

Applicant:	Shenzhen SOFARSOLAR Co., Ltd. 11/F., Gaoxinqi Technology Building, No.67 Area, Xingdong Community, Xin'an Sub-district, Bao'an District, Shenzhen City, P.R. China		
Device Category:	Inverter		
Device Type:	Photovoltaic		
PGM categories:	☒ Type A ☒ Type B ☐ Type C ☐ Type D		
Model(s):	SOFAR 100KTLX-G4, SOFAR 110KTLX-G4, SOFAR 125KTLX-G4, SOFAR 125KTLX-G4-A		
Trademark:			
Technical data:	Product family: SOFAR 100~125KTLX-G4 (-A) Registered Capacity [kW]: 100.0 ~ 125.0 (For further details see A.2 Technical data of the Generating Unit(s) on p.2)		
Firmware version:	V000001		
Grid connection code:	Engineering Recommendation G99 Issue 1 – Amendment 9 3 October 2022 Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019		
Test report no.:	221129BWA146-EG-UK-001 (2023-04-25)		

This verification confirms that the above-mentioned generating unit(s) with corresponding software meet the requirements of the referenced grid connection code at the time the tests were conducted.

This verification relates to type testing and does not imply Huachuang's endorsement, approval, certification or on-going control of the product(s), either in terms of performance, design, manufacture or materials used. This verification and the results stated herein relate solely to the sample product(s) tested and to the specific tests undertaken.

The verification will remain valid for the stated period providing no changes are made to the product, production method etc. This certificate is only valid when this is also found at <http://www.huachuang-ts.com/plus/list.php?tid=62> or contact Guangdong HuaChuang Technology Service Co., Ltd..

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Jack Shi
Sr. Project Manager

A.1 Revision history of the verification

Revision	Date	Changes	Status
0 (221129BWA146-EG-UK-C001)	2023-04-28	Initial issue	Active

A.2 Technical data of the Generating Unit(s)

Model	SOFAR 100KTLX-G4	SOFAR 110KTLX-G4
DC input (PV)		
Max. DC input voltage [V]	1100	
Operating MPPT voltage range [V]	180 ~ 1000	
Input DC current [A]	max. 10 * 40	
AC connection		
Nominal output AC voltage [V]	230/400 (3~ + N + PE, 50/60 Hz)	
Output AC current [A]	max. 145	max. 159.5
Nominal active output power P _n [kW]	100.0	100.0
Registered Capacity ¹ P _{max} [kW]	100.0	100.0
Max. apparent power [kVA]	100.0	110.0

Model	SOFAR 125KTLX-G4	SOFAR 125KTLX-G4-A
DC input (PV)		
Max. DC input voltage [V]	1100	
Operating MPPT voltage range [V]	180 ~ 1000	
Input DC current [A]	max. 10 * 40	
AC connection		
Nominal output AC voltage [V]	230/400 (3~ + N + PE, 50/60 Hz)	
Output AC current [A]	max. 181.2	max. 181.2
Nominal active output power P _n [kW]	110.0	125.0
Registered Capacity ¹ P _{max} [kW]	110.0	125.0
Max. apparent power [kVA]	125.0	125.0

Operating temperature range	-30°C ~ +60°C
Degree of protection	IP66 (according to EN 60529)
Protection class	I (according to IEC 62109-1)
Type of internal transformer	No internal transformer (transformerless)

Firmware version	V000001
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Manufacturer	Dongguan SOFAR SOLAR Co., Ltd. 1F-6F, Building E, No.1 JinQi Road, Bihu Industrial Park, Wulian Village, Fenggang Town, Dongguan City, Guangdong Province, P.R. China (The manufacturer has provided proof of certification of the quality management system of his production facility in accordance with ISO 9001)
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Testing laboratory	Guangdong HuaChuang Technology Service Co., Ltd. Room 815, No.122, Houjie Road (West), Houjie Town, Dongguan City, Guangdong, 523960, P.R. China (Accredited acc. ISO/IEC 17025: A2LA Accreditation no. 5200.02)
Testing location	Same as above
Date(s) of performance of tests	2022-12-01 - 2023-03-10

¹ The stated values of "registered capacity" related to single Generating Unit.

Annex to the Verification No.: 221129BWA146-EG-UK-C001

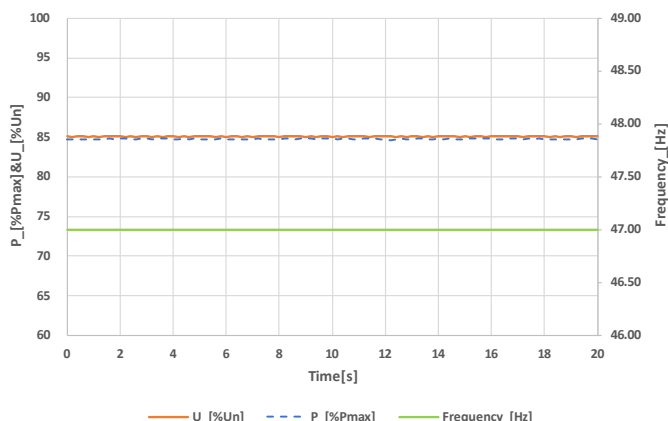
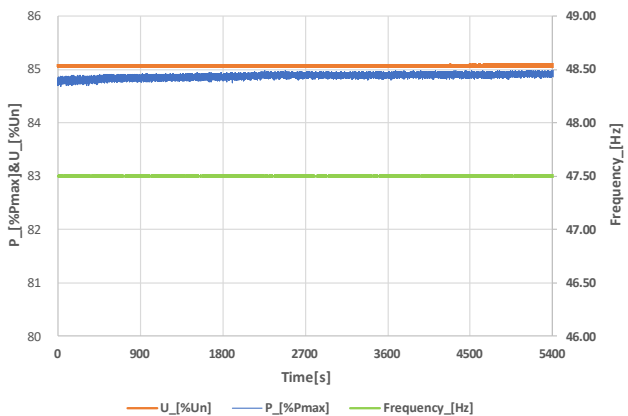
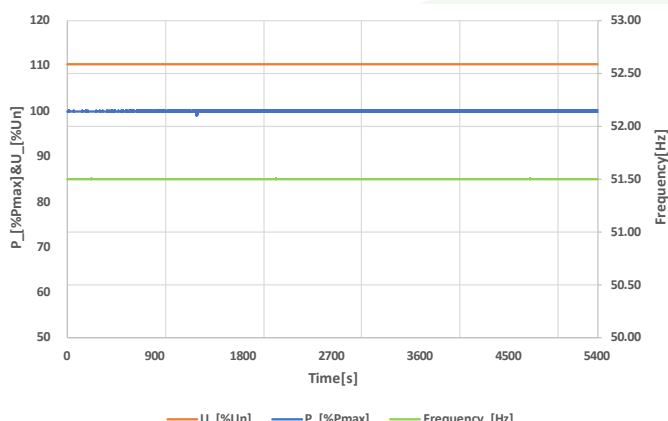
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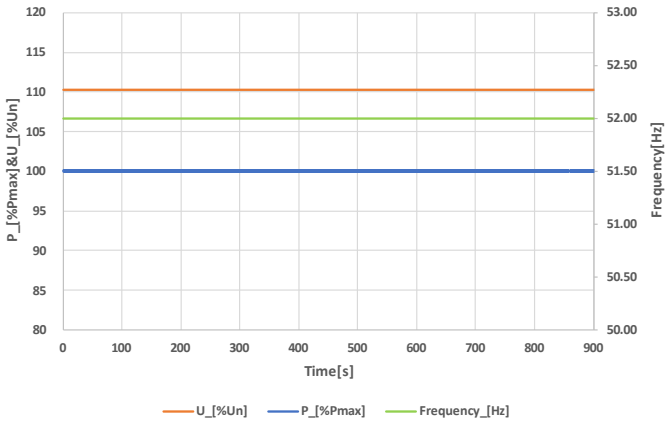
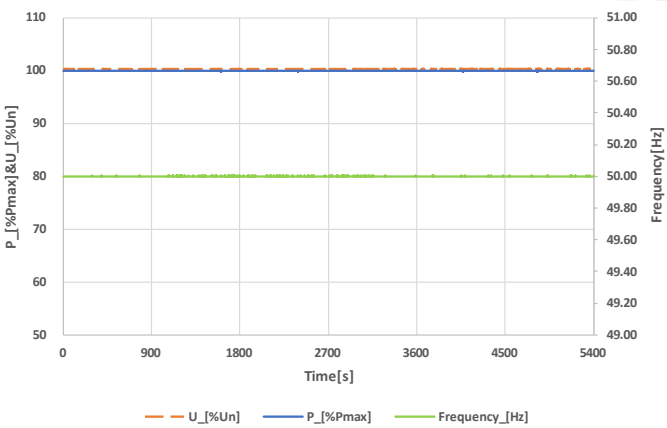
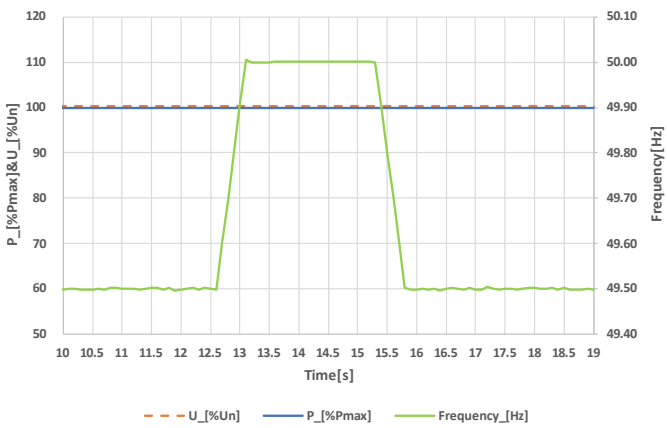
- The Power Park Modules (Generating Units):
SOFAR 110KTLX-G4, SOFAR 125KTLX-G4 are designed to be capable of operating within the range ± 0.95 Power Factor at Registered Capacity.
 Max. operating range of Power Factor at Registered Capacity:
 - SOFAR 110KTLX-G4: 0.909 lagging to 0.909 leading
 - SOFAR 125KTLX-G4: 0.880 lagging to 0.880 leading
- For Power Park Module (Generating Unit) *SOFAR 125KTLX-G4-A* to meet the requirement:
"When operating at Registered Capacity the Power Generating Module shall be capable of operating at a Power Factor within the range 0.95 lagging to 0.95 leading relative to the voltage waveform"
 - a semi-permanent active power reduction to a value
 - SOFAR 100KTLX-G4: $P_{max} \leq 95 \text{ kW}$
 - SOFAR 125KTLX-G4-A: $P_{max} \leq 118.75 \text{ kW}$
 can be applied by software (the parameter setting needs to follow the manufacturer's guidance)
 - or this need to be considered in the Power Generating Module design
 - or otherwise agreed with the DNO
- Setting range of the Power Factor:
 0.800 lagging to 0.800 leading

A.3 Extract of the test report no. 221129BWA146-EG-UK-001 (EREC G99, Form A2-3)

Note:

- The (full) tests were performed on EUT *SOFAR 125KTLX-G4-A*.
- The product was tested on:
 - SOFAR 125KTLX-G4-A* (full testing)
 - Serial No.: SD1036125KE22C180001
 - Hardware version: V001
 - Firmware version: V000001
- According to EREC G99, section 15.6.1 the following applies:
 since the rated power of *SOFAR 100KTLX-G4, SOFAR 110KTLX-G4* and *SOFAR 125KTLX-G4* is between $1/\sqrt{10} \cdot P_n$, *SOFAR 125KTLX-G4-A* and $2 \cdot P_n$, *SOFAR 125KTLX-G4-A*, a family approach to type testing is acceptable.
- A transfer of measurement results from the *SOFAR 125KTLX-G4-A* to other units in the product series according to EREC G99, section 15.6.2 is allowed.
 According to EREC G99, section 15.6.2 the following applies:
All absolute values (e.g. operating range tests) shall be transferred directly in the compliance forms of an assumed compliant Generating Unit of the same family. All relative results related to design Active Power or current (e.g. power quality fluctuation and flicker) from the tested Generating Unit shall be transferred to the compliance form of a Generating Unit in the same family according to the ratio of the respective nameplate rating (W) of the tested Generating Unit and the assumed compliant Generating Unit. For the avoidance of doubt, the Manufacturer shall register each Generating Unit in the family on the Energy Networks Association Type Test register.
 In general, the **relative results** of EUT *SOFAR 125KTLX-G4-A* can be applied to other units in the product series scaled by the factor $P_n, \text{ SOFAR 125KTLX-G4-A} / P_n, \text{ unit-not-tested}$. Exceptions are detailed in the results table below.
- Technical justification for transferability of measurement results:
 The units in der product series:
 - sharing the same control electronics,
 - with the same implemented control and firmware,
 - with the same construction solutions including the power part,
 - with the same number of phases,
 - with the power electronics, filters and transducers designed for different sizes of voltage and current ratings.
 The differences between the units in the product series are documented in detail in the test report no. 221129BWA146-EG-UK-001.

