



TEST REPORT



(Replace No.WT195201148)

Page 1 of 24 Pages

No.:WT195201231

Sample Description: MPPT Hybrid Solar Inverter

Model/Specification/Grade: InfiniSolar TX 20KW

Applicant: VOLTRONIC POWER TECHNOLOGY (SHENZHEN) CORP.

Applicant Address: 1-4F,Building 5,YuSheng Industrial Park,No.467,Section Xixiang,National Highway107,Xixiang,BaoAn District,Shenzhen,China

Date of Receipt: 2019-10-29

Test Period: 2019-10-29 to 2019-10-31

Test Location: Xili Experimental Base

Shenzhen Academy of
Metrology & Quality Inspection
(Stamp)

Approved by: 蔡纯(主任)

Issue Date: 2019-11-13

Signature: 蔡纯

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Complaint hotline : 0755-27528392（龙华 Longhua）



TEST REPORT

No.: WT195201231

Page 2 of 24 Pages

Sample Information:

Sample Description: MPPT Hybrid Solar Inverter

Trade Mark: -----

Model/Specification/Grade: InfiniSolar TX 20KW

Serial/Batch No. of Sample: -----

Manufactured Date: -----

Manufacturer: VOLTRONIC POWER TECHNOLOGY (SHENZHEN) CORP.

Manufacturer Address: 1-4F, Building 5, YuSheng Industrial Park, No.467, Section Xixiang, National Highway107, Xixiang, BaoAn District, Shenzhen, China

Sample Quantity: 1

Sample Description before Testing: Normal

Client Information:

Applicant: VOLTRONIC POWER TECHNOLOGY (SHENZHEN) CORP.

Applicant Address: 1-4F, Building 5, YuSheng Industrial Park, No.467, Section Xixiang, National Highway107, Xixiang, BaoAn District, Shenzhen, China

Applicant Telephone: + 86-755-8601-6601

Applicant Post Code: -----

Test Information:

Date of Receipt: 2019-10-29

Applicant No.: 7878942

Environment Condition: (24.8-26.7) °C (46-66) %RH

Sampling Method: Delivered by Applicant

Judgment Basis: IEC 61683:1999 Photovoltaic systems - Power conditioners - Procedure for measuring efficiency

Test Standard: IEC 61683:1999 Photovoltaic systems - Power conditioners - Procedure for measuring efficiency

Test Conclusion:

See the report for details.

Tested by: 陈官路

陈官路

Checked by: 李菊欢

李菊欢

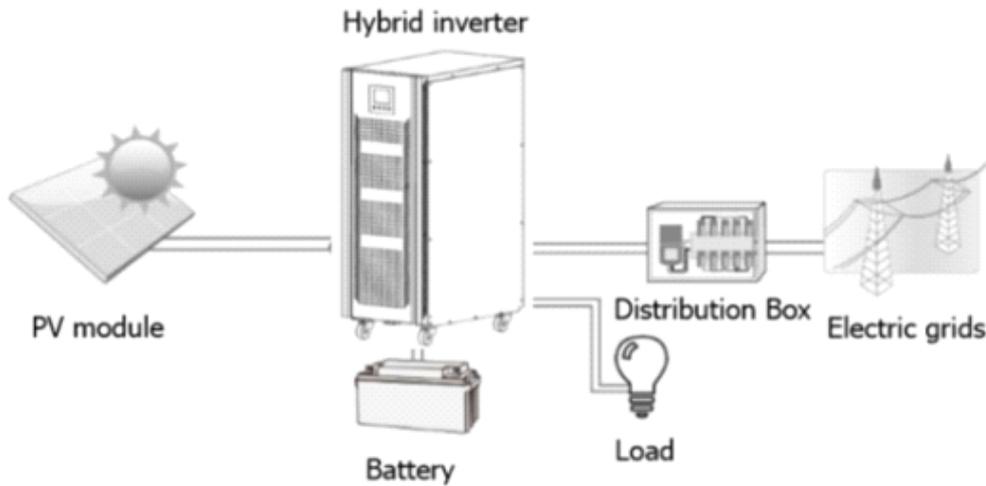
TEST REPORT

No.: WT195201231

Page 3 of 24 Pages

General product information:

The equipment is a multi-function inverter/charger, combining function of inverter, solar charger and battery charger to offer uninterruptible power support with portable size. It's not only three phase stand-alone type inverter but also a three phase on-grid type inverter. The following illustration shows basic application of this equipment.



