# EFFICIENCY AND NOISE LEVEL CERTIFICATIONS

## Anex

Aerocool Aero Bronze 650W

Lab ID#: AC65001673
Receipt Date: Jun 27, 2020
Test Date: Jul 1, 2020

Report: 20PS1673A
Report Date: Jul 13, 2020

## DUT INFORMATION

| | |
|---|---|
| Brand | Aerocool |
| Manufacturer (OEM) | - |
| Series | Aero Bronze |
| Model Number | |
| Serial Number | SNBAR65AEC1010134 |
| DUT Notes | |

## DUT SPECIFICATIONS

| | |
|---|---|
| Rated Voltage (Vrms) | 200-240 |
| Rated Current (Arms) | 5 |
| Rated Frequency (Hz) | 47-63 |
| Rated Power (W) | 650 |
| Type | ATX12V |
| Cooling | 120mm Rifle Bearing Fan (DWPH EFS-12E12H) |
| Semi-Passive Operation | ✗ |
| Cable Design | Fixed cables |

## POWER SPECIFICATIONS

| Rail | | 3.3V | 5V | 12V | 5VSB | -12V |
|---|---|---|---|---|---|---|
| Max. Power | Amps | 20 | 20 | 54 | 2.5 | 0.3 |
| | Watts | 120 | | 648 | 12.5 | 3.6 |
| Total Max. Power (W) | | 650 | | | | |

## CABLES AND CONNECTORS

### Native Cables

| Description | Cable Count | Connector Count (Total) | Gauge | In Cable Caps |
|---|---|---|---|---|
| ATX connector 20+4 pin (610mm) | 1 | 1 | 18AWG | No |
| 4+4 pin EPS12V (650mm) | 1 | 1 | 18AWG | No |
| 6+2 pin PCIe (570mm+150mm) | 1 | 2 | 18AWG | No |
| SATA (530mm+150mm+150mm) | 2 | 6 | 18AWG | No |
| 4-pin Molex (520mm+150mm) | 2 | 4 | 18AWG | No |

### Modular Cables

| | | | | |
|---|---|---|---|---|
| AC Power Cord (1070mm) - C13 coupler | 1 | 1 | 18AWG | - |

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| General Data | - |
|---|---|
| Manufacturer (OEM) | - |
| PCB Type | Single Sided |
| **Primary Side** | **-** |
| Transient Filter | 4x Y caps, 3x X caps, 2x CM chokes, 1x DM choke, 1x Champion CM02 (Discharge IC) |
| Inrush Protection | NTC Thermistor MF72 1.5D13 |
| Bridge Rectifier(s) | 1x Diodes Incorp. GBU808 (800V, 8A @ 100°C) |
| APFC MOSFET(s) | 1x IPS ITA20N50R (500V, 12.5A @ 100°C, Rds(on): 0.3Ohm) |
| APFC Boost Diode | 1x NXP BYC8X-600 (600V, 8A @ 59°C) |
| Bulk Cap(s) | 2x Nichicon (400V, 180uF each or 360uF combined, 2,000h @ 105°C, GG) |
| Main Switchers | 2x IPS ITA15N50A (500V, 10A @ 100°C, Rds(on): 0.45Ohm) |
| Driver IC | 1x SyncPower SP6019D |
| Combo APFC / PWM Controller | Champion CM6800 |
| Topology | Primary side: APFC, Double-Forward<br>Secondary side: Synchronous Rectification & DC-DC converters |
| **Secondary Side** | **-** |
| +12V MOSFETs | 4x IPS FTP03N06NA (60V, 145A @ 100°C, Rds(on): 3.6mOhm) |
| 5V & 3.3V | DC-DC Converters: 4x UBIQ QM3004D (30V, 40A @ 100°C, Rds(on): 8.5mOhm)<br>PWM Controllers: ANPEC APW7159 |
| Filtering Capacitors | Electrolytic: 10x Asia'x (@ 105°C, TMX), 4x Asia'x (@ 105°C, TNX)<br>Polymer: 4x NJcon (no info) |
| Supervisor IC | Grenergy GR8329N (OCP, OVP, UVP, SCP, PG) |
| Fan Model | DWPH EFS-12E12H (120mm, 12V, 0.5A, Rifle Bearing Fan) |
| **5VSB Circuit** | **-** |
| Standby PWM Controller | Developer Microelectronics DP2358 |

