thermaltake

Thermaltake Toughpower PF3 750W

Serial Number PSTPD0750FNFAPU3PD000094

Lab ID TT75002271

Certification ID 252271

Test Result Report ID: 23PS2271A

Certificate Issue Date: Oct 27, 2023

Scheme: ETA-EMI PSU

115V: CYBENETICS PLATINUM

230V: CYBENETICS PLATINUM 230v

Scheme: LAMBDA PSU

115V: CYBENETICS A-

230V: CYBENETICS A- 230v

CYBENETICS ATX 3.0 PASS

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 PF3 750W
OEM/ODM	HKC
Serial Number	PSTPD0750FNFAPU3PD000094
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10

Rated Frequency (Hz)	50-60
Rated Power (W)	750
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	120mm Fluid Dynamic Bearing Fan [TT-1225 (BDK12025MS)]
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	TT75002271
Date of receipt	Sep 23, 2023
Testing Date	Oct 27, 2023
Report Issued Date	Oct 27, 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	18AWG	No
4+4 pin EPS12V (650mm+150mm)	1	2	18AWG	No
6+2 pin PCIe (500mm+150mm)	2	4	18AWG	No
12+4 pin PCIe (600mm) (600W)	1	1	18-26AWG	No
SATA (500mm+145mm+145mm+145mm)	2	8	18AWG	No
4-pin Molex (500mm+150mm+150mm+150mm)	1	4	18AWG	No
FDD Adapter (150mm)	1	1	22AWG	No

AC Power Cord (1380mm) - C13 coupler	1	1	16AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	62.5	3	0.3
	Watts	100		750	15	3.6
Total Max. Power (W)		750				

Parts Description

General Data	-
Manufacturer (OEM)	HKC
PCB Type	Double-Sided
Primary Side	-
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	1x NTC Thermistor 5D-15 (5 Ohm @ 25°C) & Relay
Bridge Rectifier(s)	2x GB1006U (600V, 10A @ 120°C)
APFC MOSFETs	2x WayOn WML36N60F2 (650V, 20A @ 100°C, Rds(on): 0.11Ohm)
APFC Boost Diode	1x P3D0601012
Bulk Cap(s)	2x Rubycon (420V, 390uF each or 780uF combined, 3000h @ 105°C, MXK)
Main Switchers	4x Ncepower NCE65TF130F (650V, 18A @ 100°C, Rds(on): 0.13Ohm)
APFC Controller	Champion CH6502UHHX
Resonant Controller	Champion CU6901VPA
Topology	Primary side: APFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	8x
5V & 3.3V	DC-DC Converters: 2x PWM Controller(s): ANPEC APW7159C
Filtering Capacitors	Electrolytic: 5x Nippon Chemi-Con (2-5,000 @ 105°C, KZE), 2x Nippon Chemi-Con (4-10,000 @ 105°C, KYA) Polymer: 35x no info
Supervisor IC	Weltrend WT7527RA
Fan Model	TT-1225 BDK12025MS (120mm, 12V, 0.30A, Fluid Dynamic Bearing Fan)

5VSB Circuit	-
Rectifier	PJ1256
Standby PWM Controller	PN8141

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)	90.788%
Average Noise Output (>1450 Load Combinations)	29.62dBA
Average PF (>1450 Load Combinations)	0.976
Efficiency With 10W (≤500W) or 2% (>500W) Load	66.561%
Standby Power Consumption	0.0648W
Non-Accredited	
12V Ripple (Full Load)	19.99mV
5V Ripple (Full Load)	10.28mV
3.3V Ripple (Full Load)	20.11mV
5VSB Ripple (Full Load)	19.60mV
12V Load Regulation	0.42%
5V Load Regulation	0.40%
3.3V Load Regulation	0.75%
5VSB Load Regulation	2.26%

Inrush Current	32.650A

230V

Accredited		
Average Efficiency (>1450 load combinations)		91.936%
Average Noise Output (>1450 Load Combinations)		29.62dBA
Average PF (>1450 Load Combinations)		0.939
Efficiency With 10W (≤500W) or 2% (>500W) Load		65.457%
Standby Power Consumption		0.1376W
Non-Accredited		
12V Ripple (Full Load)		21.10mV
5V Ripple (Full Load)		10.29mV
3.3V Ripple (Full Load)		22.56mV
5VSB Ripple (Full Load)		19.82mV
12V Load Regulation		1.27%
5V Load Regulation		0.40%
3.3V Load Regulation		0.75%
5VSB Load Regulation		2.26%
Inrush Current		66.600A
12V Transient Response (200%)		11.53V
5V Transient Response (200%)		4.936V
3.3V Transient Response (200%)		3.233V
5VSB Transient Response (200%)		4.928V
Hold-Up Time & PWR_OK Signal		24.10ms
AC Loss to PWR_OK Hold Up Time		19.50ms
PWR_OK Inactive to DC Loss Delay		4.60ms
PSU Timings: T1 (20% / 100%)	92.0ms	92.0ms
PSU Timings: T3 (20% / 100%)	125.0ms	123.0ms
OPP (23.88°C / 38.22°C)	150.36%	149.95%

Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	24.1
AC Loss to PWR_OK Hold Up Time (ms)	19.5
PWR_OK Inactive to DC Loss Delay (ms)	4.6

Stromverbrauch im Ruhezustand

Tables

115V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	114.89 V	114.84 V	113.85 V	114.94 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.98 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.419	1.417	1.340	1.421	1.490	PASS
Mains Voltage THD:	0.15 %	0.09 %	N/A	0.28 %	2.00 %	PASS
Real Power:	0.065 W	0.041 W	N/A	0.090 W	N/A	N/A
Apparent Power:	8.831 W	8.809 W	N/A	8.859 W	N/A	N/A
Power Factor:	0.006	N/A	N/A	N/A	N/A	N/A

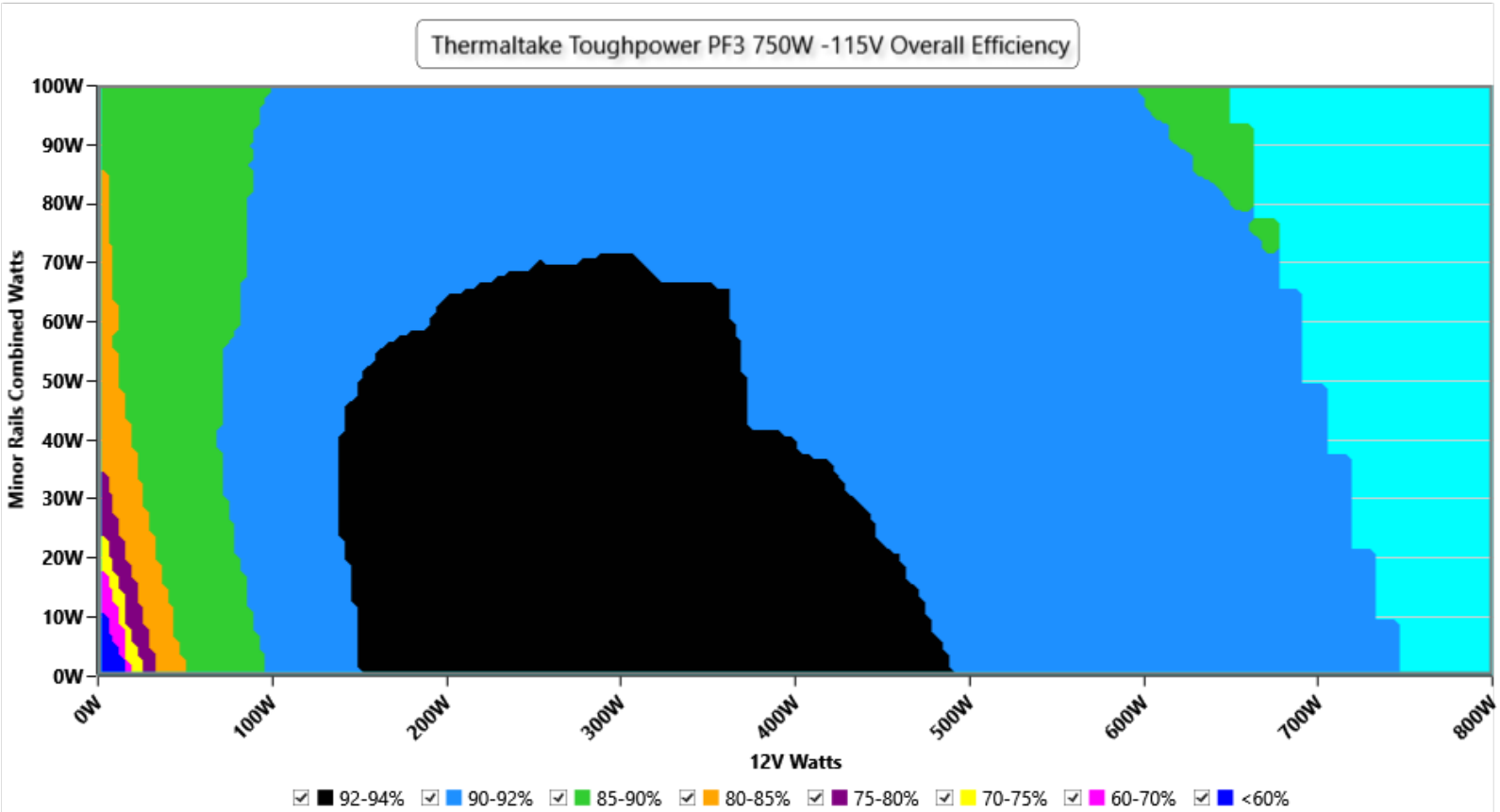
230V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	229.97 V	229.88 V	227.70 V	230.00 V	232.30 V	PASS
Mains Frequency:	50.00 Hz	49.99 Hz	49.50 Hz	50.01 Hz	50.50 Hz	PASS
Mains Voltage CF:	1.417	1.415	1.340	1.419	1.490	PASS
Mains Voltage THD:	0.13 %	0.08 %	N/A	0.19 %	2.00 %	PASS
Real Power:	0.138 W	0.089 W	N/A	0.216 W	N/A	N/A
Apparent Power:	30.989 W	30.946 W	N/A	31.035 W	N/A	N/A

