# EFFICIENCY AND NOISE LEVEL CERTIFICATIONS

## Anex

Seasonic SSR-850FX

Lab ID#: 134
Receipt Date: -
Test Date: -

Report:
Report Date: Jun 30, 2018

## DUT INFORMATION

| | |
|---|---|
| Brand | Seasonic |
| Manufacturer (OEM) | Seasonic |
| Series | FOCUS Plus Gold |
| Model Number | SSR-850FX |
| Serial Number | R1705AA135780743 |
| DUT Notes | |

## DUT SPECIFICATIONS

| | |
|---|---|
| Rated Voltage (Vrms) | 100-240 |
| Rated Current (Arms) | 12-6 |
| Rated Frequency (Hz) | 50-60 |
| Rated Power (W) | 850 |
| Type | ATX12V |
| 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 | 70 | 3 | 0.3 |
| | Watts | 100 | | 840 | 15 | 3.6 |
| Total Max. Power (W) | | 850 | | | | |

## 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) | 2 | 2 | 18AWG |
| 6+2 pin PCIe (680mm+80mm) | 3 | 6 | 18AWG |
| SATA (460mm+115mm+115mm+115mm) | 2 | 8 | 18AWG |
| SATA (460mm+115mm) | 1 | 2 | 18AWG |
| 4 pin Molex (460mm+120mm+120mm) | 1 | 3 | 18AWG |
| 4 pin Molex (360mm+120mm) | 1 | 2 | 18AWG |
| FDD Adapter (+105mm) | 1 | 1 | 22AWG |







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## Anex

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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 GBU1506 (600V, 15A) |
| APFC MOSFETS | 2x Infineon IPW50R190CE (550V, 15.7A @ 100°C, 0.19Ohm) |
| APFC Boost Diode | 1x STMicroelectronics STTH8S06D (600V, 8A @ 125°C) |
| Hold-up Cap(s) | 1x Nippon Chemi-Con (400V, 650uF, 2000h @ 105°C, CE) |
| Main Switchers | 4x UTC GPT13N50DG (500V, 13A @ 100°C, 0.49Ohm) |
| APFC Controller | Champion CM6500UNX |
| Resonant Controller | Champion CM6901T6X |
| Topology | Primary side: Full-Bridge & LLC Resonant Controller<br>Secondary side: Synchronous Rectification & DC-DC converters |
| **Secondary Side** | |
| +12V MOSFETS | 4x Nexperia PSMN2R6-40YS (40V, 100A @ 25°C, 2.8mOhm) |
| 5V & 3.3V | DC-DC Converters: 6x Infineon BSC0906NS (30V, 40A @ 100°C, 4.5mOhm)<br>PWM Controller: APW7159 |
| Filtering Capacitors | Electrolytics: Chemi-Con (1-5,000 @ 105°C, KZE), Chemi-Con (4-10,000 @ 105°C, KY), W<br>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 | 88.996 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load -115V | 0.000 |
| Average Efficiency 5VSB | 77.458 |
| Standby Power Consumption (W) -115V | 0.0453387 |
| Standby Power Consumption (W) -230V | 0.0748675 |
| Average PF | 0.985 |
| ErP Lot 3/6 Ready | ✓ |
| (EU) No 617/2013 Compliance | ✓ |
| Avg Noise Output | 33.30 |
| Efficiency Rating (ETA) | PLATINUM |
| Noise Rating (LAMBDA) | Standard++ |

| TEST EQUIPMENT | | |
|---|---|---|
| Electronic Loads | Chroma 6314A x2<br>63123A x6<br>63102A<br>63101A | Chroma 63601-5 x2<br>Chroma 63600-2<br>63640-80-80 x10<br>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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## Anex

