

Lab ID#: BQ85002146
Receipt Date: Feb 17, 2023
Test Date: Mar 3, 2023

Report: 23PS2146A
Report Date: Mar 7, 2023

DUT INFORMATION	
Brand	be quiet!
Manufacturer (OEM)	FSP
Series	Dark Power 13
Model Number	P13-850W
Serial Number	334S2481000089
DUT Notes	

DUT SPECIFICATIONS	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10-5
Rated Frequency (Hz)	50-60
Rated Power (W)	850
Type	ATX12V
Cooling	135mm Fluid Dynamic Bearing Fan (BQ SIW3-13525-HF)
Semi-Passive Operation	X
Cable Design	Fully Modular

TEST EQUIPMENT	
Electronic Loads	Chroma 63601-5 x2 Chroma 63600-2 63640-80-80 x10 63610-80-20
AC Sources	Chroma 6530, APM SP300VAC4000W-P
Power Analyzers	RS HMC8015, N4L PPA1530, N4L PPA5530
Oscilloscopes	Picoscope 4444, Rigol DS7014, Siglent SDS2104X PLUS
Sound Analyzer	Bruel & Kjaer 2270 G4
Microphone	Bruel & Kjaer Type 4955-A
Temperature Logger	Picoscope TC-08
Tachometer	UNI-T UT372
Multimeters	Keysight 34465A, Keithley 2015 - THD
UPS	FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA
Isolation Transformer	4kVA

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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	✓
ALPM (Alternative Low Power Mode) compatible	✓
ATX v3.0 PSU Power Excursion	✓

115V

Average Efficiency	92.087%
Efficiency With 10W (≤500W) or 2% (>500W)	72.474
Average Efficiency 5VSB	79.403%
Standby Power Consumption (W)	0.0577000
Average PF	0.990
Avg Noise Output	14.53 dB(A)
Efficiency Rating (ETA)	TITANIUM
Noise Rating (LAMBDA)	A++

230V

Average Efficiency	93.663%
Average Efficiency 5VSB	77.476%
Standby Power Consumption (W)	0.1464000
Average PF	0.958
Avg Noise Output	14.95 dB(A)
Efficiency Rating (ETA)	TITANIUM
Noise Rating (LAMBDA)	A++

POWER SPECIFICATIONS

Rail		3.3V	5V	12V(1)	12V(2)	12V(3)	12V(4)	5VSB	-12V
Max. Power	Amps	24	24	30	30	35	35	3	0.5
	Watts	120		840				15	6
Total Max. Power (W)		850							

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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	18-22AWG	No
4+4 pin EPS12V (700mm)	1	1	16AWG	No
8 pin EPS12V (700mm)	1	1	16AWG	No
2x 6+2 pin PCIe (600mm)	2	4	16AWG	No
12+4 pin PCIe (600mm) (600W)	1	1	16-28AWG	No
SATA (600mm+150mm+150mm)	2	6	18AWG	No
SATA (600mm+150mm+150mm+150mm)	1	4	18AWG	No
SATA (600mm+150mm) / 4-pin Molex (+150mm+150mm)	1	2 / 2	18AWG	No
AC Power Cord (1330mm) - C13 coupler	1	1	18AWG	-