1. Operating Range	
Test 1 Voltage = 85% of nominal (195.5 V), Frequency = 47 Hz, Power Factor = 1, Period of test 20 s	Pass, no disconnection occurs.  The graph for Test 1 shows three data series over a 20-second period. The left y-axis represents both Voltage (U [%Un]) and Power (P [%Pmax]), ranging from 60 to 100. The right y-axis represents Frequency (Frequency [Hz]), ranging from 46.00 to 49.00. The x-axis represents Time [s], ranging from 0 to 20. The Voltage (U [%Un]) is shown as a solid orange line at approximately 85%. The Power (P [%Pmax]) is shown as a dashed blue line at approximately 84%. The Frequency (Frequency [Hz]) is shown as a solid green line at 47.00 Hz. All three parameters remain constant throughout the test period.
Test 2 Voltage = 85% of nominal (195.5 V), Frequency = 47.5 Hz, Power Factor = 1, Period of test 90 minutes	Pass, no disconnection occurs.  The graph for Test 2 shows three data series over a 5400-second period (90 minutes). The left y-axis represents both Voltage (U [%Un]) and Power (P [%Pmax]), ranging from 80 to 86. The right y-axis represents Frequency (Frequency [Hz]), ranging from 46.00 to 49.00. The x-axis represents Time [s], ranging from 0 to 5400. The Voltage (U [%Un]) is shown as a solid orange line at approximately 85%. The Power (P [%Pmax]) is shown as a dashed blue line at approximately 84.5%. The Frequency (Frequency [Hz]) is shown as a solid green line at 47.50 Hz. All three parameters remain constant throughout the test period.
Test 3 Voltage = 110% of nominal (253 V), Frequency = 51.5 Hz, Power Factor = 1, Period of test 90 minutes	Pass, no disconnection occurs.  The graph for Test 3 shows three data series over a 5400-second period (90 minutes). The left y-axis represents both Voltage (U [%Un]) and Power (P [%Pmax]), ranging from 50 to 120. The right y-axis represents Frequency (Frequency [Hz]), ranging from 50.00 to 53.00. The x-axis represents Time [s], ranging from 0 to 5400. The Voltage (U [%Un]) is shown as a solid orange line at 110%. The Power (P [%Pmax]) is shown as a dashed blue line at 100%. The Frequency (Frequency [Hz]) is shown as a solid green line at 51.50 Hz. All three parameters remain constant throughout the test period.
Test 4 Voltage = 110% of nominal (253 V), Frequency = 52.0 Hz, Power Factor = 1, Period of test 15 minutes	Pass, no disconnection occurs.

	
Test 5 Voltage = 100% of nominal (230 V), Frequency = 50.0 Hz, Power Factor = 1, Period of test = 90 minutes	Pass, no disconnection occurs. 
Test 6 RoCoF withstand Confirm that the Power Generating Module is capable of staying connected to the Distribution Network and operate at rates of change of frequency up to 1 Hz/s-1 as measured over a period of 500 ms. Note that this is not expected to be demonstrated on site.	Pass, no disconnection occurs. 
Note: The verified operating range of the SOFAR 125KTLX-G4-A can be applied to other units in the product series directly.	

2. Power Quality – Harmonics								
Power Generating Module tested to BS EN 61000-3-12								
Power Generating Module rating per phase (rpp)				41.667		kVA	Harmonic % = Measured Value (A) x 23/rating per phase (kVA)	
Single or three phase measurements (for single phase measurements, only complete L1 columns below).				three phases				
Harmonic	At 45-55% of Registered Capacity						Limit in BS EN 61000-3-12	
	Measured Value (MV) in Amps			Measured Value (MV) in %				
Order	L ₁	L ₂	L ₃	L ₁	L ₂	L ₃	1-phase	3-phases
2	0.1107	0.0887	0.0850	0.061	0.049	0.047	8%	8%
3	0.2102	0.0642	0.2525	0.116	0.035	0.139	21.6%	Not stated
4	0.0529	0.0359	0.0381	0.029	0.020	0.021	4%	4%
5	0.4388	0.4732	0.4193	0.242	0.261	0.231	10.7%	10.7%
6	0.0310	0.0314	0.0280	0.017	0.017	0.015	2.67%	2.67%
7	0.2319	0.1772	0.1791	0.128	0.098	0.099	7.2%	7.2%
8	0.0373	0.0357	0.0364	0.021	0.020	0.020	2%	2%
9	0.0764	0.0311	0.0751	0.042	0.017	0.041	3.8%	Not stated
10	0.0290	0.0256	0.0263	0.016	0.014	0.015	1.6%	1.6%
11	0.1085	0.1069	0.0929	0.060	0.059	0.051	3.1%	3.1%
12	0.0222	0.0225	0.0233	0.012	0.012	0.013	1.33%	1.33%
13	0.0871	0.0867	0.0853	0.048	0.048	0.047	2%	2%
THD	--	--	--	0.434	0.413	0.411	23%	13%
PWHD	--	--	--	1.524	1.466	1.409	23%	22%

Harmonic	At 100% of Registered Capacity						Limit in BS EN 61000-3-12	
	Measured Value (MV) in Amps			Measured Value (MV) in %				
Order	L ₁	L ₂	L ₃	L ₁	L ₂	L ₃	1-phase	3-phases
2	0.2164	0.1786	0.1621	0.119	0.099	0.089	8%	8%
3	0.1127	0.1708	0.3965	0.062	0.094	0.219	21.6%	Not stated
4	0.0850	0.0657	0.0527	0.047	0.036	0.029	4%	4%
5	0.4568	0.5690	0.5990	0.252	0.314	0.331	10.7%	10.7%
6	0.0632	0.0628	0.0466	0.035	0.035	0.026	2.67%	2.67%
7	0.5936	0.6119	0.4824	0.328	0.338	0.266	7.2%	7.2%
8	0.0488	0.0535	0.0455	0.027	0.030	0.025	2%	2%
9	0.1505	0.0830	0.1127	0.083	0.046	0.062	3.8%	Not stated
10	0.0478	0.0485	0.0536	0.026	0.027	0.030	1.6%	1.6%
11	0.5899	0.7086	0.6113	0.326	0.391	0.337	3.1%	3.1%
12	0.0450	0.0491	0.0466	0.025	0.027	0.026	1.33%	1.33%
13	0.3712	0.4033	0.2879	0.205	0.223	0.159	2%	2%
THD	--	--	--	0.551	0.438	0.511	23%	13%
PWHD	--	--	--	2.240	1.890	2.069	23%	22%

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Note:

The percentage harmonics results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series scaled by the factor $P_{n, \text{SOFAR 125KTLX-G4-A}} / P_{n, \text{unit-not-tested}}$.

(The transferred results are below the required limit values according to BS EN 61000-3-12.)

Power Generating Module tested to IEC 61000-4-30 and IEC 61000-4-7 for EREC G5 assessment

Current Harmonics

Harmonics													
P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
Order	I _h [%I _n]												
2	0.059	0.034	0.085	0.066	0.062	0.061	0.071	0.084	0.104	0.109	0.119	0.119	---
3	0.212	0.184	0.163	0.147	0.143	0.139	0.137	0.126	0.103	0.128	0.219	0.219	---
4	0.101	0.058	0.091	0.055	0.046	0.029	0.030	0.037	0.042	0.043	0.047	0.101	---
5	0.464	0.237	0.161	0.227	0.245	0.261	0.311	0.392	0.359	0.394	0.331	0.464	---
6	0.061	0.022	0.034	0.038	0.036	0.017	0.020	0.025	0.030	0.033	0.035	0.061	---
7	0.400	0.185	0.062	0.121	0.130	0.128	0.093	0.151	0.124	0.188	0.338	0.400	---
8	0.116	0.038	0.094	0.058	0.055	0.021	0.017	0.022	0.028	0.025	0.030	0.116	---
9	0.055	0.068	0.051	0.056	0.071	0.042	0.042	0.043	0.052	0.047	0.083	0.083	---
10	0.092	0.038	0.032	0.030	0.026	0.016	0.017	0.021	0.025	0.026	0.030	0.092	---
11	0.430	0.090	0.082	0.055	0.057	0.060	0.106	0.203	0.186	0.239	0.391	0.430	---
12	0.067	0.022	0.028	0.033	0.027	0.013	0.016	0.021	0.025	0.022	0.027	0.067	---
13	0.366	0.101	0.045	0.036	0.051	0.048	0.091	0.191	0.164	0.181	0.223	0.366	---
14	0.099	0.052	0.076	0.049	0.040	0.017	0.014	0.015	0.023	0.024	0.031	0.099	---
15	0.048	0.050	0.031	0.035	0.051	0.021	0.026	0.032	0.029	0.068	0.044	0.068	---
16	0.090	0.024	0.055	0.034	0.029	0.015	0.015	0.019	0.025	0.026	0.024	0.090	---
17	0.263	0.092	0.036	0.070	0.060	0.109	0.185	0.249	0.172	0.173	0.235	0.263	---
18	0.065	0.019	0.028	0.037	0.024	0.012	0.015	0.019	0.024	0.024	0.025	0.065	---
19	0.264	0.068	0.035	0.048	0.044	0.059	0.101	0.174	0.138	0.142	0.100	0.264	---
20	0.078	0.033	0.042	0.030	0.025	0.013	0.014	0.015	0.026	0.034	0.035	0.078	---
21	0.042	0.043	0.031	0.041	0.051	0.020	0.021	0.025	0.028	0.045	0.051	0.051	---
22	0.104	0.022	0.032	0.030	0.022	0.015	0.016	0.018	0.026	0.025	0.022	0.104	---
23	0.223	0.189	0.092	0.082	0.069	0.159	0.219	0.224	0.186	0.251	0.353	0.353	---
24	0.053	0.018	0.044	0.046	0.020	0.014	0.016	0.019	0.025	0.028	0.028	0.053	---
25	0.182	0.185	0.102	0.060	0.034	0.058	0.114	0.132	0.118	0.149	0.187	0.187	---
26	0.092	0.021	0.027	0.025	0.017	0.016	0.019	0.022	0.026	0.024	0.026	0.092	---
27	0.035	0.054	0.029	0.039	0.070	0.021	0.022	0.025	0.031	0.037	0.054	0.070	---
28	0.058	0.021	0.023	0.029	0.016	0.011	0.012	0.014	0.023	0.022	0.022	0.058	---
29	0.147	0.083	0.132	0.081	0.086	0.107	0.130	0.082	0.112	0.206	0.202	0.206	---
30	0.042	0.018	0.042	0.043	0.014	0.016	0.021	0.019	0.025	0.029	0.030	0.043	---
31	0.108	0.074	0.073	0.044	0.033	0.119	0.160	0.138	0.132	0.181	0.205	0.205	---
32	0.079	0.017	0.030	0.029	0.014	0.017	0.021	0.026	0.028	0.026	0.027	0.079	---
33	0.027	0.053	0.027	0.031	0.068	0.029	0.034	0.029	0.035	0.044	0.044	0.068	---
34	0.052	0.016	0.036	0.028	0.012	0.012	0.013	0.016	0.022	0.021	0.029	0.052	---
35	0.087	0.079	0.057	0.048	0.071	0.032	0.058	0.119	0.103	0.098	0.091	0.119	---
36	0.032	0.018	0.028	0.028	0.012	0.016	0.022	0.022	0.027	0.028	0.021	0.032	---
37	0.077	0.102	0.056	0.063	0.057	0.124	0.142	0.106	0.098	0.147	0.190	0.190	---
38	0.049	0.017	0.025	0.025	0.013	0.015	0.016	0.018	0.026	0.029	0.032	0.049	---
39	0.024	0.034	0.030	0.028	0.042	0.020	0.025	0.024	0.031	0.038	0.045	0.045	---
40	0.046	0.020	0.034	0.025	0.010	0.013	0.016	0.017	0.022	0.024	0.027	0.046	---

