EFFICIENCY AND NOISE LEVEL CERTIFICATIONS

Anex

Thermaltake Toughpower GF2 ARGB 750W

Lab ID#: TT75001816
Receipt Date: Feb 22, 2021
Test Date: Mar 22, 2021

Report: 21PS1816A
Report Date: Apr 14, 2021

DUT INFORMATION

Brand	Thermaltake
Manufacturer (OEM)	High Power
Series	Toughpower GF2 ARGB
Model Number	TTP-750AH3FSG-A
Serial Number	PSTPD0750F3FAGU2XF000150
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
Rated Frequency (Hz)	50-60
Rated Power (W)	750
Type	ATX12V
Cooling	140mm Hydraulic Bearing Fan [TT-1425 (A1425S12S-2)]
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	88.917%
Efficiency With 10W (≤500W) or 2% (>500W)	44.542
Average Efficiency 5VSB	78.554%
Standby Power Consumption (W)	0.0695848
Average PF	0.992
Avg Noise Output	34.42 dB(A)
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	Standard++

230V

Average Efficiency	90.637%
Average Efficiency 5VSB	77.335%
Standby Power Consumption (W)	0.1192660
Average PF	0.956
Avg Noise Output	34.40 dB(A)
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	Standard++

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	22	22	62.5	3	0.3
	Watts	120		750	15	3.6
Total Max. Power (W)		750				

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

Hold-Up Time (ms)	20
AC Loss to PWR_OK Hold Up Time (ms)	18
PWR_OK Inactive to DC Loss Delay (ms)	2

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CABLES AND CONNECTORS

Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (610mm)	1	1	18AWG	No
4+4 pin EPS12V (660mm)	1	1	16AWG	No
8 pin EPS12V (660mm)	1	1	16AWG	No
6+2 pin PCIe (500mm+160mm)	2	4	16-18AWG	No
SATA (510mm+160mm+160mm)	3	9	18AWG	No
4-pin Molex (500mm+150mm+150mm+150mm)	1	4	18AWG	No
FDD Adapter (+160mm)	1	1	22AWG	No
ARGB Sync Cable (610mm+160mm)	1	2	26AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	18AWG	-

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General Data	-
Manufacturer (OEM)	High Power
PCB Type	Double Sided
Primary Side	**-**
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV, 1x Champion CMD02X (Discharge IC)
Inrush Protection	-
Bridge Rectifier(s)	2x HY GBU1506L (600V, 15A @ 100°C)
APFC MOSFETs	2x Infineon IPA60R180P7S (600V, 11A @ 100°C, Rds(on): 0.18Ohm)
APFC Boost Diode	1x Infineon IDH06G65C5 (650V, 6A @ 145°C)
Bulk Cap(s)	2x Nichicon (400V, 390uF each or 780uF combined, 2,000h @ 105°C, GG)
Main Switchers	2x Infineon IPA50R190CE (500V, 15.7A @ 100°C, Rds(on): 0.19Ohm)
APFC Controller	Infineon ICE3PCS01G
Resonant Controller	Champion CM6901X
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	**-**
+12V MOSFETs	6x Infineon BSC027N04LS (40V, 88A @ 100°C, Rds(on): 2.7mOhm)
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0906NS (30V, 40A @ 100°C, Rds(on): 4.5mOhm) PWM Controller(s): ANPEC APW7159C
Filtering Capacitors	Electrolytic: 3x Nippon Chemi-Con (1-5,000h @ 105°C, KZE), 3x Nippon Chemi-Con (4-10,000h @ 105°C, KY), 3x Rubycon (3-6,000h @ 105°C, YXG), 1x Rubycon (6-10,000h @ 105°C, ZLH) Polymer: 15x FPCAP, 2x NIC
Supervisor IC	WT7527RA (OCP, OVP, UVP, SCP, PG)
Fan Model	Thermaltake TT-1425 A1425S12S-2 (140mm, 12V, 0.70A, Hydraulic Bearing Fan)
Fan Controller	STC STC15W401AS
5VSB Circuit	**-**
Rectifier	1x PFC P10V45SP SBR (45V, 10A), UTC 2N70L FET (700V, 2A, 6.3Ohm)
Standby PWM Controller	SI8016HSP8
-12V	**-**
Rectifier	1x KEC KIA7912PI (-12V, 1A)

