Thermaltake Toughpower Grand Gold 850W

Serial Number PSTPG0850FPCGUSSLA000243

Lab ID 478

Certification ID 25478

Test Result Report ID:

Certificate Issue Date: Sep 22, 2018

Scheme: ETA-EMI PSU

115V



230V



115V



230V



Scheme: LAMBDA PSU



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 Gold 850W
OEM/ODM	Sirfa
Serial Number	PSTPG0850FPCGUSSLA000243
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
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	478
Date of receipt	Sep 11, 2018
Testing Date	Sep 19, 2018
Report Issued Date	Sep 22, 2018
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	18AWG	No
4+4 pin EPS12V (650mm+155mm)	1	2	16-18AWG	No
6+2 pin PCIe (500mm+155mm)	3	6	16-18AWG	No
SATA (500mm+155mm+155mm+155mm)	3	12	18AWG	No
4-pin Molex (500mm+155mm+155mm+155mm)	1	4	18AWG	No
RGB Cable (580mm+80mm)	1	1	26AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	16AWG	-

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				

Parts Description

General Data	
Manufacturer (OEM)	Sirfa / High Power
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV, 1x Champion CMD02X
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	2x GBU1506L (600V, 15A @ 100°C)
APFC MOSFETS	2x Infineon IPA50R140CP (550V, 15A @ 100°C, 0.14Ohm)
APFC Boost Diode	1x UnitedSiC UJD06508TS (650V, 8A @ 152°C)
Hold-up Cap(s)	1x Rubycon (400V, 680uF, 2000h @ 105 °C, MXH)
Main Switchers	2x Infineon IPA50R140CP (550V, 15A @ 100°C, 0.14Ohm)
APFC Controller	Infineon ICE3PCS01G
LLC Resonant Controller	Champion CM6901X
Primary MCU	STC 15W408AS
Topology	Primary side: Half-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	6x Infineon BSC027N04LS G (40V, 88A @ 100°C, 2.7mOhm)
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0906NS (30V, 40A @ 100°C, 4.5mOhm) PWM Controller: APW7159C
Filtering Capacitors	Electrolytics: Nippon Chemi-Con (1-5,000 @ 105°C, KZE), Nippon Chemi-Con (4-10,000 @ 105°C, KY), 1x Rubycon (4-10,000 @ 105°C, ZLH) Polymers: Nippon Chemi-Con, FPCAP
Supervisor IC	SITI PS224 (OVP, UVP, OCP,SCP, PG)
Serial EEPROM	ATMEL AT24C02N
Fan Model	Thermaltake TT-1425 (Hong Sheng OEM, A1425L12S, 140mm, 12V, 0.30A, 1560 RPM, Hydro Dynamic Bearing)

5VSB Circuit	
Rectifiers	1x PCF P10V45 SBR (45V, 10A) 2x Infineon BSC0906NS (30V, 40A @ 100°C, 4.5mOhm)
Standby PWM Controller	Sanken STR-A6069H
-12V Circuit	
Rectifier	KEC KIA7912PI

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)	88.962%
Average Noise Output (>1450 Load Combinations)	29.45dBA
Average PF (>1450 Load Combinations)	0.991
Efficiency With 10W (≤500W) or 2% (>500W) Load	58.956%
Standby Power Consumption	0.0904W
Non-Accredited	
12V Ripple (Full Load)	21.15mV
5V Ripple (Full Load)	20.26mV
3.3V Ripple (Full Load)	19.84mV
5VSB Ripple (Full Load)	10.49mV
12V Load Regulation	1.33%
5V Load Regulation	2.35%
3.3V Load Regulation	3.88%