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P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
Order	I _h [%I _N]												
41	0.069	0.050	0.052	0.027	0.030	0.074	0.118	0.161	0.158	0.144	0.134	0.161	---
42	0.026	0.018	0.025	0.025	0.014	0.014	0.016	0.019	0.025	0.024	0.020	0.026	---
43	0.057	0.042	0.065	0.066	0.066	0.068	0.061	0.036	0.059	0.089	0.080	0.089	---
44	0.042	0.017	0.031	0.018	0.011	0.012	0.012	0.015	0.026	0.028	0.032	0.042	---
45	0.020	0.037	0.021	0.019	0.024	0.014	0.020	0.019	0.024	0.028	0.032	0.037	---
46	0.047	0.020	0.028	0.022	0.009	0.010	0.011	0.011	0.018	0.021	0.025	0.047	---
47	0.060	0.055	0.031	0.025	0.025	0.090	0.128	0.137	0.134	0.140	0.149	0.149	---
48	0.021	0.021	0.017	0.029	0.010	0.007	0.012	0.016	0.021	0.024	0.025	0.029	---
49	0.057	0.061	0.023	0.042	0.049	0.022	0.032	0.066	0.075	0.077	0.096	0.096	---
50	0.044	0.018	0.027	0.019	0.009	0.010	0.011	0.015	0.019	0.017	0.018	0.044	---
51	0.018	0.035	0.018	0.014	0.019	0.011	0.018	0.020	0.021	0.023	0.023	0.035	---
52	0.038	0.019	0.015	0.015	0.010	0.009	0.008	0.009	0.014	0.016	0.018	0.038	---
53	0.042	0.055	0.033	0.028	0.032	0.075	0.091	0.076	0.084	0.104	0.118	0.118	---
54	0.018	0.024	0.014	0.024	0.010	0.008	0.011	0.013	0.017	0.022	0.025	0.025	---
55	0.043	0.052	0.023	0.028	0.046	0.039	0.073	0.085	0.069	0.088	0.123	0.123	---
56	0.041	0.021	0.018	0.021	0.009	0.008	0.009	0.012	0.017	0.016	0.013	0.041	---
57	0.018	0.027	0.015	0.014	0.019	0.013	0.015	0.016	0.022	0.024	0.017	0.027	---
58	0.031	0.020	0.014	0.015	0.008	0.008	0.008	0.009	0.014	0.013	0.013	0.031	---
59	0.032	0.046	0.025	0.024	0.030	0.050	0.045	0.031	0.054	0.068	0.070	0.070	---
60	0.020	0.028	0.021	0.021	0.016	0.015	0.015	0.017	0.018	0.043	0.044	0.044	---
61	0.037	0.028	0.019	0.026	0.041	0.040	0.061	0.054	0.047	0.074	0.102	0.102	---
62	0.031	0.017	0.012	0.021	0.009	0.007	0.008	0.009	0.013	0.016	0.014	0.031	---
63	0.016	0.021	0.018	0.013	0.016	0.010	0.013	0.014	0.018	0.020	0.019	0.021	---
64	0.023	0.019	0.019	0.015	0.008	0.009	0.008	0.009	0.013	0.013	0.011	0.023	---
65	0.035	0.024	0.020	0.020	0.027	0.030	0.022	0.027	0.041	0.042	0.046	0.046	---
66	0.013	0.021	0.012	0.021	0.010	0.008	0.011	0.012	0.015	0.017	0.016	0.021	---
67	0.030	0.020	0.016	0.023	0.035	0.057	0.079	0.056	0.036	0.045	0.061	0.079	---
68	0.022	0.011	0.013	0.017	0.010	0.010	0.012	0.013	0.014	0.016	0.015	0.022	---
69	0.013	0.015	0.015	0.013	0.027	0.012	0.017	0.020	0.023	0.020	0.023	0.027	---
70	0.023	0.014	0.016	0.016	0.009	0.009	0.012	0.013	0.018	0.016	0.014	0.023	---
71	0.030	0.018	0.012	0.011	0.020	0.031	0.072	0.071	0.055	0.047	0.058	0.072	---
72	0.015	0.014	0.014	0.018	0.009	0.007	0.009	0.016	0.022	0.023	0.018	0.023	---
73	0.032	0.020	0.012	0.018	0.024	0.045	0.047	0.050	0.075	0.132	0.127	0.132	---
74	0.021	0.011	0.014	0.012	0.009	0.008	0.008	0.010	0.020	0.021	0.019	0.021	---
75	0.014	0.013	0.013	0.010	0.018	0.009	0.014	0.016	0.027	0.038	0.037	0.038	---
76	0.022	0.012	0.012	0.014	0.008	0.007	0.008	0.011	0.022	0.023	0.022	0.023	---
77	0.035	0.022	0.015	0.013	0.015	0.035	0.062	0.076	0.089	0.147	0.135	0.147	---
78	0.012	0.012	0.012	0.017	0.009	0.006	0.007	0.010	0.017	0.021	0.023	0.023	---
79	0.029	0.023	0.013	0.014	0.019	0.026	0.020	0.033	0.049	0.066	0.123	0.123	---
80	0.020	0.013	0.013	0.010	0.008	0.006	0.006	0.008	0.013	0.015	0.021	0.021	---
81	0.013	0.013	0.013	0.009	0.012	0.009	0.011	0.013	0.015	0.025	0.044	0.044	---
82	0.020	0.010	0.011	0.010	0.008	0.007	0.007	0.007	0.015	0.014	0.019	0.020	---
83	0.022	0.019	0.016	0.014	0.014	0.036	0.045	0.041	0.053	0.076	0.130	0.130	---
84	0.011	0.012	0.010	0.015	0.009	0.006	0.008	0.009	0.013	0.013	0.013	0.015	---
85	0.019	0.021	0.012	0.015	0.019	0.021	0.039	0.048	0.044	0.043	0.028	0.048	---
86	0.019	0.012	0.010	0.010	0.007	0.006	0.007	0.009	0.011	0.011	0.010	0.019	---
87	0.011	0.014	0.011	0.010	0.010	0.010	0.010	0.014	0.014	0.017	0.022	0.022	---
88	0.018	0.009	0.013	0.010	0.008	0.007	0.006	0.008	0.017	0.011	0.013	0.018	---

Annex to the Verification No.: **221129BWA146-EG-UK-C001**

P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
Order	I _h [%I _n]												
89	0.023	0.020	0.017	0.013	0.014	0.029	0.028	0.028	0.044	0.054	0.074	0.074	---
90	0.012	0.012	0.009	0.011	0.008	0.007	0.008	0.009	0.016	0.013	0.013	0.016	---
91	0.021	0.018	0.011	0.017	0.021	0.030	0.051	0.046	0.040	0.048	0.042	0.051	---
92	0.018	0.011	0.010	0.009	0.008	0.007	0.009	0.009	0.014	0.011	0.009	0.018	---
93	0.011	0.013	0.010	0.010	0.012	0.010	0.011	0.012	0.014	0.016	0.017	0.017	---
94	0.023	0.020	0.023	0.021	0.021	0.021	0.020	0.022	0.033	0.015	0.015	0.033	---
95	0.018	0.019	0.013	0.012	0.014	0.021	0.024	0.029	0.036	0.043	0.052	0.052	---
96	0.010	0.013	0.010	0.011	0.008	0.007	0.007	0.008	0.011	0.013	0.013	0.013	---
97	0.016	0.018	0.011	0.015	0.020	0.037	0.045	0.033	0.038	0.046	0.064	0.064	---
98	0.015	0.012	0.012	0.011	0.009	0.007	0.008	0.008	0.011	0.011	0.010	0.015	---
99	0.009	0.012	0.010	0.010	0.013	0.010	0.011	0.011	0.015	0.017	0.018	0.018	---
100	0.014	0.011	0.012	0.010	0.009	0.007	0.007	0.008	0.023	0.010	0.009	0.023	---
THD _i [%I _n]	1.087	0.569	0.443	0.432	0.443	0.507	0.647	0.777	0.715	0.863	1.041	1.087	---
Interharmonics													
P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
f [Hz]	I _h [%I _n]												
75	0.085	0.068	0.109	0.171	0.199	0.203	0.237	0.272	0.318	0.357	0.401	0.401	---
125	0.054	0.146	0.281	0.354	0.331	0.089	0.072	0.083	0.101	0.110	0.123	0.354	---
175	0.065	0.166	0.158	0.158	0.098	0.047	0.049	0.056	0.068	0.074	0.084	0.166	---
225	0.175	0.282	0.308	0.334	0.364	0.081	0.057	0.060	0.066	0.066	0.073	0.364	---
275	0.175	0.082	0.143	0.135	0.189	0.050	0.053	0.055	0.059	0.060	0.058	0.189	---
325	0.158	0.077	0.147	0.112	0.126	0.038	0.037	0.043	0.047	0.054	0.062	0.158	---
375	0.146	0.094	0.117	0.160	0.239	0.066	0.033	0.034	0.034	0.029	0.030	0.239	---
425	0.063	0.208	0.335	0.359	0.455	0.081	0.029	0.032	0.034	0.034	0.035	0.455	---
475	0.061	0.135	0.094	0.071	0.097	0.035	0.025	0.026	0.032	0.029	0.032	0.135	---
525	0.159	0.128	0.073	0.115	0.131	0.047	0.027	0.029	0.032	0.028	0.035	0.159	---
575	0.151	0.062	0.131	0.118	0.154	0.028	0.025	0.027	0.032	0.029	0.028	0.154	---
625	0.154	0.077	0.046	0.038	0.053	0.027	0.024	0.030	0.031	0.024	0.028	0.154	---
675	0.137	0.218	0.194	0.188	0.200	0.049	0.024	0.029	0.032	0.028	0.029	0.218	---
725	0.061	0.216	0.226	0.286	0.316	0.061	0.019	0.019	0.026	0.021	0.023	0.316	---
775	0.053	0.072	0.137	0.162	0.168	0.039	0.018	0.020	0.027	0.020	0.022	0.168	---
825	0.120	0.121	0.163	0.163	0.176	0.045	0.022	0.023	0.026	0.021	0.021	0.176	---
875	0.108	0.090	0.109	0.111	0.116	0.022	0.021	0.024	0.027	0.021	0.021	0.116	---
925	0.117	0.095	0.118	0.099	0.080	0.019	0.031	0.020	0.027	0.025	0.025	0.118	---
975	0.105	0.144	0.156	0.164	0.141	0.036	0.017	0.031	0.040	0.033	0.038	0.164	---
1025	0.046	0.119	0.113	0.129	0.145	0.037	0.014	0.016	0.023	0.018	0.020	0.145	---
1075	0.040	0.065	0.093	0.098	0.114	0.039	0.013	0.017	0.023	0.018	0.020	0.114	---
1125	0.074	0.093	0.099	0.140	0.139	0.041	0.017	0.017	0.022	0.019	0.022	0.140	---
1175	0.070	0.075	0.076	0.087	0.086	0.018	0.016	0.017	0.022	0.019	0.023	0.087	---
1225	0.070	0.087	0.102	0.094	0.087	0.016	0.013	0.016	0.023	0.023	0.023	0.102	---
1275	0.065	0.096	0.094	0.092	0.085	0.026	0.013	0.016	0.024	0.022	0.022	0.096	---
1325	0.037	0.055	0.048	0.058	0.051	0.023	0.011	0.014	0.017	0.014	0.016	0.058	---
1375	0.029	0.038	0.051	0.052	0.043	0.031	0.011	0.014	0.017	0.014	0.016	0.052	---
1425	0.054	0.060	0.073	0.078	0.079	0.034	0.012	0.014	0.018	0.019	0.022	0.079	---
1475	0.050	0.064	0.055	0.058	0.056	0.014	0.012	0.012	0.020	0.020	0.023	0.064	---

