

Anex

Seasonic SSR-650FX

Lab ID#: 132

Receipt Date: -

Test Date: -

Report:

Report Date: Jun 27, 2018

DUT INFORMATION		DUT SPECIFICATIONS	
Brand	Seasonic	Rated Voltage (Vrms)	100-240
Manufacturer (OEM)	Seasonic	Rated Current (Arms)	9-4.5
Series	FOCUS Plus Gold	Rated Frequency (Hz)	50-60
Model Number	SSR-650FX	Rated Power (W)	650
Serial Number	R1705AA135760494	Type	ATX12V
DUT Notes		Cooling	120mm Fluid Dynamic Bearing Fan (HA1225H12F-Z)
		Semi-Passive Operation	✓ (selectable)
		Cable Design	Fully Modular

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				

CABLES AND CONNECTORS			
Modular Cables			
Description	Cable Count	Connector Count (Total)	Gauge
ATX connector 20+4 pin (610mm)	1	1	18-22AWG
4+4 pin EPS12V (655mm)	1	1	18AWG
6+2 pin PCIe (680mm+80mm)	2	4	18AWG
SATA (455mm+115mm+115mm+115mm)	2	8	18AWG
4 pin Molex (460mm+125mm+125mm)	1	3	18AWG
FDD Adapter (+110mm)	1	1	22AWG

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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 GBU1006 (600V, 10A @ 100°C)
APFC MOSFETS	2x UTC GPT18N50DG (500V, 18A @ 100°C, 0.265Ohm)
APFC Boost Diode	1x BYC8-600 (600V, 8A @ 109°C)
Hold-up Cap(s)	1x Nippon Chemi-Con (400V, 450uF, 2000h @ 105°C, CE)
Main Switchers	4x UTC GBT10N50ADG (500V, 10A @ 25°C, 0.61Ohm)
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	2x Nexperia PSMN1R8-40YLC (40V, 100A @ 25°C, 1.8mOhm)
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), Chemi-Con (105°C, 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

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RESULTS

Temperature Range (°C /°F)	30-32 / 86-89.6
Average Efficiency	87.957
Efficiency With 10W ($\leq 500W$) or 2% ($> 500W$) Load -115V	0.000
Average Efficiency 5VSB	77.061
Standby Power Consumption (W) -115V	0.0455888
Standby Power Consumption (W) -230V	0.0748574
Average PF	0.987
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
Avg Noise Output	26.34
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	A-

TEST EQUIPMENT

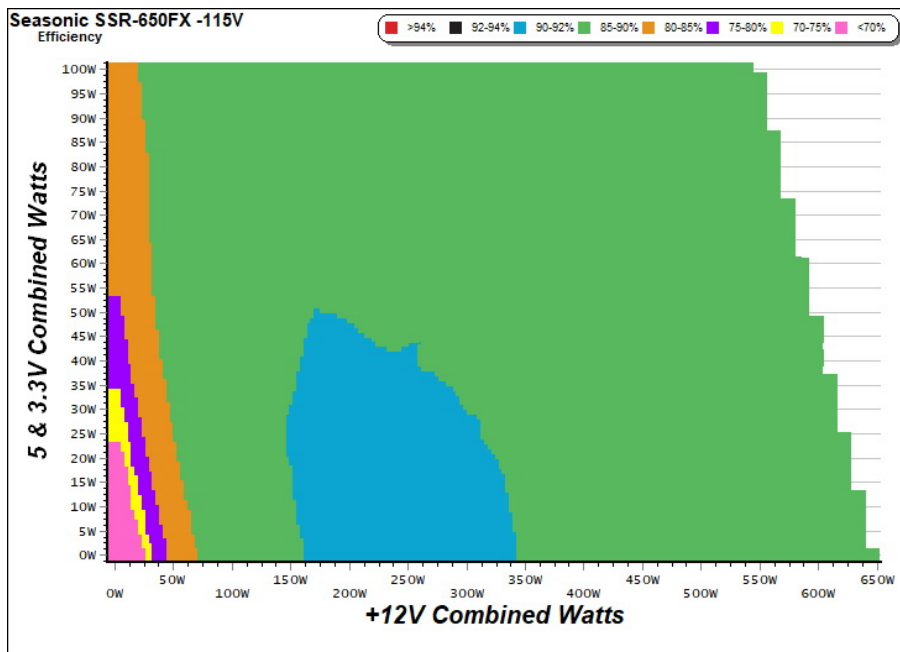
Electronic Loads	Chroma 6314A x2 63123A x6 63102A 63101A	Chroma 63601-5 x2 Chroma 63600-2 63640-80-80 x10 63610-80-20
AC Sources	Chroma 6530, Chroma 61604	
Power Analyzers	N4L PPA1530, N4L PPA5530	
Oscilloscopes	Picoscope 4444 & 3424, Keysight DSOX3024A, Rigol DS2072A	
Voltmeter	Keithley 2015 THD 6.5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

