



Enermax Revolution D.F. 850W

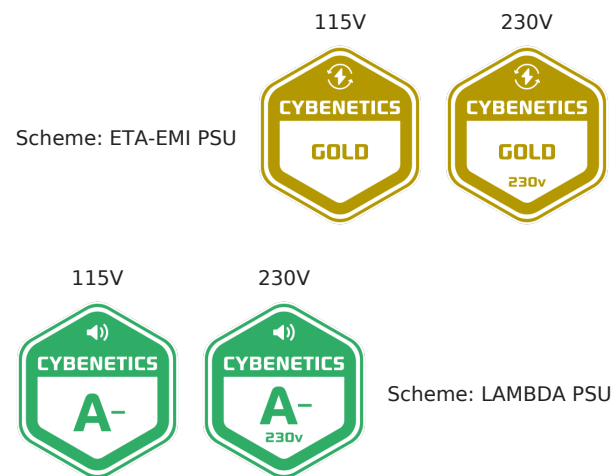
Serial Number 18C7110160206

Lab ID EM85001619

Certification ID 251619

Test Result Report ID: 20PS1619A

Certificate Issue Date: Mar 11, 2020



A handwritten signature in blue ink, appearing to read "A. Bitziopoulos", is written over a faint circular stamp.

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	Enermax
Model	Revolution D.F. 850W
OEM/ODM	Channel Well Technology
Serial Number	18C7110160206
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12
Rated Frequency (Hz)	47-63

Rated Power (W)	850
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	140mm Twister Bearing Fan (ED142512M-FA-1)
Semi-Passive Operation	X
Cybenetics Testing Information	
Lab ID	EM85001619
Date of receipt	Mar 3, 2020
Testing Date	Mar 9, 2020
Report Issued Date	Mar 11, 2020
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	18AWG	No
4+4 pin EPS12V (700mm)	2	2	16AWG	No
6+2 pin PCIe (500mm+150mm)	3	6	16-18AWG	No
SATA (450mm+150mm+150mm+150mm)	3	12	18AWG	No
4-pin Molex (450mm+150mm+150mm+150mm)	1	4	18AWG	No
FDD Adapter (150mm)	1	1	20AWG	No
AC Power Cord (1100mm) - C13 coupler	1	1	18AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	22	22	25	2.5	0.3
	Watts	120		850	12.5	3.6
Total Max. Power (W)		850				

Parts Description

General Data	-
Manufacturer (OEM)	CWT
PCB Type	Double Sided
Primary Side	-
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV, 1x Discharge IC
Inrush Protection	NTC Thermistor (SCK-055) & Relay
Bridge Rectifier(s)	1x GBU15L06 (600V, 15A @ 115°C)
APFC MOSFETs	2x Champion GP28S50G (500V, 28A @ 150°C, 0.125Ohm)
APFC Boost Diode	1x CREE C3D08060A (600V, 8A @ 152°C)
Hold-up Cap(s)	1x Nichicon (400V, 680uF, 2,000h @ 105°C, GG)
Main Switchers	2x Toshiba TK25A60X5 (600V, 25A @ 150°C, 0.14Ohm)
APFC Controller	Champion CM6500UNX & CM03X Phantom Power Remover
Resonant Controller	Champion CM6901X
Topology	Primary side: Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	6x International Rectifier IRFH7004PBF (40V, 100A @ 100°C, 1.4mOhm)
5V & 3.3V	DC-DC Converters: 2x UBIQ Semiconductor QM3006D (30V, 57A @ 100°C, 5.5mOhm) & 2x Sync Power SPN3004D (30V, 68A @ 100°C, 4.2mOhm) PWM Controllers: ANPEC APW7159C
Filtering Capacitors	Electrolytic: 11x Nippon Chemi-Con (4-10,000h @ 105°C, KY), 2x Nippon Chemi-Con (4-10,000h @ 105°C, KYA), 2x Nippon Chemi-Con (5-6,000h @ 105°C, KZH), 6x Nichicon (4-10,000h @ 105°C, HE), 1x Nichicon (1,000h @ 105°C, VZ) Polymer: 18x FPCAP
Supervisor ICs	Weltrend WT7518D (OCP, SCP) & Sitronix ST9S429-PG14 (OVP, UVP, OCP, SCP, PG)
Fan Model	Enermax ED142512M-FA-1 (140mm, 12V, 0.25A, Twister Bearing Fan)
5VSB Circuit	-

Rectifier	-
Standby PWM Controller	Power Integrations TNY177PN

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)	88.616%
Average Noise Output (>1450 Load Combinations)	25.78dBA
Average PF (>1450 Load Combinations)	0.978
Efficiency With 10W (≤500W) or 2% (>500W) Load	65.335%
Standby Power Consumption	0.0845W
Non-Accredited	
12V Ripple (Full Load)	20.34mV
5V Ripple (Full Load)	15.41mV
3.3V Ripple (Full Load)	17.40mV
5VSB Ripple (Full Load)	17.04mV
12V Load Regulation	0.57%
5V Load Regulation	0.46%
3.3V Load Regulation	0.75%
5VSB Load Regulation	1.59%
Inrush Current	30.870A

