# FSP Technology Hydro Ti Pro 1000W

Serial Number S2161030025

Lab ID FS10002101

Certification ID 252101

Test Result Report ID: 22PS2101A

Certificate Issue Date: Dec 19, 2022

Scheme: ETA-EMI PSU

115V




230V

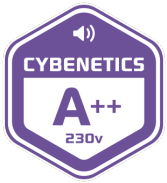



Scheme: LAMBDA PSU

115V




230V







Outside Validation Scope



# 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 | FSP Technology |
| Model | Hydro Ti Pro 1000W |
| OEM/ODM | FSP |
| Serial Number | S2161030025 |
| Product Specifications | |
| Manufacturer-Provided Information | |
| Rated Voltage (Vrms) | 100-240 |
| Rated Current (Arms) | 13-6 |

| | |
|---|---|
| Rated Frequency (Hz) | 50-60 |
| Rated Power (W) | 1000 |
| 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>(MGA13512XF-A25) |
| Semi-Passive Operation | ✓ (selectable) |
| Cybenetics Testing Information | |
| Lab ID | FS10002101 |
| Date of receipt | Dec 9, 2022 |
| Testing Date | Dec 19, 2022 |
| Report Issued Date | Dec 19, 2022 |
| 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 | 16-22AWG | Yes |
| 4+4 pin EPS12V (700mm) | 2 | 2 | 16AWG | No |
| 6+2 pin PCIe (650mm) | 3 | 3 | 16AWG | No |
| 6+2 pin PCIe (650mm+150mm) | 2 | 4 | 16-18AWG | No |
| 12+4 pin PCIe (700mm) (600W) | 1 | 1 | 16-24AWG | No |
| SATA (500mm+150mm+150mm+150mm) | 2 | 8 | 18AWG | No |
| SATA (500mm+150mm) / 4 pin Molex (+150mm+100mm) | 1 | 2 / 2 | 18AWG | No |

| | | | | | |
|---|---|---|---|---|---|
| SATA (500mm+150mm) / 4 pin Molex (+150mm) / FDD (+150mm) | 1 | 2 / 1 / 1 | 18-22AWG | No | |

## Power Specifications

| Rail | | 3.3V | 5V | 12V | 5VSB | -12V |
|---|---|---|---|---|---|---|
| Max. Power | Amps | 20 | 20 | 83.33 | 3 | 0.3 |
| | Watts | 120 | | 1000 | 15 | 3.6 |
| Total Max. Power (W) | | 1000 | | | | |

## Parts Description

| General Data | |
|---|---|
| Manufacturer (OEM) | FSP |
| PCB Type | Double Sided |
| Primary Side | |
| Transient Filter | 2x Y caps, 2x SMD Y caps, 3x X caps, 1x CM choke, 1x DM choke, 1x MOV |
| Inrush Protection | 1x NTC Thermistor SCK205R0 (5 Ohm) & Relay |
| Standby Rectifier Diodes | 4x On Semiconductor S1M (1000V, 1A @ 100°C) |
| Bridge Rectifier MOSFETs | 4x STMicroelectronics STB57N65M5 (650V, 26.5A @ 100°C, Rds(on): 0.063Ohm) |
| APFC MOSFETs | 2x Infineon IPA60R099C7 (600V, 8A @ 100°C, Rds(on): 0.099Ohm) |
| APFC Boost Diode | 2x Infineon IDH08G65C6 (650V, 8A @ 145°C) |
| Bulk Cap(s) | 1x Nippon Chemi-Con (450V, 680uF, 2,000h @ 105°C, KMZ) & 1x Nippon Chemi-Con (450V, 330uF, 2,000h @ 105°C, KMR) |
| Main Switchers | 4x Alpha & Omega AOTF160A60L (600V, 15A @ 100°C, Rds(on): 0.016Ohm) |
| Driver ICs | 2x Novosense NSi6602 |
| APFC Controller | Infineon ICE2PCS02G |
| Resonant Controller | Champion CM6901T2X |
| Topology | Primary side: Brigdeless, APFC, Full-Bridge & LLC converter<br>Secondary side: Synchronous Rectification & DC-DC converters |
| Secondary Side | |
| +12V MOSFETs | 6x Toshiba TPHR8504PL (40V, 150A, Rds(on): 0.85mOhm) |
| 5V & 3.3V | DC-DC Converters: 6x Infineon BSC0901NS (30V, 94A @ 100°C, Rds(on): 1.9mOhm)<br>PWM Controller(s): ANPEC APW7159C |
| Filtering Capacitors | Electrolytic: 5x Nippon Chemi-Con (1-5,000h @ 105°C, KZE), 4x Rubycon (6-10,000h @ 105°C, ZLH), 1x Rubycon (1-5,000h @ 105°C, ZL)<br>Polymer: 21x United Chemi-Con, 19x NIC, 4x FPCAP |

| | |
|---|---|
| Supervisor IC | Weltrend WT7527RA (OVP, UVP, OCP, SCP, PG) |
| Fan Controller | APW9010 |
| Fan Model | Protechnic Electric MGA13512XF-A25 (135mm, 12V, 0.38A, Fluid Dynamic Bearing Fan) |
| 5VSB Circuit | |
| Rectifier | 1x Nexperia PSMN2R0-30YLD FET (30V, 100A, Rds(on): 2Ohm), 1x P15L50N5 SBR (50V, 15A) &1x CET CEB04N7G FET (700V, 4A, Rds(on): 3.3Ohm) |
| Standby PWM Controller | GR8837CCG |

# 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 | ✓ |
| ALPM (Alternative Low Power Mode) compatible | ✓ |
| ATX v3.0 Compliance | ✓ |

## Performance Summary

### 115V

| | |
|---|---|
| Accredited | |
| Average Efficiency (>1450 load combinations) | 92.235% |
| Average Noise Output (>1450 Load Combinations) | 12.65dBA |
| Average PF (>1450 Load Combinations) | 0.993 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | 74.077% |
| Standby Power Consumption | 0.0756W |
| Non-Accredited | |
| 12V Ripple (Full Load) | 19.74mV |
| 5V Ripple (Full Load) | 9.47mV |
| 3.3V Ripple (Full Load) | 11.90mV |
| 5VSB Ripple (Full Load) | 16.62mV |
| 12V Load Regulation | 0.50% |

| | |
|---|---|
| 5V Load Regulation | 1.34% |
| 3.3V Load Regulation | 1.84% |
| 5VSB Load Regulation | 4.13% |
| Inrush Current | 33.780A |

