be quiet!

be quiet! Pure Power 10 500W

Serial Number 277S7031000428

Lab ID 115

Certification ID 25115

Test Result Report ID: 20PS115A

Certificate Issue Date: May 27, 2018

Scheme: ETA-EMI PSU

115V



230V



Scheme: LAMBDA PSU

115V



230V





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	be quiet!
Model	Pure Power 10 500W
OEM/ODM	FSP
Serial Number	277S7031000428
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	8-5
Rated Frequency (Hz)	50-60

Rated Power (W)	500
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Semi Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	120mm Rifle Bearing Fan (BQ QF1-12025-MS)
Semi-Passive Operation	✗
Cybenetics Testing Information	
Lab ID	115
Date of receipt	May 12, 2018
Testing Date	May 25, 2018
Report Issued Date	May 27, 2018
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

Cables and Connectors(Non-accredited measurements)

Native Cables			
Description	Cable Count	Connector Count (Total)	Gauge
ATX connector 20+4 pin (560mm)	1	1	18-24AWG
4+4 pin EPS12V (610mm)	1	1	18AWG
Modular Cables			
6+2 pin PCIe (500mm)	2	2	18AWG
SATA (500mm+150mm+150mm)	1	3	18AWG
SATA (500mm) / 4 pin Molex (+150mm+150mm)	1	1 / 2	18AWG
SATA (500mm+150mm) / 4 pin Molex (+150mm) / FDD (+150mm)	1	2 / 1 / 1	18-22AWG

Power Specifications

Rail		3.3V	5V	12V1	12V2	5VSB	-12V
Max. Power	Amps	25	15	28	20	3	0.3
	Watts	120		480		15	3.6
Total Max. Power (W)		500					

Parts Description

General Data	
Manufacturer (OEM)	CWT
Platform Model	-
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor & Diode
Bridge Rectifier(s)	2x GBU1006 (600V, 10A @ 100°C)
APFC MOSFETS	2x Infineon IPW50R280CE (550V, 11.4A @ 100°C, 0.28Ohm)
APFC Boost Diode	1x Power Integrations QH08TZ600 (600V, 8A @ 150°C)
Hold-up Cap(s)	1x Nichicon (400V, 390uF, 2000h @ 105 °C, GG)
Main Switchers	2x Vishay SiHG20N50C (560V, 11A @ 100°C, 0.27Ohm)
Combo APFC/PWM Controller	Champion CM6800TX & CM03X Green PFC controller
Topology	Primary side: Half-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	4x APEC AP9990GH-HF (60V, 100A @ 25°C, 6mOhm)
5V & 3.3V	DC-DC Converters: 6x APEC AP72T03GP (30V, 47A @ 100°C, 9.5mOhm) PWM Controller: APW7159C
Filtering Capacitors	Electrolytics: Nippon Chemi-Con (1-5,000 @ 105°C, KZE), Su' scon (2-5,000h @ 105°C, MF), TAICON (105°C) Polymers: APAQ, EneSol
Supervisor IC	Weltrend WT7502 (OVP, UVP, SCP, PG)
Fan Model	Power Logic PLA13525S12M (12V, 0.40A, 111.1CFM, 41.6 dBA, Hydro Dynamic Bearing)
5VSB Circuit	
Rectifier	1x MBR2045CT SBR (45V, 20A) & CEF04N7G (700V, 4A, 3.3Ohm)

Standby PWM Controller	On-Bright OB5269CP
-12V Circuit	
Rectifier	UTC 2SB834L

Test Results

Temperature & Compliance Info

Temperature Range (°C /°F)	28-32 / 82.4-89.6
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	87.174%
Average Noise Output (>1450 Load Combinations)	20.46dBA
Average PF (>1450 Load Combinations)	0.993
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.1006W
Non-Accredited	
12V Ripple (Full Load)	33.15mV
5V Ripple (Full Load)	24.21mV
3.3V Ripple (Full Load)	36.43mV
5VSB Ripple (Full Load)	25.93mV
12V Load Regulation	0.78%
5V Load Regulation	1.88%
3.3V Load Regulation	2.79%
5VSB Load Regulation	2.56%
Inrush Current	77.898A

