Thermaltake Toughpower GF1 ARGB 850W

Serial Number PSTPD0850F3FAGU1UE000021

Lab ID TT19850045

Certification ID 25740

Test Result Report ID:

Certificate Issue Date: Jun 25, 2019

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 GF1 ARGB 850W
OEM/ODM	Channel Well Technology
Serial Number	PSTPD0850F3FAGU1UE000021
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12
Rated Frequency (Hz)	47-63

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 HDB RGB Fan (TT-1425/A1425S12S-2)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	TT19850045
Date of receipt	May 20, 2019
Testing Date	May 28, 2019
Report Issued Date	Jun 25, 2019
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
8 pin EPS12V (650mm)	1	1	16AWG	No
4+4 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
ARGB Sync Cable (+800mm)	1	1	26AWG	No

AC Power Cord (1420mm) - C13 coupler	1	1	18AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	22	22	70.9	3	0.3
	Watts	120		850.8	15	3.6
Total Max. Power (W)		850				

Parts Description

General Data	
Manufacturer (OEM)	CWT
PCB Type	Double Sided
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV, 1x Discharge IC
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	1x GBU1506 (600V, 15A @ 100°C)
APFC MOSFETS	2x Infineon IPA60R125P6 (650V, 19A @ 100°C, 0.125Ohm)
APFC Boost Diode	1x Infineon IDH08G65C5 (650V, 8A @ 145°C)
Hold-up Cap(s)	2x Nippon Chemi-Con (400V, 470uF each or 940uF combined, 2000h @ 105°C, KMR)
Main Switchers	2x Toshiba TK25A60X5 (600V, 25A @ 150°C, 0.14Ohm)
APFC Controller	Champion CM6502UHHX & CM03X Green PFC Controller
Resonant Controllers	Champion CM6901X
Topology	Primary side: Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	6x On Semiconductor NTMFS5C430N (40V, 131A @ 100°C, 1.7mOhm)
5V & 3.3V	DC-DC Converters:2x UBIQ QM3006D (30V, 57A @ 100°C, 5.5mOhm) & 2x UBIQ QM3016D (30V, 68A @ 100°C, 4mOhm) PWM Controllers: ANPEC APW7159C
Filtering Capacitors	Electrolytics: 5x Nippon Chemi-Con (4-10,000h @ 105°C, KY),6x Nippon Chemi-Con (1-5,000h @ 105°C, KZE), 1x Nippon Chemi-Con (5-6,000h @ 105°C, KZH), 2x Nichicon (4-10,000h @ 105°C, HE) Polymers: FPCAP
Supervisor IC	Sitronix ST9S429-PG14 (OCP, OVP, UVP, SCP, PG)
Fan Model	Thermaltake TT-1425 (Hong Sheng OEM, A1425S12S-2, 140mm, 12V, 0.70A, Hydrodynamic Bearing, RGB LED Lighting Fan)

5VSB Circuit	
Rectifier	1x UTC 4N65 (650V, 4A @ 25°C, 2.5Ohm)
Standby PWM Controller	On-Bright OB5269

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)	89.228%
Average Noise Output (>1450 Load Combinations)	34.77dBA
Average PF (>1450 Load Combinations)	0.980
Efficiency With 10W (≤500W) or 2% (>500W) Load	70.579%
Standby Power Consumption	0.0483W
Non-Accredited	
12V Ripple (Full Load)	18.27mV
5V Ripple (Full Load)	14.16mV
3.3V Ripple (Full Load)	12.97mV
5VSB Ripple (Full Load)	21.29mV
12V Load Regulation	0.67%
5V Load Regulation	0.87%
3.3V Load Regulation	1.24%
5VSB Load Regulation	2.23%
Inrush Current	34.030A

230V		
Accredited		
Average Efficiency (>1450 load combinations)	90.914%	
Average Noise Output (>1450 Load Combinations)	34.63dBA	
Average PF (>1450 Load Combinations)	0.941	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.0649W	
Non-Accredited		
12V Ripple (Full Load)	18.34mV	
5V Ripple (Full Load)	13.76mV	
3.3V Ripple (Full Load)	13.92mV	
5VSB Ripple (Full Load)	21.82mV	
12V Load Regulation	0.60%	
5V Load Regulation	0.87%	
3.3V Load Regulation	1.21%	
5VSB Load Regulation	2.25%	
Inrush Current	66.850A	
Hold-Up Time & PWR_OK Signal	18.60ms	
AC Loss to PWR_OK Hold Up Time	17.40ms	
PWR_OK Inactive to DC Loss Delay	1.20ms	
OPP (0.00°C / 0.00°C)	-	-

