Seasonic Focus Plus Platinum 650W

Serial Number R1707AA170400337

Lab ID 241

Certification ID 25241

Test Result Report ID:

Certificate Issue Date: Nov 12, 2018

Scheme: ETA-EMI PSU

115V 230V

Scheme: LAMBDA PSU

115V 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	Seasonic
Model	Focus Plus Platinum 650W
OEM/ODM	Seasonic
Serial Number	R1707AA170400337
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	9-4.5
Rated Frequency (Hz)	50-60

Rated Power (W)	650
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 (HA1225M12F-Z)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	241
Date of receipt	Nov 1, 2018
Testing Date	Nov 9, 2018
Report Issued Date	Nov 12, 2018
DUT Notes	Retested on 04/10/2018
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	In Cable Capacitors
ATX connector 20+4 pin (600mm)	1	1	18-22AWG	Yes
4+4 pin EPS12V (650mm)	1	1	18AWG	Yes
6+2 pin PCIe (680mm+80mm)	2	4	18AWG	Yes
SATA (450mm+110mm+110mm+110mm)	2	8	18AWG	No
4 pin Molex (450mm+120mm+120mm)	1	3	18AWG	No
FDD Adapter (+105mm)	1	1	22AWG	No
AC Power Cord (1370mm) - C13 coupler	1	1	18AWG	No

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	54	3	0.3
	Watts	100		648	15	3.6
Total Max. Power (W)		650				

Parts Description

General Data	
Manufacturer (OEM)	Seasonic
Platform Model	PX
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV , 1x CM02X
Inrush Protection	NTC Thermistor & Diode
Bridge Rectifier(s)	2x GBU1506 (600V, 15A @ 100°C)
APFC MOSFETS	2x Infineon IPP50R199CP (550V, 15A @ 100°C, 0.199Ohm)
APFC Boost Diode	1x STMicroelectronics STTH8S06D (600V, 8A @ 125°C)
Hold-up Cap(s)	1x Nippon Chemi-Con (400V, 450uF, 2000h @ 105°C, CE)
Main Switchers	4x Infineon IPP50R250CP (550V, 9A @ 100°C, 0.25Ohm)
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 @ 100°C, 3.7mOhm @ 100°C)
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 HA1225M12F-Z (120mm, 12V, 0.45A, 2050 RPM, Fluid Dynamic Bearing)
5VSB Circuit	

Standby PWM Controller	Excelliance EM8569C
Rectifier	P10V45SP SBR (45V, 10A @ 50% Duty Cycle)

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)	90.168%
Average Noise Output (>1450 Load Combinations)	25.35dBA
Average PF (>1450 Load Combinations)	0.986
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.0490W
Non-Accredited	
12V Ripple (Full Load)	24.51mV
5V Ripple (Full Load)	11.00mV
3.3V Ripple (Full Load)	9.38mV
5VSB Ripple (Full Load)	8.06mV
12V Load Regulation	0.09%
5V Load Regulation	0.14%
3.3V Load Regulation	0.27%
5VSB Load Regulation	2.37%
Inrush Current	37.927A

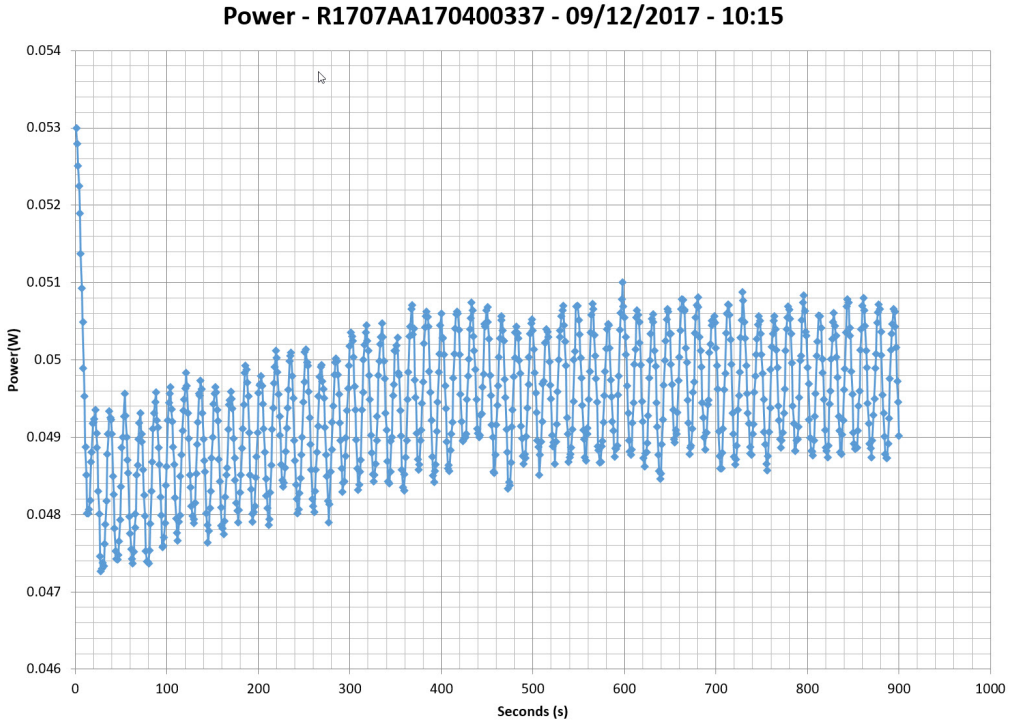
230V		
Accredited		
Average Efficiency (>1450 load combinations)	91.989%	
Average Noise Output (>1450 Load Combinations)	24.09dBA	
Average PF (>1450 Load Combinations)	0.953	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.0766W	
Non-Accredited		
12V Ripple (Full Load)	25.13mV	
5V Ripple (Full Load)	11.46mV	
3.3V Ripple (Full Load)	9.75mV	
5VSB Ripple (Full Load)	6.02mV	
12V Load Regulation	0.02%	
5V Load Regulation	0.14%	
3.3V Load Regulation	0.27%	
5VSB Load Regulation	2.29%	
Inrush Current	62.944A	
Hold-Up Time & PWR_OK Signal	22.00ms	
AC Loss to PWR_OK Hold Up Time	17.40ms	
PWR_OK Inactive to DC Loss Delay	4.60ms	
OPP (0.00°C / 0.00°C)	-	-

