Seasonic Prime Titanium Ultra 650W

Serial Number R1709AA181140024

Lab ID 239

Certification ID 25239

Test Result Report ID:

Certificate Issue Date: Aug 12, 2018

Scheme: ETA-EMI PSU

115V



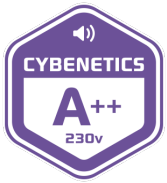
230V



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	Prime Titanium Ultra 650W
OEM/ODM	Seasonic
Serial Number	R1709AA181140024
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	8.5-4

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	135mm Fluid Dynamic Bearing Fan (HA13525L12F-Z)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	239
Date of receipt	Jul 28, 2018
Testing Date	Aug 8, 2018
Report Issued Date	Aug 12, 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	No
4+4 pin EPS12V (660mm)	2	2	18AWG	No
6+2 pin PCIe (700mm+80mm)	2	4	18AWG	No
SATA (410mm+110mm+110mm+110mm)	1	4	18AWG	No
SATA (300mm+150mm)	1	2	18AWG	No

4 pin Molex (450mm+120mm+120mm)	1	3	18AWG	No
4 pin Molex (350mm+120mm)	1	2	18AWG	No
4-pin Molex Adapter / SATA (150mm+150mm)	1	2	18AWG	No
FDD Adapter (+100mm)	1	1	22AWG	No
AC Power Cord (1370mm) - C13 coupler	1	1	18AWG	-

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				

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)	92.425%
Average Noise Output (>1450 Load Combinations)	9.98dBA
Average PF (>1450 Load Combinations)	0.987
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.0550W
Non-Accredited	
12V Ripple (Full Load)	16.73mV

5V Ripple (Full Load)	5.20mV
3.3V Ripple (Full Load)	8.53mV
5VSB Ripple (Full Load)	6.65mV
12V Load Regulation	0.04%
5V Load Regulation	0.24%
3.3V Load Regulation	0.33%
5VSB Load Regulation	1.41%
Inrush Current	31.657A

230V

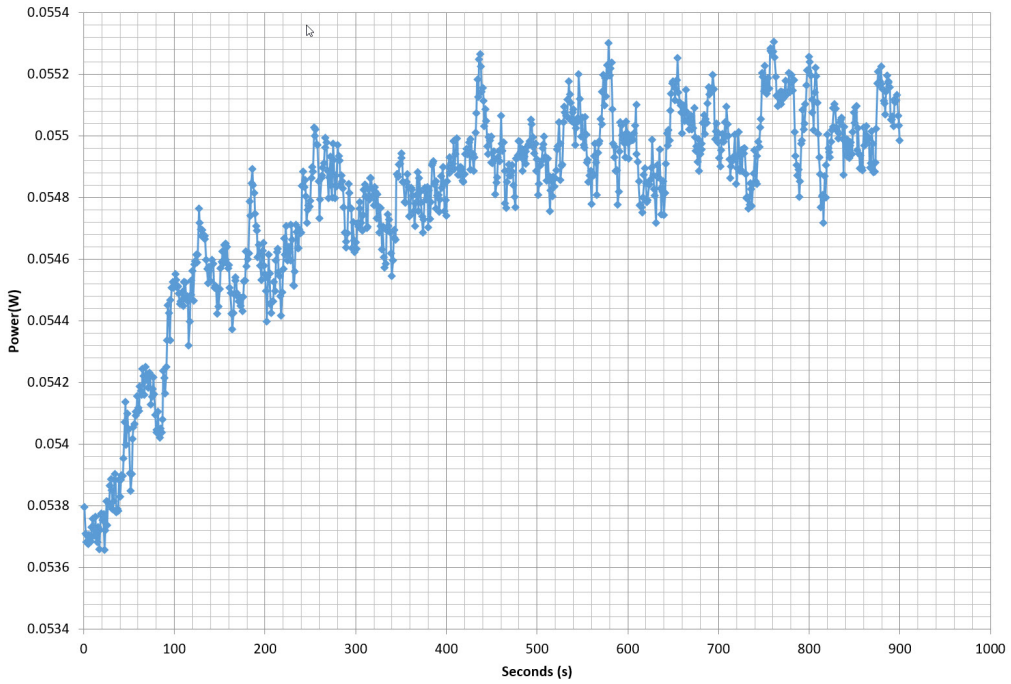
Accredited		
Average Efficiency (>1450 load combinations)		93.907%
Average Noise Output (>1450 Load Combinations)		10.29dBA
Average PF (>1450 Load Combinations)		0.931
Efficiency With 10W (≤500W) or 2% (>500W) Load		-
Standby Power Consumption		0.0863W
Non-Accredited		
12V Ripple (Full Load)		19.49mV
5V Ripple (Full Load)		7.99mV
3.3V Ripple (Full Load)		9.30mV
5VSB Ripple (Full Load)		5.46mV
12V Load Regulation		0.28%
5V Load Regulation		0.14%
3.3V Load Regulation		0.15%
5VSB Load Regulation		1.15%
Inrush Current		61.536A
Hold-Up Time & PWR_OK Signal		28.60ms
AC Loss to PWR_OK Hold Up Time		23.50ms
PWR_OK Inactive to DC Loss Delay		5.10ms
OPP (0.00°C / 0.00°C)	-	-

