



Enermax Revolution SFX 650W

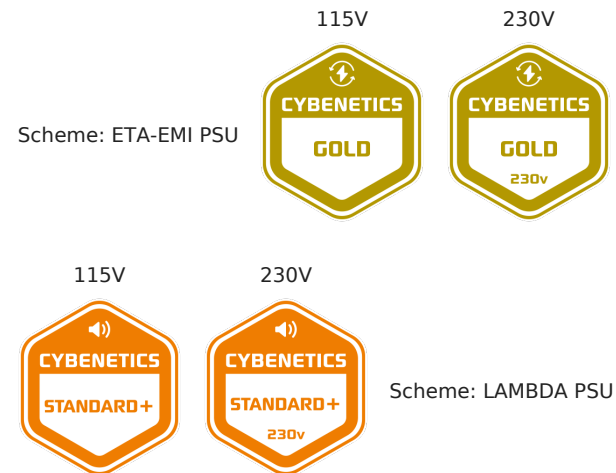
Serial Number 1695080010300

Lab ID 120

Certification ID 25120

Test Result Report ID:

Certificate Issue Date: Jul 6, 2018



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

Aristeidis Bitziopoulos, Certification Body General Manager

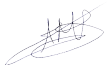
General Information

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 SFX 650W
OEM/ODM	Channel Well Technology
Serial Number	1695080010300
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	8-4
Rated Frequency (Hz)	47-63

Rated Power (W)	650
Operating Temperature (Continuous Full Load) (°C)	
Type	SFX
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	80mm Sleeve Bearing Fan (D80SH-12B)
Semi-Passive Operation	X
Cybenetics Testing Information	
Lab ID	120
Date of receipt	Jun 29, 2018
Testing Date	Jul 3, 2018
Report Issued Date	Jul 6, 2018
DUT Notes	Retested on 7/6/2017
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
ATX connector 20+4 pin (300mm)	1	1	18AWG
4+4 pin EPS12V (400mm)	1	1	18AWG
6+2 pin PCIe (400mm)	2	2	18AWG
SATA (200mm+150mm+150mm)	2	6	18AWG
4 pin Molex (250mm+150mm+150mm+150mm)	1	4	18AWG

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	18	15	54	3	0.3
	Watts	90		648	15	3.6
Total Max. Power (W)		650				

Parts Description

General Data	
Manufacturer (OEM)	CWT
Platform Model	CSN
Primary Side	
Transient Filter	4x Y caps, 3x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor & Diode
Bridge Rectifier(s)	1x GBU1006 (600V, 10A @ 100°C)
APFC MOSFETS	1x Vishay SiHG33N60E (650V, 21A @ 100°C, 0.099Ohm)
APFC Boost Diode	1x CREE C3D06060A (600V, 6A @ 154°C)
Hold-up Cap(s)	1x Nichicon (400V, 390uF, 2000h @ 105 °C, GG)
Main Switchers	2x CMS6020
APFC Controller	Champion CM6502 & CM03X Green PFC Controller
LLC/PWM Controller	Champion CM6901
Topology	Primary side: Half-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	6x SM4021NA (40V, 100A @ 150°C)
5V & 3.3V	DC-DC Converters: 2x QM3004D (30V, 40A @ 100°C, 8.5 mOhm) , 2x QM3006D (30V, 57A @ 100°C, 5.5 mOhm) PWM Controller: 1x APW7159C
Filtering Capacitors	Electrolytics: Nippon Chemi-Con (1-5,000 @ 105°C, KZE), Nippon Chemi-Con (1-2,000 @ 105°C, KMQ), Nippon Chemi-Con (4-10,000 @ 105°C, KY) Polymers: Elite (GT, RP)
Supervisor IC	Infinno ST9S313 (OVP, UVP, SCP, PG)
Fan Model	Yate Loon D80SH-12B (12V, 0.70A,Sleeve Bearing Fan)
5VSB Circuit	

FET & Rectifier	1x UTC4N65K (650V, 4A @ 25°C, 2.5Ohm @ 25°C) & S10P45U SBR (45V, 10A @ 110°C, 0.39V @ 125°C)
Standby PWM Controller	On-Bright OB5269CP

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)	87.900%
Average Noise Output (>1450 Load Combinations)	37.98dBA
Average PF (>1450 Load Combinations)	0.982
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.0823W
Non-Accredited	
12V Ripple (Full Load)	34.14mV
5V Ripple (Full Load)	24.83mV
3.3V Ripple (Full Load)	35.38mV
5VSB Ripple (Full Load)	13.26mV
12V Load Regulation	1.11%
5V Load Regulation	1.86%
3.3V Load Regulation	2.95%
5VSB Load Regulation	2.50%
Inrush Current	-

230V

Accredited		
Average Efficiency (>1450 load combinations)	90.293%	
Average Noise Output (>1450 Load Combinations)	37.74dBA	
Average PF (>1450 Load Combinations)	0.940	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1914W	
Non-Accredited		
12V Ripple (Full Load)	34.32mV	
5V Ripple (Full Load)	18.35mV	
3.3V Ripple (Full Load)	30.91mV	
5VSB Ripple (Full Load)	13.59mV	
12V Load Regulation	1.55%	
5V Load Regulation	1.54%	
3.3V Load Regulation	2.60%	
5VSB Load Regulation	2.45%	
Inrush Current	-	
Hold-Up Time & PWR_OK Signal	7.90ms	
AC Loss to PWR_OK Hold Up Time	5.80ms	
PWR_OK Inactive to DC Loss Delay	2.10ms	
OPP (0.00°C / 0.00°C)	-	-

