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# Cooler Master V650 Gold

Serial Number MPY6501AFAAGV1184300008

Lab ID CM19650004

Certification ID 25645

Test Result Report ID: 19PS645A

Certificate Issue Date: Jan 3, 2019

115V 230V

Scheme: ETA-EMI PSU

CYBENETICS GOLD

115V 230V

CYBENETICS A-

CYBENETICS A 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 | Cooler Master |
| Model | V650 Gold |
| OEM/ODM | Chicony Electronics |
| Serial Number | MPY6501AFAAGV1184300008 |
| Product Specifications | |
| Manufacturer-Provided Information | |
| Rated Voltage (Vrms) | 100-240 |
| Rated Current (Arms) | 9 |
| 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>(APISTEK SAC4H2H) |
| Semi-Passive Operation | ✓ (selectable) |
| Cybenetics Testing Information | |
| Lab ID | CM19650004 |
| Date of receipt | Feb 27, 2019 |
| Testing Date | Feb 3, 2019 |
| Report Issued Date | Jan 3, 2019 |
| DUT Notes | MPY-6501-AFAAGV |
| 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 (650mm) | 1 | 1 | 18-22AWG | No |
| 4+4 pin EPS12V (650mm) | 1 | 1 | 18AWG | No |
| 8 pin EPS12V (650mm) | 1 | 1 | 18AWG | No |
| 6+2 pin PCIe (550mm+120mm) | 2 | 4 | 18AWG | No |
| SATA (500mm+120mm+120mm+120mm) | 2 | 8 | 18AWG | No |
| 4 pin Molex (500mm+120mm+120mm+120mm) | 1 | 4 | 18AWG | No |
| FDD Adapter (125mm) | 1 | 1 | 22AWG | No |

| | | | | |
|---|---|---|---|---|
| AC Power Cord (1350mm) - C13 coupler | 1 | 1 | 18AWG | - |

### Power Specifications

| Rail | | 3.3V | 5V | 12V | 5VSB | -12V |
|---|---|---|---|---|---|---|
| Max. Power | Amps | 20 | 20 | 54 | 3 | 0.3 |
| | Watts | 130 | | 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) | 89.069% |
| Average Noise Output (>1450 Load Combinations) | 26.20dBA |
| Average PF (>1450 Load Combinations) | 0.974 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | 67.603% |
| Standby Power Consumption | 0.0771W |
| Non-Accredited | |
| 12V Ripple (Full Load) | 36.72mV |
| 5V Ripple (Full Load) | 16.23mV |
| 3.3V Ripple (Full Load) | 29.82mV |
| 5VSB Ripple (Full Load) | 20.76mV |
| 12V Load Regulation | 0.87% |

| | |
|---|---|
| 5V Load Regulation | 0.84% |
| 3.3V Load Regulation | 0.83% |
| 5VSB Load Regulation | 3.37% |
| Inrush Current | 33.513A |

**230V**

| | | |
|---|---|---|
| Accredited | | |
| Average Efficiency (>1450 load combinations) | 91.112% | |
| Average Noise Output (>1450 Load Combinations) | 24.28dBA | |
| Average PF (>1450 Load Combinations) | 0.892 | |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | - | |
| Standby Power Consumption | 0.1659W | |
| Non-Accredited | | |
| 12V Ripple (Full Load) | 29.99mV | |
| 5V Ripple (Full Load) | 16.84mV | |
| 3.3V Ripple (Full Load) | 27.91mV | |
| 5VSB Ripple (Full Load) | 26.10mV | |
| 12V Load Regulation | 0.86% | |
| 5V Load Regulation | 0.84% | |
| 3.3V Load Regulation | 0.89% | |
| 5VSB Load Regulation | 3.35% | |
| Inrush Current | - | |
| Hold-Up Time & PWR_OK Signal | 20.60ms | |
| AC Loss to PWR_OK Hold Up Time | 18.00ms | |
| PWR_OK Inactive to DC Loss Delay | 2.60ms | |
| OPP (0.00°C / 0.00°C) | - | - |

