Anex

Thermaltake Toughpower GF A3 1200W

Lab ID#: TT12002245
Receipt Date: Aug 17, 2023
Test Date: Sep 27, 2023

Report: 23PS2245A
Report Date: Oct 3, 2023

DUT INFORMATION

Brand	Thermaltake
Manufacturer (OEM)	HKC
Series	Toughpower GF A3
Model Number	TTP-1200AH2FKG
Serial Number	PSTPD1200FNFAGEHPG001739
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	15
Rated Frequency (Hz)	50-60
Rated Power (W)	1200
Type	ATX12V
Cooling	120mm Fluid Dynamic Bearing Fan (HA1225H12F-Z)
Semi-Passive Operation	✓ (selectable)
Cable Design	Fully Modular

TEST EQUIPMENT

Electronic Loads	Chroma 63601-5 x2 Chroma 63600-2 63640-80-80 x10 63610-80-20
AC Sources	Chroma 6530, APM SP300VAC4000W-P
Power Analyzers	RS HMC8015, N4L PPA1530, N4L PPA5530
Oscilloscopes	Picoscope 4444, Rigol DS7014, 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, Keithley 2015 - THD
UPS	FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA
Isolation Transformer	4kVA

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RESULTS

Temperature Range (°C /°F)	30-32 / 86-89.6
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
ALPM (Alternative Low Power Mode) compatible	✓
ATX v3.0 PSU Power Excursion	✓

115V

Average Efficiency	89.501%
Efficiency With 10W (≤500W) or 2% (>500W)	62.355
Average Efficiency 5VSB	81.615%
Standby Power Consumption (W)	0.0515000
Average PF	0.987
Avg Noise Output	37.94 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	Standard+

230V

Average Efficiency	91.854%
Average Efficiency 5VSB	80.633%
Standby Power Consumption (W)	0.0941000
Average PF	0.958
Avg Noise Output	36.39 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	Standard+

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	100	3	0.3
	Watts	100		1200	15	3.6
Total Max. Power (W)		1200				

HOLD-UP TIME & POWER OK SIGNAL (230V)

Hold-Up Time (ms)	20.9
AC Loss to PWR_OK Hold Up Time (ms)	17.8
PWR_OK Inactive to DC Loss Delay (ms)	3.1

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CABLES AND CONNECTORS

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)	2	2	16AWG	No
6+2 pin PCIe (500mm+155mm)	2	4	16-18AWG	No
6+2 pin PCIe (500mm)	1	1	16-18AWG	No
12+4 pin PCIe (600mm) (600W)	1	1	16-26AWG	No
SATA (500mm+150mm+150mm+150mm)	3	12	18AWG	No
4-pin Molex (500mm+155mm+155mm+155mm)	1	4	18AWG	No
FDD Adapter (155mm)	1	1	22AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	18AWG	-

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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 LSB65R070GT (650V, 26A @ 100°C, Rds(on): 0.099Ohm @ 150°C)
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 (450V, 680uF , 2000h @ 105°C, KMZ)
Main Switchers	2x Lonten LSB65R099GT (650V, 26A @ 100°C, Rds(on): 0.099Ohm @ 150°C)
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 R638A
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
Supervisor IC	IN1S429I - SCG
Fan Controller	1x
Fan Model	Hong Hua HA1225H12F-Z (120mm, 12V, 0.58A, Fluid Dynamic Bearing Fan)
5VSB Circuit	
Rectifier	SB1045L (45V, 10A)
Standby PWM Controller	PN8141

