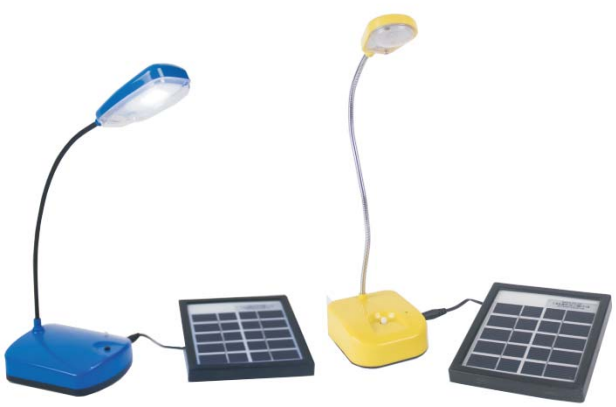
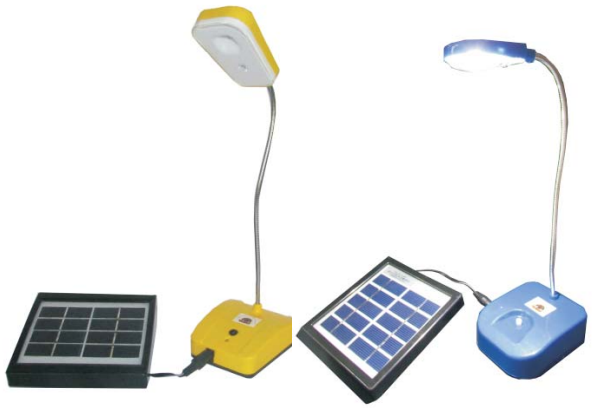
Million Solar Urja Lamps (SoUL) Program

Solar Lamp Testing Report by Accredited Agencies

Central Power Research Institute, Bangalore

Electronics Test & Development Centre, Bangalore





Abstract

The 1 Million Solar Urja Lamps through Localization of Solar Energy main Objective is to provide **One Child One Light in several states across India)**. IIT Bombay is partnering with remote rural organizations across several states in India to provide **Solar Urja Lamps (SOUL)** for school children to enhance their daily night studies, exams preparation, homework and other educational programs. **There is a need for "localization" of solar energy, wherein SOUL are assembled by local people, used by local people and serviced by local people.**

The project cost is shared among the Ministry of Finance's National Clean Energy Fund (NCEF), Philanthropic Partners (PP) and Beneficiaries (students). In this project of providing One Child One Light, students will receive the Solar Urja Lamp (SOUL); which delivers bright soothing light by combining high–output Light Emitting Diode (LED) with high performance crystalline silicon solar panel. This results in a highly efficient unit that draws only 0.5 watt, yet **delivers 150 lux at over 12" height from the LED.** The amount of light consumed by the child during the whole year is **just 1 unit**. The lamp height and **flexible angle** allows you to obtain maximum comfort while using the SOUL. The lamp is corrosion resistant and light weight to be used for multipurpose activities. To meet your energy requirement during the time of dark hours with a **battery backup of minimum 5 hours on high intensity mode and 8 hours on low intensity mode** derived from charging by a solar panel.

The purchase of up to 1 Million SoUL kits (components of SoUL in disassembled form) from vendors which were selected by open tender process. For selection of vendors as rate contract for supply of kits over a period of 1 year, IIT Bombay followed two bid system, technical bid followed by the financial bid. The specification of the Solar Urjal lamp is given by IIT Bombay.The **selected vendor's lamp has tested by accredited agencies for the technical specification.**

Table of Content

1. Technical Specifications of1 Million Solar Urja Lamps (SOUL) Through Localization of Solar Energy

2. Test certificate of Solar Lamp issue by CPRE, Bangalore
    a. Sirius Solar Energy Pvt Ltd
    b. Thrive Solar Energy Pvt Ltd
    c. Tata Power Solar System Ltd

3. Test certificate of Solar Lamp issue by STQC, Bangalore
    a. Gautam Solar Pvt Ltd

1.

