



FSP Technology HPT850M Hydro

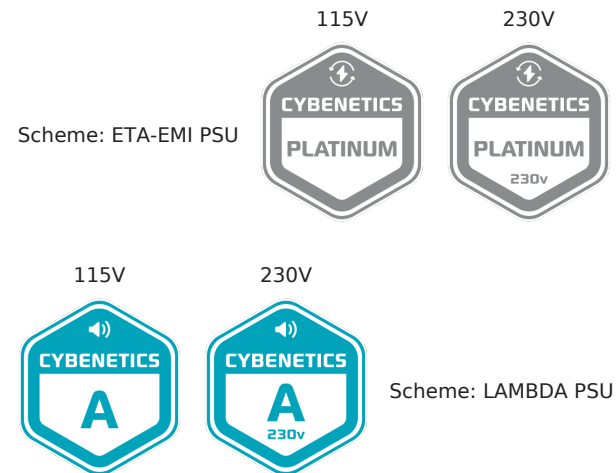
Serial Number

Lab ID 434

Certification ID 25434

Test Result Report ID:

Certificate Issue Date: Jul 20, 2018



A handwritten signature in blue ink, appearing to read 'A. Bitziopoulos', is written over a faint circular stamp.

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	HPT850M Hydro
OEM/ODM	FSP
Serial Number	
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10-5
Rated Frequency (Hz)	50-60

Rated Power (W)	850
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	135mm Fluid Dynamic Bearing Fan (MGA13512XF-A25)
Semi-Passive Operation	✓
Cybenetics Testing Information	
Lab ID	434
Date of receipt	Jul 5, 2018
Testing Date	Jul 17, 2018
Report Issued Date	Jul 20, 2018
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 (600mm)	1	1	16-22AWG	No
4+4 pin EPS12V (700mm)	2	2	16AWG	No
6+2 pin PCIe (650mm+150mm)	2	4	18AWG	No
6+2 pin PCIe (500mm+150mm)	2	4	16-18AWG	No
SATA (500mm+150mm+150mm+150mm)	2	8	18AWG	No
SATA (500mm+160mm) / 4 pin Molex (+160mm+100mm)	1	2 / 2	18AWG	No
SATA (500mm+160mm) / 4 pin Molex (+160mm) / FDD (+160mm)	1	2 / 1 / 1	18-22AWG	No
LED Light Cable (+600mm)	1	1	26AWG	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	100		850	12.5	3.6
Total Max. Power (W)		850				

Parts Description

General Data	
Manufacturer (OEM)	FSP
Platform Model	HPT (M)
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	3x GBJ1506 (600V, 15A @ 100°C)
APFC MOSFETS	2x Infineon IPA60R120P7 (650V, 16A @ 100°C, 0.12Ohm)
APFC Boost Diode	1x ROHM SCS308AP (650V, 8A @ 135°C)
Hold-up Cap(s)	2x Chemi-Con (420V, 330uF, 2000h @ 105 °C, KMZ)
Main Switchers	2x STi STF28N60M2 (650V, 14A @ 100°C, 0.15Ohm) Driver IC: Silicon Labs Si8233BD
APFC Controller	Infineon ICE2PCS02
LLC Resonant Controller	Champion CM6901T2X
Topology	Primary side: Half-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	6x Infineon BSC010N04LS (40V, 100A @ 100°C, 1mOhm)
5V & 3.3V	DC-DC Converters: 4x Infineon BSC0901NS (30V, 94A @ 100°C, 2.4mOhm) PWM Controller: Anpec APW7159C
Filtering Capacitors	Electrolytics: Chemi-Con (1-5,000 @ 105°C, KZE), Chemi-Con (4-10,000 @ 105°C, KY), 3x Rubycon (105°C) Polymers: Chemi-Con
Supervisor IC	SITI PS223H (4-channel OCP, OVP, UVP, OTP, SCP, PG)

Fan Model	Protechnic Electric MGA13512XF-A25 (135mm, 12V, 0.38A, Fluid Dynamic Bearing)
5VSB Circuit	
Rectifier	1x Infineon IRFR1018E (60V, 56A @ 100°C, 8.4mOhm)
Standby PWM Controller	InnoSwitch3-EP INN3674C

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	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	90.589%
Average Noise Output (>1450 Load Combinations)	24.90dBA
Average PF (>1450 Load Combinations)	0.994
Efficiency With 10W (≤500W) or 2% (>500W) Load	70.233%
Standby Power Consumption	0.0552W
Non-Accredited	
12V Ripple (Full Load)	24.22mV
5V Ripple (Full Load)	7.42mV
3.3V Ripple (Full Load)	15.99mV
5VSB Ripple (Full Load)	18.10mV
12V Load Regulation	0.46%
5V Load Regulation	0.65%
3.3V Load Regulation	0.63%
5VSB Load Regulation	1.51%
Inrush Current	30.108A

