TEST REPORT

IEC 61683

Photovoltaic systems – Power conditioners – Procedure for measuring efficiency

Report Number. ..... :	64.290.15.04846.01
Date of issue..... :	26 October 2015
Total number of pages ..... :	25 Pages
Testing laboratory..... :	TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch
Address..... :	5F, Communication Building, 163 Pingyun Rd, Huangpu Ave. West, Guangzhou 510656, P. R. China
Testing location ..... :	TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch 5F, Communication Building, 163 Pingyun Rd, Huangpu Ave. West, Guangzhou 510656, P. R. China
Applicant's name..... :	INVT Solar Technology (ShenZhen) Co., Ltd.
Address..... :	No.7 Building Gaofa Industrial Park, Longjing, Nanshan District, 518055 Shenzhen, PEOPLE'S REPUBLIC OF CHINA
Test specification:	
Standard ..... :	IEC 61683:1999 (First Edition)
Test procedure ..... :	Test report
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC61683A
Test Report Form(s) Originator.... :	TÜV SÜD Product Service GmbH
Master TRF..... :	Dated 2014-10

General disclaimer:

The test results presented in this report relate only to the object tested.
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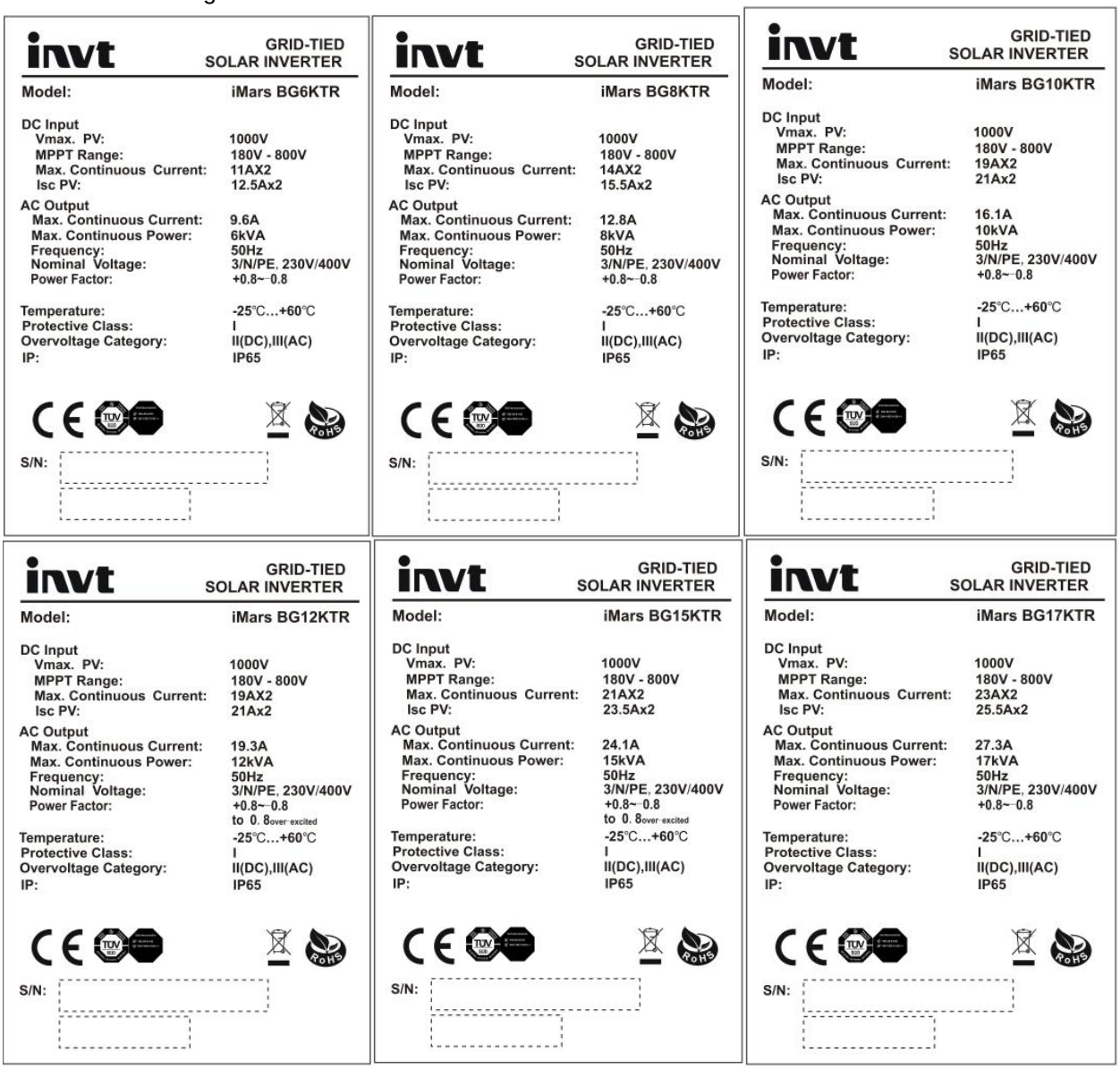
Test item description .....:	PV grid-interactive inverter
Trade Mark .....:	invt
Manufacturer.....:	INVT Solar Technology (ShenZhen) Co., Ltd.
Model/Type reference .....:	iMars BG6KTR, iMars BG8KTR, iMars BG10KTR, iMars BG12KTR, iMars BG15KTR, iMars BG17KTR
Ratings .....:	See page 3

Responsible Testing Laboratory (as applicable), testing procedure and testing location:

☒	Testing location / address .....:	TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch 5F, Communication Building, 163 Pingyun Rd, Huangpu Ave. West, Guangzhou 510656, P. R. China
	Tested by (name + signature).....:	Richard Li .....
	Approved by (+ signature).....:	Billy Qiu .....

Copy of marking plate:
Below electric ratings are silk-screen on label and affixed side of enclosure.



Dimension(Approx.): 70x100 mm

Note: The above artwork nameplate may be only a draft. For the final production, the additional markings or other words which do not conflict with this standard, may be added.

Test item particulars..... :	
Classification of installation and use..... :	Fixed, permanent connection;
Supply Connection..... :	TN or TT system
..... :	
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 .....:	14 October 2015
Date (s) of performance of tests.....:	15 October 2015 ~ 24 October 2015

General remarks:

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used 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 ..... :	☐ **Yes** ☒ **Not applicable**

Models different:

The six models have same PCB layout, communication port, electric circuits, electronic control circuits, and have similar software settings, with differences as below:

(1) Have different amounts of bus capacitors.

(2) Have different software settings for different models.

Name and address of factory (ies) ..... :

Shenzhen INVT Electric Co., Ltd.