Technical Specifications
Of
1 Million Solar Urja Lamps (SOUL) through Localization of Solar Energy

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- The main purpose of Solar Urja lamp (SOUL) is a solar powered lamp suitable formainly study purpose. This lamp is to help those students and families who are deprived of the clean and economical light, mainly to study at home after school hours but the lamp should also be useful for other lighting purposes. The design of the lamp should keep these requirements in mind.

- These batteries driven LED based lights will be charged with Solar Modules. The design should be aesthetically very attractive and should meet below given technicalSpecifications. The look of the light should be similar to table lamps for study purpose. The SOUL should have a base (housing battery, switch, indicator LED, and PCB). The base of the lamp should provide stability to lamp while keeping on the table for study purpose. The wire connection to LED should be provided from the base. Base should also support LED (like in conventional table lamps). The height of the LED housing from its base should be adjustable. The height of LED housing from top of the base should be at least 1.0 feet.

- The components of SOUL (as per specification given in the Table below) will be purchased from supplier and not the assembled lamp. Design of the lamp should allow easy local assembly of the various components of the lamp. Also the design of the lamp should allow easy and compact packaging of the lamp.

- There should be a provision to print logos or text on the SOUL and its packaging boxas per requirement. The supplier should neither have their own logo on the lamp noron the box.

1.1 GENERAL	
Lantern housing material	ABS Plastic
Ingress Protection (IP)	IP 33

Lamp look	Similar to table lamp, lamp base connected to LED with gooseneck type of arrangement
Portability	Adjustable gooseneck spring to adjust light
1.2 LIGHT SOURCE	
Technology	White Light Emitting Diode (W-LED)
Operating Voltage	3.2 V
Power Consumption (P max)	0.50 Watts (Max)
Illuminance	150 Lux, + or – 5% Lux on a table (if the height of LED is kept 30 cm above the table)
Luminous performance of LED	Minimum 75 lumens
Operating Temperature	$40^{o}C$ to $85^{o}C$
Color rendering and appearance	CCT: between 5700K to 6500K
Light distribution	Narrow
Warranty	Minimum one year from the date of delivery
LED housing	LED with diffused reflector
1.3 ELECTRONICS	
Electronic circuitry	PCB with high quality SMD components
ON/OFF & mode selection switch	Rugged
Wire from LED(Head of lamp) to circuit	Teflon coated wire
Mode of operation for LED	Two mode, high light intensity mode (Fullpower mode) and low light intensity mode(Half power mode)
Runtime	Minimum 5 Hours at full power mode and 8Hours at half power mode

Indicator LED	There should be indicator LED showing whenthe battery is getting charged under sunlight(red light), and when the battery is fullycharged (green light).
LED driving current	100-120mA for 5 hours run time (Full powermode) &At least 50 60mA for 8 hours runtime (halfpower mode).
Electronic circuit	Constant current LED driver with over voltageand under voltage protection. Also intelligentbattery charging circuit. Protections againstopen circuit and battery reverse polarityconnections
Operating switch (3 modes)	Off mode, full and half power mode
Efficiency	Minimum 85%
Warranty	Minimum One year from the date of delivery

1.4 ELECTRONIC PROTECTIONS

Indications for battery charge conditions	Passive LVD

1.5 ENERGY STORAGE SYSTEM

Battery chemistry type	Rechargeable Ni – MH battery
Nominal Operating Voltage	2.4V(1200mAh) or 1.2 V(2400 mAh)
D o D	Up to 80%
Warranty	Minimum one year from the date of delivery

1.6 SOLAR MODULE

Cell Type	Polycrystalline Silicon solar cells Module should be manufactured in India
Lamination	With glass cover and EVA sheets
Module Frame	Aluminium or ABS plastic
Max. Power rating	Power 1.0 Wp, Vmp× Imp≥ 1Wp

Connecting cable – Length	2.5 Mtrs
Maximum module Area	Maximum 150 cm^2
Maximum module Area	Maximum 150 cm2
Electrical Data*(Nominal):	Under STC
Warranty:	Minimum 5 Years from the date of purchase
Assembly of the various components will be done by trained people in ruralareas. **The design of the lamp should provide easy assembly of the component.** The assembly should require minimum soldering.	

