Thermaltake Toughpower GF3 ARGB 850W

Serial Number PSTPD0850F4FAGE1SV000459

Lab ID TT85002158

Certification ID 252158

Test Result Report ID: 23PS2158A

Certificate Issue Date: Mar 24, 2023

Scheme: ETA-EMI PSU

115V



230V



Scheme: LAMBDA PSU

115V



230V





Outside Validation Scope



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 GF3 ARGB 850W
OEM/ODM	High Power
Serial Number	PSTPD0850F4FAGE1SV000459
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12-6

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 Hydraulic Bearing Fan [TT-1425 (A1425S12S-2)]
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	TT85002158
Date of receipt	Jan 24, 2023
Testing Date	Mar 22, 2023
Report Issued Date	Mar 24, 2023
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	16-18AWG	No
4+4 pin EPS12V (650mm+155mm)	1	2	16-18AWG	No
6+2 pin PCIe (505mm+155mm)	2	4	16-18AWG	No
12+4 pin PCIe (600mm) (450W)	1	1	16-24AWG	No
SATA (505mm+155mm+155mm+155mm)	3	12	18AWG	No
4-pin Molex (510mm+155mm+155mm+155mm)	1	4	18AWG	No
FDD Adapter (160mm)	1	1	22AWG	No

ARGB Sync Cable (610mm+160mm)	1	2	26AWG	No
AC Power Cord (1360mm) - C13 coupler	1	1	16AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	70.8	3	0.3
	Watts	100		850	15	3.6
Total Max. Power (W)		850				

Parts Description

General Data	-
Manufacturer (OEM)	High Power
PCB Type	Double Sided
Primary Side	-
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV, 1x MPS HF81 (Discharge IC)
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	2x HY GBU1006F (600V, 10A @ 100°C)
APFC MOSFETs	2x Infineon IPA60R120P7 (600V, 16A @ 100°C, Rds(on): 0.12Ohm)
APFC Boost Diode	1x Maplesemi MSP08065G1 (650V, 8A @ 150°C)
Bulk Cap(s)	1x Rubycon (420V, 680uF, 2,000h @ 105°C, MXE)
Main Switchers	2x SI28S60F
APFC Controller	Infineon ICE3PCS01G
Resonant Controller	Champion CU6901VAC
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	6x Toshiba TPHR8504PL (40V, 150A, Rds(on): 0.85mOhm)
5V & 3.3V	DC-DC Converters: 4x Infineon BSC0906NS (30V, 40A @ 100°C, Rds(on): 4.5mOhm) PWM Controller(s): uPI uP3861P
Filtering Capacitors	Electrolytic: 1x Nichicon (4-10,000h @ 105°C, HE), 6x Rubycon (3-6,000h @ 105°C, YXG), 4x Rubycon (6-10,000h @ 105°C, ZLH) Polymer: 22x FPCAP, 2x Nippon Chemi-Con
Supervisor IC	WT7527RA (OCP, OVP, UVP, SCP, PG)

Fan Model	Thermaltake TT-1425 A1425S12S-2 (Hong Sheng) (140mm, 12V, 0.70A, Hydraulic Bearing Fan)
5VSB Circuit	-
Rectifier	1x D.G.M.E DG4N70S FET (700V, 2.5A @ 100°C, Rds(on): 3.2Ohm)
Standby PWM Controller	SI8016HSP8
-12V	-
Rectifier	1x KEC KIA7912PI (-12V, 1A)

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	✓
ALPM (Alternative Low Power Mode) compatible	✓
ATX v3.0 Compliance	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	89.135%
Average Noise Output (>1450 Load Combinations)	29.95dBA
Average PF (>1450 Load Combinations)	0.993
Efficiency With 10W (≤500W) or 2% (>500W) Load	77.979%
Standby Power Consumption	0.0734W
Non-Accredited	
12V Ripple (Full Load)	17.61mV
5V Ripple (Full Load)	8.59mV
3.3V Ripple (Full Load)	14.83mV
5VSB Ripple (Full Load)	15.51mV
12V Load Regulation	1.07%

5V Load Regulation	1.10%
3.3V Load Regulation	0.70%
5VSB Load Regulation	3.32%
Inrush Current	32.870A

230V

Accredited		
Average Efficiency (>1450 load combinations)		91.003%
Average Noise Output (>1450 Load Combinations)		27.29dBA
Average PF (>1450 Load Combinations)		0.964
Efficiency With 10W (≤500W) or 2% (>500W) Load		77.206%
Standby Power Consumption		0.1405W
Non-Accredited		
12V Ripple (Full Load)		12.95mV
5V Ripple (Full Load)		7.92mV
3.3V Ripple (Full Load)		10.16mV
5VSB Ripple (Full Load)		9.12mV
12V Load Regulation		1.07%
5V Load Regulation		1.14%
3.3V Load Regulation		0.76%
5VSB Load Regulation		3.32%
Inrush Current		65.790A
12V Transient Response (200%)		11.43V
5V Transient Response (200%)		4.911V
3.3V Transient Response (200%)		3.242V
5VSB Transient Response (200%)		4.988V
Hold-Up Time & PWR_OK Signal		20.60ms
AC Loss to PWR_OK Hold Up Time		17.60ms
PWR_OK Inactive to DC Loss Delay		3.00ms
PSU Timings: T1 (20% / 100%)	96.0ms	54.0ms
PSU Timings: T3 (20% / 100%)	121.5ms	120.5ms
OPP (26.82°C / 42.65°C)	145.04%	137.40%

Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	20.6
AC Loss to PWR_OK Hold Up Time (ms)	17.6
PWR_OK Inactive to DC Loss Delay (ms)	3

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Tables

115V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	115.15 V	115.14 V	113.85 V	115.17 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	60.00 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.415	1.415	1.340	1.416	1.490	PASS
Mains Voltage THD:	0.13 %	0.11 %	N/A	0.15 %	2.00 %	PASS
Real Power:	0.073 W	0.067 W	N/A	0.079 W	N/A	N/A
Apparent Power:	6.926 W	6.915 W	N/A	6.935 W	N/A	N/A
Power Factor:	0.011	N/A	N/A	N/A	N/A	N/A

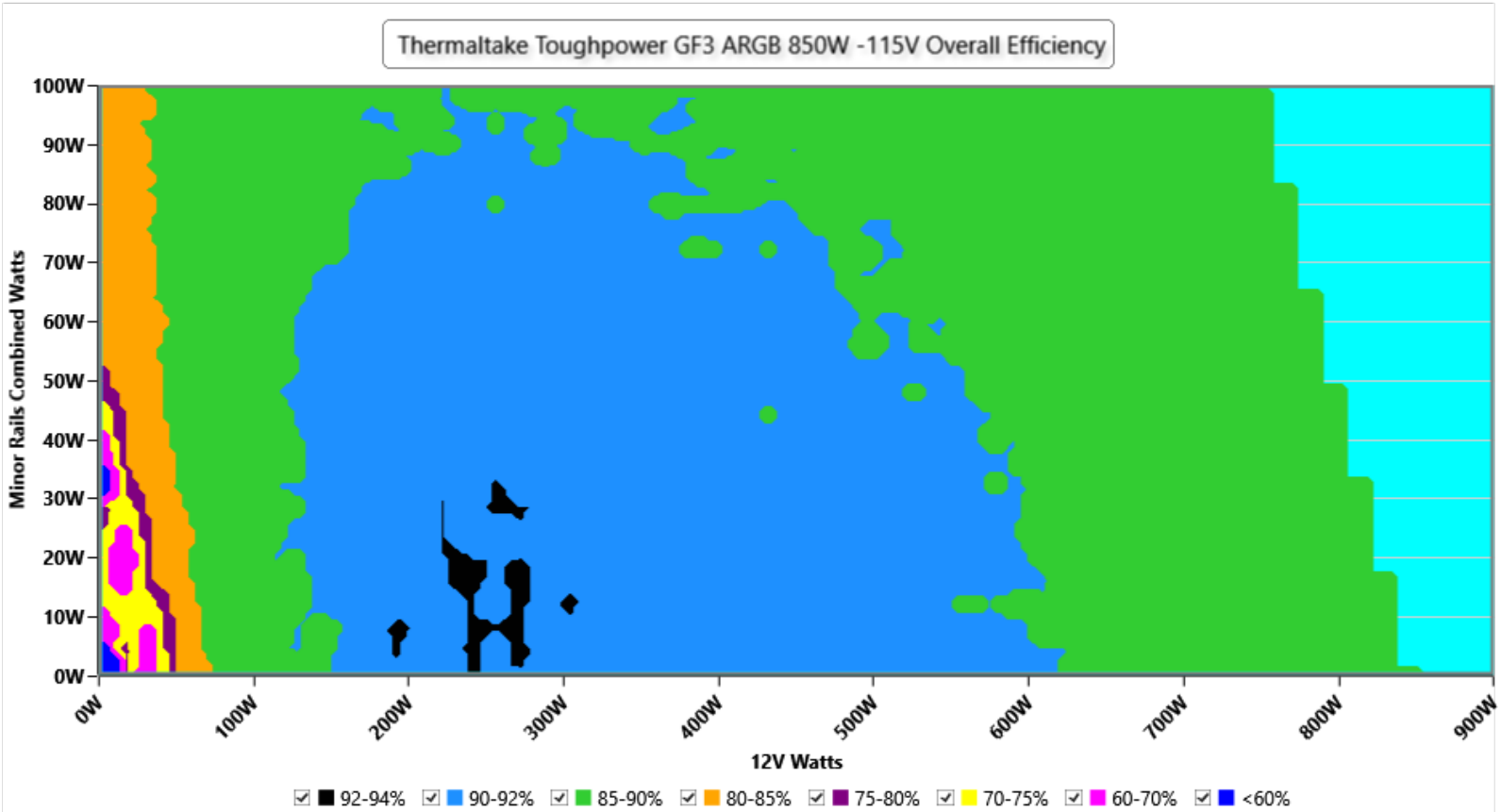
230V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	115.15 V	115.14 V	113.85 V	115.17 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	60.00 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.415	1.415	1.340	1.416	1.490	PASS
Mains Voltage THD:	0.13 %	0.11 %	N/A	0.15 %	2.00 %	PASS
Real Power:	0.073 W	0.067 W	N/A	0.079 W	N/A	N/A
Apparent Power:	6.926 W	6.915 W	N/A	6.935 W	N/A	N/A