Power Factor:	0.004	N/A	N/A	N/A	N/A	N/A

Efficiency Graph

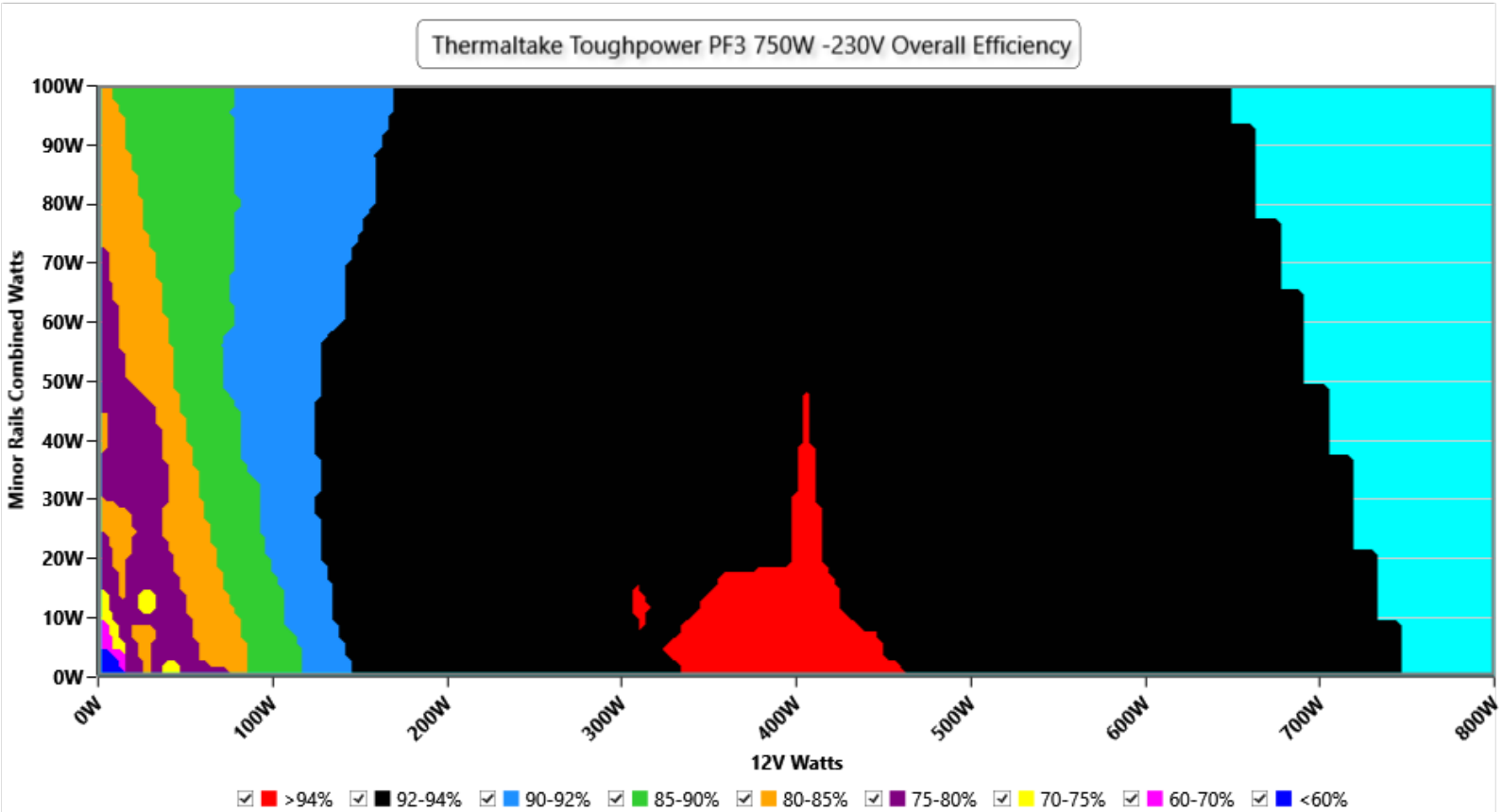
115V



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

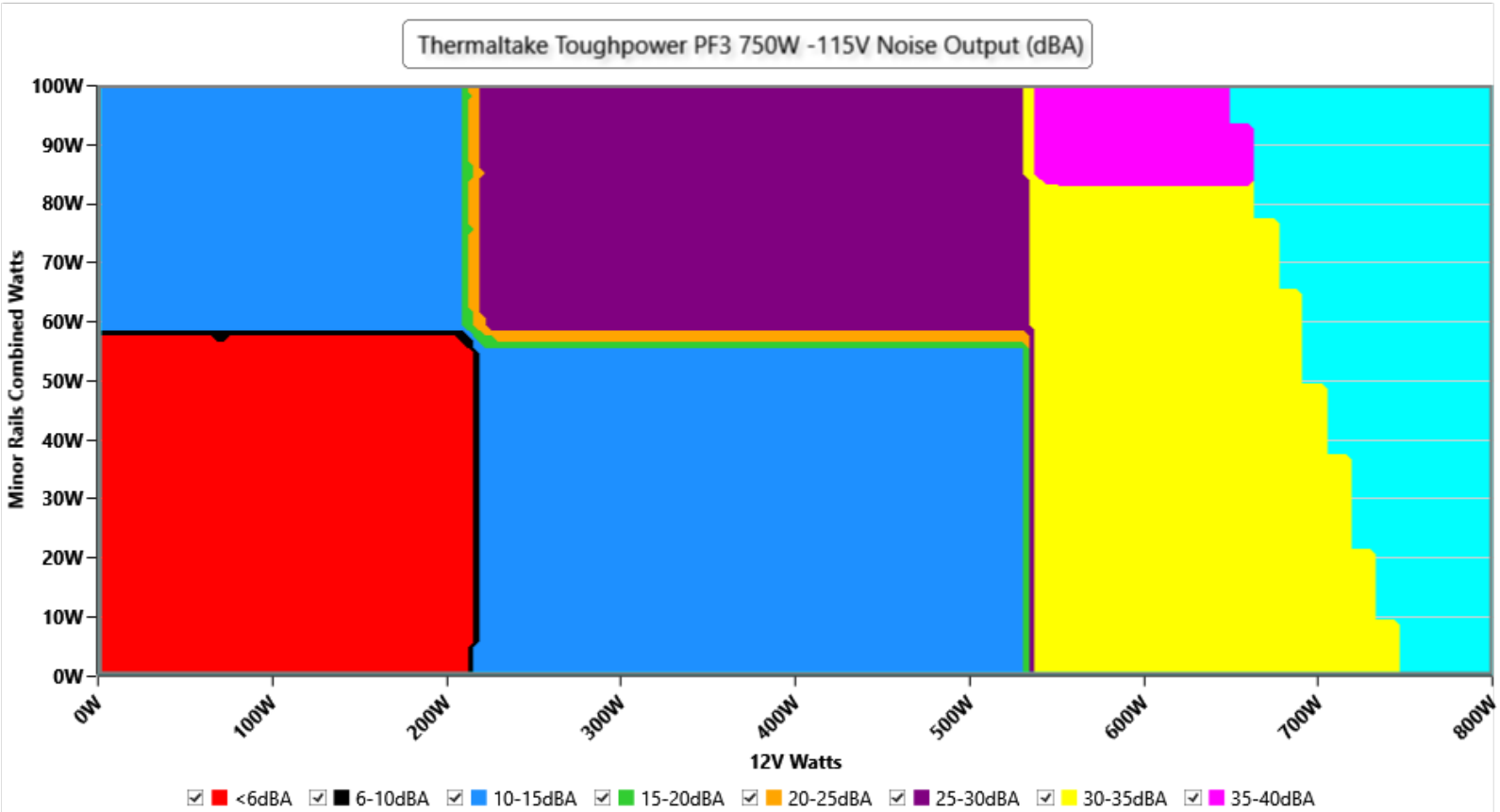


INFO

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

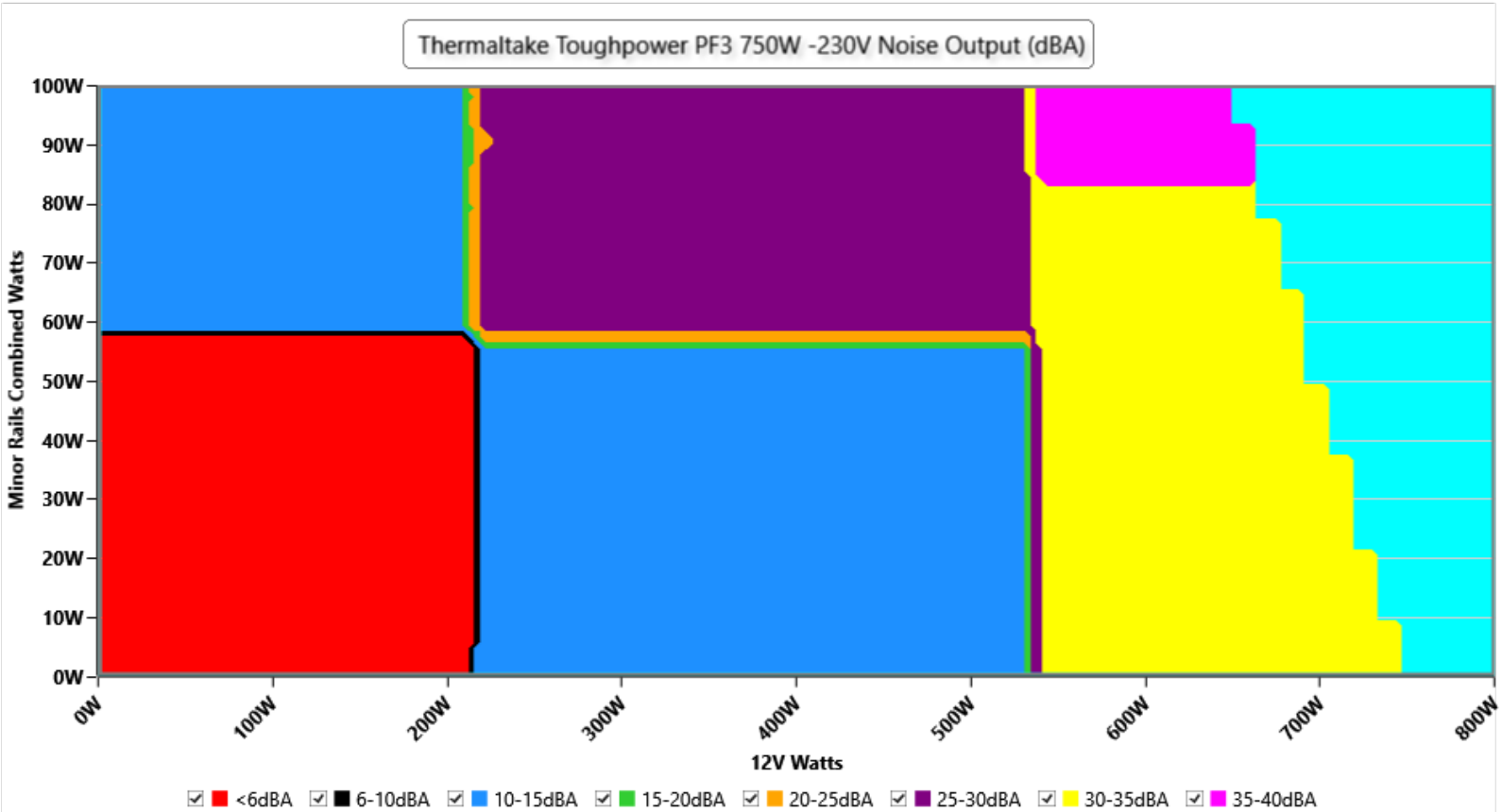
115V



