Anex

FSP Technology Inc. Hydro PTM Pro 1200W (#2)

Lab ID#: FS12001747
Receipt Date: Oct 8, 2020
Test Date: Nov 2, 2020

Report: 20PS1747A
Report Date: Nov 5, 2020

DUT INFORMATION

Brand	FSP Technology Inc.
Manufacturer (OEM)	FSP
Series	Hydro PTM Pro
Model Number	
Serial Number	S0301000159
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	9
Rated Frequency (Hz)	50-60
Rated Power (W)	1200
Type	ATX12V
Cooling	135mm Fluid Dynamic Bearing Fan (MGA13512XF-A25)
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, Keithley 2015 - THD
UPS	CyberPower OLS3000E 3kVA x2
Transformer	3kVA x2

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RESULTS

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

115V

Average Efficiency	89.795%
Efficiency With 10W (≤500W) or 2% (>500W)	66.222
Average Efficiency 5VSB	83.946%
Standby Power Consumption (W)	0.0759792
Average PF	0.989
Avg Noise Output	24.17 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	A

230V

Average Efficiency	91.997%
Average Efficiency 5VSB	81.669%
Standby Power Consumption (W)	0.2175110
Average PF	0.957
Avg Noise Output	22.76 dB(A)
Efficiency Rating (ETA)	SILVER
Noise Rating (LAMBDA)	A

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	100	3	0.3
	Watts	120		1200	15	3.6
Total Max. Power (W)		1200				

HOLD-UP TIME & POWER OK SIGNAL (230V)

Hold-Up Time (ms)	21.8
AC Loss to PWR_OK Hold Up Time (ms)	19.4
PWR_OK Inactive to DC Loss Delay (ms)	2.4

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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	16-22AWG	No
4+4 pin EPS12V (700mm)	1	1	16AWG	No
8 pin EPS12V (700mm) / 4+4 pin EPS12V (150mm)	1	2	18AWG	No
6+2 pin PCIe (650mm+150mm)	2	4	18AWG	No
6+2 pin PCIe (500mm+150mm)	2	4	18AWG	No
SATA (510mm+160mm+160mm+160mm)	2	8	18AWG	No
SATA (510mm+160mm) / 4-pin Molex (+160mm+160mm)	2	4 / 4	18AWG	No
SATA (510mm+160mm) / 4-pin Molex (+160mm) / FDD (+160mm)	1	2 / 1 / 1	18-22AWG	No
AC Power Cord (1440mm) - C13 coupler	1	1	16AWG	-

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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
Inrush Protection	NTC Thermistor SCK-056 (5 Ohm) & Relay
Bridge Rectifier(s)	2x HY GBJ2506P (600V, 25A @ 100°C)
APFC MOSFETs	3x Infineon IPA60R120P7 (650V, 16A @ 100°C, Rds(on): 0.12Ohm)
APFC Boost Diode	2x Infineon IDH08G65C6 (650V, 8A @ 145°C)
Bulk Cap(s)	2x Hitachi (450V, 560uF each or 1.120uF combined, 2,000h @ 105°C, HU)
Main Switchers	4x STMicroelectronics STF26NM60N (600V, 12.6A @ 100°C, Rds(on): 0.165Ohm)
IC Driver	2x Silicon Labs Si8233BD
APFC Controller	Infineon ICE2PCS02G
Resonant Controller	Champion CM6901T2X
Topology	Primary side: APFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	8x
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0901NS (30V, 94A @ 100°C, Rds(on): 1.9mOhm) PWM Controllers: ANPEC APW7159C
Filtering Capacitors	Electrolytic: 4x Nippon Chemi-Con (1-5,000h @ 105°C, KZE), 2x Rubycon (4-10,000h @ 105°C, YXF), 1x Rubycon (6-10,000h @ 105°C, ZLH), 1x Rubycon (4-10,000h @ 105°C, YXH), 2x Rubycon (3-6,000h @ 105°C, YXG) Polymer: 31x United Chemi-Con
Supervisor IC	SITI PS223H (OCP, OTP, OVP, UVP, SCP, PG)
Fan Controller	APW9010
Fan Model	Protechnic Electric MGA13512XF-A25 (135mm, 12V, 0.38A, Fluid Dynamic Bearing Fan)
5VSB Circuit	-
Rectifier	1x International Rectifier IRF1018ESPbF FET (60V, 56A @ 100°C, Rds(on): 8.4mOhm)
Standby PWM Controller	Power Integrations INN2603K

