

Riotoro Builder Edition 1200W

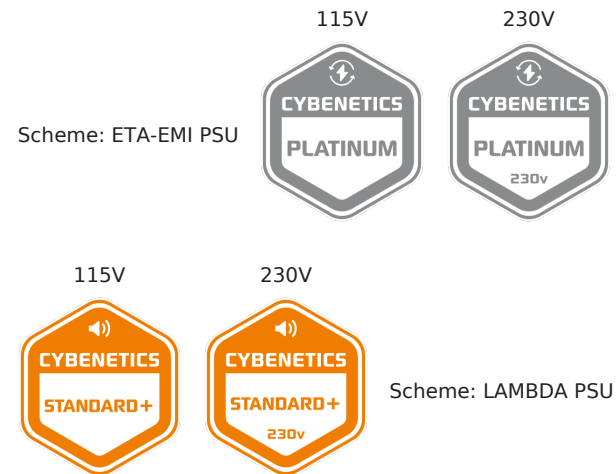
Serial Number 18160400791B00GD91F04000858

Lab ID 477

Certification ID 25477

Test Result Report ID:

Certificate Issue Date: Sep 20, 2018



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	Riotoro
Model	Builder Edition 1200W
OEM/ODM	High Power
Serial Number	18160400791B00GD91F04000858
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	110-240
Rated Current (Arms)	15-8
Rated Frequency (Hz)	50-60

Rated Power (W)	1200
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	135mm Double Ball-Bearing Fan (RL4Z B1352512HH)
Semi-Passive Operation	X
Cybenetics Testing Information	
Lab ID	477
Date of receipt	Sep 3, 2018
Testing Date	Sep 16, 2018
Report Issued Date	Sep 20, 2018
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

Cables and Connectors(Non-accredited measurements)

Modular Cables				
Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (550mm)	1	1	16-22AWG	No
4+4 pin EPS12V (650mm)	2	2	16AWG	No
6+2 pin PCIe (2x600mm)	2	4	16AWG	No
6+2 pin PCIe (2x(600mm+150mm))	1	4	16-18AWG	No
SATA (500mm+100mm+100mm+100mm)	3	12	18AWG	No
4-pin Molex (500mm+100mm+100mm)	2	6	18AWG	No
FDD Adapter (+160mm)	1	1	22AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	16AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	25	25	100	3	0.3
	Watts	130		1200	15	3.6
Total Max. Power (W)		1200				

Parts Description

General Data	
Manufacturer (OEM)	High Power
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV, 1x discharge IC
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	2x GBJ2506 (600V, 25A @ 100°C)
APFC MOSFETS	2x Infineon IPW60R099P6 (650V, 24A @ 100°C, 0.099Ohm)
APFC Boost Diode	1x CREE C3D10060 (600V, 10A @ 153°C)
Hold-up Cap(s)	2x Nichicon (400V, 560uF, 2000h @ 105 °C, GG)
Main Switchers	2x Infineon IPA60R099P6 (650V, 24A @ 100°C, 0.099Ohm)
APFC Controller	Infineon ICE3PCS01G
Resonant Controller	Champion CM6901X
Topology	Primary side: Half-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	8x APEC AP4N1R8CMT-A (60V, 32A @ 70°C, 1.8mOhm)
5V & 3.3V	DC-DC Converters: 8x APEC AP3R303GMT-HF-3 (30V, 24A @ 70°C, 3.3mOhm) PWM Controller: APW7159C
Filtering Capacitors	Electrolytics: Nippon Chemi-Con W (105°C), Nippon Chemi-Con (4-10,000 @ 105°C, KY) Polymers: Nippon Chemi-Con, FPCAP (FP)
Supervisor IC	SITI PS232S (OVP, UVP, 6x Channel OCP, SCP)
Micro Controller	STC 15W408AS
Fan Model	Globe Fan RL4Z B1352512HH (12V, 0.45A, 129.76 CFM, 1800 RPM, 33.9 dB[A], Double Ball-Bearing)
Fan Power Transistor	STi 2SD882 (NPN)

5VSB Circuit	
Rectifiers	1x PFC P10V45SP SBR (45V, 10A) & 2x APEC AP3R303GMT-HF-3 (30V, 24A @ 70°C, 3.3mOhm)
Standby PWM Controller	Sanken STR-A6069H
-12V Circuit	
Rectifier	KEC KIA7912PI (-12V, 1A)

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: ✓ ErP Lot 3 2014 & CEC: Partially
(EU) No 617/2013 Compliance	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	89.266%
Average Noise Output (>1450 Load Combinations)	35.89dBA
Average PF (>1450 Load Combinations)	0.995
Efficiency With 10W (≤500W) or 2% (>500W) Load	69.231%
Standby Power Consumption	0.0776W
Non-Accredited	
12V Ripple (Full Load)	23.77mV
5V Ripple (Full Load)	10.95mV
3.3V Ripple (Full Load)	27.06mV
5VSB Ripple (Full Load)	11.79mV
12V Load Regulation	0.24%
5V Load Regulation	0.77%

