be quiet!

be quiet! Dark Power 12 750W

Serial Number 314S1071002420

Lab ID BQ75001821

Certification ID 251821

Test Result Report ID: 21PS1821A

Certificate Issue Date: Mar 29, 2021

Scheme: ETA-EMI PSU

115V: CYBENETICS TITANIUM

230V: CYBENETICS PLATINUM 230v

Scheme: LAMBDA PSU

115V: CYBENETICS A+

230V: CYBENETICS A+ 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	Dark Power 12 750W
OEM/ODM	FSP
Serial Number	314S1071002420
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	9-4.5
Rated Frequency (Hz)	50-60

Rated Power (W)	750
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	135mm Fluid Dynamic Bearing Fan (BQ SIW3-13525-HF)
Semi-Passive Operation	✗
Cybenetics Testing Information	
Lab ID	BQ75001821
Date of receipt	Mar 16, 2021
Testing Date	Mar 29, 2021
Report Issued Date	Mar 29, 2021
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 (600mm)	1	1	18-22AWG	No
8 pin EPS12V (700mm)	1	1	16AWG	No
4+4 pin EPS12V (700mm)	1	1	16AWG	No
2x (6+2) pin PCIe (600mm)	3	6	16-18AWG	No
SATA (600mm+150mm+150mm+150mm)	1	4	18AWG	No
SATA (600mm+150mm+150mm)	2	6	18AWG	No
SATA (600mm+150mm) / 4-pin Molex (+150mm+150mm) / FDD (+150mm)	1	2 / 2 / 1	18-20AWG	No
4-pin Molex (600mm+150mm+150mm)	1	3	18AWG	No

Overclocking jumper (620mm)	1	1	24AWG	No
AC Power Cord (1370mm) - C13 coupler	1	1	18AWG	-

Power Specifications

Rail		3.3V	5V	12V(1)	12V(2)	12V(3)	12V(4)	5VSB	-12V
Max. Power	Amps	22	22	25	25	30	30	3	0.5
	Watts	110		744				15	6
Total Max. Power (W)		750							

Parts Description

General Data	-
Manufacturer (OEM)	FSP
PCB Type	Double Sided
Primary Side	-
Transient Filter	4x Y caps, 3x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor SCK-056 (5Ohm) & Relay
Rectifier(s) (Standby Mode)	4x Diodes Incorporated S3M (1000V, 3A @ 75°C)
Rectifier(s)	4x Infineon IPB60R060P7 (600V, 30A @ 100°C, Rds(on): 0.06Ohm)
APFC MOSFETs	2x Infineon IPA60R180P7 (600V, 11A @ 100°C, Rds(on): 0.18Ohm)
APFC Boost Diode	1x Cree C3D06060 (600V, 6A @ 154°C)
Bulk Cap(s)	2x Nippon Chemi-Con (420V, 330uF each or 660uF combined, 2,000h @ 105°C, KMR)
Main Switchers	4x Alpha & Omega AOTF190A60CL (600V, 12A @ 100°C, Rds(on): 0.19Ohm)
IC Driver	2x Silicon Labs Si8233BD
APFC Controller	Infineon ICE2PCS02
Resonant Controller	Champion CM6901T2X
Topology	Primary side: Bridgeless Design APFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	4x Toshiba TPHR8504PL (40V, 150A, Rds(on): 0.85mOhm)
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0901NS (30V, 94A @ 100°C, Rds(on): 1.9mOhm) PWM Controller(s): ANPEC APW7159C

Filtering Capacitors	Electrolytic: 6x Nippon Chemi-Con (1-5,000h @ 105°C, KZE), 1x Rubycon (4-10,000h @ 105°C, YXF), 2x Rubycon (6-10,000h @ 105°C, ZLH), 1x Rubycon (1-5,000h @ 105°C, ZL), 1x Nippon Chemi-Con (6-10,000h @ 105°C, KZN) Polymer: 14x United Chemi-Con, 17x FPCAP, 4x no info
Supervisor IC	Weltrend WT7527RA (OCP, OVP, UVP, SCP, PG)
Fan Controller	APW9010
Fan Model	be quiet! Silent Wings BQSIW3-13525-HF (135mm, 12V, 0.56A, 1800rpm, Fluid Dynamic Bearing Fan)
5VSB Circuit	-
Rectifier	1x Nexperia PSMN2R0-30YL (30V, 100A @ 100°C, Rds(on): 3.3mOhm) FET, 1x CET CEB04N7G (700V, 4A, Rds(on): 3.3Ohm) FET & 1x P15L50 SBR
Standby PWM Controller	Grenery GR8837C

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	✓
ALPM (Alternative Low Power Mode) compatible	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	92.078%
Average Noise Output (>1450 Load Combinations)	18.92dBA
Average PF (>1450 Load Combinations)	0.991
Efficiency With 10W (≤500W) or 2% (>500W) Load	71.620%
Standby Power Consumption	0.0867W
Non-Accredited	
12V Ripple (Full Load)	21.56mV
5V Ripple (Full Load)	16.51mV
3.3V Ripple (Full Load)	18.65mV

5VSB Ripple (Full Load)	11.78mV
12V Load Regulation	0.55%
5V Load Regulation	0.71%
3.3V Load Regulation	0.98%
5VSB Load Regulation	3.49%
Inrush Current	32.420A

