Seasonic Prime Titanium 650W

Serial Number R1606TA106370016

Lab ID 44

Certification ID 2544

Test Result Report ID: 20PS44A

Certificate Issue Date: Jan 27, 2017

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 650W
OEM/ODM	Sea Sonic Electronics Co., Ltd.
Serial Number	R1606TA106370016
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 (HA13525M12F-Z)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	44
Date of receipt	Jan 21, 2017
Testing Date	Jan 24, 2017
Report Issued Date	Jan 27, 2017
DUT Notes	Retested on 4/7/17
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 (600mm)	1	1	18-22AWG
4+4 pin EPS12V (650mm)	2	2	18AWG
6+2 pin PCIe (680mm+80mm)	2	4	18AWG
SATA (460mm+110mm+110mm+110mm)	1	4	18AWG
SATA (360mm+110mm)	1	2	18AWG
4 pin Molex (360mm+120mm)	1	2	18AWG
4 pin Molex (460mm+120mm+120mm)	1	4	18AWG

FDD Adapter (+110mm)	1	1	22AWG

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

Primary Side	
Transient Filter	6x Y caps, 3x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	2x Vishay LVB2560 (600V, 25A @ 105°C)
APFC MOSFETS	2x Infineon IPP50R140CP (550V, 15A @ 100°C, 0.14 Ohm)
APFC Boost Diode	1x SCS110AG (600V, 10A @ 117°C)
Hold-up Cap(s)	2x Nippon Chemi-Con (400V, 450uF each or 900uF combined, 2000h @ 105°C, CE)
Main Switchers	4x Infineon IPP50R199CP (550V, 11A @ 100°C, 0.199 Ohm)
Drivers For Main Switchers	2x Silicon Labs Si8230BD
APFC Controller	ON Semiconductor NPC1654
Switching Controller	Champion CM6901
Topology	Primary side: Full-Bridge & LLC Resonant Converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	4x Fairchild FDMS015N04B (40V, 100A @ 25°C, 1.5 mOhm)
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0906NS PWM Controller: APW7159
Filtering Capacitors	Electrolytics: Nippon Chemi-Con (105°C, KZE, KZH) 1x Rubycon (5VSB circuit, 105°C, YXD) Polymers: FPCAP, Nippon Chemi-Con
Supervisor IC	WeltrendWT7527V (OVP, UVP, OCP, SCP, PG)
Fan Model	Hong Hua HA13525M12F-Z (135mm, 12V, 0.36A, 1800 RPM, Fluid Dynamic Bearing)
5VSB Circuit	

Buck Converter	1x Lite-On LSP5523 (3A max output current)
MOSFET	STi CHN546

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)	92.269%
Average Noise Output (>1450 Load Combinations)	15.93dBA
Average PF (>1450 Load Combinations)	0.987
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.0565W
Non-Accredited	
12V Ripple (Full Load)	11.49mV
5V Ripple (Full Load)	5.71mV
3.3V Ripple (Full Load)	5.91mV
5VSB Ripple (Full Load)	7.13mV
12V Load Regulation	0.08%
5V Load Regulation	0.30%
3.3V Load Regulation	0.42%
5VSB Load Regulation	0.86%
Inrush Current	-

230V		
Accredited		
Average Efficiency (>1450 load combinations)	94.279%	
Average Noise Output (>1450 Load Combinations)	16.56dBA	
Average PF (>1450 Load Combinations)	0.935	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.0967W	
Non-Accredited		
12V Ripple (Full Load)	14.85mV	
5V Ripple (Full Load)	9.14mV	
3.3V Ripple (Full Load)	9.71mV	
5VSB Ripple (Full Load)	7.09mV	
12V Load Regulation	0.08%	
5V Load Regulation	0.14%	
3.3V Load Regulation	0.36%	
5VSB Load Regulation	1.16%	
Inrush Current	-	
Hold-Up Time & PWR_OK Signal	35.30ms	
AC Loss to PWR_OK Hold Up Time	34.00ms	
PWR_OK Inactive to DC Loss Delay	1.30ms	
OPP (0.00°C / 0.00°C)	-	-