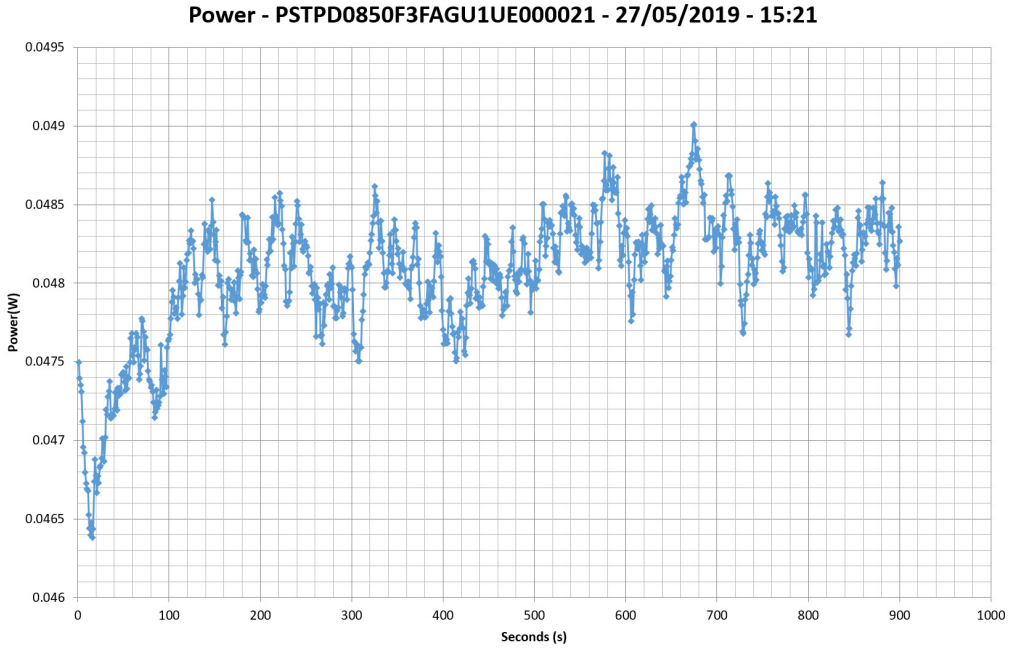
Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	18.6
AC Loss to PWR_OK Hold Up Time (ms)	17.4
PWR_OK Inactive to DC Loss Delay (ms)	1.2

