

Anex

Thermaltake Toughpower PF1 650W

Lab ID#: TT65001711
 Receipt Date: Jul 28, 2020
 Test Date: Sep 3, 2020

Report: 20PS1711A
 Report Date: Sep 14, 2020

DUT INFORMATION

Brand	Thermaltake
Manufacturer (OEM)	Jiu Zhou Yang Guang Power Supply (HKC)
Series	Toughpower PF1
Model Number	TTP-650AH2FKP
Serial Number	PSTPD0650FNFAPEXD000041
DUT Notes	Toughpower PF1

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
Rated Frequency (Hz)	50-60
Rated Power (W)	650
Type	ATX12V
Cooling	120mm Hydraulic Bearing Fan [TT-1225(XW12025MS)]
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	90.773%
Efficiency With 10W (≤500W) or 2% (>500W)	68.276
Average Efficiency 5VSB	80.411%
Standby Power Consumption (W)	0.0563983
Average PF	0.984
Avg Noise Output	23.08 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	A

230V

Average Efficiency	92.619%
Average Efficiency 5VSB	80.234%
Standby Power Consumption (W)	0.0810288
Average PF	0.933
Avg Noise Output	23.93 dB(A)
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	A

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	54	2.5	0.3
	Watts	100		648	12.5	3.6
Total Max. Power (W)		650				

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

Hold-Up Time (ms)	22.8
AC Loss to PWR_OK Hold Up Time (ms)	20.1
PWR_OK Inactive to DC Loss Delay (ms)	2.7

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CABLES AND CONNECTORS

Modular Cables

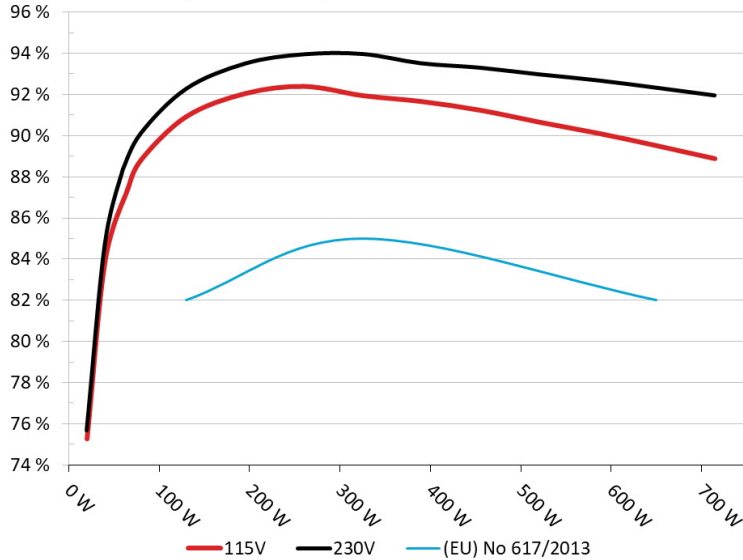
Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (600mm)	1	1	16-18AWG	No
4+4 pin EPS12V (650mm)	2	2	16AWG	No
6+2 pin PCIe (500mm+150mm)	2	4	16-18AWG	No
SATA (480mm+150mm+150mm)	3	9	18AWG	No
4-pin Molex (480mm+150mm+150mm+150mm)	1	4	18AWG	No
FDD Adapter (+100mm)	1	1	22AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	18AWG	-

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EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

Efficiency: Thermaltake TTP-650AH2FKP
 Ambient: 37°C - 47°C (98.6°F - 116.6°F)