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## RESULTS

| | |
|---|---|
| Temperature Range (°C /°F) | 30-32 / 86-89.6 |
| ErP Lot 3/6 Ready | ✓ |
| (EU) No 617/2013 Compliance | ✓ |

## 230V

| | |
|---|---|
| Average Efficiency | 87.881% |
| Average Efficiency 5VSB | 78.999% |
| Standby Power Consumption (W) | 0.1385640 |
| Average PF | 0.945 |
| Avg Noise Output | 18.24 dB(A) |
| Efficiency Rating (ETA) | SILVER |
| Noise Rating (LAMBDA) | A+ |

## TEST EQUIPMENT

| | |
|---|---|
| Electronic Loads | Chroma 63601-5 x4<br>Chroma 63600-2 x2<br>63640-80-80 x20<br>63610-80-20 x2 |
| AC Sources | Chroma 6530, Keysight AC6804B |
| Power Analyzers | N4L PPA1530 x2 |
| Sound Analyzer | Bruel & Kjaer 2270 G4 |
| Microphone | Bruel & Kjaer Type 4955-A |
| Data Loggers | Picoscope TC-08 x2, Labjack U3-HV x2 |
| Tachometer | UNI-T UT372 x2 |
| Digital Multimeter | Keysight U1273AX, Fluke 289, Keithley 2015 - THD |
| UPS | CyberPower OLS3000E 3kVA x2 |

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

| | |
|---|---|
| Hold-Up Time (ms) | 9.7 |
| AC Loss to PWR_OK Hold Up Time (ms) | 8.7 |
| PWR_OK Inactive to DC Loss Delay (ms) | 1 |

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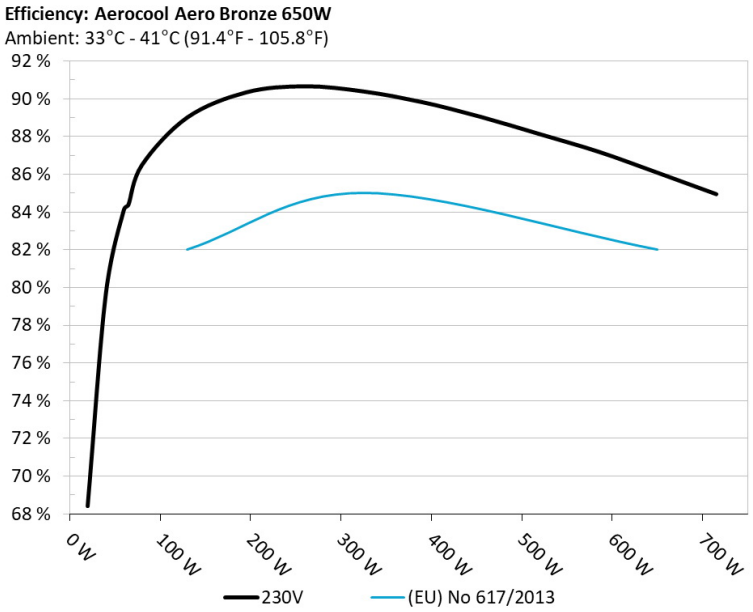
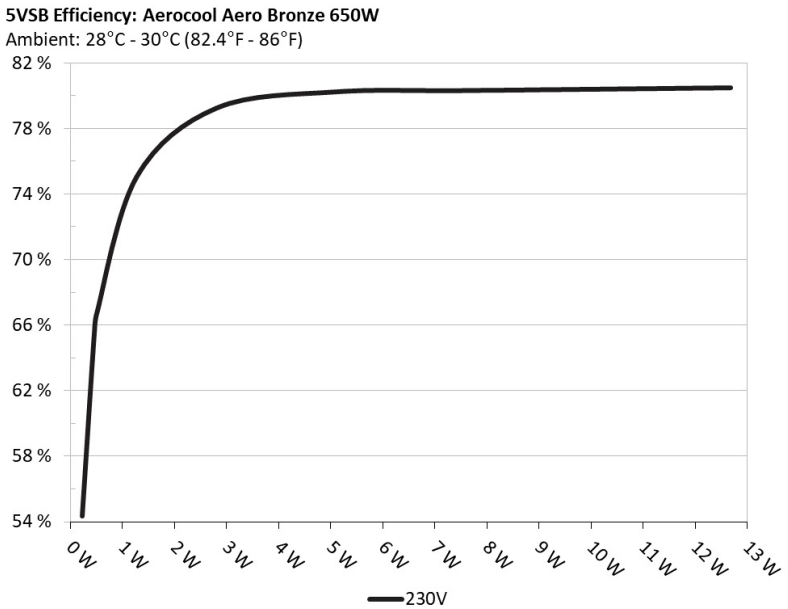
## EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE




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

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

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.045A | 0.230 | 54.374% | 0.015 |
| | 5.117V | 0.423 | | 230.43V |
| 2 | 0.090A | 0.461 | 65.483% | 0.024 |
| | 5.117V | 0.704 | | 230.42V |
| 3 | 0.550A | 2.811 | 79.228% | 0.114 |
| | 5.108V | 3.548 | | 230.42V |
| 4 | 1.000A | 5.101 | 80.217% | 0.184 |
| | 5.100V | 6.359 | | 230.41V |
| 5 | 1.500A | 7.637 | 80.296% | 0.240 |
| | 5.090V | 9.511 | | 230.42V |
| 6 | 2.501A | 12.682 | 80.464% | 0.309 |
| | 5.071V | 15.761 | | 230.42V |

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# 230V







www.cybenetics.com -info@cybenetics.com
4004 MESA GEITONIA, LIMASSOL, CYPRUS

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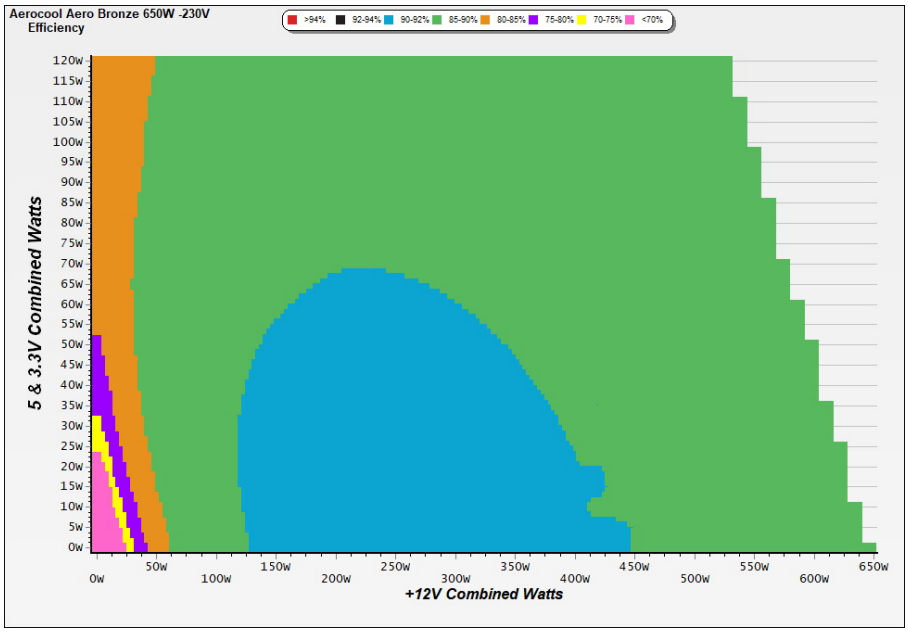
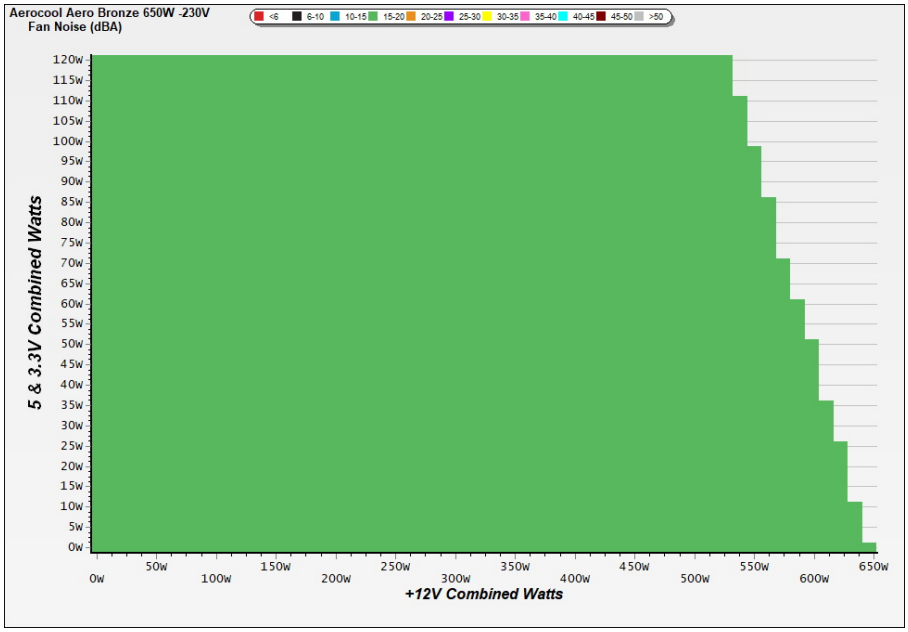
## EFFICIENCY GRAPH 230V