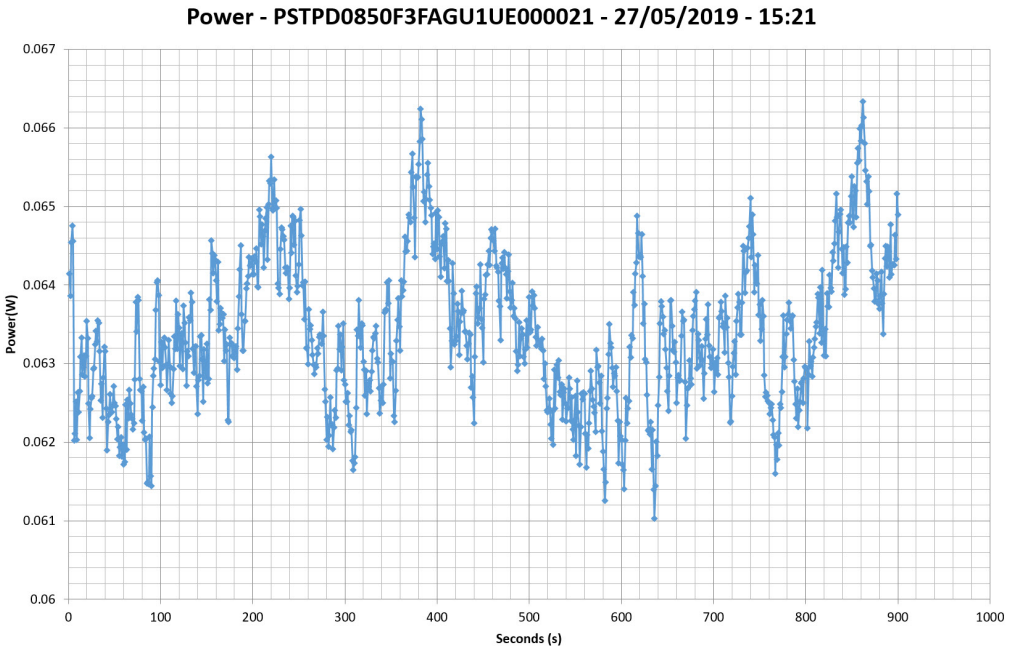
Stromverbrauch im Ruhezustand

Graphs

115V

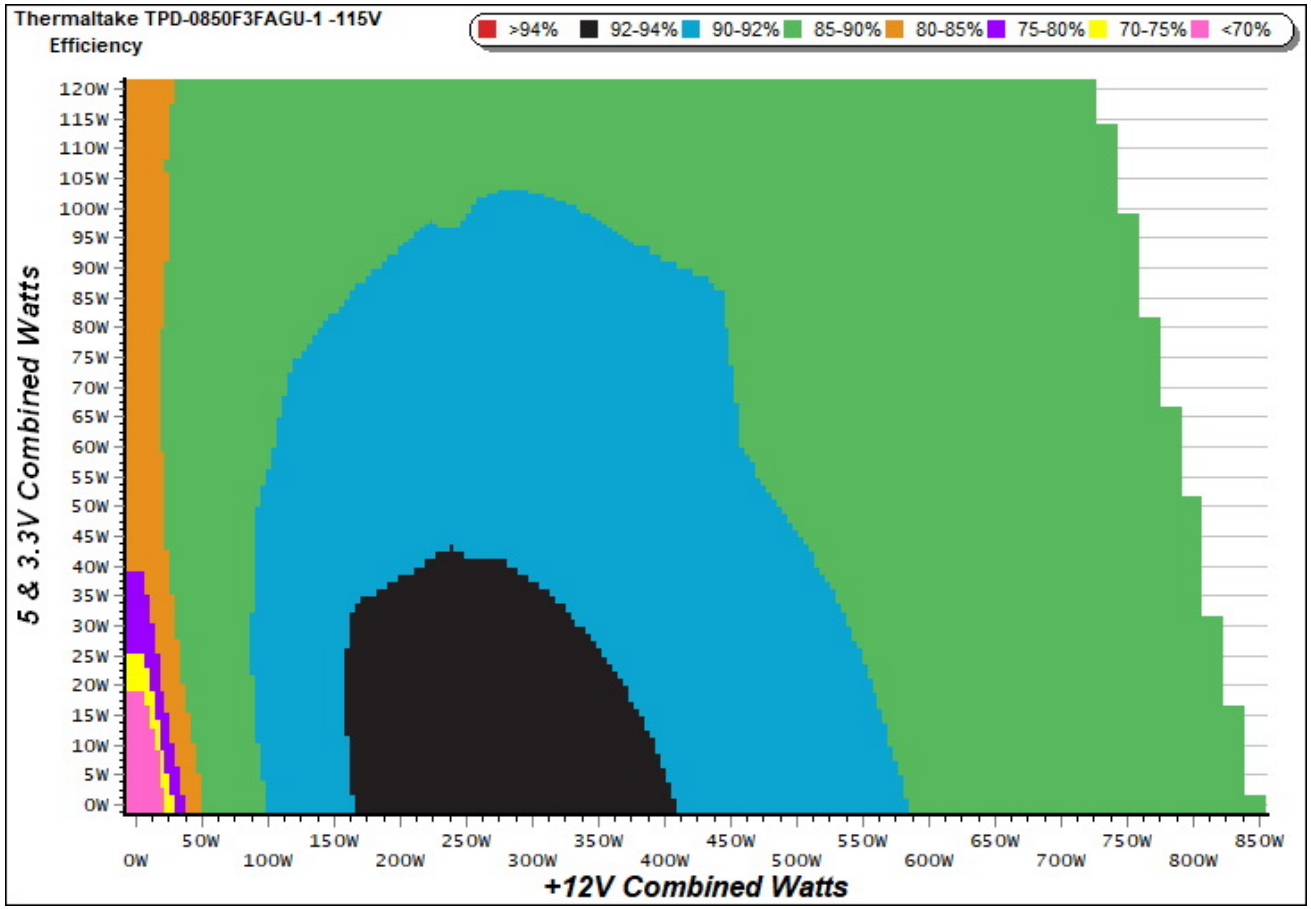


230V



Efficiency Graph

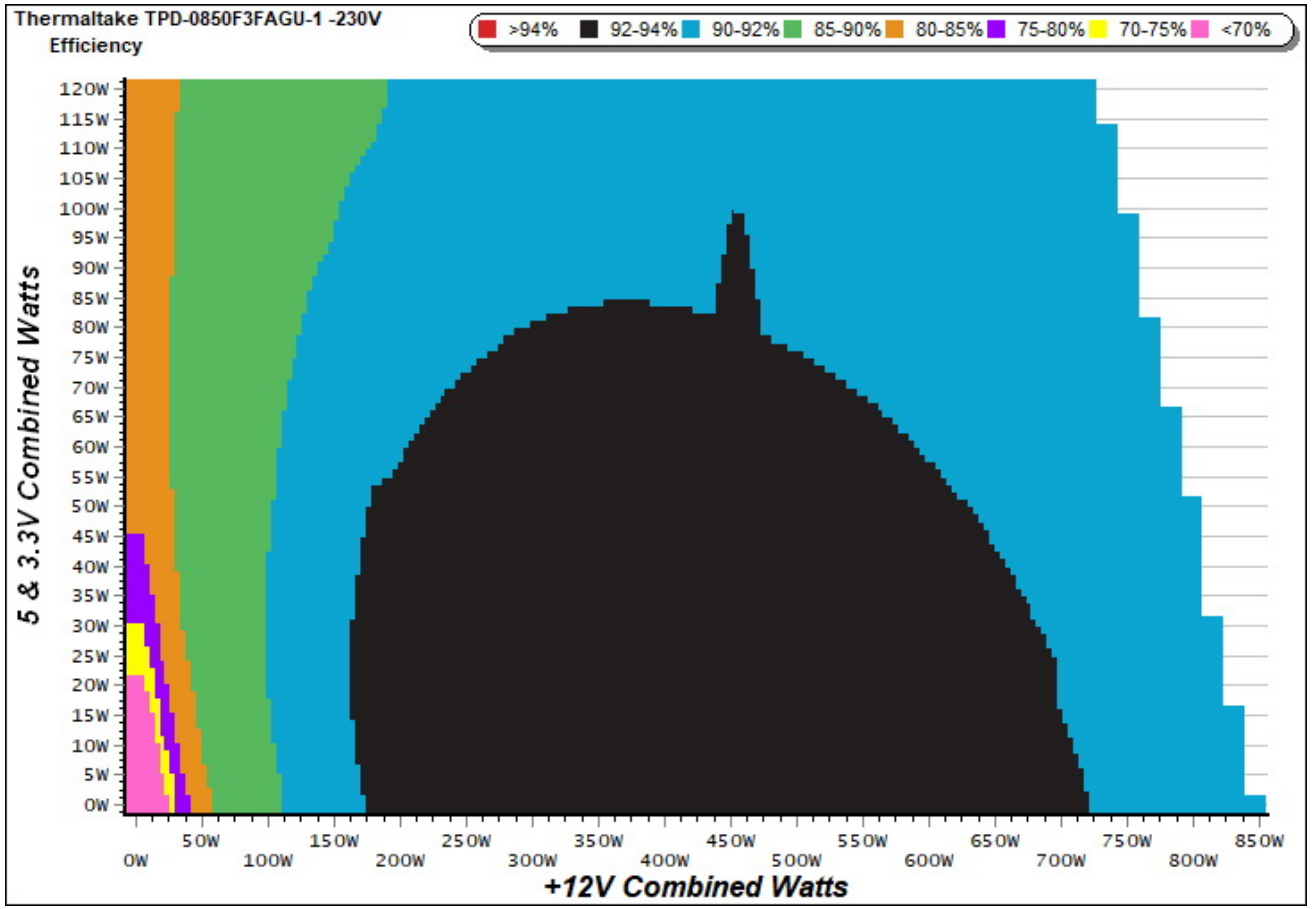
115V



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

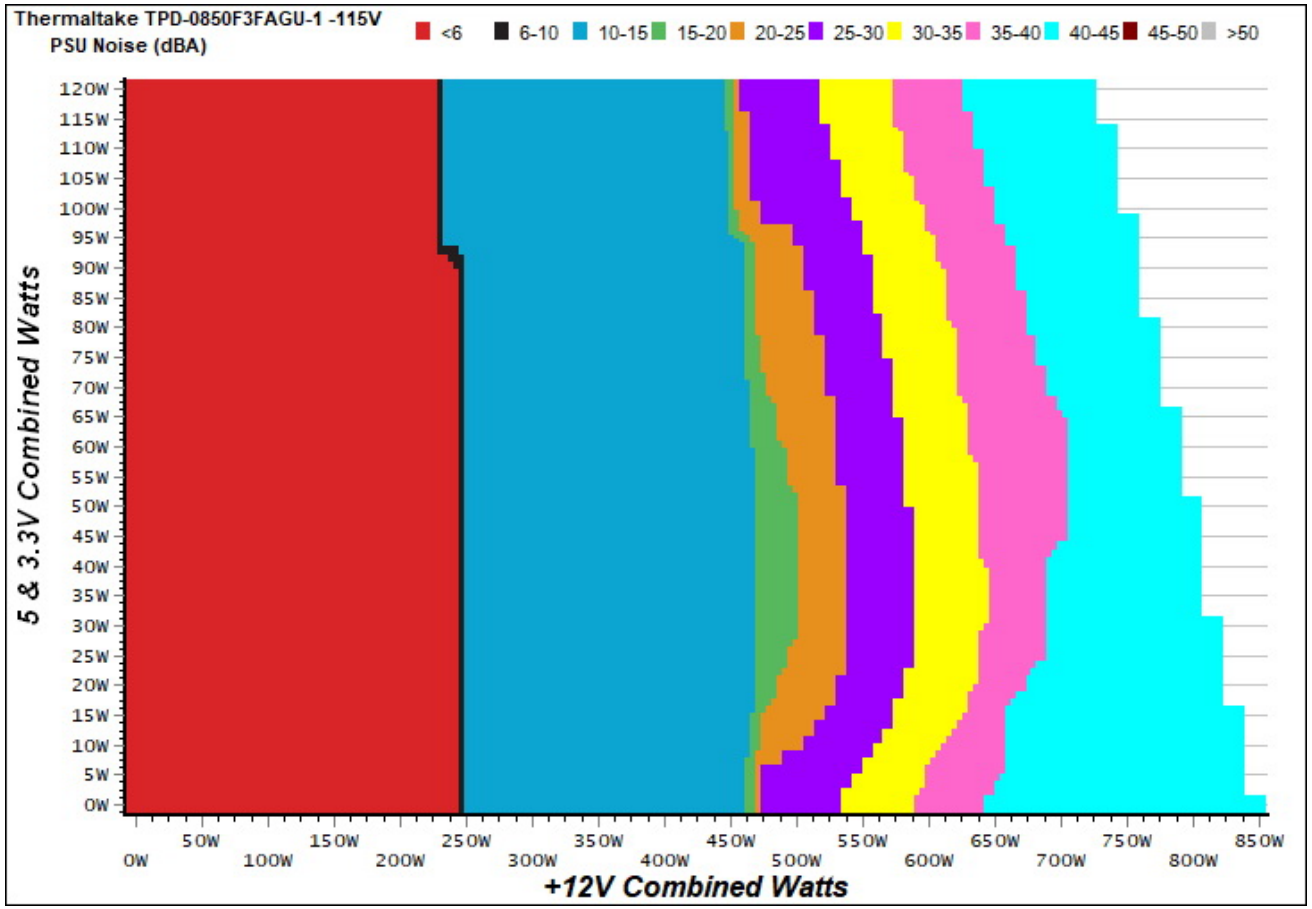


INFO

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

