



## **TEST REPORT**

# Product NameFlinInfini Turbo On-Grid inverter with<br/>Energy StorageModel Number:FlinInfini Turbo MPPT 5.6kW-48V

Prepared for Address	:	Flin Technologies Private Limited 1601 Montreal Tower, Shastri Nagar, Andheri West, Mumbai - 400 053, India
Prepared by Address	::	EMTEK (SHENZHEN) CO., LTD. Bldg 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
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Report Number : ENS2109280153S00102R





#### TEST REPORT IEC 62116 Test procedure of islanding prevention measures for utilityinterconnected photovoltaic inverters

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Applicant's name:	Flin Technologies Private Limited
Address:	1601 Montreal Tower, Shastri Nagar, Andheri West, Mumbai - 400 053 India
Test specification:	
Standard	IEC 62116:2014
Test procedure:	IEC report
Non-standard test method	N/A
Test Report Form No	IEC62116B
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Test item description	:	FlinInfi	ni Turbo On-Gri	d inverter	r with Energy S	torage
Trade Mark		≅Flin E				
Manufacturer		Samo	as applicant			
	·······	Clininfi			D) /	
Model/Type reference				<b>3.0KVV-4</b> 0	οv	
Ratings	:	See ra	ting label			
<b>D</b>						
Responsible Testing	Laboratory (as a	pplicab	ble), testing pro	cedure a	and testing loc	ation(s):
Testing Labora	tory:		EMTEK (SHEN	ZHEN) C	O., LTD.	
Testing location/ add	ress	:	Bldg 69, Majialo Shenzhen, Gua	ong Indus angdong,	stry Zone, Nans China	shan District,
Tested by (name, fun	ction, signature)	:	Lucien Tan / Engineer	EMTE	LTD,	Linen Fur
Approved by (name,	function, signatu	ire):	William Guo / Manager	* TE	STING *	william Guno
Testing procedu	ure: CTF Stage 1:					
Testing location/ add	ress	:				
Tested by (name, fun	ction, signature)	:				
Approved by (name,	function, signatu	ıre):				
Testing procedu	ure: CTF Stage 2:					
Testing location/ add	ress	:				
Tested by (name + si	gnature)	:				
Witnessed by (name,	function, signate	ure) .:				
Approved by (name,	function, signatu	ıre):				
Testing procedu	ure: CTF Stage 3:					
Testing procedu	ure: CTF Stage 4:					
Testing location/ add	ress	:				
Tested by (name, fun	ction, signature)	:				
Witnessed by (name,	function, signat	ure).:				
Approved by (name,	function, signatu	ıre):				
Supervised by (name	, function, signat	ture) :				
		,				



	Access to the world
List of Attachments (including a total number	r of pages in each attachment):
- Page 2 to 13 for TRF;	
- Page 14 to 21 for Product photos.	
Summary of testing:	
Tests performed (name of test and test	Testing location:
clause):	EMTEK (Shenzhen) Co., Ltd.
6.1. Test for single or multi-phase inverter	Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China.
Summary of compliance with National Differe	ances (List of countries addressed):
List of countries addressed:	ences (List of countries addressed).
The product fulfils the requirements of IEC 6	62116:2014



Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

	Nominal operating voltage 360Vdc
DV	Vmax PV 450Vdc
	PV input voltage range 120-450Vdc
	Isc PV 27A
	MPPT voltage range 120 ~ 430Vdc
	Nominal operating voltage 230 Vac
AC	Nominal output current 24.3A
	Nominal operating frequency 50/60Hz
UUIFUI	Maximum power 5600W
	Power factor range 0.9 lead-0.9lag
10	Nominal operating voltage 230Vac
NDUT	Maximum input current 40A
INPUT	Nominal operating frequency 50/60Hz
DATTEDY	Battery rated voltage 48Vdc
BATTERY	Maximum battery current 137A
VARNING:	
SUITABLE I	FOR MOUNTING ON CONCRETE OR OTHER
NON-COME	BUSTIBLE SURFACE ONLY
CAUTION:1	HE DC AND AC BREAKER MUST HAVE BEEN
TURNED OI	FF BEFORE SERVICING.



