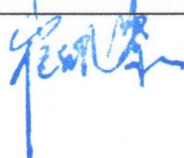




Appendix 4 Type Verification Test Report (UK-G83 Issue 2)

Type Approval and manufacturer/supplier declaration of compliance with the requirements of Engineering Recommendation G83/2.			
SSEG Type Reference Number		Photovoltaic Grid-tied Inverter	
SSEG Type		SolarRiver 1100TL-S/SolarRiver 1600TL-S/ SolarRiver 2100TL-S/SolarRiver 2600TL-S	
System Supplier Name		Samil Power Co., Ltd.	
Address		No.6 Xuefengshan Road, Suqian High-tech Industrial Development Zone, Jiangsu Province, P. R. China	
Tel	+86-510-83593132	Fax	+86-510-83593136
E:mail	info@samilpower.com	Web site	www.samilpower.com
Maximum Rated Capacity	Connection Option		
	1	kW single phase (SolarRiver 1100TL-S)	
	1.5	kW single phase (SolarRiver 1600TL-S)	
	2	kW single phase (SolarRiver 2100TL-S)	
	2.5	kW single phase (SolarRiver 2600TL-S)	
	NA	kW three phases	
	NA	kW two phases in three phase system	
	NA	kW two phases split phase system	
	SSEG manufacturer/supplier declaration.		
I certify on behalf of the company named above as a manufacturer/supplier of Small Scale Embedded Generators, that all products manufactured/supplied by the company with the above SSEG Type reference number will be manufactured and tested to ensure that they perform as stated in this Type Verification Test Report, prior to shipment to site and that no site modifications are required to ensure that the product meets all the requirements of G83/2.			
Signed	 山亿新能源股份有限公司 SAMIL POWER CO., LTD.		On behalf of Samil Power Co., Ltd.



SolarRiver 2600TL-S						
Power Quality. Harmonics.						
SSEG rating per phase (rpp)			2.5	kW	NV=MV*3.68/rpp	
Harmonic	At 45-55% of rated output		100% of rated output		Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
	Measured Value (MV) in Amps	Normalised Value (NV) in Amps	Measured Value (MV) in Amps	Normalised Value (NV) in Amps		
2	0.116	0.170	0.132	0.194	1.080	
3	0.155	0.227	0.096	0.142	2.300	
4	0.030	0.044	0.016	0.023	0.430	
5	0.063	0.093	0.051	0.074	1.140	
6	0.036	0.054	0.023	0.034	0.300	
7	0.049	0.072	0.023	0.034	0.770	
8	0.031	0.045	0.021	0.031	0.230	
9	0.041	0.060	0.012	0.017	0.400	
10	0.025	0.036	0.015	0.023	0.184	
11	0.034	0.049	0.008	0.011	0.330	
12	0.017	0.024	0.014	0.020	0.153	
13	0.027	0.039	0.003	0.005	0.210	
14	0.014	0.020	0.012	0.017	0.131	
15	0.020	0.029	0.003	0.004	0.150	
16	0.008	0.012	0.004	0.006	0.115	
17	0.017	0.024	0.001	0.001	0.132	
18	0.004	0.005	0.004	0.006	0.102	
19	0.014	0.020	0.004	0.005	0.118	
20	0.002	0.003	0.007	0.010	0.092	
21	0.011	0.016	0.002	0.003	0.107	0.160
22	0.001	0.002	0.005	0.008	0.084	
23	0.009	0.014	0.008	0.012	0.098	0.147
24	0.002	0.002	0.007	0.011	0.077	
25	0.006	0.009	0.004	0.006	0.090	0.135
26	0.001	0.002	0.006	0.008	0.071	



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27	0.005	0.007	0.007	0.010	0.083	0.124
28	0.002	0.003	0.002	0.004	0.066	
29	0.004	0.006	0.001	0.002	0.078	0.117
30	0.000	0.001	0.001	0.002	0.061	
31	0.003	0.005	0.004	0.006	0.073	0.109
32	0.000	0.000	0.003	0.004	0.058	
33	0.002	0.004	0.003	0.005	0.068	0.102
34	0.001	0.001	0.002	0.003	0.054	
35	0.002	0.003	0.005	0.007	0.064	0.096
36	0.001	0.001	0.002	0.003	0.051	
37	0.001	0.002	0.004	0.005	0.061	0.091
38	0.001	0.001	0.002	0.003	0.048	
39	0.001	0.002	0.002	0.003	0.058	0.087
40	0.001	0.001	0.001	0.002	0.046	

Note the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.