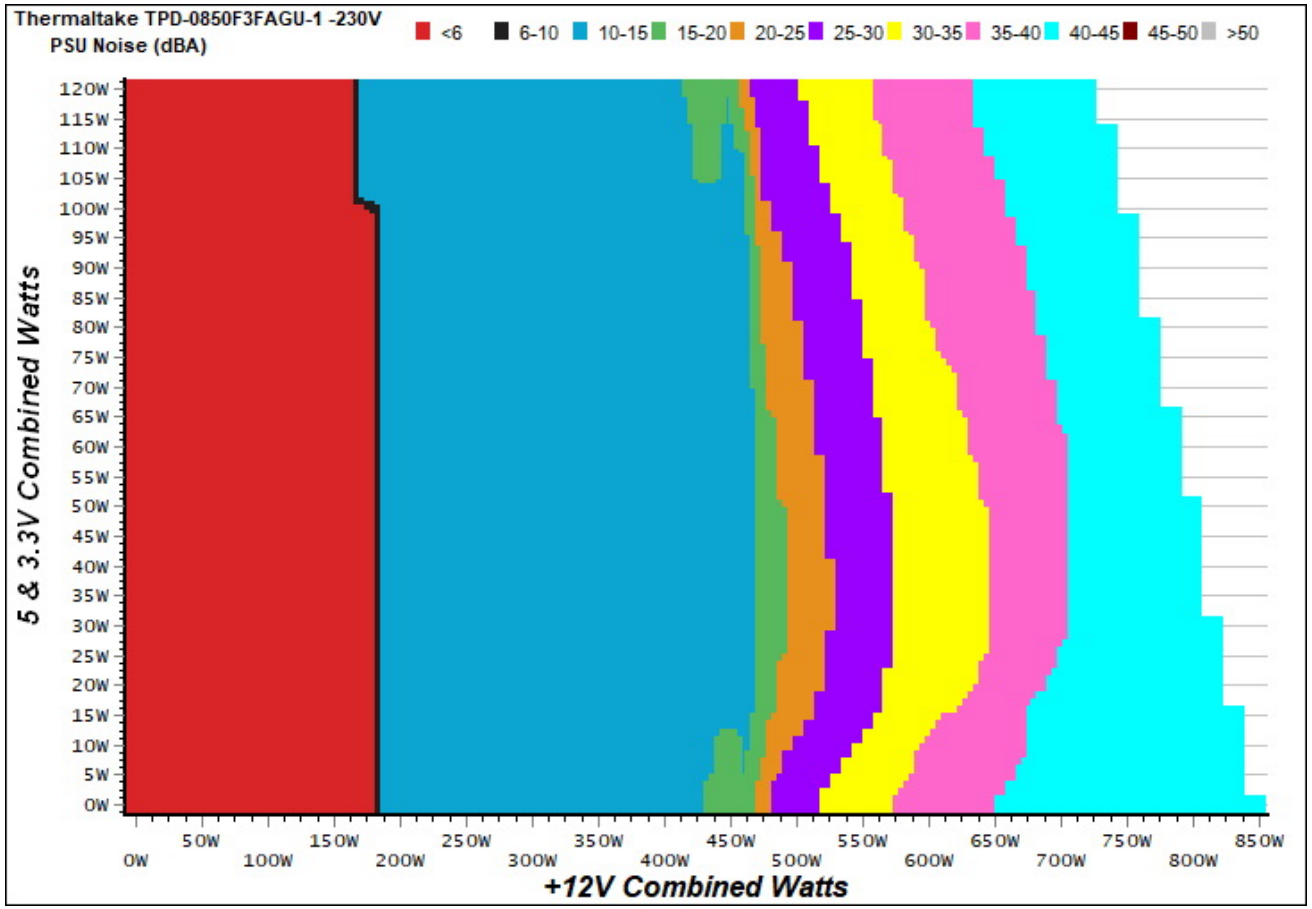
115V



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.

Noise under high ambient temperature (indicative)

115V

Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
20%	0 RPM · <6.0 dB(A) · 48.3 °C	0 RPM · <6.0 dB(A) · 48.3 °C	fan off in both
50%	582 RPM · 11.3 dB(A) · 42.3 °C	582 RPM · 11.3 dB(A) · 42.3 °C	**+0.0 dB(A)**
100%	1659 RPM · 43.1 dB(A) · 45.8 °C	1659 RPM · 43.1 dB(A) · 45.8 °C	**+0.0 dB(A)**

230V

Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
20%	582 RPM · 11.3 dB(A) · 40.6 °C	582 RPM · 11.3 dB(A) · 40.6 °C	**+0.0 dB(A)**
50%	695 RPM · 16.4 dB(A) · 42.2 °C	695 RPM · 16.4 dB(A) · 42.2 °C	**+0.0 dB(A)**
100%	1659 RPM · 43.1 dB(A) · 45.7 °C	1659 RPM · 43.1 dB(A) · 45.7 °C	**+0.0 dB(A)**