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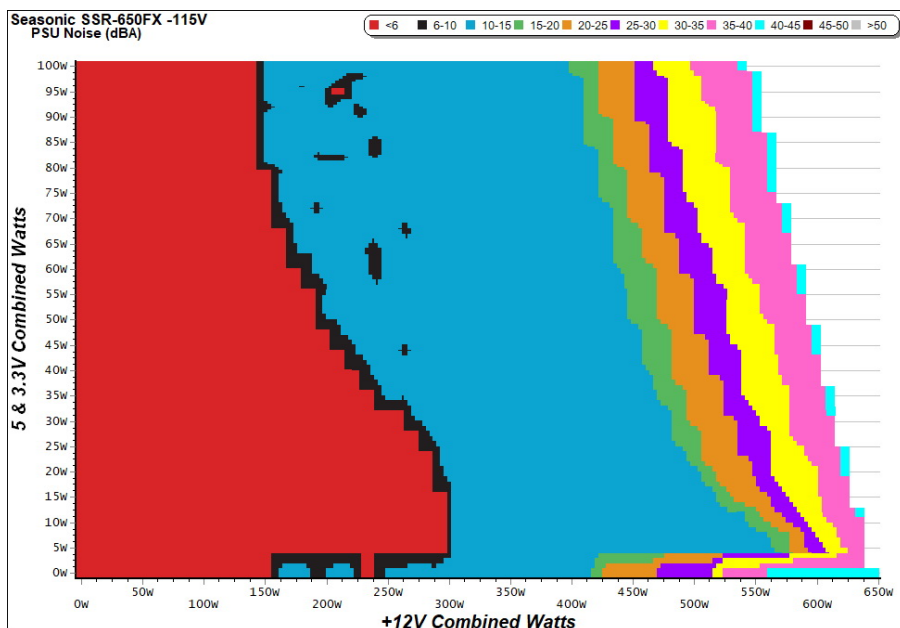
EFFICIENCY GRAPH