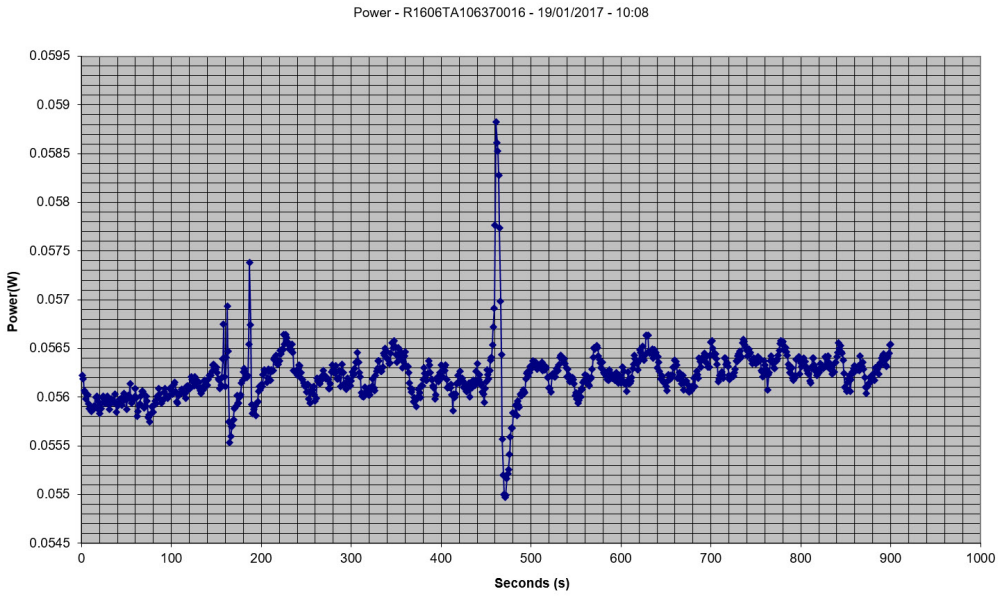
Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	35.3
AC Loss to PWR_OK Hold Up Time (ms)	34
PWR_OK Inactive to DC Loss Delay (ms)	1.3