Test item particulars:	
Classification of installation and use	Fixed and indoor use, IP21
Supply Connection	Permanent connection
:	
Possible test case verdicts:	
- test case does not apply to the test object::	N/A
- test object does meet the requirement::	P (Pass)
- test object does not meet the requirement:	F (Fail)
Testing:	
Date of receipt of test item:	N/A
Date (s) of performance of tests:	N/A
General remarks:	
"(See Enclosure #)" refers to additional information ap "(See appended table)" refers to a table appended to th	ppended to the report. ne report.
Throughout this report a 🗋 comma / 🔀 point is u	sed as the decimal separator.
Manufacturer's Declaration per sub-clause 4.2.5 of	IECEE 02:
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided	<ul> <li>☐ Yes</li> <li>☑ Not applicable</li> </ul>
When differences exist; they shall be identified in t	he General product information section.
Name and address of factory (ies)	Same as manufacturer



#### General product information:

This report is amended from previous report no. ES210129050S-002, issued date February 27, 2021, due to below amendments:

-Change of Name and address of Applicant, See page 2 of the report for details.

-Change of Name and address of Manufacturer, See page 3 of the report for details.

- Added additional Trade Mark: SFlin Energy, See page 3 of the report for details.

- Changed of Model from InfiniSolar V IV 5.6KW to FlinInfini Turbo MPPT 5.6kW-48V, See page 3 of the report for details.

- Changed of Product Name FlinInfini Lite On-grid Inverter with Energy storage to FlinInfini Turbo On-Grid inverter with Energy Storage, See page 3 of the report for details.

-Change the label, See page 5 of the report for details.

No test requirement.

1) The unit is non-isolated PV grid-interactive inverter and Stand-alone inverter, for indoor use.

2) The enclosure assembly was secured by screws.

4) Dusty conditions on the unit may impair the performance of this inverter.

5) The ambient temperature should be between -10°C and 50°C to ensure optimal operation.

6) It is manufactured to be mounted on a wall and its degree of protection is IP21.

7) Software version: 2 17.05

8) The actual block diagram see below.

- The battery circuit is considered DVC A levels.
- The battery circuit is separated by means of reinforced insulation from DVC C circuits.
- The battery circuit is transformer isolated from the AC output.





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Requirement + Test

Clause

Result - Remark

Verdict

4	Testing circuit		
	The testing circuit shown in Figure 1 is employed.		Р
	Similar circuits are used for three-phase output.		Р
	Parameters to be measured are shown in Table 1		Р
	and Figure 1. Parameters to be recorded in the test		
	report are discussed in Clause 7.		
5	Testing equipment		
5.1	Measuring instruments		Р
	The waveform measurement/capture device is able	Waveform caught from the	P
	to record the waveform from the beginning of the	switch open and the EUT	
	islanding test until the EUT ceases to energize the	cease to energize	
	island.		
-	For multi-phase EUT, all phases are monitored.		Р
	A waveform monitor designed to detect and		P
-	calculate the run-on time may be used.		
	For multi-phase EUT, the test and measurement		P
	equipment is recorded each phase current and each		
	phase-to-neutral or phase-to-phase voltage, as		
	appropriate, to determine fundamental frequency		
	active and reactive power flow over the duration of		
	Ine test.		<b>D</b>
	A sampling fale of 10 kHz of higher is		P
	accuracy is 1 % or less of rated EUT nominal output		
	voltage and 1 % or less of rated EUT nutnut current		
	Current active power and reactive power	Less than 1% of the rated	P
	measurements through switch S1 used to determine	ELIT output current	1
	the circuit balance conditions report the fundamental		
	(50  Hz or  60  Hz) component.		
5.2	DC power source		
5.2.1	General		Р
	A PV array or PV array simulator (preferred) may be		
	used. If the EUT can operate in utility-interconnected		
	mode from a storage battery, a DC power source		
	may be used in lieu of a battery as long as the DC		
	power source is not the limiting device as far as the		
	maximum EUT input current is concerned.		
	The DC power source provides voltage and current		P
	necessary to meet the testing requirements		
	described in Clause 6.		
5.2.2	Pv array simulator	PV simulator used	P
	The tests are conducted at the input voltage defined		Р
	In Table 2 below, and the current is limited to $1,5$		
	umes the rated photovoltaic input current, except		
	A DV array aimulator in recommanded however		
	A F v allay simulator is recommended, nowever,		
	influence the test results		
523	Current and voltage limited DC power supply		N/A
5.2.5	with series resistance		11/74

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Clause	Requirement + Test	Result - Remark	Verdict

