Anex

Thermaltake Toughpower GF3 750W

Lab ID#: TT75002065
Receipt Date: Sep 1, 2022
Test Date: Sep 19, 2022

Report: 22PS2065A
Report Date: Sep 19, 2022

DUT INFORMATION

Brand	Thermaltake
Manufacturer (OEM)	CWT
Series	Toughpower GF3
Model Number	TPD-0750AH3FCG
Serial Number	
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10-5
Rated Frequency (Hz)	50-60
Rated Power (W)	750
Type	ATX12V
Cooling	135mm Fluid Dynamic Bearing Fan (HA13525H12SF-Z)
Semi-Passive Operation	✓ (selectable)
Cable Design	Fully Modular

TEST EQUIPMENT

Electronic Loads	Chroma 63601-5 x4 Chroma 63600-2 x2 63640-80-80 x20 63610-80-20 x2
AC Sources	Chroma 6530, Keysight AC6804B
Power Analyzers	N4L PPA1530 x2
Sound Analyzer	Bruel & Kjaer 2270 G4
Microphone	Bruel & Kjaer Type 4955-A
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2
Tachometer	UNI-T UT372 x2
Digital Multimeter	Keysight U1273AX, Fluke 289, Keithley 2015 - THD
UPS	CyberPower OLS3000E 3kVA x2
Transformer	3kVA x2

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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	88.430%
Efficiency With 10W (≤500W) or 2% (>500W)	75.039
Average Efficiency 5VSB	79.321%
Standby Power Consumption (W)	0.0129000
Average PF	0.990
Avg Noise Output	27.02 dB(A)
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	A-

230V

Average Efficiency	90.469%
Average Efficiency 5VSB	78.188%
Standby Power Consumption (W)	0.0641000
Average PF	0.966
Avg Noise Output	26.83 dB(A)
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	A-

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	22	22	62.5	3	0.3
	Watts	120		750	15	3.6
Total Max. Power (W)		750				

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

Hold-Up Time (ms)	21.1
AC Loss to PWR_OK Hold Up Time (ms)	18.7
PWR_OK Inactive to DC Loss Delay (ms)	2.4

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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 (700mm)	2	2	18AWG	No
6+2 pin PCIe (600mm+150mm)	2	4	18AWG	No
12+4 pin PCIe (600mm) (300W)	1	1	16-24AWG	No
SATA (500mm+150mm)	1	2	18AWG	No
SATA (500mm+150mm+150mm)	2	6	18AWG	No
4-pin Molex (500mm+150mm+150mm+150mm)	1	4	18AWG	No

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General Data	-
Manufacturer (OEM)	CWT
Platform	CSZ
PCB Type	Double Sided
Primary Side	-
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	1x NTC Thermistor SCK-075 (7 Ohm) & Relay
Bridge Rectifier(s)	2x GBU806 (600V, 8A @ 100°C)
APFC MOSFETs	2x On Semiconductor FCP190N60E (600V, 13.1A @ 100°C, Rds(on): 0.19Ohm)
APFC Boost Diode	1x On Semiconductor FFSP0665A (650V, 6A @ 153°C)
Bulk Cap(s)	1x Rubycon (420V, 680uF, 2,000h @ 105°C, MXE)
Main Switchers	2x Infineon IPA60R190P6 (600V, 12.7A @ 100°C, Rds(on): 0.19Ohm)
APFC Controller	Champion CM6500UNX & CM03X
Resonant Controller	Champion CU6901VAC
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	4x International Rectifier IRFH7004PbF (40V, 164A @ 100°C, Rds(on): 1.4mOhm)
5V & 3.3V	DC-DC Converters: 2x UBIQ QN3107M6N (30V, 70A @ 100°C, Rds(on): 2.6mOhm) & 2x UBIQ QM3054M6 (30V, 61A @ 100°C, Rds(on): 4.8mOhm) PWM Controller(s): uPI-Semi uP3861P
Filtering Capacitors	Electrolytic: 2x Nichicon (2-5,000h @ 105°C, HD), 6x Nichicon (4-10,000h @ 105°C, HE), 1x Rubycon (2-10,000h @ 105°C, YXF), 1x Nippon Chemi-Con (4-10,000h @ 105°C, KY), 1x Nippon Chemi-Con (4-10,000h @ 105°C, KYA) Polymer: 8x Elite, 6x APAQ, 8x CapXon, 4x NIC
Supervisor IC	Weltrend WT7502R
Fan Controller	Microchip PIC16F1503
Fan Model	Hong Hua HA13525H12SF-Z (135mm, 12V, 0.5A, Fluid Dynamic Bearing Fan)
5VSB Circuit	-
Rectifier	1x PS1045L SBR (45V, 10A)
Standby PWM Controller	On-Bright OB2365T

