# Bitfenix Whisper 650W

Serial Number 709Q00001

Lab ID 136

Certification ID 25136

Test Result Report ID:

Certificate Issue Date: Mar 7, 2018

Scheme: ETA-EMI PSU

115V




230V




Scheme: LAMBDA PSU

115V




230V






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 | Bitfenix |
| Model | Whisper 650W |
| OEM/ODM | Channel Well Technology |
| Serial Number | 709Q00001 |
| Product Specifications | |
| Manufacturer-Provided Information | |
| Rated Voltage (Vrms) | 100-240 |
| Rated Current (Arms) | 10 |
| Rated Frequency (Hz) | 47-63 |

| | |
|---|---|
| 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 Hydro Dynamic Bearing Fan<br>(DF1352512SEHN) |
| Semi-Passive Operation | ✗ |
| Cybenetics Testing Information | |
| Lab ID | 136 |
| Date of receipt | Feb 23, 2018 |
| Testing Date | Mar 4, 2018 |
| Report Issued Date | Mar 7, 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 |
| ATX connector 20+4 pin (610mm) | 1 | 1 | 18AWG |
| 4+4 pin EPS12V (650mm) | 1 | 1 | 18AWG |
| 6+2 pin PCIe (650mm+150mm) | 2 | 4 | 18AWG |
| SATA (500mm+150mm+150mm+150mm) | 2 | 8 | 18AWG |
| 4 pin Molex (500mm+150mm+150mm+150mm) | 1 | 4 | 18AWG |

### Power Specifications

| Rail | | 3.3V | 5V | 12V | 12V | 12V | 12V | 5VSB | -12V |
|---|---|---|---|---|---|---|---|---|---|
| Max. Power | Amps | 20 | 20 | 25 | 25 | 30 | 30 | 2.5 | 0.3 |
| | Watts | 100 | | 650 | | | | 12.5 | 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) | 88.637% |
| Average Noise Output (>1450 Load Combinations) | 31.12dBA |
| Average PF (>1450 Load Combinations) | 0.982 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | - |
| Standby Power Consumption | 0.0461W |
| Non-Accredited | |
| 12V Ripple (Full Load) | 18.99mV |
| 5V Ripple (Full Load) | 13.41mV |
| 3.3V Ripple (Full Load) | 27.33mV |
| 5VSB Ripple (Full Load) | 19.66mV |
| 12V Load Regulation | 0.70% |
| 5V Load Regulation | 1.24% |
| 3.3V Load Regulation | 1.54% |

| | |
|---|---|
| 5VSB Load Regulation | 1.43% |
| Inrush Current | 48.019A |

**230V**

| | | |
|---|---|---|
| Accredited | | |
| Average Efficiency (>1450 load combinations) | | 90.952% |
| Average Noise Output (>1450 Load Combinations) | | 24.91dBA |
| Average PF (>1450 Load Combinations) | | 0.933 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | | - |
| Standby Power Consumption | | 0.0683W |
| Non-Accredited | | |
| 12V Ripple (Full Load) | | 16.91mV |
| 5V Ripple (Full Load) | | 8.78mV |
| 3.3V Ripple (Full Load) | | 9.24mV |
| 5VSB Ripple (Full Load) | | 21.60mV |
| 12V Load Regulation | | 0.46% |
| 5V Load Regulation | | 0.42% |
| 3.3V Load Regulation | | 0.63% |
| 5VSB Load Regulation | | 1.43% |
| Inrush Current | | 47.663A |
| Hold-Up Time & PWR_OK Signal | | 15.00ms |
| AC Loss to PWR_OK Hold Up Time | | 13.70ms |
| PWR_OK Inactive to DC Loss Delay | | 1.30ms |
| OPP (0.00°C / 0.00°C) | - | - |

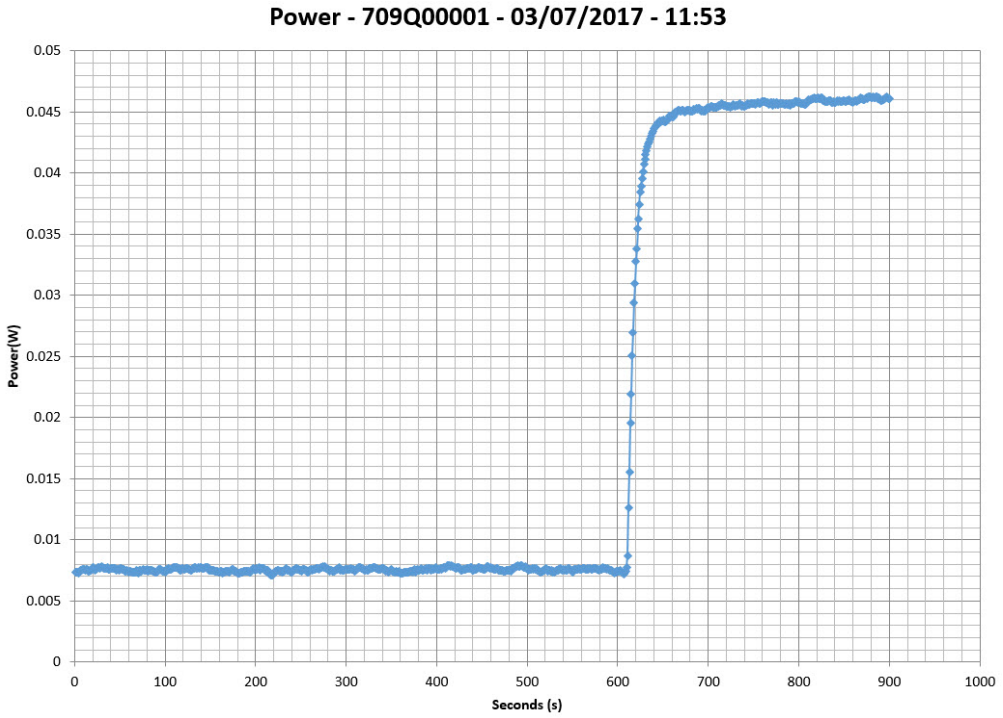
## Hold-Up Time & PWR_OK Signal

| | |
|---|---|
| Hold-Up Time (ms) | 15 |
| AC Loss to PWR_OK Hold Up Time (ms) | 13.7 |
| PWR_OK Inactive to DC Loss Delay (ms) | 1.3 |