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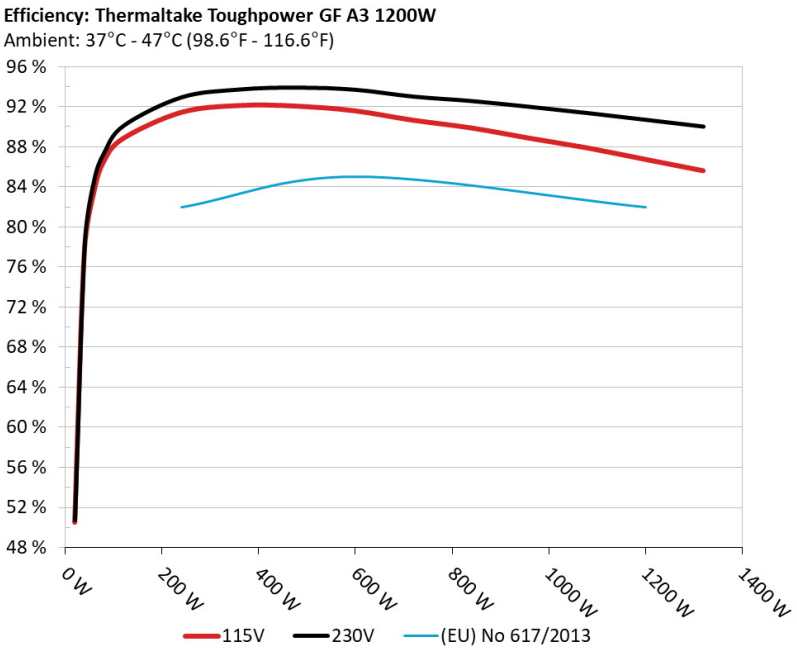
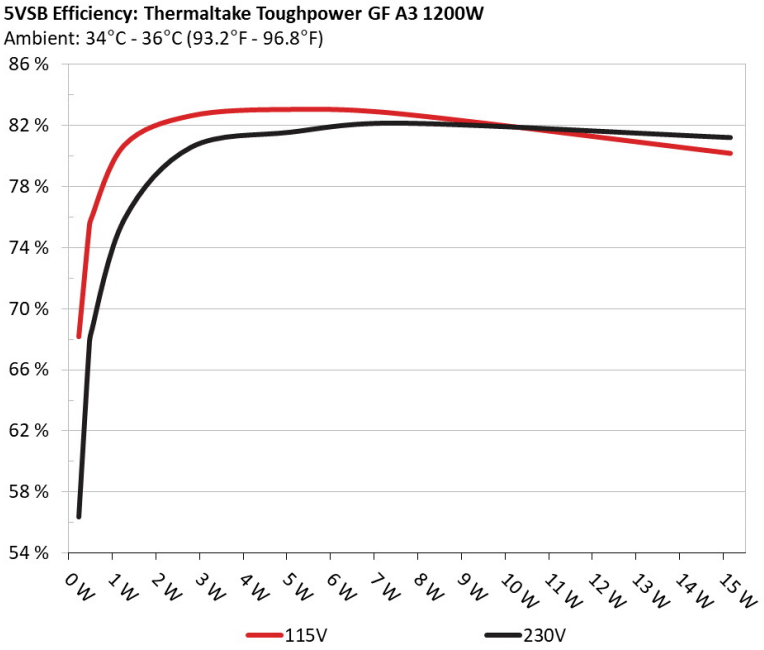
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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

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5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.041A	0.211	68.954%	0.030
	5.107V	0.306		115.20V
2	0.087A	0.442	75.685%	0.058
	5.107V	0.584		115.20V
3	0.541A	2.759	79.925%	0.265
	5.096V	3.452		115.18V
4	1.001A	5.091	77.892%	0.371
	5.085V	6.536		115.18V
5	1.501A	7.613	77.692%	0.427
	5.072V	9.799		115.18V
6	2.500A	12.617	75.370%	0.482
	5.046V	16.740		115.19V

