Gamemax GM500 rev.2

Serial Number

Lab ID 586

Certification ID 25586

Test Result Report ID: 19PS586A

Certificate Issue Date: May 1, 2019

Scheme: ETA-EMI PSU

115V



230V



115V



230V



Scheme: LAMBDA PSU



Aristeidis Bitziopoulos, Certification Body General Manager

General Information

Test Equipment

Electronic Loads	Chroma 63601-5 x2 Chroma 63600-2 Chroma 63640-80-80 x10 Chroma 63610-80-20
AC Sources	Chroma 6530, APM SP300VAC4000W-P, GW Instek ASR-3500
Power Analyzers	Rohde & Schwarz HMC8015 & NPA701
Oscilloscopes	Picoscope 4444, 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
EMI Analyzer	TekBox TBMR-110M-EU
Isolation Transformer	4kVA
UPS	FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA
Testing Methodology	Cybenetics PSU Test Protocol

DUT Information(Non-accredited measurements)

Product Identification Details	
Brand	Gamemax
Model	GM500 rev.2
OEM/ODM	Gamemax
Serial Number	
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12-6
Rated Frequency (Hz)	50-60

Rated Power (W)	500
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fixed cables
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	140mm Sleeve Bearing Fan (DF1402512SEM)
Semi-Passive Operation	✗
Cybenetics Testing Information	
Lab ID	586
Date of receipt	Apr 23, 2019
Testing Date	Apr 27, 2019
Report Issued Date	May 1, 2019
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

Cables and Connectors(Non-accredited measurements)

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

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				

Parts Description

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

Test Results

Temperature & Compliance Info

Temperature Range (°C /°F)	28-32 / 82.4-89.6
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	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	84.327%
Average Noise Output (>1450 Load Combinations)	37.51dBA
Average PF (>1450 Load Combinations)	0.988
Efficiency With 10W (≤500W) or 2% (>500W) Load	55.120%
Standby Power Consumption	0.1072W
Non-Accredited	
12V Ripple (Full Load)	30.13mV
5V Ripple (Full Load)	22.92mV
3.3V Ripple (Full Load)	22.70mV
5VSB Ripple (Full Load)	42.16mV
12V Load Regulation	1.00%
5V Load Regulation	2.25%
3.3V Load Regulation	1.92%
5VSB Load Regulation	2.13%
Inrush Current	99.284A

230V		
Accredited		
Average Efficiency (>1450 load combinations)	86.040%	
Average Noise Output (>1450 Load Combinations)	37.49dBA	
Average PF (>1450 Load Combinations)	0.945	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1890W	
Non-Accredited		
12V Ripple (Full Load)	26.83mV	
5V Ripple (Full Load)	20.90mV	
3.3V Ripple (Full Load)	23.99mV	
5VSB Ripple (Full Load)	38.46mV	
12V Load Regulation	0.99%	
5V Load Regulation	2.35%	
3.3V Load Regulation	1.83%	
5VSB Load Regulation	2.09%	
Inrush Current	66.130A	
Hold-Up Time & PWR_OK Signal	12.50ms	
AC Loss to PWR_OK Hold Up Time	8.10ms	
PWR_OK Inactive to DC Loss Delay	4.40ms	
OPP (0.00°C / 0.00°C)	-	-

