

Anex

Thermaltake Toughpower GF A3 750W

Lab ID#: TT75002256
 Receipt Date: Aug 17, 2023
 Test Date: Oct 10, 2023

Report: 23PS2256A
 Report Date: Oct 12, 2023

DUT INFORMATION

Brand	Thermaltake
Manufacturer (OEM)	HKC
Series	Toughpower GF A3
Model Number	TTP-750AH2FKG
Serial Number	PSTPD0750FNFAGKHPA000200
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
Rated Frequency (Hz)	50-60
Rated Power (W)	750
Type	ATX12V
Cooling	120mm Fluid Dynamic Bearing Fan [TT-1225 (BDH12025S)]
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	89.774%
Efficiency With 10W (≤500W) or 2% (>500W)	67.292
Average Efficiency 5VSB	80.042%
Standby Power Consumption (W)	0.0707000
Average PF	0.986
Avg Noise Output	28.44 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	A-

230V

Average Efficiency	91.830%
Average Efficiency 5VSB	79.079%
Standby Power Consumption (W)	0.1139000
Average PF	0.938
Avg Noise Output	27.88 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	A-

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				

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

Hold-Up Time (ms)	23.6
AC Loss to PWR_OK Hold Up Time (ms)	19.8
PWR_OK Inactive to DC Loss Delay (ms)	3.8

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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	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) (300W)	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	18AWG	-

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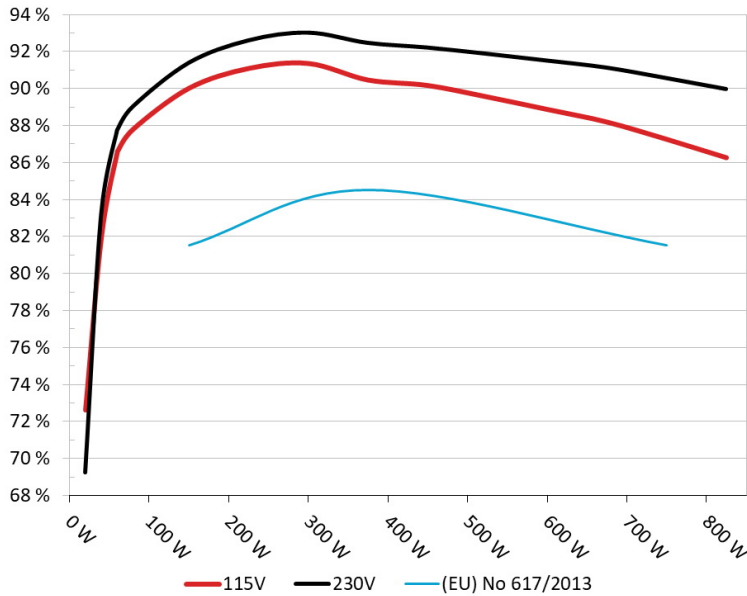
General Data	
Manufacturer (OEM)	HKC
PCB Type	Double-Sided
Primary Side	
Transient Filter	6x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	1x NTC Thermistor 5D-15 (2.5 Ohm @ 25°C) & Relay
Bridge Rectifier(s)	2x Diodes GBU1506 (800V, 15A @ 125°C)
APFC MOSFETs	2x NCEPOWER NCE65TF130 (650V, 18A @ 100°C, Rds(on): 0.140Ohm)
APFC Boost Diode	1x CREE C3D06065I (650V, 13A @ 25°C)
Bulk Cap(s)	2x Rubycon (420V, 390uF + 330uF: 720uF combined, 3000h @ 105°C, MXK)
Main Switchers	2x NCEPOWER NCE65TF130 (650V, 18A @ 100°C, Rds(on): 0.140Ohm)
APFC Controller	Champion CM6500UNX
Resonant Controller	Champion CM6901X
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETs	6x Advanced Power Electronics AP4NA1R4CMT-A (45V, 39A @ 70°C, Rds(on): 1.4 mOhm)
5V & 3.3V	DC-DC Converters: 2x Advanced Power Electronics AP4024GEMT-HF (30V, 20.9A @ 70°C, Rds(on): 4.5mOhm) 2x Wayon WMB040N03LG2 (30V, 38A @ 100°C, Rds(on): 4.0mOhm) PWM Controller(s): 2x ANPEC APW7164
Filtering Capacitors	Electrolytic: 8x CapXon (3,000h @ 105°C, KF) 2x Teapo (3,000h @ 105°C, SC) Polymer: 21x CapXon
Supervisor IC	IN1S3151 - SAG
Fan Model	TT-1225 (BDH12025S) (120mm, 12V, 0.3A, Sleeve Bearing Fan)
5VSB Circuit	
Rectifier	SB1045L (45V, 10A)
Standby PWM Controller	PN8141