Ratings:

Model	infiniSolar TX 20KW
Rated output Power (W)	20000W
PV MPP Voltage Range (V)	(550 ~900) V d.c.
PV nominal Input voltage (V)	720V d.c.
PV Maximum DC Voltage(V)	950 V d.c
PV Maximum Input Current(A)	48A
GRID OUTPUT (AC)	
Nominal Output Voltage(V)	230 Va.c (P-N) / 400 Va.c (P-P)
Output Voltage Range(V)	(184 – 265) Va.c per phase
Output Frequency Range(Hz)	(47.5 ~ 51.5) Hz or (59.3~ 60.5)Hz
Nominal Output Current (A)	29 A per phase
Power Factor Range	0.9 lead – 0.9 lag



TEST REPORT

No.: WT195201231

Page 4 of 24 Pages

BATTERY MODE OUTPUT (AC)	
Nominal Output Voltage(V)	230 VAC (P-N) / 400 VAC (P-P)
Rated output Frequency (Hz)	50 Hz / 60 Hz (auto sensing)
Out Voltage waveform	Pure Sine Wave
BATTERY (Lead-acid)	
DC Voltage Range(V)	(300 – 528) Vd.c
Nominal DC Voltage(V)	384 Vd.c
Maximum Battery Current(A)	50A
Weight (kg)	120.4
Size (mm) (W×D×H)	320*559*909
Possible test case verdicts:	
- test case does not apply to the test object	N/A
- test object does meet the requirement	Pass (P)
- test object was not evaluated for the requirement.....:	N/E
- test object does not meet the requirement	Fail (F)

TEST REPORT

No.: WT195201231

Page 5 of 24 Pages

Copy of marking plate

Model No. : InfiniSolar TX 20KW	
Serial No. :  98171709100001	
PV INPUT	Nominal operating voltage 720Vdc
	Vmax PV 900Vdc
	PV input voltage range 450-900Vdc
	Isc PV 48A
	MPPT voltage range 550 ~ 900Vdc
AC OUTPUT	Nominal operating voltage 3/N/PE, 230/400 Vac
	Nominal output current 29A per phase
	Nominal operating frequency 50Hz
	Maximum power 20000W
	Power factor range 0.9 lead-0.9lag
AC INPUT	Nominal operating voltage 3/N/PE, 230/400 Vac
	Maximum input current 50A per phase
	Nominal operating frequency 50Hz
BATTERY	Battery voltage range 300 ~ 528Vdc (29/30/31/32 PCS battery)
	Maximum battery current 50A

Ambient temperature:-10~+55℃
Enclosure:IP 20
Safety class I












5min

WARNING-FIRE HAZARD.
SUITABLE FOR MOUNTING ON CONCRETE OR OTHER
NON-COMBUSTIBLE SURFACE ONLY
CAUTION:THE DC AND AC BREAKER MUST HAVE BEEN
TURNED OFF BEFORE SERVICING
MADE IN CHINA
VOLTRONIC POWER TECHNOLOGY (SHENZHEN) CORP.



TEST REPORT

No.: WT195201231

Page 6 of 24 Pages

Clause	Requirement-Test	Result-Remark	Verdict
4	Efficiency measurement conditions		P
	Efficiency is measured under the conditions in the following clauses.	Refer to Table 1.	P
	Specific conditions may be excluded by mutual agreement when those conditions are outside the manufacturer's allowable operating range.		N/A
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	Constant voltage power source used to maintain the input voltage.	P
	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.		N/A
4.2	Temperature		P
	All measurements are to be made at an ambient temperature of $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.	$(24.8-26.7)^{\circ}\text{C}$	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.	230 VAC (P-N) / 400 VAC (P-P), 50/60Hz	P
4.4	Input voltage	The equipment under test is both a stand-alone type inverter and a on-grid type inverter.	P
	Measurements performed in each of the following tests are repeated at three power conditioner input voltages:		P
	a) manufacturer's minimum rated input voltage;		P
	b) the inverter's nominal voltage or the average of its rated input range;		P
	c) 90 % of the inverter's maximum input voltage.		P



TEST REPORT

No.: WT195201231

Page 7 of 24 Pages

Clause	Requirement-Test	Result-Remark	Verdict
	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.		P
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
	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. 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.	Refer to Table 1.	P
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.		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) = $(80 \pm 5) \%$) equal to $(25 \pm 5) \%$ 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 $(50 \pm 5) \%$ 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



TEST REPORT

No.: WT195201231

Page 8 of 24 Pages

Clause	Requirement-Test	Result-Remark	Verdict
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
	Rated output efficiency shall be calculated from measured data as follows: $\eta_R = (P_o / P_i) \times 100$	Refer to Table 1.	P
5.2	Partial output efficiency		P
	Partial output efficiency shall be calculated from measured data as follows: $\eta_{par} = (P_{op} / P_{ip}) \times 100$	Refer to Table 1.	P
5.3	Energy efficiency		P
	Energy efficiency shall be calculated from measured data as follows: $\eta_E = (W_o / W_i) \times 100$	Refer to Table 1.	P
5.4	Efficiency tolerances		P
	When an efficiency value has been guaranteed, the tolerance of this value shall be within the value at rated conditions indicated in the table 2.	The peak efficiency state in the user's manual is 91%, and the measured peak η_E is above 91%	P

