



TEST REPORT

Report No. : WTD19D08053607N
Applicant : Barebones Living
Address : 1215 East Wilmington Avenue – Ste. 140, Salt Lake City, UT 84106, USA
Manufacturer : DONGGUAN PROTRONIC ELECTRONICS LTD.
Address : Protronic Building, Xiangxi Village, Shipai Town, Dongguan City, Guangdong Province, P.R. China
Product : RailRoad Lantern
Model(s) : LIV-280, LIV-281, LIV-28xxxxx("x" may be "0-9", "a-z" or omitted)
Brand Name : Barebones
Ratings : INPUT: 5V \equiv
Total pages : 8 pages
Test Standards : California Energy Commission's Appliance Regulations (CEC-400-2017-002: Section 1601-1608 of Title 20 of the California Code of Regulations)
Test Method : 10 CFR Section 430.23(aa) (Appendix Y to Subpart B of Part 430) Uniform Test Method for Measuring the Energy Consumption of Battery Chargers
Test Category : Entrusted Test
Date of Receipt sample : 2019-08-07
Date of Test : 2019-08-07 to 2019-08-14
Date of Issue : 2019-08-14
Test Report Form No. : WPH-CEC-01A
Test Result : See the attached sheets

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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**General conditions for measurements**

Test condition parameter:	
Air speed close to the UUT:	≤0.5m/s
Ambient temperature:	20°C±5°C
Relative Humidity:	10-80%
Test voltage and frequency:	<input type="checkbox"/> 115V±1%/60Hz±1% <input checked="" type="checkbox"/> 5.0 V DC for products drawing power from a computer USB port <input type="checkbox"/> the midpoint of the rated input voltage range for all other products (only on DC input voltage)
THD of the input voltage (for AC input voltage):	≤ 2 % (up to and including the 13th harmonic)
Crest factor of input voltage (for AC input voltage):	1.34 – 1.49
AC ripple voltage (RMS) (for DC input voltage):	≤ 0.2 V for DC voltages up to 10 V; or ≤ 2 % of the DC voltage for DC voltages over 10 V
Power measurement accuracy:	≤2% (power≥0.5W) ≤0.01W (power<0.5W)
Remark: 1. When determining for test conclusion, measurement uncertainty of tests has been considered. 2. Measurements of power of 0.50 W or greater was made with an uncertainty of less than or equal to 2 % at the 95 % confidence level. 3. Measurements of power of less than 0.50 W was made with an uncertainty of less than or equal to 0.01 W at the 95 % confidence level. 4. The power measurement instrument shall, as applicable, have a resolution of: (1) 0.01 W or better for measurements up to 10 W; (2) 0.1 W or better for measurements of 10 to 100 W; or (3) 1 W or better for measurements over 100 W.	

**Product Information**

Product type:	<input type="checkbox"/> AA/AAA Cell Battery Charger <input type="checkbox"/> Cell Phone <input type="checkbox"/> Children's Toy <input type="checkbox"/> Cordless Phone <input type="checkbox"/> Emergency Lighting <input type="checkbox"/> Electric Shaver <input type="checkbox"/> Electric Toothbrush <input type="checkbox"/> Golf Cart <input type="checkbox"/> Laptop Computer <input type="checkbox"/> Personal Electric Vehicle <input checked="" type="checkbox"/> Portable Lighting <input type="checkbox"/> Portable Music Player <input type="checkbox"/> Power Tool <input type="checkbox"/> Two-Way Radio <input type="checkbox"/> Uninterruptable Power Supply <input type="checkbox"/> Other
Battery chemistry:	<input type="checkbox"/> Lead-acid <input checked="" type="checkbox"/> Lithium Ion <input type="checkbox"/> Lithium Polymer <input type="checkbox"/> Nickel Metal Hydride <input type="checkbox"/> Nickel Cadmium <input type="checkbox"/> Rechargeable Alkaline <input type="checkbox"/> Other
A La Carte Charger:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Inductive Charger:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
USB-based Charger:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Battery Backup:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Uninterruptable Power Supply:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Number of charger ports:	1
Number of test sample:	2

Battery Information

Manufacturer of battery:	GREAT POWER CO LTD.
Model of battery:	ICR18650 2200mAh
Nameplate battery voltage:	3.7V
Nameplate battery capacity:	2200mAh
Nameplate Battery Energy Capacity:	16.28Wh
Number of batteries incorporated in the product:	2
Note: Two batteries were in parallel into one for 4400mAh to testing.	

