

Anex

Seasonic SSR-650PX

Lab ID#: 241

Receipt Date: -

Test Date: -

Report:

Report Date: Nov 12, 2018

| DUT INFORMATION | |
|--------------------|------------------------|
| Brand | Seasonic |
| Manufacturer (OEM) | Seasonic |
| Series | FOCUS Plus Platinum |
| Model Number | SSR-650PX |
| Serial Number | R1707AA170400337 |
| DUT Notes | Retested on 04/10/2018 |

| DUT SPECIFICATIONS | |
|------------------------|--|
| Rated Voltage (Vrms) | 100-240 |
| Rated Current (Arms) | 9-4.5 |
| Rated Frequency (Hz) | 50-60 |
| Rated Power (W) | 650 |
| Type | ATX12V |
| Cooling | 120mm Fluid Dynamic Bearing Fan (HA1225M12F-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 | In Cable Capacitors |
| ATX connector 20+4 pin (600mm) | 1 | 1 | 18-22AWG | Yes |
| 4+4 pin EPS12V (650mm) | 1 | 1 | 18AWG | Yes |
| 6+2 pin PCIe (680mm+80mm) | 2 | 4 | 18AWG | Yes |
| SATA (450mm+110mm+110mm+110mm) | 2 | 8 | 18AWG | No |
| 4 pin Molex (450mm+120mm+120mm) | 1 | 3 | 18AWG | No |
| FDD Adapter (+105mm) | 1 | 1 | 22AWG | No |
| AC Power Cord (1370mm) - C13 coupler | 1 | 1 | 18AWG | No |

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Anex

Seasonic SSR-650PX

| General Data | |
|------------------------|---|
| Manufacturer (OEM) | Seasonic |
| Platform Model | PX |
| Primary Side | |
| Transient Filter | 4x Y caps, 2x X caps, 2x CM chokes, 1x MOV , 1x CM02X |
| Inrush Protection | NTC Thermistor & Diode |
| Bridge Rectifier(s) | 2x GBU1506 (600V, 15A @ 100°C) |
| APFC MOSFETS | 2x Infineon IPP50R199CP (550V, 15A @ 100°C, 0.199Ohm) |
| APFC Boost Diode | 1x STMicroelectronics STTH8S06D (600V, 8A @ 125°C) |
| Hold-up Cap(s) | 1x Nippon Chemi-Con (400V, 450uF, 2000h @ 105°C, CE) |
| Main Switchers | 4x Infineon IPP50R250CP (550V, 9A @ 100°C, 0.250hm) |
| 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 | 4x Nexperia PSMN2R6-40YS (40V, 100A @ 100°C, 3.7mOhm @ 100°C) |
| 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), W Polymers: Chemi-Con |
| Supervisor IC | Weltrend WT7527V (OVP, UVP, OCP, SCP, PG) |
| Fan Model | Hong Hua HA1225M12F-Z (120mm, 12V, 0.45A, 2050 RPM, Fluid Dynamic Bearing) |
| 5VSB Circuit | |
| Standby PWM Controller | Excelliance EM8569C |
| Rectifier | P10V45SP SBR (45V, 10A @ 50% Duty Cycle) |

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| RESULTS | |
|---|-----------------|
| Temperature Range (°C /°F) | 30-32 / 86-89.6 |
| Average Efficiency | 90.168 |
| Efficiency With 10W ($\leq 500W$) or 2% ($> 500W$) Load -115V | 0.000 |
| Average Efficiency 5VSB | 77.258 |
| Standby Power Consumption (W) -115V | 0.0490144 |
| Standby Power Consumption (W) -230V | 0.0765786 |
| Average PF | 0.986 |
| ErP Lot 3/6 Ready | ✓ |
| (EU) No 617/2013 Compliance | ✓ |
| Avg Noise Output | 25.35 |
| Efficiency Rating (ETA) | PLATINUM |
| Noise Rating (LAMBDA) | A- |

