FSP Technology Dagger Pro 850W

Serial Number S1131050007

Lab ID FS85001859

Certification ID 251859

Test Result Report ID: 21PS1859A

Certificate Issue Date: Jul 13, 2021

Scheme: ETA-EMI PSU

115V

230V

Scheme: LAMBDA PSU

115V

230V

Aristeidis Bitziopoulos, Certification Body General Manager

General Information

Test Equipment

Electronic Loads	Chroma 63601-5 x2 Chroma 63600-2 Chroma 63640-80-80 x10 Chroma 63610-80-20
AC Sources	Chroma 6530, APM SP300VAC4000W-P, GW Instek ASR-3500
Power Analyzers	Rohde & Schwarz HMC8015 & NPA701
Oscilloscopes	Picoscope 4444, 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
EMI Analyzer	TekBox TBMR-110M-EU
Isolation Transformer	4kVA
UPS	FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA
Testing Methodology	Cybenetics PSU Test Protocol

DUT Information
(Non-accredited measurements)

Product Identification Details	
Brand	FSP Technology
Model	Dagger Pro 850W
OEM/ODM	FSP
Serial Number	S1131050007
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12-6

Rated Frequency (Hz)	50-60
Rated Power (W)	850
Operating Temperature (Continuous Full Load) (°C)	
Type	SFX
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	92mm Double Ball Bearing Fan (PLA09215B12H)
Semi-Passive Operation	✓
Cybenetics Testing Information	
Lab ID	FS85001859
Date of receipt	Jun 10, 2021
Testing Date	Jun 22, 2021
Report Issued Date	Jul 13, 2021
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

Cables and Connectors
(Non-accredited measurements)

Modular Cables				
Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (500mm)	1	1	18-22AWG	No
4+4 pin EPS12V (700mm) / 8 pin EPS12V (700mm)	1	1 / 1	18AWG	No
6+2 pin PCIe (500mm) / 6+2 pin PCIe (500mm)	2	2 / 2	18AWG	No
SATA (350mm+100mm+100mm) / 4-pin Molex (+100mm)	1	3 / 1	18AWG	No
SATA (350mm+100mm) / 4-pin Molex (+100mm) / FDD (+100mm)	1	2 / 1 / 1	18-22AWG	No

AC Power Cord (1360mm) - C13 coupler	1	1	18AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	70.83	2.5	0.3
	Watts	120		850	12.5	3.6
Total Max. Power (W)		850				

Parts Description

General Data	
Manufacturer (OEM)	FSP
PCB Type	Double Sided
Primary Side	
Transient Filter	2x Y caps, 2x X caps, 3x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	2x HY GBU1506U (600V, 3.2A @ 100°C w/o heatsink)
APFC MOSFETs	2x Vishay SiHG120N60E (600V, 16A @ 100°C, Rds(on): 0.12Ohm)
APFC Boost Diode	2x STMicroelectronics STPSC8H065 (650V, 8A @ 140°C)
Bulk Cap(s)	1x Nippon Chemi-Con (420V, 120uF, 2,000h @ 105°C, KHE), 2x United Chemi-Con (420V, 150uF each or 300uf combined, 4-5,000h @ 105°C, CLA)
Main Switchers	2x Infineon IPA80R310CE (800V, 10.6A @ 100°C, Rds(on): 0.31Ohm)
Reset Switch	1x Infineon IPD80R1K4CE (800V, 2.3A @ 100°C, Rds(on): 1.4Ohm)
Combo APFC/Switching Controller	FSP MIA IC 6600
Topology	Primary side: APFC, Active Clamp Reset Forward Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETs	6x Toshiba TPH1R306PL (60V, 100A, Rds(on): 1.34mOhm)
5V & 3.3V	DC-DC Converters: 4x Infineon BSC0902NS (30V, 67A @ 100°C, Rds(on): 2.6mOhm) PWM Controller(s): ANPEC APW7159C & FSP MIA IC 6601
Filtering Capacitors	Electrolytic: 1x Rubycon (3-6,000h @ 105°C, YXG), 2x Nippon Chemi-Con (4-10,000h @ 105°C, KY), 2x Nippon Chemi-Con (5-6,000h @ 105°C, KZH) Polymer: 1x APAQ, 14x TEAPO
Supervisor IC	Weltrend WT7502R (OVP, UVP, SCP, PG) & FSP MIA IC 6601 (OCP)

Fan Model	Power Logic PLA09215B12H (92mm, 12V, 0.55A, Double Ball Bearing Fan)
5VSB Circuit	
Rectifiers	1x PFC PT20L80D SBR (80V, 20A) & 1x CET CEB02N7G FET (700V, 1.3A @ 100°C, Rds(on): 6.75Ohm)
Standby PWM Controller	FSP MIA IC 6600

Test Results

Temperature & Compliance Info

Temperature Range (°C /°F)	28-32 / 82.4-89.6
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
ALPM (Alternative Low Power Mode) compatible	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	89.194%
Average Noise Output (>1450 Load Combinations)	38.86dBA
Average PF (>1450 Load Combinations)	0.991
Efficiency With 10W (≤500W) or 2% (>500W) Load	66.710%
Standby Power Consumption	0.1381W
Non-Accredited	
12V Ripple (Full Load)	36.34mV
5V Ripple (Full Load)	25.26mV
3.3V Ripple (Full Load)	21.74mV
5VSB Ripple (Full Load)	16.61mV
12V Load Regulation	0.99%
5V Load Regulation	0.77%
3.3V Load Regulation	1.06%

