Enermax Revolution D.F.12 850W

2412120180008

Lab ID EM85002391

Certification ID 252391

Test Result Report ID: 24PS2391A

Certificate Issue Date: Mar 22, 2024

Scheme: ETA-EMI PSU

115V



230V



Scheme: LAMBDA PSU

115V



230V





Outside Validation Scope



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.12 850W
OEM/ODM	RSY
Serial Number	2412120180008
Product Specifications	
Manufacturer-Provided Information	
□□□□ (Vrms)	100-240

□□□□ (Arms)	10
□□□□ (Hz)	50-60
□□□□ (W)	850
Operating Temperature (Continuous Full Load) (°C)	
□□	ATX12V
□□□□	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
□□	120mm Double Ball Bearing Fan (ZFB122512M)
□□□□□	✓
Cybenetics Testing Information	
Lab ID	EM85002391
Date of receipt	Feb 27, 2024
Testing Date	Mar 15, 2024
Report Issued Date	Mar 22, 2024
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

□□□□□
(Non-accredited measurements)

□□□□□				
□□	□□□□	□□□□□□	Gauge	In Cable Capacitors
ATX □□ 20+4 pin (600mm)	1	1	16-22AWG	□
4+4 pin EPS 12V □□ (700mm)	2	2	18AWG	□
6+2pin PCIe□□ (600mm)	3	3	18AWG	□
12+4 pin PCIe (600mm) (600W)	1	1	16-24AWG	□

SATA□□ (450mm+150mm+150mm+150mm)	2	8	18AWG	□
4-pin Molex (450mm+150mm+150mm+150mm)	1	4	18AWG	□
AC Power Cord (1100mm) - C13 coupler	1	1	18AWG	-

□□□□

□		3.3V	5V	12V	5VSB	-12V
□□□□	□□	20	20	70.8	3	0.4
	□	100		849.6	15	4.8
□□□□□ (W)		850				

Parts Description

General Data	
Manufacturer (OEM)	RSY
PCB Type	Double-Sided
Primary Side	
Transient Filter	2x Y caps, 1x X caps, 2x CM chokes, 1x MOV
Inrush Protection	1x NTC Thermistor & Relay
Bridge Rectifier(s)	1x
APFC MOSFETs	2x WayOn WML28N60C4 (650V, 23A @ 25°C, Rds(on): 0.16Ohm)
APFC Boost Diode	1x Maplesemi MSP08065G1 (650V, 27A @ 25°C)
Bulk Cap(s)	2x Rubycon (420V, 270uFeach or 540both, 3000h @ 105°C ,MXK)
Main Switchers	4x Convert CS13N50FF (500V, 13A , Rds(on): 0.46Ohm)
APFC Controller	1x Texas Instrument UCC28180 & SPN5003 (for no load consumption)
Topology	Primary side: APFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETs	4x HUAYI Microelectronics HYG020N04 (40V, 220A @ 25°C, Rds(on): 2.3mOhm)
5V & 3.3V	DC-DC Converters: 4x Fets PWM Controller(s): 2x ANPEC APW7164

Filtering Capacitors	Electrolytic: 1x Rubycon (4-10,000 @ 105°C, YXJ), 3x Rubycon (3-6,000 @ 105°C, YXS), 1x Rubycon (6-10000 @ 105°C, ZLH), Polymer: 4x CAPS , 11x United Chemi-Con ,26x Unicon
Supervisor IC	1S313I-SAG
Fan Model	ZIC ZFB122512M (120mm, 12V, 0.25A, Double Ball Bearing Fan)
5VSB Circuit	
High Side Rectifier	1x Shenzhen Foster Semiconductor FIR4N70BLG (700V, 2.5A @ 100°C, Rds(on):3mOhm)
Standby PWM Controller	INFSitronix IN2P070C

Test Results

Temperature & Compliance Info

□□□□ (°C /°F)	28-32 / 82.4-89.6
□□ ErP Lot3/6□□	✓
□□ (EU) No 617/2013□□	✓
ALPM (Alternative Low Power Mode) compatible	✓
ATX v3.1 PSU Power Excursion	✓

Performance Summary

115V

Accredited	
□□□□ (>1450 load combinations)	89.589%
Average Noise Output (>1450 Load Combinations)	37.87dBA
PF□□□ (>1450 Load Combinations)	0.990
Efficiency With 10W (≤500W) or 2% (>500W) Load	73.475%
□□□□□□	0.0734W
Non-Accredited	
12V Ripple (Full Load)	23.82mV

5V Ripple (Full Load)	15.40mV
3.3V Ripple (Full Load)	15.61mV
5VSB Ripple (Full Load)	18.18mV
12V Load Regulation	0.28%
5V Load Regulation	1.30%
3.3V Load Regulation	2.35%
5VSB Load Regulation	2.96%
Inrush Current	32.460A

230V

Accredited	
□□□□ (>1450 load combinations)	91.668%
Average Noise Output (>1450 Load Combinations)	37.49dBA
PF□□□ (>1450 Load Combinations)	0.949
Efficiency With 10W (≤500W) or 2% (>500W) Load	73.160%
□□□□□□	0.1460W
Non-Accredited	
12V Ripple (Full Load)	25.60mV
5V Ripple (Full Load)	16.01mV
3.3V Ripple (Full Load)	16.32mV
5VSB Ripple (Full Load)	17.22mV
12V Load Regulation	0.28%
5V Load Regulation	1.32%
3.3V Load Regulation	2.35%
5VSB Load Regulation	2.94%
Inrush Current	65.300A
12V Transient Response (200%)	11.49V
5V Transient Response (200%)	4.867V
3.3V Transient Response (200%)	3.166V
5VSB Transient Response (200%)	4.949V
□□□□ & PG□□	21.00ms
AC Loss to PWR_OK Hold Up Time	19.30ms