Zone A, Juyuan Industrial areas, Tang Wei Fuyong street, Baoan District, 518103 Shenzhen, PEOPLE'S REPUBLIC OF CHINA

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict
4	Efficiency measurement conditions		P
	Efficiency is measured under the conditions in the following clauses.		P
	Specific conditions may be excluded by mutual agreement when those conditions are outside the manufacturer's allowable operating range.		P
4.1	DC power source for testing		P
	For power conditioners operating with fixed input voltage, the d.c. power source is a storage battery or constant voltage power source to maintain the input voltage.		N/A
	For power conditioners that employ maximum power point tracking (MPPT) and shunt-type power conditioners, either a photovoltaic array or a photovoltaic array simulator is utilized.	Two photovoltaic array simulators used.	P
4.2	Temperature		P
	All measurements are to be made at an ambient temperature of 25 °C ± 2 °C.	25 °C ± 2 °C ambient temperature as applicant's required	P
	Other ambient temperatures may be allowed by mutual agreement. However, the temperature used must be clearly stated in all documentation.		N/A
4.3	Output voltage and frequency		P
	The output voltage and frequency are maintained at the manufacturer's stated nominal values.	3N~, 230/400 V, 50 Hz	P
4.4	Input voltage		P
	Measurements performed in each of the following tests are repeated at three power conditioner input voltages: a) manufacturer's minimum rated input voltage; b) the inverter's nominal voltage or the average of its rated input range; c) 90 % of the inverter's maximum input voltage.		P
	In the case where a power conditioner is to be connected with a battery at its input terminals, only the nominal or rated input voltage may be applied.	No battery connected	N/A
4.5	Ripple and distortion		P
	Record input voltage and current ripple for each measurement. Also record output voltage and current distortion (if a.c.) or ripple (if d.c.). Ensure that these measurements remain within the manufacturer's specified values.		P
4.6	Resistive loads/utility grid		P

IEC 61683			
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	At unity power factor, or at the intrinsic power factor of grid-connected inverters without power factor adjustment, measure the efficiency for power levels of 10 %, 25 %, 50 %, 75 %, 100 % and 120 % of the inverter's rating.	The PV grid-interactive inverter can't output 120%of it's nominal power	P
	Stand-alone inverters are also measured at a power level of 5 % of rated. The power conditioner test is conducted with a specified resistive and reactive grid impedance.	grid-connected inverters	N/A
4.7	Reactive loads		N/A
	For stand-alone inverters, measure the efficiency with a load which provides a power factor equal to the manufacturer's specified minimum level (or 0,25, whichever is greater) and at power levels of 25 %, 50 % and 100 % of rated VA.	grid-connected inverters	N/A
	Repeat for power factors of 0,5 and 0,75 (do not go below the manufacturer's specified minimum PF) and power levels of 25 %, 50 %, and 100 % of rated VA.		N/A
4.8	Resistive plus non-linear loads		N/A
	For stand-alone inverters, measure the efficiency with a fixed non-linear load (total harmonic distortion (THD) = (80 ± 5) %) equal to (25 ± 5) % of the inverter's rated VA plus sufficient resistive load in parallel to achieve a total load of 25 %, 50 % and 100 % of rated VA.		N/A
	Repeat the measurements with a fixed non-linear load equivalent to (50 ± 5) % of the inverter's rated VA plus sufficient resistive load in parallel to achieve a total load of 50% and 100% of rated VA.		N/A
	The type of non-linear load must be clearly stated in all documentation.		N/A
4.9	Complex loads		N/A
	When a non-linear plus a sufficient reactive load condition is specified for stand-alone inverters, measure the efficiency with a fixed non-linear load (THD = (80 ± 5) %) equal to (50 ± 5) % of the inverter's rated VA plus a sufficient reactive load (PF = 0,5) in parallel to achieve a total load of 50 % and 100 % of rated VA.		N/A
	The type of complex load is clearly stated in all documentation.		N/A
5	Efficiency calculations		P
5.1	Rated output efficiency		P
5.2	Partial output efficiency		P

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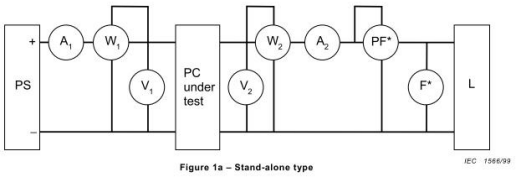
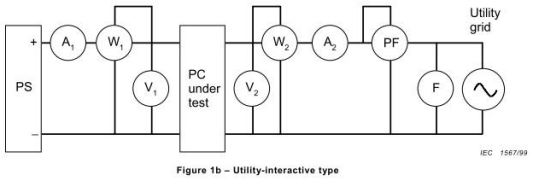
5.3	Energy efficiency		N/A
5.4	Efficiency tolerances		N/A
6	Conditions of loading for output ports		P
6.1	Test circuit		P
	Figure 1a is applied to standard-alone power conditioners		N/A
	 Figure 1a – Stand-alone type		N/A
	Figure 1b is applied to utility-interactive power conditioners		P
	 Figure 1b – Utility-interactive type PC power conditioner PS variable voltage-current d.c. power supply A_1 DC ammeter A_2 AC or d.c. ammeter W_1 DC wattmeter W_2 AC or d.c. wattmeter L load F frequency meter V_1 DC voltmeter V_2 AC or d.c. voltmeter PF power factor meter		P
6.2	Measurement procedure		P
7	Loss measurement		P
7.1	No-load loss	Max. 30 VA	P
7.2	Standby loss	Max. 15 VA	P
Annex A	Power conditioner description		--
Annex B	Power efficiency and conversion factor		--
Annex C	Weighted-average energy efficiency		--
Annex D	Derivation of efficiency tolerance in table 2		--