5VSB Load Regulation	3.67%
Inrush Current	26.360A

230V

Accredited		
Average Efficiency (>1450 load combinations)		90.910%
Average Noise Output (>1450 Load Combinations)		38.08dBA
Average PF (>1450 Load Combinations)		0.971
Efficiency With 10W (≤500W) or 2% (>500W) Load		-
Standby Power Consumption		0.2262W
Non-Accredited		
12V Ripple (Full Load)		37.26mV
5V Ripple (Full Load)		24.75mV
3.3V Ripple (Full Load)		25.91mV
5VSB Ripple (Full Load)		18.22mV
12V Load Regulation		0.86%
5V Load Regulation		0.77%
3.3V Load Regulation		1.09%
5VSB Load Regulation		3.69%
Inrush Current		89.430A
Hold-Up Time & PWR_OK Signal		20.10ms
AC Loss to PWR_OK Hold Up Time		17.10ms
PWR_OK Inactive to DC Loss Delay		3.00ms
PSU Timings: T1 (20% / 100%)	51.0ms	32.0ms
PSU Timings: T3 (20% / 100%)	130.0ms	132.0ms
OPP (21.63°C / 42.75°C)	114.12%	114.07%

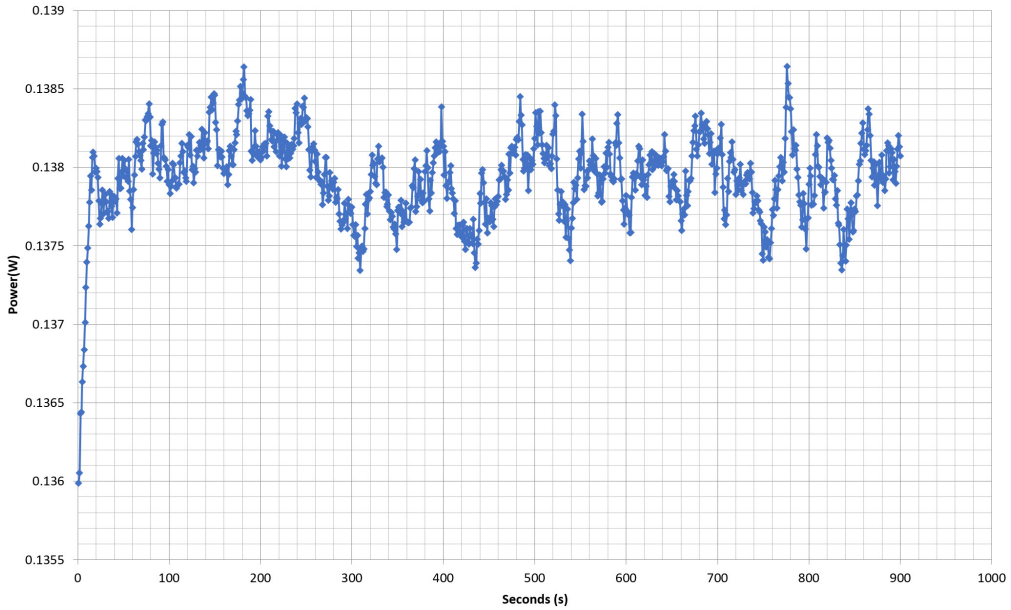
Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	20.1
AC Loss to PWR_OK Hold Up Time (ms)	17.1