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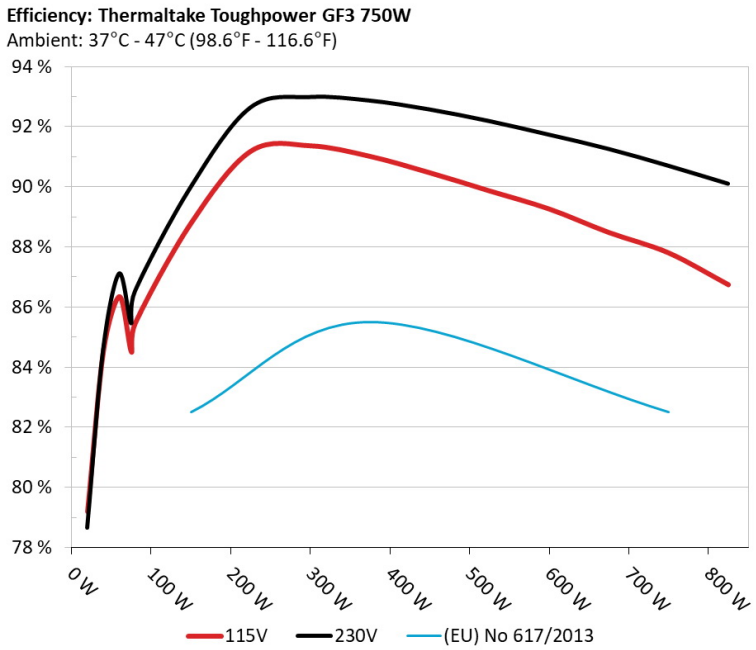
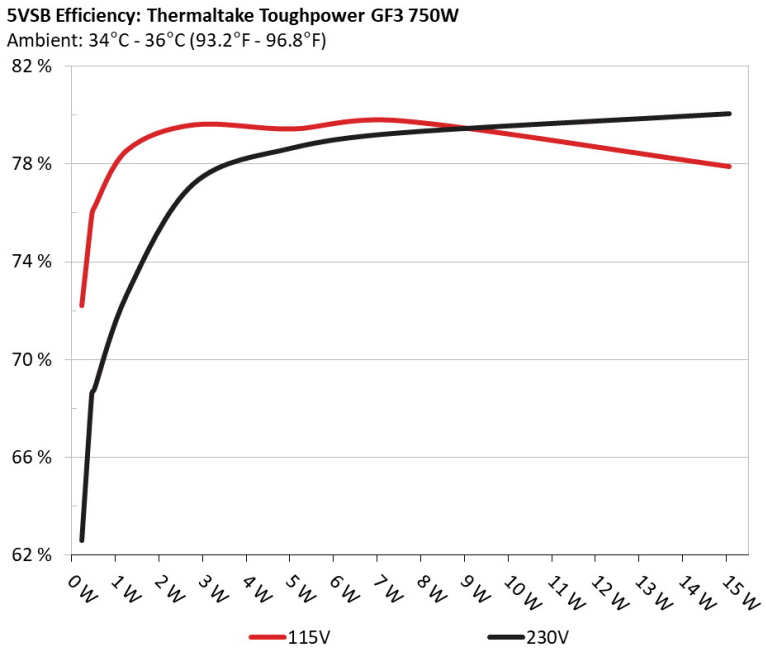
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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	0.045A	0.229W	72.217%	0.032
	5.089V	0.317W		115.16V
2	0.09A	0.458W	75.938%	0.06
	5.088V	0.603W		115.16V
3	0.55A	2.792W	79.611%	0.27
	5.078V	3.507W		115.16V
4	1A	5.067W	79.442%	0.372
	5.068V	6.378W		115.16V
5	1.5A	7.585W	79.772%	0.424
	5.057V	9.508W		115.16V
6	2.999A	15.065W	77.906%	0.495
	5.023V	19.337W		115.16V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229W	62.586%	0.011
	5.089V	0.366W		230.34V
2	0.09A	0.458W	68.61%	0.02
	5.088V	0.667W		230.33V
3	0.55A	2.792W	77.189%	0.102
	5.078V	3.618W		230.33V
4	1A	5.068W	78.653%	0.17
	5.068V	6.444W		230.33V
5	1.5A	7.585W	79.274%	0.23
	5.057V	9.568W		230.33V
6	2.999A	15.064W	80.049%	0.335
	5.023V	18.818W		230.33V