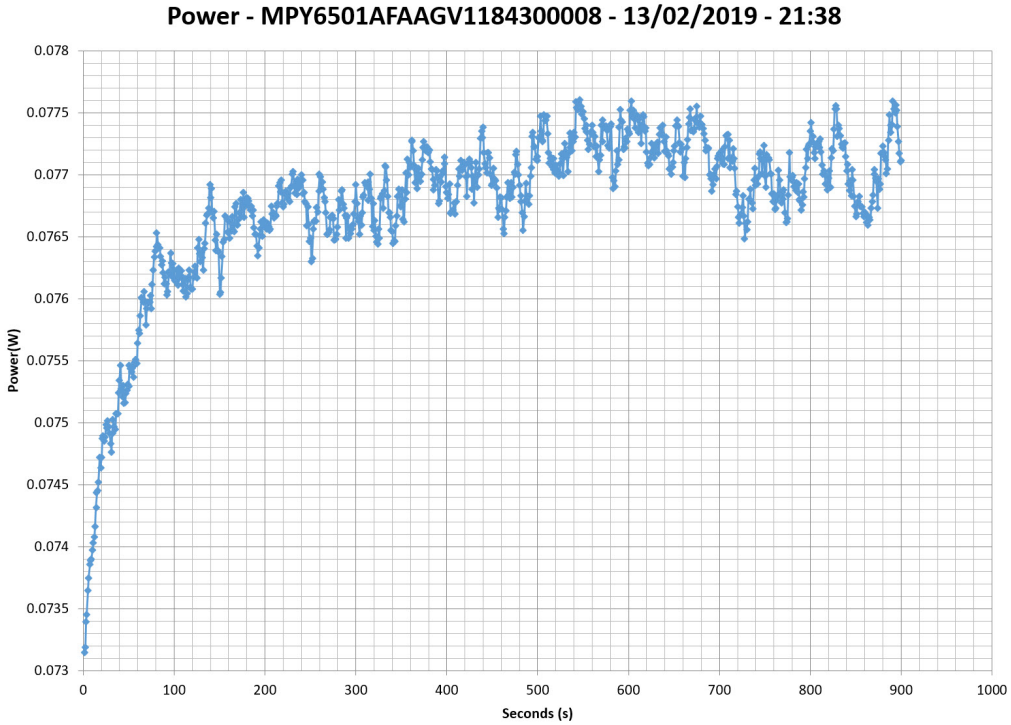
## Hold-Up Time & PWR_OK Signal

| | |
|---|---|
| Hold-Up Time (ms) | 20.6 |
| AC Loss to PWR_OK Hold Up Time (ms) | 18 |

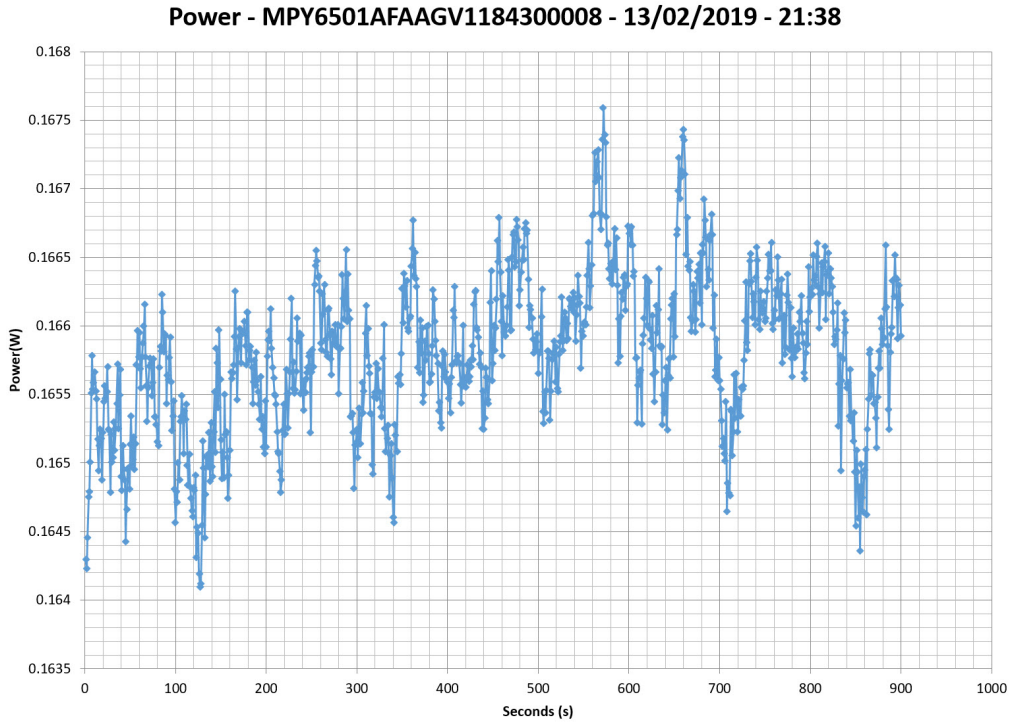
| | |
|---|---|
| PWR_OK Inactive to DC Loss Delay (ms) | 2.6 |