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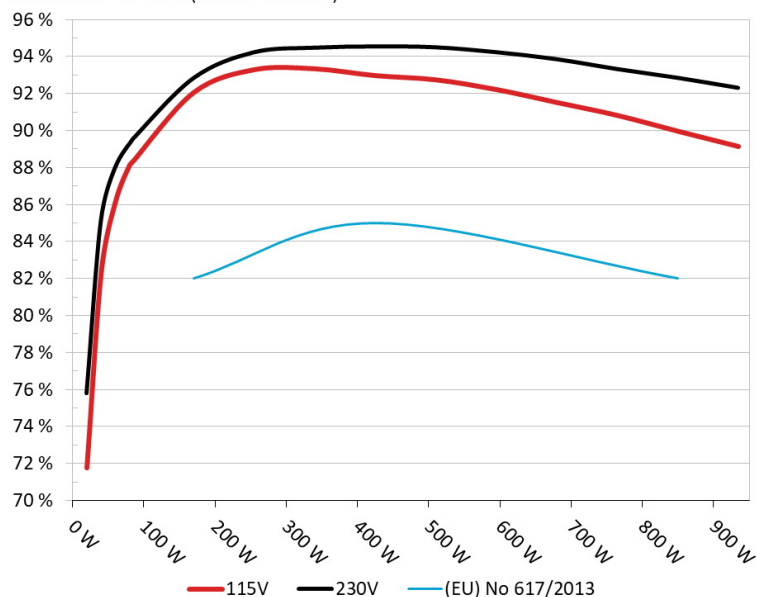
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General Data	
Manufacturer (OEM)	FSP
PCB Type	Double-Sided
Primary Side	
Transient Filter	4x Y caps, 3x X caps, 2x CM chokes, 1x MOV (TVR14561), 2x Gas Discharge Tubes (SMD)
Inrush Protection	NTC Thermistor (SCK-056, 50hm) & Relay
Rectifier MOSFETs	4x STMicroelectronics STB57N65M (650V, 26.5A @ 100°C, Rds(on): 0.063Ohm)
APFC MOSFETs	2x Infineon IPA60R120P7 (650V, 16A @ 100°C, Rds(on): 0.12Ohm)
APFC Boost Diode	2x CREE C3D06060A(600V, 6A @ 154°C)
Bulk Cap(s)	1x Nippon Chemi-Con (420V, 470uF, 2000h @ 105°C, KMZ) 1x Nippon Chemi-Con (420V, 330uF, 2000h @ 105°C, KMR)
Main Switchers	4x A&O AOTF190A60L (600V, 12A @ 100°C, Rds(on): 0.19Ohm)
IC Driver	2x Novosense Micro Labs NSi6602
APFC Controller	Infineon ICE2PCS02
Resonant Controller	Champion CM6901T2X
Topology	Primary side: Bridgless APFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETs	6x Toshiba TPHP8504PL (40V, 100A @ 100°C, Rds(on): 1.4mOhm)
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0901NS (30V, 94A @ 100°C, Rds(on): 1.9mOhm) PWM Controller(s): uPI UP3861P
Filtering Capacitors	Electrolytic: 6x Nippon Chemi-Con (2-5,000 @ 105°C, KZE) 2x Rubycon (1-5,000 @ 105°C, ZL) 2x Rubycon (6-10000 @ 105°C, ZLH) Polymer: 12x Chemi-Con, 22x FPCAP
Supervisor IC	Weltrend WT7527RA (OVP, UVP, OCP, SCP, PG)
Fan Controller	APW9010
Fan Model	be quiet! Silent Wings BQ SIW3-13525-HF (140mm, 12V, 0.56A, Fluid Dynamic Bearing Fan)
5VSB Circuit	
Rectifiers	1x CET CEB04N7G FET (700V, 4A, Rds(on): 3.3Ohm, 1x Infineon BSC0901NS FET (30V, 94A @ 100°C, Rds(on): 1.9mOhm), 1x P15L50N5 SBR (50V, 15A)

EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

Efficiency: be quiet! Dark Power 13 850W

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



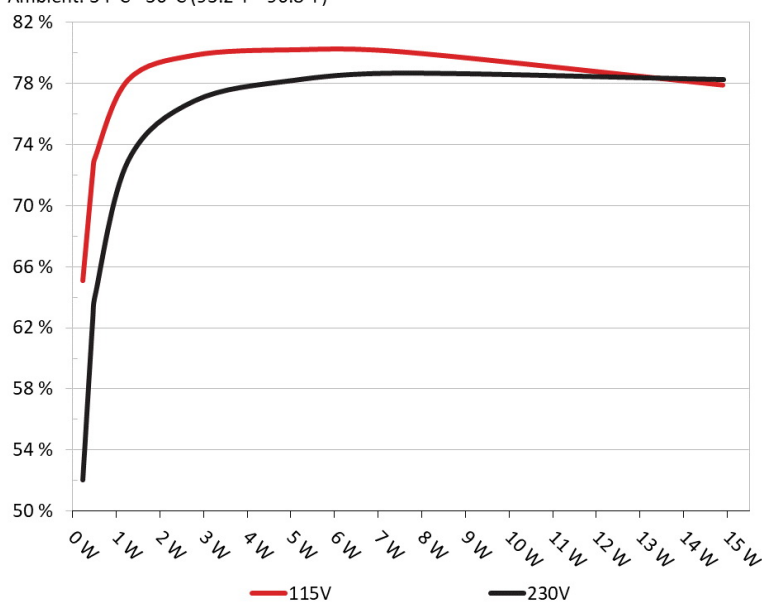
INFO

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: be quiet! Dark Power 13 850W