6	Conditions of loading for output ports		P
6.1	Test circuit		P
	Figure 1 shows recommended test circuits for power conditioners which have a single-phase a.c. output or d.c. output. It can as well as be regared as a single-phase representation of a test set-up for multiphase power conditioners.		P



TEST REPORT

No.: WT195201231

Page 9 of 24 Pages

Clause	Requirement-Test	Result-Remark	Verdict
	Figure 1a is applied to standard-alone power and ultity-interactive power conditionners respectively.		P
	The proposed test circuits in figure 1 are not mandatory, but together with the test descriptions, are intended to establish a base for mutual agreement between user and manufacturer.		P
	The type of power source shall be indicated on all tests and shall adhere to the requirements of 4.1		P
6.2	Measurement procedure		P
	a) Efficiency is calculated with equation (1) or (2) using measured P_i , P_o or P_{ip} , P_{op} . DC input power P_i , P_{ip} can be measured by wattmeter W1, or determined by multiplying the d.c. voltmeter V1 and d.c. ammeter A1 readings. Output power P_o , P_{op} is measured with wattmeter W2.		P
	b) DC input voltage, which is measured by d.c. voltmeter V1, shall be varied in the defined range where the output current, which is measured with a.c. ammeter A2, is varied from low output to the rated output.		P
	c) An average indicating instrument shall be used for the d.c. voltmeter and d.c. ammeter. A true r.m.s. type of indicating instrument shall be used for the a.c. voltmeter and a.c. ammeter. The d.c. wattmeter W1 shall be a d.c. measuring type. The wattmeter W2 shall be an a.c. or d.c. measuring type according to the output.		P
	d) Power factor (PF in per cent) can be measured by a power factor meter PF, or calculated from the readings of V2, A2, W2 and as follows: $PF = (W2 / (V2 \times A2)) \times 100$		P
	e) Each meter may be an analogue type or a digital type. The measurement accruacy shall be better than 5 % of the full-scale value for each power measured. Digital power instruments for W1 and W2 are also recommended.		P



TEST REPORT

No.: WT195201231

Page 10 of 24 Pages

Clause	Requirement-Test	Result-Remark	Verdict
	f) An MPPT dynamically adjusts the input voltage so as to maximize the output power. In principle, the monitoring equipment shall sample all of the electrical parameters, such as input voltage and current, output power and current, within the update period of the MPPT. If the MPPT and input source (PV array or PV array simulator) interact in such a way that the input voltage varies by less than 5 %, then averaging of readings is acceptable. The averaging period shall be 30 s or longer.		N/A

7	Loss measurement		P
7.1	No-load loss		P
	No-load loss shall be measured as follows.		P
	If the power conditioner is a stand-alone type, the reading of d.c. input voltage, output voltage and frequency is given with meters V1, V2 and F respectively in figure 1a, and shall be adjusted to the rated values.		P
	The no-load loss is thus the indicated value of d.c. input wattmeter, W1, when the load is disconnected from the power conditioner.	Refer to Table 1.	P
	If the power conditioner is a utility-interactive type, the reading of d.c. input voltmeter V1, a.c. output voltmeter V2 and frequency meter F in figure 1b shall be adjusted to meet the specified voltages and frequency.		P
	No-load loss is thus the indicated value of d.c. input wattmeter, W1, when a.c. wattmeter, W2, indicates a zero value. For the measurement, allow the power conditioner time to transfer to its no-load operating state, if applicable.	Refer to Table 2.	P
7.2	Standby loss		P
	Standby loss shall be measured as follows.		P
	If the power conditioner is a utility-interactive type, standby loss is defined as the consumption of utility power when the power conditioner is not operating but is under standby condition. Standby loss is indicated with a.c. wattmeter, W2 in figure 1b at the rated a.c. output voltage.		P



TEST REPORT

No.: WT195201231

Page 11 of 24 Pages

Clause	Requirement-Test	Result-Remark	Verdict
	If the power conditioner is a stand-alone type, standby loss is defined as the consumption from the d.c. source when the power conditioner is not operating but is under standby condition. Standby loss is indicated with d.c. wattmeter, W1 in figure 1a (without a.c. or d.c. output voltage).		P

