Anex

Gamemax GM600 rev.2 (Sample #2)

Lab ID#: GM19600017
Receipt Date: Mar 28, 2019
Test Date: Nov 4, 2019

Report:
Report Date: Nov 4, 2019

DUT INFORMATION

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

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12-6
Rated Frequency (Hz)	50-60
Rated Power (W)	600
Type	ATX12V
Cooling	140mm Sleeve Bearing Fan (DF1402512SEM)
Semi-Passive Operation	✗
Cable Design	Semi Modular

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	15	20	42	2.5	0.5
	Watts	100		504	12.5	6
Total Max. Power (W)		600				

CABLES AND CONNECTORS

Native Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Caps
ATX connector 20+4 pin (490mm)	1	1	18-22AWG	No
4+4 pin EPS12V (500mm)	1	1	18AWG	No
SATA (500mm+150mm)	1	2	18AWG	No

Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge	Gauge
6+2 pin PCIe (500mm)	2	2	18AWG	No
SATA (500mm+150mm+150mm)	1	3	18AWG	No
4-pin Molex (500mm+150mm)	1	2	18AWG	No
4-pin Molex (500mm) / FDD (+150mm)	1	1 / 1	18AWG	No
AC Power Cord (1370mm) - C13 coupler	1	1	18AWG	-

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General Data	
Manufacturer (OEM)	Gamemax
PCB Type	Single Sided
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor
Bridge Rectifier(s)	2x SEP GBU1510 (1000V, 15A @ 100°C)
APFC MOSFETS	2x Champion GP47S60X (600V, 47A @ 150°C, 0.081Ohm)
APFC Boost Diode	1x CREE C3D06060A (600V, 6A @ 154°C)
Hold-up Cap(s)	1x CapXon (400V, 330uF, 2000h @ 105°C, HP)
Main Switchers	2x Champion GP47S60X (600V, 47A @ 150°C, 0.081Ohm)
Combo APFC/PWM Controller	Champion CM6800G
Topology	Primary side: Double Forward Secondary side: Passive Rectification & Independent Regulation
Secondary Side	
+12V	2x MOSPEC S60M60C SBR (60V, 60A @ 100°C)
5V & 3.3V	2x MOSPEC S40M45C SBR (45V, 40A @ 125°C)
Filtering Capacitors	Electrolytics: 5x Rubycon (6-10,000h @ 105°C, ZLH), 1x Rubycon (1-2,000h @ 105°C, PX), 2x Rubycon (4-10,000h @ 105°C, YXJ), 1x CapXon (2-5,000h @ 105°C, KF), 1x Chengx (2-4,000h @ 105°C, GR)
Supervisor IC	Grenergy GR8313 (OVP, UVP, PG)
Fan Model	Xin Zheng Heng Electronic DF1402512SEM (140mm, 12V, 0.20A, 2.4W, Sleeve Bearing Fan)
5VSB Circuit	
Standby PWM Controller	Excelliance EM8569A

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RESULTS

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

115V

Average Efficiency	84.732%
Efficiency With 10W (≤500W) or 2% (>500W)	51.780
Average Efficiency 5VSB	74.899%
Standby Power Consumption (W)	0.1726360
Average PF	0.991
Avg Noise Output	37.16 dB(A)
Efficiency Rating (ETA)	BRONZE
Noise Rating (LAMBDA)	S+

230V

Average Efficiency	86.707%
Average Efficiency 5VSB	70.477%
Standby Power Consumption (W)	0.4126410
Average PF	0.953
Avg Noise Output	37.24 dB(A)
Efficiency Rating (ETA)	
Noise Rating (LAMBDA)	S+

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	

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

Hold-Up Time (ms)	12.5
AC Loss to PWR_OK Hold Up Time (ms)	69.5
PWR_OK Inactive to DC Loss Delay (ms)	-57.0

