Anex

Gamemax GP-400A rev.2

Lab ID#: 588
Receipt Date: Apr 17, 2019
Test Date: Apr 28, 2019

Report:
Report Date: May 1, 2019

DUT INFORMATION

Brand	Gamemax
Manufacturer (OEM)	Gamemax
Series	GP Series
Model Number	
Serial Number	
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	6-3
Rated Frequency (Hz)	50-60
Rated Power (W)	400
Type	ATX12V
Cooling	120mm Sleeve Bearing Fan (DF1202512SEL)
Semi-Passive Operation	✗
Cable Design	Fixed cables

TEST EQUIPMENT

Electronic Loads	Chroma 6314A x2 63123A x6 63102A 63101A	Chroma 63601-5 x4 Chroma 63600-2 x2 63640-80-80 x20 63610-80-20 x2
AC Sources	Chroma 6530, Chroma 61604, Keysight AC6804B	
Power Analyzers	N4L PPA1530 x2, N4L PPA5530	
Oscilloscopes	Picoscope 4444 & 3424, Keysight DSOX3024A, Rigol DS2072A	
Voltmeter	Keithley 2015 THD 6.5 Digit	
Sound Analyzer	Bruel & Kjaer 2250-L G4	
Microphone	Bruel & Kjaer Type 4955-A, Bruel & Kjaer Type 4189	
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2	

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RESULTS

Temperature Range (°C /°F)	30-32 / 86-89.6
ErP Lot 3/6 Ready	ErP Lot 6 2010: ✓ ErP Lot 6 2013: Partially ErP Lot 3 2014 & CEC: ✗
(EU) No 617/2013 Compliance	✓

115V

Average Efficiency	83.521%
Efficiency With 10W (≤500W) or 2% (>500W)	59.258
Average Efficiency 5VSB	71.085%
Standby Power Consumption (W)	0.1111260
Average PF	0.992
Avg Noise Output	29.47 dB(A)
Efficiency Rating (ETA)	BRONZE
Noise Rating (LAMBDA)	A-

230V

Average Efficiency	85.168%
Average Efficiency 5VSB	68.430%
Standby Power Consumption (W)	0.1944530
Average PF	0.922
Avg Noise Output	29.40 dB(A)
Efficiency Rating (ETA)	
Noise Rating (LAMBDA)	A-

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	15	15	24	2.5	0.5
	Watts	100		288	12.5	6
Total Max. Power (W)		400				

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

Hold-Up Time (ms)	17.2
AC Loss to PWR_OK Hold Up Time (ms)	12.2
PWR_OK Inactive to DC Loss Delay (ms)	5.0

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CABLES AND CONNECTORS

Captive Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (510mm)	1	1	18-22AWG	No
4+4 pin EPS12V (510mm)	1	1	18AWG	No
6+2 pin PCIe (430mm)	1	1	18AWG	No
SATA (430mm) / 4-pin Molex (+150mm)	1	1 / 1	18AWG	No
4-pin Molex (430mm) / SATA (+150mm+150mm)	1	1 / 2	18AWG	No

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General Data	
Manufacturer (OEM)	Gamemax
PCB Type	Single Layer
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor
Bridge Rectifier(s)	1x GBU1506L (600V, 15A @ 100°C)
APFC MOSFETS	2x Champion GP18S50G (500V, 28A @ 150°C, 0.19Ω)
APFC Boost Diode	1x CREE C3D06060A (600V, 6A @ 154°C)
Hold-up Cap(s)	1x CapXon (400V, 270uF, 2000h @ 105 °C, HP)
Main Switchers	2x Champion GP18S50G (500V, 28A @ 150°C, 0.19Ω)
Combo APFC/PWM Controller	Champion CM6805BSX
Topology	Primary side: Double Forward Secondary side: Group Regulation & Passive Rectification
Secondary Side	
+12V MOSFETS	2x MOSPEC S60M60C SBR (60V, 60A)
5V & 3.3V	2x MOSPEC S40M45C SBR (45V, 40A)
Filtering Capacitors	Electrolytics: CapXon (2-5,000 @ 105°C, KF), ChengX (2-4,000h @ 105°C, GR)
Supervisor IC	Grenergy GR8313 (OVP, UVP, SCP, PG)
Fan Model	Xin Zheng Heng Electronic DF1202512SEL (120mm, 12V, 0.10A, 1.2W, Sleeve Bearing)
5VSB Circuit	
Rectifier	1x MOSPEC S60M60C SBR (60V, 60A) & CEF04N7G (700V, 4A, 3.3Ohm)
Standby PWM Controller	Excelliance EM8569A

