Thermaltake Toughpower GF A3 1050W (HKC)

PSTPD1050FNFAGEHPK000199

Lab ID TT10502249

Certification ID 252249

Test Result Report ID: 23PS2249A

Certificate Issue Date: Oct 3, 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 GF A3 1050W (HKC)
OEM/ODM	HKC
Serial Number	PSTPD1050FNFAGEHPK000199
Product Specifications	
Manufacturer-Provided Information	
□□□□ (Vrms)	100-240
□□□□ (Arms)	15

□□□□ (Hz)	50-60
□□□□ (W)	1050
Operating Temperature (Continuous Full Load) (°C)	
□□	ATX12V
□□□□	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
□□	120mm Sleeve Bearing Fan [TT-1225 (AV-F12025MS)]
□□□□□	✓ (selectable)
Cybenetics Testing Information	
Lab ID	TT10502249
Date of receipt	Aug 17, 2023
Testing Date	Oct 2, 2023
Report Issued Date	Oct 3, 2023
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	16-18AWG	□
4+4 pin EPS 12V □□ (650mm)	2	2	16AWG	□
6+2pin PCIe□□ (500mm+155mm)	2	4	16-18AWG	□
6+2pin PCIe□□ (500mm)	1	1	16-18AWG	□
12+4 pin PCIe (600mm) (600W)	1	1	16-26AWG	□
SATA□□ (500mm+150mm+150mm+150mm)	3	12	18AWG	□
4-pin Molex (500mm+155m+155mm+155mm)	1	4	18AWG	□

□ 4pin □□ (150mm)	1	1	22AWG	□
AC Power Cord (1400mm) - C13 coupler	1	1	18AWG	-

□□□□

□		3.3V	5V	12V	5VSB	-12V
□□□□	□□	20	20	87.5	3	0.3
	□	100		1050	15	3.6
□□□□□ (W)		1050				

Parts Description

General Data	
Manufacturer (OEM)	HKC
PCB Type	Double-Sided
Primary Side	
Transient Filter	4x Y caps, 1x X caps, 2x CM chokes, 1x MOV
Inrush Protection	1x NTC Thermistor 5D-15 (5 Ohm @ 25°C) & Relay
Bridge Rectifier(s)	2x Diodes GBU25KH (800V, 25A @with heatsink)
APFC MOSFETs	2x Lonten LSB65R099GT (650V, 26A @ 100°C, Rds(on): 0.099Ohm)
APFC Boost Diode	1x Global Power Tech. G3S06010J (600V, 8A @ 150°C)
Bulk Cap(s)	1x Nippon Chemi-Con (420V, 570uF , 2000h @ 105°C, KHE) 1x Nippon Chemi-Con (420V, 470uF , 2000h @ 105°C, KMZ)
Main Switchers	2x Lonten LSB65R099GT (650V, 26A @ 100°C, Rds(on): 0.099Ohm)
APFC Controller	Champion CM6500UNX & CM03X
Resonant Controller	Champion CM6901X
Digital MCU	Texas Instrument TPS54231
IC Driver	Novesense NSi6602
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETs	6x Infineon ISC012N04LM6 (40V, 141A @ 100°C, Rds(on): 1.2Ohm)
5V & 3.3V	DC-DC Converters: 4x Excelliance MOS EMB06N03A (30V, 50A @ 100°C, Rds(on): 6mOhm) PWM Controller(s): 1x ANPEC APW7159C

Filtering Capacitors	Electrolytic: 3x CapXon (3,000h @ 105°C, KF) 8x CapXon (2,000h @ 105°C, KF) 2x CapXon (2,000h @ 105°C, GF) Polymer: 39x CapXon
Supervisor IC	IN1S429I - SCG
Fan Controller	1x
Fan Model	TT-1225 (AV-F12025MS) (120mm, 12V, 0.3A, Sleeve Bearing Fan)
5VSB Circuit	
Rectifier	SB1045L (45V, 10A)
Standby PWM Controller	PN8141

Test Results

Temperature & Compliance Info

□□□□ (°C /°F)	28-32 / 82.4-89.6
□□ ErP Lot3/6□□	✓
□□ (EU) No 617/2013□□	✓
ALPM (Alternative Low Power Mode) compatible	✓
ATX v3.0 Compliance	✓

Performance Summary

115V

Accredited	
□□□□ (>1450 load combinations)	89.649%
Average Noise Output (>1450 Load Combinations)	26.05dBA
PF□□□ (>1450 Load Combinations)	0.988
Efficiency With 10W (≤500W) or 2% (>500W) Load	70.604%
□□□□□□	0.0338W

Non-Accredited	
12V Ripple (Full Load)	17.79mV
5V Ripple (Full Load)	9.05mV
3.3V Ripple (Full Load)	10.29mV
5VSB Ripple (Full Load)	10.29mV
12V Load Regulation	0.47%
5V Load Regulation	0.38%
3.3V Load Regulation	0.88%
5VSB Load Regulation	2.35%
Inrush Current	33.840A