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	0.045A	0.229W	65.577%	0.029
	5.08V	0.351W		114.88V
2	0.09A	0.457W	72.694%	0.052
	5.079V	0.629W		114.88V
3	0.55A	2.783W	80.361%	0.229
	5.061V	3.464W		114.87V
4	1A	5.045W	80.715%	0.329
	5.045V	6.25W		114.88V
5	1.5A	7.541W	80.583%	0.391
	5.027V	9.358W		114.87V
6	3A	14.902W	78.406%	0.468
	4.968V	19.004W		114.87V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229W	52.55%	0.011
	5.08V	0.44W		229.78V
2	0.09A	0.457W	63.076%	0.018
	5.08V	0.728W		229.78V
3	0.55A	2.783W	77.329%	0.085
	5.061V	3.599W		229.78V
4	1A	5.044W	78.674%	0.143
	5.044V	6.413W		229.78V
5	1.5A	7.538W	79.148%	0.197
	5.025V	9.527W		229.78V
6	3A	14.91W	78.731%	0.308
	4.971V	18.942W		229.77V

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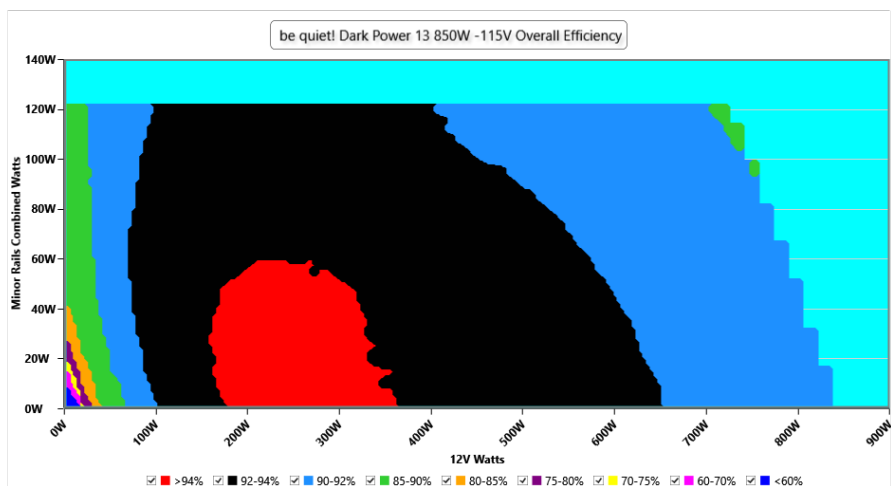
115V

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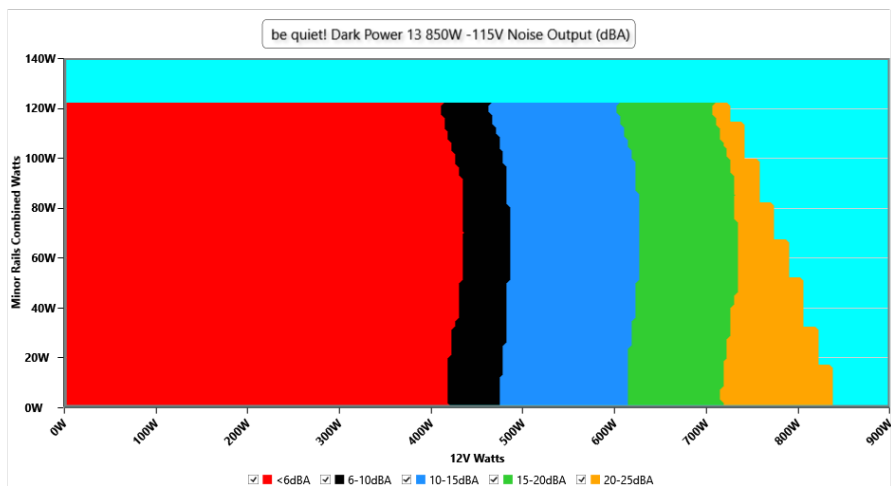
EFFICIENCY GRAPH 115V