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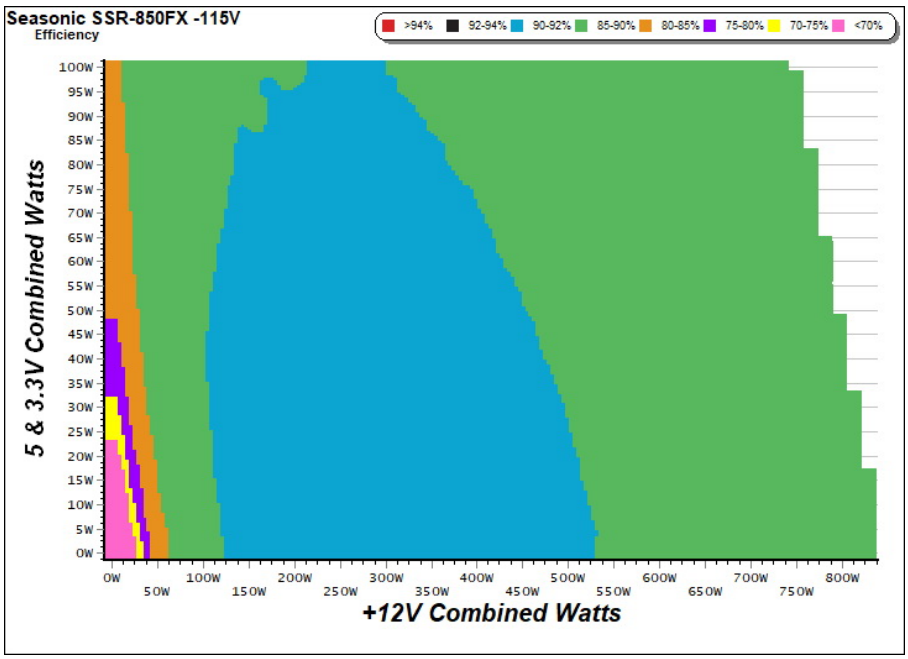
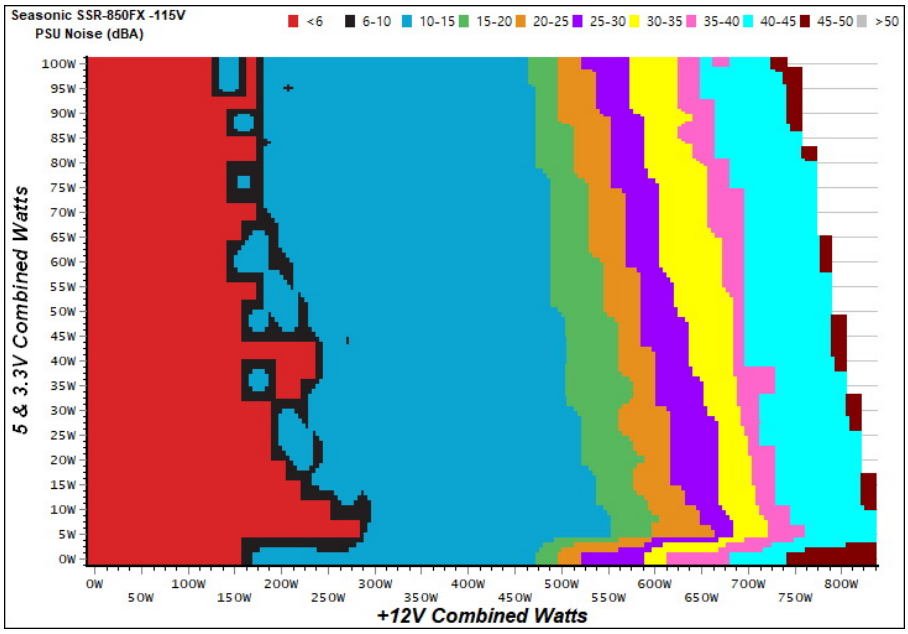
## EFFICIENCY GRAPH