230V

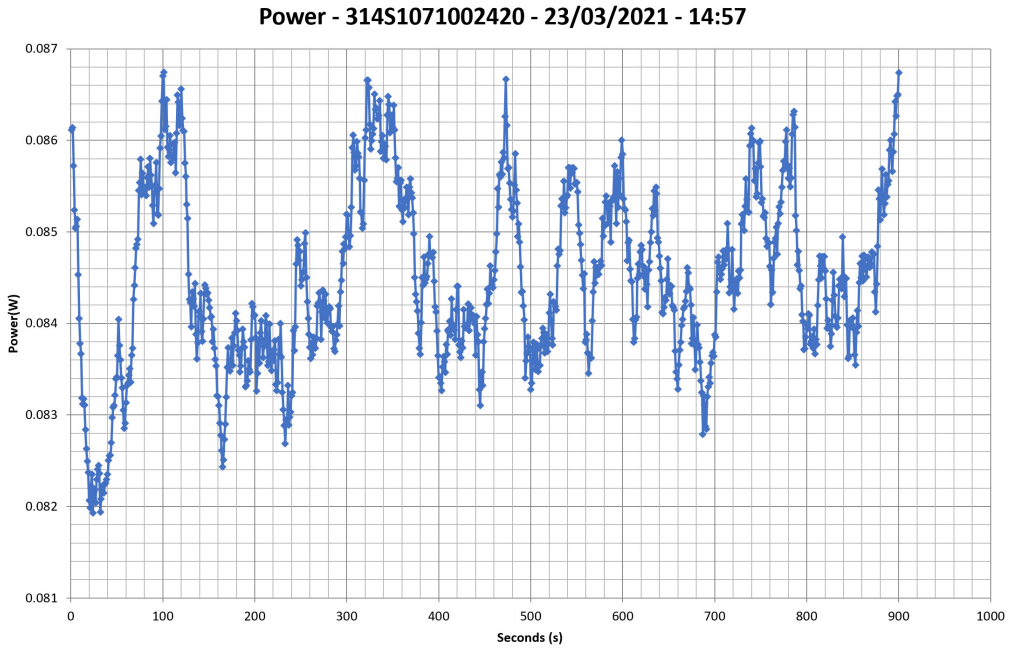
Accredited		
Average Efficiency (>1450 load combinations)		93.915%
Average Noise Output (>1450 Load Combinations)		16.86dBA
Average PF (>1450 Load Combinations)		0.961
Efficiency With 10W (≤500W) or 2% (>500W) Load		-
Standby Power Consumption		0.1672W
Non-Accredited		
12V Ripple (Full Load)		21.16mV
5V Ripple (Full Load)		16.43mV
3.3V Ripple (Full Load)		19.24mV
5VSB Ripple (Full Load)		11.32mV
12V Load Regulation		0.55%
5V Load Regulation		0.71%
3.3V Load Regulation		0.95%
5VSB Load Regulation		3.49%
Inrush Current		62.920A
Hold-Up Time & PWR_OK Signal		21.50ms
AC Loss to PWR_OK Hold Up Time		16.50ms
PWR_OK Inactive to DC Loss Delay		5.00ms
PSU Timings: T1 (20% / 100%)	69.5ms	69.5ms
PSU Timings: T3 (20% / 100%)	125.5ms	129.0ms
OPP (23.73°C / 37.62°C)	130.65%	130.65%

Hold-Up Time & PWR_OK Signal

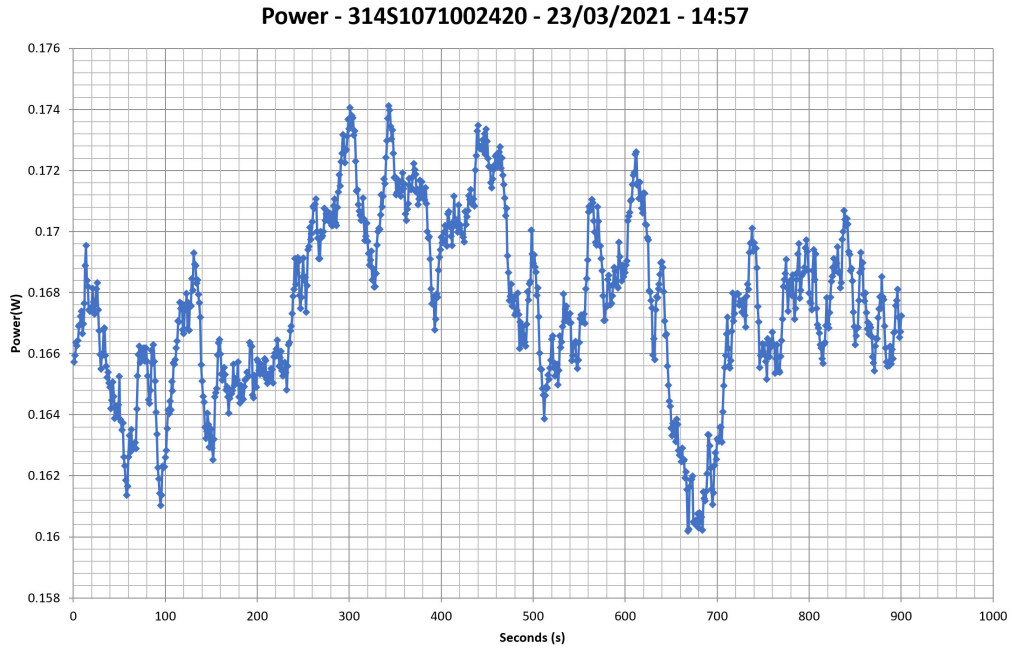
Hold-Up Time (ms)	21.5
AC Loss to PWR_OK Hold Up Time (ms)	16.5
PWR_OK Inactive to DC Loss Delay (ms)	5