5VSB Load Regulation	5.11%
Inrush Current	33.520A

230V

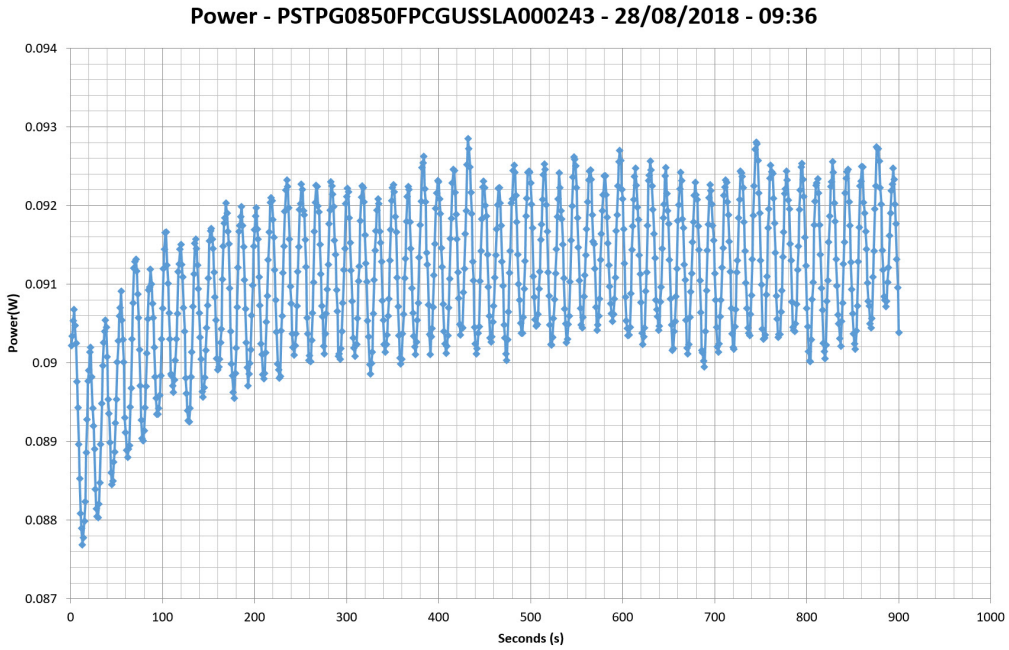
Accredited		
Average Efficiency (>1450 load combinations)	90.687%	
Average Noise Output (>1450 Load Combinations)	29.38dBA	
Average PF (>1450 Load Combinations)	0.956	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1759W	
Non-Accredited		
12V Ripple (Full Load)	20.00mV	
5V Ripple (Full Load)	20.72mV	
3.3V Ripple (Full Load)	19.47mV	
5VSB Ripple (Full Load)	11.05mV	
12V Load Regulation	1.20%	
5V Load Regulation	2.31%	
3.3V Load Regulation	3.82%	
5VSB Load Regulation	5.07%	
Inrush Current	66.480A	
Hold-Up Time & PWR_OK Signal	16.00ms	
AC Loss to PWR_OK Hold Up Time	13.90ms	
PWR_OK Inactive to DC Loss Delay	2.10ms	
OPP (0.00°C / 0.00°C)	-	-

Hold-Up Time & PWR_OK Signal

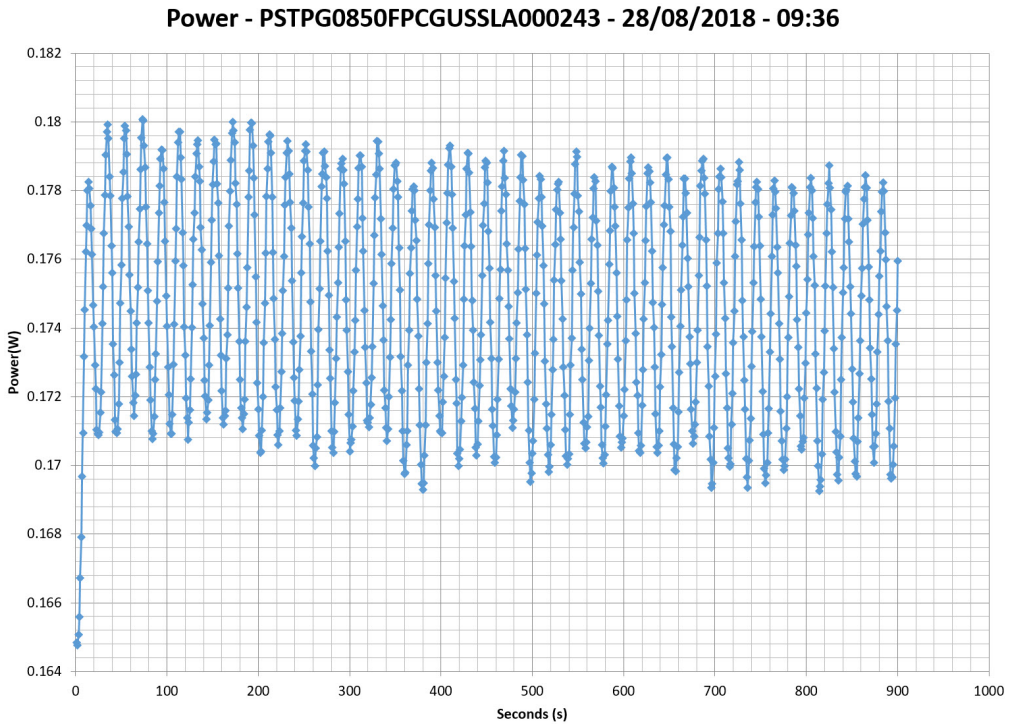
Hold-Up Time (ms)	16
AC Loss to PWR_OK Hold Up Time (ms)	13.9
PWR_OK Inactive to DC Loss Delay (ms)	2.1