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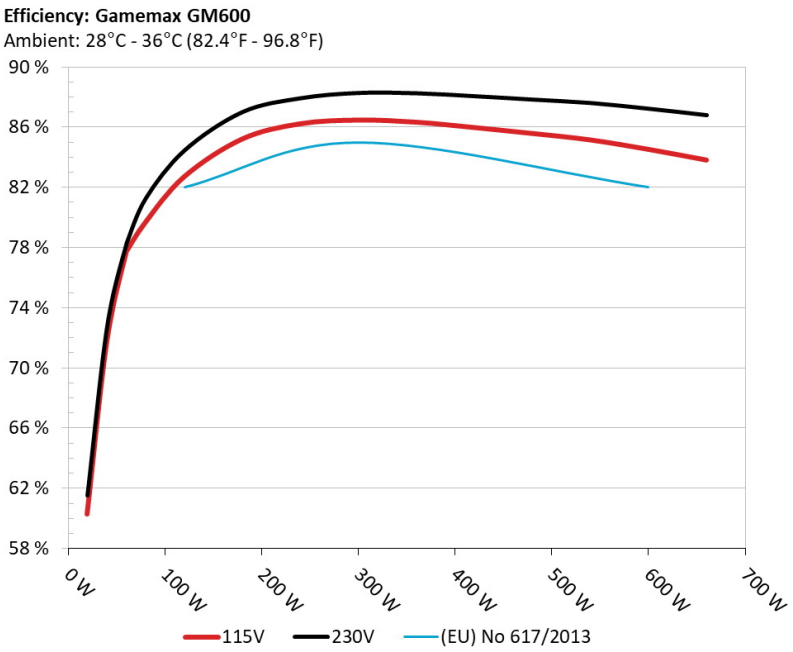
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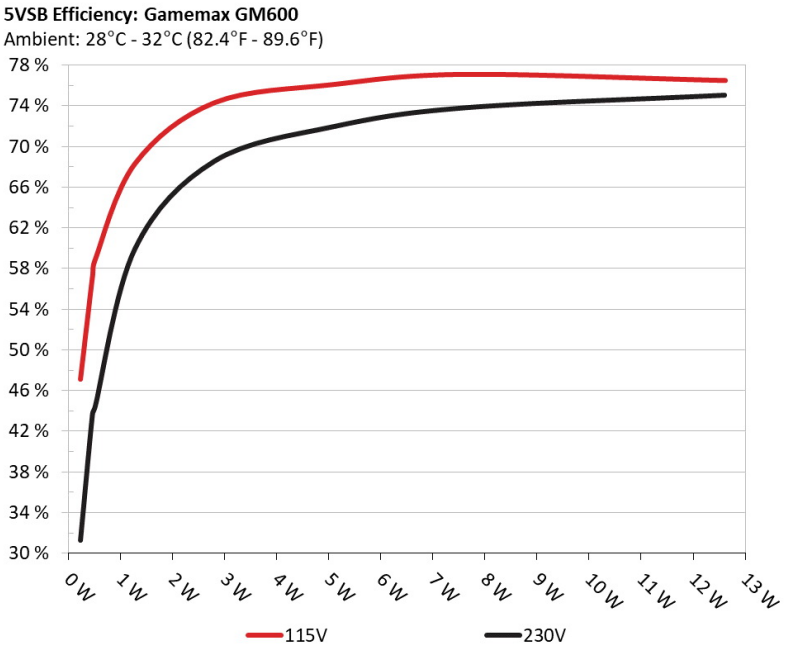
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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	0.230	47.131%	0.069
	5.111V	0.488		115.11V
2	0.090A	0.460	57.214%	0.108
	5.110V	0.804		115.11V
3	0.550A	2.804	74.318%	0.283
	5.098V	3.773		115.11V
4	1.000A	5.086	76.104%	0.329
	5.085V	6.683		115.11V
5	1.500A	7.608	77.098%	0.352
	5.072V	9.868		115.11V
6	2.500A	12.611	76.495%	0.380
	5.044V	16.486		115.11V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	31.250%	0.031
	5.112V	0.736		230.26V
2	0.090A	0.460	43.643%	0.044
	5.110V	1.054		230.26V
3	0.550A	2.804	68.574%	0.149
	5.097V	4.089		230.26V
4	1.000A	5.086	71.968%	0.212
	5.085V	7.067		230.25V
5	1.500A	7.608	73.828%	0.252
	5.071V	10.305		230.26V
6	2.500A	12.609	75.071%	0.295
	5.043V	16.796		230.26V