PWR_OK Inactive to DC Loss Delay		1.70ms
PSU Timings: T1 (20% / 100%)	110.0ms	118.0ms
PSU Timings: T3 (20% / 100%)	124.0ms	123.0ms
OPP (26.43°C / 43.18°C)	134.76%	117.40%

□□□□ & PG□□

Hold-Up Time (ms)	21
AC Loss to PWR_OK Hold Up Time (ms)	19.3
PWR_OK Inactive to DC Loss Delay (ms)	1.7

□□□□

Tables

115V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	115.12 V	115.10 V	113.85 V	115.15 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.97 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.415	1.415	1.340	1.416	1.490	PASS
Mains Voltage THD:	0.13 %	0.11 %	N/A	0.14 %	2.00 %	PASS
Real Power:	0.073 W	0.064 W	N/A	0.087 W	N/A	N/A
Apparent Power:	8.541 W	8.538 W	N/A	8.547 W	N/A	N/A
Power Factor:	0.009	N/A	N/A	N/A	N/A	N/A

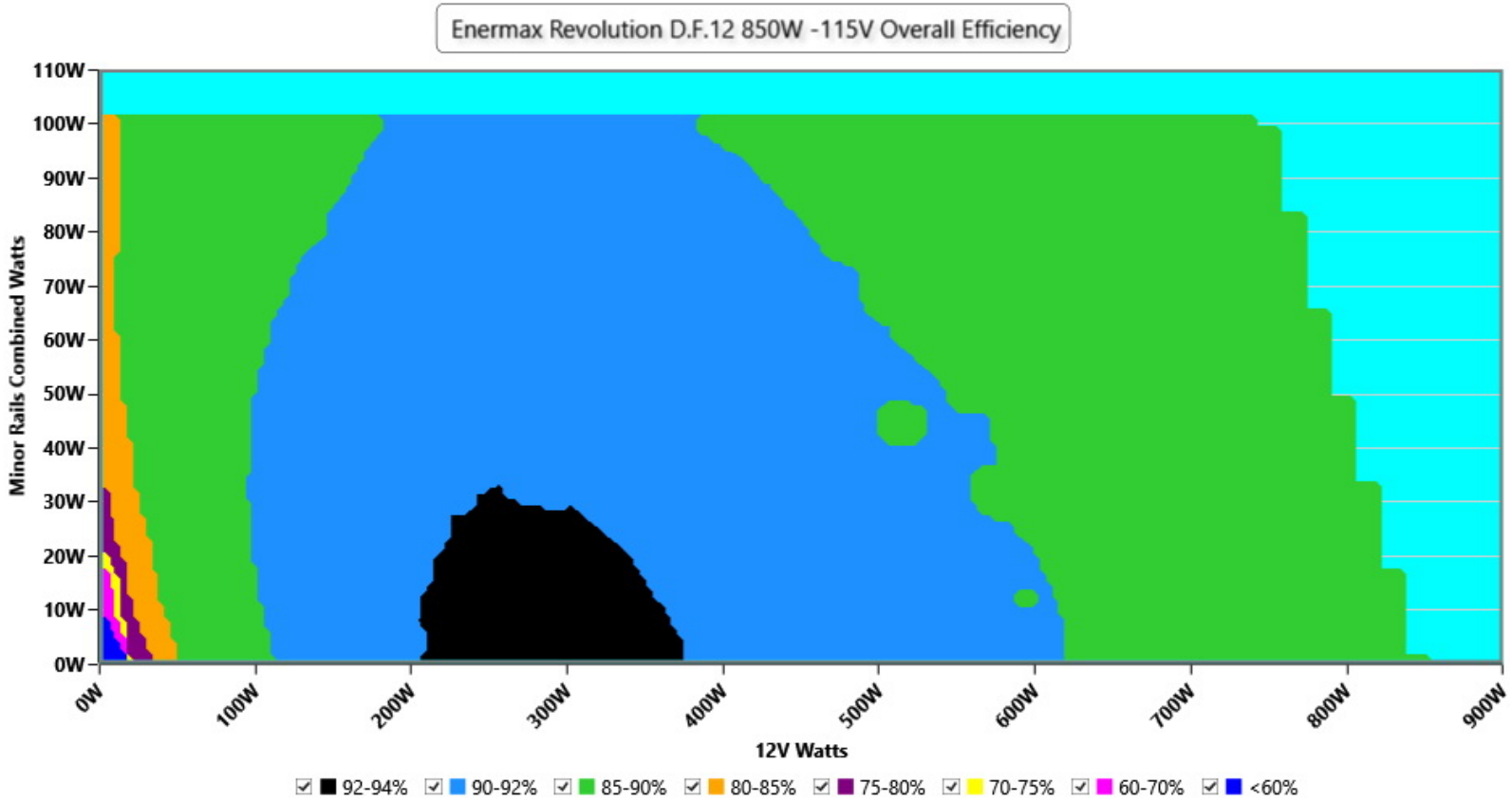
230V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	230.34 V	230.33 V	227.70 V	230.37 V	232.30 V	PASS