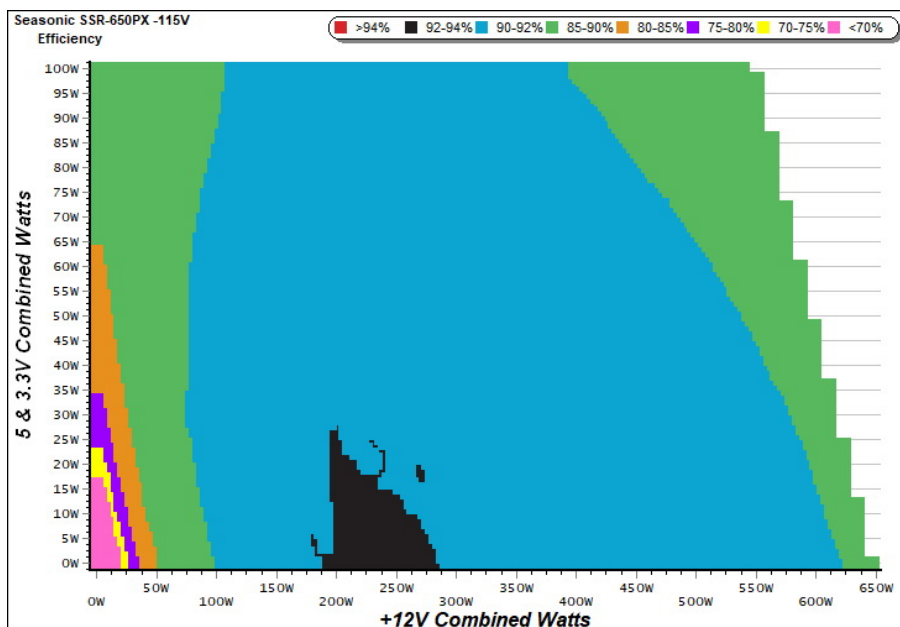
| TEST EQUIPMENT | | |
|------------------|--|---|
| Electronic Loads | Chroma 6314A x2 63123A x6 63102A 63101A | Chroma 63601-5 x2 Chroma 63600-2 63640-80-80 x10 63610-80-20 |
| AC Sources | Chroma 6530, Chroma 61604 | |
| Power Analyzers | N4L PPA1530, N4L PPA5530 | |
| Oscilloscopes | Picoscope 4444 & 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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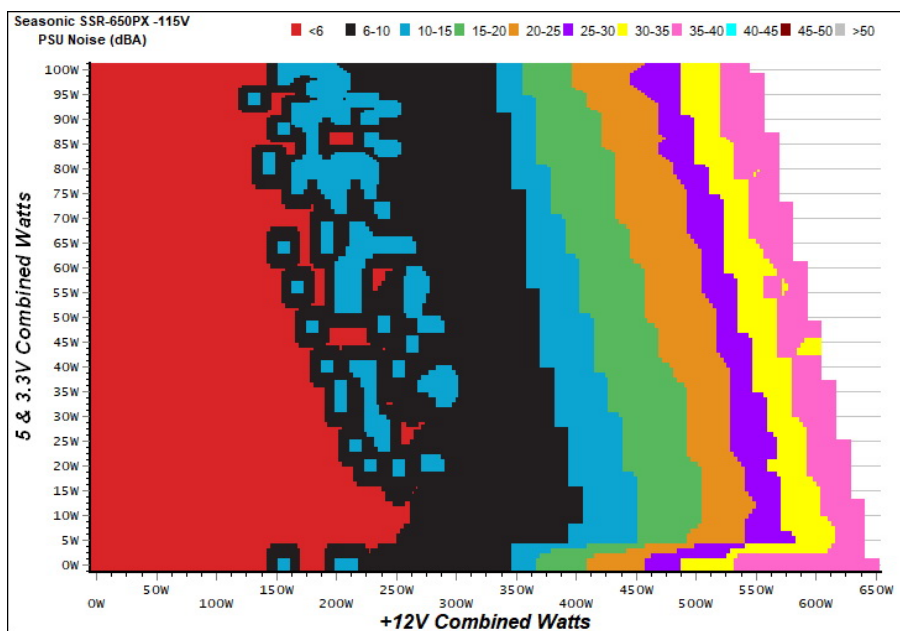
EFFICIENCY GRAPH



