

TEST REPORT

Applicant's name : Changzhou Positive Energy Electrical Equipment Co., Ltd.

Address : NO 12-2, Meihua Road, Zhonglou District, Changzhou, Jiangsu, 213000

Product Name : BATTERY CHARGER(CLASS 2 POWER SUPPLY)

Model(s) : ZNL-U240100

Testing Laboratory : Shenzhen DACE Testing Technology Co., Ltd.

Address : 102, Building H1, & 1/F., Building H, Hongfa Science & Technology
Park, Tangtou Community, Shiyan, Bao'an District, Shenzhen,
Guangdong, China

Test Date : Apr. 22, 2024 - Apr. 26, 2024

Date of Report : May 31, 2024

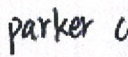
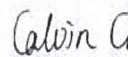
Report No. : DACE240419009RL264

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Revision History Of Report

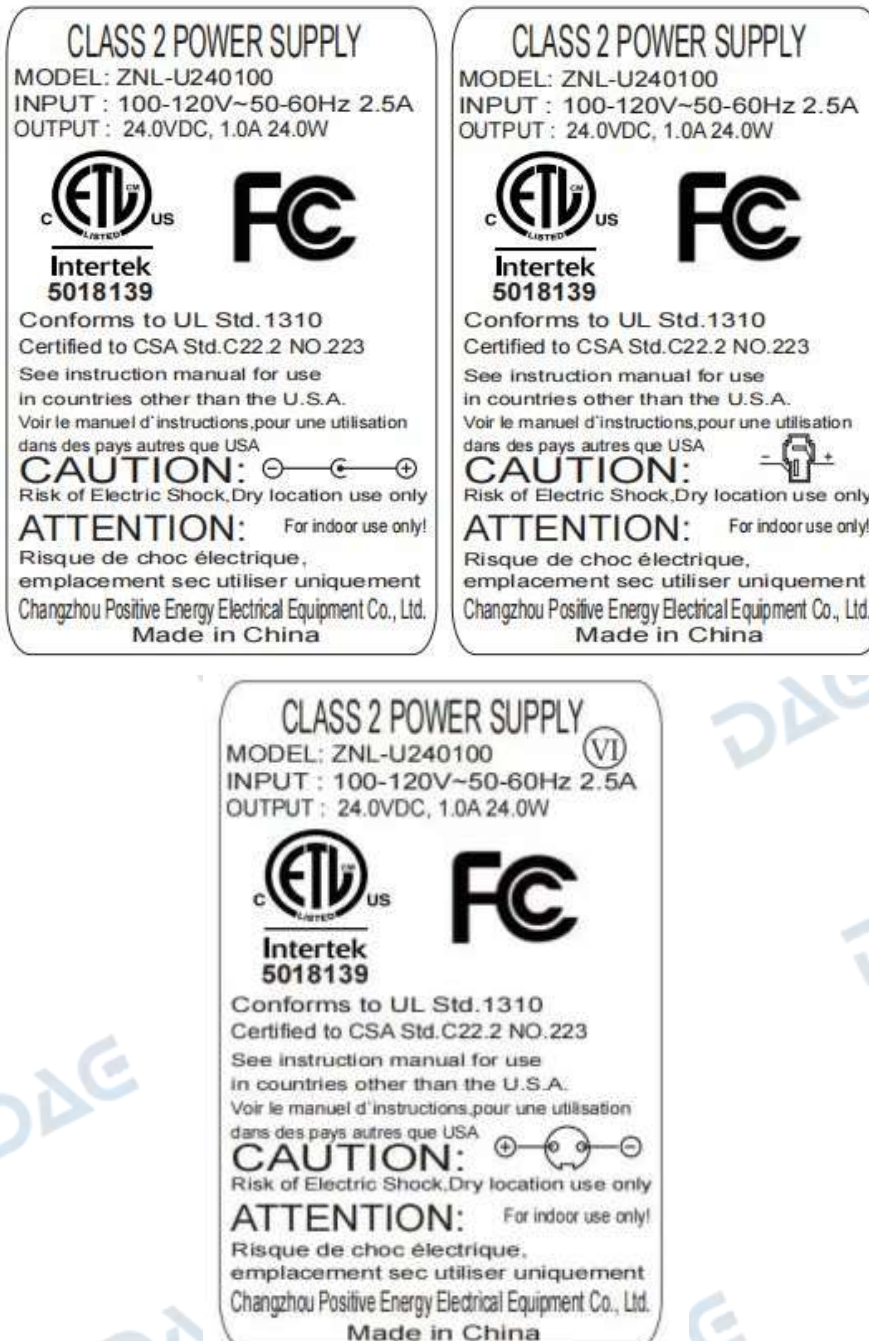
Version	Description	REPORT No.	Modified information
A0	Original	DACE240419009RL264	None