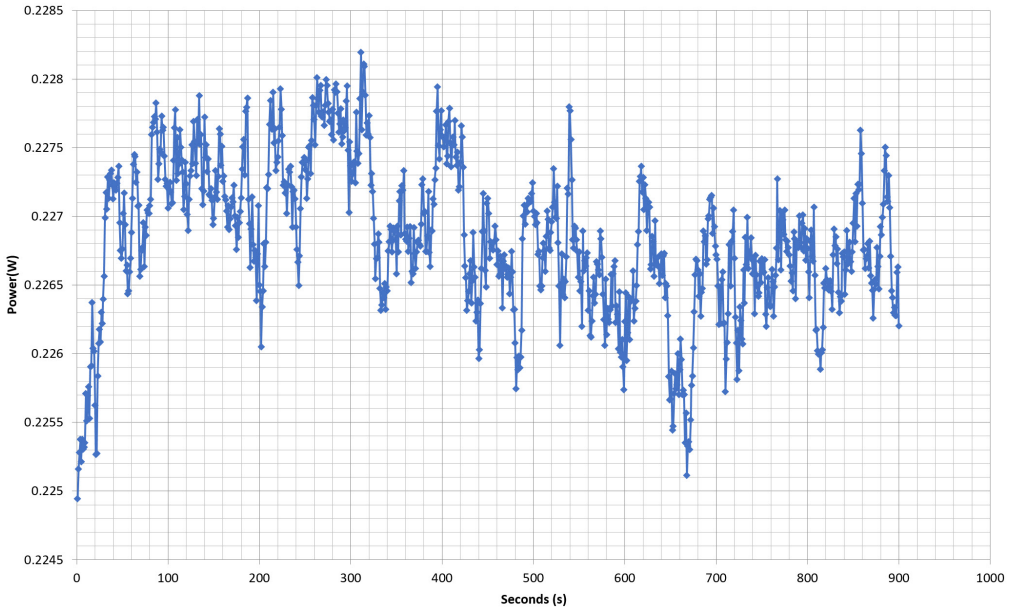
PWR_OK Inactive to DC Loss Delay (ms)	3

Graphs

115V

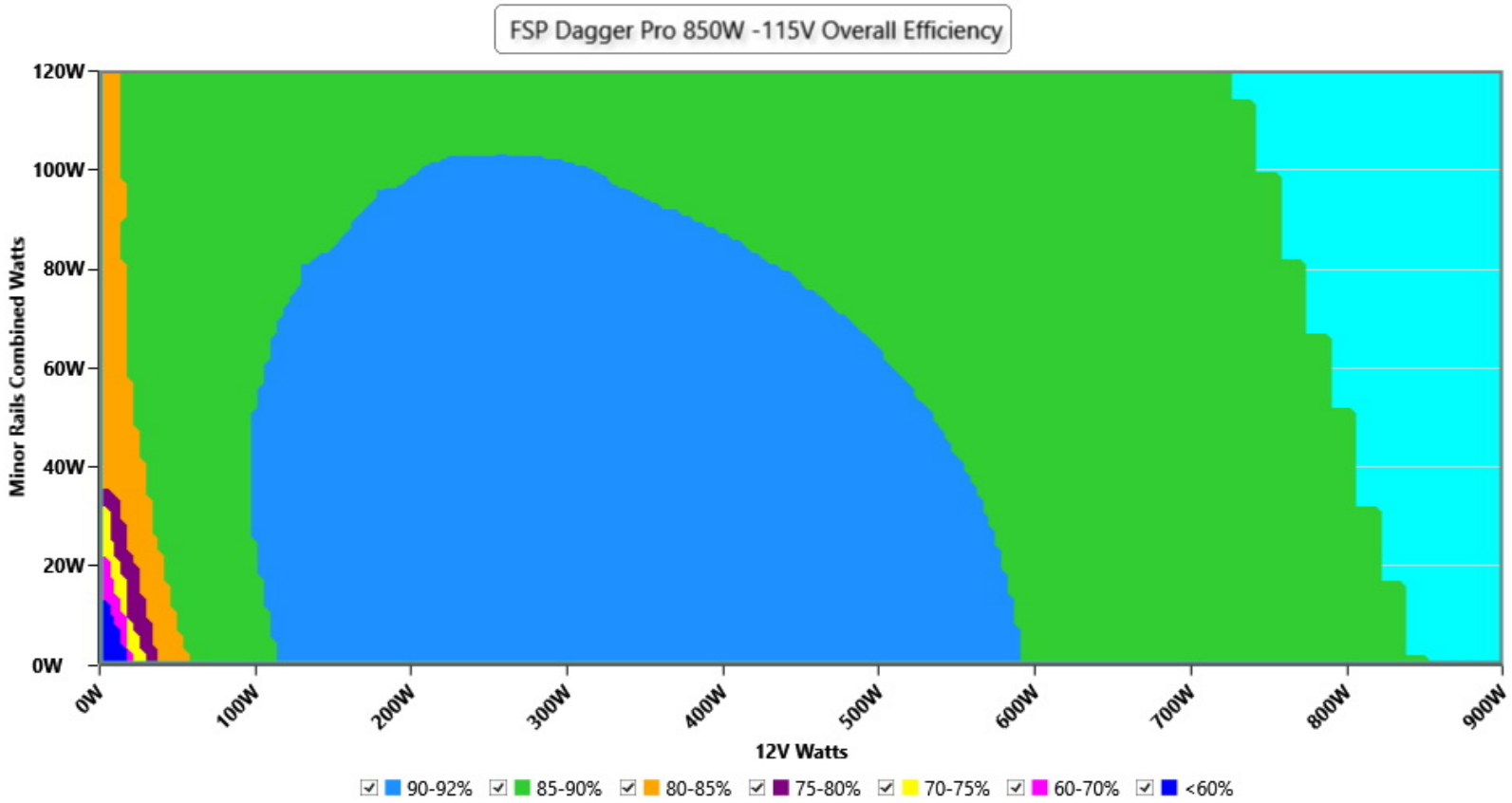


230V



Efficiency Graph

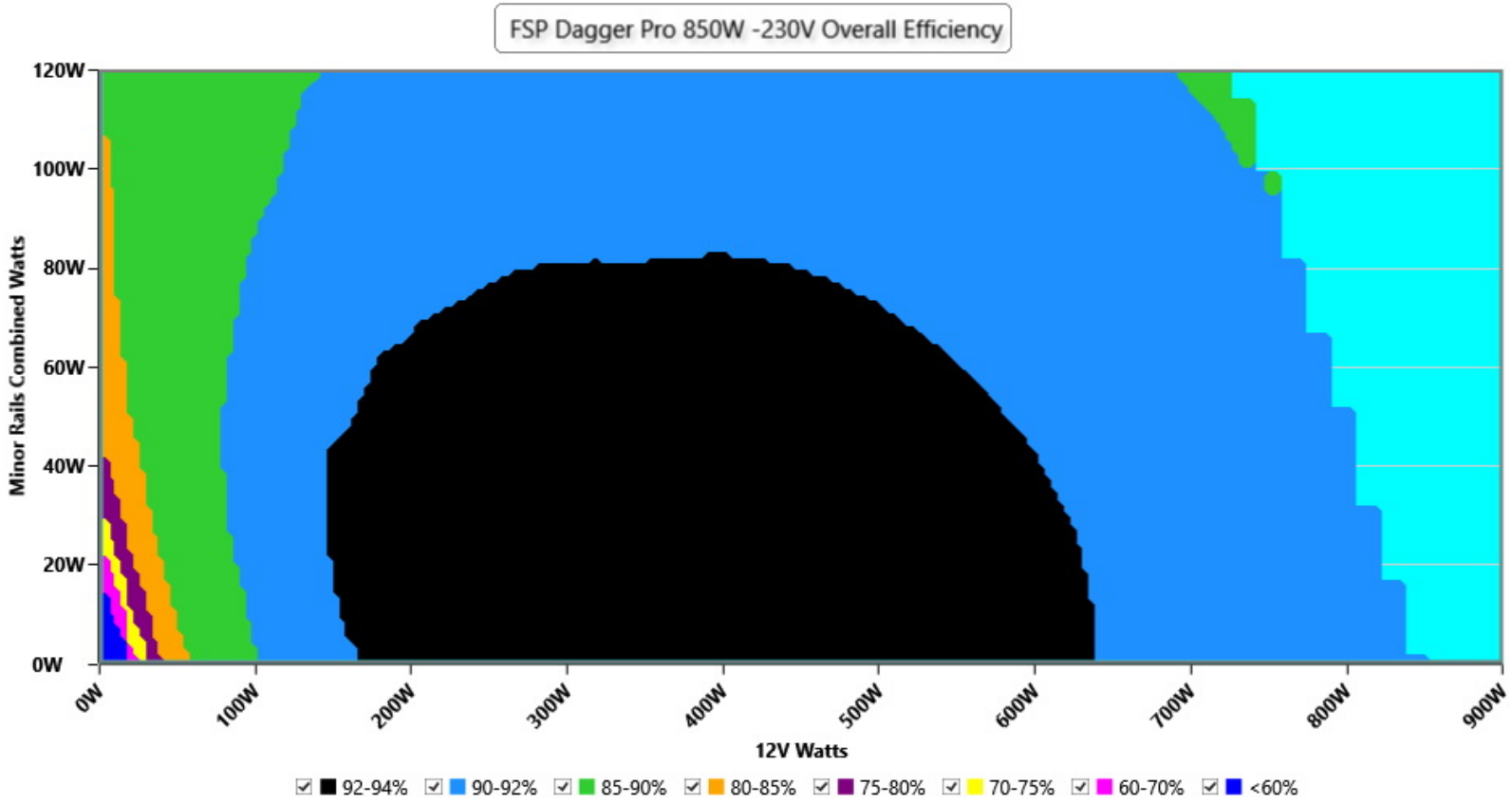