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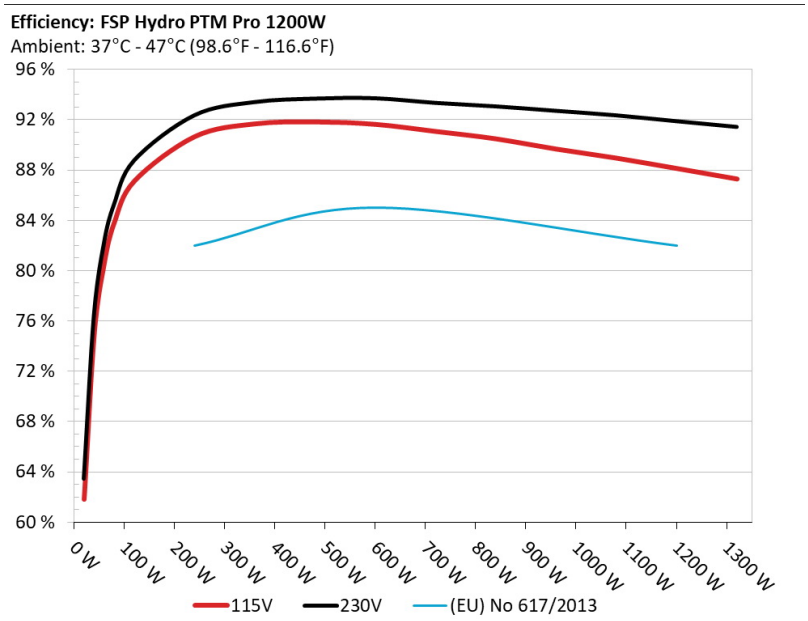
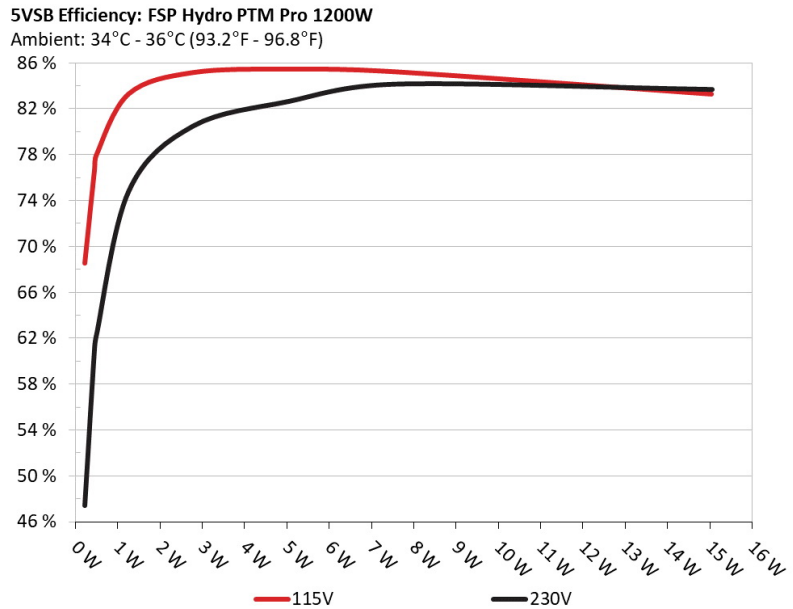
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	68.563%	0.026
	5.078V	0.334		115.13V
2	0.090A	0.457	76.678%	0.046
	5.077V	0.596		115.13V
3	0.550A	2.786	85.173%	0.215
	5.065V	3.271		115.13V
4	1.000A	5.051	85.465%	0.316
	5.051V	5.910		115.13V
5	1.500A	7.563	85.236%	0.383
	5.042V	8.873		115.13V
6	3.001A	15.036	83.293%	0.473
	5.011V	18.052		115.13V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	47.412%	0.011
	5.079V	0.483		230.27V
2	0.090A	0.457	61.015%	0.017
	5.078V	0.749		230.28V
3	0.550A	2.787	80.479%	0.077
	5.066V	3.463		230.27V
4	1.000A	5.052	82.630%	0.130
	5.052V	6.114		230.27V
5	1.500A	7.571	84.132%	0.181
	5.048V	8.999		230.27V
6	3.000A	15.052	83.664%	0.290
	5.017V	17.991		230.27V