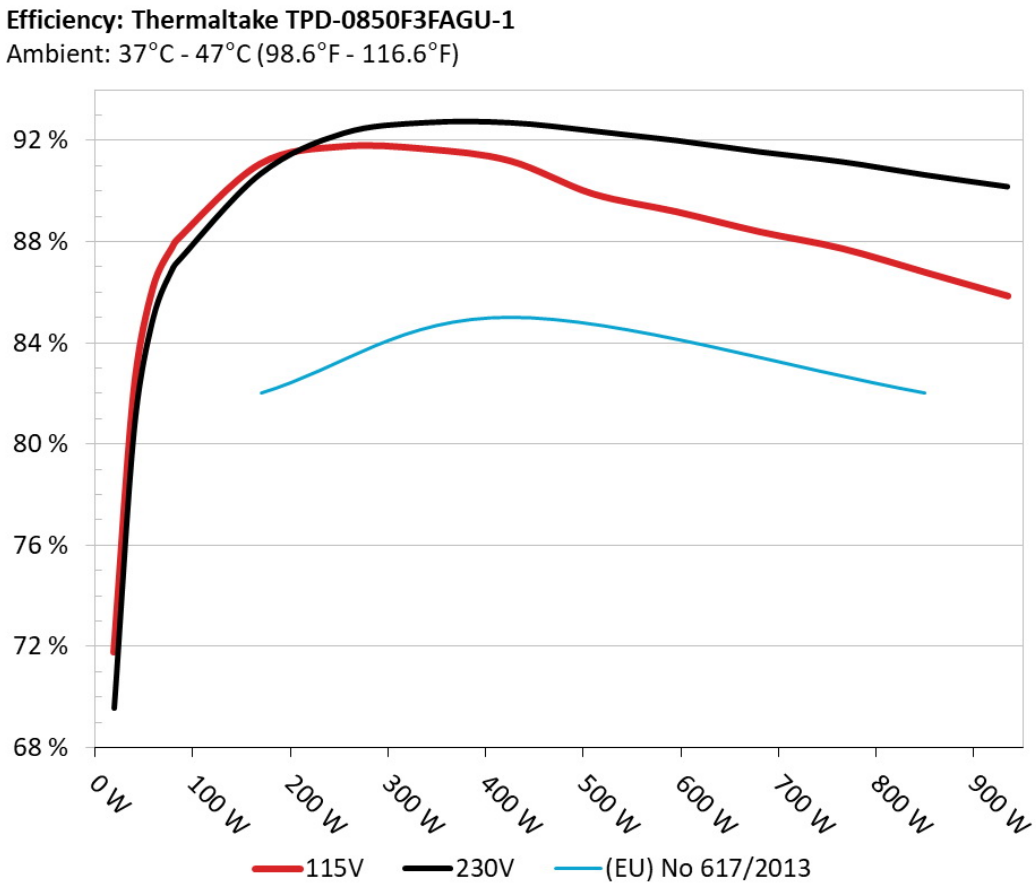
INFO

Fan speed, noise and the measured intake temperature at 10, 20, 50 and 100 % load, from the two load regulation tests: at normal ambient (about 30-32 °C) and at high ambient (about 40-47 °C). These are stabilized readings at fixed loads, not averages over the certification sweep, so they are indicative of how the fan behaves when it is hot. "<6.0" is the floor of our sound meter, with the fan stopped; with the fan stopped, the intake sensor can read higher than the chamber air.

Informational. Not part of the ETA or LAMBDA rating.

Indicative Performance

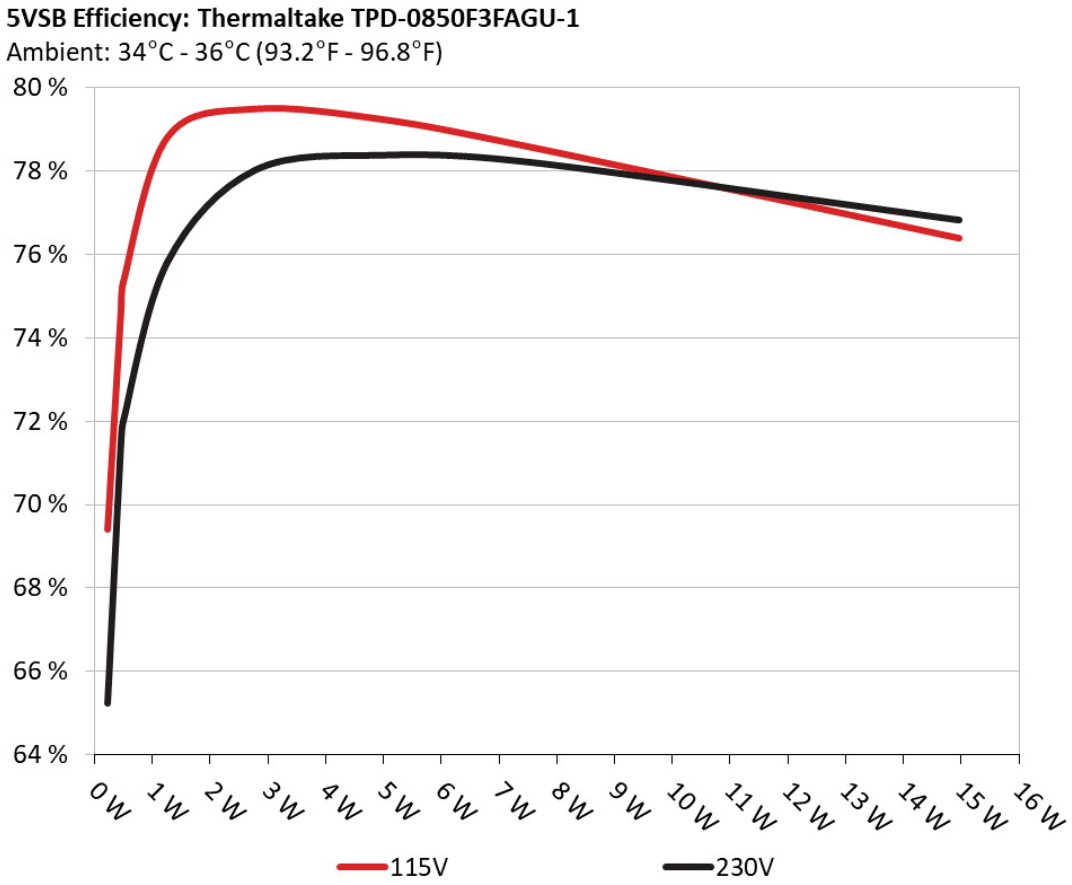
Efficiency under high ambient temperature