### 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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## Anex

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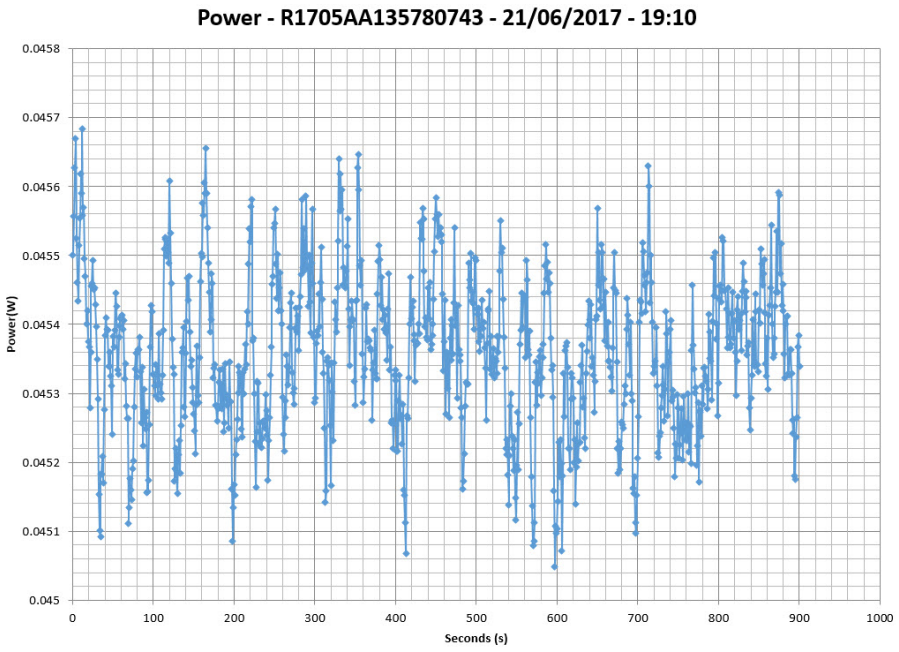
### 5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.042A | 0.214 | 68.810% | 0.051 |
| | 5.143V | 0.311 | | 115.15V |
| 2 | 0.087A | 0.448 | 74.419% | 0.096 |
| | 5.142V | 0.602 | | 115.18V |
| 3 | 0.542A | 2.781 | 78.096% | 0.334 |
| | 5.131V | 3.561 | | 115.13V |
| 4 | 1.002A | 5.130 | 77.751% | 0.405 |
| | 5.120V | 6.598 | | 115.15V |
| 5 | 1.502A | 7.672 | 77.960% | 0.439 |
| | 5.109V | 9.841 | | 115.15V |
| 6 | 3.001A | 15.195 | 76.223% | 0.485 |
| | 5.063V | 19.935 | | 115.15V |

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

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.041A | 0.213 | 61.207% | 0.017 |
| | 5.143V | 0.348 | | 230.42V |
| 2 | 0.087A | 0.448 | 69.243% | 0.032 |
| | 5.141V | 0.647 | | 230.44V |
| 3 | 0.542A | 2.781 | 76.823% | 0.158 |
| | 5.130V | 3.620 | | 230.42V |
| 4 | 1.002A | 5.129 | 77.512% | 0.241 |
| | 5.120V | 6.617 | | 230.42V |
| 5 | 1.502A | 7.670 | 78.019% | 0.295 |
| | 5.108V | 9.831 | | 230.43V |
| 6 | 3.001A | 15.223 | 77.939% | 0.372 |
| | 5.072V | 19.532 | | 230.43V |