Graphs

115V

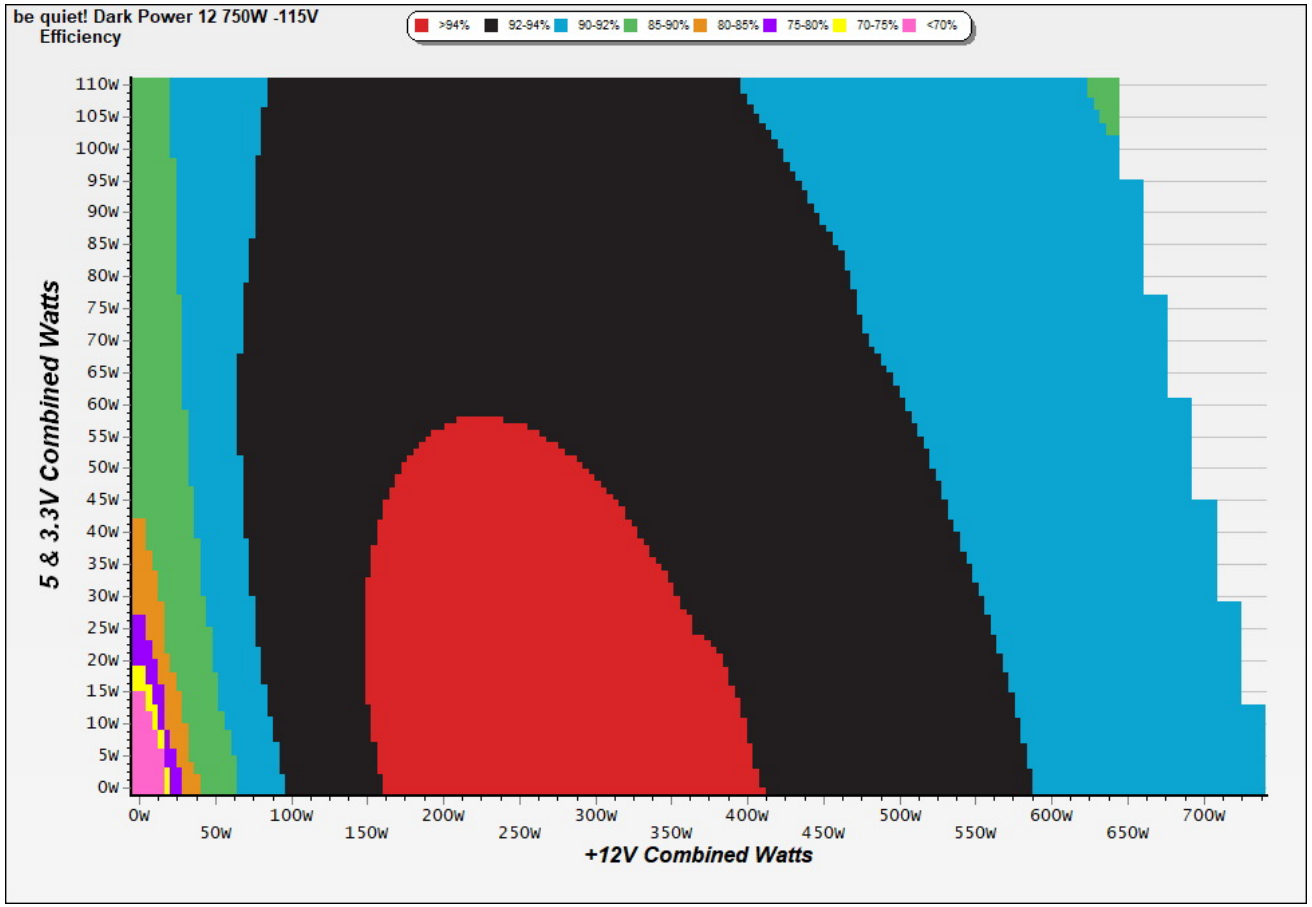


230V



Efficiency Graph

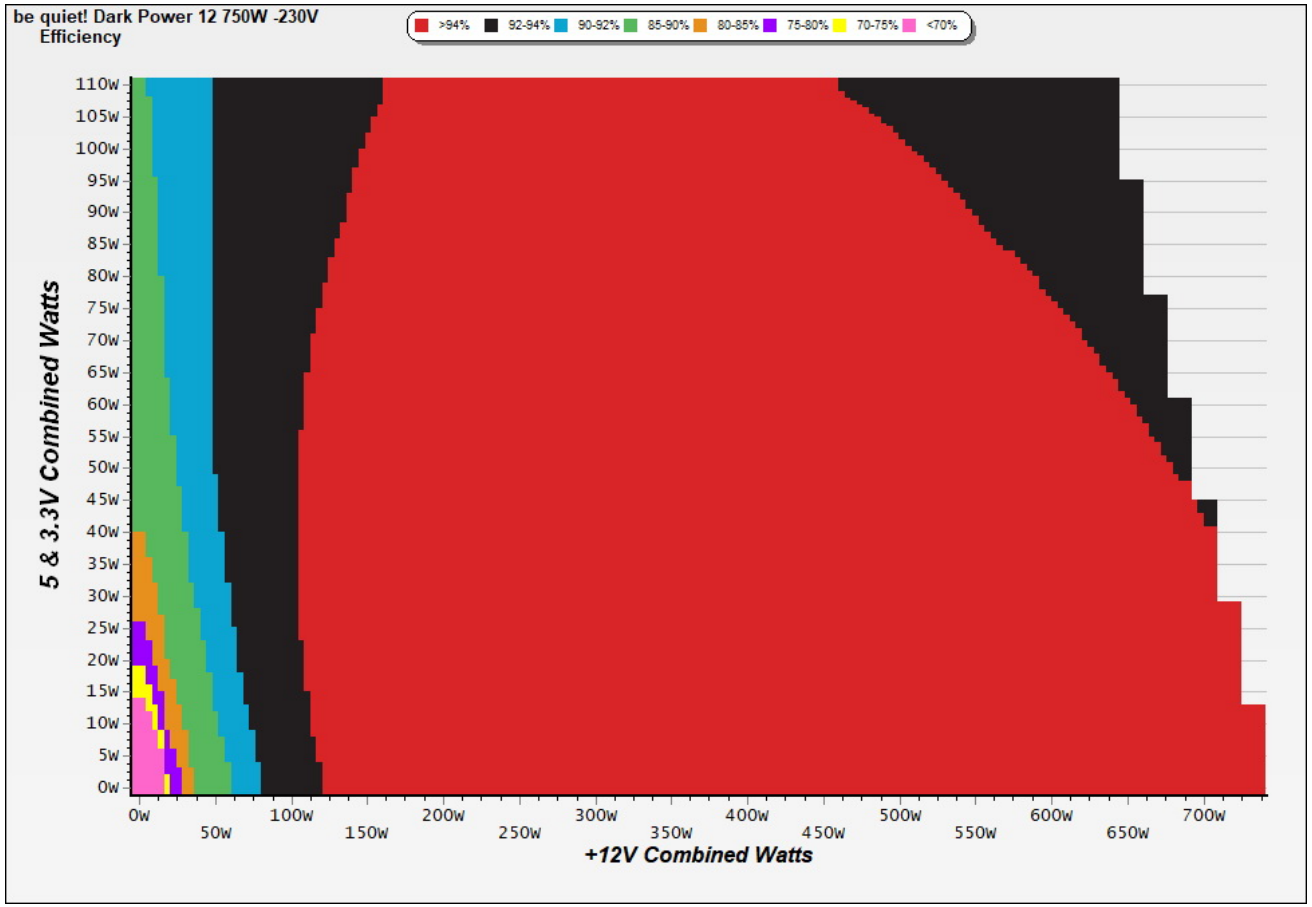
115V



