be quiet! Pure Power 10 600W

Serial Number 278S7031000446

Lab ID 112

Certification ID 25112

Test Result Report ID: 20PS112A

Certificate Issue Date: May 20, 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 600W
OEM/ODM	FSP
Serial Number	278S7031000446
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	8-5
Rated Frequency (Hz)	50-60

Rated Power (W)	600
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	112
Date of receipt	May 10, 2018
Testing Date	May 16, 2018
Report Issued Date	May 20, 2018
DUT Notes	BN274
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 (620mm)	1	1	18AWG
Modular Cables			
6+2 pin PCIe (500mm+150mm)	2	4	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	18	32	28	3	0.3
	Watts	140		576		15	3.6
Total Max. Power (W)		600					

Parts Description

General Data	
Manufacturer (OEM)	FSP
Platform Model	Raider
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x DM chocke
Inrush Protection	NTC Thermistor & Diode
Bridge Rectifier(s)	1x
APFC MOSFETS	2x JCS18N50FH (500V, 11A @ 100°C, 0.27Ohm)
APFC Boost Diode	1x STMicroelectronics STTH8R06FP (600V, 8A @ 130°C)
Hold-up Cap(s)	1x Teapo (420V, 330uF, 2000h @ 85 °C, LH)
Main Switch	1x Infineon IPA80R460CE (800V, 6.8A @ 100°C, 0.46Ohm)
Reset Switch	1x CET CEF03N8 (800V, 2A @ 100°C, 4.8 ohm)
Combo APFC/Switching Controller	FSP 6600 IC
Topology	Primary side: Active Clamp Reset Forward Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	2x
5V & 3.3V	DC-DC Converters: 4x Infineon IPD060N03L G (30V, 50A @ 100°C, 6mOhm) PWM Controller: 2x FSP6601
Filtering Capacitors	Electrolytics: Teapo (1-3,000 @ 105°C, SC) Polymers: Teapo, 5x CapXon (modular board)
Supervisor IC	Weltrend WT7527 (OVP, UVP, OCP, SCP, PG)
Fan Model	BQ QF1-12025-MS (120mm, 12V, 0.30A, 52 CFM, 1800 RPM, Sleeve Bearing)
5VSB Circuit	

Switching FET	CET CEF02N7G (700V, 1.3A @ 100°C, 6.75Ohm)
Rectifier	1x PS30U60CTR

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)	86.954%
Average Noise Output (>1450 Load Combinations)	19.64dBA
Average PF (>1450 Load Combinations)	0.988
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.0978W
Non-Accredited	
12V Ripple (Full Load)	35.10mV
5V Ripple (Full Load)	29.69mV
3.3V Ripple (Full Load)	35.36mV
5VSB Ripple (Full Load)	26.02mV
12V Load Regulation	0.81%
5V Load Regulation	1.96%
3.3V Load Regulation	2.79%
5VSB Load Regulation	2.75%
Inrush Current	77.720A

230V		
Accredited		
Average Efficiency (>1450 load combinations)	88.375%	
Average Noise Output (>1450 Load Combinations)	20.76dBA	
Average PF (>1450 Load Combinations)	0.964	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1618W	
Non-Accredited		
12V Ripple (Full Load)	23.31mV	
5V Ripple (Full Load)	32.25mV	
3.3V Ripple (Full Load)	34.47mV	
5VSB Ripple (Full Load)	18.30mV	
12V Load Regulation	0.70%	
5V Load Regulation	1.53%	
3.3V Load Regulation	2.42%	
5VSB Load Regulation	2.54%	
Inrush Current	58.334A	
Hold-Up Time & PWR_OK Signal	22.30ms	
AC Loss to PWR_OK Hold Up Time	24.00ms	
PWR_OK Inactive to DC Loss Delay	-1.70ms	
OPP (0.00°C / 0.00°C)	-	-

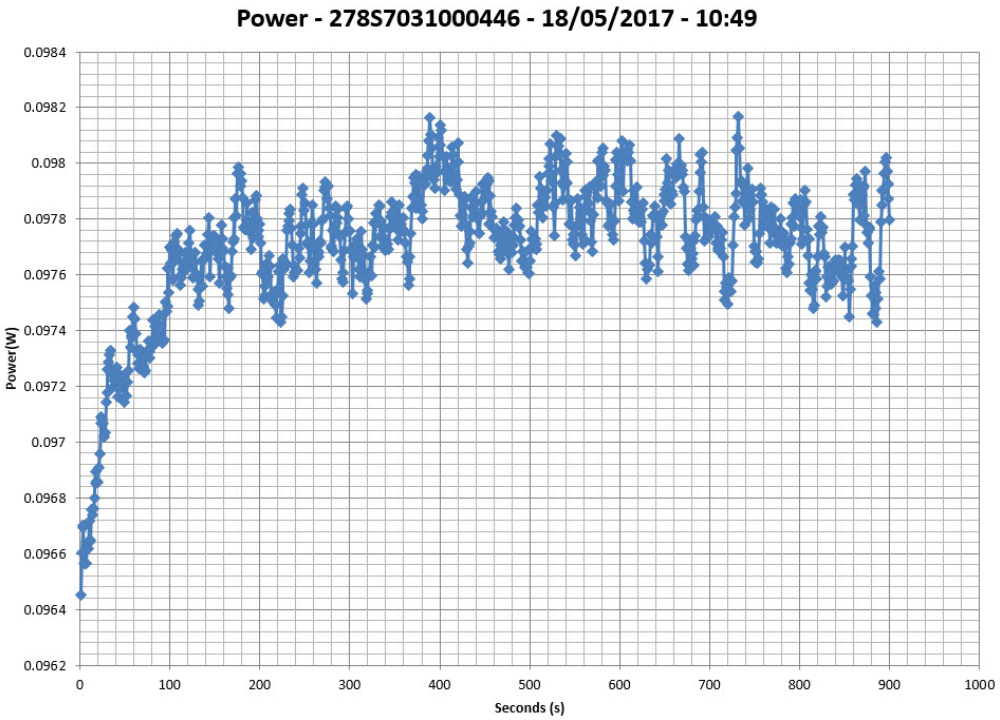
Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	22.3
AC Loss to PWR_OK Hold Up Time (ms)	24
PWR_OK Inactive to DC Loss Delay (ms)	-1.7