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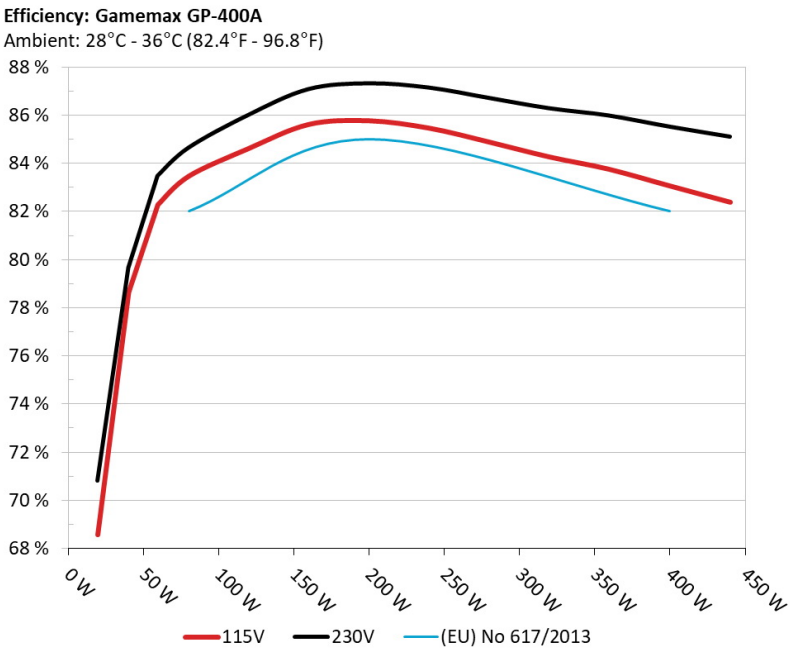
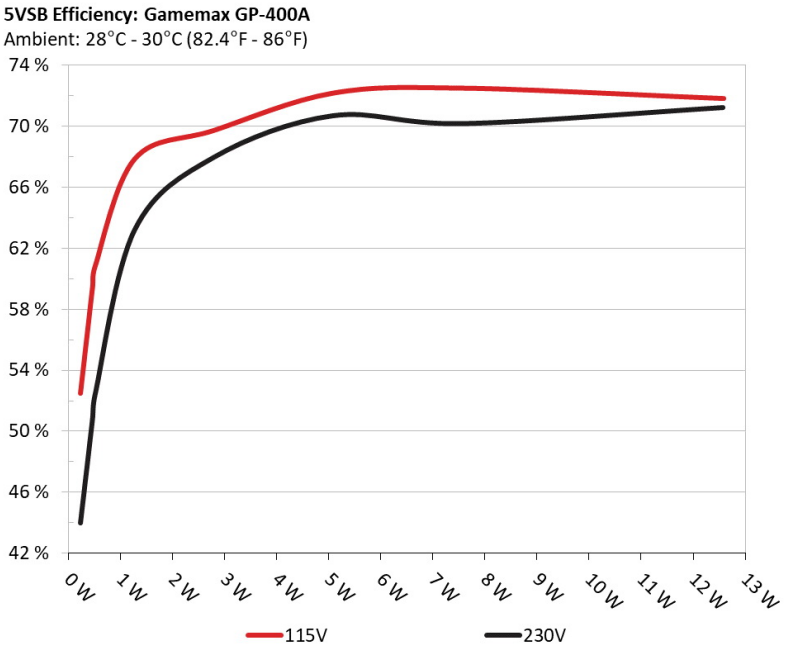
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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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Gamemax GP-400A rev.2

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	52.511%	0.059
	5.106V	0.438		115.10V
2	0.090A	0.460	59.432%	0.101
	5.104V	0.774		115.10V
3	0.550A	2.800	69.756%	0.281
	5.091V	4.014		115.10V
4	1.000A	5.078	72.192%	0.325
	5.077V	7.034		115.10V
5	1.500A	7.594	72.517%	0.350
	5.062V	10.472		115.10V
6	2.500A	12.580	71.841%	0.380
	5.032V	17.511		115.10V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	43.977%	0.022
	5.106V	0.523		230.22V
2	0.090A	0.460	50.773%	0.037
	5.104V	0.906		230.22V
3	0.550A	2.800	67.994%	0.145
	5.090V	4.118		230.22V
4	1.000A	5.077	70.710%	0.207
	5.077V	7.180		230.22V
5	1.500A	7.593	70.195%	0.249
	5.062V	10.817		230.22V
6	2.500A	12.577	71.246%	0.291
	5.031V	17.653		230.23V

