

ENGINEERING RECOMMENDATION G83/1-1

APPENDIX 4 TYPE VERIFICATION TEST SHEET

SSEG DETAILS

SSEG Type reference: IQ7-60-x-INT, x = 2, 5 and IQ7-60-ACM-INT		
SSEG Technology (as per Annex): C		
Manufacturer:	Tel: <i>+1-707-763-4784</i>	Address: <i>Enphase Energy inc. 1420 North McDowell Blvd. Petaluma, Ca 94954 USA</i>
	Fax: <i>+1-707-763-0784</i>	
Technical file reference No: <i>20171019_01</i>		
Maximum export capability <i>240 W/unit</i> (SSEG rating less parasitic load)		

TEST HOUSE DETAILS

Name and address of test house	<i>Enphase Energy 1 Treffers road Wigram 8042 Christchurch New Zealand</i>
Telephone number	<i>+64 3 345 5300</i>
Facsimile number	
E-mail address	<i>dkeis@enphaseenergy.com</i>

TEST DETAILS

Date of test	<i>January 2018</i>
Name of tester	<i>Daniel Keis</i>
Signature of tester	<i>D. Keis</i>
Test location if different from above	

ENGINEERING RECOMMENDATION G83/1-1

APPENDIX 4 TYPE VERIFICATION TEST SHEET

POWER QUALITY

Harmonic current emissions (A)								
Harmonic	2 nd	3 rd	5 th	7 th	9 th	11 th	13 th	15 th ≤ n ≤ 39 th
Limit *	1.08	2.3	1.14	0.77	0.4	0.33	0.21	0.15 x (15/n)
Test value	0.015	0.092	0.473	0.048	0.042	0.042	0.023	0.030 (max)

Note * Maximum permissible harmonic current as per BS EN 61000-3-2 Class A.

Voltage Fluctuations and Flicker				
	Starting	Stopping	Running	
Limit *	4%	4%	P _{st} = 1.0	P _{lt} = 0.65
Test Value	0.12%	0.10%	0.065	0.060

Note Maximum permissible voltage fluctuation (expressed as a percentage of nominal voltage at 100% power) and flicker. As per BS EN 61000-3-3.

	DC injection			Power factor		
G83/1 Limit	20mA, tested at three power levels *			0.95 lag– 0.95 lead at three voltage levels		
Test level	10%	55%	100%	212 V	230 V	248 V
Test value #	2 mA	1 mA	2 mA	1.00	1.00	1.00

Notes * Indicative values are shown for minimum, medium and maximum power levels.

Insert maximum value recorded during testing

UNDER / OVER FREQUENCY TESTS

Parameter	Under Frequency		Over Frequency	
	Frequency	Time	Frequency	Time
G83/1 Limit	47 Hz	0.5 sec *	50.5 Hz	0.5 sec *
Actual setting	47 Hz	0.5 sec	50.5 Hz	0.5 sec
Trip value	47.03 Hz	0.48 sec	50.48 Hz	0.48 sec

UNDER / OVER VOLTAGE TESTS

Parameter	Under Voltage		Over Voltage	
	Voltage	Time	Voltage	Time
G83/1 Limit	207 V	1.5 sec *	264 V	1.5 sec *
Actual setting	209.05 V	1.5 sec	264 V	1.5 sec
Trip value	208.9 V	1.47 sec	263.6 V	1.47 sec

Note: * For SSEG units that can withstand being re-energised from a source that is 180 out of phase with the SSEG output, it is permissible to extend the operating time of the interface protection to 5.0 seconds, as described in 5.3.1. Table 1.

ENGINEERING RECOMMENDATION G83/1-1

APPENDIX 4 TYPE VERIFICATION TEST SHEET

LOSS OF MAINS TEST

Method used:	Active Anti-Islanding as per VDE0126		
Output power level *	33%	55%	100%
Trip setting	0.5 s	0.5 s	0.5 s
Trip value	0.176 s	0.192 s	0.174 s

Note * Indicative values are shown for minimum, medium and maximum power levels.

RECONNECTION TIMES

Reconnection Time	Under/Over voltage	Under/Over Frequency	Loss of mains
Minimum value	180 seconds	180 seconds	180 seconds
Actual Setting	180 seconds	180 seconds	180 seconds
Recorded value	185 seconds	185 seconds	185 seconds

FAULT LEVEL CONTRIBUTION

SSEG Short Circuit Test

This test should determine the value of short circuit current at the SSEG terminals as described in clause 5.7 in Engineering Recommendation G83/1.

For rotating machines and linear piston machines the test should produce a 0 – 2.0 second plot of the short circuit current as seen at the SSEG terminals.

SSEG Short Circuit Parameters

Parameter	Symbol	Value
Peak short-circuit current	i_p	5.1
Initial value of aperiodic component	A	3.22
Initial symmetrical short-circuit current *	I_k	1.93
Decaying (aperiodic) component of short-circuit current *	i_{DC}	0
Reactance / Resistance Ratio of source *	X/R	2.5

Note * Values for these parameters should be provided where the short circuit duration is sufficiently long to enable interpolation of the plot

ENGINEERING RECOMMENDATION G83/1-1

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SELF MONITORING – SOLID STATE SWITCHING

Test	Yes / No
It has been verified that in the event of the solid state switching device failing to disconnect the SSEG, the voltage on the output side of the switching device is reduced to a value below 50 volt within 0.5 sec.	Yes

COMMENTS