

Lab ID#: FD19860073  
Receipt Date: Nov 7, 2019  
Test Date: Jul 15, 2019

Report:

Report Date: Jul 18, 2019

## DUT INFORMATION

Brand	Fractal Design
Manufacturer (OEM)	High Power
Series	ION+
Model Number	
Serial Number	1918FD19270100399
DUT Notes	

## DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10-5
Rated Frequency (Hz)	50-60
Rated Power (W)	860
Type	ATX12V
Cooling	140mm Fluid Dynamic Bearing Fan (DYNAMIC X2 GP-14)
Semi-Passive Operation	✓ (selectable)
Cable Design	Fully Modular

## TEST EQUIPMENT

Electronic Loads	Chroma 63601-5 x4 Chroma 63600-2 x2 63640-80-80 x20 63610-80-20 x2
AC Sources	Chroma 6530, Keysight AC6804B
Power Analyzers	N4L PPA1530 x2
Sound Analyzer	Bruel & Kjaer 2270 G4
Microphone	Bruel & Kjaer Type 4955-A
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2
Tachometer	UNI-T UT372 x2
Digital Multimeter	Keysight U1273AX, Fluke 289
UPS	CyberPower OLS3000E 3kVA x2
Transformer	3kVA x2

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## RESULTS

Temperature Range (°C /°F)	30-32 / 86-89.6 (+-2°C / +- 3.6°F)
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓

### 115V

Average Efficiency	89.952%
Efficiency With 10W (≤500W) or 2% (>500W)	49.980
Average Efficiency 5VSB	76.311%
Standby Power Consumption (W)	0.1052560
Average PF	0.993
Avg Noise Output	18.05 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	A+

### 230V

Average Efficiency	91.727%
Average Efficiency 5VSB	76.109%
Standby Power Consumption (W)	0.1402120
Average PF	0.961
Avg Noise Output	17.99 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	A+

## POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	22	22	71.6	3	0.3
	Watts	120		860	15	3.6
Total Max. Power (W)		860				

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## CABLES AND CONNECTORS

### Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (600mm)	1	1	18AWG	No
4+4 pin EPS12V (700mm)	1	1	16AWG	No
8 pin EPS12V (600mm)	1	1	16AWG	No
6+2 pin PCIe (560mm+120mm)	3	6	16-18AWG	No
SATA (650mm+120mm)	1	2	18AWG	No
SATA (400mm+120mm+120mm+120mm)	2	8	18AWG	No
4 pin Molex (400mm+120mm+120mm+120mm)	1	4	18AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	16AWG	-

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General Data	
Manufacturer (OEM)	High Power
PCB Type	Double Sided
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 3x CM chokes, 1x MOV, 1x Discharge IC
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	2x GBU1506 (600V, 15A @ 100°C)
APFC MOSFETS	2x Infineon IPA60R099P7 (650V, 20A @ 100°C, 0.0990hm)
APFC Boost Diode	1x Infineon IDH08G65C5 (650V, 8A @ 145°C)
Hold-up Cap(s)	2x Rubycon (400V, 470uF each or 940uF combined, 2,000h @ 105°C, MXH)
Main Switchers	2x Infineon IPA60R099P7 (650V, 20A @ 100°C, 0.0990hm)
APFC Controller	Infineon ICE3PCS01G
Resonant Controllers	Champion CM6901X
Topology	Primary side: Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	8x Infineon BSC010N04LS (40V, 100A @ 100°C, 1mOhm)
5V & 3.3V	DC-DC Converters: 8x Infineon BSC0906NS (30V, 40A @ 100°C, 4.5mOhm) PWM Controllers: ANPEC APW7159C
Filtering Capacitors	Electrolytics: 4x Nippon Chemi-Con (4-10,000h @ 105°C, KY), 5x Rubycon (3-6,000h @ 105°C, YXG), 1x Rubycon (6-10,000h @ 105°C, ZLH) Polymers: 31x FPCAP, 6x NIC
Supervisor IC	SMT PS224 (OCP, OVP, UVP, SCP, PG)
Micro Controller	STC 15W408AS
Fan Model	Fractal Design DYNAMIC X2 GP-14 (140mm, 3-12V, 0.40A, Fluid Dynamic Bearing Fan )
Fan Power Transistor	STi 2SD882 (NPN)
5VSB Circuit	
Rectifier	1x PFC P10V45SP SBR (45V, 10A) & 2x Infineon BSC0906NS (30V, 40A @ 100°C, 4.5mΩ)
Standby PWM Controller	Excelliance MOS Corp EM8569
-12V Circuit	
Rectifier	KEC KIA7912PI (-12V, 1A)