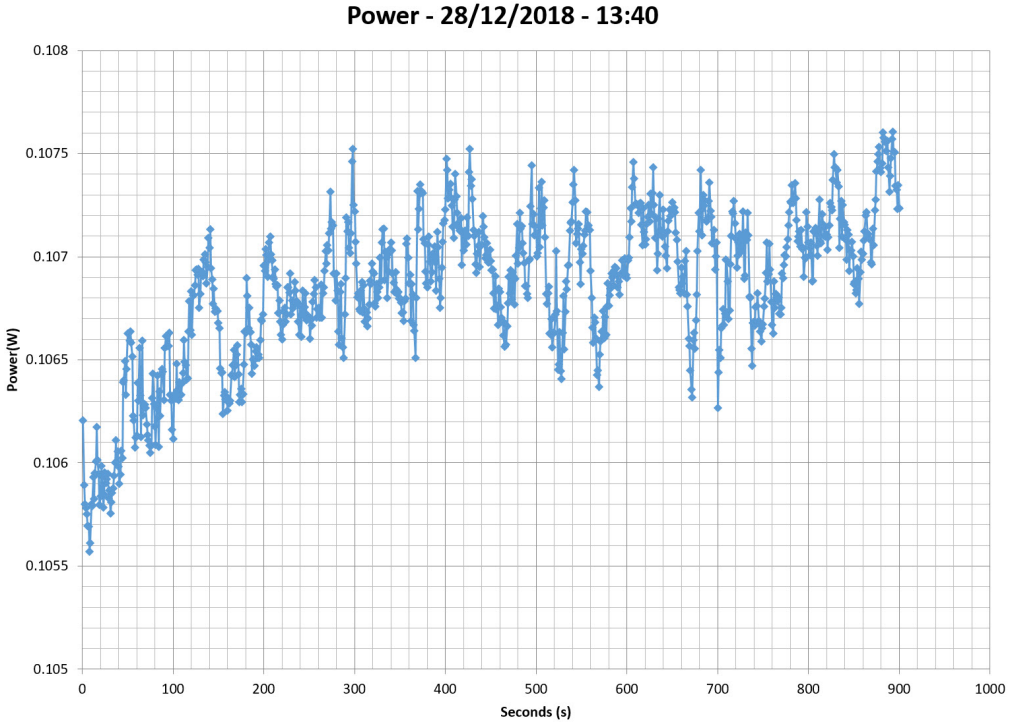
Hold-Up Time & PWR_OK Signal

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