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EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

Efficiency: Thermaltake Toughpower GF A3 750W
Ambient: 37°C - 47°C (98.6°F - 116.6°F)

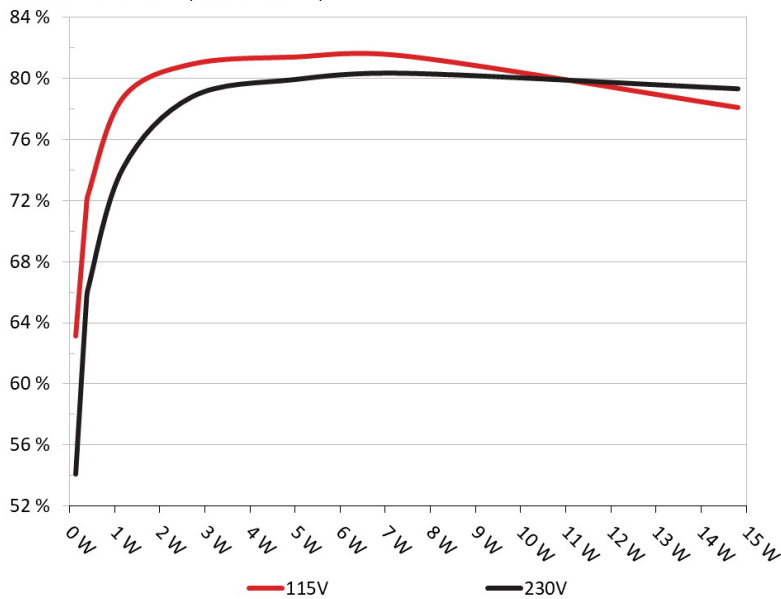


INFO

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

5VSB Efficiency: Thermaltake Toughpower GF A3 750W
Ambient: 34°C - 36°C (93.2°F - 96.8°F)



INFO

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

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Thermaltake Toughpower GF A3 750W

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231W	63.654%	0.035
	5.128V	0.363W		114.87V
2	0.09A	0.461W	71.862%	0.061
	5.126V	0.642W		114.87V
3	0.55A	2.806W	81.449%	0.25
	5.103V	3.445W		114.86V
4	1A	5.079W	81.909%	0.328
	5.08V	6.201W		114.87V
5	1.5A	7.58W	81.966%	0.378
	5.053V	9.248W		114.87V
6	3A	14.922W	78.61%	0.445
	4.974V	18.982W		114.86V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231W	54.575%	0.012
	5.129V	0.424W		229.95V
2	0.09A	0.462W	65.577%	0.02
	5.126V	0.705W		229.94V
3	0.55A	2.806W	79.264%	0.097
	5.103V	3.54W		229.94V
4	1A	5.079W	80.401%	0.16
	5.08V	6.319W		229.94V
5	1.5A	7.58W	80.808%	0.206
	5.053V	9.38W		229.94V
6	3A	14.923W	79.796%	0.308
	4.974V	18.702W		229.94V

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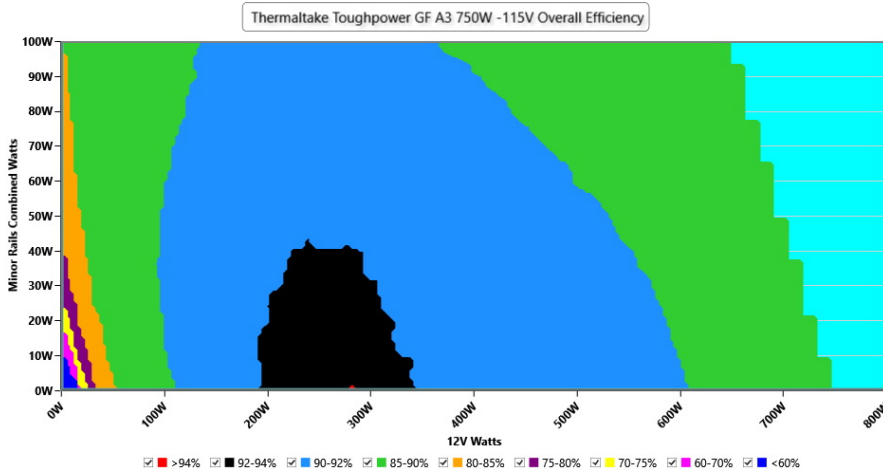
115V