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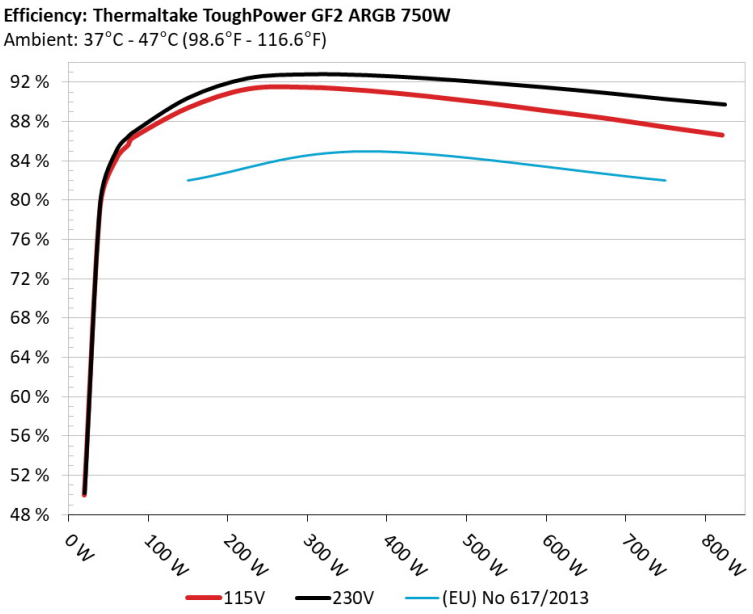
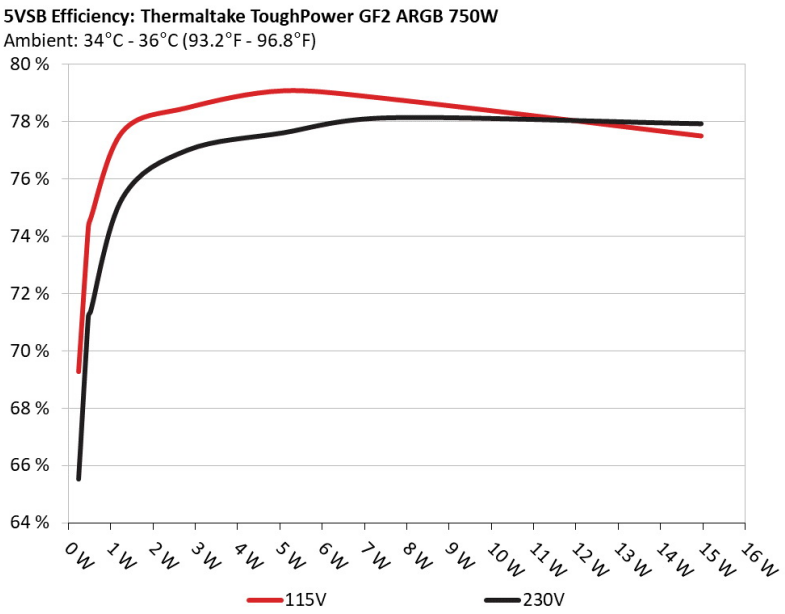
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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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Thermaltake Toughpower GF2 ARGB 750W

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	69.277%	0.046
	5.110V	0.332		115.16V
2	0.090A	0.460	74.313%	0.082
	5.109V	0.619		115.16V
3	0.550A	2.799	78.469%	0.263
	5.090V	3.567		115.15V
4	1.000A	5.071	79.061%	0.309
	5.072V	6.414		115.16V
5	1.500A	7.576	78.777%	0.335
	5.051V	9.617		115.16V
6	2.999A	14.954	77.486%	0.371
	4.987V	19.299		115.16V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	65.527%	0.015
	5.110V	0.351		230.32V
2	0.090A	0.460	71.207%	0.027
	5.109V	0.646		230.32V
3	0.550A	2.799	77.001%	0.133
	5.090V	3.635		230.32V
4	1.000A	5.071	77.609%	0.195
	5.072V	6.534		230.32V
5	1.500A	7.575	78.133%	0.236
	5.050V	9.695		230.32V
6	2.999A	14.956	77.924%	0.290
	4.987V	19.193		230.32V

