Evaluation Report

Gamemax GM500

DUT INFORMATION

Brand	Gamemax
Manufacturer (OEM)	Gamemax
Series	GM Series
Model Number	GM500
Serial Number	
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12-6
Rated Frequency (Hz)	50-60
Rated Power (W)	500
Type	ATX12V
Cooling	140mm Sleeve Bearing Fan (DF1402512SEM)
Semi-Passive Operation	✗
Cable Design	Fixed cables

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	15	20	32	2.5	0.5
	Watts	100		384	12.5	6
Total Max. Power (W)		500				

CABLES AND CONNECTORS

Captive Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (490mm)	1	1	18-22AWG	No
4+4 pin EPS12V (510mm)	1	1	18AWG	No
6+2 pin PCIe (500mm)	1	1	18AWG	No
SATA (500mm+150mm+150mm)	1	3	18AWG	No
4-pin Molex (500mm) / SATA (+150mm+150mm)	1	1 / 2	18AWG	No
4-pin Molex (500mm+150mm) / FDD (+150mm)	1	2 / 1	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 DF1402512SEM (140mm, 12V, 0.20A, 2.4W, Sleeve Bearing)
5VSB Circuit	
Standby PWM Controller	Sanken STR-A6059H

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RESULTS

Test Date	01-05-2019
Cybenetics ID #	586
Temperature Range (°C /°F)	30-32 / 86-89.6
Average Efficiency	84.327
Efficiency With 10W (≤500W) or 2% (>500W) Load -115V	55.120
Average Efficiency 5VSB	74.410
Standby Power Consumption (W) -115V	0.1072360
Standby Power Consumption (W) -230V	0.1889830
Average PF	0.988
ErP Lot 3/6 Ready	ErP Lot 6 2010: ✓ ErP Lot 6 2013: Partially ErP Lot 3 2014 & CEC: Partially
(EU) No 617/2013 Compliance	✓
Avg Noise Output	37.51
Efficiency Rating (ETA)	ETA-S
Noise Rating (LAMBDA)	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	

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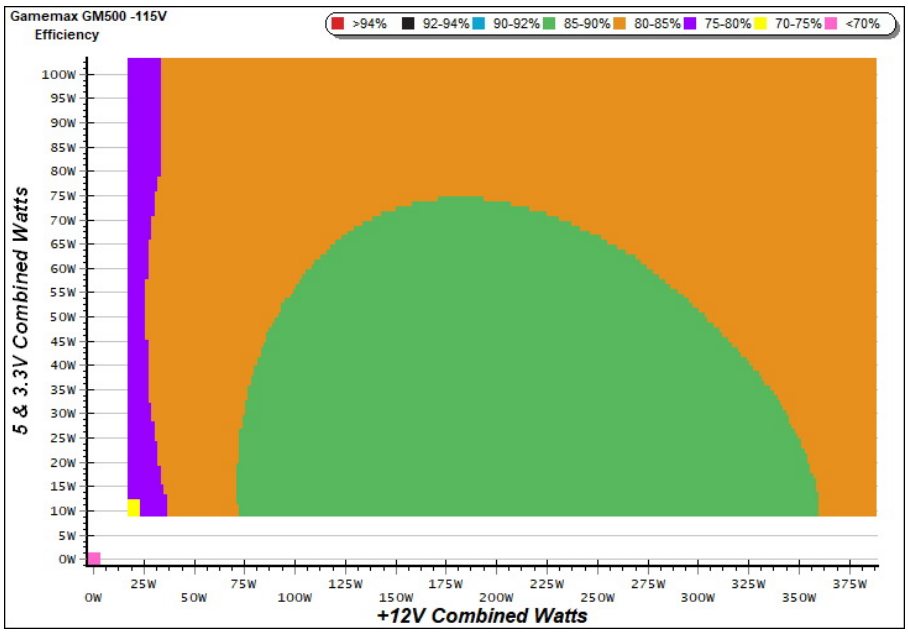
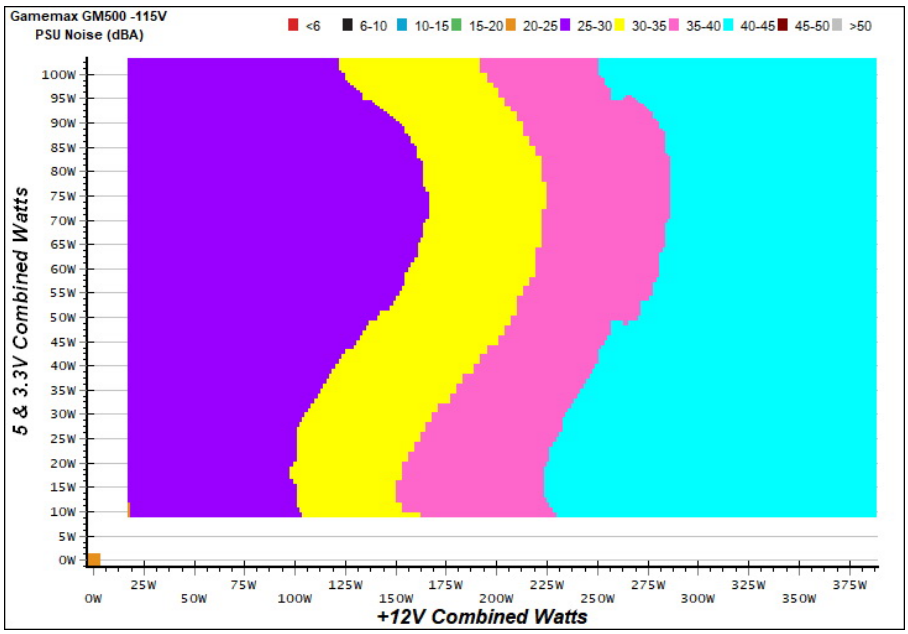
EFFICIENCY GRAPH