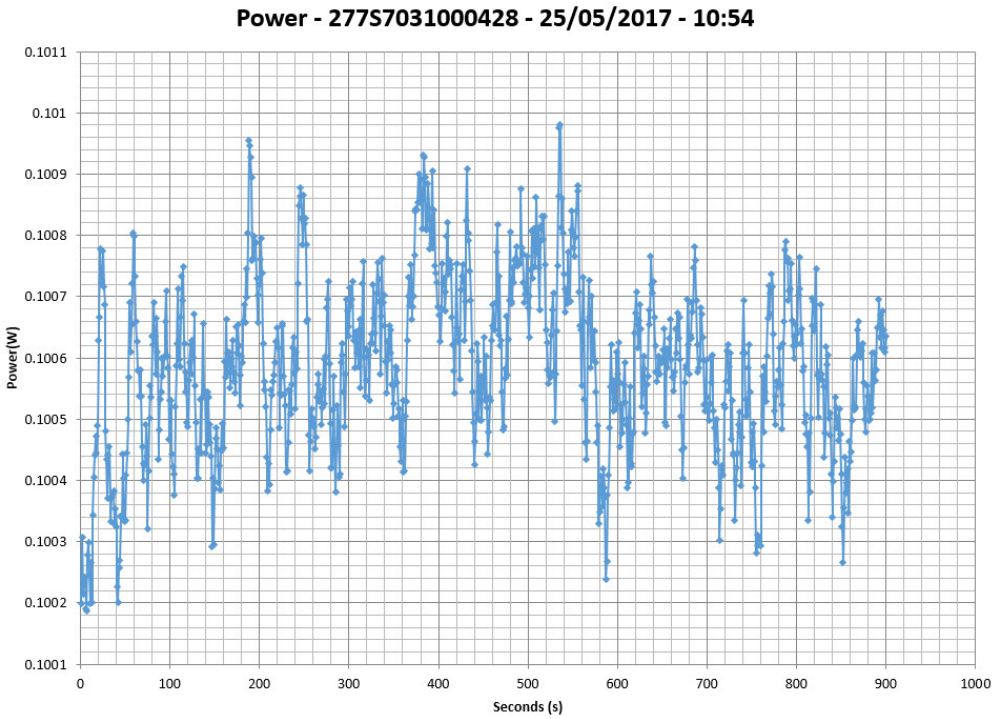
230V		
Accredited		
Average Efficiency (>1450 load combinations)	88.498%	
Average Noise Output (>1450 Load Combinations)	19.66dBA	
Average PF (>1450 Load Combinations)	0.970	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1611W	
Non-Accredited		
12V Ripple (Full Load)	25.75mV	
5V Ripple (Full Load)	26.07mV	
3.3V Ripple (Full Load)	37.52mV	
5VSB Ripple (Full Load)	20.59mV	
12V Load Regulation	0.56%	
5V Load Regulation	1.57%	
3.3V Load Regulation	2.32%	
5VSB Load Regulation	2.39%	
Inrush Current	62.069A	
Hold-Up Time & PWR_OK Signal	22.80ms	
AC Loss to PWR_OK Hold Up Time	24.60ms	
PWR_OK Inactive to DC Loss Delay	-1.80ms	
OPP (0.00°C / 0.00°C)	-	-

Hold-Up Time & PWR_OK Signal

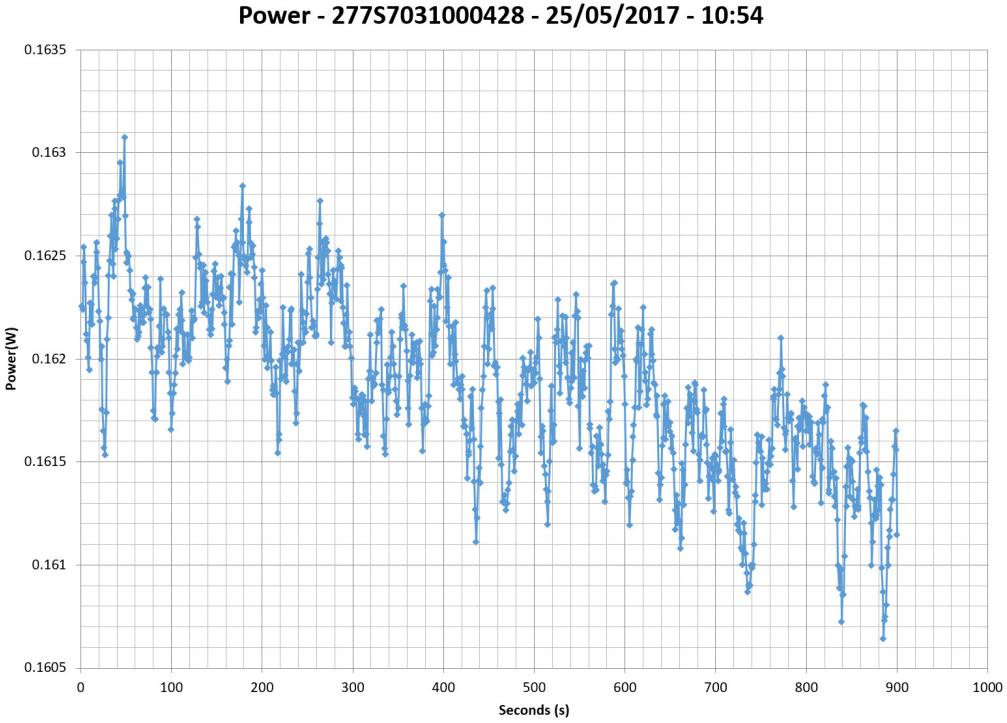
Hold-Up Time (ms)	22.8
AC Loss to PWR_OK Hold Up Time (ms)	24.6
PWR_OK Inactive to DC Loss Delay (ms)	-1.8

