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检测  
TESTING  
CNAS L14701

# TEST REPORT


**Application number:** PVP01079/22B-04

**Applicant:** Shenzhen Hopewind Technology Co., Ltd

**Address:** A1 Area of Building 6, Jinhaoyuan, No.1 of Yanshan Avenue, Yanchuan Community, Songgang Sub-district, Baoan District, Shenzhen, Guangdong Province China

**Equipment Type:** PV Grid-interactive Inverter

**Model Name:** hopeSun 100KTL, hopeSun 110KTL, hopeSun 125KTL-M

**Brand Name:**  Hopewind

**Ratings:** See copy of marking label and model list.

**Test Standard:** IEC 61683:1999

**Test Date:** Jan. 19, 2022 to Feb. 19, 2022

**Date of Issue:** Mar. 28, 2022

## ISSUED BY:

Dongguan BALUN Testing Technology Co., Ltd.

**Tested by:** Ben Liu

Ben Liu

**Checked by:** Xingzhen Man

Xingzhen Man

**Approved by:** Simon Qi



**Revision History**

| <u>Version</u> | <u>Issue Date</u>    | <u>Revisions Content</u> |
|----------------|----------------------|--------------------------|
| <u>Rev. 01</u> | <u>Mar. 28, 2022</u> | <u>Initial Issue</u>     |

**List of Attachments:**

/

**Summary of testing:****All the tests results confirmed to the requirements of the standard.****Tests performed (name of test and test clause):**

- ☒ Efficiency measurement
- Other testing conditions considered in this test report, see General Product Information on the following pages.



**Testing location:**

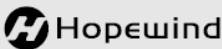
Dongguan BALUN Testing Technology Co., Ltd.  
Room 104, 204, 205, Building 1, No. 6, Industrial South Road, Songshan Lake District, Dongguan, Guangdong, China

☒ **The product fulfils the requirements of IEC 61683:1999.**

## 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.

| H Hopewind 光伏并网逆变器<br>PV Grid-interactive Inverter  |                | H Hopewind 光伏并网逆变器<br>PV Grid-interactive Inverter  |                |
|---|----------------|---|----------------|
| 型号 Model:   | hopeSun 100KTL | 型号 Model:   | hopeSun 110KTL |
| 产品序列号 Serial No.:   | 贴序列号标签         | 产品序列号 Serial No.:   | 贴序列号标签         |
| 制造日期 Manufacture Date:  | 制造日期标签         | 制造日期 Manufacture Date:  | 制造日期标签         |
| <b>直流侧 DC</b><br>最大输入电压 Max. Input Voltage : 1100Vd.c.<br>MPP电压范围 MPP Voltage Range : 200-1000Vd.c.<br>最大输入电流 Max. Input Current : 65A/65A/65A/65A<br>最大短路电流 Isc PV : 100A/100A/100A/100A   |                | <b>直流侧 DC</b><br>最大输入电压 Max. Input Voltage : 1100Vd.c.<br>MPP电压范围 MPP Voltage Range : 200-1000Vd.c.<br>最大输入电流 Max. Input Current : 65A/65A/65A/65A<br>最大短路电流 Isc PV : 100A/100A/100A/100A   |                |
| <b>交流侧 AC</b><br>输出电压 Nominal Output Voltage : 400Va.c./230Va.c.;3P+N+PE<br>输出频率 Nominal Output Frequency : 50Hz/60Hz<br>额定输出功率 Rated Output Power : 100kW<br>最大输出功率 Max. Output Power : 110kW<br>最大输出电流 Max. Output Current : 158.8A<br>功率因数 Power Factor : 0.9 (lagging) -0.9 (leading) |                | <b>交流侧 AC</b><br>输出电压 Nominal Output Voltage : 400Va.c./230Va.c.;3P+N+PE<br>输出频率 Nominal Output Frequency : 50Hz/60Hz<br>额定输出功率 Rated Output Power : 110kW<br>最大输出功率 Max. Output Power : 121kW<br>最大输出电流 Max. Output Current : 174.6A<br>功率因数 Power Factor : 0.9 (lagging) -0.9 (leading) |                |
| 工作环境温度 Operating Ambient Temperature : -40 to +60°C<br>防护等级 Ingress Protection : IP65<br>保护等级 Protection Class : I  |                | 工作环境温度 Operating Ambient Temperature : -40 to +60°C<br>防护等级 Ingress Protection : IP65<br>保护等级 Protection Class : I  |                |
|    |                |   |                |
| 深圳市禾望科技有限公司<br>Shenzhen Hopewind Technology Co., Ltd  |                | 深圳市禾望科技有限公司<br>Shenzhen Hopewind Technology Co., Ltd  |                |
| 中国制造<br>MADE IN CHINA   |                | 中国制造<br>MADE IN CHINA   |                |



光伏并网逆变器  
PV Grid-interactive Inverter

型号 Model:

hopeSun 125KTL-M

产品序列号 Serial No.:

贴序列号标签

制造日期 Manufacture Date:

制造日期标签

最大输入电压 Max. Input Voltage : 1100Vd.c.

MPP电压范围 MPP Voltage Range : 200-1000Vd.c.