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

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

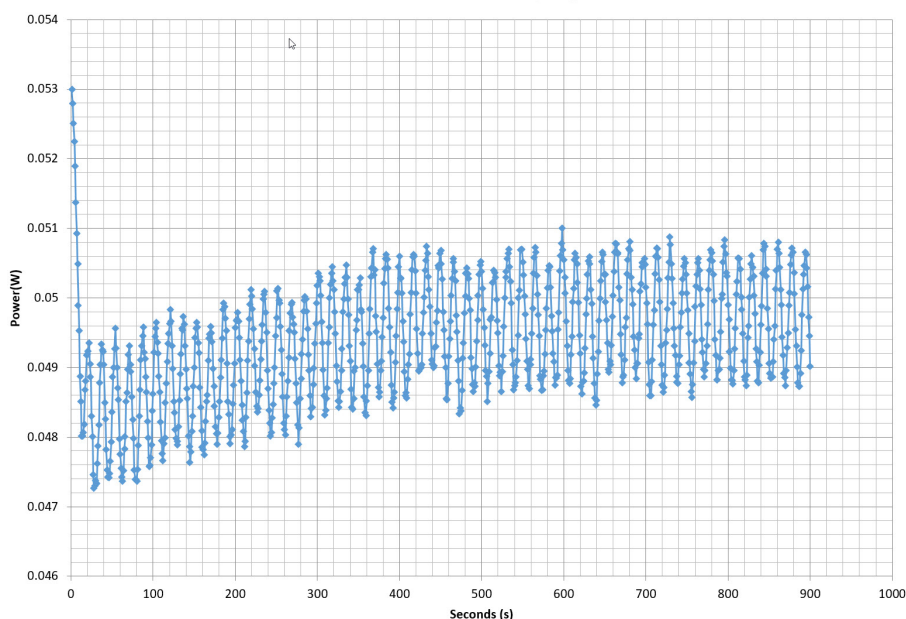
| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|--------|--------|---------------|------------|-------------|
| 1 | 0.045A | 0.230 | 68.047% | 0.029 |
| | 5.112V | 0.338 | | 115.27V |
| 2 | 0.090A | 0.460 | 73.248% | 0.054 |
| | 5.111V | 0.628 | | 115.27V |
| 3 | 0.550A | 2.805 | 77.593% | 0.251 |
| | 5.100V | 3.615 | | 115.26V |
| 4 | 1.000A | 5.090 | 77.984% | 0.350 |
| | 5.091V | 6.527 | | 115.26V |
| 5 | 1.500A | 7.619 | 78.072% | 0.408 |
| | 5.080V | 9.759 | | 115.26V |
| 6 | 3.000A | 15.106 | 76.335% | 0.479 |
| | 5.036V | 19.789 | | 115.25V |

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

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|--------|--------|---------------|------------|-------------|
| 1 | 0.045A | 0.230 | 60.847% | 0.012 |
| | 5.112V | 0.378 | | 230.83V |
| 2 | 0.090A | 0.460 | 67.847% | 0.021 |
| | 5.111V | 0.678 | | 230.82V |
| 3 | 0.550A | 2.805 | 76.285% | 0.106 |
| | 5.100V | 3.677 | | 230.82V |
| 4 | 1.000A | 5.090 | 77.580% | 0.175 |
| | 5.090V | 6.561 | | 230.81V |
| 5 | 1.500A | 7.619 | 77.358% | 0.236 |
| | 5.079V | 9.849 | | 230.82V |
| 6 | 3.000A | 15.135 | 77.931% | 0.338 |
| | 5.045V | 19.421 | | 230.82V |

VAMPIRE POWER -115V

Power - R1707AA170400337 - 09/12/2017 - 10:15



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

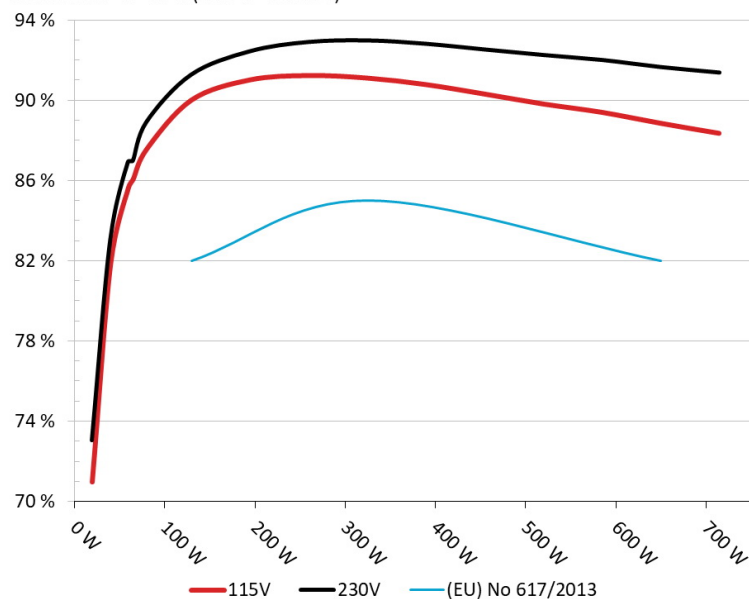
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EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