Hold-Up Time & PWR_OK Signal

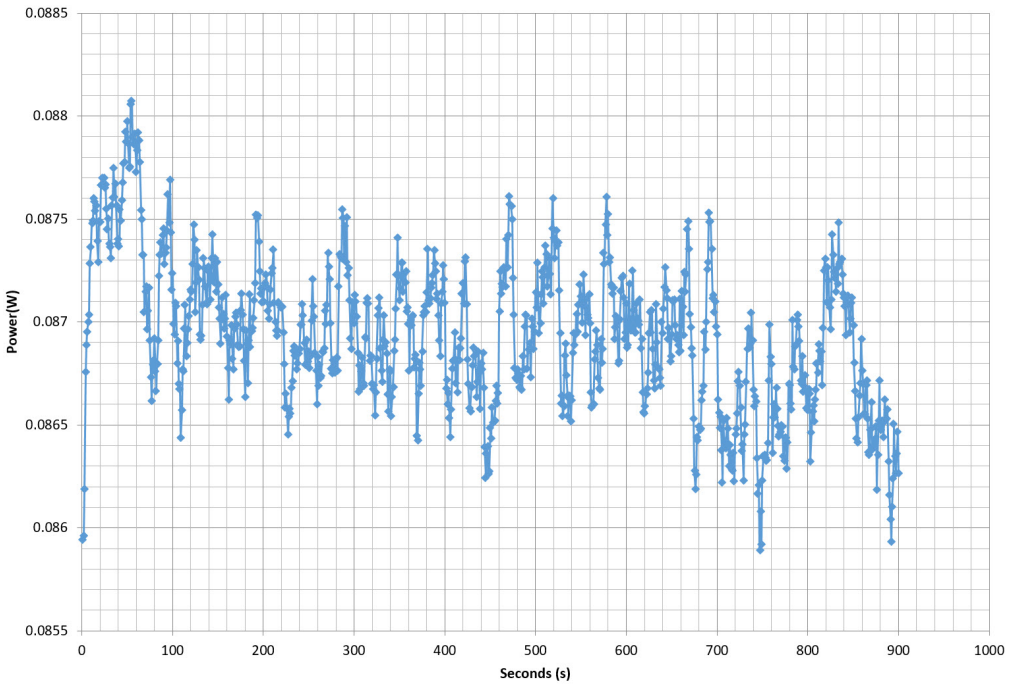
Hold-Up Time (ms)	28.6
AC Loss to PWR_OK Hold Up Time (ms)	23.5
PWR_OK Inactive to DC Loss Delay (ms)	5.1