230V

Accredited		
Average Efficiency (>1450 load combinations)	90.838%	
Average Noise Output (>1450 Load Combinations)	25.06dBA	
Average PF (>1450 Load Combinations)	0.934	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1242W	
Non-Accredited		
12V Ripple (Full Load)	20.69mV	
5V Ripple (Full Load)	15.04mV	
3.3V Ripple (Full Load)	17.70mV	
5VSB Ripple (Full Load)	16.57mV	
12V Load Regulation	0.57%	
5V Load Regulation	0.46%	
3.3V Load Regulation	0.75%	
5VSB Load Regulation	1.57%	
Inrush Current	66.870A	
Hold-Up Time & PWR_OK Signal	14.60ms	
AC Loss to PWR_OK Hold Up Time	14.30ms	
PWR_OK Inactive to DC Loss Delay	0.30ms	
PSU Timings: T1 (20% / 100%)	74.0ms	70.0ms
PSU Timings: T3 (20% / 100%)	364.0ms	368.0ms
OPP (0.00°C / 0.00°C)	139.51%	-

Hold-Up Time & PWR_OK Signal

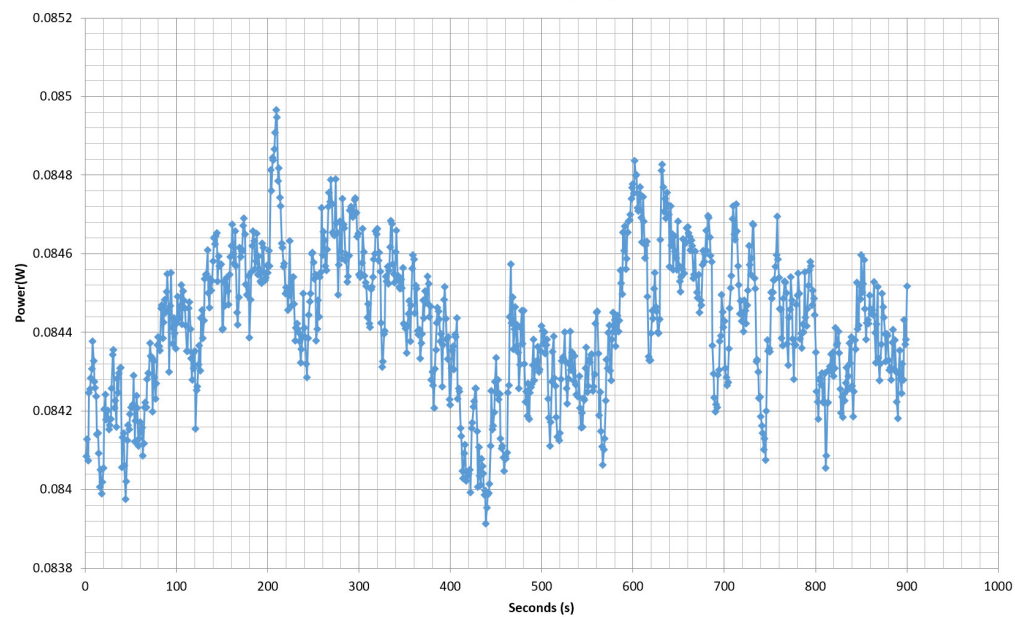
Hold-Up Time (ms)	14.6
AC Loss to PWR_OK Hold Up Time (ms)	14.3
PWR_OK Inactive to DC Loss Delay (ms)	0.3