IMPORTANT NOTE: Solar PV module, PCB and plastic body of the SOUL manufactured in India are only accepted for this project.

Sirius Solar Energy Pvt Ltd

(Test certificate of Solar Lamp issue by CPRE, Bangalore)

CPRI

TEST REPORT

CENTRAL POWER RESEARCH INSTITUTE
(A Govt. Of India Society)
P.B. No. 8066, Sadashivanagar Post Office
Sir C.V. Raman Road
Bangalore – 560080 (INDIA)

CENTRAL POWER RESEARCH INSTITUTE

TEST REPORT

Test Report Number : **CPRI/ERED/LED/3462/2014** **Date: 29/09/2014**

Name and address of the customer	: M/s. Sirius Solar Energy Systems (P) Ltd. S. No. 342, Plot No. 30 &46, ALEAP Industrial Estate, Near Pragathi Nagar, Hyderabad – 500 055
Name and address of the manufacturer	: Same as above
Particulars of the sample tested	: LED based Solar study light
Condition of the sample on receipt	: New
Type	: Solar Powered LED study light
Designation	: LED study Light
Serial Number	: Luminaire: ACSL
Number of sample tested	: One set
Date(s) of test(s)	: 08/09/2014 to 26/09/2014
CPRI Sample Code No(s)	: 2014 ERED LED S312
Particulars of the test conducted	: As per manufacturer specification
Test accordance with Standard/specification	: As per manufacturer specification
Sampling Plan	: Submitted by the Manufacturer
Customer's Requirement	: Test as per manufacture specification
Deviation if any	: Nil
Name of the witnessing persons	: Nil
Customer Representative	: Nil
Other than Customer Representative	: Nil
Test(s) subcontracted with	: Nil
Address of the laboratory	: Nil
Documents constituting this report (in words)	
Number of sheets	: Four
Number of oscillogram/s	: Nil
Number of Photos	: Nil
Number of test circuit diagrams	: Nil
Number of drawings	: Nil

Neha Adhikari
Test in-charge

(M. Siddhartha Bhatt)
Additional Director

TEST REPORT No.: CPRI/ERED/LED/3462/2014 DATE: 29/09/2014

TEST REPORT

SL.No.	Test description	Observations	Manufacturer Specification	Remarks
1.0 PV MODULE				
1.1	Type of module	Poly crystalline silicon	Mono or poly crystalline Silicon	
1.2	Manufacturer	M/s. Sirius Solar Energy Systems (P) Ltd.	M/s. Sirius Solar Energy Systems (P) Ltd.	
1.3	SL. no.	SSSLDM1407290001	SSSLDM1407290001	
1.4	Module configuration	1 X 1 W	1 X 1 W module.	
1.5	Peak power at 8.80 V	1.24 Wp	1.0 W	
2.0 LAMP				
2.1	Make	M/s. Nichia NFSW757DT	M/s. Nichia NFSW757DT	
2.2	Power	0.5 W	0.5 W	
2.3	Color	Cool white	Cool white	
3.0 BATTERY				
3.1	Make	M/s. Avolute	M/s. Avolute	
3.2	Type of battery	Re-Chargeable Ni-MH	Re-Chargeable Ni-MH	
3.3	Capacity	2.4 V 1200 mA	2.4 V 1200 mA	

*PV Module is certified as per IEC 61215 standards vide report No. 21199811.001 dated 23/05/2013 issued by TUV Rheinland.