5VSB EFFICIENCY -230V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.041A	0.212	63.473%	0.010
	5.108V	0.334		230.40V
2	0.087A	0.444	71.268%	0.019
	5.107V	0.623		230.40V
3	0.542A	2.760	76.731%	0.102
	5.096V	3.597		230.43V
4	1.002A	5.093	78.294%	0.172
	5.085V	6.505		230.43V
5	1.501A	7.614	78.301%	0.232
	5.071V	9.724		230.42V
6	2.501A	12.620	78.186%	0.314
	5.046V	16.141		230.41V

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115V

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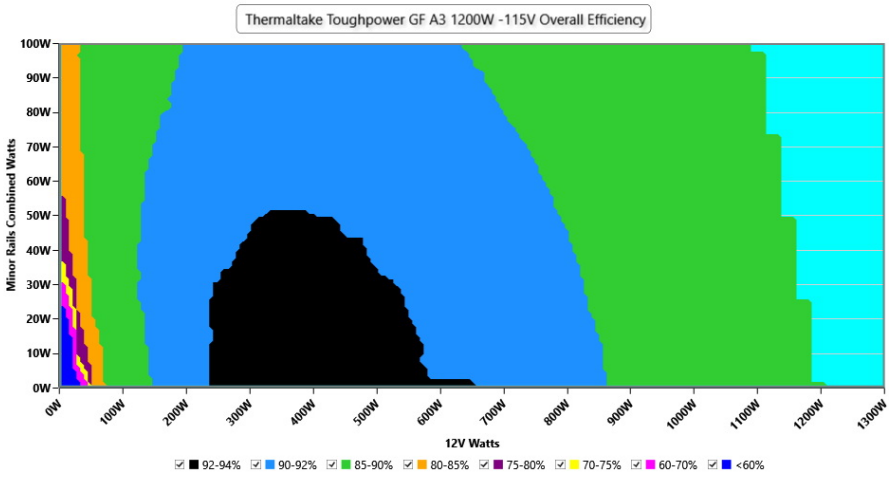
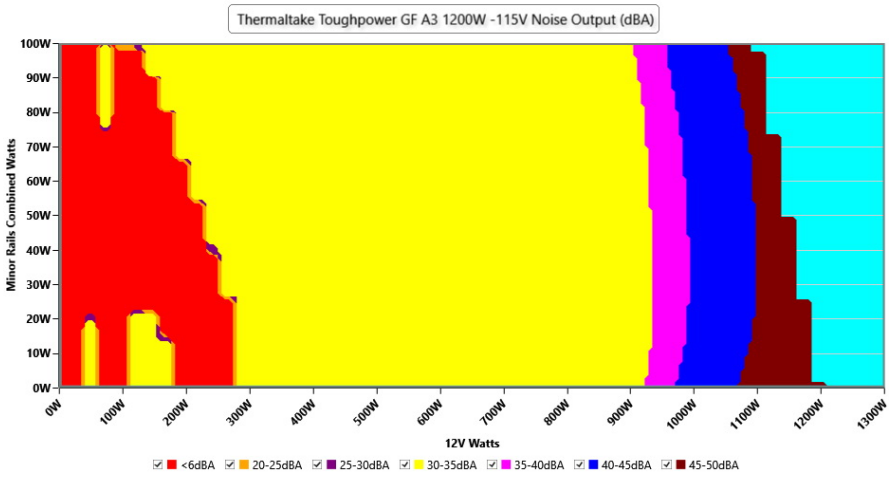
EFFICIENCY GRAPH 115V



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

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

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VAMPIRE POWER -115V

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	114.91 V	114.87 V	113.85 V	114.95 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.99 Hz	59.40 Hz	60.02 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.416	1.416	1.340	1.417	1.490	PASS
Mains Voltage THD:	0.15 %	0.12 %	N/A	0.20 %	2.00 %	PASS
Real Power:	0.051 W	0.032 W	N/A	0.073 W	N/A	N/A
Apparent Power:	11.777 W	11.753 W	N/A	11.809 W	N/A	N/A
Power Factor:	0.005	N/A	N/A	N/A	N/A	N/A

