

Anex

Thermaltake Toughpower PF3 1200W

Lab ID#: TT12002253
 Receipt Date: Sep 25, 2023
 Test Date: Oct 6, 2023

Report: 23PS2253A
 Report Date: Oct 9, 2023

DUT INFORMATION

Brand	Thermaltake
Manufacturer (OEM)	HKC
Series	Toughpower PF3
Model Number	TPD-1200AH2FLP
Serial Number	PSTPD1200FNFAPULPGVH00251
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	15-8
Rated Frequency (Hz)	50-60
Rated Power (W)	1200
Type	ATX12V
Cooling	120mm Fluid Dynamic Bearing Fan [TT-1225 (GQR1225D12H)]
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	90.201%
Efficiency With 10W (≤500W) or 2% (>500W)	66.334
Average Efficiency 5VSB	81.732%
Standby Power Consumption (W)	0.0435000
Average PF	0.986
Avg Noise Output	41.94 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	Standard

230V

Average Efficiency	92.169%
Average Efficiency 5VSB	80.100%
Standby Power Consumption (W)	0.0905000
Average PF	0.953
Avg Noise Output	41.78 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	130		1200	15	3.6
Total Max. Power (W)		1200				

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

Hold-Up Time (ms)	22.5
AC Loss to PWR_OK Hold Up Time (ms)	20.2
PWR_OK Inactive to DC Loss Delay (ms)	2.3

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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	16-22AWG	No
4+4 pin EPS12V (650mm)	2	2	16AWG	No
6+2 pin PCIe (500mm+150mm)	2	4	16-18AWG	No
6+2 pin PCIe (500mm)	1	1	16AWG	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+150mm+150mm+150mm)	2	8	18AWG	No
FDD Adapter (160mm)	1	1	22AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	14AWG	-

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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 no info
APFC MOSFETs	2x Wayon WML53N60C4 (600V, 26A @ 100°C, Rds(on): 0.070Ohm)
APFC Boost Diode	1x CH3D160651
Bulk Cap(s)	2x Nichicon (420V, 390uF each or 780uF combined, 3000h @ 105°C, LGM)
Main Switchers	4x Wayon WML36N60F2 (600V, 20A @ 100°C, Rds(on): 0.110Ohm)
APFC Controller	Champion CM6502UHHX
Resonant Controller	Champion CU6901VPA
Topology	Primary side: APFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	8x Infineon BSC007N04LS6 (40V, 269A @ 100°C, Rds(on): 0.7 mOhm)
5V & 3.3V	DC-DC Converters: 2x PWM Controller(s): ANPEC APW7159C
Filtering Capacitors	Electrolytic: 5x Nippon Chemi-Con (2-5,000h, @ 105°C, KZE) 2x Nippon Chemi-Con (4-10,000h, @ 105°CKYA), Polymer: 35x no info
Fan Model	Weltrend WT7527RA TT-1225 BDK12025MS (120mm, 12V, 0.30A, Fluid Dynamic Bearing Fan)
5VSB Circuit	-
Rectifier	1x PN8141
Standby PWM Controller	PJ1256

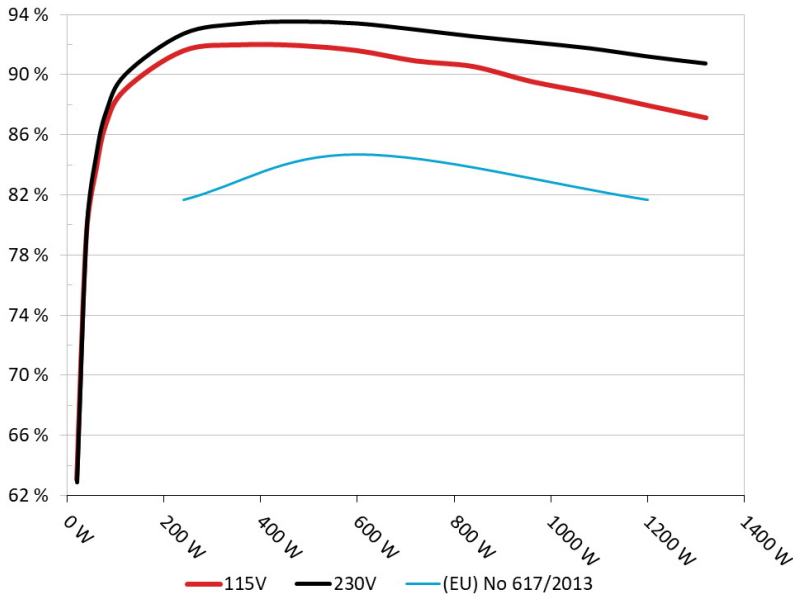
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EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