Annex A	Power conditioner description		P
	A power conditioner is defined in IEC 61277.		P
	Some types of photovoltaic system configurations relate to their purpose and size. Figure A.1 shows the generic system configuration proposed in IEC 61277. In figure A.1, the power conditioner (PC) is inside the dotted line. The power conditioner may consist of one or more of the following: d.c. conditioner, d.c./d.c. interface, inverter, a.c./a.c. interface, a.c. utility interface, and a part of master control and monitoring (MCM) subsystem. The power flows are indicated by the arrows. When a PV system has a d.c. storage subsystem, it is assumed that the storage is connected to the input of the power conditioner in parallel with the array (see figures A.2 and A.3).	The equipment under test is both a three phase stand-alone type inverter and a three phase on-grid type inverter. As a stand-alone type, the power flow diagram is indicated as figure A.1. As a on-grid type inverter, the power flow diagram is indicated as figure A.2.	P
	Under normal conditions, the power conditioner a.c. output voltage and frequency are constant value when the system is connected to the utility grid (in a utility-interactive type) or to the a.c. loads (in a stand-alone type). However, when a.c. loads consist of pumps or blowers with variable speed induction motors, the a.c. voltage and frequency may be variable.	The a.c. output voltage and frequency are constant value.	P
	In this standard, systems with a constant a.c. output voltage and frequency as well as systems with a d.c. output are discussed. Figures A.2 and A.3 show the configuration of the PV system and the power conditioner described in this standard.	With a constant a.c. output voltage and frequency	P

Annex B	Power efficiency and conversion factor		P
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TEST REPORT

No.: WT195201231

Page 12 of 24 Pages

Clause	Requirement-Test	Result-Remark	Verdict
	<p>There are two types of efficiencies shown in IEC 60146-2; one is a power efficiency, the other is a conversion factor. Power efficiency is defined as the ratio of active output power and active input power. Conversion factor is the ratio between output and input fundamental power levels. The formulae for these two parameters:</p> $\eta_P = (P_{aAC} / P_{aDC}) \times 100 \quad (\%)$ $\eta_C = (P_{fAC} / P_{fDC}) \times 100 \quad (\%)$		P
	<p>Active power P_a is calculated as</p> $P_a = \frac{1}{T} \int_0^T v(t)i(t)dt \quad \text{or} \quad = \frac{1}{T} \int_0^T p(t)dt$		P
	<p>The difference between the above two efficiencies is due to the evaluation of the harmonic components. IEC 60146 unifies them into power efficiency. Their differences depend on their voltage and current waveforms as shown in table B.1 and are only meaningful in case 5. Considering the purpose of IEC standards and the illustration in table B.1, the power efficiency is used as the efficiency of power conditioners.</p>		P
	<p>As shown in table B.1, case 1 or case 4, the difference between C and P is only 0.1% when the d.c. voltage and current ripple are 10 %pp, or when a.c. 5th r.m.s. voltage content is 2 % and the 5th current content is 5 %. This means that the conversion factor is practically the same as the power efficiency. It shall, however, be noted that in the case of a square wave, as in case 5, the power efficiency shall be used because the difference is large, i. e., $\eta_C / \eta_P = 0,81$.</p>		P
	<p>The integration time (duration of one cycle) T shall be 30 s or more and the resultant mean power efficiency value shall be used as the efficiency of the power conditioner.</p>		P

Annex C	Weighted-average energy efficiency		N/A
	<p>The energy of a power conditioner depends on both the irradiance profile and the load profile. The energy efficiency of a power conditioner shall be calculated by the ratio of the output to the input energy actually measured over a certain period (such as a month or a year).</p>		N/A



TEST REPORT

No.: WT195201231

Page 13 of 24 Pages

Clause	Requirement-Test	Result-Remark	Verdict
	For reference, a method of estimating the energy efficiency using a weighted-average energy efficiency is described.		N/A
	The weighted-average energy efficiency, η_{WT} , is calculated as the sum of the products of each power level efficiency and related weighting coefficient.		N/A
	When the system is a utility-interactive type without a storage subsystem, the weighting coefficients depend on a regional irradiance duration curve.		N/A
	When the system is a stand-alone type with a storage subsystem, the weighting coefficients depend on the load duration curve.		N/A
	Clauses C.1 and C.2 show the calculation procedures for η_{WT} for utility-interactive systems and stand-alone systems.		N/A
C.1	η_{WT} of power conditioner for utility-interactive PV systems		N/A
	Utility-interactive PV systems, which have no storage and for which reverse-power flow is accepted, are described. In this case, d.c. power generated by the PV array is supplied direct into the power conditioner (PC). Almost all of the input power to the PC is converted to a.c. power. A part of it is dissipated as the PC loss.		N/A
	<p>The weighted-average energy efficiency, WT, is an index to evaluate annual energy efficiency in which a weighting coefficient, K_i, is used for each input power level. Here, the irradiance is divided into several discrete levels. By using a duration time T_i, d.c. input power level, P_{i1}, output power level, P_{O_i}, and PC efficiency, i, for each level i, WT is defined as follows:</p> $f_{iWT} = \frac{\sum P_{O_i} \cdot T_i}{\sum P_{i1} \cdot T_i} = \frac{P_{11} \cdot f_{11} \cdot T_1 + \dots + P_{1n} \cdot f_{1n} \cdot T_n}{P_{11} \cdot T_1 + \dots + P_{1n} \cdot T_n}$ $= K_1 \cdot f_{11} + K_2 \cdot f_{12} + \dots + K_n \cdot f_{1n}$		N/A