Test in- Charge

Test Engineer

TEST REPORT No.: CPRI/ERED/LED/3462/2014 DATE: 29/09/2014

TEST RESULT

Sl.No.	Test Description	CPRI Observations	Manufacturer Specification
LED study light composed of 1 LED with electronic circuit			
01	Input Power	0.42 W	0.50 W
02	Output Power (circuit to LED)	0.38 W	--
03	Driver Efficiency	90.47 %	--
04	Power consumption of the electronic circuit	0.04 W	--
05	Lux level at 1 feet (reading book)	270 lux	--
06	Idle current	0.0 mA	--
07	Load disconnect battery voltage	2.12 V	--
08	Load reconnect battery voltage	2.51 V	--
09	Over Charging cut off	2.94 V	--
Protection			
10	No load protection	Provided	Required
11	Reverse polarity Protection	Provided	Required
12	Reverse Flow Protection	Provided	Required
13	Short circuit protection	Provided	Required
14	Indications for charging and low battery	Provided	Required
15	PCB Installation	Solder free	Solder free
16	Mobile charging Option	Provided	Provided
17	Portability	Complies	Adjustable Gooseneck spring
18	Light Appearance	Cool white	Coo White
19	Light distribution	Complies	Narrow, Uni-directional
20	Operating Switch	Complies	Push to on/off
21	Run time	Complies	10 Hours

Test in- Charge

Test Engineer

TEST REPORT

Test Report No.: CPRI/ERED/LED/3462/2014 **Date: 29/09/2014**

NOTE

a) The test results are only for the Item tested

b) Publication or reproduction of the test report/certificate in any form other than by complete set of the whole test report/Certificate and the language written is not permitted without the written consent of CPRI

c) Any corrections/erasure invalidates the test Report/Certificate

d) Any anomaly/Discrepancy in the test report/Certificate should be brought to the notice of CPRI within 45 days from the date of issue

e) The verification of the sample drawings by CPRI is limited to dimensional checks only wherever possible.

Test in- Charge

Test Engineer

Thrive Solar Energy Pvt Ltd

(Test certificate of Solar Lamp issue by CPRE, Bangalore)

CPRI

TEST REPORT

CENTRAL POWER RESEARCH INSTITUTE
(A Govt. Of India Society)
P.B. No. 8066, Sadashivanagar Post Office
Sir C.V. Raman Road
Bangalore – 560080 (INDIA)

CENTRAL POWER RESEARCH INSTITUTE

TEST REPORT

Test Report Number : CPRI/ERED/LED/3422/2014 **Date: 04/09/2014** CPRI

Name and address of the customer	: M/s. Thrive Solar Energy (P) Ltd. Plot No. 38/B, Phase –I, IDA, Cherlapally, Hyderabad – 500 051, Andhra Pradesh.
Name and address of the manufacturer	: Same as above
Particulars of the sample tested	: LED based Solar study light
Condition of the sample on receipt	: New
Type	: Solar Powered LED study light
Designation	: LED study Light
Serial Number	: Luminaire: ACSL
Number of sample tested	: One set
Date(s) of test(s)	: 08/08/2014 to 03/09/2014
CPRI Sample Code No(s)	: 2014 ERED LED S283
Particulars of the test conducted	: As per manufacturer specification
Test accordance with	
Standard/specification	: As per manufacturer specification
Sampling Plan	: Submitted by the Manufacturer
Customer's Requirement	: Test as per manufacture specification
Deviation if any	: Nil
Name of the witnessing persons	: Nil
Customer Representative	: Nil
Other than Customer Representative	: Nil
Test(s) subcontracted with	: Nil
Address of the laboratory	: Nil

Documents constituting this report (in words)

Number of sheets	: Four
Number of oscillogram/s	: Nil
Number of Photos	: Nil
Number of test circuit diagrams	: Nil
Number of drawings	: Nil