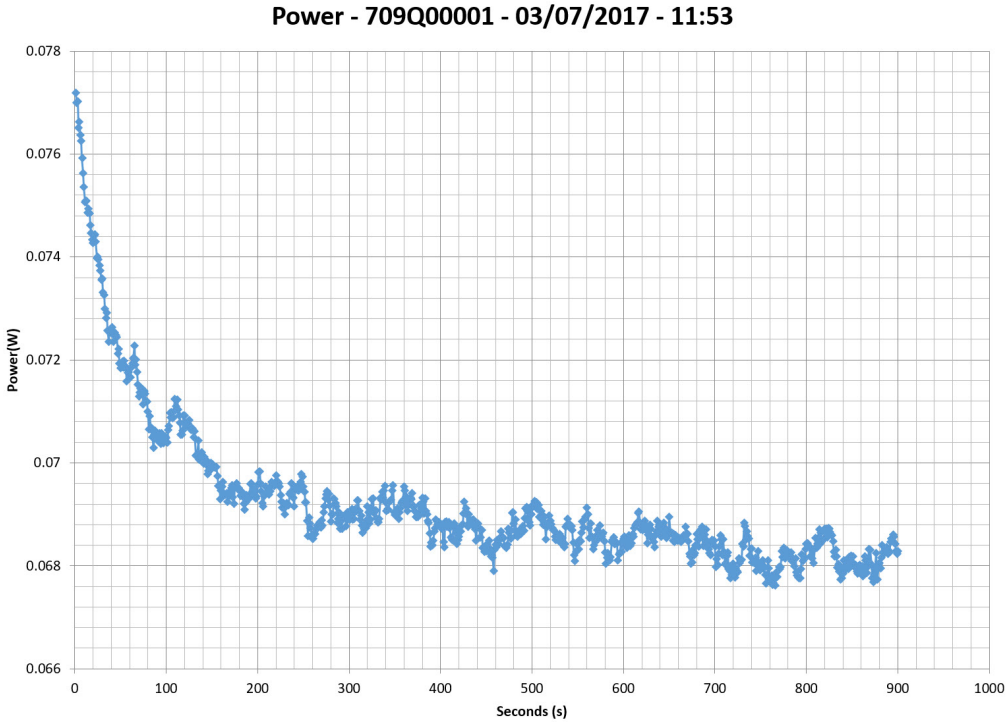
## Stromverbrauch im Ruhezustand

### Graphs

**115V**

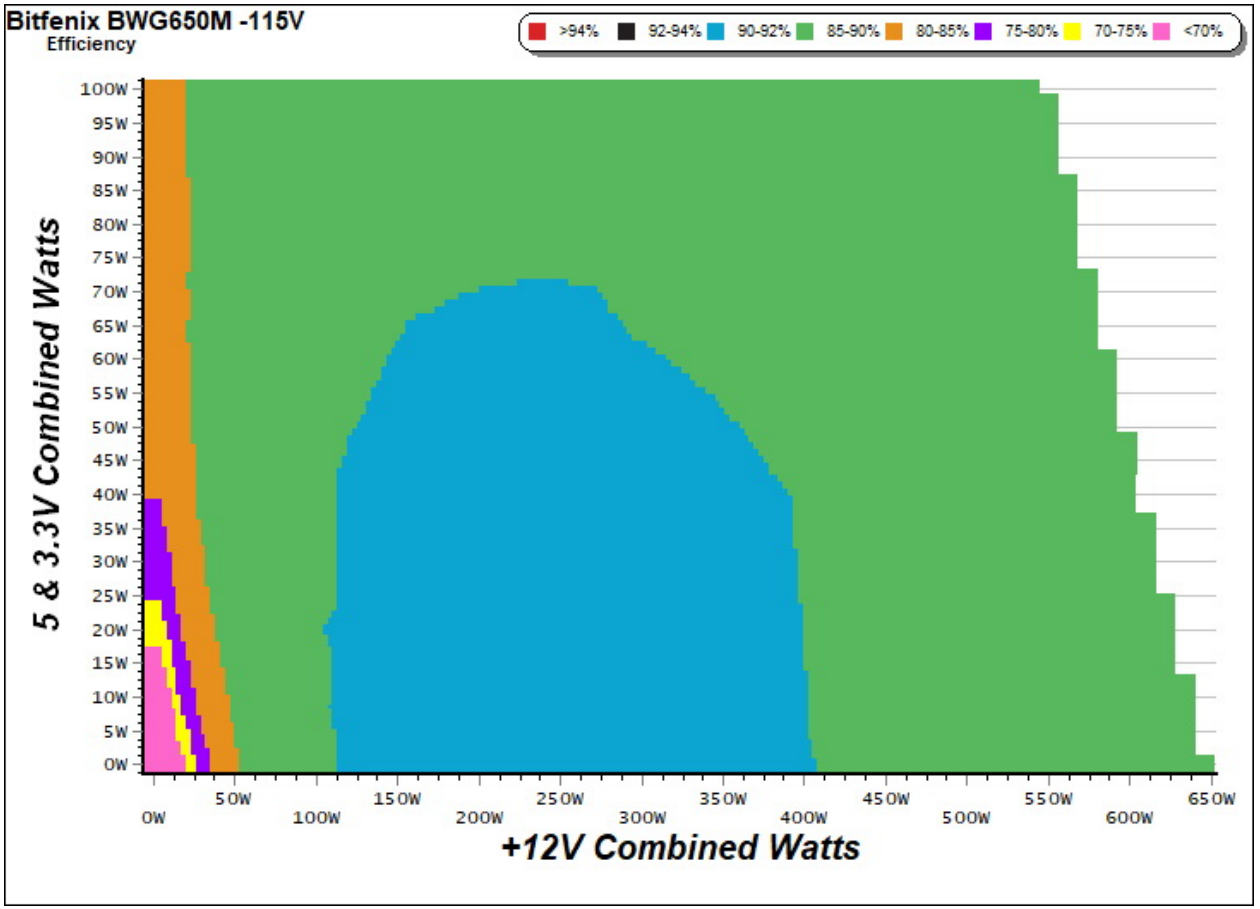



**230V**



## Efficiency Graph

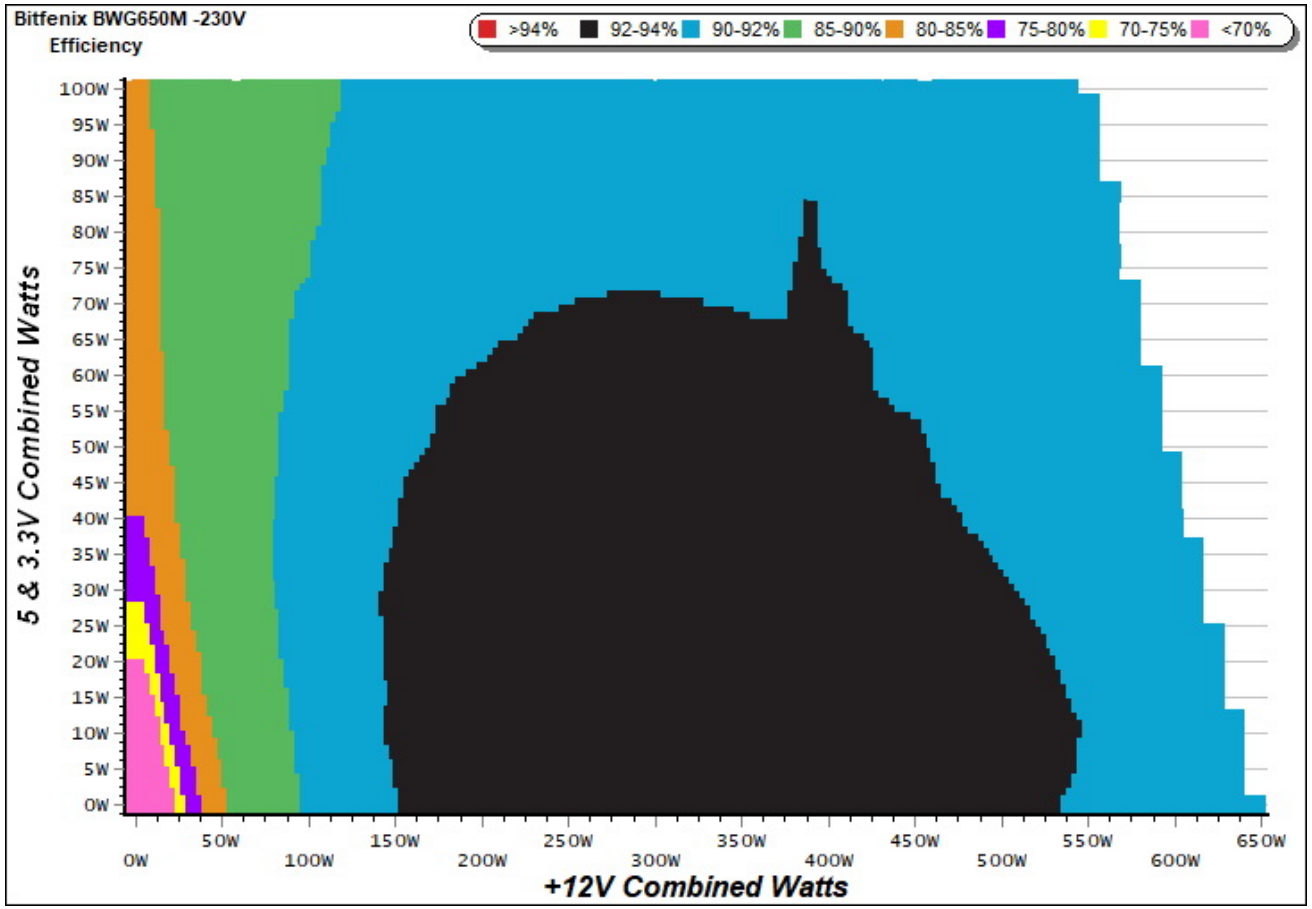
**115V**




**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

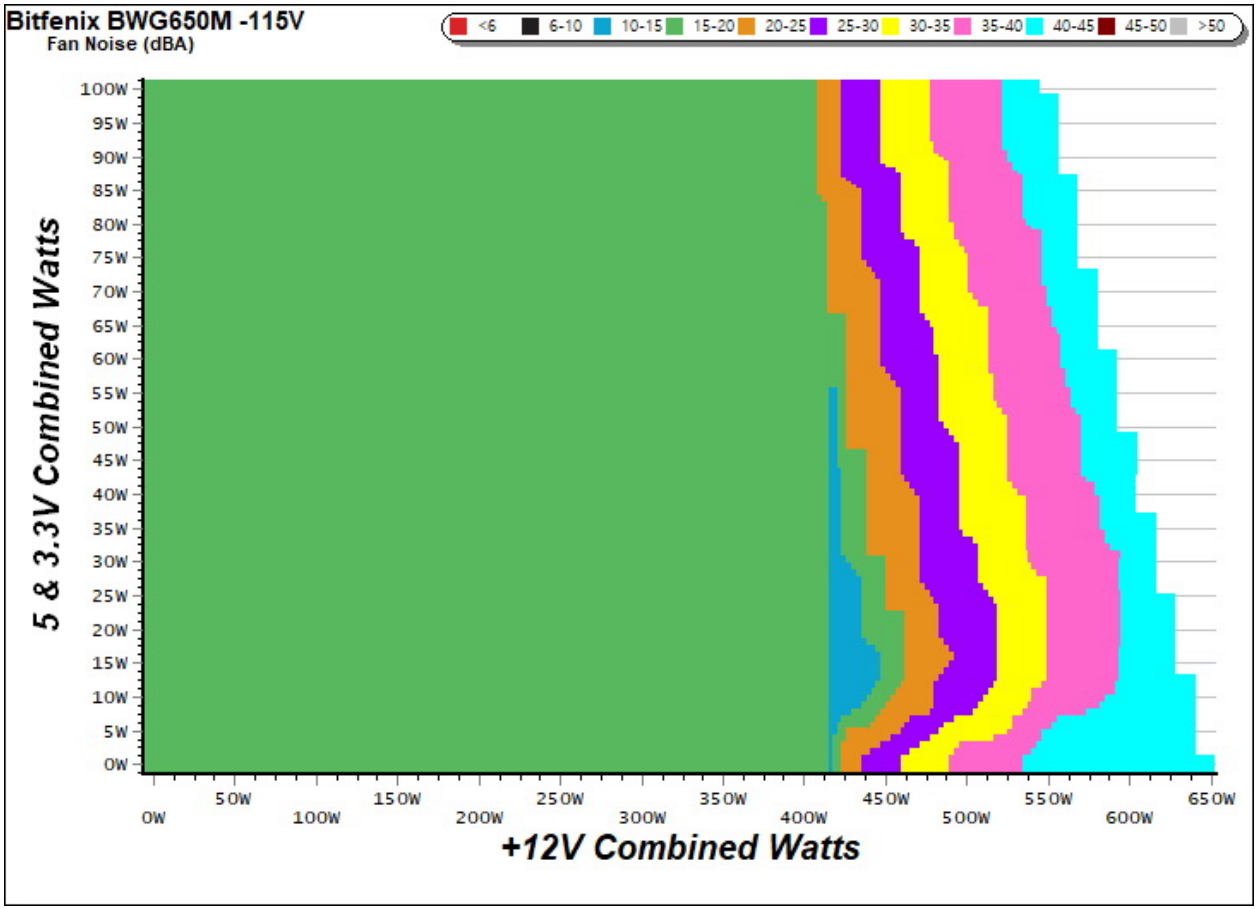