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115V

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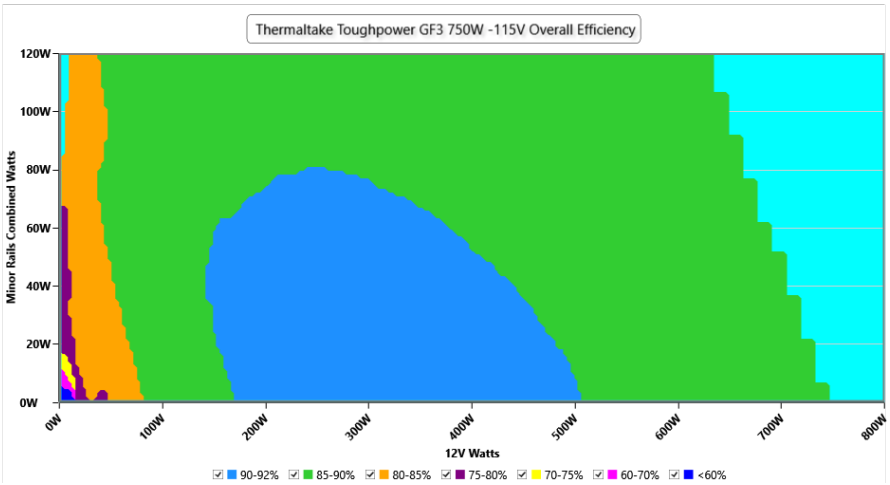
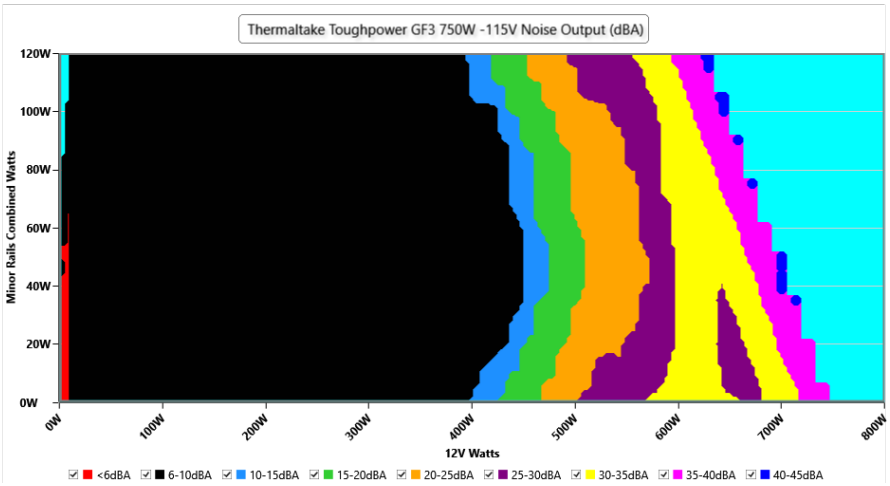
EFFICIENCY GRAPH 115V



