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

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)	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

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				

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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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	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

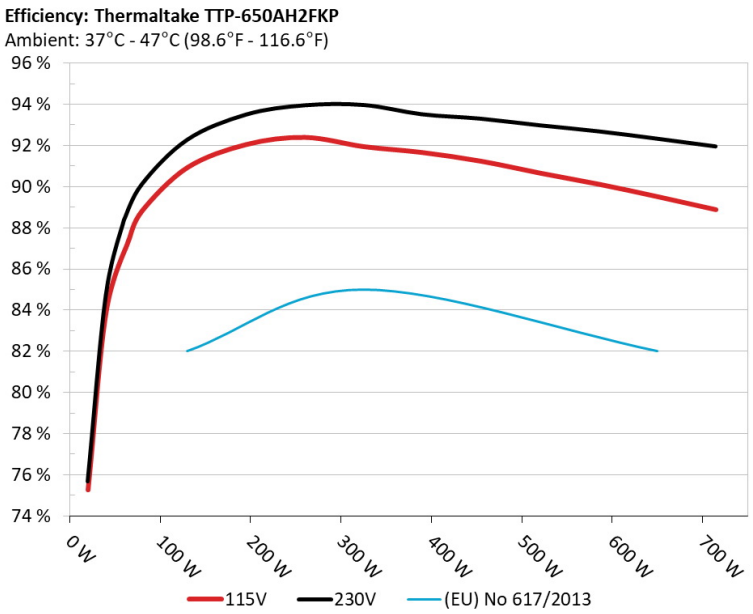
230V

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

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

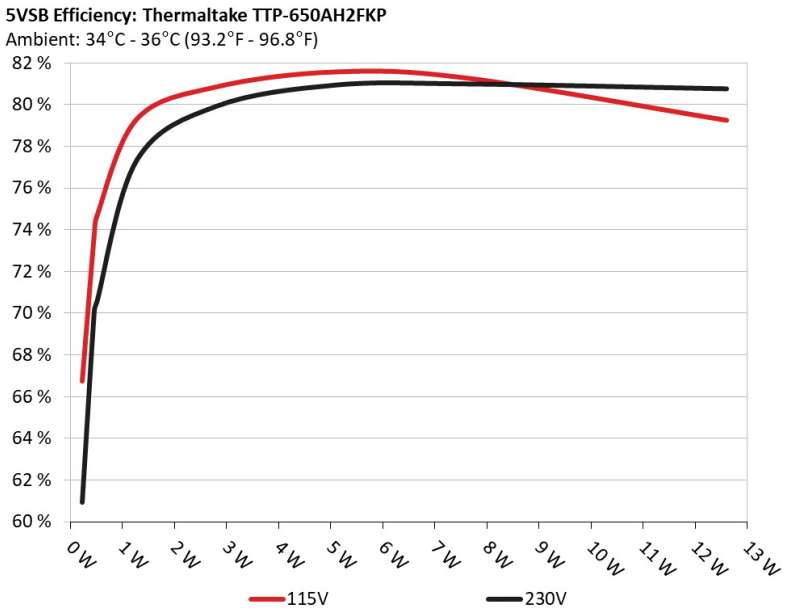
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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 -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