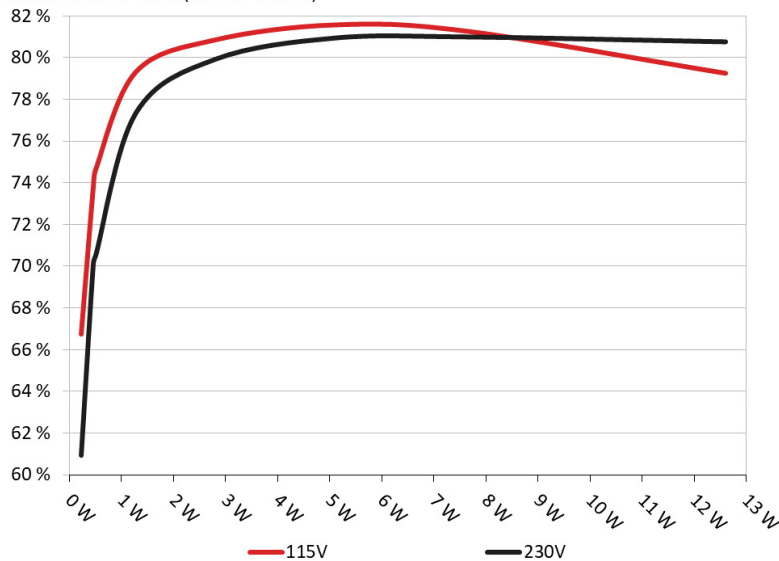


INFO

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: Thermaltake TTP-650AH2FKP
 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	0.231	66.763%	0.039
	5.133V	0.346		115.16V
2	0.090A	0.462	73.802%	0.069
	5.131V	0.626		115.16V
3	0.550A	2.813	80.857%	0.272
	5.115V	3.479		115.16V
4	1.000A	5.099	81.571%	0.352
	5.100V	6.251		115.16V
5	1.500A	7.622	81.275%	0.395
	5.082V	9.378		115.16V
6	2.499A	12.611	79.255%	0.441
	5.046V	15.912		115.16V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231	60.950%	0.013
	5.132V	0.379		230.31V
2	0.090A	0.462	70.106%	0.022
	5.131V	0.659		230.32V
3	0.550A	2.813	79.937%	0.111
	5.115V	3.519		230.31V
4	1.000A	5.099	80.949%	0.179
	5.099V	6.299		230.31V
5	1.500A	7.623	81.001%	0.235
	5.082V	9.411		230.31V
6	2.499A	12.610	80.766%	0.303
	5.046V	15.613		230.31V

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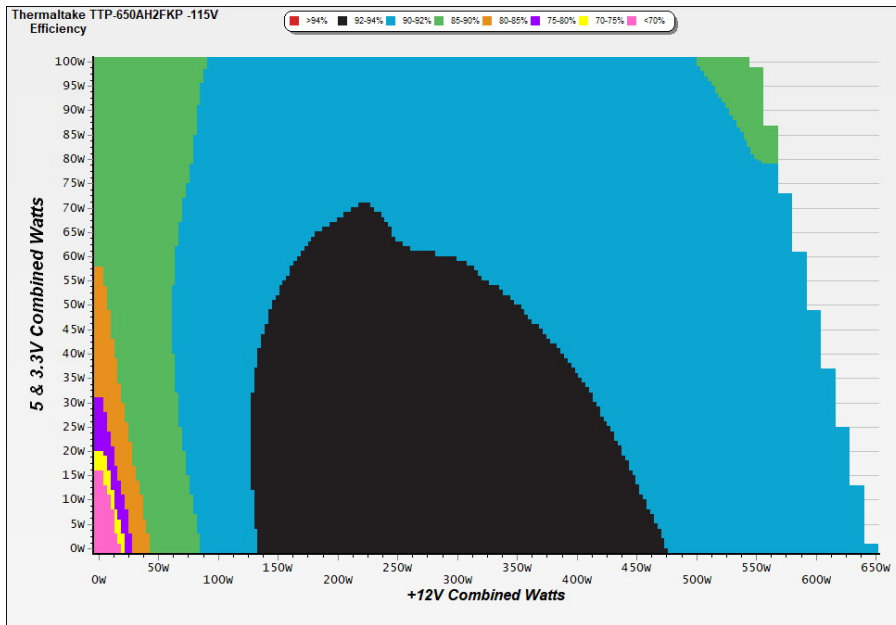
115V

