

## Certificate

## SPAIN RD 1699/2011

The results of tests performed according to reference standard SPAIN RD 1699/2011 are summarized in this certificate. Power-One Italy S.p.a. declares that the units set for SPAIN RD 1699/2011 operations are characterized by the following features:

- The internal specification and parameters are set to be compliant with SPAIN RD 1699/2011 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 derived models) 11000W (PVI-10.0-TL-OUTD and derived models)
Nominal Output AC Power	12500W (PVI-12.5-TL-OUTD and derived models) 10000W (PVI-10.0-TL-OUTD and derived 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 VDE 0126
- Power Factor as per VDE 0126

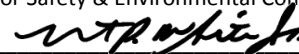
#### Protection:

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

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

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Robert White  
(Director Safety & Environmental Compliance)



**SPAIN RD 1699/2011 TEST RESULTS DETAILS – TYPE VERIFICATION TEST SHEET**

**POWER QUALITY**

<b>PVI-12.5-TL-OUTD</b>		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	0.664	0.360	0.026	0.075	0.348	0.383	1.326	3.586
	Test value L2	0.088	0.215	0.167	0.089	0.309	0.439	0.986	3.575
	Test value L3	0.549	0.425	0.150	0.104	0.334	0.478	1.230	3.461

<b>PVI-10.0-TL-OUTD</b>		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	0.981	0.490	0.095	0.072	0.046	0.149	1.333	2.953
	Test value L2	0.306	0.403	0.280	0.062	0.056	0.197	0.926	3.219
	Test value L3	0.668	0.761	0.275	0.076	0.067	0.149	1.288	3.368

<b>PVI-12.5-TL-OUTD</b>					
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	4
Test Value	0.17	0.15	0	1.80	2.18

<b>PVI-10.0-TL-OUTD</b>					
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	4
Test Value	0.17	0.15	0	1.8	2.18

<b>PVI-12.5-TL-OUTD</b>							
VDE 0126 Limit 0.5% of 20A	DC injection [mA]				Power Factor		
	100mA, tested at three power levels				0.95 lag - 0.95 lead at three voltage levels		
Test Level		10%	50%	100%	200 Vac	230 Vac	250 Vac
Test Value	L1	-11.0	-31.0	13.0	0.99	0.99	0.99
	L2	15.0	11.0	-26.0			
	L3	5.0	20.0	20.0			

<b>PVI-10.0-TL-OUTD</b>							
VDE 0126 Limit 0.5% of 16.5A	DC injection [mA]				Power Factor		
	82.5mA, tested at three power levels				0.95 lag - 0.95 lead at three voltage levels		
Test Level		10%	50%	100%	200 Vac	230 Vac	250 Vac
Test Value	L1	-4.0	-15.0	-14.0	0.99	0.99	0.99
	L2	-19.0	8.0	-16.0			
	L3	1.0	1.0	8.0			

## PROTECTION

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

UNDER FREQUENCY TEST						
Fnom=50Hz	SPAIN RD 1699/2011 Limit		Settings		Results	
Under Frequency <	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
		48.00	3.00	48.00	2.92	47.96

OVER FREQUENCY TEST						
Fnom=50Hz	SPAIN RD 1699/2011 Limit		Settings		Results	
Over Frequency >	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]	Frequency [Hz]	Time [s]
		50.50	0.50	50.50	0.42	50.54

UNDER VOLTAGE TEST						
Vφ-n nom =230V	SPAIN RD 1699/2011 Limit		Settings		Results	
Under Voltage <	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
	L1-N	195.5	1.50	195.5	1.44	194.5
L2-N	195.9					1.48
L3-N	195.6					1.48
L1-L2-L3	338.6	1.50	338.6	1.44	336.9	1.47

OVER VOLTAGE TEST						
Vφ-n nom =230V	SPAIN RD 1699/2011 Limit		Settings		Results	
Over Voltage >	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
	L1-N	253.0	1.50	253.0	1.44	252.2
L2-N	252.0					1.49
L3-N	252.1					1.48
L1-L2-L3	438.2	1.50	438.2	1.44	437.2	1.49
Over Voltage >>	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
	L1-N	264.5	0.20	264.5	0.16	264.1
L2-N	263.9					0.19
L3-N	264.0					0.19
L1-L2-L3	458.1	0.20	458.1	0.16	456.0	0.19

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	183	183

LOSS OF MAIN TESTS			
Method used	Rate Of Change Of Frequency and Active Power Variation		
Output power Level	10%Prated	55%Prated	100%Prated
SPAIN RD 1699/2011 Limit [s]	5	5	5
Trip setting [s]	5	5	5
Trip value [s]	4	4	4

**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