Graphs

115V

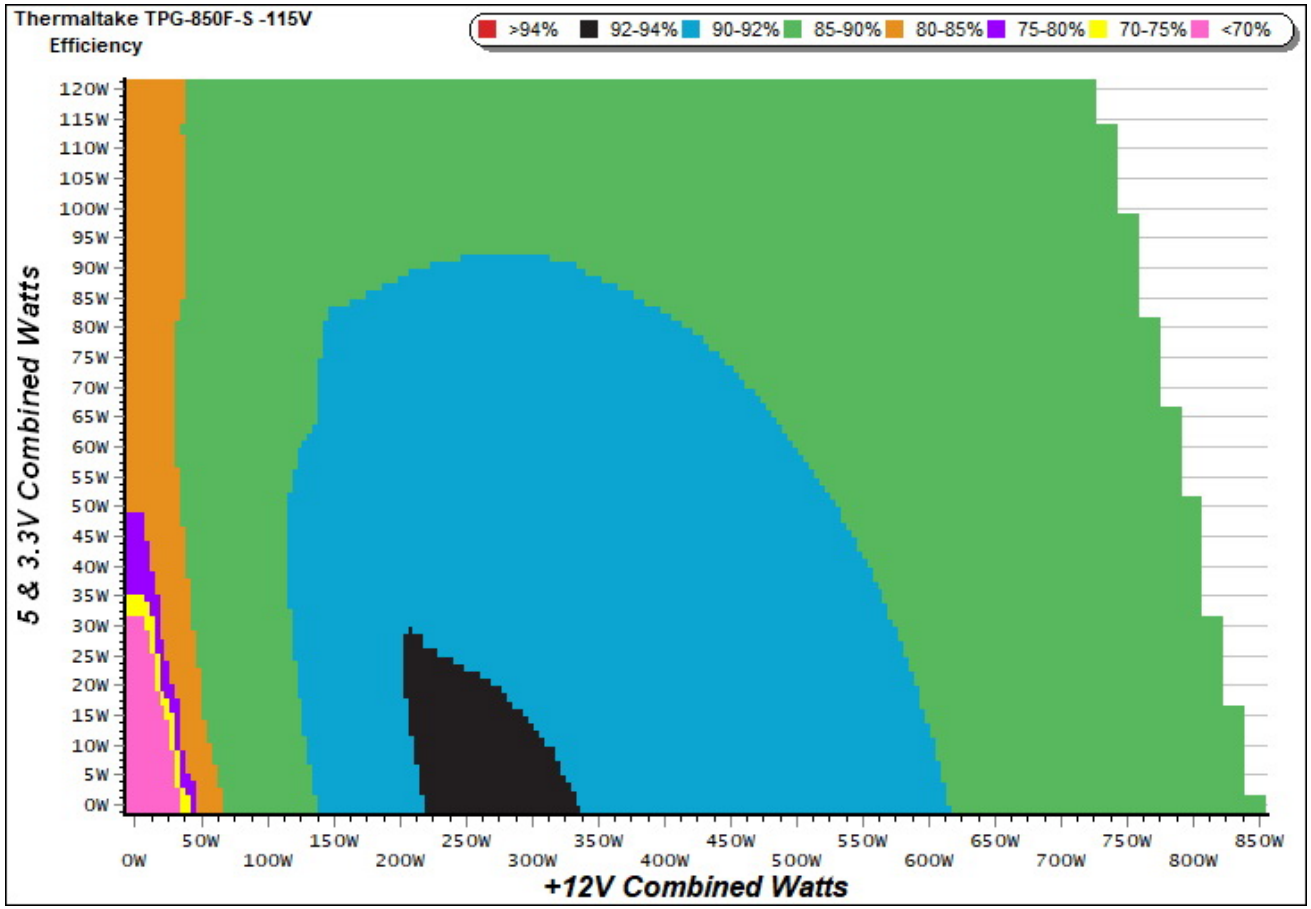


230V



Efficiency Graph

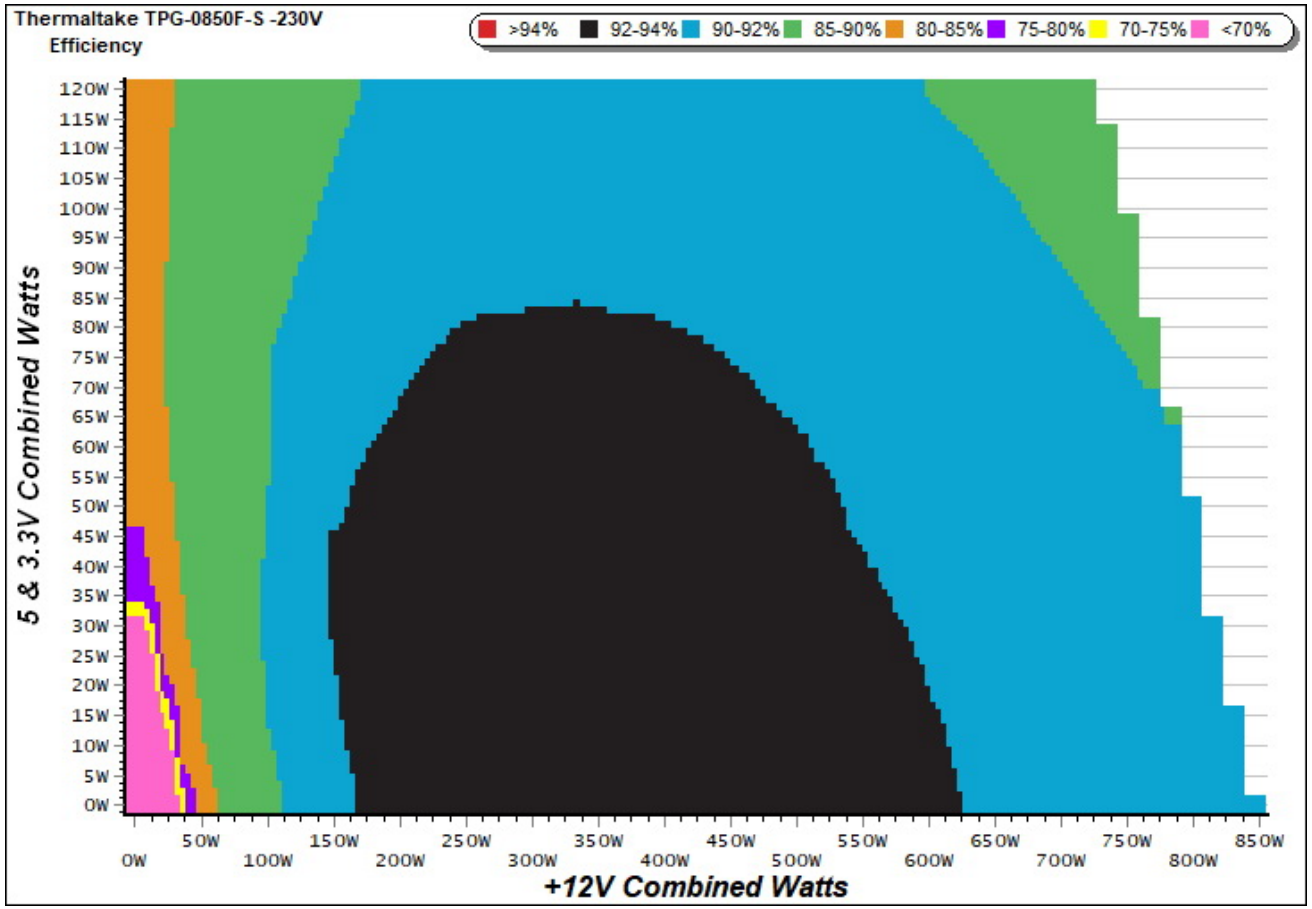
115V