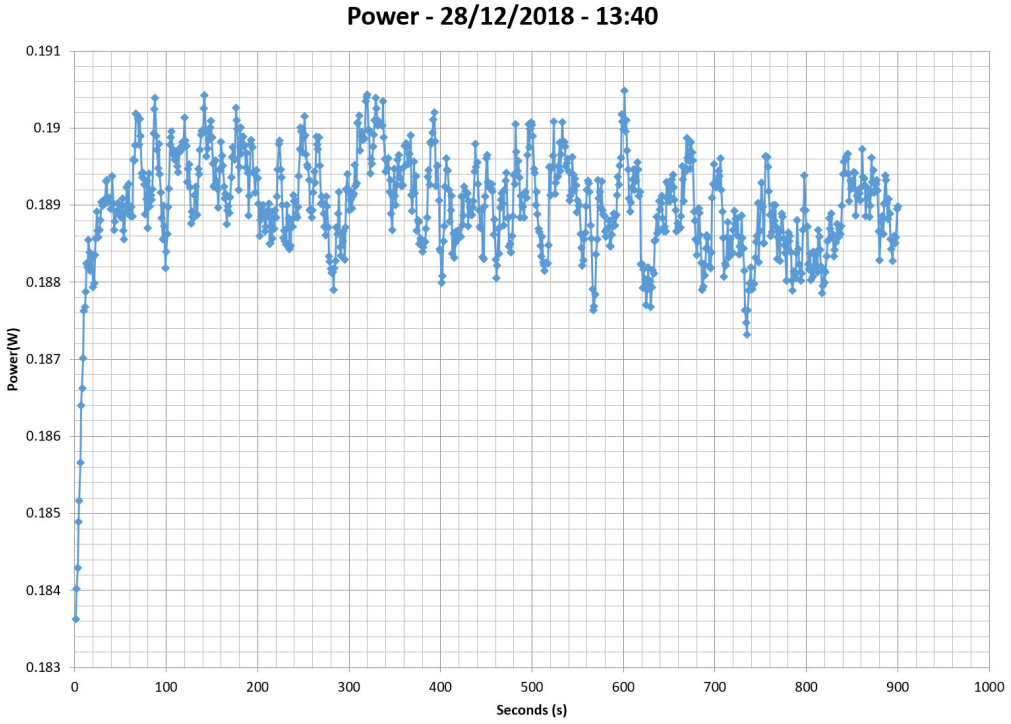
Vampire Power

Graphs

115V

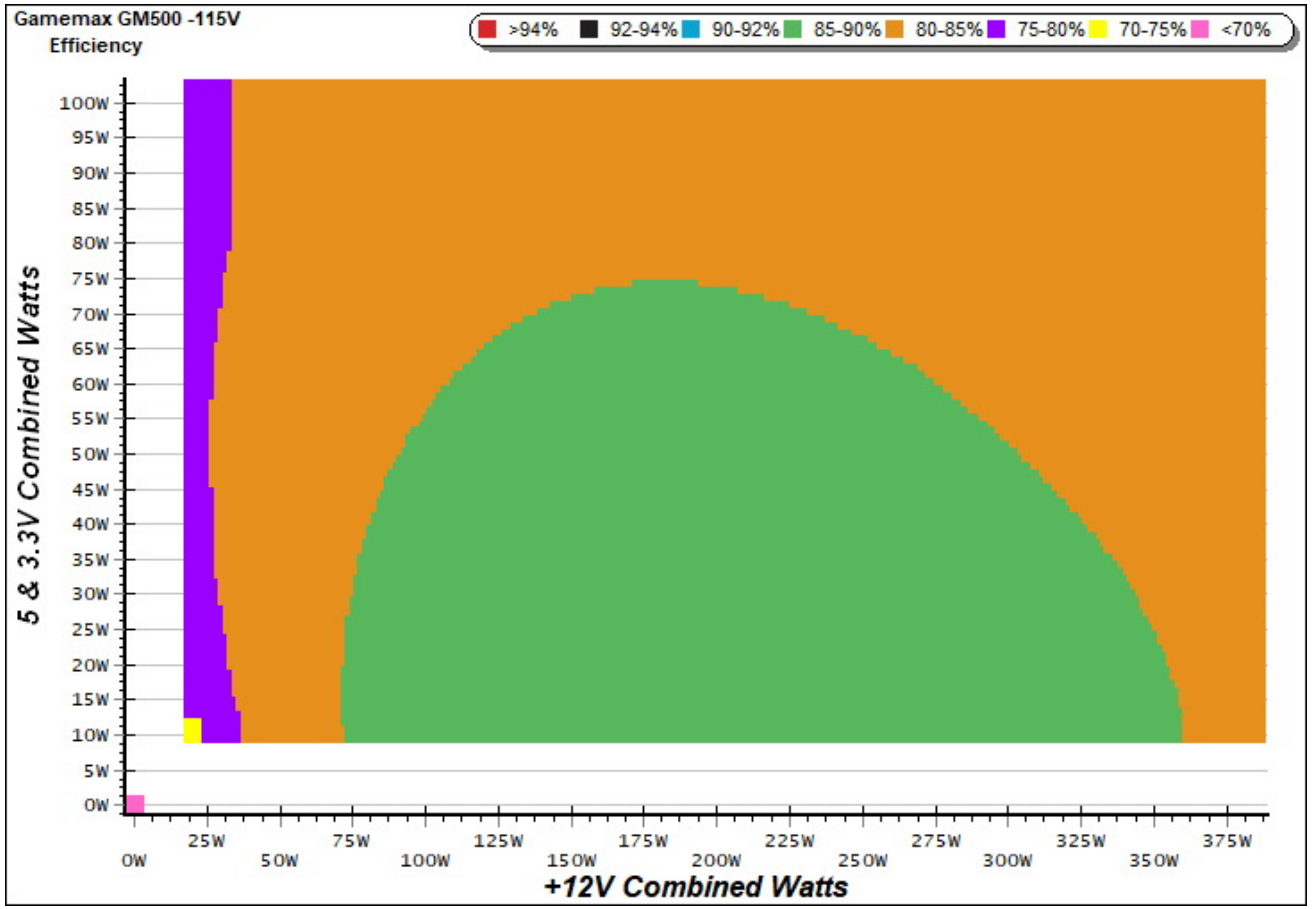


230V