Mains Frequency:	50.00 Hz	50.00 Hz	49.50 Hz	50.01 Hz	50.50 Hz	PASS
Mains Voltage CF:	1.415	1.415	1.340	1.416	1.490	PASS
Mains Voltage THD:	0.14 %	0.13 %	N/A	0.16 %	2.00 %	PASS
Real Power:	0.146 W	0.125 W	N/A	0.188 W	N/A	N/A
Apparent Power:	28.599 W	28.586 W	N/A	28.613 W	N/A	N/A
Power Factor:	0.005	N/A	N/A	N/A	N/A	N/A

□□□□□□

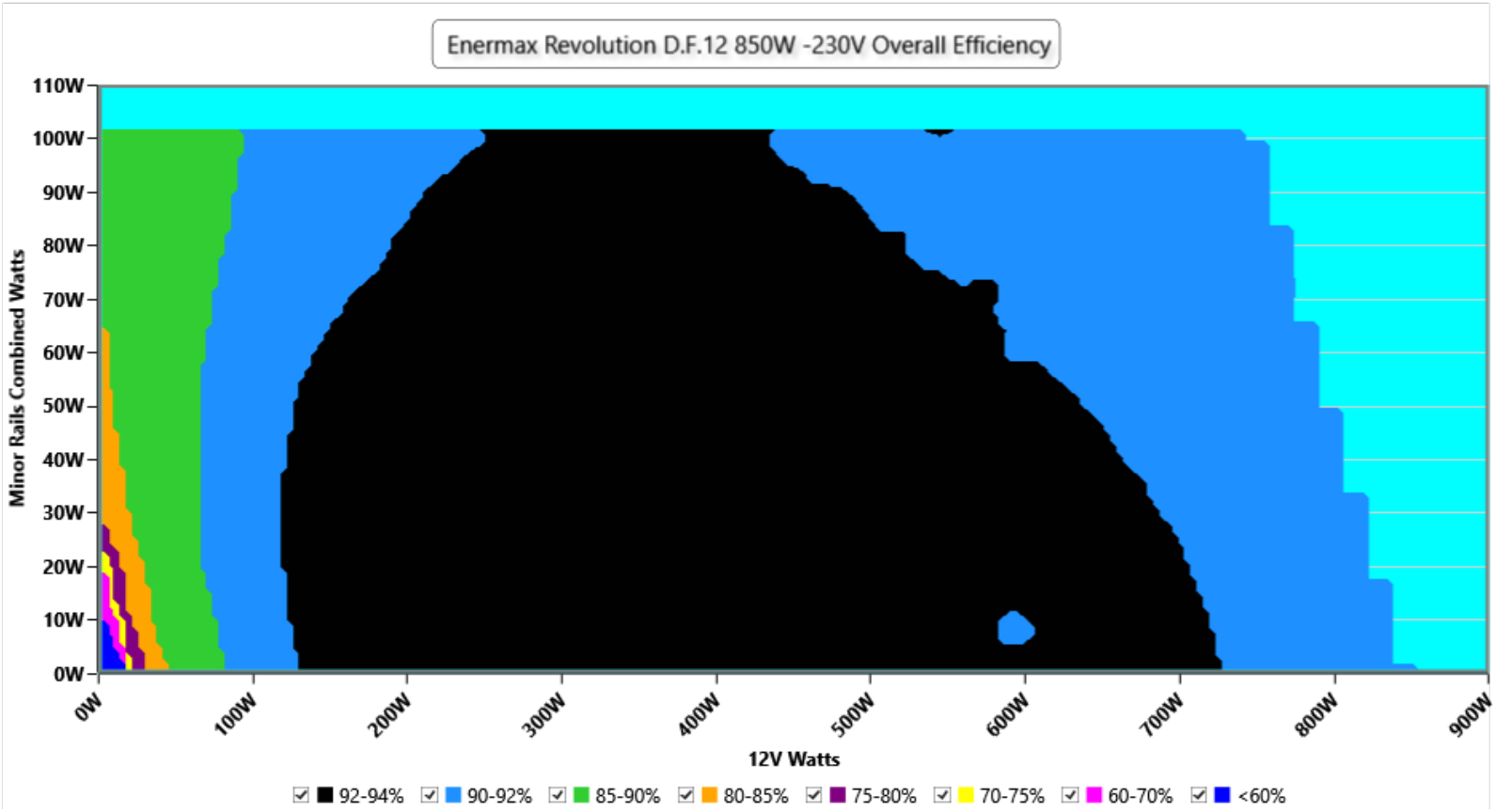
115V



□□

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



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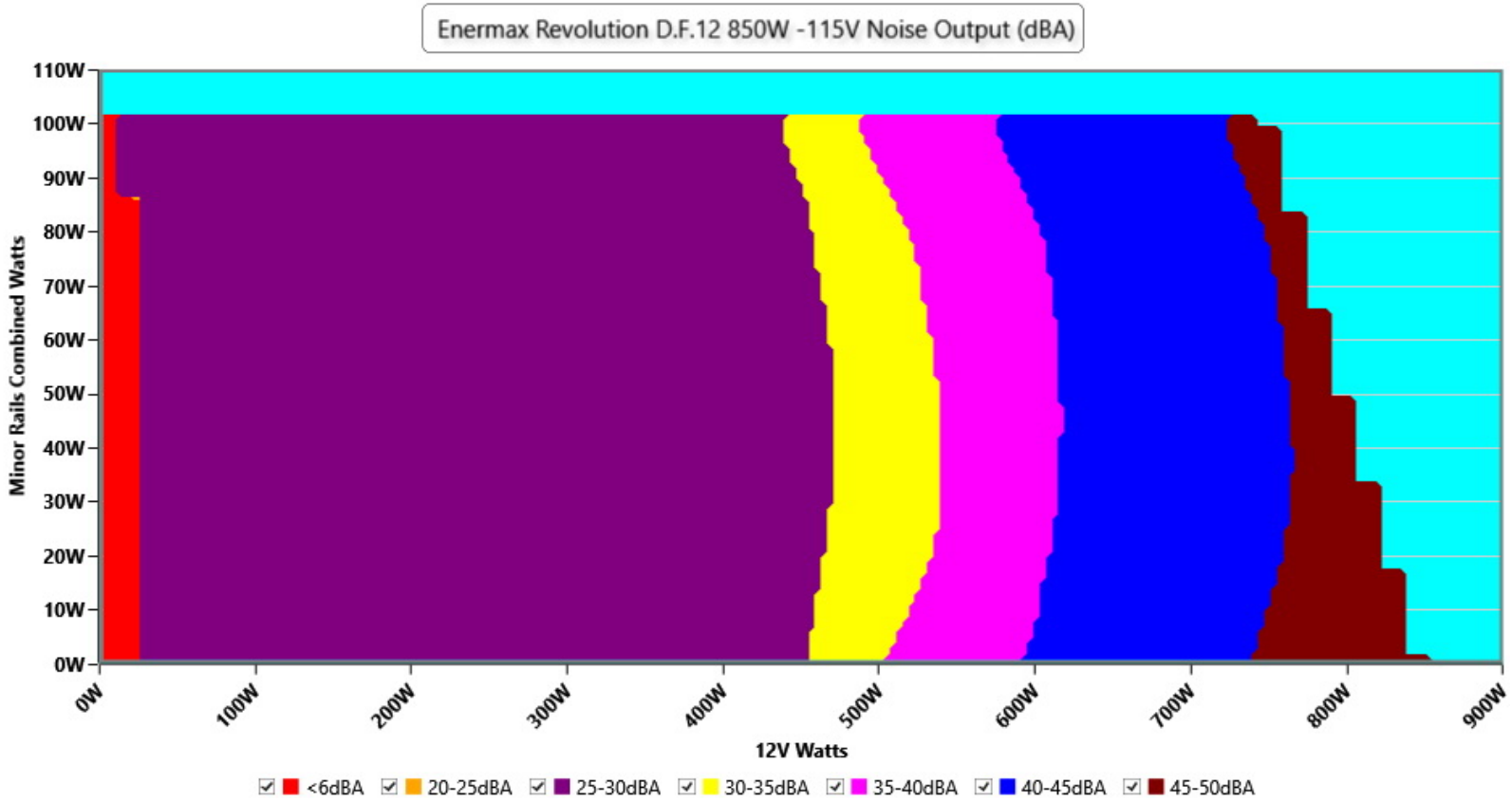
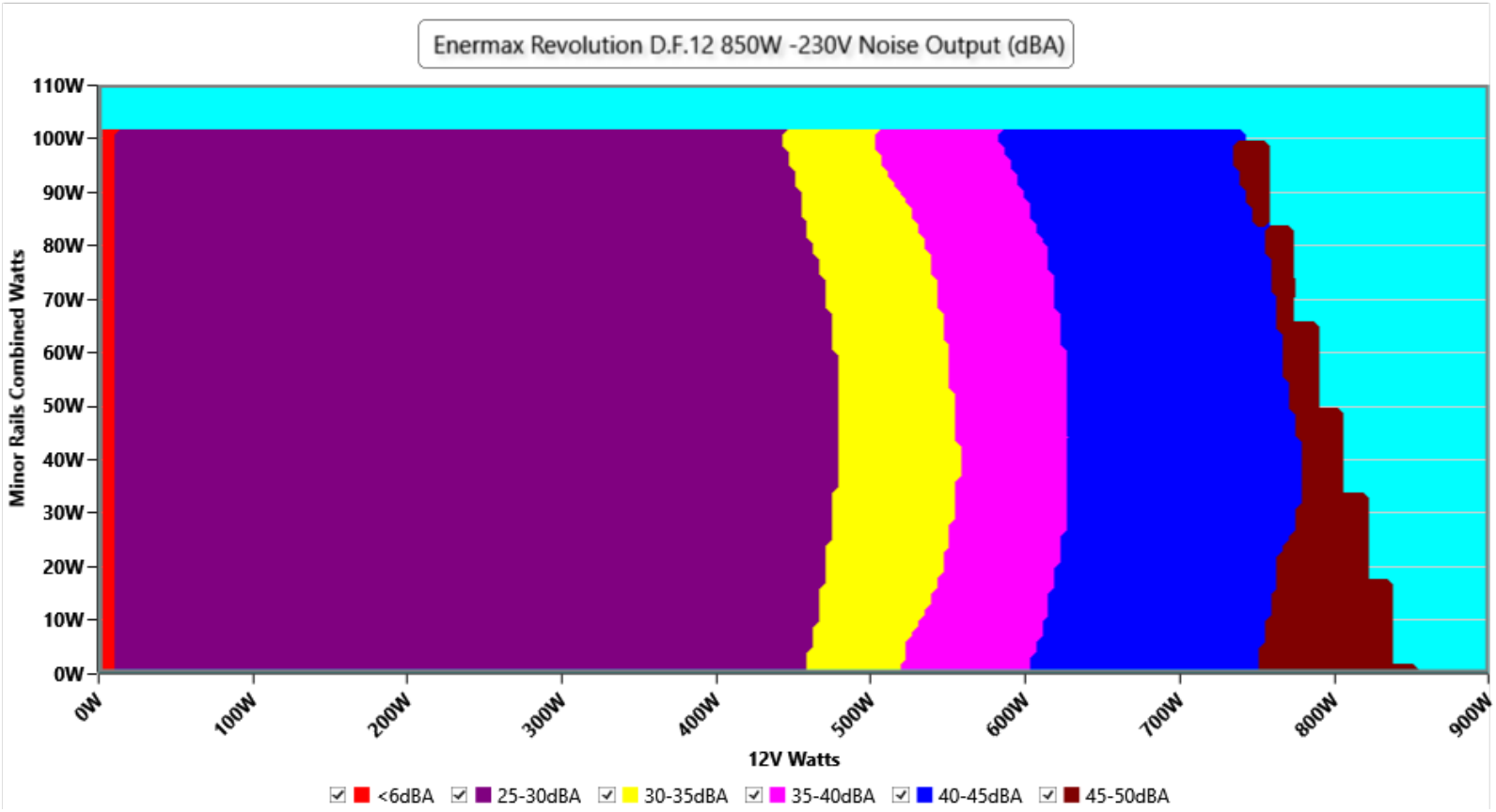
115V