TEST REPORT

No.: WT195201231

Page 14 of 24 Pages

Clause	Requirement-Test	Result-Remark	Verdict
	<p>If the irradiance duration curve is given as shown in figure C.1, equation (C.1) can be rewritten as follows:</p> $\eta_{WT} = \frac{1T_1}{T_{WT}} \eta_{1/4} + \frac{2T_2}{T_{WT}} \eta_{2/4} + \frac{3T_3}{T_{WT}} \eta_{3/4} + \frac{4T_4}{T_{WT}} \eta_{4/4} \geq \eta_{ER}$ $T_{WT} = 1T_1 + 2T_2 + 3T_3 + 4T_4$		N/A
C.2	η_{WT} of power conditioner for stand-alone PV systems		N/A
	In stand-alone PV systems with a storage subsystem, power generated from the PV array is stored and stabilized by the batteries. DC power is converted into regulated d.c. power or constant-voltage and constant-frequency a.c. power by a power conditioner (PC) and supplied to the load. In this case, some fraction of the generated power is dissipated as a loss in the batteries and power conditioner.		N/A
	The calculation of the weighted-average energy efficiency, η_{WT} , for stand-alone PV systems requires weighting coefficients for respective load levels.		N/A
	<p>By using a load duration time T_i, d.c. input power P_{Ii}, a.c. output power P_{Oi} and PC efficiency for respective load level i, η_{WT} is defined as follows:</p> $\eta_{WT} = \frac{\sum P_{Oi} \cdot T_i}{\sum P_{Ii} \cdot T_i} = \frac{\sum P_{O1} \cdot T_1 + \dots + P_{On} \cdot T_n}{P_{I0} \cdot T_0 + P_{O1} \cdot T_1 / \eta_{i1} + P_{On} \cdot T_n / \eta_{in}}$ $= \frac{1}{K_0 + K_1 / \eta_{i1} + \dots + K_n / \eta_{in}}$		N/A
Annex D	Derivation of efficiency tolerance in table 2		N/A

Table 1	Efficiency measurement(stand-alone mode)							P
Model	infiniSolar TX 20KW							
Ambient temperature	(24.8-26.7)°C							
Output rated power	20000W							
Input rated voltage	384Vd.c							
Standby loss power	28W							
No-load loss power	242W							
Total load, % of rated VA	5%	10%	25%	50%	75%	100%	120%	



TEST REPORT

No.: WT195201231

Page 15 of 24 Pages

Table 1		Efficiency measurement(stand-alone mode)						P
Stand alone inverter with battery supply								
Voltage	Pac/Pac,r [%]:	5.01%	10.08%	25.05%	49.86%	75.11%	99.80%	--
Output efficiency								
Vnorminal	R-Vac[V]	230.18	230.21	230.26	229.92	229.81	229.65	--
	R-Iac[A]	2.24	3.32	7.38	14.66	21.28	29.16	--
	R-Pop [W]	295.19	607.54	1583.77	3351.14	4875.05	6686.12	--
	R-PF	0.57	0.80	0.93	0.99	1.00	1.00	--
	S-Vac[V]	230.56	230.60	230.72	230.23	230.13	230.01	--
	S-Iac[A]	2.67	3.91	8.09	14.45	22.10	28.88	--
	S-Pop [W]	346.50	703.88	1717.23	3303.75	5069.39	6629.88	--
	S-PF	0.56	0.78	0.92	0.99	1.00	1.00	--
	T-Vac[V]	230.46	230.49	230.58	230.12	229.99	229.84	--
	T-Iac[A]	2.66	3.87	8.03	14.52	22.15	28.97	--
	T-Pop [W]	359.50	703.93	1708.92	3317.36	5078.46	6644.73	--
	T-PF	0.59	0.79	0.92	0.99	1.00	1.00	--
	Total-Vac [V]	230.40	230.43	230.52	230.09	229.98	229.83	--
Total-Iac [A]	2.52	3.70	7.84	14.54	21.84	29.00	--	

Table 1		Efficiency measurement(stand-alone mode)						P
Volta ge	Pac/Pac,r [%]:	5.01%	10.08%	25.05%	49.86%	75.11%	99.80%	--