230V

Accredited	
□□□□ (>1450 load combinations)	91.823%
Average Noise Output (>1450 Load Combinations)	24.70dBA
PF□□□ (>1450 Load Combinations)	0.956
Efficiency With 10W (≤500W) or 2% (>500W) Load	69.644%
□□□□□□	0.1024W
Non-Accredited	
12V Ripple (Full Load)	17.53mV
5V Ripple (Full Load)	9.29mV
3.3V Ripple (Full Load)	10.53mV
5VSB Ripple (Full Load)	10.23mV
12V Load Regulation	0.49%
5V Load Regulation	0.36%
3.3V Load Regulation	0.88%
5VSB Load Regulation	2.47%
Inrush Current	65.300A
12V Transient Response (200%)	11.21V
5V Transient Response (200%)	4.946V
3.3V Transient Response (200%)	3.181V
5VSB Transient Response (200%)	4.889V

□□□□ & PG□□		21.70ms
AC Loss to PWR_OK Hold Up Time		18.70ms
PWR_OK Inactive to DC Loss Delay		3.00ms
PSU Timings: T1 (20% / 100%)	49.0ms	50.0ms
PSU Timings: T3 (20% / 100%)	112.0ms	113.0ms
OPP (25.65°C / 36.24°C)	125.06%	118.44%

□□□□ & PG□□

Hold-Up Time (ms)	21.7
AC Loss to PWR_OK Hold Up Time (ms)	18.7
PWR_OK Inactive to DC Loss Delay (ms)	3

□□□□

Tables

115V

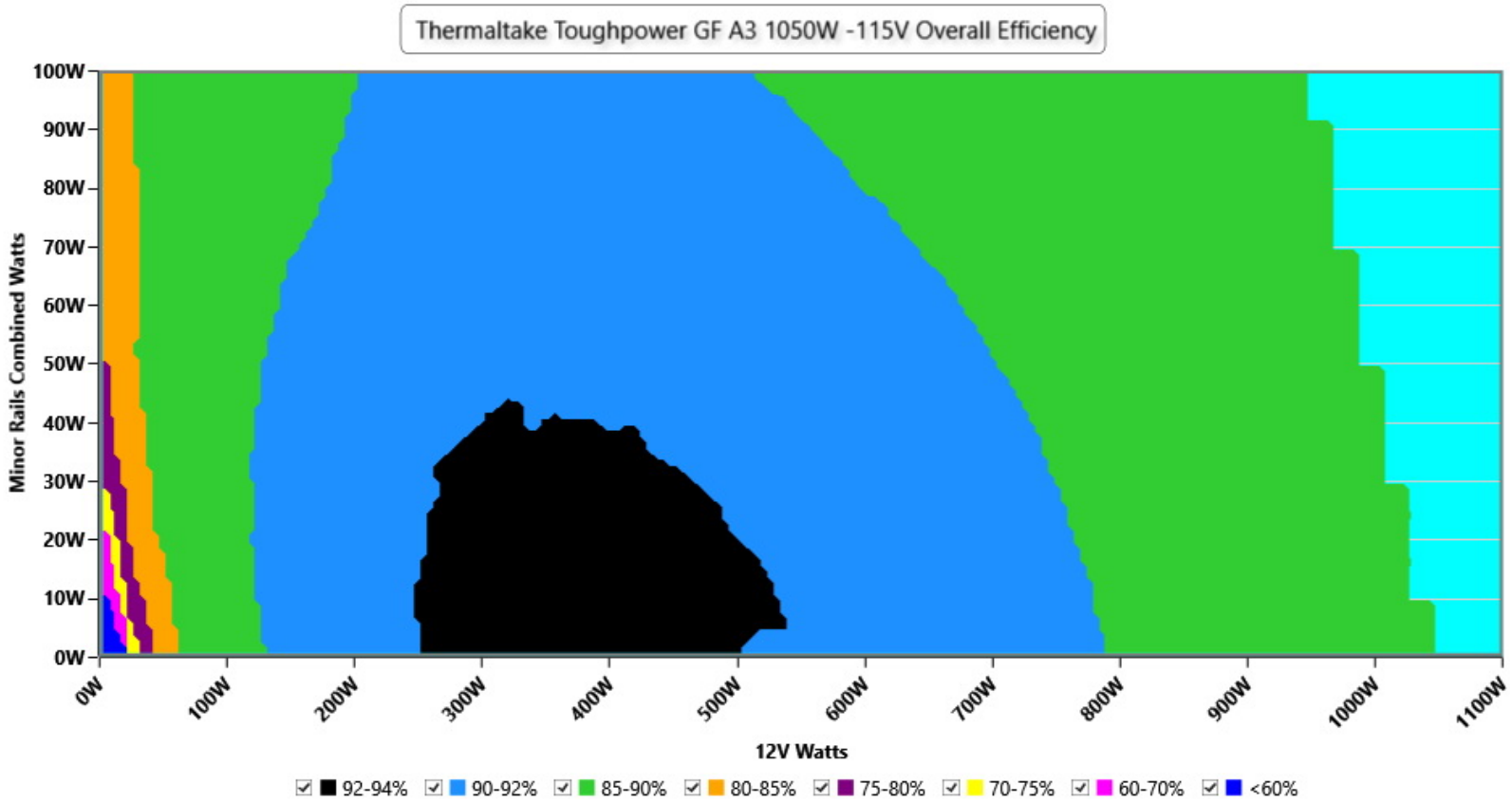
Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	114.87 V	114.83 V	113.85 V	114.91 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.98 Hz	59.40 Hz	60.02 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.417	1.416	1.340	1.419	1.490	PASS
Mains Voltage THD:	0.14 %	0.11 %	N/A	0.20 %	2.00 %	PASS
Real Power:	0.034 W	-0.005 W	N/A	0.074 W	N/A	N/A
Apparent Power:	11.895 W	11.866 W	N/A	11.930 W	N/A	N/A
Power Factor:	0.005	N/A	N/A	N/A	N/A	N/A