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Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**							
Model		iMars BG6KTR						
Test condition		(1)Two PV simulators used, each settings: Vmax PV=375 Vdc, V_{mppt}=300 Vdc						
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		300,5	300,5	300,5	300,5	300,5	300,5	300,5	300,5
Input current (Adc)		1,146	2,237	4,305	5,399	6,417	10,578	15,636	20,706
Input power (kW)		0,341	0,668	1,287	1,617	1,922	3,174	4,692	6,212
Output voltage (Vac)	L1-N	230,1	230,2	228,7	228,9	230,2	229,8	229,9	230,2
	L2-N	230,0	230,2	230,8	230,7	230,2	230,6	230,5	230,4
	L3-N	230,4	230,2	231,0	230,9	230,1	230,4	230,4	230,3
Output current (Aac)	L1	1,022	1,081	1,811	2,213	2,636	4,399	6,462	8,595
	L2	0,980	1,083	1,857	2,268	2,679	4,412	6,542	8,674
	L3	1,011	1,126	1,912	2,329	2,739	4,477	6,609	8,744
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,3630	0,7464	0,9173	0,9463	0,9619	0,9855	0,9934	0,9961
	L2	0,4400	0,7998	0,9368	0,9587	0,9703	0,9887	0,9948	0,9969
	L3	0,4753	0,8106	0,9389	0,9595	0,9707	0,9887	0,9947	0,9968
Output active power (kW)	L1	0,085	0,186	0,380	0,479	0,584	0,983	1,476	1,971
	L2	0,099	0,199	0,402	0,502	0,598	1,006	1,499	1,992
	L3	0,111	0,210	0,415	0,516	0,612	1,019	1,514	2,007
Total output active power (kW)		0,295	0,595	1,285	1,497	1,794	3,008	4,491	5,970
Output apparent power (kVA)	L1	0,235	0,249	0,414	0,507	0,607	0,997	1,4862	1,978
	L2	0,225	0,249	0,428	0,523	0,616	1,017	1,508	1,998
	L3	0,233	0,259	0,442	0,538	0,630	1,031	1,522	2.013
Total output apparent power (kVA)		0,694	0,757	1,196	1,568	1,854	3,046	4,516	5,991
Efficiency (η)		86,34%	88,99%	92,85%	92,60%	93,29%	94,77%	95,69%	96,09%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 300 – 800 Vdc specified by manufacture.