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

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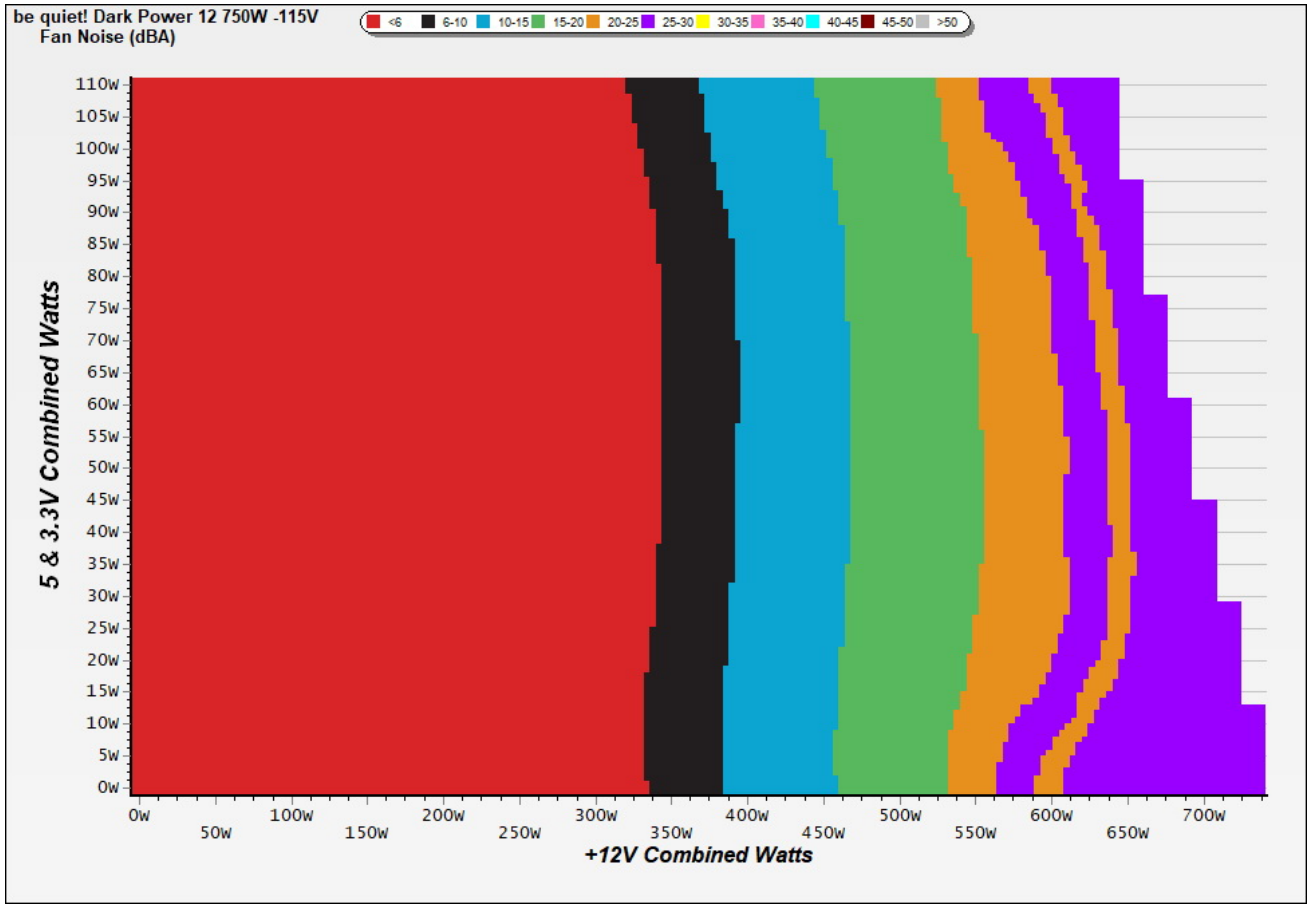
Noise Graph