230V

Accredited		
Average Efficiency (>1450 load combinations)	92.672%	
Average Noise Output (>1450 Load Combinations)	22.75dBA	
Average PF (>1450 Load Combinations)	0.969	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1603W	
Non-Accredited		
12V Ripple (Full Load)	23.84mV	
5V Ripple (Full Load)	7.60mV	
3.3V Ripple (Full Load)	13.49mV	
5VSB Ripple (Full Load)	17.21mV	
12V Load Regulation	0.44%	
5V Load Regulation	0.65%	
3.3V Load Regulation	0.66%	
5VSB Load Regulation	1.57%	
Inrush Current	58.961A	
Hold-Up Time & PWR_OK Signal	16.70ms	
AC Loss to PWR_OK Hold Up Time	15.80ms	
PWR_OK Inactive to DC Loss Delay	0.90ms	
OPP (0.00°C / 0.00°C)	-	-

Hold-Up Time & PWR_OK Signal

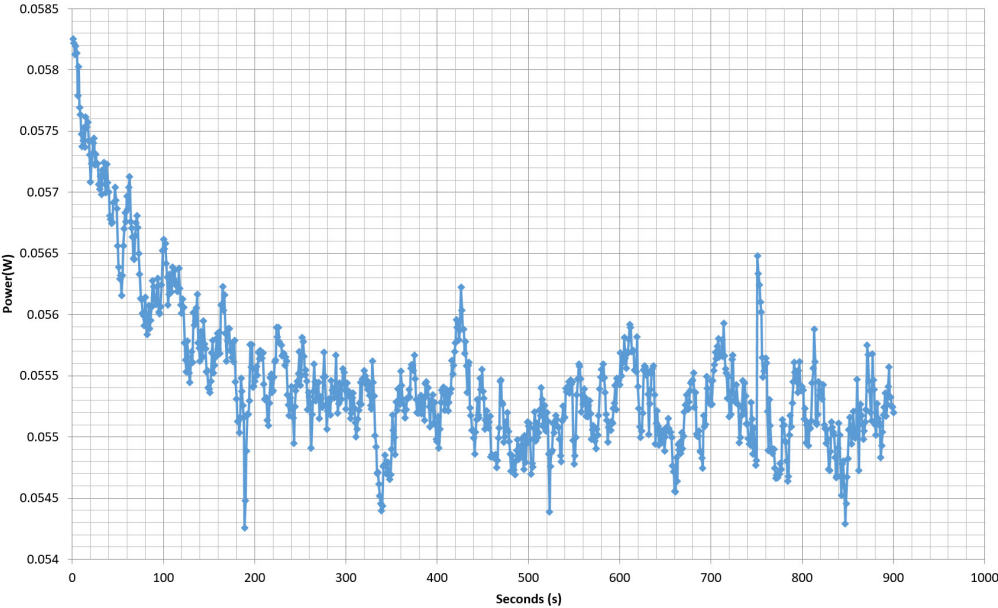
Hold-Up Time (ms)	16.70
AC Loss to PWR_OK Hold Up Time (ms)	15.80
PWR_OK Inactive to DC Loss Delay (ms)	0.90