Neha Adhikari
Test in-charge

(M. Siddhartha Bhatt)
Additional Director

CENTRAL POWER RESEARCH INSTITUTE

CPRI

TEST REPORT No.: CPRI/ERED/LED/3422/2014 DATE: 04/09/2014

TEST REPORT

SL.No.	Test description	Observations	Manufacturer Specification	Remarks
1.0 PV MODULE				
1.1	Type of module	Poly crystalline silicon	Mono or poly crystalline Silicon	
1.2	Manufacturer	M/s. Thrive Solar	M/s. Thrive Solar	
1.3	SL. no.	TSE0501	TSE0501	
1.4	Module configuration	1 X 1 W	1 X 1 W module.	
1.5	Peak power at 8.80 V	1.29 Wp	1.0 W	
2.0 LAMP				
2.1	Make	M/s. Nichia NFSW757DT	M/s. Nichia NFSW757DT	
2.2	Power	0.5 W	0.5 W	
2.3	Color	Cool white	Cool white	
3.0 BATTERY				
3.1	Make	M/s. Topa	M/s. Topa	
3.2	Type of battery	Re-Chargeable Ni-MH	Re-Chargeable Ni-MH	
3.3	Capacity	2.4 V 1200 mA	2.4 V 1200 mA	

Test in- Charge

Test Engineer

CENTRAL POWER RESEARCH INSTITUTE

CPRI

TEST REPORT No.: CPRI/ERED/LED/3422/2014 DATE: 04/09/2014

TEST RESULT

Sl.No.	Test Description	CPRI Observations	Manufacturer Specification
LED study light composed of 1 LED with electronic circuit			
01	Input Power	0.29 W	0.24 W
02	Output Power (circuit to LED)	0.24 W	0.20 W
03	Driver Efficiency	82.75 %	80.00 %
04	Power consumption of the electronic circuit	0.05 W	--
05	Lux level at 1 feet (reading book)	184 lux	155 lux
06	Idle current	0.0 mA	0.01 mA
07	Load disconnect battery voltage	1.80 V	--
08	Load reconnect battery voltage	2.40 V	--
09	Over Charging cuf off	2.90 V	--
Protection			
10	No load protection	Provided	Required
11	Reverse polarity Protection	Provided	Required
12	Reverse Flow Protection	Provided	Required
13	Short circuit protection	Provided	Required
14	Indications for charging and low battery	Provided	Required
15	PCB Installation	Solder free	Solder free
16	Mobile charging Option	Provided	Provided
17	Portability	Complies	Adjustable Gooseneck spring
18	Light Appearance	Cool white	Coo White
19	Light distribution	Complies	Narrow, Uni-directional
20	Operating Switch	Complies	Push to on/off
21	Run time	Complies	10 Hours

Test In- Charge

Test Engineer

Tata Power Solar System Ltd

(Test certificate of Solar Lamp issue by CPRE, Bangalore)

CENTRAL POWER RESEARCH INSTITUTE

TEST REPORT

Test Report Number : CPRI/ERED/LED/3426/2014 **Date: 05/09/2014** CPRI

Name and address of the customer	: M/s. Tata Power Solar Systems Ltd. Unit-5, 264, Survey Nos. 127&137, Bommasandra Industrial Area, Bommasandra Jigani Link Road, Bangalore – 560 106
Name and address of the manufacturer	: Same as above
Particulars of the sample tested	: Solar Urja Lamp (SOUL) kit
Condition of the sample on receipt	: New
Type	: 1Wp PV panel, 0.5W LED study lamp with 2.4 V, 1200mAH battery.
Designation	: LED SOUL kit
Serial Number	: Luminaire:TPS-140070001
Number of sample tested	: One set
Date(s) of test(s)	: 08/08/2014 to 03/09/2014
CPRI Sample Code No(s)	: 2014 ERED LED S290
Particulars of the test conducted	: As per manufacturer specification
Test accordance with Standard/specification	: As per manufacturer specification
Sampling Plan	: Submitted by the Manufacturer
Customer's Requirement	: Test as per manufacture specification
Deviation if any	: Nil
Name of the witnessing persons	: Nil
Customer Representative	: Nil
Other than Customer Representative	: Nil
Test(s) subcontracted with	: Nil
Address of the laboratory	: Nil