Annex to the Verification No.: **221129BWA146-EG-UK-C001**

P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
f [Hz]	I _h [%I _N]												
1525	0.049	0.050	0.047	0.049	0.050	0.016	0.012	0.015	0.018	0.018	0.019	0.050	---
1575	0.049	0.067	0.052	0.055	0.054	0.025	0.012	0.015	0.019	0.018	0.019	0.067	---
1625	0.030	0.042	0.049	0.054	0.053	0.022	0.010	0.011	0.014	0.012	0.014	0.054	---
1675	0.026	0.030	0.038	0.048	0.036	0.022	0.009	0.011	0.014	0.012	0.014	0.048	---
1725	0.038	0.060	0.050	0.049	0.043	0.023	0.010	0.013	0.016	0.017	0.019	0.060	---
1775	0.037	0.063	0.044	0.036	0.032	0.011	0.010	0.011	0.018	0.018	0.020	0.063	---
1825	0.034	0.033	0.026	0.025	0.028	0.015	0.011	0.012	0.015	0.017	0.016	0.034	---
1875	0.038	0.058	0.055	0.058	0.047	0.024	0.012	0.013	0.016	0.016	0.017	0.058	---
1925	0.023	0.051	0.054	0.051	0.045	0.023	0.009	0.012	0.012	0.011	0.012	0.054	---
1975	0.021	0.041	0.034	0.032	0.028	0.015	0.009	0.010	0.014	0.012	0.013	0.041	---
2025	0.031	0.056	0.033	0.026	0.030	0.015	0.010	0.012	0.015	0.015	0.015	0.056	---
2075	0.030	0.046	0.028	0.031	0.025	0.011	0.009	0.012	0.016	0.016	0.016	0.046	---
2125	0.027	0.040	0.030	0.029	0.038	0.018	0.011	0.013	0.014	0.014	0.015	0.040	---
2175	0.030	0.048	0.033	0.050	0.035	0.021	0.013	0.016	0.018	0.016	0.021	0.050	---
2225	0.021	0.039	0.039	0.038	0.025	0.021	0.009	0.009	0.015	0.017	0.017	0.039	---
2275	0.020	0.043	0.043	0.032	0.026	0.015	0.008	0.010	0.011	0.010	0.012	0.043	---
2325	0.027	0.049	0.034	0.029	0.026	0.017	0.009	0.011	0.013	0.015	0.014	0.049	---
2375	0.026	0.036	0.029	0.029	0.028	0.011	0.009	0.010	0.014	0.015	0.015	0.036	---
2425	0.025	0.041	0.036	0.031	0.036	0.009	0.007	0.010	0.013	0.012	0.015	0.041	---
2475	0.027	0.043	0.023	0.029	0.023	0.016	0.008	0.010	0.014	0.014	0.017	0.043	---
2525	0.021	0.032	0.036	0.029	0.021	0.016	0.007	0.008	0.010	0.010	0.010	0.036	---
2575	0.017	0.037	0.030	0.030	0.031	0.018	0.007	0.007	0.010	0.009	0.010	0.037	---
2625	0.022	0.041	0.032	0.030	0.028	0.021	0.008	0.009	0.012	0.013	0.014	0.041	---
2675	0.020	0.037	0.034	0.031	0.027	0.011	0.008	0.008	0.013	0.014	0.016	0.037	---
2725	0.020	0.032	0.032	0.031	0.027	0.010	0.008	0.010	0.012	0.013	0.015	0.032	---
2775	0.025	0.034	0.026	0.027	0.026	0.013	0.008	0.010	0.012	0.014	0.016	0.034	---
2825	0.018	0.030	0.030	0.030	0.027	0.013	0.007	0.008	0.009	0.009	0.010	0.030	---
2875	0.015	0.032	0.021	0.024	0.026	0.016	0.006	0.007	0.009	0.009	0.010	0.032	---
2925	0.018	0.037	0.027	0.031	0.026	0.018	0.007	0.008	0.012	0.012	0.015	0.037	---
2975	0.017	0.037	0.026	0.027	0.024	0.011	0.008	0.008	0.013	0.019	0.020	0.037	---
3025	0.018	0.029	0.022	0.027	0.021	0.012	0.010	0.011	0.012	0.015	0.016	0.029	---
3075	0.020	0.025	0.024	0.021	0.029	0.014	0.008	0.010	0.012	0.014	0.016	0.029	---
3125	0.015	0.025	0.031	0.027	0.022	0.013	0.006	0.007	0.008	0.009	0.010	0.031	---
3175	0.014	0.032	0.024	0.027	0.019	0.011	0.006	0.007	0.008	0.008	0.009	0.032	---
3225	0.017	0.028	0.027	0.036	0.024	0.018	0.007	0.009	0.011	0.012	0.014	0.036	---
3275	0.016	0.024	0.028	0.025	0.028	0.011	0.007	0.008	0.013	0.013	0.016	0.028	---
3325	0.015	0.030	0.029	0.024	0.025	0.015	0.010	0.011	0.014	0.014	0.014	0.030	---
3375	0.017	0.021	0.021	0.023	0.027	0.023	0.010	0.012	0.015	0.014	0.016	0.027	---
3425	0.013	0.019	0.022	0.025	0.022	0.026	0.009	0.011	0.011	0.011	0.011	0.026	---
3475	0.013	0.029	0.028	0.028	0.026	0.018	0.010	0.011	0.012	0.010	0.010	0.029	---
3525	0.017	0.020	0.022	0.022	0.023	0.020	0.011	0.015	0.017	0.016	0.017	0.023	---
3575	0.015	0.020	0.020	0.017	0.023	0.014	0.011	0.015	0.019	0.016	0.017	0.023	---
3625	0.014	0.024	0.018	0.020	0.021	0.013	0.009	0.014	0.019	0.023	0.026	0.026	---
3675	0.015	0.020	0.017	0.020	0.022	0.020	0.009	0.014	0.020	0.023	0.030	0.030	---
3725	0.013	0.019	0.019	0.020	0.020	0.017	0.008	0.013	0.018	0.018	0.019	0.020	---
3775	0.013	0.023	0.025	0.021	0.020	0.014	0.008	0.011	0.018	0.016	0.017	0.025	---
3825	0.016	0.018	0.021	0.019	0.018	0.016	0.008	0.011	0.018	0.024	0.028	0.028	---
3875	0.014	0.025	0.021	0.017	0.021	0.012	0.008	0.010	0.017	0.024	0.028	0.028	---

Annex to the Verification No.: **221129BWA146-EG-UK-C001**

P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
f [Hz]	I _h [%I _n]												
3925	0.013	0.018	0.018	0.017	0.017	0.010	0.007	0.009	0.014	0.015	0.023	0.023	---
3975	0.014	0.019	0.020	0.021	0.023	0.015	0.007	0.009	0.013	0.014	0.021	0.023	---
4025	0.013	0.022	0.018	0.018	0.020	0.013	0.007	0.009	0.011	0.011	0.017	0.022	---
4075	0.013	0.021	0.020	0.017	0.018	0.014	0.007	0.008	0.011	0.010	0.015	0.021	---
4125	0.015	0.018	0.020	0.020	0.018	0.017	0.007	0.008	0.012	0.011	0.015	0.020	---
4175	0.013	0.024	0.020	0.016	0.018	0.012	0.007	0.008	0.011	0.010	0.013	0.024	---
4225	0.013	0.018	0.018	0.016	0.016	0.011	0.008	0.009	0.011	0.009	0.010	0.018	---
4275	0.014	0.017	0.019	0.020	0.021	0.015	0.007	0.009	0.011	0.010	0.010	0.021	---
4325	0.012	0.019	0.016	0.017	0.019	0.013	0.007	0.008	0.010	0.009	0.009	0.019	---
4375	0.013	0.021	0.022	0.020	0.018	0.013	0.006	0.008	0.011	0.008	0.009	0.022	---
4425	0.014	0.017	0.017	0.019	0.018	0.015	0.007	0.008	0.011	0.010	0.009	0.019	---
4475	0.013	0.018	0.017	0.016	0.015	0.011	0.007	0.008	0.011	0.009	0.009	0.018	---
4525	0.012	0.018	0.019	0.017	0.018	0.012	0.007	0.008	0.011	0.009	0.009	0.019	---
4575	0.014	0.016	0.017	0.017	0.019	0.015	0.007	0.008	0.010	0.009	0.009	0.019	---
4625	0.012	0.017	0.015	0.016	0.017	0.013	0.007	0.008	0.009	0.008	0.008	0.017	---
4675	0.013	0.019	0.023	0.023	0.018	0.014	0.009	0.010	0.013	0.008	0.009	0.023	---
4725	0.013	0.016	0.018	0.018	0.018	0.014	0.008	0.009	0.012	0.009	0.008	0.018	---
4775	0.013	0.017	0.016	0.015	0.015	0.011	0.007	0.008	0.010	0.009	0.008	0.017	---
4825	0.012	0.017	0.017	0.016	0.017	0.011	0.007	0.008	0.010	0.009	0.009	0.017	---
4875	0.013	0.015	0.017	0.017	0.018	0.014	0.007	0.008	0.010	0.009	0.008	0.018	---
4925	0.011	0.016	0.017	0.017	0.016	0.012	0.006	0.007	0.009	0.007	0.008	0.017	---
4975	0.011	0.017	0.020	0.021	0.017	0.013	0.007	0.007	0.011	0.007	0.007	0.021	---