**Test requirement**

- (A) Multi-port battery charger systems shall be tested for 24-hour efficiency and maintenance mode with a battery in each port.
- (B) For single port small battery charger systems, the highest 24-hour charge and maintenance energy, maintenance mode, and no battery mode results of the test procedure shall be used for purposes of reporting and determining compliance with Table W-2.
- (C) For purposes of computing the small battery charger system standard, the number of ports included in a multi-port charger system shall be equal to the number ports that are separately controlled. For example a multi-port charger system that charges eight batteries by using two charge controllers that charge four batteries in parallel would use two for “N” as described in Table W-2.
- (D) Small battery charger systems that are not consumer products may use the battery manufacturer's recommended end of discharge voltage in place of values in the test Method Table 5.2 where the table's values are not applicable.

Table W-2
Standards for Small Battery Charger Systems

Performance Parameter	Standard
Maximum 24 hour charge and maintenance energy (Wh) (E_b = capacity of all batteries in ports and N = number of charger ports)	For E_b of 2.5 Wh or less: $16 \times N$
	For E_b greater than 2.5 Wh and less than or equal to 100 Wh: $12 \times N + 1.6E_b$
	For E_b greater than 100 Wh and less than or equal to 1000 Wh: $22 \times N + 1.5E_b$
	For E_b greater than 1000 Wh: $36.4 \times N + 1.486E_b$
Maintenance Mode Power and No Battery Mode Power (W) (E_b = capacity of all batteries in ports and N = number of charger ports)	The sum of maintenance mode power and no battery mode power must be less than or equal to: $1 \times N + 0.0021 \times E_b$ Watts

Unit Energy Consumption requirement

Unit energy consumption (UEC) less than or equal to the prescribed “Maximum UEC” standard when using the equations for the appropriate product class and corresponding rated battery energy as shown in the following table:

TABLE 3.3.3—BATTERY CHARGER USAGE PROFILES

Product class				Hours per day***			Charges (n)	Threshold charge time*
Number	Description	Rated battery energy (ebatt)**	Special characteristic or battery voltage	Active + maintenance (t_{am})	Standby (t_{sb})	Off (t_{om})	Number per day	Hours
1	Low-Energy	≤ 5 Wh	Inductive Connection****	20.66	0.10	0.00	0.15	137.73
2	Low-Energy, Low-Voltage	< 100 Wh	< 4 V	7.82	5.29	0.00	0.54	14.48
3	Low-Energy, Medium-Voltage		4-10 V	6.42	0.30	0.00	0.10	64.20
4	Low-Energy, High-Voltage		> 10 V	16.84	0.91	0.00	0.50	33.68
5	Medium-Energy, Low-Voltage	100-3000 Wh	< 20 V	6.52	1.16	0.00	0.11	59.27
6	Medium-Energy, High-Voltage		≥ 20 V	17.15	6.85	0.00	0.34	50.44
7	High-Energy	> 3000 Wh		8.14	7.30	0.00	0.32	25.44

*If the duration of the charge test (minus 5 hours) as determined in section 3.3.2 of appendix Y to subpart B of this part exceeds the threshold charge time, use equation (ii) to calculate UEC otherwise use equation (i).

** E_{batt} = Rated battery energy as determined in 10 CFR part 429.39(a).

***If the total time does not sum to 24 hours per day, the remaining time is allocated to unplugged time, which means there is 0 power consumption and no changes to the UEC calculation needed.

****Inductive connection and designed for use in a wet environment (e.g. electric toothbrushes).

**Test Result:**

Measured Value			
Determination of represented values	Sample 1	Sample 2	Represented value
Battery capacity of tested battery (if more than 1 charger port report the total of all battery capacities connected during test)(E _{batt} = Measured battery energy) (Watt-hours):	15.97	15.70	15.835
24 Hour Charge and Maintenance Energy (E ₂₄) (Watt-hours):	25.51	25.32	25.415
Battery maintenance mode power (P _m) (Watts):	0.04	0.04	0.04
No battery mode power (P _{sb}) (Watts):	0.01	0.01	0.01
No battery mode power (P _{off}) (Watts):	0	0	0
t _{cd} = Charge test duration (Hours)	24	24	24
t _{a&m} , n, t _{sb} and t _{off}	See table 3.3.3 for Product class 2. Low-Energy, Low-Voltage		--

