Seasonic Focus Plus Gold 850W (#2)

Serial Number R1705AA135890205

Lab ID 394

Certification ID 25394

Test Result Report ID:

Certificate Issue Date: May 30, 2018

Scheme: ETA-EMI PSU

115V



230V



115V



230V



Scheme: LAMBDA PSU



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	Seasonic
Model	Focus Plus Gold 850W (#2)
OEM/ODM	Seasonic
Serial Number	R1705AA135890205
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12-6
Rated Frequency (Hz)	50-60

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	120mm Fluid Dynamic Bearing Fan (HA1225H12F-Z)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	394
Date of receipt	May 18, 2018
Testing Date	May 27, 2018
Report Issued Date	May 30, 2018
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 (610mm)	1	1	18-22AWG
4+4 pin EPS12V (655mm)	2	2	18AWG
6+2 pin PCIe (680mm+80mm)	3	6	18AWG
SATA (460mm+115mm+115mm+115mm)	2	8	18AWG
SATA (460mm+115mm)	1	2	18AWG
4 pin Molex (460mm+120mm+120mm)	1	3	18AWG
4 pin Molex (360mm+120mm)	1	2	18AWG
FDD Adapter (+105mm)	1	1	22AWG

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	70	3	0.3
	Watts	100		840	15	3.6
Total Max. Power (W)		850				

Parts Description

General Data	
Manufacturer (OEM)	Seasonic
Platform Model	FX
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor & Diode
Bridge Rectifier(s)	2x GBU1506 (600V, 15A)
APFC MOSFETS	2x Infineon IPW50R190CE (550V, 15.7A @ 100°C, 0.19Ohm)
APFC Boost Diode	1x STMicroelectronics STTH8S06D (600V, 8A @ 125°C)
Hold-up Cap(s)	1x Nippon Chemi-Con (400V, 650uF, 2000h @ 105°C, CE)
Main Switchers	4x UTC GPT13N50DG (500V, 13A @ 100°C, 0.49Ohm)
APFC Controller	Champion CM6500UNX
Resonant Controller	Champion CM6901T6X
Topology	Primary side: Full-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	4x Nexperia PSMN2R6-40YS (40V, 100A @ 25°C, 2.8mOhm)
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0906NS (30V, 40A @ 100°C, 4.5mOhm) PWM Controller: APW7159
Filtering Capacitors	Electrolytics: Chemi-Con (1-5,000 @ 105°C, KZE), Chemi-Con (4-10,000 @ 105°C, KY), W Polymers: Chemi-Con
Supervisor IC	Weltrend WT7527V (OVP, UVP, OCP, SCP, PG)
Fan Model	Hong Hua HA1225H12F-Z (120mm, 12V, 0.58A, 2200 RPM, Fluid Dynamic Bearing)
5VSB Circuit	

Standby PWM Controller	Excelliance EM8569

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)	89.428%
Average Noise Output (>1450 Load Combinations)	35.68dBA
Average PF (>1450 Load Combinations)	0.987
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.0506W
Non-Accredited	
12V Ripple (Full Load)	24.16mV
5V Ripple (Full Load)	12.32mV
3.3V Ripple (Full Load)	9.52mV
5VSB Ripple (Full Load)	9.76mV
12V Load Regulation	0.05%
5V Load Regulation	0.16%
3.3V Load Regulation	0.36%
5VSB Load Regulation	2.23%
Inrush Current	27.695A

230V		
Accredited		
Average Efficiency (>1450 load combinations)	91.512%	
Average Noise Output (>1450 Load Combinations)	32.98dBA	
Average PF (>1450 Load Combinations)	0.955	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.0903W	
Non-Accredited		
12V Ripple (Full Load)	23.11mV	
5V Ripple (Full Load)	11.52mV	
3.3V Ripple (Full Load)	9.63mV	
5VSB Ripple (Full Load)	7.49mV	
12V Load Regulation	0.03%	
5V Load Regulation	0.20%	
3.3V Load Regulation	0.39%	
5VSB Load Regulation	2.47%	
Inrush Current	79.836A	
Hold-Up Time & PWR_OK Signal	25.00ms	
AC Loss to PWR_OK Hold Up Time	22.10ms	
PWR_OK Inactive to DC Loss Delay	2.90ms	
OPP (0.00°C / 0.00°C)	-	-