Hold-Up Time & PWR_OK Signal

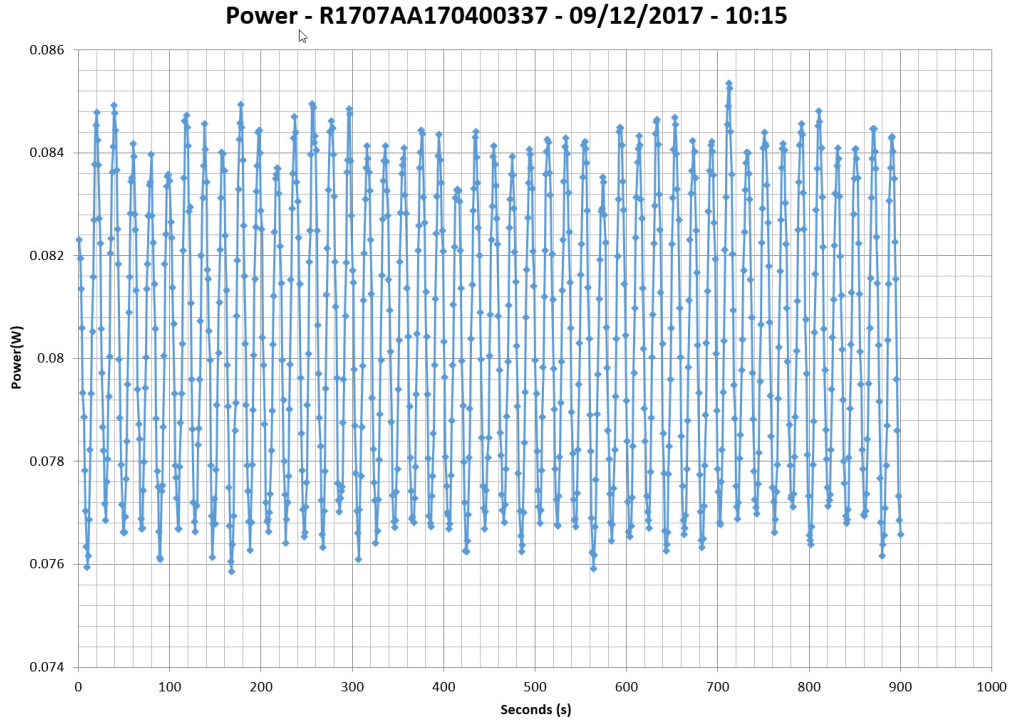
Hold-Up Time (ms)	22
AC Loss to PWR_OK Hold Up Time (ms)	17.4
PWR_OK Inactive to DC Loss Delay (ms)	4.6