Efficiency: Thermaltake Toughpower PF3 1200W

Ambient: 30°C - 40°C (86°F - 104°F)



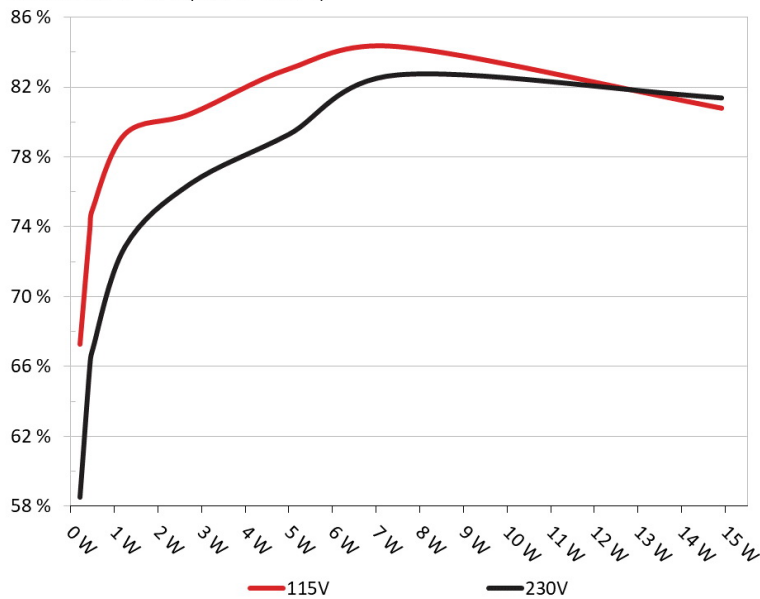
INFO

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 PF3 1200W

Ambient: 28°C - 32°C (82.4°F - 89.6°F)



INFO

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

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Thermaltake Toughpower PF3 1200W

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.226W	67.253%	0.043
	5.025V	0.336W		115.17V
2	0.09A	0.452W	73.884%	0.077
	5.024V	0.612W		115.17V
3	0.55A	2.76W	80.456%	0.301
	5.016V	3.43W		115.16V
4	1A	5.01W	83.031%	0.386
	5.008V	6.034W		115.16V
5	1.5A	7.501W	84.307%	0.425
	4.999V	8.898W		115.16V
6	3A	14.917W	80.778%	0.484
	4.972V	18.467W		115.15V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.226W	58.514%	0.015
	5.025V	0.387W		230.4V
2	0.09A	0.452W	66.086%	0.026
	5.024V	0.685W		230.4V
3	0.55A	2.76W	76.489%	0.128
	5.016V	3.608W		230.39V
4	1A	5.01W	79.31%	0.202
	5.008V	6.319W		230.39V
5	1.5A	7.501W	82.716%	0.257
	4.999V	9.067W		230.39V
6	3.001A	14.92W	81.396%	0.353
	4.973V	18.331W		230.38V

