Thermaltake Toughpower Grand RGB 850W Platinum (#2)

Serial Number PSTPG0850F1FAPU1LE000286

Lab ID TT20850006

Certification ID 251599

Test Result Report ID: 20PSA

Certificate Issue Date: Feb 18, 2020

Scheme: ETA-EMI PSU

115V



230V



Scheme: LAMBDA PSU

115V



230V





Aristeidis Bitziopoulos, Certification Body General Manager

General Information

Test Equipment

Electronic Loads	Chroma 63601-5 x2 Chroma 63600-2 Chroma 63640-80-80 x10 Chroma 63610-80-20
AC Sources	Chroma 6530, APM SP300VAC4000W-P, GW Instek ASR-3500
Power Analyzers	Rohde & Schwarz HMC8015 & NPA701
Oscilloscopes	Picoscope 4444, Siglent SDS2104X PLUS
Sound Analyzer	Bruel & Kjaer 2270 G4
Microphone	Bruel & Kjaer Type 4955-A
Temperature Logger	Picoscope TC-08
Tachometer	UNI-T UT372
Multimeters	Keysight 34465A
EMI Analyzer	TekBox TBMR-110M-EU
Isolation Transformer	4kVA
UPS	FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA
Testing Methodology	Cybenetics PSU Test Protocol

DUT Information(Non-accredited measurements)

Product Identification Details	
Brand	Thermaltake
Model	Toughpower Grand RGB 850W Platinum (#2)
OEM/ODM	Channel Well Technology
Serial Number	PSTPG0850F1FAPU1LE000286
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12
Rated Frequency (Hz)	50-60

Rated Power (W)	850
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	140mm Hydro Dynamic Bearing Fan (TT-1425 (A1425L12S))
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	TT20850006
Date of receipt	Sep 11, 2019
Testing Date	Feb 3, 2020
Report Issued Date	Feb 18, 2020
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

Cables and Connectors(Non-accredited measurements)

Modular Cables				
Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (600mm)	1	1	16AWG	No
4+4 pin EPS12V (650mm)	1	1	16AWG	No
8 pin EPS12V (650mm)	1	1	16AWG	No
6+2 pin PCIe (500mm+150mm)	3	6	16-18AWG	No
SATA (500mm+150mm+150mm+150mm)	3	12	18AWG	No
4-pin Molex (500mm+150mm+150mm+150mm)	1	4	18AWG	No
FDD Adapter (+100mm)	1	1	22AWG	No
AC Power Cord (1440mm) - C13 coupler	1	1	18AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	83.33	3	0.3
	Watts	100		850	15	3.6
Total Max. Power (W)		850				

Parts Description

General Data	-
Manufacturer (OEM)	Enhance Electronics
PCB Type	Single Sided
Primary Side	-
Transient Filter	6x Y caps, 3x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	1x RS2505M-U1 (600V, 25A @ 150°C)
APFC MOSFETs	4x Infineon IPP50R140CP (550V, 15A @ 100°C, 0.14Ohm)
APFC Boost Diode	2x CREEC3D08060A(600V, 8A @ 152°C)
Hold-up Cap(s)	2x Nippon Chemi-Con (450V, 560uF, 2000h @ 105°C, KMW)
Main Switchers	4x Infineon IPP50R140CP (550V, 15A @ 100°C, 0.14Ohm)
IC Driver	2x Silicon Labs Si8230BD
APFC Controller	ATK AT6101ZS & CM03X Green PFC Controller
Resonant Controller	Champion CM6901T6
Topology	Primary side: Interleaved PFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	8x Infineon BSC014N04LS (40V, 100A @ 100°C, 1.4mOhm)
5V & 3.3V	DC-DC Converters: 4x Infineon BSC018NE2LS (25V, 97A @ 100°C, 1.4mOhm) PWM Controllers: ANPEC APW7160A
Filtering Capacitors	Electrolytic: Nippon Chemi-Con (4-10,000 @ 105°C, KY), Rubycon (3-6,000 @ 105°C, YXG), Rubycon (6-10000 @ 105°C, ZLH), Suncon (105°C) Polymer: Unicon (UPH)
Supervisor IC	SITI PS223 (OCP, OTP, OVP, UVP, SCP, PG)
Fan Model	Yate Loon D12SH (120mm, 12V, 0.30A, Rifle Bearing Fan)

5VSB Circuit	-
Rectifier	1x PFR10V45CT SBR (45V, 10A)
Standby PWM Controller	ATK AT6002H

Test Results

Temperature & Compliance Info

Temperature Range (°C /°F)	28-32 / 82.4-89.6
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	90.434%
Average Noise Output (>1450 Load Combinations)	33.78dBA
Average PF (>1450 Load Combinations)	0.978
Efficiency With 10W (≤500W) or 2% (>500W) Load	66.795%
Standby Power Consumption	0.0355W
Non-Accredited	
12V Ripple (Full Load)	24.87mV
5V Ripple (Full Load)	7.95mV
3.3V Ripple (Full Load)	17.26mV
5VSB Ripple (Full Load)	8.89mV
12V Load Regulation	0.67%
5V Load Regulation	0.93%
3.3V Load Regulation	0.91%
5VSB Load Regulation	2.07%
Inrush Current	20.797A

