EFFICIENCY AND NOISE LEVEL CERTIFICATIONS

Anex

Seasonic SSR-600TL Fanless

Lab ID#: 258
Receipt Date: -
Test Date: -

Report:
Report Date: Dec 29, 2018

DUT INFORMATION

Brand	Seasonic
Manufacturer (OEM)	Seasonic
Series	Prime Titanium
Model Number	SSR-600TL Fanless
Serial Number	R1708TA105680169
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	8-4
Rated Frequency (Hz)	50-60
Rated Power (W)	600
Type	ATX12V
Cooling	Passive
Semi-Passive Operation	✗
Cable Design	Fully Modular

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	50	2.5	0.3
	Watts	100		600	12.5	3.6
Total Max. Power (W)		600				

CABLES AND CONNECTORS

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)	2	2	18AWG	No
6+2 pin PCIe (680mm+80mm)	2	4	18AWG	No
SATA (450mm+110mm+110mm+110mm)	1	4	18AWG	No
SATA (350mm+110mm)	1	2	18AWG	No
4 pin Molex (450mm+120mm+120mm)	1	3	18AWG	No
4 pin Molex (350mm+120mm)	1	2	18AWG	No
AC Power Cord (1350mm) - C13 coupler	1	1	18AWG	-

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General Data	
Manufacturer (OEM)	Seasonic
Platform Model	Prime Fanless
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 CREE C3D06060A (600V, 6A @ 154°C)
Hold-up Cap(s)	1x Nippon Chemi-Con (400V, 450uF, 2000h @ 105°C, CE) 1x Nippon Chemi-Con (400V, 390uF, 2000h @ 105°C, CE)
Main Switchers	4x Infineon IPP50R140CP (550V, 15A @ 100°C, 0.14 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 Infineon BSC014N04LS (40V, 100A @ 25°C, 1.4mOhm)
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0906NS PWM Controller: APW7159
Filtering Capacitors	Electrolytics: Nippon Chemi-Con (105°C, W), Nippon Chemi-Con (4,000-10,000h @ 105°C, KY), Nippon Chemi-Con (4,000-10,000h @ 105°C, KYB), Rubycon (5VSB circuit, 3,000-6,000h @ 105°C, YXG), Nichicon (4,000-10,000h @ 105°C, HE) Polymers: FPCAP, Nippon Chemi-Con
Supervisor IC	Weltrend WT7527V (OVP, UVP, OCP, SCP, PG) & AS393M
5VSB Circuit	
Buck Converter	AME5268 (3A
Rectifiers	STMicroelectronics STU6N65K3 (650V, 3A @ 100°C, 1.3Ohm), 6A4 SBR (400V, 6A @ 75°C), Infineon BSC0906NS (30V, 40A @ 100°C, 4.5 mOhm)

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RESULTS	
Temperature Range (°C /°F)	30-32 / 86-89.6
Average Efficiency	92.462
Efficiency With 10W (≤500W) or 2% (>500W) Load -115V	0.000
Average Efficiency 5VSB	80.005
Standby Power Consumption (W) -115V	0.0544275
Standby Power Consumption (W) -230V	0.0888056
Average PF	0.987
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
Avg Noise Output	-
Efficiency Rating (ETA)	TITANIUM
Noise Rating (LAMBDA)	A++

TEST EQUIPMENT		
Electronic Loads	Chroma 6314A x2 63123A x6 63102A 63101A	Chroma 63601-5 x2 Chroma 63600-2 63640-80-80 x10 63610-80-20
AC Sources	Chroma 6530, Chroma 61604	
Power Analyzers	N4L PPA1530, N4L PPA5530	
Oscilloscopes	Picoscope 4444 & 3424, Keysight DSOX3024A, Rigol DS2072A	
Voltmeter	Keithley 2015 THD 6.5 Digit	
Sound Analyzer	Bruel & Kjaer 2250-L G4	
Microphone	Bruel & Kjaer Type 4955-A, Bruel & Kjaer Type 4189	
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2	

