# Seasonic Prime Titanium Ultra 650W

Serial Number R1709AA181140024

Lab ID 239

Certification ID 25239

Test Result Report ID:

Certificate Issue Date: Aug 12, 2018

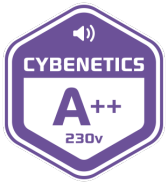
Scheme: ETA-EMI PSU

115V

230V

115V

230V




Scheme: LAMBDA PSU

Aristeidis Bitziopoulos, Certification Body General Manager

# General Information

## Test Equipment

| | |
|---|---|
| Electronic Loads | Chroma 63601-5 x2<br>Chroma 63600-2<br>Chroma 63640-80-80 x10<br>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 Ultra 650W |
| OEM/ODM | Seasonic |
| Serial Number | R1709AA181140024 |
| 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<br>(HA13525L12F-Z) |
| Semi-Passive Operation | ✓ (selectable) |
| Cybenetics Testing Information | |
| Lab ID | 239 |
| Date of receipt | Jul 28, 2018 |
| Testing Date | Aug 8, 2018 |
| Report Issued Date | Aug 12, 2018 |
| 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 | In Cable Capacitors |
| ATX connector 20+4 pin (600mm) | 1 | 1 | 18-22AWG | No |
| 4+4 pin EPS12V (660mm) | 2 | 2 | 18AWG | No |
| 6+2 pin PCIe (700mm+80mm) | 2 | 4 | 18AWG | No |
| SATA (410mm+110mm+110mm+110mm) | 1 | 4 | 18AWG | No |
| SATA (300mm+150mm) | 1 | 2 | 18AWG | No |
| 4 pin Molex (450mm+120mm+120mm) | 1 | 3 | 18AWG | No |
| 4 pin Molex (350mm+120mm) | 1 | 2 | 18AWG | No |
| 4-pin Molex Adapter / SATA (150mm+150mm) | 1 | 2 | 18AWG | No |

| | | | | |
|---|---|---|---|---|
| FDD Adapter (+100mm) | 1 | 1 | 22AWG | No |
| AC Power Cord (1370mm) - C13 coupler | 1 | 1 | 18AWG | - |

### 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 | | | | |

## 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) | 92.425% |
| Average Noise Output (>1450 Load Combinations) | 9.98dBA |
| Average PF (>1450 Load Combinations) | 0.987 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | - |
| Standby Power Consumption | 0.0550W |
| Non-Accredited | |
| 12V Ripple (Full Load) | 16.73mV |
| 5V Ripple (Full Load) | 5.20mV |
| 3.3V Ripple (Full Load) | 8.53mV |
| 5VSB Ripple (Full Load) | 6.65mV |

| | |
|---|---|
| 12V Load Regulation | 0.04% |
| 5V Load Regulation | 0.24% |
| 3.3V Load Regulation | 0.33% |
| 5VSB Load Regulation | 1.41% |
| Inrush Current | 31.657A |

## 230V

| | | |
|---|---|---|
| Accredited | | |
| Average Efficiency (>1450 load combinations) | 93.907% | |
| Average Noise Output (>1450 Load Combinations) | 10.29dBA | |
| Average PF (>1450 Load Combinations) | 0.931 | |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | - | |
| Standby Power Consumption | 0.0863W | |
| Non-Accredited | | |
| 12V Ripple (Full Load) | 19.49mV | |
| 5V Ripple (Full Load) | 7.99mV | |
| 3.3V Ripple (Full Load) | 9.30mV | |
| 5VSB Ripple (Full Load) | 5.46mV | |
| 12V Load Regulation | 0.28% | |
| 5V Load Regulation | 0.14% | |
| 3.3V Load Regulation | 0.15% | |
| 5VSB Load Regulation | 1.15% | |
| Inrush Current | 61.536A | |
| Hold-Up Time & PWR_OK Signal | 28.60ms | |
| AC Loss to PWR_OK Hold Up Time | 23.50ms | |
| PWR_OK Inactive to DC Loss Delay | 5.10ms | |
| OPP (0.00°C / 0.00°C) | - | - |

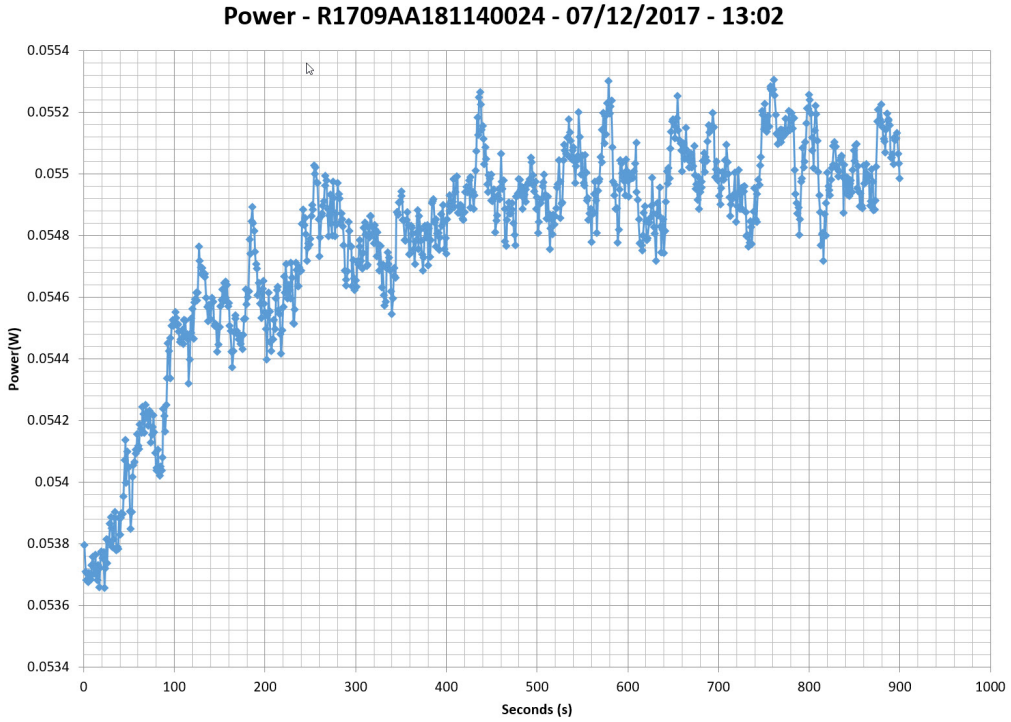
## Hold-Up Time & PWR_OK Signal

| | |
|---|---|
| Hold-Up Time (ms) | 28.6 |
| AC Loss to PWR_OK Hold Up Time (ms) | 23.5 |
| PWR_OK Inactive to DC Loss Delay (ms) | 5.1 |