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Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG6KTR							
Test condition		(2)Two PV simulators used, each settings: Vmax PV=687,5 Vdc, V_{mppt}=550 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		550,8	550,8	550,8	550,8	550,8	550,8	550,8	550,8
Input current (Adc)		0,663	1,191	2,292	2,863	3,430	5,657	8,401	11,174
Input power (kW)		0,361	0,653	1,258	1,573	1,886	3,112	4,625	6,136
Output voltage (Vac)	L1-N	230,2	229,9	230,3	229,2	229,1	229,7	229,9	230,1
	L2-N	230,2	229,9	230,2	230,6	230,7	230,6	230,4	230,4
	L3-N	230,1	230,6	230,2	230,8	230,8	230,4	230,3	230,4
Output current (Aac)	L1	0,790	1,065	1,814	2,213	2,632	4,337	6,466	8,600
	L2	0,763	1,069	1,846	2,264	2,695	4,412	6,549	8,689
	L3	0,798	1,112	1,898	2,324	2,758	4,477	6,617	8,761
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,5078	0,7676	0,9282	0,9479	0,9601	0,9848	0,9929	0,9958
	L2	0,5977	0,8167	0,9441	0,9598	0,9692	0,9881	0,9944	0,9967
	L3	0,6190	0,8274	0,9450	0,9607	0,9697	0,9881	0,9942	0,9965
Output active power (kW)	L1	0,092	0,187	0,387	0,481	0,579	0,981	1,476	1,975
	L2	0,104	0,201	0,401	0,501	0,602	1,005	1,500	1,995
	L3	0,113	0,212	0,412	0,515	0,617	1,019	1,515	2,011
Total output active power (kW)		0,310	0,601	1,201	1,497	1,799	3,006	4,493	5,977
Output apparent power (kVA)	L1	0,181	0,245	0,418	0,507	0,603	0,996	1,487	1,979
	L2	0,176	0,246	0,424	0,522	0,621	1,101	1,509	2,002
	L3	0,183	0,256	0,436	0,536	0,636	1,031	1,524	2,018
Total output apparent power (kVA)		0,540	0,747	1,279	1,565	1,861	3,045	4,521	5,999
Efficiency (η)		85,75%	91,97%	95,45%	95,16%	95,36%	96,55%	97,13%	97,39%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 300 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**							
Model		iMars BG6KTR						
Test condition		(3)Two PV simulators used, each settings: Vmax PV=1000 Vdc, V_{mppt}=800 Vdc						
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		801,2	801,2	801,2	801,2	801,2	801,2	801,2	801,2
Input current (Adc)		0,448	0,869	1,631	1,992	2,370	3,877	5,806	7,654
Input power (kW)		0,355	0,692	1,302	1,604	1,907	3,106	4,651	6,131
Output voltage (Vac)	L1-N	230,1	230,1	230,2	229,9	230,1	229,4	229,7	229,8
	L2-N	230,1	230,1	230,2	230,4	230,2	230,6	230,5	230,5
	L3-N	230,2	230,2	230,2	230,3	230,2	230,5	230,4	230,4
Output current (Aac)	L1	1,302	1,368	2,021	2,348	2,734	4,358	6,513	8,589
	L2	1,114	1,261	1,984	2,341	2,737	4,411	6,586	8,674
	L3	1,340	1,441	2,123	2,457	2,847	4,507	6,676	8,765
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,2616	0,5862	0,8292	0,8974	0,9265	0,9711	0,9864	0,9919
	L2	0,3795	0,6934	0,8841	0,9324	0,9516	0,9815	0,9912	0,9948
	L3	0,3608	0,6436	0,8453	0,9066	0,9322	0,9732	0,9871	0,9922
Output active power (kW)	L1	0,078	0,184	0,385	0,484	0,583	0,971	1,476	1,958
	L2	0,097	0,201	0,403	0,502	0,599	0,998	1,505	1,989
	L3	0,111	0,213	0,413	0,513	0,611	1,011	1,518	2,004
Total output active power (kW)		0,286	0,599	1,203	1,500	1,794	2,981	4,500	5,952
Output apparent power (kVA)	L1	0,299	0,314	0,465	0,540	0,629	1,002	1,496	1,974
	L2	0,256	0,290	0,456	0,539	0,630	1,107	1,518	1,999
	L3	0,308	0,331	0,488	0,565	0,655	1,038	1,538	2,020
Total output apparent power (kVA)		0,864	0,936	1,316	1,645	1,915	3,056	4,553	5,994
Efficiency (η)		80,56%	86,47%	92,25%	93,81%	94,57%	95,98%	96,73%	97,05%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 300 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG8KTR							
Test condition		(1)Two PV simulators used, each settings: Vmax PV=375 Vdc, V_{mppt}=300 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		300,4	300,4	300,4	300,4	300,4	300,4	300,4	300,4
Input current (Adc)		1,649	2,935	5,711	7,033	8,463	14,119	20,788	27,669
Input power (kW)		0,492	0,877	1,710	2,138	2,538	4,236	6,236	8,297
Output voltage (Vac)	L1-N	230,1	230,2	230,1	229,7	229,7	230,1	230,1	230,3
	L2-N	230,2	230,5	230,2	230,8	230,7	230,4	230,3	230,3
	L3-N	230,1	229,7	230,1	230,1	230,1	230,3	230,2	230,3
Output current (Aac)	L1	1,181	1,501	2,463	3,004	3,504	5,875	8,663	11,538
	L2	1,573	1,517	2,513	3,073	3,608	5,959	8,754	11,627
	L3	1,243	1,596	2,582	3,137	3,667	6,011	8,801	11,675
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,4662	0,7175	0,9062	0,9378	0,9578	0,9842	0,9928	0,9960
	L2	0,5432	0,7715	0,9249	0,9510	0,9556	0,9873	0,9942	0,9968
	L3	0,5260	0,7470	0,9124	0,9419	0,9579	0,9845	0,9929	0,9960
Output active power (kW)	L1	0,126	0,247	0,513	0,647	0,775	1,331	1,979	2,646
	L2	0,144	0,269	0,535	0,674	0,803	1,355	2,005	2,669
	L3	0,150	0,274	0,542	0,679	0,808	1,362	2,012	2,678
Total output active power (kW)		0,421	0,791	1,591	2,001	2,387	4,408	5,997	7,994
Output apparent power (kVA)	L1	0,271	0,345	0,567	0,690	0,811	1,351	1,994	2,657
	L2	0,266	0,349	0,58	0,709	0,832	1,373	2,016	2,678
	L3	0,286	0,366	0,594	0,721	0,844	1,384	2,026	2,689
Total output apparent power (kVA)		0,824	1,062	1,740	2,121	2,488	4,108	6,037	8,024
Efficiency (η)		85,68%	90,17%	92,99%	93,59%	94,02%	95,55%	96,14%	96,33%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 300 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**							
Model		iMars BG8KTR						
Test condition		(2)Two PV simulators used, each settings: Vmax PV=687,5 Vdc, V_{mppt}=550 Vdc						
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		550,8	550,8	550,8	550,8	550,8	550,8	550,8	550,8
Input current (Adc)		0,801	1,553	3,045	3,759	4,526	7,510	11,137	14,837
Input power (kW)		0,444	0,852	1,674	2,068	2,488	4,131	6,126	8,162
Output voltage (Vac)	L1-N	230,2	229,7	229,6	229,7	229,8	230,1	230,2	230,3
	L2-N	230,1	231,4	230,9	230,7	230,6	230,4	230,3	230,3
	L3-N	230,2	229,3	229,9	230,1	230,1	230,2	230,4	230,2
Output current (Aac)	L1	0,973	1,366	2,459	2,975	3,535	5,817	8,716	11,616
	L2	0,961	1,398	2,521	3,046	3,610	5,902	8,714	11,583
	L3	1,030	1,458	2,592	3,111	3,706	6,012	8,759	11,628
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,5387	0,7991	0,9042	0,9358	0,9579	0,9847	0,9933	0,9963
	L2	0,6143	0,8437	0,9255	0,9499	0,9668	0,9878	0,9946	0,9970
	L3	0,5908	0,8203	0,9188	0,9399	0,9600	0,9850	0,9933	0,9962
Output active power (kW)	L1	0,120	0,250	0,510	0,639	0,778	1,317	1,993	2,665
	L2	0,136	0,273	0,538	0,667	0,805	1,343	1,996	2,659
	L3	0,140	0,274	0,543	0,672	0,818	1,363	2,003	2,667
Total output active power (kW)		0,396	0,798	1,593	1,980	2,402	4,024	5,992	7,992
Output apparent power (kVA)	L1	0,224	0,313	0,564	0,683	0,812	1,338	2,006	2.675
	L2	0,221	0,323	0,582	0,702	0,832	1,359	2,007	2.668
	L3	0,237	0,334	0,55	0,715	0,852	1,384	2,016	2.677
Total output apparent power (kVA)		0,682	0,971	1,743	2,102	2,498	4,082	6,030	8,020
Efficiency (η)		89,13%	93,55%	95,15%	95,72%	96,53%	97,39%	97,81%	97,91%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 300 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**							