3.3V Load Regulation	0.36%
5VSB Load Regulation	2.85%
Inrush Current	22.939A

230V

Accredited		
Average Efficiency (>1450 load combinations)	91.425%	
Average Noise Output (>1450 Load Combinations)	35.87dBA	
Average PF (>1450 Load Combinations)	0.975	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1137W	
Non-Accredited		
12V Ripple (Full Load)	22.27mV	
5V Ripple (Full Load)	11.61mV	
3.3V Ripple (Full Load)	24.51mV	
5VSB Ripple (Full Load)	13.58mV	
12V Load Regulation	0.19%	
5V Load Regulation	0.76%	
3.3V Load Regulation	0.42%	
5VSB Load Regulation	2.83%	
Inrush Current	54.660A	
Hold-Up Time & PWR_OK Signal	10.30ms	
AC Loss to PWR_OK Hold Up Time	10.90ms	
PWR_OK Inactive to DC Loss Delay	-0.60ms	
OPP (0.00°C / 0.00°C)	-	-

Hold-Up Time & PWR_OK Signal

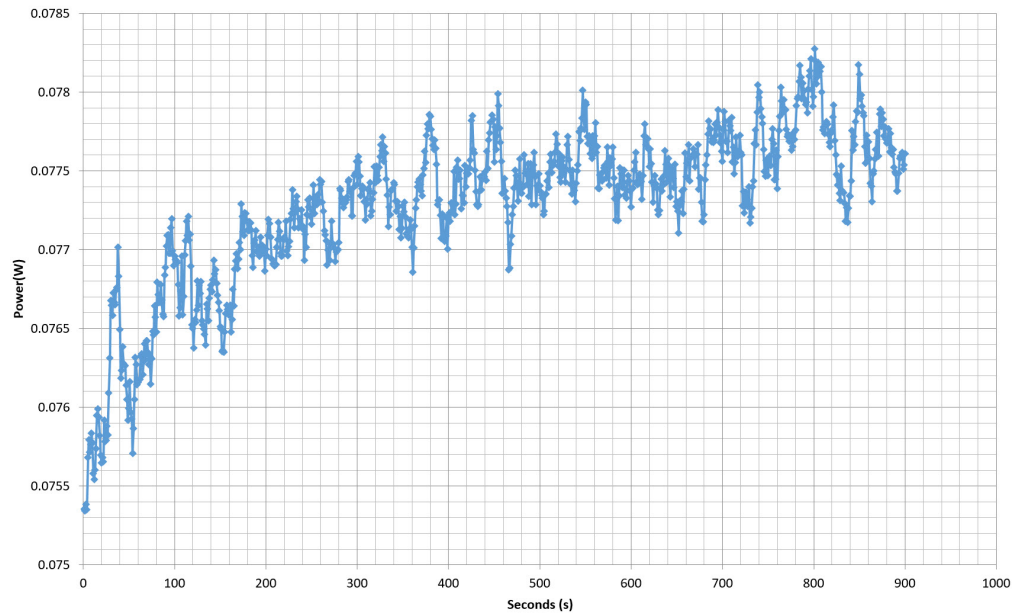
Hold-Up Time (ms)	10.3
AC Loss to PWR_OK Hold Up Time (ms)	10.9
PWR_OK Inactive to DC Loss Delay (ms)	-0.6