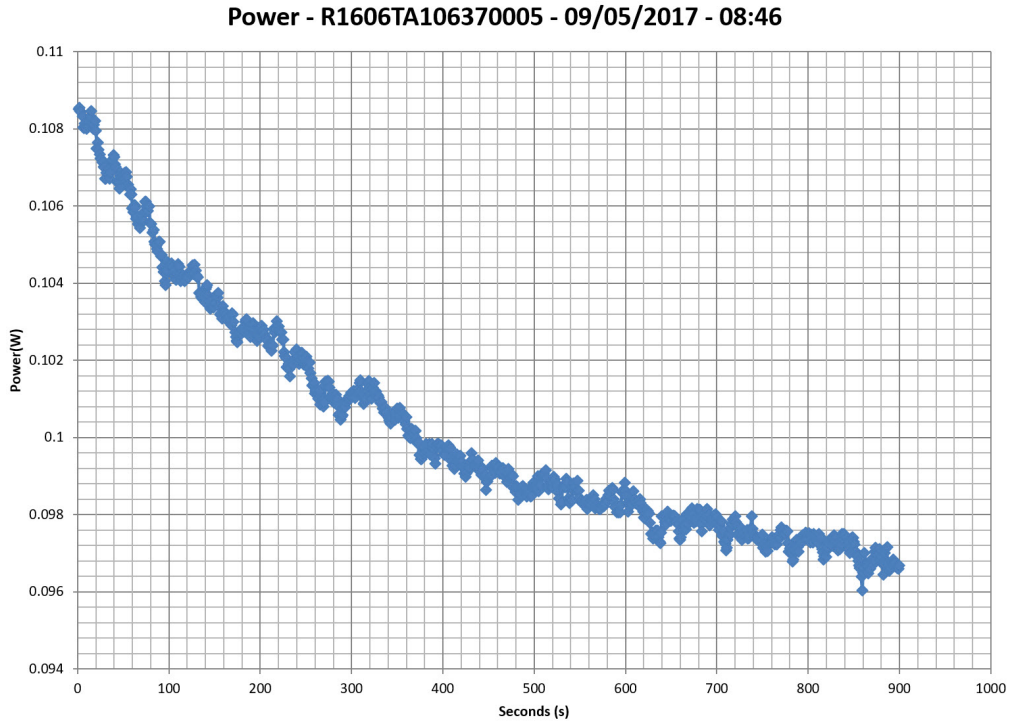
Vampire Power

Graphs

115V

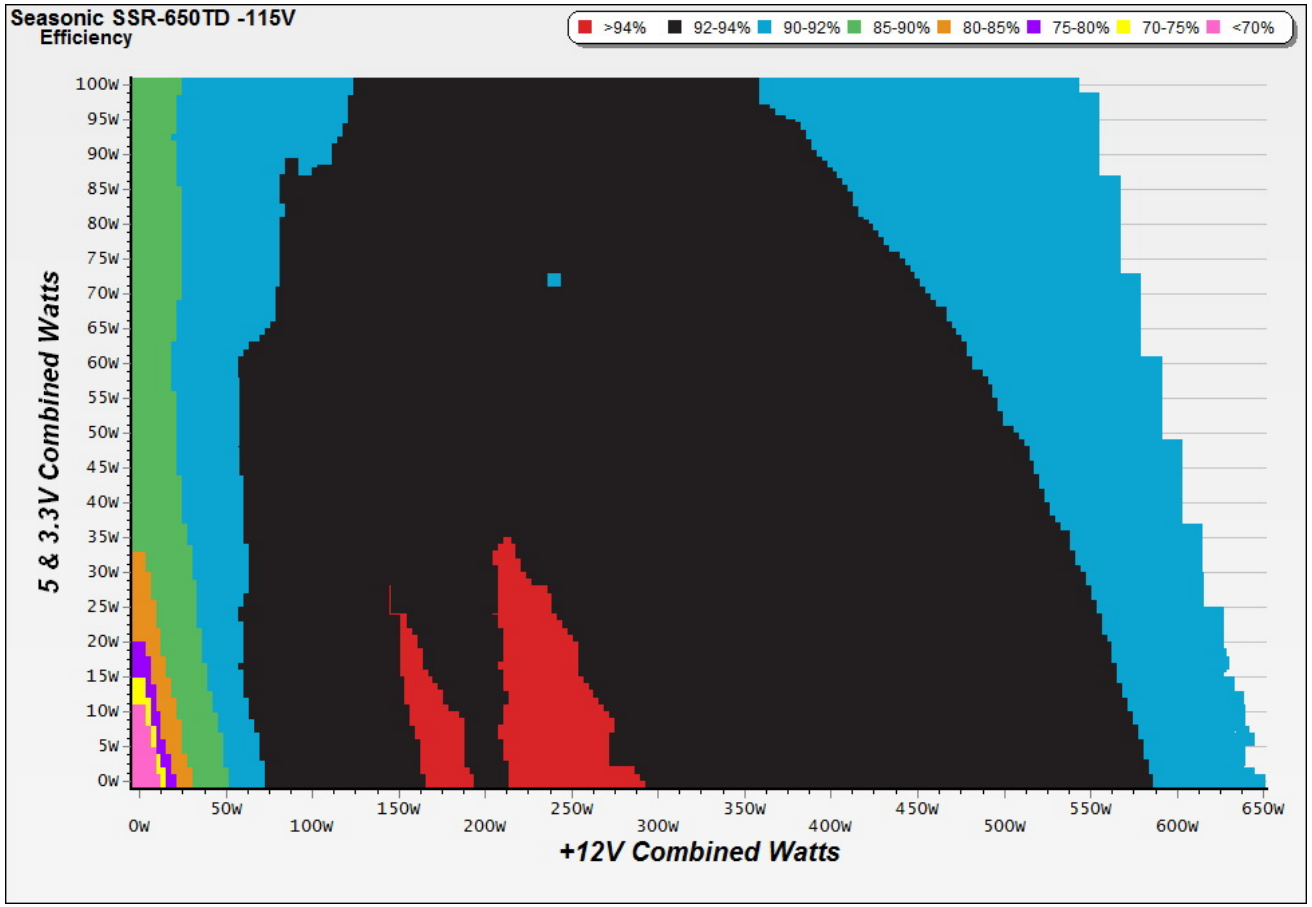