□□

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



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

Noise under high ambient temperature (indicative)

115V

Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 44.5 °C	0 RPM · <6.0 dB(A) · 44.5 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 45.0 °C	0 RPM · <6.0 dB(A) · 45.0 °C	fan off in both
50%	916 RPM · 27.1 dB(A) · 42.3 °C	916 RPM · 27.1 dB(A) · 42.3 °C	**+0.0 dB(A)**
100%	2175 RPM · 47.6 dB(A) · 45.4 °C	2175 RPM · 47.6 dB(A) · 45.4 °C	**+0.0 dB(A)**

230V

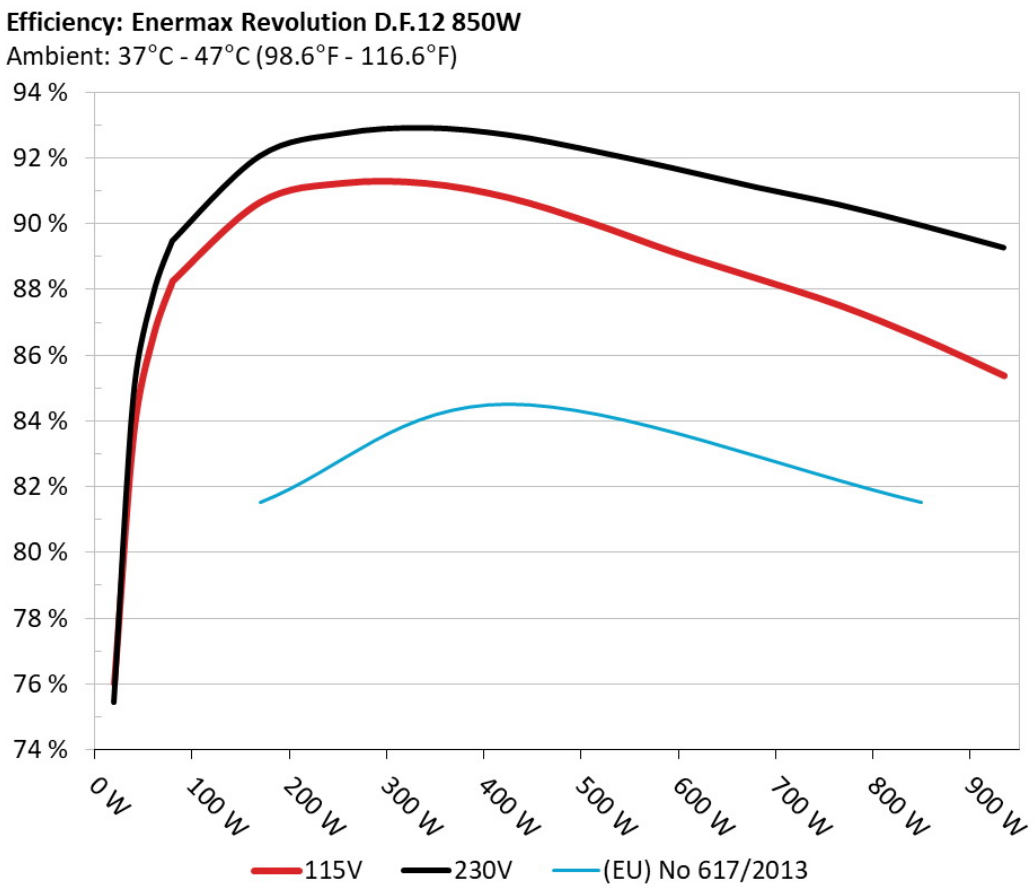
Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 44.5 °C	0 RPM · <6.0 dB(A) · 44.5 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 45.0 °C	0 RPM · <6.0 dB(A) · 45.0 °C	fan off in both
50%	918 RPM · 27.1 dB(A) · 42.2 °C	918 RPM · 27.1 dB(A) · 42.2 °C	**+0.0 dB(A)**
100%	2177 RPM · 47.7 dB(A) · 45.4 °C	2177 RPM · 47.7 dB(A) · 45.4 °C	**+0.0 dB(A)**

