

Certificate of Conformity

No. ESY 086470 0181 Rev. 00

Holder of Certificate: **Ginlong Technologies Co., Ltd.**

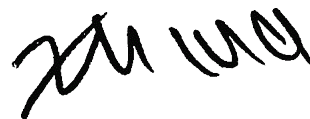
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PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
AC coupled Inverter

This Certificate of Conformity confirms the compliance with the above listed standards on a voluntary basis. It refers only to the sample submitted to TÜV SÜD Product Service GmbH and does not certify the quality or safety of the serial products. It was issued according to TÜV SÜD Product Service certification program Photovoltaics and Grid Integration. For details see: www.tuvsud.com/ps-cert

Test report no.: 50409230013131-00

Date, 2024-03-20



(Zhengdong Ma)



Product Service

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Model(s):

S6-EA1P3K-L, S6-EA1P3.6K-L, S6-EA1P4.6K-L,
S6-EA1P5K-L, S6-EA1P6K-L

Parameters:

Please see pages 3 to 9.

Applicable standards:

EN 50549-1:2019
EN 50549-10:2022

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| Model | S6-EA1P3K-L | S6-EA1P3.6K-L | S6-EA1P4.6K-L |
|-------------------------------------|------------------------|---------------|---------------|
| Battery input parameters: | | | |
| Battery type: | Li-ion | | |
| Battery voltage range: | 40-60 Vd.c. | | |
| Maximum charge current: | 62.5 Ad.c. | 75 Ad.c. | 96 Ad.c. |
| Maximum discharge current: | 62.5 Ad.c. | 75 Ad.c. | 96 Ad.c. |
| AC parameters: | | | |
| AC-output parameters (Grid side): | | | |
| Maximum output apparent Power: | 3000 VA | 3600 VA | 4600 VA |
| Nominal output voltage: | 1/N/PE ~ 230 Va.c. | | |
| Maximum (Rated) output current: | 13.1 Aa.c. | 15.7 Aa.c. | 20 Aa.c. |
| Nominal frequency: | 50 Hz | | |
| AC-input parameters: | | | |
| Nominal input voltage: | 1/N/PE ~ 230 Va.c. | | |
| Maximum (Rated) continuous current: | 13.1 Aa.c. | 15.7 Aa.c. | 20 Aa.c. |
| Nominal frequency: | 50 Hz | | |
| Power factor range: | -0.8, ..., 1, ..., 0.8 | | |

| Model | S6-EA1P5K-L | S6-EA1P6K-L |
|-------------------------------------|------------------------|-------------|
| Battery input parameters: | | |
| Battery type: | Li-ion | |
| Battery voltage range: | 40-60 Vd.c. | |
| Maximum charge current: | 105 Ad.c. | 125 Ad.c. |
| Maximum discharge current: | 105 Ad.c. | 125 Ad.c. |
| AC parameters: | | |
| AC-output parameters (Grid side): | | |
| Maximum output apparent Power: | 5000 VA | 6000 VA |
| Nominal output voltage: | 1/N/PE ~ 230 Va.c. | |
| Maximum (Rated) output current: | 21.8 Aa.c. | 26.1 Aa.c. |
| Nominal frequency: | 50 Hz | |
| AC-input parameters: | | |
| Nominal input voltage: | 1/N/PE ~ 230 Va.c. | |
| Maximum (Rated) continuous current: | 21.8 Aa.c. | 26.1 Aa.c. |
| Nominal frequency: | 50 Hz | |
| Power factor range: | -0.8, ..., 1, ..., 0.8 | |

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Evaluated protection function and operational capabilities

