Thermaltake Toughpower GF1 ARGB 850W

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	
□□□□ (Vrms)	100-240
□□□□ (Arms)	12
□□□□ (Hz)	47-63

□□□□ (W)	850
Operating Temperature (Continuous Full Load) (°C)	
□□	ATX12V
□□□□	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
□□	140mm HDB RGB Fan (TT-1425/A1425S12S-2)
□□□□□	✓ (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	

□□□□□ (Non-accredited measurements)

□□□□□				
□□	□□□□	□□□□□□	Gauge	In Cable Capacitors
ATX □□ 20+4 pin (600mm)	1	1	18AWG	□
8 pin EPS 12V □□ (650mm)	1	1	16AWG	□
4+4 pin EPS 12V □□ (650mm)	1	1	16AWG	□
6+2pin PCIe□□ (500mm+150mm)	3	6	16-18AWG	□
SATA□□ (500mm+150mm+150mm+150mm)	3	12	18AWG	□
□ 4pin Molex□□ (500mm+150mm+150mm+150mm)	1	4	18AWG	□
□ 4pin □□ (+100mm)	1	1	22AWG	□
ARGB Sync Cable (+800mm)	1	1	26AWG	□

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

□□□□

□		3.3V	5V	12V	5VSB	-12V
□□□□	□□	22	22	70.9	3	0.3
	□	120		850.8	15	3.6
□□□□□ (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

□□□□ (°C /°F)	28-32 / 82.4-89.6
□□ ErP Lot3/6□□	✓
□□ (EU) No 617/2013□□	✓

Performance Summary

115V

Accredited	
□□□□ (>1450 load combinations)	89.228%
Average Noise Output (>1450 Load Combinations)	34.77dBA
PF□□□ (>1450 Load Combinations)	0.980
Efficiency With 10W (≤500W) or 2% (>500W) Load	70.579%
□□□□□□	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

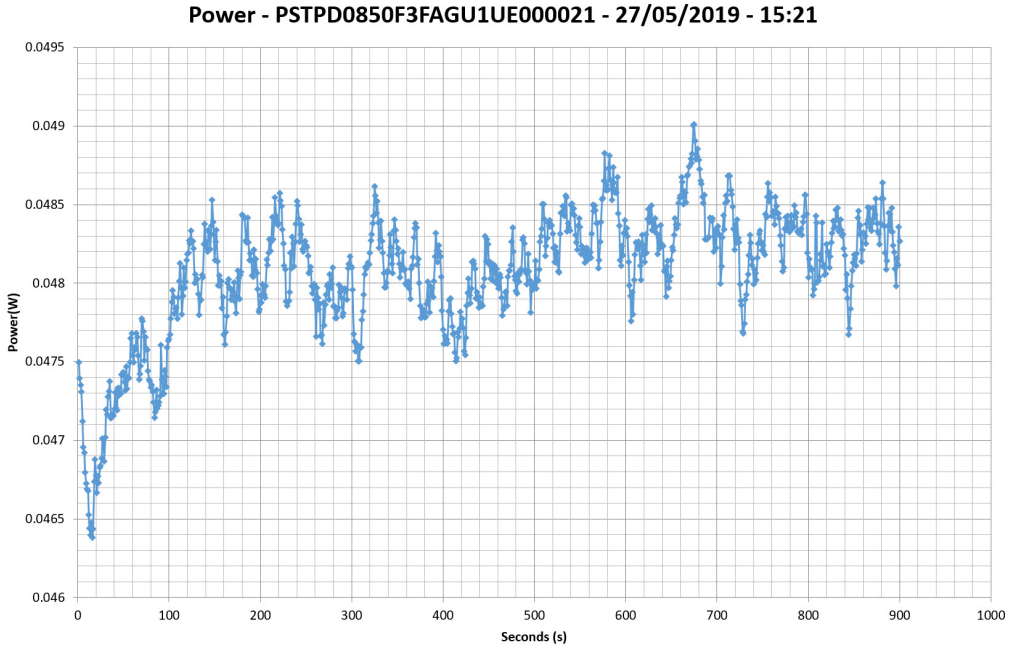
Accredited		
□□□□ (>1450 load combinations)		90.914%
Average Noise Output (>1450 Load Combinations)		34.63dBA
PF□□□ (>1450 Load Combinations)		0.941
Efficiency With 10W (≤500W) or 2% (>500W) Load		-
□□□□□□		0.0649W
Non-Accredited		
12V Ripple (Full Load)		18.34mV
5V Ripple (Full Load)		13.76mV
3.3V Ripple (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
□□□□ & PG□□		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)	-	-