## 230V

| | | |
|---|---|---|
| Accredited | | |
| Average Efficiency (>1450 load combinations) | | 93.950% |
| Average Noise Output (>1450 Load Combinations) | | 14.69dBA |
| Average PF (>1450 Load Combinations) | | 0.968 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | | 75.276% |
| Standby Power Consumption | | 0.1218W |
| Non-Accredited | | |
| 12V Ripple (Full Load) | | 16.82mV |
| 5V Ripple (Full Load) | | 9.39mV |
| 3.3V Ripple (Full Load) | | 12.81mV |
| 5VSB Ripple (Full Load) | | 16.40mV |
| 12V Load Regulation | | 0.58% |
| 5V Load Regulation | | 1.46% |
| 3.3V Load Regulation | | 1.94% |
| 5VSB Load Regulation | | 4.25% |
| Inrush Current | | 66.610A |
| 12V Transient Response (200%) | | 11.72V |
| 5V Transient Response (200%) | | 5.098V |
| 3.3V Transient Response (200%) | | 3.272V |
| 5VSB Transient Response (200%) | | 5.028V |
| Hold-Up Time & PWR_OK Signal | | 27.10ms |
| AC Loss to PWR_OK Hold Up Time | | 23.30ms |
| PWR_OK Inactive to DC Loss Delay | | 3.80ms |
| PSU Timings: T1 (20% / 100%) | 51.0ms | 51.0ms |
| PSU Timings: T3 (20% / 100%) | 129.0ms | 130.0ms |
| OPP (28.78°C / 40.63°C) | 129.89% | 129.89% |

## Hold-Up Time & PWR_OK Signal

| | |
|---|---|
| Hold-Up Time (ms) | 27.1 |
| AC Loss to PWR_OK Hold Up Time (ms) | 23.3 |
| PWR_OK Inactive to DC Loss Delay (ms) | 3.8 |



### Tables

#### 115V

| Detailed Results | | | | | | |
|---|---|---|---|---|---|---|
| | Average | Min | Limit Min | Max | Limit Max | Result |
| Mains Voltage RMS: | 114.86 V | 114.81 V | 113.85 V | 114.89 V | 116.15 V | PASS |
| Mains Frequency: | 60.00 Hz | 60.00 Hz | 59.40 Hz | 60.02 Hz | 60.60 Hz | PASS |
| Mains Voltage CF: | 1.416 | 1.416 | 1.340 | 1.418 | 1.490 | PASS |
| Mains Voltage THD: | 0.17 % | 0.13 % | N/A | 0.24 % | 2.00 % | PASS |
| Real Power: | 0.076 W | 0.038 W | N/A | 0.108 W | N/A | N/A |
| Apparent Power: | 9.472 W | 8.985 W | N/A | 9.793 W | N/A | N/A |
| Power Factor: | 0.007 | N/A | N/A | N/A | N/A | N/A |