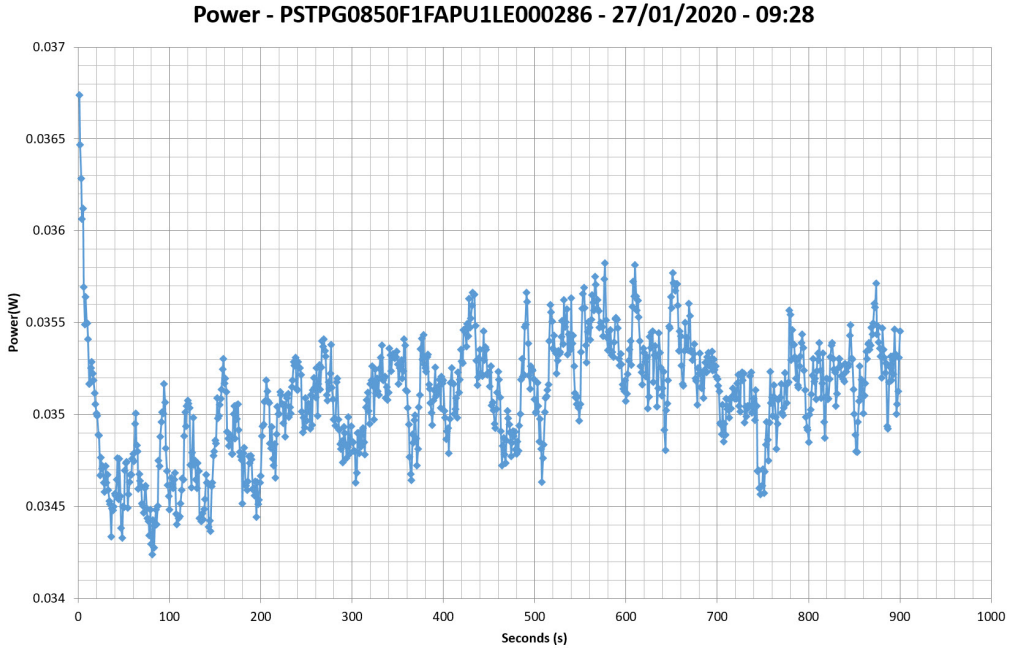
230V		
Accredited		
Average Efficiency (>1450 load combinations)		92.180%
Average Noise Output (>1450 Load Combinations)		33.76dBA
Average PF (>1450 Load Combinations)		0.929
Efficiency With 10W (≤500W) or 2% (>500W) Load		-
Standby Power Consumption		0.0529W
Non-Accredited		
12V Ripple (Full Load)		26.86mV
5V Ripple (Full Load)		8.46mV
3.3V Ripple (Full Load)		18.27mV
5VSB Ripple (Full Load)		8.88mV
12V Load Regulation		0.53%
5V Load Regulation		0.99%
3.3V Load Regulation		0.79%
5VSB Load Regulation		1.68%
Inrush Current		50.405A
Hold-Up Time & PWR_OK Signal		18.80ms
AC Loss to PWR_OK Hold Up Time		17.30ms
PWR_OK Inactive to DC Loss Delay		1.50ms
PSU Timings: T1 (20% / 100%)	86.0ms	86.0ms
PSU Timings: T3 (20% / 100%)	285.0ms	285.0ms
OPP (0.00°C / 0.00°C)	149.87%	-

Hold-Up Time & PWR_OK Signal

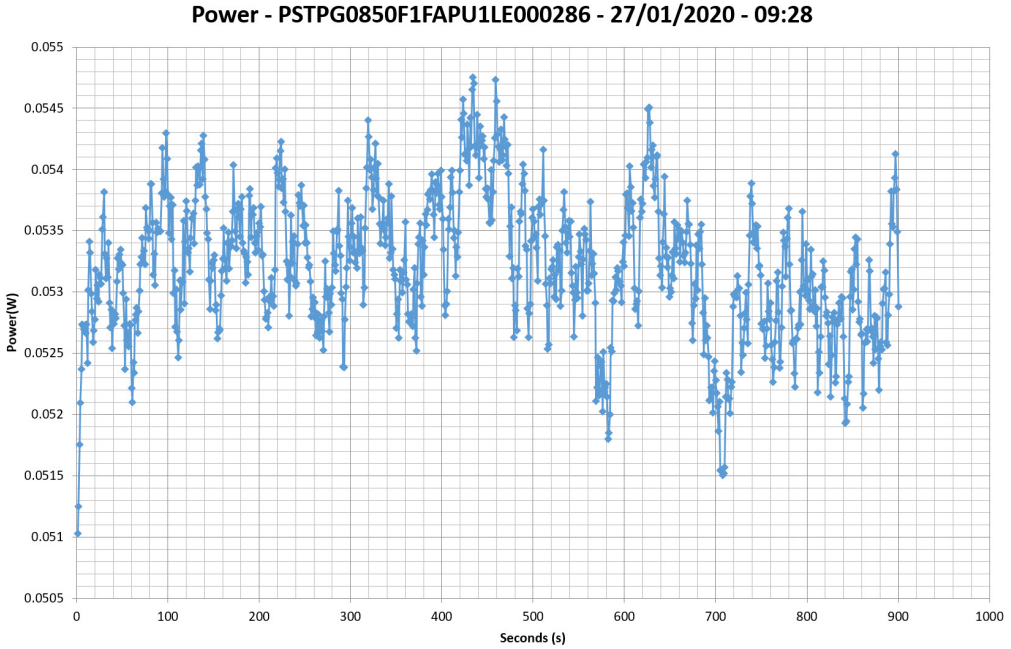
Hold-Up Time (ms)	18.8
AC Loss to PWR_OK Hold Up Time (ms)	17.3
PWR_OK Inactive to DC Loss Delay (ms)	1.5