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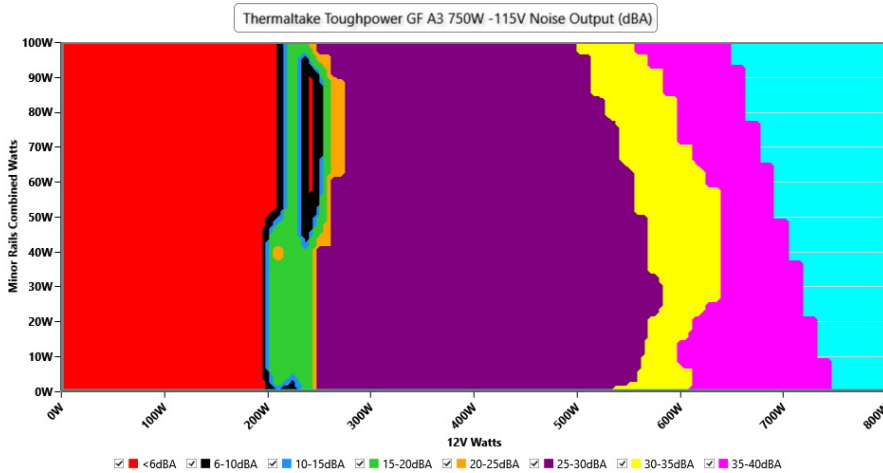
EFFICIENCY GRAPH 115V



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:	114.88 V	114.84 V	113.85 V	114.92 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.99 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.416	1.415	1.340	1.418	1.490	PASS
Mains Voltage THD:	0.14 %	0.11 %	N/A	0.17 %	2.00 %	PASS
Real Power:	0.071 W	0.004 W	N/A	0.101 W	N/A	N/A
Apparent Power:	10.895 W	10.871 W	N/A	10.924 W	N/A	N/A
Power Factor:	0.007	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%	4.460A	1.983A	1.979A	0.986A	75.004	87.1%	531	<6.0	40.21°C	0.963
	11.976V	5.043V	3.336V	5.073V	86.112				44.43°C	114.84V
20%	9.950A	2.98A	2.977A	1.188A	149.946	90.511%	912	22.2	40.55°C	0.976
	11.965V	5.035V	3.326V	5.05V	165.666				45.21°C	114.82V
30%	15.800A	3.482A	3.482A	1.392A	224.948	91.58%	968	24.2	41.32°C	0.983
	11.956V	5.027V	3.317V	5.028V	245.631				46.51°C	114.78V
40%	21.665A	3.985A	3.99A	1.598A	300.015	91.845%	979	24.5	41.64°C	0.988
	11.945V	5.02V	3.308V	5.006V	326.655				47.27°C	114.77V
50%	27.145A	4.99A	5.004A	1.806A	374.42	90.954%	991	24.9	42.36°C	0.991
	11.932V	5.011V	3.298V	4.983V	411.659				48.41°C	114.74V
60%	32.687A	5.998A	6.026A	2A	449.289	90.661%	992	24.9	42.89°C	0.993
	11.918V	5.003V	3.286V	4.96V	495.574				49.53°C	114.71V
70%	38.238A	7.01A	7.054A	2.23A	524.324	90.04%	1197	30.9	43.45°C	0.994
	11.905V	4.994V	3.275V	4.934V	582.328				50.53°C	114.68V
80%	43.861A	8.002A	8.087A	2.339A	599.376	89.368%	1197	30.9	43.9°C	0.995
	11.892V	4.985V	3.264V	4.916V	670.687				51.92°C	114.66V
90%	49.835A	8.538A	8.602A	2.45A	674.487	88.685%	1531	37.7	44.06°C	0.996
	11.879V	4.978V	3.255V	4.898V	760.548				53.13°C	114.63V
100%	55.612A	9.056A	9.153A	3.095A	749.682	87.75%	1824	42.2	45.1°C	0.997
	11.867V	4.969V	3.245V	4.846V	854.342				55.15°C	114.6V
110%	61.273A	10.082A	10.298A	3.102A	824.708	86.758%	2078	46.0	46.67°C	0.997
	11.855V	4.959V	3.233V	4.835V	950.581				57.57°C	114.57V
CL1	0.116A	11.986A	12.004A	0A	101.283	84.773%	986	24.7	40.39°C	0.978
	11.942V	5.023V	3.307V	5.112V	119.481				45.84°C	114.82V
CL2	0.116A	19.908A	0A	0A	101.362	83.336%	986	24.7	40.94°C	0.978
	11.954V	5.022V	3.322V	5.12V	121.634				47.991°C	114.82V
CL3	0.115A	0A	19.977A	0A	67.38	78.446%	988	24.7	40.21°C	0.963
	11.954V	5.039V	3.304V	5.117V	85.891				49.22°C	114.84V
CL4	63.048A	0A	0A	0.001A	749.534	88.912%	1394	35.1	45.04°C	0.996
	11.888V	4.992V	3.271V	5.064V	843.011				55.99°C	114.6V