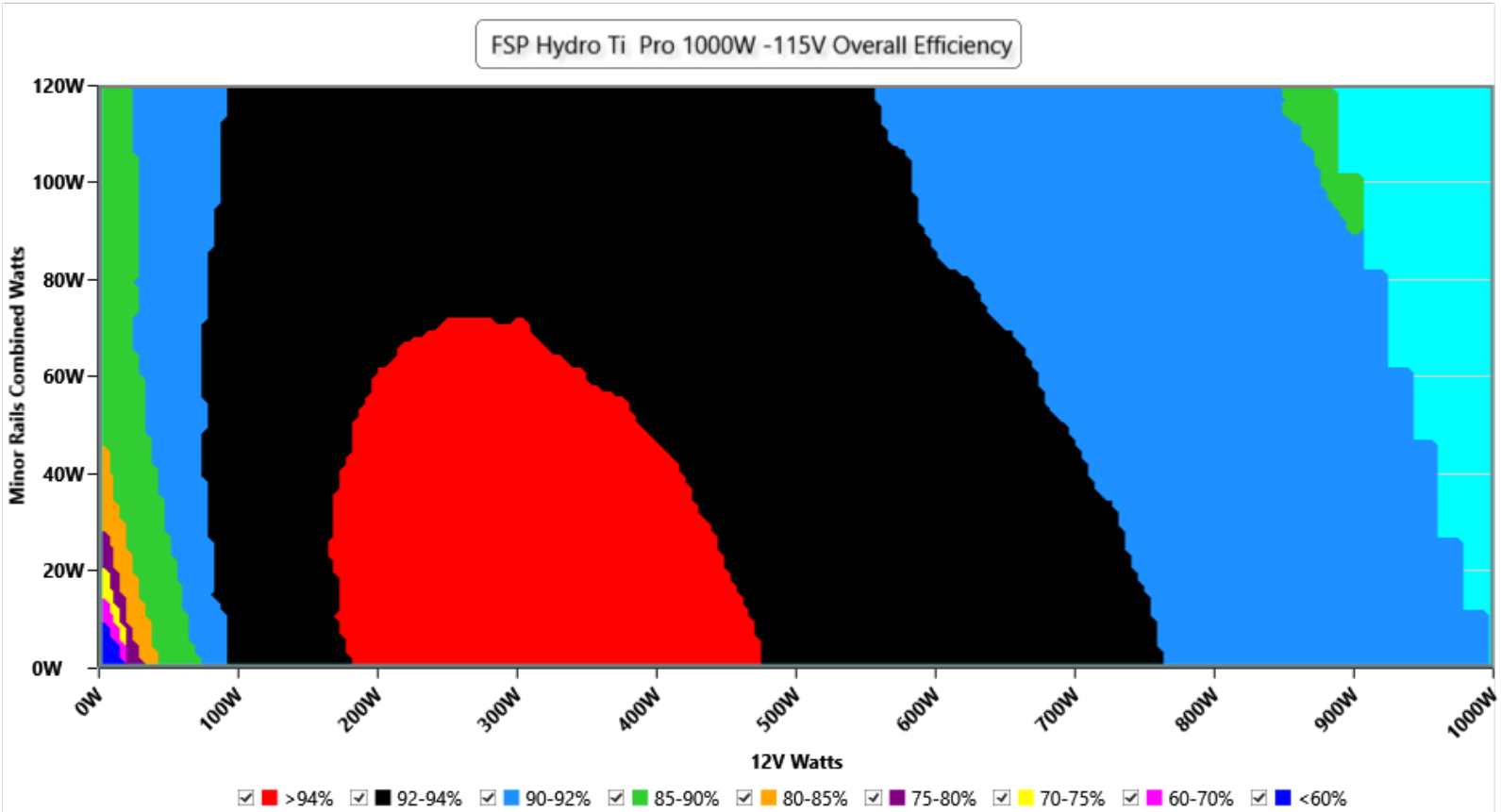
#### 230V

| Detailed Results | | | | | | |
|---|---|---|---|---|---|---|
| | Average | Min | Limit Min | Max | Limit Max | Result |
| Mains Voltage RMS: | 229.88 V | 229.84 V | 227.70 V | 229.93 V | 232.30 V | PASS |
| Mains Frequency: | 50.00 Hz | 50.00 Hz | 49.50 Hz | 50.01 Hz | 50.50 Hz | PASS |
| Mains Voltage CF: | 1.415 | 1.415 | 1.340 | 1.416 | 1.490 | PASS |
| Mains Voltage THD: | 0.13 % | 0.11 % | N/A | 0.20 % | 2.00 % | PASS |
| Real Power: | 0.122 W | 0.045 W | N/A | 0.202 W | N/A | N/A |
| Apparent Power: | 31.424 W | 31.022 W | N/A | 31.770 W | N/A | N/A |

| | | | | | | |
|---|---|---|---|---|---|---|
| Power Factor: | 0.004 | N/A | N/A | N/A | N/A | N/A |