Model		iMars BG8KTR						
Test condition		(3)Two PV simulators used, each settings: Vmax PV=1000 Vdc, V_{mppt}=800 Vdc						
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		801,2	801,2	801,2	801,2	801,2	801,2	801,2	801,2
Input current (Adc)		0,631	1,119	2,182	2,670	3,032	5,249	7,748	10,453
Input power (kW)		0,501	0,893	1,745	2,137	2,507	4,204	6,206	8,374
Output voltage (Vac)	L1-N	230,3	230,1	229,3	229,4	230,2	229,9	230,0	230.3
	L2-N	230,1	230,2	231,2	231,0	230,2	230,4	230,4	230.3
	L3-N	230,1	230,2	229,9	230,1	230,2	230,3	230,3	230.3
Output current (Aac)	L1	1,394	1,604	2,614	3,114	3,599	5,857	8,617	11,632
	L2	1,268	1,555	2,613	3,123	3,635	5,933	8,708	11,724
	L3	1,486	1,714	2,728	3,226	3,725	6,002	8,769	11,596
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,3641	0,6829	0,8759	0,9142	0,9431	0,9788	0,9901	0,9944
	L2	0,4895	0,7672	0,9131	0,9403	0,9602	0,9855	0,9933	0,9963
	L3	0,4339	0,7104	0,8821	0,9174	0,9436	0,9786	0,9898	0,9942
Output active power (kW)	L1	0,116	0,252	0,525	0,653	0,781	1,318	1,962	2,664
	L2	0,142	0,274	0,551	0,678	0,803	1,347	1,992	2,690
	L3	0,148	0,280	0,553	0,681	0,809	1,352	1,998	2,697
Total output active power (kW)		0,408	0,807	1,630	2,012	2,394	4,018	5,954	8,052
Output apparent power (kVA)	L1	0,321	0,369	0,599	0,714	0,828	1,346	1,982	2,679
	L2	0,291	0,358	0,604	0,721	0,836	1,367	2,006	2,700
	L3	0,341	0,394	0,627	0,742	0,857	1,382	2,019	2,721
Total output apparent power (kVA)		0,955	1,122	1,831	2,178	2,523	4,096	6,008	8,092
Efficiency (η)		81,26%	90,29%	93,37%	94,15%	95,47%	95,56%	95,93%	96,15%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 300 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG10KTR							
Test condition		(1)Two PV simulators used, each settings: Vmax PV=400 Vdc, V_{mppt}=320 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		320,6	320,6	320,6	320,6	320,6	320,6	320,6	320,6
Input current (Adc)		1,770	3,478	6,748	8,201	9,670	16,152	24,240	32,831
Input power (kW)		0,564	1,110	2,159	2,625	3,095	5,169	7,752	10,502
Output voltage (Vac)	L1-N	230,2	230,2	230,2	229,8	230,2	230,2	230,2	230,3
	L2-N	230,2	230,2	230,2	229,8	230,2	230,2	230,2	230,3
	L3-N	230,2	230,2	230,2	229,8	230,2	230,2	230,2	230,3
Output current (Aac)	L1	1,075	1,657	3,008	3,642	4,296	7,186	10,792	14,617
	L2	1,079	1,692	3,063	3,710	4,363	7,260	10,866	14,711
	L3	1,137	1,744	3,102	3,746	4,398	7,291	10,898	14,751
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,6317	0,8641	0,9613	0,9739	0,9810	0,9933	0,9971	0,9975
	L2	0,6911	0,89,2	0,9685	0,9787	0,9846	0,9945	0,9976	0,9980
	L3	0,6688	0,8746	0,9624	0,9743	0,9814	0,9933	0,9970	0,9975
Output active power (kW)	L1	0,156	0,330	0,665	0,815	0,969	1,643	2,478	3,358
	L2	0,171	0,346	0,683	0,837	0,989	1,663	2,497	3,338
	L3	0,174	0,350	0,687	0,840	0,993	1,667	2,502	3,388
Total output active power (kW)		0,502	1,027	2,036	2,492	3,953	4,973	7,478	10,127
Output apparent power (kVA)	L1	0,247	0,381	0,692	0,837	0,988	1,654	2,485	0.366
	L2	0,248	0,389	0,705	0,855	1,005	1,672	2,503	0.387
	L3	0,261	0,401	0,714	0,862	1,012	1,678	2,509	3.398
Total output apparent power (kVA)		0,757	1,117	2,112	2,555	3,006	5,005	7,498	10,151
Efficiency (η)		88,95%	92,48%	94,30%	94,95%	95,38%	96,20%	96,45%	96,43%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 320 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG10KTR							
Test condition		(2)Two PV simulators used, each settings: Vmax PV=700 Vdc, V_{mppt}=560 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		560,9	560,9	560,9	560,9	560,9	560,9	560,9	560,9
Input current (Adc)		1,034	1,953	3,802	4,609	5,625	9,269	13,708	18,583
Input power (kW)		0,577	1,092	2,129	2,582	3,152	5,195	7,684	10,414
Output voltage (Vac)	L1-N	230,2	230,1	230,2	230,2	230,2	230,2	230,2	230,2
	L2-N	230,2	230,3	230,1	230,2	230,3	230,4	230,2	230,2
	L3-N	230,2	230,2	230,2	230,2	230,2	230,2	230,2	230,1
Output current (Aac)	L1	1,253	1,757	3,061	3,674	4,457	7,314	10,823	14,666
	L2	1,244	1,792	3,134	3,754	4,540	7,406	10,915	14,762
	L3	1,322	1,859	3,188	3,804	4,586	7,446	10,953	14,802
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,5482	0,8027	0,9400	0,9588	0,9722	0,9897	0,9953	0,9975
	L2	0,6181	0,8405	0,9522	0,9670	0,9776	0,9917	0,9962	0,9980
	L3	0,5930	0,8189	0,9431	0,9604	0,9730	0,9897	0,9953	0,9974
Output active power (kW)	L1	0,158	0,324	0,660	0,809	0,996	1,665	2,480	3,369
	L2	0,176	0,347	0,688	0,837	1,023	1,691	2,504	3,393
	L3	0,180	0,350	0,691	0,641	1,027	1,697	2,510	3,399
Total output active power (kW)		0,515	1,022	2,041	2,487	3,046	5,054	7,495	10,162
Output apparent power (kVA)	L1	0,288	0,404	0,730	0,844	1,024	1,683	2,492	3,377
	L2	0,286	0,413	0,723	0,866	1,046	1,705	2,513	3,400
	L3	0,304	0,427	0,733	0,875	1,055	1,714	2,522	3,408
Total output apparent power (kVA)		0,878	1,245	2,160	2,585	3,127	5,104	7,528	10,186
Efficiency (η)		89,28%	93,57%	95,83%	96,31%	96,63%	97,28%	97,54%	97,60%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 320 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**							
Model		iMars BG10KTR						
Test condition		(3)Two PV simulators used, each settings: Vmax PV=1000 Vdc, V_{mppt}=800 Vdc						
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		801,3	801,3	801,3	801,3	801,3	801,3	801,3	801,3
Input current (Adc)		0,797	1,390	2,625	3,241	3,845	4,474	9,708	12,750
Input power (kW)		0,635	1,110	2,100	2,595	3,080	5,185	7,777	10,213
Output voltage (Vac)	L1-N	230,2	230,2	230,2	230,2	230,2	230,2	230,2	230,2
	L2-N	230,2	230,2	230,2	230,2	230,2	230,2	230,2	230,2
	L3-N	230,2	230,2	230,2	230,2	230,2	230,2	230,2	230,2
Output current (Aac)	L1	1,445	1,876	3,069	3,720	4,379	7,286	10,920	14,340
	L2	1,354	1,854	3,110	3,777	4,430	7,376	11,014	14,445
	L3	1,545	1,996	3,205	3,864	4,509	7,438	11,067	14,497
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,4911	0,7408	0,9117	0,9408	0,9575	0,9843	0,9929	0,9957
	L2	0,6070	0,8138	0,9379	0,9589	0,9702	0,9891	0,9951	0,9971
	L3	0,5417	0,7613	0,9147	0,9420	0,9575	0,9840	0,9926	0,9955
Output active power (kW)	L1	0,163	0,319	0,642	0,803	0,993	1,685	2,529	3,324
	L2	0,189	0,349	0,674	0,836	0,982	1,681	2,524	3,317
	L3	0,192	0,348	0,674	0,838	0,993	1,685	2,529	3,324
Total output active power (kW)		0,545	1,017	1,991	2,478	2,949	5,016	7,551	9,930
Output apparent power (kVA)	L1	0,332	0,431	0,704	0,853	1,008	1,675	2,514	3,302
	L2	0,311	0429	0,718	0,872	1,020	1,699	2,536	3,327
	L3	0,355	0,457	0,737	0,889	1,037	1,712	2,548	3,339
Total output apparent power (kVA)		0,999	1,317	2,160	2,615	3,066	5,088	7,599	9,968
Efficiency (η)		85,72%	91,51%	94,74%	95,43%	95,73%	96,72%	97,08%	97,21%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 320 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG12KTR							