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115V

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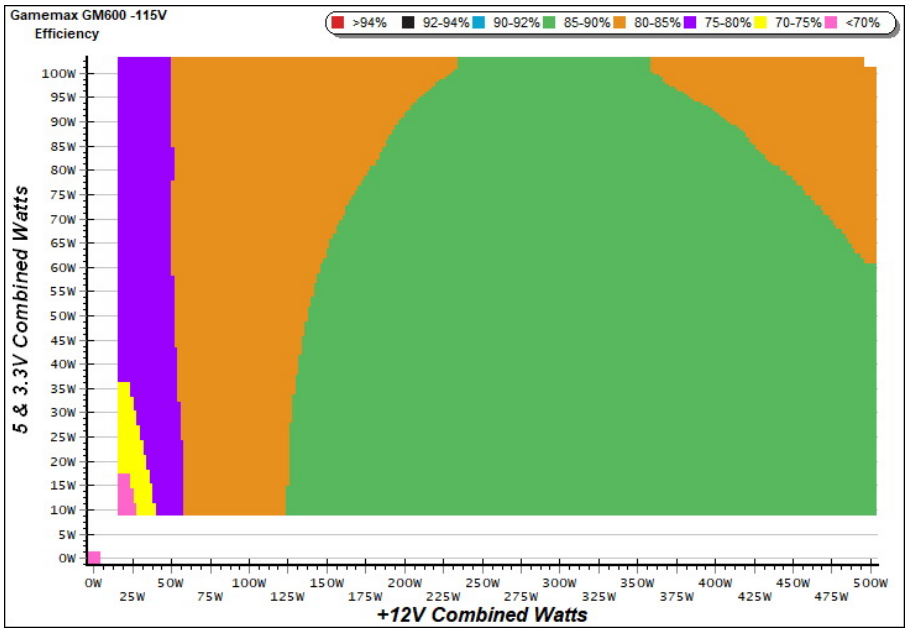
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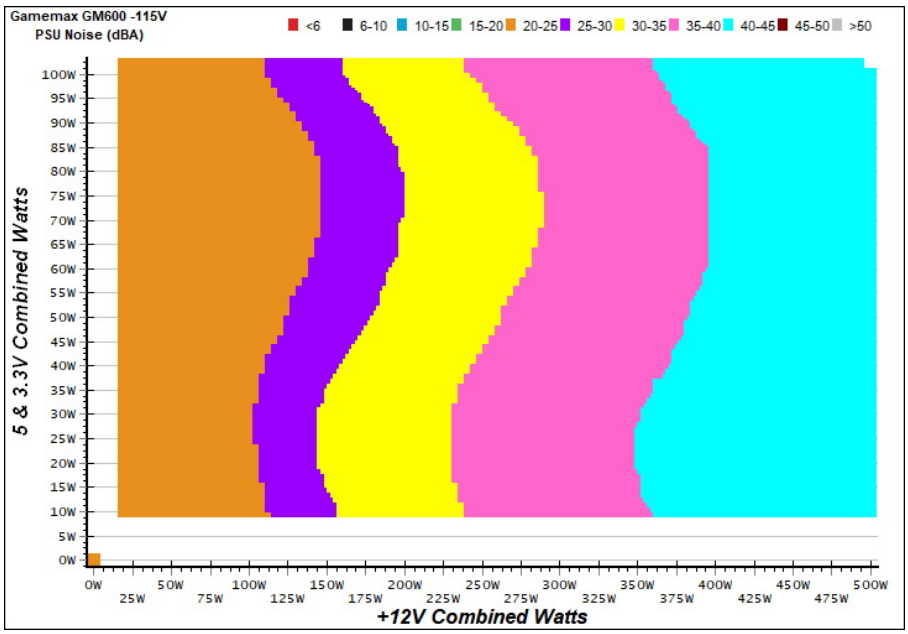
EFFICIENCY GRAPH 115V