## Efficiency Graph

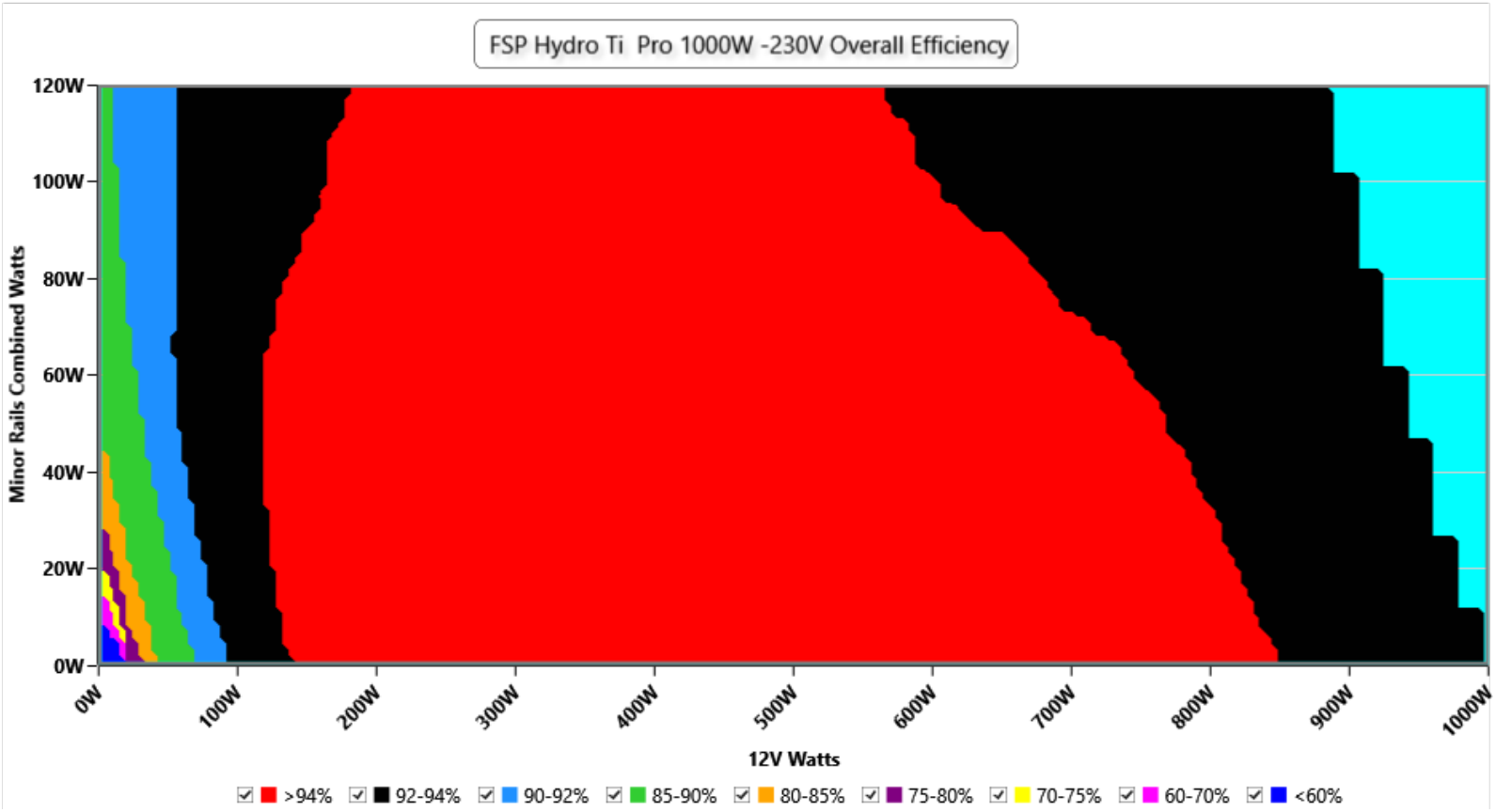
**115V**




**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

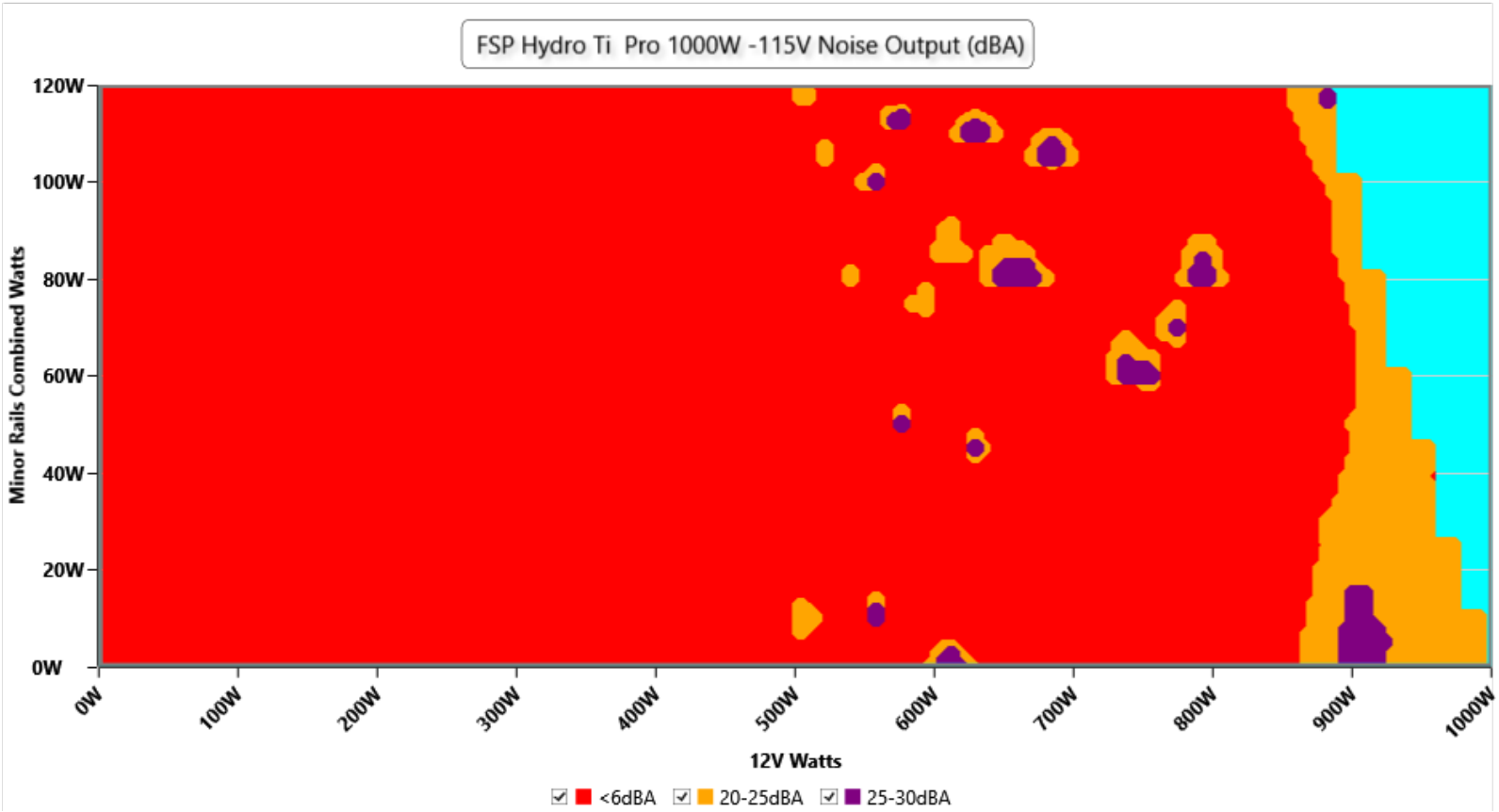



### INFO

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

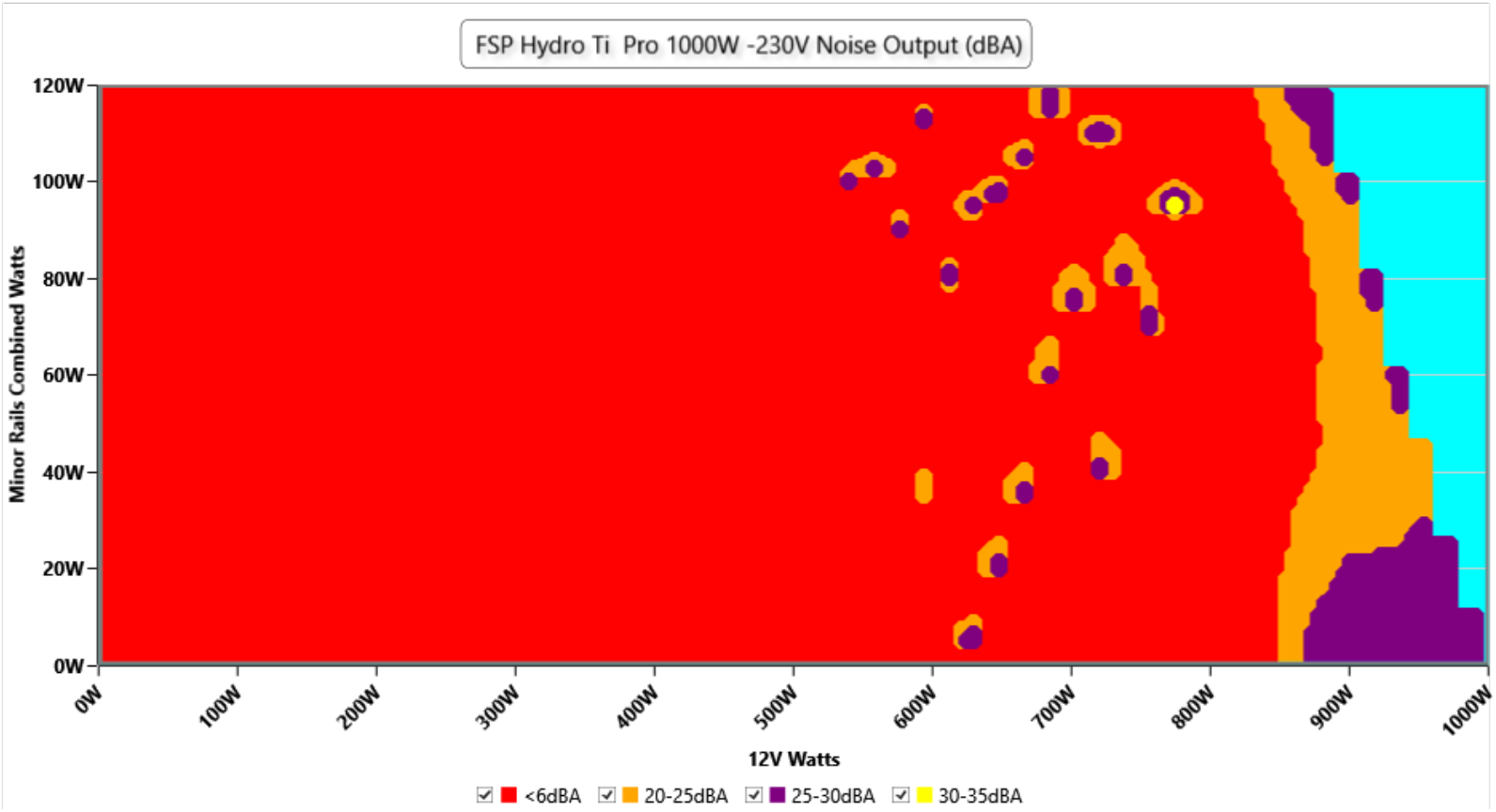
**115V**




**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

## Noise under high ambient temperature (indicative)

### 115V

| Load | Normal ambient<br>fan · noise · intake | High ambient<br>fan · noise · intake | Noise change |
|---|---|---|---|
| 10% | 0 RPM · <6.0 dB(A) · 44.4 °C | 0 RPM · <6.0 dB(A) · 44.4 °C | fan off in both |
| 20% | 0 RPM · <6.0 dB(A) · 45.5 °C | 0 RPM · <6.0 dB(A) · 45.5 °C | fan off in both |
| 50% | 0 RPM · <6.0 dB(A) · 48.3 °C | 0 RPM · <6.0 dB(A) · 48.3 °C | fan off in both |
| 100% | 1464 RPM · 41.4 dB(A) · 45.2 °C | 1464 RPM · 41.4 dB(A) · 45.2 °C | **+0.0 dB(A)** |

### 230V

| Load | Normal ambient<br>fan · noise · intake | High ambient<br>fan · noise · intake | Noise change |