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115V

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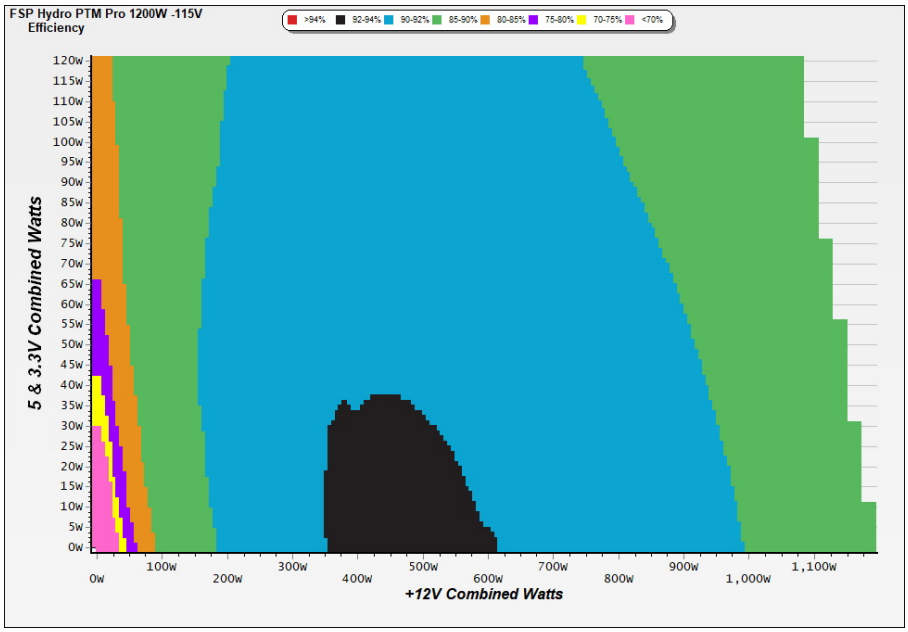
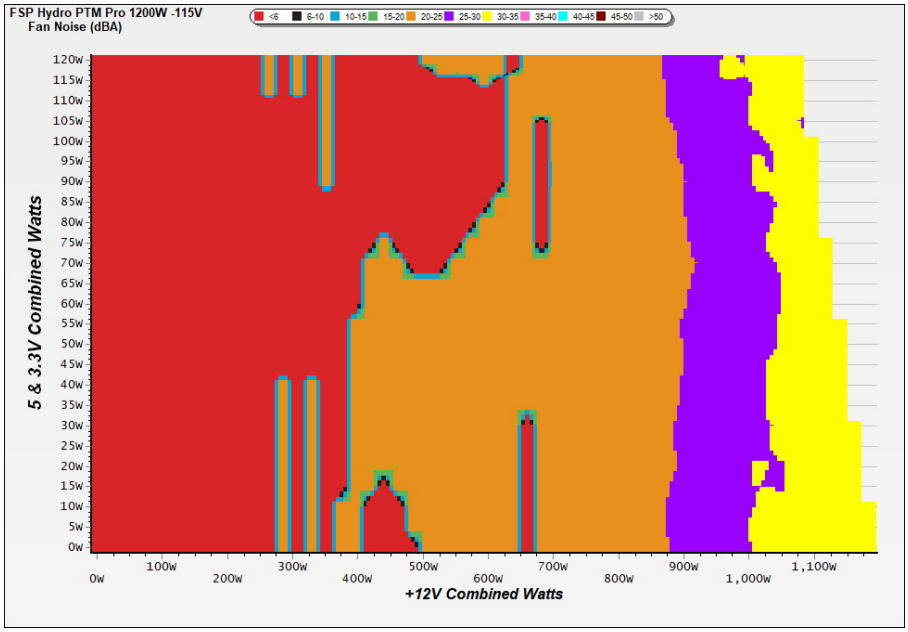
EFFICIENCY GRAPH 115V



