





**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	 Scan this QR Code to verify the Report
Laboratory Name and Address:	<b>BHARAT TEST HOUSE PVT. LTD.</b> 1474, HSIIDC Indl. Estate, Rai, Distt. Sonapat-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	
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.	
	<i>This report is related to the sample submitted.</i>	

Tested by:	Approved by:	Issued by:
		
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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**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:

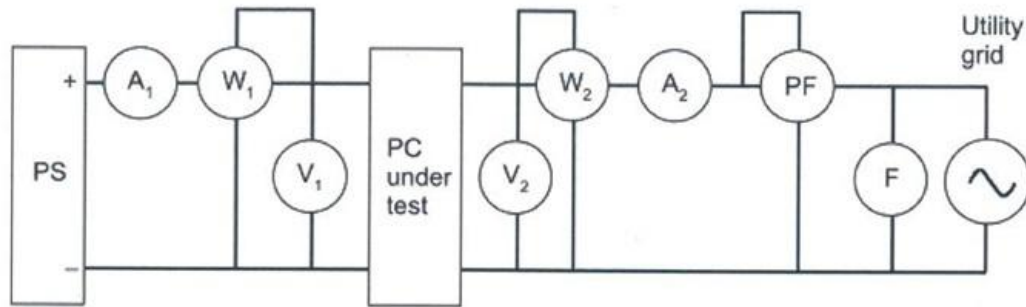


Figure 1b – Utility-Interactive type

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 <sub>max</sub>	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

<b>Provision for standby mode is not provided with the Inverter.</b>
<b>Supplementary information:</b> The power conditioner is a "utility-interactive type"

**TEST SUMMARY**

Efficiency measurement test results							
Serial No: -1114A4050046 Model: MS11500		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	

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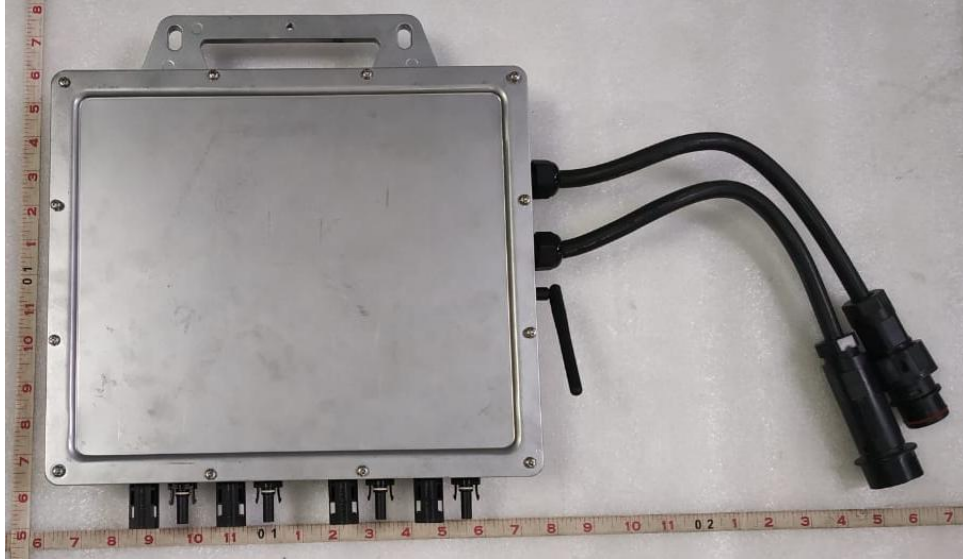
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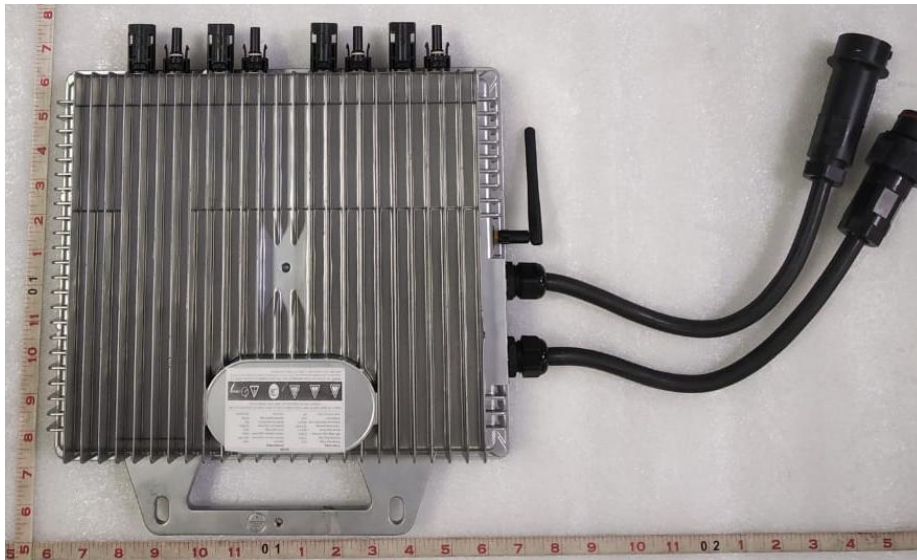
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**PHOTOGRAPHS**

**Front View**



**Back View**



.....End of Report.....

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