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

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	114.88 V	114.84 V	113.85 V	114.91 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.98 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.416	1.415	1.340	1.418	1.490	PASS
Mains Voltage THD:	0.17 %	0.12 %	N/A	0.23 %	2.00 %	PASS
Real Power:	0.058 W	-0.086 W	N/A	0.221 W	N/A	N/A
Apparent Power:	12.263 W	11.934 W	N/A	12.796 W	N/A	N/A
Power Factor:	0.005	N/A	N/A	N/A	N/A	N/A

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
10%	5.252A	1.965A	1.969A	0.993A	84.998	88.345%	371	<6.0	40.23°C	0.966
	12.072V	5.088V	3.352V	5.037V	96.212				44.48°C	114.85V
20%	11.580A	2.95A	2.953A	1.194A	169.935	92.057%	385	<6.0	40.85°C	0.987
	12.006V	5.085V	3.353V	5.025V	184.597				45.53°C	114.82V
50%	31.245A	4.927A	4.935A	1.808A	424.837	92.969%	497	12.4	42.37°C	0.995
	11.981V	5.074V	3.344V	4.979V	456.968				48.62°C	114.73V
100%	63.734A	8.903A	8.933A	3.069A	849.706	89.959%	1309	34.6	45.21°C	0.994
	11.924V	5.054V	3.325V	4.887V	944.554				55.27°C	114.57V

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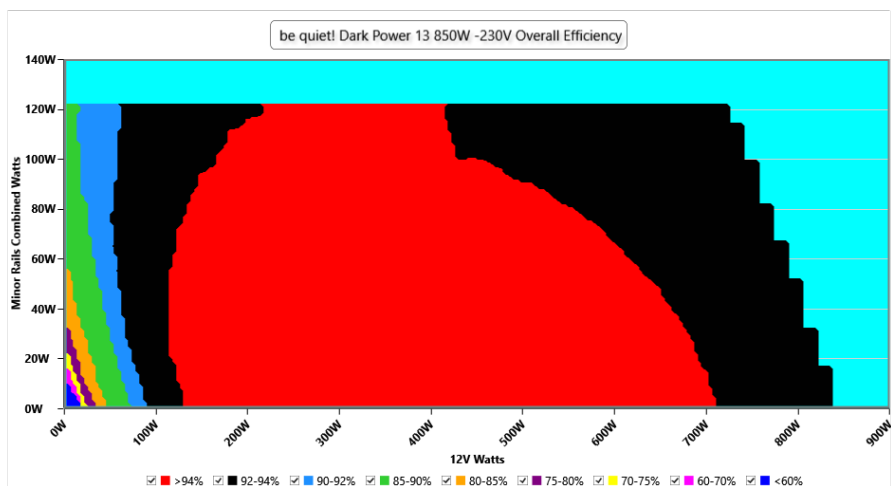
230V

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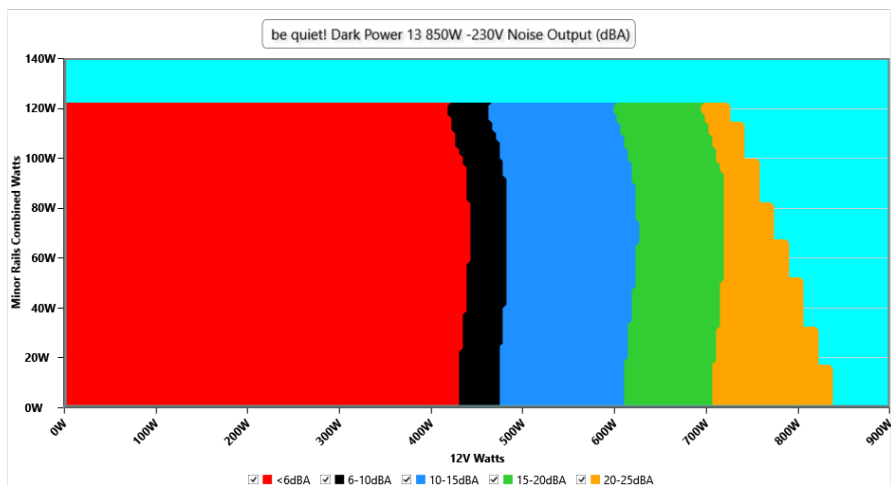
EFFICIENCY GRAPH 230V