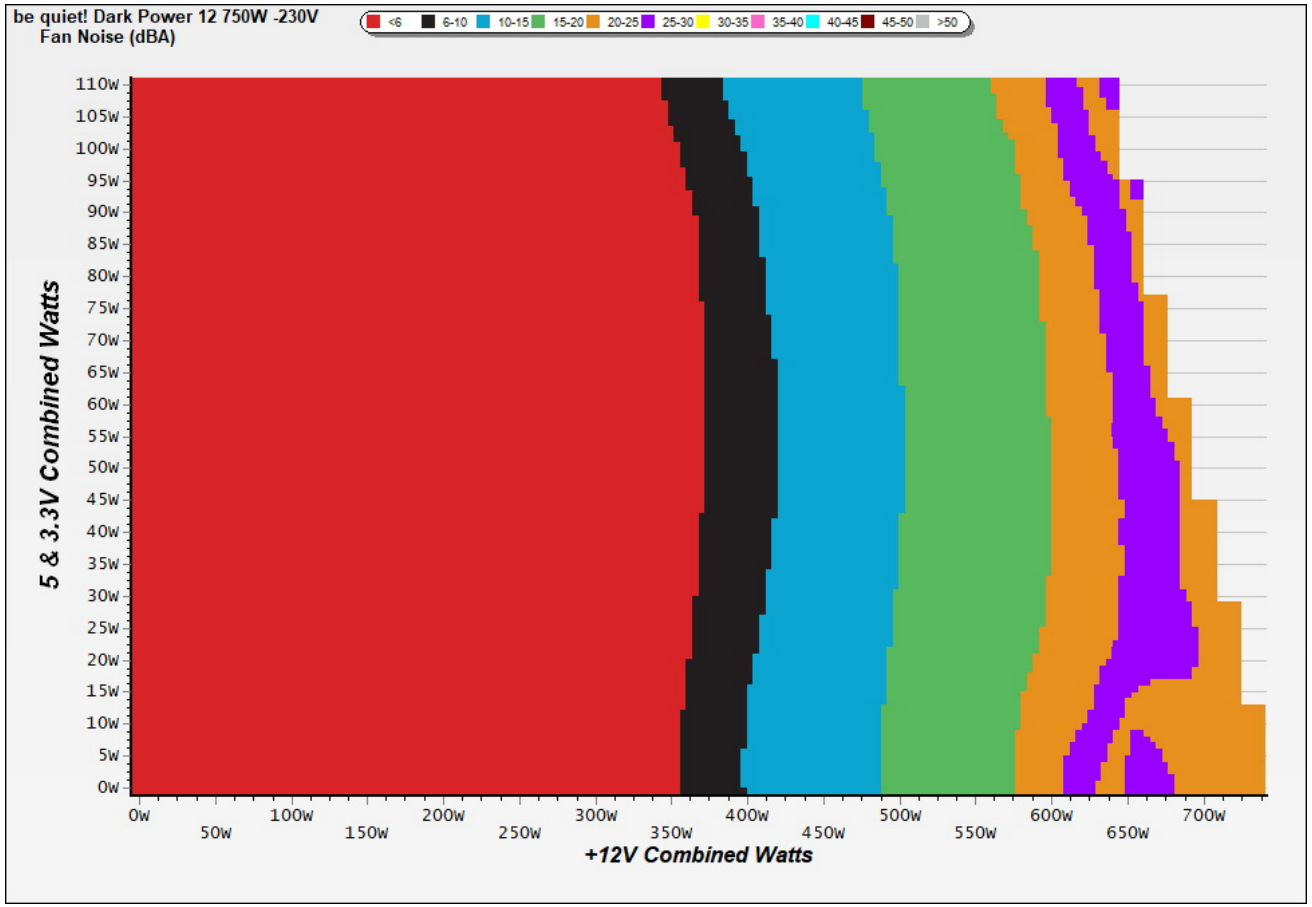
115V



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

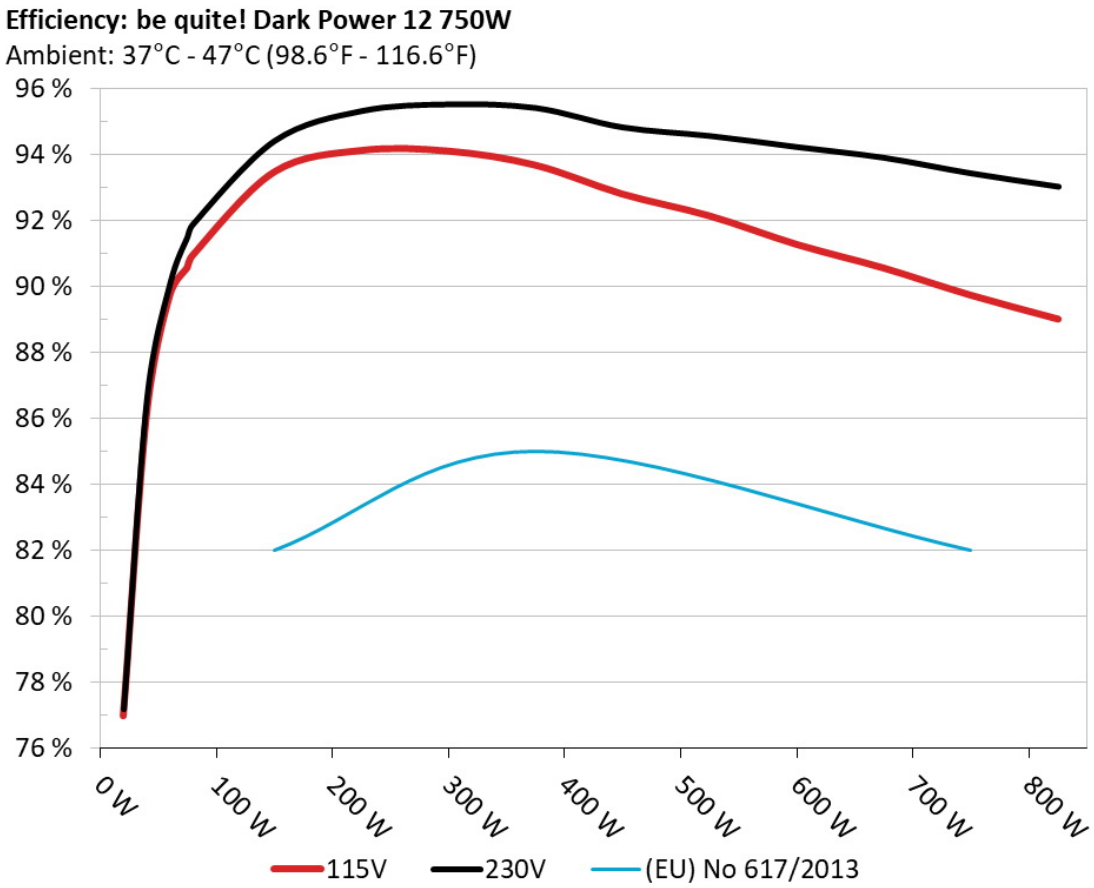