TEST REPORT

No.: WT195201231

Page 16 of 24 Pages

Vnor minal	Total-Pop [W]	1001.19	2015.35	5009.92	9972.25	15022.90	19960.72	--	
	Total-PF	0.57	0.79	0.92	0.99	1.00	1.00	--	
	Vdc[V]	385.09	385.08	385.09	385.09	385.09	384.84	--	
	Idc[A]	3.29	5.99	14.09	27.59	41.83	56.22	--	
	Pip [W]	1268.50	2306.43	5423.49	10625.35	16108.18	21636.54	--	
	η_{par} [%]	78.93	87.38	92.37	93.85	93.26	92.25	--	
	R-Uthd [%]	1.18	0.77	2.44	1.37	1.41	1.44	--	
	R-Ithd[%]	7.29	3.97	6.92	1.81	1.70	1.62	--	
	S-Uthd[%]	1.13	1.07	3.07	1.22	1.49	1.41	--	
	S-Ithd[%]	7.97	4.46	8.07	1.66	1.73	1.59	--	
	T-Uthd[%]	1.01	1.03	2.78	1.33	1.34	1.47	--	
	T-Ithd[%]	7.84	4.40	7.51	1.77	1.60	1.65	--	
	Power efficiency								
	Total - PaAC[W]	1004.51	2022.10	5026.52	10005.56	15072.84	20027.88	--	
	PaDC[W]	1268.72	2306.82	5425.05	10625.39	16108.19	21636.51	--	
	η_P [%]	79.18	87.66	92.65	94.17	93.57	92.57	--	
	Conversion factor								
	Total - PfAC[W]	994.50	1995.53	4911.42	9940.33	14973.74	19894.50	--	
	PfDC[W]	1268.72	2306.82	5425.05	10625.39	16108.19	21636.51	--	
	η_C [%]	78.39	86.51	90.53	93.55	92.96	91.95	--	

Table 1	Efficiency measurement(stand-alone mode)	P
Energy efficiency		



TEST REPORT

No.: WT195201231

Page 17 of 24 Pages

Volta ge	Pac/Pac,r [%]:	5.01%	10.08%	25.05%	49.86%	75.11%	99.80%	
Vnor minal	Total -Wo [Wh] (5min.)	83.71	168.51	418.88	833.80	1256.07	1668.99	--
	Wi[Wh] (5min.)	106.07	192.84	453.46	888.40	1346.81	1809.09	--
	$\eta E = (W_o / W_i) \times 100\%$	78.92	87.38	92.37	93.85	93.26	92.26	--

Note:
 ηR is the rated output efficiency.
 η_{par} is the partial output efficiency.
 ηE is the energy efficiency.
 The inverter can not overload to 120%.
 As a stand-alone type, the power flow diagram is indicated as figure A.1.

Table 2		Efficiency measurement(Utility-interactive mode)						P
Model		infiniSolar TX 20KW						
Ambient temperature		(24.8-26.7)°C						
Output rated power		20000W						
Input rated voltage		550Vd.c						
Standby loss power		20.7W						
No-load loss power		26W						
Total load, % of rated VA		5%	10%	25%	50%	75%	100%	
Voltag e	Pac/Pac,r [%]:	--	10.06%	25.01%	50.59%	75.55%	100.03%	
Vmin	Output efficiency							
	R-Vac[V]	--	230.01	229.50	229.44	229.56	229.95	
	R-Iac[A]	--	5.30	8.57	15.52	22.66	29.69	
	R-Pop [W]	--	833.80	1819.42	3511.89	5172.29	6804.83	

Table 2		Efficiency measurement(Utility-interactive mode)						P
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TEST REPORT

No.: WT195201231

Page 18 of 24 Pages

Voltag e	Pac/Pac,r [%]:	--	10.06%	25.01%	50.59%	75.55%	100.03%
Vmin	R-PF	--	0.68	0.93	0.99	0.99	1.00
	S-Vac[V]	--	229.59	229.05	228.94	229.02	229.37
	S-Iac[A]	--	4.52	7.72	14.79	21.99	29.04
	S-Pop [W]	--	619.40	1625.22	3339.61	5002.92	6631.67
	S-PF	--	0.60	0.92	0.99	0.99	1.00
	T-Vac[V]	--	230.15	229.60	229.60	229.64	229.91
	T-Iac[A]	--	4.22	7.35	14.39	21.62	28.72
	T-Pop [W]	--	558.05	1556.90	3266.72	4934.24	6570.02
	T-PF	--	0.57	0.92	0.99	0.99	1.00
	Total-Vac [V]	--	229.92	229.39	229.33	229.41	229.74
	Total-Iac [A]	--	4.68	7.88	14.90	22.09	29.15
	Total-Pop [W]	--	2011.25	5001.54	10118.21	15109.45	20006.52
	Total-PF	--	0.62	0.92	0.99	0.99	1.00
	Vdc[V]	--	562.10	561.85	561.82	562.00	562.07
	Idc[A]	--	4.20	9.74	19.49	29.27	39.09
	Pip [W]	--	2359.78	5473.65	10949.20	16446.54	21972.25
	ηpar[%]	--	85.23	91.37	92.41	91.87	91.05
	R-Uthd[%]	--	1.25	0.99	1.01	1.05	1.22
	R-Ithd[%]	--	30.30	16.19	10.71	9.29	7.76
	S-Uthd[%]	--	1.15	0.82	0.95	0.90	1.11
S-Ithd[%]	--	27.39	18.10	12.66	10.34	8.63	
T-Uthd[%]	--	1.26	1.02	1.16	1.00	1.00	
T-Ithd[%]	--	39.08	20.89	11.74	9.72	8.06	