Voltage Harmonics

Harmonics													
P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
Order	V _h [%V _n]												
2	0.012	0.016	0.026	0.025	0.021	0.021	0.019	0.015	0.013	0.029	0.015	0.029	1.600
3	0.048	0.028	0.079	0.133	0.167	0.189	0.204	0.216	0.224	0.231	0.239	0.239	4.000
4	0.017	0.009	0.014	0.022	0.024	0.024	0.023	0.021	0.021	0.031	0.016	0.031	1.000
5	0.076	0.027	0.021	0.076	0.116	0.147	0.173	0.196	0.205	0.216	0.224	0.224	4.000
6	0.016	0.012	0.005	0.009	0.016	0.019	0.020	0.020	0.020	0.021	0.018	0.021	0.500
7	0.068	0.031	0.012	0.031	0.065	0.092	0.107	0.118	0.132	0.141	0.142	0.142	4.000
8	0.027	0.012	0.016	0.008	0.008	0.011	0.013	0.014	0.016	0.029	0.016	0.029	0.400
9	0.043	0.017	0.009	0.012	0.026	0.046	0.065	0.081	0.095	0.103	0.113	0.113	1.200
10	0.026	0.015	0.015	0.010	0.004	0.006	0.010	0.012	0.014	0.027	0.016	0.027	0.400
11	0.104	0.027	0.011	0.020	0.016	0.011	0.027	0.047	0.063	0.081	0.111	0.111	3.000
12	0.019	0.013	0.011	0.012	0.008	0.004	0.005	0.007	0.011	0.015	0.013	0.019	0.200
13	0.099	0.032	0.022	0.039	0.040	0.030	0.022	0.027	0.028	0.036	0.052	0.099	2.500
14	0.028	0.011	0.014	0.013	0.011	0.006	0.004	0.004	0.008	0.024	0.010	0.028	0.200
15	0.028	0.015	0.017	0.024	0.031	0.031	0.027	0.020	0.010	0.025	0.026	0.031	0.500
16	0.027	0.008	0.010	0.008	0.008	0.005	0.003	0.004	0.008	0.022	0.011	0.027	0.200
17	0.077	0.020	0.015	0.014	0.027	0.037	0.043	0.046	0.028	0.021	0.031	0.077	1.600
18	0.021	0.006	0.008	0.009	0.008	0.008	0.007	0.004	0.006	0.012	0.007	0.021	0.200
19	0.089	0.025	0.016	0.020	0.032	0.039	0.034	0.033	0.031	0.030	0.022	0.089	1.500
20	0.027	0.010	0.009	0.007	0.008	0.007	0.006	0.005	0.007	0.021	0.009	0.027	0.200

Annex to the Verification No.: 221129BWA146-EG-UK-C001

P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
Order	V _h [%V _n]												
21	0.017	0.014	0.014	0.019	0.024	0.030	0.030	0.028	0.026	0.024	0.020	0.030	0.200
22	0.034	0.007	0.007	0.006	0.006	0.005	0.005	0.005	0.007	0.017	0.006	0.034	0.200
23	0.074	0.050	0.017	0.014	0.022	0.048	0.061	0.060	0.049	0.060	0.075	0.075	1.200
24	0.021	0.010	0.010	0.010	0.006	0.008	0.009	0.007	0.008	0.013	0.007	0.021	0.200
25	0.068	0.055	0.017	0.008	0.020	0.019	0.012	0.012	0.020	0.022	0.030	0.068	1.000
26	0.035	0.008	0.008	0.007	0.007	0.006	0.007	0.008	0.009	0.019	0.014	0.035	0.200
27	0.014	0.026	0.018	0.017	0.025	0.025	0.027	0.028	0.028	0.028	0.027	0.028	0.200
28	0.022	0.008	0.007	0.007	0.006	0.007	0.005	0.004	0.007	0.015	0.006	0.022	0.200
29	0.052	0.034	0.027	0.015	0.024	0.037	0.043	0.036	0.043	0.058	0.056	0.058	0.862
30	0.017	0.008	0.011	0.011	0.005	0.006	0.006	0.006	0.008	0.013	0.007	0.017	0.200
31	0.044	0.028	0.022	0.016	0.026	0.020	0.026	0.030	0.028	0.023	0.023	0.044	0.806
32	0.031	0.006	0.008	0.008	0.005	0.005	0.005	0.007	0.009	0.016	0.009	0.031	0.200
33	0.021	0.021	0.019	0.020	0.021	0.019	0.024	0.026	0.029	0.026	0.021	0.029	0.200
34	0.023	0.006	0.010	0.008	0.005	0.004	0.003	0.005	0.010	0.014	0.009	0.023	0.200
35	0.041	0.035	0.009	0.008	0.017	0.015	0.020	0.025	0.032	0.031	0.017	0.041	0.714
36	0.015	0.008	0.010	0.009	0.004	0.005	0.006	0.007	0.009	0.014	0.007	0.015	0.200
37	0.037	0.039	0.013	0.014	0.014	0.031	0.039	0.035	0.028	0.035	0.039	0.039	0.676
38	0.020	0.007	0.007	0.008	0.005	0.007	0.006	0.006	0.009	0.015	0.010	0.020	0.200
39	0.015	0.014	0.012	0.012	0.016	0.018	0.019	0.018	0.019	0.017	0.016	0.019	0.200
40	0.020	0.008	0.011	0.008	0.005	0.005	0.005	0.006	0.009	0.013	0.009	0.020	0.200
41	0.030	0.021	0.018	0.012	0.015	0.027	0.038	0.045	0.040	0.033	0.027	0.045	0.610
42	0.013	0.008	0.026	0.009	0.016	0.014	0.006	0.006	0.011	0.015	0.008	0.026	0.200
43	0.025	0.020	0.022	0.021	0.017	0.025	0.034	0.028	0.020	0.028	0.026	0.034	0.581
44	0.018	0.012	0.011	0.007	0.006	0.006	0.005	0.006	0.025	0.027	0.021	0.027	0.200
45	0.011	0.019	0.016	0.008	0.011	0.015	0.018	0.019	0.017	0.014	0.015	0.019	0.200
46	0.021	0.008	0.009	0.007	0.004	0.004	0.004	0.004	0.010	0.013	0.011	0.021	0.200
47	0.027	0.023	0.012	0.011	0.012	0.029	0.041	0.042	0.037	0.036	0.035	0.042	0.532
48	0.015	0.009	0.006	0.009	0.006	0.005	0.005	0.006	0.009	0.022	0.009	0.022	0.200
49	0.028	0.023	0.018	0.019	0.022	0.018	0.012	0.015	0.019	0.022	0.026	0.028	0.510
50	0.020	0.008	0.010	0.008	0.006	0.006	0.005	0.005	0.008	0.018	0.007	0.020	0.200
51	0.011	0.022	0.015	0.010	0.011	0.014	0.016	0.013	0.013	0.011	0.009	0.022	0.200
52	0.019	0.008	0.007	0.008	0.007	0.008	0.007	0.004	0.007	0.013	0.007	0.019	0.200
53	0.029	0.022	0.010	0.013	0.018	0.025	0.031	0.030	0.029	0.036	0.041	0.041	0.472
54	0.016	0.011	0.006	0.011	0.013	0.011	0.007	0.005	0.009	0.027	0.009	0.027	0.200
55	0.028	0.026	0.010	0.014	0.016	0.014	0.016	0.021	0.021	0.025	0.033	0.033	0.455
56	0.019	0.011	0.009	0.013	0.011	0.009	0.007	0.005	0.008	0.021	0.007	0.021	0.200
57	0.013	0.017	0.014	0.014	0.014	0.013	0.013	0.012	0.011	0.012	0.010	0.017	0.200
58	0.018	0.008	0.009	0.009	0.006	0.004	0.004	0.004	0.007	0.014	0.008	0.018	0.200
59	0.038	0.041	0.034	0.036	0.040	0.046	0.045	0.042	0.045	0.057	0.062	0.062	0.424
60	0.018	0.016	0.016	0.015	0.014	0.013	0.014	0.013	0.021	0.102	0.094	0.102	0.200
61	0.019	0.014	0.010	0.009	0.017	0.022	0.031	0.021	0.015	0.024	0.031	0.031	0.410
62	0.016	0.012	0.007	0.009	0.005	0.005	0.004	0.004	0.007	0.026	0.009	0.026	0.200
63	0.014	0.014	0.014	0.009	0.008	0.008	0.009	0.009	0.011	0.012	0.012	0.014	0.200
64	0.012	0.013	0.009	0.007	0.005	0.005	0.004	0.004	0.007	0.016	0.008	0.016	0.200
65	0.021	0.016	0.013	0.008	0.011	0.013	0.011	0.013	0.019	0.017	0.016	0.021	0.385
66	0.014	0.011	0.007	0.009	0.006	0.004	0.005	0.005	0.008	0.032	0.010	0.032	0.200
67	0.020	0.010	0.010	0.008	0.011	0.017	0.025	0.020	0.016	0.018	0.027	0.027	0.373
68	0.013	0.007	0.007	0.009	0.006	0.006	0.006	0.005	0.008	0.028	0.007	0.028	0.200

Annex to the Verification No.: **221129BWA146-EG-UK-C001**

P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
Order	V _h [%V _n]												
69	0.013	0.015	0.010	0.008	0.012	0.008	0.009	0.009	0.012	0.012	0.013	0.015	0.200
70	0.013	0.007	0.008	0.007	0.005	0.004	0.004	0.005	0.009	0.014	0.007	0.014	0.200
71	0.014	0.010	0.009	0.007	0.010	0.011	0.025	0.024	0.021	0.018	0.024	0.025	0.352
72	0.010	0.007	0.007	0.008	0.004	0.004	0.004	0.006	0.009	0.016	0.008	0.016	0.200
73	0.013	0.013	0.011	0.007	0.010	0.021	0.023	0.019	0.028	0.050	0.045	0.050	0.342
74	0.013	0.007	0.007	0.006	0.005	0.004	0.004	0.004	0.009	0.029	0.009	0.029	0.200
75	0.019	0.014	0.009	0.006	0.009	0.007	0.008	0.009	0.013	0.017	0.015	0.019	0.200
76	0.012	0.007	0.007	0.006	0.004	0.003	0.004	0.005	0.010	0.013	0.010	0.013	0.200
77	0.022	0.010	0.009	0.006	0.007	0.015	0.027	0.032	0.034	0.055	0.048	0.055	0.325
78	0.013	0.008	0.006	0.008	0.005	0.004	0.004	0.005	0.008	0.011	0.009	0.013	0.200
79	0.021	0.010	0.008	0.006	0.008	0.012	0.009	0.012	0.019	0.026	0.045	0.045	0.316
80	0.011	0.008	0.007	0.006	0.005	0.004	0.004	0.004	0.008	0.026	0.010	0.026	0.200
81	0.010	0.010	0.007	0.006	0.007	0.007	0.007	0.007	0.010	0.014	0.024	0.024	0.200
82	0.011	0.007	0.006	0.005	0.004	0.004	0.004	0.004	0.008	0.010	0.010	0.011	0.200
83	0.016	0.010	0.008	0.008	0.008	0.017	0.022	0.019	0.024	0.033	0.057	0.057	0.301
84	0.008	0.007	0.006	0.008	0.006	0.004	0.005	0.005	0.008	0.012	0.007	0.012	0.200
85	0.010	0.010	0.007	0.007	0.009	0.009	0.016	0.020	0.019	0.018	0.016	0.020	0.294
86	0.012	0.007	0.006	0.006	0.005	0.004	0.004	0.005	0.007	0.023	0.008	0.023	0.200
87	0.008	0.008	0.007	0.006	0.006	0.006	0.007	0.008	0.009	0.011	0.013	0.013	0.200
88	0.011	0.006	0.007	0.006	0.005	0.004	0.004	0.005	0.010	0.009	0.009	0.011	0.200
89	0.014	0.012	0.010	0.008	0.008	0.015	0.014	0.013	0.021	0.024	0.033	0.033	0.281
90	0.009	0.007	0.006	0.007	0.005	0.005	0.005	0.005	0.009	0.015	0.009	0.015	0.200
91	0.013	0.011	0.006	0.008	0.011	0.014	0.024	0.022	0.020	0.021	0.012	0.024	0.275
92	0.012	0.007	0.007	0.006	0.005	0.005	0.005	0.006	0.009	0.018	0.007	0.018	0.200
93	0.008	0.008	0.007	0.007	0.007	0.007	0.007	0.008	0.010	0.011	0.010	0.011	0.200
94	0.014	0.012	0.013	0.012	0.012	0.011	0.011	0.011	0.016	0.010	0.010	0.016	0.200
95	0.012	0.012	0.009	0.008	0.008	0.012	0.012	0.015	0.019	0.020	0.022	0.022	0.263
96	0.008	0.008	0.007	0.007	0.005	0.005	0.005	0.005	0.008	0.015	0.009	0.015	0.200
97	0.011	0.013	0.007	0.008	0.011	0.020	0.026	0.020	0.021	0.024	0.027	0.027	0.258
98	0.010	0.008	0.008	0.007	0.005	0.005	0.005	0.005	0.009	0.014	0.008	0.014	0.200
99	0.007	0.009	0.007	0.007	0.008	0.007	0.008	0.009	0.011	0.012	0.010	0.012	0.200
100	0.009	0.007	0.008	0.006	0.006	0.005	0.005	0.005	0.014	0.010	0.009	0.014	0.200
THD _V [%V _n]	0.311	0.175	0.147	0.197	0.254	0.306	0.348	0.374	0.395	0.451	0.460	0.460	5.000
Interharmonics													
P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
f [Hz]	V _h [%V _n]												
75	0.020	0.020	0.021	0.021	0.021	0.021	0.026	0.020	0.022	0.023	0.021	0.026	0.360
125	0.008	0.009	0.012	0.014	0.013	0.007	0.009	0.007	0.010	0.010	0.009	0.014	0.360
175	0.009	0.015	0.012	0.012	0.008	0.006	0.006	0.006	0.009	0.009	0.007	0.015	0.360
225	0.026	0.027	0.022	0.020	0.020	0.006	0.005	0.004	0.008	0.009	0.006	0.027	0.360
275	0.028	0.011	0.015	0.013	0.016	0.005	0.005	0.005	0.009	0.010	0.008	0.028	0.360
325	0.030	0.011	0.016	0.013	0.012	0.004	0.004	0.004	0.008	0.009	0.006	0.030	0.360
375	0.029	0.014	0.015	0.020	0.025	0.007	0.005	0.005	0.008	0.010	0.006	0.029	0.360
425	0.015	0.033	0.044	0.044	0.051	0.009	0.005	0.005	0.008	0.008	0.007	0.051	0.360
475	0.015	0.024	0.016	0.012	0.010	0.005	0.005	0.005	0.009	0.009	0.007	0.024	0.360