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

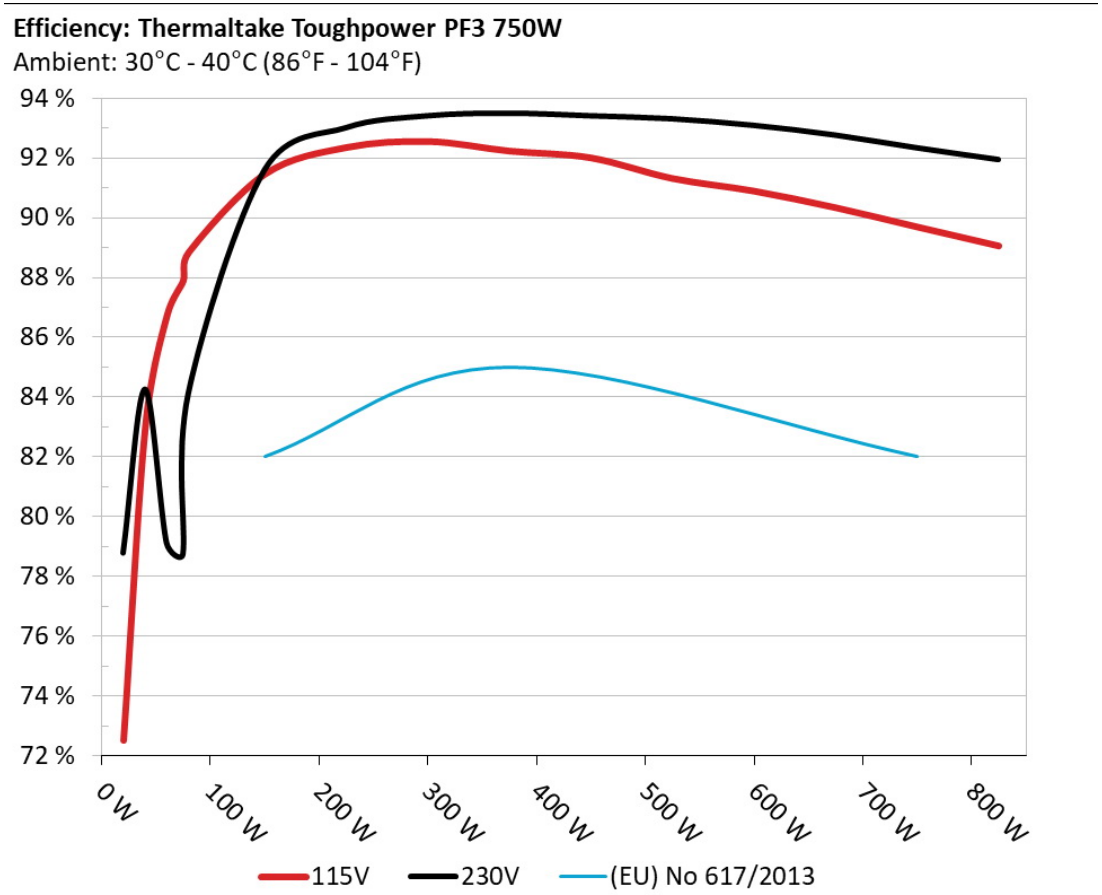


INFO

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

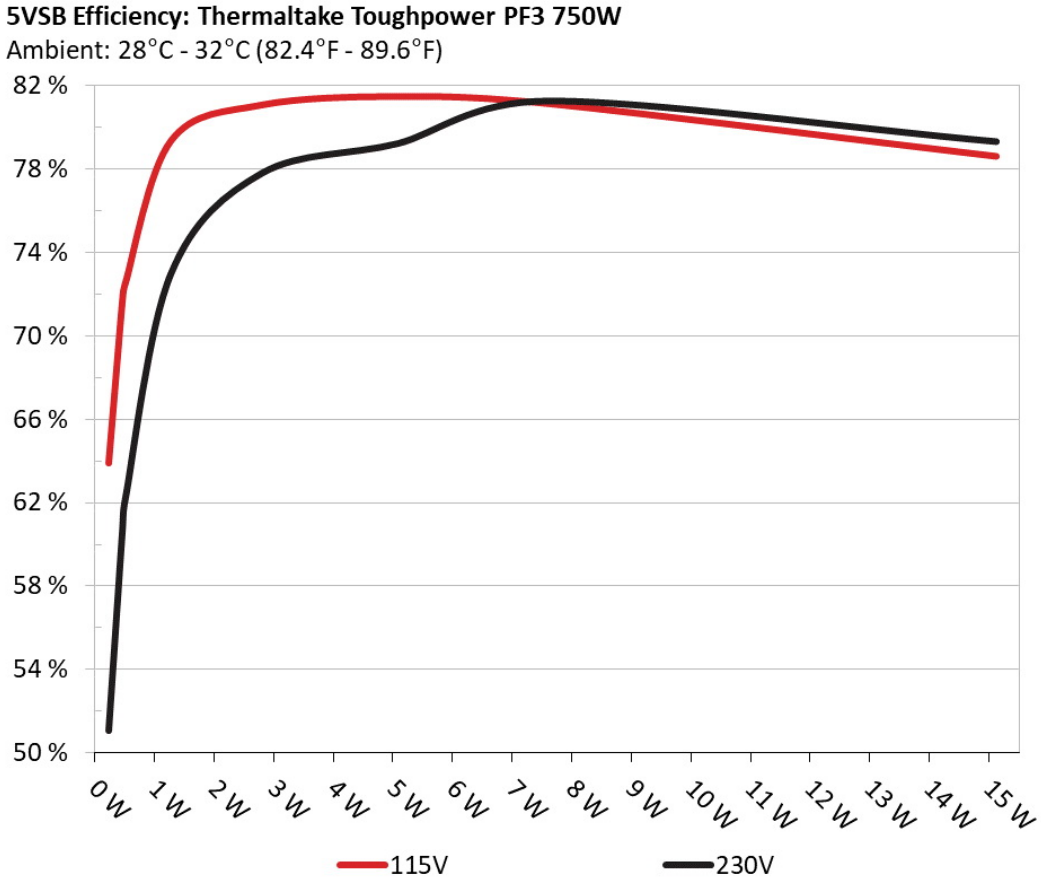
Efficiency under high ambient temperature



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	64.411%	0.045
	5.104V	0.357W		114.87V
2	0.09A	0.459W	72.197%	0.079
	5.103V	0.636W		114.87V
3	0.55A	2.8W	81.57%	0.299
	5.092V	3.433W		114.88V
4	1A	5.082W	81.978%	0.372
	5.082V	6.199W		114.87V
5	1.5A	7.608W	81.633%	0.422
	5.072V	9.319W		114.88V
6	3A	15.117W	79.109%	0.485
	5.039V	19.11W		114.87V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.23W	51.534%	0.017
	5.104V	0.447W		229.94V
2	0.09A	0.459W	61.135%	0.028
	5.104V	0.751W		229.95V
3	0.55A	2.8W	78.302%	0.124
	5.093V	3.577W		229.94V
4	1A	5.082W	79.727%	0.199
	5.083V	6.374W		229.94V
5	1.5A	7.608W	81.77%	0.237
	5.072V	9.303W		229.94V
6	3A	15.117W	79.817%	0.345
	5.039V	18.94W		229.94V