Power Factor:	0.011	N/A	N/A	N/A	N/A	N/A

Efficiency Graph

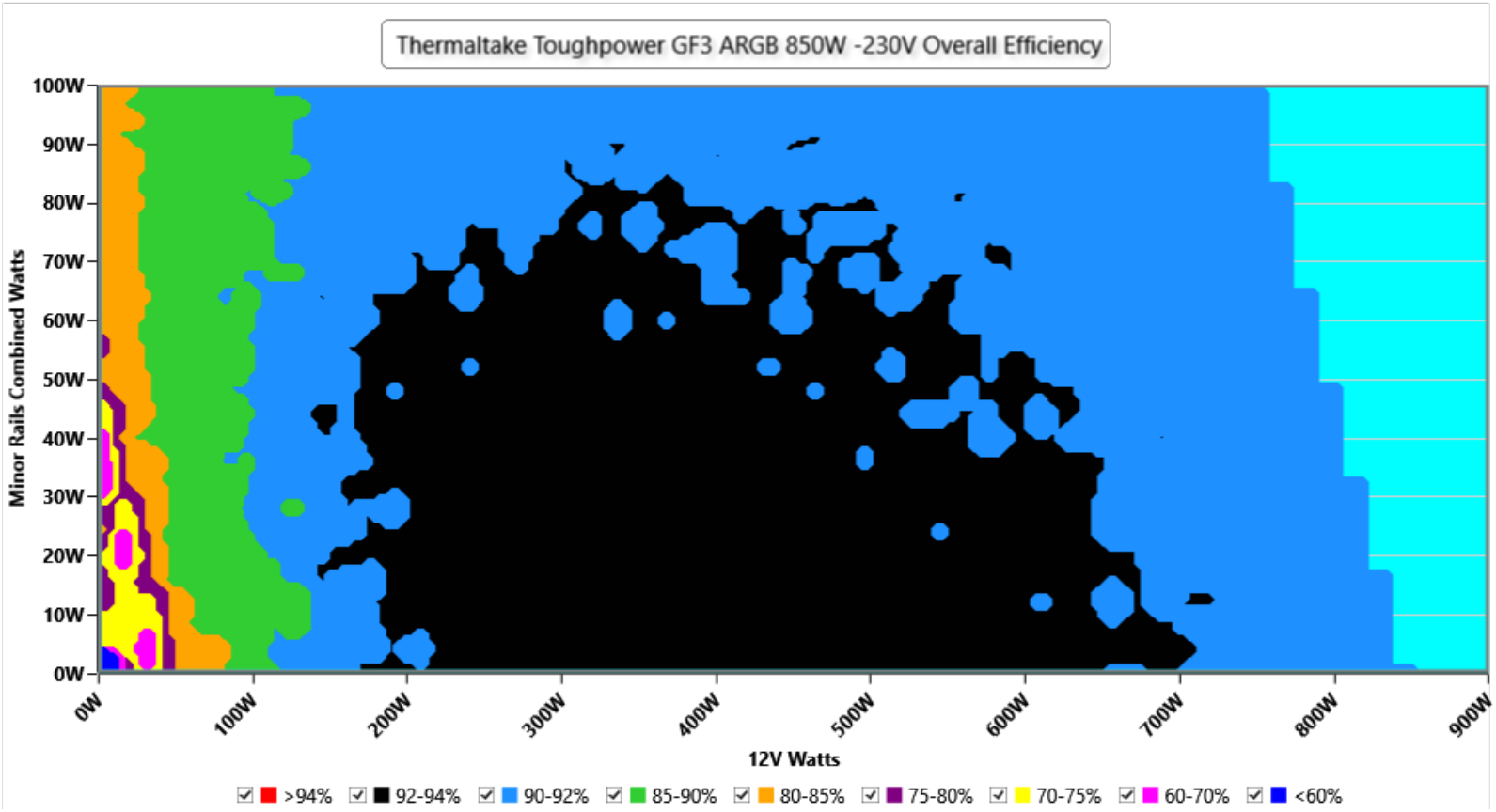
115V



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

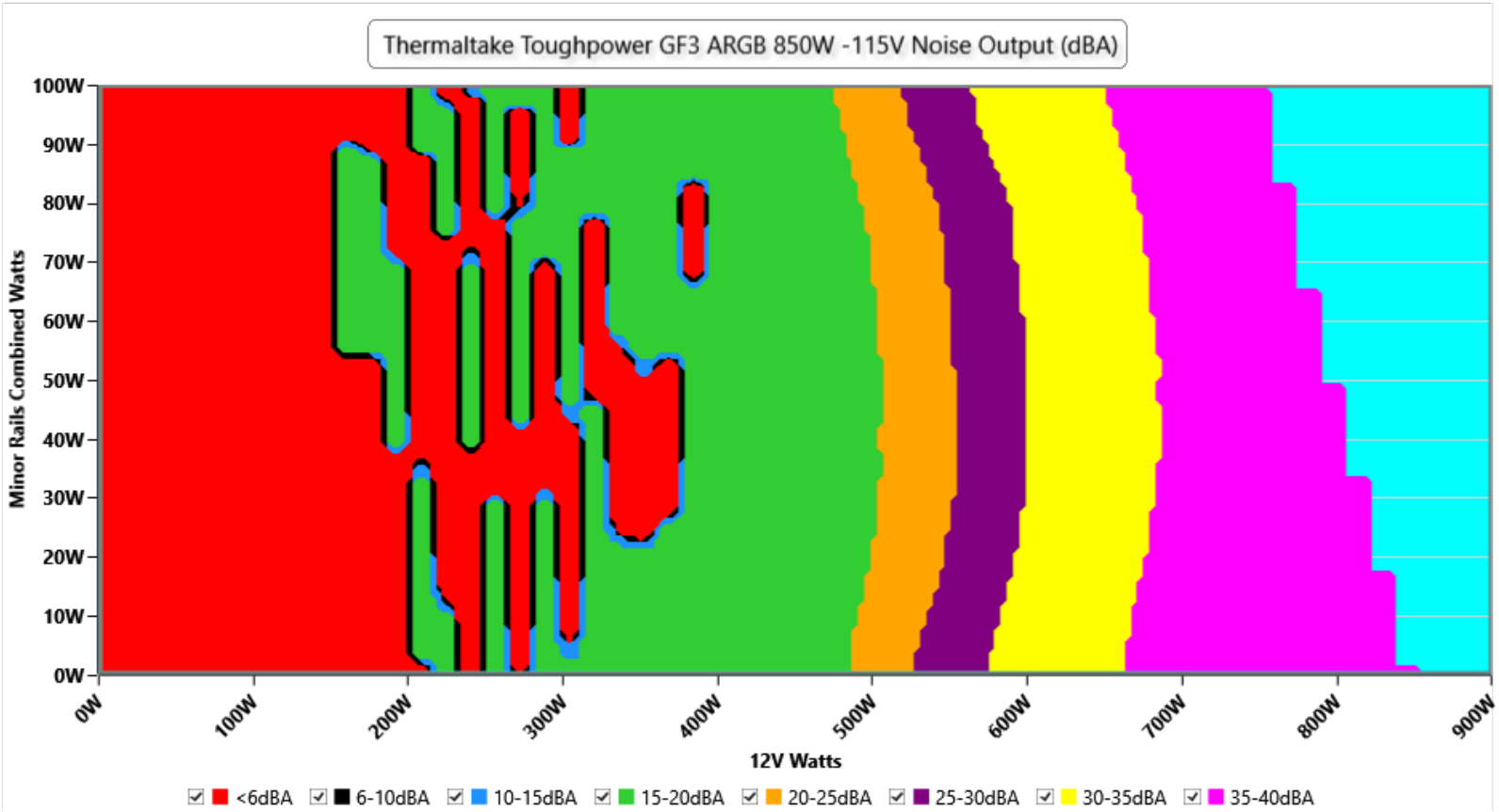


INFO

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

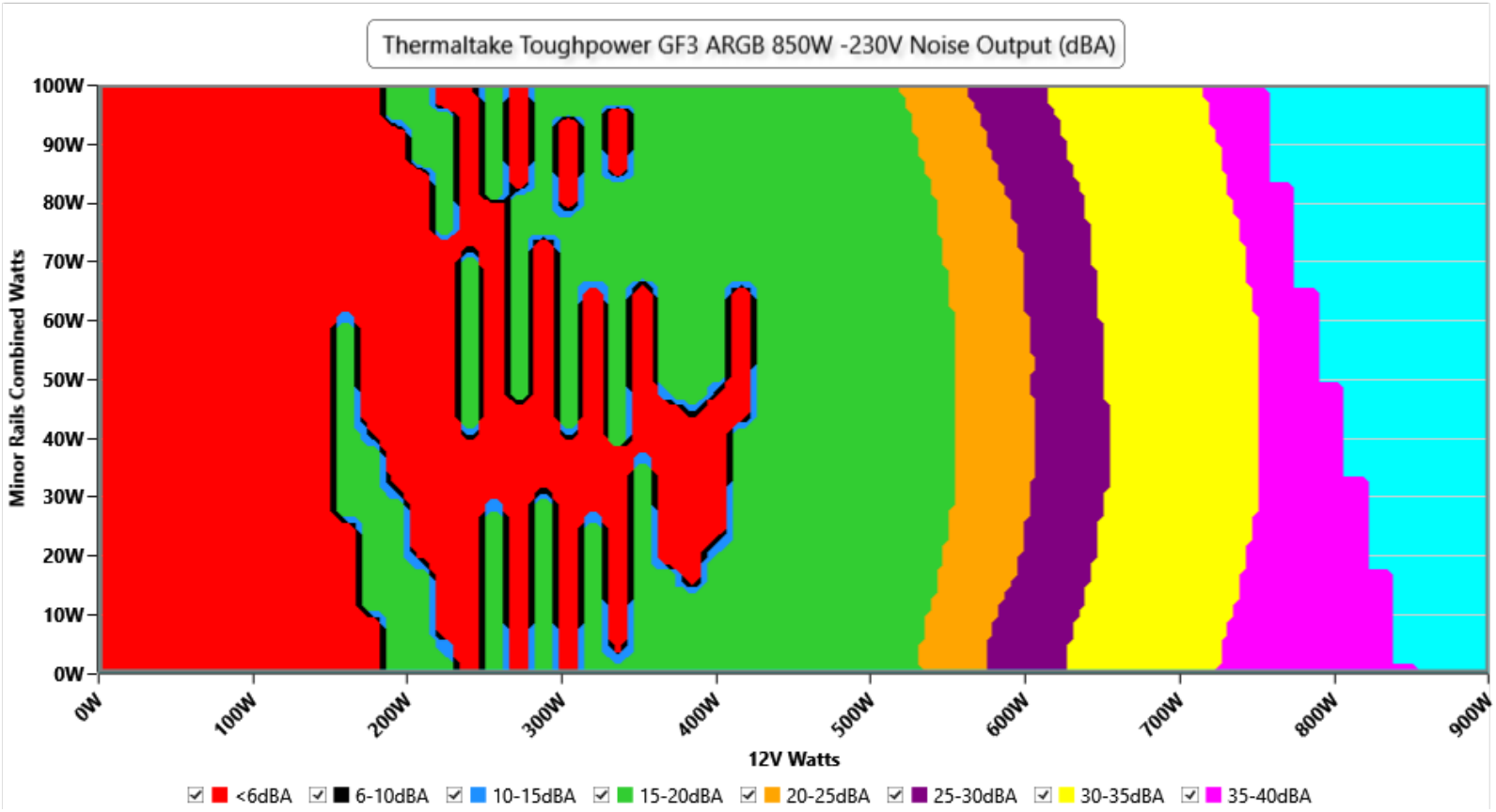
115V