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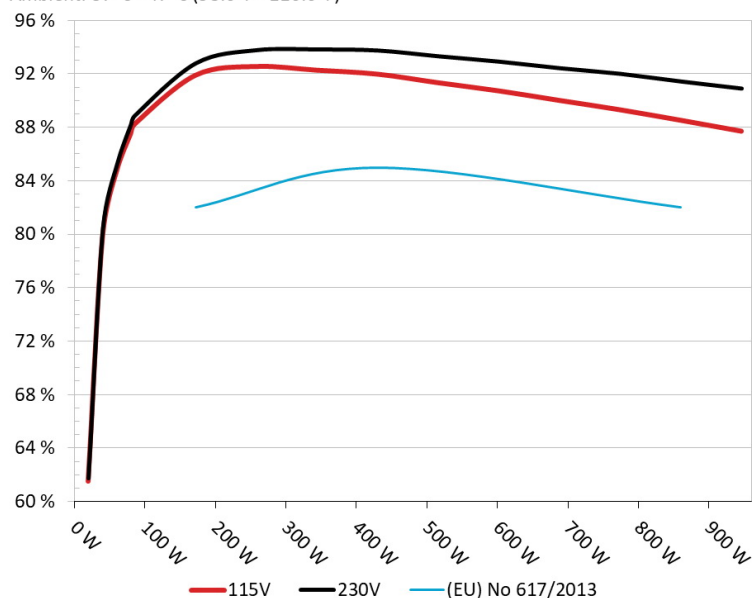
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## EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

### Efficiency: Fractal Design ION+ 860P

Ambient: 37°C - 47°C (98.6°F - 116.6°F)



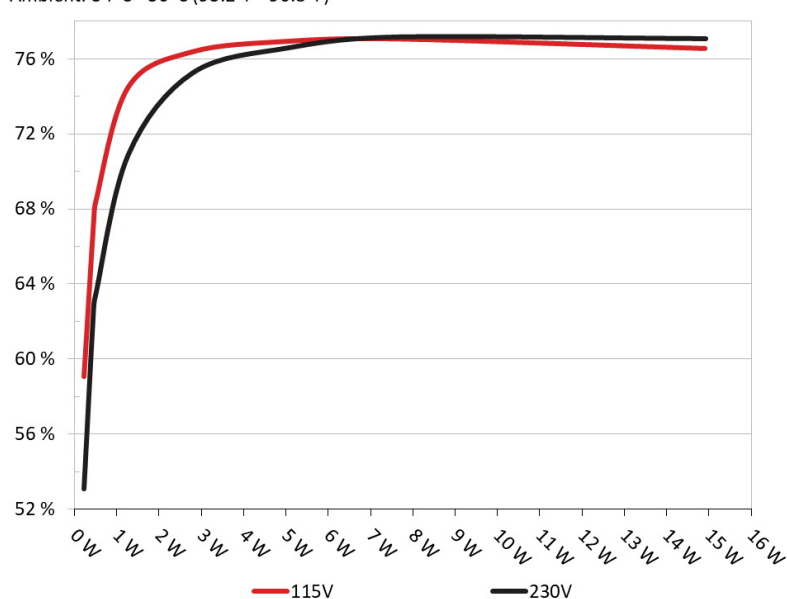
### INFO

The PSU's efficiency under high ambient temperatures with 115V and 230V input. For this graph the results of the 10-110% load regulation table are used

## 5VSB EFFICIENCY

### 5VSB Efficiency: Fractal Design ION+ 860P

Ambient: 34°C - 36°C (93.2°F - 96.8°F)