## Graphs

### 115V

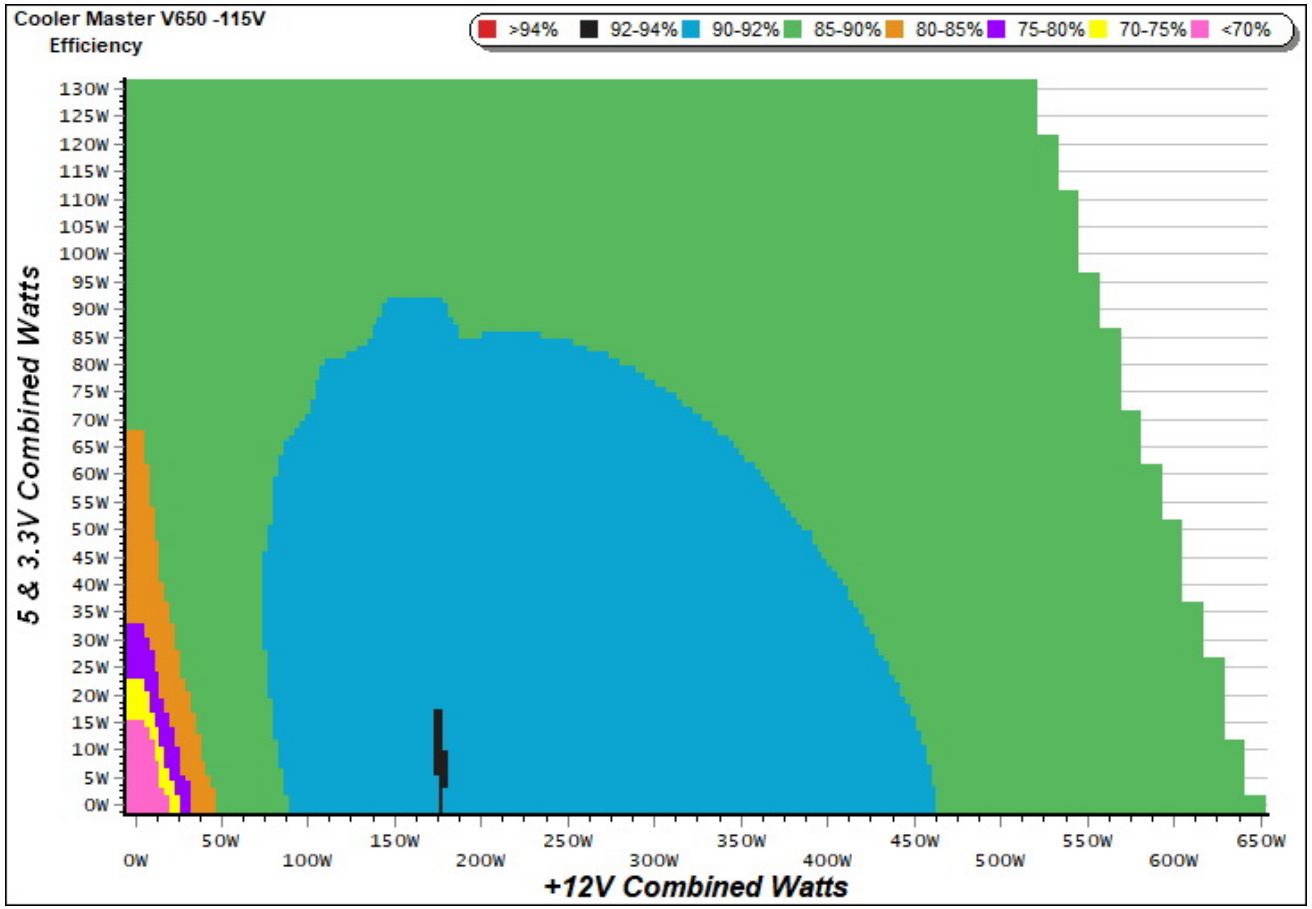



### 230V



## Efficiency Graph

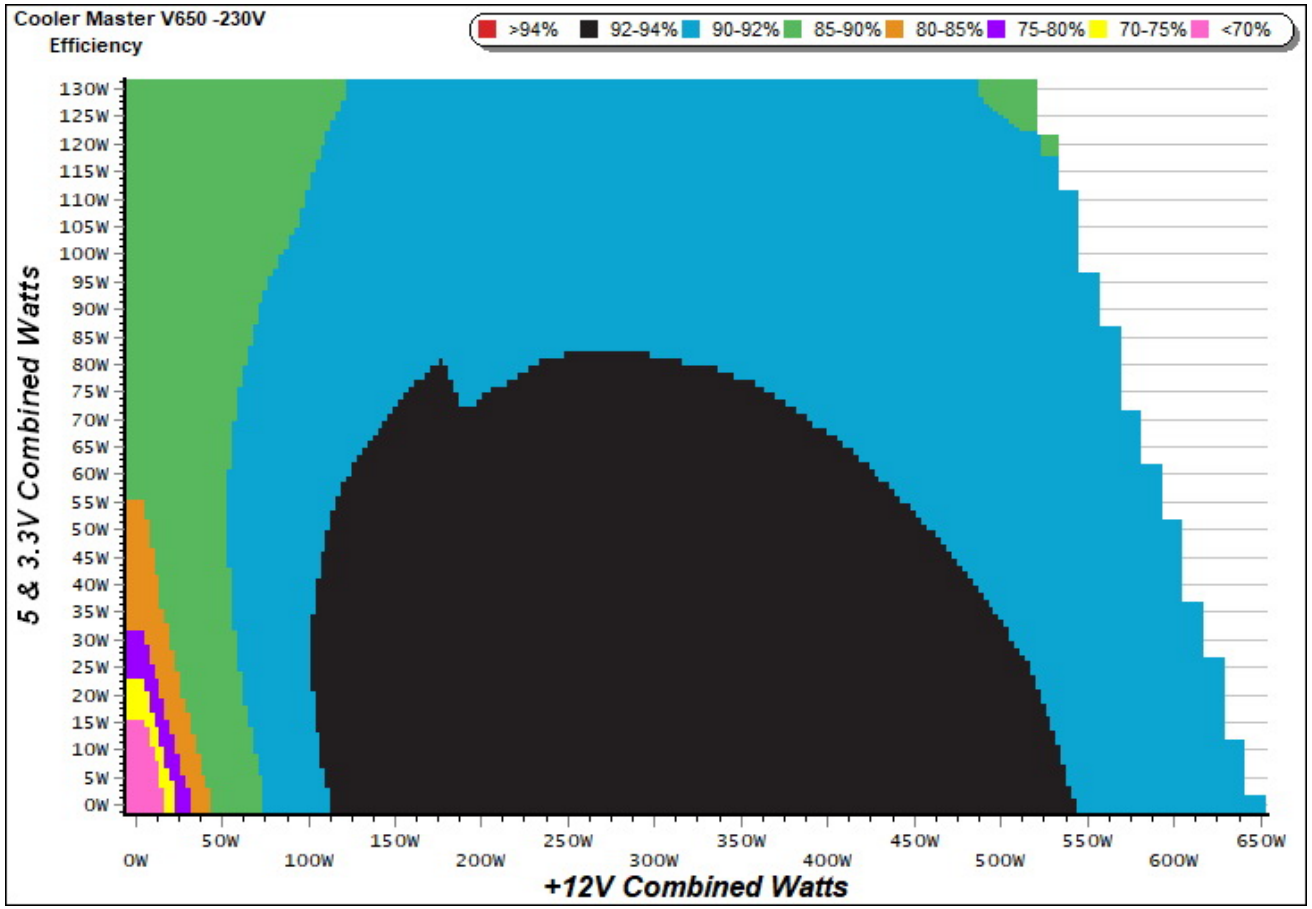
**115V**




**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

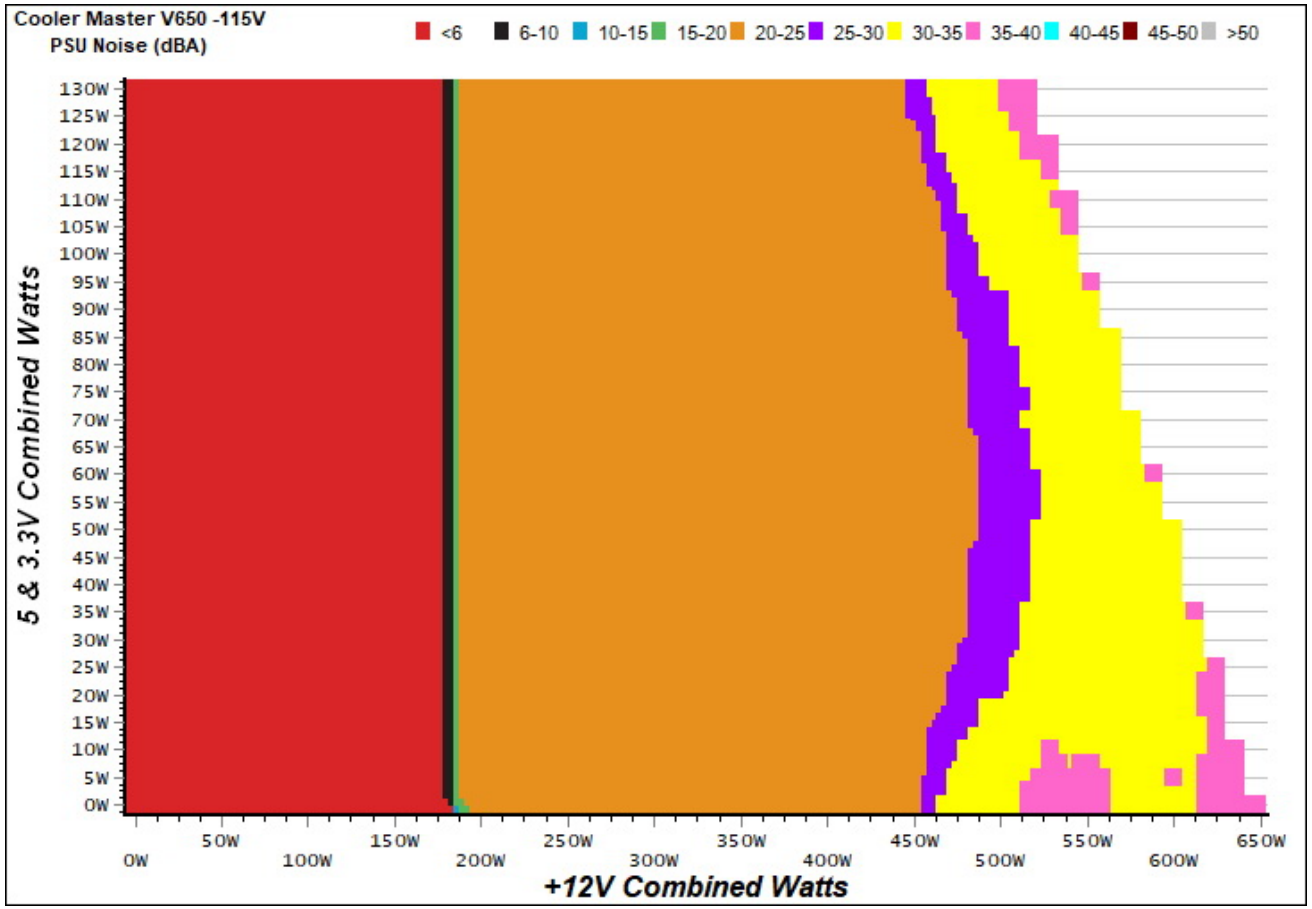