Graphs

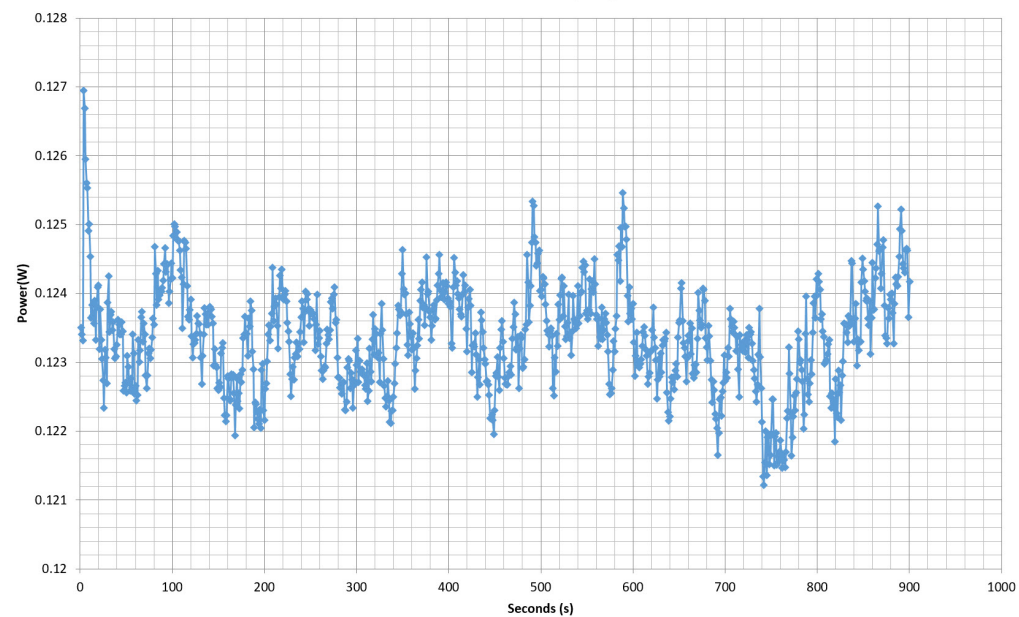
115V

Power - 18C7110160206 - 04/03/2020 - 10:59



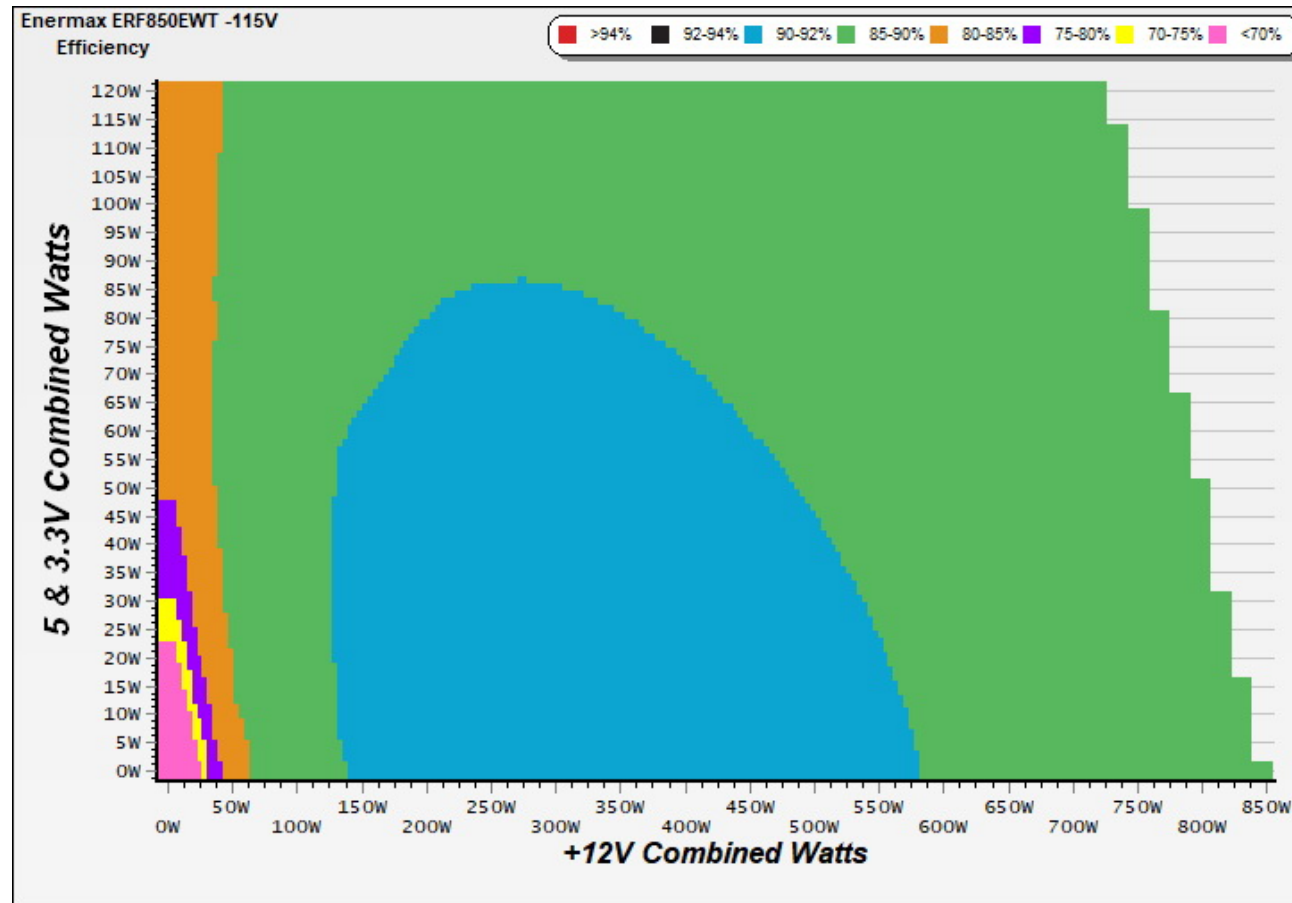
230V

Power - 18C7110160206 - 04/03/2020 - 10:59