Vampire Power

Graphs

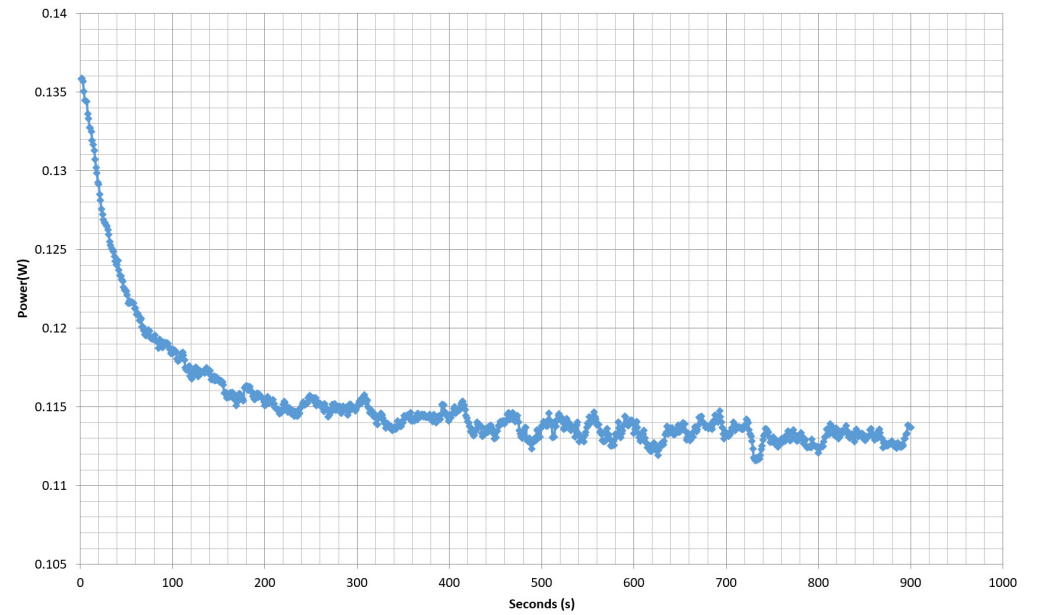
115V

Power - 18160400791B00GD91F04000858 - 12/09/2018 - 11:51



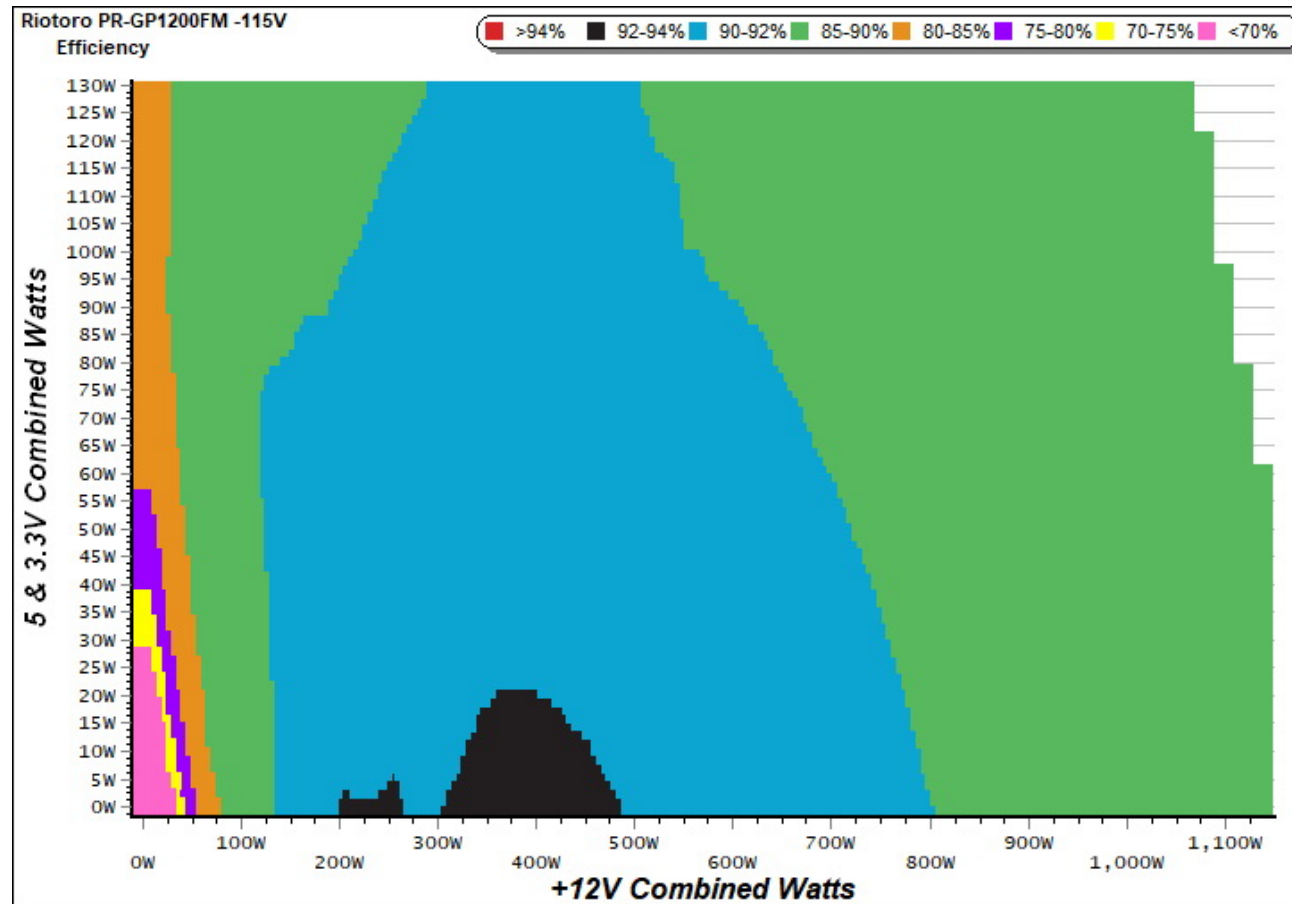
230V

Power - 18160400791B00GD91F04000858 - 12/09/2018 - 11:51