Vampire Power

Graphs

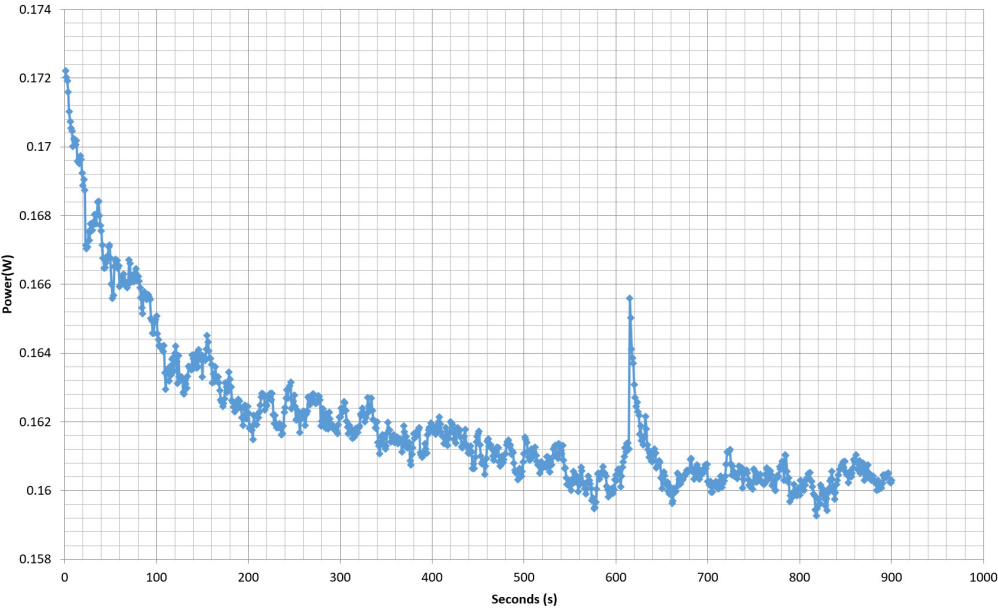
115V

Power - 17/07/2018 - 16:08



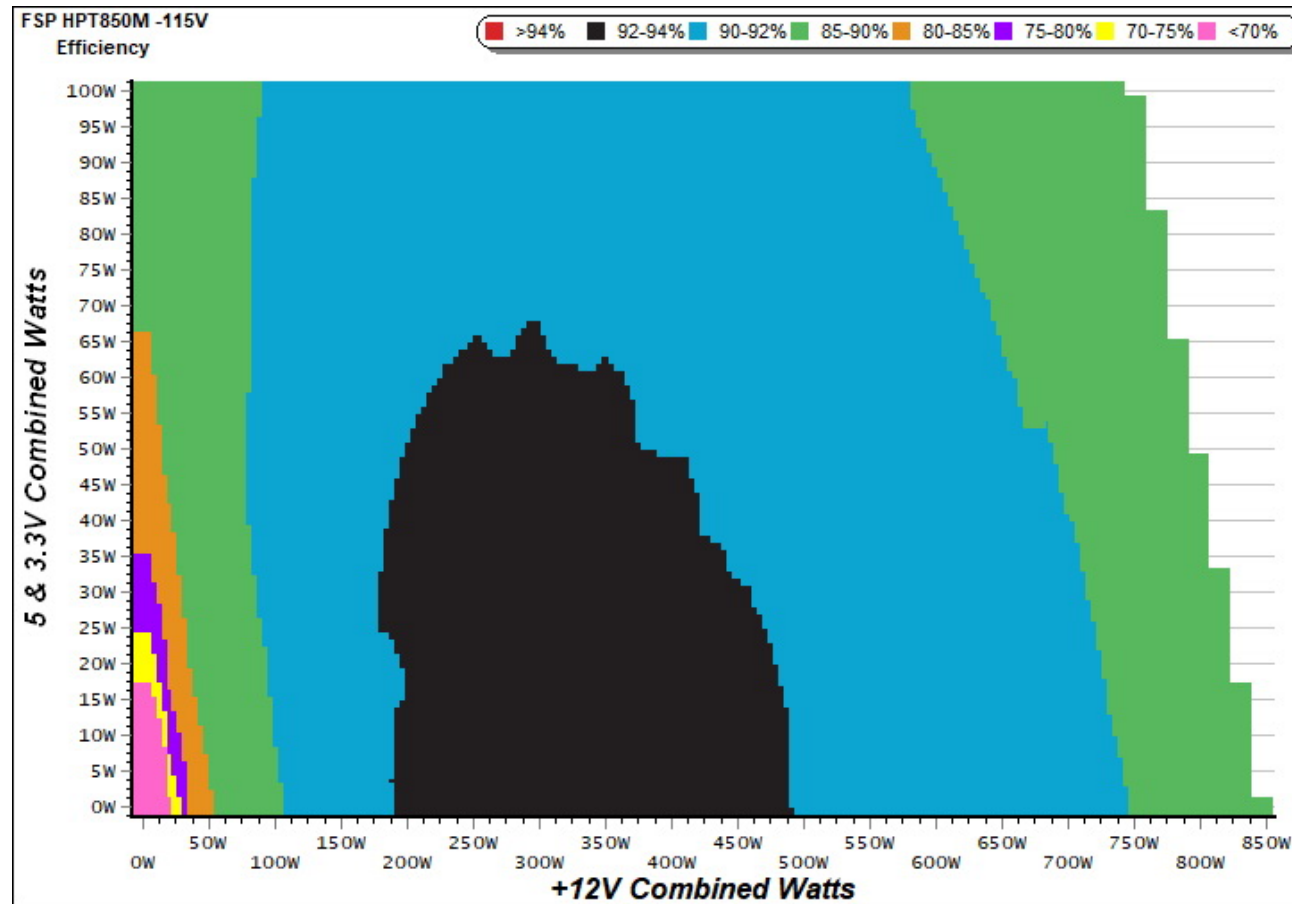
230V

Power - 17/07/2018 - 16:08



Efficiency Graph

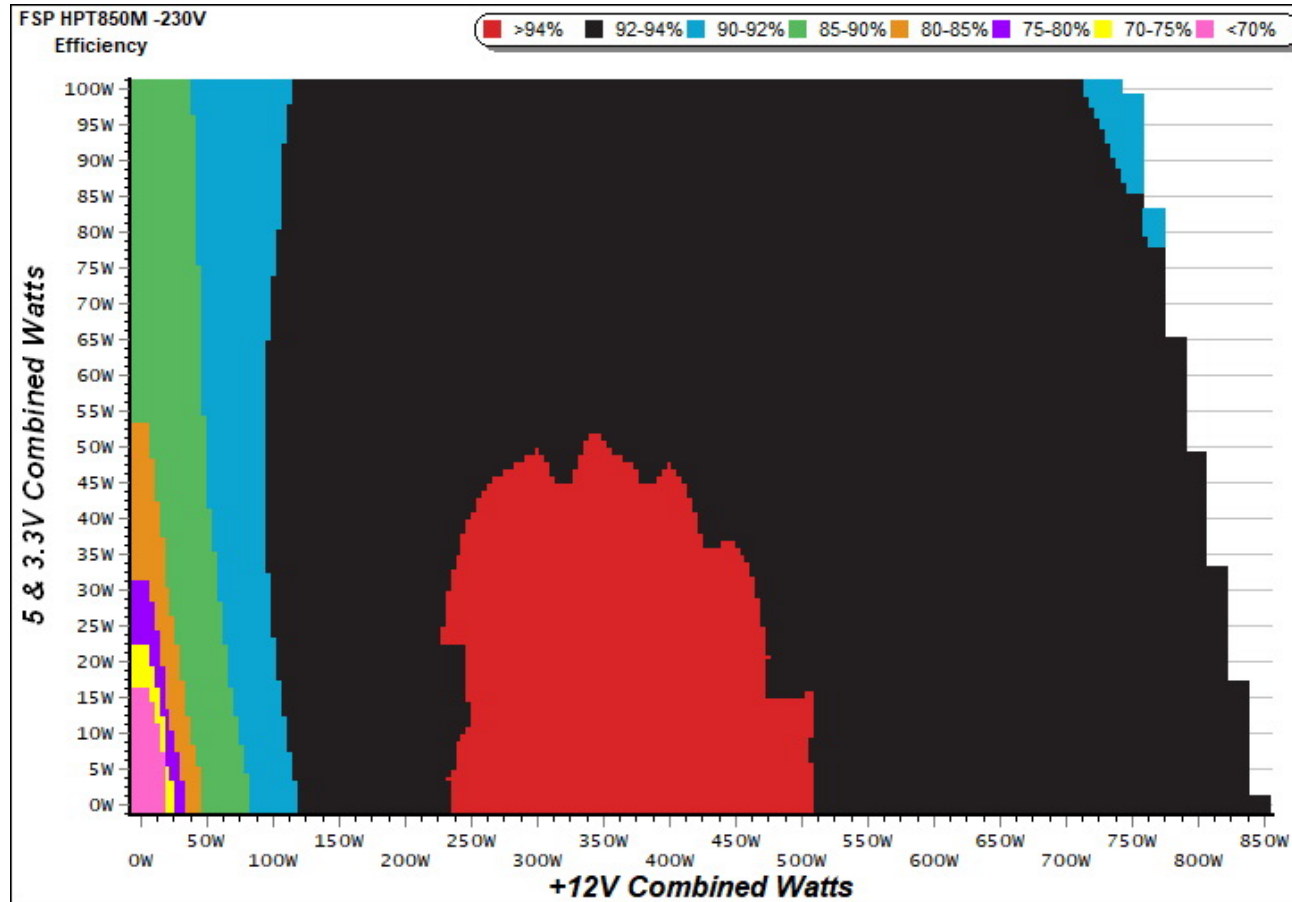