### INFO

This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input

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### 5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.046A	0.231	59.079%	0.247
	5.040V	0.391		115.12V
2	0.090A	0.460	67.350%	0.092
	5.106V	0.683		115.12V
3	0.550A	2.798	76.365%	0.315
	5.086V	3.664		115.12V
4	1.000A	5.067	76.924%	0.392
	5.066V	6.587		115.12V
5	1.500A	7.566	77.047%	0.434
	5.044V	9.820		115.12V
6	3.000A	14.914	76.537%	0.487
	4.971V	19.486		115.12V

### 5VSB EFFICIENCY -230V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.046A	0.231	53.103%	0.102
	5.041V	0.435		230.27V
2	0.090A	0.460	62.756%	0.031
	5.106V	0.733		230.27V
3	0.550A	2.798	75.235%	0.143
	5.085V	3.719		230.27V
4	1.000A	5.066	76.572%	0.221
	5.065V	6.616		230.26V
5	1.500A	7.564	77.144%	0.278
	5.042V	9.805		230.27V
6	3.000A	14.918	77.056%	0.365
	4.972V	19.360		230.27V

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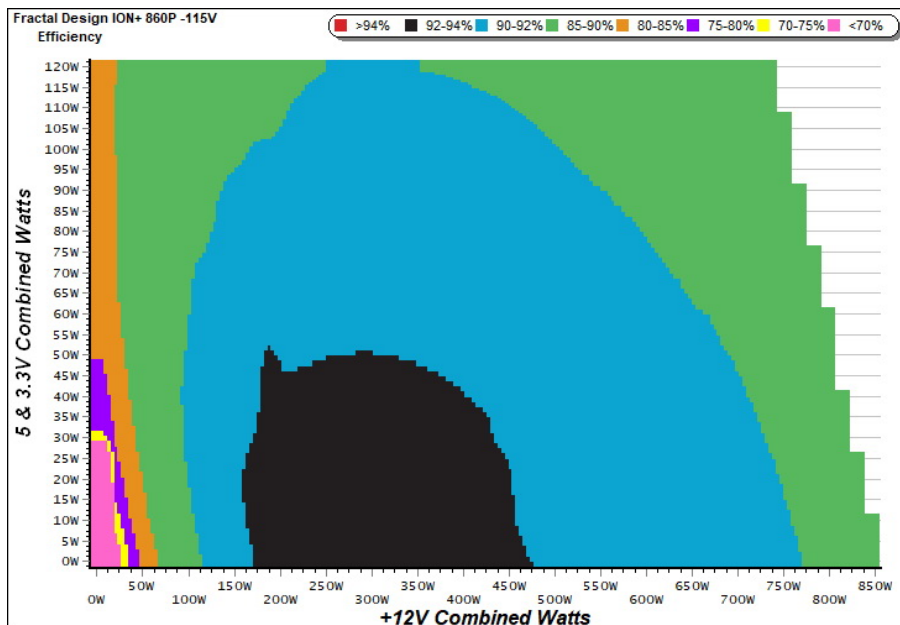
# 115V

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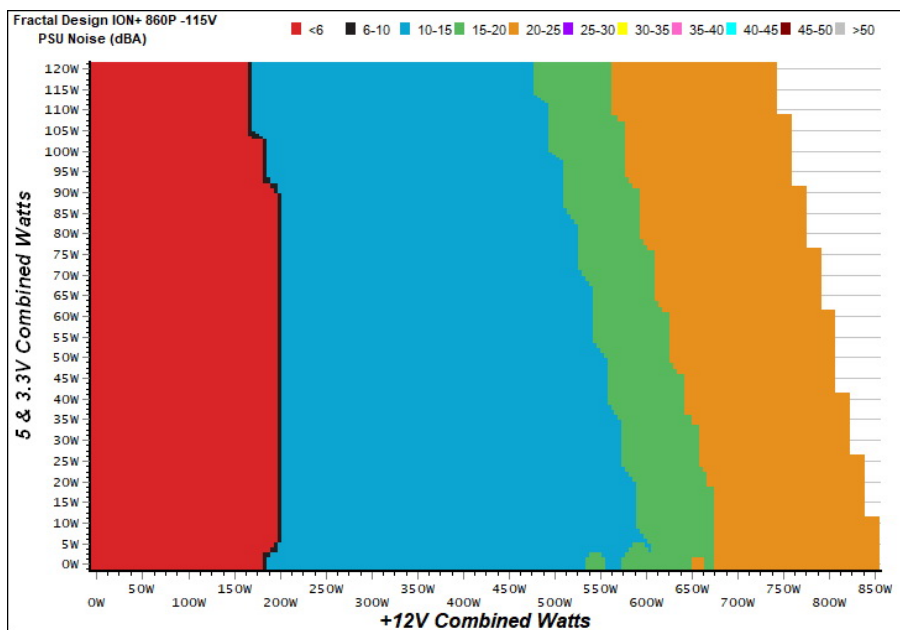
## EFFICIENCY GRAPH 115V