Graphs

115V

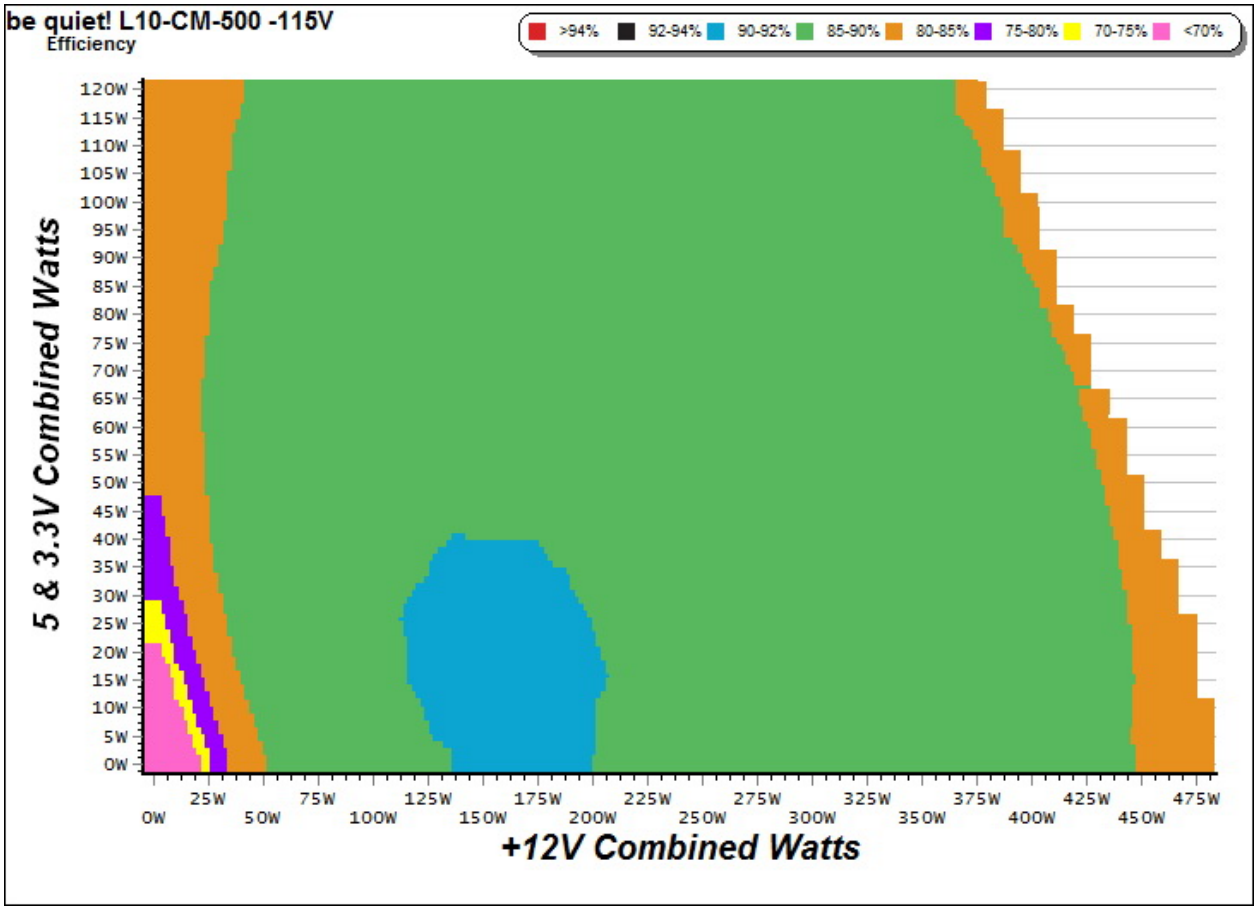


230V



Efficiency Graph

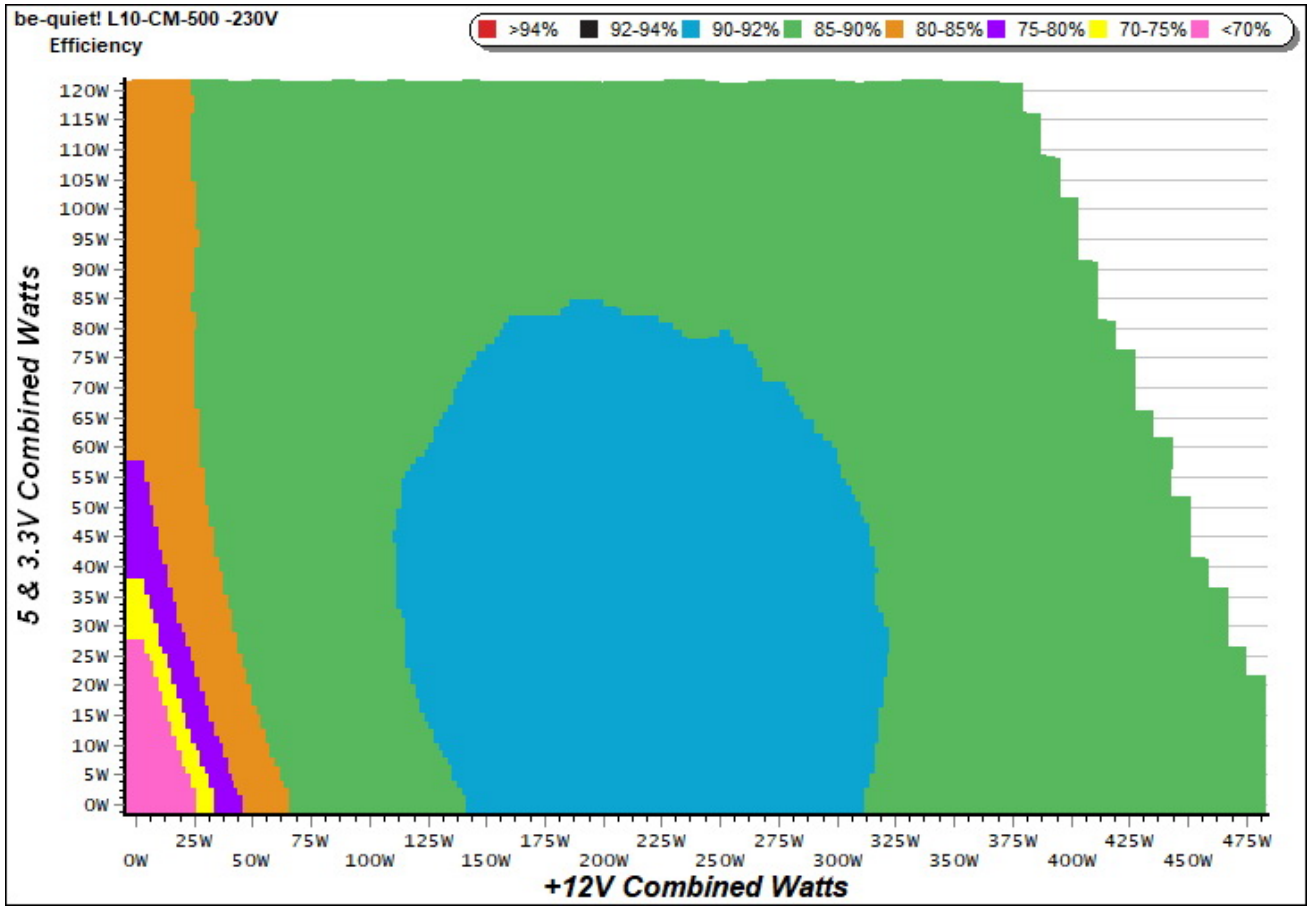
115V