	A DC power source used capable of EUT maximum achieve EUT maximum of and maximum EUT input	as the EUT input source is n input power (so as to utput power) at minimum		N/A
	The power source provide voltage limit, set to provide current and open circuit vo the series and shunt resis	es adjustable current and e the desired short circuit oltage when combined with tance described below.		N/A
	A series resistance (and, or resistance) is selected to p the range: Output power: Sufficient to output power and other let conditions of table 5. Response speed: The res to a step in output voltage change, results in a settlin within 10% of its final valu Stability: Excluding the va EUT MPPT, simulator out within 2 % of specified por of the test: from the point achieved until the island c allowable run-on time is e Power factor: 0.25 to 0.8	optionally, a shunt provide a fill factor within o provide maximum EUT vels specified by test sponse time of a simulator e, due to a 5% load ng of the output current to re in less than 1ms. riations caused by the put power remains stable wer level over the duration where load balance is condition is cleared or the xceeded.		N/A
5.2.4	PV array			N/A
	A PV array used as the EU of EUT maximum input po maximum EUT input oper	UT input source is capable ower at minimum and ating voltage.		N/A
	Testing is limited to times by no more than 2 % over measured by a silicon-typ reference device. It may be array configuration to achi power levels prescribed in	when the irradiance varies the duration of the test as e pyranometer or be necessary to adjust the ieve the input voltage and h 6.1.		N/A
5.3	AC power source		,	
	The utility grid or other AC used as long as it meets t Table 4.	power source may be he conditions specified in		Р
	Items	Conditions		
	Voltage	Nominal ±2,0 %		
	Voltage THD	< 2.5 %		
	Frequency	Nominal ±0,1 Hz		
	Phase angle distance '/	120 ° ± 1,5 °		
	inree-phase case only			
5.4	AC loads			



IEC	621	1	(
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R	Result - Remark	Verdict
	F	Result - Remark

	On the AC side of the EUT, variable resistance, capacitance, and inductance are connected in parallel as loads between the EUT and the AC power source. Other sources of load, such as electronic loads, may be used if it can be shown that the source does not cause results that are different than would be obtained with passive resistors, inductors, and capacitors.		Ρ
	All AC loads are rated for and adjustable to all test conditions. The equations for Qf are based upon an ideal parallel RLC circuit. For this reason, non- inductive resistors, low loss (high Qf) inductors, and capacitors with low effective series resistance and effective series inductance are utilized in the test circuit. Iron core inductors, if used, are not exceed a current THD of 2 % when operated at nominal voltage. Load components are conservatively rated for the voltage and power levels expected. Resistor power ratings are chosen so as to minimize thermally-induced drift in esistance values during the course of the test.		P
	Active and reactive power is calculated (using the measurements provided in Table 1) in each of the R, L and C legs of the load so that these parasitic parameters (and parasitics introduced by variacs or autotransformers) are properly accounted for when calculating Qf.		Р
6	Test for single or multi-phase inverter		_
6.1	Test procedure	(see appended table)	P
	The test uses an RLC load, resonant at the EUT nominal frequency (50 Hz or 60 Hz) and matched to the EUT output power.		Р
	For multi-phase EUT, the load is balanced across all phases and the switch S1 as in Figure 1 opens all phases		Р
	This test is performed with the EUT conditions as in Table 5, where power and voltage values are given as a percent of EUT full output rating.		Р
	a)Determine EUT test output power		Р
	b) .Adjusting the DC input source		Р
	c) .Turn off the EUT and open S1		P
	d) Adjust the RLC circuit to have $Qf = 1.0 \pm 0.05$		P
	e)Connect the RLC load configured in step d) to the EUT by closing S2		P
	the test Run-on time is recorded		Р