INFO

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

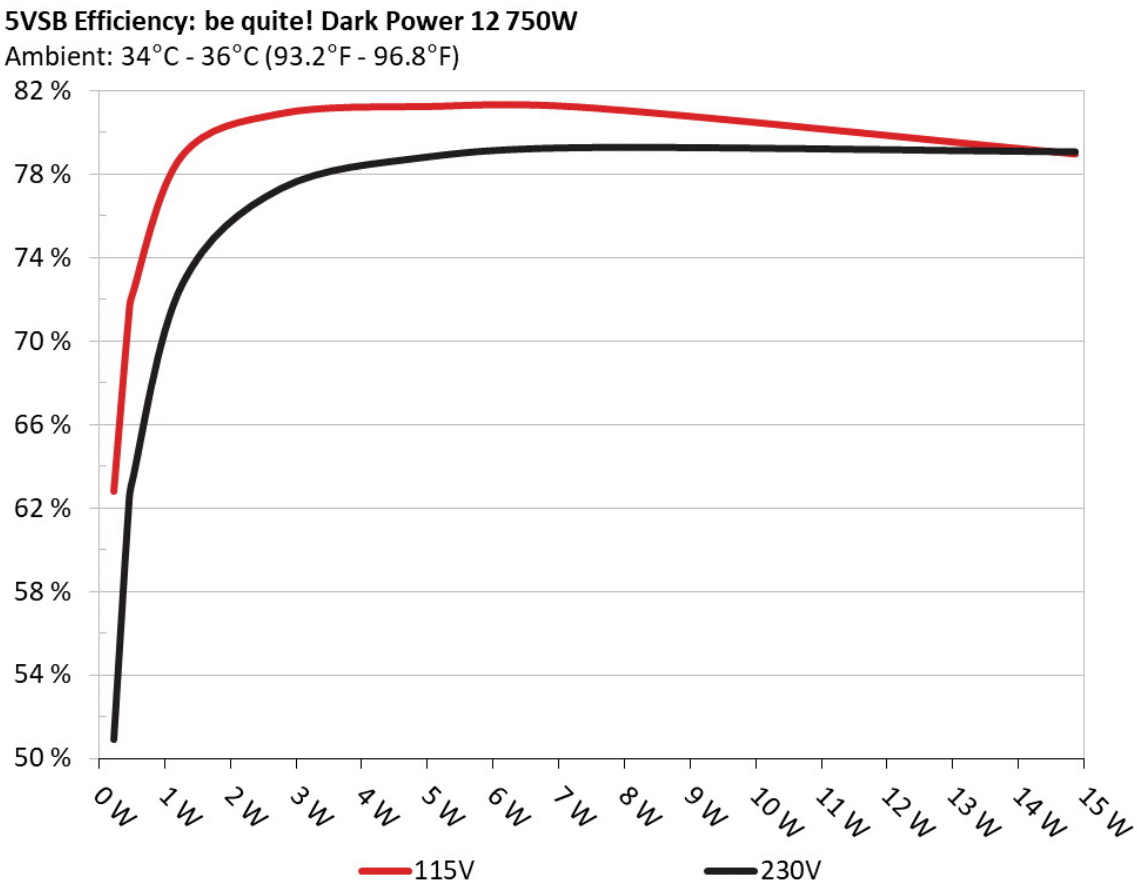
Efficiency under high ambient temperature