Graphs

115V

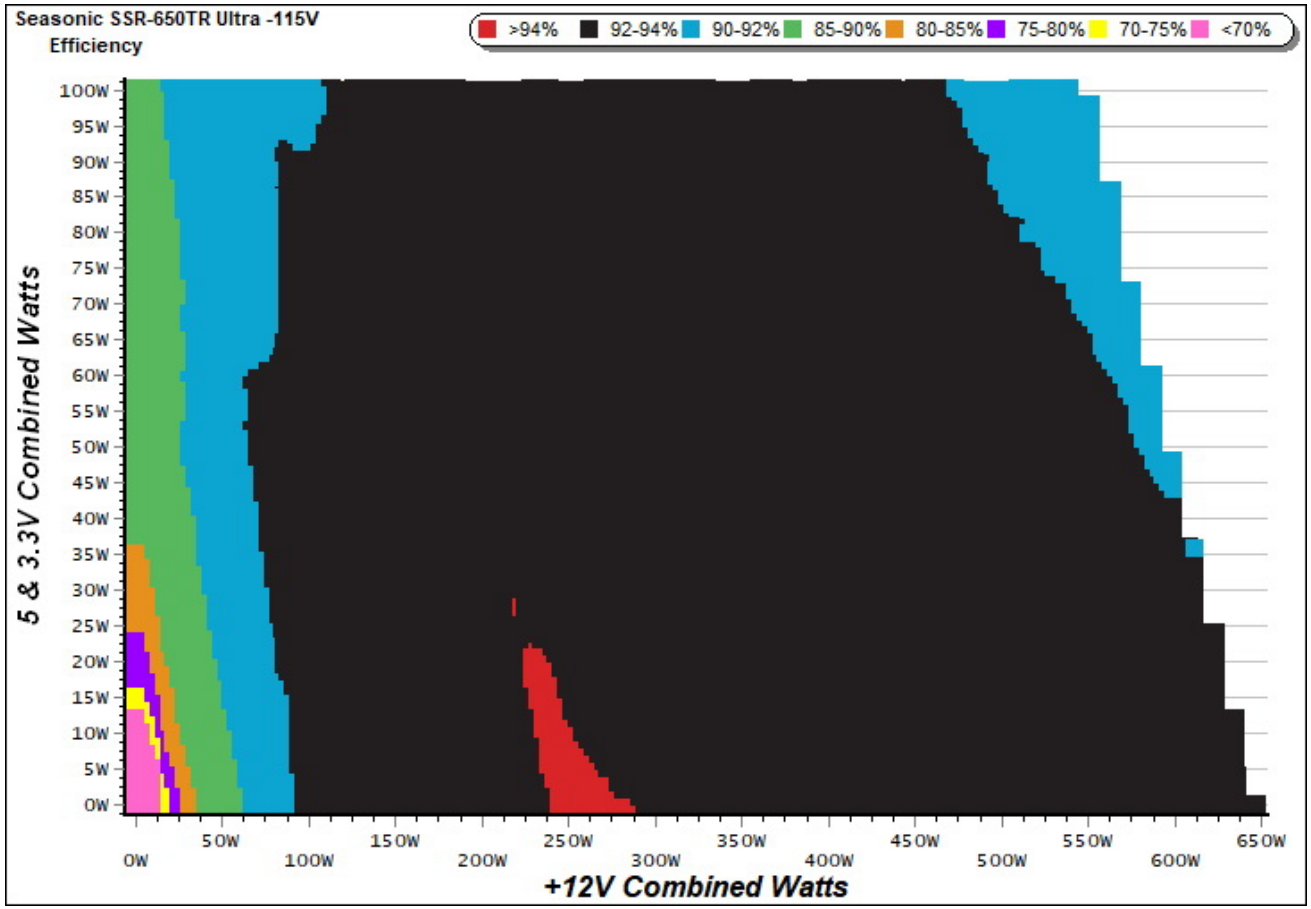


230V



Efficiency Graph

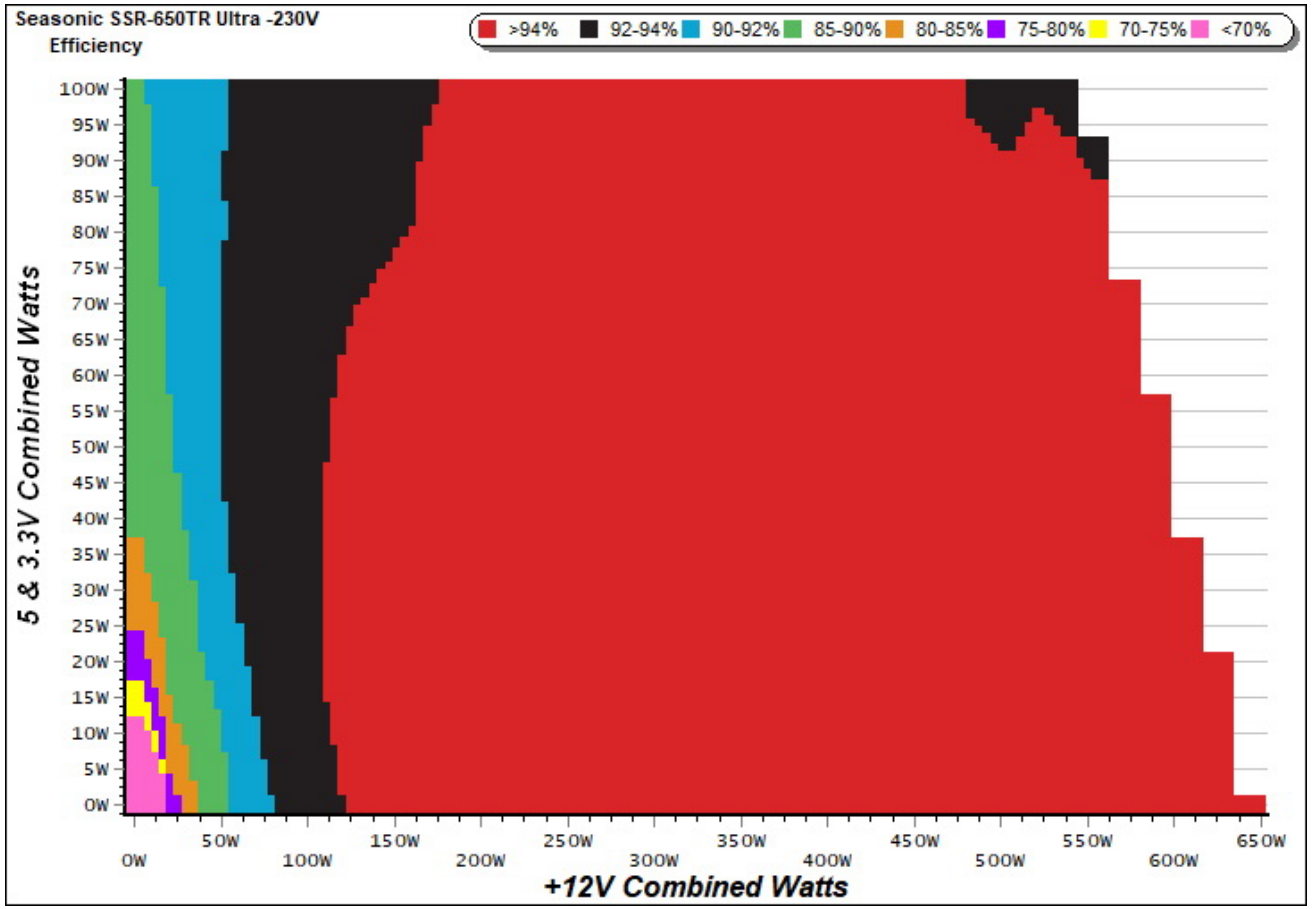
115V



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

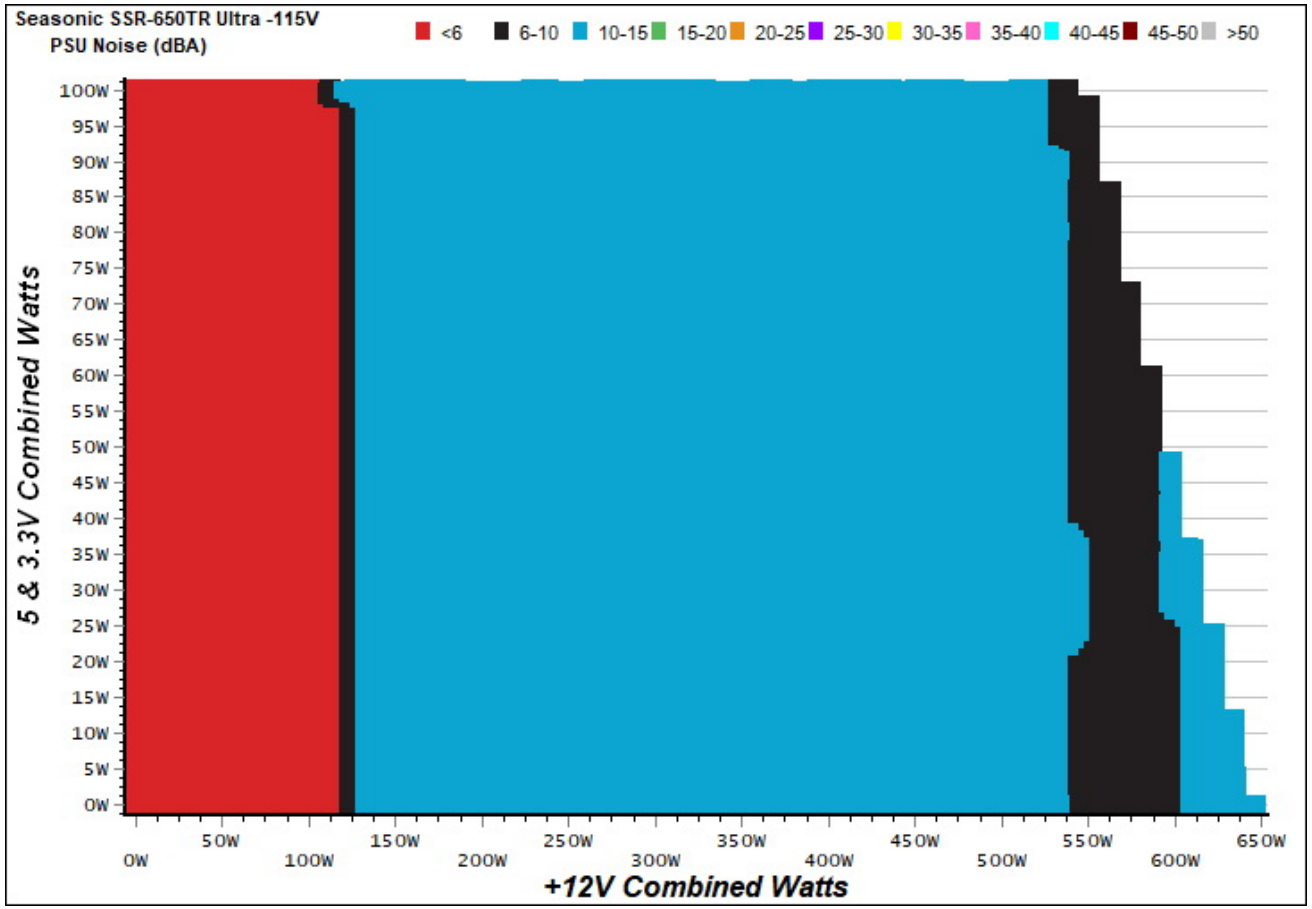


INFO

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Noise Graph

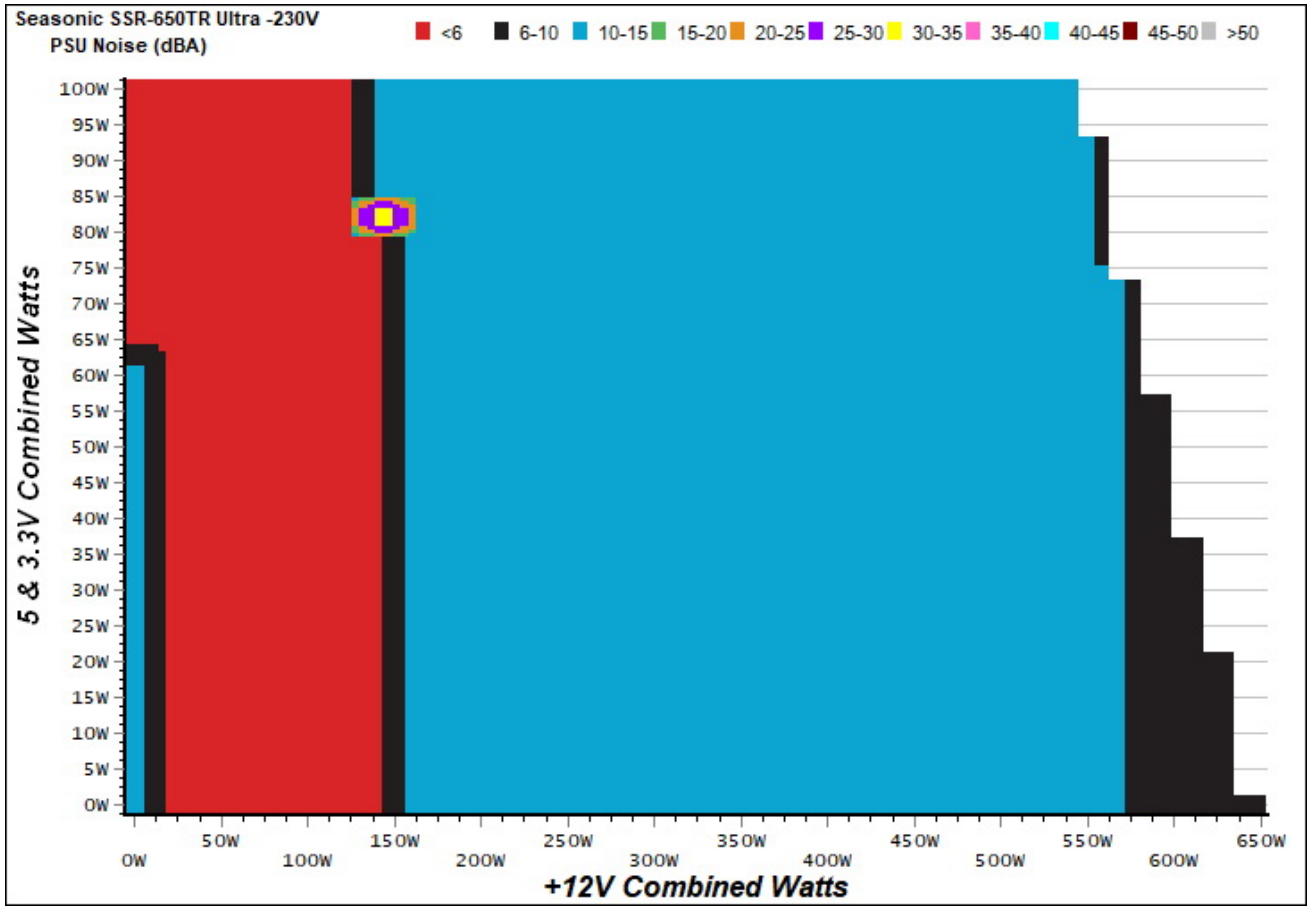