115V



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

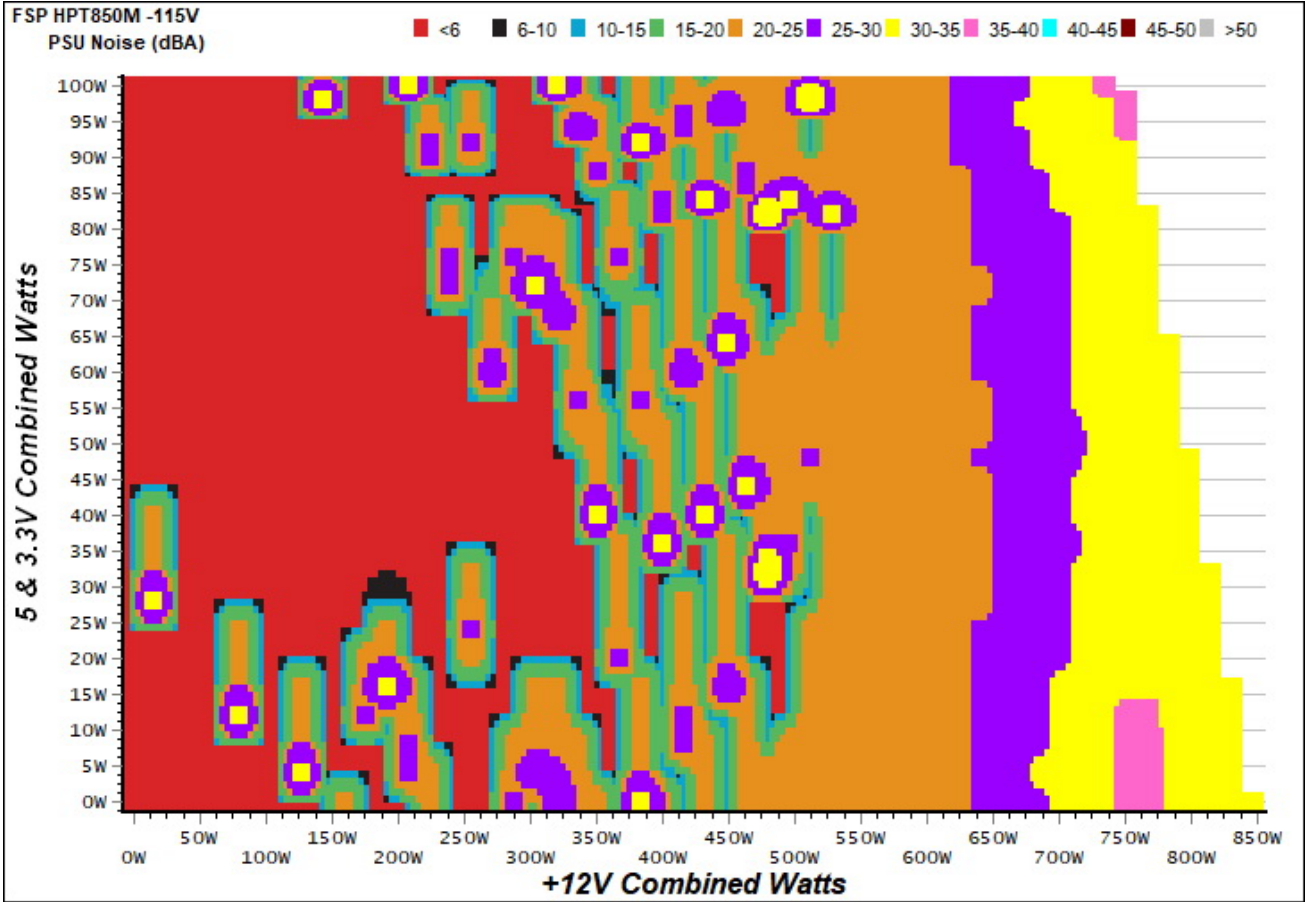


INFO

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

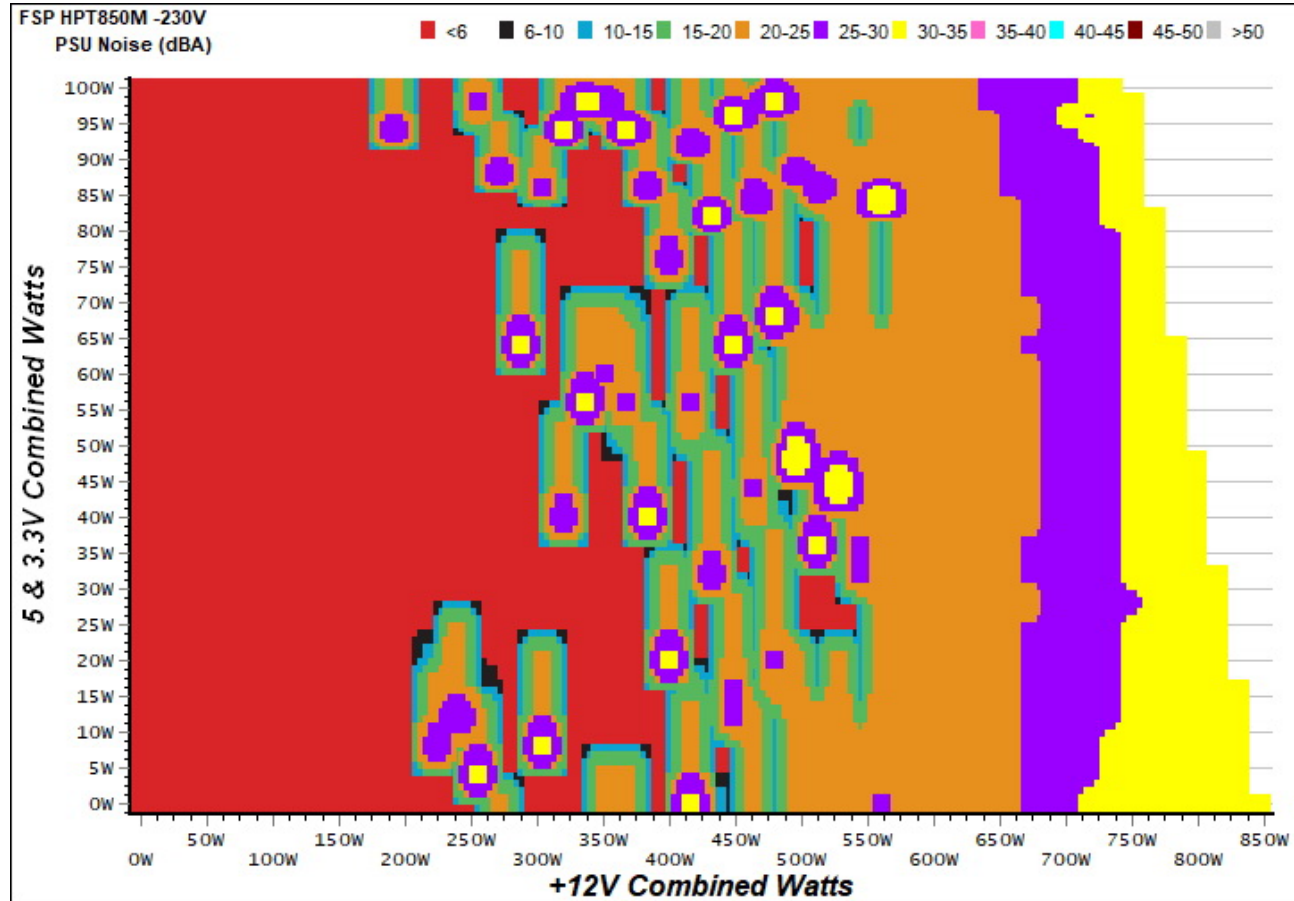
115V



INFO