最大输入电流 Max. Input Current : 65A/65A/65A/65A

最大短路电流 Isc PV : 100A/100A/100A/100A

直流侧 DC

输出电压 Nominal Output Voltage : 500Va.c.;3P+N+PE

输出频率 Nominal Output Frequency : 50Hz/60Hz

额定输出功率 Rated Output Power : 125kW

最大输出功率 Max. Output Power : 137.5kW

最大输出电流 Max. Output Current : 158.8A






功率因数 Power Factor : 0.9 (lagging) -0.9 (leading)

交流侧 AC

工作环境温度 Operating Ambient Temperature : -40 to +60°C

防护等级 Ingress Protection : IP65

保护等级 Protection Class : I



深圳市禾望科技有限公司  
Shenzhen Hopewind Technology Co., Ltd

中国制造  
MADE IN CHINA

|  |                               |
|--|-------------------------------|
| <b>Test item particulars..... :</b>                  |                               |
| <b>Equipment mobility .....</b>                      | Permanent connection          |
| <b>Operating condition..... :</b>                    | Continuous                    |
| <b>Enviromental category .....</b>                   | Outdoor use                   |
| <b>Over voltage category Mains .....</b>             | OVC III                       |
| <b>Over voltage category PV .....</b>                | OVC II                        |
| <b>Class of equipment..... :</b>                     | Class I                       |
| <b>Pollution degree .....</b>                        | PD3 (internal reduced to PD2) |
| <b>IP protection class .....</b>                     | IP65                          |
| <b>Mass of equipment (kg) .....</b>                  | See model list.               |
| <b>Possible test case verdicts:</b>                  |                               |
| - test case does not apply to the test object..... : | N/A                           |
| - test object does meet the requirement..... :       | P (Pass)                      |
| - test object was not evaluated for the requirement: | N/E                           |
| - test object does not meet the requirement..... :   | F (Fail)                      |

**General remarks:**

"(See Enclosure #)" refers to additional information appended to the report.

"(See appended table)" refers to a table appended to the report.

The tests 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 testing laboratory.

List of test equipment must be kept on file and available for review.

Additional test data and/or information provided in the attachments to this report.

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

Determination of the test results includes consideration of measurement uncertainty from the test equipment and methods.

**Manufacturer's Declaration per sub-clause 4.2.5 of IEC 60335-1:**

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 manufacturer (s)..... :** Shenzhen Hopewind Technology Co., Ltd  
A1 Area of Building 6, Jinhaoyuan, No.1 of Yanshan Avenue, Yanchuan Community, Songgang Sub-district, Baoan District, Shenzhen, Guangdong Province China

**Name and address of factory (ies) .....** Suzhou Hopewind Electric Co., Ltd.  
555 Songjia Road, wusongjiang science and Technology Industrial Park, wuzhong Economic Development Zone, Suzhou. Jiangsu Province, China

**General product information:**

The PCE under test (EUT) is a Grid-Connected PV Inverter which utilizes the advanced power electronics conversion components such as MOSFET, IGBT, IPM to convert the variable DC power generated from the photovoltaic (PV) arrays to the stable utility AC power which can be fed into the commercial electrical grid.

**Differences of the models:**

All model has the same hardware and control software. The difference of all models is output power and output voltage which is controlled by software.