Hold-Up Time & PWR_OK Signal

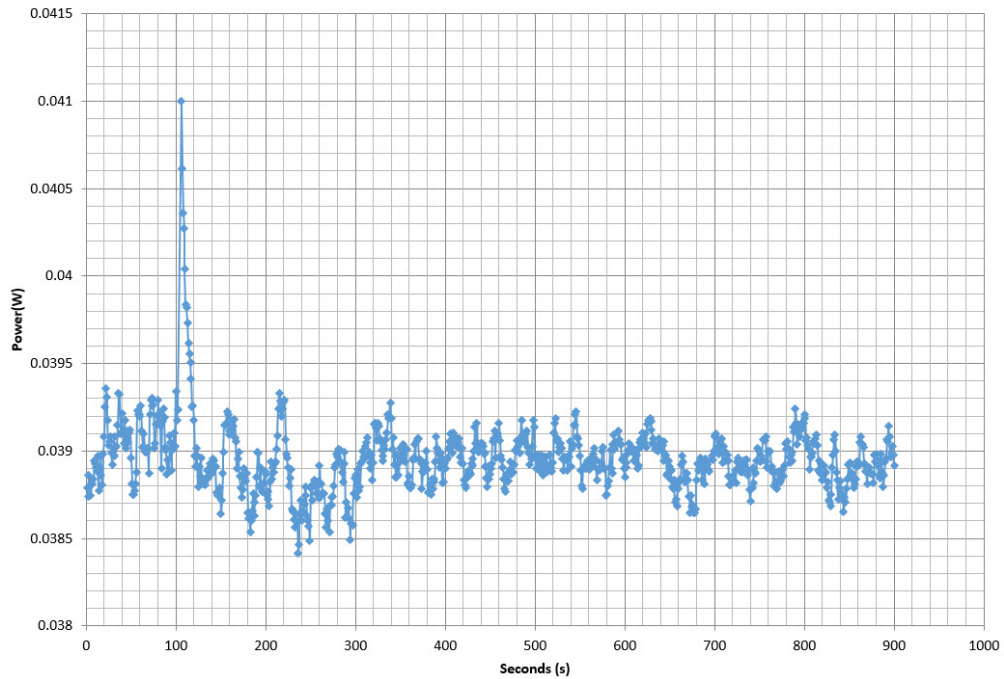
Hold-Up Time (ms)	7.9
AC Loss to PWR_OK Hold Up Time (ms)	5.8
PWR_OK Inactive to DC Loss Delay (ms)	2.1