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

NOISE GRAPH



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

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Seasonic SSR-650FX

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

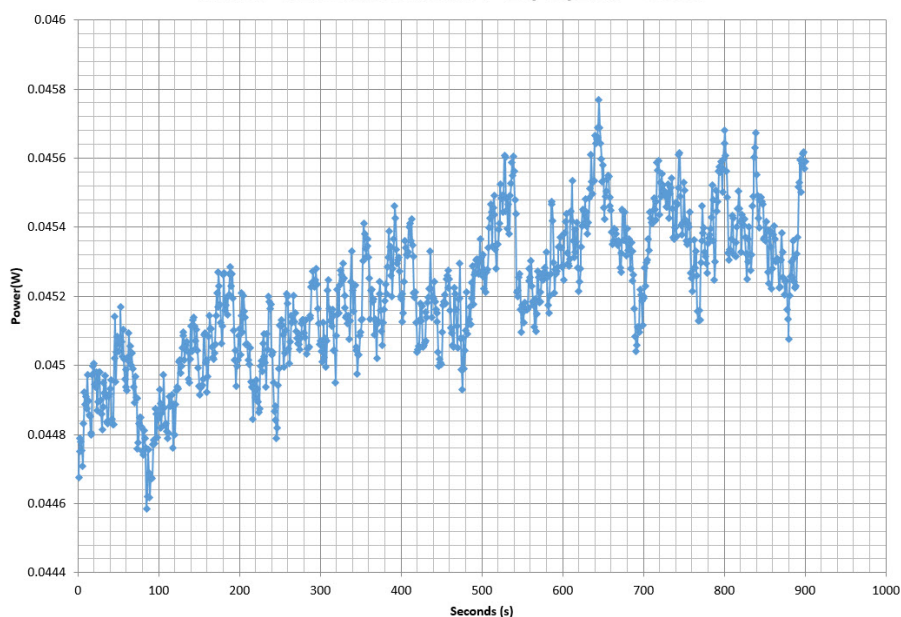
Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.041A	0.213	67.834%	0.052
	5.135V	0.314		115.11V
2	0.087A	0.447	73.520%	0.098
	5.133V	0.608		115.13V
3	0.542A	2.775	77.449%	0.334
	5.122V	3.583		115.13V
4	1.002A	5.120	77.155%	0.405
	5.111V	6.636		115.13V
5	1.502A	7.657	77.398%	0.439
	5.099V	9.893		115.14V
6	3.001A	15.163	75.679%	0.484
	5.052V	20.036		115.14V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.214	60.623%	0.018
	5.135V	0.353		230.37V
2	0.087A	0.447	68.244%	0.033
	5.133V	0.655		230.37V
3	0.542A	2.777	75.957%	0.160
	5.122V	3.656		230.36V
4	1.002A	5.121	76.685%	0.243
	5.111V	6.678		230.36V
5	1.502A	7.658	76.980%	0.298
	5.099V	9.948		230.36V
6	3.001A	15.199	77.000%	0.373
	5.064V	19.739		230.36V

VAMPIRE POWER -115V

Power - R1705AA135760494 - 27/06/2017 - 09:03



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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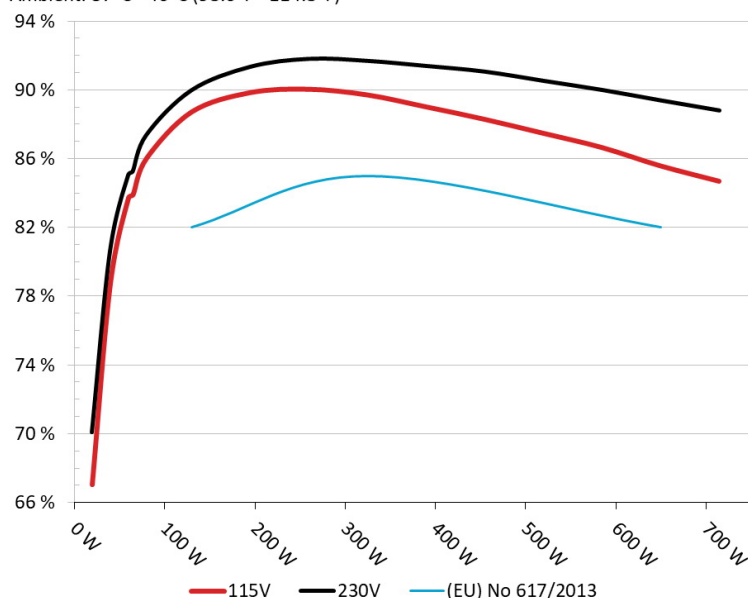
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EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

Efficiency: Seasonic SSR-650FX

Ambient: 37°C - 46°C (98.6°F - 114.8°F)