Efficiency Graph

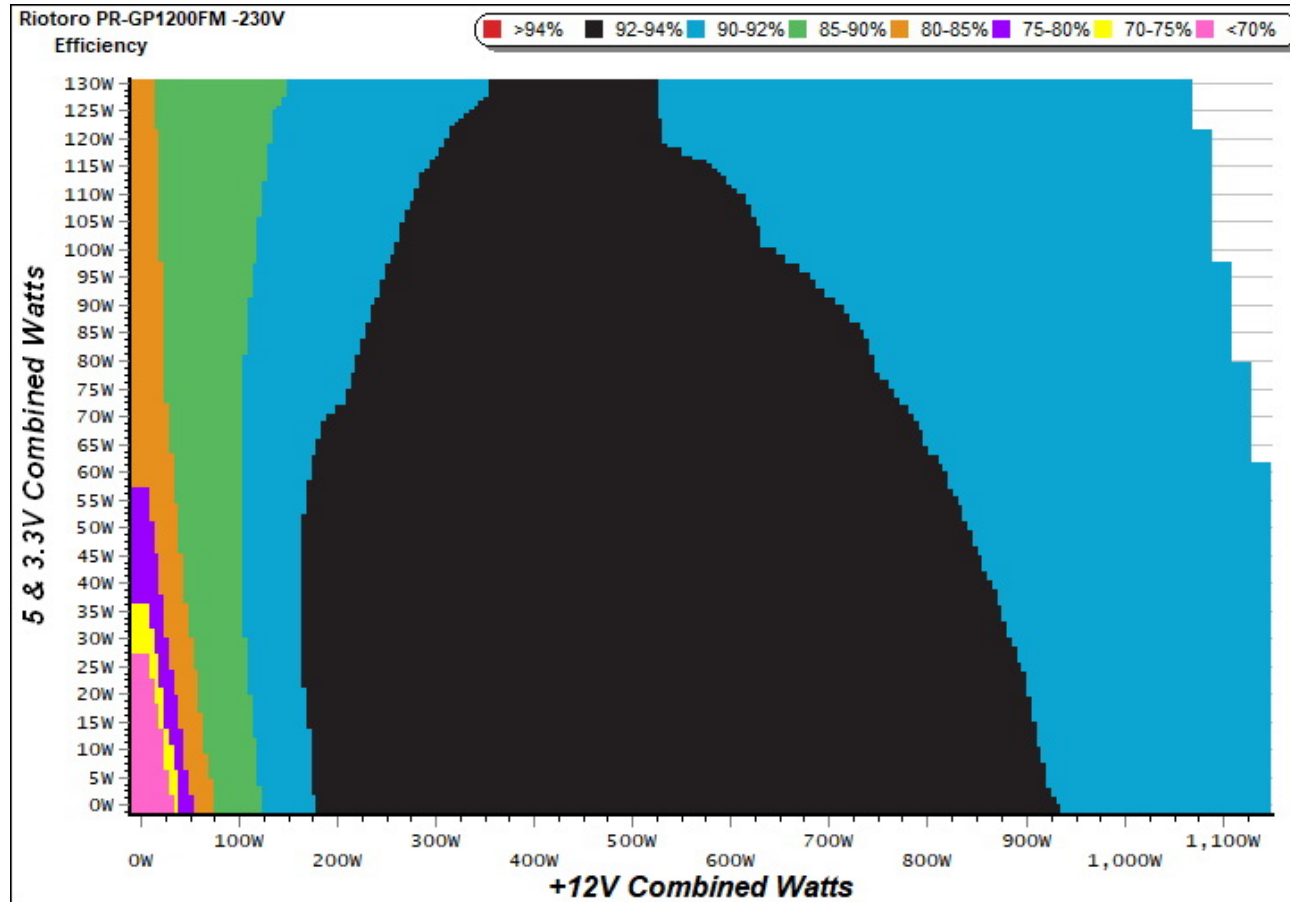
115V



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

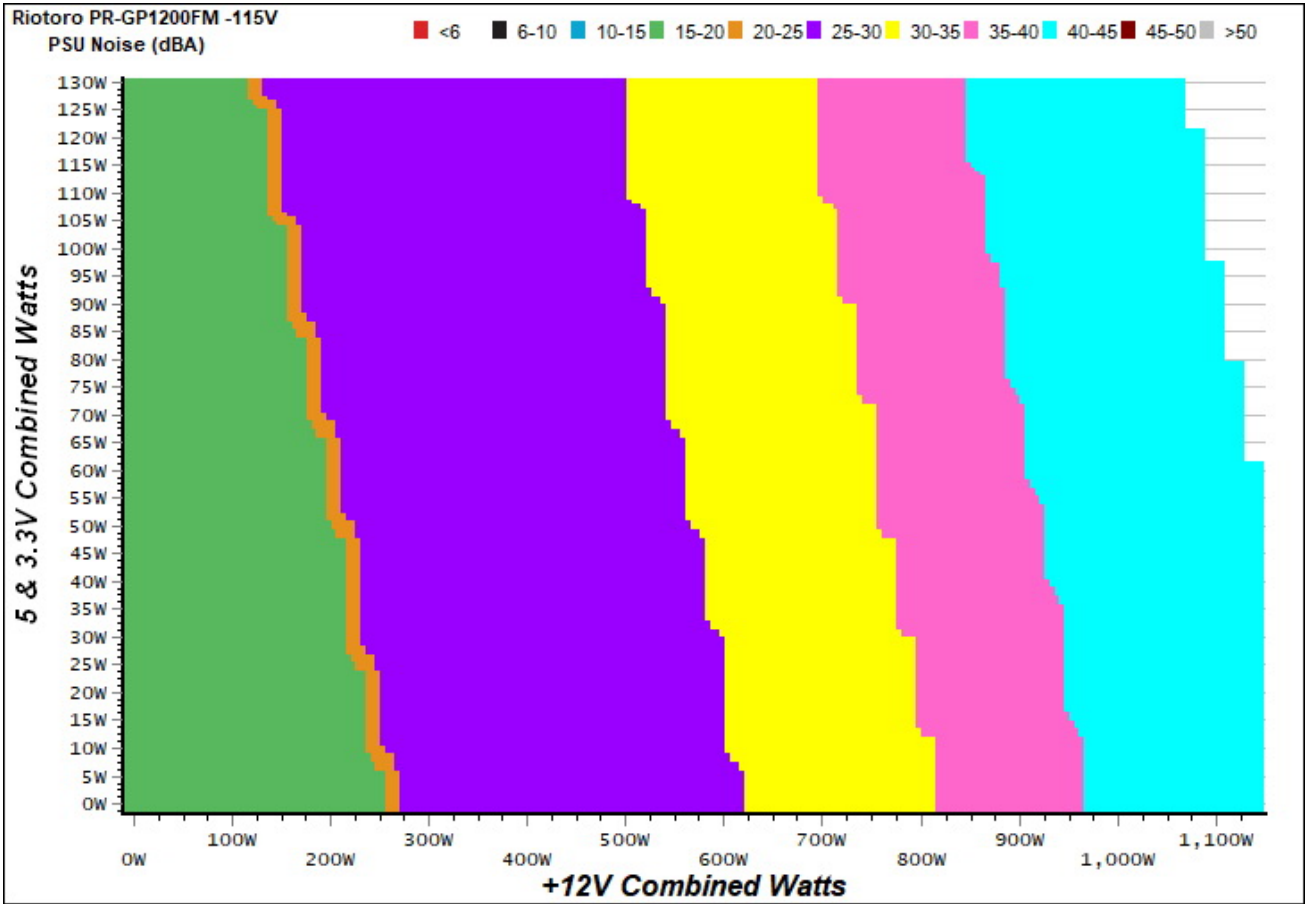


INFO

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

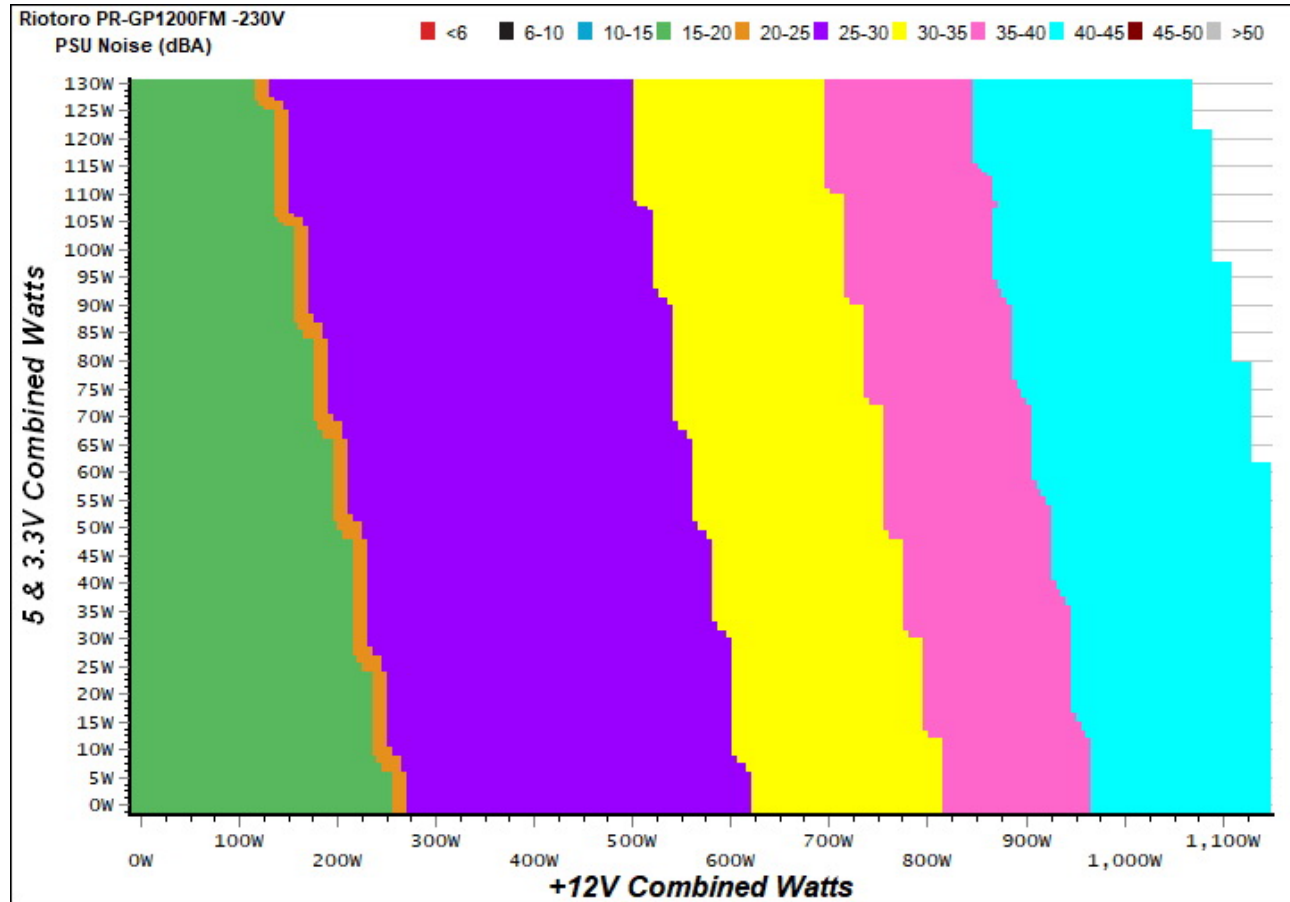