|---|---|---|---|
| 10% | 0 RPM · <6.0 dB(A) · 44.4 °C | 0 RPM · <6.0 dB(A) · 44.4 °C | fan off in both |
| 20% | 0 RPM · <6.0 dB(A) · 45.2 °C | 0 RPM · <6.0 dB(A) · 45.2 °C | fan off in both |
| 50% | 0 RPM · <6.0 dB(A) · 48.6 °C | 0 RPM · <6.0 dB(A) · 48.6 °C | fan off in both |
| 100% | 1354 RPM · 39.2 dB(A) · 45.1 °C | 1354 RPM · 39.2 dB(A) · 45.1 °C | **+0.0 dB(A)** |

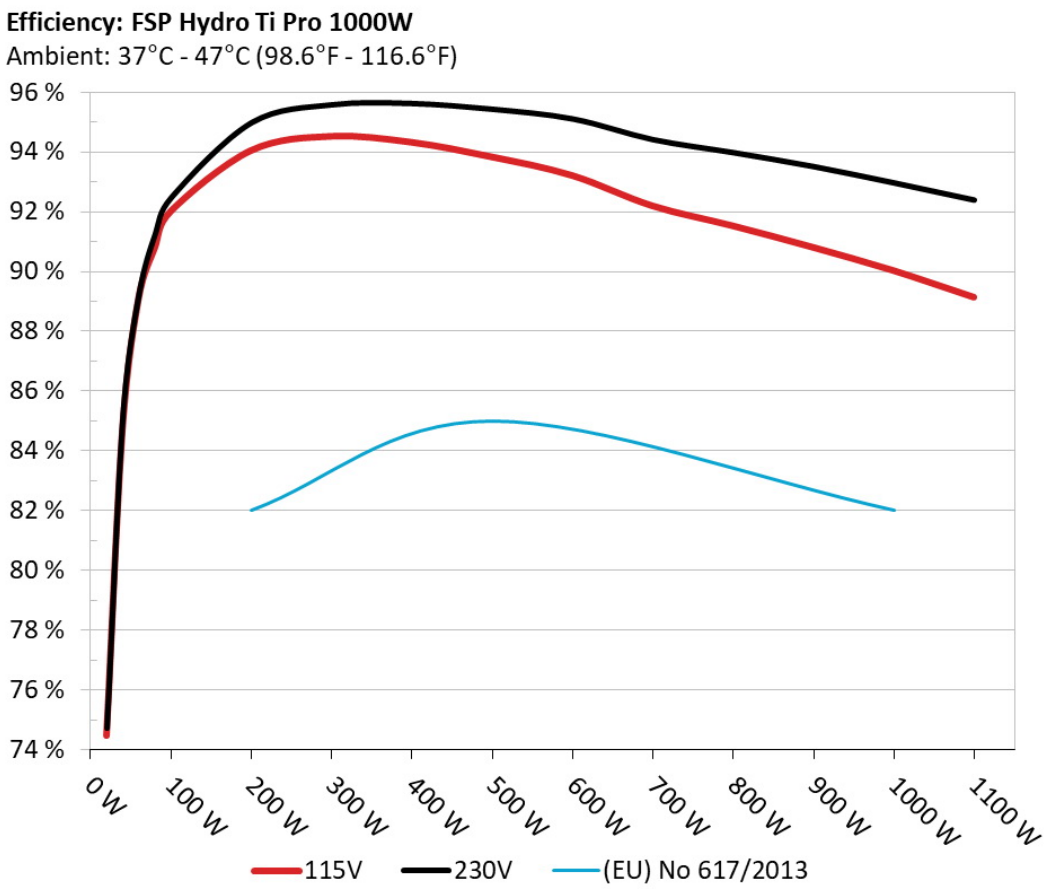
### INFO

Fan speed, noise and the measured intake temperature at 10, 20, 50 and 100 % load, from the two load regulation tests: at normal ambient (about 30-32 °C) and at high ambient (about 40-47 °C). These are stabilized readings at fixed loads, not averages over the certification sweep, so they are indicative of how the fan behaves when it is hot. "<6.0" is the floor of our sound meter: the fan is stopped or too quiet to measure (the fan speed column says which); with the fan stopped, the intake sensor can read higher than the chamber air.