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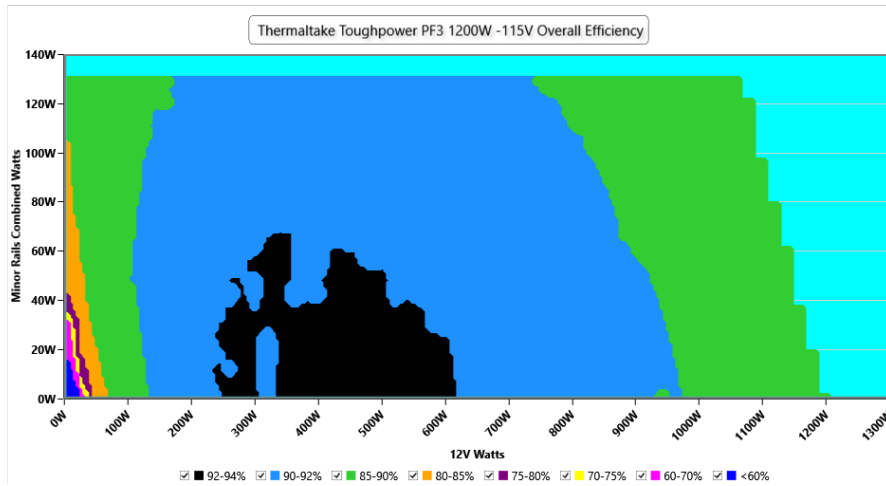
115V

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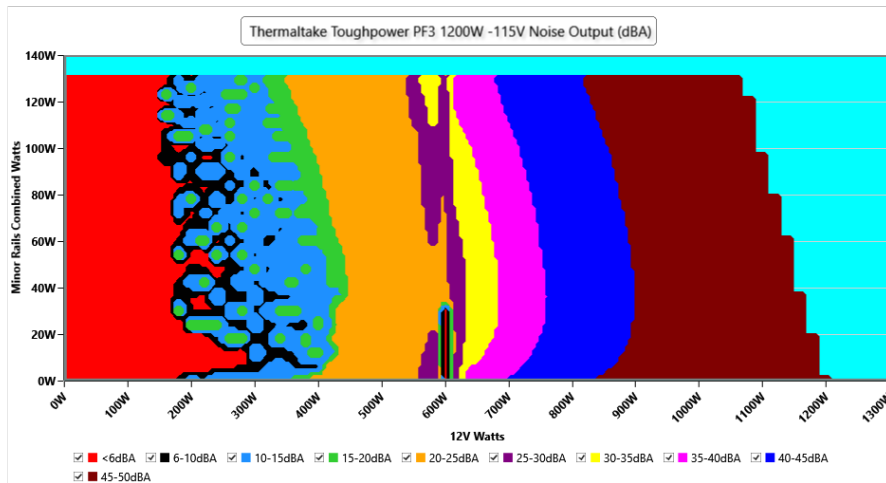
EFFICIENCY GRAPH 115V



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:	115.15 V	115.12 V	113.85 V	115.19 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.91 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.415	1.415	1.340	1.416	1.490	PASS
Mains Voltage THD:	0.13 %	0.11 %	N/A	0.15 %	2.00 %	PASS
Real Power:	0.043 W	0.006 W	N/A	0.064 W	N/A	N/A
Apparent Power:	7.747 W	7.742 W	N/A	7.753 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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Thermaltake Toughpower PF3 1200W