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115V

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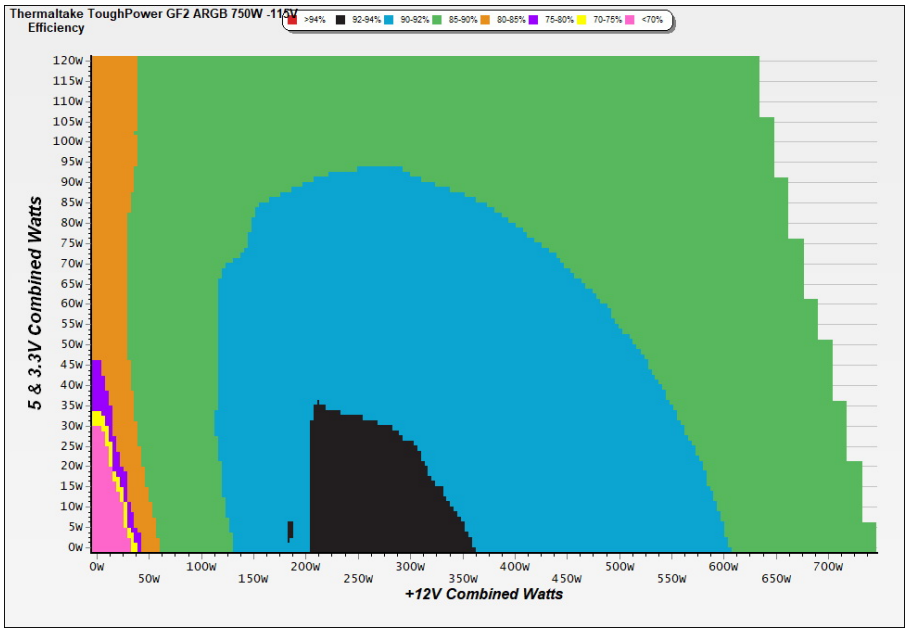
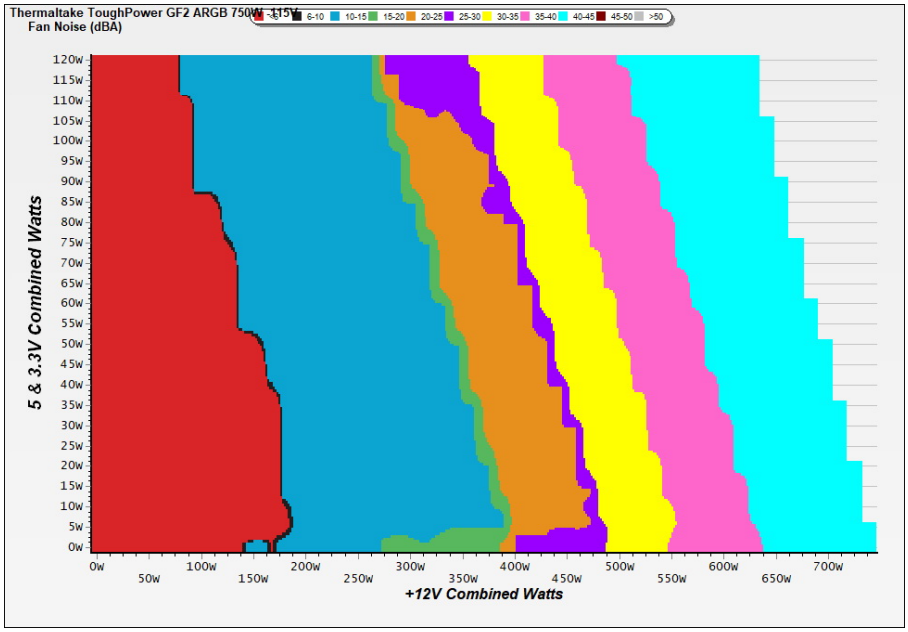
EFFICIENCY GRAPH 115V