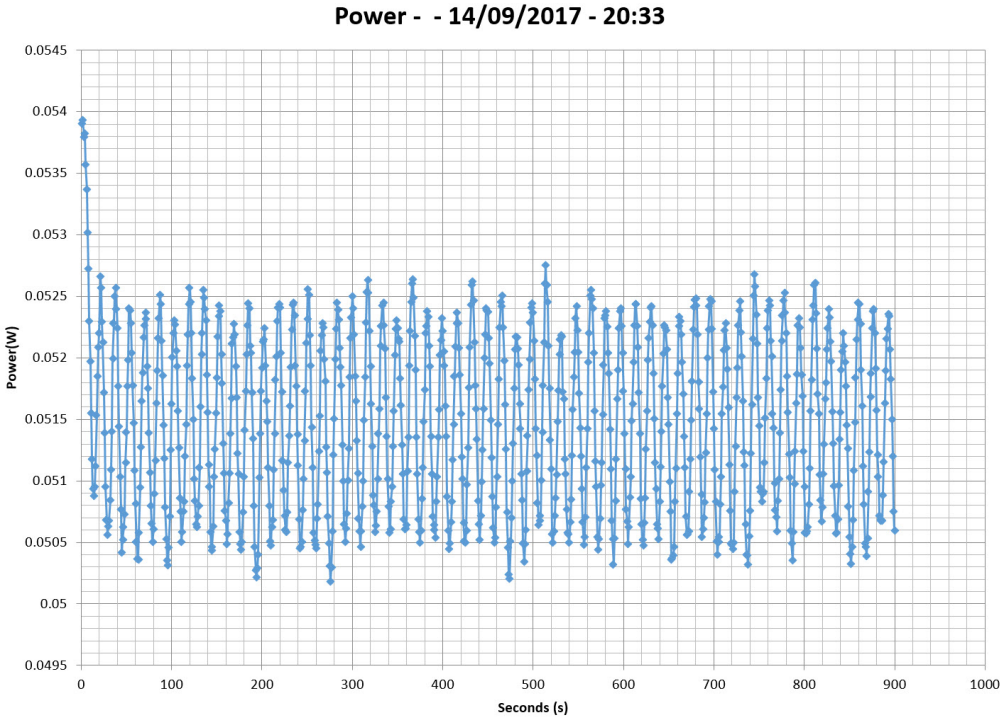
Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	25
AC Loss to PWR_OK Hold Up Time (ms)	22.1
PWR_OK Inactive to DC Loss Delay (ms)	2.9