115V



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

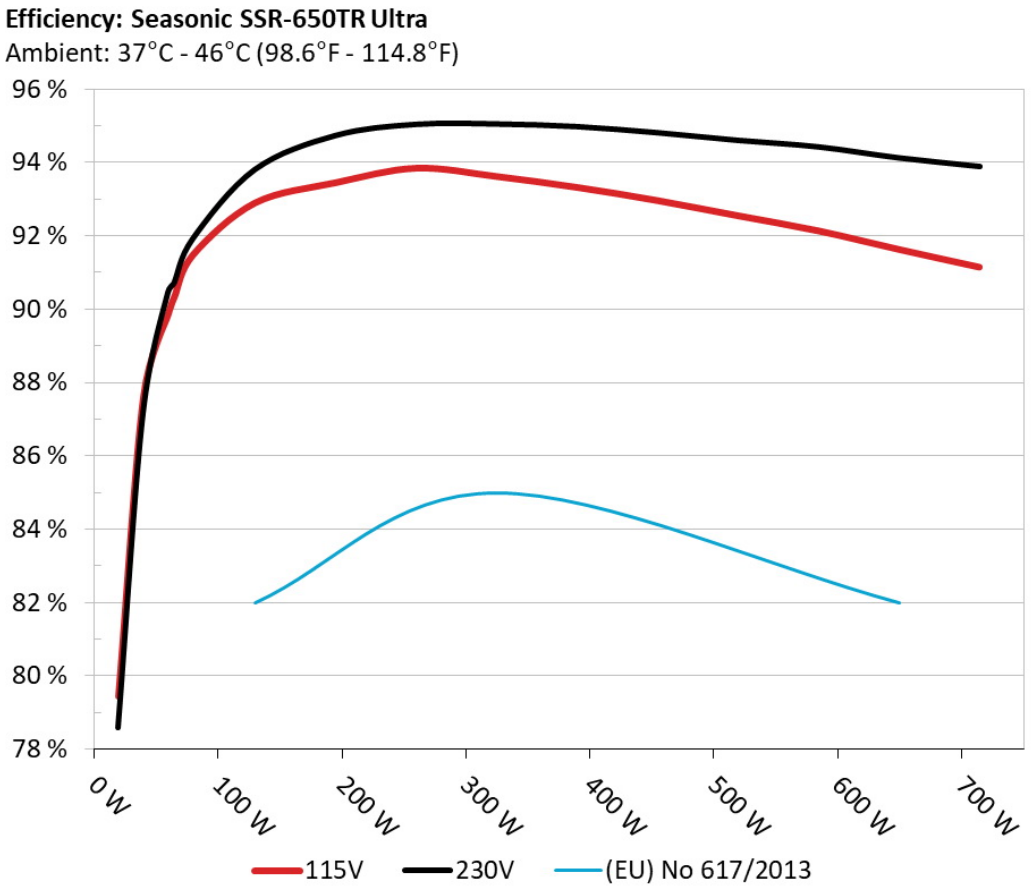


INFO

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

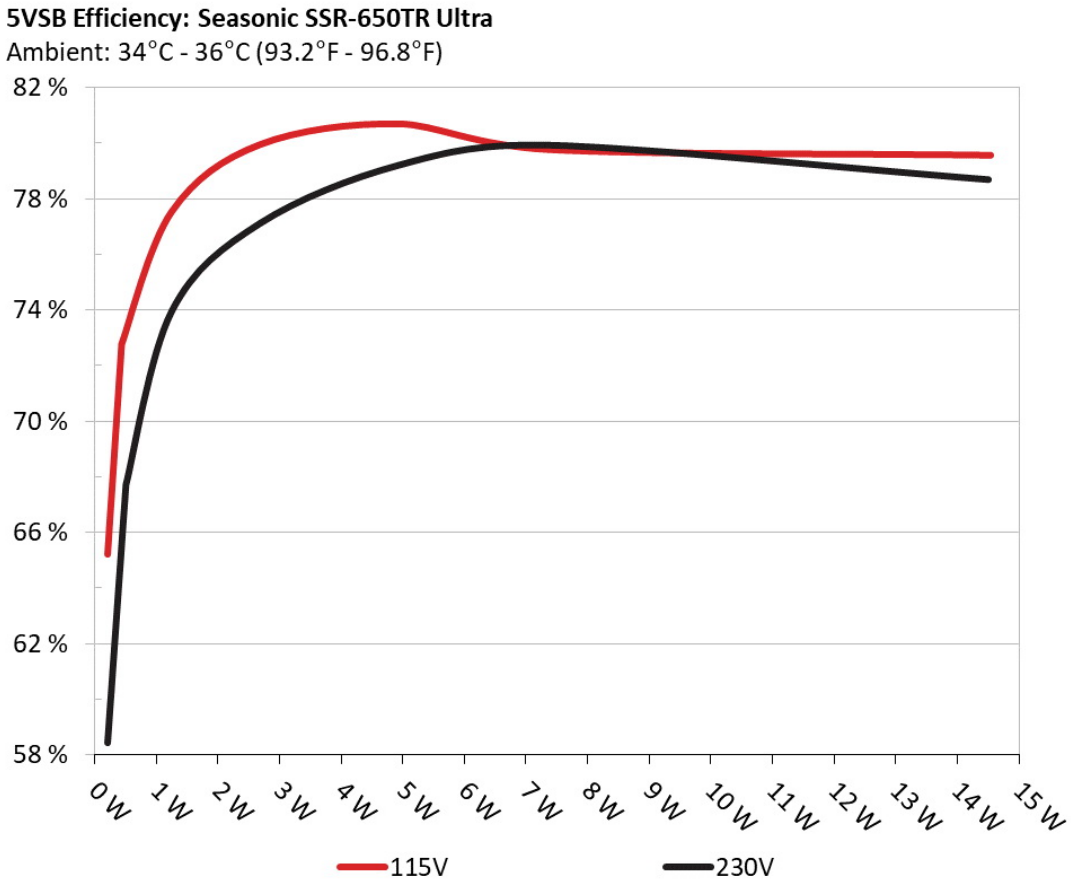
Efficiency under high ambient temperature



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	0.042A	0.208	65.204%	0.034
	4.966V	0.319		115.07V
2	0.088A	0.435	72.621%	0.063
	4.963V	0.599		115.09V
3	0.542A	2.682	79.940%	0.267
	4.944V	3.355		115.07V
4	1.002A	4.938	80.686%	0.361
	4.926V	6.120		115.07V
5	1.502A	7.365	79.760%	0.414
	4.903V	9.234		115.08V
6	3.001A	14.542	79.556%	0.479
	4.845V	18.279		115.08V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.208	58.427%	0.011
	4.965V	0.356		230.28V
2	0.087A	0.434	67.707%	0.021
	4.963V	0.641		230.28V
3	0.542A	2.681	77.107%	0.105
	4.942V	3.477		230.25V
4	1.002A	4.935	79.201%	0.173
	4.924V	6.231		230.26V
5	1.502A	7.364	79.922%	0.231
	4.903V	9.214		230.27V
6	3.002A	14.510	78.683%	0.333
	4.834V	18.441		230.27V