Graphs

115V

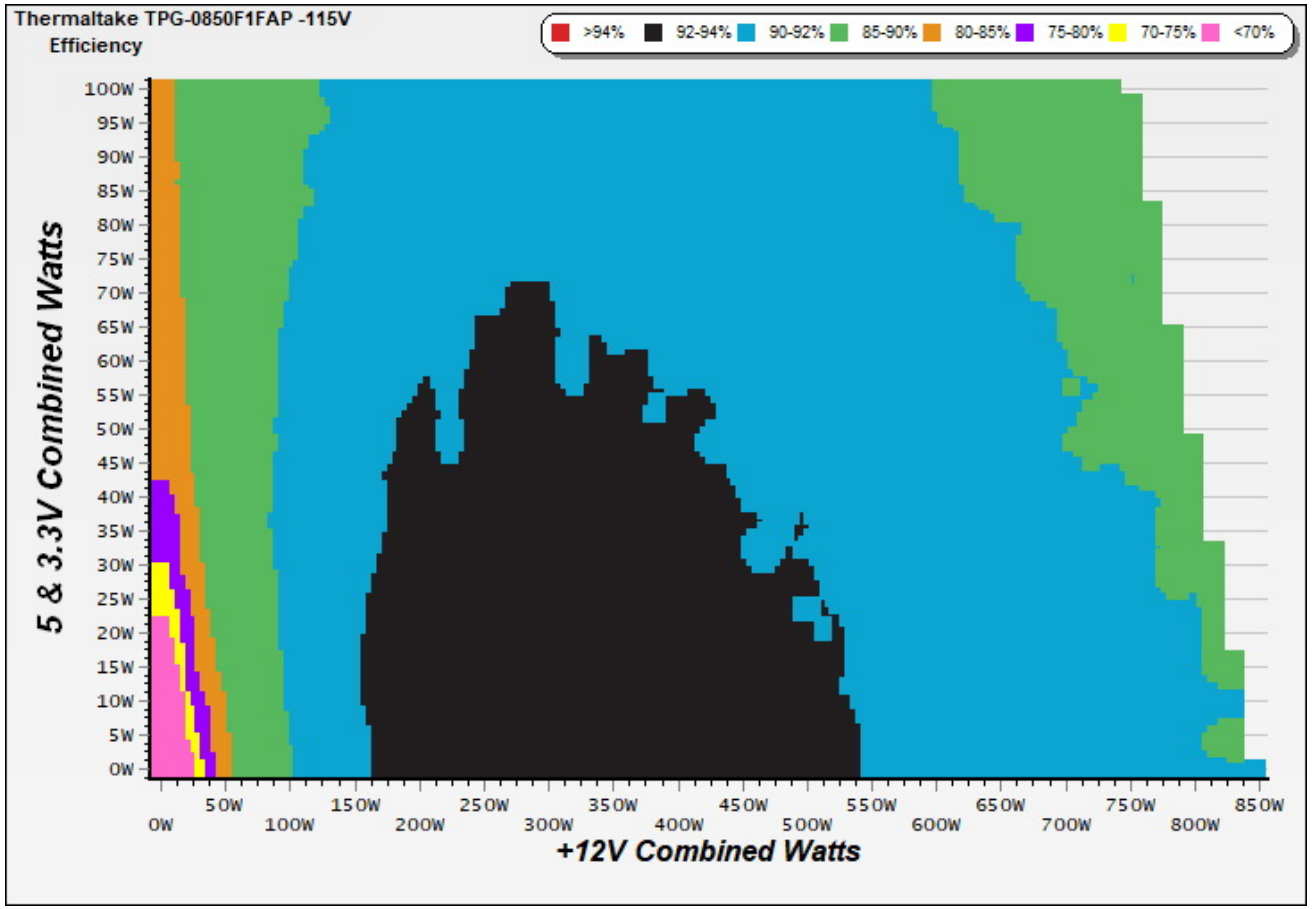


230V



Efficiency Graph