115V



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

230V



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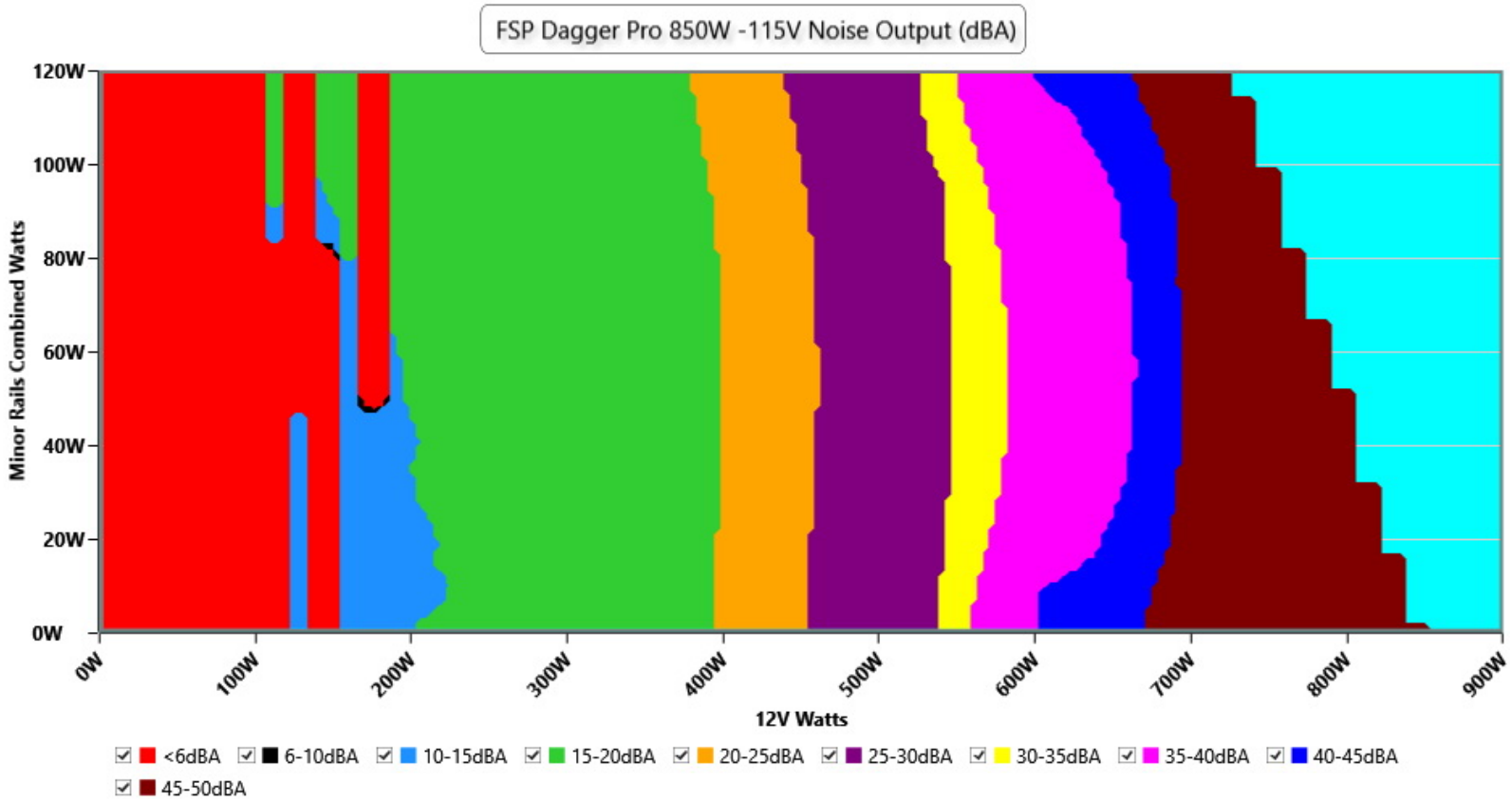
Noise Graph