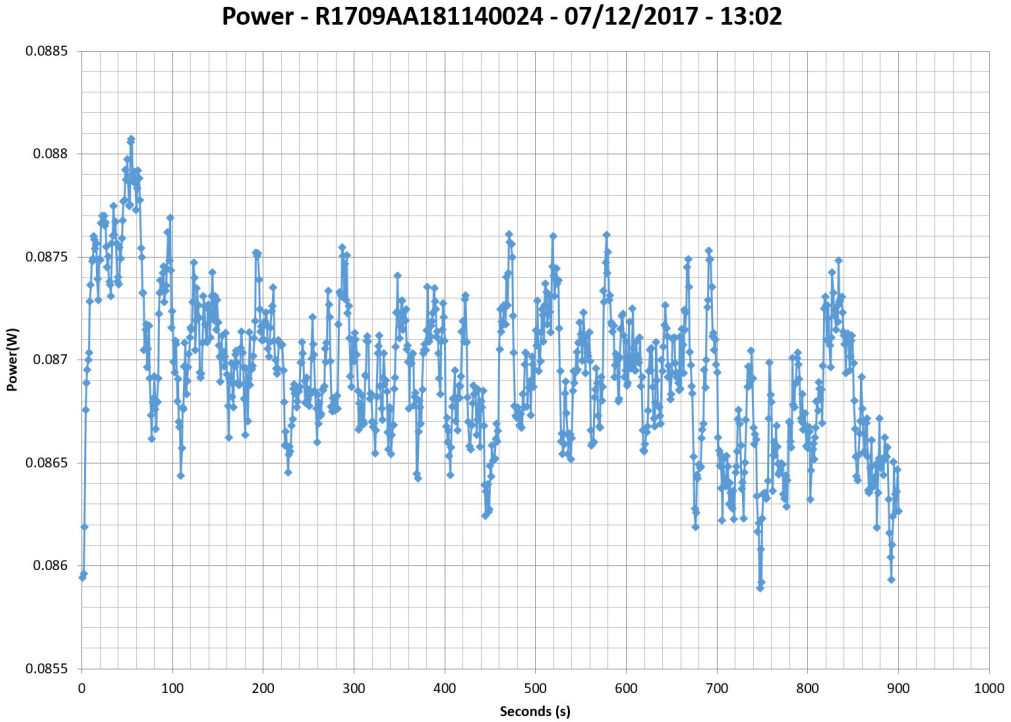
## Vampire Power

### Graphs

**115V**

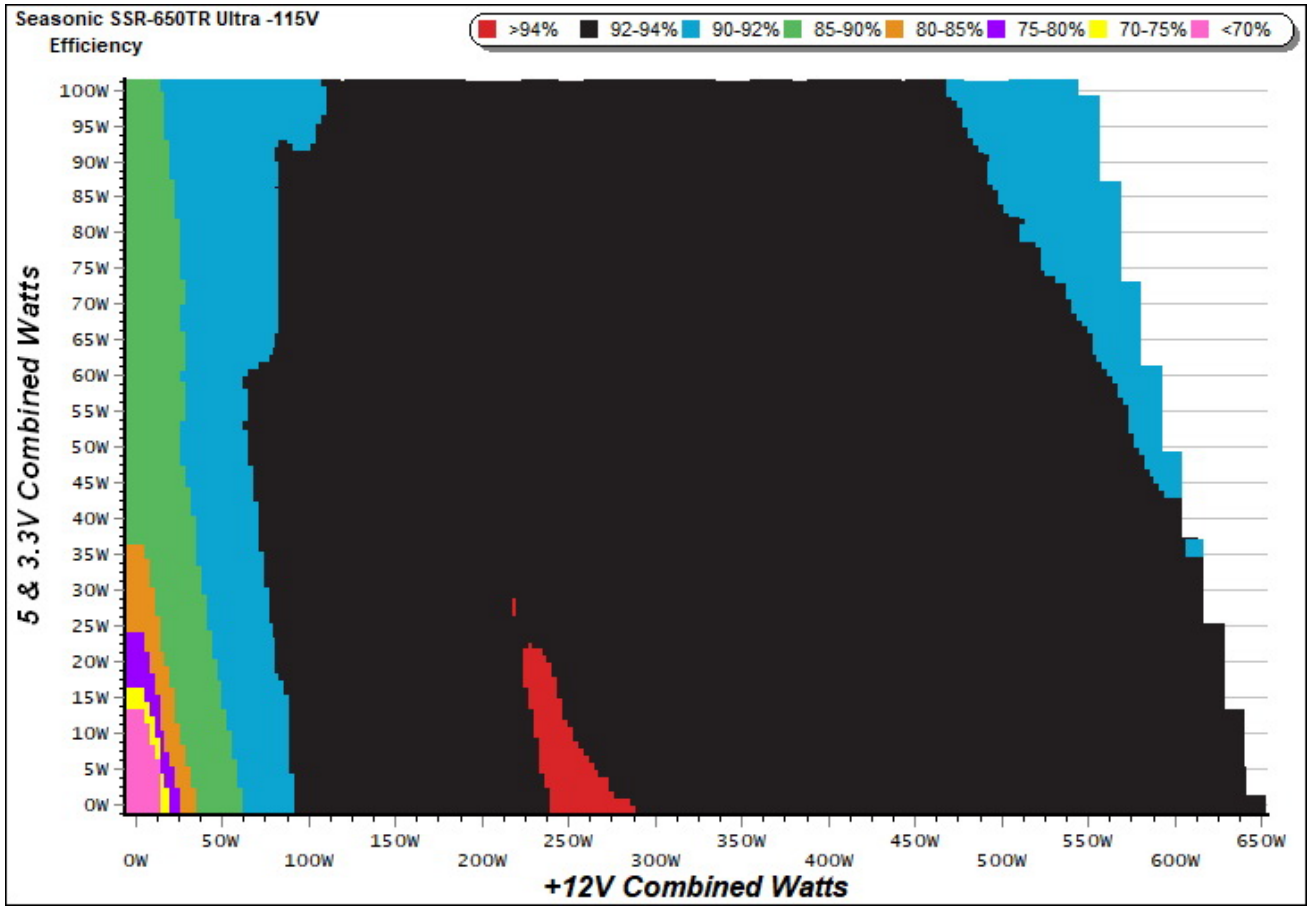



**230V**



## Efficiency Graph

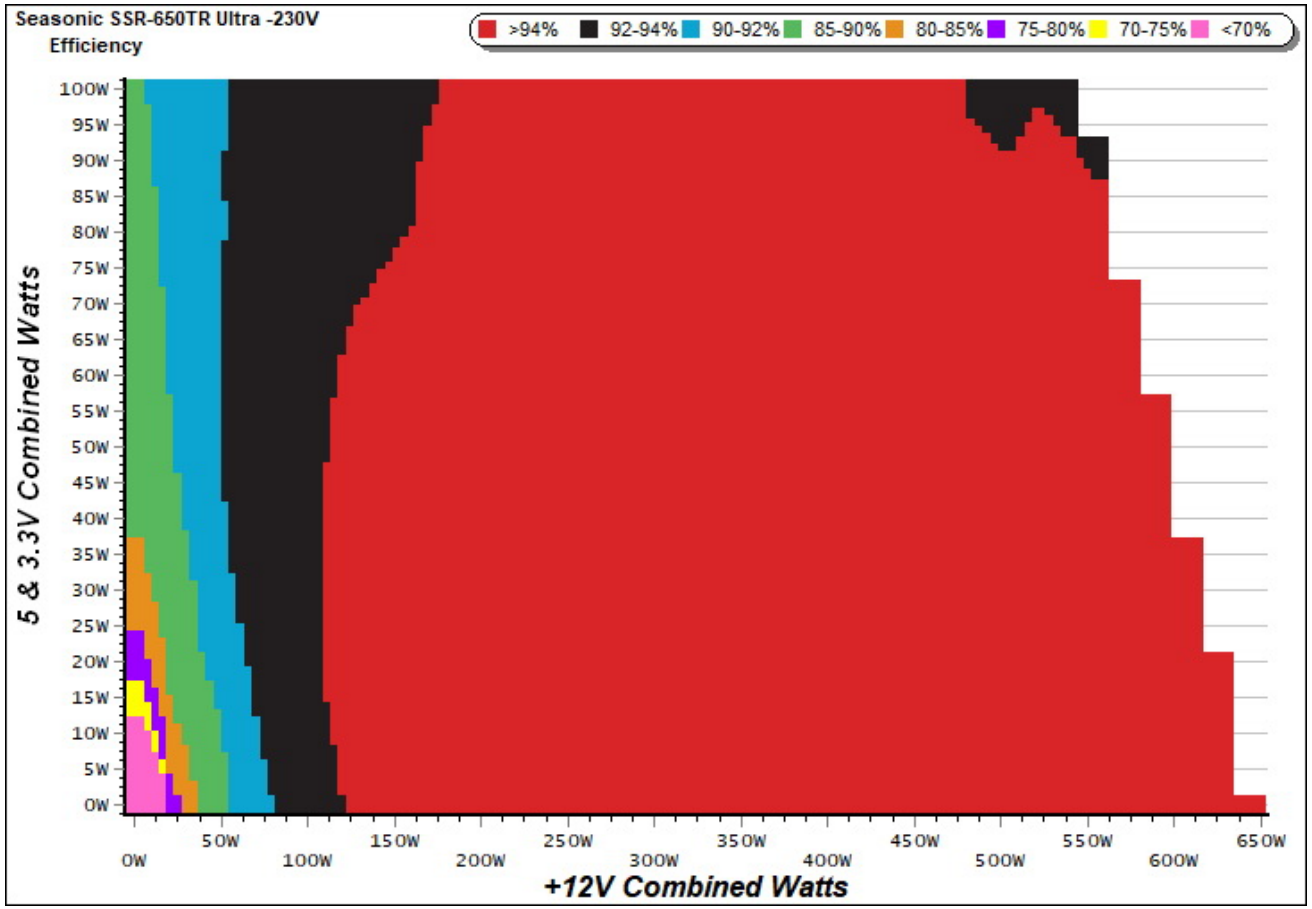