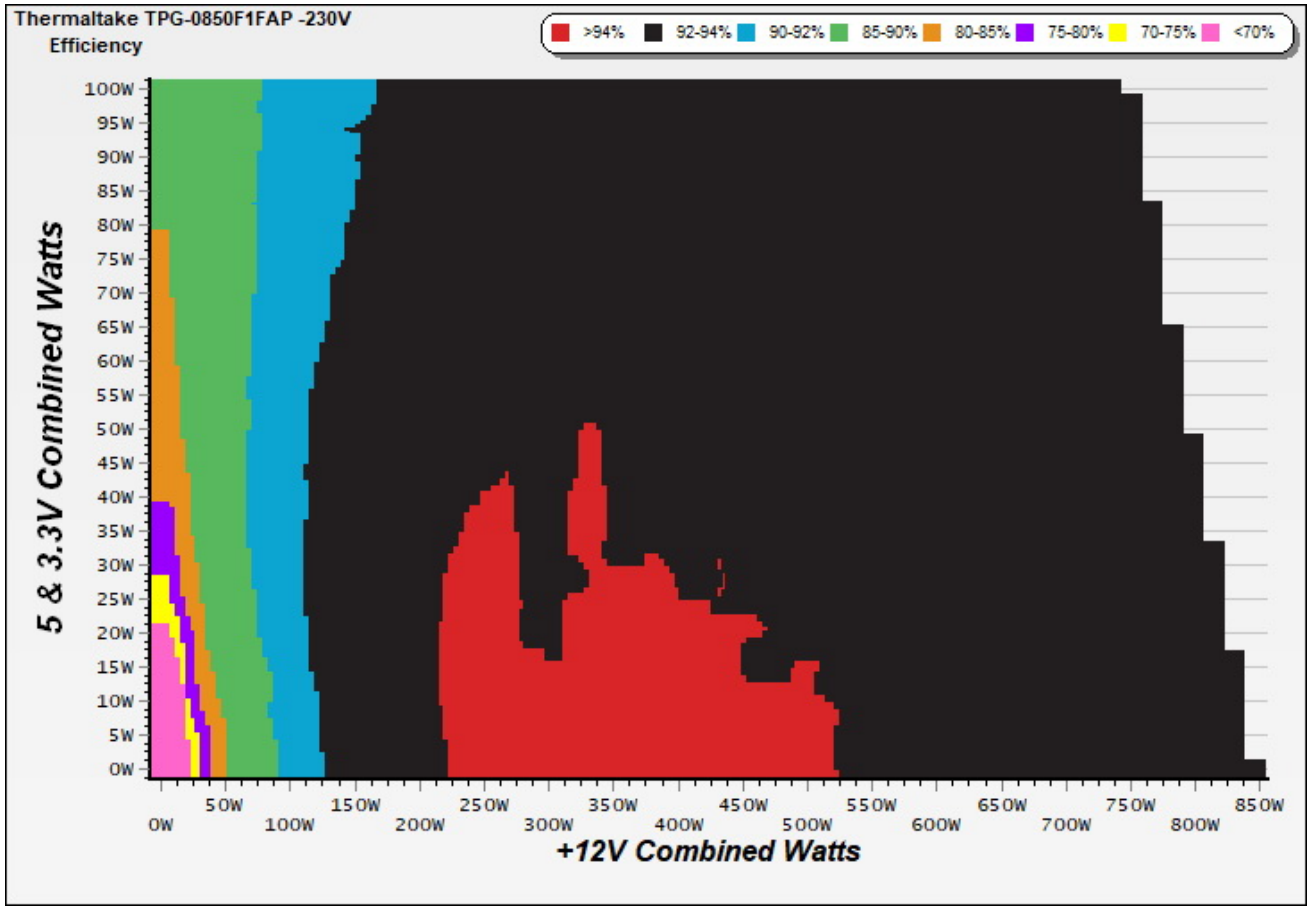
115V



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.