Test condition		(1)Two PV simulators used, each settings: Vmax PV=437,5 Vdc, V_{mppt}=350 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		350,8	350,8	350,8	350,8	350,8	350,8	350,8	350,8
Input current (Adc)		2,057	3,681	6,334	9,169	10,793	17,875	26,569	35,707
Input power (kW)		0,717	1,286	2,566	3,210	3,779	7,261	9,304	12,497
Output voltage (Vac)	L1-N	230,5	229,6	229,7	229,8	229,9	230,2	230,3	230,4
	L2-N	230,5	229,6	229,7	229,8	229,9	230,2	230,3	230,4
	L3-N	230,5	229,6	229,7	229,8	229,9	230,2	230,3	230,4
Output current (Aac)	L1	1,347	1,952	3,588	43463	2,252	8,715	12,969	17,412
	L2	1,376	2,009	3,672	4,551	5,342	8,809	13,064	17,513
	L3	1,433	2,063	3,712	4,586	5,376	8,839	13,095	17,549
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,6390	0,8464	0,9576	0,9727	0,9800	0,9928	0,9968	0,9982
	L2	0,7045	0,8759	0,9654	0,9775	0,9837	0,9940	0,9974	0,9986
	L3	0,667	0,8574	0,9589	0,9731	0,9804	0,9927	0,9967	0,9920
Output active power (kW)	L1	0,198	0,379	0,789	0,997	1,183	1,991	2,977	4,004
	L2	0,224	0,406	0,817	1,025	1,211	2,016	3,001	4,028
	L3	0,219	0,406	0,819	1,270	1,213	2,021	3,006	4,035
Total output active power (kW)		0,642	1,192	2,426	3,050	3,609	6,029	8,983	12,067
Output apparent power (kVA)	L1	0,310	0,448	0,824	1,02	1,207	2,005	2,987	4,011
	L2	0,318	0,464	0,847	1,049	1,231	2,028	3,008	4,033
	L3	0,327	0,474	0,854	1,055	1,237	2,035	3,015	4,042
Total output apparent power (kVA)		0,956	1,386	2,525	3,130	3,677	6,070	9,011	12,087
Efficiency (η)		89,45%	92,70%	94,53%	95,01%	95,46%	96,28%	96,56%	96,55%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 350 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG12KTR							
Test condition		(2)Two PV simulators used, each settings: Vmax PV=719 Vdc, V_{mppt}=575 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		576,1	576,1	576,1	576,1	576,1	576,1	576,1	576,1
Input current (Adc)		1,171	2,244	4,297	5,396	6,457	10,706	16,266	21,429
Input power (kW)		0,671	1,290	2,473	3,105	3,717	6,163	9,300	12,330
Output voltage (Vac)	L1-N	230,3	229,6	229,7	229,8	229,9	230,2	230,3	230,4
	L2-N	231,4	231,1	230,1	230,1	230,2	230,3	230,4	230,3
	L3-N	229,8	229,8	230,1	230,1	230,2	230,3	230,3	230,3
Output current (Aac)	L1	1,320	1,972	3,524	4,399	5,256	8,692	13,119	17,371
	L2	1,342	2,029	3,604	4,484	5,347	8,787	13,215	17,472
	L3	1,404	2,0822	3,644	4,521	5,380	8,816	13,243	17,506
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,6191	0,8596	0,9585	0,9724	0,9803	0,9928	0,9969	0,9982
	L2	0,6872	0,8870	0,9663	0,9773	0,9837	0,9940	0,9974	0,9986
	L3	0,6536	0,8695	0,9599	0,9730	0,9805	0,9927	0,9968	0,9982
Output active power (kW)	L1	0,188	0,213	0,776	0,983	1,184	1,986	3,012	3,995
	L2	0,213	0,389	0,803	1,010	1,213	2,012	3,035	4,019
	L3	0,209	0,415	0,804	1,012	1,214	2,015	3,040	4,024
Total output active power (kW)		0,611	1,221	2,384	3,006	3,611	6,013	9,087	12,040
Output apparent power (kVA)	L1	0,304	0,310	0,809	1,011	1,214	2,015	3,040	4,024
	L2	0,310	0,452	0,831	1,034	1,232	2,024	3,043	4,025
	L3	0,321	0,468	0,838	1,040	1,238	2,030	3,049	4,032
Total output apparent power (kVA)		0,935	1,400	2,479	3,086	3,679	6,055	9,114	12,060
Efficiency (η)		90,96%	94,63%	96,38%	96,79%	97,15%	97,56%	97,67%	97,63%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 350 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**							
Model		iMars BG12KTR						
Test condition		(3)Two PV simulators used, each settings: Vmax PV=1000 Vdc, V_{mppt}=800 Vdc						
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		801,4	801,4	801,4	801,4	801,4	801,4	801,4	801,4
Input current (Adc)		0,889	1,262	3,143	3,894	4,644	7,657	11,067	15,363
Input power (kW)		0,708	1,300	2,517	3,118	3,719	6,134	9,298	12,307
Output voltage (Vac)	L1-N	230,2	230,1	230,2	230,2	230,2	230,2	230,3	230,2
	L2-N	230,2	230,2	230,2	230,0	230,2	230,1	230,2	230,2
	L3-N	230,2	230,2	230,3	230,2	230,2	230,2	230,2	230,2
Output current (Aac)	L1	1,452	2,037	3,600	4,410	5,245	8,612	13,057	17,263
	L2	1,385	2,034	3,658	4,482	5,318	8,710	13,156	17,379
	L3	1,551	2,135	3,729	4,545	5,376	8,756	13,796	17,426
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,5717	0,8319	0,9457	0,9637	0,9740	0,9901	0,9955	0,9972
	L2	0,6729	0,8763	0,9618	0,9746	0,9817	0,9931	0,9969	0,9982
	L3	0,6065	0,8371	0,9462	0,9637	0,9737	0,9897	0,9952	0,9970
Output active power (kW)	L1	0,191	0,389	0,781	0,975	1,174	1,961	2,993	3,964
	L2	0,214	0,410	0,812	1,008	1,203	1,993	3,021	3,997
	L3	0,216	0,411	0,812	1,009	1,205	1,995	3,025	4,002
Total output active power (kW)		0,622	1,211	2,406	2,993	3,583	5,950	9,039	11,964
Output apparent power (kVA)	L1	0,334	0,468	0,826	1,012	1,205	1,980	3,007	3,975
	L2	0,319	0,468	0,844	1,034	1,225	2,007	3,030	4,004
	L3	0,357	0,491	0,858	1,046	1,237	2,016	3,039	4,014
Total output apparent power (kVA)		1,009	1,428	2,529	3,093	3,669	6,006	9,077	11,994
Efficiency (η)		87,63%	93,13%	95,56%	95,94%	96,31%	96,99%	97,21%	97,21%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 350 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG15KTR							
Test condition		(1)Two PV simulators used, each settings: Vmax PV=500 Vdc, V_{mppt}=400 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		400,3	400,3	400,3	400,3	400,3	400,3	400,3	400,3
Input current (Adc)		2,111	4,023	7,929	9,759	11,787	19,286	29,424	38,964
Input power (kW)		0,840	1,606	3,170	3,904	4,715	7,714	11,763	15,571
Output voltage (Vac)	L1-N	230,1	229,6	229,8	230,1	230,1	230,6	230,4	230,4
	L2-N	230,2	229,4	229,4	230,1	230,2	230,2	230,7	230,2
	L3-N	230,1	229,6	229,8	230,3	230,1	230,2	230,4	230,3
Output current (Aac)	L1	1,473	2,348	4,426	5,477	6,578	10,782	16,447	21,736
	L2	1,504	2,418	4,513	5,533	6,671	10,883	16,551	21,852
	L3	1,552	2,454	4,537	5,535	6,689	10,899	16,571	21,883
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,7127	0,8980	0,9722	0,9815	0,9871	0,9951	0,9979	0,9988
	L2	0,7573	0,9163	0,9768	0,9845	0,9892	0,9960	0,9983	0,9990
	L3	0,7301	0,9026	0,9724	0,9815	0,9871	0,9951	0,9979	0,9987
Output active power (kW)	L1	0,241	0,484	0,989	1,230	1,494	2,470	3,781	5,002
	L2	0,262	0,511	1,016	1,255	1,520	2,497	3,806	5,029
	L3	0,260	0,509	1,016	1,255	1,520	2,497	3,808	5,034
Total output active power (kW)		0,765	1,505	3,021	3,740	4,534	7,565	11,396	15,066
Output apparent power (kVA)	L1	0,339	0,539	1,017	1,253	1,513	2,482	3,789	5,008
	L2	0,347	0,558	1,041	1,274	1,536	2,506	3,812	5,034
	L3	0,356	0,564	1,044	1,278	1,540	2,509	3,817	5,040
Total output apparent power (kVA)		1,042	1,662	3,102	3,807	4,590	7,499	11,418	15,083
Efficiency (η)		90,86%	93,74%	95,30%	95,79%	96,16%	96,76%	96,87%	96,75%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 400 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG15KTR							