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%	4.471A	2A	1.976A	0.984A	74.999	87.896%	0	<6.0	38.24°C	0.946
	11.943V	4.999V	3.34V	5.083V	85.327				34.02°C	114.85V
20%	9.963A	3.001A	2.966A	1.183A	149.922	91.443%	0	<6.0	39.49°C	0.967
	11.946V	4.998V	3.338V	5.074V	163.95				34.82°C	114.82V
30%	15.807A	3.502A	3.462A	1.382A	224.915	92.334%	0	<6.0	40.21°C	0.975
	11.948V	4.997V	3.336V	5.064V	243.589				35.19°C	114.8V
40%	21.653A	4.004A	3.96A	1.583A	300.007	92.534%	756	13.9	35.58°C	0.979
	11.952V	4.995V	3.333V	5.054V	324.216				41.21°C	114.77V
50%	27.093A	5.008A	4.954A	1.785A	374.442	92.216%	1149	26.7	36.04°C	0.982
	11.957V	4.993V	3.331V	5.043V	406.047				42.09°C	114.74V
60%	32.567A	6.012A	5.949A	1.987A	449.323	91.988%	1147	26.6	36.7°C	0.984
	11.961V	4.99V	3.328V	5.033V	488.446				43.28°C	114.72V
70%	37.995A	7.018A	6.946A	2.19A	524.223	91.302%	1145	26.6	37.21°C	0.984
	11.979V	4.988V	3.326V	5.023V	574.167				44.25°C	114.69V
80%	43.522A	8.001A	7.943A	2.293A	599.312	90.878%	1144	26.6	37.54°C	0.985
	11.983V	4.986V	3.324V	5.015V	659.469				45.58°C	114.66V
90%	49.377A	8.525A	8.43A	2.396A	674.444	90.326%	1812	39.9	38.05°C	0.986
	11.988V	4.985V	3.322V	5.007V	746.671				47.12°C	114.63V
100%	55.029A	9.029A	8.947A	3.006A	749.662	89.679%	1814	40.0	39.03°C	0.988
	11.993V	4.984V	3.319V	4.989V	835.947				49.05°C	114.6V
110%	60.544A	10.035A	10.038A	3.01A	824.69	89.046%	2222	44.9	40.08°C	0.988
	11.997V	4.982V	3.317V	4.983V	926.14				50.98°C	114.57V
CL1	0.115A	12.064A	11.913A	0A	101.274	86.081%	1166	27.2	34.58°C	0.957
	11.949V	4.99V	3.332V	5.096V	117.648				40.08°C	114.83V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
CL2	0.115A	20.048A	0A	0A	101.334	84.2%	1819	40.1	34.47°C	0.957
	11.948V	4.986V	3.341V	5.098V	120.348				41.56°C	114.84V
CL3	0.116A	0A	19.83A	0A	67.378	80.06%	763	14.1	33.86°C	0.945
	11.940V	5V	3.328V	5.095V	84.162				42.93°C	114.85V
CL4	62.513A	0A	0A	0A	749.505	90.513%	1807	39.8	39.45°C	0.987
	11.989V	4.995V	3.328V	5.059V	828.07				50.36°C	114.6V

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%	4.449A	2A	1.976A	0.983A	74.998	78.758%	0	<6.0	38.31°C	0.831
	12.001V	4.999V	3.34V	5.084V	95.232				34.09°C	229.93V
20%	9.939A	3.001A	2.966A	1.182A	149.926	91.598%	0	<6.0	39.26°C	0.901
	11.977V	4.998V	3.338V	5.075V	163.677				34.65°C	229.92V
30%	15.785A	3.503A	3.463A	1.382A	224.923	93.016%	0	<6.0	40.19°C	0.932
	11.965V	4.996V	3.336V	5.065V	241.81				35.1°C	229.91V
40%	21.620A	4.004A	3.96A	1.583A	300.005	93.414%	1152	26.8	35.71°C	0.949
	11.970V	4.995V	3.333V	5.055V	321.159				41.28°C	229.9V
50%	27.049A	5.007A	4.954A	1.784A	374.38	93.498%	1149	26.7	36.24°C	0.958
	11.974V	4.993V	3.331V	5.044V	400.416				42.29°C	229.89V
60%	32.520A	6.012A	5.949A	1.986A	449.277	93.414%	1147	26.6	36.93°C	0.964
	11.977V	4.99V	3.328V	5.034V	480.951				43.51°C	229.87V
70%	37.992A	7.018A	6.946A	2.189A	524.197	93.314%	1146	26.6	37.42°C	0.968
	11.979V	4.988V	3.326V	5.024V	561.756				44.54°C	229.86V
80%	43.522A	8.001A	7.943A	2.293A	599.301	93.096%	1145	26.6	37.68°C	0.971
	11.982V	4.986V	3.324V	5.015V	643.743				45.8°C	229.85V
90%	49.380A	8.525A	8.43A	2.396A	674.441	92.769%	1817	40.0	38.23°C	0.974
	11.988V	4.985V	3.321V	5.007V	727.012				47.27°C	229.84V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
100%	55.033A	9.029A	8.947A	3.006A	749.664	92.342%	1817	40.0	39.47°C	0.976
	11.992V	4.984V	3.319V	4.99V	811.838				49.54°C	229.83V
110%	60.547A	10.035A	10.038A	3.01A	824.695	91.95%	2219	44.9	40.16°C	0.978
	11.997V	4.982V	3.317V	4.984V	896.894				51.09°C	229.81V
CL1	0.115A	12.064A	11.913A	0A	101.283	83.783%	1161	27.0	34.18°C	0.866
	11.986V	4.99V	3.332V	5.096V	120.888				39.69°C	229.93V
CL2	0.115A	20.049A	0A	0A	101.345	82.768%	1818	40.1	34.42°C	0.868
	11.983V	4.986V	3.341V	5.099V	122.443				41.44°C	229.93V
CL3	0.115A	0A	19.83A	0A	67.376	75.829%	974	21.4	34.43°C	0.819
	11.985V	5.001V	3.328V	5.096V	88.863				43.51°C	229.94V
CL4	62.506A	0A	0A	0A	749.512	93.124%	1808	39.8	39.05°C	0.975
	11.991V	4.995V	3.328V	5.059V	804.856				49.99°C	229.82V