230V

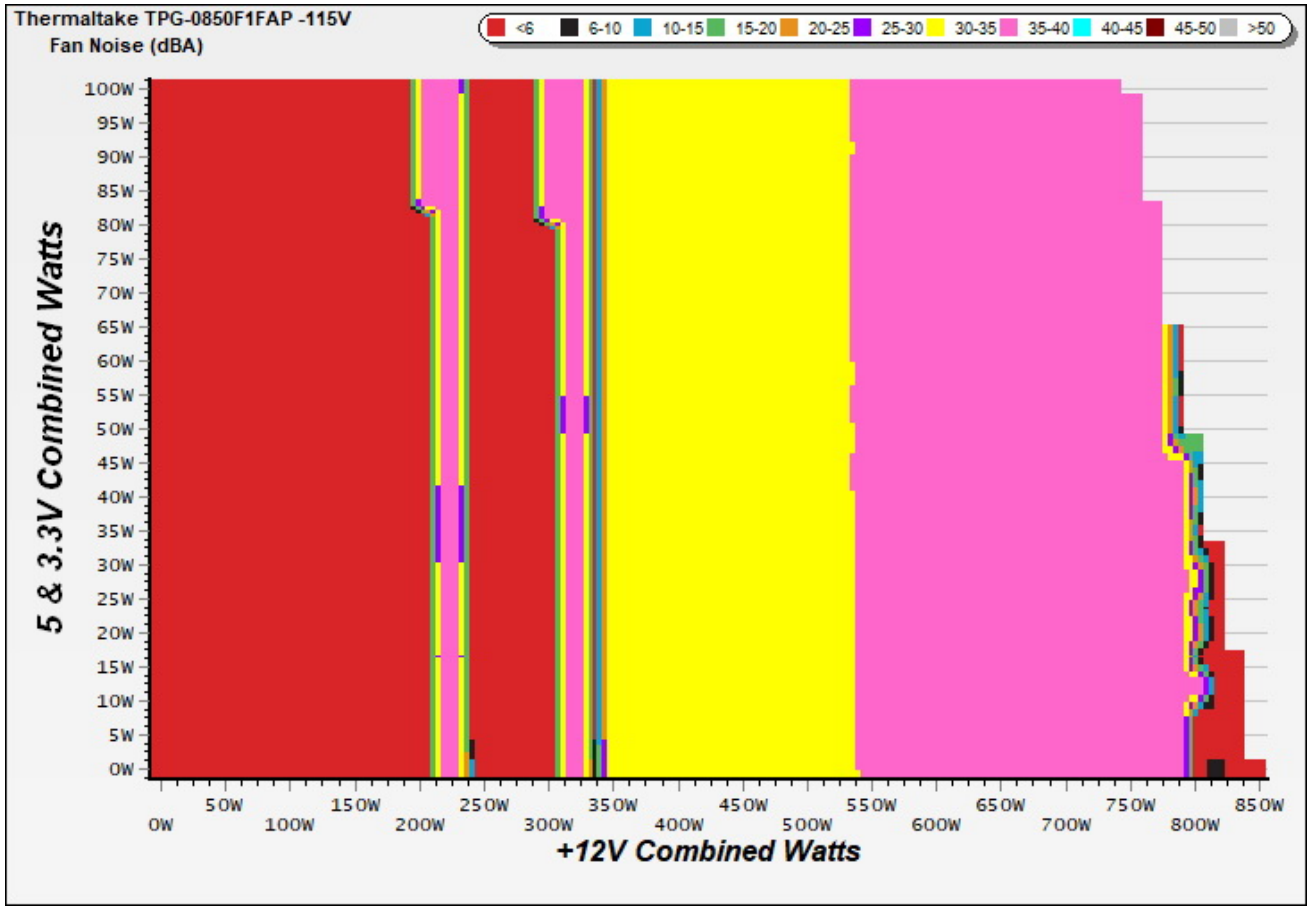


INFO

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

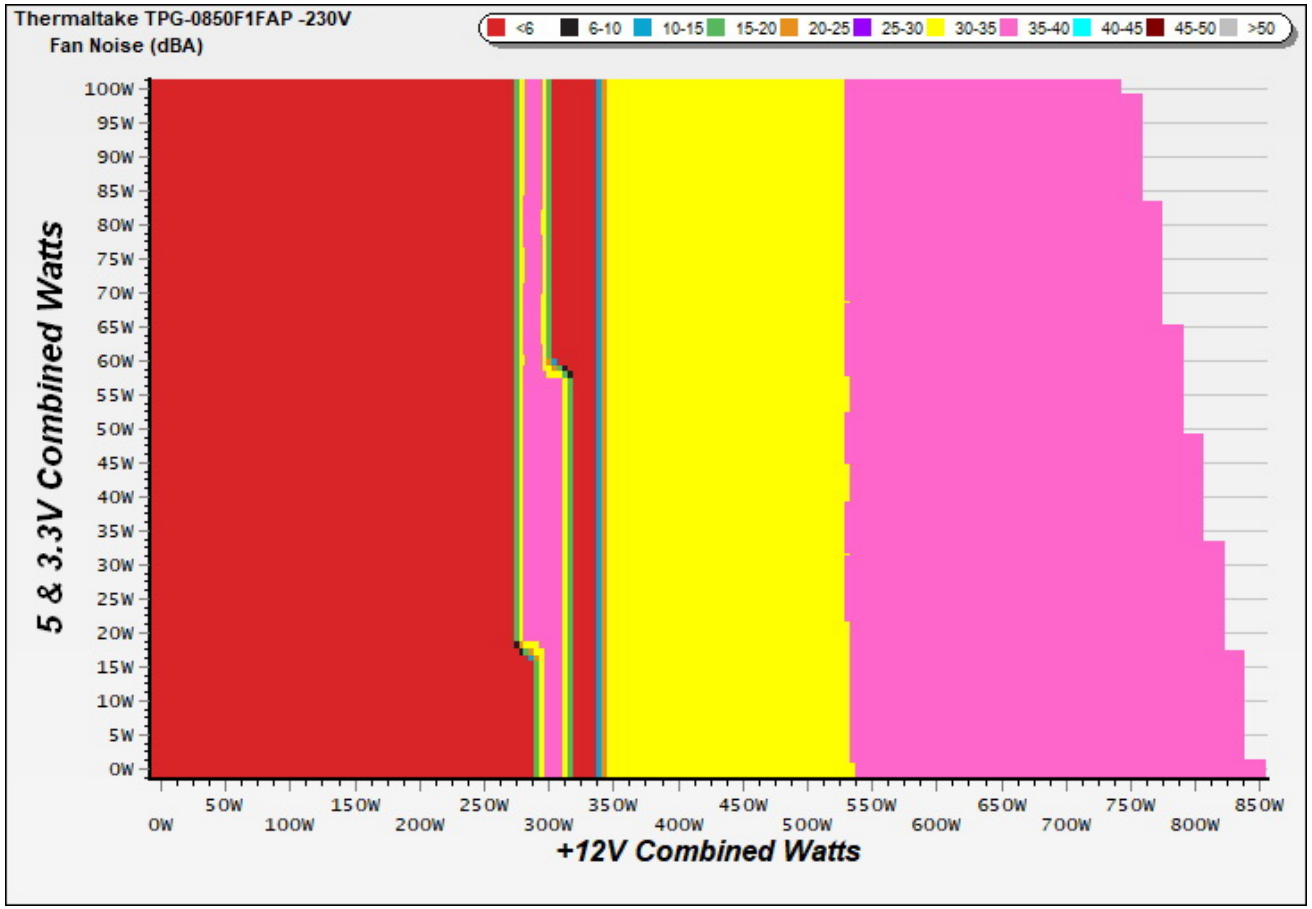
115V



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.

