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

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 (+-2°C / +- 3.6°F)
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				

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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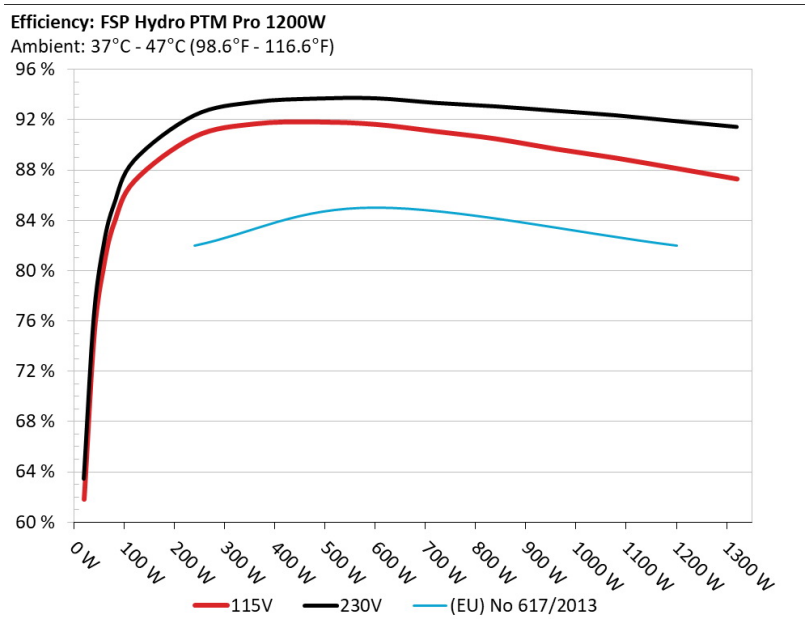
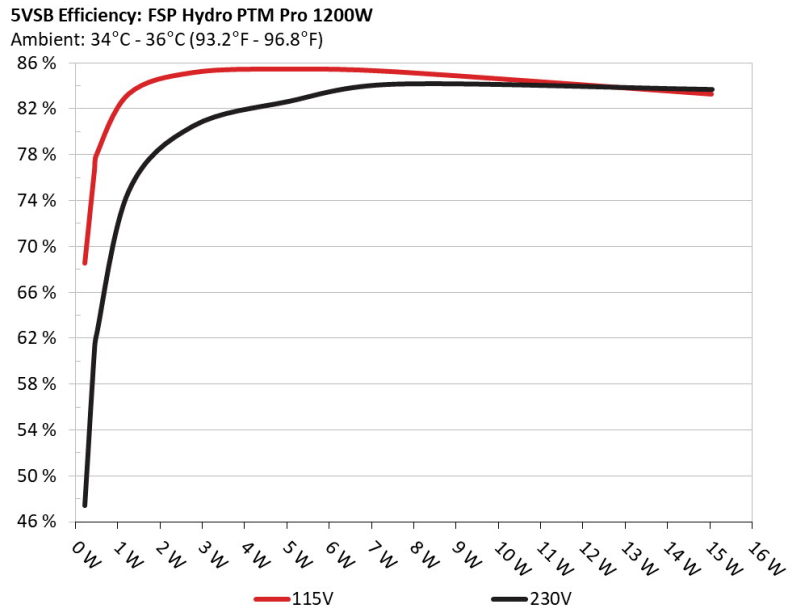
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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