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115V

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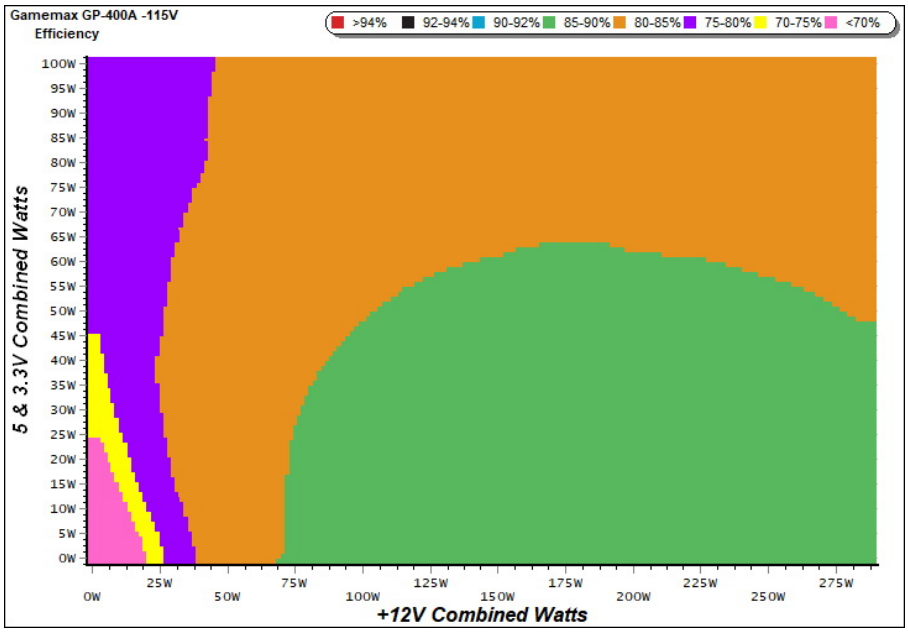
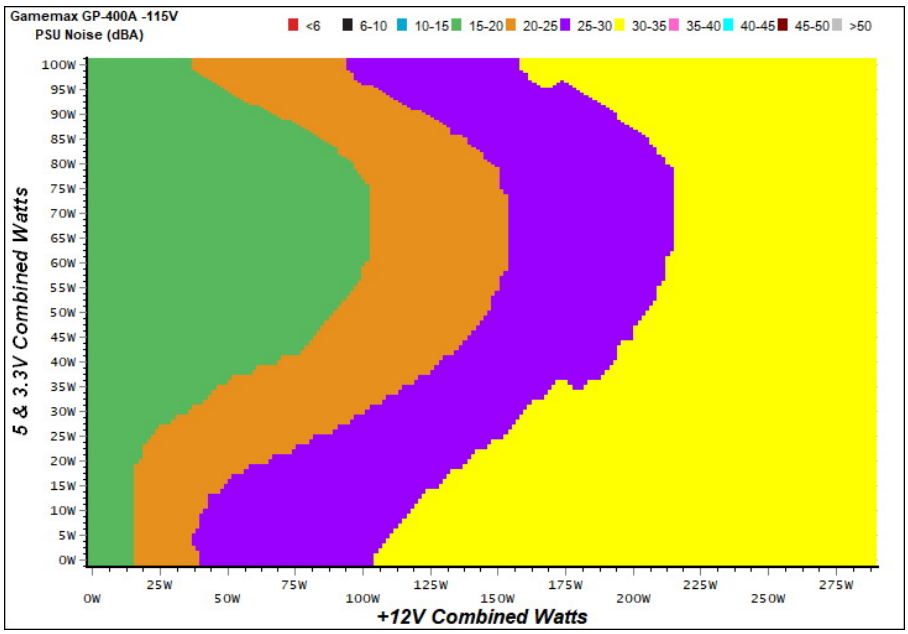
EFFICIENCY GRAPH 115V



