Certificate of compliance

Applicant:	**SolarEdge Technologies Ltd.** 1 HaMada Street Herzliya 4673335 **Israel**			
Product:	**Photovoltaic (PV) inverter**			
Model:	**SE20K**	**SE25K**	**SE27.6K**	**SE30K**
	SE33.3K	**SE40K***		
Note:	*** 480 V mains voltage models**			

Inverter for three-phase parallel connection to the public grid. The network monitoring and disconnection device is an integral part of the above-mentioned model.

Applied rules and standards:

EN 50549-1:2019
Requirements for parallel connection of installations with distribution networks - Part 1: Connection to an LV distribution network - Production of installations up to and including Type B

4.4 Normal operating range
4.5 Immunity to disturbances
4.6 Active response to frequency deviation
4.7 Power response to voltage variations and voltage changes
4.8 EMC and power quality
4.9 Interface protection
4.10 Connection and starting to generate electrical power
4.11 Ceasing and reduction of active power on set point
4.12 Remote information exchange
4.13 Requirements regarding single fault tolerance of interface protection system and interface switch

DIN V VDE V 0126-1-1:2006 (4.1 Functional safety)
Automatic disconnection device between a generator and the public low-voltage grid

Commission Regulation (EU) 2016/631 of 14 April 2016
Establishing a network code on requirements for grid connection of generators (NC RFG).
Type approval for generation units to use in Type A and Type B plants.

At the time of issue of this certificate, the safety concept of an aforementioned representative product corresponds to the valid safety specifications for the specified use in accordance with regulations.

Report number:	**19TH0534-EN50549-1_7** **19TH0534-Power Quality_4** **19TH0534-FRT_4**	**Certification Program:**	**NSOP-0032-DEU-ZE-V01**
Certificate number:	**U22-0131**	**Date of issue:**	**2022-03-02**

Certification body

Thomas Lammel

DAkkS Deutsche Akkreditierungsstelle D-ZE-12024-01-00

Certification body Bureau Veritas Consumer Products Services Germany GmbH accreditation to DIN EN ISO/IEC 17065

Testing laboratory accredited according to DIN EN ISO/IEC 17025

A partial representation of the certificate requires the written approval of Bureau Veritas Consumer Products Services Germany GmbH

Appendix

Extract from test report according to EN 50549-1

No. 19TH0534-EN50549-1_7
No. 19TH0534-Power Quality_4
No. 19TH0534-FRT_4

Type Approval and declaration of compliance with the requirements of EN 50549-1 and Commission Regulation (EU) 2016/631 of 14 April 2016				
Manufacturer / applicant	SolarEdge Technologies Ltd. 1 HaMada Street Herzliya 4673335 Israel			
Micro-generator Type	Photovoltaic inverter			
	SE20K	SE25K	SE27.6K	SE30K
Input DC voltage range [V]	680 – 1000	680 – 1000	680 – 1000	680 – 1000
Input DC current [A]	29	36,25	40,0	43,5
Output AC voltage [V]	220/230 Vac, L-N 380/400 Vac, L-L	220/230 Vac, L-N	220/230 Vac, L-N	220/230 Vac, L-N
Output AC current [A]	29	36,25	40	43,5
Output power [VA]	20001	25000	27600	29990
	SE30K	--	--	--
Input DC voltage range [V]	680 – 1000	--	--	--
Input DC current [A]	43,5	--	--	--
Output AC voltage [V]	220/230 Vac, L-N	--	--	--
Output AC current [A]	43,5	--	--	--
Output power [VA]	30000	--	--	--
	SE40K	--	--	--
Input DC voltage range [V]	680 – 1000	--	--	--
Input DC current [A]	48,25	--	--	--
Output AC voltage [V]	277 Vac, L-N 480 Vac, L-L	--	--	--
Output AC current [A]	48,25	--	--	--
Output power [VA]	40000	--	--	--
Firmware version	DSP1:1.20 / DSP2: 2.20			
Description of the structure of the power generation unit: The power generation unit is equipped with a PV and line-side EMC filter. The power generation unit has no galvanic isolation between DC input and AC output. Output switch-off is performed with single-fault tolerance based on two series-connected relays in each line and neutral. This enables a safe disconnection of the power generation unit from the network in case of error.				