Vampire Power

Graphs

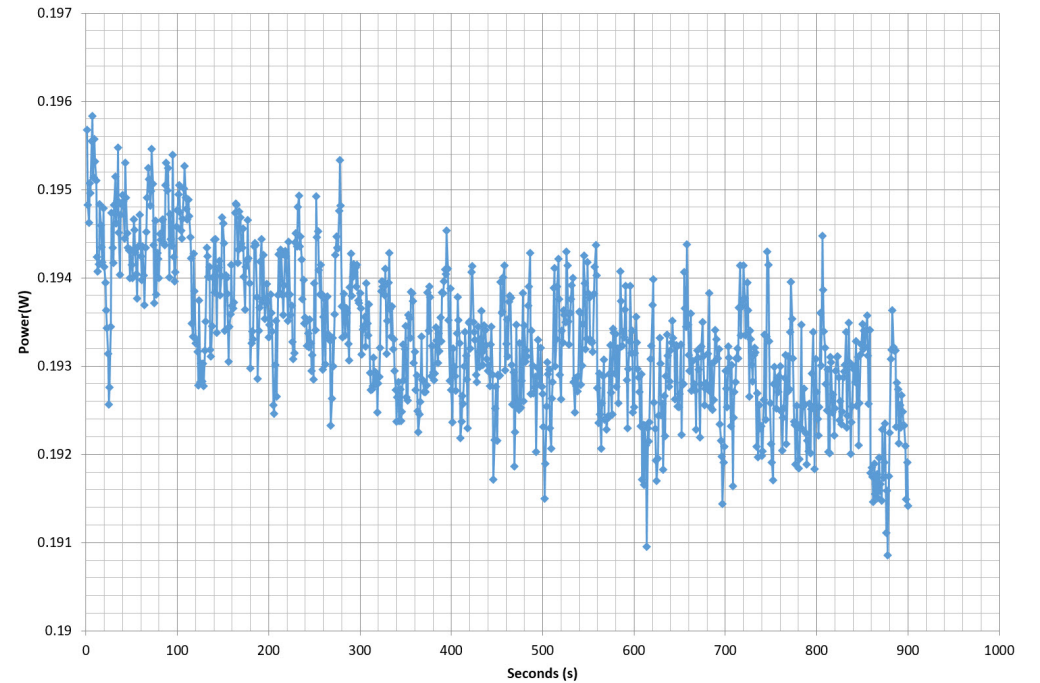
115V

Power - 1695080010300 - 31/05/2017 - 08:51



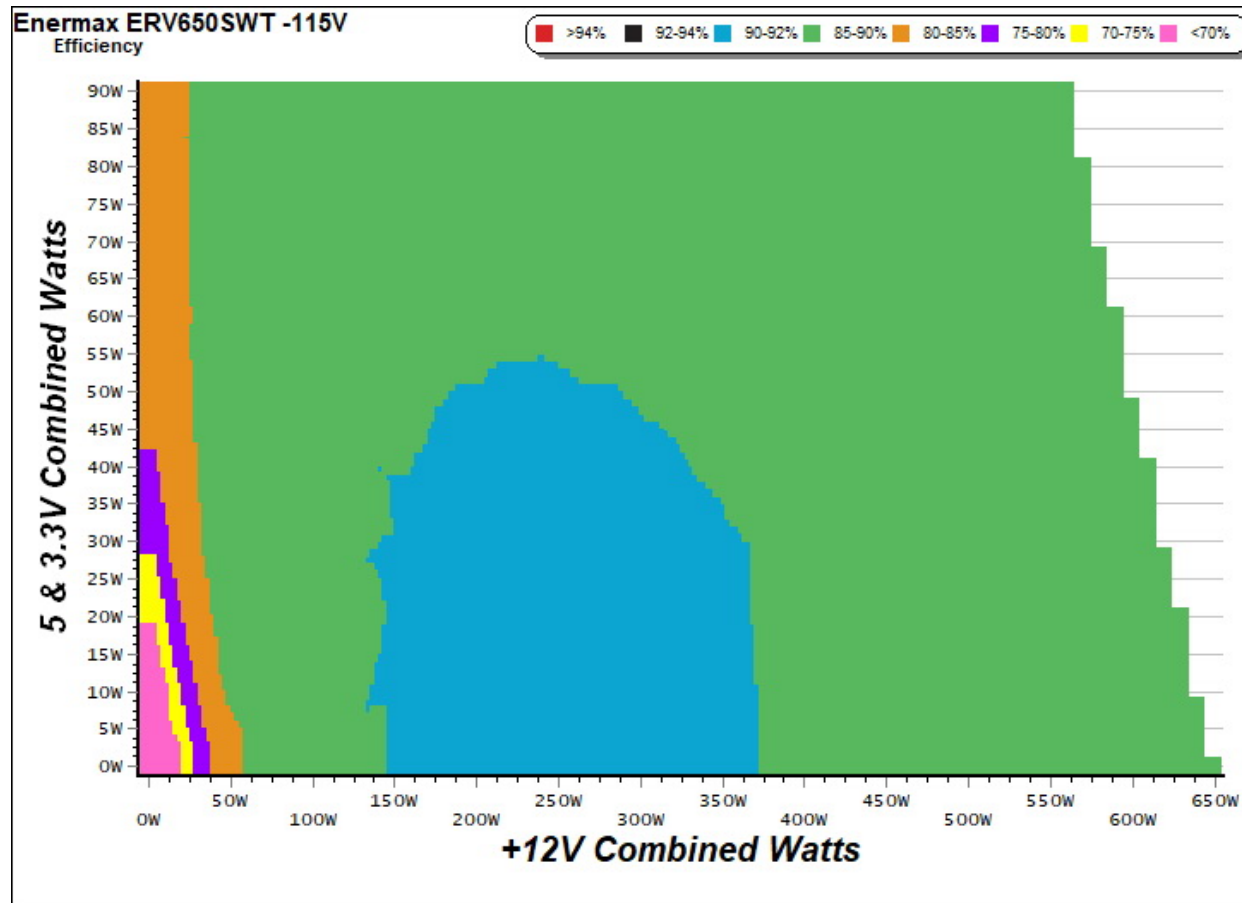
230V

Power - 163491450BR31F03001651 - 07/06/2017 - 12:08



Efficiency Graph

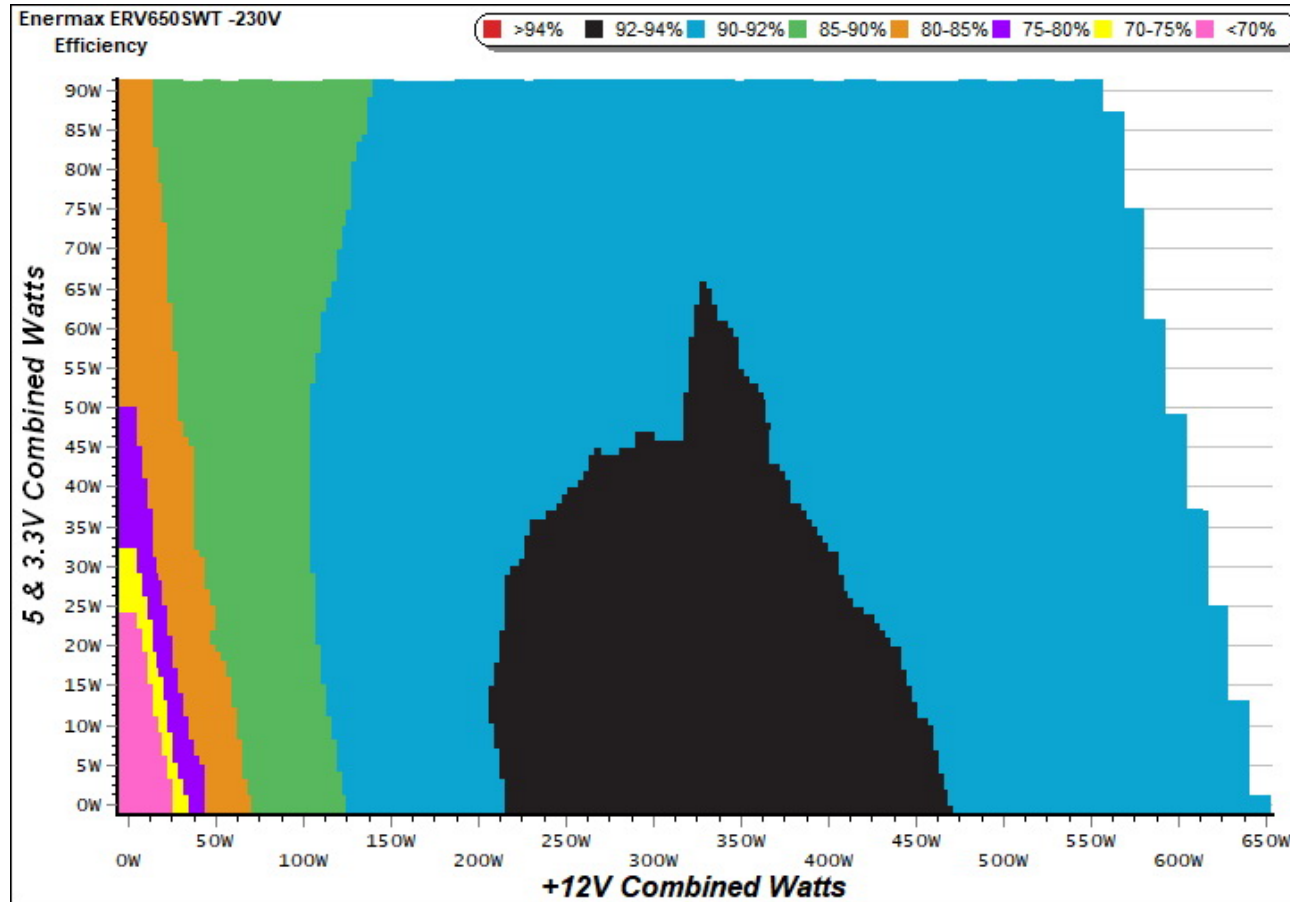
115V



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

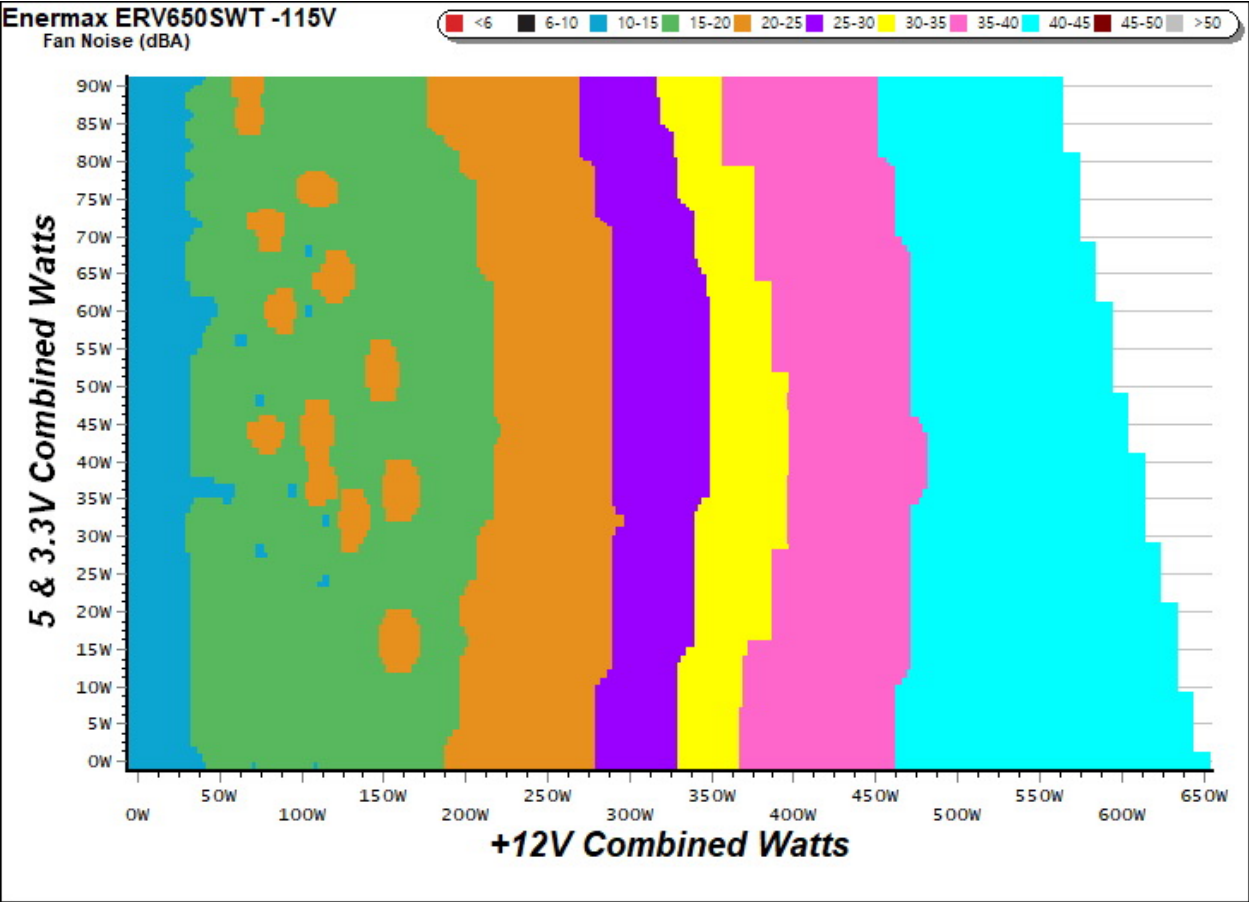


INFO