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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	1.238A	0.495A	0.493A	0.195A	19.999	73.132%	520	<6.0	36.56°C	0.786
	11.994V	5.048V	3.346V	5.132V	27.346				39.65°C	114.87V
40W	2.726A	0.694A	0.691A	0.293A	39.999	82.523%	524	<6.0	37.42°C	0.911
	11.988V	5.047V	3.343V	5.123V	48.469				40.74°C	114.86V
60W	4.216A	0.892A	0.889A	0.391A	60	86.565%	526	<6.0	38.23°C	0.95
	11.983V	5.046V	3.34V	5.114V	69.313				42.01°C	114.85V
80W	5.704A	1.091A	1.088A	0.49A	79.947	88.303%	531	<6.0	39.03°C	0.968
	11.978V	5.044V	3.338V	5.105V	90.538				42.99°C	114.84V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.57mV	11.95mV	7.08mV	3.92mV	Pass
20% Load	11.14mV	12.21mV	7.75mV	4.28mV	Pass
30% Load	12.27mV	12.57mV	8.38mV	4.95mV	Pass
40% Load	15.21mV	13.45mV	9.00mV	5.57mV	Pass
50% Load	17.06mV	13.96mV	9.82mV	6.40mV	Pass
60% Load	19.13mV	15.35mV	11.48mV	6.76mV	Pass
70% Load	23.25mV	16.95mV	12.46mV	8.46mV	Pass
80% Load	25.16mV	16.38mV	13.55mV	9.24mV	Pass
90% Load	26.81mV	18.39mV	14.22mV	10.12mV	Pass
100% Load	36.63mV	19.22mV	16.56mV	12.25mV	Pass
110% Load	39.95mV	20.30mV	17.66mV	12.93mV	Pass
Crossload1	20.12mV	16.80mV	11.40mV	8.23mV	Pass
Crossload2	16.71mV	18.96mV	11.69mV	8.72mV	Pass
Crossload3	12.68mV	14.53mV	10.70mV	7.12mV	Pass
Crossload4	32.56mV	16.12mV	15.24mV	12.82mV	Pass

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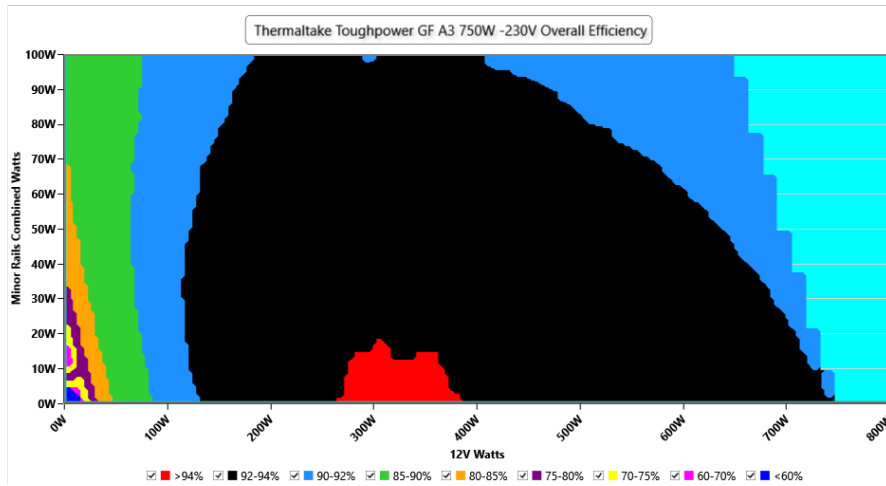
230V