□□□□ & PG□□

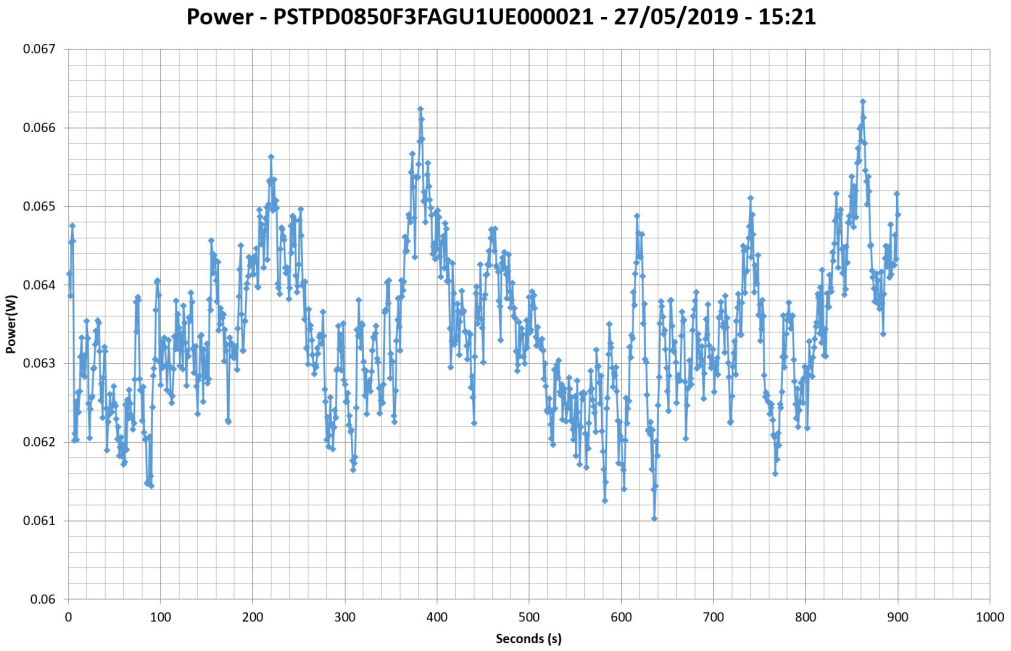
Hold-Up Time (ms)	18.6
AC Loss to PWR_OK Hold Up Time (ms)	17.4
PWR_OK Inactive to DC Loss Delay (ms)	1.2