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	1.242A	0.5A	0.493A	0.196A	19.99	72.529%	0	<6.0	33.51°C	0.851
	11.945V	5.004V	3.344V	5.102V	27.561				30.42°C	114.86V
40W	2.736A	0.699A	0.691A	0.294A	39.992	83.003%	0	<6.0	34.18°C	0.91
	11.943V	5.003V	3.343V	5.1V	48.181				30.89°C	114.85V
60W	4.230A	0.899A	0.888A	0.392A	59.996	86.728%	0	<6.0	35.82°C	0.935
	11.943V	5.003V	3.342V	5.096V	69.177				32.06°C	114.85V
80W	5.720A	1.1A	1.086A	0.491A	79.941	88.83%	0	<6.0	36.99°C	0.948
	11.944V	5.001V	3.341V	5.093V	89.992				33.07°C	114.85V

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	1.252A	0.5A	0.493A	0.196A	19.992	78.796%	0	<6.0	33.09°C	0.515
	11.851V	5.004V	3.344V	5.103V	25.372				30.01°C	229.94V
40W	2.758A	0.7A	0.691A	0.294A	39.996	84.267%	0	<6.0	34.76°C	0.687
	11.850V	5.003V	3.343V	5.099V	47.463				31.49°C	229.95V
60W	4.216A	0.899A	0.888A	0.392A	59.998	79.116%	0	<6.0	36.01°C	0.79
	11.981V	5.003V	3.342V	5.096V	75.842				32.51°C	229.94V
80W	5.694A	1.1A	1.086A	0.491A	79.938	84.129%	0	<6.0	36.86°C	0.83
	11.996V	5.001V	3.341V	5.094V	95.019				33.06°C	229.93V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.22mV	7.01mV	10.45mV	6.45mV	Pass
20% Load	7.73mV	7.47mV	10.14mV	6.66mV	Pass
30% Load	8.61mV	7.21mV	10.45mV	6.76mV	Pass
40% Load	11.55mV	7.47mV	11.48mV	6.86mV	Pass
50% Load	12.84mV	7.88mV	12.20mV	7.07mV	Pass
60% Load	12.58mV	7.83mV	14.27mV	7.43mV	Pass
70% Load	12.22mV	8.24mV	14.12mV	8.00mV	Pass
80% Load	12.22mV	8.60mV	15.05mV	8.26mV	Pass
90% Load	13.56mV	9.99mV	17.17mV	8.78mV	Pass
100% Load	19.99mV	10.28mV	20.11mV	19.60mV	Pass
110% Load	18.04mV	10.34mV	21.93mV	20.46mV	Pass
Crossload1	13.65mV	9.08mV	12.60mV	5.70mV	Pass
Crossload2	12.53mV	12.67mV	11.12mV	5.16mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
Crossload3	10.93mV	6.96mV	12.15mV	5.32mV	Pass
Crossload4	19.42mV	8.78mV	19.84mV	7.25mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	12.84mV	7.06mV	10.60mV	6.20mV	Pass
20% Load	12.77mV	6.54mV	10.50mV	6.40mV	Pass
30% Load	13.52mV	7.42mV	10.91mV	6.97mV	Pass
40% Load	13.25mV	20.30mV	17.94mV	7.23mV	Pass
50% Load	12.79mV	8.76mV	13.29mV	7.17mV	Pass
60% Load	12.05mV	7.99mV	13.24mV	7.74mV	Pass
70% Load	12.32mV	8.04mV	14.94mV	8.16mV	Pass
80% Load	12.84mV	8.45mV	16.50mV	8.11mV	Pass
90% Load	13.30mV	10.10mV	17.43mV	8.83mV	Pass
100% Load	21.10mV	10.29mV	22.56mV	19.82mV	Pass
110% Load	18.83mV	10.26mV	26.57mV	21.27mV	Pass
Crossload1	12.97mV	8.70mV	13.25mV	6.17mV	Pass
Crossload2	17.48mV	13.96mV	10.96mV	5.68mV	Pass
Crossload3	8.76mV	7.37mV	12.15mV	5.26mV	Pass
Crossload4	21.19mV	8.83mV	23.57mV	6.89mV	Pass

The results above are not used in the certification process

Thermaltake Toughpower PF3 750W

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

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