Efficiency: Seasonic SSR-650PX

Ambient: 37°C - 47°C (98.6°F - 116.6°F)



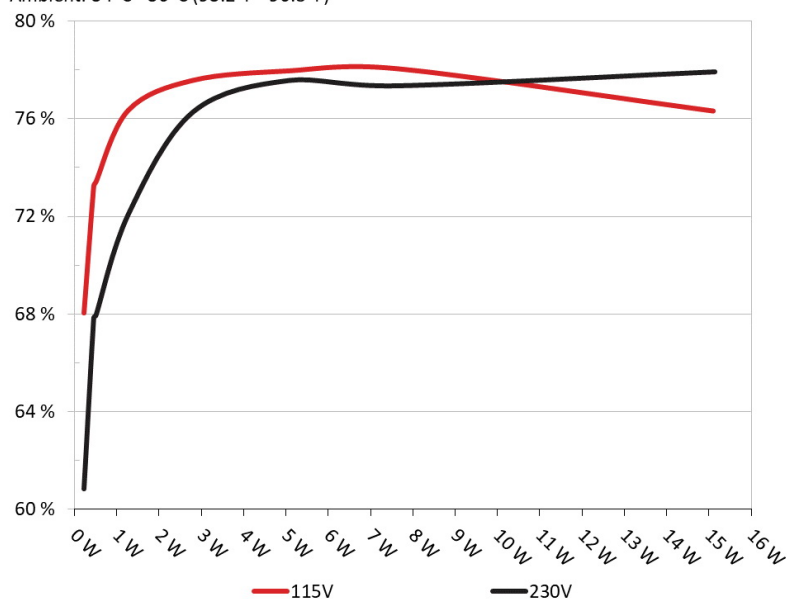
INFO

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-650PX

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) | PSU Noise (dB[A]) | Temps (In/Out) | PF/AC Volts |
|--------|---------|---------|---------|--------|---------------|------------|-----------------|-------------------|----------------|-------------|
| 1 | 3.557A | 1.984A | 1.989A | 0.984A | 64.736 | 86.050% | 0 | <6.0 | 45.47°C | 0.958 |
| | 12.134V | 5.029V | 3.316V | 5.084V | 75.231 | | | | 38.02°C | 115.29V |
| 2 | 8.107A | 2.983A | 2.985A | 1.183A | 129.267 | 89.991% | 0 | <6.0 | 46.33°C | 0.979 |
| | 12.134V | 5.028V | 3.315V | 5.074V | 143.644 | | | | 38.38°C | 115.20V |
| 3 | 13.051A | 3.481A | 3.470A | 1.382A | 194.391 | 90.999% | 0 | <6.0 | 47.30°C | 0.987 |
| | 12.136V | 5.028V | 3.315V | 5.064V | 213.620 | | | | 38.77°C | 115.11V |
| 4 | 17.994A | 3.976A | 3.983A | 1.583A | 259.599 | 91.212% | 485 | 9.3 | 39.00°C | 0.989 |
| | 12.138V | 5.027V | 3.314V | 5.054V | 284.610 | | | | 49.36°C | 115.12V |
| 5 | 22.606A | 4.974A | 4.982A | 1.785A | 324.927 | 91.087% | 445 | 9.6 | 39.68°C | 0.990 |
| | 12.139V | 5.027V | 3.313V | 5.044V | 356.722 | | | | 51.37°C | 115.02V |
| 6 | 27.154A | 5.970A | 5.977A | 1.987A | 389.451 | 90.764% | 795 | 18.9 | 40.03°C | 0.991 |
| | 12.140V | 5.026V | 3.312V | 5.033V | 429.079 | | | | 51.88°C | 114.92V |
| 7 | 31.770A | 6.962A | 6.978A | 2.191A | 454.772 | 90.291% | 1155 | 28.7 | 41.34°C | 0.991 |
| | 12.140V | 5.025V | 3.310V | 5.022V | 503.673 | | | | 53.59°C | 114.94V |
| 8 | 36.388A | 7.964A | 7.979A | 2.395A | 520.095 | 89.795% | 1670 | 37.2 | 42.84°C | 0.991 |
| | 12.138V | 5.024V | 3.309V | 5.012V | 579.203 | | | | 55.57°C | 114.84V |
| 9 | 41.400A | 8.463A | 8.464A | 2.398A | 585.024 | 89.380% | 2005 | 41.1 | 43.86°C | 0.991 |
| | 12.138V | 5.023V | 3.308V | 5.005V | 654.535 | | | | 56.75°C | 114.74V |
| 10 | 46.149A | 8.962A | 8.980A | 3.009A | 649.864 | 88.838% | 2025 | 41.2 | 45.29°C | 0.992 |
| | 12.138V | 5.022V | 3.307V | 4.986V | 731.517 | | | | 58.65°C | 114.63V |
| 11 | 51.480A | 8.963A | 8.982A | 3.013A | 714.688 | 88.339% | 2035 | 41.3 | 46.57°C | 0.993 |
| | 12.140V | 5.022V | 3.307V | 4.980V | 809.032 | | | | 60.54°C | 114.64V |
| CL1 | 0.738A | 12.001A | 12.001A | 0.000A | 109.074 | 86.604% | 445 | 9.6 | 43.65°C | 0.979 |
| | 12.143V | 5.026V | 3.316V | 5.092V | 125.946 | | | | 52.20°C | 115.21V |
| CL2 | 54.012A | 1.002A | 1.000A | 1.000A | 668.978 | 89.315% | 2025 | 41.2 | 45.89°C | 0.992 |
| | 12.138V | 5.024V | 3.308V | 5.039V | 749.007 | | | | 59.16°C | 114.62V |