### 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 230V



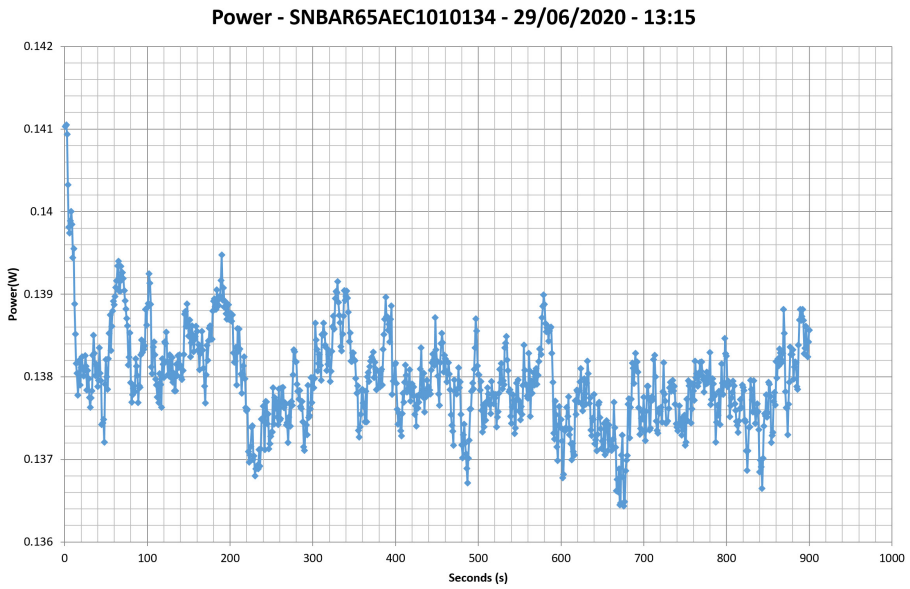

### INFO

*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*

## Anex

Aerocool Aero Bronze 650W

### VAMPIRE POWER -230V




**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

Aerocool Aero Bronze 650W

### 10-110% LOAD TESTS 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 | 3.536A | 1.976A | 1.961A | 0.980A | 64.960 | 84.372% | 815 | 18.1 | 35.71°C | 0.816 |
| | 12.260V | 5.065V | 3.365V | 5.103V | 76.992 | | | | 38.71°C | 230.37V |
| 2 | 8.094A | 2.967A | 2.946A | 1.177A | 130.028 | 89.012% | 818 | 18.2 | 35.83°C | 0.916 |
| | 12.247V | 5.054V | 3.361V | 5.101V | 146.079 | | | | 39.44°C | 230.37V |
| 3 | 12.996A | 3.468A | 3.441A | 1.373A | 195.032 | 90.341% | 820 | 18.2 | 36.60°C | 0.946 |
| | 12.232V | 5.048V | 3.359V | 5.099V | 215.885 | | | | 40.55°C | 230.37V |
| 4 | 17.912A | 3.969A | 3.933A | 1.570A | 260.039 | 90.667% | 825 | 18.2 | 37.23°C | 0.965 |
| | 12.217V | 5.041V | 3.356V | 5.097V | 286.806 | | | | 41.81°C | 230.35V |
| 5 | 22.499A | 4.969A | 4.923A | 1.767A | 325.076 | 90.390% | 828 | 18.2 | 37.29°C | 0.969 |
| | 12.204V | 5.030V | 3.352V | 5.095V | 359.637 | | | | 42.32°C | 230.40V |
| 6 | 27.050A | 5.977A | 5.912A | 1.964A | 389.546 | 89.826% | 832 | 18.3 | 37.57°C | 0.975 |