Table 2	Efficiency measurement(Utility-interactive mode)	P
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TEST REPORT

No.: WT195201231

Page 19 of 24 Pages

Voltage	Pac/Pac,r [%]:	--	10.06%	25.01%	50.59%	75.55%	100.03%
Vmin	Power efficiency						
	Total -PaAC[W]	--	2017.90	5018.30	10151.88	15159.96	20073.00
	PaDC[W]	--	2359.95	5473.97	10949.75	16447.11	21972.91
	ηP [%]	--	85.51	91.68	92.71	92.17	91.35
	Conversion factor						
	Total -PfAC[W]	--	2008.30	4990.76	10084.97	15058.49	19933.65
	PfDC[W]	--	2359.95	5473.97	10949.75	16447.11	21972.91
	ηC [%]	--	85.10	91.17	92.10	91.56	90.72
	Energy efficiency						
	Total -Wo[Wh] (5min.)	--	168.16	418.19	845.99	1263.33	1672.75
	Wi[Wh] (5min.)	--	197.30	457.67	915.46	1375.13	1837.11
	$\eta E = (Wo / Wi) \times 100\%$	--	85.23	91.37	92.41	91.87	91.05

Table 2		Efficiency measurement(Utility-interactive mode)						P
Model		infiniSolar TX 20KW						
Ambient temperature		(24.8-26.7)°C						
Output rated power		20000W						
Input rated voltage		720Vd.c						
Standby loss power		20.7W						
No-load loss power		26W						
Total load, % of rated VA		5%	10%	25%	50%	75%	100%	
Voltage	Pac/Pac,r [%]:	--	9.91%	25.39%	50.43%	75.58%	100.09%	
	Output efficiency							
Vnormal	R-Vac[V]	--	230.01	229.48	229.54	229.54	229.87	
	R-Iac[A]	--	5.29	8.67	15.48	22.69	29.72	
	R-Pop [W]	--	827.96	1845.46	3502.98	5176.60	6808.51	



TEST REPORT

No.: WT195201231

Page 20 of 24 Pages

Voltage	Pac/Pac,r [%]:	--	9.91%	25.39%	50.43%	75.58%	100.09%
Vnormal	R-PF	--	0.68	0.93	0.99	0.99	1.00
	S-Vac[V]	--	229.58	229.03	229.07	229.04	229.34
	S-Iac[A]	--	4.51	7.83	14.74	22.00	29.07
	S-Pop [W]	--	607.88	1651.81	3329.81	5006.98	6638.33
	S-PF	--	0.59	0.92	0.99	0.99	1.00
	T-Vac[V]	--	230.14	229.59	229.67	229.64	229.88
	T-Iac[A]	--	4.19	7.45	14.33	21.61	28.73
	T-Pop [W]	--	545.39	1581.02	3254.02	4932.21	6571.45
	T-PF	--	0.57	0.92	0.99	0.99	1.00
	Total-Vac [V]	--	229.91	229.37	229.42	229.41	229.69
	Total-Iac [A]	--	4.66	7.98	14.85	22.10	29.17
	Total-Pop [W]	--	1981.23	5078.29	10086.82	15115.79	20018.29
	Total-PF	--	0.62	0.92	0.99	0.99	1.00
	Vdc[V]	--	691.07	710.70	716.84	715.05	714.79
	Idc[A]	--	3.41	7.94	15.38	23.21	31.00
	Pip [W]	--	2353.71	5644.17	11026.51	16594.70	22157.15
	η_{par} [%]	--	84.17	89.97	91.48	91.09	90.35
	R-Uthd[%]	--	1.23	0.82	0.97	1.06	1.13
	R-Ithd[%]	--	29.51	15.88	10.58	9.26	7.62
	S-Uthd[%]	--	1.07	0.74	1.02	0.93	1.05
	S-Ithd[%]	--	27.04	17.95	12.45	10.22	8.45
	T-Uthd[%]	--	1.27	0.90	1.17	0.97	1.13
	T-Ithd[%]	--	37.95	20.67	11.64	9.60	8.13
Power efficiency							
Total -PaAC [W]	--	1988.24	5112.04	10120.50	15166.20	20085.12	
PaDC[W]	--	2354.25	5644.77	11027.71	16596.04	22158.62	



TEST REPORT

No.: WT195201231

Page 21 of 24 Pages

Table 2		Efficiency measurement(Utility-interactive mode)					P
Voltage	Pac/Pac,r [%]:	--	9.91%	25.39%	50.43%	75.58%	100.09%
Vnorminal	ηP [%]	--	84.45	90.56	91.77	91.38	90.64
	Conversion factor						
	Total -PfAC [W]	--	1978.53	5082.19	10053.80	15064.97	19947.93
	PfDC[W]	--	2354.25	5644.77	11027.71	16596.04	22158.62
	ηC [%]	--	84.04	90.03	91.17	90.77	90.02
	Energy efficiency						
	Total -Wo [Wh] (5min.)	--	165.69	426.00	843.38	1263.85	1673.76
	Wi[Wh] (5min.)	--	196.84	473.47	921.96	1387.51	1852.60
	$\eta E=(W_o/W_i) \times 100\%$	--	84.17	89.97	91.48	91.09	90.35