Require of CEC Appliance Efficiency Regulations:

Performance Parameter	Standard limit	Verdict
Maximum 24 hour charge and maintenance energy (Wh) (E _b = capacity of all batteries in ports and N = number of charger ports)	For E _b of 2.5 Wh or less: 16 × N	N/A
	For E _b greater than 2.5 Wh and less than or equal to 100 Wh: 12 × N + 1.6E _b Test result: 37.34Wh	P
	For E _b greater than 100 Wh and less than or equal to 1000 Wh: 22 × N + 1.5E _b	N/A
	For E _b greater than 1000 Wh: 36.4 × N + 1.486E _b	N/A
Maintenance Mode Power and No Battery Mode Power (W) (E _b = capacity of all batteries in ports and N = number of charger ports)	The sum of maintenance mode power and no battery mode power must be less than or equal to: 1x N + 0.0021x E _b Watts Test result: 1.03Wh	P

Unit Energy Consumption Result:

Calculate unit energy consumption (UEC) for a battery charger using one of the two equations (equation (i) or equation (ii)) listed below. If a battery charger is tested and its charge duration as determined in section 5.2 of this appendix minus 5 hours is greater than the threshold charge time listed in table 5.3 below (i.e. (t_{cd} - 5) * n > t_{a&m}), use equation (ii) to calculate UEC; otherwise calculate the battery charger's UEC using

$$(i) UEC = 365(n(E_{24} - 5P_m - E_{batt}) \frac{24}{t_{cd}} + (P_m(t_{a\&m} - (t_{cd} - 5)n) + (P_{sb}t_{sb}) + (P_{off}t_{off}))) \text{ or,}$$

$$(ii) UEC = 365(n(E_{24} - 5P_m - E_{batt}) \frac{24}{(t_{cd}-5)} + (P_{sb}t_{sb}) + (P_{off}t_{off}))$$

TABLE V-55—ADOPTED ENERGY CONSERVATION STANDARDS FOR BATTERY CHARGERS

Product class	Description	Maximum unit energy consumption (kWh/yr)
1	Low-Energy, Inductive	3.04.
2	Low-Energy, Low-Voltage	0.1440 * E _{batt} + 2.95.
3	Low-Energy, Medium-Voltage	For E _{batt} < 10Wh, UEC = 1.42 kWh/yr; E _{batt} ≥ 10 Wh, UEC = 0.0255 * E _{batt} + 1.16
4	Low-Energy, High-Voltage	= 0.11 * E _{batt} + 3.18.
5	Medium-Energy, Low-Voltage	0.0257 * E _{batt} + .815.
6	Medium-Energy, High-Voltage	0.0778 * E _{batt} + 2.4.
7	High-Energy	= 0.0502(E _{batt}) + 4.53.

**Unit Energy Consumption Result:**

	Product class and description	battery energy and battery voltage or Special characteristic	UEC (kWh/yr)	Maximum UEC (kWh/yr)
Sample 1	2. Low-Energy, Low-Voltage	15.97Wh, 3.7V	2.34	5.25
Sample 2		15.70Wh, 3.7V	2.36	5.21

Department of Energy (DOE) sampling plan for Battery chargers

Determination of represented value. Manufacturers must determine represented values, which include certified ratings, for each basic model of battery charger in accordance with the following sampling provisions.

Represented values include: The unit energy consumption (UEC) in kilowatt-hours per year (kWh/yr), battery discharge energy (E_{batt}) in watt hours (Wh), 24-hour energy consumption (E₂₄) in watt hours (Wh), maintenance mode power (P_m) in watts (W), standby mode power (P_{sb}) in watts (W), off mode power (P_{off}) in watts (W), and duration of the charge and maintenance mode test (t_{cd}) in hours (hrs) for all battery chargers other than uninterruptible power supplies (UPSs); and average load adjusted efficiency (Eff_{avg}) for UPSs.

Sample No.	Active model energy consumption UEC (kWh/yr)
1#	2.34
2#	2.36
Number of units tested (n)	2
Mean of sample (X)	2.3546
Sample standard deviation (s)	0.014084
LCL/0.95	N/A
UCL/1.05	2.3631
Conclusion: the samples tested comply with the 10 CFR Part 430.	

Ambient Temperature and Humidity

Temperature: 23.8°C

Humidity: 65.4%RH



Photo and Rating Label of Product





Photo and Rating Label of Product



===== End of Report =====

WALTEK