

## Anex

## Thermaltake Toughpower GF2 ARGB 850W

Lab ID#: TT85001815  
 Receipt Date: Feb 22, 2021  
 Test Date: Mar 22, 2021

Report: 21PS1815A  
 Report Date: Apr 7, 2021

### DUT INFORMATION

Brand	Thermaltake
Manufacturer (OEM)	High Power
Series	Toughpower GF2 ARGB
Model Number	TTP-850AH3FSG-A
Serial Number	PSTPD0850F3FAGU2XF000374
DUT Notes	

### DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
Rated Frequency (Hz)	50-60
Rated Power (W)	850
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	✓
ALPM (Alternative Low Power Mode) compatible	✓

### 115V

Average Efficiency	89.025%
Efficiency With 10W (≤500W) or 2% (>500W)	56.515
Average Efficiency 5VSB	78.336%
Standby Power Consumption (W)	0.0703683
Average PF	0.993
Avg Noise Output	34.51 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	Standard++

### 230V

Average Efficiency	90.754%
Average Efficiency 5VSB	77.343%
Standby Power Consumption (W)	0.1194710
Average PF	0.962
Avg Noise Output	34.51 dB(A)
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	Standard++

### POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	22	22	70.9	3	0.3
	Watts	120		850	15	3.6
Total Max. Power (W)		850				

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

Hold-Up Time (ms)	20
AC Loss to PWR_OK Hold Up Time (ms)	17
PWR_OK Inactive to DC Loss Delay (ms)	3

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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)	3	6	16-18AWG	No
SATA (510mm+160mm+160mm+160mm)	3	12	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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<b>General Data</b>	-
Manufacturer (OEM)	High Power
PCB Type	Double Sided
<b>Primary Side</b>	-
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 IPA50R140CP (500V, 15A @ 100°C, Rds(on): 0.14Ohm)
APFC Boost Diode	1x CREE C3D08060A (600V, 8A @ 152°C)
Bulk Cap(s)	1x Rubycon (400V, 470uF, 3,000h @ 105°C, MXK) & 1x Rubycon (400V, 390uF, 2,000h @ 105°C, MXH)
Main Switchers	2x Infineon IPA60R180P7S (600V, 11A @ 100°C, Rds(on): 0.18Ohm)
APFC Controller	Infineon ICE3PCS01G
Resonant Controller	Champion CM6901X
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
<b>Secondary Side</b>	-
+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): ANPEK 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
<b>5VSB Circuit</b>	-
Rectifier	1x PFC P10V45SP SBR (45V, 10A), UTC 2N70L FET (700V, 2A, 6.3Ohm)
Standby PWM Controller	SI8016HSP8
<b>-12V</b>	-
Rectifier	1x KEC KIA7912PI (-12V, 1A)

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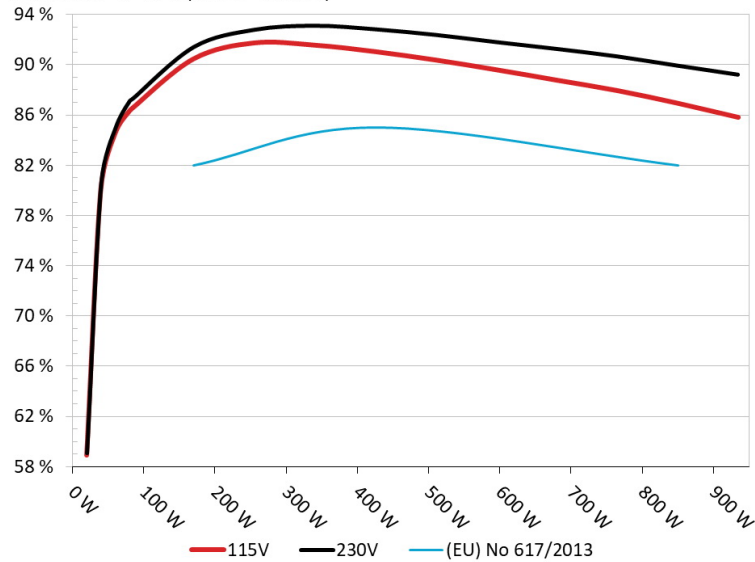
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### EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