### INFO

This graph depicts the PSU's efficiency throughout its entire operational range. For the generation of the efficiency and noise graphs we set our loaders to auto mode through our custom-made software before trying thousands of possible load combinations

## NOISE GRAPH 115V



### INFO

The PSU's noise in its entire operational range and under 30-32 °C (+2 °C) ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

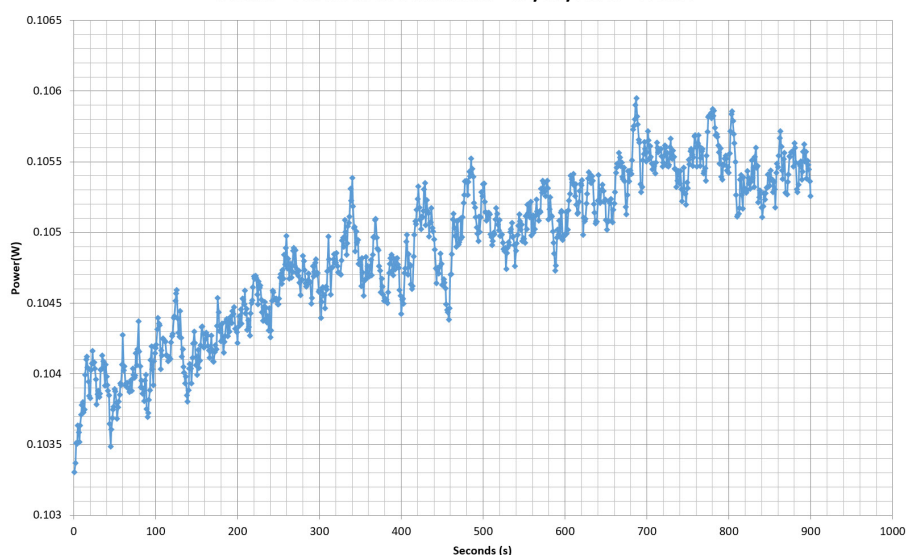
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## VAMPIRE POWER -115V

Power - 1918FD19270100399 - 12/07/2019 - 12:01



### INFO

*This graph is generated by the PPA Standby Power Analysis software which takes full control of the power analyzer during the whole procedure. This application features all of the EN50564 & IEC62301 test limits for standby power software testing*

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COMMISSION REGULATION (EU) NO 617/2013 TESTING 115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	5.338A	1.996A	2.004A	1.003A	85.828	88.273%	0	<6.0	43.85°C	0.969
	12.028V	5.016V	3.299V	4.985V	97.230				40.30°C	115.12V
2	11.733A	2.997A	3.009A	1.206A	171.908	91.918%	0	<6.0	45.00°C	0.990
	12.016V	5.011V	3.292V	4.976V	187.023				40.73°C	115.12V
5	31.667A	4.997A	5.020A	1.817A	429.928	92.001%	598	12.6	42.31°C	0.997
	11.981V	5.006V	3.288V	4.956V	467.308				49.40°C	115.11V
10	64.594A	9.029A	9.090A	3.063A	860.005	88.546%	1332	36.2	45.55°C	0.999
	11.925V	4.986V	3.267V	4.899V	971.250				56.85°C	115.10V