Hardware version: hopeSunC4\_PCB\_A

hopeSunF7\_PCB\_A

hopeSunHVBH2\_PCB\_B

hopeSunME\_PCB\_A

hopeSunP7\_PCB\_A

hopeSunWP\_PCB\_A

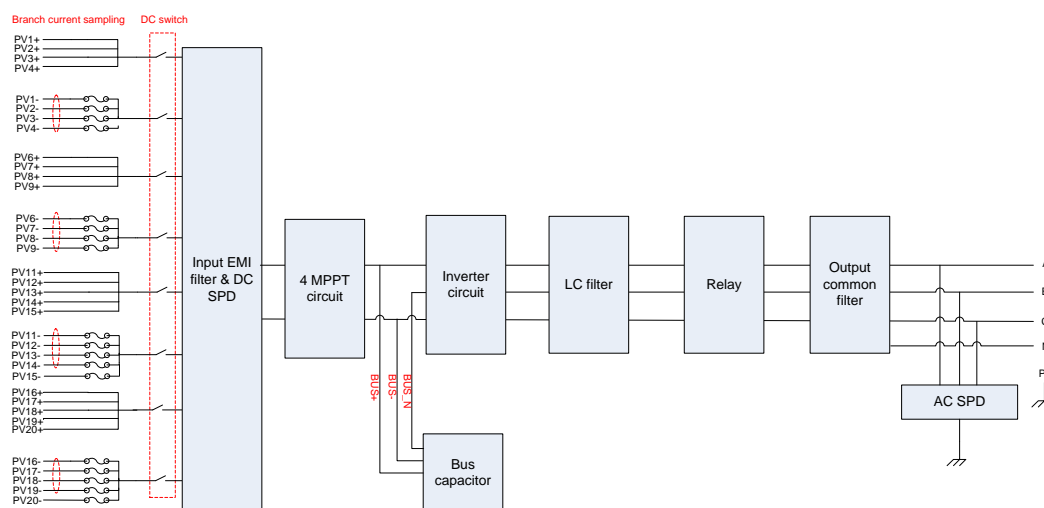
hopeSunWQ\_PCB\_A

Software version: bootloader: V102.003.000

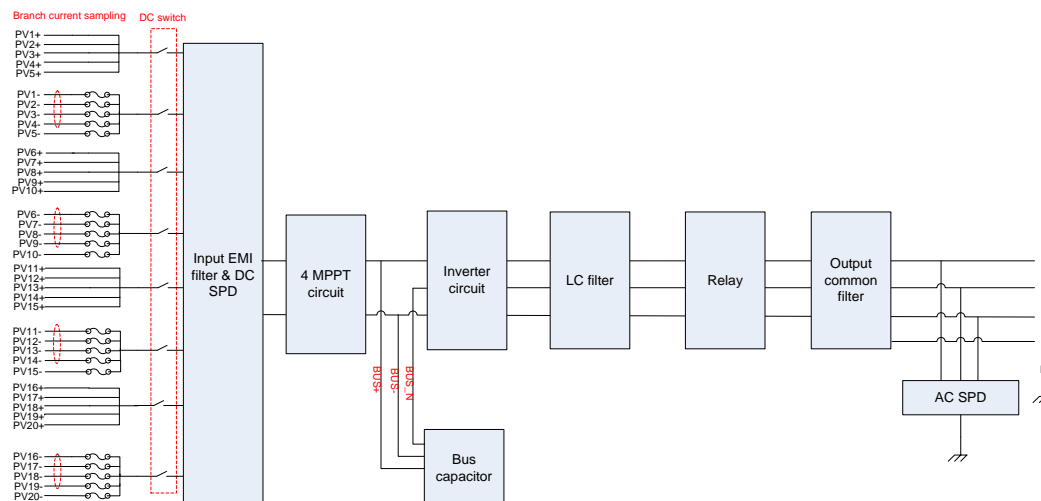
FPGA: 108.000.000

Inverter side: 106.005.000

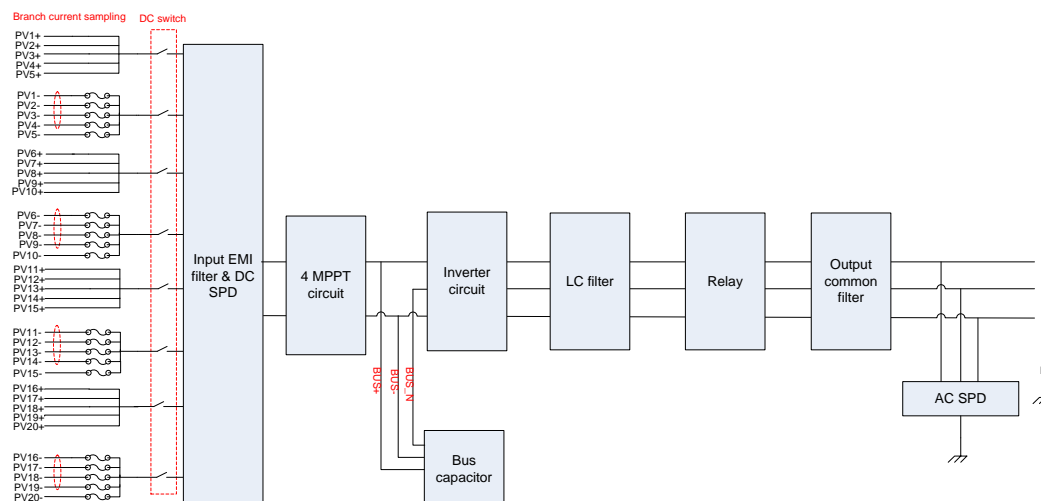
Boost side: 569.004.000

**Block diagram of the utility interactive inverter:**

Block Diagram of hopeSun 100KTL



Block Diagram of hopeSun 110KTL



Block Diagram of hopeSun 125KTL-M

**Model list:**

| Model or Type designation            | hopeSun 100KTL   | hopeSun 110KTL   | hopeSun 125KTL-M |
|--------------------------------------|------------------|------------------|------------------|
| PV input parameters:                 |                  |                  |                  |
| Max. PV input Power [W]              | 1100             |                  |                  |
| MPP Voltage Range [Vd.c.]            | 200-1000         |                  |                  |
| Max. PV Input Current [Ad.c.]        | 65/65/65/65      |                  |                  |
| Max.DC Short-circuit current [Ad.c.] | 100/100/100/100  |                  |                  |
| AC output (On-Grid) parameters:      |                  |                  |                  |
| Rated Output Voltage [Va.c.]         | 230/400, 3P/N/PE | 230/400, 3P/N/PE | 500, 3P/N/PE     |
| Rated Output Frequency [Hz]          | 50/60            |                  |                  |
| Rated Output Power [kW]              | 100              | 110              | 125              |
| Max. Output Power [kVA]              | 110              | 121              | 137.5            |



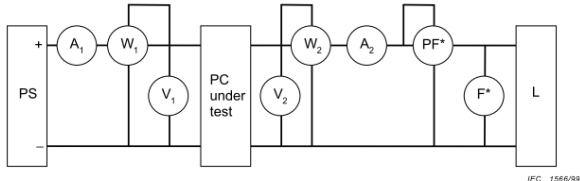
|                             |                            |       |       |
|-----------------------------|----------------------------|-------|-------|
| Max. Output Current [Aa.c.] | 158.8                      | 174.6 | 158.8 |
| Power Factor cosφ [λ]       | 0.9 leading to 0.9 lagging |       |       |
| Others:                     |                            |       |       |
| Protective class            | Class I                    |       |       |
| Inverter topology           | Non-isolated               |       |       |
| Operation temperature range | -40~60℃ (>45℃ derating)    |       |       |
| Ingress protection          | IP65                       |       |       |
| Overvoltage-category        | DC II, AC III              |       |       |

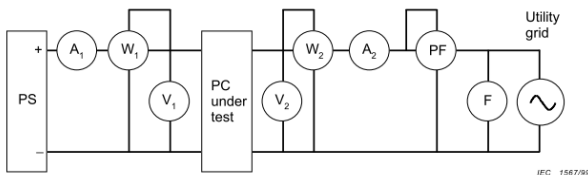
| IEC 61683 |   |   |         |
|-----------|---|---|---------|
| Clause    | Requirement – Test  | Result – Remark   | Verdict |
| 4         | Efficiency measurement conditions   |   | P       |
|           | Efficiency is measured under the conditions in the following clauses.   |   | P       |
|           | Specific conditions may be excluded by mutual agreement when those conditions are outside the manufacturer's allowable operating range.   |   | P       |
| 4.1       | DC power source for testing   |   | P       |
|           | For power conditioners operating with fixed input voltage, the d.c. power source is a storage battery or constant voltage power source to maintain the input voltage.   |   | N/A     |
|           | For power conditioners that employ maximum power point tracking (MPPT) and shunt-type power conditioners, either a photovoltaic array or a photovoltaic array simulator is utilized.  |   | P       |
| 4.2       | Temperature   |   | P       |
|           | All measurements are to be made at an ambient temperature of $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ .   |   | N/A     |
|           | Other ambient temperatures may be allowed by mutual agreement. However, the temperature used must be clearly stated in all documentation.   | By mutual agreement all measurements at 50Hz/60Hz have been carried out at $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ | P       |
| 4.3       | Output voltage and frequency  |   | P       |
|           | The output voltage and frequency are maintained at the manufacturer's stated nominal values.  | 3P/N/PE, 230/400V, 50Hz/60Hz<br>3P/N/PE, 500V, 50Hz/60Hz<br>3P/PE, 520V, 50Hz/60Hz                                    | P       |
| 4.4       | Input voltage   | PV input  | P       |
|           | Measurements performed in each of the following tests are repeated at three power conditioner input voltages:<br>a) manufacturer's minimum rated input voltage;<br>b) the inverter's nominal voltage or the average of its rated input range;<br>c) 90 % of the inverter's maximum input voltage. |   | P       |
|           | In the case where a power conditioner is to be connected with a battery at its input terminals,   |   | N/A     |