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

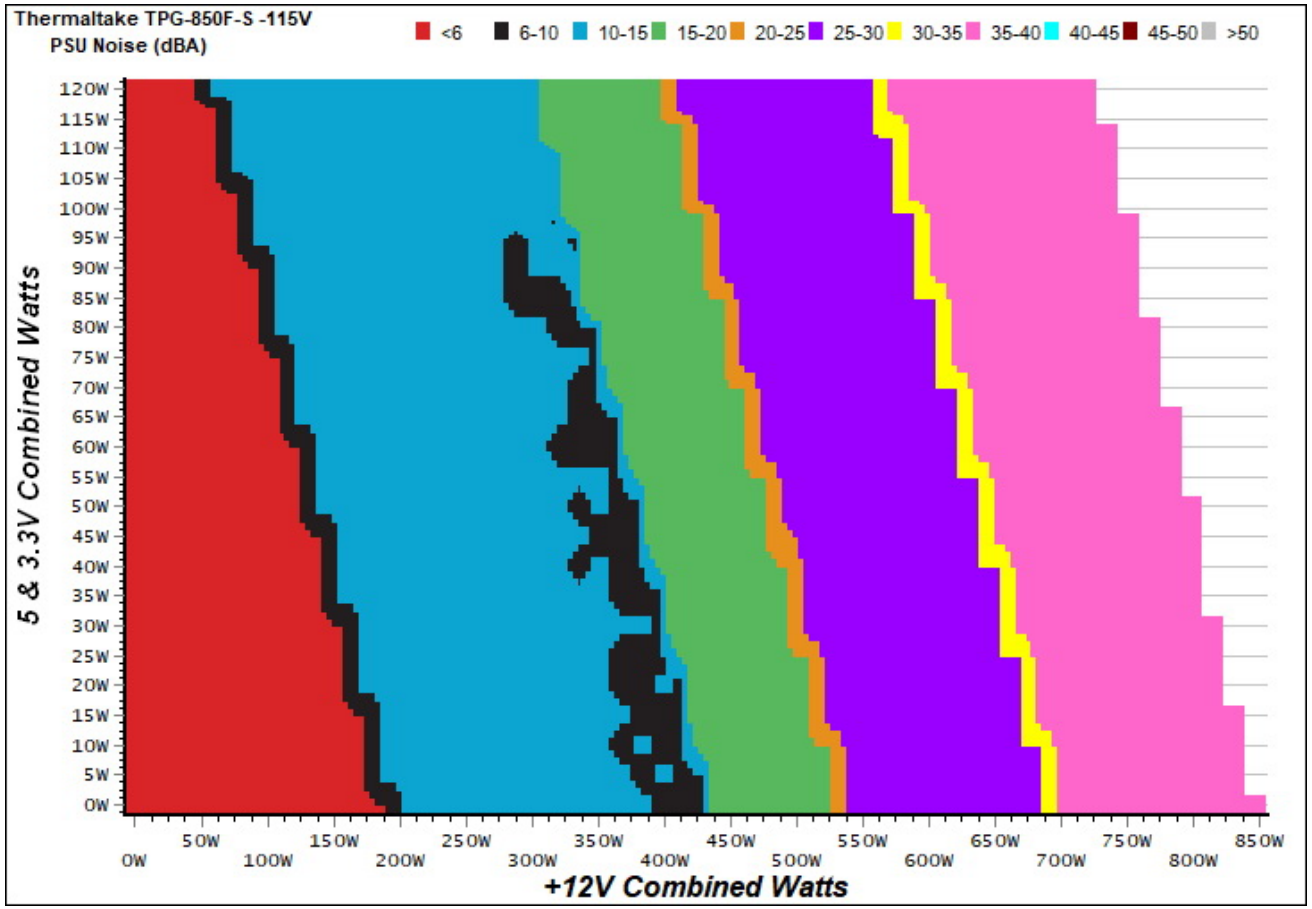


INFO

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