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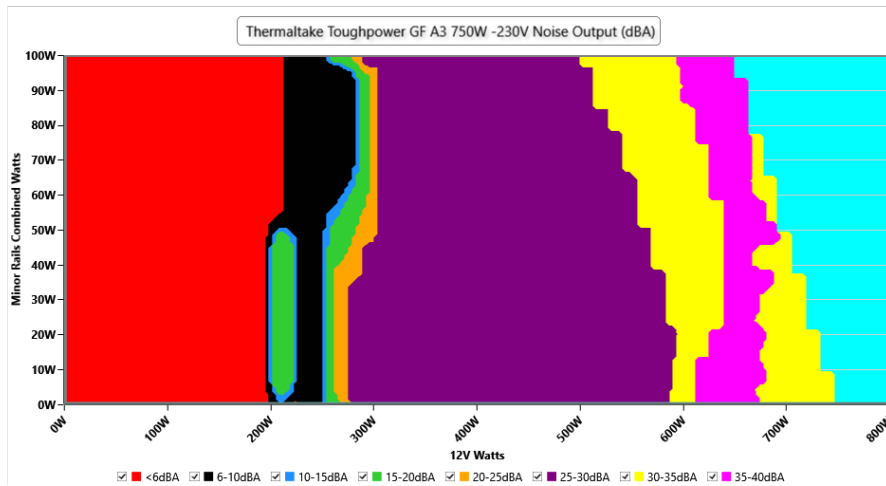
EFFICIENCY GRAPH 230V



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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:	229.96 V	229.90 V	227.70 V	229.99 V	232.30 V	PASS
Mains Frequency:	50.00 Hz	50.00 Hz	49.50 Hz	50.00 Hz	50.50 Hz	PASS
Mains Voltage CF:	1.416	1.415	1.340	1.416	1.490	PASS
Mains Voltage THD:	0.13 %	0.11 %	N/A	0.16 %	2.00 %	PASS
Real Power:	0.114 W	0.066 W	N/A	0.179 W	N/A	N/A
Apparent Power:	37.173 W	37.132 W	N/A	37.217 W	N/A	N/A
Power Factor:	0.002	N/A	N/A	N/A	N/A	N/A

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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%	4.460A	1.983A	1.978A	0.986A	74.994	88.246%	896	21.4	40.17°C	0.75
	11.972V	5.044V	3.336V	5.071V	84.982				44.42°C	229.93V
20%	9.948A	2.979A	2.976A	1.188A	149.909	91.879%	911	22.2	40.84°C	0.889
	11.964V	5.035V	3.326V	5.05V	163.161				45.47°C	229.92V
30%	15.796A	3.481A	3.481A	1.392A	224.901	93.093%	991	24.9	41.34°C	0.933
	11.956V	5.027V	3.318V	5.029V	241.586				46.39°C	229.9V
40%	21.662A	3.984A	3.989A	1.598A	299.98	93.509%	992	24.9	41.78°C	0.955
	11.946V	5.02V	3.309V	5.007V	320.803				47.27°C	229.89V
50%	27.137A	4.989A	5.002A	1.806A	374.334	92.961%	992	24.9	42.08°C	0.966
	11.933V	5.011V	3.299V	4.984V	402.68				48.08°C	229.88V
60%	32.679A	5.997A	6.023A	2A	449.184	92.706%	993	25.0	42.7°C	0.975
	11.918V	5.003V	3.287V	4.961V	484.523				49.24°C	229.87V
70%	38.227A	7.008A	7.05A	2.228A	524.198	92.37%	1198	30.9	43.04°C	0.979
	11.905V	4.995V	3.277V	4.936V	567.501				50.07°C	229.86V
80%	43.852A	8.001A	8.083A	2.338A	599.281	92.003%	1197	30.9	43.73°C	0.981
	11.892V	4.986V	3.265V	4.918V	651.368				51.86°C	229.84V
90%	49.816A	8.538A	8.598A	2.449A	674.42	91.622%	1392	35.1	44.02°C	0.983
	11.882V	4.977V	3.256V	4.9V	736.094				53.04°C	229.83V
100%	55.594A	9.056A	9.149A	3.094A	749.633	91.056%	1744	41.1	45.32°C	0.985
	11.871V	4.969V	3.246V	4.847V	823.267				55.38°C	229.82V
110%	61.249A	10.082A	10.293A	3.102A	824.665	90.464%	2079	46.0	46.76°C	0.987
	11.859V	4.959V	3.235V	4.835V	911.593				57.7°C	229.81V
CL1	0.116A	11.987A	12.005A	0A	101.279	85.859%	989	24.8	41.53°C	0.834
	11.939V	5.022V	3.307V	5.113V	117.958				46.99°C	229.93V
CL2	0.115A	19.909A	0A	0A	101.358	84.535%	990	24.8	40.76°C	0.836
	11.952V	5.022V	3.322V	5.121V	119.899				47.79°C	229.93V
CL3	0.115A	0A	19.973A	0A	67.376	79.558%	990	24.8	40.02°C	0.749
	11.953V	5.04V	3.304V	5.118V	84.688				49.09°C	229.93V
CL4	63.031A	0A	0A	0.001A	749.478	92.108%	1397	35.2	45.23°C	0.985
	11.891V	4.992V	3.272V	5.065V	813.702				56.19°C	229.82V