| IEC 61683 |   |                        |         |
|-----------|---|------------------------|---------|
| Clause    | Requirement – Test  | Result – Remark        | Verdict |
|           | only the nominal or rated input voltage may be applied.   |                        |         |
| 4.5       | Ripple and distortion   |                        | P       |
|           | Record input voltage and current ripple for each measurement. Also record output voltage and current distortion (if a.c.) or ripple (if d.c.). Ensure that these measurements remain within the manufacturer's specified values.  |                        | P       |
| 4.6       | Resistive loads/utility grid  |                        | P       |
|           | At unity power factor, or at the intrinsic power factor of grid-connected inverters without power factor adjustment, measure the efficiency for power levels of 10 %, 25 %, 50 %, 75 %, 100 % and 120 % of the inverter's rating.   | (See test data record) | P       |
|           | Stand-alone inverters are also measured at a power level of 5 % of rated. The power conditioner test is conducted with a specified resistive and reactive grid impedance.   |                        | P       |
| 4.7       | Reactive loads  | (See test data record) | P       |
|           | For stand-alone inverters, measure the efficiency with a load which provides a power factor equal to the manufacturer's specified minimum level (or 0,25, whichever is greater) and at power levels of 25 %, 50 % and 100 % of rated VA.  |                        | P       |
|           | Repeat for power factors of 0,5 and 0,75 (do not go below the manufacturer's specified minimum PF) and power levels of 25 %, 50 %, and 100 % of rated VA.   |                        | P       |
| 4.8       | Resistive plus non-linear loads   | (See test data record) | P       |
|           | For stand-alone inverters, measure the efficiency with a fixed non-linear load (total harmonic distortion (THD) = $(80 \pm 5) \%$ ) equal to $(25 \pm 5) \%$ of the inverter's rated VA plus sufficient resistive load in parallel to achieve a total load of 25 %, 50 % and 100 % of rated VA. |                        | P       |
|           | Repeat the measurements with a fixed non-linear load equivalent to $(50 \pm 5) \%$ of the inverter's rated VA plus sufficient resistive load in parallel to   |                        | P       |

| IEC 61683 |  |                        |         |
|-----------|--|------------------------|---------|
| Clause    | Requirement – Test   | Result – Remark        | Verdict |
|           | achieve a total load of 50% and 100% of rated VA.  |                        |         |
|           | The type of non-linear load must be clearly stated in all documentation.   |                        | P       |
| 4.9       | Complex loads  | (See test data record) | P       |
|           | When a non-linear plus a sufficient reactive load condition is specified for stand-alone inverters, measure the efficiency with a fixed non-linear load (THD = $(80 \pm 5) \%$ ) equal to $(50 \pm 5) \%$ of the inverter's rated VA plus a sufficient reactive load (PF = 0,5) in parallel to achieve a total load of 50 % and 100 % of rated VA. |                        | P       |
|           | The type of complex load is clearly stated in all documentation.   |                        | P       |

|     |                           |  |   |
|-----|---------------------------|--|---|
| 5   | Efficiency calculations   |  | P |
| 5.1 | Rated output efficiency   |  | P |
| 5.2 | Partial output efficiency |  | P |
| 5.3 | Energy efficiency         |  | P |
| 5.4 | Efficiency tolerances     |  | P |

|     |  |  |     |
|-----|--|--|-----|
| 6   | Conditions of loading for output ports   |  | P   |
| 6.1 | Test circuit   |  | P   |
|     | Figure 1a is applied to standard-alone power conditioners  |  | N/A |
|     |  <p>Figure 1a – Stand-alone type</p> <p>IEC 1568/99</p> |  | N/A |
|     | Figure 1b is applied to utility-interactive power conditioners   |  | P   |

| IEC 61683 |  |                 |         |
|-----------|--|-----------------|---------|
| Clause    | Requirement – Test   | Result – Remark | Verdict |
|           |  <p>Figure 1b – Utility-interactive type</p> <p>PC power conditioner<br/>PS variable voltage-current d.c. power supply<br/>A<sub>1</sub> DC ammeter<br/>A<sub>2</sub> AC or d.c. ammeter<br/>W<sub>1</sub> DC wattmeter<br/>W<sub>2</sub> AC or d.c. wattmeter<br/>L load<br/>F frequency meter<br/>V<sub>1</sub> DC voltmeter<br/>V<sub>2</sub> AC or d.c. voltmeter<br/>PF power factor meter</p> |                 | P       |
| 6.2       | Measurement procedure  |                 | P       |
| 7         | Loss measurement   |                 | P       |
| 7.1       | No-load loss   |                 | P       |
| 7.2       | Standby loss   |                 | P       |
| Annex A   | Power conditioner description  | See Clause 6.1  | P       |
| Annex B   | Power efficiency and conversion factor   |                 | P       |
| Annex C   | Weighted-average energy efficiency   |                 | P       |
| Annex D   | Derivation of efficiency tolerance in table 2  |                 | P       |