Energy Efficiency Test Report of External Power Supplies for CEC

Test Report Number.:	DACE240419009RL264
Tested by (printed name and signature).....:	Parker Chen 
Approved by (printed name and signature).....:	Calvin Chen 
Total number of pages.:	15
Date of issue.....:	May 31, 2024
Testing laboratory	Shenzhen DACE Testing Technology Co., Ltd.
Address.....:	102, Building H1, & 1/F., Building H, Hongfa Science & Technology Park, Tangtou Community, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Applicant.....:	Changzhou Positive Energy Electrical Equipment Co., Ltd.
Address.....:	NO 12-2, Meihua Road, Zhonglou District, Changzhou, Jiangsu, 213000
Manufacturer.....:	Changzhou Positive Energy Electrical Equipment Co., Ltd.
Address.....:	NO 12-2, Meihua Road, Zhonglou District, Changzhou, Jiangsu, 213000
Standards.....:	2014 Appliance Efficiency Regulations, CEC-400-2014-009-CMF
Energy performance mark.....:	VI
Test item description.....:	BATTERY CHARGER(CLASS 2 POWER SUPPLY)
Trade Mark.....:	ZNL
Model(s).....:	ZNL-U240100
Ratings.....:	Input: 100-120V~, 50/60Hz Output: 24.0V=1.0A, 24.0W
Input Cord Length (cm).....:	N/A
Output Cord Length (cm).:	180cm
Samples Received Date.....:	Apr. 22, 2024
Tested Date.:	Apr. 22, 2024 - Apr. 26, 2024
Ambient temp. (°C).:	24.2
Test Room Air Speed.....:	< 0.5m/s



Copy of marking plate:



TEST CONDITION AND PROGRAM:

1. MEASURING EQUIPMENT:

Measurements of active power of 0.5W or greater shall be made with an uncertainty of $\leq 2\%$. Measurements of active power of less than 0.5W shall be made with an uncertainty of $< 0.01W$. The power measurement instrument shall have a resolution of 0.01W or better for active power. Measurements of voltage and current shall be made with an uncertainty of $< 2\%$.

2. TEST ROOM:

The tests shall be carried out in a room that has an air speed close to the EUT of < 0.5 m/s. The ambient temperature shall be maintained at $23^{\circ}C \pm 5^{\circ}C$ throughout the test.

3. TEST VOLTAGE:

The Total Harmonic Distortion (THD) of input voltage source shall not exceed 2%. Where the Equipment Under Test (EUT) nameplate input voltage is 115V or the nameplate input voltage range includes 115V, the test voltage shall be 115V at 60Hz. Where the EUT nameplate input voltage is 230V or the nameplate input voltage range includes 230V, the test voltage shall be 230V at 50Hz. Where the EUT nameplate input voltage or input voltage range includes both 115V and 230V, the EUT shall be tested at both 115V at 60Hz and 230V at 50Hz.

4. LOAD CONDITIONS:

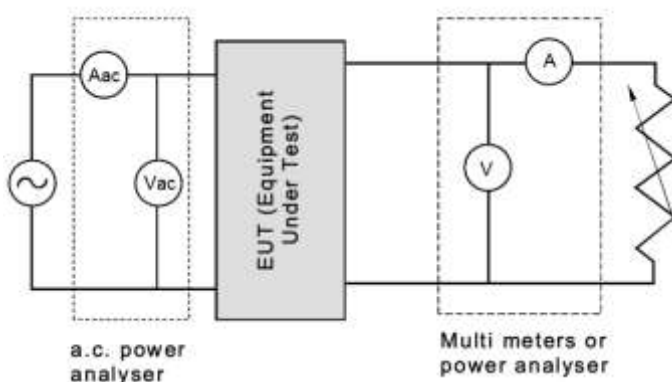
External power supplies with a switchable output are normally tested twice; once with the output voltage set to the lowest voltage value and then again with the output voltage set to the highest voltage value.

The EUT shall be tested at the below load conditions:

Percentage of nameplate output current	
Load condition	Percentage
1	100 ± 2
2	75 ± 2
3	50 ± 2
4	25 ± 2
5	0

5. TEST LOAD:

In order to load the power supply to produce all four active mode load conditions (1 to 4 as defined in above), a set of variable resistive or electronic test loads shall be used. The test loads shall have a power factor of 0.95 to 1.