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	0.228	62.810%	0.034
	5.062V	0.363		115.16V
2	0.090A	0.455	71.205%	0.058
	5.060V	0.639		115.16V
3	0.550A	2.775	80.880%	0.250
	5.044V	3.431		115.14V
4	1.000A	5.029	81.218%	0.351
	5.028V	6.192		115.13V
5	1.500A	7.518	81.144%	0.424
	5.011V	9.265		115.10V
6	3.000A	14.858	78.944%	0.502
	4.952V	18.821		115.11V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.228	50.893%	0.013
	5.062V	0.448		230.36V
2	0.090A	0.455	62.074%	0.021
	5.059V	0.733		230.37V
3	0.550A	2.774	77.313%	0.096
	5.042V	3.588		230.37V
4	1.000A	5.027	78.830%	0.159
	5.026V	6.377		230.37V
5	1.500A	7.513	79.276%	0.215
	5.008V	9.477		230.37V
6	3.000A	14.869	79.069%	0.323
	4.956V	18.805		230.36V

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	4.380A	1.968A	1.958A	0.993A	74.964	90.569%	414	<6.0	40.92°C	0.976
	12.182V	5.084V	3.371V	5.035V	82.770				43.58°C	115.17V
2	9.785A	2.954A	2.941A	1.195A	150.044	93.477%	455	<6.0	41.32°C	0.990
	12.175V	5.080V	3.367V	5.023V	160.515				44.58°C	115.17V
3	15.533A	3.449A	3.433A	1.398A	225.063	94.130%	535	9.4	41.49°C	0.994
	12.168V	5.076V	3.364V	5.009V	239.099				45.62°C	115.16V
4	21.287A	3.946A	3.927A	1.602A	300.065	94.109%	518	10.5	41.82°C	0.995
	12.160V	5.072V	3.361V	4.995V	318.849				46.72°C	115.16V
5	26.673A	4.934A	4.913A	1.807A	374.689	93.685%	622	16.7	42.38°C	0.996
	12.154V	5.069V	3.357V	4.982V	399.944				47.56°C	115.18V
6	32.089A	5.926A	5.904A	2.001A	449.547	92.809%	699	19.4	42.75°C	0.996
	12.147V	5.065V	3.354V	4.970V	484.379				48.75°C	115.17V
7	37.548A	6.920A	6.896A	2.220A	524.926	92.142%	879	23.6	43.22°C	0.996
	12.139V	5.061V	3.351V	4.955V	569.693				50.29°C	115.18V
8	43.014A	7.914A	7.889A	2.429A	600.267	91.273%	1212	32.9	43.59°C	0.996
	12.132V	5.056V	3.347V	4.942V	657.660				52.28°C	115.18V
9	48.848A	8.413A	8.372A	2.430A	674.792	90.559%	1574	40.0	44.77°C	0.995
	12.125V	5.053V	3.344V	4.939V	745.143				54.25°C	115.15V
10	54.494A	8.916A	8.893A	3.062A	750.027	89.733%	1807	43.1	45.63°C	0.994
	12.117V	5.049V	3.340V	4.900V	835.842				55.68°C	115.16V
11	60.732A	8.922A	8.900A	3.064A	825.259	89.008%	1856	44.0	46.70°C	0.993
	12.111V	5.046V	3.338V	4.897V	927.172				57.52°C	115.17V
CL1	0.118A	13.001A	13.000A	0.000A	111.058	88.522%	939	26.8	42.04°C	0.986
	12.174V	5.076V	3.356V	5.105V	125.458				47.60°C	115.20V

CL2	62.021A	0.999A	1.001A	1.000A	765.290	90.256%	1667	41.8	45.54°C	0.994
	12.123V	5.055V	3.350V	5.006V	847.909				55.32°C	115.16V