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

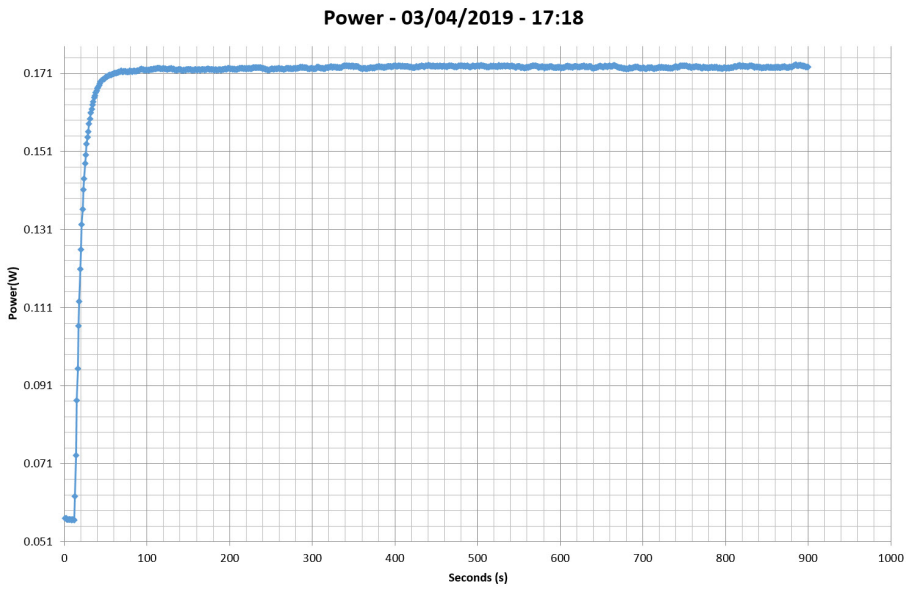
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

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Gamemax GM600 rev.2 (Sample #2)

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 GM600 rev.2 (Sample #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	3.096A	1.954A	1.953A	0.985A	60.075	76.977%	912	22.3	30.24°C	0.971
	12.428V	5.119V	3.376V	5.079V	78.043				36.68°C	115.12V
2	7.160A	2.937A	2.930A	1.184A	119.777	82.721%	916	22.4	30.87°C	0.974
	12.413V	5.109V	3.377V	5.068V	144.796				38.40°C	115.12V
3	11.589A	3.433A	3.405A	1.385A	179.668	85.232%	924	22.6	31.32°C	0.986
	12.396V	5.101V	3.376V	5.057V	210.799				39.57°C	115.12V
4	16.034A	3.928A	3.910A	1.586A	239.690	86.250%	1104	28.2	31.57°C	0.991
	12.379V	5.092V	3.376V	5.046V	277.900				40.67°C	115.12V
5	20.166A	4.921A	4.887A	1.788A	299.799	86.497%	1335	33.5	32.45°C	0.993
	12.362V	5.082V	3.376V	5.034V	346.601				42.22°C	115.12V
6	24.306A	5.918A	5.863A	1.992A	359.889	86.359%	1540	37.3	32.96°C	0.994
	12.346V	5.071V	3.376V	5.022V	416.737				43.23°C	115.12V
7	28.430A	6.917A	6.843A	2.196A	419.611	86.006%	1744	41.2	33.48°C	0.995
	12.329V	5.059V	3.376V	5.010V	487.887				44.56°C	115.11V
8	32.631A	7.928A	7.822A	2.402A	480.134	85.608%	1745	41.2	33.75°C	0.996
	12.311V	5.047V	3.375V	4.997V	560.852				46.41°C	115.12V
9	37.170A	8.441A	8.303A	2.405A	539.457	85.184%	1747	41.3	34.84°C	0.997
	12.293V	5.037V	3.373V	4.991V	633.288				49.11°C	115.12V
10	41.800A	8.954A	8.810A	2.510A	600.176	84.551%	1747	41.3	35.96°C	0.997
	12.272V	5.027V	3.370V	4.982V	709.839				51.53°C	115.11V
11	46.763A	8.968A	8.818A	2.513A	660.209	83.841%	1750	41.3	36.41°C	0.997
	12.253V	5.020V	3.368V	4.976V	787.450				53.70°C	115.11V
CL2	42.014A	1.002A	1.000A	1.000A	529.839	85.965%	1746	41.2	35.99°C	0.997
	12.290V	5.074V	3.361V	5.042V	616.345				51.51°C	115.11V