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

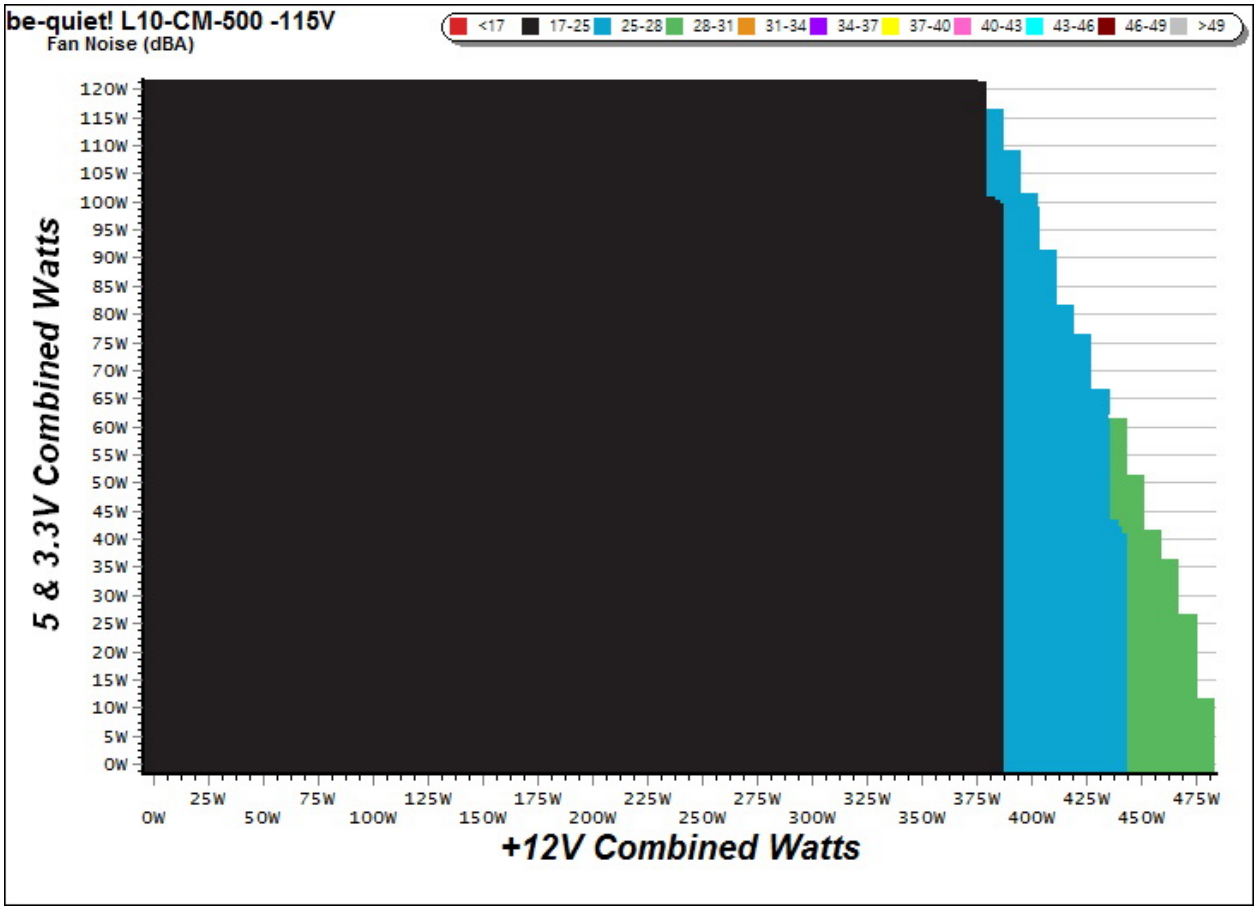


INFO

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