| TABLE   | Efficiency recording and efficient calculation sheet   |        |         |         |         |         |       |   |   |
|---|--|--------|---------|---------|---------|---------|-------|---|---|
| power conditioner type                        | Grid-connected   |        |         |         |         |         |       |   |   |
| Model:  | hopeSun 100KTL   |        |         |         |         |         |       |   |   |
| Parameters of power conditioner               | Minimum full load input voltage: 550V<br>Nominal voltage: 700V<br>90% of the inverter's Maximum input voltage: 850V<br>Rated output voltage: 230Vac<br>Rated output frequency: 50Hz<br>Rated output power: 100kW |        |         |         |         |         |       |   |   |
| PV input voltage                              | a) Manufacturer's minimum rated input voltage 550V   |        |         |         |         |         |       |   |   |
| Temperature (°C)                              | 25°C ± 5°C   |        |         |         |         |         |       |   |   |
| Operating period for energy measurement (min) | 3.0  |        |         |         |         |         |       |   |   |
| Percentage of rated output VA                 | /  | 10%    | 25%     | 50%     | 75%     | 100%    | 120%* | / | / |
| Input voltage (V)                             | /  | 551.11 | 550.99  | 550.83  | 550.71  | 550.55  | /     | / | / |
| Input voltage ripple (V)                      | /  | 32.3   | 45.8    | 44.4    | 45.9    | 46.1    | /     | / | / |
| Input current (A)                             | /  | 20.45  | 47.79   | 93.09   | 140.93  | 187.83  | /     | / | / |
| Input current ripple (A)                      | /  | 5.5    | 9.5     | 15.4    | 24.9    | 20.8    | /     | / | / |
| Input power (Pi) (W)                          | /  | 11.26  | 26.33   | 51.28   | 77.61   | 103.41  | /     | / | / |
| Output power (Po) (W)                         | /  | 10.47  | 25.53   | 50.14   | 75.61   | 100.59  | /     | / | / |
| Output efficiency (%)                         | /  | 92.98  | 96.96   | 97.78   | 97.42   | 97.27   | /     | / | / |
| Input energy (Wi) (Wh)                        | /  | 569.31 | 1326.53 | 2649.15 | 4165.18 | 5486.24 | /     | / | / |
| Output energy (Wo) (Wh)                       | /  | 529.47 | 1287.46 | 2591.77 | 4061.21 | 5338.66 | /     | / | / |
| Energy efficiency (%)                         | /  | 93.00  | 97.05   | 97.83   | 97.50   | 97.31   | /     | / | / |
|   |  |        |         |         |         |         |       |   |   |
| PV input voltage                              | b) The inverter's nominal voltage 700V   |        |         |         |         |         |       |   |   |
| Temperature (°C)                              | 25°C ± 5°C   |        |         |         |         |         |       |   |   |
| Operating period for energy measurement (min) | 3.0  |        |         |         |         |         |       |   |   |
| Percentage of rated output VA                 | /  | 10%    | 25%     | 50%     | 75%     | 100%    | 120%* | / | / |
| Input voltage (V)                             | /  | 701.05 | 700.94  | 700.84  | 700.72  | 700.59  | /     | / | / |
| Input voltage ripple (V)                      | /  | 51.8   | 47.6    | 49.3    | 48.1    | 53.0    | /     | / | / |
| Input current (A)                             | /  | 16.52  | 38.12   | 73.18   | 109.04  | 146.40  | /     | / | / |

|  |   |        |         |         |         |         |       |   |   |
|--|---|--------|---------|---------|---------|---------|-------|---|---|
| Input current ripple (A)   | /   | 17.5   | 8.1     | 18.1    | 19.6    | 16.2    | /     | / | / |
| Input power (Pi) (W)   | /   | 11.56  | 26.71   | 51.28   | 76.40   | 102.56  | /     | / | / |
| Output power (Po) (W)  | /   | 10.66  | 25.46   | 50.36   | 75.46   | 100.73  | /     | / | / |
| Output efficiency(%)   | /   | 92.21  | 95.32   | 98.21   | 98.76   | 98.22   | /     | / | / |
| Input energy (Wi) (Wh)   | /   | 599.34 | 1522.61 | 2960.15 | 4019.76 | 5470.01 | /     | / | / |
| Output energy (Wo) (Wh)  | /   | 552.82 | 1452.31 | 2908.71 | 3972.83 | 5375.74 | /     | / | / |
| Energy efficiency(%)   | /   | 92.24  | 95.38   | 98.26   | 98.83   | 98.28   | /     | / | / |
|  |   |        |         |         |         |         |       |   |   |
| PV input voltage   | c) 90% of the inverter's Maximum input voltage 850V |        |         |         |         |         |       |   |   |
| Temperature (°C)   | 25°C ± 5°C  |        |         |         |         |         |       |   |   |
| Operating period for energy measurement (min)  | 3.0   |        |         |         |         |         |       |   |   |
| Percentage of rated output VA  | /   | 10%    | 25%     | 50%     | 75%     | 100%    | 120%* | / | / |
| Input voltage (V)  | /   | 851.09 | 850.99  | 850.89  | 850.80  | 850.70  | /     | / | / |
| Input voltage ripple (V)   | /   | 55.0   | 50.1    | 52.8    | 55.9    | 58.7    | /     | / | / |
| Input current (A)  | /   | 13.73  | 30.98   | 61.46   | 91.48   | 120.86  | /     | / | / |
| Input current ripple (A)   | /   | 8.2    | 20.4    | 28.0    | 25.6    | 20.9    | /     | / | / |
| Input power (Pi) (W)   | /   | 11.65  | 26.34   | 52.28   | 77.82   | 102.81  | /     | / | / |
| Output power (Po) (W)  | /   | 10.17  | 25.34   | 50.56   | 75.43   | 100.34  | /     | / | / |
| Output efficiency(%)   | /   | 87.30  | 96.20   | 96.70   | 96.91   | 97.60   | /     | / | / |
| Input energy (Wi) (Wh)   | /   | 613.03 | 1360.96 | 3023.67 | 4120.11 | 5402.87 | /     | / | / |
| Output energy (Wo) (Wh)  | /   | 535.69 | 1309.83 | 2925.69 | 3992.72 | 5277.67 | /     | / | / |
| Energy efficiency(%)   | /   | 87.38  | 96.24   | 96.76   | 96.91   | 97.68   | /     | / | / |
| Remark:  |   |        |         |         |         |         |       |   |   |
| *If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived; |   |        |         |         |         |         |       |   |   |