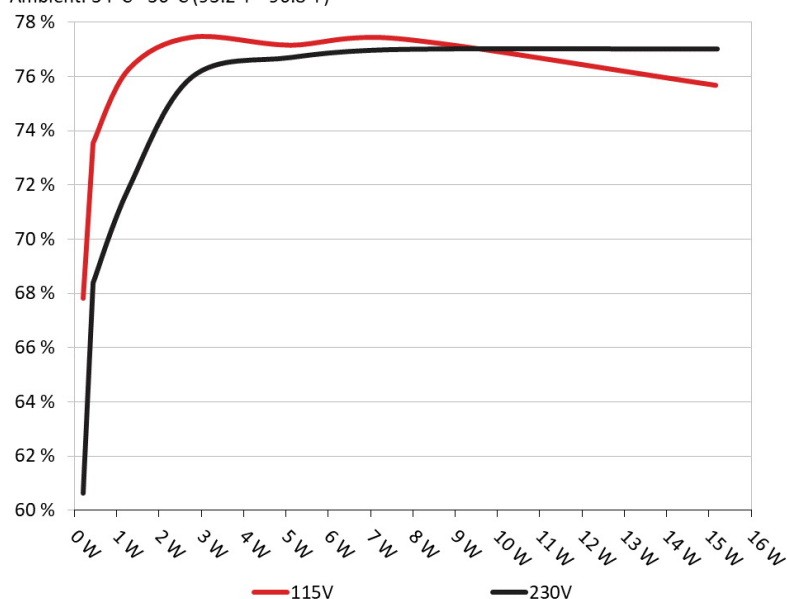
INFO

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

5VSB Efficiency: Seasonic SSR-650FX

Ambient: 34°C - 36°C (93.2°F - 96.8°F)



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)	Fan Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.524A	1.985A	1.978A	0.981A	64.785	83.886%	0	< 6.0	44.17°C	0.957
	12.260V	5.031V	3.332V	5.100V	77.230				41.62°C	115.17V
2	8.066A	2.980A	2.968A	1.176A	129.741	88.711%	0	< 6.0	44.71°C	0.980
	12.260V	5.029V	3.330V	5.087V	146.252				41.88°C	115.17V
3	12.953A	3.488A	3.480A	1.375A	194.878	89.839%	0	< 6.0	45.38°C	0.987
	12.259V	5.026V	3.328V	5.073V	216.920				42.06°C	115.16V
4	17.830A	3.982A	3.964A	1.580A	259.745	90.035%	0	< 6.0	45.79°C	0.990
	12.258V	5.024V	3.326V	5.060V	288.493				42.23°C	115.16V
5	22.371A	4.976A	4.960A	1.781A	324.680	89.702%	550	10.4	40.25°C	0.991
	12.258V	5.022V	3.323V	5.045V	361.956				48.56°C	115.16V
6	26.912A	5.976A	5.957A	1.985A	389.646	89.008%	560	10.5	41.08°C	0.991
	12.258V	5.019V	3.321V	5.029V	437.766				50.62°C	115.15V
7	31.449A	6.981A	6.959A	2.190A	454.567	88.286%	735	15.4	41.65°C	0.992
	12.257V	5.017V	3.318V	5.015V	514.881				51.38°C	115.16V
8	36.000A	7.975A	7.960A	2.400A	519.523	87.474%	1300	32.4	43.03°C	0.993
	12.254V	5.014V	3.316V	4.999V	593.917				53.07°C	115.15V
9	40.979A	8.481A	8.473A	2.401A	584.571	86.643%	1960	41.4	43.89°C	0.993
	12.250V	5.012V	3.315V	4.991V	674.691				53.87°C	115.15V
10	45.700A	8.989A	8.963A	3.015A	649.398	85.575%	2320	45.2	44.70°C	0.994
	12.247V	5.010V	3.313V	4.969V	758.863				54.76°C	115.14V
11	51.006A	8.990A	8.966A	3.020A	714.331	84.685%	2330	45.4	46.12°C	0.994
	12.246V	5.009V	3.312V	4.962V	843.518				56.50°C	115.14V
CL1	0.100A	12.012A	12.005A	0.004A	101.428	83.993%	560	10.5	43.48°C	0.975
	12.265V	5.020V	3.322V	5.101V	120.757				56.63°C	115.19V
CL2	54.121A	1.004A	1.003A	1.002A	676.286	85.925%	2330	45.4	45.60°C	0.994
	12.248V	5.017V	3.322V	5.033V	787.070				55.33°C	115.14V