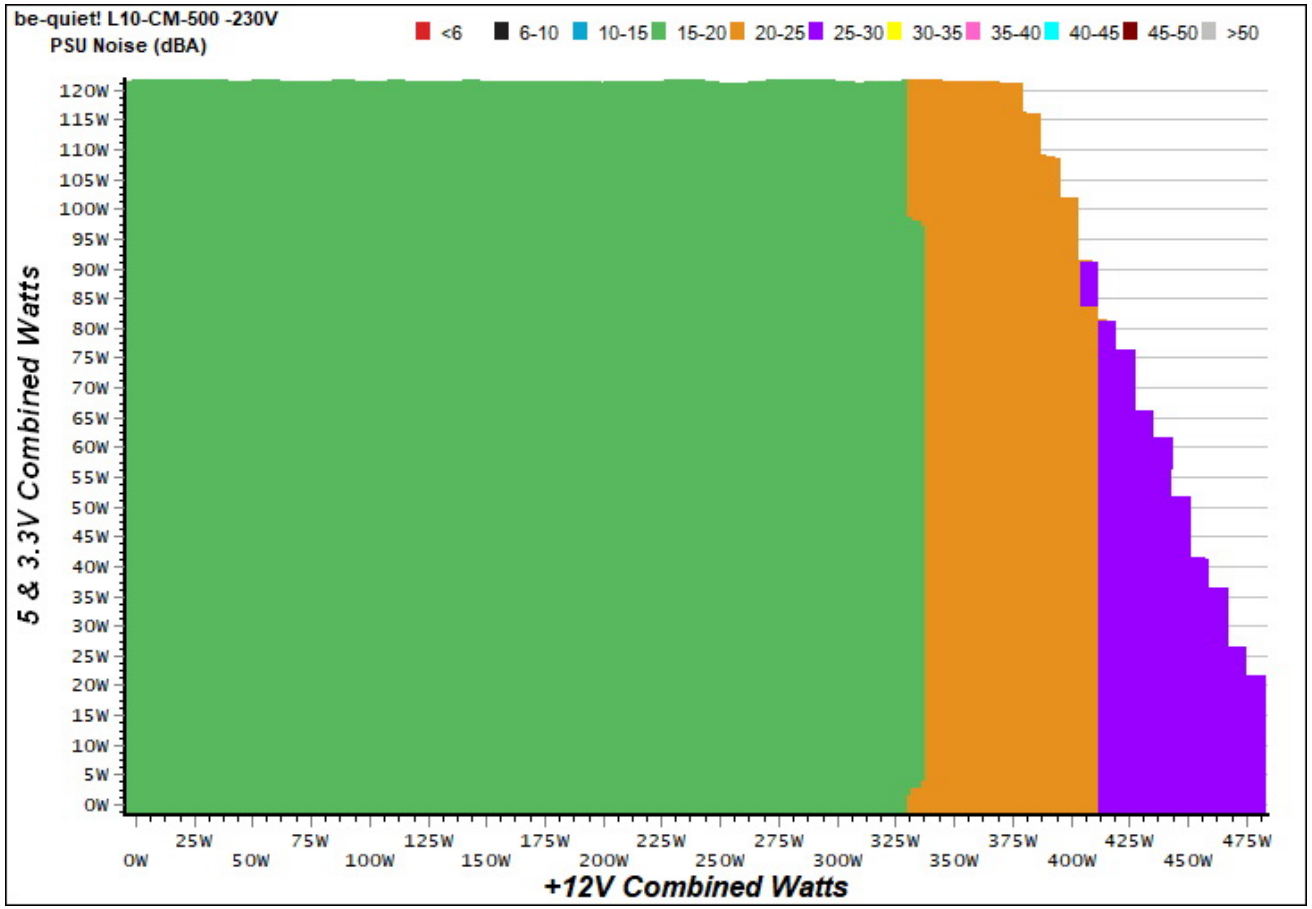
115V



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

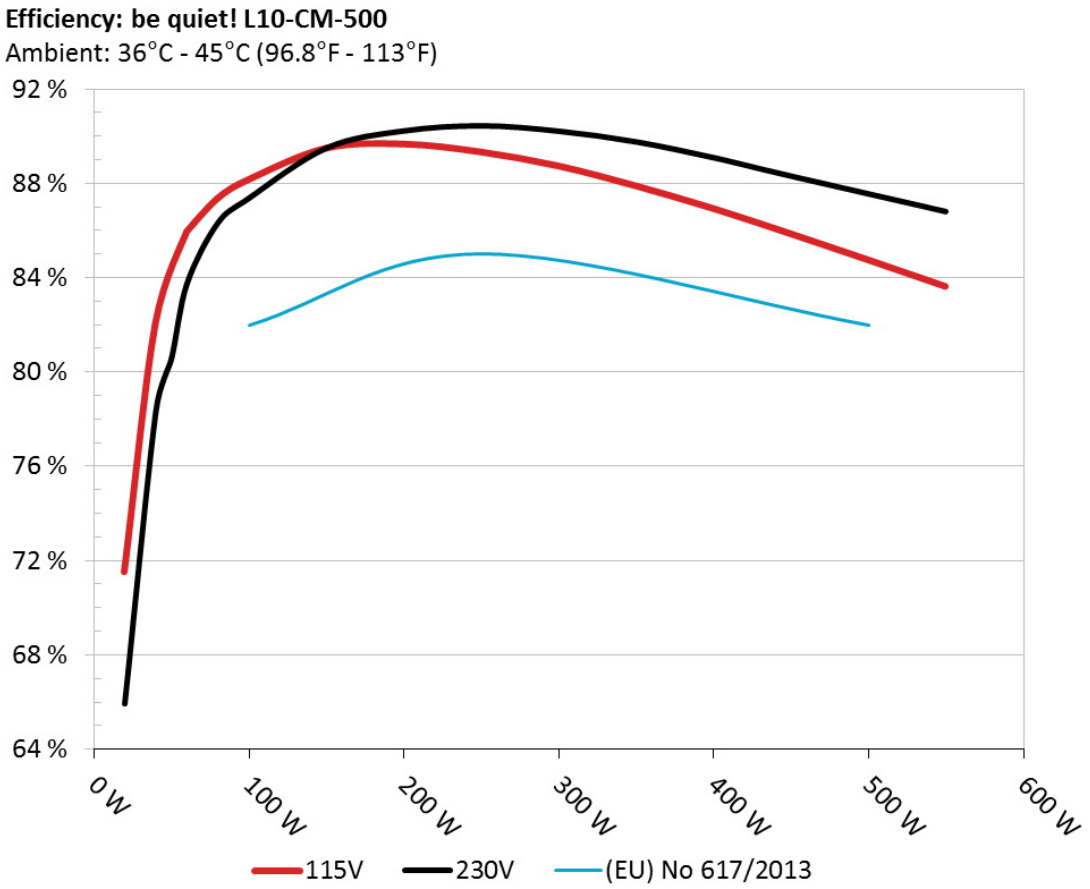


