

Certificate

UK-G59

The results of the UK-G59 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 engineering requirements.
- All units have identical internal parameter setting.
- These parameters cannot be changed by a user, an installer or by any person other than the manufacturer.
- All units are tested before shipping according to UK-G59 engineering specification.

SSEG DETAILS

SSEG Type Reference:	PHOTO-VOLTAIC GRID TIED INVERTER
SSEG Model Reference:	TRIO-20.0-TL-OUTD-400 / TRIO-20.0-TL-OUTD-S2-400 TRIO-20.0-TL-OUTD-S2F-400 / TRIO-20.0-TL-OUTD-S2X-400 TRIO-20.0-TL-OUTD-S1J-400 / TRIO-20.0-TL-OUTD-S2J-400 TRIO-27.6-TL-OUTD-400 / TRIO-27.6-TL-OUTD-S2-400 TRIO-27.6-TL-OUTD-S2F-400 / TRIO-27.6-TL-OUTD-S2X-400 TRIO-27.6-TL-OUTD-S1J-400 / TRIO-27.6-TL-OUTD-S2J-400
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)	30360W (TRIO-27.6-TL-OUTD and derived models) 22000W (TRIO-20.0-TL-OUTD and derived models)
Nominal Output AC Power	27600W (TRIO-27.6-TL-OUTD and derived models) 20000W (TRIO-20.0-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-61000-3-3
- DC Injection as Uk G59
- Power Factor as Uk G59

Protection:

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

Power-One Italy S.p.a.
Terranuova Bracciolini,

23 luglio 2012

Robert White
(Director Safety & Environmental Compliance)

UK-G59 TEST RESULTS DETAILS – TYPE VERIFICATION TEST SHEET

POWER QUALITY

(TRIO-27.6-TL-OUTD and derived models)		Value of Short Circuit Power SSC = 0.9108 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	23 (13)	23 (22)
Result	Test value L1	0.74	0.08	0.02	0.03	0.33	0.14	0.85	0.27
	Test value L2	0.45	0.08	0.02	0.06	0.33	0.16	0.62	0.27
	Test value L3	0.36	0.08	0.03	0.02	0.32	0.18	0.53	0.27

(TRIO-20.0-TL-OUTD and derived models)		Value of Short Circuit Power SSC = 0.66 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	23 (13)	23 (22)
Result	Test value L1	1.07	0.06	0.05	0.03	0.59	0.36	1.34	1.11
	Test value L2	0.67	0.06	0.06	0.08	0.57	0.4	1.02	1.11
	Test value L3	0.52	0.04	0.06	0.07	0.6	0.41	0.95	1.21

(TRIO-27.6-TL-OUTD and derived models)					
Voltage Fluctuation and Flickers as per BS EN-61000-3-3					
Voltage Disturbance	Pst	Plt	D(t) > 3%	dc (%)	dmax (%)
Limit	1	0.65	0.5	3.3	6
Test Value	0.112	0.059	0.1	0.10	5.629

(TRIO-20.0-TL-OUTD and derived models)					
Voltage Fluctuation and Flickers as per BS EN-61000-3-3					
Voltage Disturbance	Pst	Plt	D(t) > 3%	dc (%)	dmax (%)
Limit	1	0.65	0.5	3.3	6
Test Value	0.205	0.168	0.1	0.049	0.739

(TRIO-27.6-TL-OUTD and derived models)							
Uk G59 Limit	DC injection [mA]				Power Factor		
	112.5mA, tested at three power levels				0.95 - 0.95 lead at three voltage levels		
Test Level		0%	0%	0%	212 Vac	230 Vac	248 Vac
Test Value	L1	-12	-1	2	0.99	0.99	0.99
	L2	-21	-4	28			
	L3	37	8	-32			

(TRIO-20.0-TL-OUTD and derived models)							
Uk G59 Limit	DC injection [mA]				Power Factor		
	82.5mA, tested at three power levels				0.95 - 0.95 lead at three voltage levels		
Test Level		0%	0%	0%	212 Vac	230 Vac	248 Vac
Test Value	L1	-24	-8	19	0.99	0.99	0.99
	L2	-14	1	18			
	L3	37	28	-29			

PROTECTION

(TRIO-27.6-TL-OUTD and derived models) and (TRIO-20.0-TL-OUTD and derived models)

UNDER FREQUENCY TEST						
	UK-G59 Limit		Settings		Results	
	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
Under Frequency <	47.5	20	47.5	20	47.54	20.3
Under Frequency <<	47	0.5	47	0.42	47.05	0.38

OVER FREQUENCY TEST						
	UK-G59 Limit		Settings		Results	
	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
Over Frequency >	51.5	90	51.5	90	51.45	91.18
Over Frequency >>	52	0.5	52	0.42	51.96	0.4

UNDER VOLTAGE TEST						
	UK-G59 Limit		Settings		Results	
	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
Undervoltage <	208.8	2.5	208.8	2.3	208.9	2.35
L1-N					208.7	2.34
L2-N					209.1	2.35
L3-N					209.1	2.35
L1-L2-L3	361.7	2.5	361.65	2.3	363.2	2.37
Undervoltage <<	192	0.5	192	0.44	192.5	0.46
L1-N					192.4	0.45
L2-N					192.4	0.46
L3-N					192.4	0.46
L1-L2-L3	332.6	0.5	332.55	0.44	334.1	0.43

OVER VOLTAGE TEST						
	UK-G59 Limit		Settings		Results	
	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
Overvoltage >	264	1	264	0.9	264.6	0.94
L1-N					264.7	0.94
L2-N					264.6	0.96
L3-N					264.6	0.96
L1-L2-L3	457.3	1	457.26	0.9	457.5	0.94
Overvoltage >>	276	0.5	276	0.44	276.2	0.47
L1-N					276.5	0.47
L2-N					276.5	0.48
L3-N					276.5	0.48
L1-L2-L3	478	0.5	478.04	0.44	478.1	0.46

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]	197	195	196

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 Limit [s]	5	5	5
Trip setting [s]	5	5	5
Trip value [s]	0.5	2.8	1.16

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 = +/- 2%

Frequency reading accuracy = +/- 0.1Hz