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



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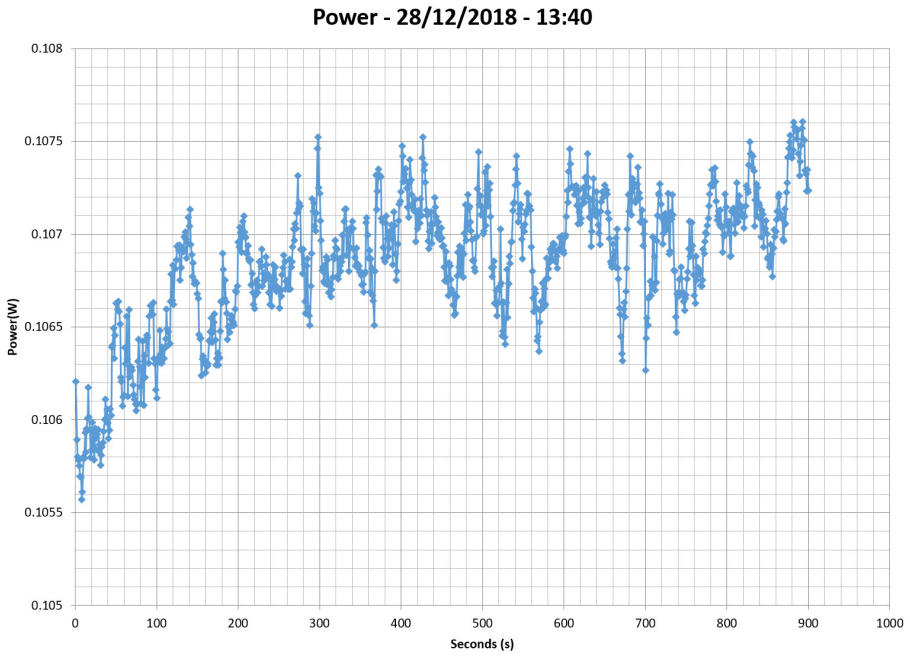
5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231	53.349%	0.068
	5.137V	0.433		115.10V
2	0.090A	0.462	61.682%	0.112
	5.134V	0.749		115.10V
3	0.550A	2.820	74.722%	0.290
	5.126V	3.774		115.10V
4	1.000A	5.120	76.190%	0.332
	5.120V	6.720		115.10V
5	1.500A	7.669	75.998%	0.356
	5.112V	10.091		115.10V
6	2.501A	12.743	74.420%	0.385
	5.096V	17.123		115.10V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231	43.667%	0.026
	5.134V	0.529		230.28V
2	0.090A	0.462	53.534%	0.041
	5.133V	0.863		230.28V
3	0.550A	2.820	71.320%	0.160
	5.126V	3.954		230.26V
4	1.000A	5.121	74.390%	0.226
	5.120V	6.884		230.26V
5	1.500A	7.669	74.922%	0.269
	5.112V	10.236		230.26V
6	2.501A	12.744	75.377%	0.315
	5.096V	16.907		230.25V