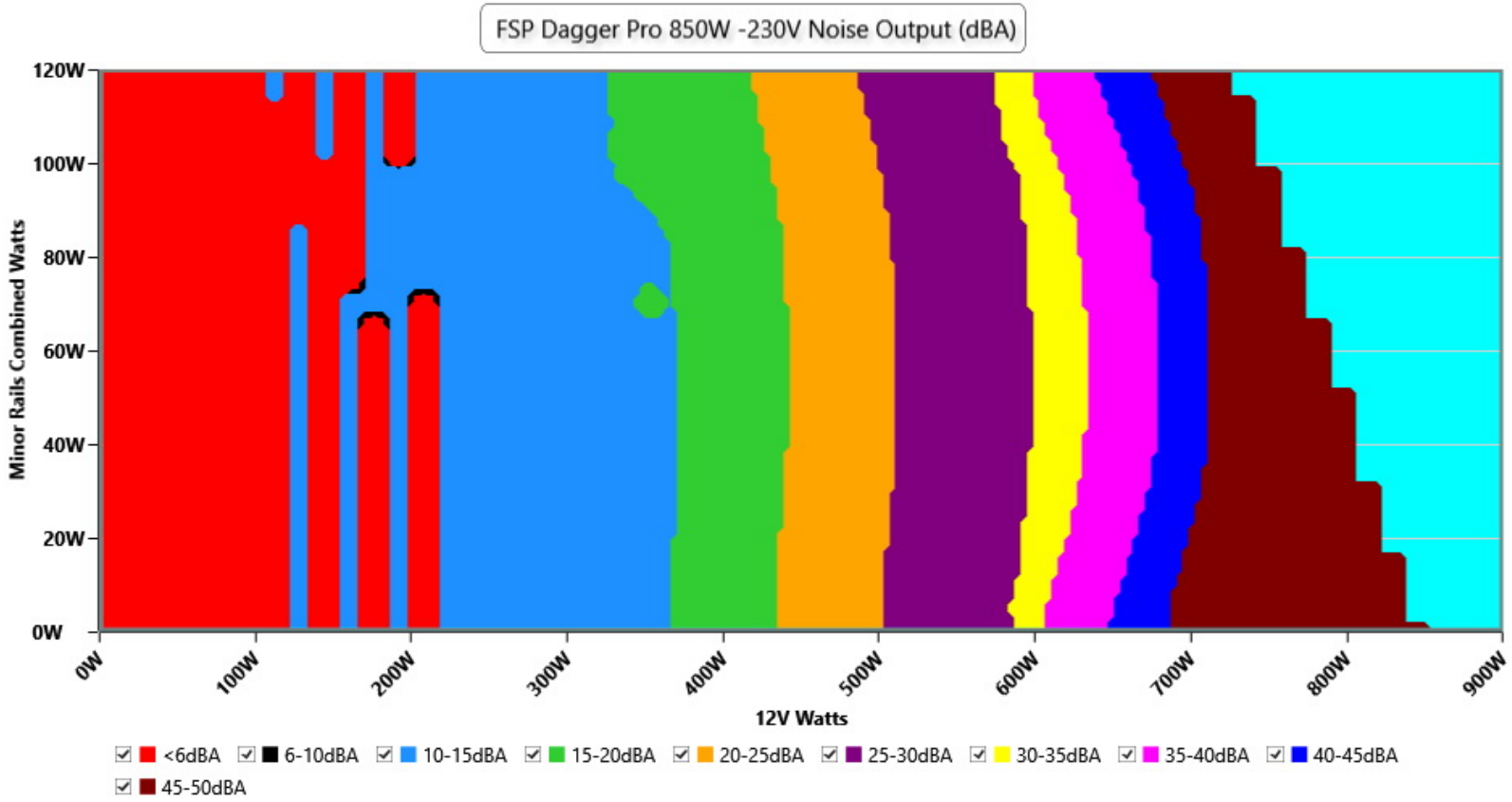
115V



INFO

The PSU`s noise in its entire operational range and under 30-32 °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

230V



INFO

The PSU`s noise in its entire operational range and under 30-32 °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

Noise under high ambient temperature (indicative)

115V

Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 46.0 °C	0 RPM · <6.0 dB(A) · 46.0 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 46.7 °C	0 RPM · <6.0 dB(A) · 46.7 °C	fan off in both
50%	1373 RPM · 20.6 dB(A) · 42.3 °C	1373 RPM · 20.6 dB(A) · 42.3 °C	**+0.0 dB(A)**
100%	3354 RPM · 47.0 dB(A) · 45.8 °C	3354 RPM · 47.0 dB(A) · 45.8 °C	**+0.0 dB(A)**

230V

Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 45.2 °C	0 RPM · <6.0 dB(A) · 45.2 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 46.2 °C	0 RPM · <6.0 dB(A) · 46.2 °C	fan off in both
50%	1301 RPM · 18.4 dB(A) · 43.0 °C	1301 RPM · 18.4 dB(A) · 43.0 °C	**+0.0 dB(A)**
100%	3363 RPM · 47.0 dB(A) · 45.6 °C	3363 RPM · 47.0 dB(A) · 45.6 °C	**+0.0 dB(A)**