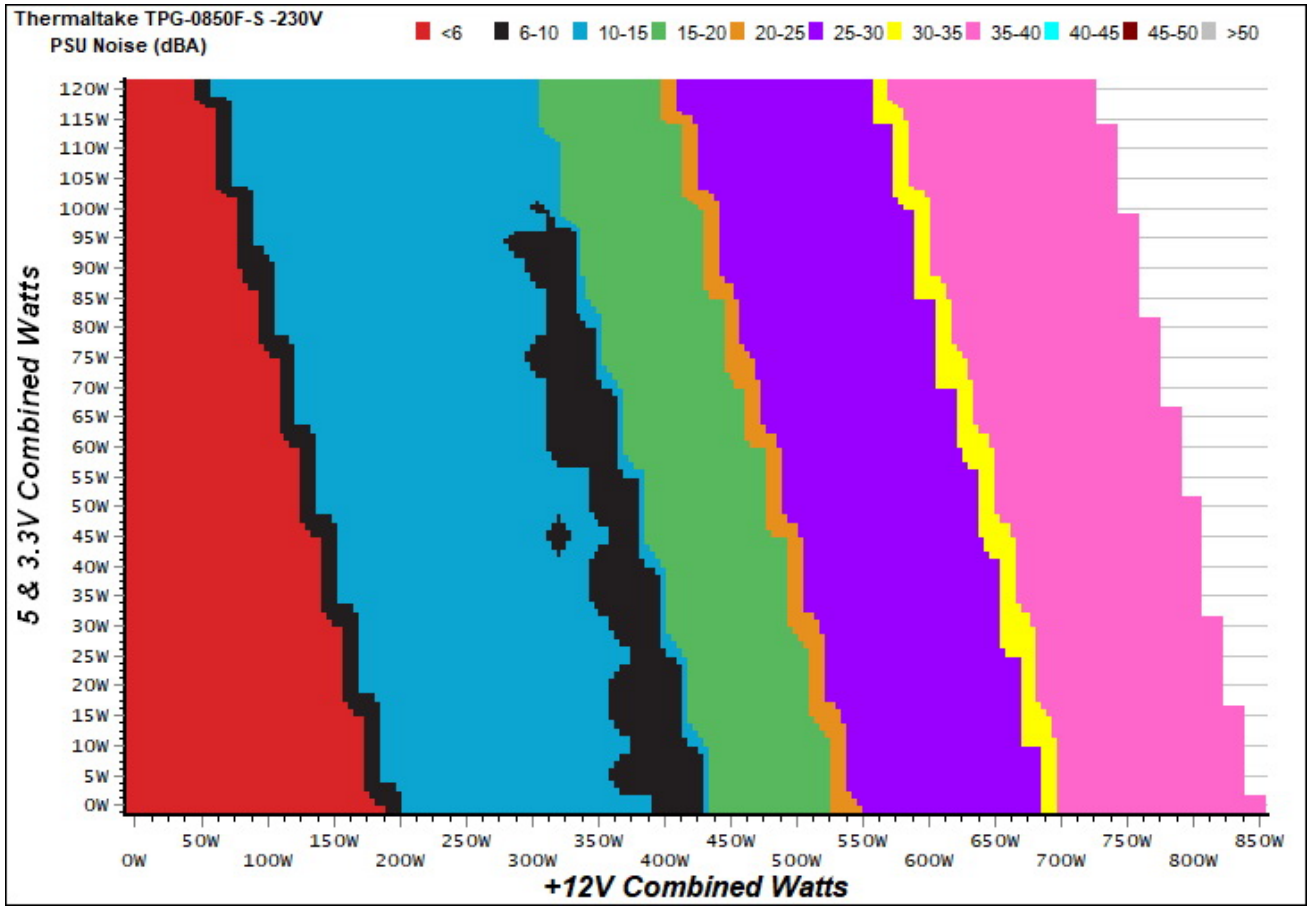
115V



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

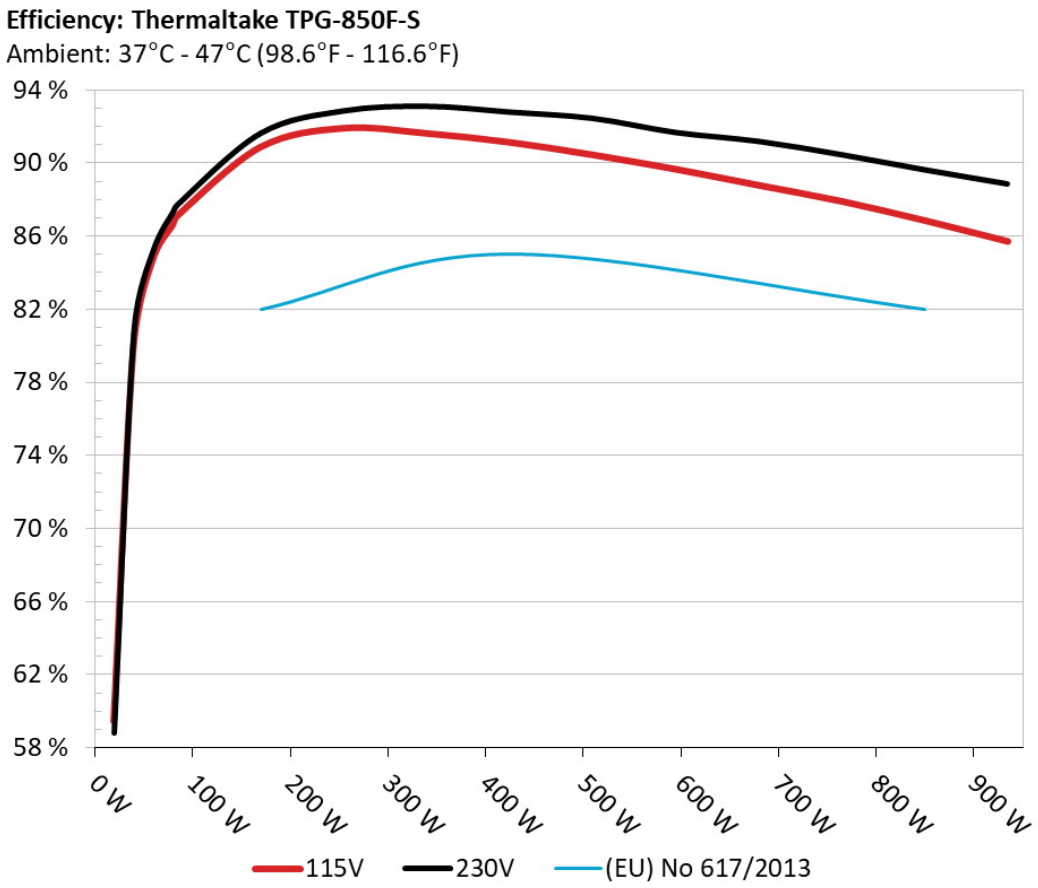