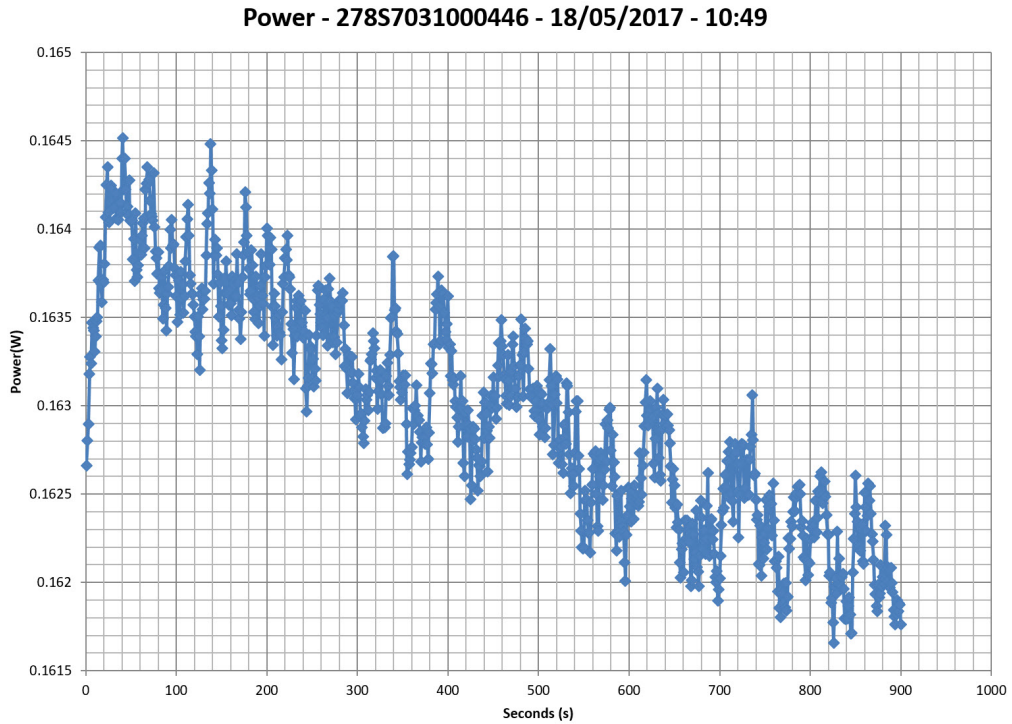
Vampire Power

Graphs

115V

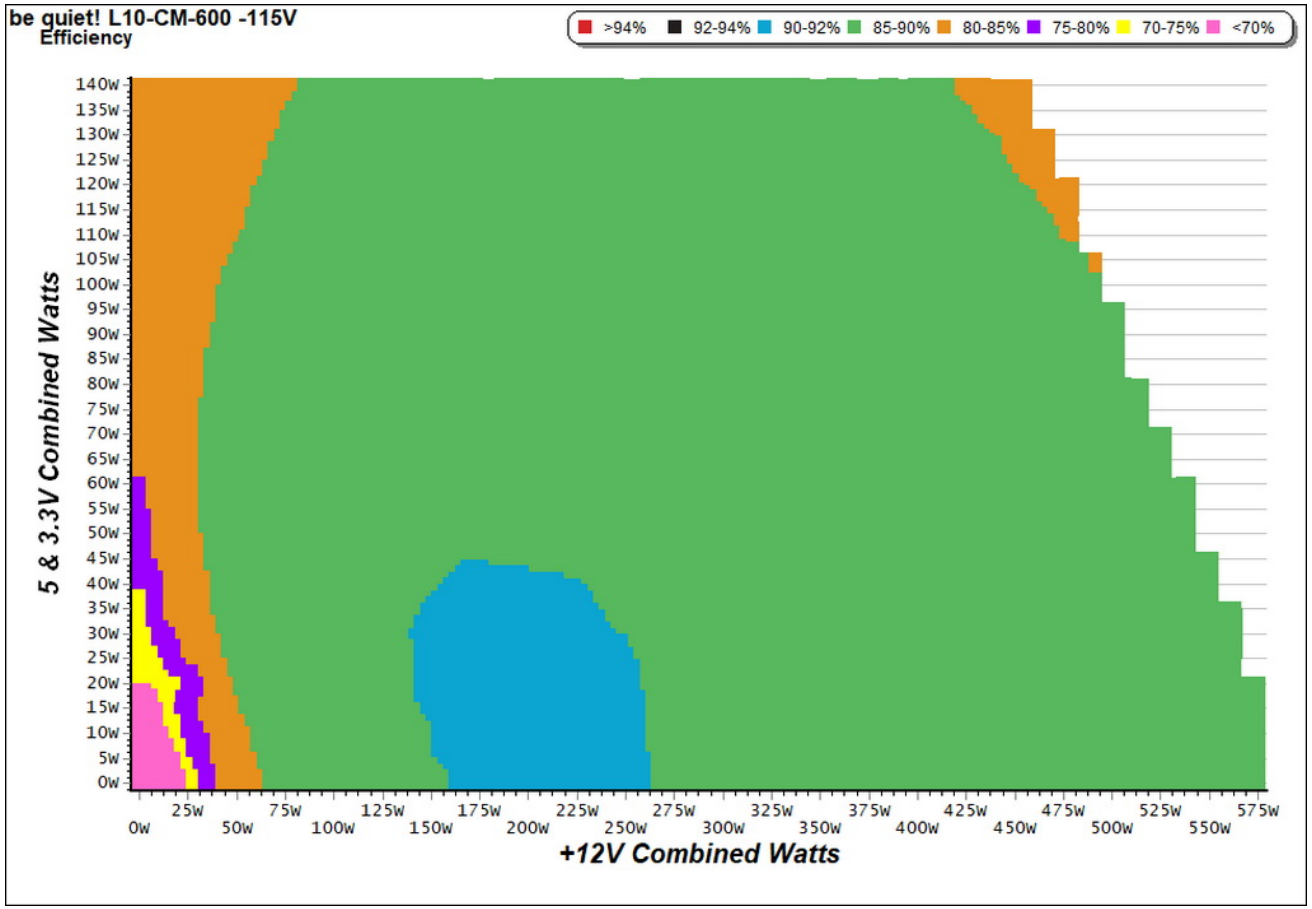


230V