*Informational. Not part of the ETA or LAMBDA rating.*

## Indicative Performance

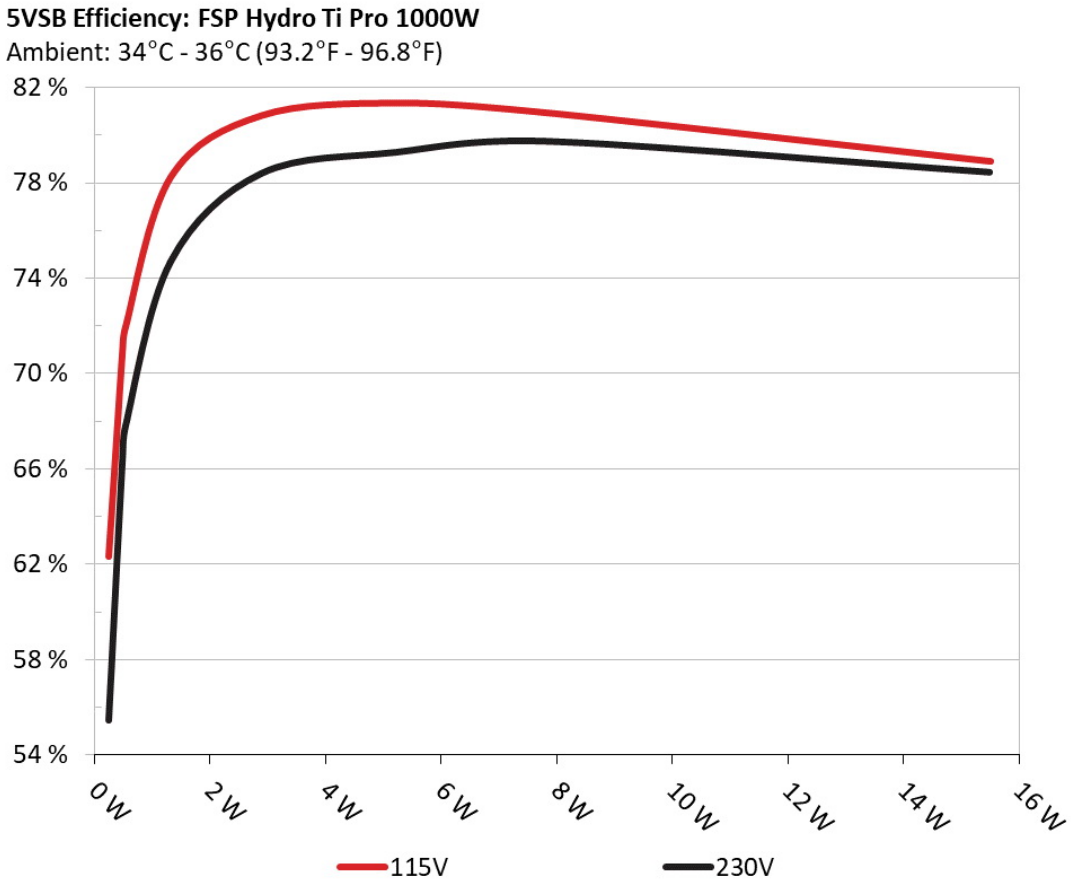
### Efficiency under high ambient temperature




**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 | 0.045A | 0.236W | 62.809% | 0.04 |
| | 5.248V | 0.378W | | 114.85V |
| 2 | 0.09A | 0.472W | 71.385% | 0.069 |
| | 5.247V | 0.661W | | 114.84V |
| 3 | 0.55A | 2.879W | 81.334% | 0.28 |
| | 5.236V | 3.54W | | 114.85V |
| 4 | 1A | 5.224W | 81.863% | 0.378 |
| | 5.225V | 6.381W | | 114.84V |
| 5 | 1.5A | 7.817W | 81.451% | 0.432 |
| | 5.212V | 9.596W | | 114.84V |
| 6 | 2.999A | 15.507W | 79.412% | 0.495 |
| | 5.171V | 19.528W | | 114.85V |

### 230V

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.045A | 0.236W | 55.95% | 0.013 |
| | 5.248V | 0.423W | | 229.89V |
| 2 | 0.09A | 0.472W | 66.83% | 0.022 |
| | 5.247V | 0.706W | | 229.89V |
| 3 | 0.55A | 2.879W | 78.876% | 0.11 |
| | 5.235V | 3.647W | | 229.89V |
| 4 | 1A | 5.222W | 79.766% | 0.182 |
| | 5.223V | 6.548W | | 229.89V |
| 5 | 1.5A | 7.814W | 80.224% | 0.244 |
| | 5.21V | 9.74W | | 229.89V |
| 6 | 2.999A | 15.497W | 78.928% | 0.355 |
| | 5.167V | 19.635W | | 229.89V |

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 10% | 6.450A | 1.923A | 1.96A | 0.97A | 99.984 | 92.009% | 0 | <6.0 | 44.43°C | 0.982 |
| | 12.153V | 5.199V | 3.366V | 5.151V | 108.668 | | | | 40.01°C | 114.83V |
| 20% | 13.915A | 2.89A | 2.947A | 1.169A | 199.912 | 94.038% | 0 | <6.0 | 45.51°C | 0.991 |
| | 12.146V | 5.19V | 3.359V | 5.134V | 212.585 | | | | 40.6°C | 114.8V |
| 30% | 21.738A | 3.376A | 3.444A | 1.368A | 299.939 | 94.513% | 0 | <6.0 | 46.79°C | 0.995 |
| | 12.139V | 5.183V | 3.353V | 5.118V | 317.354 | | | | 41.53°C | 114.78V |
| 40% | 29.513A | 3.864A | 3.943A | 1.568A | 399.281 | 94.314% | 0 | <6.0 | 47.61°C | 0.996 |
| | 12.133V | 5.176V | 3.347V | 5.102V | 423.352 | | | | 41.87°C | 114.76V |
| 50% | 36.983A | 4.836A | 4.938A | 1.77A | 499.014 | 93.827% | 0 | <6.0 | 48.29°C | 0.997 |
| | 12.127V | 5.169V | 3.341V | 5.085V | 531.836 | | | | 42.19°C | 114.72V |
| 60% | 44.525A | 5.811A | 5.937A | 1.973A | 599.546 | 93.205% | 0 | <6.0 | 49.49°C | 0.997 |
| | 12.122V | 5.163V | 3.335V | 5.069V | 643.253 | | | | 42.9°C | 114.7V |
| 70% | 52.018A | 6.791A | 6.942A | 2.177A | 699.27 | 92.19% | 689 | <6.0 | 43.64°C | 0.997 |
| | 12.114V | 5.154V | 3.328V | 5.05V | 758.499 | | | | 50.71°C | 114.68V |
| 80% | 59.574A | 7.773A | 7.945A | 2.281A | 799.253 | 91.523% | 746 | 19.7 | 43.9°C | 0.997 |
| | 12.109V | 5.147V | 3.321V | 5.038V | 873.288 | | | | 51.95°C | 114.65V |
| 90% | 67.472A | 8.266A | 8.443A | 2.387A | 899.009 | 90.806% | 1122 | 34.0 | 44.2°C | 0.996 |
| | 12.103V | 5.139V | 3.314V | 5.025V | 990.03 | | | | 53.23°C | 114.63V |
| 100% | 75.180A | 8.766A | 8.974A | 3.008A | 999.013 | 90.029% | 1464 | 41.4 | 45.19°C | 0.996 |
| | 12.096V | 5.132V | 3.308V | 4.985V | 1109.659 | | | | 55.22°C | 114.59V |
| 110% | 82.834A | 9.758A | 10.084A | 3.013A | 1099.649 | 89.136% | 1803 | 46.8 | 47.35°C | 0.995 |
| | 12.089V | 5.123V | 3.3V | 4.976V | 1233.669 | | | | 58.26°C | 114.56V |
| CL1 | 0.113A | 13.938A | 14.241A | 0A | 121.247 | 88.879% | 0 | <6.0 | 48.99°C | 0.985 |
| | 12.153V | 5.179V | 3.348V | 5.197V | 136.42 | | | | 43.69°C | 114.81V |