Test condition		(2)Two PV simulators used, each settings: Vmax PV=750 Vdc, V_{mppt}=600 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		601,4	601,4	601,4	601,4	601,4	601,4	601,4	601,4
Input current (Adc)		1,376	2,716	5,290	6,446	7,672	12,926	19,395	25,880
Input power (kW)		0,823	1,629	3,178	3,875	4,610	7,767	11,652	15,426
Output voltage (Vac)	L1-N	230,1	229,6	229,8	230,0	230,1	230,3	230,4	230,4
	L2-N	229,5	229,9	230,7	230,5	230,5	230,3	230,3	230,4
	L3-N	229,5	229,9	230,2	230,2	230,3	230,3	230,3	230,4
Output current (Aac)	L1	1,501	2,422	4,501	5,474	6,502	10,946	16,406	21,680
	L2	1,513	2,483	4,589	5,564	6,597	11,046	16,515	21,810
	L3	1,575	2,530	4,620	5,587	6,618	11,065	16,537	21,840
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,6849	0,8922	0,9689	0,9799	0,9856	0,9948	0,9977	0,9999
	L2	0,7442	0,9159	0,9764	0,9780	0,9885	0,9959	0,9982	0,9996
	L3	0,7084	0,8987	0,9707	0,9801	0,9856	0,9948	0,9976	1,0000
Output active power (kW)	L1	0,236	0,496	1,003	1,123	1,474	2,508	3,771	4,989
	L2	0,259	0,526	1,033	1,262	1,502	2,534	3,767	5,019
	L3	0,256	0,523	1,033	1,261	1,502	2,534	3,780	5,023
Total output active power (kW)		0,753	1,545	3,069	3,756	4,478	7,576	11,367	15,031
Output apparent power (kVA)	L1	0,345	0,556	1,035	1,259	1,496	2,521	3,779	4,997
	L2	0,349	0,374	1,058	1,282	1,520	2,544	3,797	5,025
	L3	0,362	0,582	1,064	1,286	1,524	2,547	3,809	5,031
Total output apparent power (kVA)		1,056	1,712	3,157	3,828	4,540	7,612	11,391	15,052
Efficiency (η)		91,34%	94,87%	96,62%	96,94%	97,13%	97,52%	97,56%	97,46%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 400 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG15KTR							
Test condition		(3)Two PV simulators used, each settings: Vmax PV=1000 Vdc, V_{mppt}=800 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		801,8	801,8	801,8	801,8	801,8	801,8	801,8	801,8
Input current (Adc)		1,108	2,005	4,013	4,876	5,858	9,589	14,686	19,401
Input power (kW)		0,884	1,604	3,215	3,907	4,694	7,684	11,770	15,546
Output voltage (Vac)	L1-N	230,1	229,4	229,6	229,9	229,9	230,3	230,3	230,4
	L2-N	230,3	230,2	230,2	230,3	230,3	2303	230,4	230,4
	L3-N	230,2	229,8	230,3	230,3	230,3	230,3	230,4	230,4
Output current (Aac)	L1	1,623	2,425	4,555	5,519	6,612	10,801	16,522	21,795
	L2	1,562	2,446	4,627	5,593	6,698	10,898	16,639	21,918
	L3	1,708	2,527	4,680	5,640	6,738	10,926	16,669	21,962
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,6683	0,8676	0,9638	0,9738	0,9814	0,9927	0,9966	0,9978
	L2	0,7539	0,9055	0,9748	0,9817	0,9870	0,9949	0,9788	0,9986
	L3	0,6923	0,8728	0,9641	0,9737	0,9812	0,9925	0,9965	0,9977
Output active power (kW)	L1	0,249	0,482	1,008	1,235	1,492	2,469	3,792	5,011
	L2	0,271	0,512	1,041	1,265	1,524	2,497	3,825	5,043
	L3	0,272	0,507	1,039	1,264	1,522	2,497	3,826	5,047
Total output active power (kW)		0,793	1,502	3,088	3,766	4,539	7,464	11,444	15,102
Output apparent power (kVA)	L1	0,372	0,556	1,046	1,268	1,520	2,487	3,805	5,022
	L2	0,372	0,566	1,067	1,289	1,544	2,510	3,834	5,050
	L3	0,393	0,580	1,078	1,298	1,551	2,516	3,839	5,509
Total output apparent power (kVA)		1,126	1,703	3,192	3,857	4,616	7,514	11,479	15,132
Efficiency (η)		89,56%	9,359%	96,02%	96,37%	96,67%	97,13%	97,23%	97,14%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 400 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG17KTR							
Test condition		(1)Two PV simulators used, each settings: Vmax PV=500 Vdc, V_{mppt}=400 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		400,2	400,2	400,2	400,2	400,2	400,2	400,2	400,2
Input current (Adc)		2,322	4,511	8,927	10,977	13,211	22,122	33,050	40,089
Input power (kW)		0,925	1,800	3,568	4,389	5,283	8,845	13,211	17,619
Output voltage (Vac)	L1-N	229,9	229,7	229,9	230,0	230,1	230,3	230,4	230,4
	L2-N	231,3	230,9	230,5	230,4	230,4	230,3	230,3	230,2
	L3-N	229,2	230,3	230,2	230,2	230,3	230,3	230,3	230,3
Output current (Aac)	L1	1,553	2,597	4,975	6,126	7,377	12,374	18,458	24,605
	L2	1,600	2,671	5,068	6,218	7,472	12,472	18,565	24,739
	L3	1,642	2,707	5,091	6,239	7,491	12,489	18,592	24,776
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,7473	0,9182	0,9781	0,9853	0,9898	0,9964	0,9984	0,9987
	L2	0,7890	0,9320	0,9815	0,9856	0,9914	0,9969	0,9987	0,9989
	L3	0,7625	0,9208	0,9780	0,9852	0,9897	0,9962	0,9983	0,9989
Output active power (kW)	L1	0,267	0,348	1,118	1,388	1,680	2,839	4,246	5,661
	L2	0,292	0,575	1,147	1,415	1,706	2,863	4,270	5,692
	L3	0,287	0,573	1,143	1,415	1,707	2,865	4,275	5,698
Total output active power (kW)		0,846	1,696	3,411	4,218	5,093	8,567	12,791	17,051
Output apparent power (kVA)	L1	0,357	0,596	1,144	1,409	1,698	2,849	4,253	5,668
	L2	0,370	0,616	1,168	1,433	1,722	2,872	4,276	5,698
	L3	0,376	0,623	1,172	1,436	1,724	2,875	4,282	5,706
Total output apparent power (kVA)		1,104	1,836	3,484	4,278	5,143	8,567	12,811	17,072
Efficiency (η)		91,45%	94,18%	95,62%	96,13%	96,42%	96,82%	96,87%	96,85%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 400 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG17KTR							
Test condition		(2)Two PV simulators used, each settings: Vmax PV=750 Vdc, V_{mppt}=600 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		601,1	601,1	601,1	601,1	601,1	601,1	601,1	601,1
Input current (Adc)		1,543	2,926	5,873	7,292	8,717	14,586	21,667	29,426
Input power (kW)		0,924	1,756	3,529	4,380	5,238	8,763	13,014	17,598
Output voltage (Vac)	L1-N	230,1	230,1	229,9	230,0	230,1	230,3	230,2	230,1
	L2-N	231,6	230,3	230,2	230,2	230,1	230,5	230,1	230,4
	L3-N	228,8	230,1	230,3	230,2	230,3	230,3	230,3	230,3
Output current (Aac)	L1	1,565	2,587	4,988	6,181	7,382	12,344	18,309	24,794
	L2	1,607	2,645	5,081	6,276	7,481	12,446	18,423	24,938
	L3	1,655	2,690	5,107	6,298	7,501	12,464	18,450	24,976
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,7497	0,9113	0,9765	0,9846	0,9891	0,9960	0,9982	0,9985
	L2	0,7980	0,9278	0,9809	0,9873	0,9910	0,9968	0,9986	0,9989
	L3	0,7644	0,9136	0,9265	0,9843	0,9888	0,9959	0,9981	0,9985
Output active power (kW)	L1	0,270	0,542	1,119	1,400	1,680	2,832	4,211	5,704
	L2	0,297	0,565	1,149	1,429	1,708	2,857	4,238	5,739
	L3	0,286	0,566	1,148	1,427	1,708	2,856	4,241	5,744
Total output active power (kW)		0,856	1,673	3,417	4,255	5,096	8,547	12,689	17,186
Output apparent power (kVA)	L1	0,360	0,595	1,147	1,422	1,699	2,846	4,218	5,712
	L2	0,372	0,609	1,172	1,446	1,723	2,886	4,244	5,745
	L3	0,379	0,619	1,176	1,450	1,727	2,870	4,249	5,753
Total output apparent power (kVA)		1,111	1,823	3,494	4,317	5,149	8,580	12,711	17,209
Efficiency (η)		92,72%	95,34%	96,85%	97,12%	97,36%	97,52%	97,56%	97,65%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 400 – 800 Vdc specified by manufacture.