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Neha Adhikari
Test in-charge

(M. Siddhartha Bhatt)
Additional Director

CPRI

TEST REPORT No.: CPRI/ERED/LED/3426/2014 DATE: 04/09/2014

TEST REPORT

SL.No.	Test description	CPRI Observations	Manufacturer Specification	Remarks
1.0 PV MODULE				
1.1	Type of module	Poly crystalline silicon	Mono or poly crystalline Silicon	
1.2	Manufacturer	M/s. Tata Power Solar Systems Ltd.	M/s. Tata Power Solar Systems Ltd.	
1.3	SL. No.	TPS14070105019743	TPS14070105019743	
1.4	Module configuration	1 X 1 W	1 X 1 W module.	
1.5	Peak power at 8.80 V	1.18 Wp	1.0 W	
2.0 LAMP				
2.1	Make	M/s. Nichia NFSW757DT	M/s. Nichia NFSW757DT	
2.2	Power	0.5 W	0.5 W	
2.3	Color	Cool white	Cool white	
3.0 BATTERY				
3.1	Make	M/s. LEONE (EVOLUTE)	M/s. LEONE (EVOLUTE	
3.2	Type of battery	Re-Chargeable Ni-MH	Re-Chargeable Ni-MH	
3.3	Capacity	2.4 V 1.2 Ah	2.4 V 1.2 Ah	

*PV Module is manufactured as per IEC 61215 standards vide report No. 21191929.001 dated 20/11/2012 issued by TUV Rheinland.

Test in- Charge

Test Engineer

CENTRAL POWER RESEARCH INSTITUTE

CPRI

TEST REPORT No.: CPRI/ERED/LED/3426/2014 DATE: 04/09/2014

TEST RESULT

Sl.No.	Test Description	CPRI Observations	Manufacturer Specification
LED study light composed of 1 LED with electronic circuit			
	At full brightness		
01	Input Power	0.379 W	0.381 W
02	Output Power (circuit to LED)	0.364 W	0.357 W
03	Driver Efficiency	96.04 %	93.70 %
04	Power consumption of the electronic circuit	0.24 W	--
05	Lux level at 1 feet (reading book)	188 lux	--
	At half brightness		
06	Input Power	0.196 W	0.194 W
07	Output Power (circuit to LED)	0.178 W	0.178 W
08	Driver Efficiency	90.81 %	91.75 %
09	Idle current	0.12 µA	--
10	Load disconnect battery voltage	1.84 V	--
11	Load reconnect battery voltage	2.40 V	--
12	Over Charging cut off	2.89 V	--
	Protection		
13	No load protection	Provided	Required
14	Reverse polarity Protection	Provided	Required
15	Reverse Flow Protection	Provided	Required
16	Short circuit protection	Provided	Required
17	Indications for charging and low battery	Provided	Required
18	PCB Installation	Solder free	Solder free
19	Portability	Complies	Adjustable Gooseneck spring
20	Light Appearance	Cool white	Coo White
21	Light distribution	Complies	Narrow, Uni-directional
22	Operating Switch	Complies	Push to on/off
23	Run time	Complies	10 Hours

Test in- Charge

Test Engineer

CPRI

TEST REPORT

Test Report No.: CPRI/ERED/LED/3426/2014 **Date: 04/09/2014**

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Test in- Charge

Test Engineer

Gautam Solar Pvt Ltd

(Test certificate of Solar Lamp issue by STQC, Bangalore)

ELECTRONICS TEST AND DEVELOPMENT CENTRE
(STQC Directorate, Ministry of Communications & Information Technology)
100 ft Road, Peenya Industrial Estate, Bangalore-560 058
(Tel: 2839 5992, 2839 4647, Fax: 080 - 2839 1804)
E-mail: etdcbg@stqc.nic.in