INFO

Fan speed, noise and the measured intake temperature at 10, 20, 50 and 100 % load, from the two load regulation tests: at normal ambient (about 30-32 °C) and at high ambient (about 40-47 °C). These are stabilized readings at fixed loads, not averages over the certification sweep, so they are indicative of how the fan behaves when it is hot. "<6.0" is the floor of our sound meter: the fan is stopped or too quiet to measure (the fan speed column says which); with the fan stopped, the intake sensor can read higher than the chamber air.

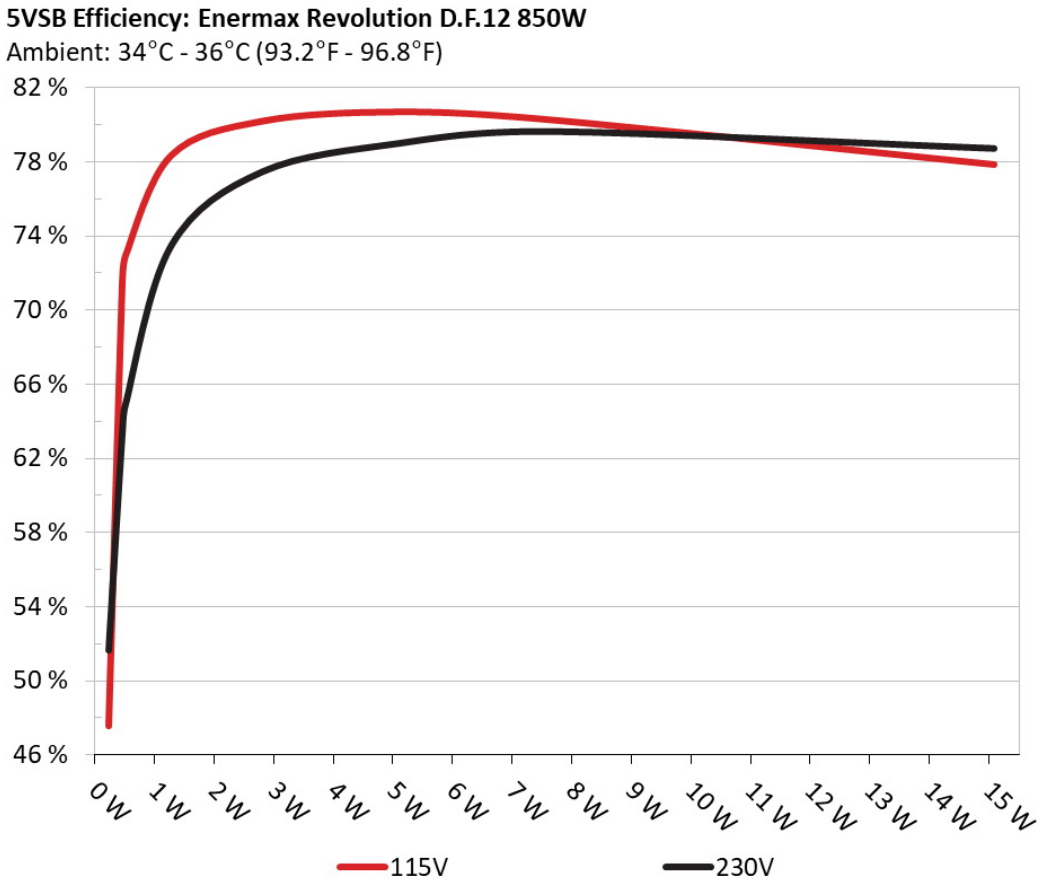
Informational. Not part of the ETA or LAMBDA rating.

Indicative Performance



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□□□□



□□

This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input

□□□□ □□ 5Vsb □□ (ErP Lot3/6 & CEC)

115V

□□ #	5VSB	DC/AC (□)	□□	PF/AC □□
1	0.045A	0.23W	48.033%	0.03
	5.113V	0.258W		115.17V
2	0.09A	0.46W	72.222%	0.073
	5.111V	0.637W		115.16V
3	0.55A	2.804W	80.663%	0.277
	5.098V	3.477W		115.17V
4	1A	5.087W	81.166%	0.35
	5.085V	6.267W		115.16V
5	1.5A	7.61W	80.75%	0.393
	5.072V	9.425W		115.16V
6	3A	15.092W	78.326%	0.452
	5.03V	19.27W		115.16V

230V

□□ #	5VSB	DC/AC (□)	□□	PF/AC □□
1	0.045A	0.23W	52.143%	0.015
	5.116V	0.442W		230.4V
2	0.09A	0.46W	63.973%	0.025
	5.112V	0.719W		230.4V
3	0.55A	2.804W	77.936%	0.117
	5.097V	3.597W		230.4V
4	1A	5.087W	79.465%	0.187
	5.085V	6.404W		230.4V
5	1.5A	7.609W	80.109%	0.24
	5.072V	9.497W		230.4V
6	3A	15.091W	79.198%	0.33
	5.03V	19.054W		230.4V

Supplementary Tests (For Reference)