IEC 61683			
Clause	Requirement – Test	Measuring result – Remark	Verdict

TABLE	**Efficiency recording and efficient calculation sheet**								
Model		iMars BG17KTR							
Test condition		(3)Two PV simulators used, each settings: Vmax PV=1000 Vdc, V_{mppt}=800 Vdc							
Total load, % of rated VA		5%	10%	20%	25%	30%	50%	75%	100%
Input voltage (Vdc)		801,6	801,5	801,5	801,5	801,5	801,5	801,5	801,5
Input current (Adc)		1,210	2,327	4,473	5,523	6,642	11,012	16,272	21,989
Input power (kW)		0,971	1,860	3,543	4,424	5,320	8,823	13,038	17,463
Output voltage (Vac)	L1-N	230,3	229,5	229,5	229,6	229,9	229,9	229,9	230,3
	L2-N	230,4	231,1	230,9	230,8	230,5	230,5	230,4	230,4
	L3-N	229,9	229,4	230,2	230,2	230,2	230,3	230,3	230,4
Output current (Aac)	L1	1,990	2,898	5,040	6,263	7,503	13,392	18,310	24,492
	L2	1,910	2,923	5,152	6,364	7,604	12,533	18,452	24,657
	L3	2,110	3,035	5,235	6,437	7,665	12,572	18,487	24,703
Output frequency (Hz)		49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
Power factor (PF)	L1	0,5765	0,8351	0,9466	0,9643	0,9762	0,9906	0,9958	0,9974
	L2	0,6742	0,8791	0,9619	0,9746	0,9829	0,9935	0,9971	0,9953
	L3	0,6002	0,8403	0,9466	0,9640	0,9756	0,9904	0,9955	0,9972
Output active power (kW)	L1	0,263	0,555	1,101	1,387	1,684	2,824	4,198	5,626
	L2	0,296	0,595	1,144	1,431	1,724	2,869	4,238	5,672
	L3	0,294	0,585	1,141	1,429	1,722	2,868	4,239	5,675
Total output active power (kW)		0,853	1,735	3,388	4,247	1,765	8,562	12,676	16,973
Output apparent power (kVA)	L1	0,457	0,665	1,164	1,438	1,725	2,850	4,216	5,640
	L2	0,439	0,667	1,189	1,468	1,725	2,850	4,251	5,681
	L3	0,486	0,696	1,205	1,482	1,754	2,895	4,258	5,691
Total output apparent power (kVA)		1,284	2,038	3,559	4,389	5,243	8,634	12,725	17,013
Efficiency (η)		87,71%	93,22%	95,65%	95,92%	96,43%	97,04%	97,24%	97,24%

Supplementary information:

(1) The above parameters are logged about 1 minutes of average values after the stabilization of the MPP tracking. MPPT range (output full load): 400 – 800 Vdc specified by manufacture.

…… End of test report……..