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:	115.17 V	115.13 V	113.85 V	115.20 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.94 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:	0.13 %	0.10 %	N/A	0.17 %	2.00 %	PASS
Real Power:	0.013 W	0.009 W	N/A	0.017 W	N/A	N/A
Apparent Power:	9.923 W	9.881 W	N/A	9.966 W	N/A	N/A
Power Factor:	0.001	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%	4.418A	1.982A	1.999A	0.988A	74.991	84.017%	0	<6.0	44.47°C	0.98
	12.086V	5.045V	3.301V	5.059V	89.257				40.19°C	115.15V
20%	9.848A	2.975A	3.001A	1.188A	149.913	88.302%	0	<6.0	45.26°C	0.99
	12.084V	5.042V	3.299V	5.049V	169.776				40.51°C	115.13V
30%	15.650A	3.472A	3.503A	1.368A	224.91	90.694%	0	<6.0	45.75°C	0.993
	12.068V	5.041V	3.297V	5.117V	247.988				40.61°C	115.11V
40%	21.451A	3.97A	4.006A	1.564A	299.986	90.874%	419	7.8	41.59°C	0.993
	12.063V	5.038V	3.295V	5.116V	330.112				47.21°C	115.09V
50%	26.856A	4.965A	5.011A	1.762A	374.359	90.525%	418	7.8	41.73°C	0.992
	12.059V	5.036V	3.293V	5.107V	413.545				47.84°C	115.07V
60%	32.318A	5.96A	6.016A	1.961A	449.289	89.981%	576	14.3	42.27°C	0.992
	12.051V	5.034V	3.291V	5.099V	499.323				48.83°C	115.04V
70%	37.775A	6.955A	7.022A	2.16A	524.202	89.377%	766	23.7	43.45°C	0.993
	12.047V	5.033V	3.29V	5.09V	586.504				50.58°C	115.01V
80%	43.345A	7.952A	8.025A	2.261A	599.307	88.775%	832	26.5	44.14°C	0.994
	12.029V	5.031V	3.288V	5.084V	675.09				52.16°C	114.99V
90%	49.191A	8.448A	8.516A	2.363A	674.38	87.993%	1160	33.9	45.41°C	0.995
	12.033V	5.03V	3.286V	5.076V	766.395				54.57°C	114.96V
100%	54.900A	8.95A	9.038A	2.964A	749.546	87.312%	1247	38.8	45.74°C	0.995
	12.020V	5.027V	3.285V	5.059V	858.469				55.76°C	114.93V
110%	60.407A	9.948A	10.14A	2.968A	824.621	86.254%	1809	48.8	46.68°C	0.996
	12.024V	5.025V	3.283V	5.053V	956.041				57.62°C	114.9V
CL1	0.114A	14.324A	14.482A	0A	121.269	83.063%	420	7.9	42.49°C	0.989
	12.102V	5.04V	3.293V	5.067V	145.995				48.99°C	115.14V
CL2	0.114A	21.779A	0A	0A	111.379	81.686%	420	7.9	43.67°C	0.988
	12.107V	5.051V	3.294V	5.074V	136.353				50.86°C	115.14V
CL3	0.114A	0A	22.028A	0A	73.967	75.611%	419	7.8	44.26°C	0.981
	12.106V	5.04V	3.295V	5.069V	97.825				52.27°C	115.15V
CL4	62.279A	0A	0A	0A	749.458	87.989%	1401	41.7	45.48°C	0.995
	12.034V	5.043V	3.294V	5.133V	851.765				55.46°C	114.93V

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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	0.494A	0.499A	0.197A	19.987	78.708%	0	<6.0	40.15°C	0.867
	11.982V	5.061V	3.309V	5.082V	25.394				37.02°C	115.17V
40W	2.726A	0.692A	0.698A	0.295A	39.988	84.068%	0	<6.0	40.66°C	0.947
	11.988V	5.061V	3.309V	5.079V	47.567				37.28°C	115.16V
60W	4.212A	0.89A	0.899A	0.394A	59.988	85.858%	0	<6.0	42.24°C	0.969
	11.994V	5.052V	3.305V	5.075V	69.87				38.45°C	115.16V
80W	5.653A	1.089A	1.099A	0.493A	79.929	84.98%	0	<6.0	43.59°C	0.981
	12.083V	5.047V	3.302V	5.071V	94.056				39.67°C	115.15V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	41.47mV	5.84mV	7.33mV	24.24mV	Pass
20% Load	40.60mV	6.10mV	8.24mV	24.99mV	Pass
30% Load	12.23mV	5.79mV	6.88mV	8.30mV	Pass
40% Load	37.31mV	6.25mV	7.33mV	22.87mV	Pass
50% Load	45.70mV	6.81mV	8.14mV	27.12mV	Pass
60% Load	48.05mV	7.72mV	8.44mV	29.91mV	Pass
70% Load	38.93mV	7.57mV	8.60mV	26.16mV	Pass
80% Load	45.62mV	8.03mV	10.42mV	25.96mV	Pass
90% Load	41.36mV	9.40mV	10.57mV	27.63mV	Pass
100% Load	16.23mV	9.73mV	11.25mV	13.68mV	Pass
110% Load	17.54mV	10.22mV	12.21mV	13.40mV	Pass
Crossload1	8.14mV	10.19mV	14.42mV	12.54mV	Pass
Crossload2	8.61mV	13.87mV	7.94mV	12.60mV	Pass
Crossload3	44.76mV	8.28mV	13.25mV	28.64mV	Pass
Crossload4	15.34mV	7.58mV	9.30mV	13.30mV	Pass

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Thermaltake Toughpower GF3 750W