### 115V




### 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

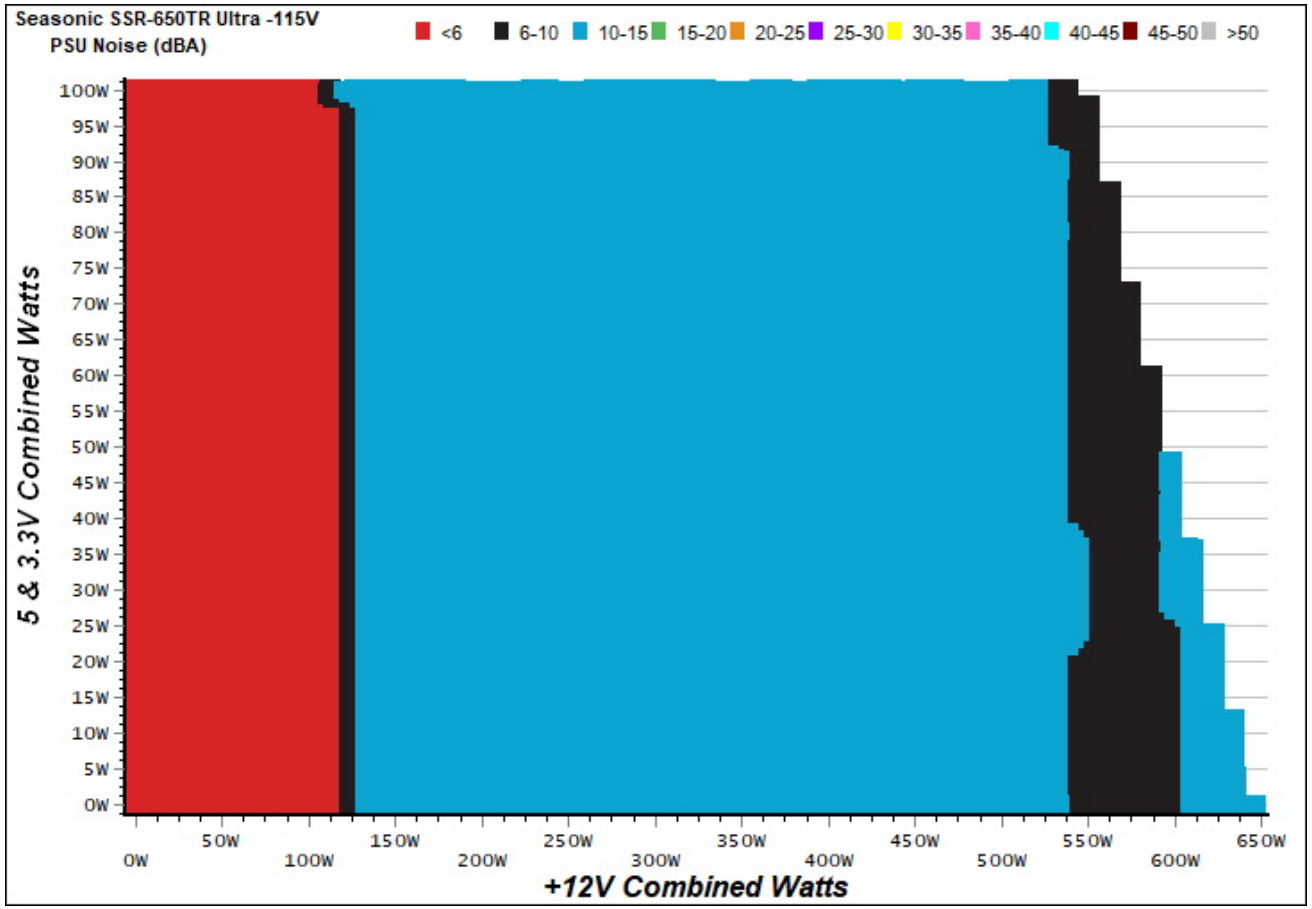



### INFO