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	4.380A	1.967A	1.956A	0.993A	74.953	91.524%	425	<6.0	40.35°C	0.863
	12.182V	5.084V	3.371V	5.036V	81.894				43.24°C	230.31V
2	9.782A	2.953A	2.940A	1.195A	150.007	94.430%	460	<6.0	40.51°C	0.946
	12.176V	5.080V	3.367V	5.023V	158.856				44.00°C	230.32V
3	15.529A	3.448A	3.432A	1.398A	225.006	95.335%	493	9.1	41.59°C	0.970
	12.168V	5.076V	3.364V	5.009V	236.015				45.70°C	230.31V
4	21.280A	3.943A	3.927A	1.602A	300.013	95.536%	538	9.9	41.87°C	0.975
	12.162V	5.073V	3.361V	4.996V	314.030				46.70°C	230.32V
5	26.659A	4.933A	4.913A	1.807A	374.521	95.429%	601	13.3	42.61°C	0.977
	12.154V	5.069V	3.358V	4.983V	392.462				47.84°C	230.30V
6	32.077A	5.924A	5.905A	2.000A	449.389	94.841%	690	16.2	42.84°C	0.981
	12.147V	5.065V	3.354V	4.970V	473.834				48.75°C	230.30V
7	37.536A	6.917A	6.895A	2.220A	524.796	94.579%	868	23.4	43.71°C	0.982
	12.140V	5.061V	3.350V	4.956V	554.874				50.70°C	230.30V
8	43.003A	7.912A	7.889A	2.428A	600.129	94.241%	1171	32.3	43.93°C	0.982
	12.132V	5.057V	3.347V	4.943V	636.805				52.13°C	230.30V
9	48.843A	8.412A	8.371A	2.430A	674.676	93.916%	1387	36.1	44.13°C	0.982
	12.124V	5.053V	3.344V	4.940V	718.381				52.88°C	230.33V
10	54.487A	8.912A	8.890A	3.061A	749.919	93.442%	1707	42.0	45.32°C	0.981
	12.117V	5.049V	3.341V	4.901V	802.552				54.70°C	230.34V
11	60.728A	8.920A	8.898A	3.064A	825.192	93.037%	1849	43.6	46.69°C	0.980
	12.111V	5.046V	3.338V	4.897V	886.946				56.53°C	230.34V
CL1	0.117A	13.000A	13.000A	0.000A	111.054	89.517%	874	23.3	42.84°C	0.926
	12.174V	5.077V	3.356V	5.105V	124.059				47.71°C	230.36V

CL2	62.015A	0.998A	1.000A	1.000A	765.210	93.949%	1515	39.5	45.23°C	0.981
	12.123V	5.055V	3.351V	5.006V	814.494				54.42°C	230.37V

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	1.218A	0.492A	0.489A	0.197A	19.992	76.960%	371	<6.0	0.876
	12.184V	5.086V	3.374V	5.077V	25.977				115.17V
2	2.436A	0.983A	0.979A	0.395A	39.983	86.102%	374	<6.0	0.939
	12.184V	5.085V	3.373V	5.068V	46.437				115.17V
3	3.658A	1.474A	1.469A	0.593A	60.013	89.738%	375	<6.0	0.970
	12.183V	5.085V	3.372V	5.057V	66.876				115.17V
4	4.873A	1.967A	1.959A	0.793A	79.963	90.957%	390	<6.0	0.978
	12.181V	5.084V	3.371V	5.046V	87.913				115.17V

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	1.217A	0.491A	0.489A	0.197A	19.983	77.166%	390	<6.0	0.508
	12.189V	5.087V	3.374V	5.079V	25.896				230.26V
2	2.435A	0.982A	0.979A	0.395A	39.971	86.594%	387	<6.0	0.714
	12.186V	5.086V	3.373V	5.068V	46.159				230.30V
3	3.657A	1.475A	1.467A	0.593A	60.002	90.113%	398	<6.0	0.815
	12.184V	5.085V	3.372V	5.057V	66.585				230.31V
4	4.872A	1.967A	1.958A	0.793A	79.952	91.912%	407	<6.0	0.873
	12.182V	5.084V	3.371V	5.046V	86.988				230.33V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.70mV	7.20mV	5.10mV	6.20mV	Pass
20% Load	12.00mV	7.90mV	6.00mV	6.60mV	Pass
30% Load	14.10mV	9.30mV	6.50mV	7.10mV	Pass
40% Load	15.40mV	8.90mV	7.90mV	7.80mV	Pass
50% Load	17.40mV	9.10mV	8.30mV	7.90mV	Pass
60% Load	24.10mV	11.20mV	13.00mV	8.40mV	Pass
70% Load	16.50mV	11.30mV	10.70mV	9.90mV	Pass
80% Load	16.10mV	12.60mV	15.90mV	9.70mV	Pass
90% Load	15.80mV	12.50mV	17.50mV	9.70mV	Pass
100% Load	21.60mV	16.50mV	18.70mV	11.80mV	Pass
110% Load	22.30mV	16.70mV	19.40mV	12.40mV	Pass
Crossload1	14.70mV	10.30mV	13.30mV	7.70mV	Pass
Crossload2	21.10mV	15.10mV	12.90mV	10.70mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	9.10mV	7.10mV	4.90mV	6.10mV	Pass
20% Load	12.30mV	7.60mV	5.80mV	6.50mV	Pass
30% Load	14.10mV	7.70mV	6.40mV	7.00mV	Pass
40% Load	15.70mV	8.10mV	7.30mV	7.20mV	Pass
50% Load	17.70mV	8.90mV	8.20mV	7.70mV	Pass
60% Load	20.10mV	12.20mV	14.20mV	8.40mV	Pass
70% Load	13.80mV	10.80mV	10.10mV	8.20mV	Pass
80% Load	14.50mV	12.40mV	15.70mV	9.90mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	14.50mV	13.80mV	16.80mV	10.60mV	Pass
100% Load	21.20mV	16.40mV	19.20mV	11.30mV	Pass
110% Load	22.80mV	16.40mV	19.40mV	11.80mV	Pass
Crossload1	14.60mV	10.10mV	13.60mV	7.70mV	Pass
Crossload2	21.00mV	15.30mV	13.10mV	10.80mV	Pass

The results above are not used in the certification process

be quiet! Dark Power 12 750W

Top side

Power specifications label