Efficiency Graph

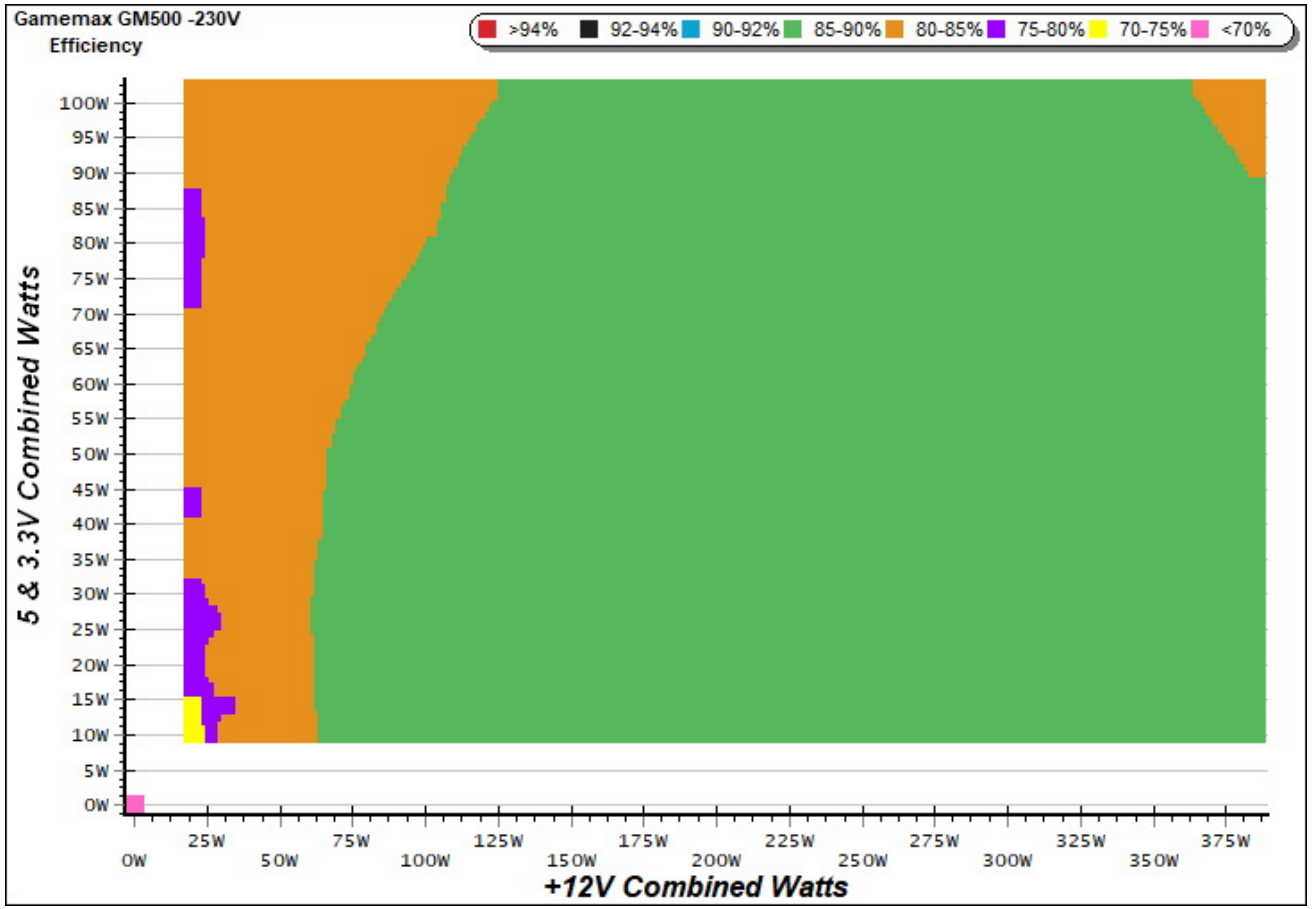
115V



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.