### INFO

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

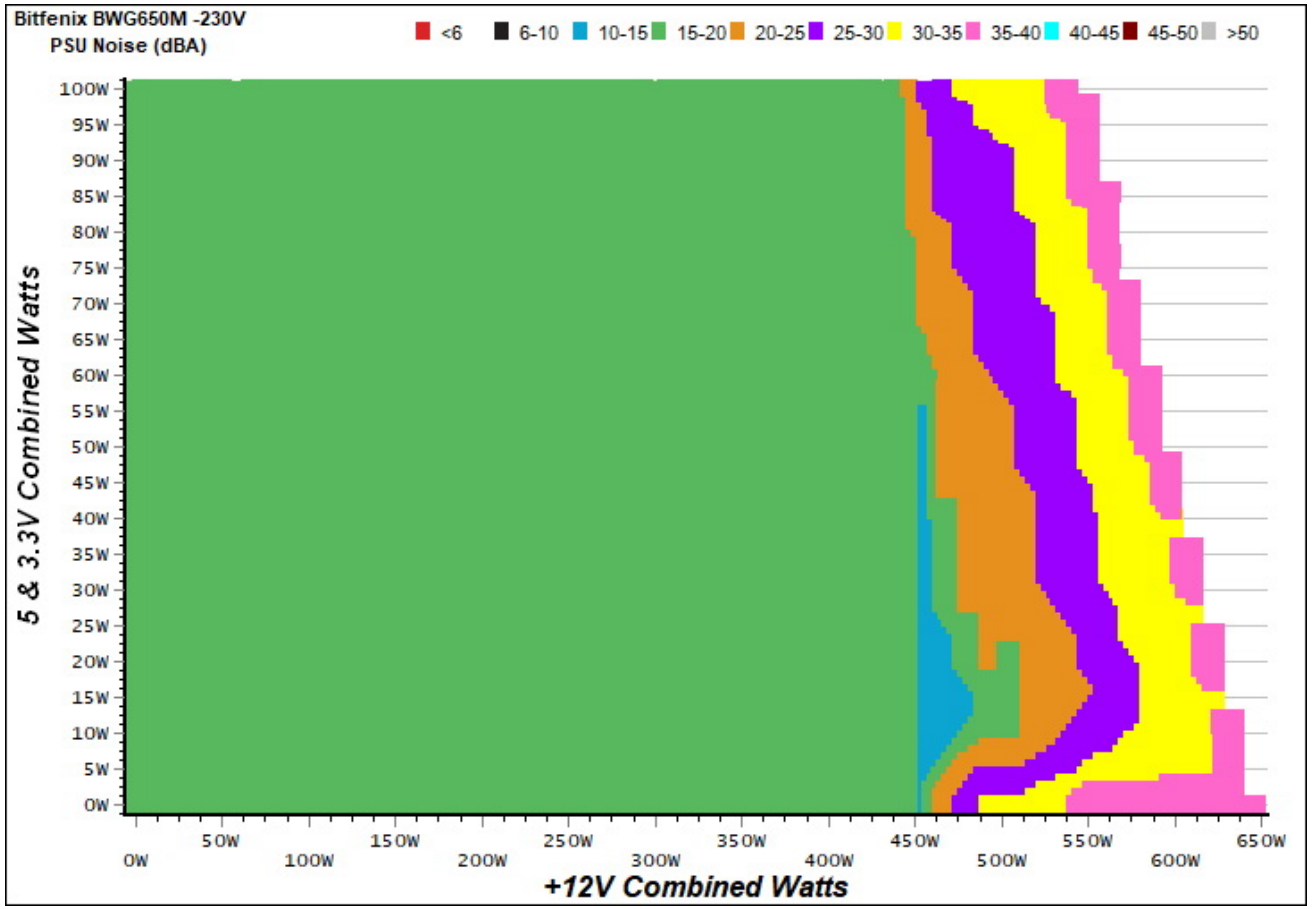
### 115V




### 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

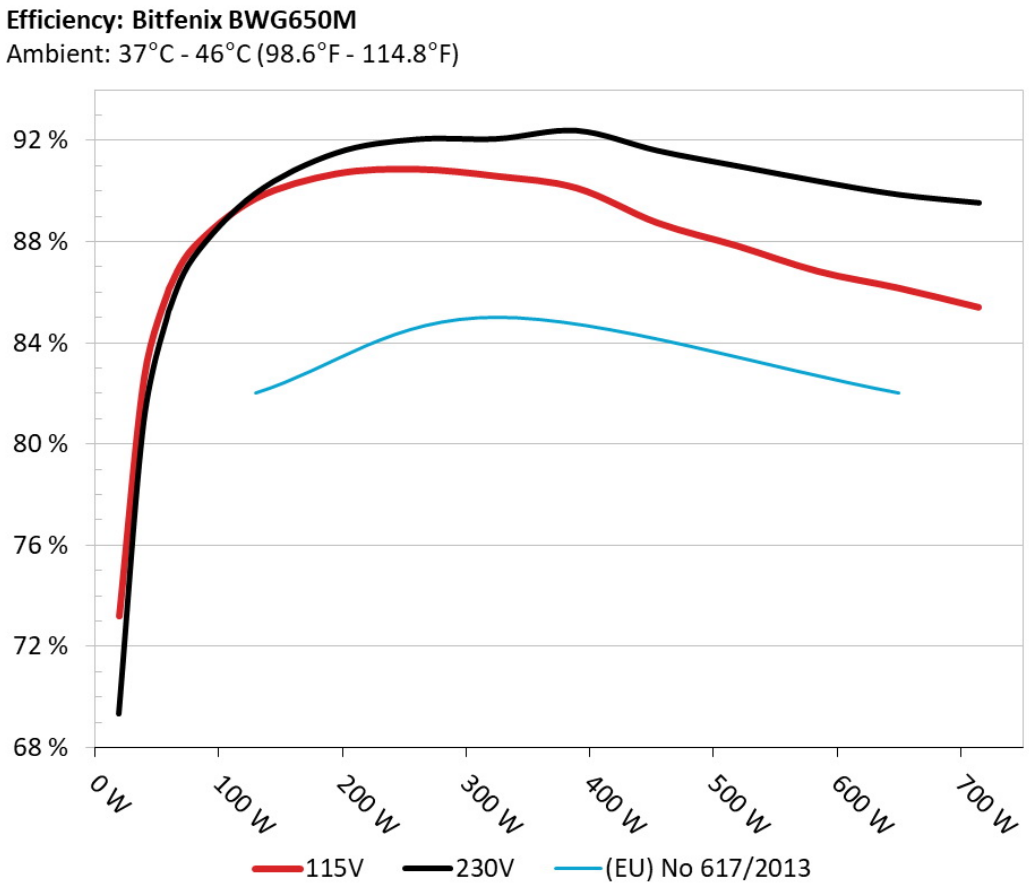



### INFO

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

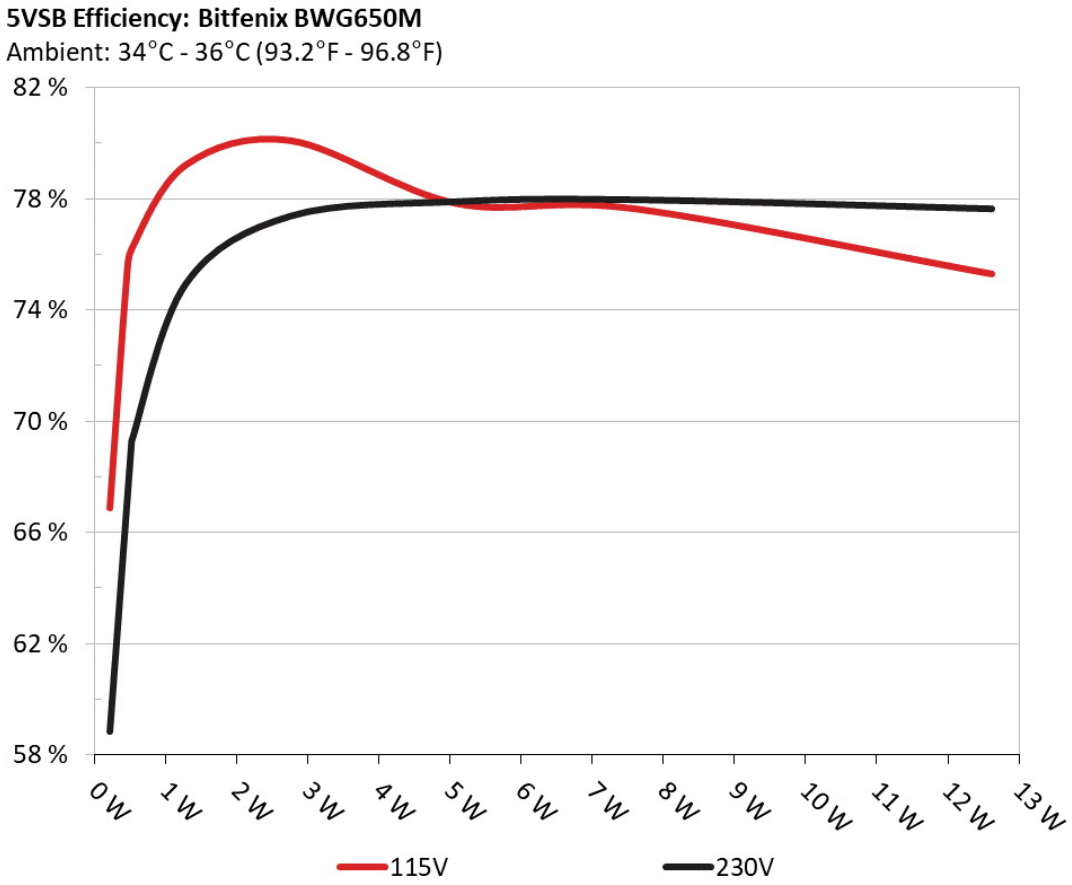