115V

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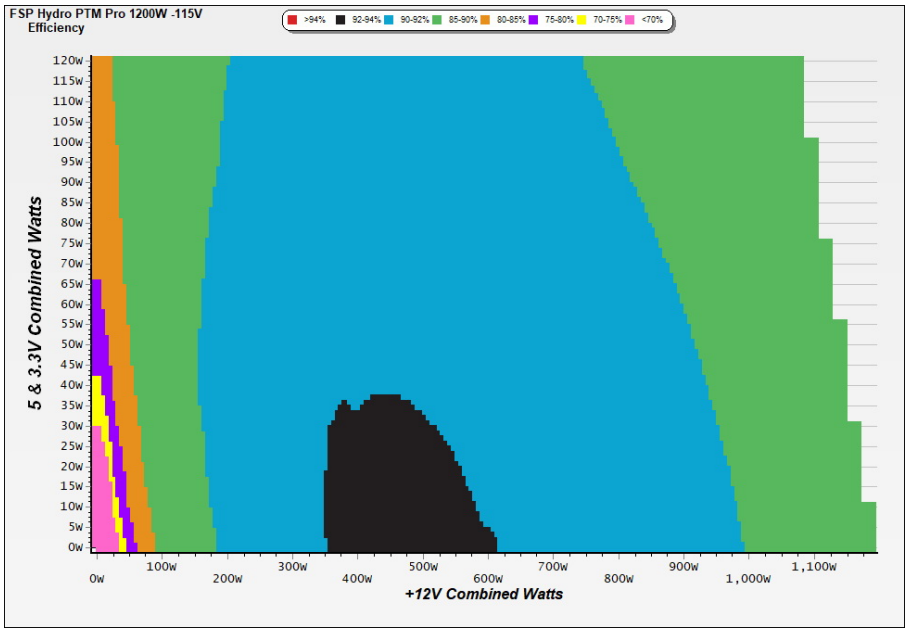
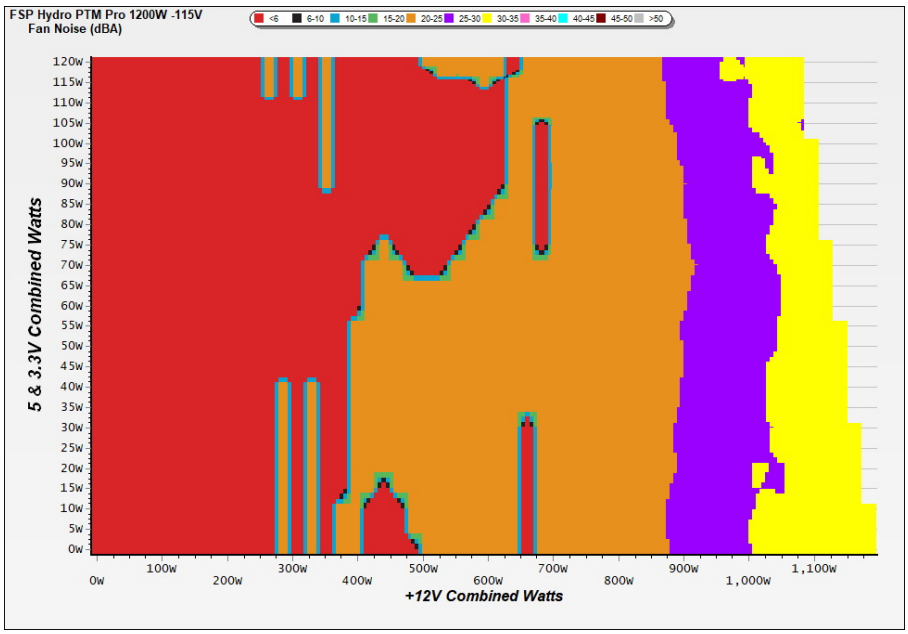
EFFICIENCY GRAPH 115V



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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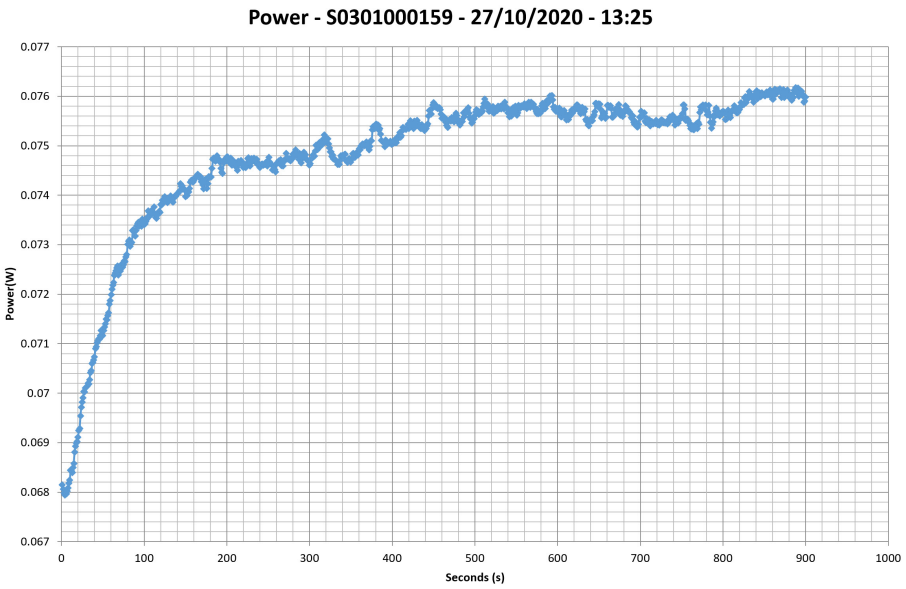
VAMPIRE POWER -115V



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	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
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
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