| TABLE   | Efficiency recording and efficient calculation sheet   |        |         |         |         |         |       |   |   |
|---|--|--------|---------|---------|---------|---------|-------|---|---|
| power conditioner type                        | Grid-connected   |        |         |         |         |         |       |   |   |
| Model:  | hopeSun hopeSun 110KTL   |        |         |         |         |         |       |   |   |
| Parameters of power conditioner               | Minimum full load input voltage: 550V<br>Nominal voltage: 700V<br>90% of the inverter's Maximum input voltage: 850V<br>Rated output voltage: 230Vac<br>Rated output frequency: 50Hz<br>Rated output power: 100kW |        |         |         |         |         |       |   |   |
| PV input voltage                              | a) Manufacturer's minimum rated input voltage 550V   |        |         |         |         |         |       |   |   |
| Temperature (°C)                              | 25°C ± 5°C   |        |         |         |         |         |       |   |   |
| Operating period for energy measurement (min) | 3.0  |        |         |         |         |         |       |   |   |
| Percentage of rated output VA                 | /  | 10%    | 25%     | 50%     | 75%     | 100%    | 120%* | / | / |
| Input voltage (V)                             | /  | 551.07 | 550.98  | 550.82  | 550.66  | 550.47  | /     | / | / |
| Input voltage ripple (V)                      | /  | 46.7   | 41.5    | 44.8    | 49.0    | 51.4    | /     | / | / |
| Input current (A)                             | /  | 22.02  | 52.02   | 103.59  | 154.11  | 204.23  | /     | / | / |
| Input current ripple (A)                      | /  | 7.4    | 12.4    | 22.7    | 22.8    | 19.7    | /     | / | / |
| Input power (Pi) (W)                          | /  | 12.12  | 28.65   | 57.06   | 84.86   | 112.42  | /     | / | / |
| Output power (Po) (W)                         | /  | 11.42  | 27.81   | 55.49   | 82.86   | 110.31  | /     | / | / |
| Output efficiency(%)                          | /  | 94.22  | 97.06   | 97.26   | 97.65   | 98.12   | /     | / | / |
| Input energy (Wi) (Wh)                        | /  | 626.41 | 1477.26 | 2966.99 | 4417.43 | 5845.93 | /     | / | / |
| Output energy (Wo) (Wh)                       | /  | 590.30 | 1434.92 | 2888.65 | 4314.36 | 5741.49 | /     | / | / |
| Energy efficiency(%)                          | /  | 94.24  | 97.13   | 97.36   | 97.67   | 98.21   | /     | / | / |
|   |  |        |         |         |         |         |       |   |   |
| PV input voltage                              | b) The inverter's nominal voltage 700V   |        |         |         |         |         |       |   |   |
| Temperature (°C)                              | 25°C ± 5°C   |        |         |         |         |         |       |   |   |
| Operating period for energy measurement (min) | 3.0  |        |         |         |         |         |       |   |   |
| Percentage of rated output VA                 | /  | 10%    | 25%     | 50%     | 75%     | 100%    | 120%* | / | / |
| Input voltage (V)                             | /  | 701.04 | 700.95  | 700.00  | 699.00  | 700.51  | /     | / | / |
| Input voltage ripple (V)                      | /  | 54.6   | 47.8    | 47.7    | 50.1    | 52.2    | /     | / | / |
| Input current (A)                             | /  | 18.00  | 40.86   | 79.67   | 119.86  | 160.29  | /     | / | / |



|  |   |        |         |         |         |         |       |   |   |
|--|---|--------|---------|---------|---------|---------|-------|---|---|
| Input current ripple (A)   | /   | 7.9    | 7.8     | 20.7    | 19.9    | 16.4    | /     | / | / |
| Input power (Pi) (W)   | /   | 12.60  | 28.63   | 55.69   | 83.62   | 112.28  | /     | / | / |
| Output power (Po) (W)  | /   | 11.35  | 27.51   | 55.04   | 82.69   | 110.59  | /     | / | / |
| Output efficiency(%)   | /   | 90.08  | 96.09   | 98.70   | 98.88   | 98.49   | /     | / | / |
| Input energy (Wi) (Wh)   | /   | 702.83 | 1641.38 | 3080.00 | 4620.00 | 5925.96 | /     | / | / |
| Output energy (Wo) (Wh)  | /   | 633.27 | 1577.24 | 3040.00 | 4570.00 | 5840.13 | /     | / | / |
| Energy efficiency(%)   | /   | 90.10  | 96.09   | 98.70   | 98.92   | 98.55   | /     | / | / |
|  |   |        |         |         |         |         |       |   |   |
| PV input voltage   | c) 90% of the inverter's Maximum input voltage 850V |        |         |         |         |         |       |   |   |
| Temperature (°C)   | 25°C ± 5°C  |        |         |         |         |         |       |   |   |
| Operating period for energy measurement (min)  | 3.0   |        |         |         |         |         |       |   |   |
| Percentage of rated output VA  | /   | 10%    | 25%     | 50%     | 75%     | 100%    | 120%* | / | / |
| Input voltage (V)  | /   | 851.08 | 850.99  | 850.88  | 850.76  | 850.66  | /     | / | / |
| Input voltage ripple (V)   | /   | 56.2   | 48.7    | 55.3    | 56.2    | 58.0    | /     | / | / |
| Input current (A)  | /   | 15.13  | 34.91   | 68.16   | 100.60  | 134.21  | /     | / | / |
| Input current ripple (A)   | /   | 7.3    | 22.2    | 26.7    | 22.7    | 20.0    | /     | / | / |
| Input power (Pi) (W)   | /   | 12.85  | 29.69   | 57.99   | 85.58   | 114.16  | /     | / | / |
| Output power (Po) (W)  | /   | 11.46  | 27.49   | 55.54   | 82.78   | 110.20  | /     | / | / |
| Output efficiency(%)   | /   | 89.18  | 92.58   | 95.77   | 96.73   | 96.53   | /     | / | / |
| Input energy (Wi) (Wh)   | /   | 821.46 | 1690.81 | 3253.92 | 4973.27 | 6272.58 | /     | / | / |
| Output energy (Wo) (Wh)  | /   | 733.07 | 1566.18 | 3116.89 | 4814.74 | 6059.15 | /     | / | / |
| Energy efficiency(%)   | /   | 89.24  | 92.63   | 95.79   | 96.81   | 96.60   | /     | / | / |
| Remark:  |   |        |         |         |         |         |       |   |   |
| *If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived; |   |        |         |         |         |         |       |   |   |