6. TESTING SEQUENCE:

The test sample was operated at 100% of nameplate current output for at least 30 minutes immediately prior to conducting efficiency measurements. After this warm-up period, if the power level does not drift by more than 5% from the maximum value observed, of the 5 minutes period. Subsequent load conditions can then be measured under the same 5 minute stability guidelines.

TEST RESULT AND VERDICT:

Table U-1
Standards for Class A External Power Supplies
That are Federally Regulated

Nameplate Output	Minimum Efficiency in Active Mode (Decimal equivalent of a Percentage)
< 1 watt	$0.5 * \text{Nameplate Output}$
≥ 1 and ≤ 51 watts	$0.09 * \ln(\text{Nameplate Output}) + 0.5$
> 51 watts	0.85
	<i>Maximum Energy Consumption in No-Load Mode</i>
≤ 250 watts	0.5 watts
Where $\ln$ (Nameplate Output) = Natural Logarithm of the nameplate output expressed in watts.	

Table U-3
Standards for State-Regulated External Power Supplies
Effective July 1, 2008

Nameplate Output	Minimum Efficiency in Active Mode
< 1 watt	$0.5 * \text{Nameplate Output}$
≥ 1 and ≤ 51 watts	$0.09 * \ln(\text{Nameplate Output}) + 0.5$
> 51 watts	0.85
	<i>Maximum Energy Consumption in No-Load Mode</i>
Any output	0.5 watts
Where $\ln$ (Nameplate Output) = Natural Logarithm of the nameplate output expressed in watts.	

Table I-1. Energy Conservation Standards for Direct Operation EPSs (Compliance Starting February 10, 2016) (Level VI)

Single-Voltage External AC-DC Power Supply, Basic-Voltage		
Nameplate Output Power (P_{out})	Minimum Average Efficiency in Active Mode (expressed as a decimal)	Maximum Power in No-Load Mode [W]
$P_{out} \leq 1$ W	$\geq 0.5 \times P_{out} + 0.16$	≤ 0.100
$1 \text{ W} < P_{out} \leq 49 \text{ W}$	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤ 0.100
$49 \text{ W} < P_{out} \leq 250 \text{ W}$	≥ 0.880	≤ 0.210
$P_{out} > 250 \text{ W}$	≥ 0.875	≤ 0.500

Single-Voltage External AC-DC Power Supply, Low-Voltage		
Nameplate Output Power (P_{out})	Minimum Average Efficiency in Active Mode (expressed as a decimal)	Maximum Power in No-Load Mode [W]
$P_{out} \leq 1 \text{ W}$	$\geq 0.517 \times P_{out} + 0.087$	≤ 0.100
$1 \text{ W} < P_{out} \leq 49 \text{ W}$	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤ 0.100
$49 \text{ W} < P_{out} \leq 250 \text{ W}$	≥ 0.870	≤ 0.210
$P_{out} > 250 \text{ W}$	≥ 0.875	≤ 0.500
Single-Voltage External AC-AC Power Supply, Basic-Voltage		
Nameplate Output Power (P_{out})	Minimum Average Efficiency in Active Mode (expressed as a decimal)	Maximum Power in No-Load Mode [W]
$P_{out} \leq 1 \text{ W}$	$\geq 0.5 \times P_{out} + 0.16$	≤ 0.210
$1 \text{ W} < P_{out} \leq 49 \text{ W}$	$\geq 0.071 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.67$	≤ 0.210
$49 \text{ W} < P_{out} \leq 250 \text{ W}$	≥ 0.880	≤ 0.210
$P_{out} > 250 \text{ W}$	≥ 0.875	≤ 0.500
Single-Voltage External AC-AC Power Supply, Low-Voltage		
Nameplate Output Power (P_{out})	Minimum Average Efficiency in Active Mode (expressed as a decimal)	Maximum Power in No-Load Mode [W]
$P_{out} \leq 1 \text{ W}$	$\geq 0.517 \times P_{out} + 0.087$	≤ 0.210
$1 \text{ W} < P_{out} \leq 49 \text{ W}$	$\geq 0.0834 \times \ln(P_{out}) - 0.0014 \times P_{out} + 0.609$	≤ 0.210
$49 \text{ W} < P_{out} \leq 250 \text{ W}$	≥ 0.870	≤ 0.210
$P_{out} > 250 \text{ W}$	≥ 0.875	≤ 0.500
Multiple-Voltage External Power Supply		
Nameplate Output Power (P_{out})	Minimum Average Efficiency in Active Mode (expressed as a decimal)	Maximum Power in No-Load Mode [W]
$P_{out} \leq 1 \text{ W}$	$\geq 0.497 \times P_{out} + 0.067$	≤ 0.300
$1 \text{ W} < P_{out} \leq 49 \text{ W}$	$\geq 0.075 \times \ln(P_{out}) + 0.561$	≤ 0.300
$P_{out} > 49 \text{ W}$	≥ 0.860	≤ 0.300

Note:

Single-voltage external AC-DC power supply means an external power supply that is designed to convert line voltage AC into lower-voltage DC output and is able to convert to only one DC output voltage at a time.