230V

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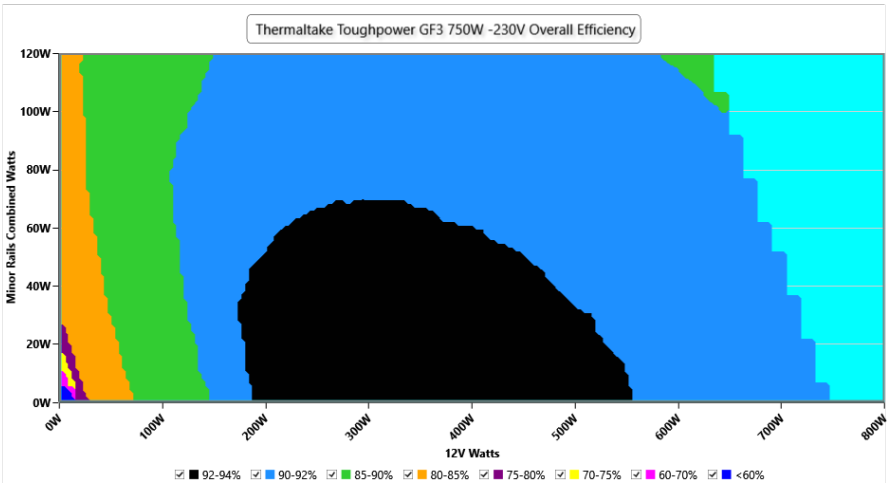
EFFICIENCY GRAPH 230V



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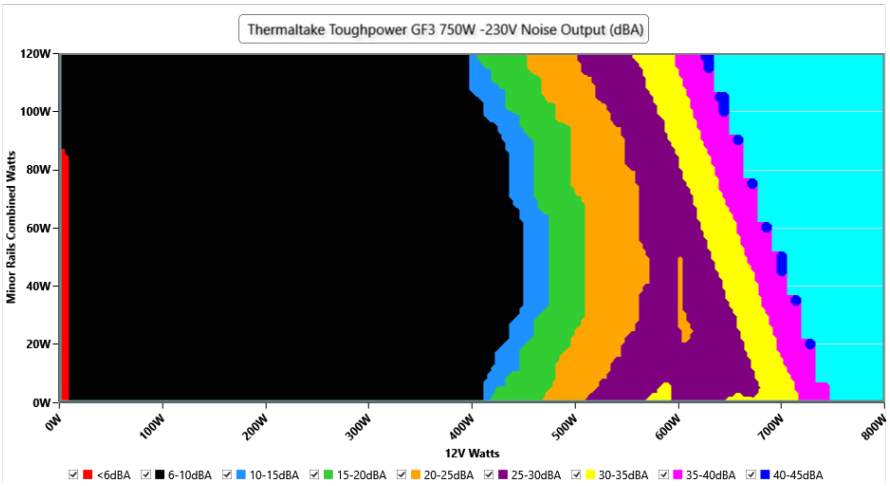
NOISE GRAPH 230V



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VAMPIRE POWER -230V

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	230.34 V	230.22 V	227.70 V	230.38 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:	0.12 %	0.10 %	N/A	0.22 %	2.00 %	PASS
Real Power:	0.064 W	0.056 W	N/A	0.078 W	N/A	N/A
Apparent Power:	33.760 W	33.585 W	N/A	33.982 W	N/A	N/A
Power Factor:	0.002	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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Anex