Graphs

115V



230V



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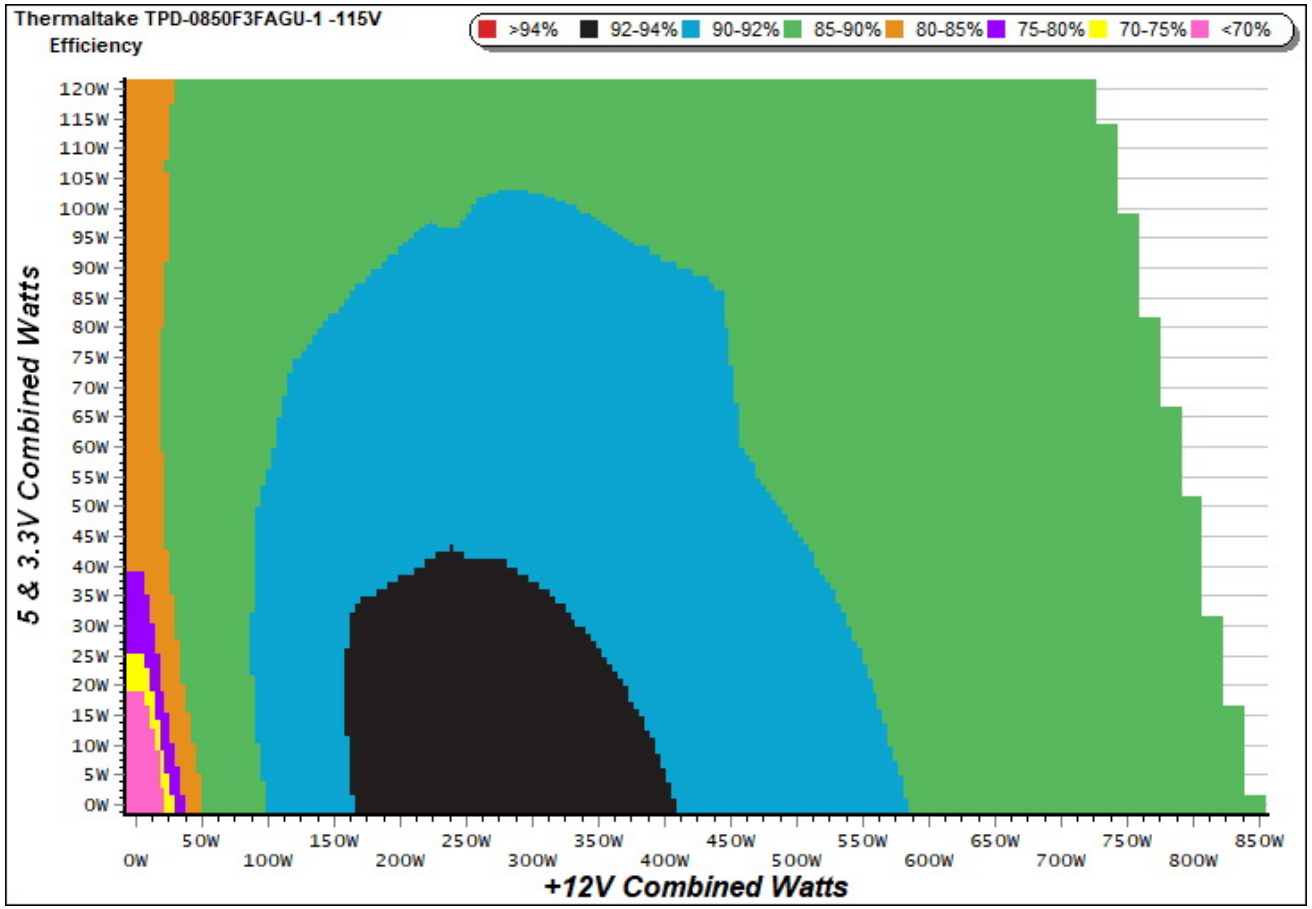
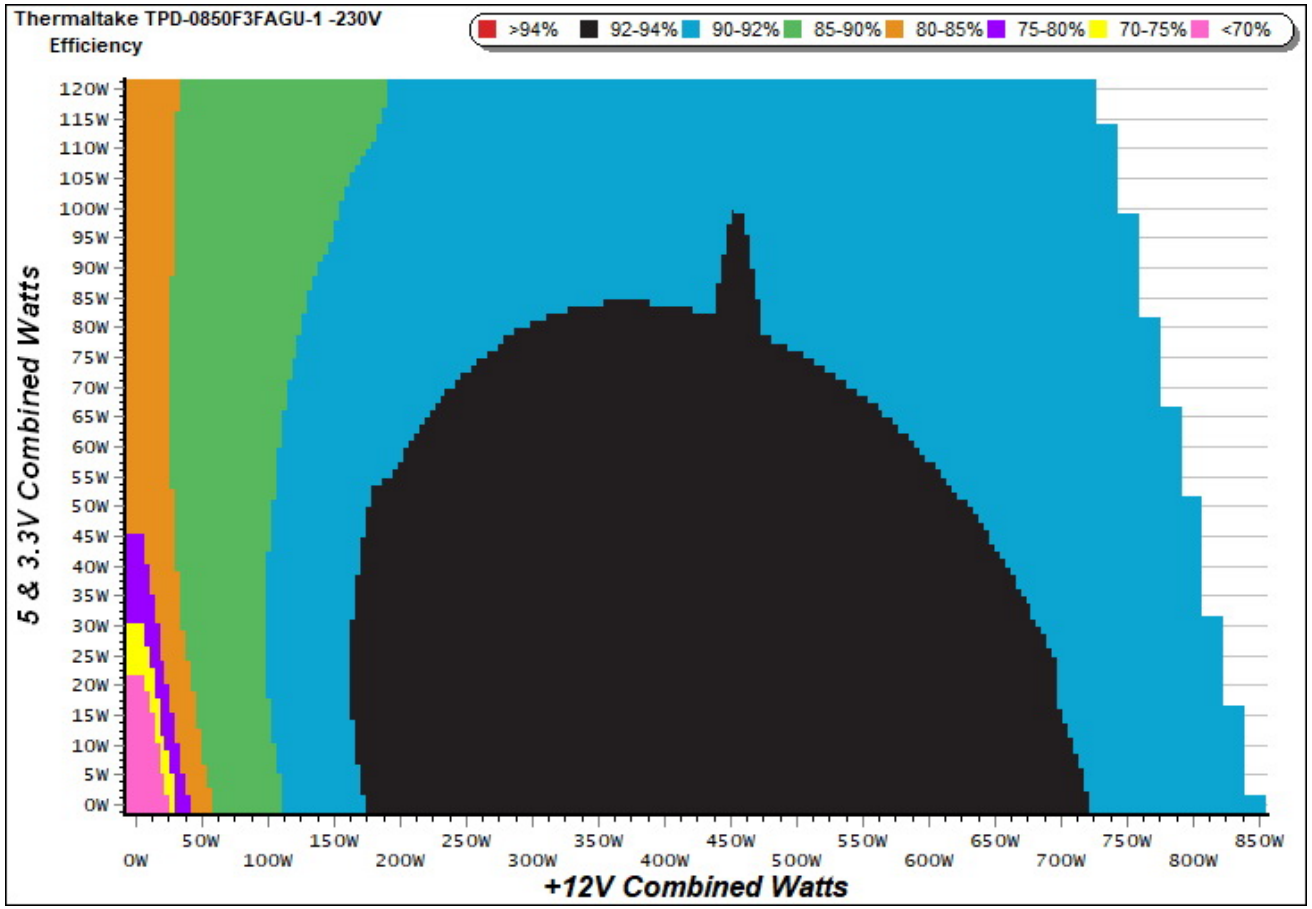
115V