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	g)For test condition A, adjust the real load and only		Р
	one of the reactive load components to each of		
	the load imbalance conditions shown in the		
	shaded portion of table 6. If any of the recorded		
	run-on times are longer than the one recorded for		
	the rated balance condition, then the non-shaded		
	parameter combinations also require testing.		
	h) For test condition B and C, adjust the only one		Р
	reactive load components by approximately 1,0%		
	per test, within a total range of 95% to 105% of the		
	operating point. If run-on times are still increasing at		
	the 95% or 105% points, additional 1% increments		
	have to be taken until run-on times begin		
	decreasing.		
6.2	Pass/fail criteria		
	An EUT is considered to comply with the	See appendix table below	Р
	requirements for islanding protection when each		
	case of recorded run-on time is less than 2 s or		
	meets the requirements of local codes.		
7	Documentation		
-	At a minimum, the following information is recorded		Р
	and maintained in the test report		
	a) Specifications of EUT. Table 8 provides an		Р
	example of the type of information that is provided		•
	b) Measurement results Table 9 provides an		Р
	example of the type of information that is provided		•
	Actual measured values is to be recorded		
	c) Block diagram of test circuit		Р
	d) Specifications of the test and measurement		P
	equipment. Table 10 provides an example of the		•
	type of information that is provided		
	e) Any test configuration or procedure details such		P
	as methods of achieving specified load and FLIT		•
	output conditions		
	f) Any additional information required by the testing		Р
	laboratory's accreditation		•
	a) Specify the evaluation criterion from clause 6.2		Р
	that was utilized to determine if the product passed		•
	or failed the test		
	Islanding as it applies to PV systems(Informative)		
	General		
Δ 2	Impact of distortion on islanding		
Annox B	Test for independent islanding detection device (relay	()(Informative)	
	Introduction		
D.1 B 2			
D.2 D.2			
D.3			
D.4			
D.0	Documentation		

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Requirement + Test

Clause

Result - Remark

Verdict

6.1	Та	Table: tested condition and run-on time								
No.	P <sub>EUT</sub> (% of EUT rating)	Reactive load (% of normial)	P <sub>AC</sub>	Q <sub>AC</sub>	Run-on time (ms)	P <sub>EUT</sub> (kW)	Actual Q <sub>f</sub> (Var)	Vdc	Remarks 4)	
1	100	100	0	0	437	5.6	1.00	370	Test A at BL	
2	66	66	0	0	458	3.70	1.00	275	Test B at BL	
3	33	33	0	0	369	1.85	1.00	180	Test C at BL	
4	100	100	-5	-5	385	5.6	0.98	370	Test A at IB	
5	100	100	-5	0	256	5.5	0.99	370	Test A at IB	
6	100	100	-5	+5	148	3.6	1.01	370	Test A at IB	
7	100	100	0	-5	146	5.6	0.99	370	Test A at IB	
8	100	100	0	5	157	5.5	0.99	370	Test A at IB	
9	100	100	+5	-5	138	5.6	0.98	370	Test A at IB	
10	100	100	+5	0	252	5.6	0.98	370	Test A at IB	
11	100	100	+5	+5	276	5.6	0.97	370	Test A at IB	
12	66	66	0	-5	216	3.70	0.97	275	Test B at IB	
13	66	66	0	-4	254	3.70	0.97	275	Test B at IB	
14	66	66	0	-3	198	3.70	0.96	275	Test B at IB	
15	66	66	0	-2	274	3.70	0.97	275	Test B at IB	
16	66	66	0	-1	176	3.70	0.98	275	Test B at IB	
17	66	66	0	1	158	3.70	0.98	275	Test B at IB	
18	66	66	0	2	154	3.70	0.98	275	Test B at IB	
19	66	66	0	3	147	3.70	0.98	275	Test B at IB	
20	66	66	0	4	144	3.70	0.98	275	Test B at IB	
21	66	66	0	5	118	3.70	0.98	275	Test B at IB	
22	33	33	0	-5	152	1.85	0.98	180	Test C at IB	

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23	33	33	0	-4	134	1.85	0.98	180	Test C at IB
24	33	33	0	-3	160	1.85	0.96	180	Test C at IB
25	33	33	0	-2	134	1.85	0.97	180	Test C at IB
26	33	33	0	-1	138	1.85	0.98	180	Test C at IB
27	33	33	0	1	154	1.85	0.98	180	Test C at IB
28	33	33	0	2	138	1.85	0.99	180	Test C at IB
29	33	33	0	3	136	1.85	0.99	180	Test C at IB
30	33	33	0	4	124	1.85	0.99	180	Test C at IB
31	33	33	0	5	122	1.85	0.99	180	Test C at IB

Remark:

1) PEUT: EUT output power.

2) PAC: Active power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

3) QAC: Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

4) BL: balance condition, IB: imbalance condition.





Fig. 1 -- Over view 1



Fig. 2 -- Over view 2

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Fig. 3 -- Over view 3



Fig. 4 -- Over view 4





Fig. 5 -- Internal view



Fig. 6 -- Internal view





Fig. 7 -- Component side view



Fig. 8 -- Trace side view





Fig. 9 -- Component side view



Fig. 10 -- Trace side view





Fig. 11 -- Component side view



Fig. 12 -- Trace side view

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Fig. 13 -- Component side view





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Fig. 15 -- Component side view



Fig. 16 -- Trace side view



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