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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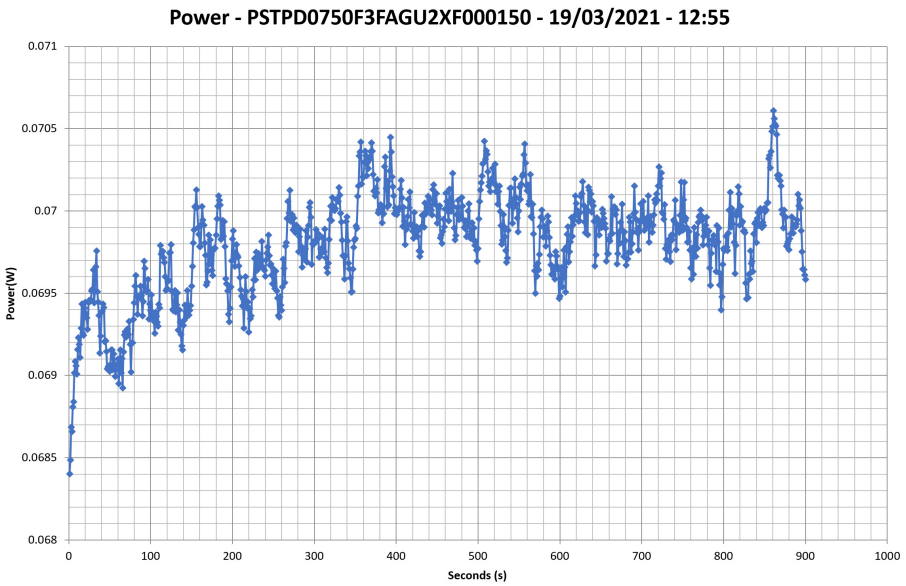
VAMPIRE POWER -115V



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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Thermaltake Toughpower GF2 ARGB 750W

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	4.448A	2.000A	2.000A	1.000A	75.370	85.644%	0	<6.0	43.53°C	0.966
	12.046V	5.031V	3.336V	5.056V	88.004				40.17°C	115.16V
2	9.926A	3.001A	3.000A	1.200A	150.548	89.411%	602	13.3	40.26°C	0.986
	12.031V	5.027V	3.333V	5.036V	168.378				44.32°C	115.15V
3	15.743A	3.501A	3.500A	1.400A	225.633	91.328%	606	13.6	41.62°C	0.994
	12.028V	5.025V	3.331V	5.018V	247.058				46.53°C	115.15V
4	21.568A	3.998A	4.000A	1.600A	300.595	91.494%	610	13.8	42.32°C	0.997
	12.018V	5.023V	3.328V	4.998V	328.541				47.82°C	115.15V
5	27.041A	5.000A	5.002A	1.800A	375.371	91.157%	613	14.0	42.56°C	0.997
	12.007V	5.020V	3.325V	4.977V	411.785				48.75°C	115.14V
6	32.513A	5.997A	5.996A	2.000A	449.946	90.592%	882	25.5	42.70°C	0.997
	11.996V	5.017V	3.322V	4.957V	496.674				50.01°C	115.13V
7	37.995A	6.997A	6.996A	2.199A	524.535	89.910%	1084	32.2	43.41°C	0.998
	11.985V	5.014V	3.320V	4.936V	583.398				51.31°C	115.12V
8	43.454A	7.996A	7.995A	2.399A	598.791	89.130%	1210	35.6	44.35°C	0.998
	11.976V	5.012V	3.317V	4.915V	671.818				52.71°C	115.12V
9	49.360A	8.497A	8.497A	2.399A	673.200	88.372%	1498	40.9	44.82°C	0.998
	11.967V	5.011V	3.315V	4.903V	761.783				54.16°C	115.12V
10	55.014A	8.998A	8.994A	2.999A	747.251	87.481%	1499	40.9	45.35°C	0.998
	11.957V	5.008V	3.313V	4.865V	854.187				55.43°C	115.10V
11	61.267A	8.999A	8.997A	2.999A	821.472	86.638%	1500	40.9	46.62°C	0.999
	11.949V	5.006V	3.311V	4.853V	948.164				57.31°C	115.10V
CL1	0.119A	14.001A	13.996A	0.000A	118.366	81.906%	621	14.6	42.13°C	0.983
	12.033V	5.026V	3.327V	5.068V	144.514				48.73°C	115.15V
CL2	62.465A	1.001A	1.000A	1.000A	761.449	88.180%	1501	40.8	45.12°C	0.998
	11.977V	5.019V	3.319V	4.963V	863.520				55.24°C	115.11V