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



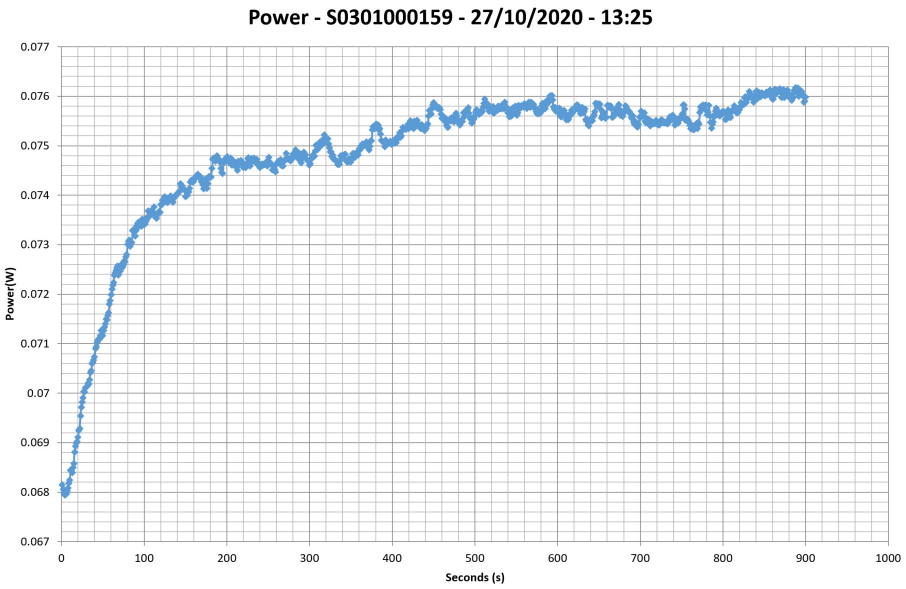
INFO

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

Anex

FSP Technology Inc. Hydro PTM Pro 1200W (#2)

VAMPIRE POWER -115V



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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FSP Technology Inc. Hydro PTM Pro 1200W (#2)

10-110% 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	8.135A	1.990A	1.971A	0.992A	120.018	87.106%	0	<6.0	44.31°C	0.966
	12.099V	5.024V	3.346V	5.040V	137.784				40.29°C	115.13V
2	17.304A	2.987A	2.964A	1.194A	240.065	90.632%	0	<6.0	45.31°C	0.990
	12.088V	5.020V	3.340V	5.025V	264.878				40.51°C	115.13V
3	26.772A	3.489A	3.464A	1.397A	359.388	91.643%	0	<6.0	46.46°C	0.993
	12.077V	5.017V	3.336V	5.013V	392.160				41.26°C	115.12V
4	36.346A	3.990A	3.963A	1.600A	479.761	91.800%	776	21.5	41.51°C	0.994
	12.066V	5.014V	3.331V	5.003V	522.615				47.59°C	115.12V
5	45.581A	4.991A	4.961A	1.805A	599.891	91.608%	779	21.6	42.26°C	0.995
	12.053V	5.010V	3.325V	4.988V	654.843				48.89°C	115.11V
6	54.830A	5.995A	5.965A	2.000A	719.971	91.044%	785	22.2	42.53°C	0.996
	12.041V	5.006V	3.320V	4.974V	790.792				49.68°C	115.11V
7	64.065A	6.999A	6.973A	2.219A	839.759	90.456%	1000	29.8	43.41°C	0.995
	12.029V	5.002V	3.314V	4.959V	928.366				51.16°C	115.10V
8	73.393A	8.002A	7.981A	2.429A	960.219	89.643%	1261	36.0	43.94°C	0.995
	12.015V	4.998V	3.308V	4.943V	1071.155				52.41°C	115.09V
9	83.080A	8.513A	8.476A	2.433A	1079.554	88.927%	1518	41.2	44.44°C	0.995
	12.001V	4.994V	3.303V	4.933V	1213.976				53.93°C	115.09V
10	92.625A	9.021A	9.005A	3.058A	1200.015	88.103%	1771	45.0	44.86°C	0.994
	11.987V	4.990V	3.298V	4.907V	1362.053				55.11°C	115.08V
11	102.757A	9.027A	9.018A	3.064A	1320.037	87.267%	2036	48.2	45.44°C	0.994
	11.973V	4.987V	3.294V	4.897V	1512.643				56.35°C	115.08V
CL1	0.101A	14.004A	13.999A	0.000A	117.999	83.485%	776	21.5	42.03°C	0.968
	12.090V	5.017V	3.323V	5.045V	141.341				48.54°C	115.13V
CL2	100.015A	1.000A	1.000A	1.000A	1212.755	88.489%	1678	43.9	44.97°C	0.994
	11.993V	4.998V	3.315V	4.962V	1370.520				55.90°C	115.08V

