## Anex

Antec HCG850 Gold

Lab ID#: 320
Receipt Date: -
Test Date: -

Report:
Report Date: Mar 13, 2018

## DUT INFORMATION

| | |
|---|---|
| Brand | Antec |
| Manufacturer (OEM) | Seasonic |
| Series | HCG Gold |
| Model Number | HCG850 Gold |
| Serial Number | HCG850GSN180405125 |
| 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 | In Cable Capacitors |
|---|---|---|---|---|
| ATX connector 20+4 pin (610mm) | 1 | 1 | 18-22AWG | Yes |
| 4+4 pin EPS12V (660mm) | 2 | 2 | 18AWG | Yes |
| 6+2 pin PCIe (680mm+80mm) | 3 | 6 | 18AWG | Yes |
| SATA (460mm+110mm+110mm+110mm) | 2 | 8 | 18AWG | No |
| SATA (460mm+110mm) | 1 | 2 | 18AWG | No |
| 4 pin Molex (460mm+120mm+120mm) | 1 | 3 | 18AWG | No |
| 4 pin Molex (350mm+120mm) | 1 | 2 | 18AWG | No |
| FDD Adapter (+110mm) | 1 | 1 | 22AWG | No |
| AC Power Cord (1370mm) - C13 coupler | 1 | 1 | 18AWG | - |







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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, 1x CM02X |
| Inrush Protection | NTC Thermistor & Diode |
| Bridge Rectifier(s) | 2x GBU1508 (800V, 15A @ 100°C) |
| 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 Nichicon (400V, 680uF, 2000h @ 105°C, GG) |
| 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: Anpec APW7159 |
| Filtering Capacitors | Electrolytics: Chemi-Con (1-5,000 @ 105°C, KZE), Chemi-Con (4-10,000 @ 105°C, KY), 2x Nichicon (2-5,000 @ 105°C, HD), 1x Rubycon (3-6,000 @ 105°C,YXG)<br>Polymers: Chemi-Con, FPCAP |
| 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 | 88.639 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load -115V | 0.000 |
| Average Efficiency 5VSB | 77.400 |
| Standby Power Consumption (W) -115V | 0.0429330 |
| Standby Power Consumption (W) -230V | 0.0704867 |
| Average PF | 0.985 |
| ErP Lot 3/6 Ready | ✓ |
| (EU) No 617/2013 Compliance | ✓ |
| Avg Noise Output | 33.35 |
| 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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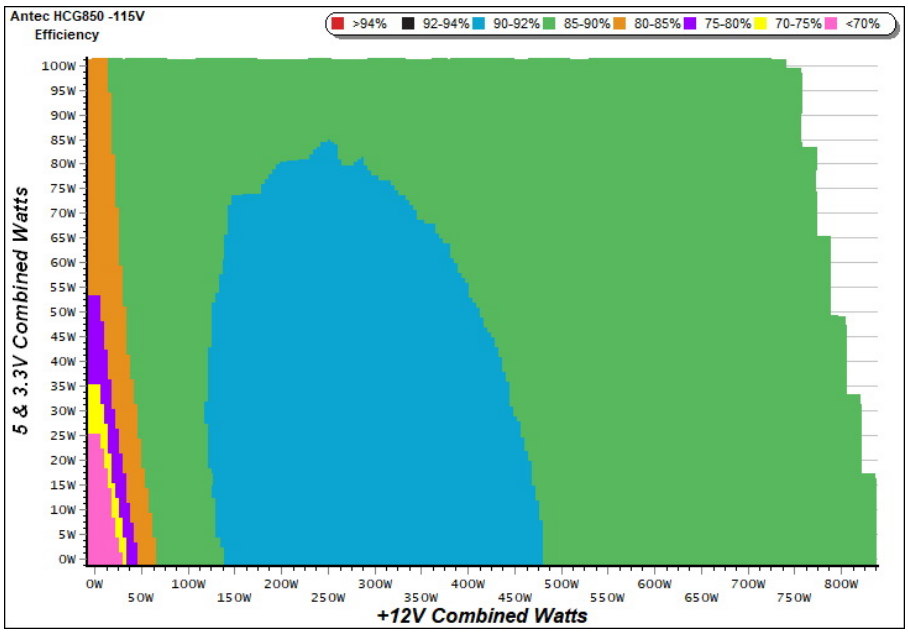
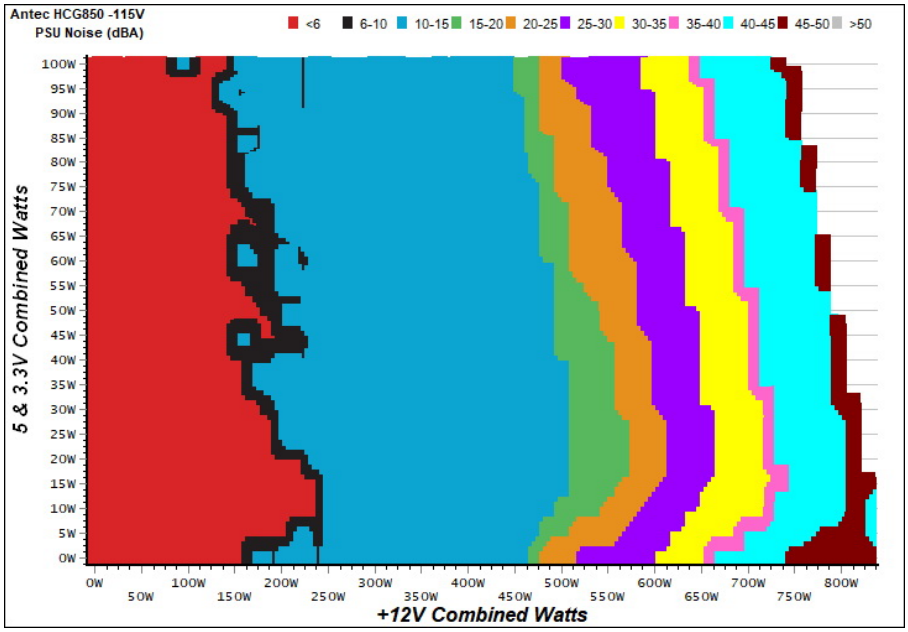
## EFFICIENCY GRAPH