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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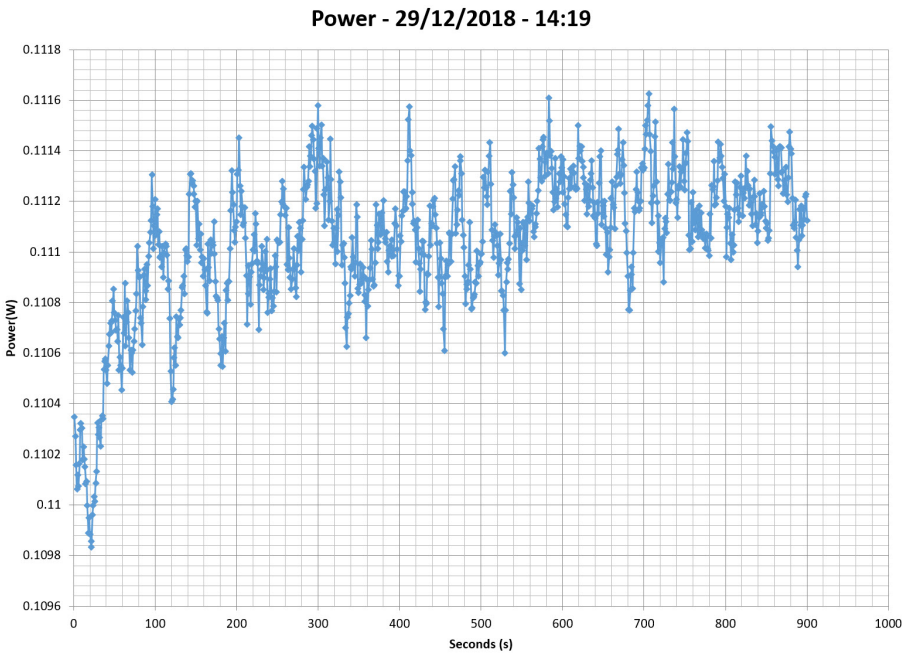
VAMPIRE POWER -115V



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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Gamemax GP-400A rev.2

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
1	1.488A	1.976A	1.959A	0.987A	39.977	76.480%	834	13.5	29.43°C	0.949
	12.355V	5.059V	3.367V	5.066V	52.271				31.26°C	115.11V
2	3.945A	2.975A	2.946A	1.188A	79.639	82.278%	838	13.5	29.82°C	0.989
	12.358V	5.040V	3.358V	5.051V	96.792				31.85°C	115.11V
3	6.741A	3.478A	3.430A	1.390A	119.187	84.598%	842	13.5	30.41°C	0.992
	12.342V	5.031V	3.350V	5.037V	140.887				32.84°C	115.10V
4	9.606A	3.983A	3.948A	1.593A	159.609	85.612%	978	16.7	31.05°C	0.995
	12.327V	5.021V	3.343V	5.022V	186.433				33.86°C	115.10V
5	12.101A	5.000A	4.946A	1.798A	199.729	85.766%	1204	22.3	31.54°C	0.997
	12.332V	5.000V	3.335V	5.008V	232.877				34.49°C	115.11V
6	14.594A	6.024A	5.950A	2.003A	239.867	85.459%	1421	27.9	31.99°C	0.997
	12.338V	4.981V	3.328V	4.992V	280.682				35.56°C	115.11V
7	17.060A	7.053A	6.955A	2.211A	279.575	84.884%	1605	31.8	32.20°C	0.998
	12.337V	4.963V	3.321V	4.977V	329.363				36.17°C	115.11V
8	19.587A	8.092A	7.967A	2.420A	320.083	84.261%	1613	31.8	32.76°C	0.998
	12.339V	4.943V	3.313V	4.961V	379.870				37.20°C	115.11V
9	22.469A	8.617A	8.464A	2.423A	359.395	83.754%	1616	32.0	33.49°C	0.998
	12.323V	4.933V	3.308V	4.954V	429.107				38.36°C	115.12V
10	25.427A	9.142A	8.992A	2.530A	400.105	83.056%	1620	32.0	34.70°C	0.998
	12.306V	4.922V	3.303V	4.942V	481.728				40.07°C	115.12V
11	28.776A	9.143A	9.009A	2.534A	440.126	82.383%	1622	31.8	35.90°C	0.998
	12.264V	4.923V	3.297V	4.934V	534.243				41.77°C	115.12V
CL1	0.137A	12.002A	11.999A	0.000A	98.911	75.745%	1433	28.1	31.07°C	0.992
	12.969V	4.756V	3.338V	5.064V	130.584				35.00°C	115.13V
CL2	23.999A	1.001A	0.999A	1.000A	301.128	86.099%	1574	31.1	35.19°C	0.998
	11.986V	5.118V	3.332V	5.024V	349.748				39.94°C	115.12V

