



Certificate G59/2

Engineering Recommendation

Manufacturer	SMA Solar Technology AG
Address	Sonnenallee 1
Postal code, place	34266 Niestetal
Country	Germany

Test house details	SMA Solar Technology AG
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Type reference	Max. AC power	Nominal AC power	Nominal AC current
SB 3000TL-21/WB 3000TL-21	3,000 VA	3,000 VA	13
SB 3600TL-21/WB 3600TL-21	3,680 VA	3,680 VA	16
SB 4000TL-21/WB 4000TL-21	4,000 VA	4,000 VA	17.4
SB 5000TL-21/WB 5000TL-21	5,000 VA	4,600 VA	20

The results of the G59/2 tests are summarized in this certificate. SMA declares that all devices (with G59 setting) that are shipped to the UK comply with the requirements defined in engineering recommendation G59/2. These settings cannot be changed by an installer, user or by any other person without the use of a tool (password protected). The complete documentation can be viewed at SMA (headquarters) after prior announcement.

SMA Solar Technology AG
 Niestetal, 2012-10-10

ppa. Frank Greizer
 (Vice President MP T PD)

Test Results

Power Quality

Harmonic current emissions as per BS EN 61000-3-12									
Minimal Short Circuit Ratio R_{SCE}								33	
Value of Short Circuit Power S_{SC} corresponding to R_{SCE}				SB 3000TL-21/WB 3000TL-21			0.099 MVA		
				SB 3600TL-21/WB 3600TL-21			0.121 MVA		
				SB 4000TL-21/WB 4000TL-21			0.132 MVA		
				SB 5000TL-21/WB 5000TL-21			0.152 MVA		
Description		Harmonic current % = $100 I_n/I_1$					Harmonic current distortion factors (%)		
Harmonic		3 rd	5 th	7 th	9 th	11 th	13 th	THD	PWHD
Limit BS EN 61000-3-12 Table 2 - 4		21.6	10.7	7.2	3.8	3.1	2	23 (13)	23 (22)
Actual values	SB 3000TL-21/WB 3000TL-21	2.82	1.40	0.94	0.50	0.40	0.26	1.16	1.57
	SB 3600TL-21/WB 3600TL-21	3.36	1.66	1.12	0.59	0.48	0.31	1.20	1.32
	SB 4000TL-21/WB 4000TL-21	3.67	1.82	1.22	0.65	0.53	0.34	1.23	1.39
	SB 5000TL-21/WB 5000TL-21	4.69	2.32	1.56	0.83	0.67	0.43	1.19	1.14

Voltage fluctuations and flicker				
	Starting	Stopping	Running (at rated power)	
BS EN 61000-3-3 Limit	4%	4%	$P_{st} = 1.0$	$P_{It} = 0.65$
Test value	0%	0%	0.27	0.20

DC injection			
G59/2 Limit	20 mA		
Test level (% of rated power)	10%	55%	100%
Test value	10 mA	14 mA	14 mA

Power factor			
G59/2 Limit	0.95 lag - 0.95 lead		
Test level (AC voltage)	212 V	230 V	248 V
Test value (at rated power)	> 0.99	> 0.99	> 0.99

Undervoltage/Overvoltage

Undervoltage/overvoltage test						
	G59/2 Limit		Setting		Test results	
	Voltage	Time	Voltage	Time	Voltage	Time
Undervoltage stage 1	208.8 V	2.5 s	208.8 V	2.5 s	210.0 V	2.47 s
Undervoltage stage 2	192 V	0.5 s	192 V	0.5 s	193.0 V	0.48 s
Overvoltage stage 1	264 V	1 s	264 V	1 s	261.8 V	0.97 s
Overvoltage stage 2	276 V	0.5 s	276 V	0.5 s	273.9 V	0.48 s

Under/Over Frequency

Under/over frequency test						
	G59/2 Limit		Setting		Test results	
	Frequency	Time	Frequency	Time	Frequency	Time
Under frequency stage 1	47.5 Hz	20 s	47.5 Hz	20 s	47.56 Hz	17.99 s
Under frequency stage 2	47 Hz	0.5 s	47 Hz	0.5 s	47.06 Hz	0.45 s
Over frequency stage 1	51.5 Hz	90 s	51.5 Hz	90 s	51.45 Hz	80.98 s
Over frequency stage 2	52 Hz	0.5 s	52 Hz	0.5 s	51.96 Hz	0.46 s

Loss of Mains Tests

Loss of mains tests (method used: frequency shift)			
Test level (% of rated power)	10%	55%	100%
G59/2 Limit	2.5 s	2.5 s	2.5 s
Actual setting	-	-	-
Trip value	0.70 s	0.56 s	0.68 s

Reconnection Times

Reconnection times			
Test level (% of rated power)	Undervoltage/overvoltage	Under/over frequency	Loss of mains
G59/2 Limit	180 s	180 s	180 s
Actual setting	180 s	180 s	180 s
Recorded value	184 s	184 s	184 s

Fault Level Contribution

As SSEGs (small-scale embedded generators) for PV or wind turbine systems are inverter-connected, they are deemed to automatically comply with regulations and no further tests are required.

Self Monitoring – Solid State Switching

Not applicable as electro-mechanical relays used.