Graphs

115V

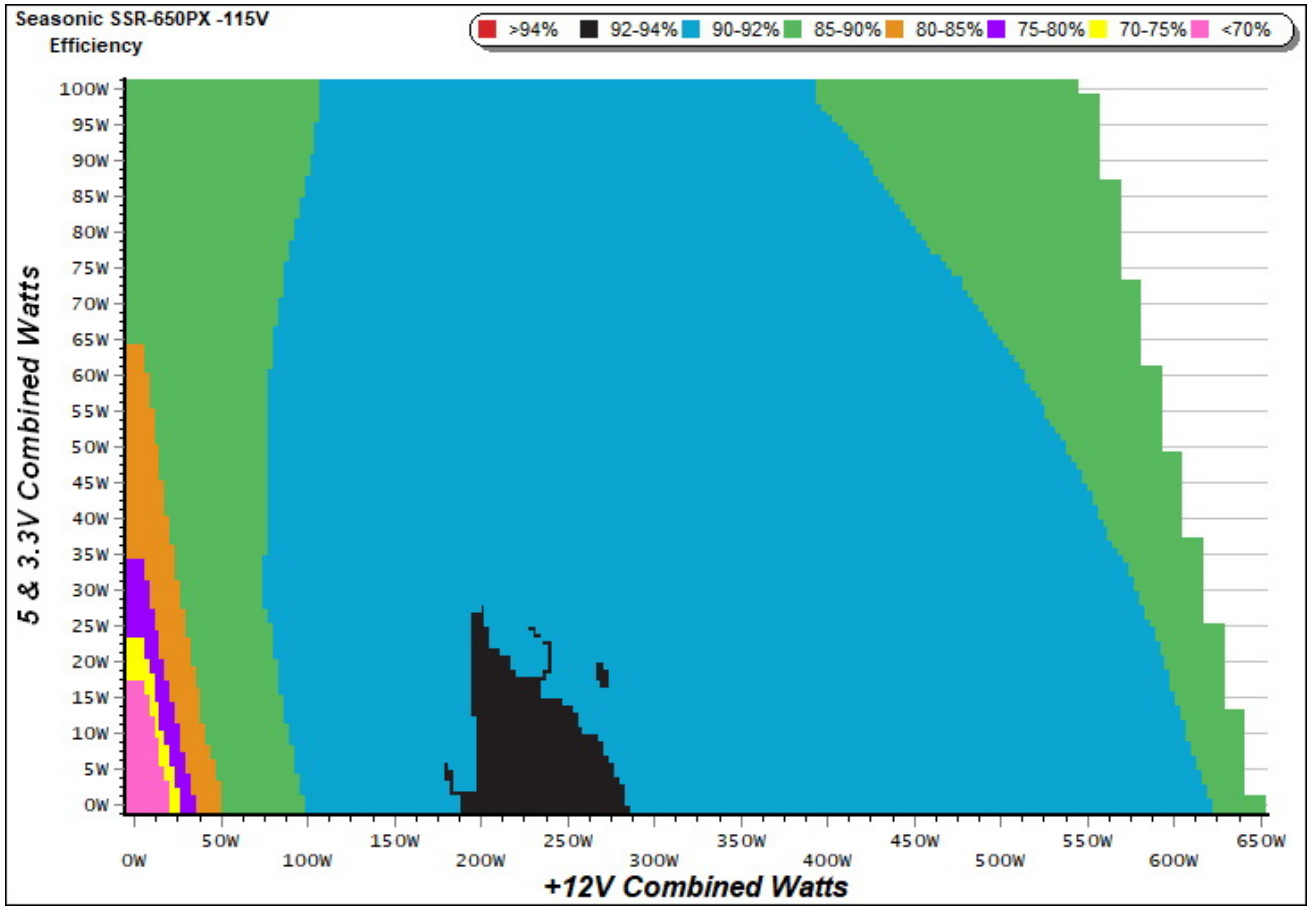


230V



Efficiency Graph

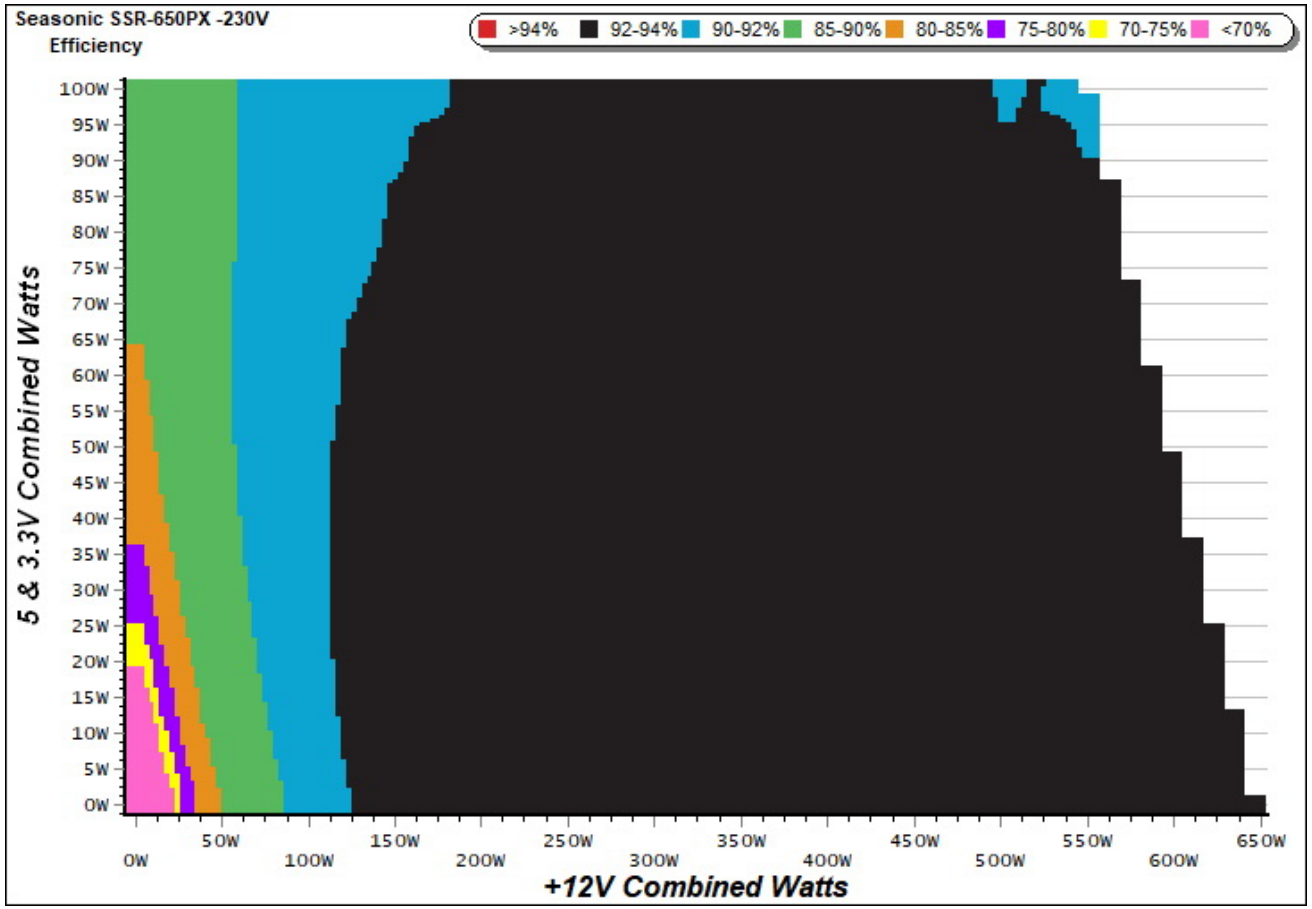
115V



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

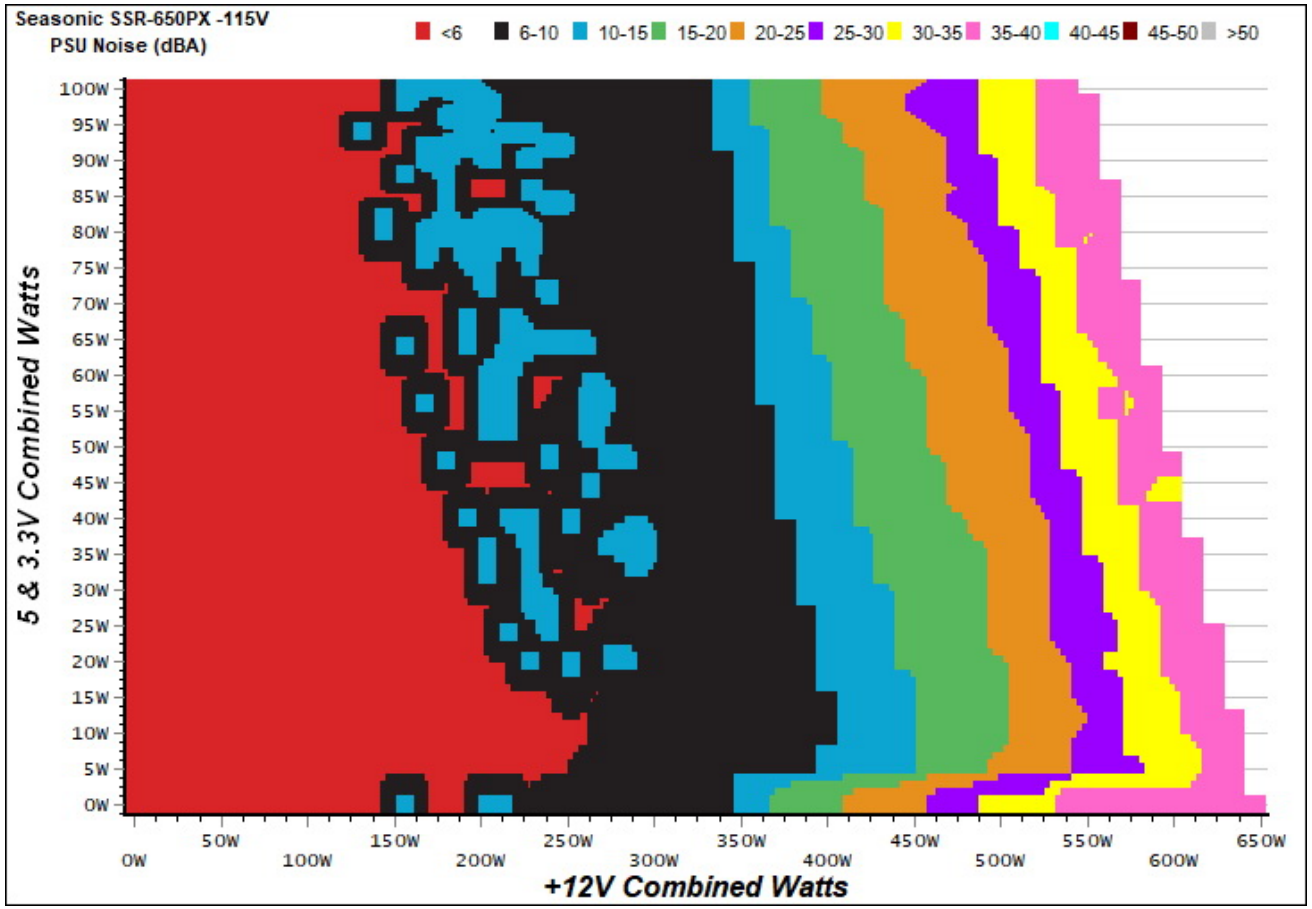


INFO

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

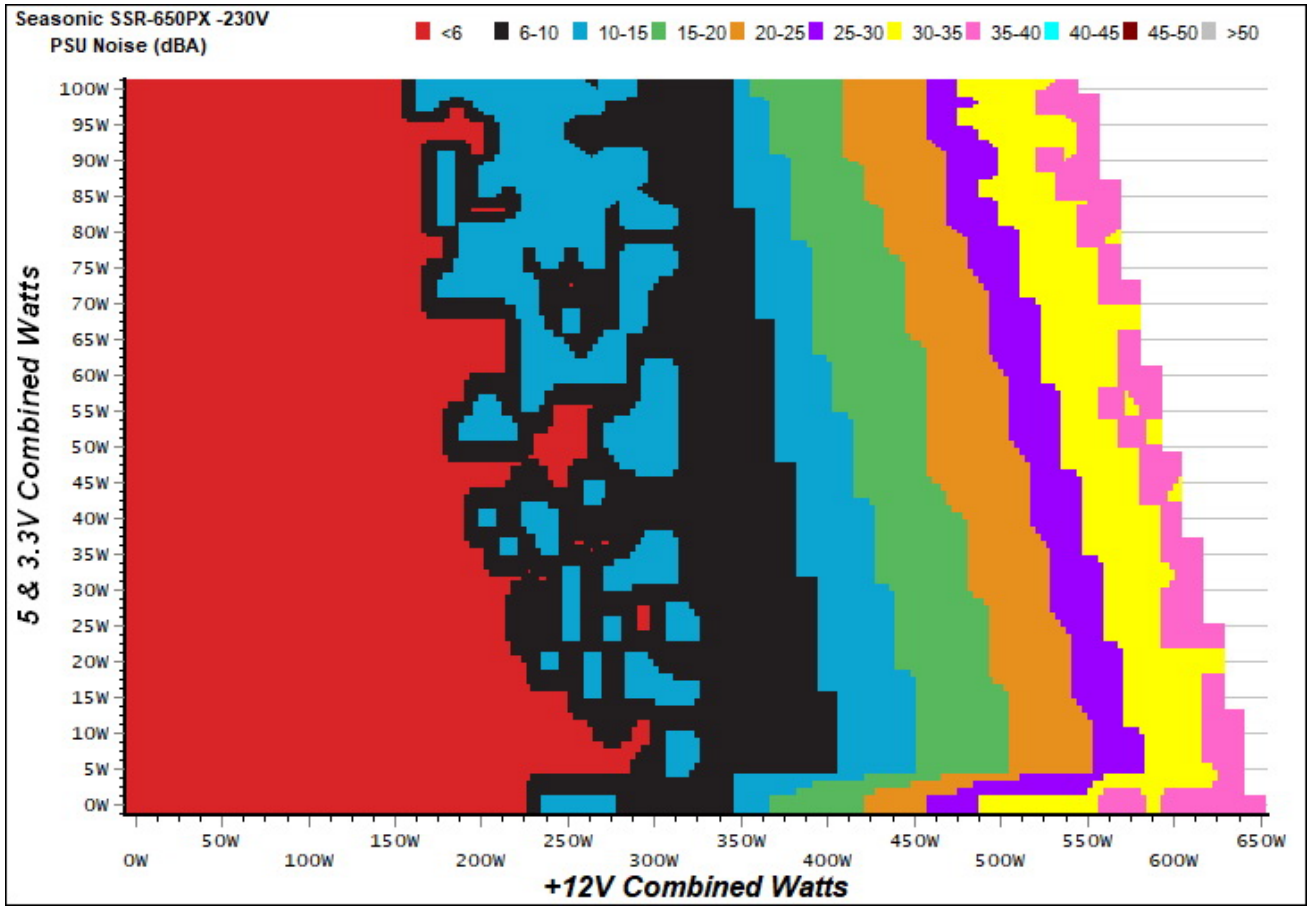