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

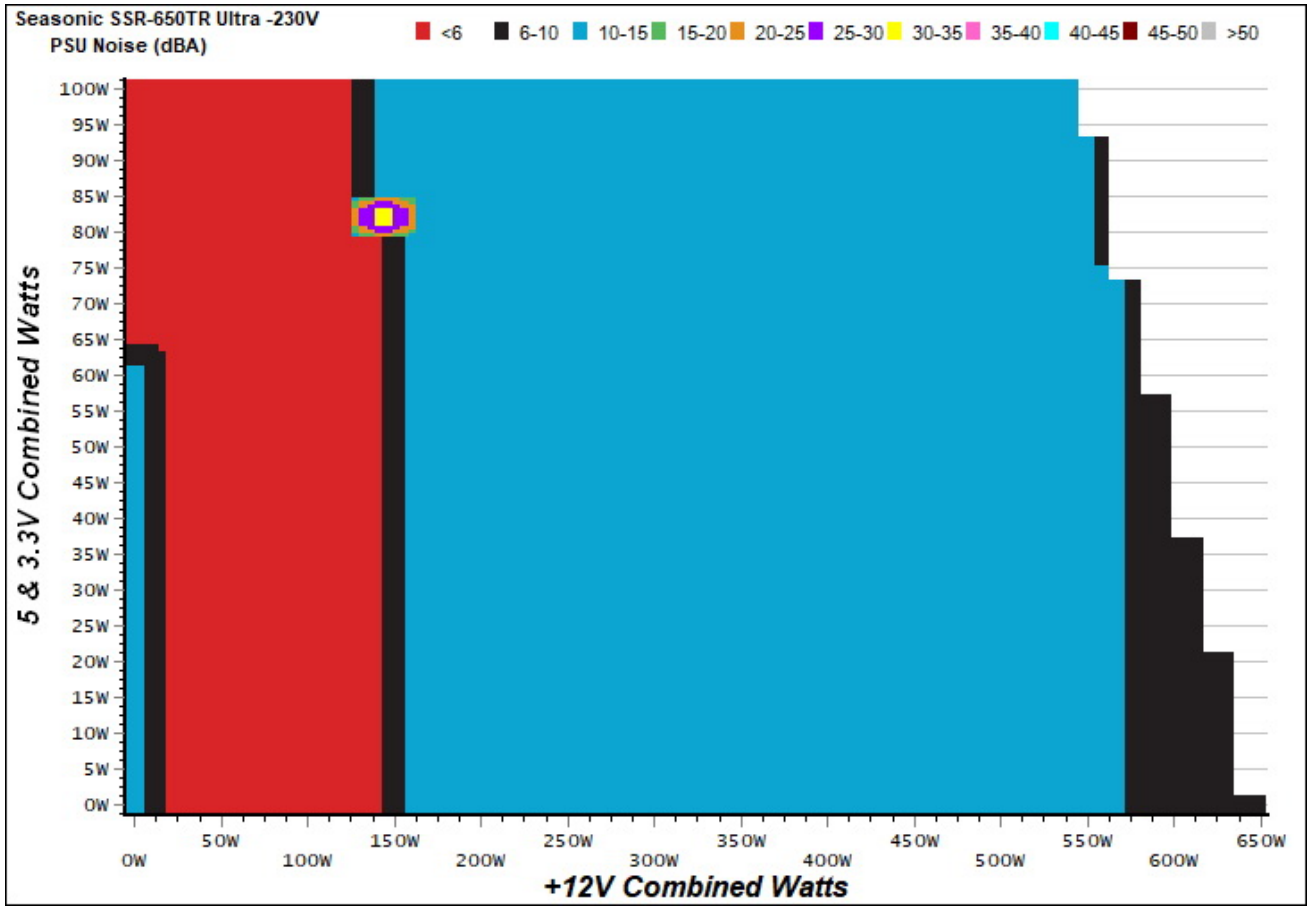
### 115V




### 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

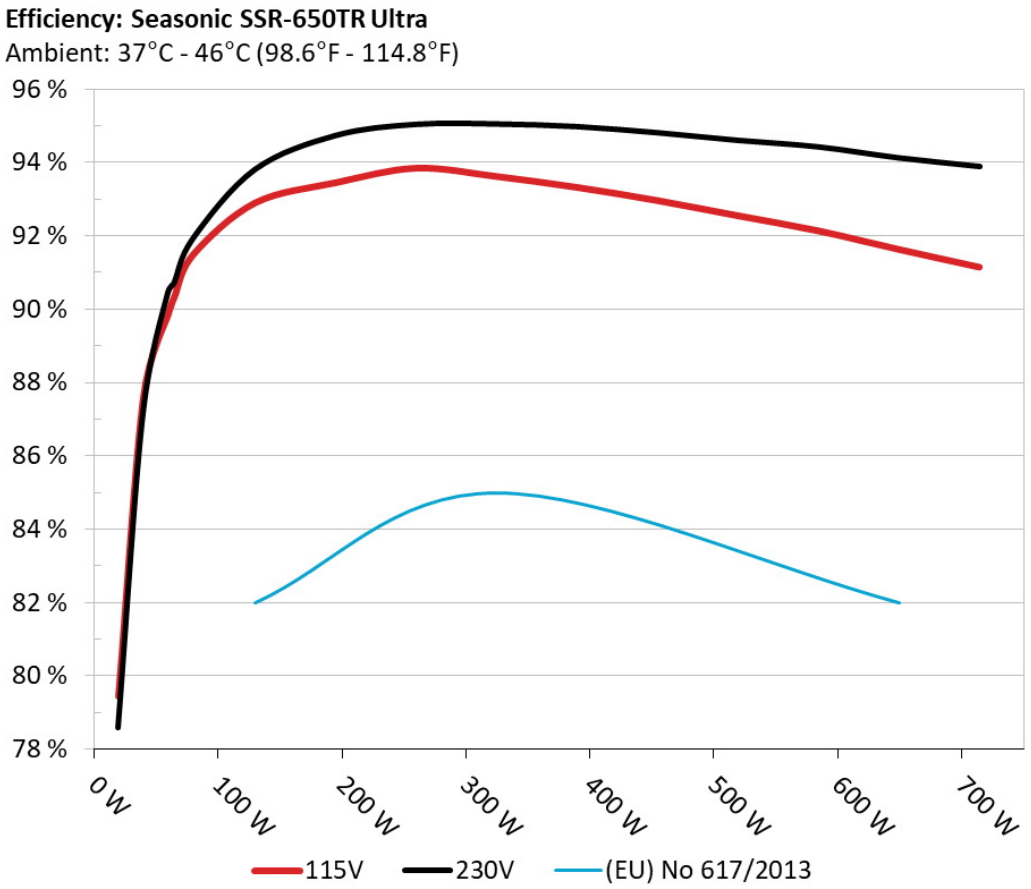