Table 2		Efficiency measurement(Utility-interactive mode)					P
Model			infiniSolar TX 20KW				
Ambient temperature			(24.8-26.7)°C				
Output rated power			20000W				
Input rated voltage			855Vd.c				
Standby loss power			20.7W				
No-load loss power			26W				
Total load, % of rated VA		5%	10%	25%	50%	75%	100%
Voltage	Pac/Pac,r [%]:	--	9.43%	25.30%	50.29%	75.48%	99.56%
Output efficiency							
0.9* Vmax	R-Vac[V]	--	230.01	229.49	229.43	229.52	229.71
	R-Iac[A]	--	5.20	8.64	15.44	22.66	29.59



TEST REPORT

No.: WT195201231

Page 22 of 24 Pages

Voltage	Pac/Pac,r [%]:	--	9.43%	25.30%	50.29%	75.48%	99.56%
0.9* Vmax	R-Pop [W]	--	794.26	1839.44	3493.76	5171.16	6773.05
	R-PF	--	0.66	0.93	0.99	0.99	1.00
	S-Vac[V]	--	229.59	229.04	228.94	229.01	229.21
	S-Iac[A]	--	4.45	7.80	14.71	21.98	28.96
	S-Pop [W]	--	576.78	1645.40	3320.71	5001.41	6607.72
	S-PF	--	0.56	0.92	0.99	0.99	1.00
	T-Vac[V]	--	230.16	229.59	229.60	229.62	229.74
	T-Iac[A]	--	4.13	7.42	14.29	21.58	28.57
	T-Pop [W]	--	514.09	1575.96	3243.45	4924.28	6531.45
	T-PF	--	0.54	0.93	0.99	0.99	0.99
	Total-Vac [V]	--	229.92	229.37	229.32	229.38	229.55
	Total-Iac [A]	--	4.59	7.96	14.81	22.08	29.04
	Total-Pop [W]	--	1885.13	5060.80	10057.93	15096.84	19912.22
	Total-PF	--	0.59	0.92	0.99	0.99	1.00
	Vdc[V]	--	802.66	839.79	837.00	827.76	820.25
	Idc[A]	--	2.83	6.75	13.25	20.13	26.99
	Pip [W]	--	2271.28	5666.43	11088.66	16665.20	22135.57
	ηpar[%]	--	83.00	89.31	90.70	90.59	89.96
	R-Uthd[%]	--	1.27	1.07	1.05	0.99	1.20
	R-Ithd[%]	--	30.95	16.32	10.53	9.21	7.73
S-Uthd[%]	--	1.20	0.87	0.94	1.00	1.02	
S-Ithd[%]	--	27.17	18.18	12.24	10.42	8.58	
T-Uthd[%]	--	1.29	1.10	1.03	1.12	1.10	
T-Ithd[%]	--	38.17	20.97	11.34	9.72	8.21	

Table 2	Efficiency measurement(Utility-interactive mode)	P
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TEST REPORT

No.: WT195201231

Page 23 of 24 Pages

Voltage	Pac/Pac,r [%]:	--	9.43%	25.30%	50.29%	75.48%	99.56%
0.9* Vmax	Power efficiency						
	Total -PaAC [W]	--	1891.45	5077.97	10094.08	15138.60	19962.12
	PaDC[W]	--	2271.79	5667.11	11089.68	16666.55	22137.13
	ηP [%]	--	83.26	89.60	91.02	90.83	90.17
	Conversion factor						
	Total -PfAC [W]	--	1882.57	5049.92	10035.10	15032.96	19818.37
	PfDC[W]	--	2271.79	5667.11	11089.68	16666.55	22137.13
	ηC [%]	--	82.87	89.11	90.49	90.20	89.53
	Energy efficiency						
	Total -Wo [Wh] (5min.)	--	157.62	423.16	841.17	1261.55	1663.51
	Wi[Wh] (5min.)	--	189.91	473.80	927.38	1392.61	1849.23
	$\eta E = (W_o / W_i) \times 100\%$	--	83.00	89.31	90.70	90.59	89.96

Note:

ηR is the rated output efficiency.

η_{par} is the partial output efficiency.

ηE is the energy efficiency.

The inverter can not overload to 120%.

As a on-grid type inverter, the power flow diagram is indicated as figure A.2.

TEST REPORT

No.: WT195201231

Page 24 of 24 Pages



The front of the sample



The back of the sample
--End of test report--