### INFO

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

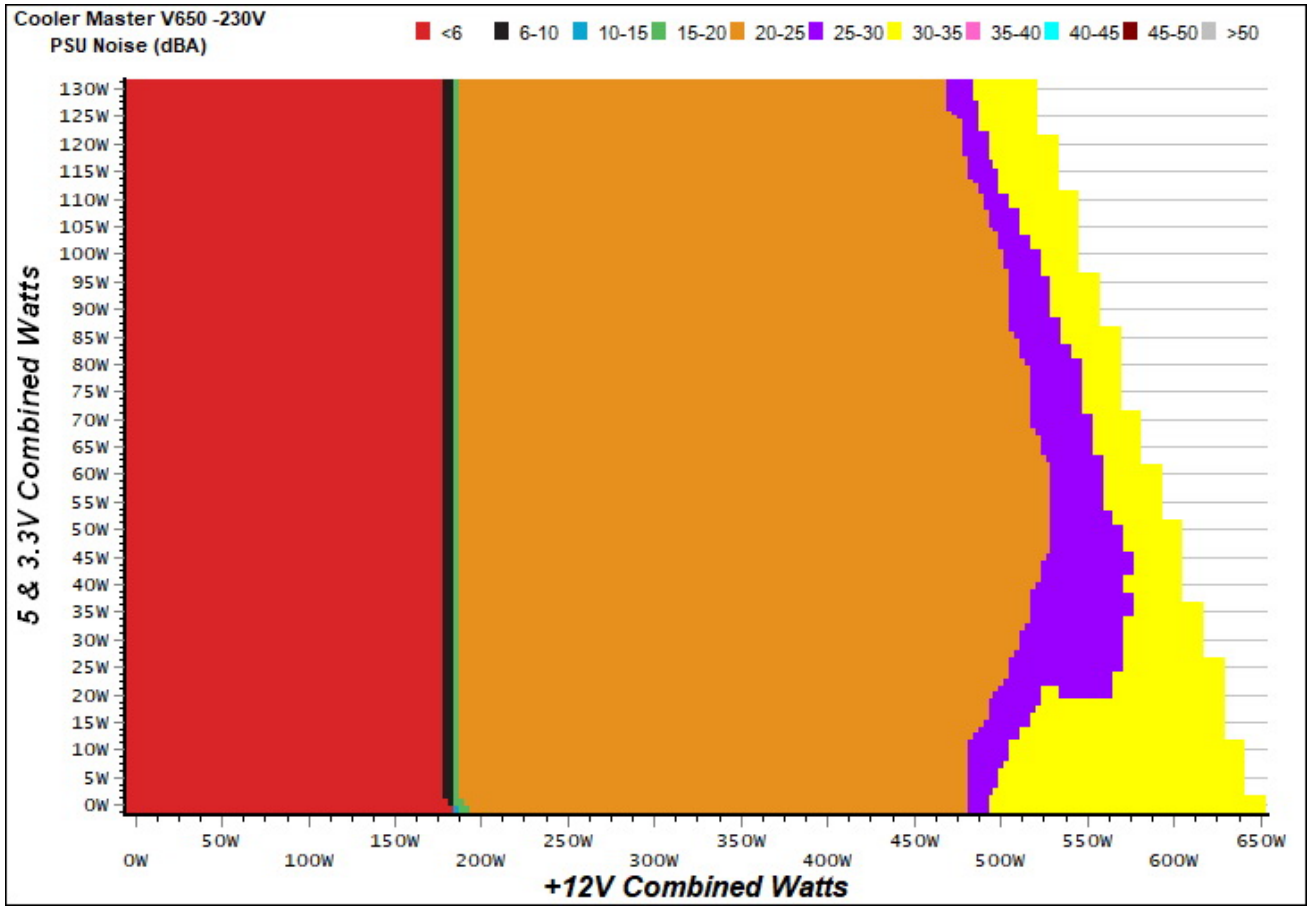
**115V**




**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

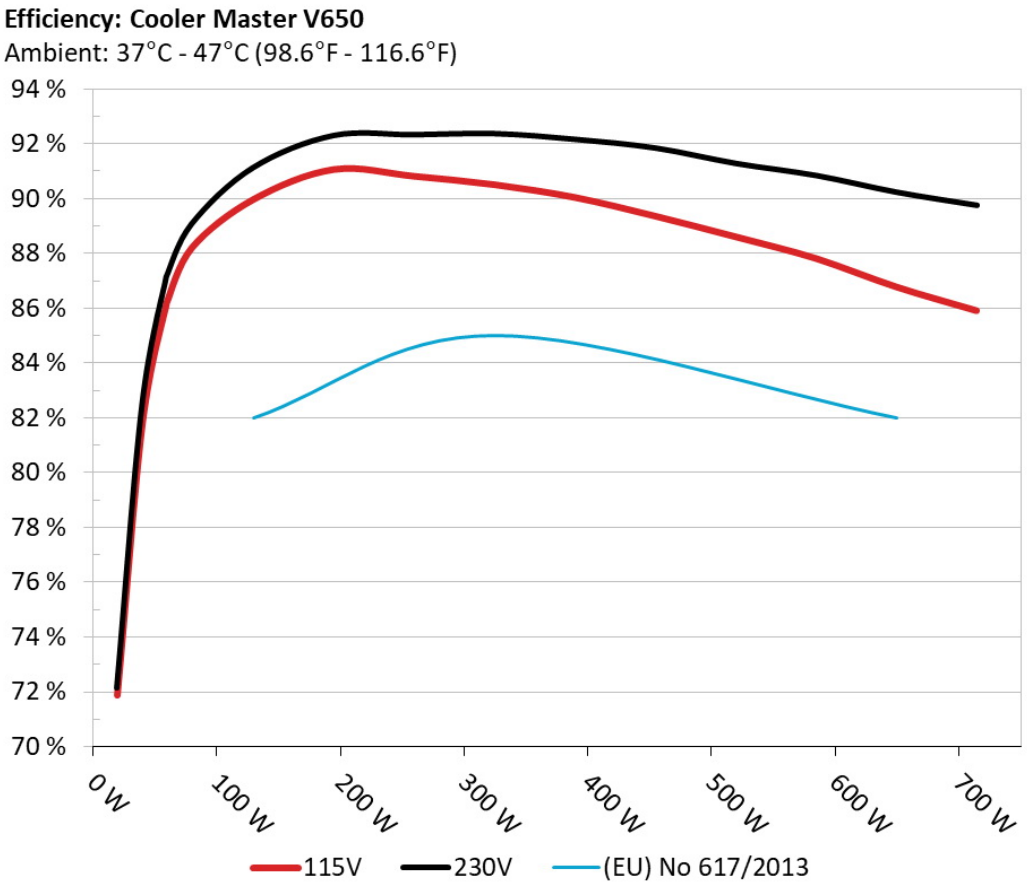



### INFO

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

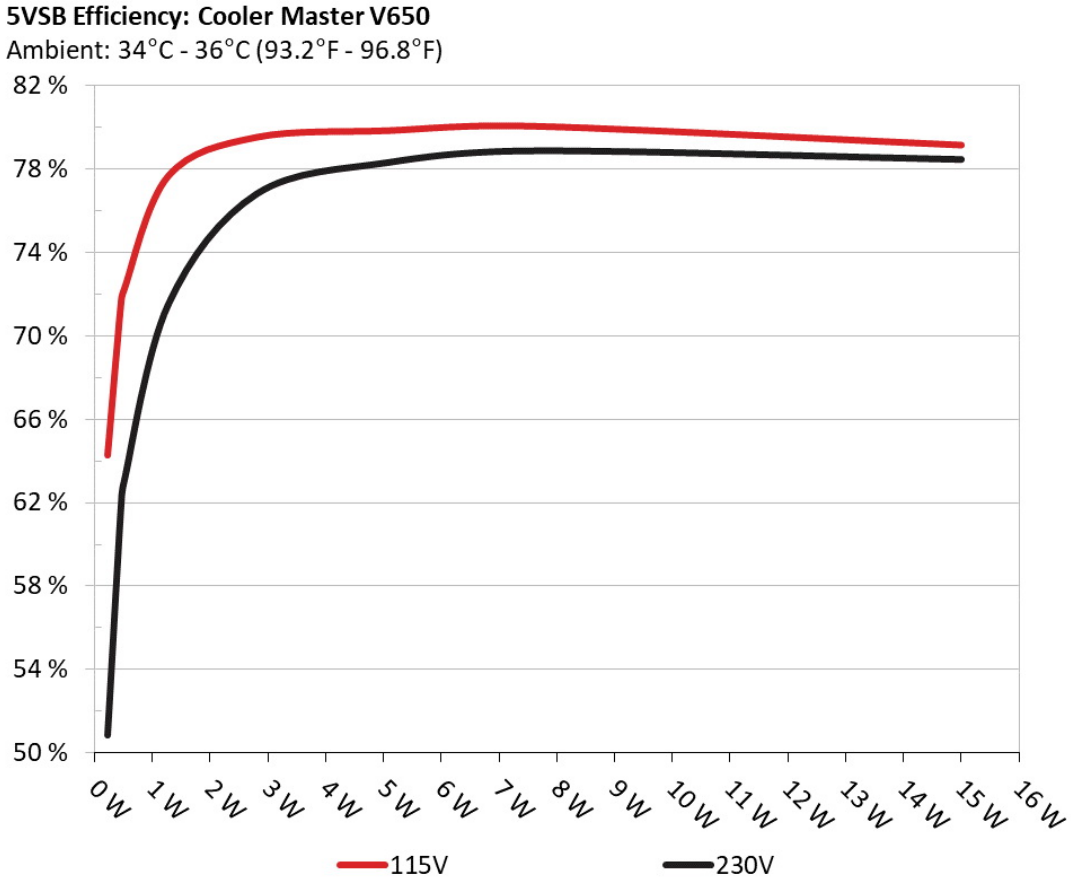
### Efficiency under high ambient temperature




**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 | 0.045A | 0.232 | 64.266% | 0.041 |
| | 5.140V | 0.361 | | 115.10V |
| 2 | 0.090A | 0.463 | 71.561% | 0.072 |
| | 5.138V | 0.647 | | 115.10V |
| 3 | 0.550A | 2.815 | 79.520% | 0.244 |
| | 5.117V | 3.540 | | 115.10V |
| 4 | 1.000A | 5.097 | 79.840% | 0.296 |
| | 5.097V | 6.384 | | 115.10V |
| 5 | 1.500A | 7.612 | 80.050% | 0.323 |
| | 5.074V | 9.509 | | 115.10V |
| 6 | 2.999A | 15.009 | 79.145% | 0.362 |
| | 5.004V | 18.964 | | 115.10V |