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20-80W 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	0.492A	0.198A	19.998	61.827%	0	<6.0	0.814
	12.106V	5.025V	3.351V	5.065V	32.345				115.14V
2	2.452A	0.995A	0.987A	0.396A	39.990	74.917%	0	<6.0	0.898
	12.105V	5.025V	3.350V	5.059V	53.379				115.14V
3	3.682A	1.493A	1.480A	0.594A	60.021	80.583%	0	<6.0	0.930
	12.103V	5.025V	3.348V	5.052V	74.483				115.14V
4	4.906A	1.990A	1.971A	0.793A	79.970	83.801%	0	<6.0	0.948
	12.102V	5.024V	3.347V	5.047V	95.428				115.14V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.20mV	6.60mV	21.30mV	12.70mV	Pass
20% Load	8.60mV	7.00mV	20.70mV	13.80mV	Pass
30% Load	9.80mV	7.90mV	22.00mV	20.60mV	Pass
40% Load	11.90mV	7.80mV	22.90mV	22.80mV	Pass
50% Load	12.50mV	8.10mV	22.80mV	22.20mV	Pass
60% Load	10.40mV	8.60mV	24.20mV	24.20mV	Pass
70% Load	11.70mV	8.60mV	24.50mV	26.00mV	Pass
80% Load	12.40mV	9.50mV	26.10mV	26.50mV	Pass
90% Load	13.30mV	9.80mV	27.00mV	31.60mV	Pass
100% Load	20.80mV	11.00mV	30.50mV	32.20mV	Pass
110% Load	22.70mV	11.10mV	30.80mV	32.40mV	Pass
Crossload1	9.40mV	10.50mV	23.90mV	9.80mV	Pass
Crossload2	20.60mV	9.10mV	30.50mV	23.20mV	Pass

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230V

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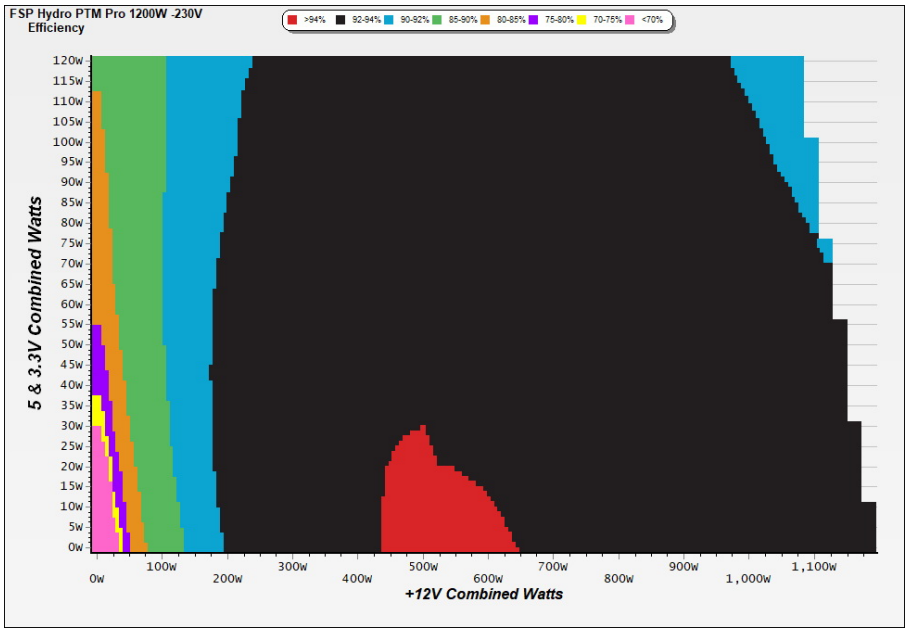
EFFICIENCY GRAPH 230V