| TABLE   | Efficiency recording and efficient calculation sheet   |        |         |         |         |         |       |   |   |
|---|--|--------|---------|---------|---------|---------|-------|---|---|
| power conditioner type                        | Grid-connected   |        |         |         |         |         |       |   |   |
| Model:  | hopeSun hopeSun 125KTL-M   |        |         |         |         |         |       |   |   |
| Parameters of power conditioner               | Minimum full load input voltage: 600V<br>Nominal voltage: 750V<br>90% of the inverter's Maximum input voltage: 850V<br>Rated output voltage: 230Vac<br>Rated output frequency: 50Hz<br>Rated output power: 100kW |        |         |         |         |         |       |   |   |
| PV input voltage                              | a) Manufacturer's minimum rated input voltage 600V   |        |         |         |         |         |       |   |   |
| Temperature (°C)                              | 25°C ± 5°C   |        |         |         |         |         |       |   |   |
| Operating period for energy measurement (min) | 3.0  |        |         |         |         |         |       |   |   |
| Percentage of rated output VA                 | /  | 10%    | 25%     | 50%     | 75%     | 100%    | 120%* | / | / |
| Input voltage (V)                             | /  | 601.11 | 601.02  | 600.85  | 600.68  | 600.51  | /     | / | / |
| Input voltage ripple (V)                      | /  | 38.8   | 55.8    | 58.1    | 59.0    | 64.8    | /     | / | / |
| Input current (A)                             | /  | 22.85  | 55.17   | 106.74  | 159.38  | 212.23  | /     | / | / |
| Input current ripple (A)                      | /  | 7.0    | 15.8    | 20.6    | 29.2    | 29.7    | /     | / | / |
| Input power (Pi) (W)                          | /  | 13.73  | 33.14   | 64.13   | 95.73   | 127.44  | /     | / | / |
| Output power (Po) (W)                         | /  | 12.54  | 32.02   | 62.99   | 94.11   | 125.24  | /     | / | / |
| Output efficiency(%)                          | /  | 91.33  | 96.60   | 98.23   | 98.31   | 98.27   | /     | / | / |
| Input energy (Wi) (Wh)                        | /  | 656.32 | 1761.08 | 3248.58 | 5081.00 | 6473.91 | /     | / | / |
| Output energy (Wo) (Wh)                       | /  | 717.55 | 1822.35 | 3305.22 | 5164.07 | 6584.30 | /     | / | / |
| Energy efficiency(%)                          | /  | 91.47  | 96.64   | 98.29   | 98.39   | 98.32   | /     | / | / |
|   |  |        |         |         |         |         |       |   |   |
| PV input voltage                              | b) The inverter's nominal voltage 750V   |        |         |         |         |         |       |   |   |
| Temperature (°C)                              | 25°C ± 5°C   |        |         |         |         |         |       |   |   |
| Operating period for energy measurement (min) | 3.0  |        |         |         |         |         |       |   |   |
| Percentage of rated output VA                 | /  | 10%    | 25%     | 50%     | 75%     | 100%    | 120%* | / | / |
| Input voltage (V)                             | /  | 751.04 | 750.96  | 750.00  | 750.00  | 750.53  | /     | / | / |
| Input voltage ripple (V)                      | /  | 58.1   | 47.9    | 56.4    | 55.3    | 53.7    | /     | / | / |
| Input current (A)                             | /  | 17.73  | 44.02   | 84.46   | 126.00  | 170.47  | /     | / | / |

|  |   |        |         |         |         |         |       |   |   |
|--|---|--------|---------|---------|---------|---------|-------|---|---|
| Input current ripple (A)   | /   | 17.6   | 10.2    | 21.8    | 21.0    | 17.7    | /     | / | / |
| Input power (Pi) (W)   | /   | 13.30  | 33.05   | 63.22   | 94.48   | 127.94  | /     | / | / |
| Output power (Po) (W)  | /   | 12.66  | 31.43   | 62.52   | 93.47   | 125.44  | /     | / | / |
| Output efficiency(%)   | /   | 95.19  | 95.11   | 98.85   | 98.93   | 98.05   | /     | / | / |
| Input energy (Wi) (Wh)   | /   | 653.92 | 1978.42 | 3480.00 | 5220.00 | 6943.01 | /     | / | / |
| Output energy (Wo) (Wh)  | /   | 684.58 | 2078.48 | 3440.00 | 5170.00 | 7079.31 | /     | / | / |
| Energy efficiency(%)   | /   | 95.52  | 95.19   | 98.85   | 99.04   | 98.07   | /     | / | / |
|  |   |        |         |         |         |         |       |   |   |
| PV input voltage   | c) 90% of the inverter's Maximum input voltage 850V |        |         |         |         |         |       |   |   |
| Temperature (°C)   | 25°C ± 5°C  |        |         |         |         |         |       |   |   |
| Operating period for energy measurement (min)  | 3.0   |        |         |         |         |         |       |   |   |
| Percentage of rated output VA  | /   | 10%    | 25%     | 50%     | 75%     | 100%    | 120%* | / | / |
| Input voltage (V)  | /   | 851.07 | 850.97  | 850.86  | 850.75  | 850.62  | /     | / | / |
| Input voltage ripple (V)   | /   | 64.8   | 62.9    | 55.3    | 58.4    | 62.0    | /     | / | / |
| Input current (A)  | /   | 16.04  | 39.74   | 76.11   | 112.83  | 150.93  | /     | / | / |
| Input current ripple (A)   | /   | 9.0    | 25.4    | 30.1    | 25.8    | 21.5    | /     | / | / |
| Input power (Pi) (W)   | /   | 13.62  | 33.80   | 64.75   | 95.98   | 128.37  | /     | / | / |
| Output power (Po) (W)  | /   | 12.87  | 31.76   | 62.91   | 93.85   | 125.67  | /     | / | / |
| Output efficiency(%)   | /   | 94.49  | 93.98   | 97.15   | 97.78   | 97.89   | /     | / | / |
| Input energy (Wi) (Wh)   | /   | 679.58 | 1645.61 | 3988.09 | 5023.72 | 6665.44 | /     | / | / |
| Output energy (Wo) (Wh)  | /   | 716.95 | 1749.74 | 4104.25 | 5135.22 | 6803.84 | /     | / | / |
| Energy efficiency(%)   | /   | 94.79  | 94.05   | 97.17   | 97.83   | 97.97   | /     | / | / |
| Remark:  |   |        |         |         |         |         |       |   |   |
| *If limited by design, inverter is not capable to operate with the 120% of rated output load, test under this condition is waived; |   |        |         |         |         |         |       |   |   |

