"our footprint evidences our quality"

TEST REPORT

Test Report No.: TR120200903001		*Page 1 of 5*	
		Issue Date:	03/09/2020
Customer/Manufacture Name:	System Level Solutions (India) Pvt. Ltd. Plot No. 32, Zone D-4, Phase-1, G.I.D.C. Estate, Vithal Udyognagar-388121, Gujarat, India.		
Sample/Item Description:	Said to be "Micro Inverter, Single Phase, grid tied, 1400W output power, utility interactive inverter with integrated GFDI, Brand: System Level Solutions, Trademark: System Level Solutions"		
Sample/Item Condition:	Fit for testing		
Identification:	Model Name: MSI1500	Serial No.:	1114A4050046
		Sample Code:	N/A
Sample Deposited/Collected by:	Customer		
Customer Reference no.	Nil	*Date:*	20/08/2020
Job Order No.:	BTH-R1/EL/200821/1	*Date of receipt:*	21/08/2020
Date(s) of performance of tests	21/08/2020 to 03/09/2020		
Test Location:	At Lab		
Laboratory Name and Address:	**BHARAT TEST HOUSE PVT. LTD.** 1474, HSIIDC Indl. Estate, Rai, Distt. Sonepat-131001 Haryana.		
Test specification(s):	Protocol followed as per IEC 61683:1999		
General Environmental Conditions:	Temperature: 25±2°C, Relative humidity: 65±5%RH, Air Pressure: 75kPa to 106kPa		
		Scan this QR Code to verify the Report	
Result:	The sample confirms the relevant test specification as per below report.		
Supplementary Information:	- Deviation from the test methods as prescribed in relevant Specification/Work Instructions: Nil. - The information supplied by the customer may affect the validity of results reported as per standard requirement.		
Abbreviations:	N/A		
Remarks: *1.* The report has been generated and verified digitally.			
This report is related to the sample submitted.			

Tested by:	**Approved by:**	**Issued by:**
	BHARAT TEST HOUSE (P) LTD.	
T.Gautam	**P. Dinesh Babu**	**P. Dinesh Babu**
Testing Engineer	**TM**	**TM**
Date: 03/09/2020	**Date: 03/09/2020**	**Date: 03/09/2020**

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Tel: 0130-2367673, 2974474 | email: bthrai@bharattesthouse.com

Product information: Specification of Equipment under Test (EUT) provided by Manufacturer

Parameter	Value
1) Rating	
a) Maximum Output power	1400 W
b) DC Voltage range	22V – 55V
c) DC Current range	40A
d) AC Voltage range	(212 – 264) V
e) Frequency range	(48 – 52) Hz
f) AC Current Limits	6.09A
g) Efficiency	95%
h) Voltage and frequency trip settings (magnitude and timigs)	--
i) Other software settings	--
j) Firmware version	--
2) Others	
a) Displays	--
b) Temperature Range	-25°C to 60°C
c) Humidity	--
d) Size (LxBxH)	32.2 cm x 27.8 cm x 6.1 cm
e) Weight	7.5 Kg

i) Efficiency test as per the requirements of Cl. No. 4.6, 5.1, 5.2 & 5.3.

Table 1: Efficiency recording sheet

Input voltage:		Vmin. = 37.7 V						
Sl. No.	**Testing, load, % of rated VA (Resistive load)**	**5%**	**10%**	**25%**	**50%**	**75%**	**100%**	**120%**
1	Input DC Voltage (V)	-	37.7	37.8	38.1	37.9	37.8	-
2	Input DC Current (A)	-	4.03	10.03	19.89	29.91	39.85	-
3	Input DC Power (W)	-	151.9	379.1	757.8	1133.6	1506.3	-
4	Output RMS Voltage (V)	-	230.22	230.24	230.25	230.28	230.26	-
5	Output RMS Current (A)	-	0.65	1.51	3.11	4.65	6.19	-
6	Output AC Power (W)	-	136.1	340.7	708.9	1060.1	1411.1	-
7	Power Efficiency (%)	-	89.6	89.9	93.5	93.5	93.7	-
8	Power factor	-	0.91	0.98	0.99	0.99	0.99	-
9	Voltage THD (%)	-	0.04	0.04	0.04	0.05	0.06	-
10	Current THD (%)	-	19.13	7.68	4.15	2.89	2.61	-
11	Input Energy (Wh)	-	2.53	6.32	12.63	18.89	25.1	-
12	Output Energy (Wh)	-	2.27	5.68	11.82	17.67	23.52	-
13	Energy Efficiency (%)	-	89.7	89.9	93.6	93.5	93.7	-

Supplementary Information: - Grid-connected EUT.
- 120% load was excluded due to limitation of power conditioning unit.
- Energy averaged over a period of 1 minute, Wh.