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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 | 1.172A | 0.494A | 0.480A | 0.196A | 19.296 | 70.980% | 0 | <6.0 | 0.860 |
| | 12.128V | 5.035V | 3.319V | 5.107V | 27.185 | | | | 115.34V |
| 2 | 2.427A | 0.993A | 0.995A | 0.392A | 39.729 | 81.845% | 0 | <6.0 | 0.930 |
| | 12.129V | 5.029V | 3.316V | 5.100V | 48.542 | | | | 115.32V |
| 3 | 3.619A | 1.490A | 1.476A | 0.589A | 59.286 | 85.605% | 0 | <6.0 | 0.957 |
| | 12.130V | 5.029V | 3.316V | 5.094V | 69.255 | | | | 115.29V |
| 4 | 4.873A | 1.987A | 1.989A | 0.786A | 79.711 | 87.547% | 0 | <6.0 | 0.970 |
| | 12.133V | 5.029V | 3.316V | 5.088V | 91.049 | | | | 115.26V |

RIPPLE MEASUREMENTS

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|-------------|---------|---------|--------|--------|-----------|
| 10% Load | 8.1 mV | 4.8 mV | 3.7 mV | 3.9 mV | Pass |
| 20% Load | 11.7 mV | 5.6 mV | 4.3 mV | 4.3 mV | Pass |
| 30% Load | 14.3 mV | 6.0 mV | 4.9 mV | 4.4 mV | Pass |
| 40% Load | 17.0 mV | 6.5 mV | 5.6 mV | 4.7 mV | Pass |
| 50% Load | 19.0 mV | 7.9 mV | 6.5 mV | 4.9 mV | Pass |
| 60% Load | 20.4 mV | 9.3 mV | 7.1 mV | 5.4 mV | Pass |
| 70% Load | 22.1 mV | 10.4 mV | 8.2 mV | 7.2 mV | Pass |
| 80% Load | 22.4 mV | 10.9 mV | 9.0 mV | 9.5 mV | Pass |
| 90% Load | 23.4 mV | 9.9 mV | 9.0 mV | 9.8 mV | Pass |
| 100% Load | 24.5 mV | 11.0 mV | 9.4 mV | 8.1 mV | Pass |
| 110% Load | 26.7 mV | 11.5 mV | 9.7 mV | 8.9 mV | Pass |
| Crossload 1 | 10.6 mV | 9.5 mV | 8.4 mV | 5.2 mV | Pass |
| Crossload 2 | 24.9 mV | 8.2 mV | 5.6 mV | 7.8 mV | Pass |

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Anex

Seasonic SSR-650PX

HOLD-UP TIME & POWER OK SIGNAL (230V)

| | |
|---------------------------------------|------|
| Hold-Up Time (ms) | 22.0 |
| AC Loss to PWR_OK Hold Up Time (ms) | 17.4 |
| PWR_OK Inactive to DC Loss Delay (ms) | 4.6 |



Top side



Power specifications label

CERTIFICATIONS



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