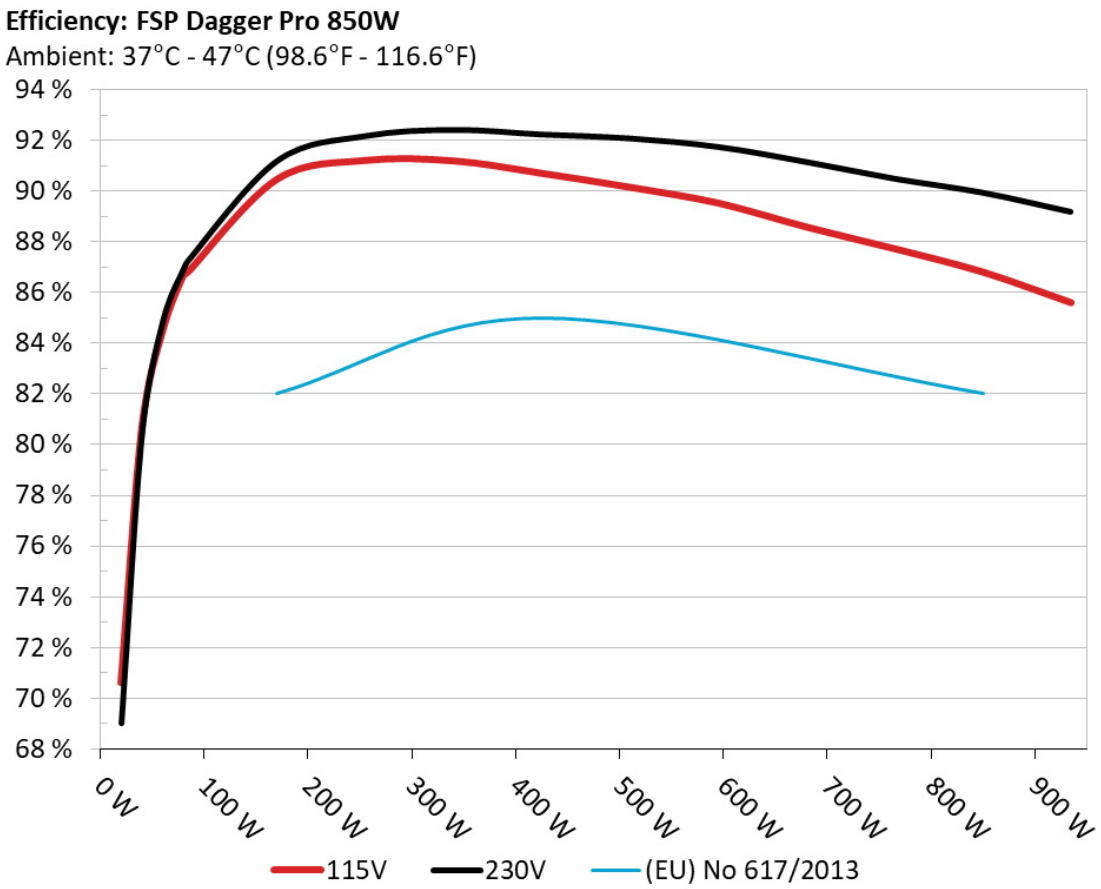
INFO

Fan speed, noise and the measured intake temperature at 10, 20, 50 and 100 % load, from the two load regulation tests: at normal ambient (about 30-32 °C) and at high ambient (about 40-47 °C). These are stabilized readings at fixed loads, not averages over the certification sweep, so they are indicative of how the fan behaves when it is hot. "<6.0" is the floor of our sound meter: the fan is stopped or too quiet to measure (the fan speed column says which); with the fan stopped, the intake sensor can read higher than the chamber air.

Informational. Not part of the ETA or LAMBDA rating.

Indicative Performance

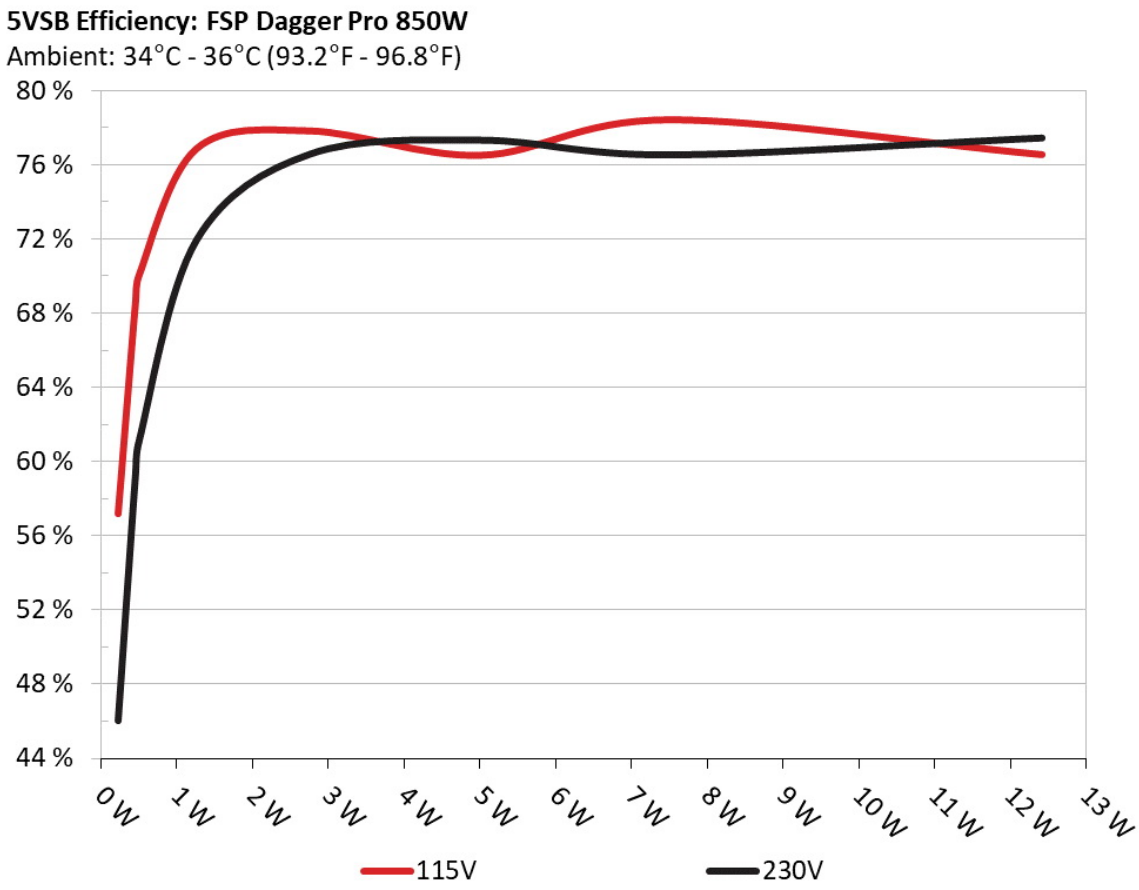
Efficiency under high ambient temperature



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



INFO

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

5VSB Efficiency (ERP LOT 3/6 & CEC)

