

Certificate of Conformity

No. ESY 086470 0181 Rev. 00

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

No.57 Jintong Road
Binhai Industrial Park, Xiangshan
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PEOPLE'S REPUBLIC OF CHINA

Product:

Converter
AC coupled Inverter

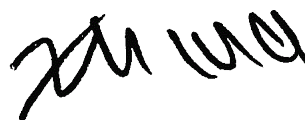
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Test report no.:

50409230013131-00

Date,

2024-03-20



(Zhengdong Ma)

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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
4.5.4 Over-voltage ride through (OVRT)	Voltage-Time-Diagram	--	not configurable See figure 8 of EN 50549-1:2019	3	0.85
				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
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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	staged disconnection			
4.6.2 Power response to underfrequency	Threshold frequency f_1	--	49.8 Hz – 46 Hz	49.8 Hz
	Droop	--	2 – 12 %	5 %
	Power reference	--	$P_M P_{max}$	P_{max}
	Intentional delay	--	0 – 2 s	0 s
4.7.2.2 Voltage support by reactive power - Capabilities	Active factor / Reactive power (%Pd) range overexcited	--	0.8 – 1 / 60 % P_D – 0	0.9 – 1 / 48 % P_D – 0
	Active factor / Reactive power (%Pd) range underexcited	--	0.8 – 1 / 60 % P_D – 0	0.9 – 1 / 48 % P_D – 0
4.7.2.3 Voltage support by reactive power - Control modes	Enabled control mode	--	Q setp. Q(U) Cos ϕ setp. Cos ϕ (P)	Q setp.
4.7.2.3.2 Voltage support by reactive power - Setpoint control modes	Q setpoint and excitation	--	0 – 60 % P_D	0
	cos ϕ setpoint and excitation	--	1 – 0.8	1
4.7.2.3.3 Voltage support by reactive power - Voltage related control modes	Characteristic curve – Q (U)	--	--	Indicate default characteristic
	Point a	--	50% U_n – 100% U_n	93 % U_n
	Point b	--	50% U_n – 100% U_n	97 % U_n
	Point c	--	100% U_n – 115% U_n	103% U_n
	Point d	--	100% U_n – 117% U_n	107 % U_n
	Min. reactive power	--	0 – 60 %Pd ($Q_{max \text{ under}}$)	48 %Pd
	Max. reactive power	--	0 – 60 %Pd ($Q_{max \text{ over}}$)	48 %Pd
	Time constant	--	3 s – 60 s	3.33 s
	Min cos ϕ	--	0.0 – 1	deactivated
	Lock in power	--	0 % – 20 %	deactivated
	Lock out power	--	0 % – 20 %	deactivated
4.7.2.3.4 Voltage support by reactive power – Power related control mode	Characteristic curve – Cos ϕ (P)	--	--	Indicate default characteristic
	Point a	--	0 – 100% P_n / PF:-0.8, ..., +0.8	25% P_n /PF=0.9
	Point b	--	0 – 100% P_n / PF:-0.8, ..., +0.8	40% P_n /PF=0.98
	Point c	--	0 – 100% P_n / PF:-0.8, ..., +0.8	60% P_n /PF=-0.98
	Point d	--	0 – 100% P_n / PF:-0.8, ..., +0.8	75% P_n /PF=-0.9
	Cos ϕ	--	0.8 – 1	0.9
	Time constant	--	3 s – 60 s	3.33 s
	Lock in voltage	--	105 % U_n	deactivated
	Lock out voltage	--	100 % U_n	deactivated
4.7.3 Voltage related active power reduction	Characteristic curve - P (U)	--	--	Indicate default characteristic
	Point a	--	0 – 100% P_n / U:115 V, ..., 230 V	100% P_n / U=115 V
	Point b	--	0 – 100% P_n / U:115 V, ..., 230 V	100% P_n / U=161 V
	Point c	--	0 – 100% P_n / U:115 V, ..., 230 V	100% P_n / U=161 V

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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
	Overvoltage threshold stage 1	--	1.0 U _n – 1.2 U _n	1.2U _n
	Overvoltage operate time stage 1	--	0.1 s – 100 s	5s
	Overvoltage threshold stage 2	--	1.0 U _n – 1.3 U _n	1.25U _n
	Overvoltage operate time stage 2	--	0.1 s – 5 s	0.1s
	Overvoltage 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
	Active power increase gradient	--	5% – 3000 %/min	disabled
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
	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	