INFO

This graph is generated by the PPA Standby Power Analysis software which takes full control of the power analyzer during the whole procedure. This application features all of the EN50564 & IEC62301 test limits for standby power software testing

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10-110% 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%	8.211A	1.985A	1.967A	0.983A	119.975	88.802%	0	<6.0	44.46°C	0.978
	11.981V	5.038V	3.355V	5.088V	135.104				40.24°C	114.83V
20%	17.450A	2.978A	2.955A	1.182A	239.922	91.406%	1340	32.2	40.85°C	0.978
	11.979V	5.036V	3.35V	5.077V	262.481				45.38°C	114.8V
30%	26.988A	3.476A	3.453A	1.382A	359.08	92.093%	1342	32.3	41.09°C	0.984
	11.969V	5.034V	3.345V	5.065V	389.909				46.17°C	114.75V
40%	36.637A	3.975A	3.95A	1.583A	479.447	92.038%	1345	32.7	41.57°C	0.988
	11.962V	5.032V	3.342V	5.054V	520.921				47.12°C	114.71V
50%	45.894A	4.972A	4.941A	1.784A	599.191	91.567%	1350	33.2	42.29°C	0.991
	11.955V	5.029V	3.339V	5.043V	654.374				48.26°C	114.66V
60%	55.219A	5.97A	5.934A	1.987A	719.729	90.631%	1354	33.7	42.82°C	0.993
	11.951V	5.025V	3.337V	5.033V	794.129				49.33°C	114.63V
70%	64.496A	6.969A	6.931A	2.19A	839.434	89.864%	1358	33.8	43.14°C	0.994
	11.944V	5.022V	3.333V	5.021V	934.11				50.18°C	114.57V
80%	73.842A	7.971A	7.924A	2.294A	959.442	88.843%	1822	42.2	43.71°C	0.995
	11.939V	5.019V	3.331V	5.013V	1079.934				51.75°C	114.52V
90%	83.545A	8.471A	8.414A	2.398A	1079.279	87.873%	2146	44.5	44.16°C	0.996
	11.931V	5.016V	3.327V	5.003V	1228.221				53.19°C	114.47V
100%	93.058A	8.975A	8.932A	3.009A	1199.322	86.729%	2751	51.8	45.34°C	0.996
	11.924V	5.014V	3.325V	4.984V	1382.853				55.39°C	114.42V
110%	102.516A	9.978A	10.025A	3.014A	1319.891	85.584%	2751	51.8	46.65°C	0.997
	11.916V	5.011V	3.321V	4.976V	1542.218				57.49°C	114.37V
CL1	0.115A	11.975A	11.854A	0A	101.283	82.281%	1355	33.8	40.32°C	0.972
	11.984V	5.027V	3.349V	5.106V	123.094				45.72°C	114.83V
CL2	0.115A	19.907A	0A	0A	101.352	80.833%	1358	33.8	40.59°C	0.972
	11.979V	5.022V	3.36V	5.107V	125.385				47.65°C	114.83V
CL3	0.115A	0A	19.727A	0A	67.376	75.956%	1343	32.4	40.37°C	0.964
	11.989V	5.038V	3.346V	5.103V	88.706				49.38°C	114.85V
CL4	100.666A	0A	0A	0A	1199.885	87.619%	2343	47.8	45.96°C	0.996
	11.919V	5.026V	3.33V	5.044V	1369.456				56.89°C	114.43V

