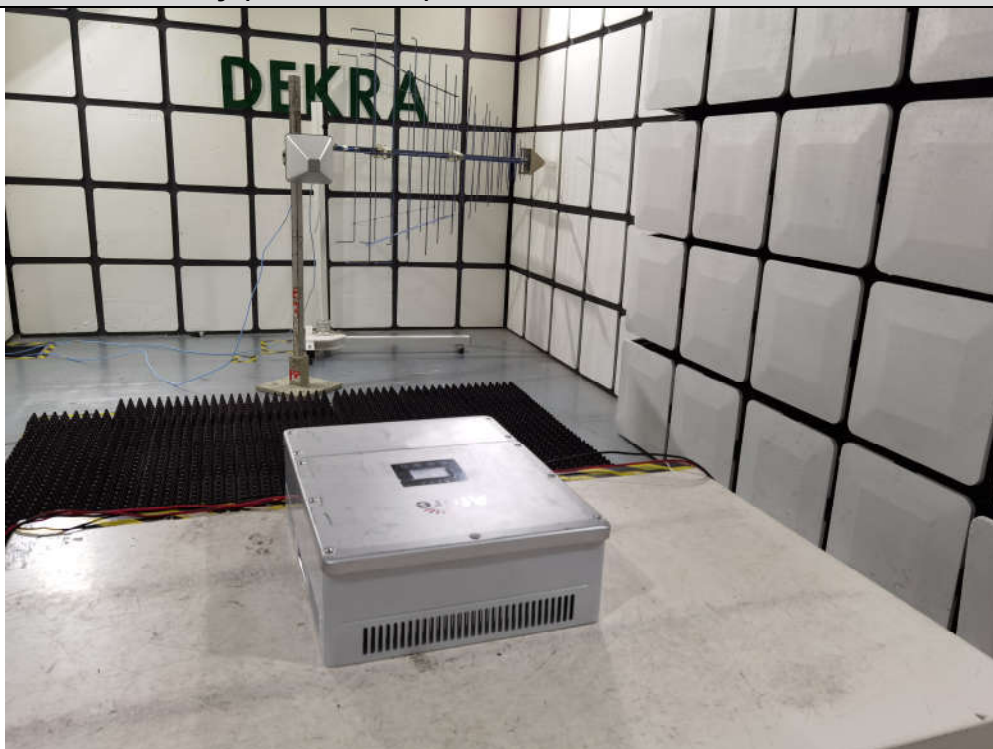
### Electrostatic discharge immunity



### Radiated EM Field Immunity (Below 1GHz)



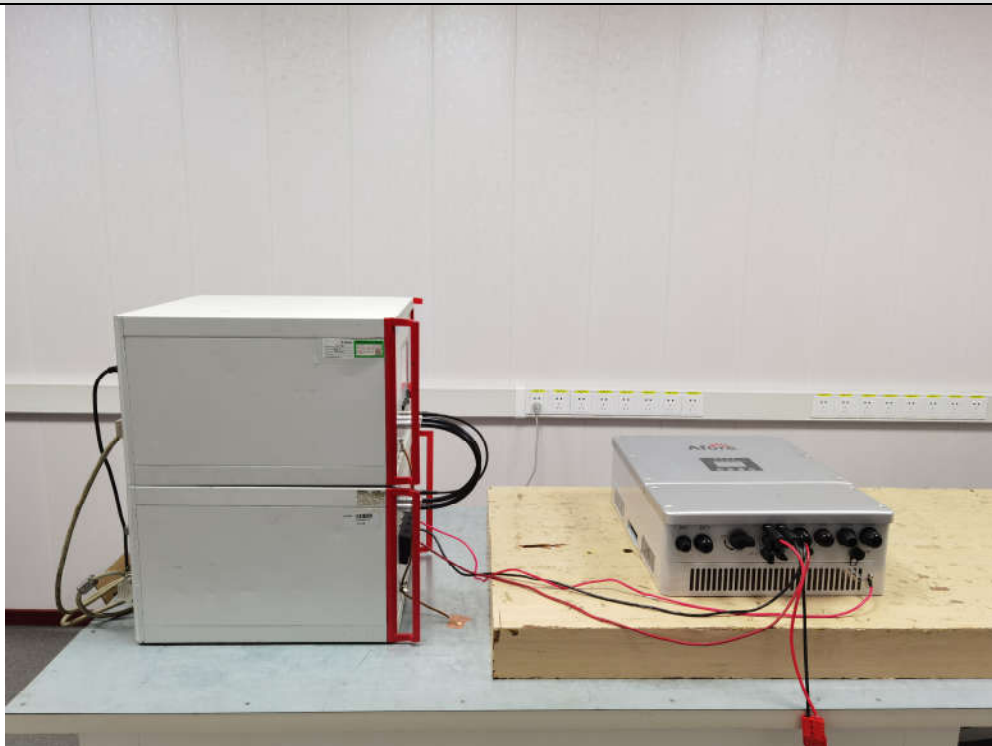
### Radiated EM Field Immunity (Above 1GHz)