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Gamemax GP-400A rev.2

20-80W LOAD TESTS 115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.170A	0.488A	0.473A	0.196A	19.436	68.572%	821	13.1	0.832
	12.265V	5.108V	3.374V	5.095V	28.344				115.11V
2	2.404A	0.982A	0.978A	0.393A	39.848	78.642%	825	13.5	0.948
	12.295V	5.088V	3.369V	5.085V	50.670				115.11V
3	3.575A	1.476A	1.453A	0.591A	59.370	82.108%	828	13.5	0.985
	12.305V	5.075V	3.365V	5.076V	72.307				115.11V
4	4.806A	1.974A	1.962A	0.790A	79.760	83.458%	832	13.5	0.989
	12.311V	5.064V	3.361V	5.066V	95.569				115.11V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	13.3 mV	11.6 mV	9.3 mV	22.7 mV	Pass
20% Load	17.3 mV	13.0 mV	11.9 mV	37.6 mV	Pass
30% Load	19.6 mV	14.2 mV	12.6 mV	39.7 mV	Pass
40% Load	22.0 mV	15.5 mV	13.8 mV	45.6 mV	Pass
50% Load	25.1 mV	18.1 mV	12.9 mV	33.6 mV	Pass
60% Load	29.6 mV	20.2 mV	12.4 mV	40.0 mV	Pass
70% Load	34.0 mV	22.9 mV	12.4 mV	46.9 mV	Pass
80% Load	36.6 mV	27.9 mV	16.7 mV	56.6 mV	Fail
90% Load	39.7 mV	29.7 mV	15.1 mV	63.0 mV	Fail
100% Load	46.2 mV	34.6 mV	15.8 mV	73.6 mV	Fail
110% Load	61.3 mV	39.5 mV	15.3 mV	71.1 mV	Fail
Crossload 1	24.0 mV	73.6 mV	18.3 mV	19.8 mV	Fail
Crossload 2	34.8 mV	21.1 mV	8.8 mV	30.6 mV	Pass

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Gamemax GP-400A rev.2

230V

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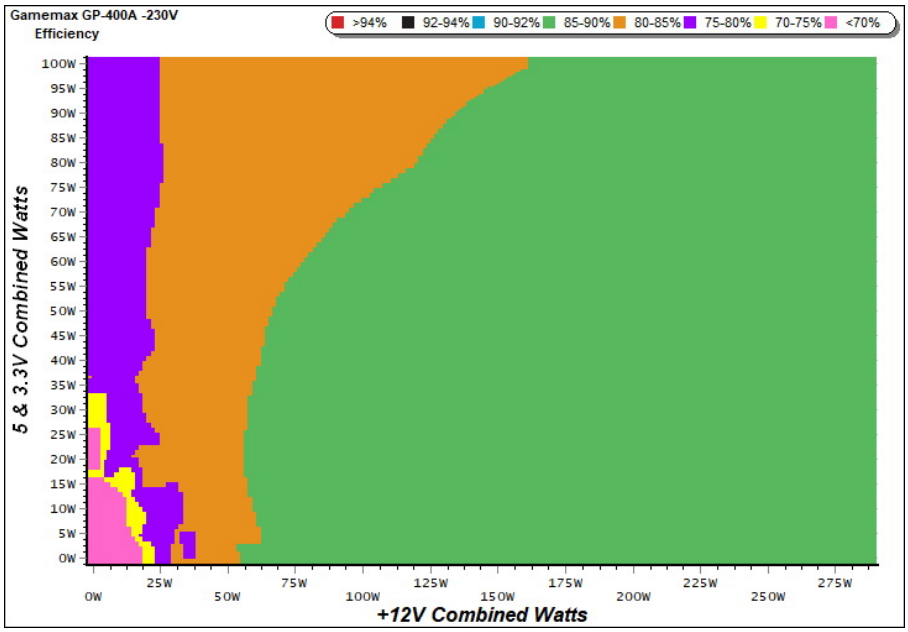
EFFICIENCY GRAPH 230V