230V

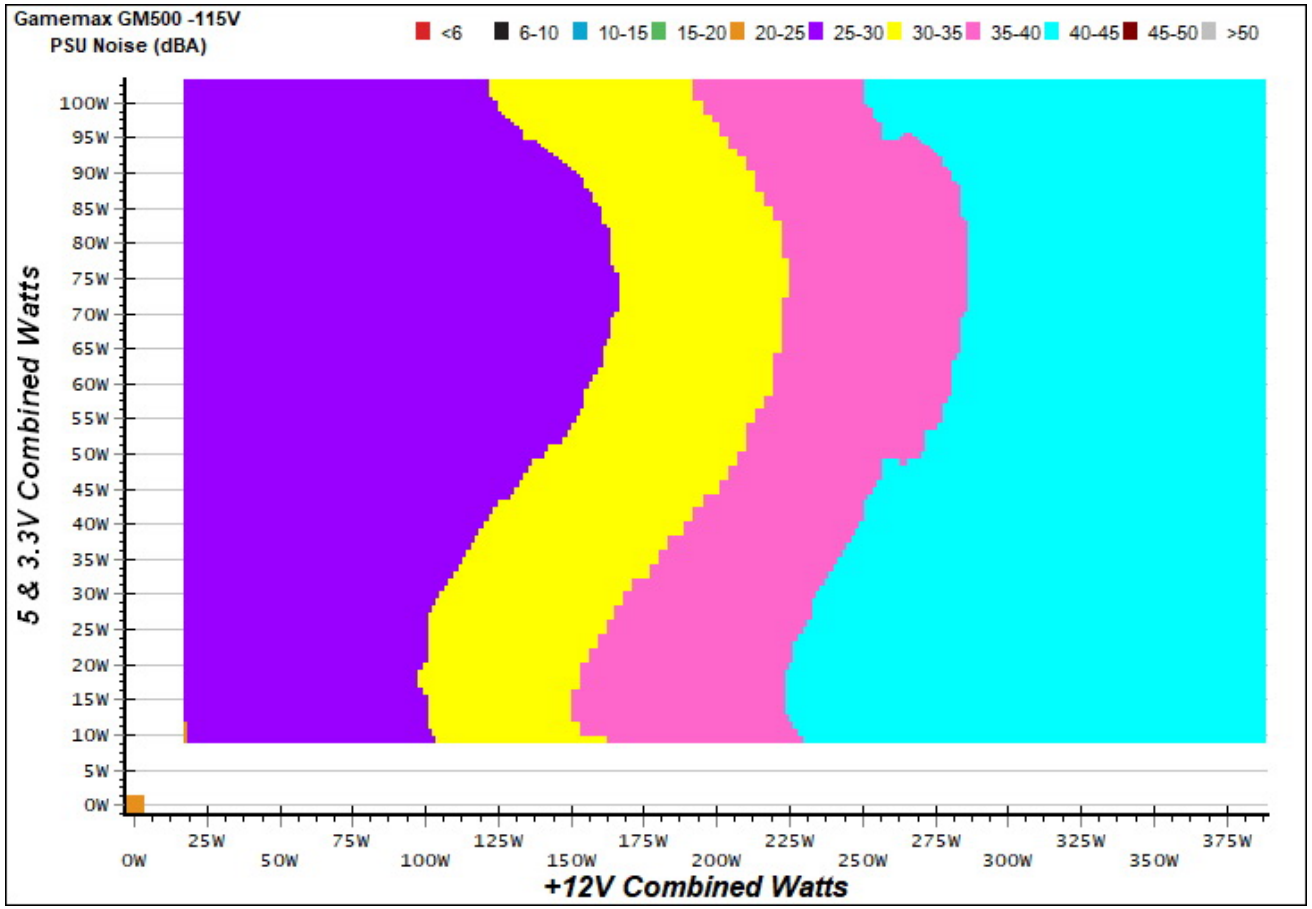


INFO

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

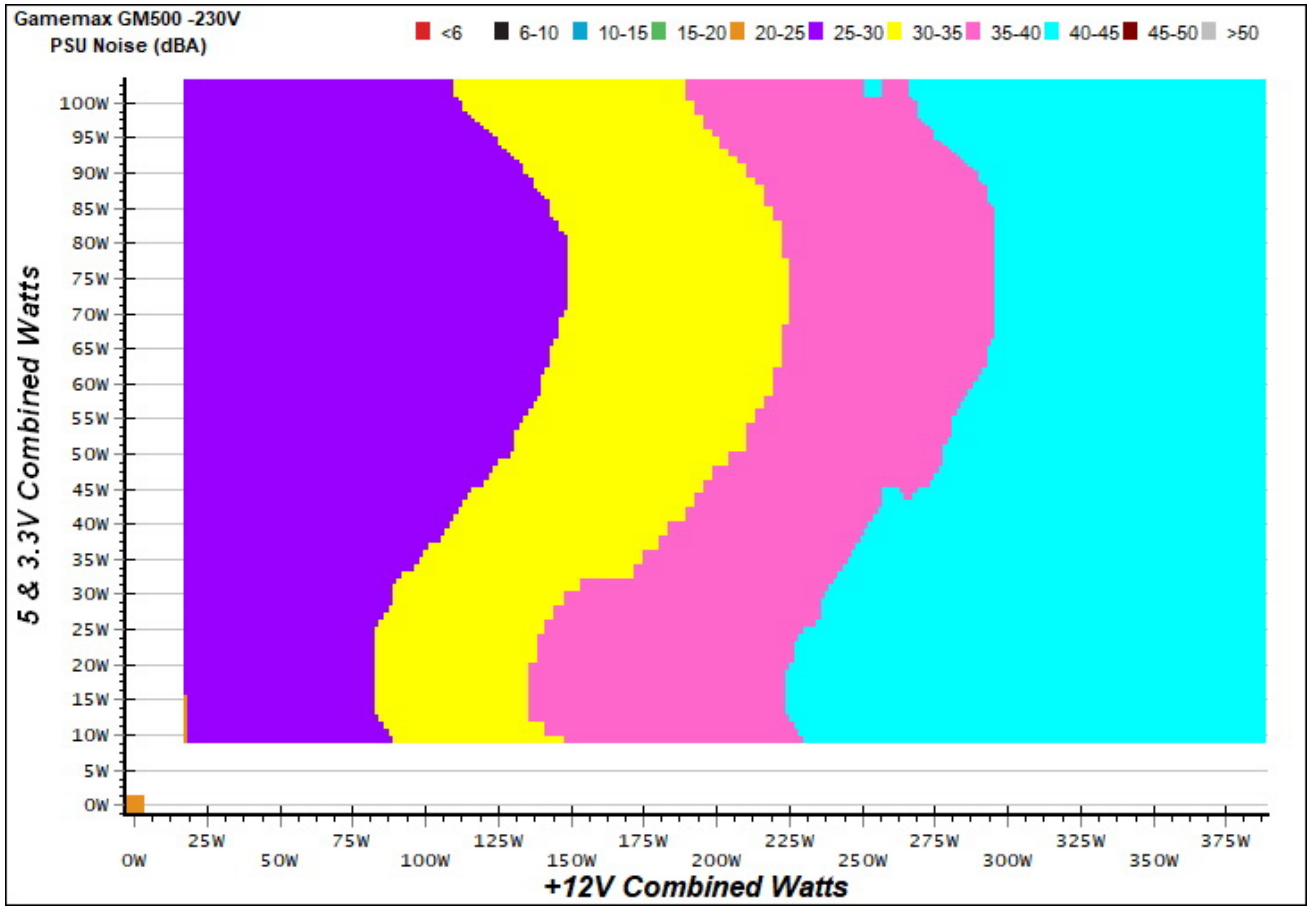
115V



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.