**Efficiency: Thermaltake ToughPower GF2 ARGB 850W**

Ambient: 37°C - 47°C (98.6°F - 116.6°F)



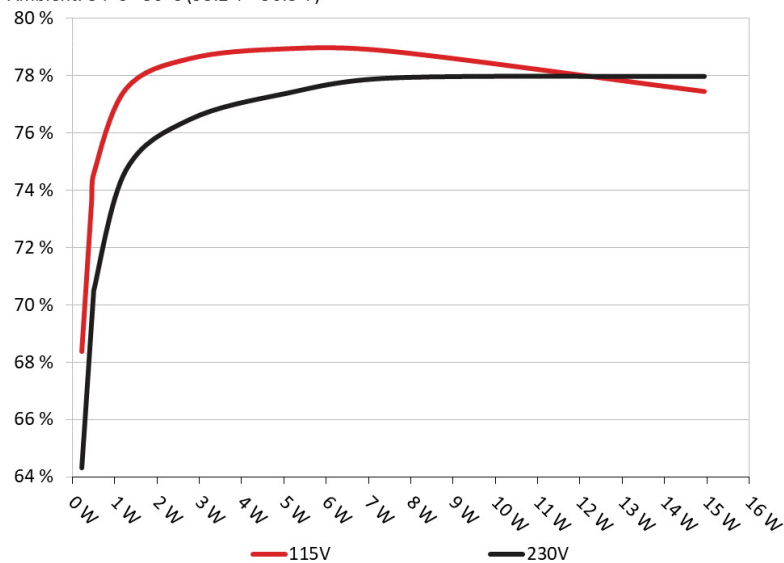
#### INFO

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 ToughPower GF2 ARGB 850W**

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	0.229	68.358%	0.047
	5.097V	0.335		115.12V
2	0.090A	0.459	73.558%	0.085
	5.095V	0.624		115.13V
3	0.550A	2.793	78.588%	0.256
	5.077V	3.554		115.11V
4	1.000A	5.060	78.927%	0.307
	5.060V	6.411		115.11V
5	1.500A	7.561	78.834%	0.337
	5.040V	9.591		115.12V
6	3.000A	14.941	77.435%	0.376
	4.980V	19.295		115.12V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	64.326%	0.016
	5.097V	0.356		230.27V
2	0.090A	0.459	70.507%	0.028
	5.095V	0.651		230.27V
3	0.550A	2.793	76.479%	0.131
	5.077V	3.652		230.26V
4	1.000A	5.060	77.382%	0.194
	5.060V	6.539		230.25V
5	1.500A	7.562	77.919%	0.235
	5.040V	9.705		230.26V
6	3.000A	14.944	77.975%	0.293
	4.981V	19.165		230.27V

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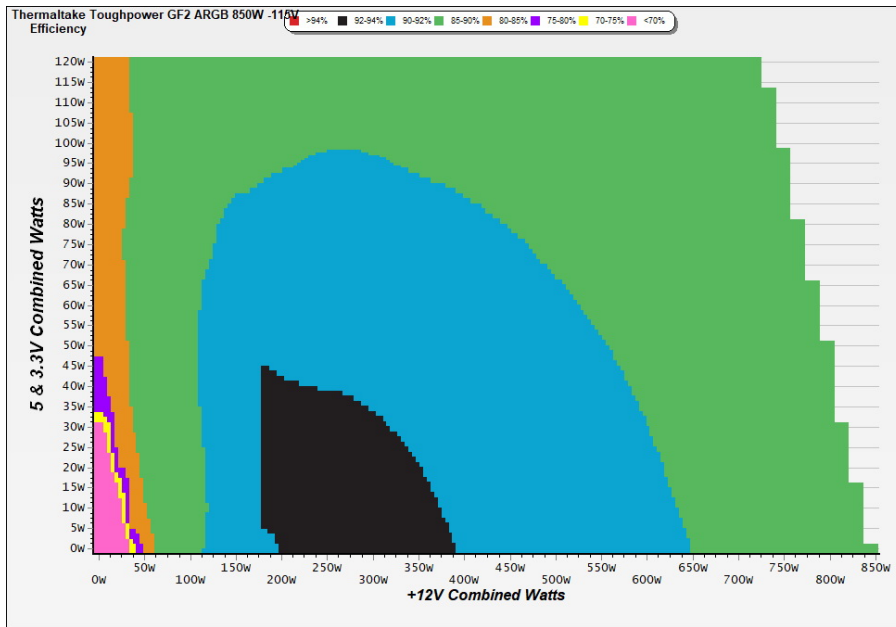
# 115V