230V

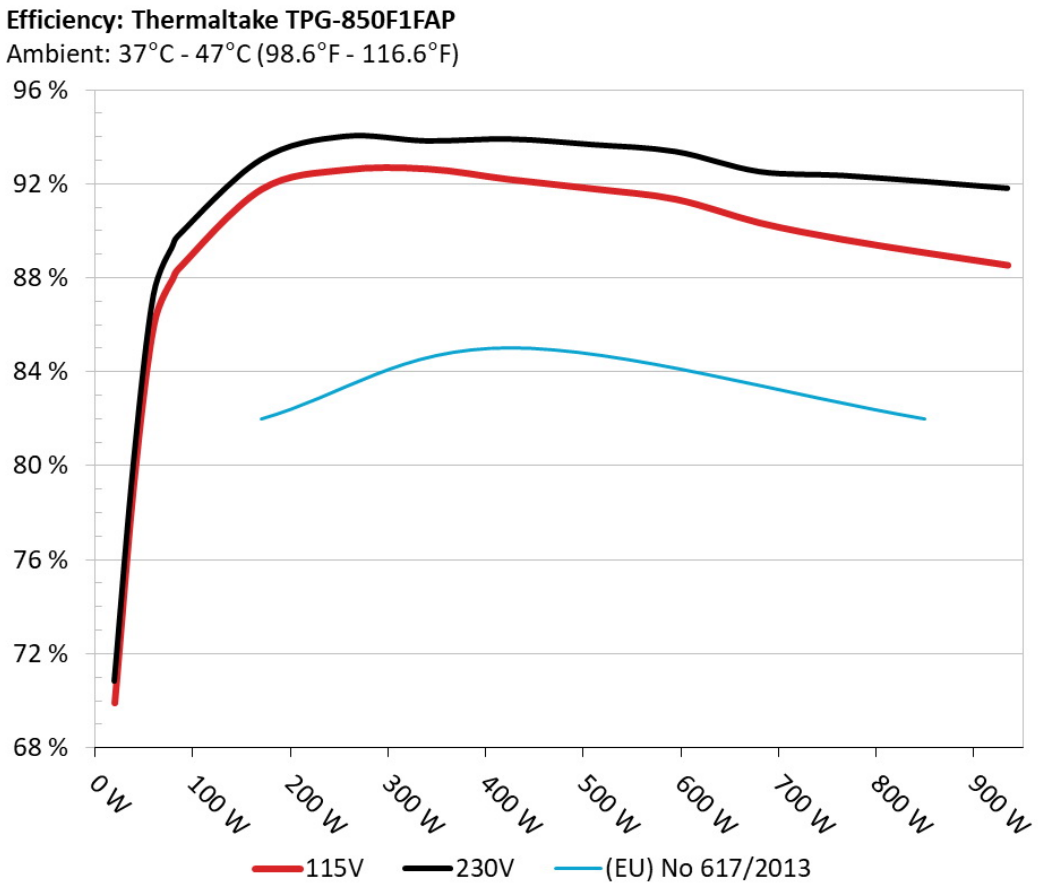


INFO

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.

Indicative Performance

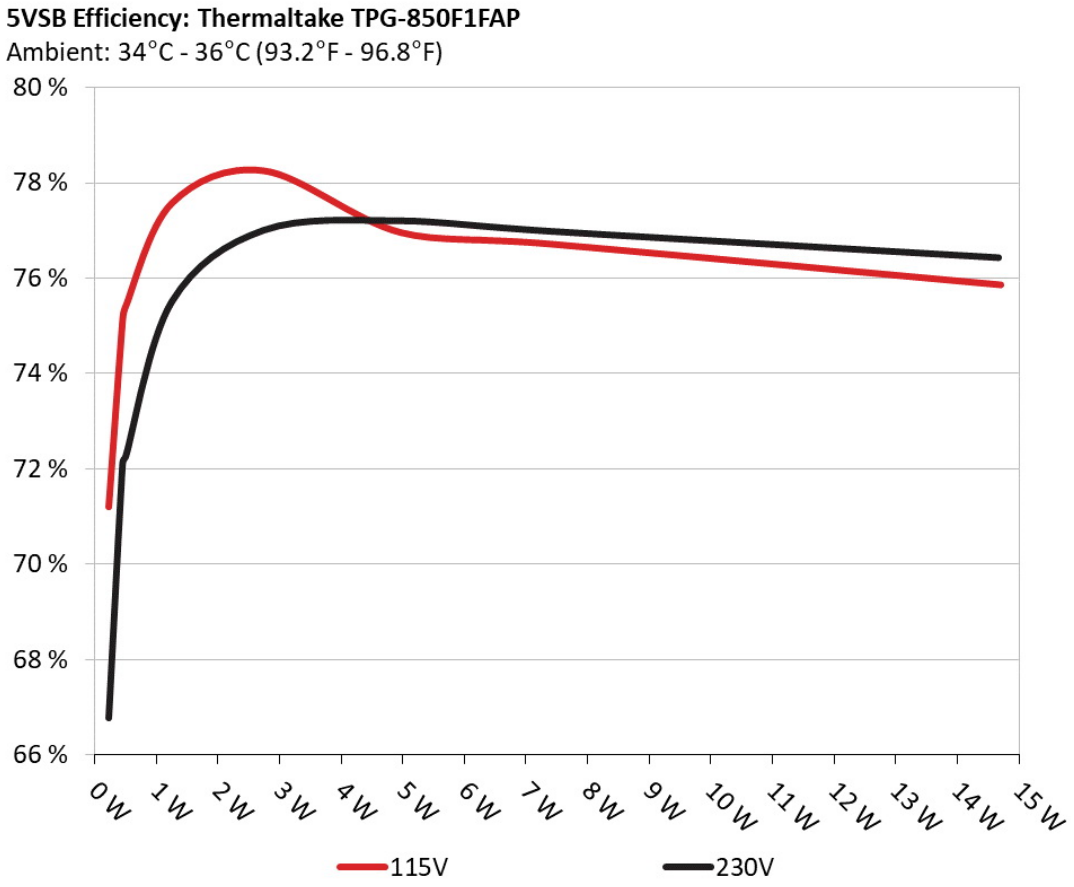
Efficiency under high ambient temperature