### INFO

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

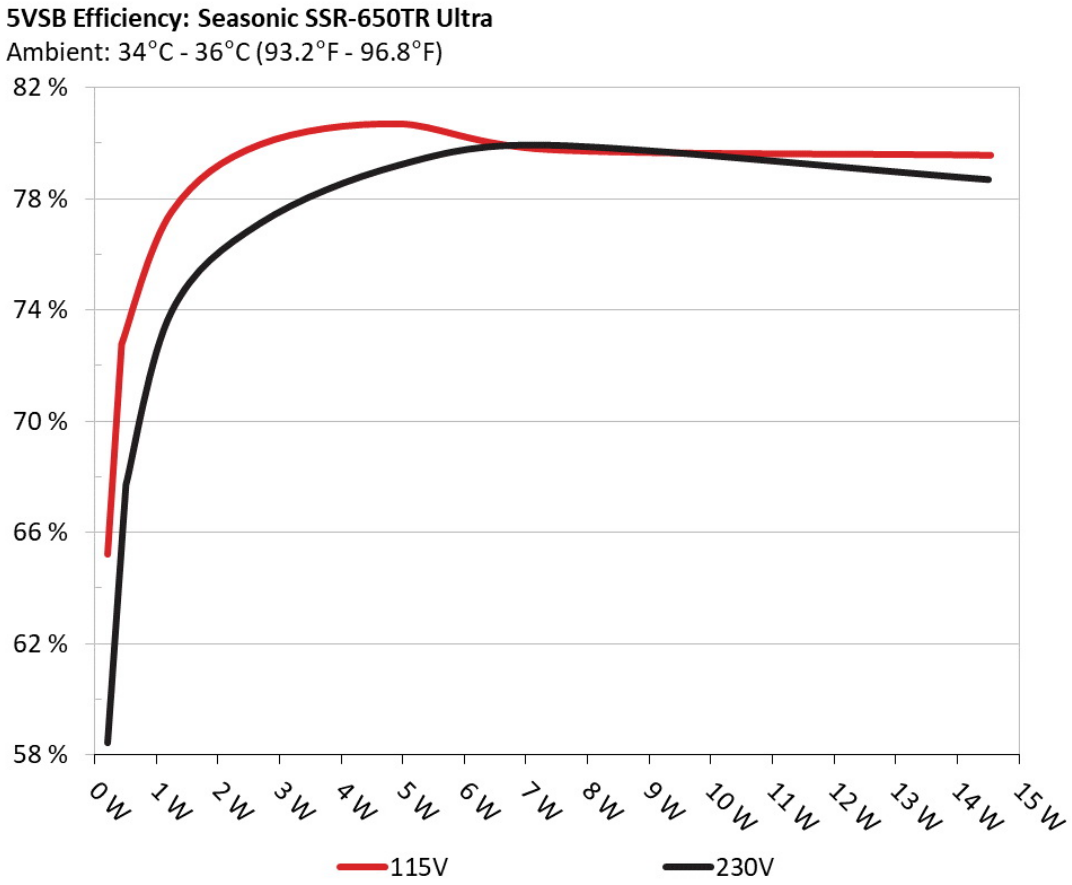
### Efficiency under high ambient temperature