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%	8.076A	1.979A	1.975A	0.995A	120.017	89.326%	0	<6.0	38.78°C	0.972
	12.185V	5.055V	3.341V	5.028V	134.361				34.62°C	115.14V
20%	17.174A	2.97A	2.964A	1.195A	239.984	91.899%	0	<6.0	39.36°C	0.974
	12.174V	5.051V	3.34V	5.021V	261.138				34.84°C	115.11V
30%	26.579A	3.467A	3.46A	1.397A	359.363	92.298%	687	15.7	35.05°C	0.981
	12.164V	5.049V	3.339V	5.012V	389.35				40.06°C	115.07V
40%	36.079A	3.965A	3.955A	1.599A	479.733	92.251%	917	23.2	35.84°C	0.987
	12.154V	5.044V	3.338V	5.003V	520.025				41.43°C	115.04V
50%	45.209A	4.96A	4.946A	1.802A	599.501	91.914%	1091	28.1	36.34°C	0.99
	12.143V	5.041V	3.336V	4.995V	652.246				42.35°C	115.01V
60%	54.419A	5.958A	5.938A	2A	720.029	91.228%	1684	39.8	36.85°C	0.992
	12.133V	5.037V	3.335V	4.988V	789.268				43.39°C	114.98V
70%	63.515A	6.956A	6.931A	2.208A	839.487	90.851%	2152	45.9	37.38°C	0.993
	12.129V	5.033V	3.333V	4.982V	924.036				44.53°C	114.93V
80%	72.795A	7.951A	7.918A	2.309A	959.596	89.854%	2263	47.5	37.73°C	0.994
	12.112V	5.03V	3.334V	4.981V	1067.959				46.01°C	114.89V
90%	82.396A	8.455A	8.4A	2.413A	1079.474	89.11%	2268	47.4	38.91°C	0.995
	12.100V	5.026V	3.333V	4.975V	1211.394				48.009°C	114.86V
100%	91.828A	8.959A	8.911A	3.029A	1199.552	88.266%	2270	47.4	39.68°C	0.996
	12.086V	5.023V	3.332V	4.952V	1359.02				49.71°C	114.83V
110%	101.221A	9.963A	9.995A	3.03A	1320.184	87.438%	2271	47.4	40.22°C	0.996
	12.071V	5.019V	3.331V	4.951V	1509.853				51.12°C	114.8V
CL1	0.115A	15.507A	15.476A	0A	131.293	84.04%	939	23.8	38.35°C	0.978
	12.166V	5.049V	3.334V	5.102V	156.232				43.86°C	115.12V
CL2	0.115A	19.782A	0A	0A	101.394	83.287%	920	23.4	37.35°C	0.964
	12.179V	5.055V	3.337V	5.131V	121.744				44.38°C	115.13V
CL3	0.115A	0A	19.741A	0A	67.39	78.875%	509	7.5	37.35°C	0.953
	12.174V	5.058V	3.343V	5.052V	85.441				46.39°C	115.14V
CL4	99.237A	0A	0A	0A	1200.218	88.587%	2270	47.4	39.98°C	0.996
	12.094V	5.031V	3.34V	5.038V	1354.85				50.96°C	114.84V

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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	1.218A	0.494A	0.494A	0.198A	20.001	63.356%	0	<6.0	33.12°C	0.878
	12.186V	5.063V	3.343V	5.058V	31.573				30.05°C	115.17V
40W	2.680A	0.692A	0.691A	0.297A	39.999	79.654%	0	<6.0	35.61°C	0.919
	12.194V	5.06V	3.343V	5.054V	50.215				32.25°C	115.17V
60W	4.144A	0.89A	0.889A	0.396A	59.998	84.005%	0	<6.0	36.65°C	0.945
	12.192V	5.058V	3.342V	5.049V	71.429				32.97°C	115.16V
80W	5.606A	1.088A	1.086A	0.496A	79.964	86.992%	0	<6.0	37.42°C	0.961
	12.190V	5.057V	3.342V	5.045V	91.927				33.46°C	115.15V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.36mV	6.19mV	5.63mV	5.05mV	Pass
20% Load	9.79mV	6.80mV	6.09mV	5.25mV	Pass
30% Load	9.14mV	7.21mV	6.60mV	6.17mV	Pass
40% Load	9.19mV	7.41mV	5.89mV	6.12mV	Pass
50% Load	9.81mV	7.26mV	6.45mV	6.42mV	Pass
60% Load	11.34mV	7.46mV	6.30mV	7.09mV	Pass
70% Load	12.05mV	7.98mV	6.60mV	7.55mV	Pass
80% Load	12.31mV	8.54mV	11.87mV	8.06mV	Pass
90% Load	13.84mV	9.21mV	12.74mV	7.90mV	Pass
100% Load	20.05mV	9.58mV	12.99mV	9.36mV	Pass
110% Load	21.69mV	10.37mV	13.76mV	10.35mV	Pass
Crossload1	14.05mV	9.53mV	14.34mV	6.41mV	Pass
Crossload2	9.35mV	9.41mV	5.68mV	6.32mV	Pass
Crossload3	8.94mV	7.67mV	14.38mV	5.30mV	Pass
Crossload4	19.43mV	7.38mV	6.29mV	9.59mV	Pass