115V



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

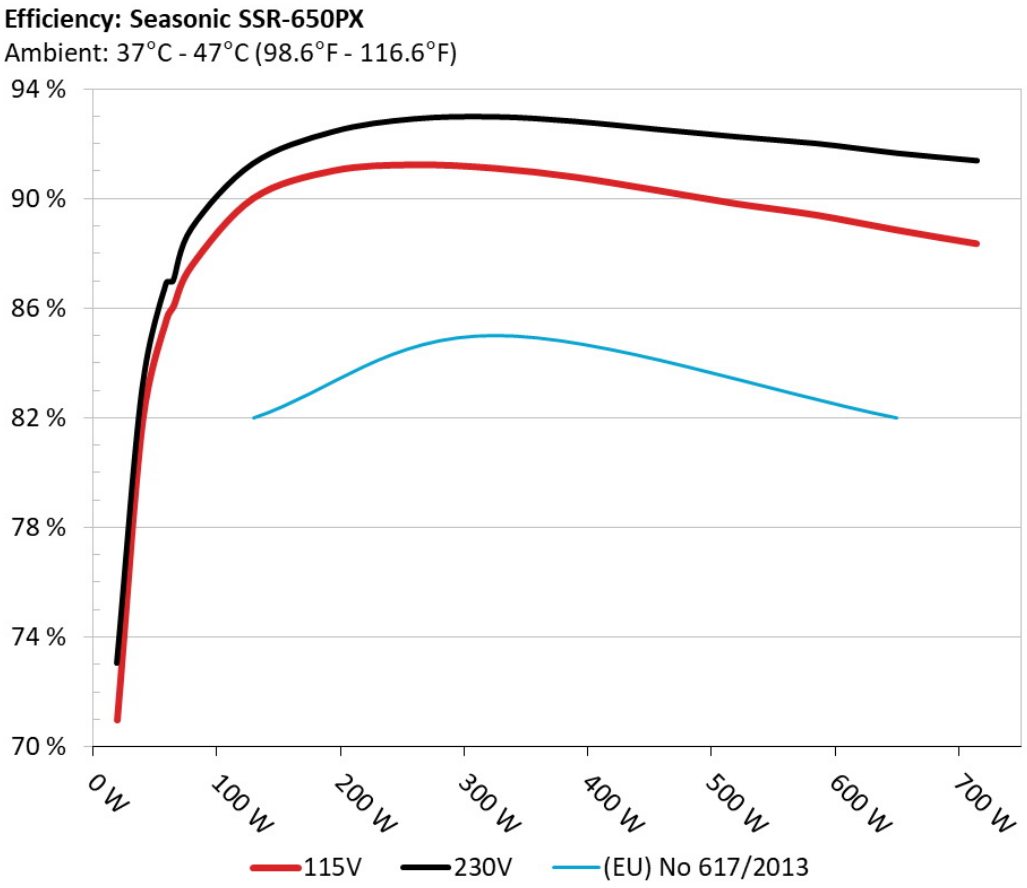


INFO

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

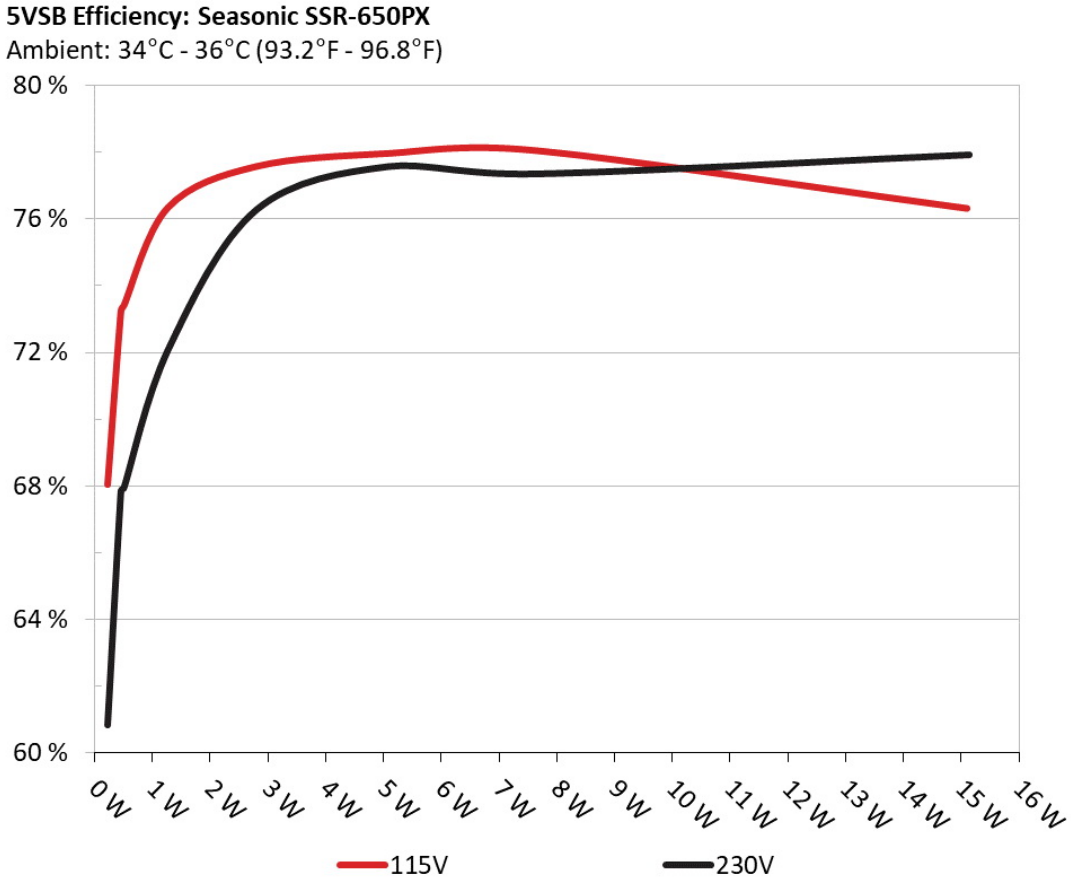
Efficiency under high ambient temperature



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	0.045A	0.230	68.047%	0.029
	5.112V	0.338		115.27V
2	0.090A	0.460	73.248%	0.054
	5.111V	0.628		115.27V
3	0.550A	2.805	77.593%	0.251
	5.100V	3.615		115.26V
4	1.000A	5.090	77.984%	0.350
	5.091V	6.527		115.26V
5	1.500A	7.619	78.072%	0.408
	5.080V	9.759		115.26V
6	3.000A	15.106	76.335%	0.479
	5.036V	19.789		115.25V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	60.847%	0.012
	5.112V	0.378		230.83V
2	0.090A	0.460	67.847%	0.021
	5.111V	0.678		230.82V
3	0.550A	2.805	76.285%	0.106
	5.100V	3.677		230.82V
4	1.000A	5.090	77.580%	0.175
	5.090V	6.561		230.81V
5	1.500A	7.619	77.358%	0.236
	5.079V	9.849		230.82V
6	3.000A	15.135	77.931%	0.338
	5.045V	19.421		230.82V