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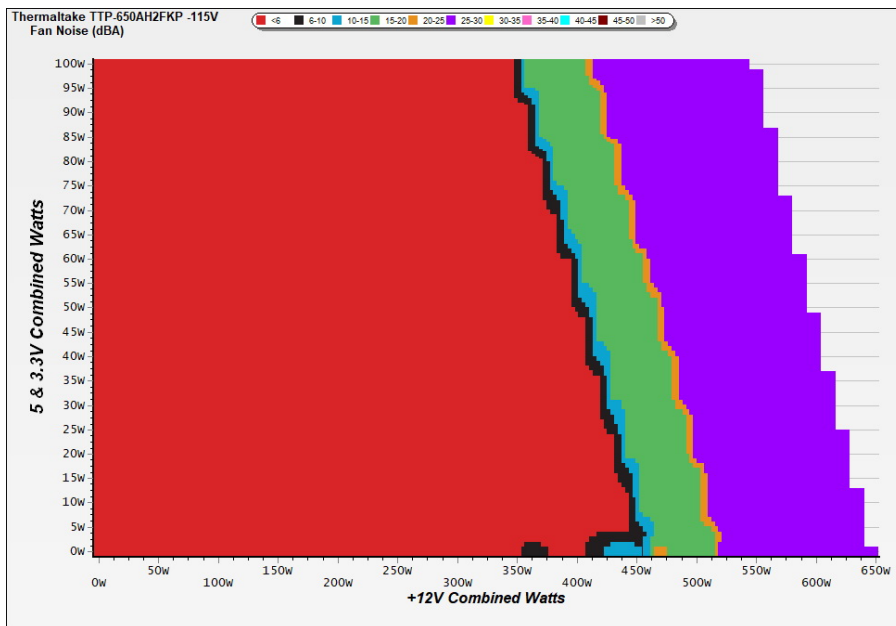
EFFICIENCY GRAPH 115V



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

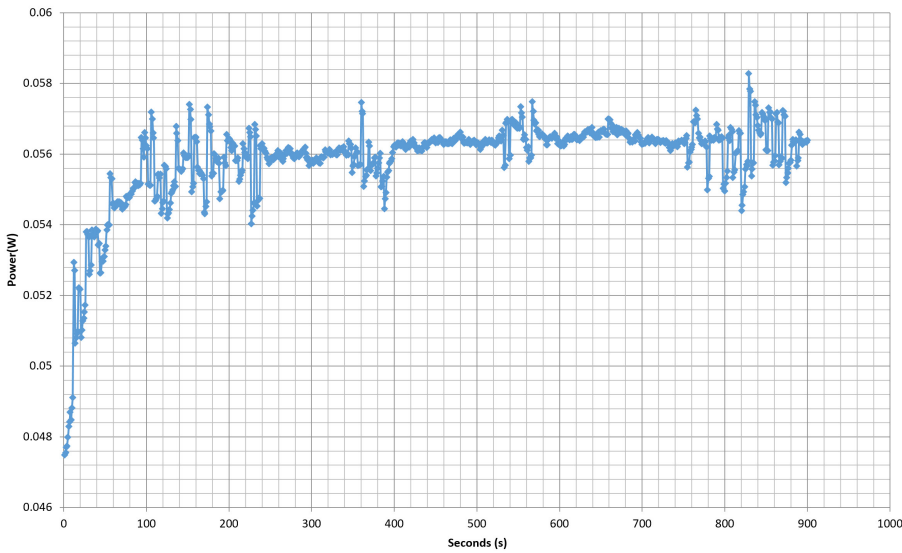
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