### Efficiency under high ambient temperature




**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 | 0.041A | 0.210 | 66.879% | 0.031 |
| | 5.101V | 0.314 | | 115.23V |
| 2 | 0.087A | 0.442 | 75.042% | 0.058 |
| | 5.101V | 0.589 | | 115.23V |
| 3 | 0.542A | 2.757 | 80.076% | 0.258 |
| | 5.090V | 3.443 | | 115.22V |
| 4 | 1.002A | 5.087 | 77.819% | 0.357 |
| | 5.079V | 6.537 | | 115.22V |
| 5 | 1.501A | 7.608 | 77.625% | 0.407 |
| | 5.068V | 9.801 | | 115.22V |
| 6 | 2.501A | 12.613 | 75.288% | 0.458 |
| | 5.044V | 16.753 | | 115.22V |

### 230V

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.041A | 0.210 | 58.824% | 0.011 |
| | 5.101V | 0.357 | | 230.51V |
| 2 | 0.087A | 0.442 | 69.279% | 0.019 |
| | 5.101V | 0.638 | | 230.51V |
| 3 | 0.541A | 2.756 | 77.372% | 0.101 |
| | 5.090V | 3.562 | | 230.51V |
| 4 | 1.002A | 5.087 | 77.890% | 0.170 |
| | 5.079V | 6.531 | | 230.51V |
| 5 | 1.501A | 7.606 | 77.954% | 0.228 |
| | 5.067V | 9.757 | | 230.51V |
| 6 | 2.501A | 12.615 | 77.631% | 0.305 |
| | 5.044V | 16.250 | | 230.51V |