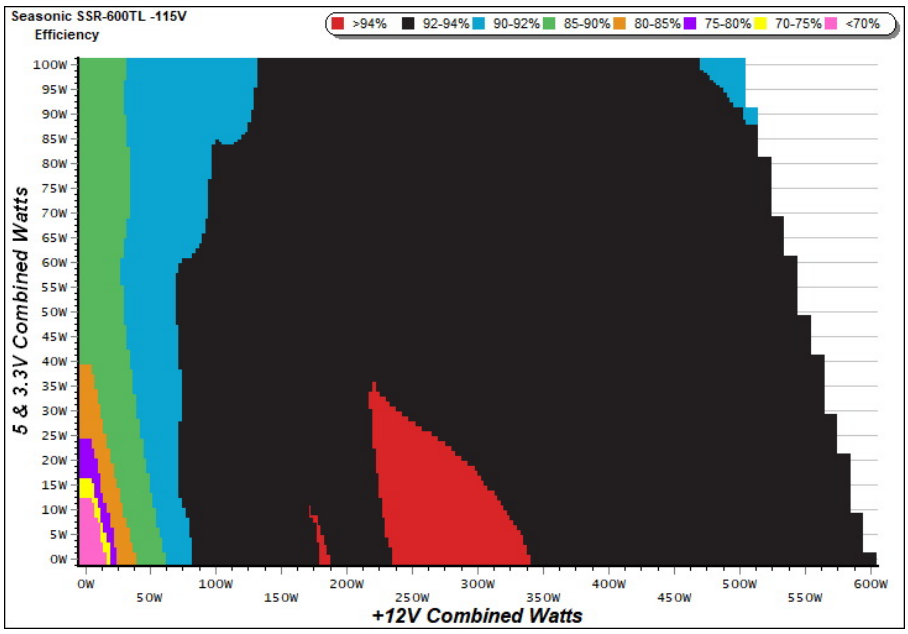
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EFFICIENCY GRAPH



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

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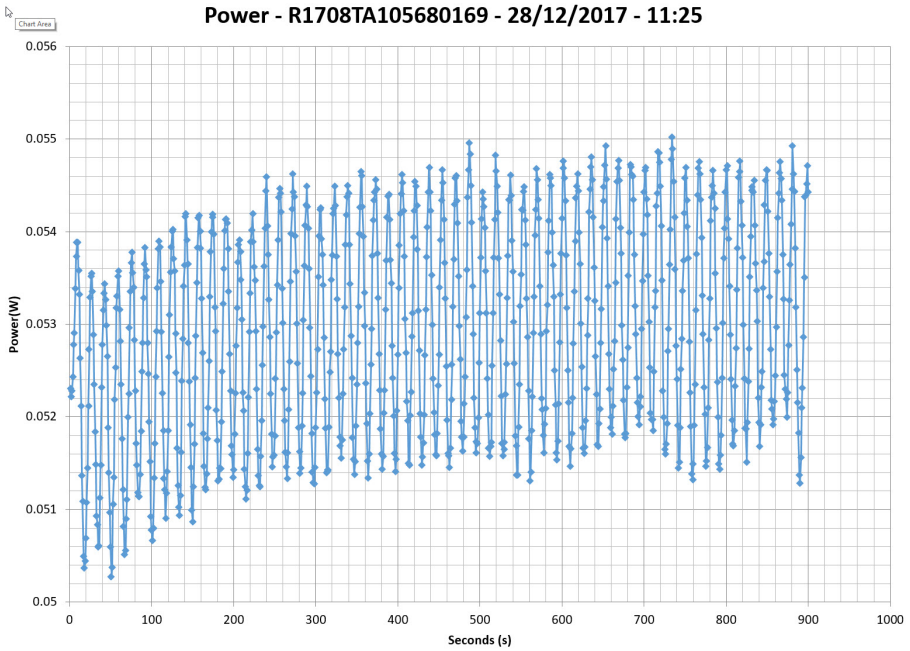
5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.222	67.069%	0.029
	4.938V	0.331		115.27V
2	0.090A	0.444	73.147%	0.053
	4.936V	0.607		115.27V
3	0.550A	2.706	80.344%	0.240
	4.920V	3.368		115.26V
4	1.000A	4.906	80.797%	0.343
	4.906V	6.072		115.25V
5	1.500A	7.335	80.889%	0.404
	4.890V	9.068		115.26V
6	2.500A	12.143	79.999%	0.464
	4.857V	15.179		115.25V

5VSB EFFICIENCY -230V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.222	60.490%	0.011
	4.937V	0.367		230.81V
2	0.090A	0.444	68.624%	0.019
	4.936V	0.647		230.81V
3	0.550A	2.705	77.954%	0.095
	4.918V	3.470		230.81V
4	1.000A	4.904	79.857%	0.158
	4.903V	6.141		230.81V
5	1.500A	7.330	80.479%	0.216
	4.886V	9.108		230.81V
6	2.500A	12.128	80.254%	0.298
	4.851V	15.112		230.81V