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VAMPIRE POWER -115V

Power - PSTPD0650FNFAPEXD000041 - 31/08/2020 - 13:22



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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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	3.578A	1.969A	1.978A	0.983A	64.957	87.184%	0	<6.0	45.46°C	0.943
	12.119V	5.074V	3.338V	5.088V	74.506				40.46°C	115.15V
2	8.177A	2.958A	2.970A	1.183A	130.014	90.915%	0	<6.0	46.57°C	0.973
	12.120V	5.072V	3.335V	5.072V	143.006				40.57°C	115.14V
3	13.111A	3.451A	3.467A	1.384A	195.009	92.030%	0	<6.0	47.85°C	0.981
	12.124V	5.071V	3.332V	5.057V	211.898				41.35°C	115.14V
4	18.041A	3.946A	3.966A	1.587A	260.009	92.375%	0	<6.0	49.45°C	0.987
	12.128V	5.070V	3.329V	5.041V	281.470				41.85°C	115.14V
5	22.603A	4.934A	4.962A	1.792A	325.047	91.927%	566	<6.0	42.33°C	0.991
	12.146V	5.068V	3.326V	5.023V	353.593				50.66°C	115.16V
6	27.143A	5.922A	5.960A	1.997A	389.429	91.644%	819	16.3	42.42°C	0.992
	12.144V	5.067V	3.322V	5.007V	424.935				51.24°C	115.16V
7	31.744A	6.911A	6.961A	2.204A	454.763	91.219%	822	16.8	43.21°C	0.994
	12.149V	5.065V	3.319V	4.990V	498.541				52.49°C	115.16V
8	36.331A	7.903A	7.964A	2.413A	520.058	90.640%	1048	25.4	43.30°C	0.994
	12.156V	5.064V	3.315V	4.972V	573.764				53.03°C	115.16V
9	41.349A	8.396A	8.451A	2.417A	584.969	90.102%	1452	35.3	44.09°C	0.995
	12.152V	5.062V	3.313V	4.964V	649.233				54.68°C	115.16V
10	46.283A	8.895A	8.974A	2.524A	649.687	89.501%	1795	41.1	45.69°C	0.995
	12.153V	5.060V	3.310V	4.951V	725.903				56.89°C	115.15V
11	51.630A	8.897A	8.977A	2.528A	714.500	88.867%	2152	45.9	46.60°C	0.996
	12.150V	5.058V	3.308V	4.944V	804.007				58.50°C	115.14V
CL1	0.102A	12.000A	11.999A	0.000A	101.953	85.941%	575	<6.0	42.93°C	0.972
	12.172V	5.075V	3.318V	5.100V	118.631				51.22°C	115.18V
CL2	54.018A	1.001A	0.999A	1.000A	669.677	90.129%	1451	35.3	45.99°C	0.995
	12.149V	5.063V	3.326V	5.021V	743.023				56.65°C	115.15V

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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	1.225A	0.494A	0.494A	0.195A	19.986	75.260%	0	<6.0	0.773
	12.106V	5.074V	3.341V	5.123V	26.556				115.17V
2	2.450A	0.986A	0.988A	0.391A	39.975	83.911%	0	<6.0	0.896
	12.112V	5.074V	3.340V	5.113V	47.640				115.15V
3	3.678A	1.478A	1.482A	0.588A	60.007	87.388%	0	<6.0	0.937
	12.115V	5.074V	3.339V	5.103V	68.667				115.15V
4	4.899A	1.971A	1.977A	0.785A	79.958	88.819%	0	<6.0	0.956
	12.117V	5.074V	3.337V	5.093V	90.024				115.14V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.20mV	6.70mV	8.60mV	4.30mV	Pass
20% Load	8.30mV	7.40mV	8.70mV	4.20mV	Pass
30% Load	8.40mV	8.40mV	9.10mV	4.90mV	Pass
40% Load	8.30mV	9.20mV	9.50mV	5.60mV	Pass
50% Load	11.60mV	11.20mV	10.40mV	5.80mV	Pass
60% Load	12.00mV	12.70mV	11.30mV	6.60mV	Pass
70% Load	12.10mV	13.70mV	12.90mV	8.10mV	Pass
80% Load	11.80mV	14.60mV	13.70mV	8.20mV	Pass
90% Load	12.60mV	15.90mV	14.40mV	8.90mV	Pass
100% Load	18.50mV	17.10mV	14.30mV	11.10mV	Pass
110% Load	19.50mV	17.70mV	15.70mV	13.30mV	Pass
Crossload1	12.00mV	10.50mV	13.80mV	6.20mV	Pass
Crossload2	17.80mV	14.90mV	11.50mV	10.00mV	Pass

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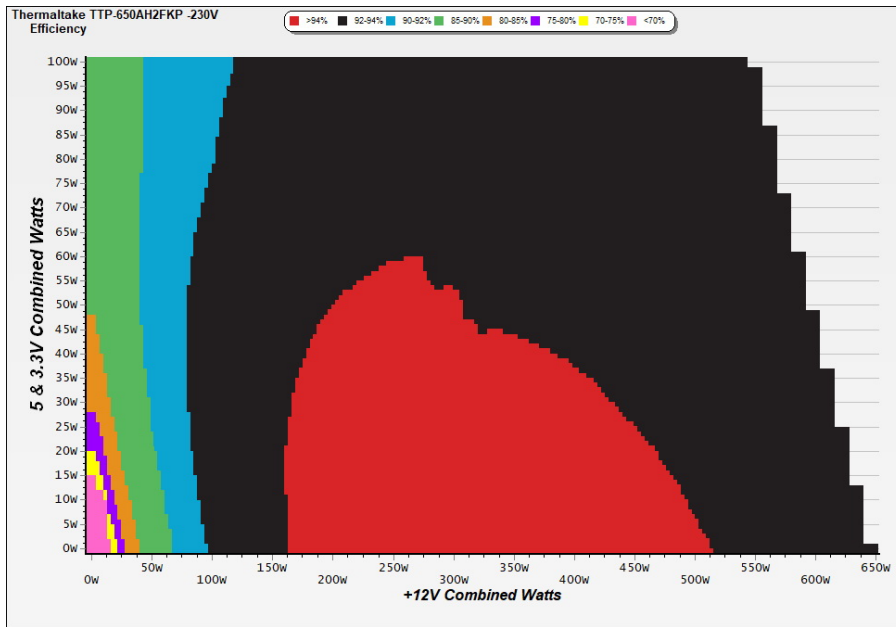
230V