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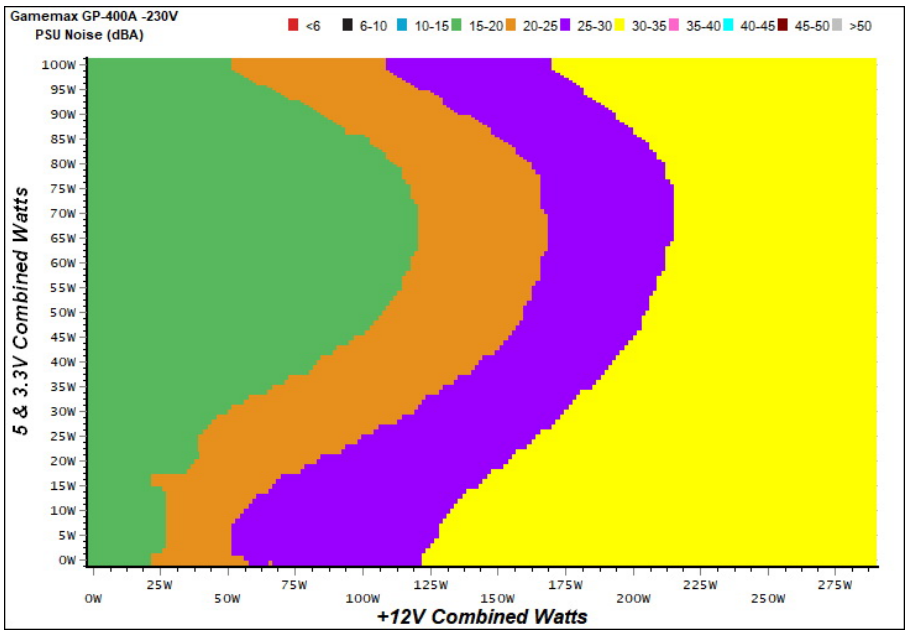
NOISE GRAPH 230V



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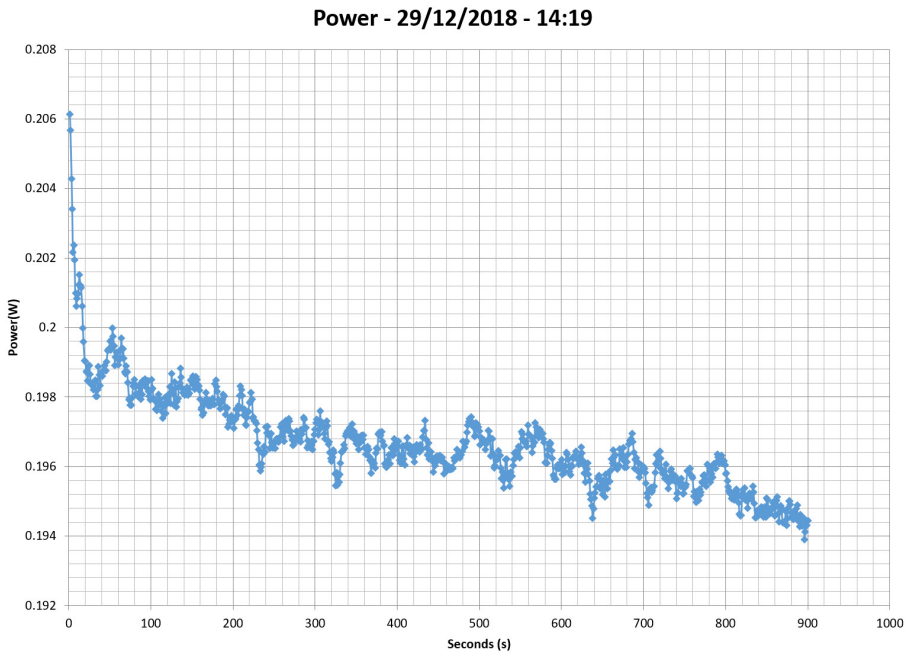
VAMPIRE POWER -230V