Efficiency Graph

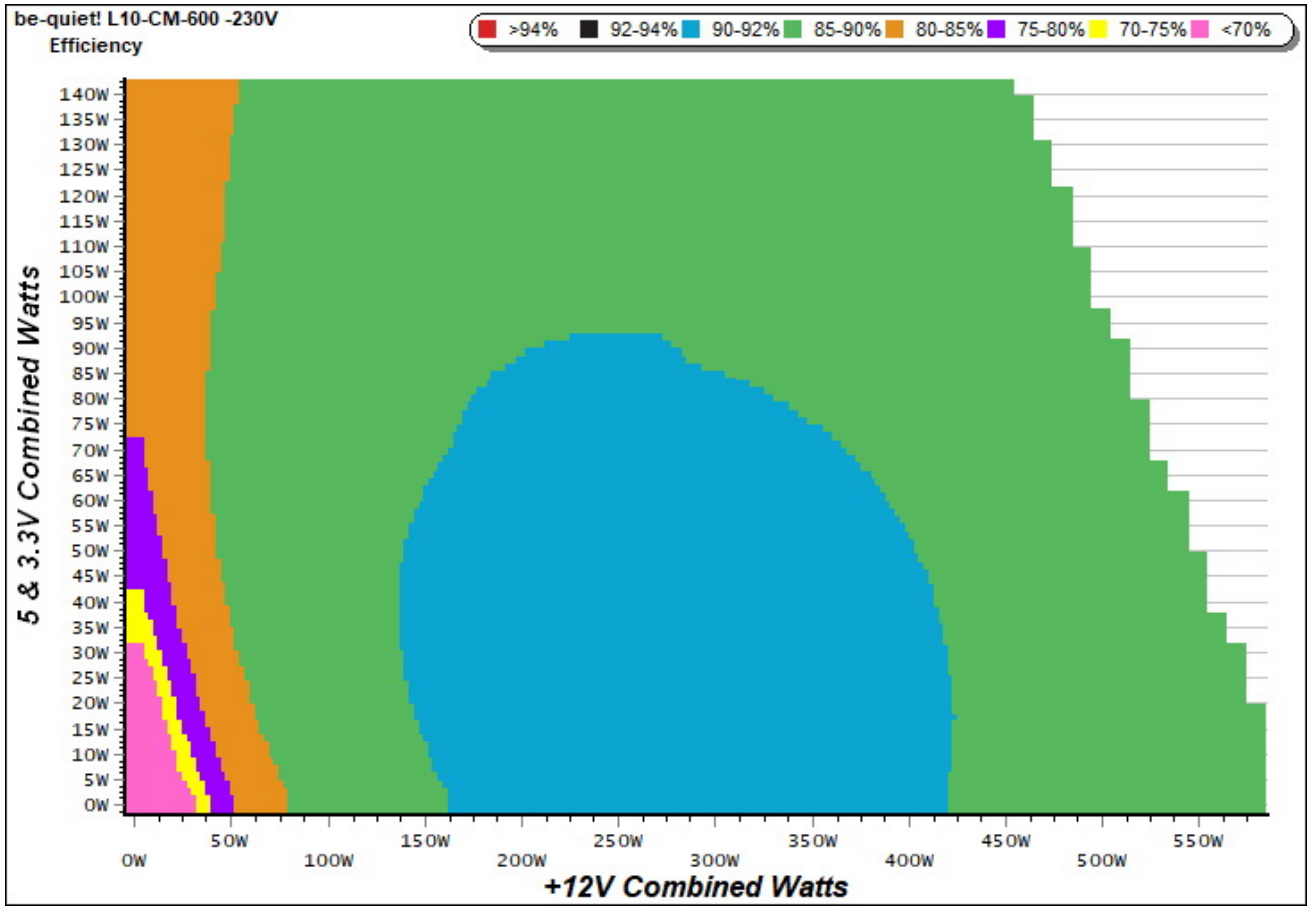
115V



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