INFO

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

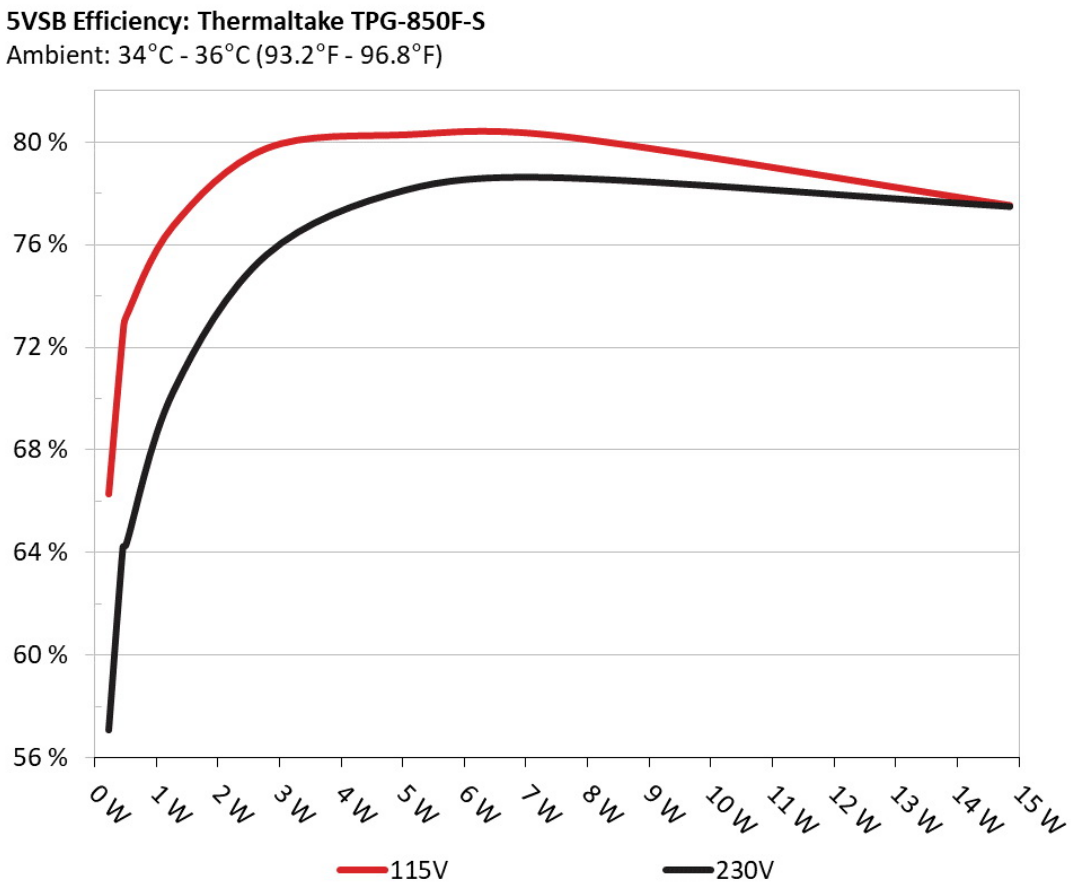
Efficiency under high ambient temperature