SolarRiver 2600TL-S								
Power Quality. Voltage fluctuations and Flicker.								
	Starting			Stopping			Running	
	d_{max} [%]	d_c [%]	$d_{(t)}$ [%]	d_{max} [%]	d_c [%]	$d_{(t)}$ [%]	P_{st}	P_{it} 2 hours
Measured Values	0.24	0	0	0.24	0	0	0.173	0.207
Normalised to standard impedance and 3.68kW for multiple units	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Limits set under BS EN 61000-3-2	4%	3.3%	3.3% 500ms	4%	3.3%	3.3% 500ms	1.0	0.65
Test start date	05\05\2014			Test end date	05\05\2014			
Test location	Eurofins Product Testing Service (Shanghai) Co., Ltd.							



SolarRiver 1100TL-S				
Power Quality. DC injection.				
Test power level	10%	55%	100%	
Recorded value	0.010	0.005	0.002	
as % of rated AC current	0.22%	0.11%	0.04%	
Limit	0.25%	0.25%	0.25%	

SolarRiver 2600TL-S				
Power Quality. DC injection.				
Test power level	10%	55%	100%	
Recorded value	0.016	0.009	0.020	
as % of rated AC current	0.11%	0.06%	0.14%	
Limit	0.25%	0.25%	0.25%	

SolarRiver 1100TL-S				
Power Quality. Power factor.				
	216,2V	230V	253V	Measured at three voltage levels and at full output. Voltage to be maintained within ±1.5% of the stated level during the test.
Measured value	0.998	0.996	0.997	
Limit	>0.95	>0.95	>0.95	

SolarRiver 2600TL-S				
Power Quality. Power factor.				
	216.2V	230V	253V	Measured at three voltage levels and at full output. Voltage to be maintained within ±1.5% of the stated level during the test.
Measured value	0.998	0.998	0.998	
Limit	>0.95	>0.95	>0.95	



Protection. Frequency tests						
Function	Setting		Trip test		"No trip tests"	
	Frequency	Time delay	Frequency	Time delay	Frequency/Time	Confirm no trip
U/F stage 1	47.5Hz	20s	47.50	20.10	47.7Hz/ 25s	No Trip
U/F stage 2	47Hz	0.5s	47.00	0.56	47.2Hz/ 19.98s	No Trip
					46.8Hz/ 0.48s	No Trip
O/F stage 1	51.5Hz	90s	51.50	90.10	51.3Hz/ 95s	No Trip
O/F stage 2	52Hz	0.5s	52.00	0.504	51.8Hz/ 89.98s	No Trip
					52.2Hz/0.48s	No Trip

Protection. Voltage tests						
Function	Setting		Trip test		"No trip tests"	
	Voltage	Time delay	Voltage	Time delay	Voltage /Time	Confirm no trip
U/V stage 1	200.1 V	2.5s	199.0	2.51	204.1V/ 3.5s	No trip
U/V stage 2	184 V	0.5s	183.0	0.503	188V/ 2.48s	No trip
					180V/ 0.48s	No trip
O/V stage 1	262.2 V	1.0s	261.5	1.01	258.2V/ 2.0s	No trip
O/V stage 2	273.7 V	0.5s	273.0	0.51	269.7V/ 0.98s	No trip
					277.7V/ 0.48s	No trip

Note for Voltage tests the Voltage required to trip is the setting $\pm 3.45V$. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting $\pm 4V$ and for the relevant times as shown in the table above to ensure that the protection will not trip in error.