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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])	PF/AC Volts
1	1.161A	0.487A	0.472A	0.196A	19.540	60.299%	904	22.1	0.876
	12.444V	5.131V	3.374V	5.105V	32.405				115.12V
2	2.387A	0.976A	0.978A	0.392A	39.980	71.795%	908	22.2	0.939
	12.434V	5.126V	3.374V	5.097V	55.686				115.12V
3	3.547A	1.464A	1.450A	0.590A	59.476	77.758%	909	22.2	0.972
	12.428V	5.121V	3.375V	5.090V	76.489				115.12V
4	4.769A	1.954A	1.956A	0.787A	79.845	79.699%	911	22.3	0.963
	12.423V	5.117V	3.375V	5.082V	100.183				115.12V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	21.6 mV	30.0 mV	19.7 mV	16.9 mV	Pass
20% Load	25.0 mV	25.2 mV	17.6 mV	18.4 mV	Pass
30% Load	23.3 mV	23.8 mV	16.6 mV	17.8 mV	Pass
40% Load	24.6 mV	22.1 mV	16.0 mV	15.7 mV	Pass
50% Load	26.9 mV	22.0 mV	16.9 mV	16.8 mV	Pass
60% Load	28.0 mV	21.1 mV	15.9 mV	18.3 mV	Pass
70% Load	35.8 mV	17.0 mV	14.6 mV	20.7 mV	Pass
80% Load	41.4 mV	18.3 mV	15.4 mV	22.1 mV	Pass
90% Load	44.6 mV	17.8 mV	15.9 mV	23.0 mV	Pass
100% Load	47.7 mV	19.7 mV	17.8 mV	25.0 mV	Pass
110% Load	54.8 mV	22.7 mV	20.5 mV	26.6 mV	Pass
Crossload 2	58.3 mV	21.0 mV	22.7 mV	24.8 mV	Pass

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230V

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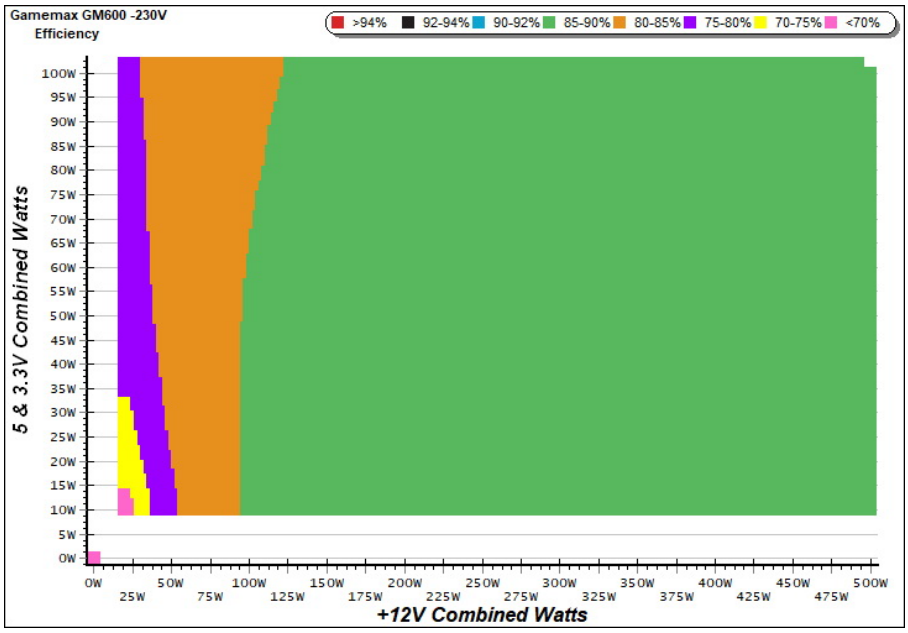
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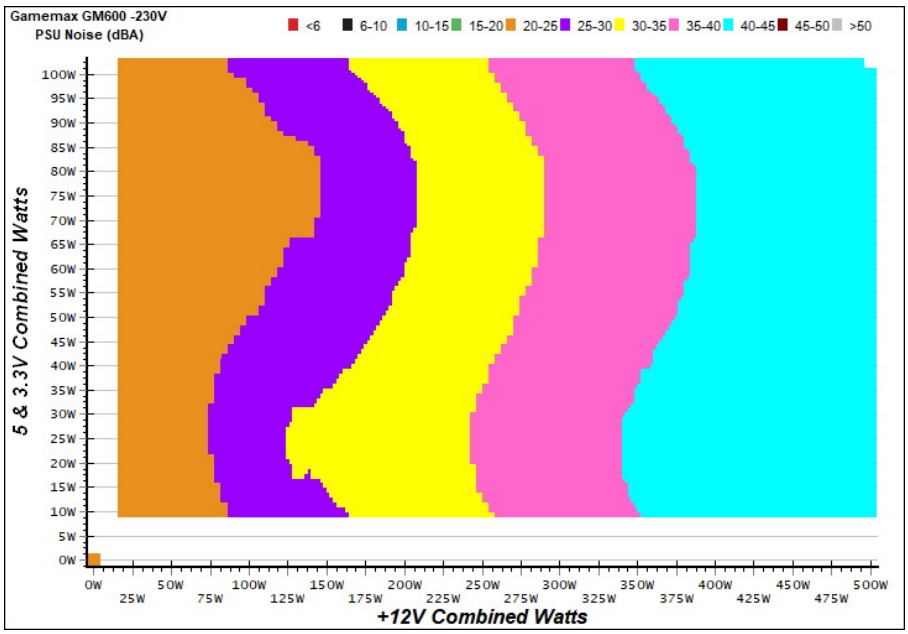
EFFICIENCY GRAPH 230V