115V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.227	57.179%	0.053
	5.048V	0.397		115.14V
2	0.090A	0.454	68.477%	0.086
	5.047V	0.663		115.14V
3	0.550A	2.767	77.790%	0.297
	5.034V	3.557		115.14V
4	1.000A	5.017	76.479%	0.375
	5.018V	6.560		115.14V
5	1.500A	7.503	78.393%	0.416
	5.003V	9.571		115.14V
6	2.499A	12.420	76.516%	0.458
	4.970V	16.232		115.14V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.227	46.045%	0.020
	5.049V	0.493		230.28V
2	0.090A	0.454	59.192%	0.031
	5.047V	0.767		230.29V
3	0.550A	2.767	76.563%	0.133
	5.032V	3.614		230.29V
4	1.000A	5.017	77.304%	0.210
	5.018V	6.490		230.29V
5	1.500A	7.502	76.512%	0.271
	5.001V	9.805		230.29V
6	2.499A	12.421	77.423%	0.337
	4.970V	16.043		230.31V

Supplementary Tests (For Reference)

Typical Load Tests

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	5.246A	1.985A	1.993A	0.998A	84.954	86.818%	0	<6.0	45.98°C	0.963
	12.079V	5.034V	3.310V	5.008V	97.853				40.47°C	115.14V
2	11.522A	2.982A	2.993A	1.202A	169.994	90.449%	0	<6.0	46.74°C	0.983
	12.072V	5.031V	3.307V	4.992V	187.945				40.65°C	115.14V
3	18.142A	3.480A	3.495A	1.407A	254.983	91.195%	1205	16.0	41.24°C	0.992
	12.068V	5.028V	3.304V	4.975V	279.601				47.73°C	115.14V
4	24.771A	3.978A	3.998A	1.613A	339.978	91.180%	1216	16.2	41.48°C	0.996
	12.062V	5.025V	3.302V	4.959V	372.865				48.62°C	115.13V
5	31.071A	4.977A	5.002A	1.821A	424.776	90.690%	1373	20.6	42.25°C	0.999
	12.046V	5.022V	3.299V	4.941V	468.384				49.61°C	115.12V
6	37.327A	5.979A	6.010A	2.000A	509.149	90.143%	1635	26.4	42.67°C	0.999
	12.042V	5.019V	3.295V	4.923V	564.824				50.48°C	115.12V
7	43.676A	6.981A	7.020A	2.242A	594.618	89.517%	2033	32.5	43.63°C	0.999
	12.032V	5.015V	3.291V	4.904V	664.252				51.82°C	115.11V
8	50.073A	7.987A	8.031A	2.455A	679.932	88.568%	3141	46.6	43.74°C	0.999
	12.013V	5.010V	3.287V	4.885V	767.691				52.64°C	115.10V
9	56.897A	8.488A	8.526A	2.461A	764.851	87.712%	3363	47.0	44.88°C	0.999
	11.993V	5.006V	3.284V	4.874V	872.004				54.50°C	115.10V
10	63.740A	8.994A	9.049A	2.573A	849.581	86.796%	3354	47.0	45.84°C	0.999
	11.961V	5.003V	3.281V	4.858V	978.828				55.86°C	115.09V
11	71.115A	8.996A	9.054A	2.579A	934.365	85.592%	3345	47.0	46.71°C	0.999
	11.913V	5.001V	3.279V	4.845V	1091.645				57.42°C	115.08V
CL1	0.115A	14.001A	13.998A	0.001A	117.368	83.208%	1824	29.4	42.25°C	0.977
	12.087V	5.003V	3.281V	5.022V	141.053				49.25°C	115.15V

CL2	70.825A	1.001A	1.001A	1.000A	860.182	87.268%	3354	47.0	46.13°C	0.999
	11.958V	5.025V	3.300V	4.923V	985.683				56.25°C	115.09V

The results above are not used in the certification process

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	5.264A	1.987A	1.993A	0.999A	84.954	87.290%	0	<6.0	45.18°C	0.886
	12.035V	5.034V	3.310V	5.007V	97.324				40.28°C	230.29V
2	11.566A	2.982A	2.992A	1.202A	169.999	91.188%	0	<6.0	46.20°C	0.950
	12.027V	5.031V	3.307V	4.990V	186.426				40.83°C	230.30V
3	18.213A	3.481A	3.498A	1.407A	254.996	92.170%	1191	15.7	41.53°C	0.971
	12.021V	5.028V	3.304V	4.974V	276.657				47.53°C	230.30V
4	24.868A	3.982A	3.999A	1.614A	340.000	92.410%	1204	15.8	41.72°C	0.979
	12.015V	5.025V	3.301V	4.957V	367.926				48.48°C	230.31V
5	31.192A	4.978A	5.003A	1.823A	424.774	92.230%	1301	18.4	42.97°C	0.986
	11.999V	5.022V	3.298V	4.938V	460.558				50.24°C	230.31V
6	37.470A	5.979A	6.011A	2.000A	509.147	92.075%	1565	24.8	43.16°C	0.989
	11.996V	5.019V	3.295V	4.921V	552.970				51.04°C	230.31V
7	43.817A	6.983A	7.021A	2.244A	594.623	91.740%	1808	29.1	43.87°C	0.991
	11.993V	5.015V	3.291V	4.902V	648.159				52.24°C	230.30V
8	50.195A	7.986A	8.031A	2.457A	679.932	91.145%	2750	41.0	43.91°C	0.993
	11.984V	5.010V	3.286V	4.882V	745.986				52.83°C	230.31V
9	57.049A	8.488A	8.525A	2.462A	764.835	90.487%	3372	47.0	44.08°C	0.994
	11.961V	5.006V	3.283V	4.872V	845.243				53.31°C	230.31V
10	63.864A	8.994A	9.053A	2.573A	849.529	89.937%	3363	47.0	45.62°C	0.995
	11.937V	5.003V	3.280V	4.856V	944.578				55.36°C	230.30V
11	71.297A	8.997A	9.054A	2.580A	934.336	89.183%	3349	47.0	46.58°C	0.996
	11.882V	5.002V	3.279V	4.843V	1047.658				57.29°C	230.30V
CL1	0.115A	14.000A	13.998A	0.001A	117.360	83.708%	1665	27.0	42.84°C	0.925
	12.039V	5.003V	3.281V	5.022V	140.201				50.56°C	230.32V