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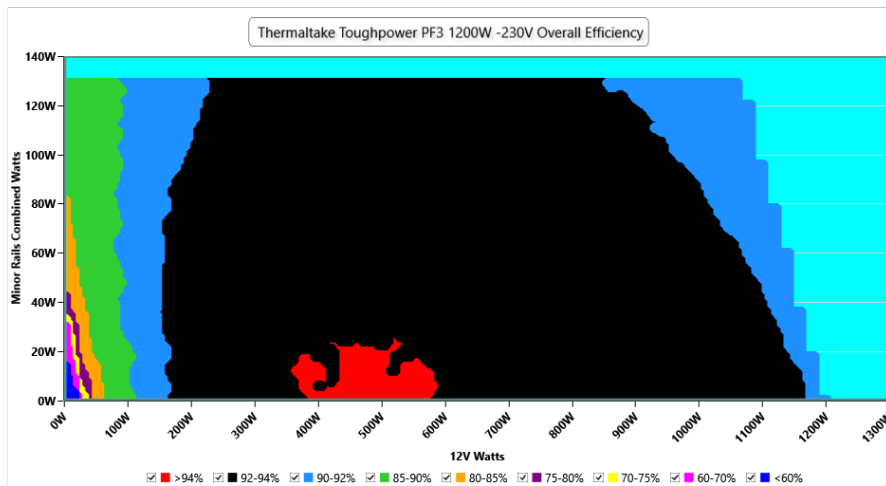
230V

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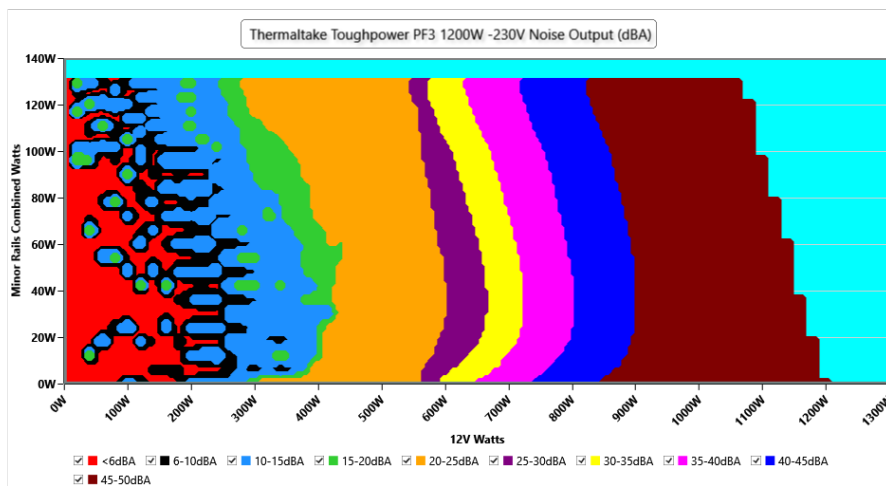
EFFICIENCY GRAPH 230V