| Clause(s) / subclause(s) of EN 50549-1:2019 | Applicable clause(s) / subclause (s) of this document | Remarks, optional modes and constraints | Verdict |
|---|--|---|---------|
| 4.4.2 Operating frequency range | 5.2.1 Frequency operating range | -- | Pass |
| 4.4.3 Minimal requirement for active power delivery at underfrequency | 5.2.1 Frequency operating range | -- | Pass |
| 4.4.4 Continuous operating voltage range | 5.2.2 Voltage operating range | -- | Pass |
| 4.5.2 Rate of change of frequency (ROCOF) immunity | 5.3.1 Immunity to disturbances – Rated of change of frequency (ROCOF) | -- | Pass |
| 4.5.3.2 Generating plant with nonsynchronous generating technology | 5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT) | -- | Pass |
| 4.5.4 Over-voltage ride through (OVRT) | 5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT) | -- | Pass |
| 4.6.1 Power response to overfrequency | 5.4 Active response to frequency deviation | -- | Pass |
| 4.6.2 Power response to underfrequency | 5.4 Active response to frequency deviation | -- | Pass |
| 4.7.2.2 Voltage support by reactive power, Capabilities | 5.5.1 Power capabilities assessment | -- | Pass |
| 4.7.2.3 Voltage support by reactive power, Control modes | 5.5.2 Voltage support by reactive power - test to determine the reactive power control modes | Q setp. Q(U) Cos φ setp. Cos φ (P) | Pass |
| 4.7.2.3.2 Set point control modes | 5.5.2.3 Verification procedure for set point control | Q setp. Cos φ setp. | Pass |
| 4.7.2.3.3 Voltage related control modes | 5.5.2.5 Verification procedure for power related control modes for reactive power | Q(U) | Pass |
| 4.7.2.3.4 Power related control mode | 5.5.2.5 Verification procedure for power related control modes for reactive power | Cos φ (P) | Pass |
| 4.7.3 Voltage related active power reduction | 5.6 Voltage related active power reduction - P(U) | P(U) | Pass |
| 4.7.4.2.2 Zero current mode for converter connected generating technology | 5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT) | -- | Pass |
| 4.9.3 Requirements on voltage and frequency protection | 5.8.3 Verification procedure for generating plants to be connected to a LV distribution network with Interface protection as internal device | -- | Pass |
| 4.9.4 Means to detect island situation | 5.8.6 Islanding detection | Active methods tested with a | Pass |

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|---|--|--|------|
| | | resonant circuit according to EN 62116 | |
| 4.10.2 Automatic reconnection after tripping | 5.9.3 Automatic reconnection after tripping | -- | Pass |
| 4.10.3 Starting to generate electrical power | 5.9.4 Starting to generate electrical power | -- | Pass |
| 4.11.1 Ceasing active power | 5.10 Active power reduction on set point | -- | Pass |
| 4.11.2 Reduction of active power on set point | 5.10 Active power reduction on set point | -- | Pass |
| 4.12 Remote information exchange | 5.11 Remote information exchange | Standardized communication protocol not provided by manufacturer | N/A |
| 4.13 single fault tolerance of interface protection system and interface switch | 5.12 Requirements regarding single fault tolerance of interface protection system and interface switch | -- | Pass |

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Evaluated parameter and parameter range

| Specific technical requirement (e.g. grid codes) | | EN 50549-1:2019 | | | |
|---|--|---------------------------------|--|---------------------------|----------|
| Clause(s) / subclause(s) of EN 50549-1:2019 | Parameter | Remarks/ additional information | Configurable value range | Default value | |
| 4.4.2 Operating frequency range | 47.0 – 47.5 Hz Duration | -- | 0 – 20 s | 20 s | |
| | 47.5 – 48.5 Hz Duration | -- | 30 – 90 min | 30 min | |
| | 48.5 – 49.0 Hz Duration | -- | 30 – 90 min | 30 min | |
| | 49.0 – 51.0 Hz Duration | -- | not configurable | unlimited | |
| | 51.0 – 51.5 Hz Duration | -- | 30 – 90 min | 30 min | |
| | 51.5 – 52 Hz Duration | -- | 0 – 15 min | 0 s | |
| 4.4.3 Minimal requirement for active power delivery at underfrequency | Reduction threshold | -- | not configurable | 49.5 Hz | |
| | Maximum reduction rate | -- | not configurable | 10 % P _M /Hz | |
| 4.4.4 Continuous operating voltage range | Upper limit | -- | not configurable | 110% U _n | |
| | Lower limit | -- | not configurable | 85% U _n | |
| 4.5.2 Rate of change of frequency (ROCOF) immunity | ROCOF withstand capability (defined with a sliding measurement window of 500 ms) | -- | not configurable | 2 Hz/s | |
| 4.5.3.2 Under-voltage ride through (UVRT) Generating plant with non-synchronous generating technology | Maximum power resumption time | -- | not configurable | 1 s | |
| | Voltage-Time-Diagram | -- | See figure 6 most stringent curve of EN 50549-1:2019 | Time [s] | U [p.u.] |
| | | | | 0.0 | 0.05 |
| | | | | 0.25 | 0.05 |
| | | | 3 | 0.85 | |
| 4.5.4 Over-voltage ride through (OVRT) | Voltage-Time-Diagram | -- | not configurable See figure 8 of EN 50549-1:2019 | Time [s] | U [p.u.] |
| | | | | 0 | 1.25 |
| | | | | 0.1 | 1.25 |
| | | | | 0.1 | 1.20 |
| | | | | 5.0 | 1.20 |
| | | | | 5.0 | 1.15 |
| | | | | 60 | 1.15 |
| 60 | 1.00 | | | | |
| 4.6.1 Power response to overfrequency | Threshold frequency f ₁ | -- | 50.2 Hz – 52 Hz | 50.2 Hz | |
| | Droop | -- | 2 % – 12 % | 5 % | |
| | Power reference | -- | P _M P _{max} | P _{Max} for EESS | |
| | Intentional delay | -- | 0 – 2 s | 0s | |
| | Deactivation threshold f _{stop} | -- | 50.0 Hz – f ₁ | deactivated | |
| | Deactivation time t _{stop} | -- | 0 – 600 s | - | |
| Acceptance of | -- | yes no | yes | | |