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

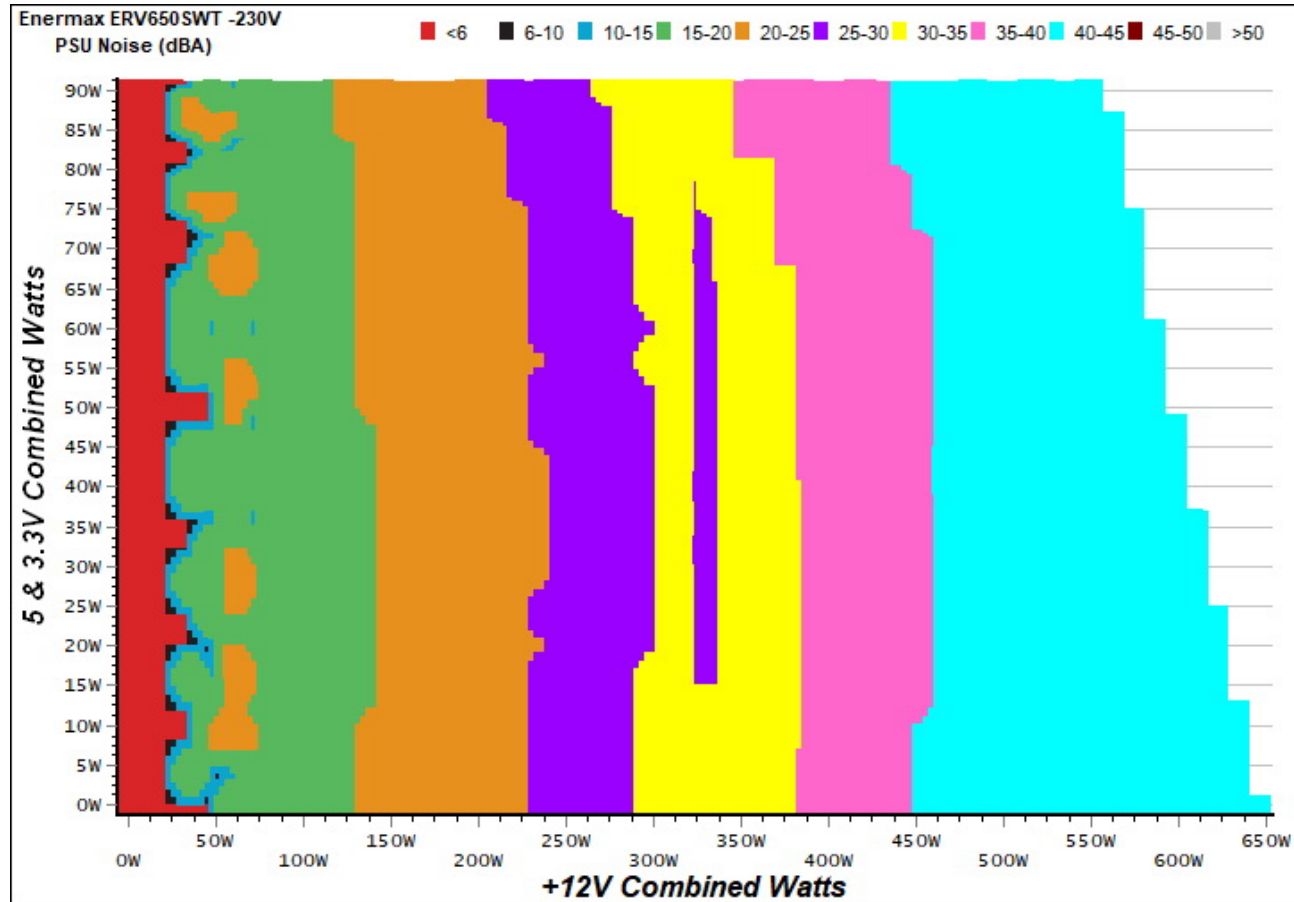
115V



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

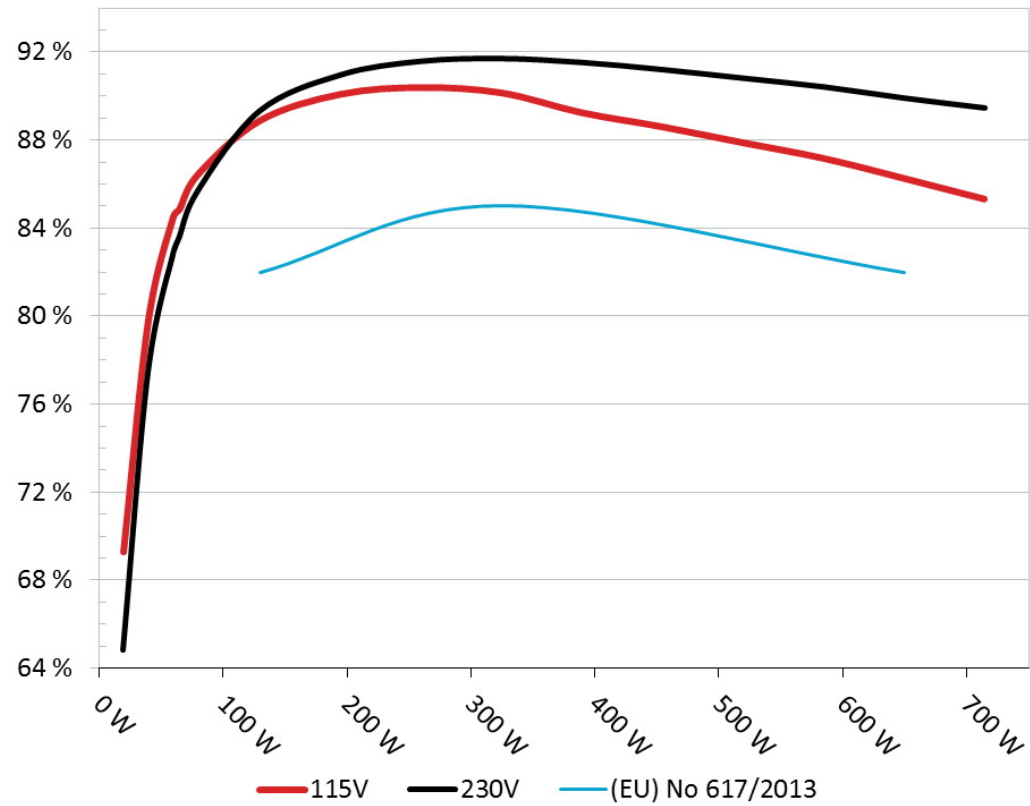
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails.

Indicative Performance

Efficiency under high ambient temperature

Efficiency: Enermax ERV650SWT

Ambient: 37°C - 46°C (98.6°F - 114.8°F)



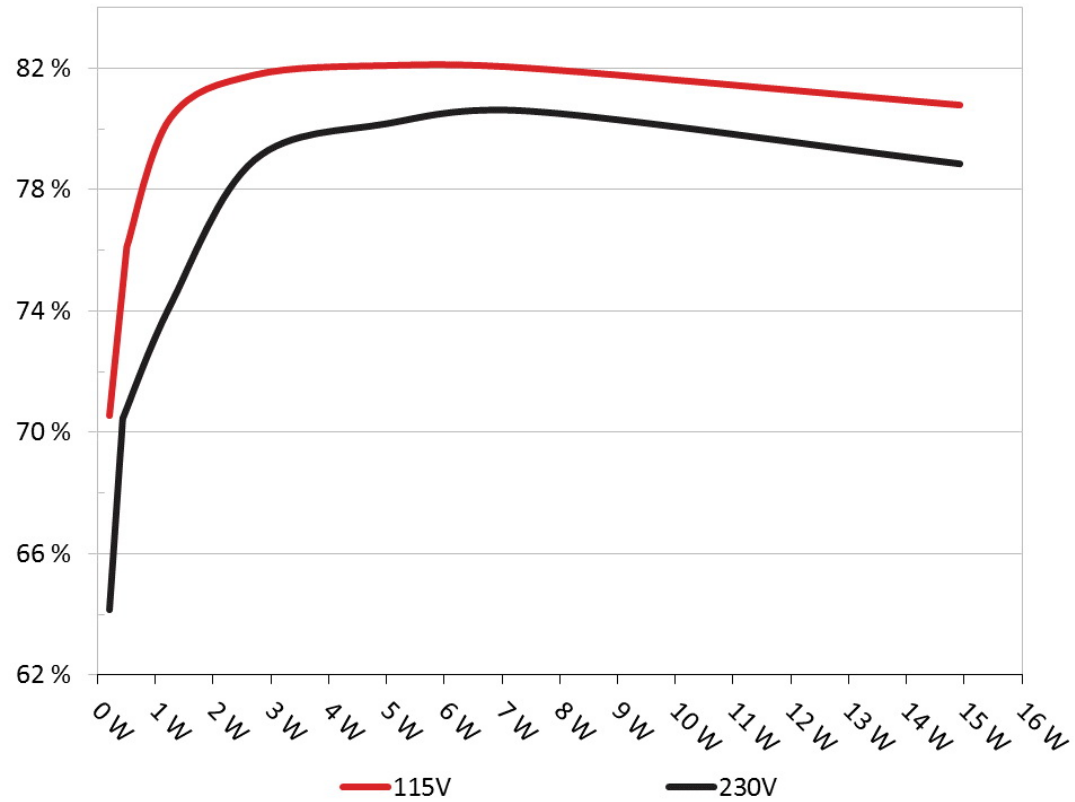
INFO

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 ERV650SWT

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	0.042A	0.211	70.569%	0.030
	5.019V	0.299		115.15V
2	0.088A	0.440	76.125%	0.057
	5.018V	0.578		115.14V
3	0.542A	2.718	81.769%	0.243
	5.011V	3.324		115.14V
4	1.002A	5.016	82.081%	0.327
	5.004V	6.111		115.14V
5	1.502A	7.503	81.991%	0.373
	4.995V	9.151		115.14V
6	3.002A	14.922	80.782%	0.435
	4.971V	18.472		115.13V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.211	64.134%	0.010
	5.019V	0.329		230.33V
2	0.088A	0.440	70.288%	0.019
	5.018V	0.626		230.33V
3	0.542A	2.718	78.966%	0.097
	5.011V	3.442		230.33V
4	1.003A	5.016	80.166%	0.162
	5.003V	6.257		230.33V
5	1.502A	7.503	80.573%	0.216
	4.995V	9.312		230.33V
6	3.002A	14.922	78.840%	0.319
	4.971V	18.927		230.33V