230V

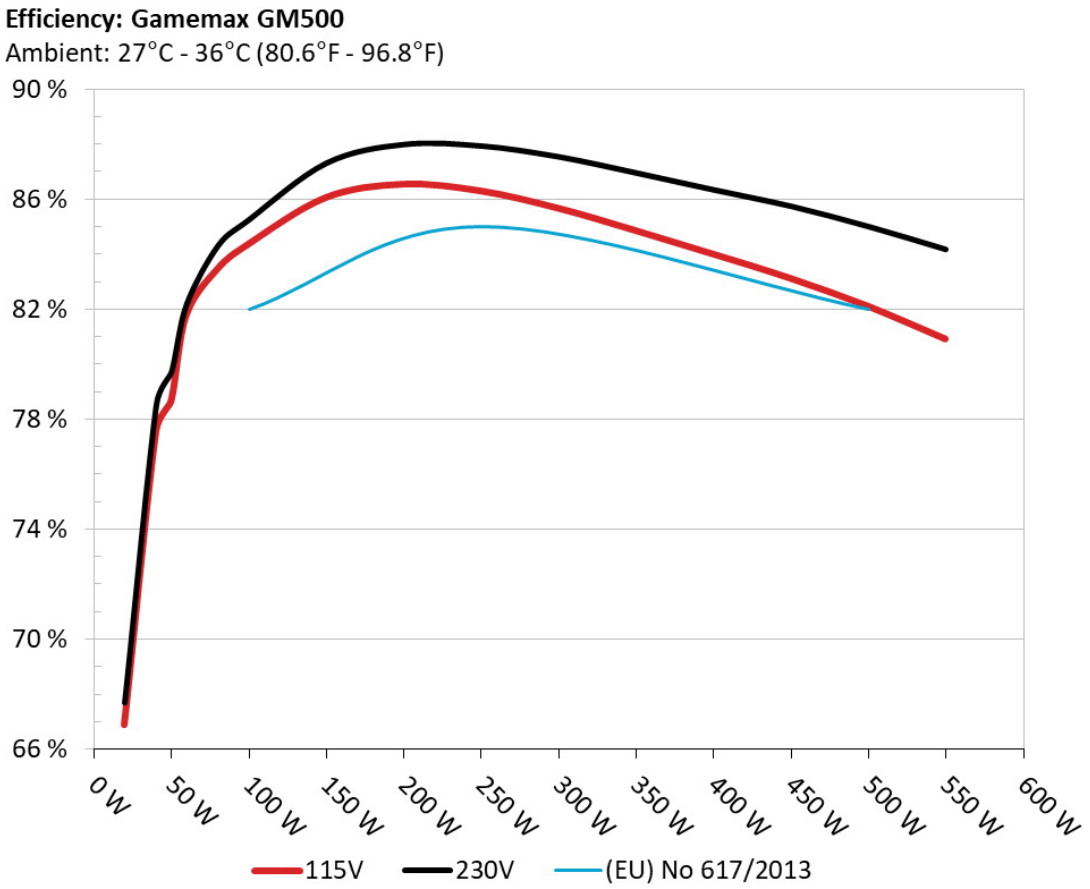


INFO

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.