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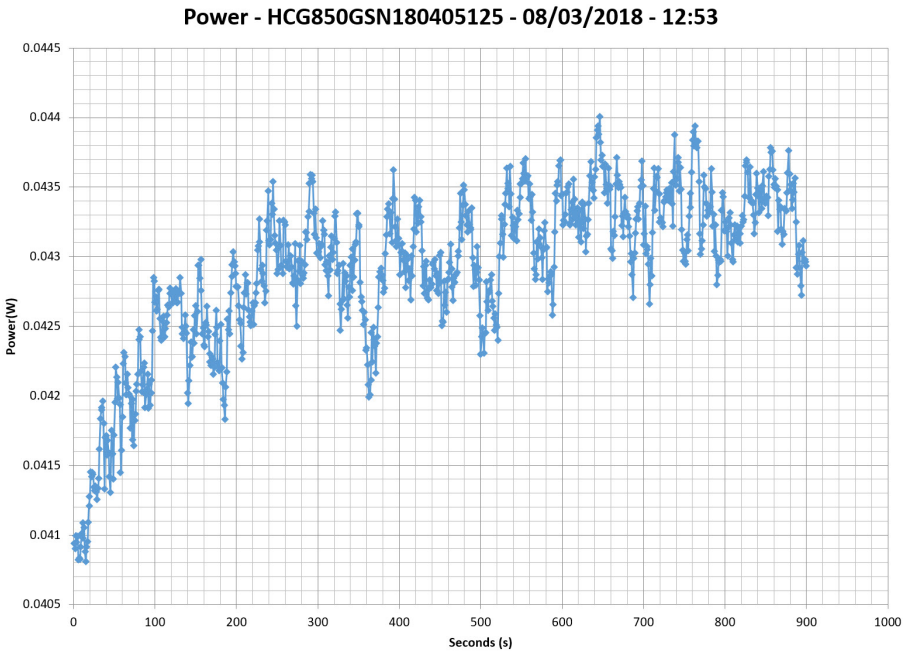
### 5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.041A | 0.211 | 68.285% | 0.051 |
| | 5.101V | 0.309 | | 115.12V |
| 2 | 0.087A | 0.443 | 74.080% | 0.096 |
| | 5.099V | 0.598 | | 115.12V |
| 3 | 0.542A | 2.758 | 77.932% | 0.332 |
| | 5.088V | 3.539 | | 115.11V |
| 4 | 1.002A | 5.088 | 77.608% | 0.403 |
| | 5.078V | 6.556 | | 115.11V |
| 5 | 1.502A | 7.610 | 77.931% | 0.438 |
| | 5.068V | 9.765 | | 115.11V |
| 6 | 3.001A | 15.080 | 76.023% | 0.485 |
| | 5.025V | 19.836 | | 115.11V |