230V



Efficiency Graph

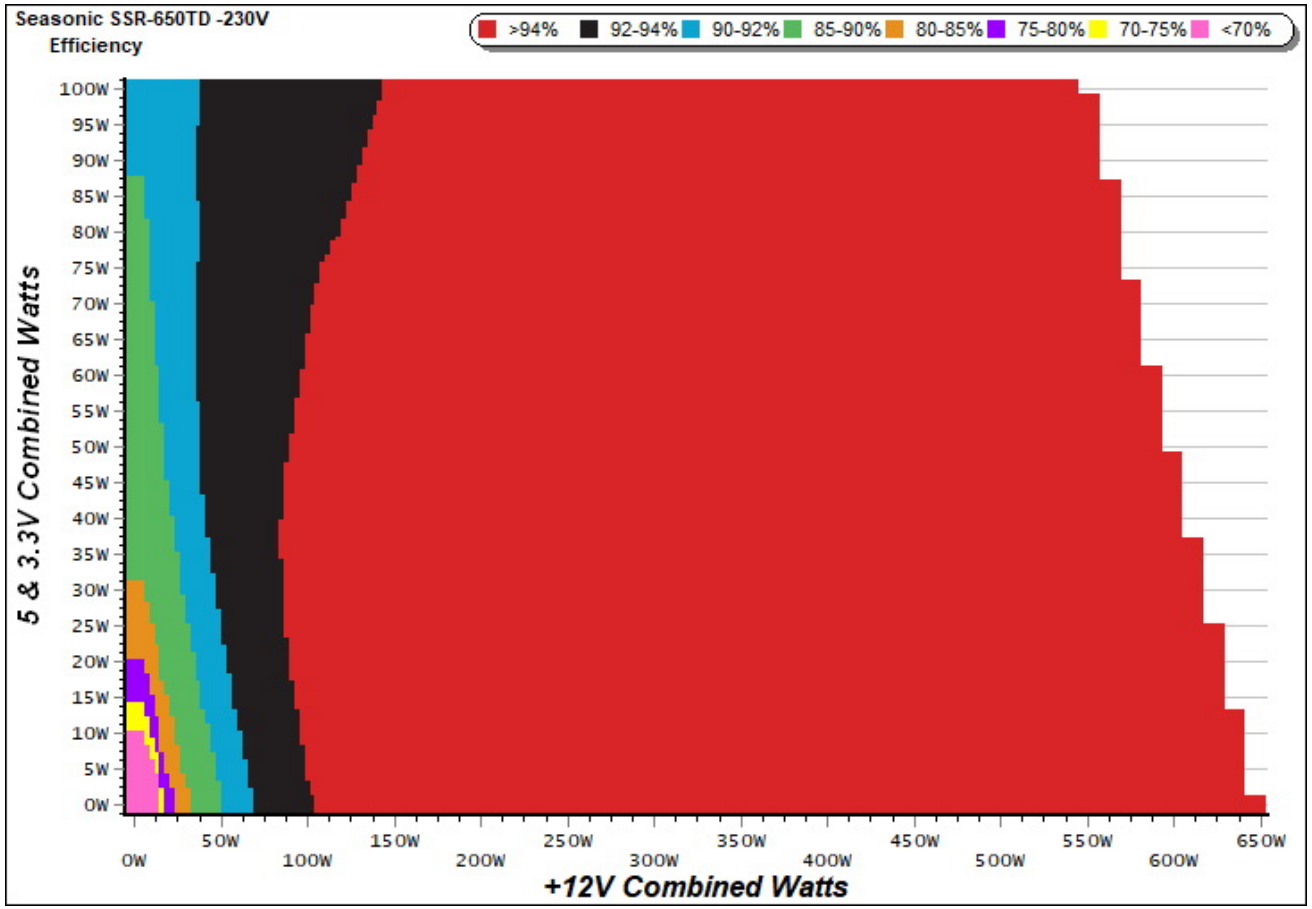
115V



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