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Thermaltake Toughpower GF2 ARGB 750W

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	1.240A	0.500A	0.498A	0.200A	20.165	50.015%	0	<6.0	0.911
	12.069V	5.034V	3.339V	5.100V	40.318				115.13V
2	2.472A	1.000A	0.998A	0.400A	40.199	79.486%	0	<6.0	0.935
	12.055V	5.033V	3.338V	5.088V	50.574				115.16V
3	3.714A	1.501A	1.499A	0.600A	60.325	84.208%	0	<6.0	0.955
	12.042V	5.032V	3.337V	5.076V	71.638				115.16V
4	4.952A	1.999A	2.001A	0.800A	80.441	86.333%	0	<6.0	0.969
	12.047V	5.032V	3.336V	5.063V	93.175				115.16V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	20.00mV	6.80mV	6.90mV	5.80mV	Pass
20% Load	14.20mV	7.90mV	7.60mV	5.50mV	Pass
30% Load	6.70mV	8.70mV	8.30mV	5.80mV	Pass
40% Load	6.80mV	9.50mV	8.30mV	6.10mV	Pass
50% Load	7.10mV	10.80mV	9.30mV	6.00mV	Pass
60% Load	7.90mV	11.40mV	10.90mV	7.20mV	Pass
70% Load	8.60mV	12.90mV	12.30mV	7.20mV	Pass
80% Load	9.80mV	14.30mV	13.70mV	8.60mV	Pass
90% Load	10.80mV	14.50mV	14.30mV	8.20mV	Pass
100% Load	13.60mV	15.90mV	15.30mV	10.40mV	Pass
110% Load	16.00mV	16.80mV	16.20mV	11.00mV	Pass
Crossload1	16.10mV	12.40mV	13.80mV	15.20mV	Pass
Crossload2	13.80mV	12.00mV	11.20mV	8.60mV	Pass

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230V

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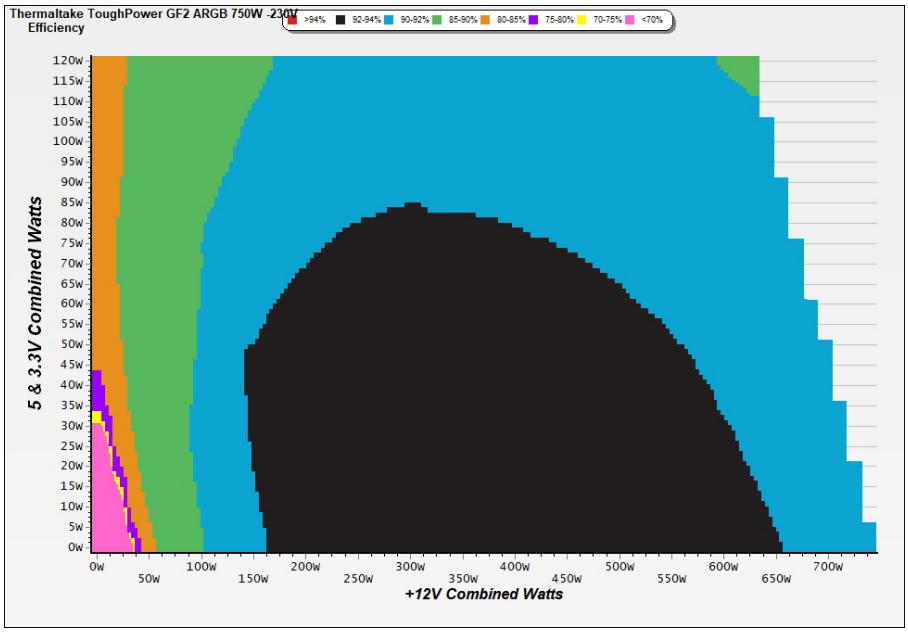
EFFICIENCY GRAPH 230V