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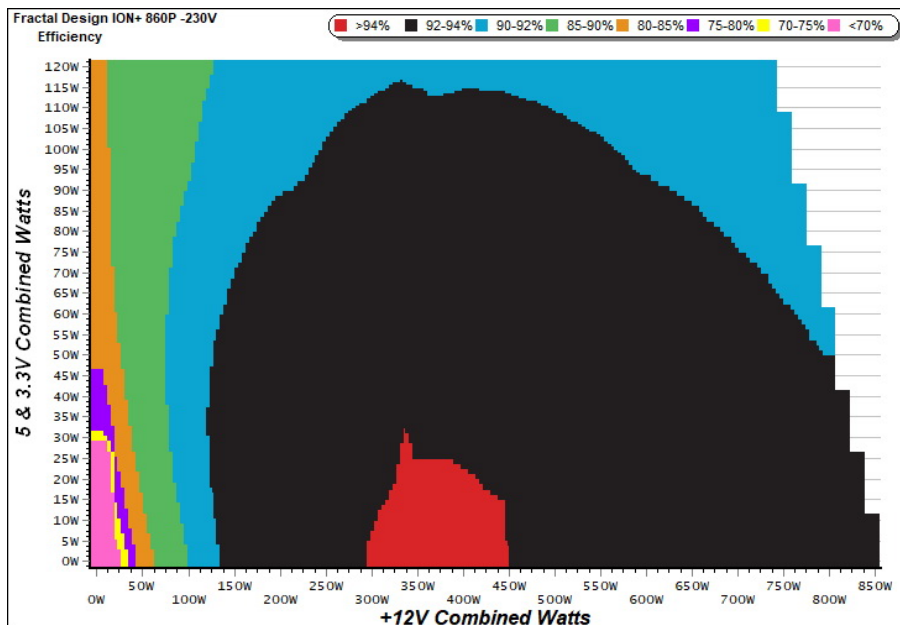
# 230V

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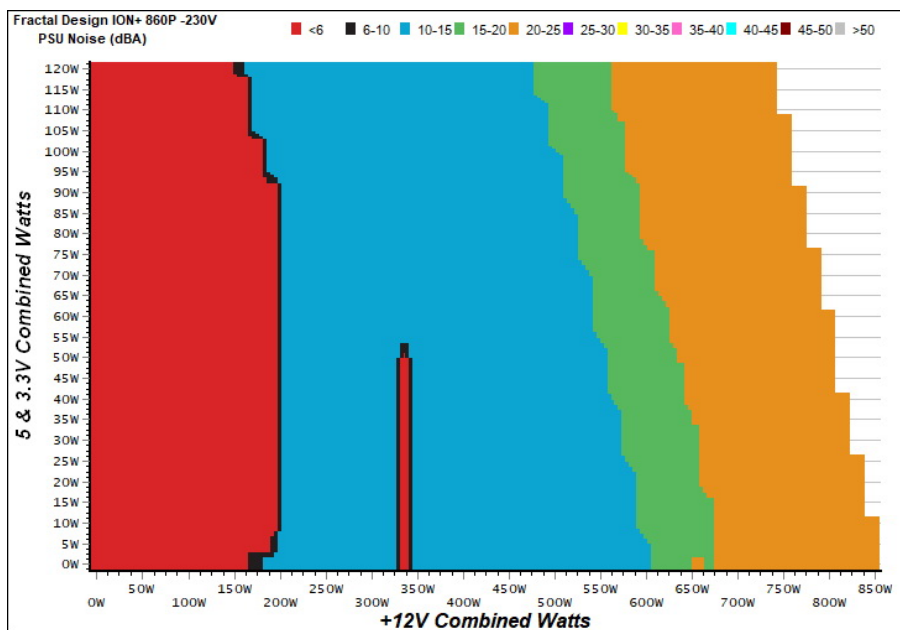
## EFFICIENCY GRAPH 230V