115V



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

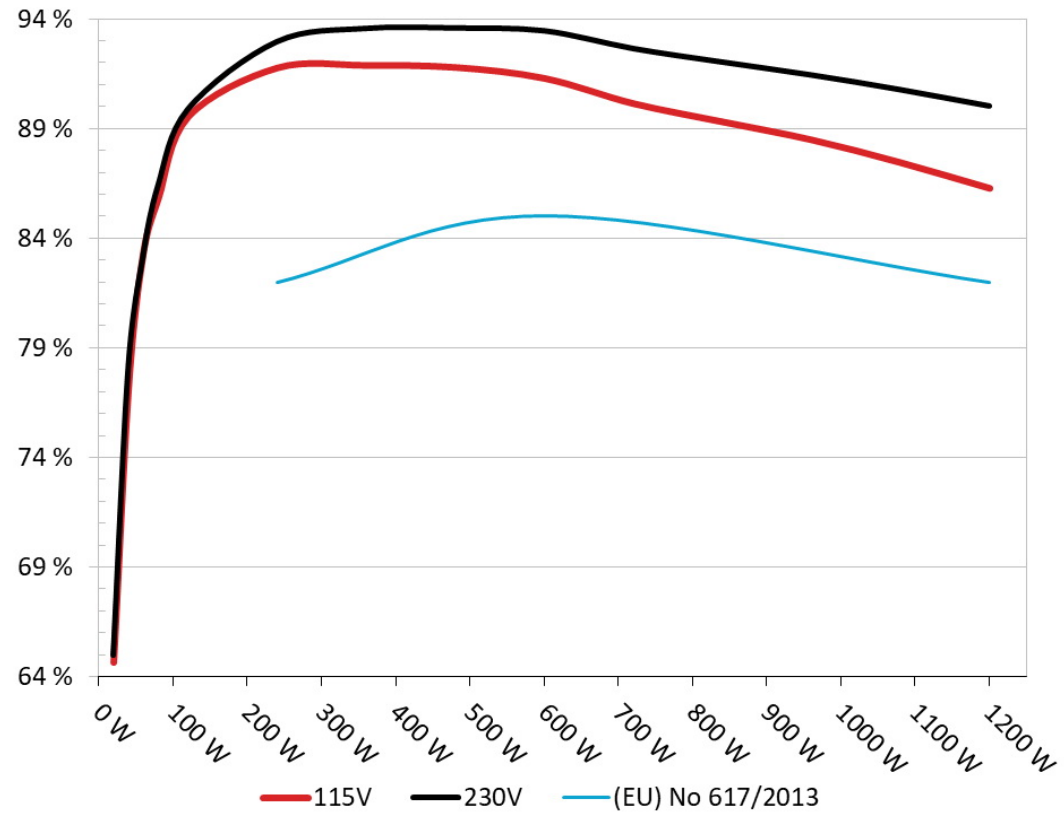
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails.

Indicative Performance

Efficiency under high ambient temperature