□□

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



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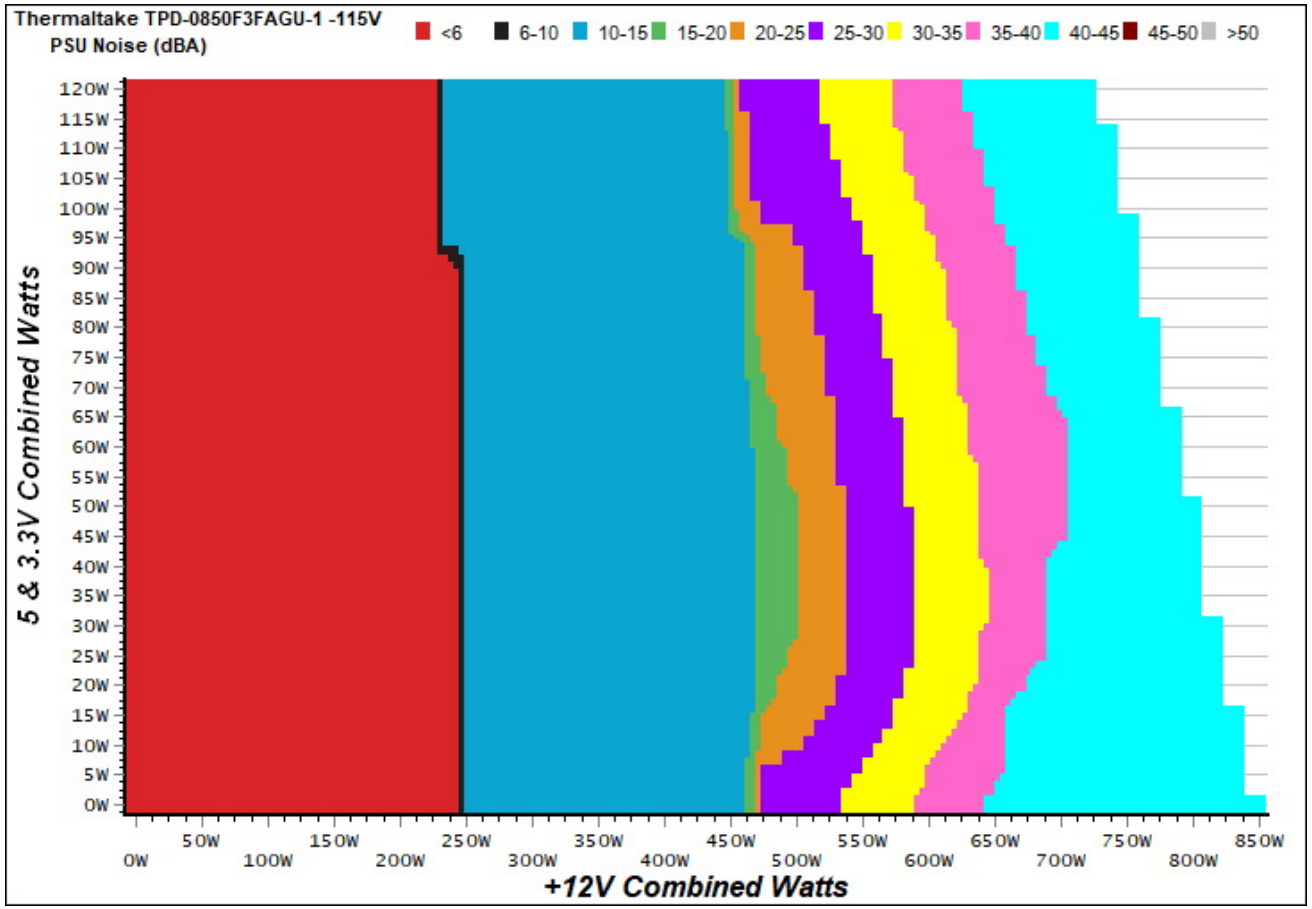
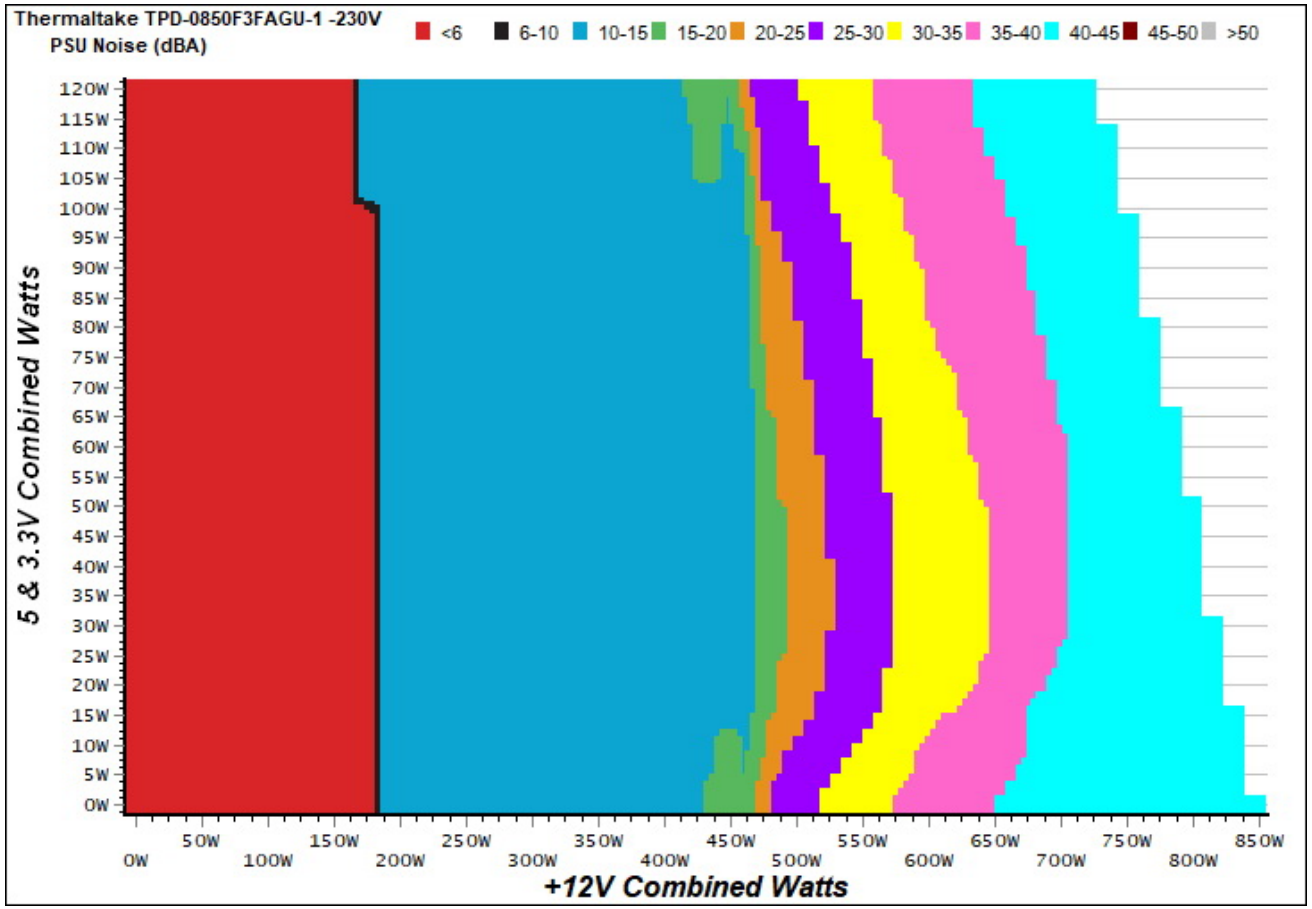
115V