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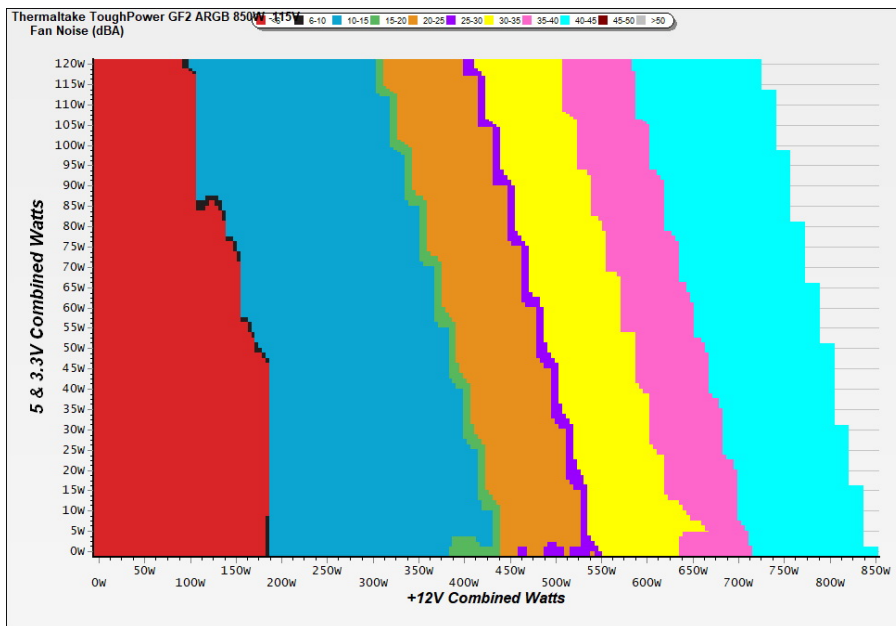
### EFFICIENCY GRAPH 115V



#### 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

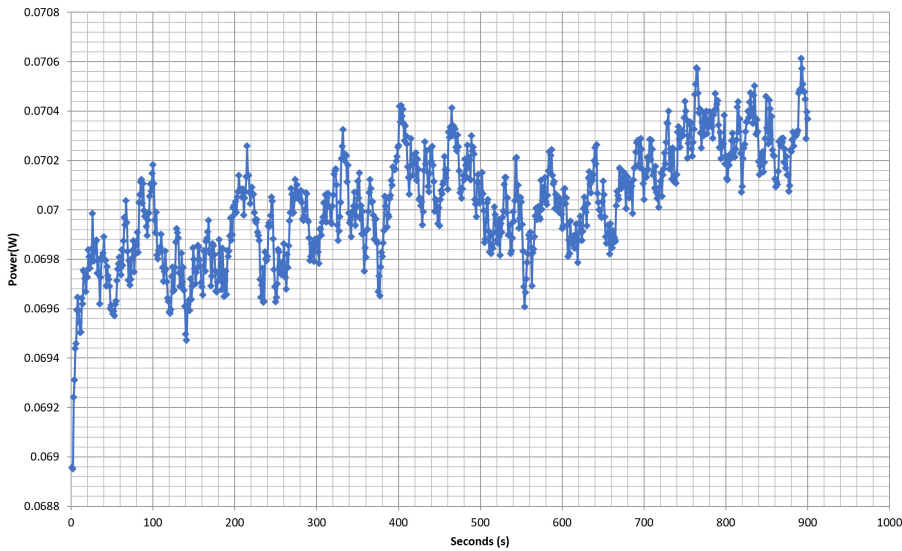
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### VAMPIRE POWER -115V