Efficiency: Rioroto PR-GP1200FM

Ambient: 37°C - 45°C (98.6°F - 113°F)



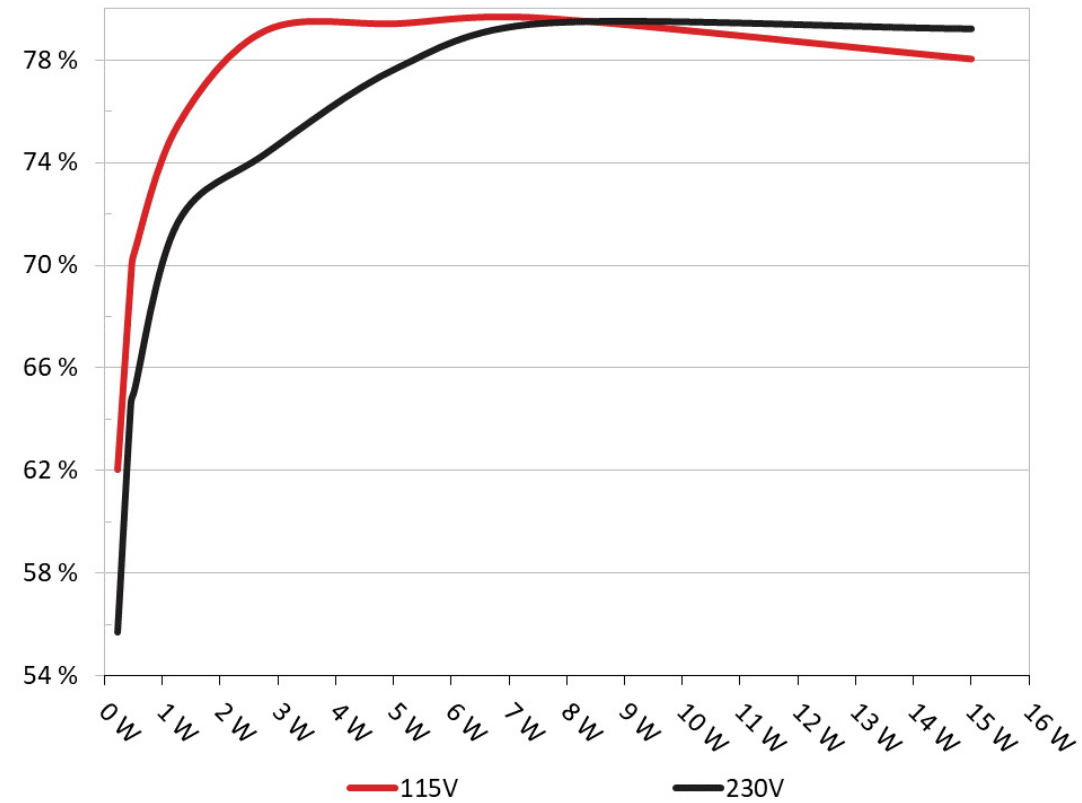
INFO

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: Rioroto PR-GP1200FM

Ambient: 34°C - 36°C (93.2°F - 96.8°F)