INFO

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NOISE GRAPH 230V



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 -230V

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	229.76 V	229.73 V	227.70 V	229.82 V	232.30 V	PASS
Mains Frequency:	50.00 Hz	50.00 Hz	49.50 Hz	50.00 Hz	50.50 Hz	PASS
Mains Voltage CF:	1.416	1.415	1.340	1.417	1.490	PASS
Mains Voltage THD:	0.15 %	0.12 %	N/A	0.21 %	2.00 %	PASS
Real Power:	0.146 W	-0.108 W	N/A	0.450 W	N/A	N/A
Apparent Power:	41.126 W	40.807 W	N/A	41.949 W	N/A	N/A
Power Factor:	0.001	N/A	N/A	N/A	N/A	N/A

INFO

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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
10%	5.258A	1.965A	1.968A	0.992A	84.994	89.289%	333	<6.0	39.83°C	0.846
	12.055V	5.088V	3.354V	5.038V	95.184				44.18°C	229.76V
20%	11.576A	2.949A	2.952A	1.194A	169.923	92.836%	330	<6.0	41.03°C	0.937
	12.009V	5.086V	3.354V	5.026V	183.037				45.68°C	229.75V
50%	31.238A	4.926A	4.934A	1.807A	424.803	94.552%	480	11.2	42.13°C	0.977
	11.983V	5.075V	3.344V	4.98V	449.278				48.17°C	229.71V
100%	63.726A	8.903A	8.932A	3.069A	849.68	92.853%	1327	35.7	45.31°C	0.981
	11.926V	5.054V	3.325V	4.887V	915.085				55.34°C	229.63V

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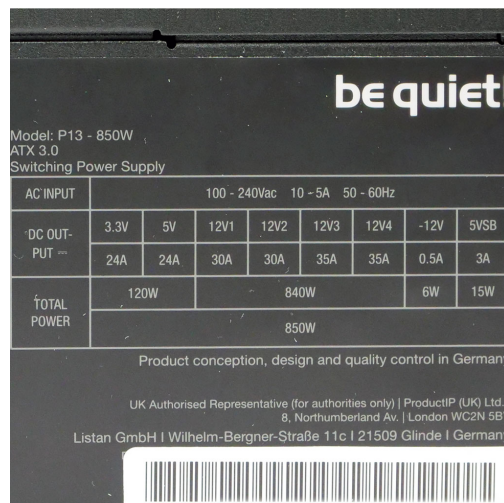
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EFFICIENCY AND NOISE REPORT IN ACCORDANCE WITH
CYBENETICS ETA AND CYBENETICS LAMBDA PROCEDURE

be quiet! Dark Power 13 850W



Top side



AC INPUT		100 - 240Vac 10 - 5A 50 - 60Hz						
DC OUT- PUT	3.3V	5V	12V1	12V2	12V3	12V4	-12V	5VSB
	24A	24A	30A	30A	35A	35A	0.5A	3A
TOTAL POWER	120W		840W				6W	15W
	850W							

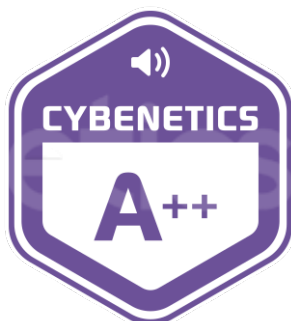

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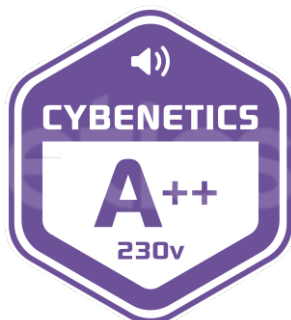
Power specifications label

CERTIFICATIONS 115V

Aristeidis Bitziopoulos
Lab Director

CERTIFICATIONS 230V



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