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Table 2: Efficiency recording sheet								
Input voltage:		Vnom. = 48.8 V						
Sl. No.	**Testing, load, % of rated VA (Resistive load)**	**5%**	**10%**	**25%**	**50%**	**75%**	**100%**	**120%**
1	Input DC Voltage (V)	-	48.2	48.1	48.6	47.9	48.9	-
2	Input DC Current (A)	-	3.15	7.81	15.58	23.81	30.81	-
3	Input DC Power (W)	-	151.8	375.7	757.2	1140.5	1506.6	-
4	Output RMS Voltage (V)	-	230.23	230.24	230.23	230.27	230.25	-
5	Output RMS Current (A)	-	0.66	1.53	3.14	4.84	6.18	-
6	Output AC Power (W)	-	138.3	345.2	715.7	1103.4	1408.7	-
7	Power Efficiency (%)	-	91.1	91.9	94.5	96.7	93.5	-
8	Power factor	-	0.91	0.98	0.99	0.99	0.99	-
9	Voltage THD (%)	-	0.04	0.04	0.04	0.05	0.06	-
10	Current THD (%)	-	20.74	7.67	3.86	2.48	2.54	-
11	Input Energy (Wh)	-	2.53	6.26	12.62	19.01	25.11	-
12	Output Energy (Wh)	-	2.31	5.75	11.93	18.39	23.48	-
13	Energy Efficiency (%)	-	91.3	91.8	94.5	96.7	93.5	-
Supplementary Information: - Grid-connected EUT. - 120% load was excluded due to limitation of power conditioning unit. - Energy averaged over a period of 1 minute, Wh.								

Table 3: Efficiency recording sheet								
Input voltage:		Vmax. = 54 V						
Sl. No.	**Testing, load, % of rated VA (Resistive load)**	**5%**	**10%**	**25%**	**50%**	**75%**	**100%**	**120%**
1	Input DC Voltage (V)	-	-	53.9	54.9	54.8	54.2	-
2	Input DC Current (A)	-	-	7.16	13.89	20.81	27.85	-
3	Input DC Power (W)	-	-	385.9	762.6	1140.4	1509.4	-
4	Output RMS Voltage (V)	-	-	230.23	230.24	230.27	230.28	-
5	Output RMS Current (A)	-	-	1.59	3.19	4.78	6.21	-
6	Output AC Power (W)	-	-	358.7	727.1	1089.7	1415.7	-
7	Power Efficiency (%)	-	-	92.9	95.3	95.5	93.8	-
8	Power factor	-	-	0.98	0.99	0.99	0.99	-
9	Voltage THD (%)	-	-	0.04	0.04	0.05	0.06	-
10	Current THD (%)	-	-	6.93	3.11	2.27	2.45	-
11	Input Energy (Wh)	-	-	6.43	12.71	19	25.16	-
12	Output Energy (Wh)	-	-	5.97	12.12	18.16	23.59	-
13	Energy Efficiency (%)	-	-	92.8	95.3	95.6	93.7	-
Supplementary Information: - Grid-connected EUT. - 120% and 10% load was excluded due to limitation of power conditioning unit. - Energy averaged over a period of 1 minute, Wh.								

ii) Cl. 5.4 - Efficiency tolerance of power conditioner at rated condition (%) = -1.22%

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iii) Cl. No. 6 – Efficiency test circuit:

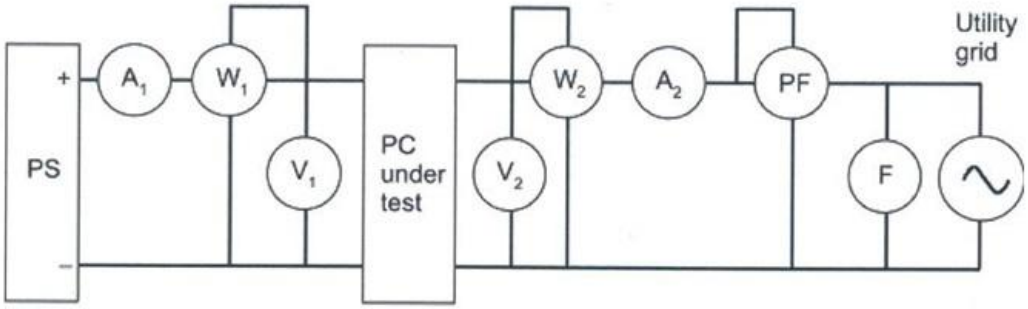


Figure 1b – Utility-Interactive type

Figure 1.b: Test circuit diagram for measuring by considering the power conditioner is utility-interactive type – where

PC	**Power conditioner**	**L**	**Load**
PS	**Variable voltage-current DC power supply**	**F**	**Frequency meter**
A1	**DC ammeter**	**V1**	**DC voltmeter**
A2	**AC or DC ammeter**	**V2**	**AC or DC voltmeter**
W1	**DC wattmeter**	**PF**	**Power factor meter**
W2	**AC to DC wattmeter**		

iv) Cl. 7 - Loss measurements

Table 4: Cl. 7.1 - No load loss measurement				
Input DC Voltage, V dc		**Input DC Current, A**	**No load loss, W**	**Energy averaged over a period of 1 minute, Wh**
V min	37.7 V	0.03	1.13	0.019
V nominal	48.8 V	0.03	1.46	0.024
90% of V_{max}	54 V	0.03	1.62	0.027
Supplementary information: The power conditioner is a "utility-interactive type"				