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 (ERP LOT 3/6 & CEC)

115V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.225	71.203%	0.026
	5.003V	0.316		115.15V
2	0.090A	0.450	75.125%	0.049
	5.001V	0.599		115.15V
3	0.550A	2.743	78.260%	0.240
	4.987V	3.505		115.15V
4	1.000A	4.974	76.961%	0.351
	4.973V	6.463		115.15V
5	1.500A	7.437	76.718%	0.418
	4.957V	9.694		115.15V
6	2.999A	14.708	75.865%	0.503
	4.905V	19.387		115.14V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.225	66.766%	0.008
	5.004V	0.337		230.21V
2	0.090A	0.450	72.115%	0.015
	5.001V	0.624		230.21V
3	0.550A	2.742	77.001%	0.085
	4.985V	3.561		230.22V
4	1.000A	4.970	77.198%	0.146
	4.970V	6.438		230.23V
5	1.500A	7.429	76.976%	0.205
	4.952V	9.651		230.23V
6	2.999A	14.675	76.424%	0.321
	4.894V	19.202		230.24V

Supplementary Tests (For Reference)

Typical 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	5.250A	1.974A	2.001A	0.991A	84.958	88.370%	0	<6.0	45.88°C	0.825
	12.068V	5.065V	3.298V	5.049V	96.139				40.70°C	115.16V
2	11.533A	2.965A	3.005A	1.190A	170.036	91.759%	0	<6.0	46.63°C	0.991
	12.064V	5.059V	3.295V	5.042V	185.307				40.78°C	115.15V
3	18.163A	3.462A	3.508A	1.391A	255.044	92.588%	0	<6.0	47.58°C	0.995
	12.057V	5.055V	3.292V	5.035V	275.462				41.19°C	115.15V
4	24.803A	3.960A	4.013A	1.592A	340.054	92.634%	0	<6.0	48.83°C	0.997
	12.049V	5.051V	3.289V	5.027V	367.093				41.91°C	115.14V
5	31.079A	4.956A	5.024A	1.794A	424.994	92.180%	1156	33.9	42.40°C	0.997
	12.049V	5.046V	3.286V	5.020V	461.046				49.89°C	115.15V
6	37.331A	5.954A	6.033A	1.996A	509.546	91.790%	1160	34.0	42.57°C	0.997
	12.047V	5.041V	3.283V	5.009V	555.121				50.72°C	115.18V
7	43.670A	6.952A	7.044A	2.199A	594.869	91.338%	1223	35.0	43.16°C	0.997
	12.039V	5.037V	3.280V	5.004V	651.283				51.86°C	115.14V
8	50.058A	7.953A	8.057A	2.403A	680.219	90.340%	1385	38.8	43.79°C	0.998
	12.022V	5.032V	3.277V	4.994V	752.954				53.51°C	115.15V
9	56.834A	8.456A	8.552A	2.407A	765.144	89.634%	1387	38.8	44.42°C	0.998
	12.011V	5.027V	3.274V	4.987V	853.630				54.56°C	115.17V
10	63.328A	8.961A	9.080A	3.023A	849.959	89.066%	1387	38.8	45.97°C	0.998
	12.005V	5.022V	3.271V	4.963V	954.304				56.74°C	115.17V
11	70.413A	8.968A	9.088A	3.081A	934.744	88.537%	1388	38.8	46.56°C	0.998
	12.001V	5.019V	3.268V	4.871V	1055.769				58.09°C	115.15V
CL1	0.117A	12.001A	12.000A	0.000A	101.545	83.771%	1362	34.0	42.58°C	0.841
	12.057V	5.050V	3.294V	5.082V	121.218				49.91°C	115.17V

CL2	70.849A	1.001A	0.999A	1.000A	865.150	89.674%	1385	38.8	46.21°C	0.998
	12.023V	5.033V	3.278V	5.019V	964.771				56.44°C	115.17V