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	3.534A	1.985A	1.986A	0.997A	64.778	90.337%	395	10.5	38.04°C	0.956
	12.231V	5.026V	3.317V	5.004V	71.707				43.86°C	115.02V
2	8.089A	2.979A	2.985A	1.201A	129.809	92.894%	395	10.5	38.25°C	0.981
	12.231V	5.025V	3.316V	4.999V	139.739				44.20°C	115.03V
3	12.988A	3.485A	3.498A	1.401A	194.969	93.444%	395	10.5	38.65°C	0.988
	12.232V	5.024V	3.315V	4.993V	208.649				45.55°C	115.03V
4	17.876A	3.983A	3.980A	1.602A	259.838	93.840%	395	10.5	38.96°C	0.996
	12.232V	5.022V	3.313V	4.988V	276.896				47.01°C	115.03V
5	22.426A	4.976A	4.978A	1.805A	324.799	93.614%	420	10.8	39.27°C	0.992
	12.233V	5.020V	3.312V	4.984V	346.954				49.37°C	115.02V
6	26.979A	5.974A	5.976A	2.005A	389.787	93.318%	435	10.7	40.36°C	0.991
	12.233V	5.020V	3.310V	4.979V	417.698				50.63°C	115.03V
7	31.519A	6.979A	6.978A	2.210A	454.723	92.959%	290	9.0	41.18°C	0.992
	12.234V	5.019V	3.310V	4.975V	489.164				57.03°C	115.02V
8	36.068A	7.973A	7.979A	2.412A	519.682	92.545%	385	10.5	41.69°C	0.993
	12.235V	5.018V	3.308V	4.970V	561.544				57.89°C	115.02V
9	41.044A	8.473A	8.494A	2.412A	584.760	92.133%	460	11.9	43.46°C	0.994
	12.235V	5.017V	3.307V	4.970V	634.691				61.08°C	115.03V
10	45.759A	8.978A	8.982A	3.026A	649.638	91.627%	540	15.8	44.97°C	0.995
	12.236V	5.016V	3.307V	4.955V	709.002				63.12°C	115.03V
11	51.068A	8.981A	8.983A	3.026A	714.584	91.146%	610	18.7	46.24°C	0.995
	12.236V	5.015V	3.305V	4.953V	783.995				66.07°C	115.04V
CL1	0.102A	12.012A	12.003A	0.005A	101.471	89.060%	440	11.6	44.35°C	0.978
	12.228V	5.026V	3.318V	5.048V	113.936				59.17°C	115.06V

CL2	53.978A	1.003A	1.002A	1.002A	673.938	91.878%	580	16.4	45.08°C	0.995
	12.238V	5.018V	3.310V	4.995V	733.515				64.07°C	115.04V

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	3.543A	1.990A	1.988A	0.999A	64.916	90.761%	0	<6.0	46.73°C	0.735
	12.224V	5.027V	3.320V	5.007V	71.524				40.00°C	231.00V
2	8.060A	2.986A	2.981A	1.199A	129.395	93.703%	395	10.5	40.83°C	0.859
	12.220V	5.026V	3.319V	5.004V	138.090				47.97°C	230.97V
3	12.973A	3.483A	3.465A	1.400A	194.477	94.652%	395	10.5	41.13°C	0.915
	12.216V	5.025V	3.318V	5.000V	205.465				48.48°C	230.76V
4	17.889A	3.981A	3.977A	1.602A	259.663	94.905%	395	10.5	41.86°C	0.944
	12.212V	5.025V	3.318V	4.995V	273.603				49.83°C	230.88V
5	22.483A	4.978A	4.973A	1.803A	324.977	94.910%	420	10.8	42.05°C	0.961
	12.208V	5.024V	3.317V	4.992V	342.405				50.46°C	230.66V
6	27.011A	5.974A	5.967A	2.005A	389.473	94.797%	468	12.1	42.80°C	0.968
	12.205V	5.023V	3.317V	4.989V	410.848				51.74°C	230.79V
7	31.607A	6.971A	6.966A	2.207A	454.795	94.616%	350	10.1	43.29°C	0.975
	12.202V	5.023V	3.317V	4.986V	480.676				52.67°C	230.74V
8	36.209A	7.968A	7.959A	2.409A	520.099	94.353%	425	10.8	43.77°C	0.979
	12.198V	5.022V	3.317V	4.984V	551.227				53.69°C	230.69V
9	41.212A	8.466A	8.444A	2.408A	585.007	94.134%	460	11.9	44.67°C	0.981
	12.193V	5.021V	3.316V	4.984V	621.465				54.88°C	230.64V
10	45.949A	8.963A	8.958A	3.019A	649.819	93.818%	525	13.8	45.21°C	0.984
	12.190V	5.021V	3.315V	4.969V	692.641				55.60°C	230.60V
11	51.286A	8.965A	8.960A	3.020A	714.633	93.609%	580	16.4	46.13°C	0.987
	12.185V	5.021V	3.314V	4.969V	763.425				56.87°C	230.39V
CL1	0.139A	12.002A	11.999A	0.000A	101.906	89.766%	385	10.5	42.66°C	0.826
	12.227V	5.025V	3.325V	5.061V	113.524				50.91°C	230.96V

CL2	54.002A	1.001A	0.999A	1.000A	671.245	94.176%	490	13.3	45.63°C	0.985
	12.183V	5.024V	3.312V	5.001V	712.754				55.71°C	230.59V