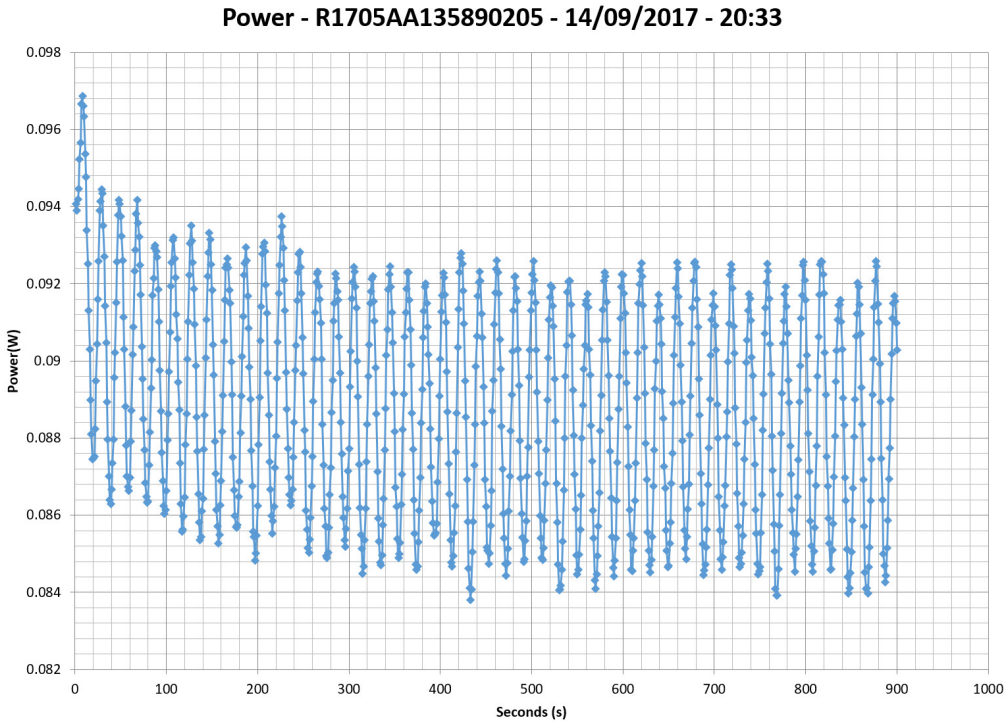
Vampire Power

Graphs

115V

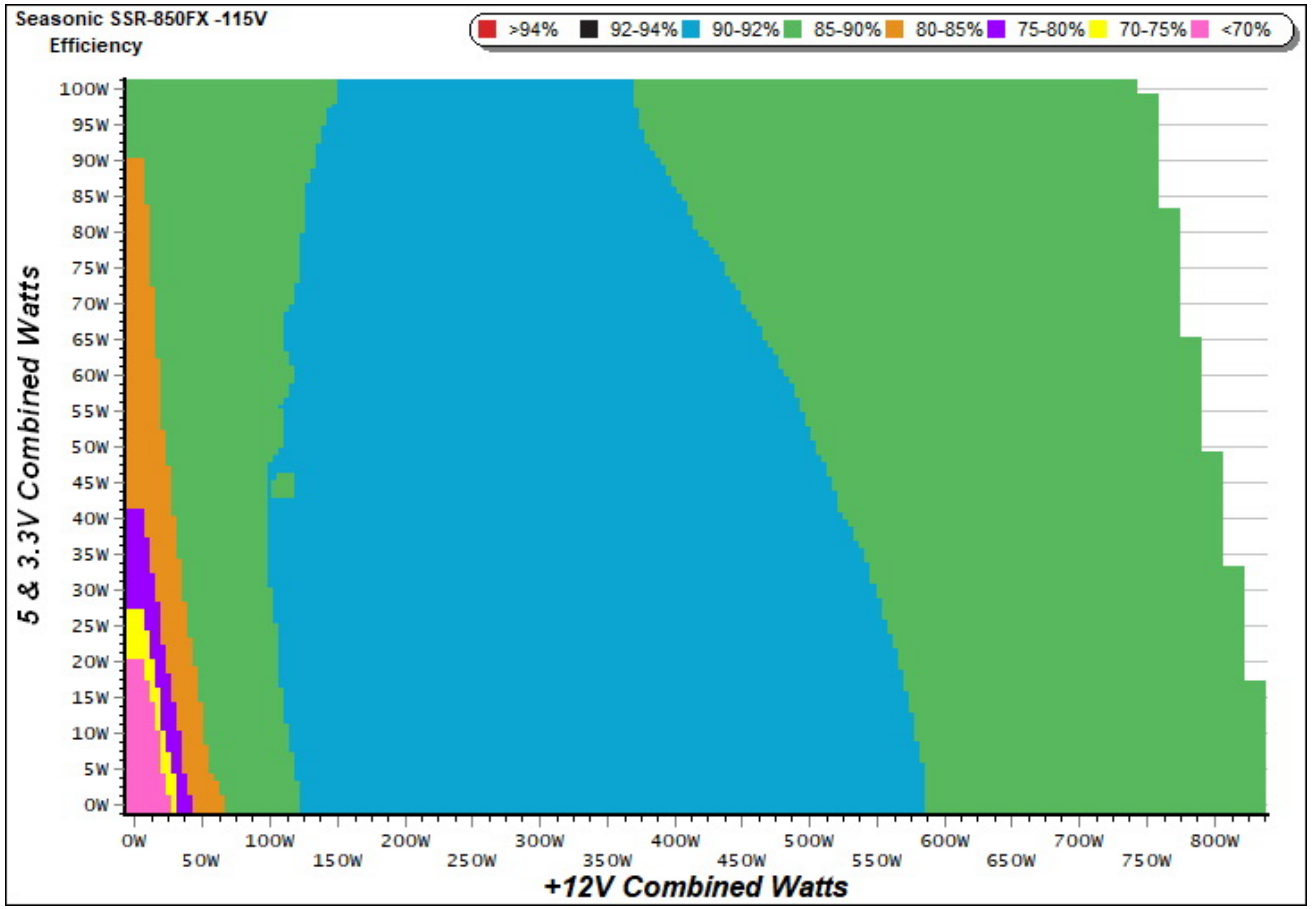


230V



Efficiency Graph

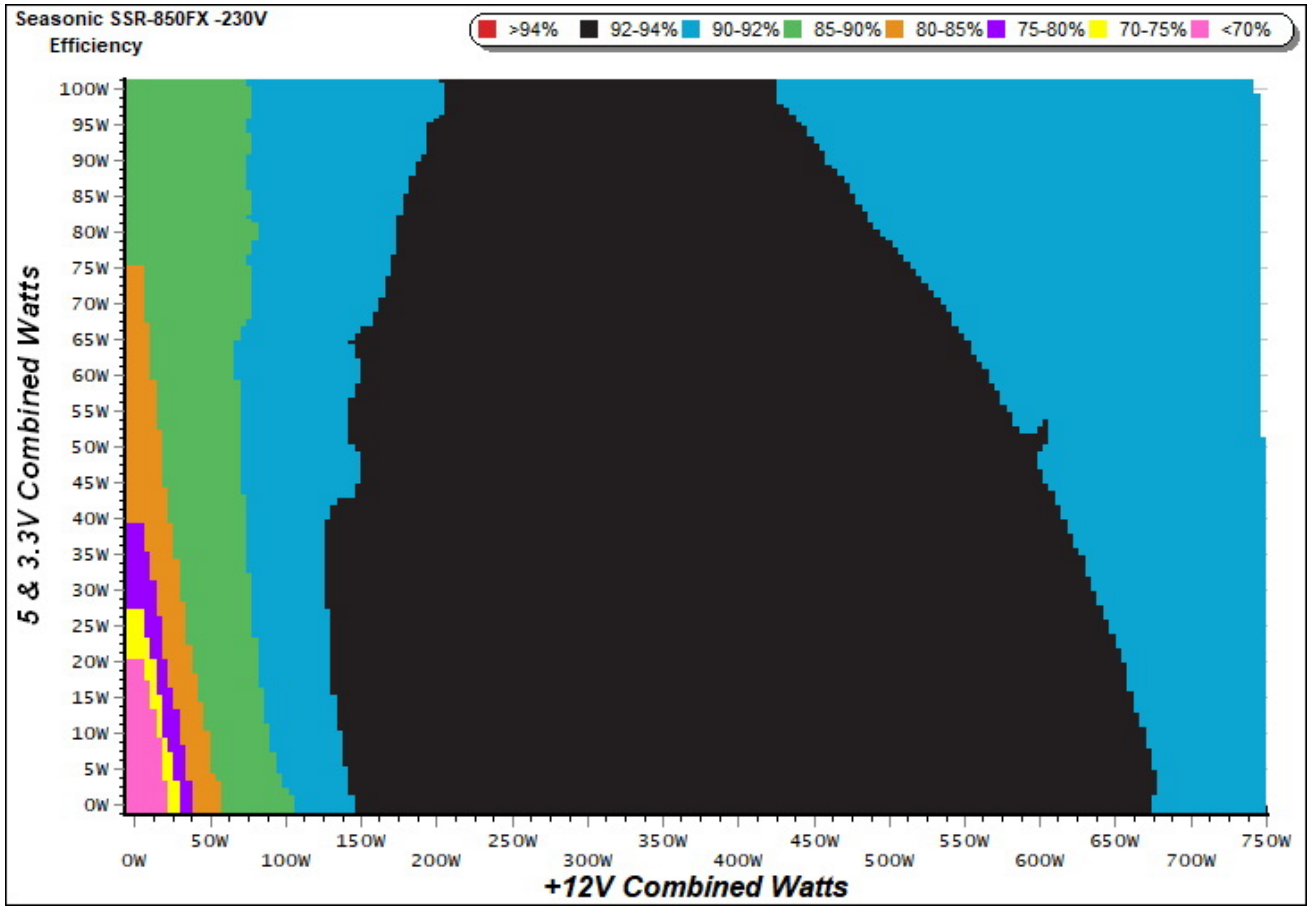
115V



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

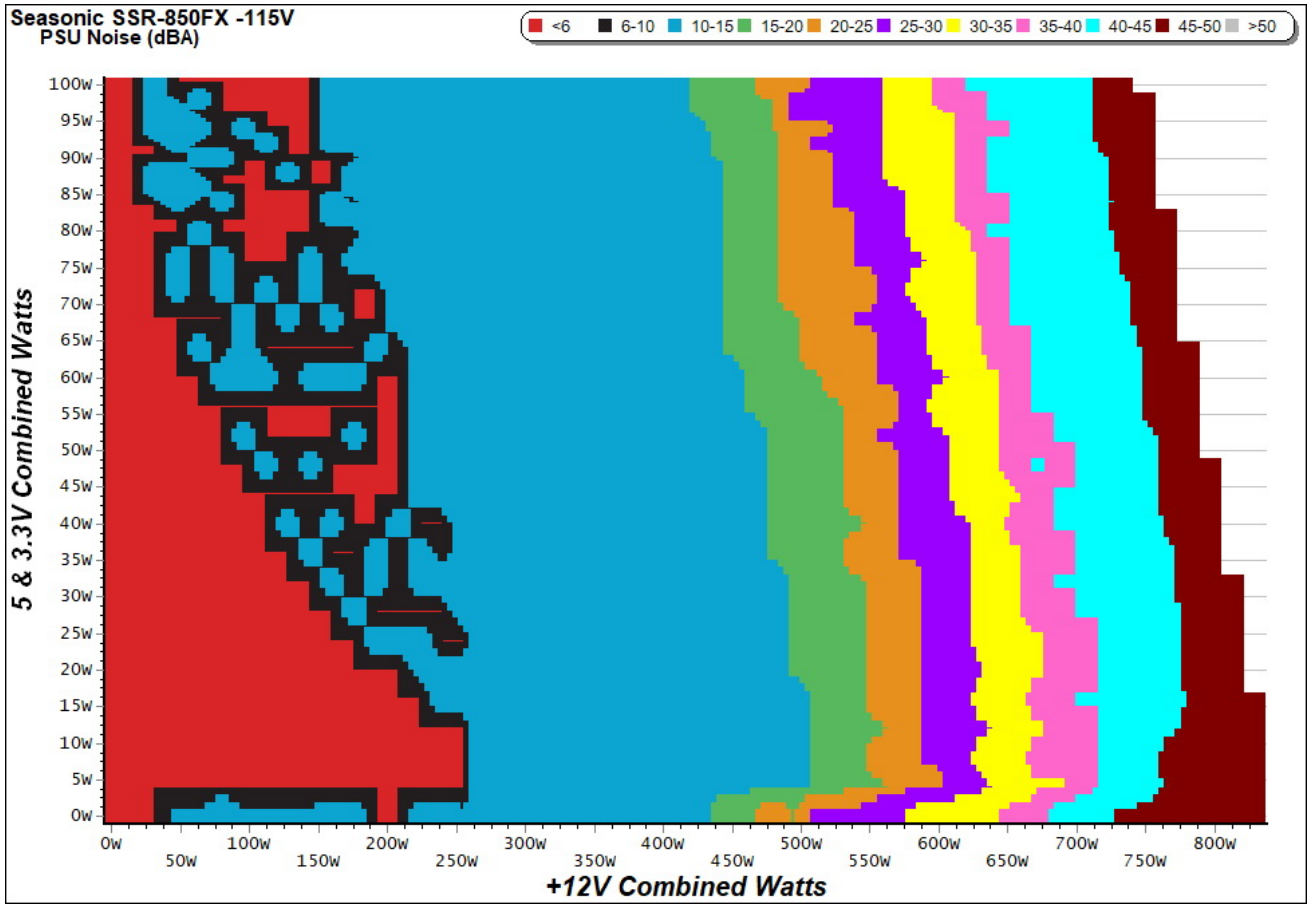


INFO

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