Efficiency Graph

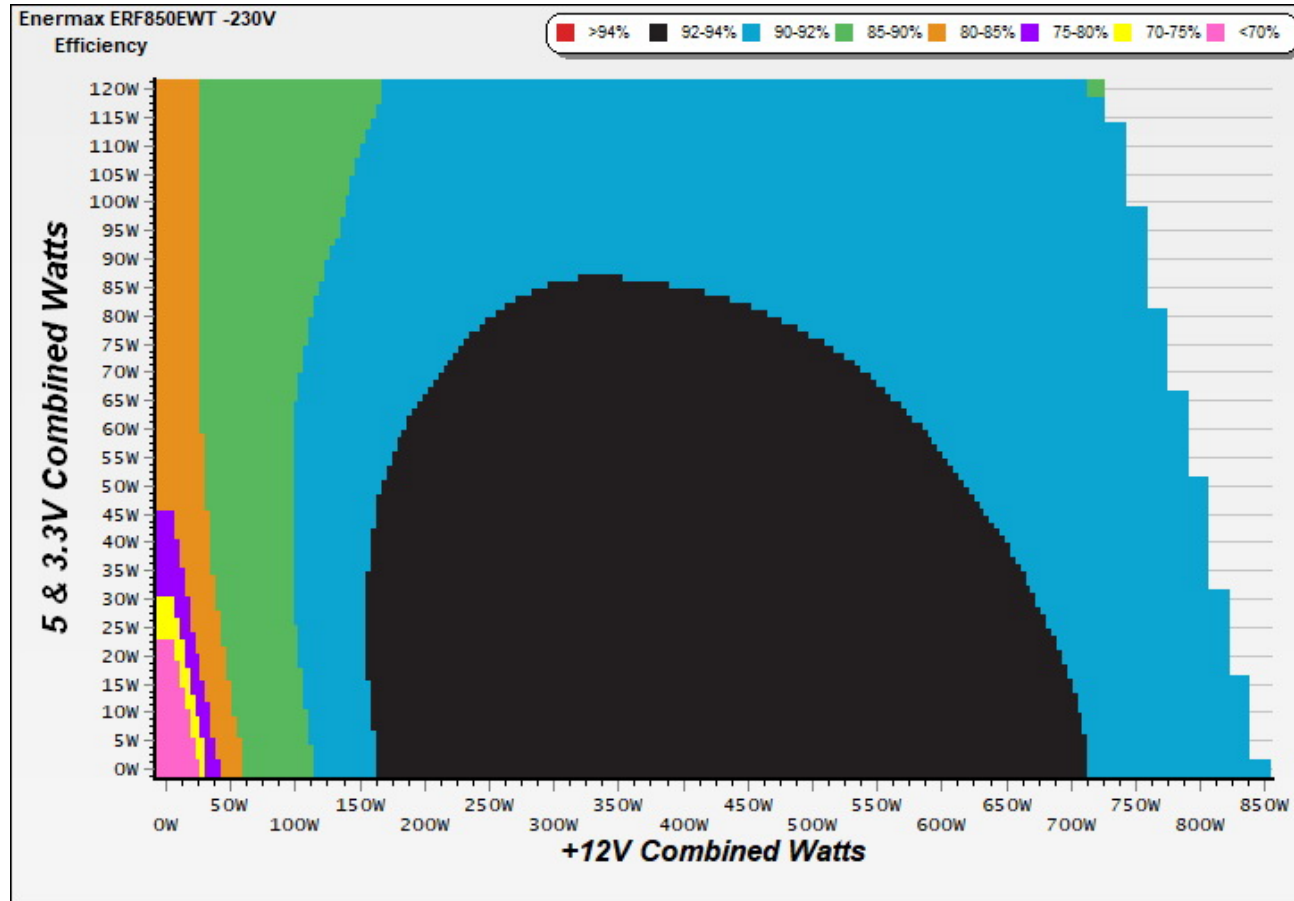
115V



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

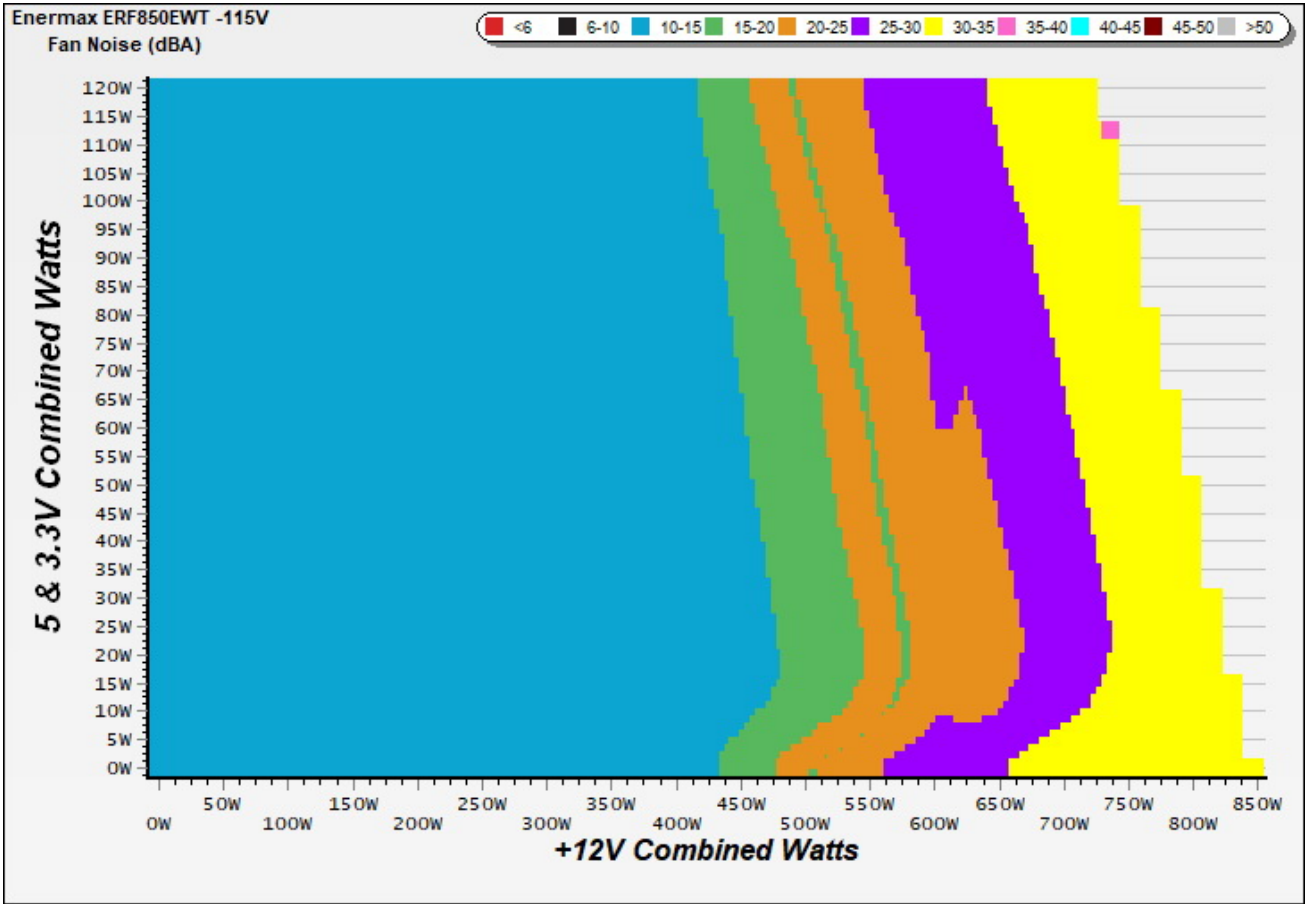


INFO