### VAMPIRE POWER -115V



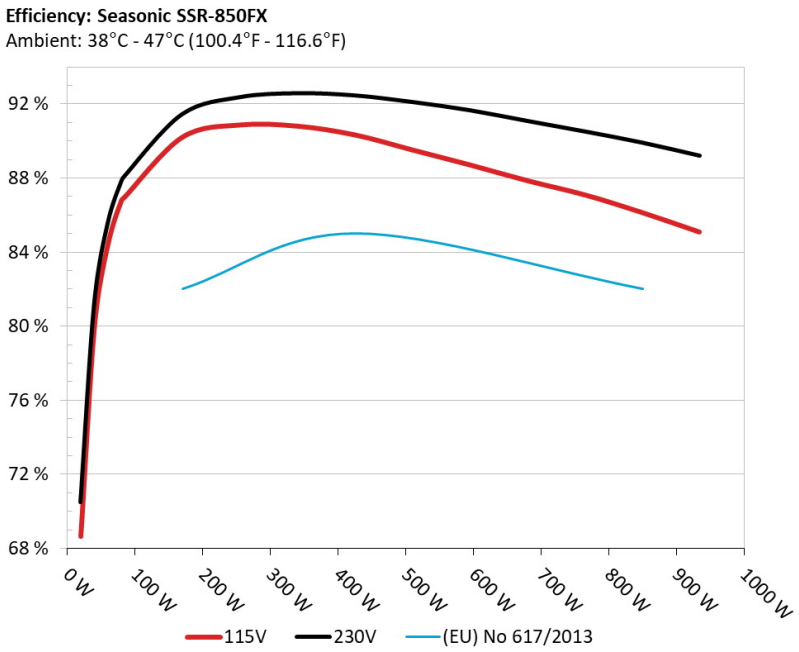

**INFO**

*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*

## Anex

Seasonic SSR-850FX

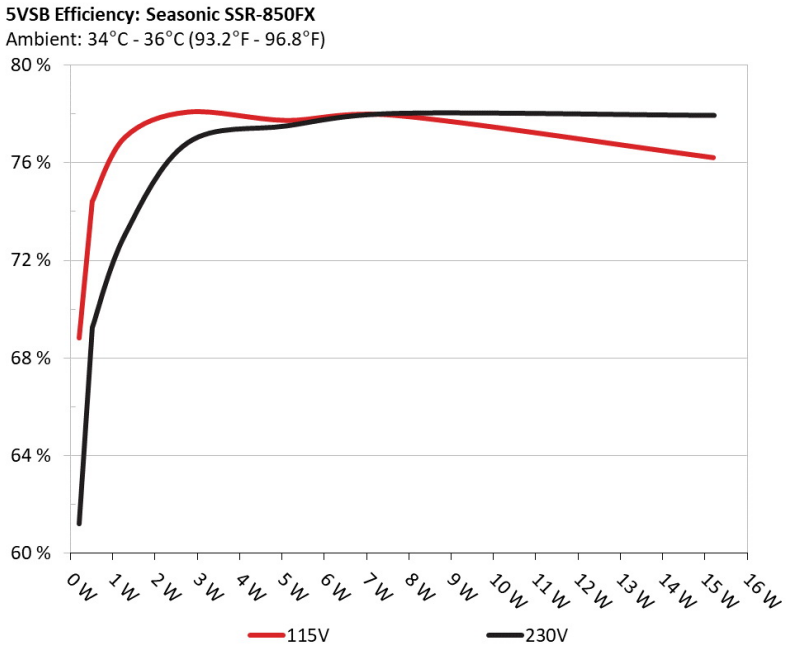
## EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE




**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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## Anex

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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 | 5.213A | 1.986A | 1.978A | 0.976A | 84.753 | 86.973% | 0 | < 6.0 | 42.86°C | 0.967 |
| | 12.118V | 5.038V | 3.330V | 5.113V | 97.448 | | | | 38.79°C | 115.20V |
| 2 | 11.451A | 2.969A | 2.973A | 1.176A | 169.604 | 90.195% | 0 | < 6.0 | 38.99°C | 0.983 |
| | 12.118V | 5.036V | 3.327V | 5.100V | 188.042 | | | | 51.28°C | 115.20V |
| 3 | 18.055A | 3.478A | 3.485A | 1.374A | 254.859 | 90.860% | 550 | 10.4 | 39.78°C | 0.987 |
| | 12.117V | 5.034V | 3.324V | 5.090V | 280.495 | | | | 49.35°C | 115.19V |
| 4 | 24.639A | 3.974A | 3.969A | 1.574A | 339.701 | 90.797% | 550 | 10.4 | 40.23°C | 0.989 |
| | 12.116V | 5.031V | 3.323V | 5.078V | 374.132 | | | | 49.92°C | 115.19V |
| 5 | 30.880A | 4.973A | 4.963A | 1.775A | 424.604 | 90.325% | 550 | 10.4 | 40.84°C | 0.989 |
| | 12.115V | 5.030V | 3.321V | 5.069V | 470.085 | | | | 51.66°C | 115.18V |
| 6 | 37.124A | 5.967A | 5.962A | 1.975A | 509.527 | 89.513% | 735 | 15.4 | 42.33°C | 0.990 |
| | 12.115V | 5.027V | 3.319V | 5.056V | 569.222 | | | | 53.09°C | 115.17V |
| 7 | 43.372A | 6.971A | 6.963A | 2.179A | 594.475 | 88.706% | 1270 | 32.7 | 43.06°C | 0.990 |
| | 12.113V | 5.024V | 3.317V | 5.044V | 670.160 | | | | 53.86°C | 115.17V |
| 8 | 49.628A | 7.968A | 7.962A | 2.381A | 679.388 | 87.855% | 1890 | 40.5 | 43.79°C | 0.991 |
| | 12.110V | 5.022V | 3.315V | 5.033V | 773.307 | | | | 54.66°C | 115.17V |
| 9 | 56.316A | 8.475A | 8.478A | 2.385A | 764.445 | 87.087% | 2310 | 45.1 | 44.43°C | 0.992 |
| | 12.107V | 5.020V | 3.314V | 5.026V | 877.791 | | | | 54.80°C | 115.16V |
| 10 | 62.742A | 8.974A | 8.964A | 2.995A | 849.146 | 86.135% | 2320 | 45.2 | 45.36°C | 0.992 |
| | 12.104V | 5.019V | 3.312V | 5.004V | 985.835 | | | | 56.01°C | 115.16V |
| 11 | 69.759A | 8.977A | 8.968A | 2.999A | 934.022 | 85.080% | 2320 | 45.2 | 46.66°C | 0.992 |
| | 12.103V | 5.017V | 3.312V | 4.998V | 1097.811 | | | | 56.34°C | 115.16V |
| CL1 | 0.099A | 12.014A | 12.002A | 0.004A | 101.451 | 84.910% | 550 | 10.4 | 43.79°C | 0.976 |
| | 12.125V | 5.027V | 3.319V | 5.121V | 119.481 | | | | 53.23°C | 115.21V |
| CL2 | 69.943A | 1.003A | 1.003A | 1.002A | 859.895 | 86.501% | 2320 | 45.2 | 45.83°C | 0.992 |
| | 12.102V | 5.025V | 3.321V | 5.064V | 994.088 | | | | 54.35°C | 115.16V |