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Anex

Thermaltake Toughpower GF A3 750W

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	1.240A	0.495A	0.493A	0.195A	19.992	69.748%	526	<6.0	36.62°C	0.43
	11.974V	5.05V	3.345V	5.129V	28.661				39.68°C	229.94V
40W	2.728A	0.693A	0.691A	0.293A	39.996	83.695%	530	<6.0	37.23°C	0.574
	11.979V	5.048V	3.342V	5.12V	47.788				40.49°C	229.94V
60W	4.218A	0.892A	0.889A	0.391A	59.997	87.622%	529	<6.0	38.25°C	0.684
	11.977V	5.046V	3.34V	5.112V	68.471				41.73°C	229.93V
80W	5.704A	1.09A	1.087A	0.49A	79.933	89.525%	528	<6.0	39.23°C	0.763
	11.974V	5.045V	3.338V	5.104V	89.284				42.99°C	229.93V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.37mV	12.21mV	7.55mV	3.92mV	Pass
20% Load	10.47mV	12.31mV	7.39mV	4.44mV	Pass
30% Load	12.27mV	13.09mV	8.43mV	5.21mV	Pass
40% Load	15.26mV	13.96mV	9.05mV	5.68mV	Pass
50% Load	17.99mV	14.63mV	10.75mV	6.35mV	Pass
60% Load	19.23mV	16.23mV	11.74mV	7.33mV	Pass
70% Load	22.53mV	17.21mV	12.78mV	8.46mV	Pass
80% Load	24.64mV	16.85mV	13.71mV	9.29mV	Pass
90% Load	27.33mV	18.19mV	13.81mV	9.60mV	Pass
100% Load	37.01mV	19.39mV	17.44mV	12.63mV	Pass
110% Load	40.65mV	20.35mV	18.32mV	12.59mV	Pass
Crossload1	20.12mV	16.81mV	12.29mV	8.42mV	Pass
Crossload2	15.47mV	19.53mV	11.79mV	8.93mV	Pass
Crossload3	11.65mV	14.22mV	10.76mV	7.07mV	Pass
Crossload4	33.34mV	16.41mV	15.13mV	13.25mV	Pass

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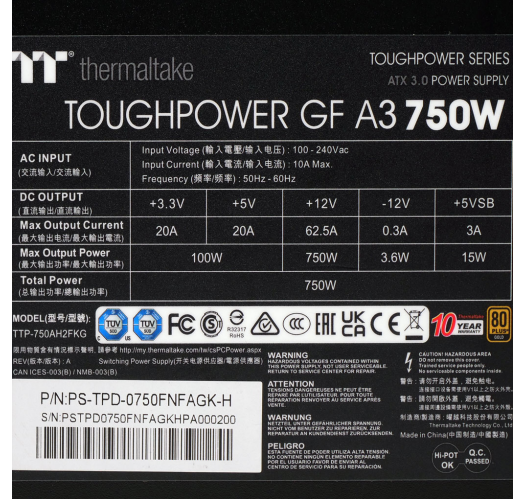
- > It should be mentioned that the test results are provided by Cybenetics
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Anex

Thermaltake Toughpower GF A3 750W

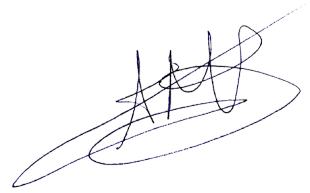


Top side



Power specifications label

CERTIFICATIONS 115V

Aristeidis Bitziopoulos
Lab Director

CERTIFICATIONS 230V



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