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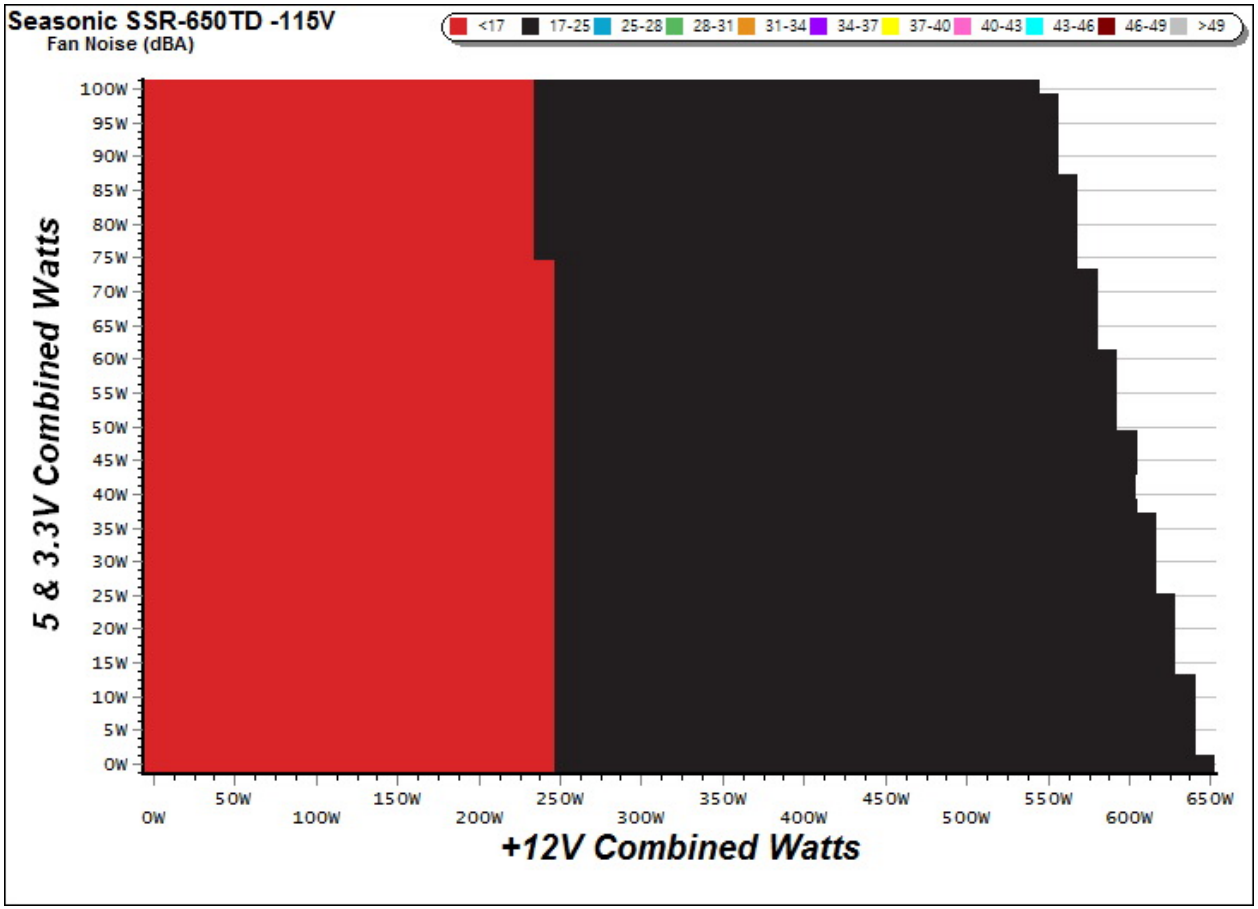
Noise Graph