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20-80W 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	0.496A	0.492A	0.196A	19.993	50.487%	0	<6.0	39.72°C	0.888
	12.049V	5.044V	3.354V	5.105V	39.6				36.65°C	114.87V
40W	2.724A	0.694A	0.689A	0.294A	39.996	77.554%	0	<6.0	40.26°C	0.933
	11.997V	5.043V	3.354V	5.102V	51.574				37.04°C	114.86V
60W	4.214A	0.893A	0.885A	0.392A	59.997	83.54%	0	<6.0	41.89°C	0.951
	11.989V	5.041V	3.356V	5.101V	71.816				38.15°C	114.85V
80W	5.700A	1.091A	1.082A	0.49A	79.932	86.496%	0	<6.0	42.99°C	0.965
	11.984V	5.04V	3.355V	5.098V	92.409				39.01°C	114.85V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	5.21mV	8.91mV	8.74mV	5.32mV	Pass
20% Load	16.31mV	9.12mV	8.84mV	5.47mV	Pass
30% Load	15.69mV	9.02mV	8.79mV	5.73mV	Pass
40% Load	13.89mV	9.43mV	8.79mV	6.35mV	Pass
50% Load	14.25mV	9.27mV	9.88mV	6.92mV	Pass
60% Load	13.17mV	9.68mV	9.31mV	7.23mV	Pass
70% Load	12.34mV	8.81mV	8.27mV	8.05mV	Pass
80% Load	15.10mV	9.27mV	9.62mV	9.03mV	Pass
90% Load	16.91mV	9.69mV	9.77mV	9.45mV	Pass
100% Load	20.33mV	12.32mV	13.41mV	13.38mV	Pass
110% Load	24.93mV	12.87mV	14.68mV	13.57mV	Pass
Crossload1	6.05mV	10.67mV	10.37mV	6.93mV	Pass
Crossload2	6.19mV	12.21mV	6.83mV	6.30mV	Pass
Crossload3	6.65mV	9.84mV	11.12mV	6.35mV	Pass
Crossload4	18.16mV	10.17mV	11.22mV	11.63mV	Pass

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230V

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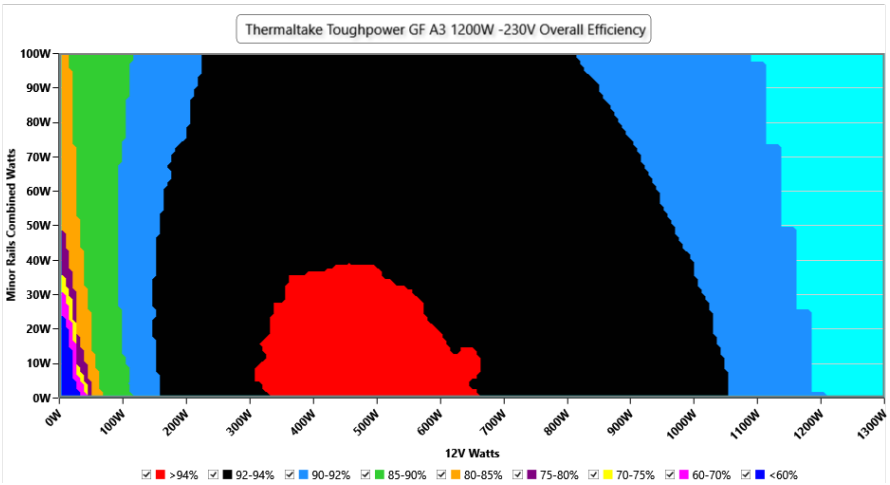
EFFICIENCY GRAPH 230V



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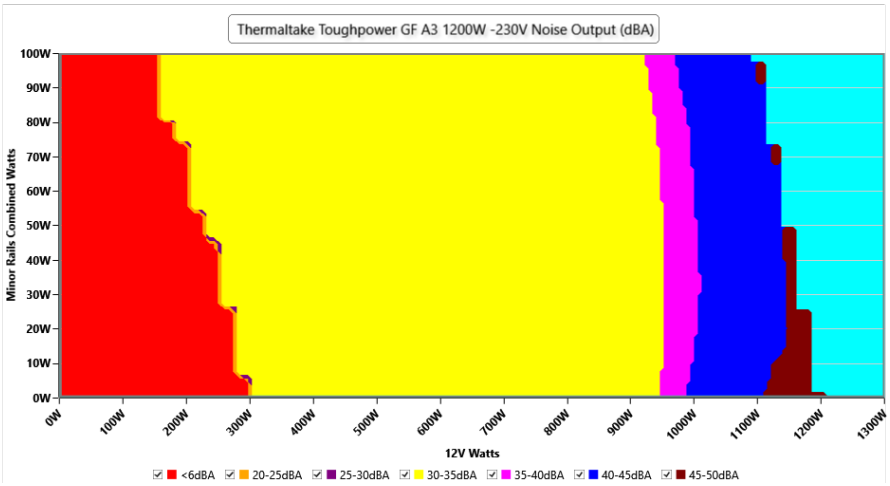
NOISE GRAPH 230V