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

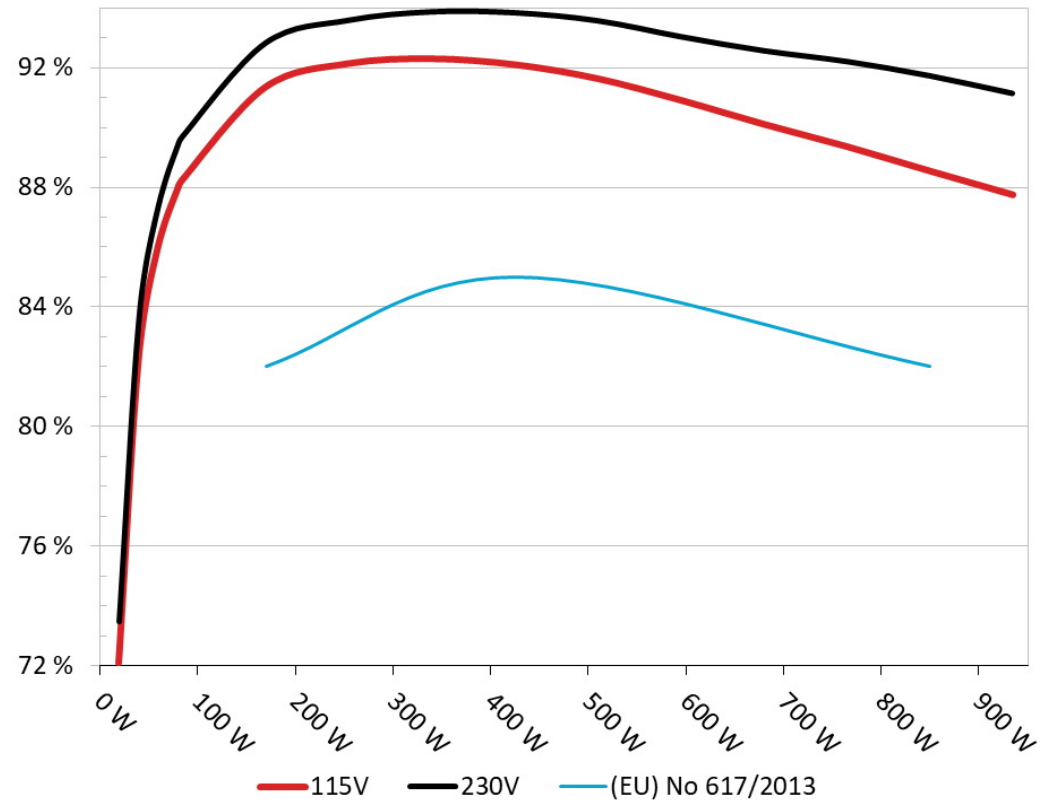
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails.

Indicative Performance

Efficiency under high ambient temperature

Efficiency: FSP HPT850M