Thermaltake Toughpower GF3 750W

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%	4.416A	1.982A	1.999A	0.988A	74.988	84.96%	0	<6.0	44.85°C	0.859
	12.089V	5.045V	3.301V	5.059V	88.262				40.59°C	230.34V
20%	9.846A	2.975A	3A	1.188A	149.91	89.489%	0	<6.0	45.58°C	0.942
	12.088V	5.042V	3.299V	5.048V	167.513				40.78°C	230.34V
30%	15.648A	3.472A	3.503A	1.368A	224.899	92.131%	0	<6.0	46.27°C	0.966
	12.069V	5.04V	3.297V	5.118V	244.104				41.03°C	230.33V
40%	21.451A	3.971A	4.006A	1.564A	299.971	92.48%	419	7.8	41.54°C	0.976
	12.064V	5.037V	3.295V	5.116V	324.365				47.23°C	230.32V
50%	26.854A	4.966A	5.01A	1.762A	374.298	92.362%	419	7.8	42.26°C	0.981
	12.057V	5.035V	3.293V	5.107V	405.242				48.51°C	230.3V
60%	32.312A	5.961A	6.017A	1.962A	449.262	92.07%	578	14.4	43.01°C	0.984
	12.053V	5.033V	3.291V	5.098V	487.955				49.76°C	230.29V
70%	37.774A	6.957A	7.023A	2.161A	524.183	91.684%	709	21.3	43.81°C	0.986
	12.047V	5.032V	3.289V	5.089V	571.721				50.87°C	230.28V
80%	43.312A	7.953A	8.026A	2.262A	599.382	91.231%	954	30.6	44.11°C	0.987
	12.040V	5.031V	3.288V	5.083V	656.994				52.13°C	230.28V
90%	49.184A	8.449A	8.516A	2.363A	674.378	90.756%	1183	37.0	44.36°C	0.989
	12.034V	5.029V	3.286V	5.076V	743.072				53.49°C	230.26V
100%	54.860A	8.95A	9.038A	2.965A	749.611	90.197%	1483	43.3	45.2°C	0.99
	12.030V	5.027V	3.285V	5.058V	831.078				55.21°C	230.25V
110%	60.407A	9.949A	10.14A	2.968A	824.616	89.6%	1819	49.1	46.73°C	0.99
	12.024V	5.025V	3.283V	5.053V	920.333				57.64°C	230.23V
CL1	0.114A	14.325A	14.481A	0A	121.268	84.387%	420	7.9	42.05°C	0.929
	12.102V	5.04V	3.293V	5.067V	143.706				48.45°C	230.34V
CL2	0.114A	21.776A	0A	0A	111.378	82.778%	420	7.9	43.41°C	0.922
	12.107V	5.051V	3.294V	5.074V	134.554				50.8°C	230.34V
CL3	0.114A	0A	22.031A	0A	73.965	76.39%	419	7.8	44.16°C	0.876
	12.107V	5.037V	3.295V	5.069V	96.828				52.27°C	230.34V
CL4	62.290A	0A	0A	0A	749.416	91.009%	1394	41.6	45.86°C	0.989
	12.031V	5.043V	3.294V	5.133V	823.467				55.82°C	230.25V

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Anex

Thermaltake Toughpower GF3 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	1.238A	0.494A	0.498A	0.197A	19.985	78.168%	0	<6.0	40.37°C	0.5
	11.982V	5.061V	3.309V	5.082V	25.569				37.32°C	230.35V
40W	2.726A	0.692A	0.698A	0.295A	39.986	84.093%	0	<6.0	41.19°C	0.702
	11.987V	5.06V	3.309V	5.078V	47.545				37.9°C	230.35V
60W	4.212A	0.891A	0.898A	0.394A	59.986	86.613%	0	<6.0	42.44°C	0.808
	11.993V	5.052V	3.305V	5.075V	69.261				38.99°C	230.34V
80W	5.653A	1.09A	1.099A	0.493A	79.924	86.025%	0	<6.0	43.09°C	0.868
	12.082V	5.047V	3.302V	5.071V	92.906				39.31°C	230.34V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	5.87mV	5.69mV	6.12mV	8.55mV	Pass
20% Load	5.98mV	5.59mV	6.57mV	7.64mV	Pass
30% Load	13.39mV	6.30mV	7.13mV	8.35mV	Pass
40% Load	48.45mV	6.56mV	7.13mV	30.71mV	Pass
50% Load	42.99mV	6.71mV	7.38mV	28.18mV	Pass
60% Load	41.36mV	7.11mV	8.04mV	26.36mV	Pass
70% Load	43.54mV	8.44mV	9.30mV	28.03mV	Pass
80% Load	42.33mV	8.23mV	10.97mV	27.02mV	Pass
90% Load	46.02mV	8.59mV	11.02mV	28.59mV	Pass
100% Load	17.38mV	9.90mV	11.78mV	13.27mV	Pass
110% Load	18.16mV	10.16mV	12.72mV	14.02mV	Pass
Crossload1	8.14mV	10.18mV	11.67mV	13.66mV	Pass
Crossload2	43.44mV	13.57mV	7.79mV	31.68mV	Pass
Crossload3	40.91mV	8.18mV	12.99mV	29.60mV	Pass
Crossload4	16.23mV	7.37mV	9.66mV	13.71mV	Pass

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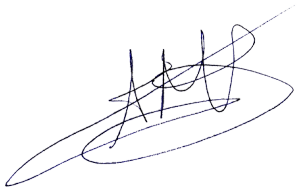
Anex

Thermaltake Toughpower GF3 750W

Top side

Power specifications label

CERTIFICATIONS 115V



Aristeidis Bitziopoulos
Lab Director

CERTIFICATIONS 230V

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