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

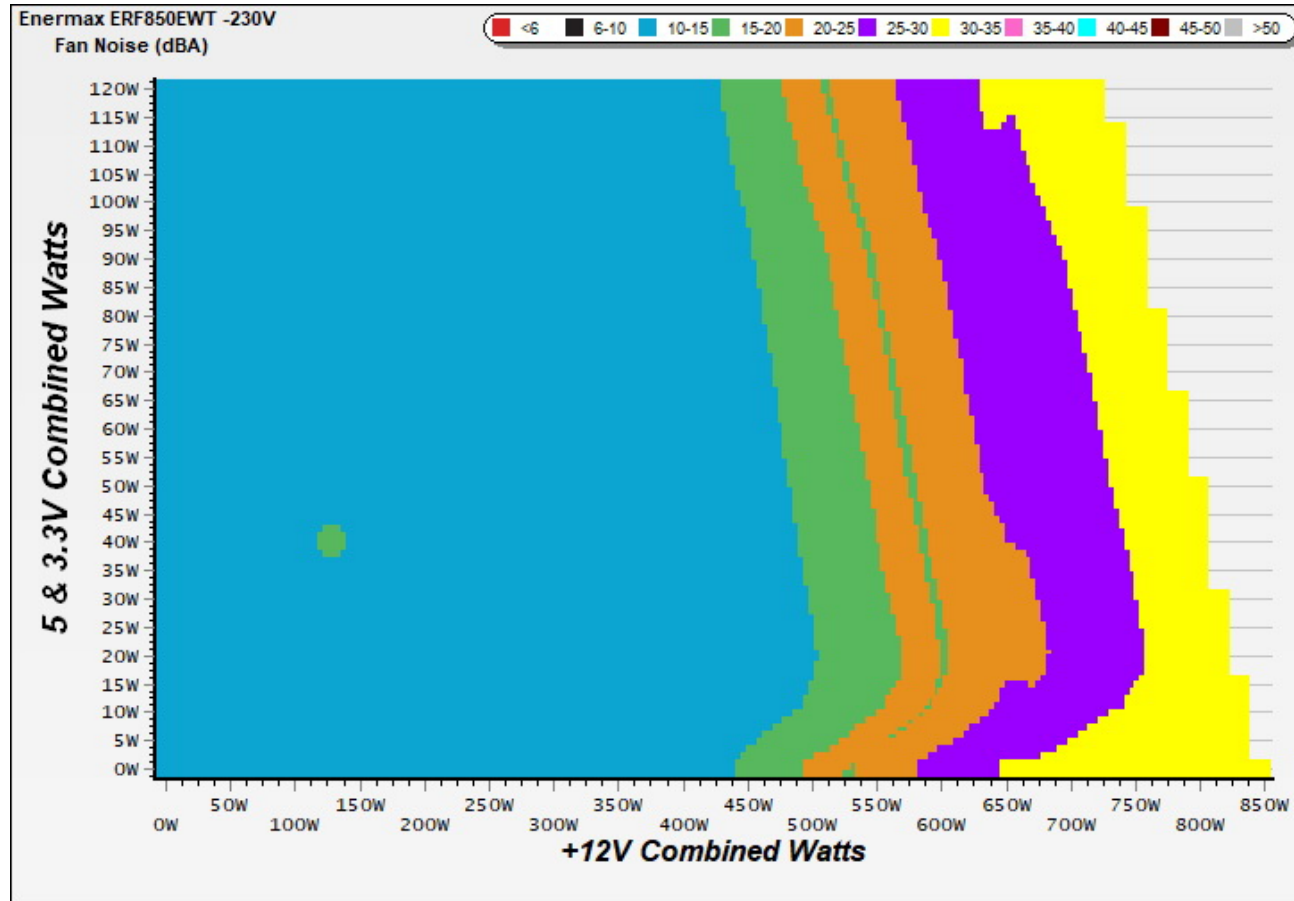
115V



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

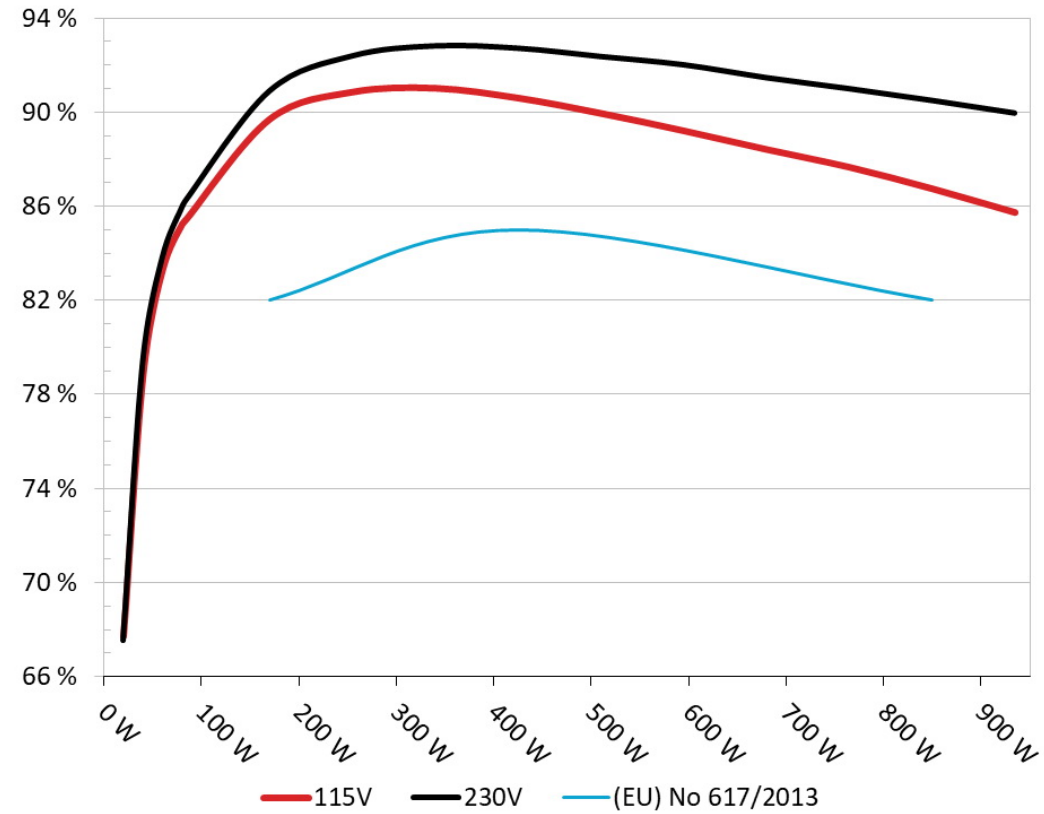
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

Indicative Performance

Efficiency under high ambient temperature

Efficiency: Enermax ERF850EWT

Ambient: 37°C - 47°C (98.6°F - 116.6°F)