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|---|--|-------------|--|---|
| | | | U:230 V, ...,265 V | U=248.4 V |
| | Point d | -- | 0 – 100%P _n / U:230 V, ...,270 V | 30%P _n / U=264.5 V |
| | Time constant | -- | 3 s – 60 s | 3.33 s |
| 4.7.4.2.2 Zero current mode for converter connected generating technology | Enabling | -- | enable disable | disabled |
| | Static voltage range overvoltage | -- | 100 %U _n – 120 %U _n | 120 %U _n |
| | Static voltage range undervoltage | -- | 20 %U _n – 100 %U _n | 50 %U _n |
| 4.9.3 Requirements on voltage and frequency protection | Threshold for protection as dedicated device [in A or kW, kVA] | -- | 16 A – 250 kVA | Not specified, inverter integrated as default |
| | Undervoltage threshold stage 1 | -- | 0.2 U _n – 1 U _n | 0.8U _n |
| | Undervoltage operate time stage 1 | -- | 0.1 s – 100 s | 3s |
| | Undervoltage threshold stage 2 | -- | 0.2 U _n – 1 U _n | 0.4U _n |
| | Undervoltage operate time stage 2 | -- | 0.1 s – 5 s | 1.5s |
| | Ovoltage threshold stage 1 | -- | 1.0 U _n – 1.2 U _n | 1.2U _n |
| | Ovoltage operate time stage 1 | -- | 0.1 s – 100 s | 5s |
| | Ovoltage threshold stage 2 | -- | 1.0 U _n – 1.3 U _n | 1.25U _n |
| | Ovoltage operate time stage 2 | -- | 0.1 s – 5 s | 0.1s |
| | Ovoltage threshold 10 min mean protection | -- | 1.0 U _n – 1.15 U _n | 1.1U _n |
| | Underfrequency threshold stage 1 | -- | 47.0 Hz – 50.0 Hz | 47.5Hz |
| | Underfrequency operate time stage 1 | -- | 0.1 s – 100 s | 0.5s |
| | Underfrequency threshold stage 2 | -- | 47.0 Hz – 50.0 Hz | 47Hz |
| | Underfrequency operate time stage 2 | -- | 0.1 s – 5 s | 0.1s |
| | Overfrequency threshold stage 1 | -- | 50.0 Hz – 52.0 Hz | 51.5Hz |
| | Overfrequency operate time stage 1 | -- | 0.1 s – 100 s | 0.5s |
| | Overfrequency threshold stage 2 | -- | 50.0 Hz – 52.0 Hz | 52Hz |
| Overfrequency operate time stage 2 | -- | 0.1 s – 5 s | 0.1s | |
| 4.10.2 Automatic reconnection after tripping | Lower frequency | -- | 47.0 Hz – 50.0 Hz | 49.5 Hz |
| | Upper frequency | -- | 50.0 Hz – 52.0 Hz | 50.2 Hz |
| | Lower voltage | -- | 50 %U _n – 100 %U _n | 85 %U _n |

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|---|-----------------------------------|----|--|-------------------------|
| | Upper voltage | -- | 100 %U _n – 120 %U _n | 110 %U _n |
| | Observation time | -- | 10 s – 600 s | 60 s |
| | Active power increase gradient | -- | 5% – 3000%/min | 10 %P _n /min |
| 4.10.3 Starting to generate electrical power | Lower frequency | -- | 47.0 Hz – 50.0 Hz | 49.5 Hz |
| | Upper frequency | -- | 50.0 Hz – 52.0 Hz | 50.1 Hz |
| | Lower voltage | -- | 50 %U _n – 100 %U _n | 85 %U _n |
| | Upper voltage | -- | 100 %U _n – 120 %U _n | 110 %U _n |
| | Observation time | -- | 10 s – 600 s | 60 s |
| | Active power increase gradient | -- | 5% – 3000 %/min | disabled |
| 4.11.1 Ceasing active power | Activation option | -- | Can be achieved by Modbus communication protocol, APP or Solis cloud, decision should be made by the DSO and responsible party | |
| 4.11.2 Reduction of active power on set point | Activation option | -- | Can be achieved by Modbus communication protocol, APP or Solis cloud, decision should be made by the DSO and responsible party | |
| 4.12 Remote information exchange | Available communication standards | -- | Standardized communication protocol not provided by manufacturer | |