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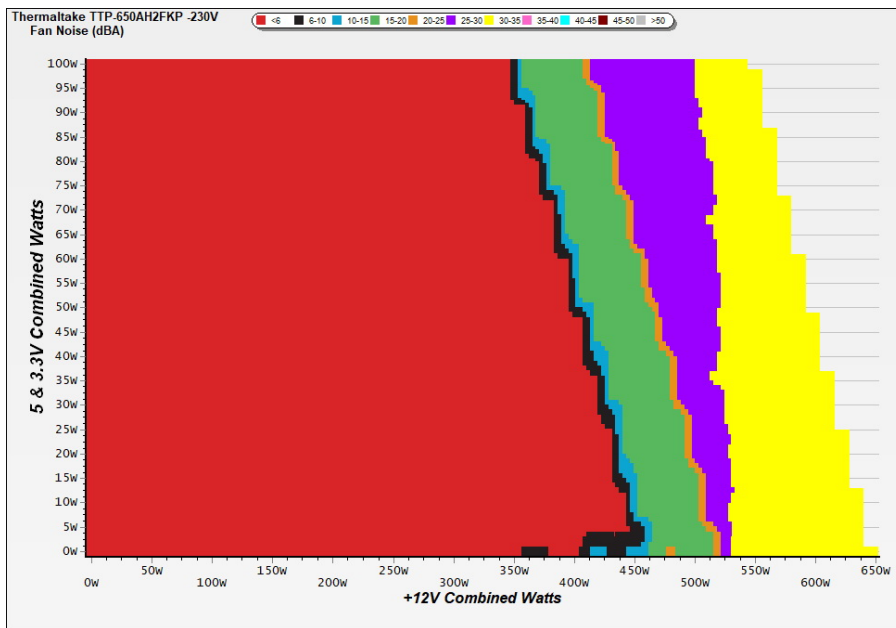
EFFICIENCY GRAPH 230V



INFO

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NOISE GRAPH 230V



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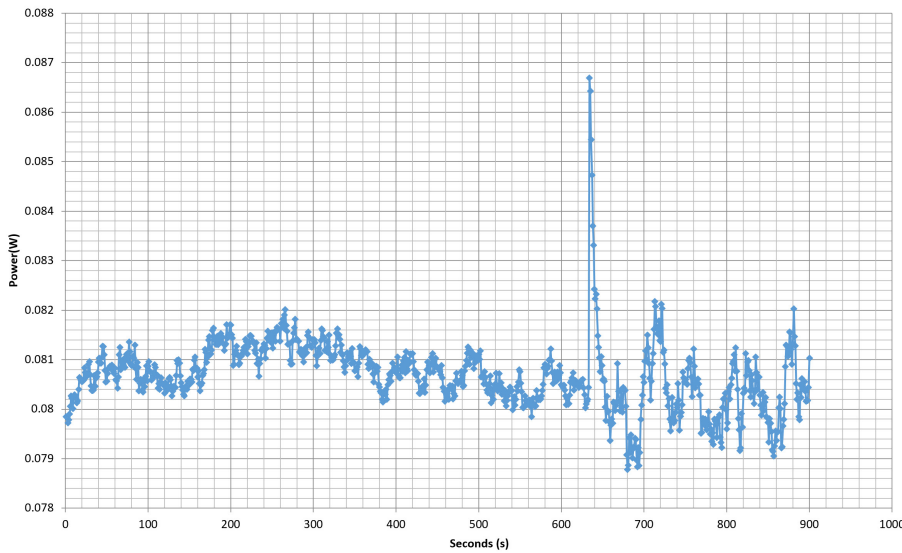
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VAMPIRE POWER -230V