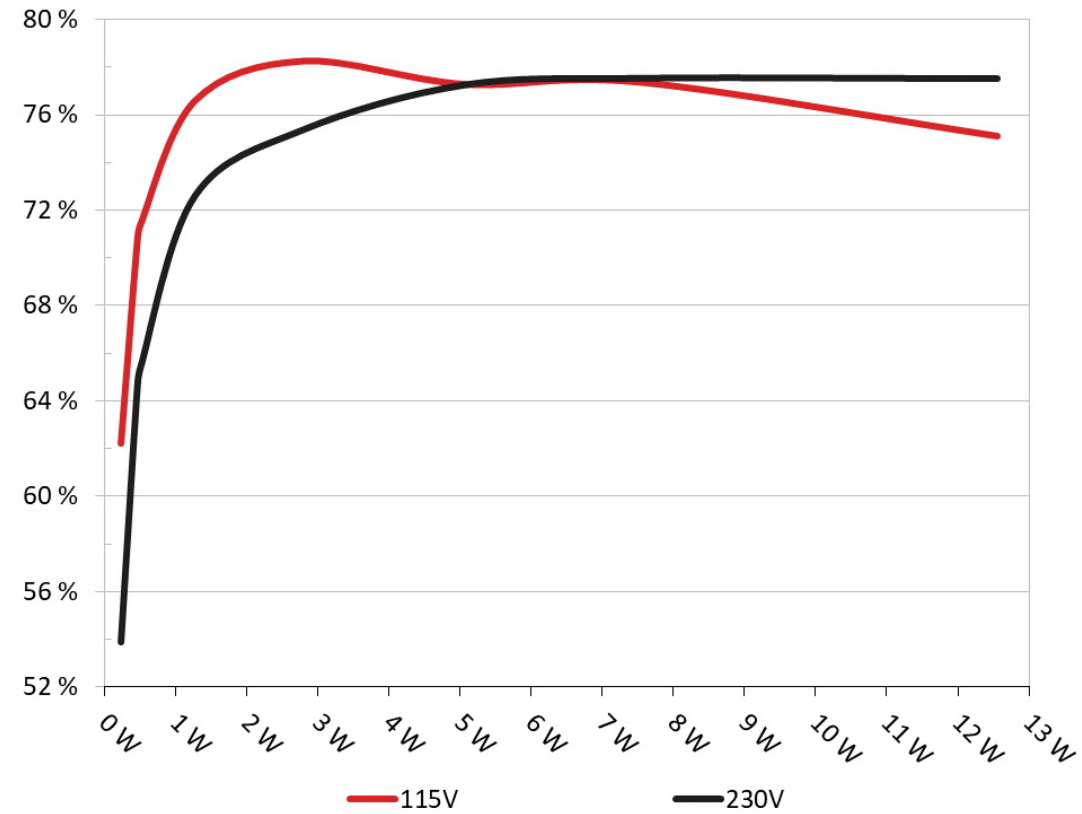
INFO

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: Enermax ERF850EWT

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	62.228%	0.037
	5.085V	0.368		115.11V
2	0.090A	0.458	70.679%	0.063
	5.084V	0.648		115.11V
3	0.550A	2.790	78.261%	0.264
	5.072V	3.565		115.11V
4	1.000A	5.061	77.291%	0.361
	5.061V	6.548		115.11V
5	1.500A	7.573	77.362%	0.413
	5.048V	9.789		115.11V
6	2.500A	12.560	75.115%	0.465
	5.024V	16.721		115.11V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	53.882%	0.153
	5.056V	0.425		230.24V
2	0.090A	0.458	64.507%	0.021
	5.084V	0.710		230.24V
3	0.550A	2.790	75.385%	0.102
	5.072V	3.701		230.24V
4	1.000A	5.061	77.267%	0.167
	5.061V	6.550		230.24V
5	1.500A	7.573	77.552%	0.225
	5.048V	9.765		230.24V
6	2.500A	12.561	77.537%	0.301
	5.024V	16.200		230.24V

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	5.264A	2.006A	1.995A	0.989A	84.961	85.476%	408	13.1	40.41°C	0.964
	12.035V	4.986V	3.310V	5.059V	99.397				43.25°C	115.10V
2	11.557A	3.010A	2.993A	1.188A	170.024	89.701%	407	13.1	40.84°C	0.980
	12.038V	4.984V	3.307V	5.052V	189.546				44.23°C	115.10V
3	18.203A	3.512A	3.496A	1.388A	255.032	90.852%	405	12.0	41.09°C	0.983
	12.030V	4.981V	3.305V	5.045V	280.710				45.49°C	115.10V
4	24.858A	4.017A	3.996A	1.588A	340.046	91.014%	402	12.0	41.92°C	0.979
	12.022V	4.980V	3.303V	5.038V	373.619				47.32°C	115.10V
5	31.168A	5.025A	5.001A	1.789A	424.933	90.598%	423	12.6	42.42°C	0.978
	12.013V	4.977V	3.300V	5.030V	469.031				48.43°C	115.10V
6	37.456A	6.031A	6.008A	1.991A	509.472	89.951%	728	20.9	42.50°C	0.980
	12.005V	4.975V	3.297V	5.023V	566.386				49.39°C	115.10V
7	43.822A	7.040A	7.012A	2.194A	594.806	89.207%	1086	30.3	43.26°C	0.982
	11.996V	4.973V	3.295V	5.015V	666.768				50.62°C	115.10V
8	50.197A	8.003A	8.018A	2.397A	679.893	88.412%	1330	35.8	43.81°C	0.984
	11.987V	4.971V	3.292V	5.008V	769.005				51.98°C	115.10V
9	56.978A	8.556A	8.511A	2.398A	765.041	87.657%	1449	38.0	44.23°C	0.985
	11.979V	4.968V	3.289V	5.005V	872.763				53.33°C	115.10V
10	63.707A	9.062A	9.035A	2.500A	849.773	86.744%	1448	38.0	45.49°C	0.987
	11.970V	4.966V	3.287V	5.000V	979.632				54.74°C	115.10V
11	70.843A	9.066A	9.040A	2.501A	934.561	85.738%	1447	38.0	46.78°C	0.988
	11.961V	4.965V	3.285V	4.998V	1090.025				56.57°C	115.10V
CL1	0.100A	14.003A	13.997A	0.000A	116.919	82.030%	408	13.1	42.59°C	0.973
	12.032V	4.969V	3.296V	5.080V	142.532				48.54°C	115.12V

CL2	70.838A	1.001A	1.000A	1.000A	861.675	87.266%	1452	38.0	45.78°C	0.987
	11.976V	4.977V	3.296V	5.041V	987.411				54.96°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	5.264A	2.007A	1.994A	0.989A	84.965	86.296%	410	13.1	40.44°C	0.811
	12.036V	4.986V	3.309V	5.058V	98.458				43.47°C	230.23V
2	11.558A	3.011A	2.994A	1.188A	170.039	90.900%	410	13.1	40.69°C	0.907
	12.038V	4.983V	3.306V	5.051V	187.062				44.55°C	230.23V
3	18.202A	3.514A	3.497A	1.388A	255.046	92.391%	409	13.1	41.47°C	0.936
	12.031V	4.981V	3.304V	5.044V	276.051				46.34°C	230.23V
4	24.858A	4.016A	3.998A	1.588A	340.064	92.819%	408	13.1	41.63°C	0.948
	12.023V	4.979V	3.302V	5.037V	366.374				47.28°C	230.23V
5	31.168A	5.024A	5.001A	1.790A	424.962	92.718%	427	12.6	42.52°C	0.955
	12.014V	4.977V	3.300V	5.029V	458.340				49.04°C	230.23V
6	37.459A	6.032A	6.004A	1.991A	509.498	92.368%	713	19.0	42.50°C	0.959
	12.005V	4.975V	3.297V	5.022V	551.598				49.74°C	230.23V
7	43.825A	7.040A	7.013A	2.194A	594.795	92.017%	952	26.2	43.16°C	0.962
	11.995V	4.973V	3.294V	5.015V	646.396				50.93°C	230.23V
8	50.199A	8.003A	8.020A	2.397A	679.906	91.467%	1309	35.0	43.81°C	0.964
	11.987V	4.970V	3.291V	5.007V	743.333				52.32°C	230.23V
9	56.984A	8.556A	8.514A	2.398A	765.065	90.998%	1452	38.0	44.73°C	0.966
	11.978V	4.968V	3.289V	5.005V	840.750				53.76°C	230.23V
10	63.712A	9.065A	9.036A	2.500A	849.786	90.499%	1451	38.0	45.49°C	0.968
	11.969V	4.966V	3.287V	5.000V	938.998				54.74°C	230.23V
11	70.842A	9.067A	9.042A	2.502A	934.567	89.967%	1450	38.0	46.56°C	0.969
	11.961V	4.965V	3.285V	4.998V	1038.792				56.21°C	230.23V
CL1	0.101A	14.002A	13.999A	0.000A	116.918	82.969%	414	13.1	42.78°C	0.875
	12.032V	4.969V	3.295V	5.079V	140.917				49.65°C	230.23V