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

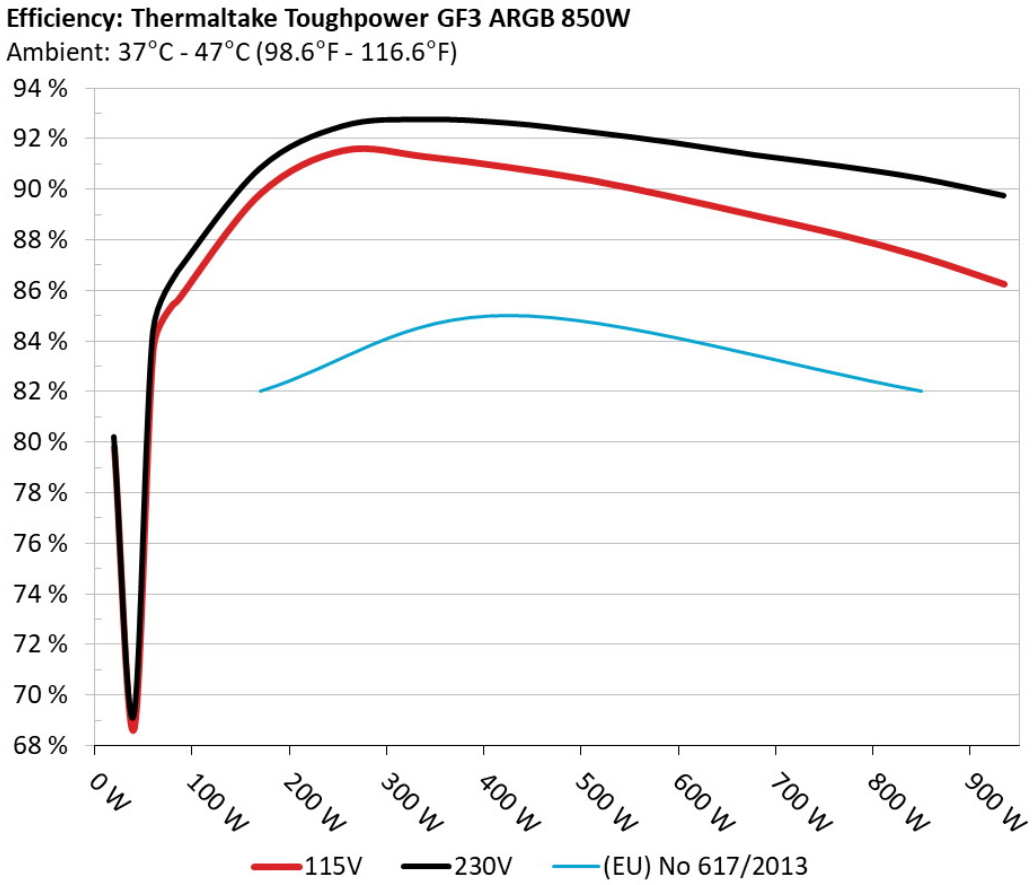


INFO

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

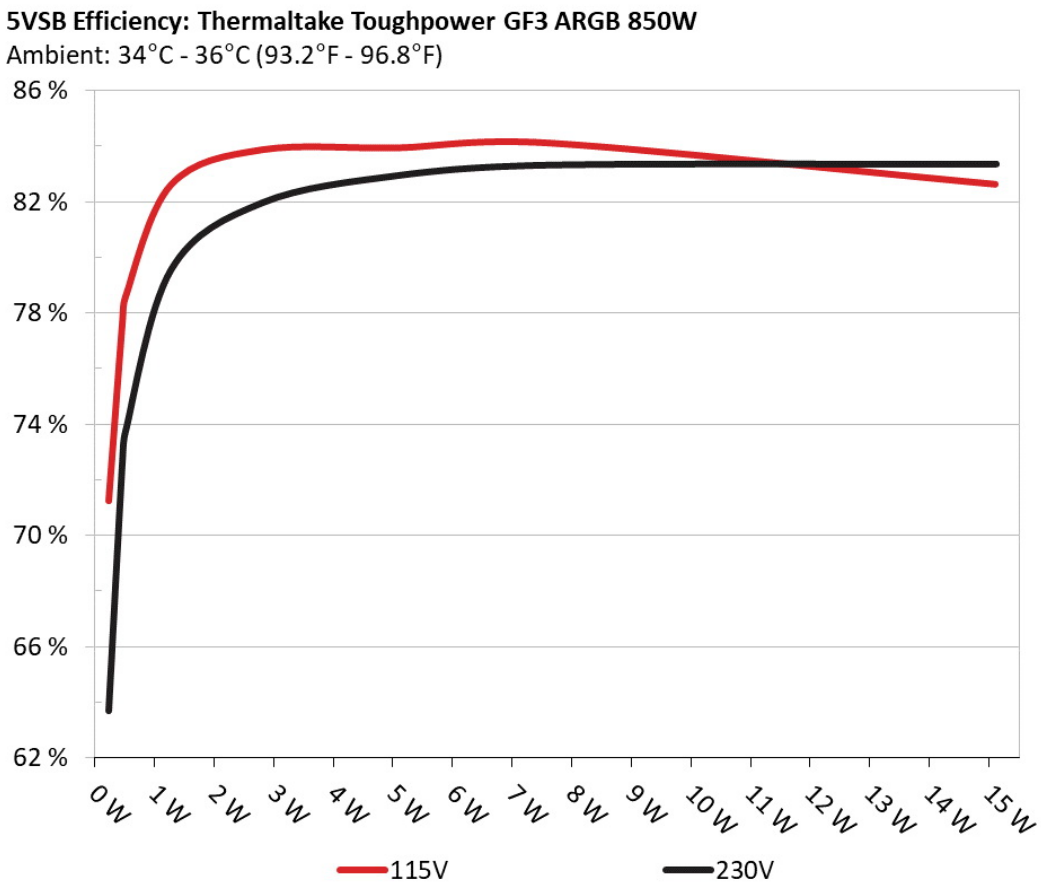
Efficiency under high ambient temperature



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	0.23W	71.259%	0.046
	5.109V	0.322W		115.16V
2	0.09A	0.46W	77.716%	0.083
	5.108V	0.592W		115.16V
3	0.55A	2.804W	83.875%	0.315
	5.096V	3.343W		115.16V
4	1A	5.087W	83.944%	0.4
	5.085V	6.06W		115.15V
5	1.5A	7.612W	84.118%	0.439
	5.073V	9.049W		115.15V
6	3A	15.107W	82.635%	0.495
	5.035V	18.282W		115.15V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.23W	63.678%	0.016
	5.11V	0.362W		230.37V
2	0.09A	0.46W	72.699%	0.027
	5.109V	0.633W		230.37V
3	0.55A	2.804W	81.948%	0.135
	5.097V	3.422W		230.37V
4	1A	5.087W	82.931%	0.214
	5.086V	6.134W		230.37V
5	1.5A	7.612W	83.303%	0.275
	5.074V	9.139W		230.37V
6	3A	15.112W	83.342%	0.366
	5.037V	18.133W		230.37V