INFO

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

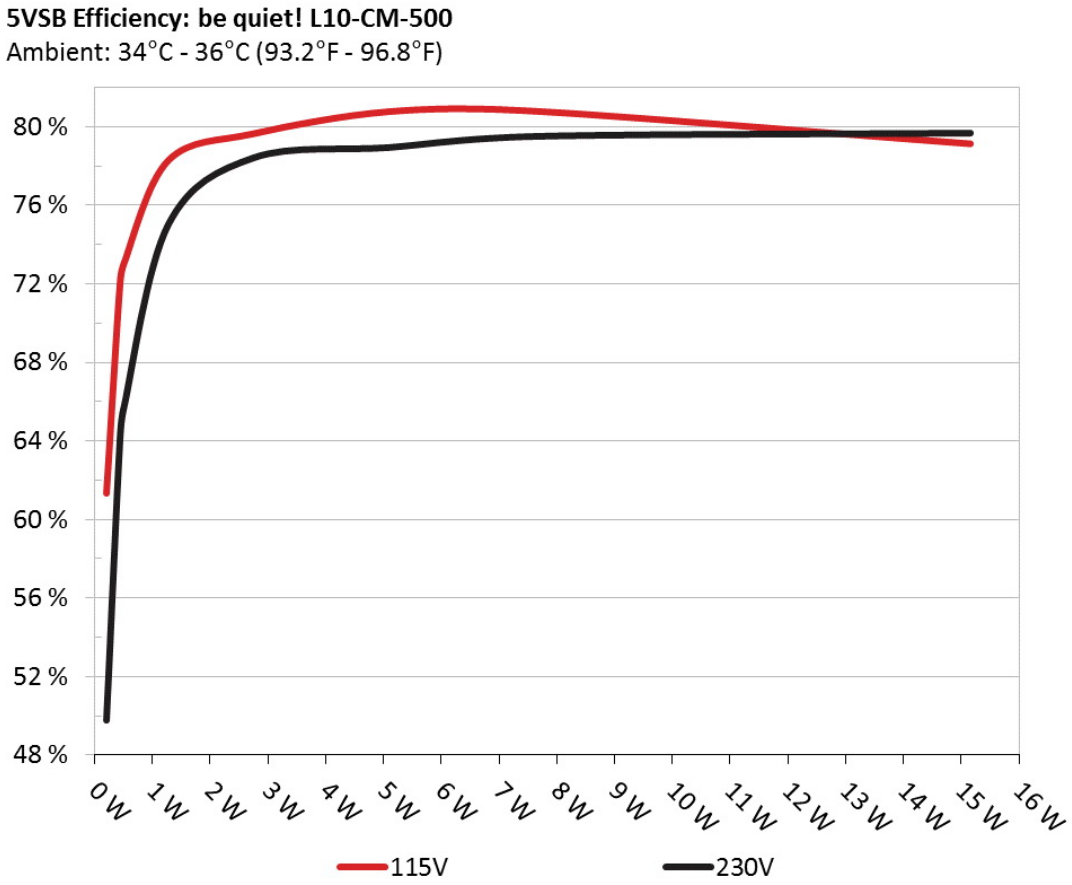
Efficiency under high ambient temperature