□□

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



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

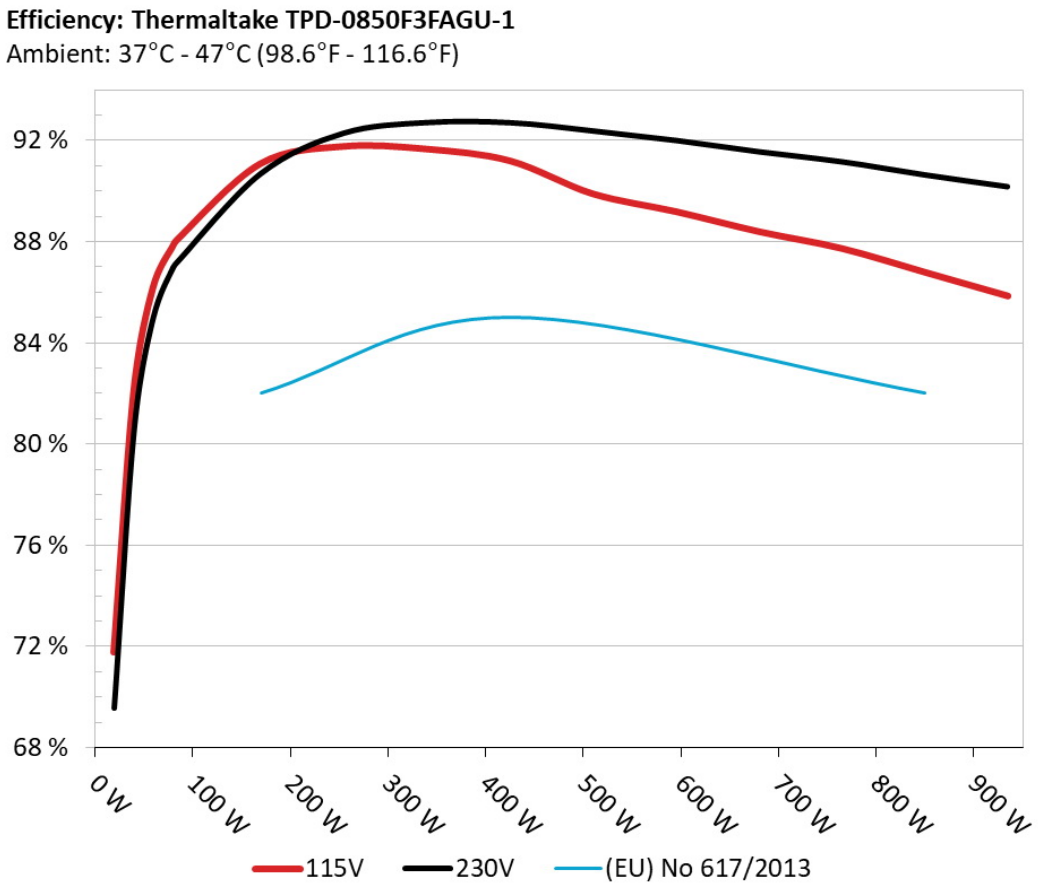
Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
20%	582 RPM · 11.3 dB(A) · 40.6 °C	582 RPM · 11.3 dB(A) · 40.6 °C	**+0.0 dB(A)**
50%	695 RPM · 16.4 dB(A) · 42.2 °C	695 RPM · 16.4 dB(A) · 42.2 °C	**+0.0 dB(A)**
100%	1659 RPM · 43.1 dB(A) · 45.7 °C	1659 RPM · 43.1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