| TABLE   | No load loss                         | P |
|---|--------------------------------------|---|
| power conditioner type  | Utility-interactive-PV input voltage |   |
| hopeSun 100KTL  |                                      |   |
| Measure input voltage (V)   | 749.56                               |   |
| Measured input power(W)   | 336.55                               |   |
| hopeSun 110KTL  |                                      |   |
| Measure input voltage (V)   | 749.57                               |   |
| Measured input power(W)   | 582.02                               |   |
| hopeSun 125KTL-M  |                                      |   |
| Measure input voltage (V)   | 749.57                               |   |
| Measured input power(W)   | 581.70                               |   |
| Remark: No load loss is measured when the power conditioner works at rated input voltage and it's load is disconnected. |                                      |   |

| TABLE   | Standby loss                     | P |
|---|----------------------------------|---|
| power conditioner type  | Utility-interactive-Test by 50Hz |   |
| hopeSun 100KTL  |                                  |   |
| Measure output voltage (V)  | 230.33                           |   |
| Measured output power(W)  | 12.88                            |   |
| hopeSun 110KTL  |                                  |   |
| Measure output voltage (V)  | 230.35                           |   |
| Measured output power(W)  | 12.98                            |   |
| hopeSun 125KTL-M  |                                  |   |
| Measure output voltage (V)  | 499.66                           |   |
| Measured output power(W)  | 14.77                            |   |
| Remark: Standby loss is measured when the power conditioner works at rated input voltage and in standby mode. |                                  |   |

## Pictures of the unit



Figure 1. Overview I



Figure 2. Overview II



### Pictures of the unit



Figure 3. Overview III

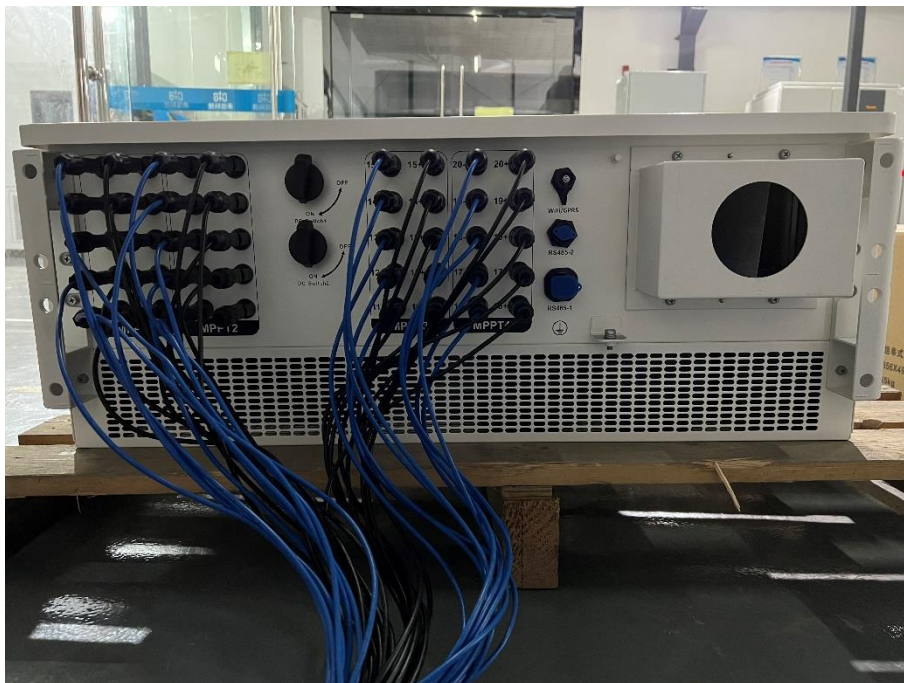


Figure 4. Overview IV

| Test Equipment list |                      |                 |               |                      |
|---------------------|----------------------|-----------------|---------------|----------------------|
| No                  | Test Equipment       | Equipment model | Equipment No. | Calibration due date |
| 1                   | AC source            | WPLA-330200KVA  | BZ-DGD-L204   | 2022/12/22           |
| 2                   | DC source            | WPLA-150KW      | BZ-DGD-L013   | 2022/12/22           |
| 3                   | Oscilloscope         | MS04054B        | BZ-DGD-L064   | 2023/02/28           |
| 4                   | AC/DC current sensor | CT6863-05       | BZ-DGD-L026-1 | 2023/02/22           |
| 5                   | AC/DC current sensor | CT6863-05       | BZ-DGD-L026-2 | 2023/02/22           |
| 6                   | AC/DC current sensor | CT6863-05       | BZ-DGD-L026-3 | 2022/12/19           |
| 7                   | AC/DC current sensor | CT6863-05       | BZ-DGD-L026-4 | 2023/02/22           |
| 8                   | Power analyzer       | PA6000H         | BZ-DGD-L059   | 2022/10/21           |
| 9                   | Current probe        | CP8150A         | BZ-DGD-L067   | 2023/02/28           |

## Statement

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