**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 | 0.042A | 0.208 | 65.204% | 0.034 |
| | 4.966V | 0.319 | | 115.07V |
| 2 | 0.088A | 0.435 | 72.621% | 0.063 |
| | 4.963V | 0.599 | | 115.09V |
| 3 | 0.542A | 2.682 | 79.940% | 0.267 |
| | 4.944V | 3.355 | | 115.07V |
| 4 | 1.002A | 4.938 | 80.686% | 0.361 |
| | 4.926V | 6.120 | | 115.07V |
| 5 | 1.502A | 7.365 | 79.760% | 0.414 |
| | 4.903V | 9.234 | | 115.08V |
| 6 | 3.001A | 14.542 | 79.556% | 0.479 |
| | 4.845V | 18.279 | | 115.08V |

### 230V

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.042A | 0.208 | 58.427% | 0.011 |
| | 4.965V | 0.356 | | 230.28V |
| 2 | 0.087A | 0.434 | 67.707% | 0.021 |
| | 4.963V | 0.641 | | 230.28V |
| 3 | 0.542A | 2.681 | 77.107% | 0.105 |
| | 4.942V | 3.477 | | 230.25V |
| 4 | 1.002A | 4.935 | 79.201% | 0.173 |
| | 4.924V | 6.231 | | 230.26V |
| 5 | 1.502A | 7.364 | 79.922% | 0.231 |
| | 4.903V | 9.214 | | 230.27V |
| 6 | 3.002A | 14.510 | 78.683% | 0.333 |
| | 4.834V | 18.441 | | 230.27V |

## Supplementary Tests (For Reference)

### Typical Load Tests

**115V**

| Test # | 12V | 5V | 3.3V | 5VSB | DC/AC (Watts) | Efficiency | Fan Speed (RPM) | PSU Noise (dB[A]) | Temps (In/Out) | PF/AC Volts |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.534A | 1.985A | 1.986A | 0.997A | 64.778 | 90.337% | 395 | 10.5 | 38.04°C | 0.956 |
| | 12.231V | 5.026V | 3.317V | 5.004V | 71.707 | | | | 43.86°C | 115.02V |
| 2 | 8.089A | 2.979A | 2.985A | 1.201A | 129.809 | 92.894% | 395 | 10.5 | 38.25°C | 0.981 |
| | 12.231V | 5.025V | 3.316V | 4.999V | 139.739 | | | | 44.20°C | 115.03V |
| 3 | 12.988A | 3.485A | 3.498A | 1.401A | 194.969 | 93.444% | 395 | 10.5 | 38.65°C | 0.988 |
| | 12.232V | 5.024V | 3.315V | 4.993V | 208.649 | | | | 45.55°C | 115.03V |
| 4 | 17.876A | 3.983A | 3.980A | 1.602A | 259.838 | 93.840% | 395 | 10.5 | 38.96°C | 0.996 |
| | 12.232V | 5.022V | 3.313V | 4.988V | 276.896 | | | | 47.01°C | 115.03V |
| 5 | 22.426A | 4.976A | 4.978A | 1.805A | 324.799 | 93.614% | 420 | 10.8 | 39.27°C | 0.992 |
| | 12.233V | 5.020V | 3.312V | 4.984V | 346.954 | | | | 49.37°C | 115.02V |
| 6 | 26.979A | 5.974A | 5.976A | 2.005A | 389.787 | 93.318% | 435 | 10.7 | 40.36°C | 0.991 |
| | 12.233V | 5.020V | 3.310V | 4.979V | 417.698 | | | | 50.63°C | 115.03V |
| 7 | 31.519A | 6.979A | 6.978A | 2.210A | 454.723 | 92.959% | 290 | 9.0 | 41.18°C | 0.992 |
| | 12.234V | 5.019V | 3.310V | 4.975V | 489.164 | | | | 57.03°C | 115.02V |
| 8 | 36.068A | 7.973A | 7.979A | 2.412A | 519.682 | 92.545% | 385 | 10.5 | 41.69°C | 0.993 |
| | 12.235V | 5.018V | 3.308V | 4.970V | 561.544 | | | | 57.89°C | 115.02V |
| 9 | 41.044A | 8.473A | 8.494A | 2.412A | 584.760 | 92.133% | 460 | 11.9 | 43.46°C | 0.994 |
| | 12.235V | 5.017V | 3.307V | 4.970V | 634.691 | | | | 61.08°C | 115.03V |
| 10 | 45.759A | 8.978A | 8.982A | 3.026A | 649.638 | 91.627% | 540 | 15.8 | 44.97°C | 0.995 |
| | 12.236V | 5.016V | 3.307V | 4.955V | 709.002 | | | | 63.12°C | 115.03V |
| 11 | 51.068A | 8.981A | 8.983A | 3.026A | 714.584 | 91.146% | 610 | 18.7 | 46.24°C | 0.995 |
| | 12.236V | 5.015V | 3.305V | 4.953V | 783.995 | | | | 66.07°C | 115.04V |
| CL1 | 0.102A | 12.012A | 12.003A | 0.005A | 101.471 | 89.060% | 440 | 11.6 | 44.35°C | 0.978 |
| | 12.228V | 5.026V | 3.318V | 5.048V | 113.936 | | | | 59.17°C | 115.06V |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CL2 | 53.978A | 1.003A | 1.002A | 1.002A | 673.938 | 91.878% | 580 | 16.4 | 45.08°C | 0.995 |
| | 12.238V | 5.018V | 3.310V | 4.995V | 733.515 | | | | 64.07°C | 115.04V |