230V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	229.98 V	229.90 V	227.70 V	230.04 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:	1.416	1.415	1.340	1.417	1.490	PASS
Mains Voltage THD:	0.16 %	0.14 %	N/A	0.19 %	2.00 %	PASS
Real Power:	0.102 W	0.053 W	N/A	0.160 W	N/A	N/A
Apparent Power:	41.046 W	40.998 W	N/A	41.100 W	N/A	N/A
Power Factor:	0.003	N/A	N/A	N/A	N/A	N/A

□□□□□□

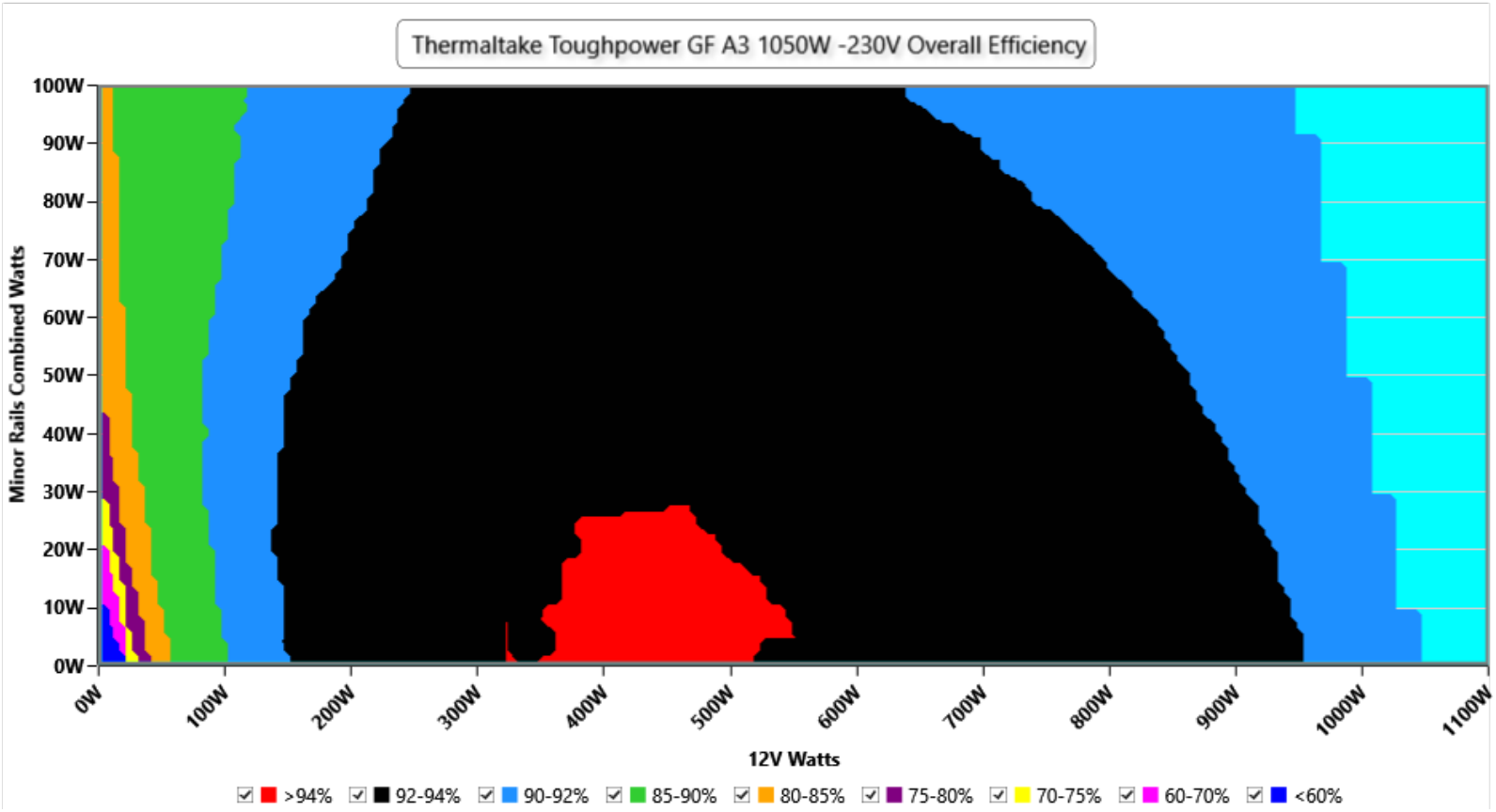
115V



□□

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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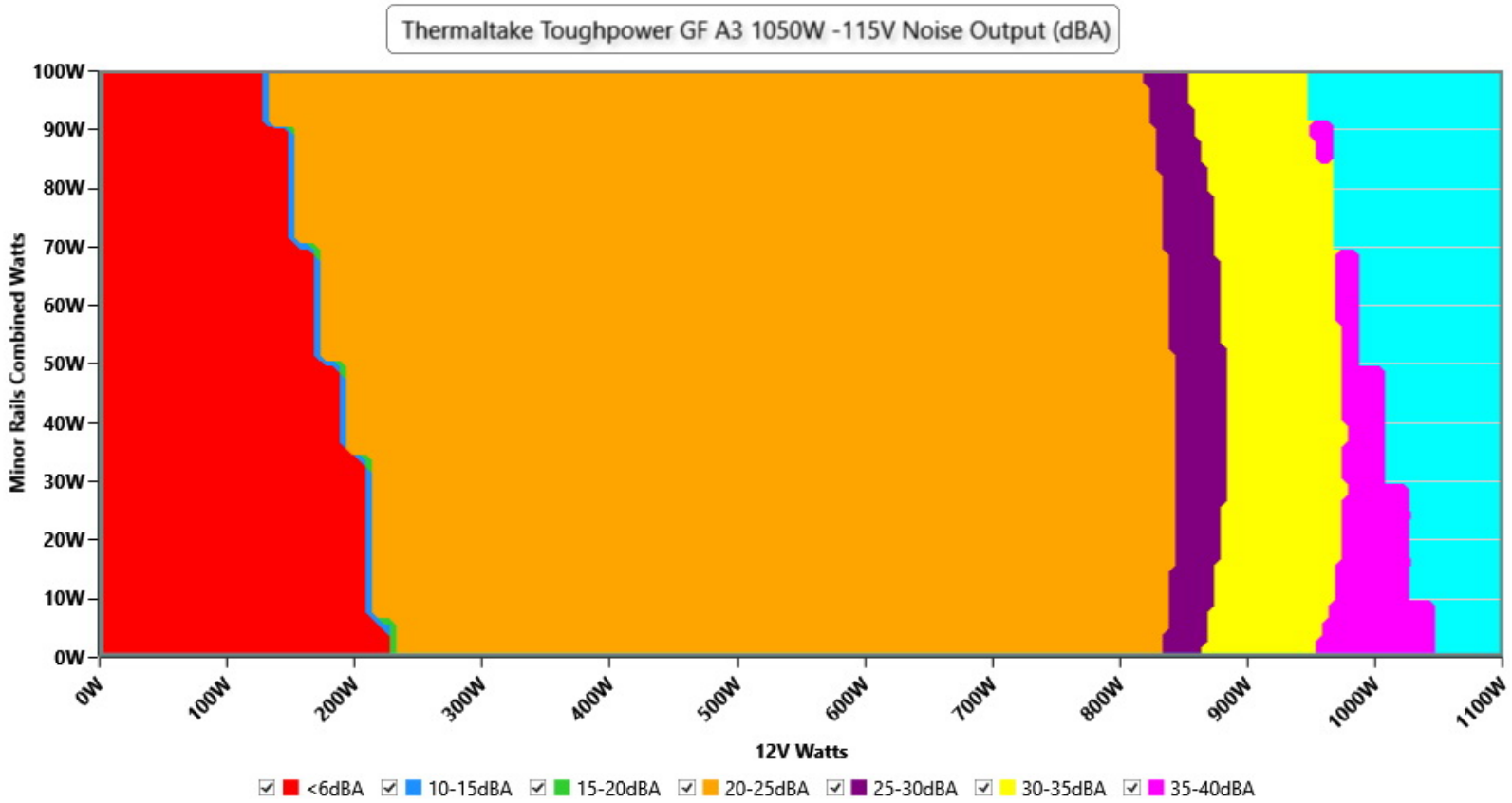
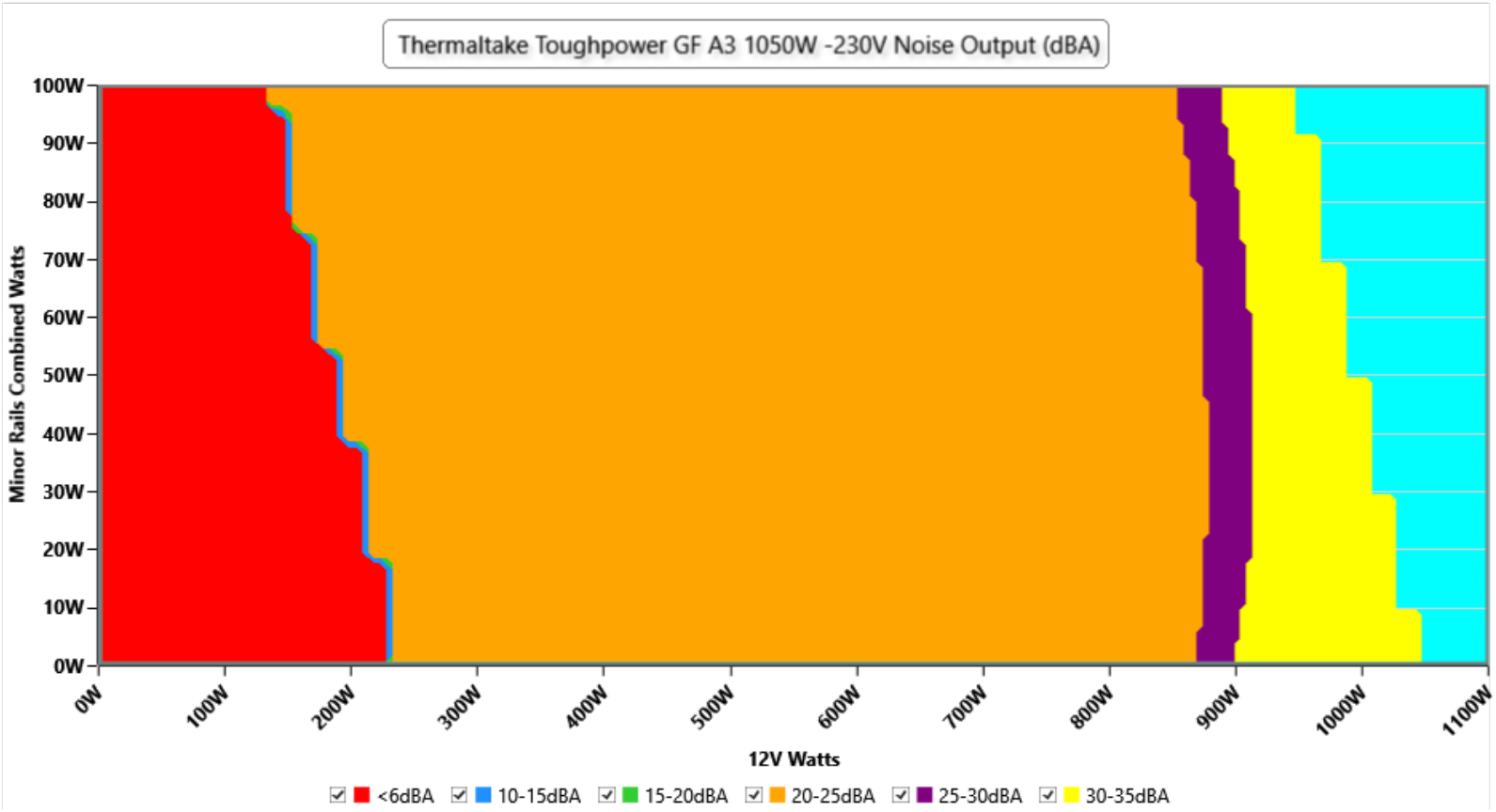
115V