115V

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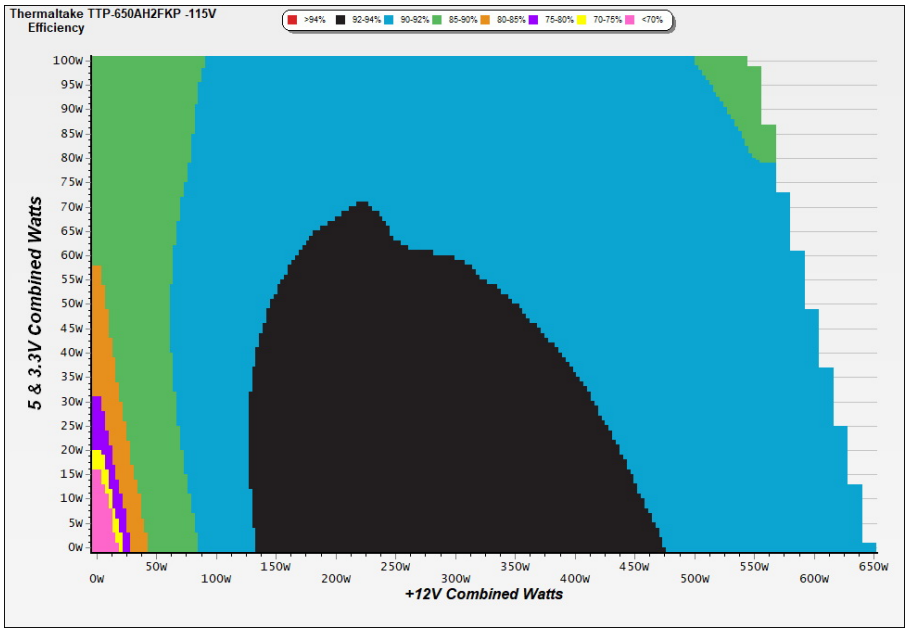
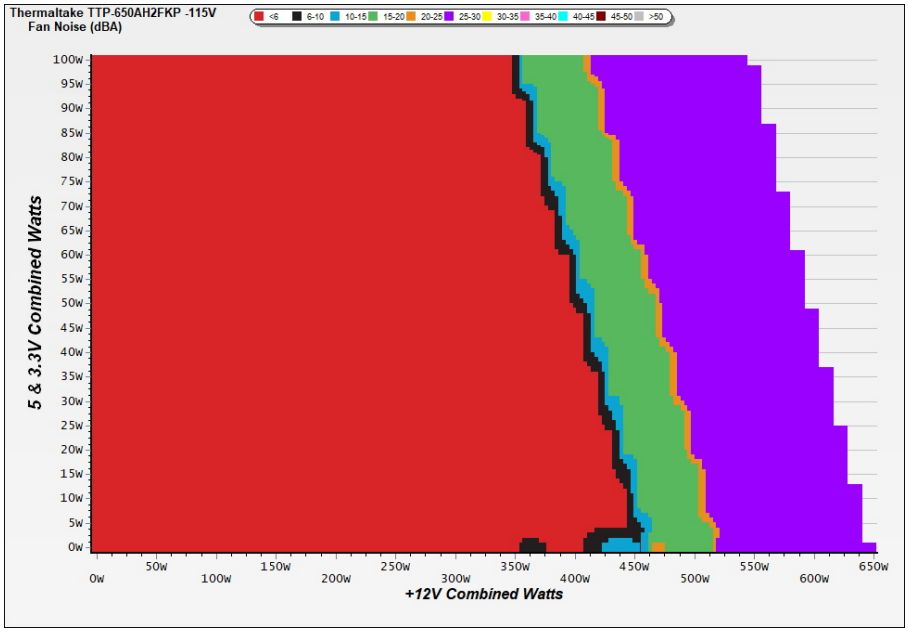
EFFICIENCY GRAPH 115V



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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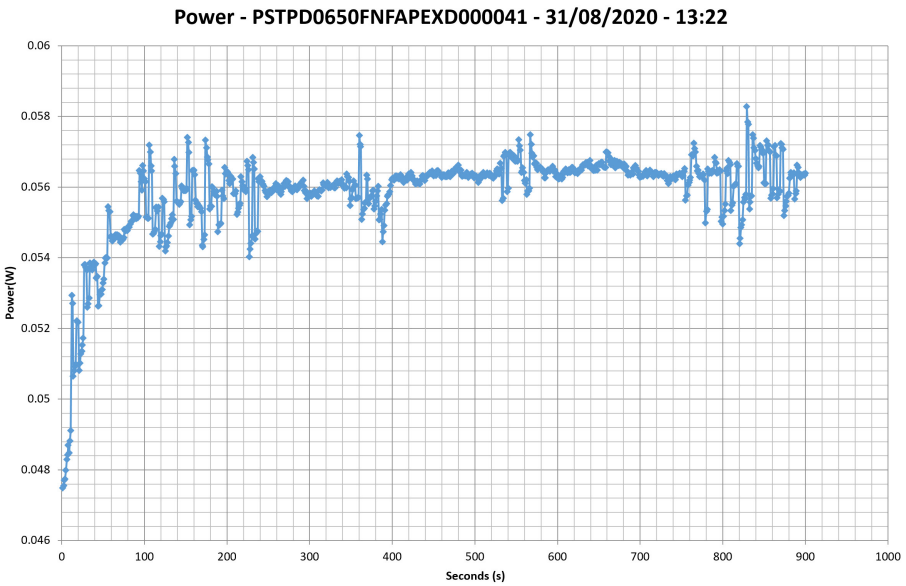
VAMPIRE POWER -115V



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

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	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
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
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

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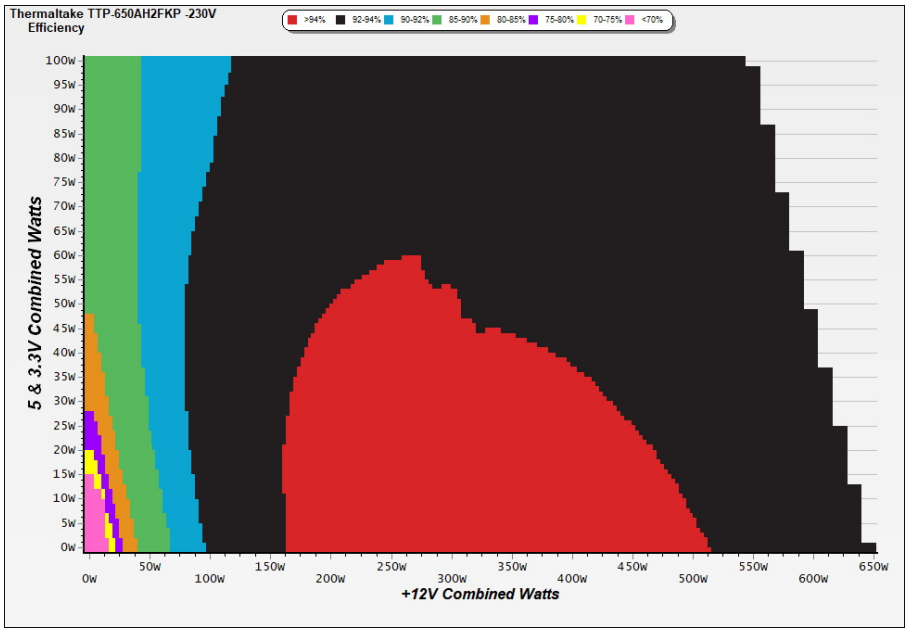
230V