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

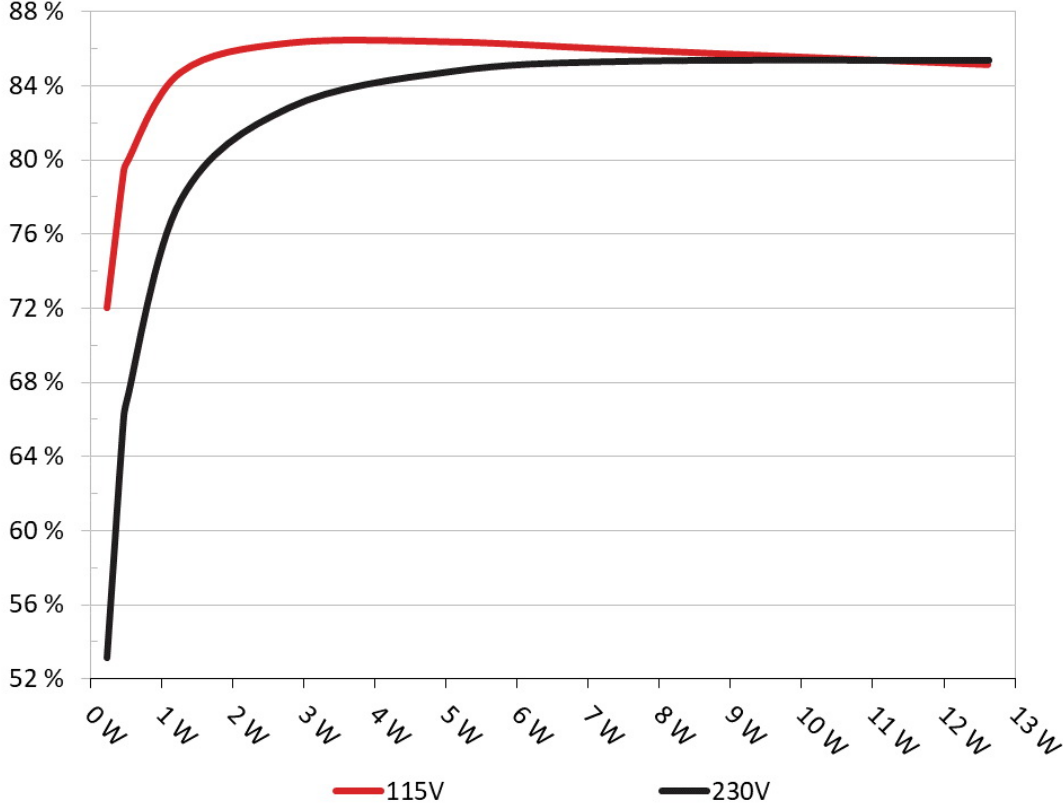


INFO

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: FSP HPT850M
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.