## Supplementary Tests (For Reference)

### Typical Load Tests

**115V**

| Test # | 12V | 5V | 3.3V | 5VSB | DC/AC (Watts) | Efficiency | Fan Speed (RPM) | Fan Noise (dB[A]) | Temps (In/Out) | PF/AC Volts |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.582A | 1.997A | 1.987A | 0.980A | 64.750 | 86.146% | 455 | 10.9 | 38.53°C | 0.958 |
| | 12.055V | 5.009V | 3.317V | 5.077V | 75.163 | | | | 42.03°C | 115.23V |
| 2 | 8.209A | 2.993A | 2.986A | 1.180A | 129.721 | 89.701% | 455 | 10.9 | 38.84°C | 0.978 |
| | 12.045V | 5.002V | 3.312V | 5.070V | 144.615 | | | | 43.20°C | 115.23V |
| 3 | 13.186A | 3.511A | 3.503A | 1.380A | 194.835 | 90.682% | 435 | 9.9 | 39.16°C | 0.984 |
| | 12.037V | 4.996V | 3.307V | 5.065V | 214.856 | | | | 44.09°C | 115.22V |
| 4 | 18.167A | 4.010A | 3.992A | 1.580A | 259.692 | 90.865% | 455 | 10.9 | 39.69°C | 0.986 |
| | 12.028V | 4.989V | 3.302V | 5.058V | 285.800 | | | | 45.30°C | 115.22V |
| 5 | 22.815A | 5.012A | 5.002A | 1.780A | 324.643 | 90.590% | 435 | 9.9 | 40.27°C | 0.987 |
| | 12.018V | 4.983V | 3.296V | 5.051V | 358.364 | | | | 45.92°C | 115.22V |
| 6 | 27.459A | 6.034A | 6.012A | 1.980A | 389.602 | 90.116% | 435 | 9.9 | 40.86°C | 0.986 |
| | 12.011V | 4.975V | 3.291V | 5.044V | 432.334 | | | | 47.51°C | 115.22V |
| 7 | 32.111A | 7.043A | 7.027A | 2.180A | 454.496 | 88.747% | 895 | 25.4 | 41.96°C | 0.985 |
| | 12.003V | 4.969V | 3.286V | 5.037V | 512.124 | | | | 49.24°C | 115.21V |
| 8 | 36.789A | 8.069A | 8.048A | 2.384A | 519.526 | 87.828% | 1415 | 38.2 | 42.92°C | 0.986 |
| | 11.990V | 4.962V | 3.280V | 5.029V | 591.528 | | | | 50.98°C | 115.22V |
| 9 | 41.881A | 8.578A | 8.579A | 2.385A | 584.544 | 86.827% | 1795 | 44.4 | 43.59°C | 0.987 |
| | 11.985V | 4.956V | 3.275V | 5.028V | 673.228 | | | | 53.09°C | 115.22V |
| 10 | 46.957A | 9.092A | 9.082A | 2.485A | 649.363 | 86.168% | 1795 | 44.4 | 44.61°C | 0.988 |
| | 11.972V | 4.951V | 3.270V | 5.023V | 753.603 | | | | 54.78°C | 115.21V |
| 11 | 52.391A | 9.097A | 9.087A | 2.487A | 714.295 | 85.406% | 1795 | 44.4 | 46.12°C | 0.989 |
| | 11.970V | 4.947V | 3.267V | 5.020V | 836.353 | | | | 57.61°C | 115.22V |
| CL1 | 0.095A | 12.014A | 12.005A | 0.004A | 100.466 | 84.532% | 555 | 13.1 | 44.96°C | 0.975 |
| | 12.042V | 4.973V | 3.295V | 5.096V | 118.849 | | | | 57.68°C | 115.23V |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CL2 | 54.094A | 1.005A | 1.003A | 1.001A | 662.011 | 86.828% | 1800 | 44.4 | 45.29°C | 0.988 |
| | 11.991V | 4.978V | 3.290V | 5.062V | 762.439 | | | | 55.83°C | 115.21V |

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 | 3.589A | 1.994A | 1.983A | 0.984A | 64.826 | 85.427% | 455 | 10.9 | 40.15°C | 0.774 |
| | 12.050V | 5.015V | 3.321V | 5.075V | 75.885 | | | | 43.39°C | 265.12V |
| 2 | 8.217A | 2.991A | 2.979A | 1.181A | 129.824 | 90.062% | 435 | 9.9 | 40.77°C | 0.891 |
| | 12.043V | 5.013V | 3.319V | 5.069V | 144.149 | | | | 44.35°C | 230.26V |
| 3 | 13.181A | 3.498A | 3.492A | 1.380A | 194.894 | 91.680% | 435 | 9.9 | 41.20°C | 0.928 |
| | 12.047V | 5.012V | 3.317V | 5.063V | 212.580 | | | | 45.59°C | 230.26V |
| 4 | 18.157A | 3.995A | 3.979A | 1.581A | 259.786 | 92.244% | 455 | 10.9 | 41.61°C | 0.946 |
| | 12.039V | 5.009V | 3.315V | 5.056V | 281.629 | | | | 46.70°C | 230.26V |
| 5 | 22.793A | 4.990A | 4.975A | 1.781A | 324.704 | 92.262% | 455 | 10.9 | 42.13°C | 0.955 |
| | 12.032V | 5.007V | 3.313V | 5.049V | 351.935 | | | | 47.43°C | 230.29V |
| 6 | 27.437A | 5.994A | 5.976A | 1.980A | 389.700 | 92.086% | 435 | 9.9 | 42.57°C | 0.961 |
| | 12.025V | 5.005V | 3.311V | 5.042V | 423.193 | | | | 48.39°C | 230.32V |
| 7 | 32.082A | 7.001A | 6.978A | 2.181A | 454.627 | 91.520% | 1005 | 28.4 | 43.14°C | 0.965 |
| | 12.017V | 5.004V | 3.308V | 5.035V | 496.750 | | | | 49.40°C | 230.36V |
| 8 | 36.742A | 8.003A | 7.983A | 2.385A | 519.607 | 90.934% | 1425 | 38.6 | 43.78°C | 0.968 |
| | 12.008V | 5.000V | 3.307V | 5.029V | 571.409 | | | | 50.52°C | 230.34V |
| 9 | 41.835A | 8.505A | 8.505A | 2.385A | 584.657 | 90.408% | 1800 | 44.4 | 44.74°C | 0.970 |
| | 12.001V | 4.998V | 3.304V | 5.026V | 646.690 | | | | 51.83°C | 230.30V |
| 10 | 46.876A | 9.014A | 8.994A | 2.486A | 649.492 | 90.043% | 1800 | 44.4 | 45.18°C | 0.972 |
| | 11.995V | 4.996V | 3.302V | 5.021V | 721.311 | | | | 52.61°C | 000.00V |
| 11 | 52.325A | 9.017A | 9.002A | 2.488A | 714.497 | 89.708% | 1800 | 44.4 | 46.32°C | 0.973 |
| | 11.988V | 4.994V | 3.300V | 5.019V | 796.474 | | | | 54.00°C | 230.41V |
| CL1 | 0.100A | 12.013A | 12.006A | 0.004A | 101.245 | 84.694% | 555 | 13.1 | 42.88°C | 0.866 |
| | 12.037V | 5.010V | 3.318V | 5.096V | 119.542 | | | | 49.70°C | 230.27V |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CL2 | 54.122A | 1.002A | 1.001A | 1.002A | 663.183 | 90.797% | 1800 | 44.4 | 45.06°C | 0.972 |
| | 12.006V | 5.002V | 3.309V | 5.059V | 730.399 | | | | 52.41°C | 230.29V |