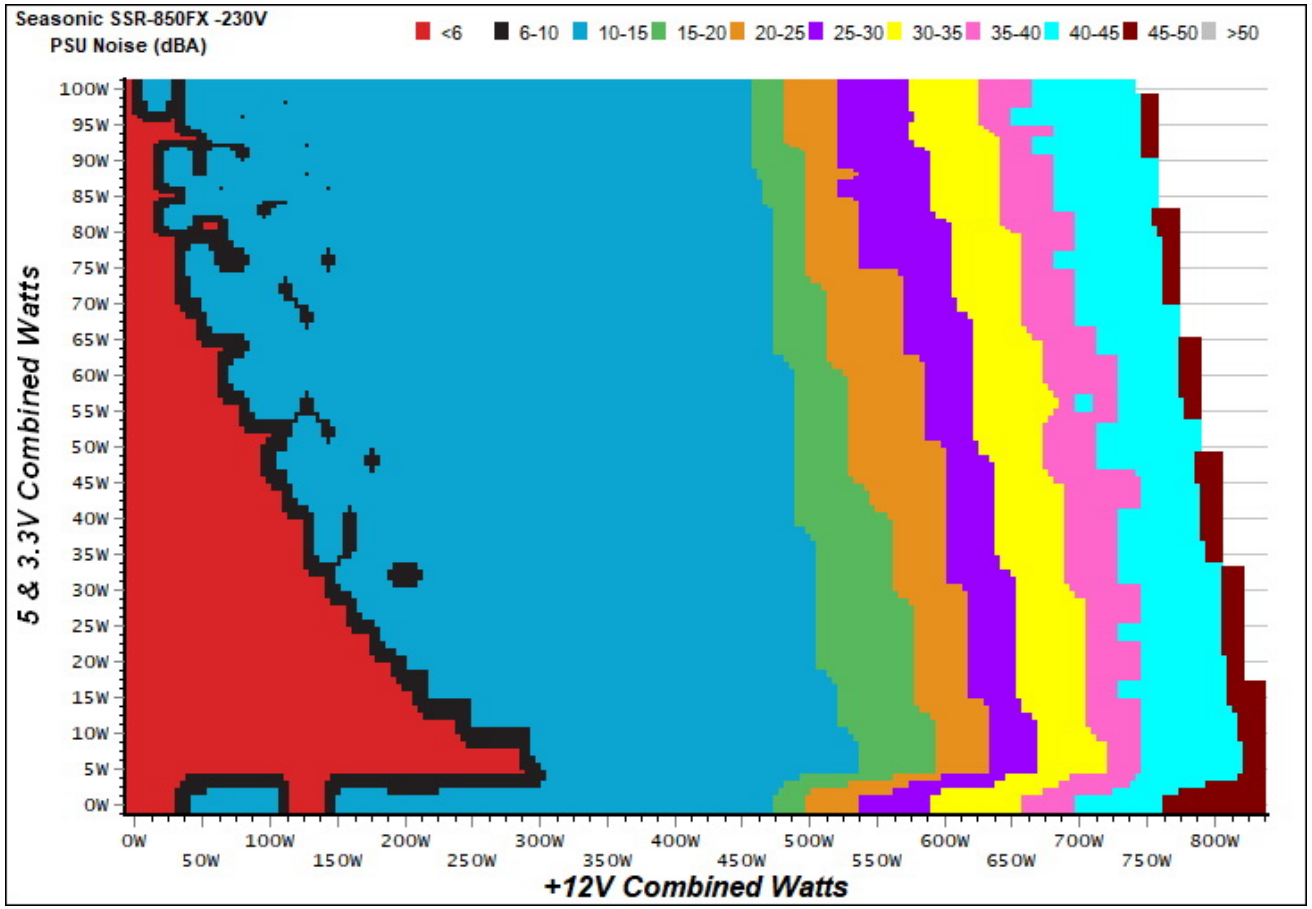
115V



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

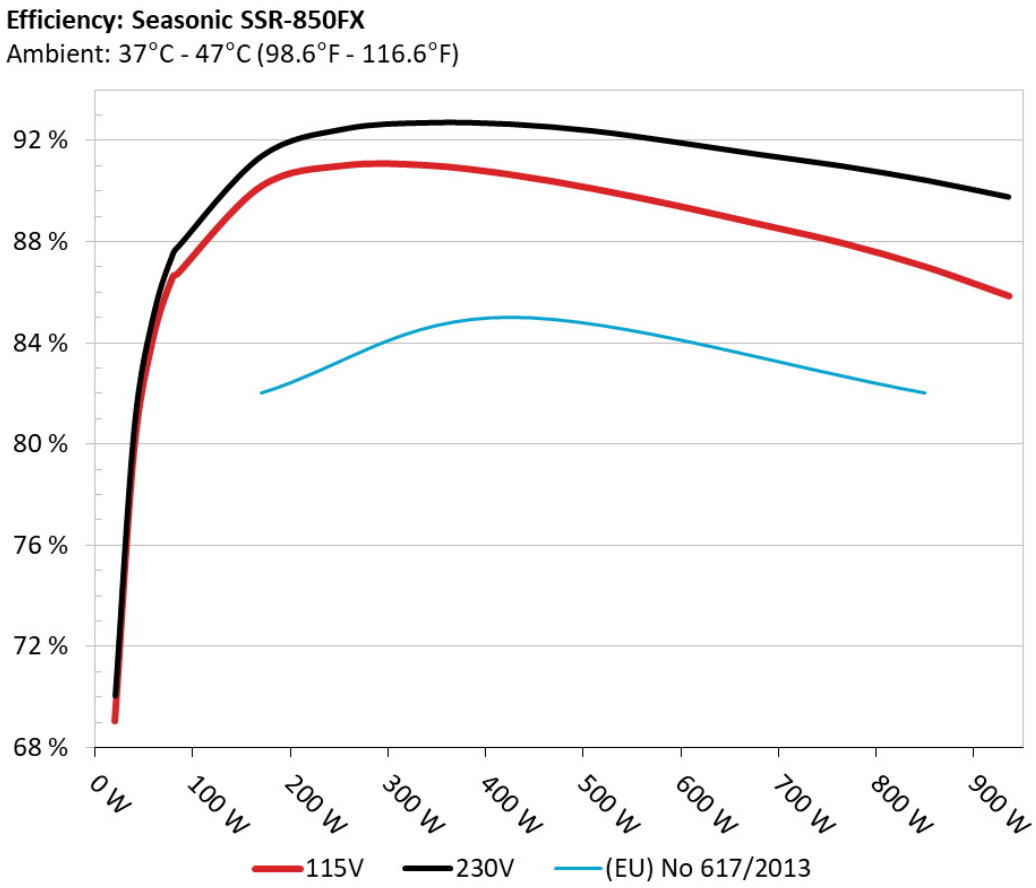


INFO

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

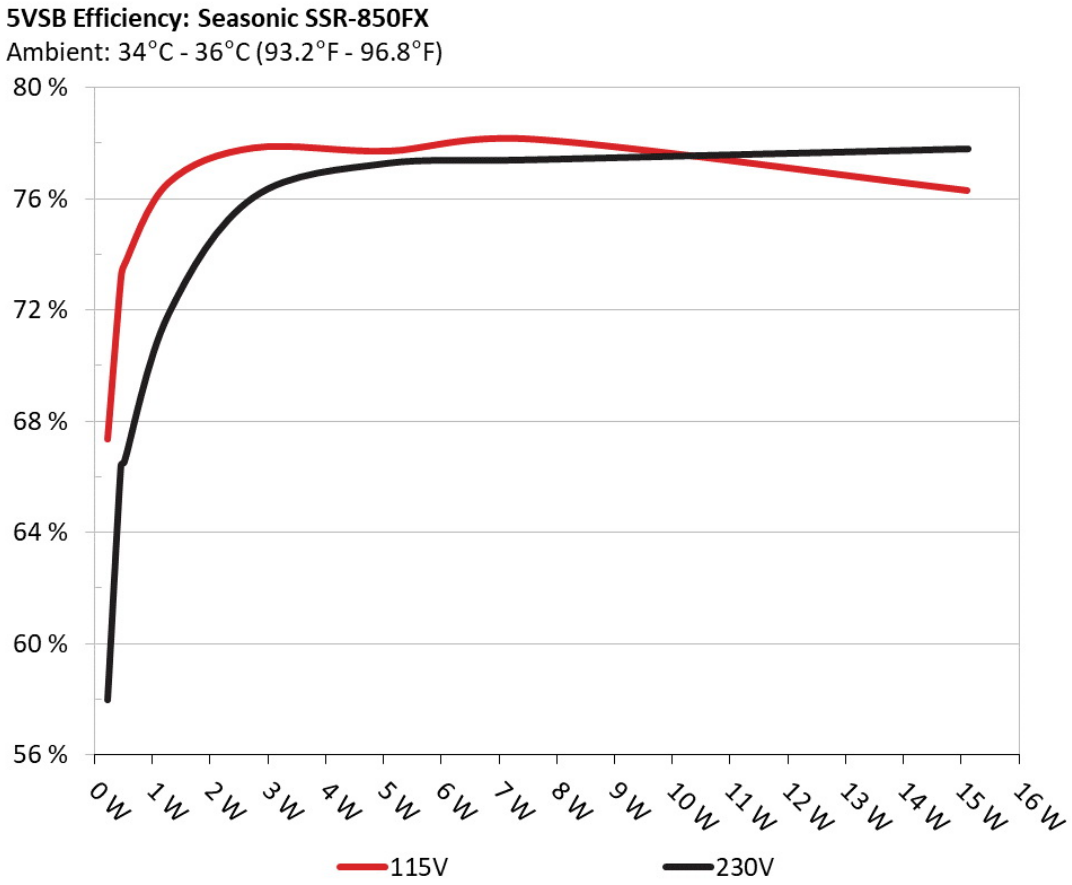
Efficiency under high ambient temperature



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	0.044A	0.225	67.365%	0.032
	5.106V	0.334		115.39V
2	0.089A	0.455	73.151%	0.060
	5.105V	0.622		115.39V
3	0.540A	2.752	77.850%	0.268
	5.095V	3.535		115.38V
4	1.000A	5.086	77.732%	0.372
	5.084V	6.543		115.39V
5	1.500A	7.612	78.160%	0.426
	5.073V	9.739		115.38V
6	3.001A	15.093	76.316%	0.493
	5.030V	19.777		115.37V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.044A	0.225	57.990%	0.013
	5.106V	0.388		230.97V
2	0.089A	0.455	66.423%	0.023
	5.105V	0.685		230.97V
3	0.540A	2.752	76.064%	0.113
	5.094V	3.618		230.96V
4	1.000A	5.085	77.291%	0.189
	5.084V	6.579		230.96V
5	1.500A	7.610	77.416%	0.251
	5.072V	9.830		230.96V
6	3.001A	15.117	77.802%	0.355
	5.038V	19.430		230.96V