10-110%□□□□

115V

□□	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
10%	5.233A	2.01A	1.999A	0.984A	85.008	88.735%	0	<6.0	44.49°C	0.977
	12.116V	4.977V	3.302V	5.083V	95.8				40.48°C	115.16V
20%	11.482A	3.018A	3.005A	1.184A	169.979	91.136%	0	<6.0	45.01°C	0.985
	12.112V	4.971V	3.295V	5.071V	186.51				40.67°C	115.14V
30%	18.081A	3.526A	3.513A	1.384A	254.99	91.713%	916	27.1	41.18°C	0.991
	12.108V	4.965V	3.288V	5.059V	278.034				45.95°C	115.11V
40%	24.694A	4.033A	4.023A	1.586A	340.081	91.709%	916	27.1	41.76°C	0.993
	12.103V	4.96V	3.281V	5.047V	370.824				46.79°C	115.09V
50%	30.956A	5.048A	5.042A	1.788A	425.097	91.272%	916	27.1	42.28°C	0.994
	12.100V	4.954V	3.273V	5.034V	465.745				47.82°C	115.07V
60%	37.186A	6.066A	6.065A	1.992A	509.632	90.51%	1245	33.7	42.77°C	0.994
	12.097V	4.947V	3.265V	5.021V	563.068				48.79°C	115.04V
70%	43.483A	7.086A	7.093A	2.197A	594.964	89.614%	1609	41.5	43.19°C	0.994
	12.093V	4.941V	3.257V	5.008V	663.921				50.21°C	115.02V
80%	49.786A	8.109A	8.126A	2.301A	679.808	88.822%	1863	44.6	43.77°C	0.995
	12.089V	4.933V	3.249V	4.998V	765.358				51.86°C	114.99V
90%	56.493A	8.626A	8.637A	2.406A	765.264	88%	2091	47.2	44.48°C	0.995
	12.086V	4.928V	3.242V	4.988V	869.614				53.54°C	114.96V
100%	62.931A	9.146A	9.183A	3.023A	850.078	86.993%	2175	47.6	45.42°C	0.994
	12.082V	4.921V	3.234V	4.962V	977.18				55.51°C	114.93V
110%	69.241A	10.177A	10.324A	3.028A	934.666	85.855%	2173	47.6	46.75°C	0.994
	12.079V	4.914V	3.225V	4.954V	1088.655				57.69°C	114.92V
CL1	0.116A	12.14A	12.107A	0A	101.318	83.701%	921	27.2	40.46°C	0.978
	12.112V	4.959V	3.279V	5.104V	121.048				45.98°C	115.15V

CL2	0.116A	20.184A	0A	0A	101.407	81.995%	932	27.7	40.58°C	0.978
	12.113V	4.954V	3.3V	5.109V	123.675				47.61°C	115.15V
CL3	0.116A	0A	20.181A	0A	67.398	77.349%	914	27	40.07°C	0.978
	12.108V	4.974V	3.27V	5.102V	87.138				49.16°C	115.16V
CL4	70.352A	0A	0A	0A	849.798	87.788%	2183	47.7	45.23°C	0.994
	12.080V	4.94V	3.257V	5.062V	968.017				56.19°C	114.94V

The results above are not used in the certification process

230V

□□	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
10%	5.233A	2.009A	1.999A	0.984A	85.006	89.964%	0	<6.0	44.52°C	0.833
	12.116V	4.978V	3.302V	5.083V	94.487				40.46°C	230.38V
20%	11.481A	3.018A	3.005A	1.183A	169.964	92.545%	0	<6.0	44.98°C	0.931
	12.112V	4.971V	3.295V	5.071V	183.657				40.69°C	230.38V
30%	18.079A	3.525A	3.513A	1.384A	254.975	93.231%	917	27.1	41.23°C	0.959
	12.109V	4.966V	3.288V	5.059V	273.487				46.05°C	230.37V
40%	24.694A	4.033A	4.023A	1.586A	340.066	93.402%	918	27.1	41.74°C	0.97
	12.102V	4.96V	3.281V	5.047V	364.089				46.79°C	230.36V
50%	30.956A	5.048A	5.042A	1.788A	425.07	93.185%	918	27.1	42.19°C	0.971
	12.100V	4.954V	3.273V	5.034V	456.16				47.69°C	230.35V
60%	37.184A	6.066A	6.065A	1.992A	509.603	92.721%	1249	33.8	42.8°C	0.97
	12.096V	4.947V	3.265V	5.021V	549.611				48.87°C	230.35V
70%	43.484A	7.087A	7.094A	2.197A	594.945	92.176%	1581	41.3	43.34°C	0.969
	12.092V	4.94V	3.257V	5.008V	645.442				50.37°C	230.33V
80%	49.787A	8.109A	8.127A	2.302A	679.791	91.598%	1868	44.6	43.85°C	0.97
	12.089V	4.933V	3.248V	4.997V	742.145				52.1°C	230.33V
90%	56.491A	8.626A	8.638A	2.406A	765.246	91.069%	2104	47.1	44.64°C	0.97
	12.086V	4.927V	3.241V	4.988V	840.295				53.65°C	230.31V
100%	62.930A	9.146A	9.184A	3.024A	850.06	90.437%	2177	47.7	45.36°C	0.969
	12.082V	4.921V	3.234V	4.962V	939.954				55.44°C	230.3V