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230V

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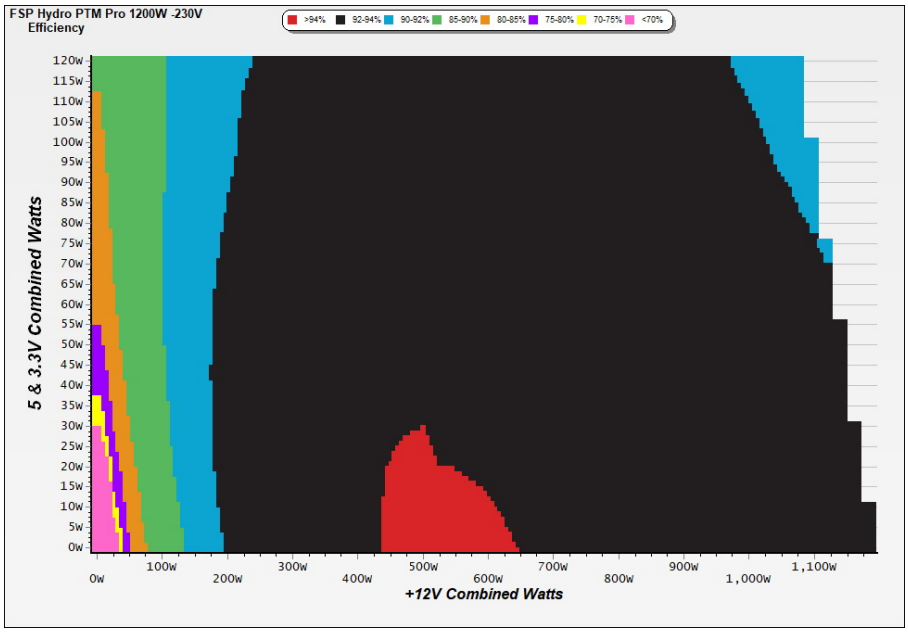
EFFICIENCY GRAPH 230V



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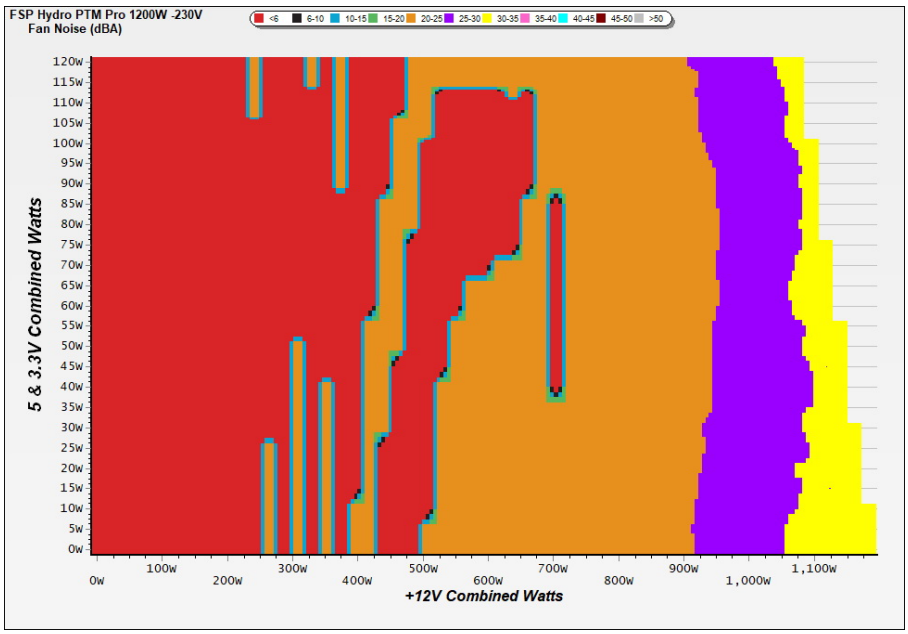
NOISE GRAPH 230V



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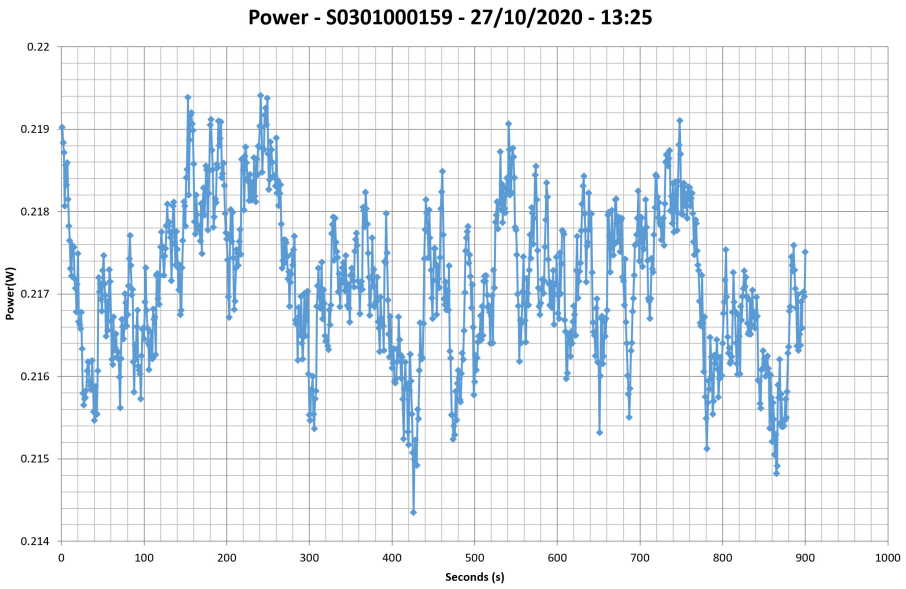
VAMPIRE POWER -230V



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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	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
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
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

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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

Aristeidis Bitziopoulos
Lab Director