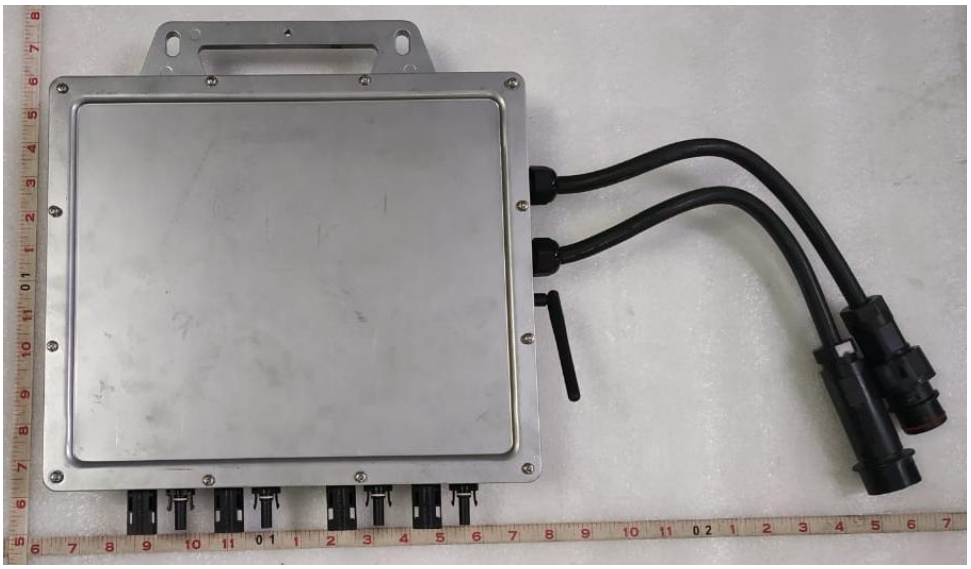
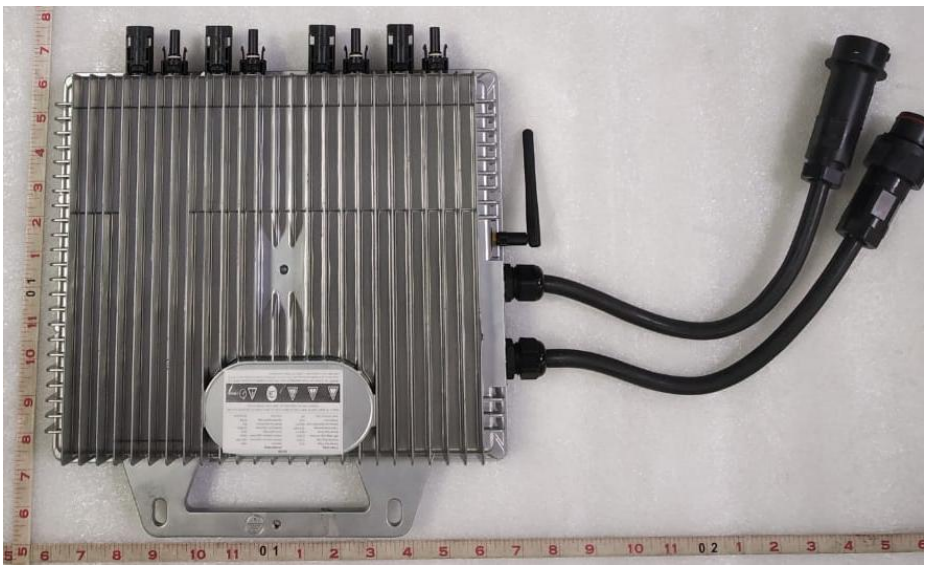
Table 5: Cl. 7.2 - Standby loss measurement
Provision for standby mode is not provided with the Inverter.
Supplementary information: The power conditioner is a "utility-interactive type"

TEST SUMMARY

Efficiency measurement test results							
Serial No: -1114A4050046 **Model:** MSI1500		**Temperature:** 25°C±2°C **Output Voltage:** 230Vac, 50Hz					
Input Voltage (V dc)		**Power Level**					
		10%	25%	50%	75%	100%	120%
		140W	350W	700W	1050W	1400W	1680W
		η (%) **Rated output efficiency and partial output efficiency**					
Vmin	37.7 V	89.6	89.9	93.5	93.5	93.7	-
Vnominal	48.8 V	91.1	91.9	94.5	96.7	93.5	-
Vmax (90% of max. V dc)	54 V	-	92.9	95.3	95.5	93.8	-

BTHPL/7.2/01

PHOTOGRAPHS

Front View

Back View


……End of Report……

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