□□

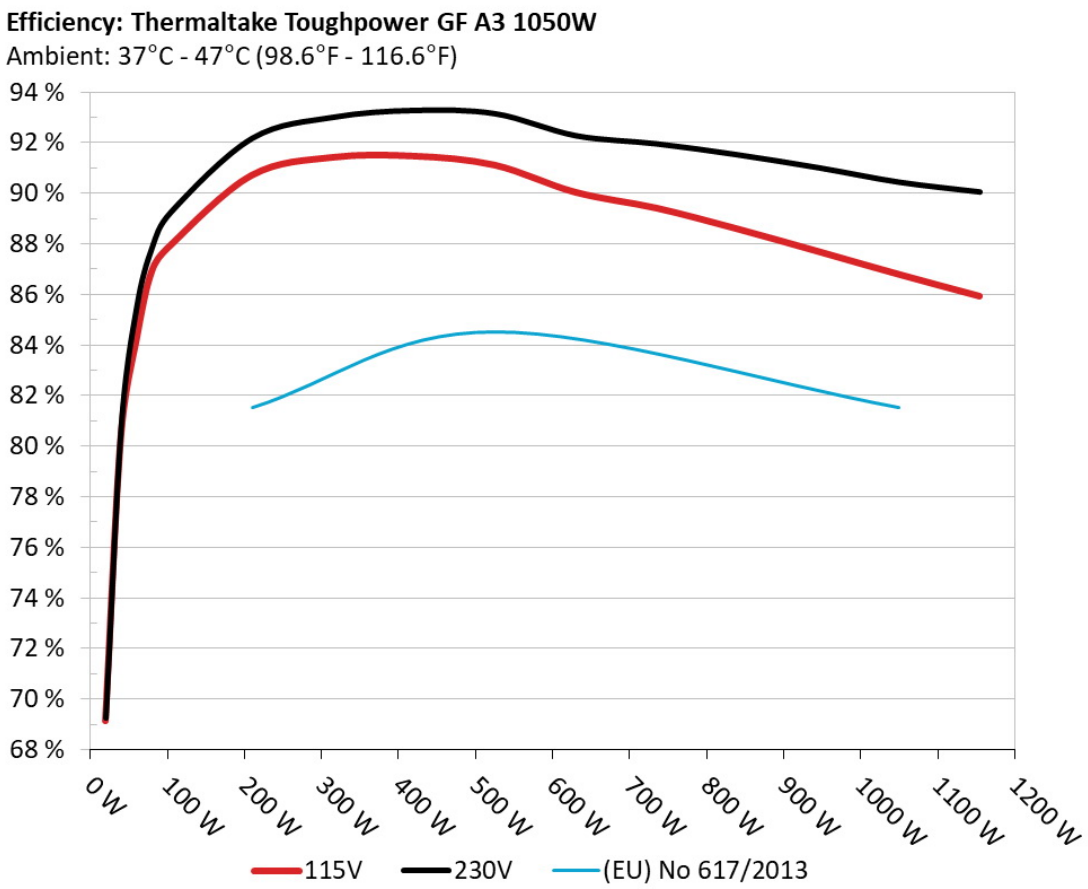
The PSU`s noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