Indicative Performance

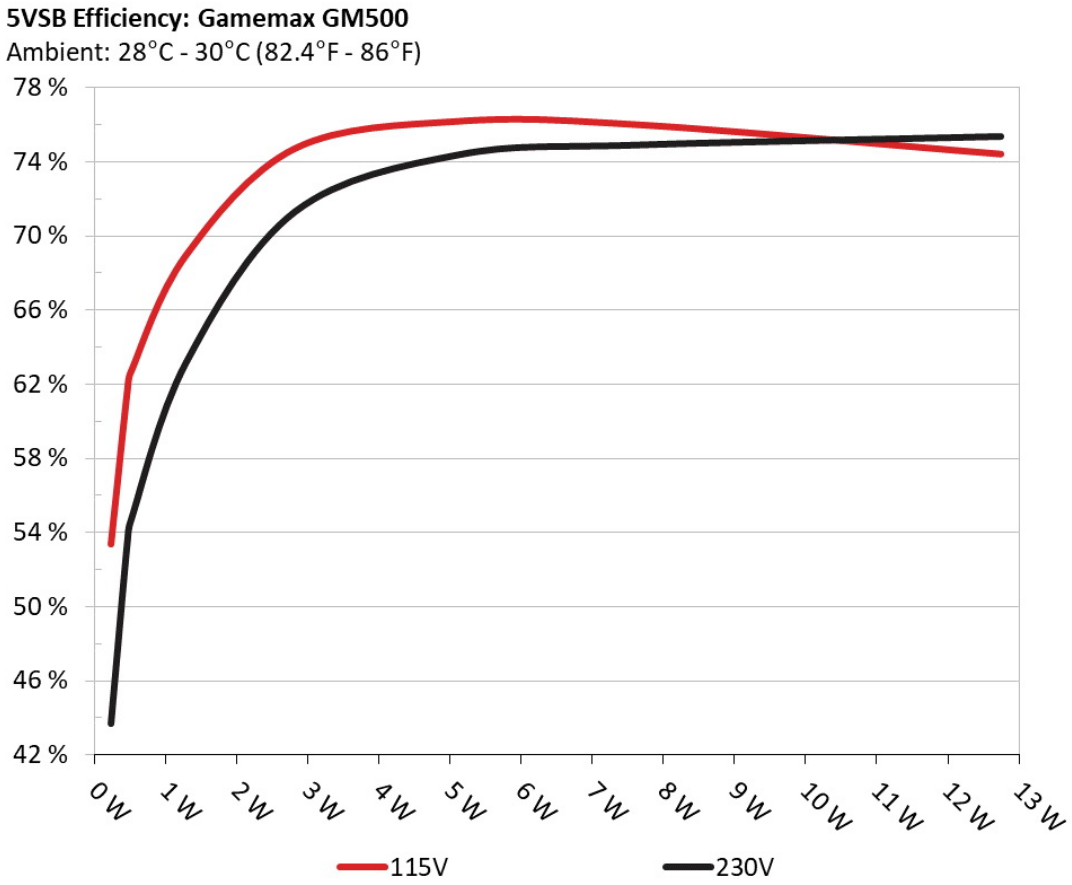
Efficiency under high ambient temperature



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.

5VSB Efficiency (ERP LOT 3/6 & CEC)

115V

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

230V

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

Supplementary Tests (For Reference)

Typical 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	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

The results above are not used in the certification process

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	2.268A	1.967A	1.981A	0.979A	49.608	79.695%	1014	25.3	28.90°C	0.595
	12.358V	5.076V	3.328V	5.110V	62.247				30.87°C	230.30V
2	5.569A	2.962A	2.980A	1.177A	99.702	85.237%	1016	25.5	29.55°C	0.817
	12.357V	5.061V	3.320V	5.099V	116.970				31.86°C	230.30V
3	9.210A	3.462A	3.469A	1.376A	149.601	87.290%	1019	25.7	30.21°C	0.912
	12.335V	5.056V	3.312V	5.089V	171.383				32.83°C	230.30V
4	12.869A	3.959A	3.989A	1.575A	199.607	87.971%	1025	25.9	30.87°C	0.942
	12.310V	5.052V	3.306V	5.080V	226.901				33.87°C	230.29V
5	16.188A	4.962A	4.997A	1.776A	249.700	87.916%	1255	32.1	31.07°C	0.965
	12.306V	5.038V	3.300V	5.069V	284.021				34.70°C	230.29V
6	19.516A	5.969A	6.010A	1.978A	299.795	87.522%	1487	36.6	31.79°C	0.978
	12.298V	5.024V	3.294V	5.057V	342.535				35.78°C	230.27V
7	22.836A	6.987A	7.027A	2.180A	349.888	86.936%	1721	40.9	32.38°C	0.984
	12.296V	5.009V	3.287V	5.046V	402.465				37.18°C	230.27V
8	26.157A	8.012A	8.042A	2.383A	400.007	86.320%	1725	41.0	33.36°C	0.985
	12.295V	4.994V	3.282V	5.036V	463.401				38.54°C	230.27V
9	29.933A	8.518A	8.543A	2.386A	449.720	85.725%	1724	41.0	33.62°C	0.986
	12.268V	4.990V	3.277V	5.030V	524.609				39.46°C	230.26V
10	33.739A	9.030A	9.089A	2.491A	500.041	84.984%	1722	41.0	34.41°C	0.987
	12.236V	4.985V	3.267V	5.019V	588.396				40.65°C	230.27V
11	37.970A	9.020A	9.104A	2.496A	549.674	84.156%	1716	40.8	35.79°C	0.988
	12.180V	4.989V	3.262V	5.009V	653.161				42.39°C	230.28V
CL1	0.134A	12.000A	12.001A	0.000A	99.176	77.618%	1389	34.7	31.23°C	0.850
	12.937V	4.817V	3.303V	5.105V	127.774				34.75°C	230.29V