CL2	70.834A	1.001A	0.999A	1.000A	861.623	91.057%	1454	38.3	45.79°C	0.968
	11.976V	4.976V	3.296V	5.041V	946.250				55.07°C	230.23V

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	1.232A	0.501A	0.498A	0.197A	19.986	67.735%	412	13.1	0.819
	12.040V	4.990V	3.314V	5.081V	29.506				115.10V
2	2.466A	1.001A	0.995A	0.394A	39.976	78.815%	412	13.1	0.916
	12.039V	4.989V	3.312V	5.075V	50.721				115.09V
3	3.702A	1.503A	1.495A	0.592A	60.008	83.302%	411	13.1	0.953
	12.037V	4.987V	3.311V	5.070V	72.037				115.10V
4	4.932A	2.006A	1.994A	0.790A	79.960	85.232%	411	13.1	0.960
	12.035V	4.986V	3.310V	5.064V	93.814				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	1.233A	0.501A	0.497A	0.197A	19.994	67.559%	413	13.1	0.459
	12.042V	4.990V	3.313V	5.080V	29.595				230.23V
2	2.466A	1.002A	0.995A	0.394A	39.983	79.336%	412	13.1	0.624
	12.040V	4.988V	3.312V	5.074V	50.397				230.23V
3	3.702A	1.504A	1.495A	0.592A	60.014	83.801%	411	13.1	0.732
	12.038V	4.987V	3.310V	5.069V	71.615				230.23V
4	4.932A	2.005A	1.995A	0.790A	79.964	85.929%	410	13.1	0.798
	12.037V	4.986V	3.309V	5.063V	93.058				230.24V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	5.20mV	11.80mV	12.30mV	5.80mV	Pass
20% Load	23.80mV	12.20mV	12.80mV	7.40mV	Pass
30% Load	17.70mV	15.00mV	14.10mV	7.40mV	Pass
40% Load	12.80mV	13.00mV	15.20mV	9.90mV	Pass
50% Load	12.30mV	13.40mV	14.20mV	12.40mV	Pass
60% Load	12.20mV	13.80mV	14.40mV	18.00mV	Pass
70% Load	12.60mV	14.20mV	15.40mV	16.40mV	Pass
80% Load	12.70mV	15.40mV	16.60mV	19.70mV	Pass
90% Load	13.30mV	16.30mV	17.50mV	20.50mV	Pass
100% Load	20.30mV	15.40mV	17.40mV	17.00mV	Pass
110% Load	21.90mV	15.50mV	18.30mV	17.70mV	Pass
Crossload1	8.00mV	13.80mV	17.00mV	3.90mV	Pass
Crossload2	19.20mV	14.60mV	15.10mV	16.50mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	5.40mV	11.80mV	11.60mV	5.80mV	Pass
20% Load	22.90mV	11.90mV	12.30mV	8.80mV	Pass
30% Load	16.30mV	14.60mV	14.50mV	7.50mV	Pass
40% Load	12.90mV	12.80mV	13.20mV	11.50mV	Pass
50% Load	12.80mV	13.40mV	14.10mV	12.40mV	Pass
60% Load	11.80mV	13.50mV	14.10mV	16.10mV	Pass
70% Load	12.50mV	13.80mV	14.50mV	17.50mV	Pass
80% Load	12.20mV	16.00mV	15.40mV	20.20mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	13.50mV	16.10mV	16.50mV	19.60mV	Pass
100% Load	20.70mV	15.00mV	17.70mV	16.60mV	Pass
110% Load	21.80mV	16.10mV	17.40mV	18.10mV	Pass
Crossload1	7.90mV	13.50mV	16.70mV	3.80mV	Pass
Crossload2	19.50mV	14.70mV	14.70mV	17.20mV	Pass

The results above are not used in the certification process

Enermax Revolution D.F. 850W



Top side



Power specifications label

Cybenetics

ETA

LAMBDA

SAFE

DELTA

PHI

CYBENETICS LTD Syrou 6, Latsia, 2231, Nicosia Cyprus

www.cybenetics.com - info@cybenetics.com