### 230V

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.045A | 0.232 | 50.877% | 0.019 |
| | 5.139V | 0.456 | | 230.24V |
| 2 | 0.090A | 0.463 | 61.816% | 0.030 |
| | 5.137V | 0.749 | | 230.23V |
| 3 | 0.550A | 2.814 | 76.801% | 0.129 |
| | 5.115V | 3.664 | | 230.24V |
| 4 | 1.000A | 5.095 | 78.300% | 0.189 |
| | 5.095V | 6.507 | | 230.24V |
| 5 | 1.500A | 7.608 | 78.856% | 0.229 |
| | 5.072V | 9.648 | | 230.24V |
| 6 | 3.000A | 15.004 | 78.444% | 0.284 |
| | 5.002V | 19.127 | | 230.23V |

## 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 | 3.574A | 1.991A | 1.956A | 0.983A | 64.904 | 86.205% | 0 | <6.0 | 44.49°C | 0.898 |
| | 12.115V | 5.024V | 3.375V | 5.088V | 75.290 | | | | 40.12°C | 115.14V |
| 2 | 8.136A | 2.990A | 2.933A | 1.183A | 129.381 | 89.955% | 0 | <6.0 | 45.67°C | 0.941 |
| | 12.104V | 5.019V | 3.373V | 5.074V | 143.829 | | | | 40.70°C | 115.15V |
| 3 | 13.106A | 3.491A | 3.410A | 1.383A | 194.489 | 91.055% | 0 | <6.0 | 46.99°C | 0.961 |
| | 12.093V | 5.015V | 3.370V | 5.061V | 213.594 | | | | 41.33°C | 115.16V |
| 4 | 18.085A | 3.990A | 3.923A | 1.585A | 259.692 | 90.806% | 828 | 23.7 | 41.74°C | 0.978 |
| | 12.081V | 5.014V | 3.365V | 5.048V | 285.986 | | | | 48.14°C | 115.15V |
| 5 | 22.738A | 4.992A | 4.907A | 1.788A | 324.955 | 90.497% | 829 | 23.7 | 42.08°C | 0.983 |
| | 12.070V | 5.010V | 3.362V | 5.034V | 359.079 | | | | 49.19°C | 115.14V |
| 6 | 27.338A | 5.994A | 5.895A | 1.992A | 389.444 | 90.036% | 832 | 23.8 | 42.50°C | 0.987 |
| | 12.058V | 5.005V | 3.359V | 5.021V | 432.543 | | | | 50.63°C | 115.13V |
| 7 | 32.014A | 7.002A | 6.883A | 2.198A | 454.741 | 89.351% | 1002 | 28.9 | 43.14°C | 0.989 |
| | 12.046V | 4.999V | 3.356V | 5.004V | 508.938 | | | | 52.21°C | 115.12V |
| 8 | 36.692A | 8.009A | 7.874A | 2.404A | 520.035 | 88.595% | 1265 | 35.4 | 43.89°C | 0.991 |
| | 12.036V | 4.995V | 3.353V | 4.993V | 586.983 | | | | 53.67°C | 115.12V |
| 9 | 41.781A | 8.515A | 8.356A | 2.405A | 584.950 | 87.804% | 1493 | 39.6 | 44.50°C | 0.993 |
| | 12.026V | 4.991V | 3.350V | 4.990V | 666.202 | | | | 54.96°C | 115.11V |
| 10 | 46.611A | 9.024A | 8.872A | 3.027A | 649.776 | 86.769% | 1644 | 41.9 | 45.33°C | 0.994 |
| | 12.016V | 4.987V | 3.347V | 4.956V | 748.860 | | | | 56.37°C | 115.11V |
| 11 | 52.062A | 9.031A | 8.877A | 3.030A | 714.601 | 85.906% | 1794 | 43.7 | 46.70°C | 0.995 |
| | 12.003V | 4.983V | 3.345V | 4.952V | 831.841 | | | | 58.39°C | 115.11V |
| CL1 | 0.133A | 16.000A | 16.000A | 0.000A | 135.225 | 84.896% | 0 | 0 | 49.72°C | 0.949 |
| | 12.092V | 4.989V | 3.362V | 5.115V | 159.284 | | | | 42.12°C | 115.13V |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CL2 | 54.002A | 1.002A | 0.999A | 1.000A | 662.199 | 87.262% | 1682 | 42.3 | 45.13°C | 0.994 |
| | 12.014V | 4.998V | 3.355V | 5.060V | 758.867 | | | | 56.27°C | 115.11V |