Power - PSTPD0850F3FAGU2XF000374 - 19/03/2021 - 12:47



#### 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	5.269A	1.984A	1.966A	0.991A	84.963	86.569%	0	<6.0	43.85°C	0.970
	12.026V	5.040V	3.354V	5.049V	98.145				40.41°C	115.11V
2	11.578A	2.979A	2.955A	1.193A	170.042	90.463%	603	13.4	40.48°C	0.987
	12.018V	5.035V	3.350V	5.029V	187.969				44.30°C	115.11V
3	18.224A	3.480A	3.453A	1.397A	255.057	91.733%	606	13.6	41.16°C	0.997
	12.017V	5.030V	3.346V	5.011V	278.044				45.62°C	115.10V
4	24.884A	3.979A	3.948A	1.603A	340.088	91.556%	608	13.6	41.99°C	0.996
	12.011V	5.028V	3.343V	4.992V	371.454				47.24°C	115.10V
5	31.202A	4.977A	4.942A	1.811A	425.027	91.040%	610	13.8	42.31°C	0.997
	12.003V	5.024V	3.339V	4.972V	466.858				48.16°C	115.10V
6	37.489A	5.977A	5.939A	2.000A	509.470	90.375%	877	25.0	42.75°C	0.998
	11.997V	5.020V	3.335V	4.952V	563.727				49.30°C	115.09V
7	43.856A	6.980A	6.935A	2.232A	594.915	89.598%	1079	32.1	43.56°C	0.998
	11.989V	5.016V	3.332V	4.931V	663.979				50.82°C	115.09V
8	50.231A	7.985A	7.934A	2.445A	680.248	88.764%	1201	35.4	43.96°C	0.998
	11.981V	5.012V	3.328V	4.910V	766.357				52.05°C	115.09V
9	57.006A	8.488A	8.424A	2.451A	765.179	87.934%	1496	41.0	44.84°C	0.998
	11.975V	5.009V	3.325V	4.898V	870.170				53.71°C	115.08V
10	63.530A	8.995A	8.944A	3.088A	849.991	86.925%	1498	40.9	45.17°C	0.999
	11.967V	5.005V	3.321V	4.859V	977.840				54.72°C	115.07V
11	70.651A	8.997A	8.951A	3.095A	934.772	85.807%	1498	40.9	46.69°C	0.999
	11.961V	5.003V	3.318V	4.848V	1089.392				57.44°C	115.06V
CL1	0.122A	14.004A	14.000A	0.000A	118.596	81.726%	617	14.5	41.88°C	0.980
	12.018V	5.022V	3.343V	5.064V	145.114				48.25°C	115.13V
CL2	70.843A	0.999A	1.000A	1.000A	861.651	87.494%	1496	41.0	45.60°C	0.999
	11.975V	5.021V	3.331V	4.959V	984.809				55.04°C	115.07V

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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	1.240A	0.500A	0.501A	0.200A	20.150	58.903%	0	<6.0	0.892
	12.039V	5.044V	3.358V	5.090V	34.209				115.12V
2	2.467A	0.991A	0.984A	0.394A	39.981	80.087%	0	<6.0	0.931
	12.031V	5.042V	3.357V	5.079V	49.922				115.11V
3	3.705A	1.488A	1.473A	0.592A	60.011	84.523%	0	<6.0	0.959
	12.029V	5.041V	3.355V	5.068V	71.000				115.11V
4	4.936A	1.984A	1.969A	0.791A	79.962	86.302%	0	<6.0	0.966
	12.026V	5.039V	3.354V	5.057V	92.654				115.11V

### RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	32.00mV	7.60mV	10.70mV	3.50mV	Pass
20% Load	11.90mV	10.70mV	24.60mV	7.90mV	Pass
30% Load	9.20mV	8.50mV	11.80mV	3.90mV	Pass
40% Load	9.00mV	9.50mV	12.40mV	4.10mV	Pass
50% Load	9.50mV	10.40mV	12.50mV	4.80mV	Pass
60% Load	9.90mV	11.00mV	12.20mV	4.60mV	Pass
70% Load	11.40mV	11.60mV	13.10mV	5.10mV	Pass
80% Load	12.40mV	12.40mV	16.00mV	5.80mV	Pass
90% Load	13.90mV	13.30mV	14.60mV	6.20mV	Pass
100% Load	16.70mV	15.00mV	16.10mV	7.30mV	Pass
110% Load	19.90mV	16.70mV	18.50mV	7.50mV	Pass
Crossload1	25.50mV	17.00mV	19.20mV	14.70mV	Pass
Crossload2	16.80mV	13.60mV	14.30mV	6.50mV	Pass

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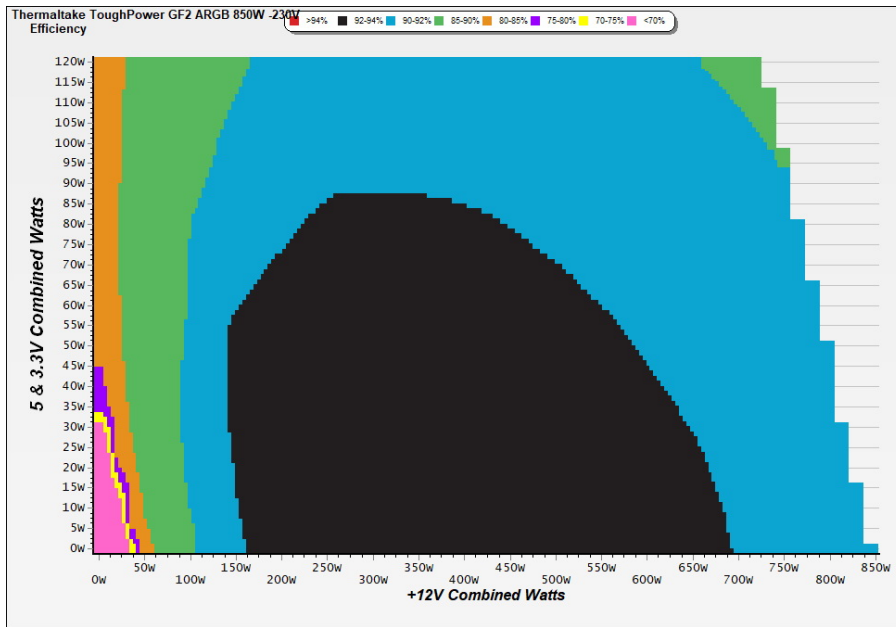
# 230V