1. SCOPE.

1.	SERVICE REQUEST NUMBER	62983
2.	Test Requested by (Name of Organization)	M/s. GAUTAM SOLAR PVT LTD.. Plot No.- 114 , Sector-6A, IIE Ranipur, SIDCUL, Haridwar-249403. (Uttrakhand)
3.	Test Carried out at	M/s. ETDC, Bangalore
4.	Description of the Equipment	
	a) Nomenclature	LED Based Study Lamp
	b) Manufactured by	M/s. GAUTAM SOLAR PVT LTD.
	c) Model No / Type No	Study Lamp
	d) No. of samples submitted	01 Set (1 Flexible LED Lamp post with battery, 1-SPV panel 1W)
	e) Serial No.	a) Flexible LED Lamp post with battery:GP05Y0515664; b) SPV panel: GP05Y0515663
4.	Date of submission of samples	16/09/2014
5.	Condition of items on receipt	Good
6.	Test Carried Out at	ETDC Bangalore.
7.	Date of start of tests	25/09/2014
8.	Date of completion of test	29/09/2014
9.	Applicable test specification	Customer
10.	Test category	Performance
11.	Env. Condition During Measurements	Temperature: 15-35 °C Relative humidity: 45-70%

II. MAJOR EQUIPMENT USED:

Sl. No.	Nomenclature	Make	Model	Cal. Due
1.	DMM	Agilent	34401A	Jan 2015
2.	DMM	HP	3478A	Jan 2015
3.	Power Analyser	Voltech	PM 6000	Aug 2015
4.	LUX meter	Lutron	LX 101	Aug 2015
5.	System Power Supply	HP	6038A	Used as source

Date of Release: 16/05/2014

2.0 Test Details & Test Results..

Sl. No.	Test parameter / Condition	Requirement	Mode selected in Lamp	Measured Value / Observation / Remarks
1	Battery	2.4V 1200mAh :- Ni-MH (two cell in series 1.2V each)	---	Visually checked and found as below Rating: 2.4V, 1200mAh Type: Rechargeable Ni-MH battery.
2	Input Voltage	Shall be measured	Low	2.55 V
		Shall be measured	High	2.52 V
3	Input Current	79 mA ± 5mA	Low	77.8 mA
		163 mA ± 5mA	High	163.6 mA
4	I/P Power consumption	0.1922W ±5%	Low	0.198 W
		0.4015W ±5%	High	0.411 W
5	O/P Operating voltage	2.874 V ±5%	Low	2.88 V
		3.059 V ±5%	High	3.07 V
6	Output Current	59 mA ±5%	Low	61.7 mA
		115 mA ±5%	High	119.8 mA
7	O/P Power consumption	0.1724 W ±5%	Low	0.178 W
		0.3601 W ±5%	High	0.368 W
8	Efficiency	89.70%>85%	Low	89.9%
		87.34%>85%	High	89.5%
9	No Load current	<1 mA	---	0.37 mA
10	Solar Input Voltage	Typically 6 Volt	---	5.99 V
11	Charging indication	when solar connected Red LED Indication ON	---	Checked and found satisfactory
12	Battery Charged indication	3V, Green LED Indication ON	---	Checked and found satisfactory
13	LUX @ distance of 1feet vertically	>150 LUX	High	177 LUX
14	No Load protection.	Shall be Provided	---	Checked and found satisfactory
15	Protection against battery reverse polarity connections.	Shall be Provided	---	Checked and found satisfactory
16	Battery reverse flow protection.	Shall be Provided	---	Checked and found satisfactory
17	Short circuit protection.	Shall be Provided	---	Checked and found satisfactory

Tested By.....

Approved By.. 29.09.2014
Scientist 'E'
Electronics Test & Development Centre,
Government of India,
STQC Directorate,
Department of Electronics & Information Technology
100 Feet Road, Peenya Industrial Estate,
Bangalore - 560 058.

Issued By:.. 01/10/14

Contact :

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