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 | 3.543A | 1.990A | 1.988A | 0.999A | 64.916 | 90.761% | 0 | <6.0 | 46.73°C | 0.735 |
| | 12.224V | 5.027V | 3.320V | 5.007V | 71.524 | | | | 40.00°C | 231.00V |
| 2 | 8.060A | 2.986A | 2.981A | 1.199A | 129.395 | 93.703% | 395 | 10.5 | 40.83°C | 0.859 |
| | 12.220V | 5.026V | 3.319V | 5.004V | 138.090 | | | | 47.97°C | 230.97V |
| 3 | 12.973A | 3.483A | 3.465A | 1.400A | 194.477 | 94.652% | 395 | 10.5 | 41.13°C | 0.915 |
| | 12.216V | 5.025V | 3.318V | 5.000V | 205.465 | | | | 48.48°C | 230.76V |
| 4 | 17.889A | 3.981A | 3.977A | 1.602A | 259.663 | 94.905% | 395 | 10.5 | 41.86°C | 0.944 |
| | 12.212V | 5.025V | 3.318V | 4.995V | 273.603 | | | | 49.83°C | 230.88V |
| 5 | 22.483A | 4.978A | 4.973A | 1.803A | 324.977 | 94.910% | 420 | 10.8 | 42.05°C | 0.961 |
| | 12.208V | 5.024V | 3.317V | 4.992V | 342.405 | | | | 50.46°C | 230.66V |
| 6 | 27.011A | 5.974A | 5.967A | 2.005A | 389.473 | 94.797% | 468 | 12.1 | 42.80°C | 0.968 |
| | 12.205V | 5.023V | 3.317V | 4.989V | 410.848 | | | | 51.74°C | 230.79V |
| 7 | 31.607A | 6.971A | 6.966A | 2.207A | 454.795 | 94.616% | 350 | 10.1 | 43.29°C | 0.975 |
| | 12.202V | 5.023V | 3.317V | 4.986V | 480.676 | | | | 52.67°C | 230.74V |
| 8 | 36.209A | 7.968A | 7.959A | 2.409A | 520.099 | 94.353% | 425 | 10.8 | 43.77°C | 0.979 |
| | 12.198V | 5.022V | 3.317V | 4.984V | 551.227 | | | | 53.69°C | 230.69V |
| 9 | 41.212A | 8.466A | 8.444A | 2.408A | 585.007 | 94.134% | 460 | 11.9 | 44.67°C | 0.981 |
| | 12.193V | 5.021V | 3.316V | 4.984V | 621.465 | | | | 54.88°C | 230.64V |
| 10 | 45.949A | 8.963A | 8.958A | 3.019A | 649.819 | 93.818% | 525 | 13.8 | 45.21°C | 0.984 |
| | 12.190V | 5.021V | 3.315V | 4.969V | 692.641 | | | | 55.60°C | 230.60V |
| 11 | 51.286A | 8.965A | 8.960A | 3.020A | 714.633 | 93.609% | 580 | 16.4 | 46.13°C | 0.987 |
| | 12.185V | 5.021V | 3.314V | 4.969V | 763.425 | | | | 56.87°C | 230.39V |
| CL1 | 0.139A | 12.002A | 11.999A | 0.000A | 101.906 | 89.766% | 385 | 10.5 | 42.66°C | 0.826 |
| | 12.227V | 5.025V | 3.325V | 5.061V | 113.524 | | | | 50.91°C | 230.96V |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CL2 | 54.002A | 1.001A | 0.999A | 1.000A | 671.245 | 94.176% | 490 | 13.3 | 45.63°C | 0.985 |
| | 12.183V | 5.024V | 3.312V | 5.001V | 712.754 | | | | 55.71°C | 230.59V |

The results above are not used in the certification process

## Light Load Tests

### 115V

| Test # | 12V | 5V | 3.3V | 5VSB | DC/AC (Watts) | Efficiency | Fan Speed (RPM) | PSU Noise (dB[A]) | PF/AC Volts |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.197A | 0.490A | 0.479A | 0.197A | 19.675 | 79.453% | 0 | <6.0 | 0.797 |
| | 12.221V | 5.031V | 3.321V | 5.026V | 24.763 | | | | 115.02V |
| 2 | 2.414A | 0.986A | 0.992A | 0.397A | 39.770 | 87.607% | 0 | <6.0 | 0.908 |
| | 12.232V | 5.028V | 3.318V | 5.019V | 45.396 | | | | 307.51V |
| 3 | 3.636A | 1.483A | 1.505A | 0.596A | 59.912 | 89.881% | 395 | 10.5 | 0.952 |
| | 12.232V | 5.027V | 3.318V | 5.013V | 66.657 | | | | 115.02V |
| 4 | 4.844A | 1.986A | 1.988A | 0.796A | 79.807 | 91.478% | 395 | 10.5 | 0.964 |
| | 12.231V | 5.026V | 3.316V | 5.009V | 87.242 | | | | 115.02V |