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

115V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	72.013%	0.037
	5.080V	0.318		115.13V
2	0.090A	0.458	79.239%	0.066
	5.079V	0.578		115.15V
3	0.550A	2.792	86.333%	0.273
	5.076V	3.234		115.13V
4	1.000A	5.085	86.391%	0.725
	5.086V	5.886		115.13V
5	1.500A	7.603	85.958%	0.412
	5.067V	8.845		115.13V
6	2.501A	12.620	85.161%	0.461
	5.046V	14.819		115.14V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	53.132%	0.015
	5.086V	0.431		230.36V
2	0.090A	0.458	65.805%	0.024
	5.084V	0.696		230.36V
3	0.550A	2.790	82.814%	0.111
	5.072V	3.369		230.36V
4	1.000A	5.077	84.772%	0.179
	5.076V	5.989		230.36V
5	1.500A	7.610	85.323%	0.237
	5.072V	8.919		230.36V
6	2.500A	12.640	85.382%	0.313
	5.055V	14.804		230.36V

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	5.241A	1.966A	1.970A	0.984A	84.819	88.262%	0	<6.0	47.40°C	0.977
	12.063V	5.086V	3.348V	5.083V	96.099				40.30°C	115.12V
2	11.480A	2.952A	2.956A	1.182A	169.307	91.346%	0	<6.0	48.32°C	0.995
	12.057V	5.083V	3.345V	5.076V	185.346				40.75°C	000.00V
3	18.124A	3.445A	3.437A	1.381A	254.427	92.141%	0	<6.0	49.36°C	0.996
	12.052V	5.080V	3.344V	5.071V	276.128				41.24°C	115.11V
4	24.769A	3.941A	3.948A	1.582A	339.592	92.303%	790	21.8	41.37°C	0.997
	12.047V	5.076V	3.341V	5.060V	367.909				50.77°C	115.10V
5	31.096A	4.930A	4.941A	1.782A	424.928	92.107%	854	24.2	41.98°C	0.998
	12.041V	5.072V	3.338V	5.052V	461.340				51.79°C	115.10V
6	37.363A	5.920A	5.934A	1.984A	509.474	91.640%	1200	34.1	42.82°C	0.998
	12.035V	5.069V	3.336V	5.043V	555.954				53.32°C	115.10V
7	43.703A	6.912A	6.927A	2.187A	594.806	90.918%	1435	38.9	43.13°C	0.998
	12.029V	5.065V	3.333V	5.032V	654.221				54.04°C	115.10V
8	50.050A	7.904A	7.924A	2.391A	680.158	90.109%	1810	45.7	44.05°C	0.998
	12.023V	5.062V	3.331V	5.020V	754.819				55.23°C	115.10V
9	56.796A	8.404A	8.408A	2.394A	765.076	89.363%	1965	47.6	44.41°C	0.998
	12.018V	5.058V	3.329V	5.014V	856.148				56.35°C	115.10V
10	63.487A	8.903A	8.927A	2.497A	849.816	88.546%	2110	49.0	45.59°C	0.998
	12.012V	5.055V	3.327V	5.008V	959.742				57.87°C	115.10V
11	70.575A	8.908A	8.928A	2.499A	934.605	87.754%	2105	49.0	46.63°C	0.998
	12.007V	5.053V	3.326V	5.004V	1065.030				59.59°C	115.10V
CL1	0.145A	12.001A	12.001A	0.000A	102.772	85.747%	1295	36.1	42.92°C	0.983
	12.053V	5.078V	3.340V	5.074V	119.855				53.49°C	115.12V

CL2	70.844A	1.001A	0.998A	1.000A	864.907	88.775%	2110	49.0	45.73°C	0.999
	12.019V	5.062V	3.333V	5.039V	974.270				57.79°C	115.10V