CL2	32.005A	1.002A	0.997A	1.000A	393.919	86.870%	1689	40.2	34.14°C	0.985
	11.885V	5.169V	3.295V	5.075V	453.459				40.50°C	230.29V

The results above are not used in the certification process

Light Load Tests

115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.164A	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	0.587A	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

The results above are not used in the certification process

230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.171A	0.487A	0.476A	0.195A	19.443	67.677%	1007	24.8	0.399
	12.265V	5.121V	3.334V	5.128V	28.729				230.29V
2	2.408A	0.980A	0.988A	0.391A	39.923	78.527%	1007	24.8	0.545
	12.305V	5.101V	3.331V	5.121V	50.840				230.29V
3	3.569A	1.473A	1.469A	0.587A	59.353	82.144%	1010	25.0	0.669
	12.319V	5.090V	3.327V	5.115V	72.255				230.30V
4	4.803A	1.968A	1.981A	0.783A	79.791	84.297%	1011	25.1	0.759
	12.327V	5.080V	3.324V	5.110V	94.655				230.29V

The results above are not used in the certification process

Ripple Measurements

115V

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

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.0 mV	8.7 mV	13.5 mV	13.2 mV	Pass
20% Load	8.4 mV	8.2 mV	13.5 mV	14.6 mV	Pass
30% Load	9.4 mV	9.3 mV	13.1 mV	15.6 mV	Pass
40% Load	10.6 mV	9.5 mV	13.6 mV	15.9 mV	Pass
50% Load	11.2 mV	10.0 mV	15.1 mV	18.8 mV	Pass
60% Load	12.0 mV	11.3 mV	17.1 mV	23.2 mV	Pass
70% Load	13.6 mV	12.8 mV	17.1 mV	27.0 mV	Pass
80% Load	16.1 mV	13.6 mV	21.0 mV	30.3 mV	Pass

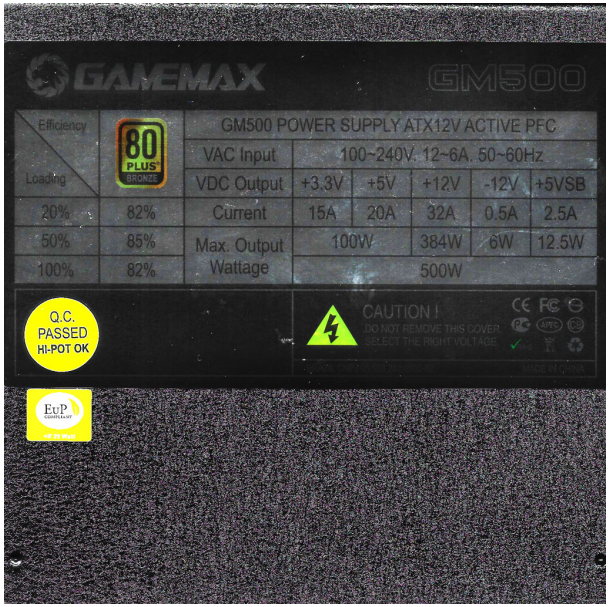
Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	18.0 mV	15.6 mV	20.8 mV	34.8 mV	Pass
100% Load	26.8 mV	20.9 mV	24.0 mV	38.5 mV	Pass
110% Load	30.5 mV	24.8 mV	24.4 mV	50.5 mV	Fail
Crossload 1	12.2 mV	61.8 mV	27.1 mV	28.2 mV	Fail
Crossload 2	18.1 mV	17.0 mV	15.3 mV	20.7 mV	Pass

The results above are not used in the certification process

Gamemax GM500 rev.2



Top side



Power specifications label

All data and graphs included in this test report can be used by any individual on the following conditions:
› It should be mentioned that the test results are provided by Cybenetics
› The link to the original test results document should be provided in any case

Cybenetics runs voluntary certification programs for power supplies - ETA for efficiency, LAMBDA for noise and SAFE for safety and correct operation - and for cooling products, with DELTA for chassis soundproofing and PHI for fan airflow and static pressure. THETA rates cooler performance on AMD AM5 and Intel LGA1851 outside ISO 17065 and accreditation scope

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