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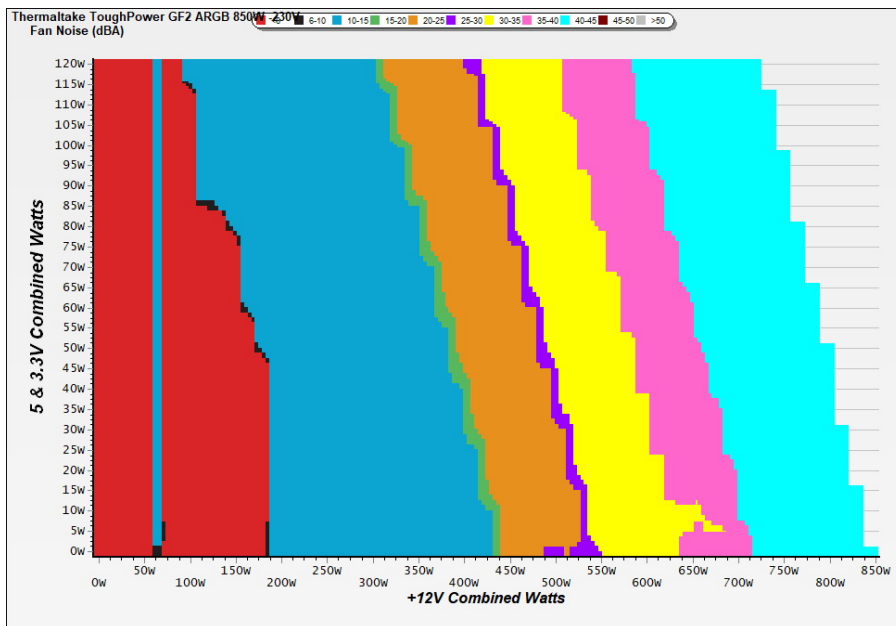
### EFFICIENCY GRAPH 230V



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### NOISE GRAPH 230V



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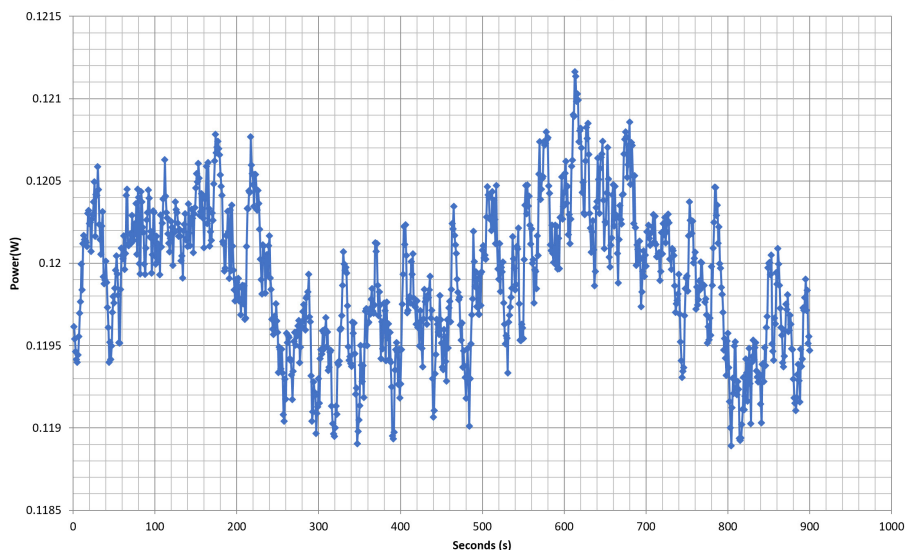
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### 10-110% LOAD TESTS 230V