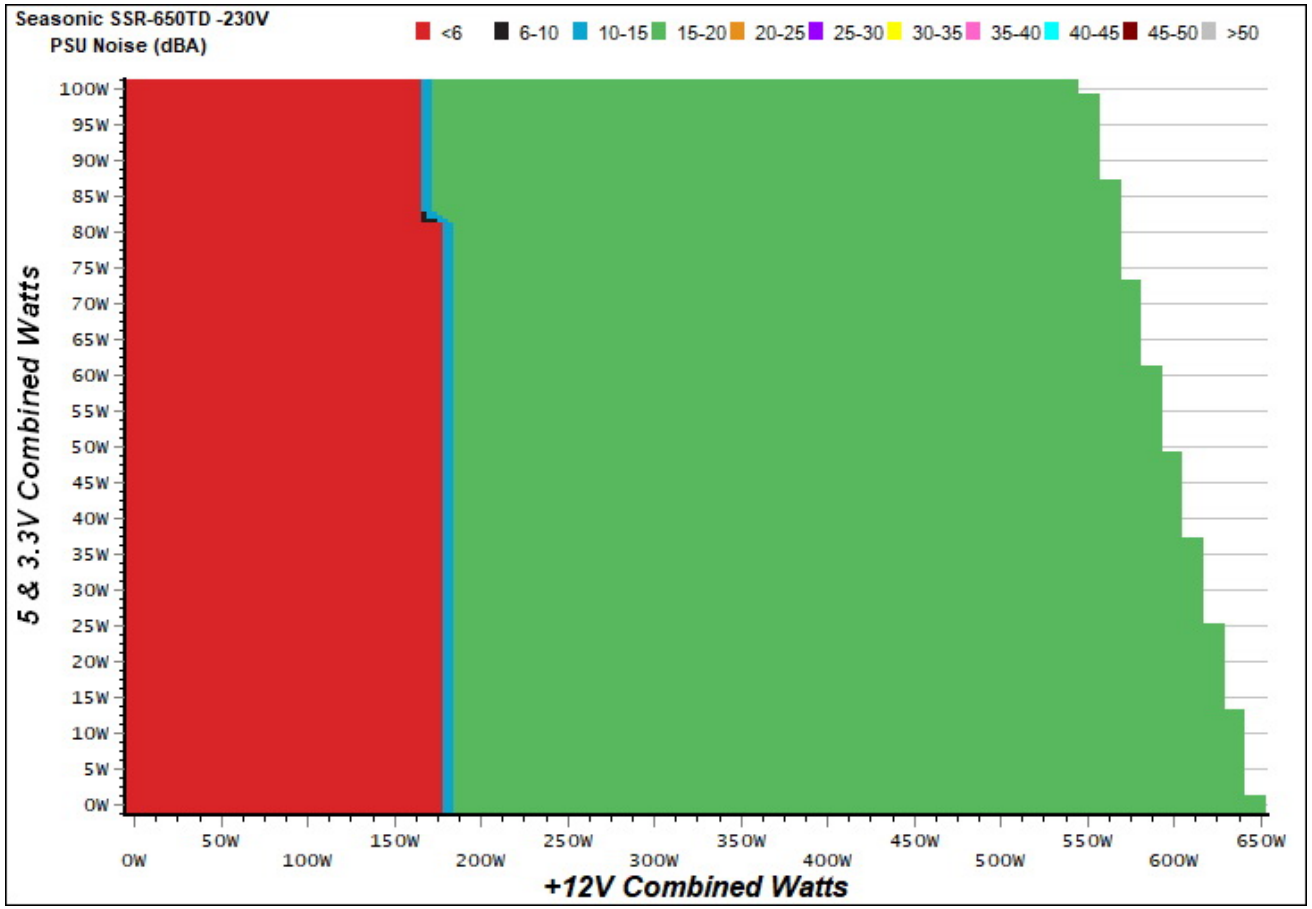
115V



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

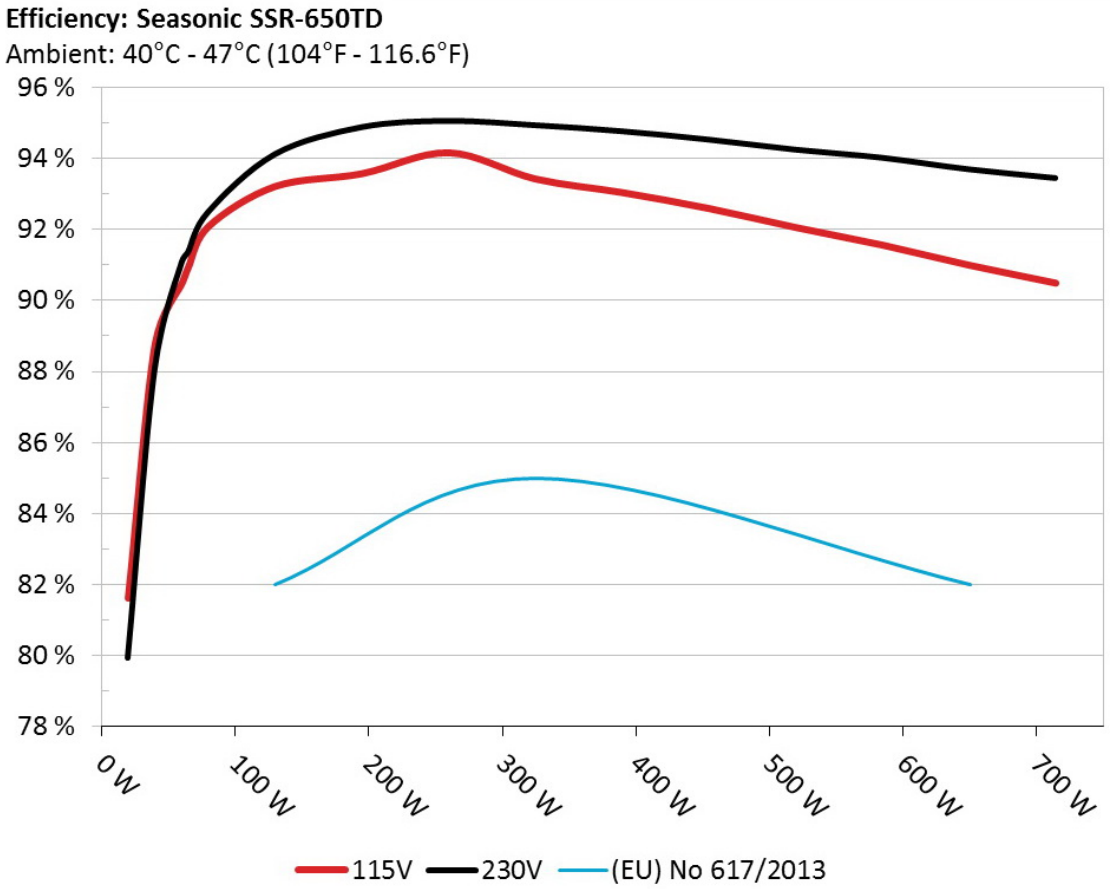