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	0.041A	0.211	61.337%	0.065
	5.115V	0.344		115.14V
2	0.087A	0.444	71.961%	0.112
	5.115V	0.617		115.14V
3	0.542A	2.765	79.660%	0.329
	5.104V	3.471		115.13V
4	1.002A	5.103	80.782%	0.382
	5.095V	6.317		115.13V
5	1.502A	7.634	80.800%	0.410
	5.084V	9.448		115.13V
6	3.001A	15.161	79.141%	0.455
	5.052V	19.157		115.13V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.213	49.766%	0.025
	5.116V	0.428		230.31V
2	0.087A	0.445	64.029%	0.040
	5.115V	0.695		230.31V
3	0.542A	2.767	78.452%	0.171
	5.105V	3.527		230.32V
4	1.002A	5.104	78.973%	0.250
	5.095V	6.463		230.32V
5	1.502A	7.634	79.537%	0.297
	5.084V	9.598		230.31V
6	3.001A	15.162	79.704%	0.359
	5.052V	19.023		230.31V

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	2.324A	1.978A	1.958A	0.981A	49.781	83.194%	568	17.4	38.03°C	0.966
	12.138V	5.051V	3.365V	5.089V	59.837				40.83°C	115.13V
2	5.683A	2.970A	2.943A	1.181A	99.764	88.156%	568	17.4	38.46°C	0.984
	12.126V	5.041V	3.358V	5.079V	113.168				41.58°C	115.12V
3	9.393A	3.476A	3.458A	1.379A	149.876	89.487%	568	17.4	38.50°C	0.990
	12.117V	5.033V	3.349V	5.066V	167.484				41.81°C	115.12V
4	13.098A	3.979A	3.945A	1.579A	199.758	89.663%	568	17.4	39.01°C	0.994
	12.109V	5.024V	3.341V	5.056V	222.788				42.67°C	115.12V
5	16.471A	4.980A	4.948A	1.783A	249.714	89.325%	568	17.4	39.96°C	0.997
	12.099V	5.013V	3.330V	5.042V	279.557				43.86°C	115.12V
6	19.852A	5.996A	5.957A	1.985A	299.734	88.735%	568	17.4	41.14°C	0.998
	12.089V	5.003V	3.317V	5.030V	337.787				45.53°C	115.12V
7	23.236A	7.010A	6.978A	2.190A	349.689	87.890%	765	17.7	41.64°C	0.998
	12.078V	4.991V	3.306V	5.018V	397.870				46.20°C	115.13V
8	26.630A	8.033A	8.004A	2.394A	399.674	86.930%	1040	20.2	42.65°C	0.998
	12.067V	4.978V	3.293V	5.006V	459.764				47.45°C	115.13V
9	30.452A	8.549A	8.539A	2.399A	449.672	85.864%	1235	24.3	43.02°C	0.999
	12.057V	4.969V	3.284V	4.998V	523.704				48.96°C	115.13V
10	34.028A	9.072A	9.059A	3.009A	499.521	84.760%	1280	24.7	44.13°C	0.999
	12.046V	4.959V	3.273V	4.979V	589.334				51.11°C	115.13V
11	38.198A	9.083A	9.075A	3.015A	549.423	83.635%	1300	25.0	44.70°C	0.999
	12.037V	4.953V	3.267V	4.974V	656.929				51.92°C	115.13V
CL1	0.102A	14.025A	14.004A	0.005A	117.794	81.997%	855	18.2	42.54°C	0.988
	12.111V	4.998V	3.316V	5.074V	143.657				45.64°C	115.13V

CL2	39.958A	1.003A	1.004A	1.001A	495.376	84.749%	1085	21.4	42.85°C	0.999
	12.063V	4.987V	3.300V	5.042V	584.522				47.20°C	115.13V

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	2.326A	1.984A	1.965A	0.981A	49.816	80.490%	568	17.4	40.29°C	0.858
	12.140V	5.039V	3.352V	5.092V	61.891				43.76°C	230.24V
2	5.682A	2.970A	2.954A	1.181A	99.761	87.447%	568	17.4	40.80°C	0.932
	12.131V	5.034V	3.345V	5.081V	114.082				44.60°C	230.24V
3	9.389A	3.488A	3.474A	1.376A	149.909	89.555%	568	17.4	41.23°C	0.958
	12.124V	5.017V	3.336V	5.079V	167.393				45.31°C	230.25V
4	13.090A	3.984A	3.956A	1.581A	199.794	90.284%	568	17.4	41.75°C	0.972
	12.118V	5.018V	3.331V	5.060V	221.295				46.28°C	230.24V
5	16.461A	4.983A	4.959A	1.781A	249.799	90.488%	568	17.4	42.22°C	0.979
	12.111V	5.010V	3.322V	5.054V	276.057				47.27°C	230.24V
6	19.828A	6.002A	5.972A	1.985A	299.797	90.230%	615	17.4	42.85°C	0.984
	12.105V	4.999V	3.312V	5.036V	332.257				48.75°C	230.24V
7	23.205A	7.015A	6.988A	2.186A	349.738	89.749%	855	18.2	43.39°C	0.987
	12.097V	4.987V	3.300V	5.024V	389.685				49.89°C	230.24V
8	26.584A	8.035A	8.010A	2.394A	399.708	89.229%	1040	20.2	43.90°C	0.990
	12.088V	4.978V	3.292V	5.010V	447.957				50.81°C	230.25V
9	30.392A	8.547A	8.541A	2.396A	449.716	88.601%	1165	22.3	44.02°C	0.990
	12.081V	4.972V	3.285V	5.007V	507.575				51.41°C	230.25V
10	33.952A	9.065A	9.048A	3.005A	499.583	87.879%	1380	26.6	45.04°C	0.991
	12.074V	4.965V	3.277V	4.988V	568.490				52.82°C	230.25V
11	38.111A	9.065A	9.052A	3.008A	549.574	87.096%	1440	27.9	46.01°C	0.993
	12.069V	4.963V	3.274V	4.982V	630.995				54.53°C	230.26V
CL1	0.102A	14.027A	14.004A	0.005A	117.861	83.080%	568	17.4	43.08°C	0.950
	12.115V	5.002V	3.316V	5.084V	141.864				50.47°C	230.26V