INFO

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NOISE GRAPH 230V



INFO

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VAMPIRE POWER -230V

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	230.43 V	230.36 V	227.70 V	230.41 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:	1.415	1.415	1.340	1.416	1.490	PASS
Mains Voltage THD:	0.14 %	0.13 %	N/A	0.16 %	2.00 %	PASS
Real Power:	0.091 W	0.074 W	N/A	0.159 W	N/A	N/A
Apparent Power:	25.970 W	25.952 W	N/A	25.988 W	N/A	N/A
Power Factor:	0.003	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%	8.078A	1.977A	1.975A	0.994A	120.018	90.309%	0	<6.0	38.46°C	0.87
	12.184V	5.058V	3.342V	5.031V	132.891				34.21°C	230.4V
20%	17.175A	2.969A	2.964A	1.195A	239.981	93.004%	505	7.5	34.85°C	0.931
	12.173V	5.053V	3.341V	5.023V	258.032				39.54°C	230.39V
30%	26.580A	3.467A	3.46A	1.396A	359.363	93.674%	816	19.3	35.28°C	0.95
	12.164V	5.049V	3.339V	5.014V	383.634				40.37°C	230.37V
40%	36.082A	3.965A	3.955A	1.599A	479.744	93.817%	920	23.4	35.53°C	0.961
	12.154V	5.045V	3.337V	5.005V	511.364				41.05°C	230.35V
50%	45.212A	4.96A	4.946A	1.801A	599.51	93.689%	1174	30.2	36.05°C	0.967
	12.142V	5.041V	3.337V	4.998V	639.899				42.12°C	230.33V
60%	54.422A	5.957A	5.937A	2A	720.03	93.282%	1716	40.4	36.7°C	0.971
	12.132V	5.037V	3.335V	4.99V	771.889				43.23°C	230.32V
70%	63.581A	6.956A	6.93A	2.208A	839.779	92.828%	2245	47.5	37.39°C	0.975
	12.121V	5.033V	3.334V	4.983V	904.662				44.57°C	230.31V
80%	72.828A	7.954A	7.921A	2.31A	959.768	92.444%	2256	47.6	37.47°C	0.978
	12.109V	5.029V	3.333V	4.979V	1038.228				45.53°C	230.3V
90%	82.421A	8.458A	8.402A	2.413A	1079.609	92.044%	2265	47.5	38.19°C	0.979
	12.098V	5.025V	3.332V	4.974V	1172.918				47.25°C	230.28V
100%	91.859A	8.96A	8.912A	3.029A	1199.667	91.497%	2270	47.4	39.17°C	0.981
	12.083V	5.022V	3.332V	4.953V	1311.148				49.23°C	230.26V
110%	101.260A	9.962A	9.994A	3.029A	1320.304	91.031%	2269	47.4	40.25°C	0.983
	12.068V	5.019V	3.332V	4.953V	1450.372				51.19°C	230.25V
CL1	0.115A	15.504A	15.474A	0A	131.301	85.43%	944	23.8	37.88°C	0.89
	12.166V	5.05V	3.334V	5.104V	153.689				43.41°C	230.41V
CL2	0.115A	19.781A	0A	0A	101.398	84.37%	922	23.4	36.8°C	0.856
	12.179V	5.055V	3.337V	5.132V	120.177				43.91°C	230.41V
CL3	0.115A	0A	19.742A	0A	67.39	79.911%	579	8.8	38.58°C	0.802
	12.174V	5.059V	3.343V	5.051V	84.329				47.75°C	230.41V
CL4	99.283A	0A	0A	0A	1200.412	91.878%	2266	47.5	40.57°C	0.981
	12.091V	5.032V	3.341V	5.038V	1306.532				51.49°C	230.27V