VAMPIRE POWER -115V



INFO

This graph is generated by the PPA Standby Power Analysis software which takes full control of the power analyzer during the whole procedure. This application features all of the EN50564 & IEC62301 test limits for standby power software testing

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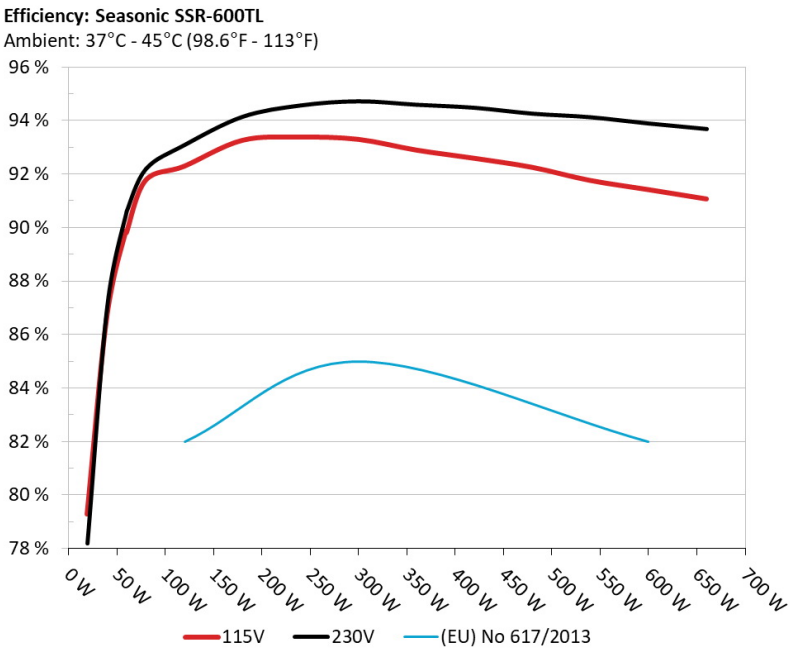
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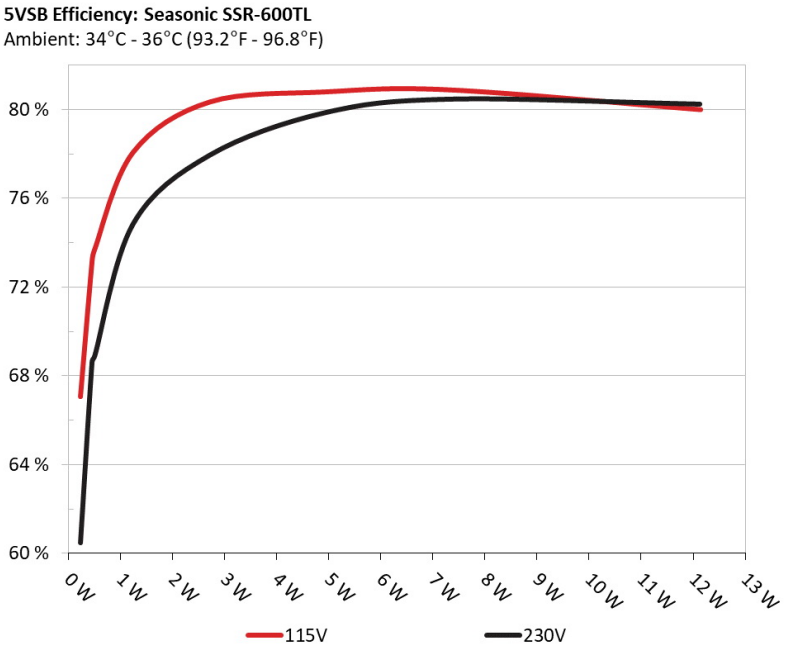
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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