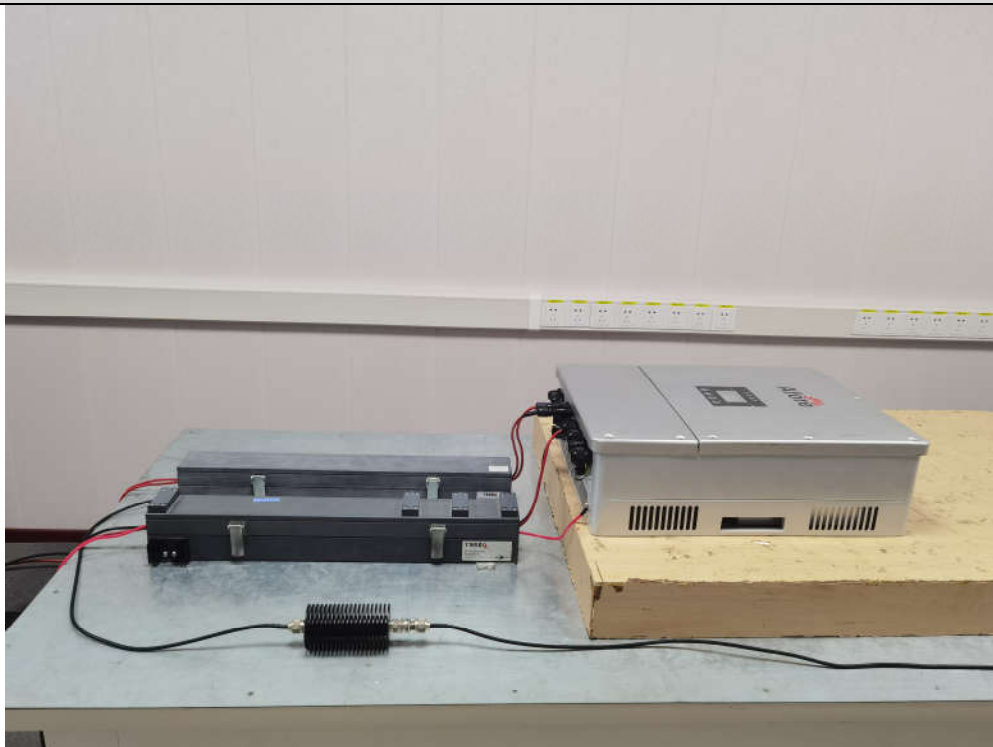
### Electrical fast transient (EFT) / Burst transients immunity



### Surge transients immunity



### Conducted RF disturbances immunity

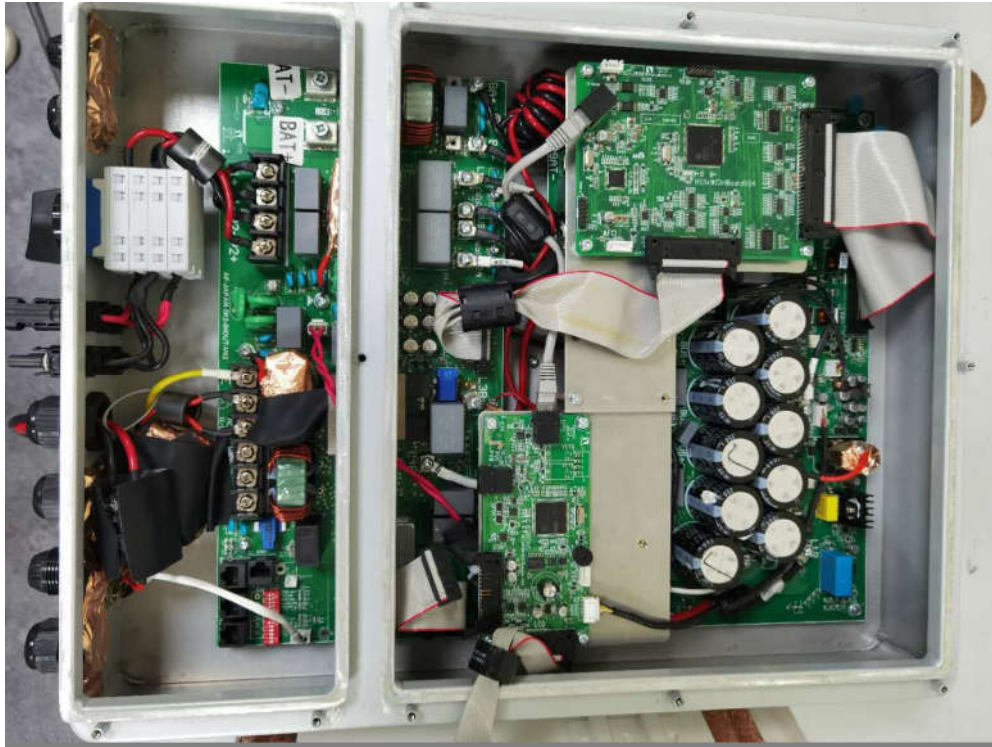


### Power-frequency magnetic field immunity



## 9 ANNEX 3 - EUT PHOTOS

### EUT PHOTOS (1)



### EUT PHOTOS (2)





**EUT PHOTOS (3)**



**EUT PHOTOS (4)**



## EUT PHOTOS (5)



End of the report