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	0.046A	0.230	66.282%	0.199
	5.023V	0.347		115.36V
2	0.090A	0.459	72.512%	0.048
	5.091V	0.633		115.37V
3	0.550A	2.789	79.731%	0.211
	5.069V	3.498		115.37V
4	1.000A	5.050	80.261%	0.290
	5.049V	6.292		115.37V
5	1.500A	7.540	80.213%	0.335
	5.026V	9.400		115.36V
6	3.000A	14.852	77.516%	0.395
	4.950V	19.160		115.35V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	57.072%	0.011
	5.094V	0.403		230.93V
2	0.090A	0.459	64.196%	0.019
	5.091V	0.715		230.93V
3	0.550A	2.788	75.576%	0.095
	5.068V	3.689		230.92V
4	1.000A	5.048	78.106%	0.155
	5.048V	6.463		230.92V
5	1.500A	7.538	78.586%	0.207
	5.024V	9.592		230.92V
6	3.000A	14.861	77.466%	0.300
	4.953V	19.184		230.91V

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	5.230A	1.982A	1.960A	1.000A	84.927	87.123%	415	6.9	40.31°C	0.934
	12.108V	5.048V	3.367V	4.999V	97.479				47.67°C	115.05V
2	11.464A	2.980A	2.953A	1.205A	169.458	90.859%	542	8.9	40.71°C	0.982
	12.086V	5.035V	3.353V	4.979V	186.507				48.67°C	115.05V
3	18.099A	3.485A	3.441A	1.412A	254.535	91.901%	565	9.4	41.37°C	0.995
	12.074V	5.024V	3.341V	4.959V	276.967				49.72°C	115.04V
4	24.756A	3.992A	3.965A	1.620A	339.719	91.622%	565	9.4	41.72°C	0.994
	12.058V	5.013V	3.329V	4.938V	370.785				50.74°C	115.04V
5	31.096A	5.002A	4.977A	1.830A	425.035	91.130%	562	9.3	42.48°C	0.996
	12.044V	5.001V	3.315V	4.918V	466.405				52.39°C	115.04V
6	37.388A	6.017A	5.999A	2.043A	509.561	90.449%	805	19.0	43.06°C	0.996
	12.029V	4.988V	3.301V	4.897V	563.367				53.39°C	115.04V
7	43.758A	7.038A	7.029A	2.257A	594.877	89.659%	990	26.0	43.66°C	0.997
	12.015V	4.975V	3.287V	4.876V	663.488				54.34°C	115.03V
8	50.150A	8.063A	8.069A	2.473A	680.214	88.776%	1105	29.8	44.23°C	0.997
	12.000V	4.962V	3.272V	4.854V	766.212				55.73°C	115.03V
9	56.956A	8.588A	8.590A	2.478A	765.134	87.901%	1380	35.8	44.94°C	0.998
	11.985V	4.950V	3.260V	4.844V	870.453				57.10°C	115.03V
10	63.512A	9.114A	9.149A	3.130A	849.960	86.850%	1385	35.9	45.81°C	0.998
	11.970V	4.939V	3.246V	4.795V	978.652				58.65°C	115.03V
11	70.676A	9.131A	9.181A	3.138A	934.721	85.710%	1390	35.9	46.88°C	0.984
	11.956V	4.929V	3.236V	4.781V	1090.561				60.10°C	115.09V
CL1	0.146A	14.005A	14.001A	0.000A	118.289	81.716%	678	13.2	42.46°C	0.964
	12.101V	5.007V	3.314V	5.067V	144.757				52.27°C	115.05V

CL2	70.842A	1.001A	1.001A	1.000A	861.155	87.409%	1388	35.9	45.68°C	0.998
	11.970V	4.970V	3.284V	4.915V	985.197				58.33°C	115.03V

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	5.230A	1.981A	1.961A	1.000A	84.933	87.713%	147	5.0	39.67°C	0.847
	12.109V	5.048V	3.367V	5.000V	96.831				46.55°C	230.02V
2	11.465A	2.980A	2.952A	1.205A	169.470	91.597%	520	8.3	40.21°C	0.891
	12.086V	5.035V	3.353V	4.980V	185.017				47.73°C	230.20V
3	18.100A	3.484A	3.443A	1.412A	254.549	92.823%	565	9.4	40.83°C	0.920
	12.074V	5.024V	3.341V	4.960V	274.231				48.81°C	230.20V
4	24.758A	3.991A	3.964A	1.620A	339.737	93.073%	562	9.3	41.22°C	0.964
	12.058V	5.013V	3.329V	4.939V	365.022				49.48°C	230.19V
5	31.100A	5.002A	4.977A	1.830A	425.050	92.759%	558	9.3	41.81°C	0.978
	12.043V	5.001V	3.315V	4.918V	458.228				50.43°C	230.19V
6	37.390A	6.016A	5.998A	2.043A	509.576	92.417%	805	19.0	42.29°C	0.986
	12.029V	4.988V	3.301V	4.897V	551.389				51.50°C	230.02V
7	43.763A	7.038A	7.029A	2.257A	594.893	91.643%	990	26.0	43.05°C	0.989
	12.014V	4.975V	3.287V	4.876V	649.145				52.74°C	230.18V
8	50.145A	8.062A	8.069A	2.472A	680.097	91.155%	1105	29.8	43.63°C	0.992
	11.999V	4.962V	3.272V	4.855V	746.087				53.93°C	230.02V
9	56.956A	8.589A	8.590A	2.478A	765.092	90.424%	1385	35.9	44.13°C	0.995
	11.984V	4.951V	3.260V	4.844V	846.117				55.26°C	230.02V
10	63.513A	9.115A	9.147A	3.130A	849.966	89.603%	1385	35.9	45.40°C	0.997
	11.970V	4.939V	3.246V	4.794V	948.594				57.22°C	230.18V
11	70.681A	9.133A	9.182A	3.138A	934.727	88.832%	1390	35.9	46.92°C	0.997
	11.955V	4.929V	3.236V	4.782V	1052.239				59.77°C	230.19V
CL1	0.148A	14.004A	14.000A	0.000A	118.305	82.522%	678	13.2	41.84°C	0.867
	12.101V	5.007V	3.314V	5.067V	143.362				50.94°C	230.19V