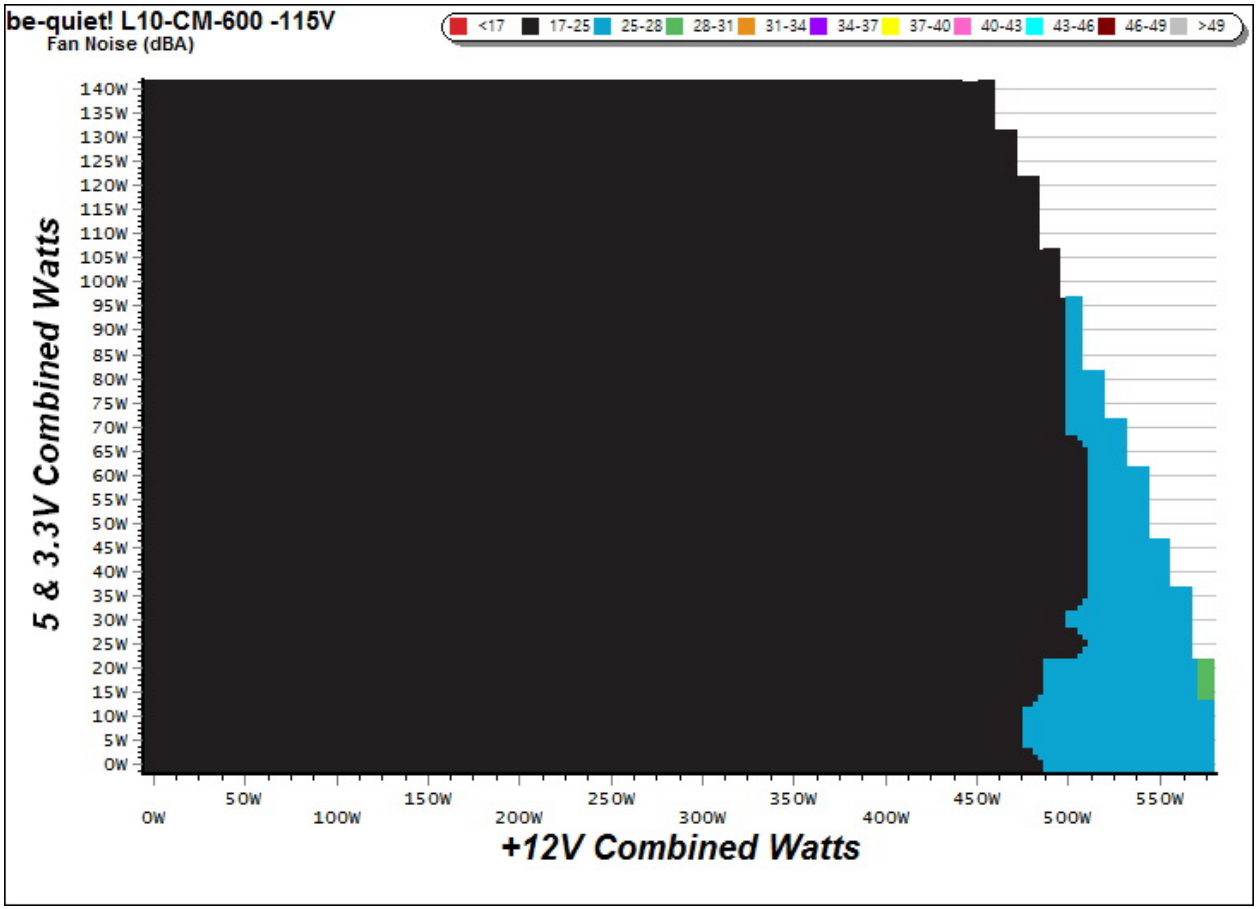


INFO

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

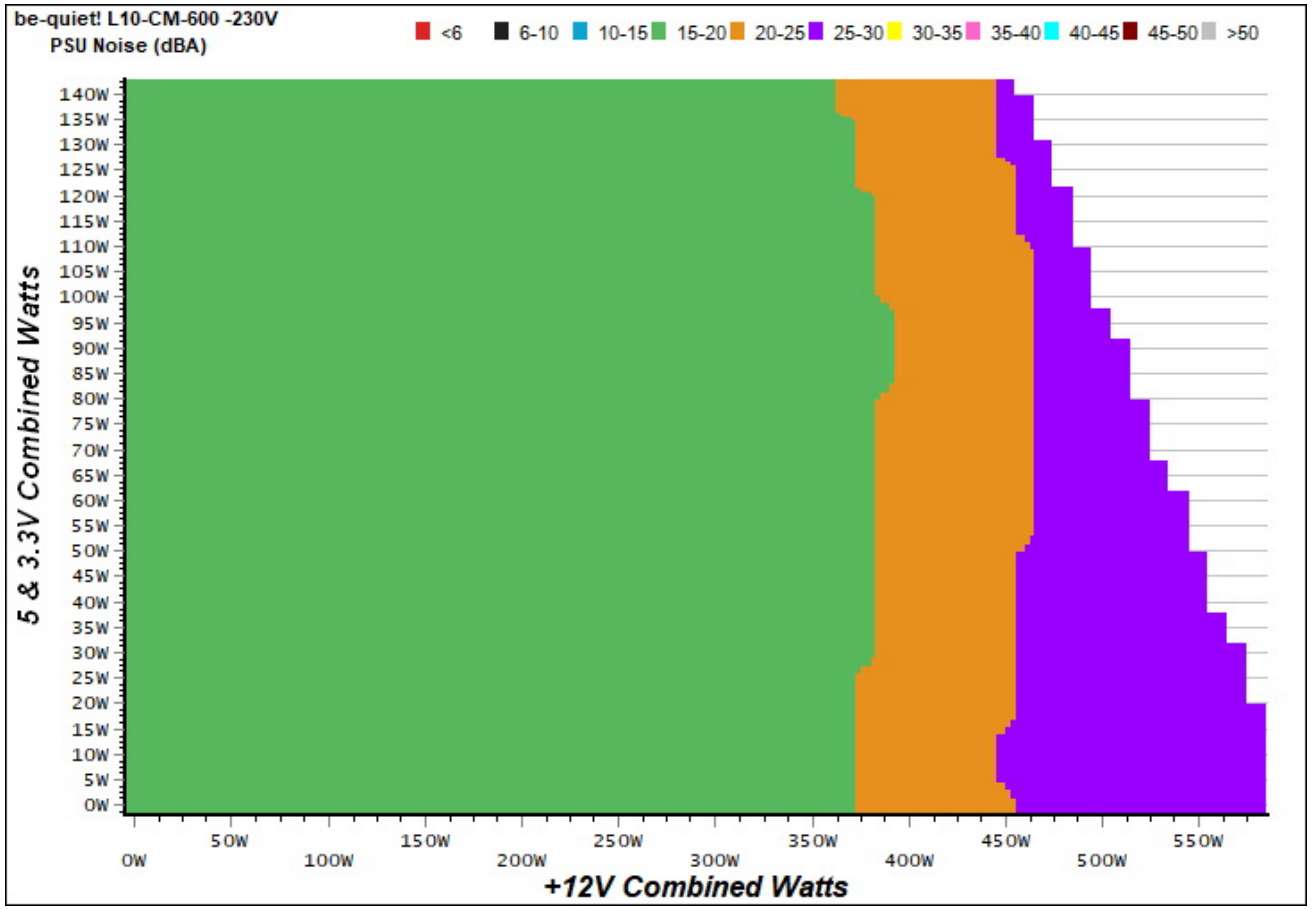