### INFO

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## NOISE GRAPH 230V



### INFO

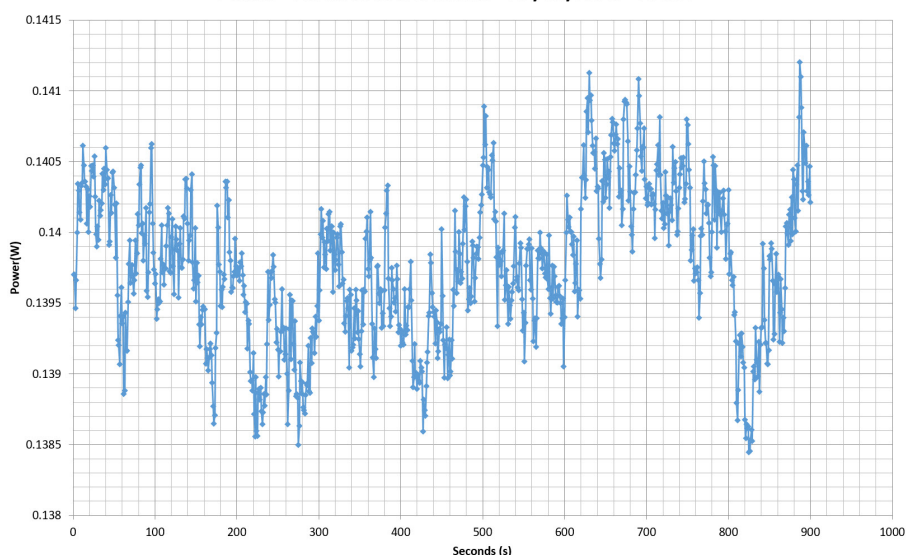
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## VAMPIRE POWER -230V

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COMMISSION REGULATION (EU) NO 617/2013 TESTING 230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	5.334A	1.996A	2.000A	1.003A	85.758	88.890%	0	<6.0	42.65°C	0.830
	12.027V	5.014V	3.300V	4.984V	96.477				40.01°C	230.25V
2	11.729A	2.990A	3.007A	1.204A	171.831	92.788%	0	<6.0	43.71°C	0.927
	12.015V	5.019V	3.292V	4.985V	185.187				40.67°C	230.25V
5	31.666A	4.998A	5.017A	1.817A	429.885	93.747%	596	12.5	42.27°C	0.980
	11.980V	5.006V	3.289V	4.956V	458.561				46.27°C	230.26V
10	64.599A	9.027A	9.093A	3.063A	860.011	91.427%	1335	36.2	45.56°C	0.996
	11.924V	4.987V	3.267V	4.900V	940.652				53.28°C	230.26V

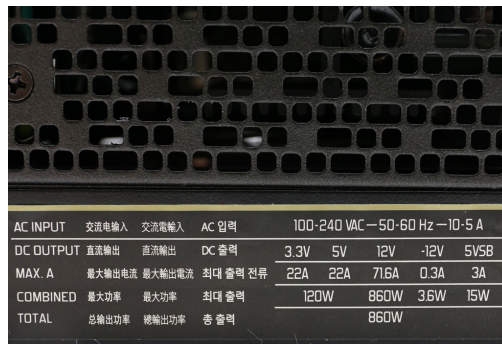
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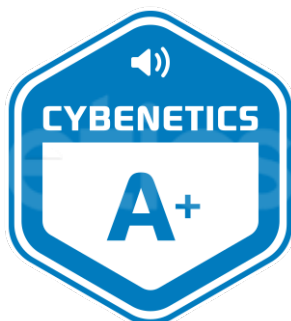

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AC INPUT	交流電輸入	交流電輸入	AC 입력	100-240 VAC — 50-60 Hz — 10-5 A				
DC OUTPUT	直流輸出	直流輸出	DC 출력	3.3V	5V	12V	-12V	5V5B
MAX. A	最大輸出電流	最大輸出電流	최대 출력 전류	22A	22A	716A	0.3A	3A
COMBINED	最大功率	最大功率	최대 출력	120W	860W	36W	15W	
TOTAL	總輸出功率	總輸出功率	총 출력	860W				

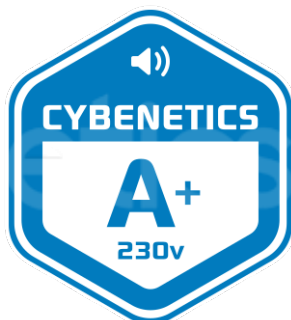
Power specifications label

## CERTIFICATIONS 115V

**Aristeidis Bitziopoulos**  
Lab Director

## CERTIFICATIONS 230V



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