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VAMPIRE POWER -230V

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	229.89 V	229.84 V	227.70 V	229.94 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:	0.094 W	0.053 W	N/A	0.139 W	N/A	N/A
Apparent Power:	40.887 W	40.818 W	N/A	40.977 W	N/A	N/A
Power Factor:	0.003	N/A	N/A	N/A	N/A	N/A

INFO

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10-110% LOAD TESTS 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%	8.212A	1.985A	1.967A	0.983A	119.977	90.105%	0	<6.0	44.58°C	0.869
	11.981V	5.038V	3.355V	5.088V	133.152				40.33°C	229.92V
20%	17.450A	2.978A	2.955A	1.182A	239.924	92.954%	1338	32.2	40.56°C	0.943
	11.978V	5.036V	3.35V	5.077V	258.112				45.21°C	229.9V
30%	26.995A	3.477A	3.452A	1.382A	359.143	93.736%	1343	32.4	41.13°C	0.964
	11.968V	5.034V	3.346V	5.065V	383.146				46.41°C	229.88V
40%	36.649A	3.976A	3.95A	1.583A	479.553	93.931%	1345	32.7	41.72°C	0.972
	11.961V	5.031V	3.342V	5.053V	510.541				47.37°C	229.86V
50%	45.907A	4.972A	4.942A	1.785A	599.27	93.717%	1356	33.8	42.39°C	0.978
	11.954V	5.028V	3.339V	5.042V	639.448				48.44°C	229.84V
60%	55.230A	5.971A	5.935A	1.988A	719.789	93.03%	1358	33.8	42.72°C	0.983
	11.950V	5.025V	3.337V	5.031V	773.717				49.29°C	229.82V
70%	64.503A	6.97A	6.931A	2.191A	839.507	92.593%	1361	33.5	43.46°C	0.985
	11.943V	5.022V	3.333V	5.021V	906.665				50.55°C	229.8V
80%	73.851A	7.972A	7.925A	2.294A	959.484	92.016%	1869	41.8	43.96°C	0.987
	11.938V	5.018V	3.331V	5.011V	1042.738				52.01°C	229.78V
90%	83.554A	8.472A	8.415A	2.399A	1079.313	91.391%	2338	47.7	44.14°C	0.988
	11.930V	5.016V	3.327V	5.002V	1180.997				53.17°C	229.76V
100%	93.071A	8.976A	8.934A	3.011A	1199.334	90.72%	2752	51.8	45.37°C	0.989
	11.922V	5.013V	3.324V	4.981V	1322.016				55.42°C	229.74V
110%	102.529A	9.98A	10.025A	3.016A	1319.966	90.039%	2756	51.9	46.63°C	0.991
	11.915V	5.01V	3.321V	4.974V	1465.992				57.57°C	229.72V
CL1	0.115A	11.974A	11.859A	0A	101.28	83.855%	1355	33.8	40.25°C	0.855
	11.980V	5.027V	3.347V	5.103V	120.782				45.78°C	229.93V
CL2	0.115A	19.907A	0A	0A	101.35	82.096%	1359	33.8	41.23°C	0.858
	11.977V	5.022V	3.36V	5.105V	123.453				48.26°C	229.93V
CL3	0.115A	0A	19.725A	0A	67.376	76.439%	1345	32.7	40.58°C	0.786
	11.988V	5.037V	3.346V	5.102V	88.146				49.59°C	229.93V
CL4	100.665A	0A	0A	0A	1199.914	91.588%	2362	48.6	45.38°C	0.989
	11.920V	5.026V	3.332V	5.043V	1310.124				56.35°C	229.74V