115V



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

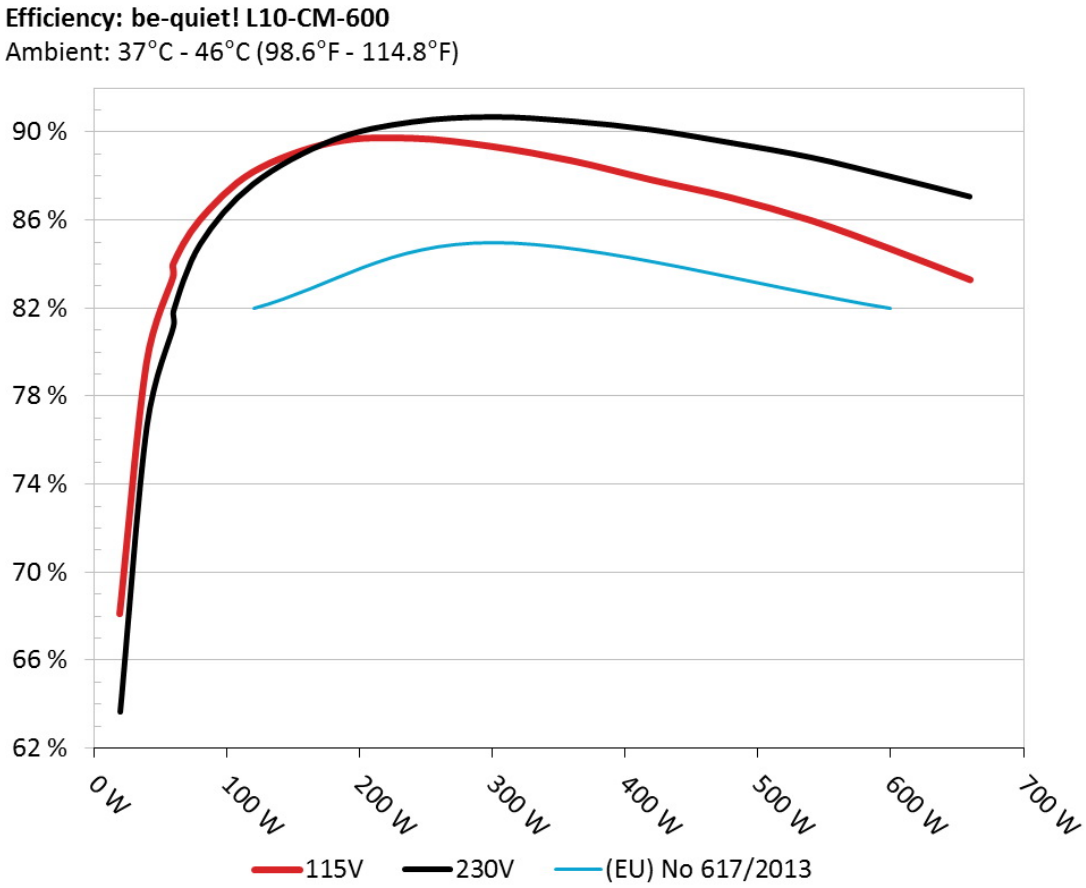


INFO