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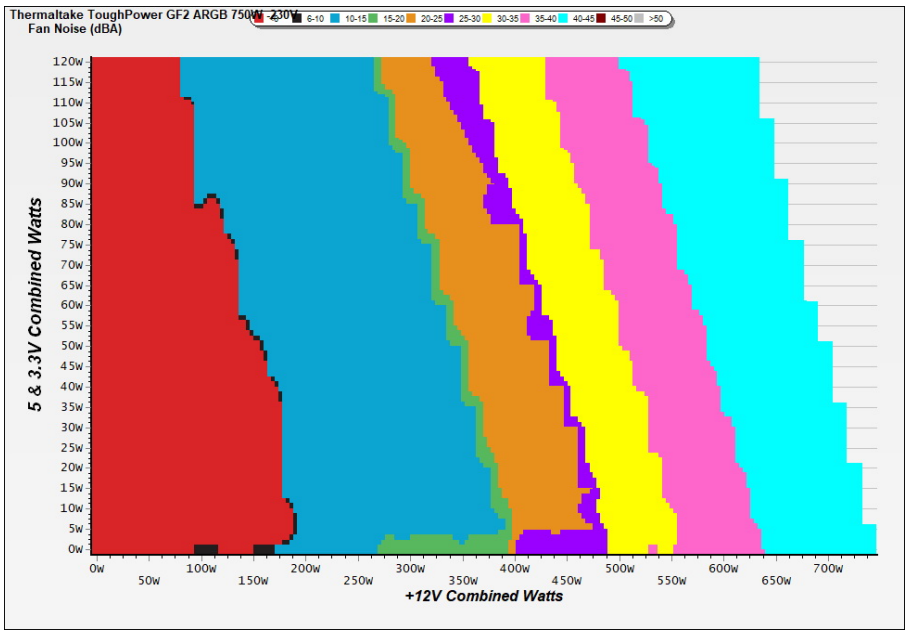
NOISE GRAPH 230V



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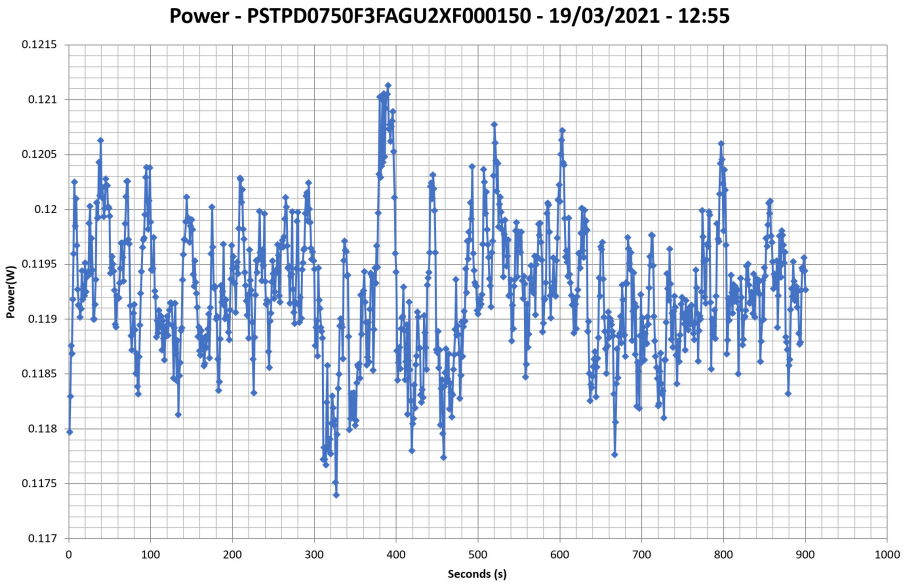
VAMPIRE POWER -230V