230V



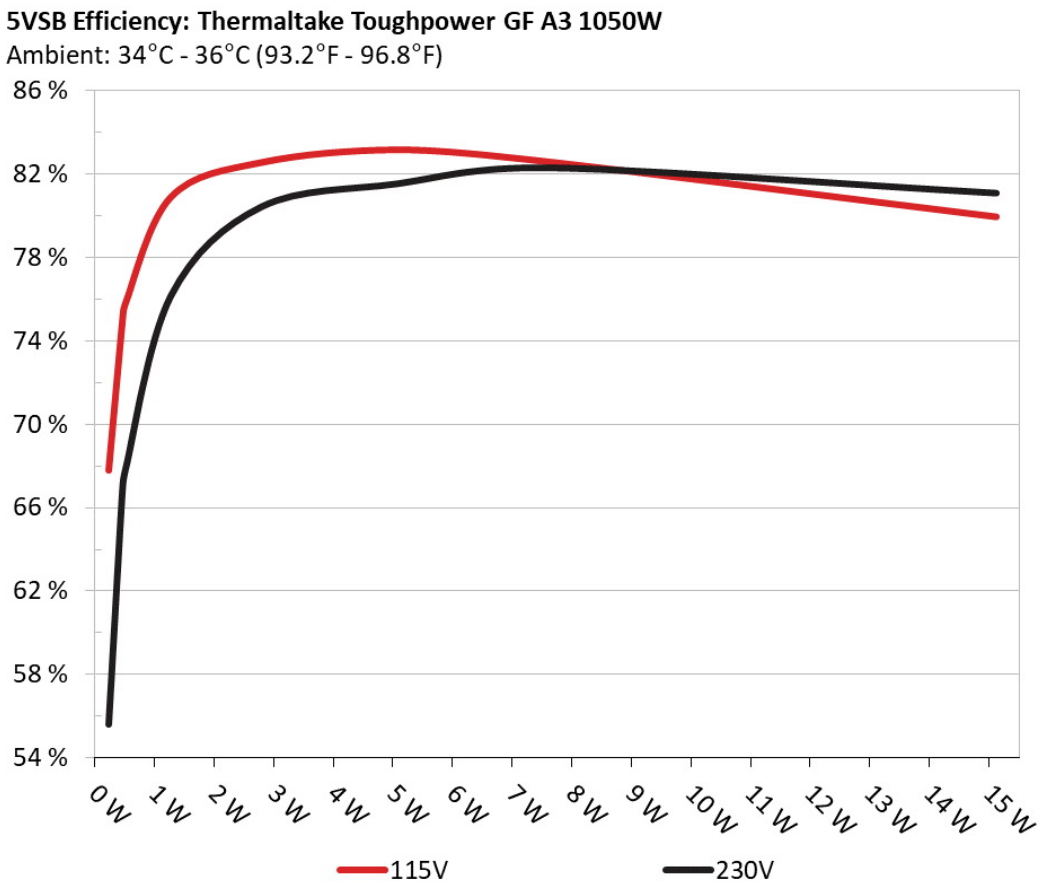
The PSU`s noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

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	0.229W	67.311%	0.031
	5.087V	0.34W		114.89V
2	0.09A	0.458W	74.438%	0.055
	5.086V	0.615W		114.89V
3	0.55A	2.793W	82.037%	0.247
	5.078V	3.404W		114.89V
4	1A	5.071W	82.641%	0.348
	5.071V	6.136W		114.87V
5	1.5A	7.594W	82.067%	0.398
	5.063V	9.254W		114.88V
6	3A	15.112W	79.434%	0.476
	5.038V	19.025W		114.87V

230V

□□ #	5VSB	DC/AC (□)	□□	PF/AC □□
1	0.045A	0.229W	55.117%	0.011
	5.091V	0.416W		229.95V
2	0.09A	0.458W	66.308%	0.018
	5.088V	0.691W		229.94V
3	0.55A	2.793W	79.912%	0.09
	5.08V	3.496W		229.94V
4	1A	5.072W	81.014%	0.152
	5.072V	6.26W		229.94V
5	1.5A	7.596W	81.778%	0.195
	5.064V	9.287W		229.94V
6	3A	15.115W	80.566%	0.308
	5.039V	18.76W		229.94V

Supplementary Tests (For Reference)