INFO

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

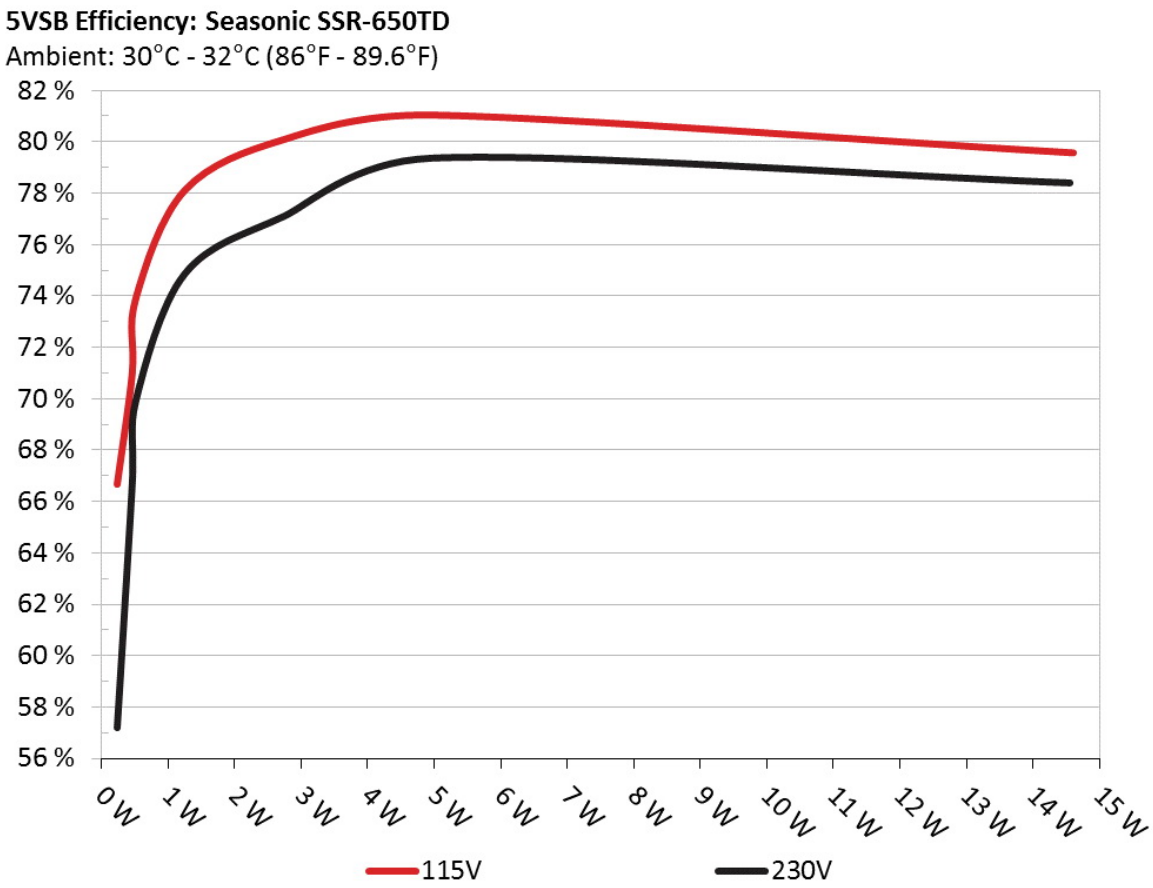
Efficiency under high ambient temperature