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	0.229	69.394%	0.034
	5.077V	0.330		115.09V
2	0.090A	0.457	74.551%	0.062
	5.076V	0.613		115.10V
3	0.550A	2.785	79.481%	0.265
	5.062V	3.504		115.08V
4	1.000A	5.050	79.216%	0.357
	5.049V	6.375		115.08V
5	1.500A	7.553	78.563%	0.410
	5.035V	9.614		115.08V
6	3.000A	14.972	76.380%	0.475
	4.991V	19.602		115.09V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	65.242%	0.011
	5.077V	0.351		230.21V
2	0.090A	0.457	71.406%	0.020
	5.076V	0.640		230.21V
3	0.550A	2.785	78.033%	0.102
	5.062V	3.569		230.21V
4	1.000A	5.050	78.392%	0.170
	5.049V	6.442		230.21V
5	1.500A	7.549	78.220%	0.229
	5.032V	9.651		230.21V
6	3.000A	14.969	76.835%	0.333
	4.989V	19.482		230.21V

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	5.248A	1.983A	2.000A	0.991A	84.879	88.094%	0	<6.0	46.83°C	0.965
	12.059V	5.044V	3.296V	5.045V	96.351				39.85°C	115.10V
2	11.492A	2.976A	3.006A	1.192A	169.384	91.082%	0	<6.0	48.31°C	0.980
	12.051V	5.039V	3.292V	5.036V	185.969				40.83°C	115.10V
3	18.142A	3.475A	3.495A	1.393A	254.473	91.770%	0	<6.0	49.22°C	0.983
	12.043V	5.035V	3.288V	5.026V	277.294				41.35°C	115.10V
4	24.804A	3.976A	4.017A	1.594A	339.669	91.669%	583	11.3	41.56°C	0.980
	12.033V	5.032V	3.285V	5.018V	370.539				50.14°C	115.10V
5	31.141A	4.974A	5.026A	1.797A	424.969	91.202%	582	11.3	42.25°C	0.979
	12.025V	5.027V	3.281V	5.010V	465.964				51.43°C	115.10V
6	37.421A	5.975A	6.043A	2.000A	509.500	89.901%	1063	30.4	42.84°C	0.980
	12.017V	5.023V	3.276V	5.001V	566.737				52.56°C	115.10V
7	43.785A	6.977A	7.059A	2.204A	594.830	89.192%	1442	38.0	43.38°C	0.982
	12.007V	5.017V	3.272V	4.992V	666.912				53.64°C	115.10V
8	50.154A	7.983A	8.080A	2.409A	680.159	88.398%	1657	43.1	43.98°C	0.983
	11.998V	5.012V	3.267V	4.983V	769.425				54.81°C	115.10V
9	56.928A	8.489A	8.579A	2.410A	765.075	87.730%	1656	43.1	44.27°C	0.985
	11.990V	5.008V	3.263V	4.980V	872.083				55.69°C	115.10V
10	63.445A	8.995A	9.112A	3.026A	849.907	86.789%	1659	43.1	45.78°C	0.987
	11.982V	5.004V	3.259V	4.958V	979.280				57.60°C	115.10V
11	70.553A	9.000A	9.122A	3.028A	934.666	85.851%	1658	43.1	46.58°C	0.988
	11.976V	5.002V	3.256V	4.955V	1088.704				58.97°C	115.10V
CL1	0.145A	14.004A	13.998A	0.000A	117.835	83.476%	642	13.9	42.20°C	0.976
	12.047V	5.013V	3.278V	5.070V	141.161				51.69°C	115.11V

CL2	70.842A	1.002A	0.998A	1.000A	862.791	87.403%	1658	43.1	45.65°C	0.987
	11.991V	5.025V	3.271V	5.025V	987.146				57.07°C	115.10V

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	5.254A	1.983A	2.002A	0.992A	84.930	87.216%	0	<6.0	46.60°C	0.829
	12.053V	5.044V	3.296V	5.043V	97.379				39.38°C	230.24V
2	11.505A	2.977A	3.007A	1.192A	169.434	90.670%	582	11.3	40.56°C	0.915
	12.041V	5.039V	3.292V	5.035V	186.869				48.13°C	230.25V
3	18.146A	3.477A	3.497A	1.393A	254.522	92.275%	582	11.3	41.08°C	0.940
	12.042V	5.036V	3.288V	5.024V	275.831				49.04°C	230.25V
4	24.805A	3.976A	4.018A	1.595A	339.712	92.694%	582	11.3	41.77°C	0.952
	12.034V	5.032V	3.285V	5.017V	366.489				50.52°C	230.25V
5	31.144A	4.975A	5.029A	1.797A	425.014	92.690%	695	16.4	42.22°C	0.957
	12.025V	5.027V	3.281V	5.008V	458.532				51.29°C	230.25V
6	37.425A	5.975A	6.042A	2.001A	509.539	92.367%	1091	30.7	42.63°C	0.961
	12.017V	5.022V	3.276V	4.999V	551.646				52.68°C	230.25V
7	43.783A	6.979A	7.059A	2.205A	594.862	91.989%	1443	38.0	43.19°C	0.964
	12.008V	5.017V	3.272V	4.991V	646.664				53.63°C	230.24V
8	50.151A	7.984A	8.079A	2.410A	680.176	91.542%	1659	43.1	43.90°C	0.965
	11.999V	5.012V	3.267V	4.981V	743.024				54.74°C	230.24V
9	56.925A	8.489A	8.580A	2.411A	765.102	91.146%	1659	43.1	44.54°C	0.967
	11.991V	5.008V	3.263V	4.979V	839.424				56.05°C	230.23V
10	63.440A	8.996A	9.111A	3.027A	849.912	90.629%	1659	43.1	45.70°C	0.969
	11.983V	5.004V	3.259V	4.956V	937.796				57.74°C	230.23V
11	70.555A	9.000A	9.120A	3.029A	934.685	90.164%	1657	43.1	46.52°C	0.971
	11.976V	5.002V	3.256V	4.954V	1036.652				59.32°C	230.24V
CL1	0.146A	14.004A	13.999A	0.000A	117.847	83.100%	596	12.1	42.35°C	0.886
	12.036V	5.013V	3.278V	5.070V	141.813				51.65°C	230.23V