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
10%	5.262A	2.009A	2.004A	0.984A	84.996	85.6%	704	18.2	40.14°C	0.973
	12.048V	4.979V	3.293V	5.082V	99.301				44.39°C	115.12V
20%	11.555A	3.016A	3.007A	1.184A	169.944	89.819%	712	18.5	40.84°C	0.99
	12.033V	4.974V	3.292V	5.068V	189.18				45.55°C	115.11V
30%	18.232A	3.522A	3.51A	1.385A	254.947	91.53%	729	19.1	41.25°C	0.997
	12.006V	4.97V	3.29V	5.054V	278.549				46.29°C	115.08V
40%	24.917A	4.028A	4.014A	1.588A	340.037	91.287%	853	24.5	41.74°C	0.996
	11.993V	4.966V	3.289V	5.04V	372.46				47.24°C	115.05V
50%	31.250A	5.04A	5.02A	1.791A	424.919	90.869%	1018	31.0	42.23°C	0.996
	11.981V	4.961V	3.287V	5.025V	467.63				48.19°C	115.02V
60%	37.564A	6.054A	6.029A	1.996A	509.449	90.358%	1184	35.0	42.87°C	0.997
	11.970V	4.956V	3.284V	5.01V	563.871				49.25°C	115V
70%	43.955A	7.073A	7.04A	2.202A	594.797	89.687%	1394	38.9	43.61°C	0.997
	11.960V	4.95V	3.281V	4.995V	663.215				50.65°C	114.97V
80%	50.358A	8.003A	8.052A	2.308A	679.199	88.955%	1504	41.0	43.8°C	0.997
	11.949V	4.943V	3.278V	4.983V	763.508				51.89°C	114.95V
90%	57.173A	8.609A	8.548A	2.414A	765.082	88.208%	1539	41.4	44.51°C	0.997
	11.939V	4.936V	3.275V	4.971V	867.398				53.53°C	114.93V
100%	63.723A	9.128A	9.076A	3.033A	849.88	87.329%	1543	41.5	45.84°C	0.997
	11.929V	4.93V	3.272V	4.946V	973.333				55.86°C	114.91V
110%	70.151A	10.161A	10.191A	3.04A	934.489	86.249%	1542	41.5	47.1°C	0.998
	11.920V	4.921V	3.267V	4.936V	1083.46				58.02°C	114.88V
CL1	0.116A	12.148A	12.092A	0A	101.294	81.171%	1266	36.6	42.18°C	0.98
	12.028V	4.955V	3.283V	5.088V	124.781				47.66°C	115.13V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
CL2	0.116A	20.201A	0A	0A	101.39	80.203%	1009	30.8	41.23°C	0.981
	12.033V	4.95V	3.28V	5.101V	126.421				48.32°C	115.13V
CL3	0.116A	0A	20.123A	0A	67.385	74.296%	820	23.1	40.04°C	0.969
	12.029V	4.958V	3.279V	5.086V	90.662				49.05°C	115.14V
CL4	71.154A	0A	0A	0A	849.833	87.715%	1537	41.4	45.6°C	0.997
	11.944V	4.939V	3.274V	5.043V	968.821				56.51°C	114.91V

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
10%	5.263A	2.009A	2.004A	0.984A	85.003	86.411%	703	18.1	40.12°C	0.851
	12.046V	4.979V	3.294V	5.082V	98.377				44.39°C	230.39V
20%	11.559A	3.016A	3.007A	1.184A	169.971	90.825%	704	18.2	40.85°C	0.94
	12.031V	4.975V	3.293V	5.067V	187.252				45.57°C	230.39V
30%	18.239A	3.521A	3.51A	1.386A	254.984	92.502%	706	18.2	41.48°C	0.967
	12.003V	4.972V	3.291V	5.053V	275.674				46.74°C	230.38V
40%	24.922A	4.028A	4.014A	1.588A	340.081	92.767%	864	25.0	41.74°C	0.977
	11.992V	4.967V	3.289V	5.04V	366.577				47.26°C	230.38V
50%	31.260A	5.04A	5.021A	1.792A	425.019	92.625%	1022	31.1	42.14°C	0.984
	11.980V	4.962V	3.287V	5.025V	458.866				48.38°C	230.37V
60%	37.574A	6.055A	6.03A	1.997A	509.552	92.27%	1239	36.2	43.07°C	0.986
	11.969V	4.956V	3.284V	5.01V	552.244				49.81°C	230.36V
70%	43.967A	7.074A	7.041A	2.203A	594.902	91.848%	1362	38.9	43.57°C	0.991
	11.958V	4.95V	3.281V	4.995V	647.633				50.64°C	230.35V
80%	50.373A	8.003A	8.053A	2.309A	679.308	91.355%	1521	41.2	44.7°C	0.994
	11.948V	4.943V	3.278V	4.982V	743.484				52.76°C	230.34V
90%	57.185A	8.611A	8.55A	2.415A	765.185	90.93%	1542	41.5	44.36°C	0.995
	11.938V	4.936V	3.275V	4.97V	841.571				53.46°C	230.32V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
100%	63.737A	9.131A	9.078A	3.034A	849.979	90.43%	1545	41.5	45.7°C	0.997
	11.928V	4.929V	3.271V	4.945V	939.923				55.74°C	230.31V
110%	70.164A	10.164A	10.194A	3.04A	934.576	89.754%	1543	41.5	47.23°C	0.997
	11.919V	4.92V	3.266V	4.935V	1041.182				58.17°C	230.29V
CL1	0.116A	12.148A	12.093A	0A	101.296	82.126%	1287	36.9	44.18°C	0.886
	12.028V	4.955V	3.282V	5.088V	123.356				49.71°C	230.39V
CL2	0.116A	20.196A	0A	0A	101.39	80.997%	1051	31.8	42.4°C	0.888
	12.033V	4.951V	3.28V	5.101V	125.17				49.45°C	230.39V
CL3	0.116A	0A	20.122A	0A	67.383	75.005%	865	25.1	41.05°C	0.83
	12.029V	4.959V	3.279V	5.085V	89.844				50.15°C	230.38V
CL4	71.162A	0A	0A	0A	849.902	90.964%	1542	41.5	46.84°C	0.996
	11.943V	4.94V	3.275V	5.043V	934.31				57.76°C	230.31V