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1	5.268A	1.984A	1.969A	0.991A	84.959	87.340%	0	<6.0	43.76°C	0.839
	12.026V	5.040V	3.354V	5.048V	97.274				40.08°C	230.23V
2	11.576A	2.977A	2.956A	1.193A	170.017	91.426%	0	<6.0	44.86°C	0.932
	12.018V	5.036V	3.351V	5.029V	185.962				40.51°C	230.22V
3	18.221A	3.479A	3.451A	1.397A	255.026	92.802%	605	13.4	41.00°C	0.957
	12.018V	5.030V	3.346V	5.011V	274.806				45.84°C	230.23V
4	24.881A	3.978A	3.949A	1.603A	340.046	93.122%	607	13.6	41.36°C	0.972
	12.011V	5.027V	3.343V	4.992V	365.161				46.59°C	230.23V
5	31.196A	4.977A	4.940A	1.810A	424.944	92.840%	610	13.8	42.44°C	0.982
	12.003V	5.024V	3.339V	4.972V	457.716				48.67°C	230.23V
6	37.485A	5.978A	5.938A	2.000A	509.389	92.398%	876	25.0	42.77°C	0.988
	11.996V	5.020V	3.335V	4.953V	551.297				49.88°C	230.23V
7	43.848A	6.979A	6.936A	2.231A	594.816	91.823%	1078	32.1	43.31°C	0.990
	11.989V	5.016V	3.332V	4.933V	647.787				51.11°C	230.23V
8	50.224A	7.985A	7.933A	2.444A	680.161	91.273%	1202	35.5	43.73°C	0.993
	11.981V	5.012V	3.328V	4.912V	745.196				52.19°C	230.23V
9	57.004A	8.489A	8.423A	2.450A	765.085	90.680%	1498	40.9	44.23°C	0.996
	11.974V	5.008V	3.324V	4.901V	843.720				53.32°C	230.22V
10	63.519A	8.993A	8.943A	3.086A	849.909	89.941%	1500	40.9	45.71°C	0.997
	11.968V	5.005V	3.321V	4.862V	944.966				55.47°C	230.22V
11	70.638A	8.995A	8.949A	3.094A	934.687	89.225%	1499	40.9	46.68°C	0.998
	11.962V	5.004V	3.319V	4.849V	1047.556				57.43°C	230.22V
CL1	0.117A	14.003A	13.999A	0.000A	118.584	82.665%	616	14.1	42.30°C	0.899
	12.019V	5.025V	3.344V	5.064V	143.452				48.70°C	230.24V
CL2	70.844A	0.999A	0.998A	1.000A	861.582	90.560%	1497	41.0	45.57°C	0.997
	11.974V	5.019V	3.330V	4.959V	951.397				55.55°C	230.23V

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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	1.232A	0.496A	0.491A	0.197A	19.988	59.063%	0	<6.0	0.568
	12.040V	5.044V	3.358V	5.090V	33.842				230.22V
2	2.466A	0.992A	0.984A	0.394A	39.976	80.558%	0	<6.0	0.666
	12.032V	5.042V	3.356V	5.079V	49.624				230.22V
3	3.704A	1.488A	1.475A	0.592A	60.006	84.970%	0	<6.0	0.769
	12.029V	5.041V	3.355V	5.068V	70.620				230.22V
4	4.936A	1.983A	1.967A	0.791A	79.957	87.124%	0	<6.0	0.831
	12.027V	5.040V	3.354V	5.057V	91.774				230.21V

### RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	31.60mV	7.90mV	11.20mV	4.00mV	Pass
20% Load	9.90mV	8.00mV	11.60mV	3.90mV	Pass
30% Load	7.60mV	9.00mV	11.90mV	4.10mV	Pass
40% Load	8.00mV	9.00mV	12.40mV	4.40mV	Pass
50% Load	8.70mV	10.00mV	12.40mV	4.90mV	Pass
60% Load	10.50mV	11.30mV	12.30mV	4.80mV	Pass
70% Load	11.10mV	11.50mV	13.00mV	5.00mV	Pass
80% Load	11.50mV	12.80mV	14.80mV	5.20mV	Pass
90% Load	12.70mV	14.60mV	14.90mV	6.30mV	Pass
100% Load	16.30mV	15.80mV	16.50mV	7.00mV	Pass
110% Load	19.80mV	16.00mV	17.50mV	7.30mV	Pass
Crossload1	25.20mV	17.80mV	20.60mV	14.40mV	Pass
Crossload2	15.20mV	14.10mV	16.40mV	5.80mV	Pass

All data and graphs included in this test report can be used by any individual on the following conditions:

- > It should be mentioned that the test results are provided by Cybenetics
- > The link to the original test results document should be provided in any case

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## Anex

## Thermaltake Toughpower GF2 ARGB 850W

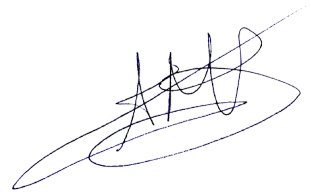


Top side



Power specifications label

### CERTIFICATIONS 115V

**Aristeidis Bitziopoulos**  
Lab Director

### CERTIFICATIONS 230V



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