CL2	70.840A	1.002A	0.997A	1.000A	862.693	91.291%	1661	43.1	45.81°C	0.969
	11.990V	5.025V	3.271V	5.025V	944.996				57.67°C	230.23V

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	1.201A	0.495A	0.484A	0.197A	19.577	71.755%	0	<6.0	0.841
	12.057V	5.051V	3.301V	5.071V	27.283				115.10V
2	2.461A	0.991A	1.001A	0.395A	39.993	82.057%	0	<6.0	0.928
	12.063V	5.048V	3.300V	5.064V	48.738				115.10V
3	3.656A	1.487A	1.482A	0.593A	59.485	86.155%	0	<6.0	0.956
	12.061V	5.046V	3.298V	5.058V	69.044				115.10V
4	4.917A	1.983A	2.001A	0.792A	79.891	87.819%	0	<6.0	0.963
	12.059V	5.044V	3.296V	5.051V	90.972				115.10V

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	1.202A	0.495A	0.483A	0.197A	19.591	69.570%	0	<6.0	0.481
	12.062V	5.050V	3.301V	5.070V	28.160				230.25V
2	2.467A	0.990A	1.000A	0.395A	40.041	80.595%	0	<6.0	0.662
	12.057V	5.048V	3.299V	5.063V	49.682				230.24V
3	3.659A	1.486A	1.486A	0.593A	59.508	84.973%	0	<6.0	0.755
	12.055V	5.047V	3.298V	5.056V	70.032				230.24V
4	4.919A	1.984A	2.002A	0.792A	79.894	86.965%	0	<6.0	0.817
	12.053V	5.044V	3.296V	5.050V	91.869				230.24V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	9.9 mV	11.3 mV	8.3 mV	15.0 mV	Pass
20% Load	11.6 mV	11.6 mV	9.1 mV	13.9 mV	Pass
30% Load	12.3 mV	11.5 mV	8.7 mV	12.8 mV	Pass
40% Load	11.8 mV	11.9 mV	9.8 mV	13.4 mV	Pass
50% Load	11.7 mV	11.7 mV	10.2 mV	13.7 mV	Pass
60% Load	11.4 mV	12.0 mV	10.4 mV	14.4 mV	Pass
70% Load	12.4 mV	12.7 mV	11.3 mV	15.7 mV	Pass
80% Load	12.7 mV	13.2 mV	12.4 mV	18.4 mV	Pass
90% Load	12.3 mV	13.7 mV	12.9 mV	18.7 mV	Pass
100% Load	18.3 mV	14.2 mV	13.0 mV	21.3 mV	Pass
110% Load	18.8 mV	14.6 mV	13.8 mV	21.1 mV	Pass
Crossload 1	16.3 mV	12.8 mV	10.6 mV	14.2 mV	Pass
Crossload 2	18.8 mV	13.5 mV	12.9 mV	18.7 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.4 mV	11.8 mV	9.2 mV	13.4 mV	Pass
20% Load	15.1 mV	11.3 mV	8.6 mV	13.2 mV	Pass
30% Load	17.3 mV	11.7 mV	9.1 mV	13.8 mV	Pass
40% Load	13.6 mV	11.8 mV	9.5 mV	13.3 mV	Pass
50% Load	12.9 mV	13.0 mV	10.3 mV	14.0 mV	Pass
60% Load	11.3 mV	12.0 mV	9.8 mV	14.4 mV	Pass
70% Load	12.0 mV	12.4 mV	11.1 mV	16.4 mV	Pass
80% Load	11.7 mV	13.1 mV	12.0 mV	18.6 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	11.9 mV	12.7 mV	12.4 mV	19.2 mV	Pass
100% Load	18.3 mV	13.8 mV	13.9 mV	21.8 mV	Pass
110% Load	18.4 mV	13.3 mV	14.2 mV	20.6 mV	Pass
Crossload 1	9.1 mV	12.4 mV	11.4 mV	15.9 mV	Pass
Crossload 2	18.0 mV	13.0 mV	12.0 mV	19.0 mV	Pass

The results above are not used in the certification process

Thermaltake Toughpower GF1 ARGB 850W



Top side



Power specifications label

Cybenetics bietet freiwillige Zertifizierungsprogramme für Netzteile – ETA für Effizienz, LAMBDA für Lautstärke und SAFE für Sicherheit und korrekten Betrieb – sowie für Kühlprodukte mit DELTA für die Schalldämmung von Gehäusen und PHI für Luftstrom und statischen Druck von Lüftern

CYBENETICS LTD Syrou 6, Latsia, 2231, Nicosia Cyprus

www.cybenetics.com - info@cybenetics.com