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Extract from test report according to EN 50549-1

No. 19TH0534-EN50549-1_7
No. 19TH0534-Power Quality_4
No. 19TH0534-FRT_4

Type Approval and declaration of compliance with the requirements of EN 50549-1 and Commission Regulation (EU) 2016/631 of 14 April 2016

Parameter Table:

Clause EN 50549-1	Ref	Parameter	Micro generator setting range	Default settings used	
4.3.2 Interface switch	n.a.	Single fault tolerance for interface switch	yes | no	yes	
4.4.2 Operating frequency range	A,B	47,0 – 47,5 Hz Duration	0,06 – unlimited	0s	
	A,B	47,5 – 48,5 Hz Duration	0,06 – unlimited	≥30 min	
	A,B	48,5 – 49,0 Hz Duration	0,06 – unlimited	≥30 min	
	A,B	49,0 – 51,0 Hz Duration	0,06 – unlimited	unlimited	
	A,B	51,0 – 51,5 Hz Duration	0,06 – unlimited	≥30 min	
	A,B	51, 5 – 52 Hz Duration	0,06 – unlimited	0 s	
4.4.3 Minimal requirement for active power delivery at under frequency	A,B	Reduction threshold	44 Hz – 60 Hz	Electronic inverter no power reduction take place	
	A,B	Maximum reduction rate	1 – 12 % P_M/Hz	≤ 2 %	
4.4.4 Continuous operating voltage range	n.a.	Upper limit	1,0 Un – 335V	N/A	
	n.a.	Lower limit	0,0 Un – 1,0 U_n	N/A	
4.5.2 Rate of change of frequency (ROCOF) immUnity	A,B	ROCOF withstand capability (defined with a sliding measurement window of 500 ms) non-synchronous generating technology: synchronous generating technology:	0 – 100 Hz/s	≥2,5 Hz/s	
4.5.3.2 Generating plant with non-synchronous generating technology (FRT)	B	Maximum power resumption time	not defined	≤1 s	
	B	Voltage-Time-Diagram	see Figure 6, EN 50549-1 *The inverters can stay connected from 0 to 40VAC up to 3 s. For voltage above 40VAC the inverters will stay connected till the NS protection setting (voltage and time are reached).	Time [s] N/A*	U [p.u.] N/A*
4.5.3.3 Generating plant with synchronous generating technology (FRT)	B	Maximum power resumption time	not defined	≤ 0,1 s	
	B	Voltage-Time-Diagram	see Figure 7, EN 50549-1	Time [s] N/A N/A N/A N/A N/A	U [p.u.] N/A N/A N/A N/A N/A

Appendix

Extract from test report according to EN 50549-1

No. 19TH0534-EN50549-1_7
No. 19TH0534-Power Quality_4
No. 19TH0534-FRT_4

4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	*The inverters can stay connected from 0 to 40VAC up to 3 s. For voltage above 40VAC the inverters will stay connected till the NS protection setting (voltage and time are reached).	Time [s]	U [p.u.]
				N/A*	N/A*
4.6.1 Power response to over frequency (LFSM-O)	A,B	Threshold frequency f1	50,0 – 66 Hz	50,2 Hz	
	A,B	Droop	1 % – 12 %	5 %	
	A,B	Power reference	P_M | P_{max}	P_M	
		P(f) soft start	0 – 20 min	10min	
		P(f) reset time	0 – 20 min	30 s	
	n.a.	Intentional delay	0 – 2 s	0 s	
	n.a.	Deactivation threshold fstop	50,0 Hz – 66 Hz	deactivated	
	n.a.	Deactivation time tstop	0 – 20 min	N/A	
	A	Acceptance of staged disconnection	yes | no	No	
4.6.2 Power response to under frequency	n.a.	Threshold frequency f_1	44 Hz – 60 Hz	N/A	
	n.a.	Droop	1 – 12 %	N/A	
	n.a.	Power reference	P_M | P_{max}	N/A	
	n.a.	Intentional delay	0 – 2 s	N/A	
4.7.2.2 Capabilities	B	Active factor range overexcited	0,1 – 1	1,0	
	B	Active factor range underexcited	0,1 – 1	1,0	
4.7.2.3 Control modes	n.a.	Enabled control mode	Q setp. Q(U) cos φ setp. cos φ (P)	disabled disabled enabled cos φ setp. disabled	
4.7.2.3.2 Set point control modes	n.a.	Q setpoint and excitation	0 – 90 % P_{nom}	N/A	
	n.a.	cos φ setpoint and excitation	0,1-1,0	1,0	
4.7.2.3.3 Voltage related control modes	n.a.	Characteristic curve	Q(U) P(U)	disabled Q(U) disabled P(U)	
	n.a.	Time constant	3 s – 60 s	3 s	
	n.a.	Min cos φ	0,0 – 1	disabled	
	n.a.	Lock in power	0 % – 20 %	deactivated	
	n.a.	Lock out power	0 % – 20 %	deactivated	
4.7.2.3.4 Power related control mode	n.a.	Characteristic curve	cos φ (P)	disabled	
4.7.4.2.2 Zero current mode for	n.a.	Enabling	enable | disable	disabled	
	n.a	Static voltage range overvoltage	1,0 U_n – 335V	1,15 U_n	