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

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.042A | 0.213 | 61.207% | 0.018 |
| | 5.101V | 0.348 | | 230.28V |
| 2 | 0.087A | 0.445 | 68.885% | 0.032 |
| | 5.099V | 0.646 | | 230.28V |
| 3 | 0.542A | 2.757 | 76.605% | 0.157 |
| | 5.088V | 3.599 | | 230.31V |
| 4 | 1.002A | 5.088 | 77.337% | 0.240 |
| | 5.078V | 6.579 | | 230.30V |
| 5 | 1.502A | 7.609 | 77.635% | 0.295 |
| | 5.067V | 9.801 | | 230.29V |
| 6 | 3.001A | 15.109 | 77.693% | 0.372 |
| | 5.034V | 19.447 | | 230.28V |

### 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*

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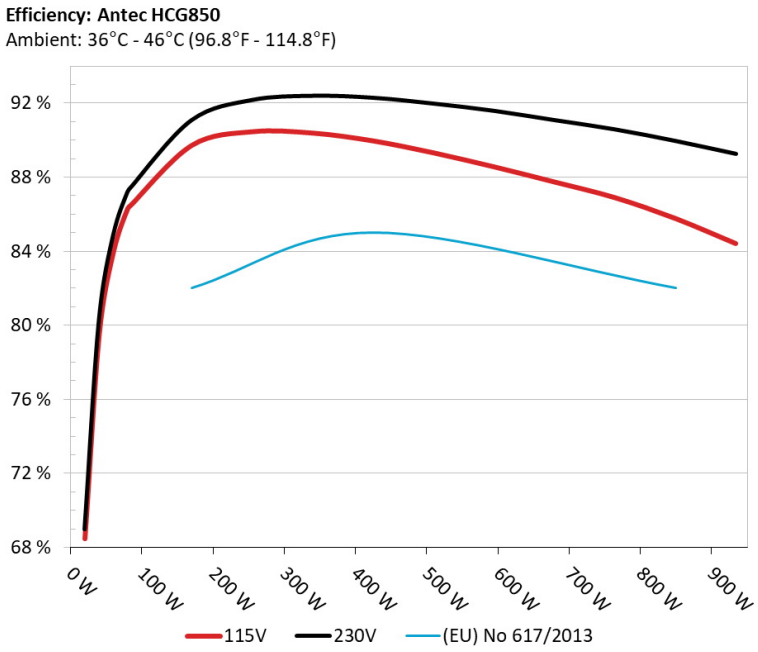
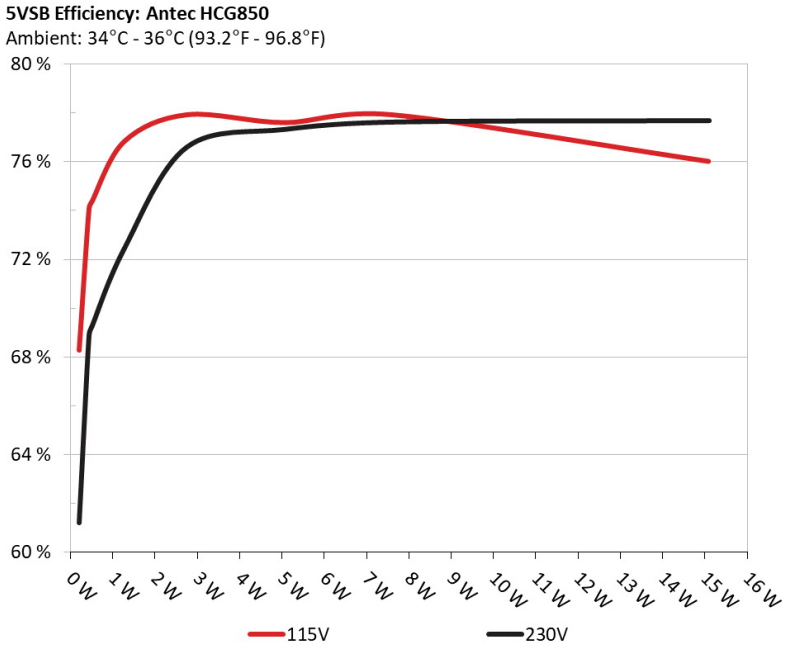
## EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE




**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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### 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 | 5.199A | 1.984A | 1.976A | 0.986A | 84.852 | 86.522% | 478 | 9.6 | 38.13°C | 0.969 |
| | 12.165V | 5.048V | 3.336V | 5.071V | 98.070 | | | | 44.56°C | 115.05V |
| 2 | 11.414A | 2.968A | 2.967A | 1.186A | 169.719 | 89.731% | 496 | 9.8 | 38.87°C | 0.983 |
| | 12.165V | 5.045V | 3.334V | 5.061V | 189.141 | | | | 45.77°C | 115.03V |
| 3 | 17.989A | 3.473A | 3.475A | 1.385A | 254.940 | 90.470% | 512 | 11.5 | 39.34°C | 0.986 |
| | 12.166V | 5.042V | 3.332V | 5.051V | 281.796 | | | | 46.80°C | 115.01V |
| 4 | 24.544A | 3.963A | 3.960A | 1.586A | 339.758 | 90.397% | 515 | 11.5 | 39.86°C | 0.988 |
| | 12.166V | 5.040V | 3.330V | 5.041V | 375.852 | | | | 48.19°C | 115.03V |
| 5 | 30.752A | 4.966A | 4.953A | 1.786A | 424.648 | 89.976% | 525 | 11.7 | 40.19°C | 0.988 |
| | 12.167V | 5.038V | 3.328V | 5.031V | 471.958 | | | | 49.41°C | 115.02V |
| 6 | 36.975A | 5.953A | 5.950A | 1.991A | 509.639 | 89.328% | 823 | 20.5 | 41.32°C | 0.988 |
| | 12.167V | 5.036V | 3.326V | 5.020V | 570.525 | | | | 51.06°C | 115.03V |
| 7 | 43.194A | 6.954A | 6.945A | 2.196A | 594.588 | 88.574% | 1185 | 30.2 | 42.02°C | 0.989 |
| | 12.166V | 5.034V | 3.324V | 5.008V | 671.293 | | | | 52.26°C | 115.03V |
| 8 | 49.424A | 7.948A | 7.945A | 2.400A | 679.571 | 87.755% | 1646 | 40.5 | 43.61°C | 0.990 |
| | 12.164V | 5.032V | 3.322V | 4.996V | 774.400 | | | | 54.51°C | 115.01V |
| 9 | 56.066A | 8.454A | 8.458A | 2.400A | 764.513 | 86.908% | 2053 | 46.0 | 44.65°C | 0.990 |
| | 12.163V | 5.030V | 3.320V | 4.991V | 879.680 | | | | 56.17°C | 115.03V |
| 10 | 62.450A | 8.953A | 8.947A | 3.015A | 849.284 | 85.787% | 2130 | 49.1 | 44.98°C | 0.991 |
| | 12.163V | 5.029V | 3.318V | 4.973V | 989.993 | | | | 56.98°C | 115.01V |
| 11 | 69.430A | 8.956A | 8.952A | 3.017A | 934.187 | 84.431% | 2150 | 49.2 | 46.28°C | 0.992 |
| | 12.163V | 5.028V | 3.317V | 4.967V | 1106.448 | | | | 59.09°C | 115.03V |
| CL1 | 0.100A | 12.013A | 12.006A | 0.005A | 101.864 | 84.708% | 520 | 11.6 | 41.49°C | 0.978 |
| | 12.167V | 5.043V | 3.335V | 5.087V | 120.253 | | | | 51.22°C | 115.08V |
| CL2 | 69.958A | 1.002A | 1.002A | 1.002A | 864.308 | 85.962% | 2140 | 49.1 | 45.97°C | 0.991 |
| | 12.163V | 5.034V | 3.323V | 5.026V | 1005.453 | | | | 55.86°C | 115.04V |