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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	4.431A	1.987A	1.977A	0.989A	74.950	86.469%	0	<6.0	42.88°C	0.810
	12.042V	5.031V	3.336V	5.056V	86.678				40.28°C	230.30V
2	9.902A	2.984A	2.968A	1.192A	150.008	90.385%	609	13.6	40.29°C	0.915
	12.029V	5.028V	3.333V	5.035V	165.966				44.60°C	230.31V
3	15.714A	3.482A	3.468A	1.396A	225.009	92.383%	611	13.8	41.43°C	0.947
	12.025V	5.025V	3.330V	5.016V	243.562				46.21°C	230.31V
4	21.542A	3.983A	3.967A	1.601A	300.012	92.781%	613	14.0	41.72°C	0.963
	12.014V	5.023V	3.328V	4.996V	323.354				47.13°C	230.31V
5	26.983A	4.982A	4.963A	1.810A	374.393	92.700%	616	14.1	42.43°C	0.978
	12.003V	5.020V	3.325V	4.974V	403.874				48.31°C	230.31V
6	32.477A	5.981A	5.962A	2.000A	449.221	92.379%	885	25.8	42.97°C	0.982
	11.993V	5.018V	3.322V	4.953V	486.282				49.77°C	230.32V
7	38.020A	6.982A	6.960A	2.231A	524.638	91.949%	1087	31.9	43.59°C	0.986
	11.981V	5.015V	3.320V	4.930V	570.573				51.09°C	230.32V
8	43.570A	7.985A	7.960A	2.445A	599.950	91.448%	1210	35.6	43.73°C	0.990
	11.970V	5.012V	3.316V	4.908V	656.053				51.93°C	230.31V
9	49.494A	8.483A	8.446A	2.451A	674.476	90.895%	1500	40.9	44.09°C	0.993
	11.961V	5.009V	3.314V	4.895V	742.037				52.87°C	230.32V
10	55.214A	8.986A	8.965A	3.088A	749.669	90.268%	1499	40.9	45.37°C	0.994
	11.953V	5.008V	3.312V	4.858V	830.497				55.15°C	230.32V
11	61.546A	8.989A	8.969A	3.095A	824.854	89.714%	1499	40.9	46.02°C	0.996
	11.945V	5.006V	3.310V	4.847V	919.428				56.79°C	230.32V
CL1	0.120A	13.999A	13.997A	0.000A	118.357	82.771%	621	14.6	42.41°C	0.894
	12.030V	5.025V	3.327V	5.067V	142.994				48.30°C	230.33V
CL2	62.489A	1.001A	1.000A	1.000A	761.357	91.115%	1501	40.8	45.69°C	0.994
	11.971V	5.016V	3.319V	4.961V	835.599				55.78°C	230.31V

Anex

Thermaltake Toughpower GF2 ARGB 750W

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	1.229A	0.496A	0.494A	0.196A	19.975	50.167%	0	<6.0	0.601
	12.065V	5.036V	3.339V	5.099V	39.817				230.30V
2	2.461A	0.993A	0.987A	0.393A	39.964	80.014%	0	<6.0	0.664
	12.056V	5.035V	3.338V	5.088V	49.946				230.30V
3	3.697A	1.490A	1.482A	0.591A	59.996	85.020%	0	<6.0	0.764
	12.051V	5.033V	3.337V	5.076V	70.567				230.30V
4	4.930A	1.988A	1.979A	0.790A	79.949	86.835%	0	<6.0	0.827
	12.038V	5.030V	3.336V	5.064V	92.070				230.30V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	20.50mV	6.70mV	7.10mV	5.60mV	Pass
20% Load	14.20mV	8.10mV	7.70mV	5.90mV	Pass
30% Load	6.50mV	8.20mV	8.10mV	5.70mV	Pass
40% Load	6.10mV	8.40mV	8.60mV	5.70mV	Pass
50% Load	6.80mV	9.40mV	9.10mV	6.20mV	Pass
60% Load	7.70mV	9.50mV	8.90mV	6.40mV	Pass
70% Load	8.60mV	11.10mV	10.20mV	6.90mV	Pass
80% Load	9.80mV	12.70mV	13.30mV	7.50mV	Pass
90% Load	10.90mV	14.80mV	14.10mV	8.70mV	Pass
100% Load	13.40mV	16.10mV	15.60mV	10.20mV	Pass
110% Load	16.60mV	17.90mV	16.40mV	11.00mV	Pass
Crossload1	17.30mV	12.20mV	13.50mV	16.40mV	Pass
Crossload2	13.70mV	11.70mV	11.30mV	8.70mV	Pass

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Anex

Thermaltake Toughpower GF2 ARGB 750W

Top side

Power specifications label

CERTIFICATIONS 115V

CERTIFICATIONS 230V