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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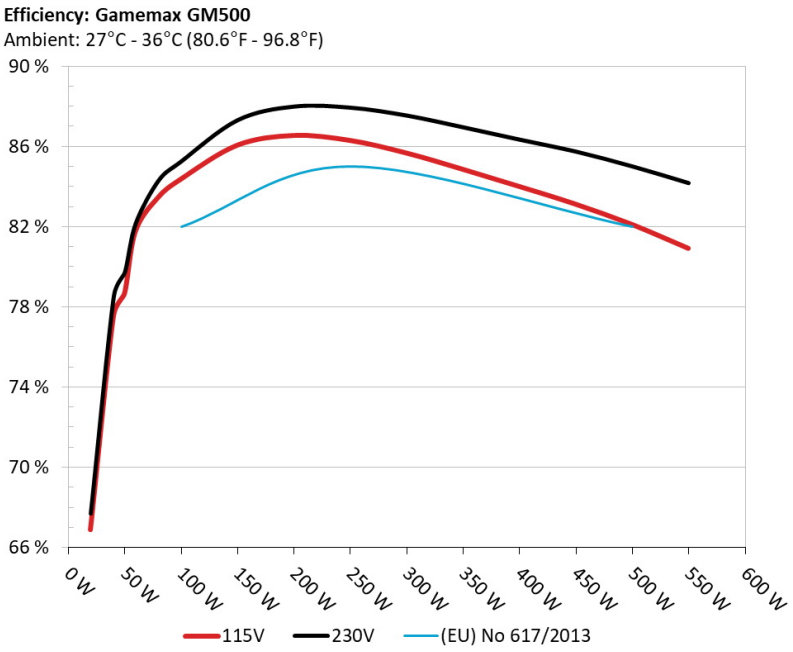
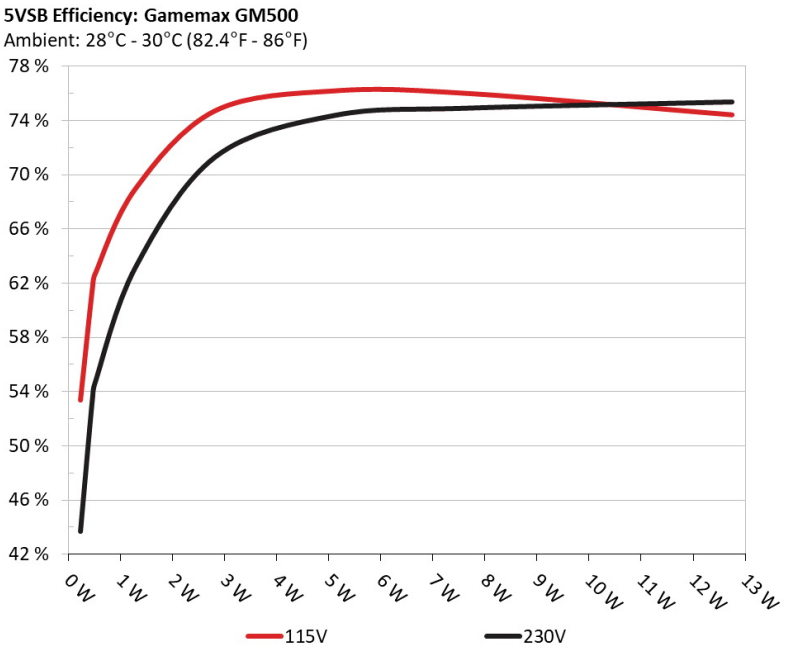
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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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10-110% LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	2.262A	1.971A	1.980A	0.979A	49.553	78.666%	1018	25.6	29.03°C	0.966
	12.359V	5.076V	3.328V	5.110V	62.992				30.88°C	115.10V
2	5.563A	2.962A	2.981A	1.177A	99.634	84.383%	1022	25.8	29.69°C	0.963
	12.357V	5.062V	3.320V	5.099V	118.073				32.00°C	115.09V
3	9.204A	3.461A	3.469A	1.376A	149.522	86.071%	1022	25.8	30.25°C	0.977
	12.335V	5.056V	3.312V	5.089V	173.719				32.90°C	115.08V
4	12.865A	3.959A	3.989A	1.575A	199.556	86.559%	1029	26.0	30.90°C	0.986
	12.310V	5.052V	3.306V	5.079V	230.542				33.78°C	115.07V
5	16.186A	4.962A	4.997A	1.776A	249.675	86.311%	1247	32.0	31.16°C	0.991
	12.306V	5.038V	3.300V	5.069V	289.272				34.56°C	115.08V
6	19.514A	5.970A	6.010A	1.978A	299.785	85.681%	1498	36.9	31.61°C	0.993
	12.298V	5.025V	3.294V	5.058V	349.883				35.46°C	115.09V
7	22.838A	6.987A	7.026A	2.180A	349.893	84.865%	1736	41.3	32.49°C	0.995
	12.295V	5.010V	3.287V	5.046V	412.296				36.90°C	115.09V
8	26.161A	8.009A	8.042A	2.383A	400.023	84.010%	1737	41.3	33.53°C	0.996
	12.294V	4.995V	3.282V	5.036V	476.162				38.26°C	115.09V
9	29.935A	8.517A	8.544A	2.386A	449.742	83.133%	1726	41.0	33.80°C	0.996
	12.268V	4.990V	3.277V	5.030V	540.994				39.21°C	115.09V
10	33.743A	9.026A	9.092A	2.491A	500.055	82.111%	1729	41.1	35.24°C	0.996
	12.235V	4.986V	3.267V	5.019V	608.996				41.17°C	115.09V
11	37.968A	9.019A	9.105A	2.496A	549.677	80.930%	1718	40.8	35.88°C	0.997
	12.181V	4.989V	3.261V	5.009V	679.198				42.61°C	115.09V
CL1	0.136A	12.000A	12.001A	0.000A	99.215	76.531%	1364	34.3	31.74°C	0.971
	12.939V	4.817V	3.304V	5.105V	129.640				34.72°C	115.10V
CL2	31.993A	1.001A	0.999A	1.000A	393.809	84.564%	1689	40.2	35.93°C	0.996
	11.886V	5.169V	3.294V	5.075V	465.696				41.16°C	115.10V