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## Anex

Seasonic SSR-850FX

### 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 | 1.206A | 0.493A | 0.476A | 0.191A | 19.666 | 68.637% | 0 | < 6.0 | 0.802 |
| | 12.113V | 5.046V | 3.335V | 5.137V | 28.652 | | | | 115.20V |
| 2 | 2.434A | 0.990A | 0.988A | 0.386A | 39.745 | 79.968% | 0 | < 6.0 | 0.914 |
| | 12.114V | 5.039V | 3.330V | 5.130V | 49.701 | | | | 115.20V |
| 3 | 3.667A | 1.474A | 1.499A | 0.586A | 59.850 | 84.416% | 0 | < 6.0 | 0.949 |
| | 12.116V | 5.038V | 3.330V | 5.124V | 70.899 | | | | 115.20V |
| 4 | 4.887A | 1.987A | 1.980A | 0.781A | 79.814 | 86.787% | 0 | < 6.0 | 0.967 |
| | 12.117V | 5.038V | 3.329V | 5.118V | 91.965 | | | | 115.20V |

### RIPPLE MEASUREMENTS

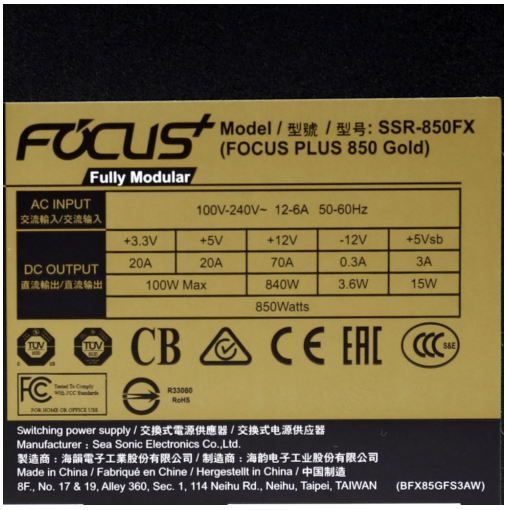
| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 8.2 mV | 6.7 mV | 9.8 mV | 5.2 mV | Pass |
| 20% Load | 11.2 mV | 7.9 mV | 14.3 mV | 5.0 mV | Pass |
| 30% Load | 13.3 mV | 9.1 mV | 17.4 mV | 5.6 mV | Pass |
| 40% Load | 15.5 mV | 8.8 mV | 17.1 mV | 6.3 mV | Pass |
| 50% Load | 17.0 mV | 9.9 mV | 17.3 mV | 6.9 mV | Pass |
| 60% Load | 18.0 mV | 10.9 mV | 19.3 mV | 8.6 mV | Pass |
| 70% Load | 19.5 mV | 10.5 mV | 19.8 mV | 8.4 mV | Pass |
| 80% Load | 21.3 mV | 12.4 mV | 19.7 mV | 11.6 mV | Pass |
| 90% Load | 22.7 mV | 12.4 mV | 21.5 mV | 12.4 mV | Pass |
| 100% Load | 25.7 mV | 18.4 mV | 25.9 mV | 16.2 mV | Pass |
| 110% Load | 27.8 mV | 17.0 mV | 28.9 mV | 16.0 mV | Pass |
| Crossload 1 | 13.2 mV | 14.7 mV | 18.1 mV | 7.4 mV | Pass |
| Crossload 2 | 24.3 mV | 14.2 mV | 25.6 mV | 10.9 mV | Pass |

## Anex

Seasonic SSR-850FX

| HOLD-UP TIME & POWER OK SIGNAL (230V) | |
|---|---|
| Hold-Up Time (ms) | 22.72 |
| AC Loss to PWR_OK Hold Up Time (ms) | 19.06 |
| PWR_OK Inactive to DC Loss Delay (ms) | 3.66 |


*Top side*




*Power specifications label*

## CERTIFICATIONS

CYBENETICS PLATINUM

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