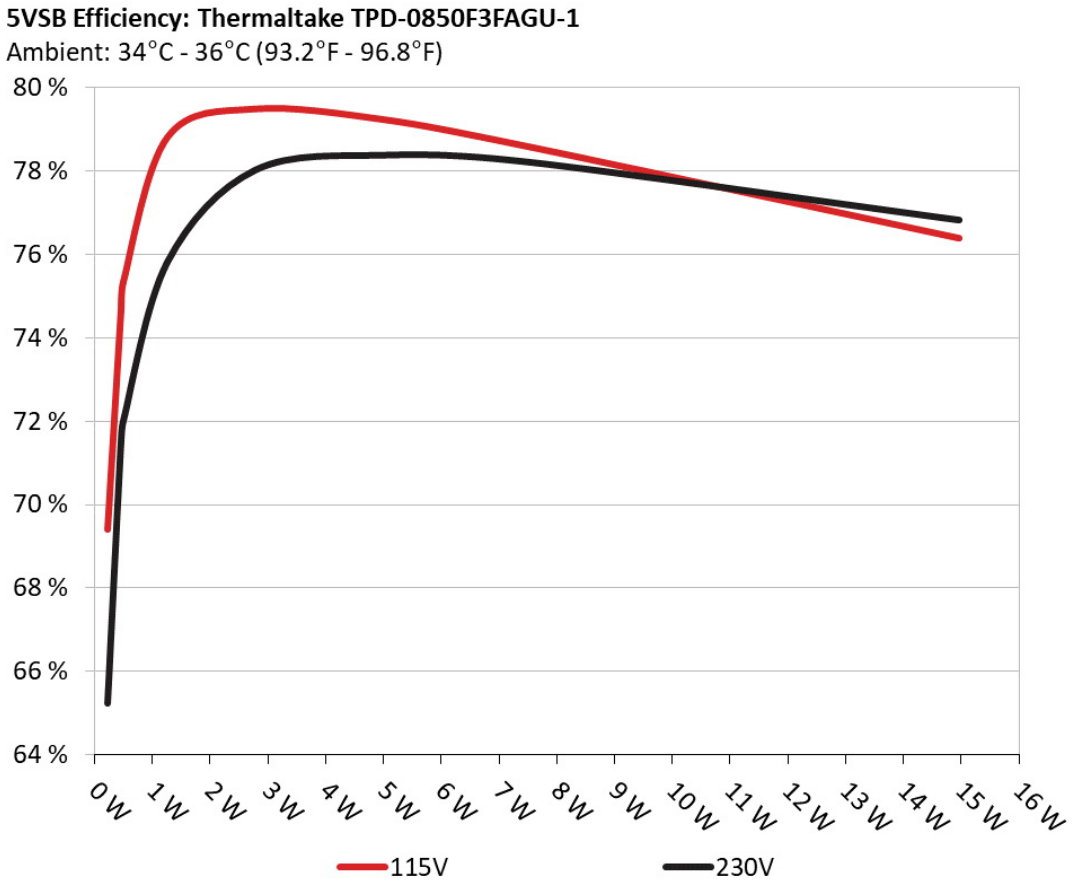
Informational. Not part of the ETA or LAMBDA rating.

Indicative Performance



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□□□□



□□

This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input.

□□□□ □□ 5Vsb □□ (ErP Lot3/6 & CEC)

115V

□□ #	5VSB	DC/AC (□)	□□	PF/AC □□
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

□□ #	5VSB	DC/AC (□)	□□	PF/AC □□
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)

10-110%□□□□

115V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
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

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
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

20-80□□□□□

115V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	PF/AC □□
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

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	PF/AC □□
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

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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

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