10-110%□□□□

115V

□□	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
10%	6.972A	1.984A	1.977A	0.984A	104.925	88.449%	0	<6.0	44.24°C	0.973
	11.952V	5.04V	3.338V	5.082V	118.629				39.96°C	114.83V
20%	14.977A	2.977A	2.968A	1.183A	209.908	91.203%	0	<6.0	45.35°C	0.98
	11.952V	5.038V	3.335V	5.072V	230.155				40.7°C	114.79V
30%	23.346A	3.477A	3.467A	1.383A	314.926	91.913%	993	23.2	41.03°C	0.985
	11.945V	5.034V	3.332V	5.061V	342.634				46.22°C	114.76V
40%	31.690A	3.975A	3.966A	1.584A	419.52	91.963%	995	23.2	41.55°C	0.989
	11.938V	5.032V	3.329V	5.05V	456.182				47.16°C	114.72V
50%	39.753A	4.971A	4.962A	1.786A	524.864	91.608%	998	23.3	42.45°C	0.992
	11.933V	5.03V	3.325V	5.039V	572.95				48.51°C	114.69V
60%	47.746A	5.967A	5.959A	1.989A	629.377	90.535%	1000	23.3	42.94°C	0.994
	11.929V	5.028V	3.323V	5.028V	695.18				49.39°C	114.64V
70%	55.818A	6.964A	6.959A	2.192A	734.644	89.908%	1008	23.5	43.35°C	0.995
	11.923V	5.026V	3.32V	5.018V	817.107				50.39°C	114.6V
80%	63.896A	7.961A	7.959A	2.295A	839.463	89.087%	1014	23.7	43.89°C	0.996
	11.919V	5.025V	3.317V	5.011V	942.297				51.95°C	114.56V
90%	72.388A	8.459A	8.448A	2.398A	944.855	88.19%	1513	35.8	44.31°C	0.997
	11.914V	5.024V	3.314V	5.004V	1071.389				53.33°C	114.52V
100%	80.611A	8.961A	8.969A	3.01A	1049.688	87.283%	1818	41.5	45.11°C	0.997
	11.909V	5.021V	3.311V	4.982V	1202.631				55.12°C	114.48V
110%	88.726A	9.963A	10.066A	3.015A	1154.301	86.422%	1941	43.4	46.88°C	0.997
	11.902V	5.018V	3.308V	4.975V	1335.663				57.82°C	114.43V
CL1	0.115A	11.965A	11.917A	0A	101.274	82.877%	1011	23.6	40.12°C	0.976
	11.961V	5.031V	3.331V	5.11V	122.198				45.61°C	114.82V

CL2	0.115A	19.881A	0A	0A	101.35	81.281%	1009	23.5	40.22°C	0.977
	11.958V	5.028V	3.341V	5.11V	124.691				47.25°C	114.82V
CL3	0.115A	0A	19.835A	0A	67.374	75.96%	0	<6.0	49.25°C	0.965
	11.955V	5.043V	3.327V	5.105V	88.698				40.19°C	114.84V
CL4	88.181A	0A	0A	0A	1049.47	88.323%	1152	28.1	45.05°C	0.997
	11.901V	5.032V	3.32V	5.053V	1188.23				56.01°C	114.48V

The results above are not used in the certification process

230V

□□	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
10%	6.974A	1.984A	1.977A	0.984A	104.942	89.765%	0	<6.0	44.37°C	0.85
	11.952V	5.04V	3.338V	5.081V	116.909				40.22°C	229.92V
20%	14.980A	2.978A	2.968A	1.183A	209.94	92.671%	0	<6.0	44.98°C	0.937
	11.952V	5.038V	3.335V	5.07V	226.54				40.57°C	229.91V
30%	23.348A	3.477A	3.467A	1.384A	314.943	93.5%	988	23.1	41.47°C	0.961
	11.945V	5.034V	3.332V	5.06V	336.838				46.47°C	229.89V
40%	31.686A	3.975A	3.965A	1.585A	419.489	93.771%	994	23.2	41.91°C	0.972
	11.939V	5.032V	3.329V	5.048V	447.357				47.42°C	229.88V
50%	39.745A	4.97A	4.961A	1.787A	524.789	93.642%	999	23.3	42.21°C	0.978
	11.933V	5.03V	3.326V	5.037V	560.421				48.23°C	229.86V
60%	47.740A	5.966A	5.959A	1.99A	629.32	92.775%	1003	23.4	42.62°C	0.984
	11.930V	5.029V	3.323V	5.026V	678.333				49.21°C	229.84V
70%	55.815A	6.963A	6.958A	2.193A	734.657	92.449%	1007	23.5	43.15°C	0.986
	11.924V	5.027V	3.32V	5.015V	794.667				50.24°C	229.82V
80%	63.894A	7.961A	7.958A	2.296A	839.463	92.018%	1013	23.7	43.84°C	0.988
	11.919V	5.025V	3.317V	5.007V	912.284				51.88°C	229.81V
90%	72.389A	8.459A	8.447A	2.4A	944.848	91.503%	1408	33.9	44.67°C	0.989
	11.913V	5.024V	3.314V	4.998V	1032.593				53.74°C	229.79V
100%	80.613A	8.96A	8.968A	3.014A	1049.671	90.933%	1780	40.6	45.07°C	0.99
	11.908V	5.022V	3.311V	4.977V	1154.332				55.11°C	229.77V