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20-80W LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.164A	0.487A	0.476A	0.195A	19.359	66.894%	1006	24.8	0.841
	12.267V	5.121V	3.334V	5.128V	28.940				115.11V
2	2.403A	0.979A	0.987A	0.391A	39.856	77.567%	1011	25.1	0.949
	12.306V	5.101V	3.331V	5.121V	51.383				115.10V
3	3.563A	1.474A	1.469A	5.115A	59.290	81.782%	1013	25.2	0.987
	12.320V	5.090V	3.328V	5.115V	72.498				115.09V
4	4.798A	1.966A	1.983A	0.783A	79.727	83.488%	1016	25.5	0.967
	12.327V	5.081V	3.324V	5.110V	95.495				115.09V

RIPPLE MEASUREMENTS

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.7 mV	8.7 mV	11.7 mV	13.4 mV	Pass
20% Load	8.9 mV	9.0 mV	21.3 mV	14.5 mV	Pass
30% Load	11.1 mV	9.4 mV	13.8 mV	15.9 mV	Pass
40% Load	12.5 mV	9.7 mV	14.4 mV	16.7 mV	Pass
50% Load	13.7 mV	10.6 mV	15.5 mV	18.4 mV	Pass
60% Load	15.7 mV	12.2 mV	17.5 mV	23.3 mV	Pass
70% Load	17.6 mV	13.7 mV	20.2 mV	25.1 mV	Pass
80% Load	19.0 mV	15.4 mV	19.5 mV	32.5 mV	Pass
90% Load	21.0 mV	17.1 mV	24.0 mV	36.8 mV	Pass
100% Load	30.1 mV	22.9 mV	22.7 mV	42.2 mV	Pass
110% Load	36.1 mV	26.8 mV	23.6 mV	54.7 mV	Fail
Crossload 1	12.7 mV	72.7 mV	24.0 mV	28.2 mV	Fail
Crossload 2	23.6 mV	18.9 mV	15.1 mV	20.9 mV	Pass

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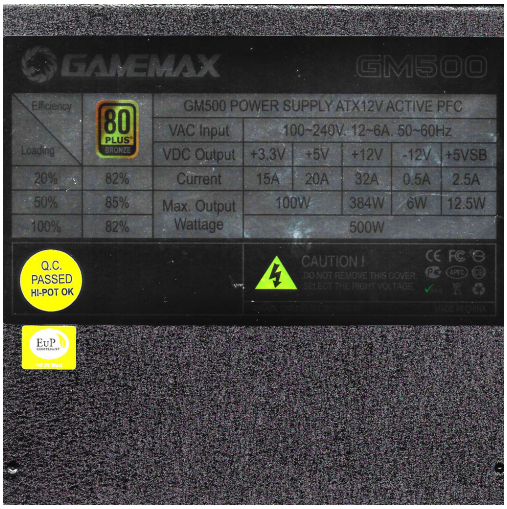
HOLD-UP TIME & POWER OK SIGNAL (230V)

Hold-Up Time (ms)	12.50
AC Loss to PWR_OK Hold Up Time (ms)	8.10
PWR_OK Inactive to DC Loss Delay (ms)	4.40

Top side



Power specifications label

CERTIFICATIONS

ETA S

LAMBDA S+

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