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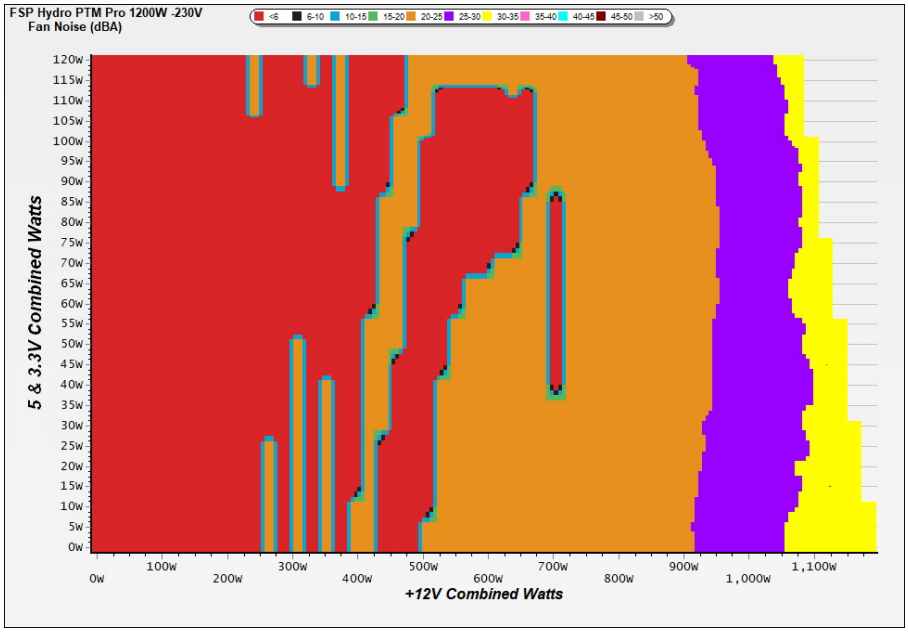
NOISE GRAPH 230V



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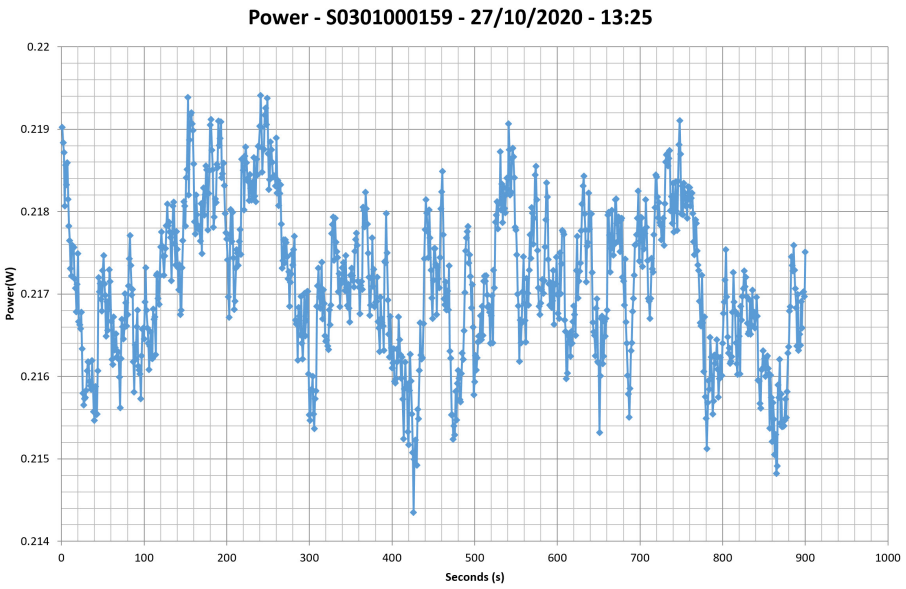
VAMPIRE POWER -230V