Power - PSTPD0650FNFAPEXD000041 - 31/08/2020 - 13:22



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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	3.578A	1.971A	1.977A	0.983A	64.955	88.357%	0	<6.0	45.20°C	0.728
	12.117V	5.073V	3.339V	5.088V	73.514				40.06°C	230.32V
2	8.179A	2.957A	2.969A	1.183A	130.005	92.260%	0	<6.0	46.32°C	0.874
	12.117V	5.072V	3.335V	5.072V	140.912				40.44°C	230.31V
3	13.140A	3.452A	3.468A	1.384A	195.008	93.482%	0	<6.0	47.45°C	0.926
	12.097V	5.069V	3.332V	5.058V	208.605				41.17°C	230.32V
4	18.070A	3.948A	3.966A	1.587A	260.006	93.933%	0	<6.0	48.21°C	0.949
	12.108V	5.068V	3.329V	5.043V	276.799				41.42°C	230.32V
5	22.624A	4.932A	4.962A	1.791A	325.044	93.949%	565	<6.0	42.62°C	0.962
	12.135V	5.069V	3.326V	5.024V	345.979				50.18°C	230.33V
6	27.148A	5.923A	5.959A	1.997A	389.380	93.500%	817	16.2	42.94°C	0.970
	12.140V	5.066V	3.322V	5.008V	416.447				51.48°C	230.33V
7	31.743A	6.913A	6.961A	2.204A	454.730	93.283%	822	16.8	43.04°C	0.976
	12.148V	5.065V	3.319V	4.990V	487.471				52.47°C	230.32V
8	36.353A	7.901A	7.963A	2.413A	520.016	92.962%	1047	25.3	43.63°C	0.980
	12.148V	5.063V	3.315V	4.973V	559.385				53.63°C	230.33V
9	41.361A	8.397A	8.454A	2.417A	584.948	92.669%	1448	35.2	44.05°C	0.982
	12.148V	5.061V	3.312V	4.964V	631.221				54.73°C	230.33V
10	46.297A	8.894A	8.972A	2.524A	649.662	92.314%	1725	40.0	45.81°C	0.984
	12.149V	5.060V	3.310V	4.952V	703.754				57.19°C	230.33V
11	51.615A	8.897A	8.976A	2.528A	714.477	91.937%	2155	45.9	46.62°C	0.985
	12.153V	5.059V	3.308V	4.944V	777.134				58.28°C	230.33V
CL1	0.101A	12.001A	12.000A	0.000A	101.939	87.230%	574	<6.0	42.28°C	0.846
	12.171V	5.075V	3.317V	5.100V	116.862				50.58°C	230.34V
CL2	54.012A	1.002A	1.000A	1.000A	669.449	93.023%	1449	35.3	45.90°C	0.984
	12.146V	5.061V	3.326V	5.022V	719.659				57.63°C	230.34V

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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	0.493A	0.492A	0.195A	19.984	75.671%	0		

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	5.90mV	6.60mV	8.80mV	4.40mV	Pass
20% Load	8.10mV	7.30mV	9.40mV	4.40mV	Pass
30% Load	8.30mV	8.10mV	9.30mV	4.60mV	Pass
40% Load	8.80mV	8.90mV	10.10mV	5.50mV	Pass
50% Load	11.20mV	9.80mV	9.70mV	6.10mV	Pass
60% Load	11.70mV	12.60mV	11.10mV	6.30mV	Pass
70% Load	11.10mV	13.40mV	12.60mV	7.40mV	Pass
80% Load	10.70mV	14.80mV	13.90mV	8.40mV	Pass
90% Load	12.30mV	15.10mV	13.90mV	8.70mV	Pass
100% Load	17.70mV	16.70mV	14.60mV	9.90mV	Pass
110% Load	19.30mV	17.40mV	15.60mV	10.60mV	Pass
Crossload1	11.90mV	11.10mV	14.70mV	6.50mV	Pass
Crossload2	17.50mV	14.90mV	12.10mV	9.40mV	Pass

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Top side



Power specifications label

CERTIFICATIONS 115V



Aristeidis Bitziopoulos
Lab Director

CERTIFICATIONS 230V



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