| | 12.190V | 5.020V | 3.349V | 5.093V | 433.667 | | | | 44.01°C | 230.37V |
| 7 | 31.686A | 6.988A | 6.906A | 2.161A | 454.889 | 89.039% | 838 | 19.1 | 38.44°C | 0.980 |
| | 12.175V | 5.009V | 3.346V | 5.091V | 510.888 | | | | 45.31°C | 230.37V |
| 8 | 36.331A | 8.001A | 7.898A | 2.358A | 520.169 | 88.121% | 844 | 19.6 | 38.79°C | 0.984 |
| | 12.160V | 4.998V | 3.342V | 5.089V | 590.292 | | | | 46.81°C | 230.36V |
| 9 | 41.389A | 8.519A | 8.383A | 2.358A | 585.089 | 87.188% | 1121 | 26.7 | 39.27°C | 0.987 |
| | 12.143V | 4.990V | 3.339V | 5.090V | 671.063 | | | | 47.82°C | 230.36V |
| 10 | 46.399A | 9.032A | 8.903A | 2.456A | 649.851 | 86.081% | 1304 | 31.0 | 40.51°C | 0.990 |
| | 12.126V | 4.983V | 3.337V | 5.090V | 754.934 | | | | 49.91°C | 230.38V |
| 11 | 51.828A | 9.038A | 8.907A | 2.456A | 714.690 | 84.945% | 1461 | 35.0 | 40.80°C | 0.991 |
| | 12.107V | 4.980V | 3.334V | 5.091V | 841.360 | | | | 50.73°C | 230.40V |
| CL1 | 0.116A | 14.000A | 14.000A | 0.001A | 117.798 | 81.764% | 846 | 19.5 | 37.36°C | 0.917 |
| | 12.284V | 4.966V | 3.346V | 5.127V | 144.071 | | | | 42.69°C | 230.39V |
| CL2 | 54.018A | 1.000A | 1.000A | 1.000A | 666.587 | 86.683% | 1150 | 27.6 | 40.66°C | 0.990 |
| | 12.090V | 5.045V | 3.346V | 5.118V | 768.992 | | | | 49.04°C | 230.43V |