Appendix

Extract from test report according to EN 50549-1

No. 19TH0534-EN50549-1_7
No. 19TH0534-Power Quality_4
No. 19TH0534-FRT_4

converter connected generating technology	n.a	Static voltage range undervoltage	0,2 U_n – 1,0 Un	0,85 U_n

Appendix

Extract from test report according to EN 50549-1

No. 19TH0534-EN50549-1_7
No. 19TH0534-Power Quality_4
No. 19TH0534-FRT_4

4.9.2 Requirements on voltage and frequency protection	n.a	Threshold for protection as dedicated device [in A or kW, kVA]	All activated	N/A
	B	Undervoltage threshold stage 1	0,0 U_n – 1 U_n	0,85 U_n
	B	Undervoltage operate time stage 1	0,04 s – 20 min	1,2 – 1,5 s
	B	Undervoltage threshold stage 2	0,0 U_n – 1 U_n	N/A
	B	Undervoltage operate time stage 2	0,04 s – 20 min	N/A
	B	Overvoltage threshold stage 1	1,0 U_n – 335V	1,10 U_n
	B	Overvoltage operate time stage 1	0,04 s – 20 min	2 s
	B	Overvoltage threshold stage 2	1,0 U_n – 315V	N/A
	B	Overvoltage operate time stage 2	0,04 s – 20 min	N/A
	B	Overvoltage threshold 10 min mean protection[a]	1,0 U_n – 315V	N/A
	B	Overvoltage operate time 10 min mean protection[a]	3 s	N/A
	B	Underfrequency threshold stage 1	44,0 Hz – 60,0 Hz	47,5 Hz
	B	Underfrequency operate time stage 1	0,06 s – 20 min	1,900 s
	B	Underfrequency threshold stage 2	44,0 Hz – 60,0 Hz	N/A
	B	Underfrequency operate time stage 2	0,06 s – 20 min	N/A
	B	Overfrequency threshold stage 1	50,0 Hz – 66,0 Hz	51,5 Hz
	B	Overfrequency operate time stage 1	0,06 s – 20 min	1,900 s
	B	Overfrequency threshold stage 2	50,0 Hz – 66,0 Hz	N/A
	B	Overfrequency operate time stage 2	0,06 s – 20 min	N/A
	B	Loss of mains according EN 62116 (LoM)	0-100 s	2,5 Hz / s (0,5s)
4.10.2 Automatic reconnection after tripping	B	Lower frequency	44,0 Hz – 60,0 Hz	49,9 Hz
	B	Upper frequency	50,0 Hz – 66,0 Hz	50,1 Hz
	B	Lower voltage	0,0 U_n – 1,0 U_n	0,90 U_n
	B	Upper voltage	1,0 U_n – 335 V	1,10 U_n
	B	Observation time	1 s – 20 min	60 s
	B	Active power increase gradient	1 % – 10000 %/min	≤10 %/min
4.10.3 Starting to generate electrical power	A,B	Lower frequency	44,0 Hz – 60,0 Hz	49,9 Hz
	A,B	Upper frequency	50,0 Hz – 66,0 Hz	50,1 Hz
	A,B	Lower voltage	0,0 U_n – 1,0 U_n	0,90 U_n
	A,B	Upper voltage	1,0 U_n – 335 V	1,10 U_n
	A,B	Observation time	0s – 20 min	60 s
	A,B	Active power increase gradient	1 % – 10000 %/min	≤10 %/min
4.11.1 Ceasing active power	A,B	Remote operation of the logic interface	yes | no	Yes (RS485, DI)
4.11.2 Reduction of active power on set point	B	Remote operation NOTE: If yes further definition is provided by the DSO	yes | no	Yes (RS485, DI)

Appendix

Extract from test report according to EN 50549-1

No. 19TH0534-EN50549-1_7
No. 19TH0534-Power Quality_4
No. 19TH0534-FRT_4

4.12 Remote information exchange	B	Remote information exchange required NOTE: If yes further definition is provided by the DSO	yes | no	No

Note:

[a] Over voltage – stage1: 10 min-mean-value corresponding to EN 50160.

The settings of the interface protection are password protected adjustable in the stated range above.

In case the above stated generators are used with an external protection device, the protection settings of the inverters are to be adjusted according to the manufacturer's declaration.

The above stated generators are tested according to the requirements in the EN 50549-1:2019 Commission Regulation (EU) 2016/631 of 14 April 2016. Any modification that affects the stated tests must be named by the manufacturer/supplier of the product to ensure that the product meets all requirements.