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P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
Order	V _h [%V _n]												
525	0.041	0.023	0.010	0.017	0.013	0.006	0.005	0.004	0.008	0.009	0.008	0.041	0.360
575	0.041	0.013	0.021	0.018	0.021	0.005	0.005	0.005	0.008	0.009	0.008	0.041	0.360
625	0.044	0.016	0.010	0.012	0.011	0.005	0.005	0.005	0.008	0.008	0.005	0.044	0.360
675	0.040	0.046	0.033	0.028	0.028	0.008	0.005	0.005	0.008	0.010	0.007	0.046	0.360
725	0.019	0.047	0.038	0.047	0.048	0.009	0.004	0.004	0.008	0.008	0.006	0.048	0.360
775	0.016	0.014	0.023	0.025	0.024	0.006	0.004	0.004	0.008	0.008	0.005	0.025	0.360
825	0.036	0.026	0.026	0.022	0.022	0.007	0.005	0.005	0.008	0.008	0.006	0.036	0.360
875	0.034	0.021	0.019	0.020	0.020	0.005	0.005	0.005	0.008	0.008	0.007	0.034	0.360
925	0.039	0.022	0.022	0.018	0.015	0.005	0.006	0.005	0.008	0.008	0.006	0.039	0.360
975	0.036	0.034	0.030	0.030	0.023	0.006	0.005	0.006	0.009	0.010	0.007	0.036	0.360
1025	0.016	0.029	0.021	0.022	0.026	0.007	0.004	0.004	0.008	0.008	0.005	0.029	0.360
1075	0.014	0.017	0.020	0.019	0.021	0.008	0.004	0.004	0.008	0.008	0.005	0.021	0.360
1125	0.024	0.023	0.020	0.027	0.024	0.008	0.005	0.005	0.008	0.008	0.006	0.027	0.360
1175	0.025	0.020	0.015	0.016	0.016	0.005	0.005	0.005	0.008	0.007	0.006	0.025	0.360
1225	0.026	0.022	0.024	0.021	0.019	0.004	0.004	0.004	0.008	0.008	0.006	0.026	0.360
1275	0.025	0.026	0.022	0.019	0.017	0.006	0.004	0.005	0.009	0.010	0.007	0.026	0.360
1325	0.014	0.015	0.011	0.011	0.011	0.005	0.004	0.004	0.007	0.008	0.007	0.015	0.360
1375	0.011	0.011	0.013	0.012	0.009	0.007	0.004	0.004	0.008	0.008	0.005	0.013	0.360
1425	0.019	0.017	0.018	0.018	0.017	0.008	0.004	0.004	0.008	0.007	0.006	0.019	0.360
1475	0.019	0.018	0.013	0.013	0.012	0.004	0.004	0.004	0.008	0.008	0.007	0.019	0.360
1525	0.019	0.014	0.013	0.013	0.013	0.005	0.004	0.004	0.008	0.008	0.005	0.019	0.360
1575	0.019	0.019	0.014	0.013	0.013	0.006	0.004	0.005	0.009	0.008	0.006	0.019	0.360
1625	0.012	0.013	0.013	0.014	0.014	0.006	0.003	0.004	0.008	0.007	0.005	0.014	0.360
1675	0.011	0.009	0.011	0.014	0.009	0.006	0.004	0.004	0.008	0.007	0.005	0.014	0.360
1725	0.015	0.018	0.014	0.014	0.011	0.007	0.004	0.004	0.008	0.007	0.006	0.018	0.360
1775	0.015	0.019	0.013	0.010	0.009	0.004	0.004	0.004	0.008	0.008	0.006	0.019	0.360
1825	0.014	0.010	0.008	0.008	0.008	0.005	0.004	0.004	0.008	0.008	0.005	0.014	0.360
1875	0.016	0.018	0.015	0.016	0.013	0.007	0.004	0.005	0.008	0.008	0.006	0.018	0.360
1925	0.010	0.016	0.015	0.014	0.013	0.007	0.004	0.004	0.008	0.007	0.005	0.016	0.360
1975	0.009	0.013	0.011	0.012	0.008	0.005	0.004	0.004	0.008	0.008	0.006	0.013	0.360
2025	0.013	0.018	0.011	0.009	0.010	0.008	0.005	0.005	0.008	0.008	0.006	0.018	0.360
2075	0.013	0.016	0.010	0.034	0.008	0.006	0.006	0.007	0.009	0.008	0.007	0.034	0.360
2125	0.012	0.014	0.016	0.009	0.028	0.027	0.011	0.012	0.009	0.009	0.007	0.028	0.360
2175	0.013	0.020	0.010	0.017	0.011	0.007	0.017	0.019	0.013	0.009	0.013	0.020	0.360
2225	0.010	0.022	0.012	0.012	0.010	0.009	0.005	0.006	0.018	0.020	0.016	0.022	0.360
2275	0.011	0.016	0.014	0.010	0.008	0.005	0.005	0.006	0.009	0.008	0.007	0.016	0.360
2325	0.015	0.018	0.011	0.010	0.009	0.006	0.004	0.004	0.009	0.009	0.008	0.018	0.360
2375	0.016	0.013	0.009	0.010	0.009	0.004	0.004	0.005	0.008	0.009	0.006	0.016	0.360
2425	0.015	0.015	0.012	0.010	0.012	0.004	0.004	0.004	0.009	0.008	0.006	0.015	0.360
2475	0.014	0.015	0.008	0.011	0.009	0.005	0.004	0.004	0.009	0.009	0.007	0.015	0.360
2525	0.010	0.012	0.013	0.010	0.008	0.005	0.004	0.004	0.008	0.008	0.005	0.013	0.220
2575	0.009	0.014	0.011	0.011	0.010	0.006	0.004	0.004	0.008	0.009	0.005	0.014	0.220
2625	0.011	0.016	0.012	0.010	0.010	0.008	0.004	0.004	0.008	0.009	0.006	0.016	0.220
2675	0.010	0.014	0.012	0.011	0.010	0.005	0.004	0.004	0.009	0.011	0.007	0.014	0.220
2725	0.009	0.012	0.012	0.011	0.009	0.004	0.004	0.005	0.008	0.009	0.007	0.012	0.220
2775	0.012	0.013	0.010	0.011	0.010	0.005	0.004	0.005	0.009	0.010	0.008	0.013	0.220
2825	0.009	0.012	0.012	0.012	0.010	0.005	0.004	0.005	0.008	0.009	0.006	0.012	0.220
2875	0.008	0.013	0.008	0.010	0.010	0.007	0.004	0.004	0.008	0.010	0.007	0.013	0.220