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	3.555A	1.985A	1.988A	0.996A	64.791	84.840%	1390	22.7	38.15°C	0.963
	12.148V	5.040V	3.317V	5.025V	76.367				44.28°C	115.13V
2	8.155A	2.981A	2.991A	1.196A	129.809	88.881%	1585	25.1	38.53°C	0.970
	12.131V	5.030V	3.307V	5.012V	146.048				45.45°C	115.13V
3	13.109A	3.488A	3.514A	1.397A	194.905	90.080%	1875	29.3	39.40°C	0.981
	12.115V	5.021V	3.298V	5.001V	216.368				46.54°C	115.12V
4	18.066A	3.990A	4.011A	1.601A	259.783	90.386%	2130	32.8	39.45°C	0.986
	12.100V	5.013V	3.289V	4.991V	287.414				46.77°C	115.12V
5	22.698A	4.990A	5.029A	1.806A	324.727	90.144%	2420	36.5	40.04°C	0.989
	12.084V	5.003V	3.278V	4.980V	360.230				47.43°C	115.11V
6	27.299A	6.012A	6.055A	2.011A	389.724	89.239%	3060	40.7	40.59°C	0.989
	12.086V	4.991V	3.268V	4.970V	436.718				48.27°C	115.11V
7	31.948A	7.020A	7.091A	2.216A	454.622	88.598%	3450	43.8	41.90°C	0.991
	12.069V	4.981V	3.256V	4.958V	513.129				50.12°C	115.11V
8	36.610A	8.050A	8.133A	2.425A	519.658	87.876%	3720	46.5	42.48°C	0.992
	12.053V	4.970V	3.245V	4.947V	591.354				51.74°C	115.10V
9	41.710A	8.567A	8.681A	2.426A	584.691	87.165%	3720	46.5	44.16°C	0.992
	12.038V	4.962V	3.236V	4.940V	670.785				54.01°C	115.10V
10	46.568A	9.086A	9.208A	3.049A	649.537	86.255%	3720	46.5	44.98°C	0.993
	12.022V	4.953V	3.225V	4.919V	753.044				56.03°C	115.10V
11	52.018A	9.100A	9.231A	3.051A	714.476	85.316%	3720	46.5	46.15°C	0.994
	12.011V	4.946V	3.217V	4.911V	837.445				60.17°C	115.09V
CL1	0.100A	11.017A	11.006A	0.005A	92.774	81.967%	2780	38.9	43.03°C	0.963
	12.121V	4.991V	3.321V	5.032V	113.185				57.09°C	115.14V

CL2	54.117A	1.003A	1.002A	0.005A	659.022	87.391%	2780	38.9	44.17°C	0.993
	12.025V	4.970V	3.249V	4.975V	754.108				57.76°C	115.05V

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	3.538A	1.980A	1.973A	0.991A	64.822	84.431%	1955	29.3	40.19°C	0.817
	12.222V	5.050V	3.343V	5.031V	76.775				44.65°C	230.21V
2	8.138A	2.969A	2.966A	1.194A	129.785	90.005%	2010	29.8	40.73°C	0.911
	12.157V	5.042V	3.334V	5.020V	144.198				45.80°C	230.21V
3	13.093A	3.475A	3.486A	1.396A	194.894	91.371%	2355	34.6	41.10°C	0.935
	12.130V	5.034V	3.325V	5.009V	213.300				46.38°C	230.21V
4	18.050A	3.975A	3.975A	1.601A	259.764	91.832%	2655	38.1	41.86°C	0.952
	12.111V	5.026V	3.316V	4.998V	282.870				47.56°C	230.23V
5	22.713A	4.979A	4.986A	1.801A	324.727	92.394%	2725	38.8	42.23°C	0.962
	12.075V	5.019V	3.308V	4.988V	351.460				48.09°C	230.23V
6	27.308A	5.986A	6.001A	2.007A	389.678	91.674%	3380	43.5	42.63°C	0.965
	12.081V	5.010V	3.298V	4.977V	425.070				49.27°C	230.24V
7	31.944A	7.003A	7.022A	2.211A	454.640	91.380%	2650	44.6	43.36°C	0.968
	12.069V	5.002V	3.289V	4.967V	497.529				50.12°C	230.25V
8	36.602A	8.015A	8.051A	2.421A	519.628	90.955%	3775	46.7	43.95°C	0.971
	12.055V	4.991V	3.278V	4.955V	571.304				51.86°C	230.25V
9	41.681A	8.525A	8.591A	2.422A	584.621	90.561%	3720	46.5	44.38°C	0.974
	12.045V	4.985V	3.270V	4.948V	645.557				52.58°C	230.25V
10	46.517A	9.052A	9.107A	3.041A	649.541	90.032%	3720	46.5	45.82°C	0.976
	12.035V	4.975V	3.260V	4.928V	721.457				54.45°C	230.25V
11	51.949A	9.064A	9.130A	3.046A	714.449	89.494%	3775	46.7	46.79°C	0.978
	12.026V	4.969V	3.251V	4.921V	798.324				55.79°C	230.26V
CL1	0.100A	11.020A	11.004A	0.004A	93.203	82.727%	3195	41.5	42.80°C	0.886
	12.189V	5.029V	3.321V	5.051V	112.663				48.69°C	230.26V