EFFICIENCY GRAPH 230V



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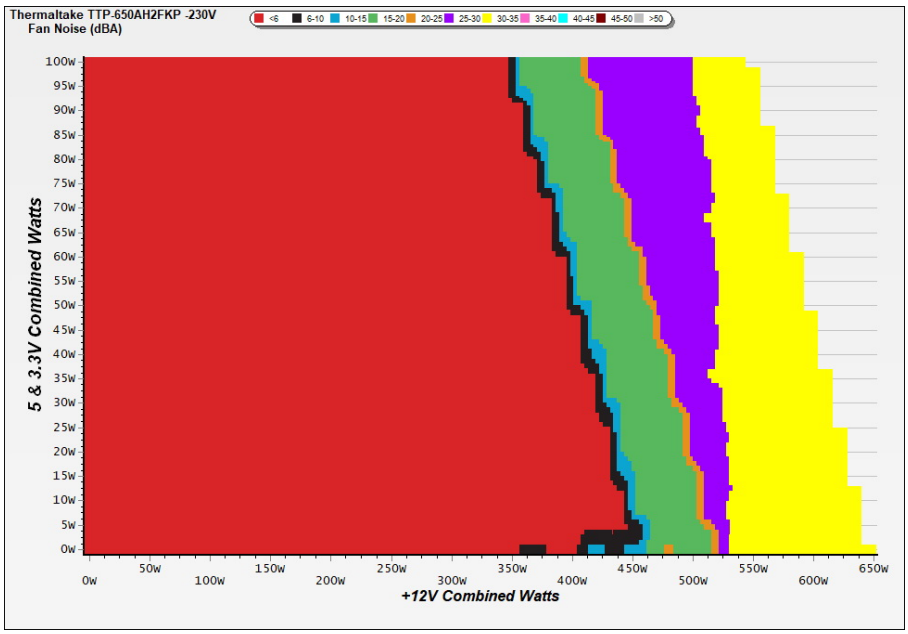
NOISE GRAPH 230V



INFO

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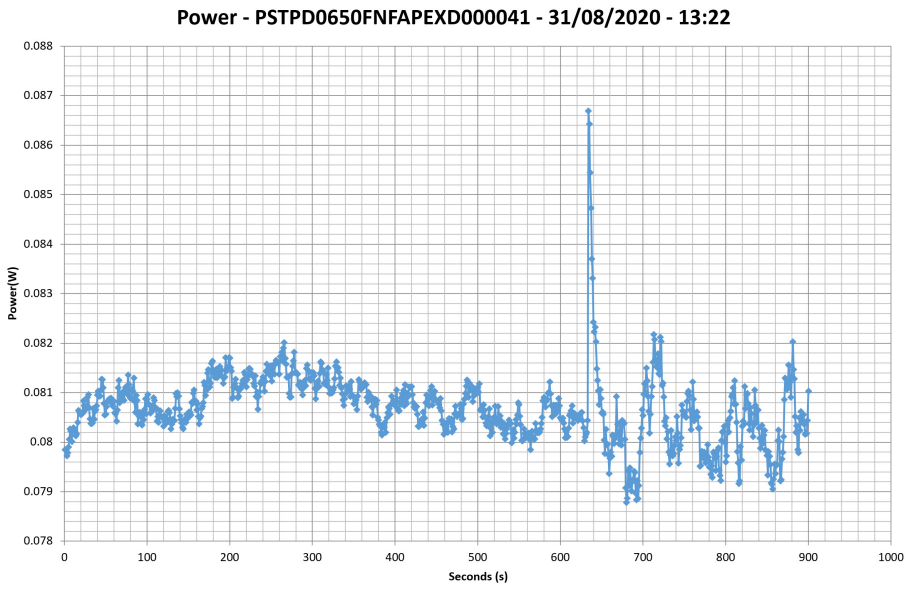
VAMPIRE POWER -230V



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COMMISSION REGULATION (EU) NO 617/2013 TESTING 230V

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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
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
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

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Thermaltake Toughpower PF1 650W

Top side

Power specifications label

CERTIFICATIONS 115V

Aris Mpitsiopoulos
Lab Director

CERTIFICATIONS 230V