Protection. Loss of Mains test according BS EN 62116								
Test conditions		Frequency : 50+/-0.1 Hz $U_N = 230+/-3$ Vac Distortion factor of chokes < 2% Quality = 1						
Disconnection limit		0.5 s						
No.	P_{EUT} (% of EUT rating)	Reactive load (% of Q_L in 6.1.d)	P_{AC} (% of nominal)	Q_{AC} (% of nominal)	Run on Time (ms)	P_{EUT} (W)	Qf	Remarks
1	100	100	0	0	287.5	2510	1.01	Test A at BL
4	100	100	-5	-5	276.5	2510	0.98	Test A at IB
5	100	100	-5	0	213.5	2510	1.03	Test A at IB
6	100	100	-5	+5	184	2510	1.03	Test A at IB
7	100	100	0	-5	267.5	2510	1.01	Test A at IB
8	100	100	0	+5	269	2510	0.98	Test A at IB
9	100	100	+5	-5	202	2510	0.98	Test A at IB
10	100	100	+5	0	280	2510	1.01	Test A at IB
11	100	100	+5	+5	216	2510	1.03	Test A at IB
12	66	66	0	-5	174.5	1650	0.98	Test B at IB
13	66	66	0	-4	283.5	1650	0.99	Test B at IB
14	66	66	0	-3	181	1650	1.00	Test B at IB
15	66	66	0	-2	160.5	1650	1.01	Test B at IB
16	66	66	0	-1	241	1660	1.01	Test B at IB
2	66	66	0	0	305.5	1650	1.02	Test B at BL
17	66	66	0	+1	285.5	1650	0.98	Test B at IB
18	66	66	0	+2	187	1650	0.96	Test B at IB
19	66	66	0	+3	466	1660	0.96	Test B at IB
20	66	66	0	+4	272.5	1650	0.95	Test B at IB
21	66	66	0	+5	274.5	1650	0.95	Test B at IB
22	33	33	0	-5	269	870	0.99	Test C at IB
23	33	33	0	-4	252	870	0.99	Test C at IB
24	33	33	0	-3	235.5	870	1.03	Test C at IB
25	33	33	0	-2	176.5	870	1.02	Test C at IB
26	33	33	0	-1	236.5	870	1.04	Test C at IB
3	33	33	0	0	484	870	1.05	Test C at BL
27	33	33	0	+1	107.6	870	0.99	Test C at IB
28	33	33	0	+2	99	870	0.98	Test C at IB



29	33	33	0	+3	82	870	0.96	Test C at IB
30	33	33	0	+4	55.5	870	0.95	Test C at IB
31	33	33	0	+5	68	870	0.90	Test C at IB

Protection. Frequency change, Stability test				
	Start Frequency	Change	End Frequency	Confirm no trip
Positive Vector Shift	49.5Hz	+9 degrees		No trip
Negative Vector Shift	50.5Hz	-9 degrees		No trip
Positive Frequency Drift	49.5Hz	+0.19Hz/sec	51.5Hz	No trip
Negative Frequency Drift	50.5Hz	-0.19Hz/sec	47.5Hz	No trip

Protection. Re-connection timer.					
Test should prove that the reconnection sequence starts after a minimum delay of 20 seconds for restoration of voltage and frequency to within the stage 1 settings of table 1.					
Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 1.			
30s	33s	At 266.2V	At 196.1V	At 47.4Hz	At 51.6Hz
Confirmation that the SSEG does not re-connect.		No re-connect	No re-connect	No re-connect	No re-connect



Fault level contribution.					
			SolarRiver 2600TL-S		
For a directly coupled SSEG			For a Inverter SSEG		
Parameter	Symbol	Value	Time After Fault	Volts	Amps
Peak Short Circuit Current	i_p	--	20ms	36.25	0.655
Initial Value of aperiodic current	A	--	100ms	36.25	0.635
Initial symmetrical short-circuit current *	I_k	--	250ms	32.50	0.610
Decaying (aperiodic) component of short circuit current *	i_{DC}	--	500ms	26.25	0.580
Reactance/Resistance Ratio of source *	X/R	--	Time to trip	0.018	In seconds

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