| Test | 12V | 5V | 3.3V | 5VSB | DC/AC (Watts) | Efficiency | Fan Speed (RPM) | PSU Noise (dB[A]) | Temps (In/Out) | PF/AC Volts |
|---|---|---|---|---|---|---|---|---|---|---|
| CL2 | 0.113A | 19.265A | 0A | 0A | 101.367 | 88.022% | 0 | <6.0 | 49.86°C | 0.983 |
| | 12.158V | 5.191V | 3.356V | 5.216V | 115.161 | | | | 42.76°C | 114.82V |
| CL3 | 0.113A | 0A | 19.635A | 0A | 67.353 | 83.552% | 0 | <6.0 | 51.83°C | 0.971 |
| | 12.156V | 5.197V | 3.36V | 5.196V | 80.611 | | | | 42.65°C | 114.83V |
| CL4 | 82.601A | 0A | 0A | 0.001A | 999.671 | 90.506% | 1226 | 36.5 | 44.64°C | 0.996 |
| | 12.102V | 5.152V | 3.322V | 5.151V | 1104.544 | | | | 55.5°C | 114.59V |

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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 10% | 6.448A | 1.924A | 1.961A | 0.971A | 99.991 | 92.48% | 0 | <6.0 | 44.42°C | 0.882 |
| | 12.156V | 5.198V | 3.365V | 5.15V | 108.124 | | | | 40.1°C | 229.89V |
| 20% | 13.914A | 2.891A | 2.948A | 1.169A | 199.934 | 94.986% | 0 | <6.0 | 45.23°C | 0.957 |
| | 12.149V | 5.19V | 3.359V | 5.133V | 210.488 | | | | 40.54°C | 229.87V |
| 30% | 21.735A | 3.377A | 3.445A | 1.368A | 299.973 | 95.586% | 0 | <6.0 | 46.86°C | 0.975 |
| | 12.143V | 5.183V | 3.353V | 5.116V | 313.823 | | | | 41.57°C | 229.86V |
| 40% | 29.516A | 3.864A | 3.944A | 1.569A | 399.408 | 95.627% | 0 | <6.0 | 47.55°C | 0.982 |
| | 12.136V | 5.177V | 3.347V | 5.1V | 417.674 | | | | 41.92°C | 229.85V |
| 50% | 36.984A | 4.837A | 4.94A | 1.77A | 499.133 | 95.438% | 0 | <6.0 | 48.59°C | 0.983 |
| | 12.130V | 5.17V | 3.34V | 5.084V | 522.993 | | | | 42.5°C | 229.84V |
| 60% | 44.523A | 5.811A | 5.938A | 1.973A | 599.633 | 95.114% | 0 | <6.0 | 49.57°C | 0.984 |
| | 12.125V | 5.164V | 3.334V | 5.068V | 630.432 | | | | 42.91°C | 229.83V |
| 70% | 52.007A | 6.788A | 6.941A | 2.176A | 699.327 | 94.422% | 664 | <6.0 | 43.3°C | 0.986 |
| | 12.118V | 5.157V | 3.328V | 5.052V | 740.645 | | | | 50.35°C | 229.81V |
| 80% | 59.579A | 7.773A | 7.946A | 2.282A | 799.294 | 93.987% | 666 | <6.0 | 43.41°C | 0.987 |
| | 12.109V | 5.147V | 3.32V | 5.038V | 850.425 | | | | 51.59°C | 229.8V |
| 90% | 67.475A | 8.267A | 8.444A | 2.387A | 899.032 | 93.523% | 984 | 30.3 | 44.16°C | 0.987 |
| | 12.102V | 5.139V | 3.314V | 5.025V | 961.293 | | | | 53.25°C | 229.79V |

| Test | 12V | 5V | 3.3V | 5VSB | DC/AC (Watts) | Efficiency | Fan Speed (RPM) | PSU Noise (dB[A]) | Temps (In/Out) | PF/AC Volts |
|---|---|---|---|---|---|---|---|---|---|---|
| 100% | 75.183A | 8.767A | 8.975A | 3.009A | 999.029 | 92.976% | 1354 | 39.2 | 45.11°C | 0.986 |
| | 12.096V | 5.131V | 3.307V | 4.984V | 1074.505 | | | | 55.14°C | 229.78V |
| 110% | 82.836A | 9.758A | 10.085A | 3.013A | 1099.636 | 92.398% | 1747 | 46.6 | 46.52°C | 0.986 |
| | 12.088V | 5.122V | 3.3V | 4.976V | 1190.12 | | | | 57.45°C | 229.76V |
| CL1 | 0.113A | 13.942A | 14.244A | 0A | 121.248 | 89.672% | 0 | <6.0 | 47.19°C | 0.916 |
| | 12.151V | 5.177V | 3.348V | 5.196V | 135.199 | | | | 41.66°C | 229.88V |
| CL2 | 0.113A | 19.271A | 0A | 0A | 101.367 | 88.687% | 0 | <6.0 | 49.89°C | 0.892 |
| | 12.158V | 5.189V | 3.355V | 5.215V | 114.296 | | | | 42.83°C | 229.89V |
| CL3 | 0.113A | 0A | 19.638A | 0A | 67.353 | 84.168% | 0 | <6.0 | 53.76°C | 0.823 |
| | 12.156V | 5.196V | 3.36V | 5.195V | 80.025 | | | | 44.73°C | 229.89V |
| CL4 | 82.586A | 0A | 0A | 0.001A | 999.634 | 93.435% | 1184 | 35.5 | 45.17°C | 0.986 |
| | 12.104V | 5.154V | 3.323V | 5.153V | 1069.875 | | | | 55.98°C | 229.77V |