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])	Temps (In/Out)	PF/AC Volts
20W	1.232A	0.502A	0.501A	0.196A	19.998	79.792%	0	<6.0	39.66°C	0.833
	12.044V	4.984V	3.295V	5.11V	25.189				36.57°C	115.12V
40W	2.712A	0.702A	0.701A	0.294A	39.995	68.642%	0	<6.0	40.38°C	0.946
	12.055V	4.983V	3.295V	5.105V	58.251				37.01°C	115.13V
60W	4.190A	0.903A	0.901A	0.392A	59.994	83.731%	0	<6.0	41.97°C	0.961
	12.057V	4.981V	3.294V	5.101V	71.67				38.13°C	115.12V
80W	5.669A	1.105A	1.102A	0.491A	79.948	85.436%	701	18.0	39.32°C	0.971
	12.052V	4.98V	3.294V	5.096V	93.556				43.29°C	115.12V

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
20W	1.236A	0.502A	0.501A	0.196A	20.002	80.21%	0	<6.0	40.01°C	0.521
	12.022V	4.985V	3.296V	5.109V	24.93				36.91°C	230.38V
40W	2.712A	0.702A	0.701A	0.294A	40	69.128%	0	<6.0	40.93°C	0.725
	12.055V	4.984V	3.295V	5.105V	57.863				37.68°C	230.39V
60W	4.191A	0.903A	0.901A	0.392A	59.999	84.35%	0	<6.0	41.89°C	0.773
	12.056V	4.982V	3.295V	5.101V	71.221				38.43°C	230.39V
80W	5.668A	1.105A	1.102A	0.491A	79.968	86.736%	0	<6.0	43.59°C	0.841
	12.055V	4.98V	3.294V	5.096V	92.191				39.74°C	230.39V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	16.75mV	3.99mV	3.89mV	5.55mV	Pass
20% Load	20.84mV	4.45mV	4.91mV	11.32mV	Pass
30% Load	12.70mV	5.06mV	4.45mV	5.81mV	Pass
40% Load	9.69mV	5.11mV	4.09mV	6.07mV	Pass
50% Load	9.13mV	6.09mV	6.50mV	6.47mV	Pass
60% Load	9.64mV	5.83mV	4.30mV	7.09mV	Pass
70% Load	8.67mV	6.13mV	4.71mV	8.46mV	Pass
80% Load	14.35mV	7.16mV	11.87mV	12.64mV	Pass
90% Load	32.13mV	12.42mV	19.86mV	25.18mV	Pass
100% Load	17.61mV	8.59mV	14.83mV	15.51mV	Pass
110% Load	24.52mV	12.65mV	17.62mV	22.68mV	Pass
Crossload1	7.05mV	5.64mV	11.26mV	11.65mV	Pass
Crossload2	6.89mV	5.22mV	4.66mV	9.38mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
Crossload3	17.52mV	4.60mV	12.90mV	11.73mV	Pass
Crossload4	29.06mV	11.77mV	16.83mV	27.05mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	17.32mV	4.24mV	4.15mV	5.35mV	Pass
20% Load	21.04mV	4.24mV	4.25mV	5.45mV	Pass
30% Load	12.85mV	5.06mV	4.45mV	6.42mV	Pass
40% Load	9.64mV	4.96mV	4.20mV	6.27mV	Pass
50% Load	8.72mV	6.03mV	6.91mV	6.02mV	Pass
60% Load	9.38mV	5.47mV	4.35mV	6.17mV	Pass
70% Load	9.33mV	5.57mV	4.45mV	7.49mV	Pass
80% Load	8.26mV	6.14mV	8.96mV	7.14mV	Pass
90% Load	8.17mV	6.75mV	9.47mV	8.00mV	Pass
100% Load	12.95mV	7.92mV	10.16mV	9.12mV	Pass
110% Load	13.14mV	8.33mV	11.35mV	9.11mV	Pass
Crossload1	7.03mV	5.58mV	11.40mV	11.54mV	Pass
Crossload2	7.41mV	5.42mV	4.71mV	9.23mV	Pass
Crossload3	17.06mV	4.40mV	12.33mV	11.06mV	Pass
Crossload4	12.92mV	7.01mV	5.06mV	11.46mV	Pass

The results above are not used in the certification process

Thermaltake Toughpower GF3 ARGB 850W



Top side



Power specifications label

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