INFO

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NOISE GRAPH 230V



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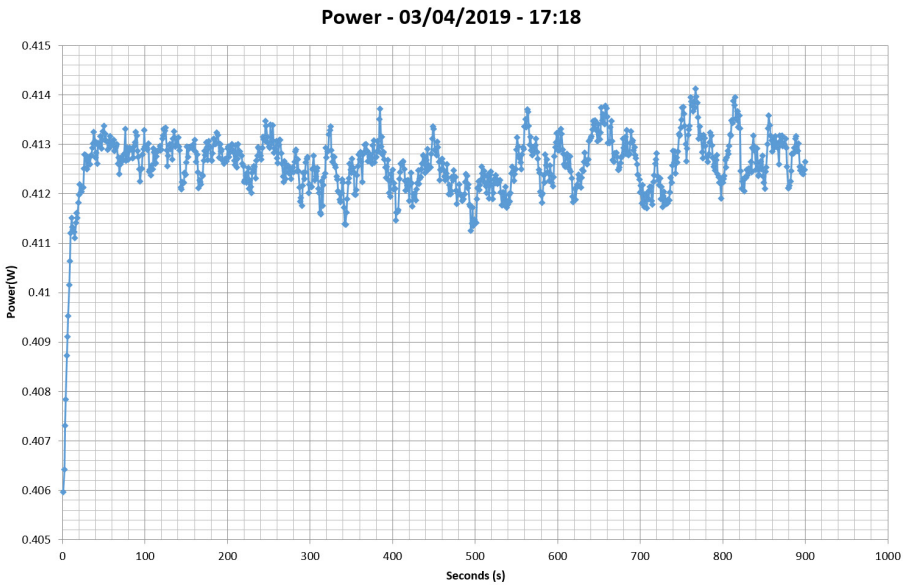
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VAMPIRE POWER -230V