The results above are not used in the certification process

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	5.251A	1.976A	2.001A	0.990A	84.956	89.761%	0	<6.0	45.97°C	0.680
	12.064V	5.064V	3.299V	5.051V	94.647				40.12°C	230.32V
2	11.537A	2.966A	3.002A	1.190A	170.024	93.019%	0	<6.0	46.87°C	0.889
	12.059V	5.058V	3.296V	5.044V	182.784				40.67°C	230.31V
3	18.169A	3.464A	3.506A	1.390A	255.029	94.009%	0	<6.0	47.55°C	0.928
	12.052V	5.054V	3.294V	5.037V	271.282				40.97°C	230.32V
4	24.788A	3.962A	4.013A	1.591A	340.037	93.817%	1369	38.6	42.01°C	0.950
	12.055V	5.049V	3.292V	5.030V	362.447				49.14°C	230.31V
5	31.068A	4.958A	5.019A	1.792A	424.917	93.895%	1159	34.0	42.35°C	0.964
	12.051V	5.044V	3.289V	5.023V	452.546				50.11°C	230.30V
6	37.336A	5.957A	6.028A	1.994A	509.458	93.660%	1159	34.0	42.58°C	0.970
	12.043V	5.038V	3.286V	5.016V	543.946				51.25°C	230.28V
7	43.670A	6.958A	7.036A	2.196A	594.777	93.363%	1229	35.1	43.42°C	0.976
	12.037V	5.033V	3.283V	5.010V	637.059				52.52°C	230.28V
8	50.062A	7.963A	8.047A	2.399A	680.129	92.512%	1383	38.7	44.03°C	0.981
	12.019V	5.028V	3.280V	5.003V	735.178				53.88°C	230.33V
9	56.811A	8.462A	8.542A	2.401A	765.038	92.346%	1383	38.7	44.23°C	0.988
	12.014V	5.023V	3.278V	5.000V	828.449				54.33°C	230.35V
10	63.325A	8.971A	9.068A	3.012A	849.865	92.088%	1390	38.9	45.86°C	0.988
	12.004V	5.017V	3.275V	4.982V	922.883				56.84°C	230.28V
11	70.437A	8.978A	9.078A	3.015A	934.675	91.805%	1391	39.0	46.69°C	0.989
	11.996V	5.013V	3.272V	4.976V	1018.113				58.57°C	230.31V
CL1	0.118A	12.000A	11.998A	0.000A	101.580	85.092%	1364	38.5	42.26°C	0.711
	12.054V	5.046V	3.301V	5.081V	119.376				50.60°C	230.33V

CL2	70.837A	0.999A	1.001A	1.000A	864.784	92.664%	1389	38.9	45.81°C	0.989
	12.020V	5.032V	3.276V	5.017V	933.245				56.34°C	230.28V

The results above are not used in the certification process

Light Load Tests

115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.228A	0.493A	0.500A	0.197A	19.990	69.920%	0	<6.0	0.710
	12.086V	5.070V	3.302V	5.068V	28.590				115.16V
2	2.455A	0.987A	1.001A	0.395A	39.979	79.404%	0	<6.0	0.779
	12.086V	5.069V	3.301V	5.064V	50.349				115.16V
3	3.692A	1.480A	1.498A	0.593A	60.009	86.002%	0	<6.0	0.805
	12.071V	5.067V	3.300V	5.059V	69.776				115.16V
4	4.918A	1.973A	2.001A	0.792A	79.958	88.011%	0	<6.0	0.823
	12.070V	5.065V	3.299V	5.054V	90.850				115.16V

The results above are not used in the certification process

230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.228A	0.493A	0.501A	0.197A	19.987	70.836%	0	<6.0	0.416
	12.080V	5.070V	3.302V	5.068V	28.216				230.32V
2	2.457A	0.986A	0.999A	0.395A	39.976	80.260%	0	<6.0	0.554
	12.080V	5.068V	3.301V	5.064V	49.808				230.32V
3	3.693A	1.481A	1.500A	0.593A	60.006	87.250%	0	<6.0	0.624
	12.064V	5.066V	3.300V	5.059V	68.775				230.32V
4	4.920A	1.975A	2.000A	0.791A	79.955	89.376%	0	<6.0	0.670
	12.064V	5.064V	3.300V	5.055V	89.459				230.31V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.40mV	5.00mV	10.10mV	3.90mV	Pass
20% Load	8.50mV	5.10mV	10.10mV	4.60mV	Pass
30% Load	9.80mV	5.20mV	9.80mV	4.90mV	Pass
40% Load	11.40mV	6.10mV	10.50mV	5.20mV	Pass
50% Load	14.60mV	6.00mV	10.60mV	5.90mV	Pass
60% Load	15.40mV	6.20mV	11.00mV	6.00mV	Pass
70% Load	17.50mV	6.90mV	11.30mV	6.70mV	Pass
80% Load	16.70mV	6.50mV	16.60mV	7.20mV	Pass
90% Load	18.10mV	7.10mV	18.00mV	7.70mV	Pass
100% Load	24.90mV	8.00mV	17.30mV	8.90mV	Pass
110% Load	26.40mV	8.90mV	16.70mV	9.80mV	Pass
Crossload1	10.70mV	5.60mV	16.60mV	4.60mV	Pass
Crossload2	24.80mV	7.90mV	12.80mV	8.50mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.90mV	5.40mV	11.10mV	4.10mV	Pass
20% Load	8.20mV	5.20mV	10.90mV	4.40mV	Pass
30% Load	11.70mV	5.50mV	11.40mV	4.80mV	Pass
40% Load	12.00mV	5.80mV	11.50mV	5.40mV	Pass
50% Load	14.10mV	6.10mV	12.10mV	5.80mV	Pass
60% Load	17.30mV	6.20mV	12.70mV	6.30mV	Pass
70% Load	17.60mV	6.80mV	12.80mV	6.80mV	Pass
80% Load	17.00mV	6.80mV	18.20mV	7.20mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	18.60mV	7.50mV	17.90mV	7.80mV	Pass
100% Load	26.90mV	8.50mV	18.30mV	8.90mV	Pass
110% Load	27.80mV	9.20mV	17.30mV	9.50mV	Pass
Crossload1	11.10mV	5.90mV	17.90mV	5.10mV	Pass
Crossload2	25.60mV	8.20mV	12.70mV	9.00mV	Pass

The results above are not used in the certification process

Thermaltake Toughpower Grand RGB 850W Platinum (#2)



Top side



Power specifications label

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