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) | Fan Noise (dB[A]) | PF/AC Volts |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.208A | 0.494A | 0.479A | 0.195A | 19.633 | 73.200% | 435 | 9.9 | 0.825 |
| | 12.061V | 5.017V | 3.323V | 5.096V | 26.821 | | | | 115.23V |
| 2 | 2.445A | 0.991A | 0.990A | 0.390A | 39.721 | 82.620% | 435 | 9.9 | 0.922 |
| | 12.057V | 5.013V | 3.321V | 5.092V | 48.077 | | | | 115.23V |
| 3 | 3.681A | 1.489A | 1.504A | 0.585A | 59.803 | 86.123% | 455 | 10.9 | 0.951 |
| | 12.055V | 5.010V | 3.319V | 5.087V | 69.439 | | | | 115.23V |
| 4 | 4.909A | 1.995A | 1.987A | 0.785A | 79.736 | 87.778% | 435 | 9.9 | 0.965 |
| | 12.053V | 5.008V | 3.316V | 5.081V | 90.838 | | | | 115.23V |

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 | 1.214A | 0.490A | 0.479A | 0.196A | 19.686 | 69.545% | 455 | 10.9 | 0.477 |
| | 12.056V | 5.018V | 3.324V | 5.095V | 28.307 | | | | 230.25V |
| 2 | 2.450A | 0.990A | 0.990A | 0.391A | 39.777 | 80.981% | 455 | 10.9 | 0.652 |
| | 12.053V | 5.017V | 3.323V | 5.090V | 49.119 | | | | 230.25V |
| 3 | 3.689A | 1.486A | 1.503A | 0.586A | 59.881 | 85.302% | 435 | 9.9 | 0.754 |
| | 12.050V | 5.016V | 3.323V | 5.085V | 70.199 | | | | 230.25V |
| 4 | 4.919A | 1.996A | 1.984A | 0.785A | 79.796 | 87.441% | 435 | 9.9 | 0.814 |
| | 12.038V | 5.013V | 3.320V | 5.080V | 91.257 | | | | 230.53V |

The results above are not used in the certification process

## Ripple Measurements

### 115V

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 12.7 mV | 7.9 mV | 12.7 mV | 9.6 mV | Pass |
| 20% Load | 17.9 mV | 8.1 mV | 17.1 mV | 6.8 mV | Pass |
| 30% Load | 16.3 mV | 8.4 mV | 13.5 mV | 6.1 mV | Pass |
| 40% Load | 16.1 mV | 9.0 mV | 15.6 mV | 7.4 mV | Pass |
| 50% Load | 16.7 mV | 9.2 mV | 17.5 mV | 8.2 mV | Pass |
| 60% Load | 18.0 mV | 11.1 mV | 18.1 mV | 13.9 mV | Pass |
| 70% Load | 17.7 mV | 10.1 mV | 21.9 mV | 17.3 mV | Pass |
| 80% Load | 18.9 mV | 12.0 mV | 23.4 mV | 18.8 mV | Pass |
| 90% Load | 19.5 mV | 11.7 mV | 27.2 mV | 23.0 mV | Pass |
| 100% Load | 19.0 mV | 13.4 mV | 27.3 mV | 19.7 mV | Pass |
| 110% Load | 19.7 mV | 13.6 mV | 31.8 mV | 22.0 mV | Pass |
| Crossload 1 | 18.1 mV | 11.6 mV | 10.8 mV | 6.5 mV | Pass |
| Crossload 2 | 17.9 mV | 13.0 mV | 27.9 mV | 17.3 mV | Pass |

The results above are not used in the certification process

### 230V

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 4.3 mV | 6.1 mV | 7.7 mV | 6.2 mV | Pass |
| 20% Load | 6.3 mV | 6.6 mV | 7.3 mV | 6.1 mV | Pass |
| 30% Load | 24.3 mV | 7.1 mV | 7.1 mV | 7.0 mV | Pass |
| 40% Load | 18.6 mV | 6.7 mV | 8.2 mV | 7.3 mV | Pass |
| 50% Load | 17.1 mV | 7.0 mV | 7.5 mV | 9.6 mV | Pass |
| 60% Load | 16.9 mV | 7.5 mV | 8.5 mV | 10.3 mV | Pass |
| 70% Load | 16.6 mV | 7.4 mV | 7.8 mV | 17.8 mV | Pass |
| 80% Load | 16.6 mV | 8.5 mV | 8.0 mV | 20.0 mV | Pass |

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 90% Load | 16.8 mV | 8.6 mV | 8.2 mV | 22.2 mV | Pass |
| 100% Load | 16.9 mV | 8.8 mV | 9.2 mV | 21.6 mV | Pass |
| 110% Load | 17.2 mV | 9.2 mV | 9.6 mV | 19.2 mV | Pass |
| Crossload 1 | 5.1 mV | 6.8 mV | 9.1 mV | 4.7 mV | Pass |
| Crossload 2 | 16.4 mV | 8.3 mV | 9.5 mV | 14.6 mV | Pass |

The results above are not used in the certification process

**Bitfenix Whisper 650W**




Top side




Power specifications label

Cybenetics bietet freiwillige Zertifizierungsprogramme für Netzteile – ETA für Effizienz, LAMBDA für Lautstärke und SAFE für Sicherheit und korrekten Betrieb – sowie für Kühlprodukte mit DELTA für die Schalldämmung von Gehäusen und PHI für Luftstrom und statischen Druck von Lüftern

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