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	5.222A	1.996A	1.987A	0.985A	84.992	86.748%	621	11.6	41.65°C	0.973
	12.137V	5.010V	3.327V	5.078V	97.976				47.59°C	115.27V
2	11.485A	2.997A	2.979A	1.184A	170.301	90.194%	565	10.7	38.83°C	0.988
	12.136V	5.009V	3.325V	5.069V	188.816				47.93°C	115.17V
3	18.076A	3.497A	3.490A	1.384A	255.483	91.014%	550	10.4	39.01°C	0.990
	12.136V	5.008V	3.323V	5.059V	280.706				48.41°C	115.15V
4	24.667A	3.997A	3.973A	1.585A	340.575	91.022%	550	10.4	39.57°C	0.991
	12.136V	5.007V	3.322V	5.050V	374.169				49.23°C	115.03V
5	30.861A	4.998A	4.968A	1.786A	425.082	90.655%	560	10.5	40.75°C	0.990
	12.137V	5.006V	3.321V	5.041V	468.903				50.75°C	114.91V
6	37.117A	5.997A	5.965A	1.988A	510.384	90.095%	880	20.6	41.79°C	0.991
	12.139V	5.005V	3.320V	5.031V	566.497				52.22°C	114.88V
7	43.348A	6.997A	6.961A	2.192A	595.278	89.427%	1333	31.4	42.33°C	0.991
	12.138V	5.004V	3.319V	5.020V	665.660				52.93°C	114.75V
8	49.587A	7.998A	7.962A	2.395A	680.212	88.693%	1984	41.5	42.93°C	0.992
	12.136V	5.003V	3.317V	5.011V	766.925				53.79°C	114.72V
9	56.248A	8.499A	8.474A	2.398A	765.241	87.942%	2310	45.1	44.02°C	0.992
	12.136V	5.002V	3.316V	5.006V	870.166				55.12°C	114.58V
10	62.643A	9.000A	8.958A	3.009A	849.956	87.009%	2320	45.2	45.40°C	0.993
	12.136V	5.002V	3.315V	4.987V	976.857				56.83°C	114.43V
11	69.683A	9.000A	8.962A	3.012A	935.525	85.851%	2225	44.7	47.19°C	0.993
	12.138V	5.001V	3.314V	4.981V	1089.714				58.87°C	114.39V
CL1	0.159A	12.001A	12.000A	0.001A	101.985	85.242%	560	10.5	43.42°C	0.983
	12.145V	5.008V	3.329V	5.092V	119.642				53.02°C	115.24V

CL2	70.008A	1.002A	1.001A	1.001A	863.063	87.262%	2320	45.2	45.75°C	0.993
	12.137V	5.004V	3.315V	5.039V	989.045				56.15°C	114.43V

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	5.208A	1.996A	1.982A	0.985A	84.840	87.431%	675	13.8	39.70°C	0.826
	12.144V	5.010V	3.327V	5.076V	97.036				46.04°C	230.88V
2	11.400A	2.996A	2.975A	1.185A	169.340	91.393%	560	10.5	40.03°C	0.929
	12.144V	5.008V	3.325V	5.065V	185.287				47.41°C	230.83V
3	17.987A	3.496A	3.461A	1.385A	254.440	92.476%	560	10.5	40.78°C	0.959
	12.144V	5.007V	3.323V	5.054V	275.143				48.65°C	230.77V
4	24.573A	3.997A	3.972A	1.586A	339.642	92.686%	560	10.5	41.33°C	0.971
	12.145V	5.006V	3.322V	5.043V	366.444				49.83°C	230.70V
5	30.828A	4.995A	4.968A	1.788A	424.965	92.577%	590	12.8	42.09°C	0.977
	12.147V	5.005V	3.321V	5.033V	459.039				50.87°C	230.64V
6	37.016A	5.997A	5.964A	1.992A	509.484	92.211%	1015	23.6	42.48°C	0.981
	12.148V	5.004V	3.320V	5.022V	552.520				51.80°C	230.68V
7	43.281A	6.998A	6.961A	2.196A	594.801	91.780%	1650	36.9	43.67°C	0.983
	12.146V	5.003V	3.318V	5.010V	648.071				53.47°C	230.62V
8	49.545A	8.001A	7.961A	2.401A	680.139	91.283%	2130	44.4	44.38°C	0.985
	12.145V	5.001V	3.316V	4.999V	745.089				54.58°C	230.55V
9	56.200A	8.501A	8.446A	2.404A	765.065	90.888%	2330	45.4	45.22°C	0.986
	12.145V	5.001V	3.315V	4.993V	841.767				55.82°C	230.32V
10	62.586A	9.003A	8.960A	3.017A	849.881	90.180%	2340	45.4	46.39°C	0.987
	12.146V	5.000V	3.314V	4.973V	942.424				57.53°C	230.42V
11	69.566A	9.003A	8.964A	3.021A	934.658	89.523%	2340	45.4	47.16°C	0.988
	12.146V	4.999V	3.313V	4.967V	1044.048				58.98°C	230.47V
CL1	0.144A	12.001A	11.998A	0.000A	101.768	86.140%	560	10.5	44.36°C	0.868
	12.149V	5.008V	3.327V	5.088V	118.143				54.52°C	230.95V