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	0.229	62.060%	0.044
	5.098V	0.369		115.11V
2	0.090A	0.459	69.545%	0.076
	5.097V	0.660		115.11V
3	0.550A	2.796	79.140%	0.290
	5.083V	3.533		115.11V
4	1.000A	5.070	79.405%	0.376
	5.069V	6.385		115.12V
5	1.500A	7.582	79.618%	0.423
	5.054V	9.523		115.10V
6	3.000A	15.002	78.030%	0.479
	5.000V	19.226		115.10V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	55.718%	0.015
	5.098V	0.411		230.25V
2	0.090A	0.459	64.648%	0.025
	5.097V	0.710		230.25V
3	0.550A	2.795	74.355%	0.124
	5.081V	3.759		230.25V
4	1.000A	5.068	77.682%	0.194
	5.067V	6.524		230.25V
5	1.500A	7.579	79.419%	0.250
	5.052V	9.543		230.25V
6	3.000A	15.008	79.206%	0.345
	5.002V	18.948		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	8.173A	1.988A	1.979A	1.002A	119.969	89.536%	753	18.3	40.07°C	0.983
	12.038V	5.029V	3.332V	4.992V	133.990				42.62°C	115.10V
2	17.335A	2.984A	2.970A	1.204A	239.718	91.759%	756	18.3	40.63°C	0.995
	12.046V	5.027V	3.332V	4.983V	261.247				43.82°C	115.09V
3	26.855A	3.489A	3.460A	1.410A	359.226	91.878%	1020	26.3	41.48°C	0.996
	12.036V	5.016V	3.322V	4.964V	390.980				45.49°C	115.10V
4	36.448A	3.988A	3.971A	1.615A	479.681	91.783%	1025	26.4	41.88°C	0.998
	12.031V	5.016V	3.323V	4.956V	522.626				46.65°C	115.10V
5	45.641A	4.987A	4.966A	1.820A	599.831	91.285%	1030	26.4	42.48°C	0.998
	12.036V	5.014V	3.322V	4.947V	657.095				49.35°C	115.18V
6	54.927A	6.001A	5.960A	2.031A	719.937	90.133%	1210	30.9	42.71°C	0.998
	12.019V	5.000V	3.322V	4.926V	798.747				49.50°C	115.18V
7	64.085A	7.004A	6.956A	2.238A	839.705	89.303%	1525	38.0	43.51°C	0.999
	12.025V	4.998V	3.321V	4.916V	940.290				51.02°C	115.09V
8	73.251A	8.008A	7.951A	2.446A	960.138	88.477%	1530	38.0	43.73°C	0.999
	12.037V	4.996V	3.320V	4.906V	1085.184				51.50°C	115.09V
9	82.776A	8.509A	8.431A	2.446A	1079.501	87.445%	1700	40.6	44.81°C	0.999
	12.044V	4.996V	3.321V	4.906V	1234.492				54.82°C	115.09V
10	92.276A	9.011A	8.945A	3.075A	1200.011	86.270%	1715	40.8	45.34°C	0.999
	12.032V	4.995V	3.320V	4.879V	1390.997				59.07°C	115.10V
11	97.377A	9.011A	8.957A	3.071A	1259.722	86.507%	1695	40.6	28.37°C	0.999
	12.015V	4.994V	3.316V	4.886V	1456.200				42.37°C	115.09V
CL1	0.142A	16.001A	16.000A	0.000A	135.073	83.302%	760	18.4	40.11°C	0.984
	12.068V	5.020V	3.316V	5.029V	162.149				50.09°C	115.12V

CL2	89.297A	1.001A	0.998A	1.000A	1086.254	87.932%	1690	40.5	29.85°C	0.999
	12.015V	5.003V	3.318V	4.971V	1235.336				41.13°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	8.179A	1.990A	1.979A	1.002A	120.051	89.889%	753	18.3	40.27°C	0.892
	12.037V	5.028V	3.332V	4.991V	133.554				42.75°C	230.30V
2	17.348A	2.985A	2.970A	1.205A	239.786	92.970%	756	18.3	40.67°C	0.957
	12.041V	5.026V	3.331V	4.982V	257.917				43.99°C	230.30V
3	26.870A	3.490A	3.462A	1.411A	359.302	93.578%	1020	26.3	41.22°C	0.977
	12.032V	5.015V	3.321V	4.963V	383.960				44.70°C	230.31V
4	36.448A	3.989A	3.973A	1.615A	479.748	93.596%	1025	26.4	41.49°C	0.986
	12.032V	5.015V	3.322V	4.955V	512.572				46.52°C	230.31V
5	45.645A	4.989A	4.968A	1.820A	599.894	93.471%	1030	26.4	42.30°C	0.991
	12.036V	5.013V	3.321V	4.946V	641.800				48.02°C	230.31V
6	54.918A	6.001A	5.962A	2.031A	720.025	92.659%	1210	30.9	42.47°C	0.995
	12.022V	4.999V	3.321V	4.925V	777.067				48.45°C	230.30V
7	64.108A	7.006A	6.958A	2.239A	839.756	92.043%	1525	38.0	43.34°C	0.997
	12.021V	4.997V	3.320V	4.915V	912.355				49.82°C	230.30V
8	73.337A	8.009A	7.956A	2.447A	960.288	91.453%	1530	38.0	43.62°C	0.997
	12.025V	4.995V	3.319V	4.904V	1050.035				51.31°C	230.30V
9	82.939A	8.513A	8.435A	2.447A	1079.619	90.786%	1685	40.5	44.25°C	0.998
	12.022V	4.995V	3.320V	4.904V	1189.195				52.82°C	230.31V
10	92.354A	9.015A	8.947A	3.076A	1200.084	90.037%	1710	40.7	45.44°C	0.998
	12.023V	4.993V	3.319V	4.878V	1332.885				55.56°C	230.32V
11	97.406A	9.013A	8.990A	3.072A	1259.945	90.193%	1680	40.4	28.50°C	0.998
	12.014V	4.994V	3.303V	4.884V	1396.937				39.12°C	230.32V
CL1	0.156A	16.002A	16.001A	0.000A	135.225	84.053%	760	18.4	42.52°C	0.913
	12.069V	5.019V	3.314V	5.028V	160.880				48.58°C	230.32V