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

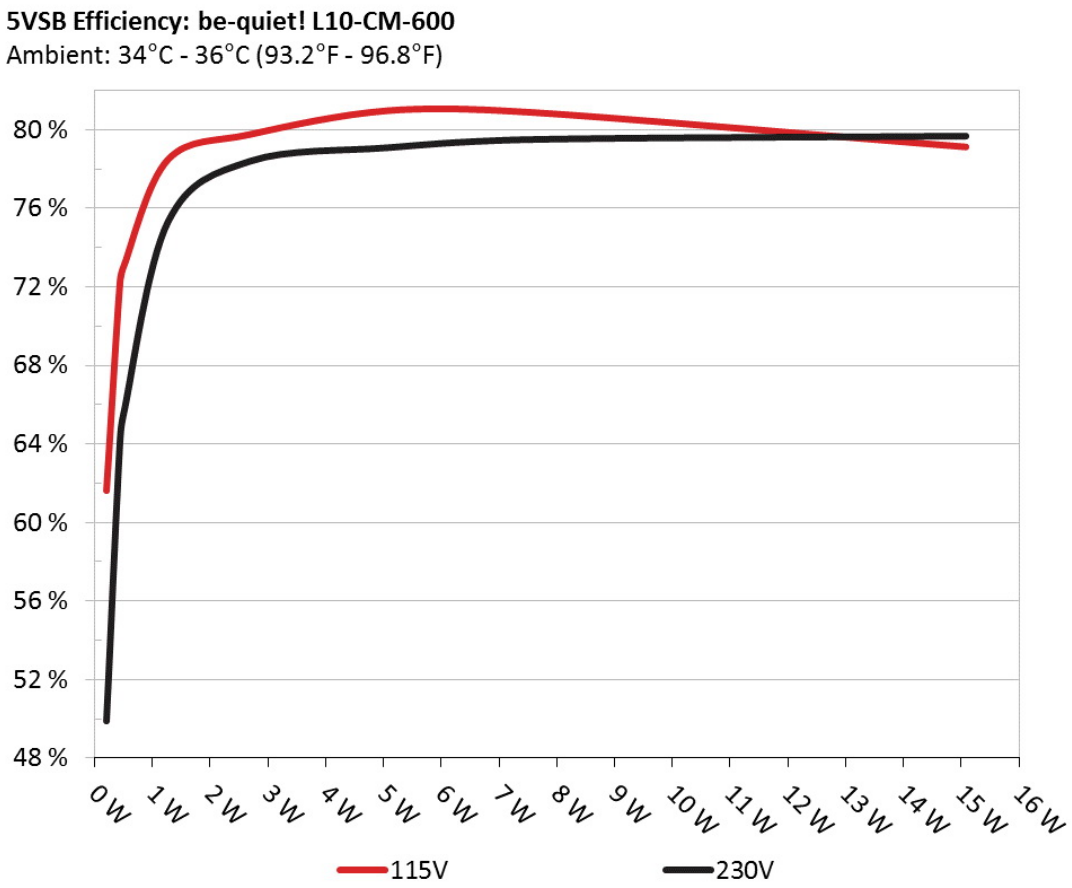
Efficiency under high ambient temperature