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	1.197A	0.490A	0.479A	0.197A	19.675	79.453%	0	<6.0	0.797
	12.221V	5.031V	3.321V	5.026V	24.763				115.02V
2	2.414A	0.986A	0.992A	0.397A	39.770	87.607%	0	<6.0	0.908
	12.232V	5.028V	3.318V	5.019V	45.396				307.51V
3	3.636A	1.483A	1.505A	0.596A	59.912	89.881%	395	10.5	0.952
	12.232V	5.027V	3.318V	5.013V	66.657				115.02V
4	4.844A	1.986A	1.988A	0.796A	79.807	91.478%	395	10.5	0.964
	12.231V	5.026V	3.316V	5.009V	87.242				115.02V

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	0.498A	0.483A	0.199A	19.707	78.608%	0	<6.0	0.454
	12.225V	5.031V	3.321V	5.027V	25.070				231.02V
2	2.437A	0.995A	0.996A	0.399A	40.101	87.229%	0	<6.0	0.625
	12.224V	5.028V	3.319V	5.020V	45.972				231.02V
3	3.612A	1.492A	1.476A	0.598A	59.548	90.412%	0	<6.0	0.715
	12.223V	5.027V	3.319V	5.016V	65.863				231.01V
4	4.854A	1.990A	1.988A	0.798A	79.926	91.892%	0	<6.0	0.775
	12.222V	5.027V	3.319V	5.012V	86.978				231.00V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	13.2 mV	3.6 mV	6.1 mV	3.3 mV	Pass
20% Load	14.5 mV	3.6 mV	6.1 mV	4.0 mV	Pass
30% Load	16.3 mV	3.4 mV	6.1 mV	4.0 mV	Pass
40% Load	12.5 mV	4.0 mV	7.0 mV	5.1 mV	Pass
50% Load	10.6 mV	4.1 mV	7.2 mV	4.5 mV	Pass
60% Load	10.8 mV	4.4 mV	7.6 mV	5.0 mV	Pass
70% Load	13.8 mV	4.3 mV	7.5 mV	5.2 mV	Pass
80% Load	15.3 mV	4.4 mV	7.8 mV	5.6 mV	Pass
90% Load	15.7 mV	4.5 mV	7.1 mV	5.6 mV	Pass
100% Load	16.7 mV	5.2 mV	8.5 mV	6.7 mV	Pass
110% Load	18.2 mV	5.5 mV	8.8 mV	6.8 mV	Pass
Crossload 1	15.5 mV	3.9 mV	6.6 mV	3.8 mV	Pass
Crossload 2	17.2 mV	5.1 mV	7.9 mV	5.3 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	13.6 mV	3.7 mV	4.9 mV	2.2 mV	Pass
20% Load	16.8 mV	4.3 mV	6.0 mV	2.5 mV	Pass
30% Load	18.5 mV	4.3 mV	6.0 mV	2.7 mV	Pass
40% Load	14.7 mV	4.8 mV	6.5 mV	3.0 mV	Pass
50% Load	12.8 mV	5.7 mV	7.2 mV	3.2 mV	Pass
60% Load	13.5 mV	6.4 mV	8.2 mV	4.1 mV	Pass
70% Load	16.2 mV	6.3 mV	7.9 mV	4.3 mV	Pass
80% Load	18.0 mV	6.2 mV	9.1 mV	4.5 mV	Pass

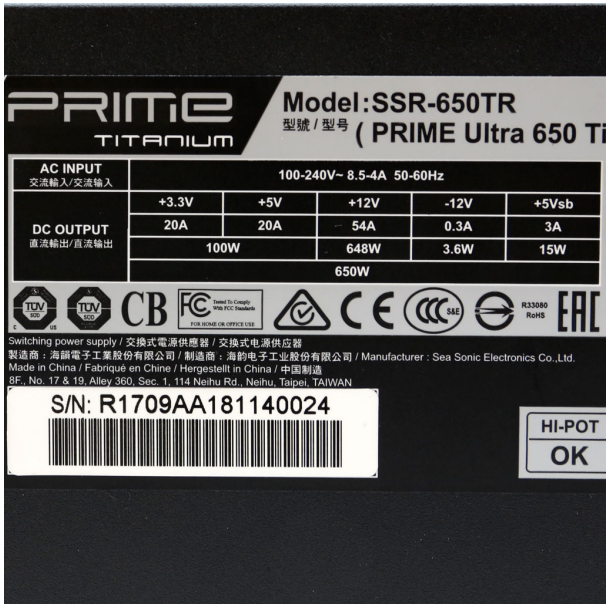
Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	18.6 mV	6.2 mV	9.1 mV	4.7 mV	Pass
100% Load	19.5 mV	8.0 mV	9.3 mV	5.5 mV	Pass
110% Load	22.2 mV	7.5 mV	9.8 mV	5.7 mV	Pass
Crossload 1	15.0 mV	7.7 mV	9.8 mV	3.5 mV	Pass
Crossload 2	21.9 mV	4.9 mV	5.3 mV	4.7 mV	Pass

The results above are not used in the certification process

Seasonic Prime Titanium Ultra 650W



Top side



Power specifications label