CL2	70.825A	1.000A	1.002A	1.000A	858.406	90.388%	3361	47.0	45.58°C	0.996
	11.933V	5.024V	3.300V	4.921V	949.692				55.88°C	230.30V

The results above are not used in the certification process

Light Load Tests

115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.227A	0.496A	0.500A	0.198A	19.982	70.620%	0	<6.0	0.707
	12.081V	5.043V	3.317V	5.043V	28.295				115.17V
2	2.456A	0.993A	0.994A	0.397A	39.970	80.630%	0	<6.0	0.934
	12.080V	5.042V	3.316V	5.033V	49.572				115.16V
3	3.689A	1.489A	1.493A	0.597A	60.002	84.477%	0	<6.0	0.951
	12.079V	5.036V	3.312V	5.024V	71.028				115.15V
4	4.914A	1.987A	1.996A	0.797A	79.953	86.658%	0	<6.0	0.960
	12.077V	5.034V	3.310V	5.015V	92.263				115.14V

The results above are not used in the certification process

230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.231A	0.497A	0.498A	0.198A	19.979	69.017%	0	<6.0	0.621
	12.041V	5.043V	3.317V	5.042V	28.948				230.29V
2	2.464A	0.993A	0.994A	0.397A	39.968	80.465%	0	<6.0	0.764
	12.040V	5.042V	3.316V	5.033V	49.671				230.29V
3	3.702A	1.488A	1.494A	0.597A	60.001	84.872%	0	<6.0	0.832
	12.037V	5.036V	3.312V	5.023V	70.696				230.29V
4	4.933A	1.984A	1.994A	0.798A	79.953	86.928%	0	<6.0	0.877
	12.034V	5.034V	3.310V	5.014V	91.976				230.29V

The results above are not used in the certification process

Ripple Measurements

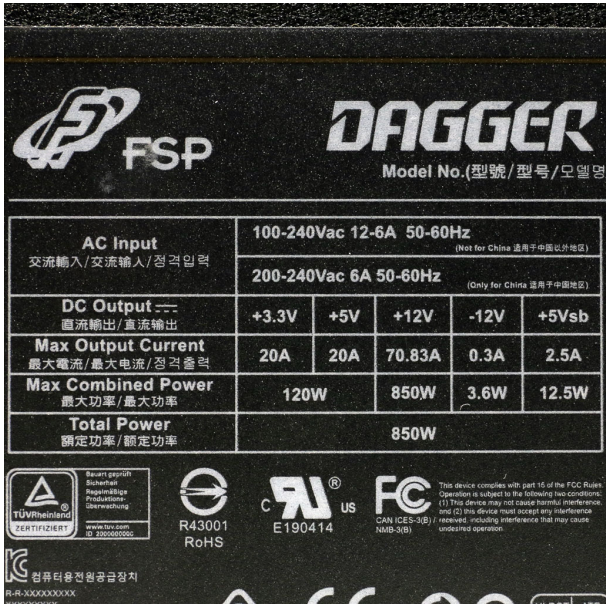
115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	33.71mV	11.82mV	13.39mV	10.42mV	Pass
20% Load	20.93mV	12.73mV	13.44mV	11.06mV	Pass
30% Load	16.78mV	14.02mV	17.62mV	13.20mV	Pass
40% Load	17.16mV	14.86mV	18.81mV	14.24mV	Pass
50% Load	18.32mV	16.28mV	19.69mV	14.46mV	Pass
60% Load	18.40mV	15.57mV	20.25mV	13.88mV	Pass
70% Load	21.61mV	19.45mV	23.02mV	15.27mV	Pass
80% Load	24.52mV	24.80mV	25.06mV	17.74mV	Pass
90% Load	27.48mV	22.52mV	20.32mV	14.97mV	Pass
100% Load	36.34mV	25.26mV	21.74mV	16.61mV	Pass
110% Load	43.23mV	30.10mV	24.99mV	17.29mV	Pass
Crossload1	39.53mV	25.45mV	27.75mV	15.75mV	Pass
Crossload2	31.12mV	18.23mV	22.21mV	15.25mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	42.51mV	13.01mV	13.54mV	11.38mV	Pass
20% Load	38.82mV	13.74mV	14.52mV	11.53mV	Pass
30% Load	32.92mV	14.12mV	17.93mV	13.66mV	Pass
40% Load	28.11mV	15.09mV	19.06mV	15.14mV	Pass
50% Load	26.65mV	16.56mV	19.54mV	14.49mV	Pass
60% Load	39.55mV	17.93mV	21.56mV	15.17mV	Pass
70% Load	23.15mV	20.56mV	24.78mV	15.80mV	Pass
80% Load	26.65mV	24.39mV	22.92mV	15.57mV	Pass



Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	29.66mV	22.16mV	18.83mV	14.99mV	Pass
100% Load	37.26mV	24.75mV	25.91mV	18.22mV	Pass
110% Load	36.51mV	25.10mV	27.10mV	16.88mV	Pass
Crossload1	46.26mV	28.45mV	27.76mV	16.64mV	Pass
Crossload2	30.69mV	16.80mV	19.11mV	14.65mV	Pass

The results above are not used in the certification process

FSP Technology Dagger Pro 850W

Top side

Power specifications label

Cybenetics 提供自願性認證方案: 電源供應器方面有 ETA (效率)、 LAMBDA (噪音) 與 SAFE (安全與正確運作)；散熱產品方面有 DELTA (機殼隔音) 與 PHI (風扇風量與靜壓)

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