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	3.557A	1.984A	1.989A	0.984A	64.736	86.050%	0	<6.0	45.47°C	0.958
	12.134V	5.029V	3.316V	5.084V	75.231				38.02°C	115.29V
2	8.107A	2.983A	2.985A	1.183A	129.267	89.991%	0	<6.0	46.33°C	0.979
	12.134V	5.028V	3.315V	5.074V	143.644				38.38°C	115.20V
3	13.051A	3.481A	3.470A	1.382A	194.391	90.999%	0	<6.0	47.30°C	0.987
	12.136V	5.028V	3.315V	5.064V	213.620				38.77°C	115.11V
4	17.994A	3.976A	3.983A	1.583A	259.599	91.212%	485	9.3	39.00°C	0.989
	12.138V	5.027V	3.314V	5.054V	284.610				49.36°C	115.12V
5	22.606A	4.974A	4.982A	1.785A	324.927	91.087%	445	9.6	39.68°C	0.990
	12.139V	5.027V	3.313V	5.044V	356.722				51.37°C	115.02V
6	27.154A	5.970A	5.977A	1.987A	389.451	90.764%	795	18.9	40.03°C	0.991
	12.140V	5.026V	3.312V	5.033V	429.079				51.88°C	114.92V
7	31.770A	6.962A	6.978A	2.191A	454.772	90.291%	1155	28.7	41.34°C	0.991
	12.140V	5.025V	3.310V	5.022V	503.673				53.59°C	114.94V
8	36.388A	7.964A	7.979A	2.395A	520.095	89.795%	1670	37.2	42.84°C	0.991
	12.138V	5.024V	3.309V	5.012V	579.203				55.57°C	114.84V
9	41.400A	8.463A	8.464A	2.398A	585.024	89.380%	2005	41.1	43.86°C	0.991
	12.138V	5.023V	3.308V	5.005V	654.535				56.75°C	114.74V
10	46.149A	8.962A	8.980A	3.009A	649.864	88.838%	2025	41.2	45.29°C	0.992
	12.138V	5.022V	3.307V	4.986V	731.517				58.65°C	114.63V
11	51.480A	8.963A	8.982A	3.013A	714.688	88.339%	2035	41.3	46.57°C	0.993
	12.140V	5.022V	3.307V	4.980V	809.032				60.54°C	114.64V
CL1	0.738A	12.001A	12.001A	0.000A	109.074	86.604%	445	9.6	43.65°C	0.979
	12.143V	5.026V	3.316V	5.092V	125.946				52.20°C	115.21V

CL2	54.012A	1.002A	1.000A	1.000A	668.978	89.315%	2025	41.2	45.89°C	0.992
	12.138V	5.024V	3.308V	5.039V	749.007				59.16°C	114.62V

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	3.565A	1.988A	1.991A	0.984A	64.877	86.983%	0	<6.0	47.54°C	0.815
	12.139V	5.029V	3.316V	5.083V	74.586				38.12°C	230.90V
2	8.113A	2.984A	2.989A	1.183A	129.398	91.271%	0	<6.0	48.29°C	0.914
	12.139V	5.028V	3.315V	5.073V	141.774				38.44°C	230.86V
3	13.055A	3.483A	3.469A	1.383A	194.487	92.439%	450	9.9	38.54°C	0.948
	12.139V	5.028V	3.314V	5.064V	210.394				48.90°C	230.81V
4	17.999A	3.979A	3.987A	1.583A	259.699	92.903%	445	9.6	39.23°C	0.962
	12.139V	5.027V	3.313V	5.053V	279.539				50.09°C	230.77V
5	22.612A	4.974A	4.984A	1.785A	325.017	92.978%	465	9.8	39.66°C	0.971
	12.140V	5.026V	3.312V	5.043V	349.565				50.64°C	230.72V
6	27.160A	5.971A	5.979A	1.987A	389.523	92.814%	795	18.9	40.65°C	0.976
	12.140V	5.025V	3.311V	5.033V	419.683				52.02°C	230.67V
7	31.773A	6.969A	6.980A	2.191A	454.836	92.528%	1130	29.9	41.56°C	0.979
	12.140V	5.024V	3.309V	5.022V	491.564				53.19°C	230.71V
8	36.393A	7.964A	7.980A	2.395A	520.158	92.254%	1655	37.0	42.54°C	0.982
	12.138V	5.024V	3.309V	5.012V	563.835				54.42°C	230.67V
9	41.402A	8.464A	8.466A	2.398A	585.061	92.005%	2005	41.1	43.97°C	0.984
	12.138V	5.023V	3.308V	5.006V	635.904				56.20°C	230.62V
10	46.151A	8.962A	8.983A	3.009A	649.900	91.654%	2025	41.2	45.48°C	0.985
	12.138V	5.022V	3.307V	4.987V	709.083				58.16°C	230.57V
11	51.487A	8.963A	8.984A	3.012A	714.717	91.382%	2035	41.3	46.41°C	0.987
	12.139V	5.022V	3.306V	4.981V	782.120				59.81°C	230.51V
CL1	0.740A	12.002A	12.000A	0.000A	109.101	87.748%	445	9.6	44.07°C	0.900
	12.143V	5.026V	3.316V	5.091V	124.335				50.37°C	230.95V