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	0.046A	0.230	66.667%	0.039
	5.004V	0.345		115.09V
2	0.091A	0.455	70.983%	0.070
	5.002V	0.641		115.09V
3	0.552A	2.750	80.105%	0.282
	4.981V	3.433		115.09V
4	3.002A	14.617	78.772%	0.508
	4.869V	18.556		115.09V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.047A	0.235	57.178%	0.014
	5.005V	0.411		230.30V
2	0.092A	0.460	66.667%	0.023
	5.003V	0.690		230.31V
3	0.552A	2.748	77.104%	0.111
	4.979V	3.564		230.33V
4	3.002A	14.560	77.999%	0.350
	4.850V	18.667		230.31V

Supplementary Tests (For Reference)

Typical Load Tests

115V

Test #	12V	5V	3.3V	5VSB	DC (W
1	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
2	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
3	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
4	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
5	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
6	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
7	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
8	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
9	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
10	45.961A	9.136A	9.143A	3.061A	64
	12.182V	4.926V	3.248V	4.900V	70
11	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00

CL1	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00
CL2	0A	00.000A	00.000A	00.000A	00
	0.000V	00.000V	00.000V	00.000V	00

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	3.520A	1.994A	1.983A	1.002A	64.710	91.379%	490	18.0	40.19°C	0.746
	12.252V	5.010V	3.325V	4.990V	70.815				45.16°C	230.80V
2	8.029A	2.994A	2.977A	1.204A	129.256	94.279%	490	18.0	40.21°C	0.866
	12.251V	5.008V	3.324V	4.986V	137.099				45.53°C	230.77V
3	12.929A	3.495A	3.459A	1.405A	194.356	95.061%	490	18.0	41.11°C	0.919
	12.249V	5.007V	3.322V	4.981V	204.454				46.63°C	230.72V
4	17.828A	3.996A	3.972A	1.608A	259.577	95.261%	490	18.0	41.62°C	0.947
	12.249V	5.007V	3.321V	4.977V	272.491				47.66°C	230.68V
5	22.402A	4.995A	4.971A	1.810A	324.892	95.170%	510	18.2	41.88°C	0.963
	12.248V	5.006V	3.320V	4.974V	341.380				48.43°C	230.73V
6	26.913A	5.994A	5.967A	2.012A	389.403	95.026%	530	18.7	42.81°C	0.970
	12.247V	5.005V	3.318V	4.971V	409.787				50.29°C	230.68V
7	31.491A	6.993A	6.964A	2.215A	454.742	94.787%	430	17.2	43.02°C	0.976
	12.246V	5.005V	3.317V	4.968V	479.753				50.87°C	230.64V
8	36.069A	7.994A	7.960A	2.417A	520.071	94.515%	495	17.9	43.71°C	0.981
	12.245V	5.005V	3.316V	4.965V	550.250				52.09°C	230.59V
9	41.042A	8.496A	8.448A	2.417A	584.987	94.265%	555	19.5	44.77°C	0.982
	12.243V	5.004V	3.314V	4.965V	620.580				53.57°C	230.60V
10	45.753A	8.997A	8.966A	3.031A	649.828	93.928%	620	21.2	45.45°C	0.986
	12.242V	5.003V	3.313V	4.950V	691.836				54.60°C	230.60V
11	51.055A	8.996A	8.966A	3.031A	714.667	93.665%	720	23.4	46.22°C	0.988
	12.241V	5.003V	3.312V	4.949V	763.005				55.81°C	230.55V
CL1	0.141A	12.000A	11.999A	0.000A	101.708	90.112%	480	17.7	41.82°C	0.829
	12.253V	5.009V	3.323V	5.042V	112.869				48.41°C	230.96V
CL2	54.008A	1.002A	1.001A	1.000A	674.364	94.304%	605	21.0	45.62°C	0.987
	12.240V	5.006V	3.314V	4.982V	715.097				54.81°C	230.59V

The results above are not used in the certification process

Light Load Tests