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	0.042A	0.212	61.628%	0.064
	5.090V	0.344		115.11V
2	0.087A	0.443	72.150%	0.111
	5.089V	0.614		115.11V
3	0.532A	2.702	79.752%	0.324
	5.080V	3.388		115.10V
4	1.002A	5.080	80.956%	0.378
	5.069V	6.275		115.10V
5	1.502A	7.597	80.862%	0.406
	5.059V	9.395		115.10V
6	3.001A	15.084	79.111%	0.449
	5.026V	19.067		115.10V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.212	49.882%	0.024
	5.090V	0.425		230.30V
2	0.087A	0.443	64.017%	0.039
	5.089V	0.692		230.29V
3	0.532A	2.701	78.403%	0.167
	5.080V	3.445		230.28V
4	1.002A	5.080	79.091%	0.247
	5.069V	6.423		230.28V
5	1.502A	7.596	79.506%	0.295
	5.058V	9.554		230.28V
6	3.002A	15.083	79.678%	0.358
	5.025V	18.930		230.28V

Supplementary Tests (For Reference)

Typical Load Tests

115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	Fan Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.145A	1.980A	1.958A	0.985A	59.772	83.428%	568	17.4	38.23°C	0.964
	12.147V	5.050V	3.364V	5.061V	71.645				41.57°C	115.11V
2	7.327A	2.970A	2.946A	1.187A	119.772	88.196%	568	17.4	38.72°C	0.980
	12.136V	5.042V	3.355V	5.049V	135.802				42.21°C	115.11V
3	11.861A	3.481A	3.462A	1.385A	179.884	89.548%	568	17.4	39.17°C	0.987
	12.126V	5.029V	3.344V	5.036V	200.881				43.08°C	115.10V
4	16.392A	3.982A	3.949A	1.591A	239.782	89.733%	568	17.4	39.37°C	0.992
	12.117V	5.021V	3.336V	5.024V	267.216				44.21°C	115.10V
5	20.587A	4.985A	4.952A	1.796A	299.681	89.357%	568	17.4	40.19°C	0.995
	12.107V	5.010V	3.325V	5.008V	335.376				45.76°C	115.10V
6	24.800A	5.997A	5.960A	2.001A	359.724	88.708%	568	17.4	41.16°C	0.997
	12.096V	5.000V	3.316V	4.995V	405.514				47.89°C	115.11V
7	29.016A	7.014A	6.979A	2.204A	419.656	87.840%	910	19.7	41.90°C	0.998
	12.084V	4.988V	3.304V	4.983V	477.750				48.92°C	115.11V
8	33.234A	8.042A	8.003A	2.414A	479.596	87.025%	1165	22.3	42.98°C	0.998
	12.074V	4.973V	3.291V	4.970V	551.101				49.98°C	115.10V
9	37.898A	8.554A	8.544A	2.415A	539.660	85.991%	1380	26.6	43.63°C	0.998
	12.063V	4.965V	3.282V	4.963V	627.575				51.01°C	115.10V
10	42.307A	9.079A	9.056A	3.030A	599.494	84.694%	1600	31.6	44.44°C	0.998
	12.053V	4.954V	3.270V	4.943V	707.836				52.52°C	115.12V
11	47.325A	9.089A	9.074A	3.034A	659.457	83.289%	1685	32.6	45.55°C	0.998
	12.042V	4.948V	3.263V	4.940V	791.770				54.49°C	115.12V
CL1	0.101A	17.022A	17.004A	0.004A	142.348	79.857%	935	19.7	43.27°C	0.985
	12.115V	4.985V	3.308V	5.040V	178.253				49.27°C	115.10V

CL2	48.307A	1.003A	1.003A	1.002A	596.137	84.638%	1535	30.0	44.45°C	0.998
	12.065V	4.979V	3.295V	5.005V	704.340				51.71°C	115.11V

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	3.152A	1.984A	1.970A	0.987A	59.939	81.062%	590	17.4	40.30°C	0.839
	12.166V	5.038V	3.348V	5.067V	73.942				45.16°C	230.89V
2	7.303A	2.979A	2.960A	1.187A	119.665	87.581%	590	17.4	40.75°C	0.928
	12.156V	5.033V	3.342V	5.057V	136.633				46.36°C	230.85V
3	11.817A	3.486A	3.449A	1.388A	179.534	89.771%	590	17.4	41.32°C	0.955
	12.147V	5.020V	3.332V	5.044V	199.990				47.35°C	230.81V
4	16.345A	3.997A	3.973A	1.589A	239.570	90.485%	590	17.4	41.86°C	0.970
	12.137V	5.003V	3.321V	5.034V	264.761				48.57°C	230.77V
5	20.546A	5.005A	4.974A	1.793A	299.652	90.701%	568	17.4	42.03°C	0.977
	12.127V	4.995V	3.315V	5.020V	330.374				49.08°C	230.56V
6	24.751A	6.005A	5.986A	1.998A	359.742	90.458%	685	17.6	42.82°C	0.983
	12.119V	4.994V	3.307V	5.005V	397.691				50.54°C	230.69V
7	28.934A	7.019A	7.005A	2.203A	419.461	90.001%	980	19.4	43.15°C	0.987
	12.109V	4.987V	3.297V	4.993V	466.063				51.39°C	230.64V
8	33.188A	8.036A	8.034A	2.410A	479.971	89.440%	1265	23.3	43.72°C	0.988
	12.100V	4.977V	3.286V	4.980V	536.639				52.44°C	230.60V
9	37.775A	8.550A	8.536A	2.413A	539.231	88.900%	1340	25.6	44.64°C	0.990
	12.091V	4.971V	3.279V	4.974V	606.556				53.88°C	230.66V
10	42.213A	9.071A	9.086A	3.027A	599.671	87.942%	1632	32.3	45.79°C	0.991
	12.081V	4.961V	3.268V	4.956V	681.897				55.43°C	230.61V
11	47.220A	9.084A	9.104A	3.030A	659.694	87.160%	1685	32.6	46.36°C	0.992
	12.071V	4.955V	3.261V	4.951V	756.874				56.75°C	230.56V
CL1	0.128A	17.001A	16.999A	0.000A	142.553	81.193%	717	17.6	43.25°C	0.949
	12.136V	4.992V	3.302V	5.050V	175.572				51.47°C	230.81V

