Certificate UK-G59/2-1

The results of the UK-G59/2-1 tests are summarized in this certificate.
Power-One Italy S.p.a. declares that the units shipped to the UK are characterized by the following features:

- The internal specification and parameters are set to be compliant with UK-G59/2-1 engineering requirements.
- All units have identical internal parameter setting.
- These parameters cannot be changed without the usage of password protected tool.
- All units are tested before shipping according to UK-G59/2-1 engineering specification.

SSEG DETAILS (Small-Scale Embedded Generator)

SSEG Type Reference:	PHOTO-VOLTAIC and EOLIC GRID TIED INVERTER
SSEG Model Reference:	PVI-6000-TL-OUTD PVI-6000-TL-OUTD-S PVI-6000-TL-OUTD-W PVI-5000-TL-OUTD PVI-5000-TL-OUTD-S PVI-5000-TL-OUTD-W
Manufacturer:	Power-one Italy S.p.A.
Telephone number:	+39-055-919551
Fax number:	+38-055-9195248
Address	Via S. Giorgio, 642 52028 Terranuova Bracciolini Arezzo - Italy
Maximum export capability (SSEG rating less parasitic load)	6200W (PVI-6000-TL-OUTD and derived models) 5050W (PVI-5000-TL-OUTD and derived models)
Nominal Output AC Power	6000W (PVI-6000-TL-OUTD and derived models) 5000W (PVI-5000-TL-OUTD and derived models)

TEST HOUSE DETAILS

Name:	Power-one Italy S.p.A. - R.& D. Department
Address:	Via S. Giorgio 642, 52028 Terranuova Bracciolini
Telephone number:	+39-055-919551
Fax number:	+38-055-9195248
E-mail address	service@power-one.com

TEST RESULTS SUMMARY

Power Quality:

- Harmonic Current Emission as per BS EN-61000-3-12
- Voltage Fluctuation and Flickers as per BS EN-61000-3-11
- DC Injection as per UK-G59/2-1
- Power Factor as per UK-G59/2-1

Protection:

- Under/Over Frequency Tests
- Under/Over Voltage Tests
- Reconnection Times
- Loss of Mains Test

Power-One Italy S.p.a.
Terranuova Bracciolini, 15 novembre 2012

Robert White
(Director Safety & Environmental Compliance)

UK-G59/2-1 TEST RESULTS DETAILS – TYPE VERIFICATION TEST SHEET

POWER QUALITY

(PVI-6000-TL-OUTD and derived models)	Value of Short Circuit Power SSC = 0.198 MVA @ RSCE = 33							
Harmonic Current Emission as per BS EN-61000-3-12								
Harmonic	3rd [%A]	5rd [%A]	7rd [%A]	9rd [%A]	11rd [%A]	13rd [%A]	THD [A%]	PWHD [A%]
Limit	21.6	10.7	7.2	3.8	3.1	2	13	22
Test value	0.2269	0.113	0.069	0.0411	0.066	0.0624	0.3546	0.740103

(PVI-5000-TL-OUTD and derived models)	Value of Short Circuit Power SSC = 0.165 MVA @ RSCE = 33							
Harmonic Current Emission as per BS EN-61000-3-12								
Harmonic	3rd [%A]	5rd [%A]	7rd [%A]	9rd [%A]	11rd [%A]	13rd [%A]	THD [A%]	PWHD [A%]
Limit	21.6	10.7	7.2	3.8	3.1	2	13	22
Test value	0.2535	0.1483	0.0655	0.0415	0.0526	0.0654	0.4024	0.921945

(PVI-6000-TL-OUTD and derived models)					
Voltage Fluctuation and Flickers as per BS EN-61000-3-11					
Voltage Disturbance	Pst	Plt	D(t) > 3%	dc (%)	dmax (%)
Limit	1	0.65	0.5	3.3	6
Test Value	0.253	0.25	0.1	0.1	1.05

(PVI-5000-TL-OUTD and derived models)					
Voltage Fluctuation and Flickers as per BS EN-61000-3-11					
Voltage Disturbance	Pst	Plt	D(t) > 3%	dc (%)	dmax (%)
Limit	1	0.65	0.5	3.3	6
Test Value	0.253	0.25	0.1	0.1	1.05

(PVI-6000-TL-OUTD and derived models)							
UK-G59/2-1 Limit 0.25% of 30A	DC injection [mA] 75mA, tested at three power levels				Power Factor 0.95 lag - 0.95 lead at three voltage levels		
Test Level		10%	55%	100%	216 Vac	240 Vac	259.2 Vac
Test Value		15.3	3.6	3.8	0.992	0.996	0.998

(PVI-5000-TL-OUTD and derived models)							
UK-G59/2-1 Limit 0.25% of 27A	DC injection [mA] 67.5mA, tested at three power levels				Power Factor 0.95 lag - 0.95 lead at three voltage levels		
Test Level		10%	55%	100%	216 Vac	240 Vac	259.2 Vac
Test Value		6.1	8.2	11.1	0.991	0.995	0.998

PROTECTION

(PVI-6000-TL-OUTD and derived models) and (PVI-5000-TL-OUTD and derived models)

UNDER FREQUENCY TEST						
Fnom=50Hz	UK-G59/2-1 Limit		Settings		Results	
Under Frequency <	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
	47.50	20.0	47.55	20.0	47.56	20.01
Under Frequency <<	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
	47.00	0.5	47.05	0.42	47.06	0.47

OVER FREQUENCY TEST						
Fnom=50Hz	UK-G59/2-1 Limit		Settings		Results	
Over Frequency >	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
	51.50	90.0	51.45	90.0	51.47	90.02
Over Frequency >>	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
	52.00	0.5	51.95	0.42	51.96	0.43

UNDER VOLTAGE TEST						
Vφ-n nom =240V	UK-G59/2-1 Limit		Settings		Results	
Under Voltage <	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
L1-N	208.8	2.5	211.2	2.3	211.5	2.33
Under Voltage <<	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
L1-N	192.0	0.5	194.4	0.44	194.6	0.49

OVER VOLTAGE TEST						
Vφ-n nom =240V	UK-G59/2-1 Limit		Settings		Results	
Over Voltage >	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
L1-N	264.0	1.0	261.6	0.9	261.9	0.95
Over Voltage >>	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
L1-N	276.0	0.5	273.6	0.44	274.0	0.49

RECONNECTION TIMES			
	Under/Over voltage	Under/Over Frequency	Loss of Main
Minimum Value Limit [s]	180	180	180
Actual setting [s]	180	180	180
Recorded value [s]	187	190	190

LOSS OF MAIN TESTS			
Method used	Rate Of Change Of Frequency and Active Power Variation		
Output power Level	10%Prated	55%Prated	100%Prated
UK-G59/2-1 Limit [s]	5.0	5.0	5.0
Trip setting [s]	5.0	5.0	5.0
Trip value [s]	0.305	0.577	0.585

SSEG Short Circuit Current Contribution Test

As Photovoltaic SSEGs are inverter connected, they are deemed to automatically comply with regulations and no further tests are required.

SELF MONITORING – SOLID STATE SWITCHING

Not applicable because electro-mechanical relays are used

ACCURACY

Voltage reading accuracy = +/- 1%

Frequency reading accuracy = +/- 0.05Hz

Power-One Italy Via S. Giorgio, 642 52028 Terranuova Bracciolini Arezzo – Italy Phone +39 055 9195 1 Fax +39 055 9195 248