CL2	54.016A	1.002A	0.999A	1.000A	669.025	92.214%	2025	41.2	45.69°C	0.986
	12.138V	5.025V	3.307V	5.040V	725.512				55.59°C	230.56V

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	1.172A	0.494A	0.480A	0.196A	19.296	70.980%	0	<6.0	0.860
	12.128V	5.035V	3.319V	5.107V	27.185				115.34V
2	2.427A	0.993A	0.995A	0.392A	39.729	81.845%	0	<6.0	0.930
	12.129V	5.029V	3.316V	5.100V	48.542				115.32V
3	3.619A	1.490A	1.476A	0.589A	59.286	85.605%	0	<6.0	0.957
	12.130V	5.029V	3.316V	5.094V	69.255				115.29V
4	4.873A	1.987A	1.989A	0.786A	79.711	87.547%	0	<6.0	0.970
	12.133V	5.029V	3.316V	5.088V	91.049				115.26V

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	1.193A	0.497A	0.484A	0.196A	19.591	73.068%	0	<6.0	0.538
	12.138V	5.034V	3.320V	5.106V	26.812				230.93V
2	2.446A	0.995A	0.996A	0.392A	39.994	83.058%	0	<6.0	0.713
	12.138V	5.029V	3.316V	5.100V	48.152				230.91V
3	3.631A	1.491A	1.477A	0.589A	59.470	86.919%	0	<6.0	0.796
	12.138V	5.029V	3.316V	5.094V	68.420				230.90V
4	4.886A	1.989A	1.992A	0.786A	79.913	88.916%	0	<6.0	0.849
	12.138V	5.029V	3.316V	5.087V	89.875				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	8.1 mV	4.8 mV	3.7 mV	3.9 mV	Pass
20% Load	11.7 mV	5.6 mV	4.3 mV	4.3 mV	Pass
30% Load	14.3 mV	6.0 mV	4.9 mV	4.4 mV	Pass
40% Load	17.0 mV	6.5 mV	5.6 mV	4.7 mV	Pass
50% Load	19.0 mV	7.9 mV	6.5 mV	4.9 mV	Pass
60% Load	20.4 mV	9.3 mV	7.1 mV	5.4 mV	Pass
70% Load	22.1 mV	10.4 mV	8.2 mV	7.2 mV	Pass
80% Load	22.4 mV	10.9 mV	9.0 mV	9.5 mV	Pass
90% Load	23.4 mV	9.9 mV	9.0 mV	9.8 mV	Pass
100% Load	24.5 mV	11.0 mV	9.4 mV	8.1 mV	Pass
110% Load	26.7 mV	11.5 mV	9.7 mV	8.9 mV	Pass
Crossload 1	10.6 mV	9.5 mV	8.4 mV	5.2 mV	Pass
Crossload 2	24.9 mV	8.2 mV	5.6 mV	7.8 mV	Pass

The results above are not used in the certification process

230V

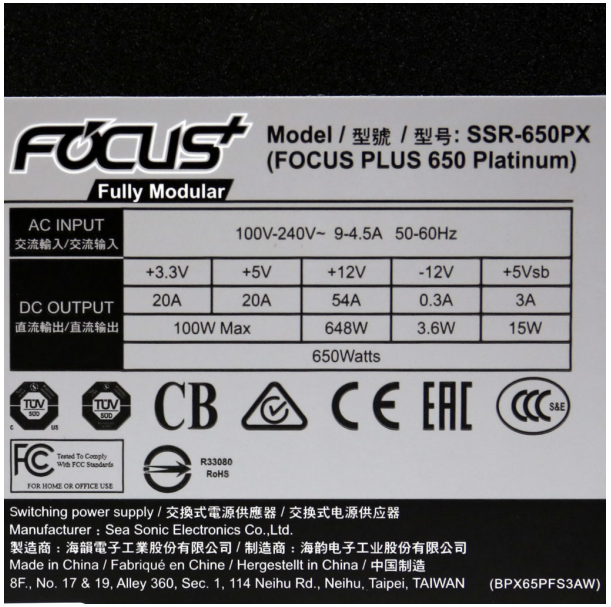
Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.2 mV	4.7 mV	3.6 mV	3.6 mV	Pass
20% Load	11.4 mV	5.2 mV	4.5 mV	4.0 mV	Pass
30% Load	14.3 mV	6.1 mV	4.8 mV	4.2 mV	Pass
40% Load	16.9 mV	6.5 mV	5.4 mV	4.3 mV	Pass
50% Load	19.2 mV	8.0 mV	6.3 mV	4.4 mV	Pass
60% Load	20.5 mV	8.8 mV	7.5 mV	4.9 mV	Pass
70% Load	22.2 mV	10.5 mV	8.5 mV	4.9 mV	Pass
80% Load	22.8 mV	11.0 mV	9.3 mV	5.9 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	23.6 mV	11.0 mV	9.3 mV	6.3 mV	Pass
100% Load	25.1 mV	11.5 mV	9.8 mV	6.0 mV	Pass
110% Load	26.8 mV	11.2 mV	9.7 mV	6.7 mV	Pass
Crossload 1	10.6 mV	9.3 mV	8.3 mV	5.3 mV	Pass
Crossload 2	25.4 mV	8.0 mV	5.9 mV	5.2 mV	Pass

The results above are not used in the certification process

Seasonic Focus Plus Platinum 650W

Top side



Power specifications label