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10-110% LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.152A	1.983A	1.972A	0.997A	59.929	89.810%	0	<6.0	43.80°C	0.945
	12.164V	5.041V	3.343V	5.015V	66.729				37.70°C	115.29V
2	7.298A	2.976A	2.960A	1.198A	119.660	92.300%	0	<6.0	44.52°C	0.983
	12.163V	5.040V	3.342V	5.011V	129.643				37.87°C	115.21V
3	11.804A	3.474A	3.441A	1.399A	179.568	93.269%	0	<6.0	44.98°C	0.992
	12.162V	5.040V	3.341V	5.005V	192.526				38.08°C	115.13V
4	16.316A	3.969A	3.950A	1.601A	239.601	93.393%	0	<6.0	45.76°C	0.993
	12.160V	5.039V	3.340V	5.000V	256.550				38.46°C	115.05V
5	20.495A	4.962A	4.940A	1.802A	299.693	93.308%	0	<6.0	46.86°C	0.995
	12.159V	5.038V	3.339V	4.995V	321.186				39.33°C	115.06V
6	24.679A	5.953A	5.929A	2.004A	359.813	92.907%	0	<6.0	48.67°C	0.992
	12.157V	5.038V	3.339V	4.991V	387.284				40.51°C	114.98V
7	28.829A	6.949A	6.917A	2.207A	419.540	92.601%	0	<6.0	50.42°C	0.992
	12.156V	5.037V	3.338V	4.986V	453.064				41.33°C	114.89V
8	33.046A	7.943A	7.910A	2.410A	480.051	92.258%	0	<6.0	52.65°C	0.993
	12.154V	5.037V	3.337V	4.981V	520.338				42.76°C	114.81V
9	37.595A	8.441A	8.393A	2.410A	539.364	91.774%	0	<6.0	54.01°C	0.994
	12.152V	5.036V	3.336V	4.980V	587.707				43.64°C	114.81V
10	42.210A	8.939A	8.904A	2.512A	600.069	91.425%	0	<6.0	55.02°C	0.995
	12.150V	5.035V	3.336V	4.978V	656.353				44.26°C	114.72V
11	47.161A	8.940A	8.904A	2.512A	660.122	91.077%	0	<6.0	57.43°C	0.995
	12.148V	5.035V	3.335V	4.977V	724.796				45.18°C	114.63V
CL1	0.733A	12.002A	12.000A	0.000A	109.494	88.811%	0	<6.0	54.21°C	0.980
	12.158V	5.038V	3.343V	5.062V	123.289				43.91°C	115.21V
CL2	50.007A	1.001A	1.000A	1.000A	620.818	91.973%	0	<6.0	55.39°C	0.995
	12.147V	5.036V	3.335V	5.007V	675.002				43.84°C	114.70V

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20-80W LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.171A	0.491A	0.476A	0.199A	19.304	79.277%	0	<6.0	0.779
	12.156V	5.041V	3.344V	5.035V	24.350				115.34V
2	2.427A	0.991A	0.985A	0.398A	39.795	86.688%	0	<6.0	0.904
	12.156V	5.041V	3.344V	5.030V	45.906				115.32V
3	3.610A	1.486A	1.464A	0.597A	59.305	89.879%	0	<6.0	0.944
	12.166V	5.041V	3.343V	5.026V	65.983				115.29V
4	4.860A	1.984A	1.973A	0.797A	79.715	91.769%	0	<6.0	0.965
	12.164V	5.041V	3.343V	5.021V	86.865				115.26V

RIPPLE MEASUREMENTS

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	13.2 mV	7.5 mV	5.8 mV	3.3 mV	Pass
20% Load	15.4 mV	8.3 mV	6.8 mV	3.5 mV	Pass
30% Load	17.4 mV	9.1 mV	7.2 mV	3.8 mV	Pass
40% Load	11.9 mV	9.4 mV	7.6 mV	4.3 mV	Pass
50% Load	10.6 mV	9.7 mV	8.1 mV	4.7 mV	Pass
60% Load	12.5 mV	10.9 mV	8.5 mV	5.3 mV	Pass
70% Load	14.1 mV	11.9 mV	8.9 mV	6.3 mV	Pass
80% Load	15.2 mV	13.5 mV	10.1 mV	7.5 mV	Pass
90% Load	16.4 mV	13.7 mV	9.9 mV	8.1 mV	Pass
100% Load	18.3 mV	14.6 mV	11.1 mV	8.8 mV	Pass
110% Load	19.6 mV	15.0 mV	11.3 mV	9.1 mV	Pass
Crossload 1	16.3 mV	11.2 mV	9.8 mV	4.2 mV	Pass
Crossload 2	18.4 mV	12.8 mV	8.5 mV	8.3 mV	Pass

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HOLD-UP TIME & POWER OK SIGNAL (230V)	
Hold-Up Time (ms)	41.0
AC Loss to PWR_OK Hold Up Time (ms)	36.2
PWR_OK Inactive to DC Loss Delay (ms)	4.8



Top side



Power specifications label

CERTIFICATIONS

CYBENETICS TITANIUM

CYBENETICS A++

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