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]) | Temps (In/Out) | PF/AC Volts |
|---|---|---|---|---|---|---|---|---|---|---|
| 20W | 1.220A | 0.481A | 0.49A | 0.193A | 19.987 | 74.485% | 0 | <6.0 | 40.17°C | 0.857 |
| | 12.156V | 5.201V | 3.369V | 5.191V | 26.833 | | | | 37.1°C | 114.84V |
| 40W | 2.688A | 0.673A | 0.686A | 0.289A | 39.986 | 84.794% | 0 | <6.0 | 41.29°C | 0.935 |
| | 12.155V | 5.199V | 3.367V | 5.185V | 47.156 | | | | 38.01°C | 114.84V |
| 60W | 4.156A | 0.866A | 0.882A | 0.386A | 59.985 | 89.116% | 0 | <6.0 | 42.49°C | 0.963 |
| | 12.153V | 5.198V | 3.366V | 5.179V | 67.31 | | | | 38.72°C | 114.84V |
| 80W | 5.621A | 1.058A | 1.079A | 0.483A | 79.936 | 90.787% | 0 | <6.0 | 43.44°C | 0.976 |
| | 12.152V | 5.197V | 3.365V | 5.173V | 88.046 | | | | 39.43°C | 114.83V |

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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 20W | 1.220A | 0.48A | 0.489A | 0.192A | 19.992 | 74.731% | 0 | <6.0 | 40.21°C | 0.492 |
| | 12.166V | 5.206V | 3.371V | 5.196V | 26.751 | | | | 37.1°C | 229.9V |
| 40W | 2.687A | 0.673A | 0.685A | 0.289A | 39.987 | 85.199% | 0 | <6.0 | 40.83°C | 0.665 |
| | 12.163V | 5.204V | 3.369V | 5.189V | 46.934 | | | | 37.51°C | 229.89V |
| 60W | 4.154A | 0.865A | 0.882A | 0.386A | 59.985 | 89.255% | 0 | <6.0 | 41.54°C | 0.777 |
| | 12.161V | 5.202V | 3.368V | 5.182V | 67.207 | | | | 38.01°C | 229.89V |
| 80W | 5.618A | 1.058A | 1.078A | 0.483A | 79.941 | 91.254% | 0 | <6.0 | 42.95°C | 0.842 |
| | 12.159V | 5.2V | 3.367V | 5.176V | 87.602 | | | | 39.1°C | 229.89V |

The results above are not used in the certification process

## Ripple Measurements

### 115V

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 5.90mV | 4.47mV | 15.22mV | 10.68mV | Pass |
| 20% Load | 7.72mV | 4.93mV | 14.31mV | 10.47mV | Pass |
| 30% Load | 9.55mV | 5.03mV | 16.79mV | 11.08mV | Pass |
| 40% Load | 11.77mV | 5.44mV | 16.48mV | 12.40mV | Pass |
| 50% Load | 12.84mV | 5.95mV | 7.79mV | 12.19mV | Pass |
| 60% Load | 14.41mV | 5.99mV | 8.80mV | 12.70mV | Pass |
| 70% Load | 11.01mV | 6.96mV | 18.91mV | 13.56mV | Pass |
| 80% Load | 11.80mV | 6.76mV | 17.59mV | 13.41mV | Pass |
| 90% Load | 12.91mV | 7.07mV | 10.82mV | 14.17mV | Pass |
| 100% Load | 19.74mV | 9.47mV | 11.90mV | 16.62mV | Pass |
| 110% Load | 21.34mV | 9.35mV | 14.51mV | 16.16mV | Pass |
| Crossload1 | 9.62mV | 6.50mV | 7.71mV | 11.78mV | Pass |
| Crossload2 | 5.95mV | 6.56mV | 6.67mV | 11.33mV | Pass |

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| Crossload3 | 5.06mV | 7.17mV | 15.72mV | 10.78mV | Pass |
| Crossload4 | 19.33mV | 8.32mV | 11.45mV | 16.39mV | Pass |

The results above are not used in the certification process

**230V**

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 4.98mV | 4.62mV | 4.85mV | 10.88mV | Pass |
| 20% Load | 14.18mV | 5.39mV | 14.05mV | 14.47mV | Pass |
| 30% Load | 9.90mV | 5.39mV | 5.91mV | 12.20mV | Pass |
| 40% Load | 15.85mV | 5.13mV | 12.74mV | 14.82mV | Pass |
| 50% Load | 13.62mV | 5.69mV | 16.38mV | 12.75mV | Pass |
| 60% Load | 15.54mV | 6.45mV | 15.88mV | 15.23mV | Pass |
| 70% Load | 13.16mV | 6.91mV | 14.81mV | 14.62mV | Pass |
| 80% Load | 16.32mV | 6.76mV | 16.13mV | 15.74mV | Pass |
| 90% Load | 11.14mV | 7.07mV | 11.27mV | 13.41mV | Pass |
| 100% Load | 16.82mV | 9.39mV | 12.81mV | 16.40mV | Pass |
| 110% Load | 18.17mV | 9.42mV | 14.10mV | 16.89mV | Pass |
| Crossload1 | 9.44mV | 7.06mV | 7.85mV | 12.59mV | Pass |
| Crossload2 | 5.29mV | 6.60mV | 6.47mV | 11.74mV | Pass |
| Crossload3 | 4.86mV | 5.54mV | 7.18mV | 10.83mV | Pass |
| Crossload4 | 16.83mV | 8.76mV | 11.98mV | 15.52mV | Pass |

The results above are not used in the certification process

## FSP Technology Hydro Ti Pro 1000W




Top side




Power specifications label

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