CL2	48.000A	1.000A	1.001A	1.000A	593.846	87.821%	1643	32.4	45.72°C	0.991
	12.095V	4.982V	3.289V	5.012V	676.199				55.58°C	230.60V

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	1.198A	0.491A	0.472A	0.196A	19.632	68.089%	568	17.4	0.580
	12.155V	5.057V	3.368V	5.083V	28.833				115.14V
2	2.428A	0.981A	0.978A	0.390A	39.731	79.481%	568	17.4	0.745
	12.152V	5.053V	3.364V	5.076V	49.988				115.14V
3	3.659A	1.477A	1.484A	0.590A	59.887	84.020%	568	17.4	0.964
	12.148V	5.050V	3.362V	5.069V	71.277				115.14V
4	4.876A	1.978A	1.959A	0.787A	79.765	86.006%	568	17.4	0.969
	12.141V	5.051V	3.363V	5.064V	92.743				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	1.180A	0.495A	0.475A	0.197A	19.459	62.946%	590	17.4	0.470
	12.174V	5.045V	3.355V	5.088V	30.914				230.97V
2	2.429A	0.990A	0.983A	0.394A	39.850	76.359%	590	17.4	0.647
	12.171V	5.041V	3.351V	5.080V	52.188				230.90V
3	3.614A	1.487A	1.461A	0.591A	59.358	81.572%	590	17.4	0.836
	12.168V	5.039V	3.348V	5.073V	72.768				230.89V
4	4.858A	1.977A	1.965A	0.789A	79.687	84.162%	590	17.4	0.884
	12.167V	5.053V	3.353V	5.071V	94.683				230.76V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.4 mV	13.9 mV	11.0 mV	11.8 mV	Pass
20% Load	10.6 mV	17.3 mV	15.3 mV	13.4 mV	Pass
30% Load	10.5 mV	19.4 mV	17.8 mV	15.4 mV	Pass
40% Load	11.5 mV	20.1 mV	20.5 mV	16.4 mV	Pass
50% Load	13.2 mV	21.6 mV	22.2 mV	17.3 mV	Pass
60% Load	15.9 mV	22.9 mV	24.7 mV	19.0 mV	Pass
70% Load	19.5 mV	24.2 mV	27.2 mV	20.2 mV	Pass
80% Load	23.0 mV	25.4 mV	29.9 mV	21.6 mV	Pass
90% Load	28.5 mV	28.7 mV	32.6 mV	22.9 mV	Pass
100% Load	35.1 mV	29.7 mV	35.4 mV	26.0 mV	Pass
110% Load	46.9 mV	31.6 mV	38.8 mV	27.9 mV	Pass
Crossload 1	18.3 mV	24.5 mV	18.7 mV	20.2 mV	Pass
Crossload 2	31.3 mV	31.2 mV	37.8 mV	24.4 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.9 mV	12.5 mV	9.3 mV	18.5 mV	Pass
20% Load	8.6 mV	14.5 mV	11.8 mV	20.5 mV	Pass
30% Load	9.2 mV	16.8 mV	14.4 mV	21.5 mV	Pass
40% Load	11.0 mV	18.3 mV	17.1 mV	22.7 mV	Pass
50% Load	11.7 mV	20.0 mV	18.9 mV	13.9 mV	Pass
60% Load	12.7 mV	25.4 mV	21.9 mV	14.7 mV	Pass
70% Load	14.9 mV	28.1 mV	24.0 mV	18.3 mV	Pass
80% Load	20.0 mV	28.1 mV	27.7 mV	19.5 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	22.0 mV	28.2 mV	30.1 mV	19.5 mV	Pass
100% Load	23.3 mV	32.3 mV	34.5 mV	18.3 mV	Pass
110% Load	26.4 mV	32.7 mV	38.1 mV	19.7 mV	Pass
Crossload 1	10.0 mV	25.9 mV	21.7 mV	22.7 mV	Pass
Crossload 2	24.4 mV	30.1 mV	31.1 mV	21.7 mV	Pass

The results above are not used in the certification process

be quiet! Pure Power 10 600W

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

CYBENETICS LTD Syrou 6, Latsia, 2231, Nicosia Cyprus

www.cybenetics.com - info@cybenetics.com