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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 | 1.205A | 0.489A | 0.476A | 0.196A | 19.716 | 68.473% | 0 | <6.0 | 0.835 |
| | 12.163V | 5.053V | 3.340V | 5.092V | 28.794 | | | | 115.05V |
| 2 | 2.429A | 0.987A | 0.985A | 0.391A | 39.802 | 79.515% | 0 | <6.0 | 0.924 |
| | 12.164V | 5.047V | 3.336V | 5.087V | 50.056 | | | | 115.05V |
| 3 | 3.657A | 1.474A | 1.496A | 0.591A | 59.918 | 83.998% | 0 | <6.0 | 0.954 |
| | 12.164V | 5.048V | 3.336V | 5.081V | 71.333 | | | | 115.05V |
| 4 | 4.869A | 1.983A | 1.976A | 0.786A | 79.822 | 86.317% | 0 | <6.0 | 0.968 |
| | 12.165V | 5.048V | 3.336V | 5.076V | 92.475 | | | | 115.05V |

### RIPPLE MEASUREMENTS

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 9.7 mV | 6.5 mV | 8.8 mV | 5.3 mV | Pass |
| 20% Load | 13.5 mV | 7.3 mV | 9.3 mV | 5.5 mV | Pass |
| 30% Load | 15.8 mV | 7.8 mV | 9.6 mV | 5.7 mV | Pass |
| 40% Load | 17.6 mV | 9.2 mV | 9.7 mV | 5.7 mV | Pass |
| 50% Load | 18.0 mV | 10.1 mV | 8.7 mV | 5.6 mV | Pass |
| 60% Load | 15.9 mV | 10.8 mV | 9.8 mV | 6.6 mV | Pass |
| 70% Load | 16.3 mV | 11.4 mV | 10.8 mV | 7.0 mV | Pass |
| 80% Load | 17.9 mV | 12.0 mV | 10.9 mV | 9.6 mV | Pass |
| 90% Load | 20.5 mV | 12.5 mV | 10.6 mV | 9.9 mV | Pass |
| 100% Load | 24.4 mV | 13.0 mV | 12.4 mV | 9.7 mV | Pass |
| 110% Load | 26.2 mV | 13.4 mV | 13.4 mV | 10.1 mV | Pass |
| Crossload 1 | 10.5 mV | 11.5 mV | 9.6 mV | 5.7 mV | Pass |
| Crossload 2 | 24.0 mV | 8.6 mV | 11.0 mV | 8.2 mV | Pass |







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| HOLD-UP TIME & POWER OK SIGNAL (230V) | |
|---|---|
| Hold-Up Time (ms) | 19.30 |
| AC Loss to PWR_OK Hold Up Time (ms) | 15.60 |
| PWR_OK Inactive to DC Loss Delay (ms) | 3.70 |


*Top side*


*Power specifications label*

## CERTIFICATIONS

CYBENETICS PLATINUM

CYBENETICS STANDARD++