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10-110% LOAD TESTS 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	8.130A	1.990A	1.974A	0.993A	120.015	88.744%	0	<6.0	45.59°C	0.855
	12.104V	5.026V	3.346V	5.038V	135.238				40.72°C	230.24V
2	17.297A	2.987A	2.963A	1.195A	240.059	92.334%	0	<6.0	46.27°C	0.938
	12.092V	5.022V	3.341V	5.024V	259.989				40.89°C	230.25V
3	26.762A	3.487A	3.464A	1.396A	359.366	93.382%	0	<6.0	47.84°C	0.965
	12.081V	5.019V	3.336V	5.013V	384.833				41.66°C	230.26V
4	36.341A	3.989A	3.964A	1.599A	479.740	93.660%	781	22.2	41.75°C	0.976
	12.067V	5.015V	3.332V	5.004V	512.212				48.59°C	230.25V
5	45.578A	4.991A	4.964A	1.804A	599.869	93.686%	782	22.2	42.15°C	0.981
	12.053V	5.010V	3.326V	4.990V	640.296				49.65°C	230.24V
6	54.819A	5.994A	5.965A	2.000A	719.953	93.323%	787	22.3	42.63°C	0.985
	12.043V	5.007V	3.320V	4.976V	771.464				50.59°C	230.25V
7	64.065A	6.998A	6.971A	2.218A	839.760	93.045%	1065	31.3	43.42°C	0.986
	12.029V	5.003V	3.315V	4.961V	902.532				51.69°C	230.25V
8	73.385A	8.002A	7.978A	2.428A	960.201	92.691%	1297	37.0	44.34°C	0.985
	12.016V	4.999V	3.309V	4.945V	1035.917				53.14°C	230.25V
9	83.064A	8.511A	8.475A	2.432A	1079.533	92.334%	1519	41.2	45.25°C	0.985
	12.003V	4.995V	3.304V	4.935V	1169.158				54.73°C	230.25V
10	92.604A	9.019A	9.004A	3.056A	1199.961	91.869%	1787	45.1	46.06°C	0.984
	11.989V	4.992V	3.299V	4.910V	1306.161				56.04°C	230.25V
11	102.728A	9.026A	9.014A	3.062A	1319.997	91.414%	2054	48.4	46.53°C	0.983
	11.976V	4.988V	3.295V	4.900V	1443.984				57.41°C	230.25V
CL1	0.102A	14.004A	13.997A	0.000A	118.017	85.034%	814	23.3	42.03°C	0.859
	12.092V	5.018V	3.323V	5.046V	138.788				49.02°C	230.26V
CL2	100.013A	1.000A	1.001A	1.000A	1212.937	92.210%	1739	44.6	45.71°C	0.984
	11.995V	4.999V	3.315V	4.964V	1315.401				56.54°C	230.25V

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FSP Technology Inc. Hydro PTM Pro 1200W (#2)

20-80W LOAD TESTS 230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.225A	0.497A	0.494A	0.198A	19.996	63.471%	0	<6.0	0.427
	12.114V	5.028V	3.352V	5.062V	31.504				230.24V
2	2.450A	0.996A	0.986A	0.396A	39.986	76.376%	0	<6.0	0.592
	12.112V	5.028V	3.350V	5.054V	52.354				230.25V
3	3.680A	1.492A	1.480A	0.594A	60.016	82.153%	0	<6.0	0.702
	12.109V	5.027V	3.349V	5.049V	73.054				230.25V
4	4.902A	1.990A	1.973A	0.794A	79.967	85.240%	0	<6.0	0.773
	12.108V	5.027V	3.348V	5.044V	93.814				230.25V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.80mV	6.60mV	21.80mV	12.00mV	Pass
20% Load	7.60mV	7.00mV	22.00mV	13.40mV	Pass
30% Load	8.70mV	8.30mV	23.60mV	20.20mV	Pass
40% Load	10.00mV	7.80mV	24.10mV	22.60mV	Pass
50% Load	11.00mV	8.00mV	25.40mV	20.00mV	Pass
60% Load	10.00mV	8.70mV	25.40mV	24.40mV	Pass
70% Load	10.70mV	9.00mV	25.60mV	28.60mV	Pass
80% Load	11.30mV	8.90mV	25.30mV	27.00mV	Pass
90% Load	12.10mV	9.50mV	26.90mV	30.70mV	Pass
100% Load	21.10mV	10.60mV	30.20mV	32.60mV	Pass
110% Load	22.60mV	10.90mV	31.70mV	32.80mV	Pass
Crossload1	9.50mV	10.50mV	24.90mV	9.80mV	Pass
Crossload2	21.50mV	9.00mV	30.20mV	23.60mV	Pass

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Anex

FSP Technology Inc. Hydro PTM Pro 1200W (#2)

Top side

Power specifications label

CERTIFICATIONS 115V

CYBENETICS PLATINUM

CYBENETICS A

CERTIFICATIONS 230V

CYBENETICS SILVER 230v

CYBENETICS A 230v

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Lab Director