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P [%P _{max}]	0 - 5	10	20	30	40	50	60	70	80	90	100	Max.	Limit
Order	V _h [%V _n]												
2925	0.017	0.021	0.019	0.020	0.019	0.018	0.016	0.018	0.021	0.025	0.027	0.027	0.220
2975	0.011	0.016	0.012	0.013	0.012	0.009	0.009	0.009	0.013	0.037	0.033	0.037	0.220
3025	0.009	0.012	0.009	0.011	0.009	0.007	0.009	0.008	0.010	0.016	0.015	0.016	0.220
3075	0.010	0.011	0.010	0.009	0.011	0.006	0.005	0.005	0.009	0.012	0.009	0.012	0.220
3125	0.008	0.011	0.013	0.011	0.009	0.006	0.004	0.004	0.008	0.011	0.006	0.013	0.220
3175	0.008	0.014	0.010	0.011	0.008	0.006	0.004	0.004	0.008	0.010	0.006	0.014	0.220
3225	0.010	0.012	0.012	0.015	0.009	0.008	0.005	0.005	0.009	0.010	0.008	0.015	0.220
3275	0.009	0.011	0.012	0.011	0.012	0.005	0.004	0.005	0.009	0.014	0.007	0.014	0.220
3325	0.008	0.013	0.012	0.010	0.010	0.007	0.005	0.006	0.009	0.010	0.007	0.013	0.220
3375	0.009	0.009	0.009	0.009	0.011	0.009	0.005	0.006	0.010	0.011	0.008	0.011	0.220
3425	0.008	0.009	0.010	0.011	0.009	0.010	0.005	0.005	0.008	0.012	0.006	0.012	0.220
3475	0.008	0.013	0.012	0.012	0.011	0.008	0.005	0.005	0.009	0.009	0.006	0.013	0.220
3525	0.009	0.009	0.010	0.011	0.010	0.009	0.005	0.007	0.010	0.011	0.008	0.011	0.220
3575	0.009	0.009	0.010	0.008	0.011	0.006	0.005	0.007	0.010	0.010	0.008	0.011	0.220
3625	0.007	0.011	0.009	0.010	0.010	0.006	0.005	0.006	0.010	0.011	0.011	0.011	0.220
3675	0.009	0.009	0.009	0.009	0.011	0.009	0.005	0.006	0.010	0.013	0.013	0.013	0.220
3725	0.008	0.010	0.009	0.010	0.009	0.008	0.004	0.006	0.010	0.013	0.009	0.013	0.220
3775	0.008	0.011	0.013	0.010	0.010	0.007	0.005	0.006	0.009	0.010	0.009	0.013	0.220
3825	0.009	0.009	0.010	0.009	0.009	0.008	0.005	0.006	0.010	0.013	0.012	0.013	0.220
3875	0.009	0.013	0.011	0.008	0.010	0.006	0.005	0.006	0.010	0.012	0.011	0.013	0.220
3925	0.008	0.009	0.010	0.009	0.009	0.006	0.004	0.005	0.009	0.010	0.010	0.010	0.220
3975	0.009	0.010	0.011	0.011	0.012	0.008	0.005	0.006	0.009	0.011	0.010	0.012	0.220
4025	0.008	0.011	0.010	0.009	0.010	0.007	0.004	0.005	0.009	0.012	0.008	0.012	0.220
4075	0.008	0.011	0.011	0.010	0.009	0.008	0.005	0.006	0.009	0.008	0.008	0.011	0.220
4125	0.009	0.010	0.010	0.010	0.009	0.009	0.005	0.005	0.009	0.011	0.008	0.011	0.220
4175	0.008	0.013	0.011	0.009	0.010	0.007	0.006	0.006	0.009	0.008	0.007	0.013	0.220
4225	0.008	0.010	0.010	0.009	0.009	0.006	0.005	0.006	0.009	0.009	0.006	0.010	0.220
4275	0.009	0.009	0.011	0.011	0.012	0.008	0.006	0.006	0.010	0.011	0.007	0.012	0.220
4325	0.008	0.011	0.009	0.010	0.010	0.007	0.005	0.006	0.009	0.011	0.006	0.011	0.220
4375	0.008	0.012	0.012	0.011	0.010	0.008	0.005	0.005	0.009	0.008	0.006	0.012	0.220
4425	0.009	0.010	0.010	0.010	0.010	0.008	0.005	0.006	0.010	0.010	0.007	0.010	0.220
4475	0.009	0.011	0.010	0.009	0.009	0.007	0.005	0.006	0.009	0.008	0.006	0.011	0.220
4525	0.008	0.011	0.012	0.010	0.010	0.007	0.005	0.005	0.009	0.009	0.007	0.012	0.220
4575	0.009	0.009	0.010	0.010	0.011	0.008	0.005	0.006	0.009	0.010	0.007	0.011	0.220
4625	0.008	0.010	0.009	0.010	0.010	0.007	0.005	0.005	0.009	0.010	0.005	0.010	0.220
4675	0.008	0.012	0.013	0.013	0.010	0.008	0.006	0.006	0.010	0.009	0.006	0.013	0.220
4725	0.009	0.010	0.011	0.011	0.010	0.008	0.005	0.006	0.009	0.010	0.006	0.011	0.220
4775	0.009	0.011	0.010	0.009	0.009	0.007	0.005	0.006	0.009	0.009	0.006	0.011	0.220
4825	0.008	0.011	0.011	0.010	0.010	0.007	0.005	0.006	0.009	0.010	0.009	0.011	0.220
4875	0.009	0.009	0.010	0.011	0.011	0.008	0.005	0.006	0.009	0.010	0.007	0.011	0.220
4925	0.008	0.010	0.011	0.011	0.010	0.007	0.005	0.005	0.009	0.009	0.006	0.011	0.220
4975	0.008	0.011	0.013	0.014	0.010	0.008	0.005	0.006	0.009	0.009	0.007	0.014	0.220

Note:

The percentage harmonics results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series scaled by the factor $P_{n, \text{SOFAR 125KTLX-G4-A}} / P_{n, \text{unit-not-tested}}$.

(The transferred results are below the required limit values derived from EREC G5.)

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3. Power Quality – Voltage fluctuations and Flicker									
Test start date		2022-12-22			Test end date			2023-02-16	
Test location		Guangdong HuaChuang Technology Service Co., Ltd. (see <i>Testing location</i> on p.2)							
	Phase no.	Starting			Stopping			Running	
		d _{max} [%]	d _c [%]	d(t) [ms]	d _{max} [%]	d _c [%]	d(t) [ms]	P _{st}	P _{It} 2 hours
Measured Values at test impedance	L1	0.662	0.353	0.000	0.482	0.359	0.000	0.045	0.043
	L2	0.592	0.350	0.000	0.416	0.328	0.000	0.116	0.110
	L3	0.107	0.020	0.000	0.110	0.019	0.000	0.182	0.172
	Overall worst case	0.662	0.353	0.000	0.482	0.359	0.000	0.182	0.172
Measured Values at test impedance	L1	0.662	0.353	0.000	0.482	0.359	0.000	0.045	0.043
	L2	0.592	0.350	0.000	0.416	0.328	0.000	0.116	0.110
	L3	0.107	0.020	0.000	0.110	0.019	0.000	0.182	0.172
	Overall worst case	0.662	0.353	0.000	0.482	0.359	0.000	0.182	0.172
Measured Values at test impedance	L1	--	--	--	--	--	--	--	--
	L2	--	--	--	--	--	--	--	--
	L3	--	--	--	--	--	--	--	--
	Overall worst case	--	--	--	--	--	--	--	--
Limits set under BS EN 61000-3-11		4	3.3	500 (3.3%)	4	3.3	500 (3.3%)	1.0	0.65
Test Impedance	R: 0.24 Ω				X: 0.15 Ω				
Standard Impedance	R: ☒ 0.24 * ☐ 0.4 ^ Ω				X: ☒ 0.15 * ☐ 0.25 ^ Ω				
Maximum Impedance	R: -- Ω				X: -- Ω				
* ☒ three-phase Power Generating Modules ☐ split single phase Power Generating Modules ^ ☐ single phase Power Generating Module ☐ Power Generating Modules using two phases on a three-phase system									
Note: The Flicker results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series scaled by the factor $P_{n, \text{SOFAR 125KTLX-G4-A}} / P_{n, \text{unit-not-tested}}$. (The transferred results (values at test and standard impedance) are below the required limit values according to BS EN 61000-3-11.)									

Power Generating Module tested to IEC 61000-4-30, IEC 61400-21 and IEC 61000-4-15 for EREC P28 assessment			
Test start date	2023-01-12	Test end date:	2023-02-01
Test location	(Tests performed in laboratory environment) Guangdong HuaChuang Technology Service Co., Ltd. (see Testing location on p.2)		
Flicker measurements			
Test conditions:			
Reactive power setpoint:		Q = 0	
Ratio S _{k,flc} /S _n in the fictitious grid used for analysis:		20	

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Grid impedance angle, ψ_k	30°	50°	70°	85°
Power level [%P _{max}]	Flicker coefficient, $c(\psi_k, P)$			
0 - 5	0.46	0.43	0.39	0.35
10	0.27	0.26	0.25	0.24
20	0.28	0.26	0.25	0.25
30	0.27	0.27	0.26	0.26
40	0.26	0.26	0.26	0.26
50	0.25	0.24	0.23	0.23
60	0.25	0.24	0.24	0.23
70	0.29	0.26	0.25	0.24
80	0.25	0.24	0.23	0.23
90	0.25	0.24	0.23	0.23
100	0.43	0.37	0.29	0.24
Max. Flicker coefficient, $c(\psi_k, P)$	0.46	0.43	0.39	0.35
Max. Short-term flicker, P _{st}	0.02	0.02	0.02	0.02
Test conditions:				
Reactive power setpoint:		PF = 0.95 (lagging)		
Ratio S _{k, fic} /S _n in the fictitious grid used for analysis:		20		
Grid impedance angle, ψ_k	30°	50°	70°	85°
Power level [%P _{max}]	Flicker coefficient, $c(\psi_k, P)$			
0 - 5	0.55	0.66	0.73	0.77
10	0.39	0.52	0.62	0.65
20	0.51	0.71	0.85	0.91
30	0.69	0.99	1.19	1.27
40	0.86	1.28	1.58	1.69
50	1.04	1.57	1.93	2.07
60	1.27	1.88	2.31	2.48
70	1.42	2.14	2.64	2.86
80	1.57	2.40	3.00	3.25
90	1.79	2.71	3.37	3.64
100	1.87	2.85	3.56	3.85
Max. Flicker coefficient, $c(\psi_k, P)$	1.87	2.85	3.56	3.85
Max. Short-term flicker, P _{st}	0.09	0.14	0.18	0.19
Test conditions:				
Reactive power setpoint:		PF = 0.95 (leading)		
Ratio S _{k, fic} /S _n in the fictitious grid used for analysis:		20		
Grid impedance angle, ψ_k	30°	50°	70°	85°
Power level [%P _{max}]	Flicker coefficient, $c(\psi_k, P)$			
0 - 5	0.52	0.66	0.75	0.77
10	0.40	0.51	0.59	0.62
20	0.53	0.72	0.86	0.91

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30	0.71	1.01	1.22	1.30
40	0.85	1.28	1.58	1.70
50	1.05	1.59	1.97	2.12
60	1.22	1.87	2.33	2.51
70	1.41	2.17	2.72	2.93
80	1.68	2.51	3.12	3.35
90	1.81	2.76	3.47	3.76
100	1.83	2.84	3.58	3.88
Max. Flicker coefficient, $c(\psi_k, P)$	1.83	2.84	3.58	3.88
Max. Short-term flicker, P_{st}	0.09	0.14	0.18	0.19

RVC measurements				
Test conditions:				
Reactive power setpoint:	Q = 0			
Ratio $S_{k,flc}/S_n$ in the fictitious grid used for analysis:	20			
Case of switching operation	Switch-on at $P_{available} < 10\%P_{max}$			
Max. no of switching operations, N_{10}	20			
Max. number of switching operations, N_{120}	240			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.02	0.02	0.02	0.02
Voltage change factor, $k_u(\psi_k)$	0.16	0.12	0.11	0.09
Maximum inrush current factor k_{imax}	0.026			
Case of switching operation	Switch-on at $P_{available} = 100\%P_{max}$			
Max. no of switching operations, N_{10}	1			
Max. number of switching operations, N_{120}	12			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.04	0.03	0.02	0.02
Voltage change factor, $k_u(\psi_k)$	0.95	0.72	0.46	0.19
Maximum inrush current factor k_{imax}	0.027			
Case of switching operation	Switching from $10\%P_{max}$ to $100\%P_{max}$			
Max. no of switching operations, N_{10}	---			
Max. number of switching operations, N_{120}	---			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.03	0.02	0.02	0.02
Voltage change factor, $k_u(\psi_k)$	0.18	0.14	0.10	0.07
Maximum inrush current factor k_{imax}	0.026			
Case of switching operation	Service shutdown at $P_{available} = 100\%P_{max}$			
Max. no of switching operations, N_{10}	1			
Max. number of switching operations, N_{120}	12			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.88	0.67	0.38	0.15
Voltage change factor, $k_u(\psi_k)$	0.96	0.73	0.46	0.23