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Anex

Thermaltake Toughpower PF3 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	1.220A	0.494A	0.493A	0.198A	20.014	63.173%	0	<6.0	33.13°C	0.574
	12.185V	5.063V	3.344V	5.059V	31.678				30.03°C	230.42V
40W	2.682A	0.691A	0.691A	0.297A	40.005	80.055%	0	<6.0	34.27°C	0.689
	12.191V	5.063V	3.345V	5.056V	49.973				30.98°C	230.41V
60W	4.146A	0.889A	0.888A	0.396A	60.002	84.986%	0	<6.0	35.17°C	0.769
	12.190V	5.061V	3.344V	5.051V	70.592				31.7°C	230.41V
80W	5.606A	1.087A	1.086A	0.495A	79.968	87.808%	0	<6.0	35.88°C	0.816
	12.188V	5.06V	3.343V	5.047V	91.072				32.01°C	230.4V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.36mV	6.49mV	5.37mV	5.40mV	Pass
20% Load	9.48mV	6.70mV	6.14mV	5.25mV	Pass
30% Load	9.53mV	7.57mV	7.06mV	6.63mV	Pass
40% Load	9.81mV	7.00mV	5.88mV	6.12mV	Pass
50% Load	10.01mV	7.31mV	6.45mV	6.53mV	Pass
60% Load	9.96mV	7.57mV	6.14mV	6.93mV	Pass
70% Load	11.34mV	7.72mV	6.29mV	7.44mV	Pass
80% Load	11.39mV	8.49mV	11.62mV	7.39mV	Pass
90% Load	13.08mV	8.33mV	11.62mV	7.80mV	Pass
100% Load	18.97mV	9.67mV	12.96mV	9.80mV	Pass
110% Load	21.52mV	10.40mV	13.49mV	10.33mV	Pass
Crossload1	13.80mV	9.61mV	14.75mV	6.23mV	Pass
Crossload2	8.48mV	8.18mV	5.99mV	5.76mV	Pass
Crossload3	8.89mV	7.62mV	14.94mV	5.30mV	Pass
Crossload4	18.03mV	7.24mV	6.04mV	8.91mV	Pass

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Anex

Thermaltake Toughpower PF3 1200W

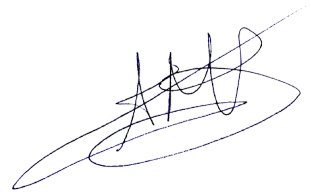


Top side

thermaltake		TOUGHPOWER SERIES				
		ATX 3.0 POWER SUPPLY				
TOUGHPOWER PF3 1200W						
AC INPUT (交流輸入/交流輸入)	Input Voltage (輸入電壓/輸入電壓): 100 - 240V~	Only For Taiwan (僅適用於台灣): 100 - 240V~, 15A - 8A, 50Hz / 60Hz				
	Input Current (輸入電流/輸入電流): 20A - 8A	Only For China (僅適用於中國): 200 - 240V~, 10A Max., 50Hz / 60Hz				
	Frequency (頻率/頻率): 50Hz / 60Hz					
DC OUTPUT (直流輸出/直流輸出)	+3.3V	+5V	+12V	-12V	+5VSB	
Max Output Current (最大輸出電流/最大輸出電流)	20A	20A	100.0A	0.3A	3A	
Max Output Power (最大輸出功率/最大輸出功率)	130W		1200W	3.6W	15W	
Total Power (總輸出功率/總輸出功率)	1200W					
MODEL(型號/型號): TPD-1200AH2FLP						
<small> 請用前管背有情況標記說明。請參考 http://my.thermaltake.com/itsPCPower.aspx REV1(版本/版本): A Switching Power Supply(開關電源/開關電源供應器) CAN(ICES-0038) / NMB-003(B) 收錄於2009年聯邦地區安全使用 </small>	<small> WARNING HAZARDOUS VOLTAGES CONTAINED WITHIN THE POWER SUPPLY UNIT. USER SERVICEABLE. RETURN TO SERVICE CENTER FOR REPAIR. CAUTION: HAZARDOUS AREA DO NOT REMOVE THIS COVER. THERE IS SERVICEABLE AREA. No serviceable components inside. </small>					
<small> ATTENTION TENSION DANGEREUSE NE PAS OUVRIRE L'APPAREIL PAR UTILISATEUR POUR TOUTE REPARATION. </small>		<small> 警告：請勿開啟外蓋，避免觸電。 請勿擅自修理，請洽原廠。 </small>			<small> 80 PLUS GOLD </small>	

Power specifications label

CERTIFICATIONS 115V

Aristeidis Bitziopoulos
Lab Director

CERTIFICATIONS 230V



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