CL2	70.846A	1.001A	1.002A	1.000A	861.136	90.180%	1392	35.9	45.34°C	0.997
	11.969V	4.970V	3.284V	4.915V	954.909				57.29°C	230.19V

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	1.192A	0.495A	0.474A	0.198A	19.626	59.480%	0	<6.0	0.878
	12.178V	5.062V	3.382V	5.053V	32.996				115.05V
2	2.449A	0.990A	0.979A	0.397A	40.023	80.075%	0	<6.0	0.876
	12.131V	5.058V	3.377V	5.039V	49.982				115.05V
3	3.641A	1.484A	1.454A	0.597A	59.514	84.717%	377	6.8	0.921
	12.115V	5.053V	3.373V	5.026V	70.250				115.05V
4	4.899A	1.983A	1.961A	0.798A	79.938	86.625%	388	6.8	0.926
	12.109V	5.049V	3.368V	5.012V	92.280				115.05V

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	1.193A	0.494A	0.472A	0.198A	19.622	58.798%	0	<6.0	0.634
	12.175V	5.062V	3.382V	5.052V	33.372				230.19V
2	2.450A	0.989A	0.977A	0.397A	40.024	80.870%	0	<6.0	0.751
	12.131V	5.058V	3.377V	5.039V	49.492				230.19V
3	3.642A	1.484A	1.452A	0.597A	59.521	85.167%	0	<6.0	0.813
	12.115V	5.054V	3.373V	5.027V	69.887				230.20V
4	4.900A	1.982A	1.958A	0.798A	79.951	87.297%	460	7.4	0.841
	12.111V	5.050V	3.369V	5.013V	91.585				230.02V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	23.0 mV	8.1 mV	7.3 mV	5.0 mV	Pass
20% Load	8.4 mV	8.9 mV	8.4 mV	4.3 mV	Pass
30% Load	10.4 mV	9.1 mV	9.1 mV	4.3 mV	Pass
40% Load	10.7 mV	9.9 mV	10.2 mV	5.0 mV	Pass
50% Load	12.5 mV	14.6 mV	12.7 mV	9.2 mV	Pass
60% Load	13.9 mV	14.1 mV	12.7 mV	6.6 mV	Pass
70% Load	15.5 mV	15.5 mV	13.8 mV	7.2 mV	Pass
80% Load	17.1 mV	17.2 mV	17.1 mV	8.8 mV	Pass
90% Load	18.9 mV	18.4 mV	18.3 mV	8.9 mV	Pass
100% Load	21.2 mV	20.3 mV	19.8 mV	10.5 mV	Pass
110% Load	24.5 mV	22.3 mV	21.2 mV	12.0 mV	Pass
Crossload 1	23.8 mV	12.9 mV	15.5 mV	4.9 mV	Pass
Crossload 2	21.0 mV	16.3 mV	13.0 mV	9.0 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	23.1 mV	8.1 mV	7.0 mV	4.7 mV	Pass
20% Load	8.7 mV	8.5 mV	8.4 mV	4.3 mV	Pass
30% Load	9.7 mV	9.0 mV	9.0 mV	4.3 mV	Pass
40% Load	9.6 mV	9.7 mV	10.1 mV	5.2 mV	Pass
50% Load	11.6 mV	14.7 mV	13.6 mV	9.0 mV	Pass
60% Load	13.0 mV	13.9 mV	12.8 mV	6.5 mV	Pass
70% Load	14.2 mV	15.6 mV	13.9 mV	7.3 mV	Pass
80% Load	15.6 mV	17.1 mV	16.8 mV	8.6 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	18.0 mV	18.2 mV	17.9 mV	8.8 mV	Pass
100% Load	20.0 mV	20.7 mV	19.5 mV	11.1 mV	Pass
110% Load	22.4 mV	22.3 mV	20.9 mV	12.4 mV	Pass
Crossload 1	22.4 mV	13.2 mV	15.9 mV	4.7 mV	Pass
Crossload 2	19.1 mV	16.7 mV	12.8 mV	9.4 mV	Pass

The results above are not used in the certification process

Thermaltake Toughpower Grand Gold 850W



Top side



Power specifications label

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