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20-80W LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	Fan Noise (dB[A])	PF/AC Volts
1	1.189A	0.493A	0.476A	0.196A	19.647	67.023%	0	< 6.0	0.809
	12.254V	5.040V	3.338V	5.126V	29.314				115.16V
2	2.405A	0.990A	0.989A	0.390A	39.749	78.730%	0	< 6.0	0.916
	12.255V	5.032V	3.333V	5.120V	50.488				115.16V
3	3.620A	1.486A	1.500A	0.586A	59.843	83.708%	0	< 6.0	0.952
	12.257V	5.032V	3.333V	5.112V	71.490				115.16V
4	4.829A	1.985A	1.978A	0.781A	79.755	86.006%	0	< 6.0	0.965
	12.258V	5.031V	3.332V	5.102V	92.732				115.16V

RIPPLE MEASUREMENTS

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	8.6 mV	5.9 mV	6.1 mV	5.7 mV	Pass
20% Load	12.4 mV	5.3 mV	5.6 mV	5.4 mV	Pass
30% Load	15.6 mV	6.5 mV	6.2 mV	5.2 mV	Pass
40% Load	17.6 mV	6.9 mV	6.3 mV	5.9 mV	Pass
50% Load	19.9 mV	7.4 mV	8.3 mV	5.9 mV	Pass
60% Load	22.0 mV	8.3 mV	8.7 mV	7.5 mV	Pass
70% Load	24.0 mV	9.4 mV	8.2 mV	7.3 mV	Pass
80% Load	25.8 mV	9.6 mV	10.1 mV	10.2 mV	Pass
90% Load	27.4 mV	10.8 mV	9.6 mV	10.6 mV	Pass
100% Load	30.0 mV	11.7 mV	11.5 mV	11.2 mV	Pass
110% Load	31.9 mV	12.1 mV	12.1 mV	11.3 mV	Pass
Crossload 1	14.1 mV	10.3 mV	8.3 mV	9.0 mV	Pass
Crossload 2	28.9 mV	10.6 mV	10.5 mV	10.7 mV	Pass

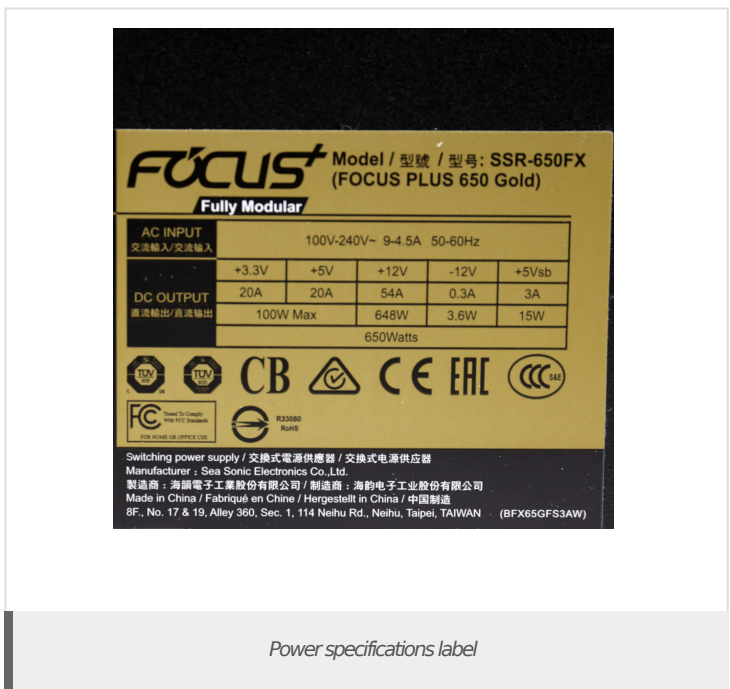
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HOLD-UP TIME & POWER OK SIGNAL (230V)	
Hold-Up Time (ms)	21.52
AC Loss to PWR_OK Hold Up Time (ms)	20.70
PWR_OK Inactive to DC Loss Delay (ms)	0.82



CERTIFICATIONS



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