110%	69.233A	10.176A	10.323A	3.028A	934.579	89.762%	2184	47.7	46.57°C	0.968
	12.080V	4.914V	3.225V	4.954V	1041.178				57.55°C	230.3V
CL1	0.116A	12.14A	12.108A	0A	101.312	85.392%	922	27.3	41.32°C	0.872
	12.112V	4.959V	3.279V	5.103V	118.642				46.8°C	230.4V
CL2	0.116A	20.185A	0A	0A	101.405	83.214%	932	27.7	40.46°C	0.876
	12.113V	4.954V	3.3V	5.109V	121.862				47.54°C	230.4V
CL3	0.116A	0.017A	20.169A	0.011A	67.479	77.672%	911	27	40.22°C	0.822
	12.112V	4.973V	3.269V	5.103V	86.847				49.27°C	230.4V
CL4	70.366A	0A	0A	0A	849.787	91.269%	2190	47.8	45.62°C	0.969
	12.077V	4.94V	3.258V	5.063V	931.079				56.59°C	230.31V

The results above are not used in the certification process

20-80□□□□□

115V

□□	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
20W	1.226A	0.502A	0.498A	0.196A	20.009	76.489%	0	<6.0	39.79°C	0.847
	12.116V	4.985V	3.31V	5.109V	26.16				36.75°C	115.18V
40W	2.698A	0.702A	0.698A	0.294A	40.006	84.096%	0	<6.0	41.14°C	0.926
	12.116V	4.983V	3.308V	5.105V	47.573				37.76°C	115.17V
60W	4.171A	0.904A	0.898A	0.392A	60.005	87.043%	0	<6.0	42.37°C	0.959
	12.115V	4.982V	3.307V	5.101V	68.936				38.56°C	115.17V
80W	5.640A	1.105A	1.099A	0.491A	79.974	89.16%	0	<6.0	43.24°C	0.977
	12.115V	4.98V	3.305V	5.098V	89.696				39.26°C	115.16V

The results above are not used in the certification process

230V

□□	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
20W	1.226A	0.501A	0.498A	0.196A	20.002	75.947%	0	<6.0	39.68°C	0.534
	12.114V	4.986V	3.31V	5.108V	26.335				36.67°C	230.37V
40W	2.698A	0.702A	0.698A	0.294A	40.001	85.234%	0	<6.0	40.78°C	0.69
	12.113V	4.985V	3.309V	5.104V	46.931				37.51°C	230.37V
60W	4.172A	0.903A	0.898A	0.392A	60	88.302%	0	<6.0	42.16°C	0.765
	12.113V	4.983V	3.307V	5.101V	67.949				38.67°C	230.37V
80W	5.640A	1.104A	1.098A	0.491A	79.956	90.21%	0	<6.0	42.87°C	0.821
	12.113V	4.981V	3.305V	5.097V	88.632				39.02°C	230.38V

The results above are not used in the certification process

□□□□

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.68mV	7.40mV	4.63mV	8.26mV	Pass
20% Load	8.24mV	7.91mV	5.04mV	9.27mV	Pass
30% Load	9.87mV	9.28mV	6.10mV	10.50mV	Pass
40% Load	11.15mV	10.20mV	6.76mV	10.34mV	Pass
50% Load	12.82mV	10.46mV	7.32mV	11.41mV	Pass
60% Load	14.86mV	10.92mV	8.34mV	11.87mV	Pass
70% Load	16.03mV	11.99mV	9.36mV	12.53mV	Pass
80% Load	16.13mV	13.93mV	13.22mV	13.55mV	Pass
90% Load	17.20mV	13.82mV	14.09mV	16.05mV	Pass
100% Load	23.82mV	15.40mV	15.61mV	18.18mV	Pass
110% Load	25.08mV	17.25mV	16.19mV	20.86mV	Pass
Crossload1	15.32mV	14.99mV	12.74mV	20.28mV	Pass
Crossload2	10.99mV	16.93mV	7.73mV	19.92mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
Crossload3	13.74mV	11.88mV	14.75mV	17.58mV	Pass
Crossload4	20.59mV	10.50mV	10.60mV	16.43mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.28mV	7.35mV	4.53mV	8.30mV	Pass
20% Load	8.55mV	8.01mV	5.49mV	10.09mV	Pass
30% Load	9.92mV	8.77mV	6.00mV	11.16mV	Pass
40% Load	11.19mV	9.28mV	6.82mV	9.99mV	Pass
50% Load	12.77mV	9.85mV	7.43mV	10.85mV	Pass
60% Load	14.09mV	11.02mV	8.14mV	12.02mV	Pass
70% Load	15.27mV	12.29mV	9.46mV	12.79mV	Pass
80% Load	15.82mV	13.82mV	13.17mV	12.79mV	Pass
90% Load	17.25mV	14.13mV	13.68mV	15.08mV	Pass
100% Load	25.60mV	16.01mV	16.32mV	17.22mV	Pass
110% Load	27.34mV	17.10mV	16.76mV	18.87mV	Pass
Crossload1	15.15mV	15.11mV	13.99mV	20.50mV	Pass
Crossload2	10.18mV	17.40mV	8.04mV	19.92mV	Pass
Crossload3	14.45mV	12.19mV	14.55mV	18.49mV	Pass
Crossload4	21.72mV	10.56mV	11.14mV	16.00mV	Pass

The results above are not used in the certification process

Enermax Revolution D.F.12 850W



Top side



Power specifications label

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