CL2	70.004A	1.002A	0.998A	1.000A	863.621	90.526%	2340	45.4	45.89°C	0.987
	12.146V	5.003V	3.317V	5.029V	954.007				57.07°C	230.42V

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	1.273A	0.500A	0.482A	0.197A	20.562	69.035%	0	<6.0	0.810
	12.133V	5.014V	3.329V	5.101V	29.785				115.36V
2	2.456A	1.001A	0.995A	0.393A	40.123	79.750%	0	<6.0	0.915
	12.133V	5.009V	3.325V	5.095V	50.311				115.34V
3	3.709A	1.499A	1.507A	0.590A	60.535	84.325%	0	<6.0	0.954
	12.135V	5.010V	3.327V	5.089V	71.788				115.31V
4	4.895A	1.999A	1.986A	0.788A	80.033	86.626%	0	<6.0	0.971
	12.136V	5.010V	3.327V	5.083V	92.389				115.29V

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	1.190A	0.499A	0.479A	0.196A	19.548	69.710%	0	<6.0	0.492
	12.143V	5.015V	3.331V	5.100V	28.042				230.92V
2	2.441A	0.999A	0.991A	0.393A	39.947	81.002%	0	<6.0	0.640
	12.144V	5.010V	3.328V	5.094V	49.316				230.91V
3	3.623A	1.496A	1.473A	0.590A	59.396	85.279%	0	<6.0	0.744
	12.144V	5.010V	3.328V	5.088V	69.649				230.89V
4	4.880A	1.995A	1.983A	0.787A	79.854	87.528%	0	<6.0	0.812
	12.144V	5.010V	3.327V	5.081V	91.233				230.89V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.0 mV	5.2 mV	3.6 mV	2.8 mV	Pass
20% Load	10.4 mV	6.1 mV	4.5 mV	3.5 mV	Pass
30% Load	13.3 mV	6.6 mV	5.0 mV	4.3 mV	Pass
40% Load	15.2 mV	7.7 mV	5.7 mV	4.7 mV	Pass
50% Load	15.7 mV	9.2 mV	6.7 mV	4.7 mV	Pass
60% Load	15.1 mV	9.9 mV	7.3 mV	5.8 mV	Pass
70% Load	16.5 mV	10.2 mV	7.8 mV	5.8 mV	Pass
80% Load	18.3 mV	10.4 mV	8.7 mV	8.7 mV	Pass
90% Load	21.2 mV	11.2 mV	9.0 mV	9.1 mV	Pass
100% Load	24.2 mV	12.3 mV	9.5 mV	9.8 mV	Pass
110% Load	26.9 mV	12.7 mV	9.7 mV	9.9 mV	Pass
Crossload 1	8.4 mV	10.6 mV	7.8 mV	3.3 mV	Pass
Crossload 2	24.0 mV	7.9 mV	5.8 mV	7.2 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.60mV	5.30mV	4.00mV	2.90mV	Pass
20% Load	9.80mV	5.90mV	4.50mV	3.40mV	Pass
30% Load	12.30mV	6.50mV	4.90mV	3.90mV	Pass
40% Load	14.50mV	7.80mV	5.70mV	3.80mV	Pass
50% Load	14.60mV	9.30mV	6.80mV	3.90mV	Pass
60% Load	14.40mV	9.70mV	7.30mV	4.90mV	Pass
70% Load	15.70mV	10.10mV	7.90mV	4.30mV	Pass
80% Load	18.40mV	10.00mV	9.00mV	7.10mV	Pass

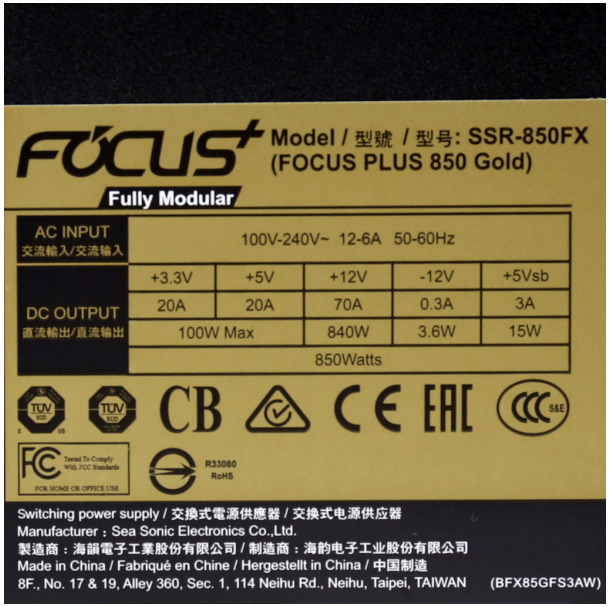
Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	20.80mV	10.40mV	9.20mV	7.50mV	Pass
100% Load	23.10mV	11.50mV	9.60mV	7.50mV	Pass
110% Load	25.80mV	12.20mV	10.10mV	8.00mV	Pass
Crossload1	8.00mV	10.30mV	8.20mV	3.30mV	Pass
Crossload2	23.70mV	7.90mV	6.10mV	5.20mV	Pass

The results above are not used in the certification process

Seasonic Focus Plus Gold 850W (#2)



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

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