Single-voltage external AC-AC power supply means an external power supply that is designed to convert line voltage AC into lower-voltage AC output and is able to convert to only one AC output voltage at a time.

Multiple-voltage external power supply means an external power supply that is designed to convert line voltage AC input into more than one simultaneous lower-voltage output.

Low-voltage external power supply means an external power supply with a nameplate output voltage less than 6 volts and nameplate output current greater than or equal to 550 milliamps. Basic-voltage external power supply means an external power supply that is not a low-voltage power supply.

Sample 1		
Test item	Test at 115V, 60Hz	Efficiency requirements
No load power (W)	0.06	≤ 0.1
Average efficiency (%)	87.01	≥ 86.20
Complies with performance mark	VI	

Sample 2		
Test item	Test at 115V, 60Hz	Efficiency requirements
No load power (W)	0.05	≤ 0.1
Average efficiency (%)	87.88	≥ 86.20
Complies with performance mark	VI	

Test Data:

Sample 1	
Test Model	ZNL-U240100
Test Results	Pass
Test Voltage	115V, 60Hz

Measured and Calculated Data						
	No load	Active Power Values				Average
Percent of nameplate current	0%	25%	50%	75%	100%	--
Output Current (mA)	--	250	500	750	1000	
Output Voltage (V)		24.69	24.59	24.49	24.40	
Output Power (W)		6.17	12.29	18.37	24.40	
AC Input Voltage (V)	115	115	115	115	115	--
AC Input Current (mA)	3	1050	2090	315	419	
AC Input Power (W)	0.06	7.04	14.06	21.22	28.26	
Total Harmonic Distortion (THD)	1.47	1.36	1.42	1.51	1.59	
True Power Factor (W/VA)	0.19	0.58	0.58	0.59	0.59	
AC Input Frequency (Hz)	60	60	60	60	60	
Power Consumed by UUT (W)	0.06	0.87	1.77	2.85	3.86	--
Efficiency (%)	--	87.69	87.44	86.56	86.34	87.01
Supplementary information:						
Level VI limit:						
Average active mode efficiency limit $\geq 0.071 \times \ln(P_o/1W) - 0.0014 \times P_o/1W + 0.67 \geq 86.20\%$						
The no-load condition consumption shall not exceed 0.1W						

Sample 2	
Test Model	ZNL-U240100
Test Results	Pass
Test Voltage	115V, 60Hz

Measured and Calculated Data						
	No load	Active Power Values				Average
Percent of nameplate current	0%	25%	50%	75%	100%	--
Output Current (mA)	--	250	500	750	1000	
Output Voltage (V)		24.66	24.55	24.45	24.36	
Output Power (W)		6.16	12.27	18.34	24.36	
AC Input Voltage (V)	115	115	115	115	115	--
AC Input Current (mA)	2	97	198	302	408	
AC Input Power (W)	0.06	7.01	13.98	21.01	27.52	
Total Harmonic Distortion (THD)	1.48	1.35	1.43	1.54	1.61	
True Power Factor (W/VA)	0.18	0.63	0.61	0.60	0.59	
AC Input Frequency (Hz)	60	60	60	60	60	
Power Consumed by UUT (W)	0.06	0.85	1.71	2.67	3.16	--
Efficiency (%)	--	87.94	87.80	87.28	88.52	87.88
Supplementary information:						
Level VI limit:						
Average active mode efficiency limit $\geq 0.071 \times \ln(P_o/1W) - 0.0014 \times P_o/1W + 0.67 \geq 86.20\%$						
The no-load condition consumption shall not exceed 0.1W						

Appendix: Test equipment list

Equipment	Manufacturer	Type	Series No	Cal.	Due.
Digital power meter	YOKOGAWA	WT210	DZ-SY-074	2024-04-15	2025-04-14
DC electronic load	ITECH	IT8512	DZ-SY-035-1	2024-04-15	2025-04-14
Variable frequency power supply	Shenzhen hengxinlong TechnologyCo., Ltd	HXL-3130	DZ-SY-004	2024-04-15	2025-04-14
Tape measure	Hengda	16ft	DZ-SY-210	2024-04-15	2025-04-14
Hygrothermograph	/	JR900	DZ-SY-192	2024-04-15	2025-04-14

PHOTO OF SAMPLE

Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



-- END OF THIS REPORT --