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]) | PF/AC Volts |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.194A | 0.498A | 0.483A | 0.199A | 19.707 | 78.608% | 0 | <6.0 | 0.454 |
| | 12.225V | 5.031V | 3.321V | 5.027V | 25.070 | | | | 231.02V |
| 2 | 2.437A | 0.995A | 0.996A | 0.399A | 40.101 | 87.229% | 0 | <6.0 | 0.625 |
| | 12.224V | 5.028V | 3.319V | 5.020V | 45.972 | | | | 231.02V |
| 3 | 3.612A | 1.492A | 1.476A | 0.598A | 59.548 | 90.412% | 0 | <6.0 | 0.715 |
| | 12.223V | 5.027V | 3.319V | 5.016V | 65.863 | | | | 231.01V |
| 4 | 4.854A | 1.990A | 1.988A | 0.798A | 79.926 | 91.892% | 0 | <6.0 | 0.775 |
| | 12.222V | 5.027V | 3.319V | 5.012V | 86.978 | | | | 231.00V |

The results above are not used in the certification process

## Ripple Measurements

### 115V

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 13.2 mV | 3.6 mV | 6.1 mV | 3.3 mV | Pass |
| 20% Load | 14.5 mV | 3.6 mV | 6.1 mV | 4.0 mV | Pass |
| 30% Load | 16.3 mV | 3.4 mV | 6.1 mV | 4.0 mV | Pass |
| 40% Load | 12.5 mV | 4.0 mV | 7.0 mV | 5.1 mV | Pass |
| 50% Load | 10.6 mV | 4.1 mV | 7.2 mV | 4.5 mV | Pass |
| 60% Load | 10.8 mV | 4.4 mV | 7.6 mV | 5.0 mV | Pass |
| 70% Load | 13.8 mV | 4.3 mV | 7.5 mV | 5.2 mV | Pass |
| 80% Load | 15.3 mV | 4.4 mV | 7.8 mV | 5.6 mV | Pass |
| 90% Load | 15.7 mV | 4.5 mV | 7.1 mV | 5.6 mV | Pass |
| 100% Load | 16.7 mV | 5.2 mV | 8.5 mV | 6.7 mV | Pass |
| 110% Load | 18.2 mV | 5.5 mV | 8.8 mV | 6.8 mV | Pass |
| Crossload 1 | 15.5 mV | 3.9 mV | 6.6 mV | 3.8 mV | Pass |
| Crossload 2 | 17.2 mV | 5.1 mV | 7.9 mV | 5.3 mV | Pass |

The results above are not used in the certification process

### 230V

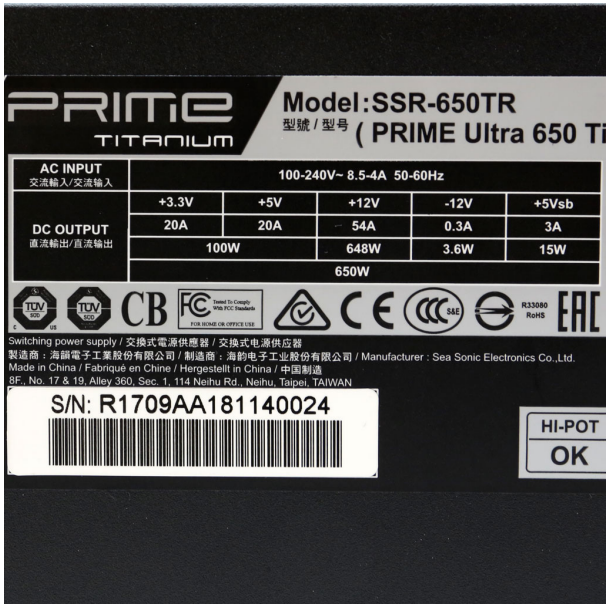
| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 13.6 mV | 3.7 mV | 4.9 mV | 2.2 mV | Pass |
| 20% Load | 16.8 mV | 4.3 mV | 6.0 mV | 2.5 mV | Pass |
| 30% Load | 18.5 mV | 4.3 mV | 6.0 mV | 2.7 mV | Pass |
| 40% Load | 14.7 mV | 4.8 mV | 6.5 mV | 3.0 mV | Pass |
| 50% Load | 12.8 mV | 5.7 mV | 7.2 mV | 3.2 mV | Pass |
| 60% Load | 13.5 mV | 6.4 mV | 8.2 mV | 4.1 mV | Pass |
| 70% Load | 16.2 mV | 6.3 mV | 7.9 mV | 4.3 mV | Pass |
| 80% Load | 18.0 mV | 6.2 mV | 9.1 mV | 4.5 mV | Pass |

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 90% Load | 18.6 mV | 6.2 mV | 9.1 mV | 4.7 mV | Pass |
| 100% Load | 19.5 mV | 8.0 mV | 9.3 mV | 5.5 mV | Pass |
| 110% Load | 22.2 mV | 7.5 mV | 9.8 mV | 5.7 mV | Pass |
| Crossload 1 | 15.0 mV | 7.7 mV | 9.8 mV | 3.5 mV | Pass |
| Crossload 2 | 21.9 mV | 4.9 mV | 5.3 mV | 4.7 mV | Pass |

The results above are not used in the certification process

**Seasonic Prime Titanium Ultra 650W**

Top side




Power specifications label

All data and graphs included in this test report can be used by any individual on the following conditions:
› It should be mentioned that the test results are provided by Cybenetics
› The link to the original test results document should be provided in any case

Cybenetics runs voluntary certification programs for power supplies - ETA for efficiency, LAMBDA for noise and SAFE for safety and correct operation - and for cooling products, with DELTA for chassis soundproofing and PHI for fan airflow and static pressure. THETA rates cooler performance on AMD AM5 and Intel LGA1851 outside ISO 17065 and accreditation scope

CYBENETICS LTD Syrou 6, Latsia, 2231, Nicosia Cyprus

www.cybenetics.com - info@cybenetics.com