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	5.246A	1.966A	1.971A	0.984A	84.884	89.724%	0	<6.0	47.88°C	0.816
	12.062V	5.088V	3.349V	5.085V	94.606				40.06°C	230.32V
2	11.486A	2.952A	2.957A	1.183A	169.376	92.827%	0	<6.0	49.06°C	0.949
	12.056V	5.083V	3.345V	5.075V	182.464				40.86°C	230.32V
3	18.130A	3.446A	3.439A	1.382A	254.488	93.590%	785	21.8	41.18°C	0.971
	12.051V	5.079V	3.343V	5.068V	271.917				50.39°C	230.32V
4	24.779A	3.941A	3.950A	1.583A	339.686	93.873%	785	21.8	41.52°C	0.983
	12.046V	5.075V	3.340V	5.057V	361.857				51.42°C	230.31V
5	31.105A	4.929A	4.942A	1.783A	425.000	93.842%	833	23.1	42.04°C	0.989
	12.040V	5.071V	3.338V	5.050V	452.887				52.48°C	230.32V
6	37.372A	5.920A	5.936A	1.984A	509.541	93.577%	1128	32.9	42.55°C	0.992
	12.034V	5.068V	3.336V	5.041V	544.515				53.59°C	230.32V
7	43.716A	6.912A	6.931A	2.188A	594.932	93.042%	1550	40.9	43.28°C	0.994
	12.028V	5.065V	3.333V	5.030V	639.421				54.73°C	230.33V
8	50.056A	7.905A	7.926A	2.393A	680.239	92.569%	1675	43.1	43.77°C	0.995
	12.023V	5.061V	3.331V	5.017V	734.843				55.85°C	230.31V
9	56.807A	8.405A	8.413A	2.395A	765.172	92.210%	1960	47.6	44.48°C	0.995
	12.017V	5.058V	3.329V	5.012V	829.816				57.22°C	230.31V
10	63.496A	8.904A	8.927A	2.498A	849.865	91.734%	2115	49.0	45.22°C	0.995
	12.011V	5.055V	3.327V	5.006V	926.441				58.73°C	230.32V
11	70.580A	8.909A	8.930A	2.500A	934.677	91.146%	2120	49.0	46.62°C	0.996
	12.007V	5.053V	3.326V	5.002V	1025.467				60.60°C	230.32V
CL1	0.149A	12.001A	12.000A	0.000A	102.817	87.309%	1263	35.4	42.92°C	0.894
	12.053V	5.078V	3.340V	5.073V	117.762				54.43°C	230.33V

CL2	70.846A	1.003A	1.001A	1.000A	864.878	91.902%	2115	49.0	45.13°C	0.996
	12.018V	5.061V	3.333V	5.038V	941.086				58.08°C	230.33V

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	1.196A	0.492A	0.476A	0.197A	19.532	72.103%	0	<6.0	0.880
	12.070V	5.088V	3.349V	5.076V	27.089				115.12V
2	2.455A	0.983A	0.983A	0.394A	39.922	82.295%	0	<6.0	0.945
	12.068V	5.088V	3.348V	5.085V	48.511				115.12V
3	3.646A	1.475A	1.461A	0.590A	59.387	85.966%	0	<6.0	0.964
	12.066V	5.087V	3.348V	5.084V	69.082				115.12V
4	4.907A	1.966A	1.970A	0.787A	79.789	87.957%	0	<6.0	0.975
	12.064V	5.086V	3.347V	5.082V	90.714				115.12V

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	1.203A	0.493A	0.476A	0.197A	19.623	73.472%	0	<6.0	0.524
	12.068V	5.090V	3.350V	5.083V	26.708				230.32V
2	2.462A	0.982A	0.984A	0.393A	40.000	83.649%	0	<6.0	0.718
	12.066V	5.089V	3.350V	5.091V	47.819				230.33V
3	3.652A	1.474A	1.462A	0.590A	59.455	87.329%	0	<6.0	0.789
	12.064V	5.088V	3.349V	5.087V	68.082				230.32V
4	4.913A	1.966A	1.970A	0.787A	79.861	89.432%	0	<6.0	0.811
	12.062V	5.088V	3.349V	5.084V	89.298				230.32V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	17.0 mV	5.4 mV	10.0 mV	10.1 mV	Pass
20% Load	15.0 mV	5.5 mV	10.3 mV	10.4 mV	Pass
30% Load	14.6 mV	6.1 mV	10.4 mV	12.6 mV	Pass
40% Load	14.6 mV	6.9 mV	12.5 mV	14.0 mV	Pass
50% Load	15.7 mV	6.3 mV	22.0 mV	12.1 mV	Pass
60% Load	16.4 mV	5.8 mV	11.8 mV	15.2 mV	Pass
70% Load	16.6 mV	6.6 mV	11.9 mV	16.5 mV	Pass
80% Load	17.1 mV	6.9 mV	13.4 mV	14.6 mV	Pass
90% Load	16.9 mV	6.6 mV	14.3 mV	15.2 mV	Pass
100% Load	24.2 mV	7.4 mV	16.0 mV	18.1 mV	Pass
110% Load	25.1 mV	7.6 mV	16.4 mV	18.5 mV	Pass
Crossload 1	17.6 mV	6.1 mV	15.1 mV	7.5 mV	Pass
Crossload 2	24.7 mV	7.0 mV	12.9 mV	14.5 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	17.7 mV	6.9 mV	22.2 mV	10.7 mV	Pass
20% Load	15.2 mV	6.5 mV	10.0 mV	10.7 mV	Pass
30% Load	14.2 mV	5.4 mV	10.0 mV	11.2 mV	Pass
40% Load	14.1 mV	5.8 mV	10.2 mV	11.8 mV	Pass
50% Load	15.2 mV	5.5 mV	10.2 mV	12.0 mV	Pass
60% Load	16.3 mV	5.3 mV	10.9 mV	14.9 mV	Pass
70% Load	15.4 mV	5.9 mV	11.2 mV	15.7 mV	Pass
80% Load	16.6 mV	6.0 mV	12.6 mV	14.6 mV	Pass

