

Certificate

UK-G59/2-1

The results of tests performed according to reference standard UK-G59/2-1 are summarized in this certificate. Power-One Italy S.p.a. declares that the units set for UK-G59/2-1 operations 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 parameters setting.
- These parameters cannot be changed without the usage of password protected tool.

SSEG DETAILS (Small-Scale Embedded Generator)

SSEG Type Reference:	PHOTO-VOLTAIC GRID TIED INVERTER
SSEG Model Reference:	PVI-12.5-TL-OUTD PVI-12.5-TL-OUTD-S PVI-12.5-TL-OUTD-FS PVI-10.0-TL-OUTD PVI-10.0-TL-OUTD-S PVI-10.0-TL-OUTD-FS
Maximum export capability (SSEG rating less parasitic load)	13750W (PVI-12.5-TL-OUTD and derivated models) 11000W (PVI-10.0-TL-OUTD and derivated models)
Nominal Output AC Power	12500W (PVI-12.5-TL-OUTD and derivated models) 10000W (PVI-10.0-TL-OUTD and derivated models)

MANUFACTURER and TEST HOUSE DETAILS

Name:	Power-one Italy S.p.A. - R.& D. Department
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TEST RESULTS SUMMARY

Power Quality:


- Harmonic Current Emission as per EN-61000-3-12
- Voltage Fluctuation and Flickers as per EN-61000-3-3
- 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 Main Test

Power-One Italy S.p.a.
Terranuova Bracciolini, 22 March 2013

Robert White
(Director Safety & Environmental Compliance)



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

POWER QUALITY

PVI-12.5-TL-OUTD		Value of Short Circuit Power SSC = 0.4125 MVA @ RSCE = 33							
Harmonic Current Emission as per 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
Result	Test value L1	1.4213	0.2646	0.1489	0.0427	0.1624	0.0799	1.5718	2.3910
	Test value L2	1.2855	0.2698	0.2147	0.0865	0.0813	0.2051	1.5016	3.0481
	Test value L3	0.8110	0.3357	0.0793	0.0748	0.2055	0.1519	1.0871	2.8753

PVI-10.0-TL-OUTD		Value of Short Circuit Power SSC = 0.33 MVA @ RSCE = 33							
Harmonic Current Emission as per 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
Result	Test value L1	1.2828	0.4570	0.1613	0.0816	0.0349	0.1742	1.5901	3.2594
	Test value L2	0.5302	0.3566	0.3926	0.0627	0.1027	0.2125	1.0796	3.4262
	Test value L3	0.7815	0.7423	0.2581	0.0788	0.0871	0.1661	1.4396	3.6193

PVI-12.5-TL-OUTD					
Voltage Fluctuation and Flickers as per EN-61000-3-3					
Voltage Disturbance	Pst	Plt	D(t) > 3%	dc (%)	dmax (%)
Limit	1	0.65	0.5	3.3	6
Test Value	0.17	0.15	0.01	1.8	2.18

PVI-10.0-TL-OUTD					
Voltage Fluctuation and Flickers as per EN-61000-3-3					
Voltage Disturbance	Pst	Plt	D(t) > 3%	dc (%)	dmax (%)
Limit	1	0.65	0.5	3.3	6
Test Value	0.17	0.15	0.01	1.8	2.18

PVI-12.5-TL-OUTD							
UK G59/2-1 Limit 0.25% of 20A	DC injection [mA]			Power Factor			
	50mA, tested at three power levels			0.95 lag - 0.95 lead at three voltage levels			
Test Level	10%	50%	100%	216 Vac	240 Vac	259.2 Vac	
Test Value	L1	-1.0	3.0	1.0	0.99	0.99	0.99
	L2	-26.0	-15.0	1.0			
	L3	6.0	-9.0	-21.0			

PVI-10.0-TL-OUTD							
UK G59/2-1 Limit 0.25% of 13A	DC injection [mA]			Power Factor			
	41.25mA, tested at three power levels			0.95 lag - 0.95 lead at three voltage levels			
Test Level	10%	50%	100%	216 Vac	240 Vac	259.2 Vac	
Test Value	L1	11.7	4.9	-5.1	0.99	0.99	0.99
	L2	-17.1	-3.4	4.1			
	L3	-14.3	-20.2	-16.6			

PROTECTION

PVI-12.5-TL-OUTD and PVI-10.0-TL-OUTD

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	20.00	47.55	20.00	47.54	20.234
Under Frequency <<	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
	47.00	0.50	47.05	0.42	47.06	0.484

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	90.00	51.45	90.00	51.46	91.087
Over Frequency >>	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
	52.00	0.50	51.95	0.42	51.96	0.422

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	211.1	2.36
	L2-N					211.1	2.36
	L3-N					210.7	2.35
L1-L2-L3	361.7	2.5	365.8	2.3	363.8	2.36	
Under Voltage <<	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]	
	L1-N	192.0	0.5	194.4	0.4	194.9	0.47
	L2-N					194.7	0.48
	L3-N					194.9	0.46
	L1-L2-L3	332.6	0.5	336.7	0.4	335.0	0.46

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	260.6	0.99
	L2-N					260.5	0.99
	L3-N					260.5	0.98
L1-L2-L3	457.3	1.0	453.1	0.9	450.1	0.99	
Over Voltage >>	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]	
	L1-N	276.0	0.5	273.6	0.4	272.0	0.50
	L2-N					272.1	0.50
	L3-N					272.3	0.50
	L1-L2-L3	478.0	0.5	473.9	0.4	470.0	0.50

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]	184	184	184

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	5	5
Trip setting [s]	5	5	5
Trip value [s]	< 5	< 5	< 5

SSEG Short Circuit Current Contribution Test

RMS Value over 1 Period (Cycle)	15.46	[Aac]
Peak Current	247.0	[A]

SELF MONITORING – SOLID STATE SWITCHING

Not applicable because electro-mechanical relays are used

SSEG ACCURACY

Voltage reading accuracy = +/- 1%
Frequency reading accuracy = +/- 0.05Hz