CL2	39.967A	1.003A	1.003A	1.002A	496.693	87.277%	1380	26.6	45.57°C	0.992
	12.093V	4.990V	3.302V	5.045V	569.099				53.71°C	230.27V

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)	Fan Noise (dB[A])	PF/AC Volts
1	1.200A	0.491A	0.472A	0.196A	19.651	71.544%	590	17.4	0.914
	12.146V	5.058V	3.370V	5.110V	27.467				115.12V
2	2.427A	0.980A	0.980A	0.391A	39.713	82.052%	590	17.4	0.951
	12.141V	5.054V	3.367V	5.102V	48.400				115.12V
3	3.660A	1.477A	1.484A	0.587A	59.858	85.953%	568	17.4	0.971
	12.136V	5.050V	3.363V	5.095V	69.640				115.12V
4	4.880A	1.983A	1.958A	0.785A	79.792	87.358%	568	17.4	0.977
	12.131V	5.048V	3.364V	5.089V	91.339				115.12V

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	1.202A	0.491A	0.475A	0.196A	19.671	65.981%	590	17.4	0.703
	12.146V	5.044V	3.356V	5.112V	29.813				230.26V
2	2.430A	0.989A	0.982A	0.391A	39.781	78.428%	568	17.4	0.825
	12.143V	5.041V	3.353V	5.104V	50.723				230.26V
3	3.661A	1.475A	1.491A	0.586A	59.856	83.817%	568	17.4	0.878
	12.139V	5.039V	3.350V	5.099V	71.413				230.25V
4	4.880A	1.984A	1.968A	0.786A	79.813	86.431%	568	17.4	0.910
	12.137V	5.036V	3.349V	5.092V	92.343				250.00V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.2 mV	11.5 mV	11.4 mV	11.9 mV	Pass
20% Load	13.5 mV	16.2 mV	17.6 mV	15.7 mV	Pass
30% Load	14.0 mV	15.4 mV	18.0 mV	14.4 mV	Pass
40% Load	15.2 mV	16.7 mV	21.8 mV	15.4 mV	Pass
50% Load	16.3 mV	18.7 mV	23.4 mV	16.8 mV	Pass
60% Load	18.6 mV	19.1 mV	24.7 mV	18.0 mV	Pass
70% Load	21.2 mV	18.5 mV	27.0 mV	19.2 mV	Pass
80% Load	24.2 mV	20.0 mV	30.2 mV	22.1 mV	Pass
90% Load	28.2 mV	22.5 mV	32.4 mV	22.4 mV	Pass
100% Load	33.2 mV	24.2 mV	36.4 mV	25.9 mV	Pass
110% Load	39.9 mV	24.7 mV	38.4 mV	26.5 mV	Pass
Crossload 1	19.0 mV	18.3 mV	21.3 mV	16.7 mV	Pass
Crossload 2	30.0 mV	23.2 mV	37.2 mV	23.7 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.4 mV	13.3 mV	13.1 mV	13.1 mV	Pass
20% Load	10.0 mV	12.7 mV	17.4 mV	14.6 mV	Pass
30% Load	10.1 mV	15.6 mV	17.6 mV	14.6 mV	Pass
40% Load	9.7 mV	15.4 mV	18.9 mV	15.1 mV	Pass
50% Load	10.8 mV	15.8 mV	21.1 mV	15.9 mV	Pass
60% Load	11.3 mV	16.5 mV	48.0 mV	26.8 mV	Pass
70% Load	13.5 mV	19.1 mV	27.3 mV	18.4 mV	Pass
80% Load	14.2 mV	20.3 mV	28.0 mV	20.5 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	22.1 mV	23.0 mV	32.5 mV	20.7 mV	Pass
100% Load	25.8 mV	26.1 mV	37.5 mV	20.6 mV	Pass
110% Load	27.9 mV	26.0 mV	40.1 mV	20.5 mV	Pass
Crossload 1	10.6 mV	18.4 mV	19.7 mV	23.2 mV	Pass
Crossload 2	23.7 mV	24.5 mV	36.2 mV	20.8 mV	Pass

The results above are not used in the certification process

be quiet! Pure Power 10 500W



Top side



Power specifications label

Cybenetics □□□□□□□□□□□□□□□□□□ ETA□□□□□ LAMBDA□□□□□ SAFE□□□□□□□□□□□□□□□□□ DELTA□□□□□□□ PHI□□□□□□□□□

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