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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
1	1.489A	1.974A	1.958A	0.987A	39.973	77.607%	835	13.5	29.09°C	0.531
	12.355V	5.058V	3.367V	5.065V	51.507				31.18°C	230.22V
2	3.944A	2.975A	2.946A	1.188A	79.630	83.485%	838	13.5	29.73°C	0.765
	12.358V	5.040V	3.359V	5.051V	95.382				32.26°C	230.22V
3	6.739A	3.479A	3.431A	1.390A	119.173	85.995%	843	13.5	30.22°C	0.882
	12.342V	5.031V	3.351V	5.036V	138.582				33.40°C	230.22V
4	9.604A	3.983A	3.946A	1.593A	159.569	87.081%	967	15.4	30.68°C	0.957
	12.326V	5.021V	3.343V	5.022V	183.242				34.26°C	230.22V
5	12.098A	5.000A	4.947A	1.798A	199.698	87.324%	1193	21.9	31.23°C	0.979
	12.332V	5.000V	3.336V	5.007V	228.685				35.23°C	230.22V
6	14.590A	6.024A	5.949A	2.003A	239.799	87.148%	1403	26.9	31.87°C	0.986
	12.337V	4.980V	3.329V	4.992V	275.163				36.35°C	230.21V
7	17.056A	7.054A	6.956A	2.211A	279.507	86.720%	1609	31.8	32.33°C	0.988
	12.336V	4.962V	3.321V	4.976V	322.311				37.83°C	230.22V
8	19.583A	8.094A	7.966A	2.420A	320.010	86.288%	1615	31.8	32.81°C	0.990
	12.338V	4.942V	3.313V	4.960V	370.861				38.70°C	230.23V
9	22.465A	8.617A	8.463A	2.424A	359.311	85.989%	1618	31.8	33.22°C	0.991
	12.322V	4.932V	3.308V	4.952V	417.858				39.72°C	230.21V
10	25.422A	9.145A	8.992A	2.531A	400.026	85.525%	1622	31.8	34.90°C	0.992
	12.305V	4.921V	3.303V	4.941V	467.730				42.07°C	230.23V
11	28.775A	9.142A	9.007A	2.535A	440.036	85.111%	1623	31.8	35.59°C	0.992
	12.262V	4.922V	3.297V	4.933V	517.015				43.84°C	230.23V
CL1	0.133A	12.002A	11.997A	0.000A	98.841	77.080%	1450	28.2	31.63°C	0.854
	12.969V	4.755V	3.338V	5.064V	128.232				35.92°C	230.23V
CL2	24.001A	1.001A	0.997A	1.000A	301.121	88.021%	1579	31.1	34.71°C	0.989
	11.985V	5.118V	3.332V	5.024V	342.100				42.25°C	230.23V

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20-80W LOAD TESTS 230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.170A	0.487A	0.474A	0.196A	19.431	70.836%	824	13.5	0.397
	12.262V	5.107V	3.374V	5.095V	27.431				230.21V
2	2.404A	0.982A	0.978A	0.393A	39.841	79.676%	824	13.5	0.552
	12.293V	5.088V	3.369V	5.085V	50.004				230.21V
3	3.575A	1.476A	1.453A	0.591A	59.367	82.569%	827	13.5	0.667
	12.304V	5.075V	3.365V	5.075V	71.900				230.22V
4	4.806A	1.973A	1.961A	0.790A	79.752	84.644%	832	13.5	0.761
	12.312V	5.063V	3.361V	5.065V	94.221				230.21V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	13.4 mV	12.1 mV	9.8 mV	24.1 mV	Pass
20% Load	15.7 mV	12.6 mV	10.9 mV	37.6 mV	Pass
30% Load	18.5 mV	13.7 mV	11.6 mV	37.3 mV	Pass
40% Load	18.7 mV	14.8 mV	11.5 mV	41.6 mV	Pass
50% Load	21.7 mV	16.0 mV	11.8 mV	37.4 mV	Pass
60% Load	23.0 mV	18.0 mV	13.0 mV	41.2 mV	Pass
70% Load	26.8 mV	19.8 mV	14.1 mV	47.9 mV	Pass
80% Load	30.1 mV	25.0 mV	18.2 mV	52.5 mV	Fail
90% Load	33.7 mV	25.7 mV	18.4 mV	63.7 mV	Fail
100% Load	40.3 mV	30.0 mV	19.4 mV	62.5 mV	Fail
110% Load	49.3 mV	33.5 mV	19.0 mV	68.8 mV	Fail
Crossload 1	21.2 mV	56.8 mV	21.7 mV	19.9 mV	Fail
Crossload 2	27.4 mV	17.6 mV	10.6 mV	32.6 mV	Pass

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Anex

Gamemax GP-400A rev.2

Top side

Power specifications label

CERTIFICATIONS 115V

Aristeidis Bitziopoulos
Lab Director

CERTIFICATIONS 230V