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### 20-80W LOAD TESTS 230V

| Test # | 12V | 5V | 3.3V | 5VSB | DC/AC (Watts) | Efficiency | Fan Speed (RPM) | PSU Noise (dB[A]) | PF/AC Volts |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.209A | 0.494A | 0.490A | 0.196A | 19.992 | 68.407% | 804 | 17.8 | 0.534 |
| | 12.267V | 5.078V | 3.368V | 5.115V | 29.225 | | | | 230.42V |
| 2 | 2.420A | 0.986A | 0.981A | 0.391A | 39.981 | 79.621% | 807 | 17.9 | 0.687 |
| | 12.263V | 5.073V | 3.367V | 5.113V | 50.214 | | | | 230.37V |
| 3 | 3.634A | 1.480A | 1.473A | 0.587A | 60.010 | 84.125% | 811 | 17.9 | 0.795 |
| | 12.260V | 5.069V | 3.365V | 5.110V | 71.334 | | | | 230.37V |
| 4 | 4.843A | 1.975A | 1.963A | 0.783A | 79.959 | 86.492% | 812 | 18.0 | 0.843 |
| | 12.256V | 5.064V | 3.364V | 5.107V | 92.447 | | | | 230.37V |

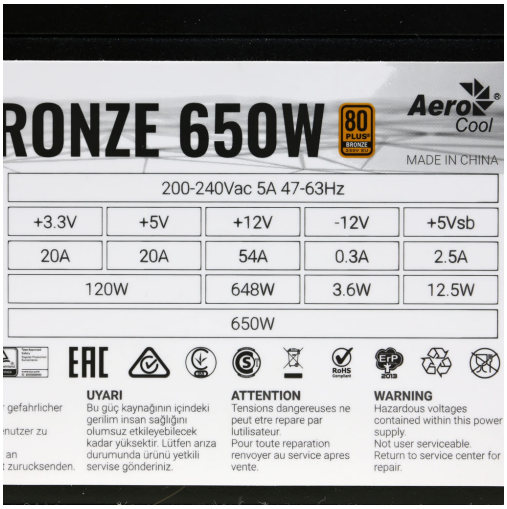
### RIPPLE MEASUREMENTS 230V

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 24.40mV | 20.30mV | 25.40mV | 15.10mV | Pass |
| 20% Load | 22.40mV | 20.20mV | 25.30mV | 14.90mV | Pass |
| 30% Load | 22.10mV | 19.70mV | 25.70mV | 14.60mV | Pass |
| 40% Load | 21.10mV | 19.80mV | 25.80mV | 15.40mV | Pass |
| 50% Load | 22.90mV | 19.10mV | 25.40mV | 16.00mV | Pass |
| 60% Load | 24.20mV | 19.40mV | 26.10mV | 17.40mV | Pass |
| 70% Load | 23.30mV | 19.10mV | 27.30mV | 18.10mV | Pass |
| 80% Load | 26.00mV | 19.70mV | 32.60mV | 19.10mV | Pass |
| 90% Load | 28.60mV | 20.40mV | 32.90mV | 20.50mV | Pass |
| 100% Load | 34.90mV | 22.10mV | 33.40mV | 28.10mV | Pass |
| 110% Load | 37.10mV | 23.30mV | 36.30mV | 28.90mV | Pass |
| Crossload1 | 33.50mV | 21.30mV | 35.50mV | 23.40mV | Pass |
| Crossload2 | 34.60mV | 21.60mV | 28.50mV | 22.60mV | Pass |

## Anex

Aerocool Aero Bronze 650W

*Top side*




*Power specifications label*

## CERTIFICATIONS 230V

CYBENETICS SILVER 230v

CYBENETICS A+ 230v