110%	88.736A	9.96A	10.064A	3.019A	1154.253	90.546%	1598	37.4	46.91°C	0.991
	11.900V	5.02V	3.308V	4.968V	1274.782				57.84°C	229.75V
CL1	0.115A	11.963A	11.916A	0A	101.272	84.131%	1014	23.7	40.68°C	0.856
	11.961V	5.032V	3.331V	5.109V	120.375				46.21°C	229.93V
CL2	0.115A	19.88A	0A	0A	101.351	82.416%	1012	23.6	40.32°C	0.859
	11.958V	5.029V	3.341V	5.109V	122.973				47.41°C	229.93V
CL3	0.115A	0A	19.83A	0A	67.376	76.654%	0	<6.0	49.09°C	0.786
	11.954V	5.046V	3.328V	5.104V	87.883				40.02°C	229.93V
CL4	88.190A	0A	0A	0A	1049.5	91.896%	1001	23.3	45.35°C	0.99
	11.900V	5.032V	3.32V	5.052V	1142.055				56.29°C	229.77V

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 □□
20W	1.240A	0.496A	0.494A	0.196A	19.99	69.616%	0	<6.0	39.77°C	0.843
	11.965V	5.038V	3.34V	5.099V	28.715				36.66°C	114.87V
40W	2.734A	0.695A	0.692A	0.294A	39.989	80.85%	0	<6.0	40.36°C	0.928
	11.952V	5.039V	3.34V	5.098V	49.461				37.1°C	114.85V
60W	4.228A	0.893A	0.889A	0.392A	59.989	84.675%	0	<6.0	42.32°C	0.951
	11.949V	5.04V	3.34V	5.095V	70.846				38.49°C	114.85V
80W	5.715A	1.091A	1.087A	0.491A	79.921	87.391%	0	<6.0	43.15°C	0.965
	11.950V	5.04V	3.339V	5.093V	91.453				39.16°C	114.84V

The results above are not used in the certification process

230V

□□	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
20W	1.240A	0.496A	0.494A	0.196A	19.991	69.738%	0	<6.0	39.82°C	0.457
	11.966V	5.039V	3.34V	5.1V	28.669				36.75°C	229.94V
40W	2.734A	0.694A	0.692A	0.294A	39.99	81.294%	0	<6.0	40.46°C	0.619
	11.953V	5.04V	3.34V	5.098V	49.193				37.16°C	229.94V
60W	4.228A	0.893A	0.889A	0.392A	59.99	85.981%	0	<6.0	41.52°C	0.722
	11.950V	5.04V	3.34V	5.096V	69.769				38.07°C	229.94V
80W	5.715A	1.091A	1.087A	0.491A	79.922	88.345%	0	<6.0	42.86°C	0.791
	11.950V	5.04V	3.339V	5.093V	90.466				39.06°C	229.93V

The results above are not used in the certification process

□□□□

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	20.23mV	4.95mV	5.28mV	3.72mV	Pass
20% Load	16.31mV	5.41mV	5.43mV	3.87mV	Pass
30% Load	15.95mV	5.67mV	5.64mV	4.33mV	Pass
40% Load	14.56mV	5.51mV	6.21mV	4.49mV	Pass
50% Load	13.99mV	6.18mV	6.46mV	5.16mV	Pass
60% Load	14.81mV	6.34mV	7.08mV	5.73mV	Pass
70% Load	13.73mV	6.91mV	7.45mV	6.40mV	Pass
80% Load	14.74mV	7.00mV	8.74mV	6.76mV	Pass
90% Load	15.21mV	8.35mV	9.41mV	7.23mV	Pass
100% Load	17.79mV	9.05mV	10.29mV	10.29mV	Pass
110% Load	19.46mV	9.46mV	10.74mV	10.89mV	Pass
Crossload1	18.89mV	9.89mV	9.82mV	4.46mV	Pass
Crossload2	13.73mV	12.11mV	5.79mV	4.08mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
Crossload3	9.85mV	8.50mV	10.29mV	3.77mV	Pass
Crossload4	16.99mV	6.94mV	7.91mV	8.31mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	19.56mV	5.10mV	5.28mV	3.71mV	Pass
20% Load	16.05mV	5.15mV	5.69mV	3.98mV	Pass
30% Load	16.46mV	5.62mV	5.95mV	4.28mV	Pass
40% Load	15.23mV	5.87mV	6.62mV	4.65mV	Pass
50% Load	14.35mV	6.18mV	6.41mV	5.01mV	Pass
60% Load	15.74mV	6.80mV	7.24mV	5.68mV	Pass
70% Load	13.53mV	6.96mV	7.39mV	6.30mV	Pass
80% Load	14.59mV	7.06mV	9.00mV	6.86mV	Pass
90% Load	14.20mV	8.40mV	9.36mV	6.97mV	Pass
100% Load	17.53mV	9.29mV	10.53mV	10.23mV	Pass
110% Load	18.77mV	9.53mV	11.36mV	10.04mV	Pass
Crossload1	18.58mV	10.04mV	9.56mV	4.55mV	Pass
Crossload2	14.86mV	11.64mV	6.20mV	3.82mV	Pass
Crossload3	9.59mV	7.11mV	9.36mV	3.56mV	Pass
Crossload4	16.74mV	6.76mV	8.30mV	7.91mV	Pass

The results above are not used in the certification process





Thermaltake Toughpower GF A3 1050W (HKC)

Top side

Power specifications label

本测试报告中包含的所有数据和图表均可在以下条件下由任何人使用：使用过程需提及测试结果由Cybenetics提供。

在任何情况下都应提供原始测试结果文档的网站链接

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