CL2	89.294A	1.000A	0.999A	0.000A	1081.293	91.338%	1675	40.4	45.57°C	0.998
	12.016V	5.015V	3.325V	5.021V	1183.831				55.47°C	230.30V

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	1.192A	0.497A	0.479A	0.199A	19.458	64.642%	750	18.3	0.859
	12.051V	5.029V	3.329V	5.022V	30.101				115.10V
2	2.455A	0.995A	0.989A	0.399A	39.870	77.368%	750	18.3	0.934
	12.047V	5.026V	3.331V	5.013V	51.533				115.11V
3	3.651A	1.490A	1.471A	0.599A	59.384	83.305%	753	18.3	0.960
	12.048V	5.034V	3.327V	5.013V	71.285				115.10V
4	4.914A	1.987A	1.985A	0.800A	79.782	85.820%	753	18.3	0.970
	12.044V	5.031V	3.324V	5.002V	92.964				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])	PF/AC Volts
1	1.197A	0.497A	0.479A	0.199A	19.513	64.976%	750	18.3	0.496
	12.048V	5.028V	3.328V	5.022V	30.031				230.27V
2	2.459A	0.996A	0.990A	0.399A	39.934	78.230%	750	18.3	0.664
	12.051V	5.025V	3.330V	5.012V	51.047				230.28V
3	3.660A	1.489A	1.471A	0.599A	59.471	83.163%	753	18.3	0.761
	12.044V	5.034V	3.326V	5.012V	71.511				230.29V
4	4.920A	1.988A	1.979A	0.800A	79.872	86.415%	753	18.3	0.821
	12.047V	5.031V	3.334V	5.002V	92.428				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	7.9 mV	5.7 mV	10.0 mV	6.1 mV	Pass
20% Load	10.4 mV	5.9 mV	11.1 mV	5.9 mV	Pass
30% Load	11.0 mV	6.5 mV	12.3 mV	6.6 mV	Pass
40% Load	11.2 mV	7.1 mV	13.7 mV	7.1 mV	Pass
50% Load	12.1 mV	8.1 mV	15.0 mV	7.8 mV	Pass
60% Load	11.6 mV	9.3 mV	17.2 mV	8.5 mV	Pass
70% Load	12.7 mV	9.5 mV	19.1 mV	8.2 mV	Pass
80% Load	13.6 mV	11.0 mV	22.9 mV	10.0 mV	Pass
90% Load	13.4 mV	11.2 mV	24.8 mV	10.8 mV	Pass
100% Load	23.8 mV	11.0 mV	27.1 mV	11.8 mV	Pass
105% Load	16.6 mV	12.7 mV	24.5 mV	12.1 mV	Pass
Crossload 1	11.2 mV	7.4 mV	21.3 mV	7.6 mV	Pass
Crossload 2	23.2 mV	12.4 mV	23.0 mV	12.2 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.7 mV	5.6 mV	10.0 mV	6.4 mV	Pass
20% Load	10.3 mV	5.5 mV	11.1 mV	6.8 mV	Pass
30% Load	10.3 mV	6.4 mV	12.3 mV	7.6 mV	Pass
40% Load	11.3 mV	7.3 mV	13.7 mV	8.0 mV	Pass
50% Load	12.0 mV	7.6 mV	14.7 mV	8.4 mV	Pass
60% Load	11.2 mV	9.1 mV	17.5 mV	10.1 mV	Pass
70% Load	11.4 mV	8.2 mV	16.7 mV	8.4 mV	Pass
80% Load	12.9 mV	10.0 mV	22.6 mV	10.1 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	13.2 mV	10.9 mV	24.1 mV	12.0 mV	Pass
100% Load	22.3 mV	11.6 mV	24.5 mV	13.6 mV	Pass
105% Load	24.6 mV	13.6 mV	25.4 mV	15.1 mV	Pass
Crossload 1	11.5 mV	7.6 mV	21.6 mV	8.7 mV	Pass
Crossload 2	21.4 mV	11.8 mV	25.3 mV	12.8 mV	Pass

The results above are not used in the certification process

Riotoro Builder Edition 1200W



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 LTD Syrou 6, Latsia, 2231, Nicosia Cyprus

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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