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Thermaltake Toughpower GF A3 1200W

20-80W LOAD TESTS 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	1.232A	0.496A	0.492A	0.196A	19.993	50.749%	0	<6.0	39.71°C	0.551
	12.045V	5.044V	3.353V	5.104V	39.395				36.64°C	229.95V
40W	2.724A	0.694A	0.689A	0.294A	39.996	78.313%	0	<6.0	40.49°C	0.632
	11.995V	5.043V	3.354V	5.102V	51.068				37.16°C	229.94V
60W	4.216A	0.893A	0.885A	0.392A	59.998	84.77%	0	<6.0	41.51°C	0.728
	11.986V	5.042V	3.355V	5.1V	70.775				38.04°C	229.94V
80W	5.700A	1.091A	1.082A	0.49A	79.938	87.385%	0	<6.0	42.78°C	0.796
	11.983V	5.041V	3.355V	5.098V	91.48				39.02°C	229.93V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	4.59mV	7.52mV	6.83mV	6.25mV	Pass
20% Load	16.67mV	7.78mV	7.03mV	6.40mV	Pass
30% Load	15.53mV	8.14mV	7.08mV	6.61mV	Pass
40% Load	14.76mV	7.73mV	7.76mV	7.12mV	Pass
50% Load	13.99mV	8.24mV	8.22mV	7.79mV	Pass
60% Load	13.01mV	8.91mV	8.79mV	7.90mV	Pass
70% Load	12.29mV	9.17mV	8.74mV	8.98mV	Pass
80% Load	14.69mV	9.22mV	9.98mV	9.14mV	Pass
90% Load	15.73mV	9.94mV	11.63mV	11.61mV	Pass
100% Load	20.99mV	12.81mV	15.73mV	15.03mV	Pass
110% Load	25.21mV	13.30mV	16.79mV	14.79mV	Pass
Crossload1	6.47mV	11.26mV	11.05mV	7.63mV	Pass
Crossload2	6.39mV	12.36mV	7.19mV	6.25mV	Pass
Crossload3	6.50mV	9.53mV	11.07mV	6.14mV	Pass
Crossload4	18.42mV	11.38mV	13.31mV	11.91mV	Pass

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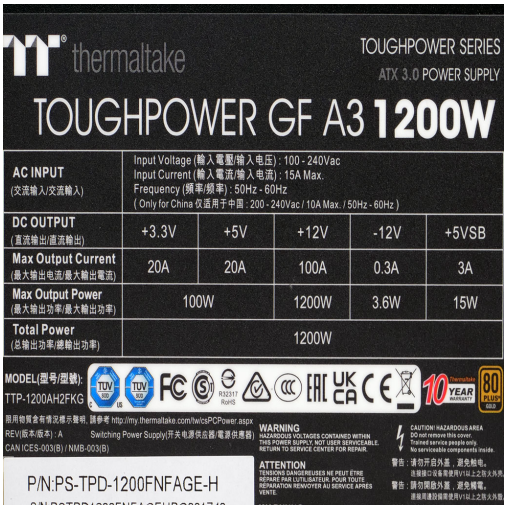
Thermaltake Toughpower GF A3 1200W

Top side



Power specifications label

CERTIFICATIONS 115V

CYBENETICS PLATINUM

CYBENETICS STANDARD+

CERTIFICATIONS 230V

CYBENETICS PLATINUM 230v

CYBENETICS STANDARD+ 230v

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