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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	3.099A	1.953A	1.958A	0.985A	60.121	77.564%	914	22.3	30.05°C	0.804
	12.428V	5.119V	3.374V	5.079V	77.511				36.76°C	230.26V
2	7.164A	2.937A	2.932A	1.184A	119.818	84.449%	918	22.4	30.78°C	0.901
	12.412V	5.109V	3.374V	5.068V	141.882				38.20°C	230.26V
3	11.591A	3.434A	3.409A	1.385A	179.701	87.003%	923	22.6	31.32°C	0.933
	12.396V	5.101V	3.373V	5.057V	206.546				39.50°C	230.25V
4	16.037A	3.928A	3.914A	1.586A	239.724	87.927%	1086	27.9	31.74°C	0.951
	12.379V	5.092V	3.372V	5.046V	272.639				40.58°C	230.26V
5	20.168A	4.922A	4.892A	1.788A	299.827	88.282%	1322	33.2	32.47°C	0.963
	12.362V	5.082V	3.372V	5.034V	339.626				41.73°C	230.26V
6	24.307A	5.918A	5.873A	1.992A	359.912	88.262%	1536	37.3	32.97°C	0.967
	12.346V	5.071V	3.372V	5.022V	407.775				42.85°C	230.25V
7	28.430A	6.919A	6.852A	2.196A	419.625	88.068%	1736	41.1	33.14°C	0.971
	12.329V	5.060V	3.371V	5.010V	476.478				44.57°C	230.26V
8	32.631A	7.927A	7.833A	2.402A	480.136	87.841%	1743	41.2	33.74°C	0.975
	12.311V	5.047V	3.371V	4.997V	546.595				46.57°C	230.26V
9	37.170A	8.441A	8.310A	2.405A	539.456	87.617%	1744	41.2	34.56°C	0.979
	12.293V	5.037V	3.370V	4.991V	615.698				48.62°C	230.26V
10	41.795A	8.953A	8.815A	2.510A	600.169	87.234%	1746	41.2	35.32°C	0.982
	12.273V	5.028V	3.369V	4.982V	687.998				51.73°C	230.26V
11	46.761A	8.967A	8.823A	2.513A	660.198	86.803%	1748	41.3	36.20°C	0.985
	12.253V	5.021V	3.367V	4.976V	760.573				53.98°C	230.25V
CL2	42.017A	1.002A	0.999A	1.000A	529.831	88.322%	1744	41.2	35.39°C	0.978
	12.289V	5.074V	3.361V	5.042V	599.885				51.60°C	230.26V

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Anex

Gamemax GM600 rev.2 (Sample #2)

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	1.167A	0.488A	0.472A	0.196A	19.619	61.503%	909	22.2	0.570
	12.444V	5.132V	3.373V	5.105V	31.899				230.25V
2	2.392A	0.976A	0.977A	0.393A	40.042	72.757%	911	22.3	0.723
	12.433V	5.126V	3.374V	5.097V	55.035				230.26V
3	3.552A	1.465A	1.450A	0.590A	59.539	78.294%	912	22.3	0.801
	12.427V	5.121V	3.374V	5.090V	76.045				230.26V
4	4.774A	1.954A	1.955A	0.787A	79.896	81.266%	912	22.3	0.844
	12.422V	5.117V	3.374V	5.082V	98.314				230.26V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	20.5 mV	31.4 mV	20.3 mV	18.0 mV	Pass
20% Load	24.0 mV	24.9 mV	18.5 mV	20.2 mV	Pass
30% Load	24.4 mV	24.7 mV	18.0 mV	18.8 mV	Pass
40% Load	24.0 mV	23.0 mV	16.8 mV	16.1 mV	Pass
50% Load	26.8 mV	22.6 mV	17.0 mV	17.4 mV	Pass
60% Load	28.3 mV	20.4 mV	18.0 mV	18.4 mV	Pass
70% Load	34.4 mV	16.5 mV	15.1 mV	21.1 mV	Pass
80% Load	40.0 mV	17.1 mV	16.4 mV	21.7 mV	Pass
90% Load	46.4 mV	17.2 mV	17.1 mV	23.2 mV	Pass
100% Load	56.6 mV	19.1 mV	19.5 mV	26.2 mV	Pass
110% Load	67.9 mV	20.3 mV	19.1 mV	27.7 mV	Pass
Crossload 2	56.1 mV	17.7 mV	18.7 mV	24.2 mV	Pass

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Cybenetics offers the ETA and Lambda voluntary certification programs, through which the efficient and silent power supplies are promoted

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Anex

Gamemax GM600 rev.2 (Sample #2)



Top side



Power specifications label

CERTIFICATIONS 115V

CYBENETICS BRONZE

CYBENETICS STANDARD+

CERTIFICATIONS 230V

CYBENETICS STANDARD+ 230v

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