CL2	53.974A	1.003A	1.003A	1.002A	663.191	90.815%	3775	46.7	45.15°C	0.976
	12.041V	4.996V	3.282V	4.977V	730.264				53.33°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	1.202A	0.492A	0.481A	0.196A	19.695	69.263%	1155	19.9	0.881
	12.164V	5.050V	3.328V	5.045V	28.435				115.13V
2	2.429A	0.989A	0.990A	0.396A	39.806	79.813%	1200	20.4	0.948
	12.157V	5.047V	3.323V	5.039V	49.874				115.13V
3	3.657A	1.477A	1.505A	0.596A	59.877	84.505%	1300	21.5	0.965
	12.150V	5.042V	3.320V	5.033V	70.856				115.13V
4	4.877A	1.985A	1.989A	0.796A	79.830	86.434%	1390	22.7	0.960
	12.145V	5.039V	3.316V	5.028V	92.360				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])	PF/AC Volts
1	1.194A	0.490A	0.475A	0.196A	19.689	65.451%	1485	22.7	0.555
	12.251V	5.057V	3.352V	5.052V	30.082				230.20V
2	2.413A	0.978A	0.986A	0.396A	39.756	79.312%	1585	24.1	0.715
	12.231V	5.054V	3.348V	5.045V	50.126				230.20V
3	3.637A	1.476A	1.491A	0.595A	59.902	83.959%	1690	25.6	0.801
	12.224V	5.052V	3.345V	5.040V	71.347				230.20V
4	4.850A	1.982A	1.974A	0.791A	79.838	86.481%	1875	29.3	0.853
	12.217V	5.049V	3.341V	5.035V	92.319				230.20V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	18.10mV	12.20mV	10.10mV	7.40mV	Pass
20% Load	21.70mV	13.00mV	12.40mV	7.60mV	Pass
30% Load	23.80mV	14.40mV	14.30mV	8.80mV	Pass
40% Load	26.50mV	16.20mV	17.00mV	9.70mV	Pass
50% Load	31.40mV	17.90mV	22.50mV	10.60mV	Pass
60% Load	25.00mV	20.20mV	27.10mV	12.00mV	Pass
70% Load	27.20mV	19.90mV	27.00mV	11.40mV	Pass
80% Load	27.90mV	21.90mV	28.80mV	11.80mV	Pass
90% Load	28.60mV	23.20mV	32.40mV	12.60mV	Pass
100% Load	34.10mV	24.80mV	35.40mV	13.30mV	Pass
110% Load	36.00mV	27.10mV	40.20mV	14.70mV	Pass
Crossload1	19.10mV	13.90mV	10.60mV	6.70mV	Pass
Crossload2	33.30mV	23.70mV	32.10mV	12.60mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	17.0 mV	9.6 mV	9.3 mV	16.0 mV	Pass
20% Load	23.7 mV	10.5 mV	10.3 mV	17.6 mV	Pass
30% Load	26.9 mV	11.5 mV	11.1 mV	19.7 mV	Pass
40% Load	27.9 mV	13.2 mV	15.8 mV	19.7 mV	Pass
50% Load	31.0 mV	15.0 mV	17.7 mV	20.1 mV	Pass
60% Load	37.7 mV	17.3 mV	34.0 mV	21.8 mV	Pass
70% Load	36.5 mV	19.7 mV	16.9 mV	32.1 mV	Pass
80% Load	39.2 mV	21.4 mV	17.9 mV	27.9 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	41.0 mV	23.9 mV	28.2 mV	30.1 mV	Pass
100% Load	45.1 mV	29.9 mV	33.9 mV	28.4 mV	Pass
110% Load	47.2 mV	31.7 mV	39.7 mV	30.2 mV	Pass
Crossload 1	36.2 mV	17.4 mV	11.9 mV	15.1 mV	Pass
Crossload 2	37.4 mV	26.8 mV	38.9 mV	33.9 mV	Pass

The results above are not used in the certification process

Enermax Revolution SFX 650W

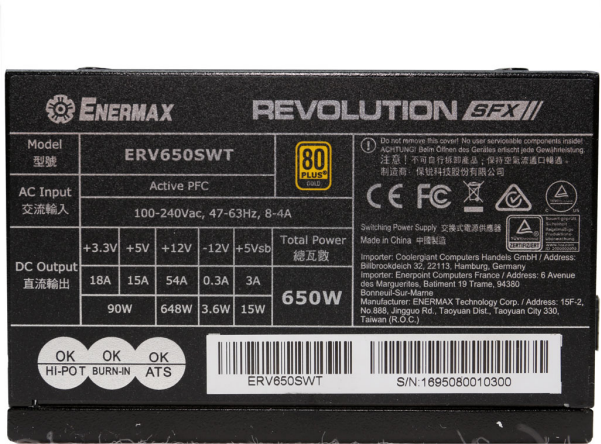


Top side

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 LTD Syrou 6, Latsia, 2231, Nicosia Cyprus



Power specifications label

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

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