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Maximum inrush current factor k_{imax}	0.004			
Test conditions:				
Reactive power setpoint:	PF = 0.95 (lagging)			
Ratio $S_{k, fic}/S_n$ in the fictitious grid used for analysis:	20			
Case of switching operation	Switch-on at $P_{available} < 10\%P_{max}$			
Max. no of switching operations, N_{10}	20			
Max. number of switching operations, N_{120}	240			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.03	0.03	0.03	0.02
Voltage change factor, $k_u(\psi_k)$	0.17	0.18	0.14	0.10
Maximum inrush current factor k_{imax}	0.026			
Case of switching operation	Switch-on at $P_{available} = 100\%P_{max}$			
Max. no of switching operations, N_{10}	1			
Max. number of switching operations, N_{120}	12			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.06	0.09	0.11	0.11
Voltage change factor, $k_u(\psi_k)$	1.05	0.93	0.71	0.50
Maximum inrush current factor k_{imax}	0.032			
Case of switching operation	Switching from $10\%P_{max}$ to $100\%P_{max}$			
Max. no of switching operations, N_{10}	---			
Max. number of switching operations, N_{120}	---			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.20	0.18	0.14	0.12
Voltage change factor, $k_u(\psi_k)$	0.97	0.86	0.68	0.48
Maximum inrush current factor k_{imax}	0.012			
Case of switching operation	Service shutdown at $P_{available} = 100\%P_{max}$			
Max. no of switching operations, N_{10}	1			
Max. number of switching operations, N_{120}	12			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.97	0.86	0.66	0.45
Voltage change factor, $k_u(\psi_k)$	1.07	0.94	0.73	0.52
Maximum inrush current factor k_{imax}	0.004			
Test conditions:				
Reactive power setpoint:	PF = 0.95 (leading)			
Ratio $S_{k, fic}/S_n$ in the fictitious grid used for analysis:	20			
Case of switching operation	Switch-on at $P_{available} < 10\%P_{max}$			
Max. no of switching operations, N_{10}	20			
Max. number of switching operations, N_{120}	240			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.03	0.02	0.02	0.02
Voltage change factor, $k_u(\psi_k)$	0.14	0.11	0.07	0.08

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Maximum inrush current factor k_{imax}	0.026			
Case of switching operation	Switch-on at $P_{available} = 100\%P_{max}$			
Max. no of switching operations, N_{10}	1			
Max. number of switching operations, N_{120}	12			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.06	0.08	0.10	0.11
Voltage change factor, $k_u(\psi_k)$	0.78	0.50	0.17	0.29
Maximum inrush current factor k_{imax}	0.033			
Case of switching operation	Switching from 10% P_{max} to 100% P_{max}			
Max. no of switching operations, N_{10}	---			
Max. number of switching operations, N_{120}	---			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.17	0.13	0.11	0.11
Voltage change factor, $k_u(\psi_k)$	0.70	0.48	0.17	0.24
Maximum inrush current factor k_{imax}	0.016			
Case of switching operation	Service shutdown at $P_{available} = 100\%P_{max}$			
Max. no of switching operations, N_{10}	1			
Max. number of switching operations, N_{120}	12			
Grid impedance angle, ψ_k	30°	50°	70°	85°
Flicker step factor, $k_f(\psi_k)$	0.68	0.41	0.13	0.22
Voltage change factor, $k_u(\psi_k)$	0.77	0.49	0.18	0.28
Maximum inrush current factor k_{imax}	0.005			

4. Power Quality – DC injection			
SOFAR 125KTLX-G4-A			
Test power level	10%	55%	100%
Recorded DC value in Amps	0.048	0.074	0.146
as % of rated AC current	0.009	0.014	0.027
Limit [%]	0.25	0.25	0.25
Note: The percentage DC injection of the SOFAR 125KTLX-G4-A can be considered as worst case results and applied to the SOFAR 110KTLX-G4, SOFAR 125KTLX-G4 directly. The percentage DC injection of the SOFAR 125KTLX-G4-A can be applied to other units in the product series scaled by the factor $P_{n, \text{SOFAR 125KTLX-G4-A}} / P_{n, \text{unit-not-tested}}$. (The transferred results are below the required limit of 0.25%.)			

5. Power Factor			
Voltage	0.94 pu (216.2 V)	1 pu (230 V)	1.1 pu (253 V)
Measured value	0.999	0.999	0.999
Power Factor Limit	>0.95	>0.95	>0.95
Note: The Power Factor results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series directly.			

6. 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	47.5 Hz	20 s	47.46 Hz	20.050 s	47.7 Hz 30 s	No trip occurred
U/F stage 2	47 Hz	0.5 s	46.98 Hz	0.537 s	47.2 Hz 19.5 s	No trip occurred
					46.8 Hz 0.45 s	No trip occurred
O/F	52 Hz	0.5 s	51.98 Hz	0.525 s	51.8 Hz 120.0 s	No trip occurred
					52.2 Hz 0.45 s	No trip occurred
Note: The measurement results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series directly.						

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7. Protection – Voltage tests							
Function		Setting		Trip test		“No trip tests”	
		Voltage	Time delay	Voltage	Time delay	Voltage / time	Confirm no trip
U/V	L1-N	0.8 pu (184 V)	2.5 s	184.16 V	2.535 s	188 V 5.0 s	No trip occurred
	L2-N			183.93 V	2.535 s		No trip occurred
	L3-N			182.25 V	2.535 s		No trip occurred
						180 V 2.45 s	No trip occurred
O/V stage 1	L1-N	1.14 pu (262.2 V)	1.0 s	261.81 V	1.020 s	258.2 V 5.0 s	No trip occurred
	L2-N			263.06 V	1.022 s		No trip occurred
	L3-N			261.90 V	1.028 s		No trip occurred
O/V stage 2	L1-N	1.19 pu (273.7 V)	0.5 s	273.52 V	0.533 s	269.7 V 0.95 s	No trip occurred
	L2-N			273.73 V	0.519 s		No trip occurred
	L3-N			272.54 V	0.517 s		No trip occurred
						277.7 V 0.45 s	No trip occurred
Note: The measurement results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series directly.							

8. Protection – Loss of Mains test						
Test Power and imbalance	33% -5%Q (Test 22)	66% -5%Q (Test 12)	100% -5%P (Test 5)	33% +5%Q (Test 31)	66% +5%Q (Test 21)	100% +5%P (Test 10)
Trip time [s]	0.201	0.269	0.263	0.187	0.234	0.358
Trip time limit [s]	0.5					
Loss of Mains Protection, Vector Shift Stability test						
	Start Frequency		Change		Confirm no trip	
Positive Vector Shift	49.5 Hz		+50 degrees		No trip occurred	
Negative Vector Shift	50.5 Hz		- 50 degrees		No trip occurred	
Loss of Mains Protection, RoCoF Stability test						
Ramp range	Test frequency ramp:		Test Duration		Confirm no trip	
49.0 Hz to 51.0 Hz	+0.95 Hz/s		2.1 s		No trip occurred	
51.0 Hz to 49.0 Hz	-0.95 Hz/s		2.1 s		No trip occurred	
Note:						
The measurement results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series directly.						

9. Limited Frequency Sensitive Mode – Overfrequency test				
Active Power response to rising frequency/time plots are attached if frequency injection tests are undertaken in accordance with Annex A.7.2.4.				N
Alternatively, test results should be noted below:				
Test sequence at Registered Capacity >80%	Measured Active Power Output [W]	Frequency [Hz]	Primary Power Source [W]	Active Power Gradient Droop
Step a) 50.00Hz ± 0.01Hz	125013	50.00	126500	---
Step b) 50.45Hz ± 0.05Hz	123691	50.45		9.46% 1)
Step c) 50.70Hz ± 0.10Hz	117513	50.70		10.12% 2)
Step d) 51.15Hz ± 0.05Hz	106225	51.15		9.97% 3)
Step e) 50.70Hz ± 0.10Hz	117515	50.70		9.96% 4)
Step f) 50.45Hz ± 0.05Hz	123687	50.45		10.13% 5)
Step g) 50.00Hz ± 0.01Hz	124987	50.00		---
	1 st Droop (calculated using frequency and power between steps d) & b))			10.02%
	2 nd Droop (calculated using frequency and power between steps f) & d))			10.02%
Test sequence at Registered Capacity 40% - 60%	Measured Active Power Output [W]	Frequency [Hz]	Primary Power Source [W]	Active Power Gradient Droop
Step a) 50.00Hz ± 0.01Hz	62504	50.00	68750	---
Step b) 50.45Hz ± 0.05Hz	61349	50.45		10.82% 1)
Step c) 50.70Hz ± 0.10Hz	55141	50.70		10.07% 2)
Step d) 51.15Hz ± 0.05Hz	43563	51.15		9.72% 3)
Step e) 50.70Hz ± 0.10Hz	55199	50.70		9.67% 4)
Step f) 50.45Hz ± 0.05Hz	61334	50.45		10.19% 5)
Step g) 50.00Hz ± 0.01Hz	124961	50.00		---
	1 st Droop (calculated using frequency and power between steps d) & b))			9.84%
	2 nd Droop (calculated using frequency and power between steps f) & d))			9.85%
Note:				
1) Droop calculated using frequency and power between steps b) & threshold frequency of 50.4 Hz				
2) Droop calculated using frequency and power between steps c) & b)				
3) Droop calculated using frequency and power between steps d) & c)				
4) Droop calculated using frequency and power between steps e) & d)				

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5) Droop calculated using frequency and power between steps f) & e)

The determined droops of the SOFAR 125KTLX-G4-A can be applied to other units in the product series directly.

10. Protection – Re-connection timer

Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of Table 10.1.			
60 s	113 s	At 1.16 pu (266.2 V LV connection)	At 0.78 pu (180.0 V LV connection)	At 47.4 Hz	At 52.1 Hz
Confirmation that the Power Generating Module does not re-connect.		No reconnection occurred	No reconnection occurred	No reconnection occurred	No reconnection occurred

Note:

The measurement results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series directly.

11. Fault level contribution

For **Inverter** output

Time after fault	Volts	Amps
20 ms	L1: 35.6	L1: 88.8
	L2: 29.1	L2: 98.1
	L3: 38	L3: 104.3
100 ms	L1: 10	L1: 4.0
	L2: 10	L2: 2.7
	L3: 9	L3: 3.9
250 ms	L1: 10	L1: 4.1
	L2: 9	L2: 2.3
	L3: 10	L3: 3.8
500 ms	L1: 10	L1: 4.0
	L2: 9	L2: 2.0
	L3: 9	L3: 4.0
Time to trip	0.012	In seconds

Note:

The measurement results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series directly.

12. Self-Monitoring solid state switching

It has been verified that in the event of the solid-state switching device failing to disconnect the **Power Park Module**, the voltage on the output side of the switching device is reduced to a value below 50 volts within 0.5 s.

NA

13. Wiring functional tests

Confirm that the relevant test schedule is attached (tests to be undertaken at time of commissioning)

NA

14. Logic interface (input port)

Confirm that an input port is provided and can be used to shut down the module	Yes
Provide high level description of logic interface, e.g. details in 11.1.3.1 such as AC or DC signal (the additional comments box below can be used)	Yes For details see "Additional comments." Below.
Note: The measurement results of the SOFAR 125KTLX-G4-A can be applied to other units in the product series directly. The high-level description of logic interface applies to the whole product series.	

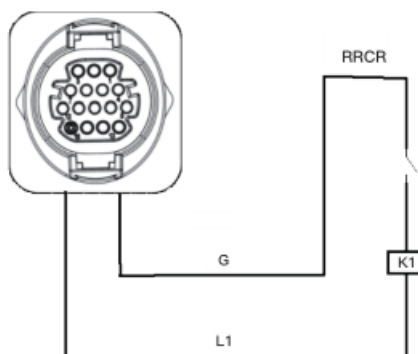
15. Cyber security

Confirm that the Power Generating Module has been designed to comply with cyber security requirements, as detailed in 9.1.7.	Yes.
Note: Manufacturer's declaration provided.	

Additional comments:

High level description of logic interface:

The PGU equipped with a logic interface for ceasing active power output within 5 s following an instruction being received. The following is a possible configuration (if another configuration is required, this can be agreed with the manufacturer):



where RRCR = Radio Ripple Control Receiver.

The signal from the Power Generating Module that is being switched can be either AC (maximum value 240 V) or DC (maximum value 110 V)

Function description of the terminal:

PIN	Pin name	Description	Connected to (RRCR)
9	L1	Relay contact 1 input	K1 – Relay 1 output
13	G	GND	K1 – Relay 1 output

Relay status: close is 1, open is 0

L1	Active Power	Power drop rate	cos(φ)
1	0%	<5 seconds	1
0	100%	/	1