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 | 3.572A | 1.992A | 1.954A | 0.983A | 64.872 | 87.165% | 0 | <6.0 | 44.77°C | 0.709 |
| | 12.114V | 5.022V | 3.376V | 5.086V | 74.424 | | | | 40.02°C | 230.33V |
| 2 | 8.134A | 2.990A | 2.933A | 1.183A | 129.331 | 91.140% | 0 | <6.0 | 45.94°C | 0.807 |
| | 12.102V | 5.017V | 3.373V | 5.072V | 141.904 | | | | 40.50°C | 230.34V |
| 3 | 13.104A | 3.490A | 3.410A | 1.384A | 194.430 | 92.321% | 0 | <6.0 | 47.22°C | 0.855 |
| | 12.091V | 5.012V | 3.371V | 5.059V | 210.602 | | | | 41.11°C | 230.33V |
| 4 | 18.083A | 3.992A | 3.921A | 1.585A | 259.644 | 92.350% | 827 | 23.7 | 41.51°C | 0.885 |
| | 12.080V | 5.012V | 3.365V | 5.047V | 281.151 | | | | 48.59°C | 230.33V |
| 5 | 22.738A | 4.993A | 4.908A | 1.788A | 324.925 | 92.391% | 828 | 23.7 | 42.52°C | 0.906 |
| | 12.069V | 5.008V | 3.361V | 5.034V | 351.683 | | | | 50.17°C | 230.33V |
| 6 | 27.339A | 5.997A | 5.897A | 1.992A | 389.438 | 92.185% | 833 | 23.8 | 42.72°C | 0.919 |
| | 12.057V | 5.004V | 3.358V | 5.020V | 422.453 | | | | 51.16°C | 230.33V |
| 7 | 32.016A | 7.005A | 6.883A | 2.198A | 454.739 | 91.865% | 851 | 24.1 | 43.27°C | 0.935 |
| | 12.045V | 4.998V | 3.355V | 5.006V | 495.010 | | | | 52.69°C | 230.33V |
| 8 | 36.699A | 8.011A | 7.876A | 2.404A | 520.035 | 91.300% | 1211 | 34.3 | 43.72°C | 0.947 |
| | 12.034V | 4.993V | 3.352V | 4.992V | 569.588 | | | | 54.33°C | 230.32V |
| 9 | 41.789A | 8.520A | 8.359A | 2.406A | 584.973 | 90.859% | 1424 | 38.5 | 44.17°C | 0.957 |
| | 12.024V | 4.989V | 3.349V | 4.988V | 643.824 | | | | 55.27°C | 230.32V |
| 10 | 46.624A | 9.029A | 8.876A | 3.028A | 649.797 | 90.251% | 1619 | 41.6 | 45.31°C | 0.965 |
| | 12.013V | 4.984V | 3.346V | 4.955V | 719.990 | | | | 57.12°C | 230.32V |
| 11 | 52.068A | 9.034A | 8.881A | 3.030A | 714.621 | 89.776% | 1756 | 43.2 | 46.77°C | 0.970 |
| | 12.002V | 4.981V | 3.344V | 4.952V | 796.001 | | | | 58.84°C | 230.31V |
| CL1 | 0.135A | 16.002A | 15.998A | 0.000A | 135.220 | 85.936% | 0 | <6.0 | 50.34°C | 0.822 |
| | 12.091V | 4.988V | 3.361V | 5.114V | 157.349 | | | | 42.51°C | 230.30V |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CL2 | 54.009A | 1.003A | 0.997A | 1.000A | 662.116 | 90.847% | 1659 | 42.0 | 45.32°C | 0.965 |
| | 12.011V | 4.995V | 3.355V | 5.059V | 728.824 | | | | 57.18°C | 230.33V |

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 | 1.193A | 0.497A | 0.472A | 0.195A | 19.561 | 71.878% | 0 | <6.0 | 0.774 |
| | 12.127V | 5.031V | 3.376V | 5.129V | 27.214 | | | | 115.13V |
| 2 | 2.448A | 0.995A | 0.976A | 0.391A | 39.975 | 81.844% | 0 | <6.0 | 0.857 |
| | 12.122V | 5.029V | 3.375V | 5.118V | 48.843 | | | | 115.13V |
| 3 | 3.639A | 1.493A | 1.451A | 0.588A | 59.499 | 86.152% | 0 | <6.0 | 0.889 |
| | 12.117V | 5.027V | 3.375V | 5.108V | 69.063 | | | | 115.15V |
| 4 | 4.893A | 1.991A | 1.955A | 0.785A | 79.872 | 88.199% | 0 | <6.0 | 0.912 |
| | 12.113V | 5.025V | 3.374V | 5.097V | 90.559 | | | | 115.14V |

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 | 1.191A | 0.497A | 0.471A | 0.195A | 19.530 | 72.160% | 0 | <6.0 | 0.481 |
| | 12.125V | 5.028V | 3.378V | 5.127V | 27.065 | | | | 230.31V |
| 2 | 2.446A | 0.995A | 0.976A | 0.391A | 39.943 | 82.523% | 0 | <6.0 | 0.611 |
| | 12.120V | 5.026V | 3.377V | 5.116V | 48.402 | | | | 230.32V |
| 3 | 3.638A | 1.492A | 1.449A | 0.588A | 59.462 | 87.010% | 0 | <6.0 | 0.692 |
| | 12.115V | 5.023V | 3.376V | 5.106V | 68.339 | | | | 230.32V |
| 4 | 4.892A | 1.992A | 1.954A | 0.785A | 79.844 | 89.089% | 0 | <6.0 | 0.740 |
| | 12.111V | 5.022V | 3.375V | 5.095V | 89.623 | | | | 230.33V |

The results above are not used in the certification process

## Ripple Measurements

### 115V

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 7.1 mV | 6.7 mV | 14.0 mV | 8.0 mV | Pass |
| 20% Load | 7.4 mV | 8.9 mV | 15.0 mV | 8.6 mV | Pass |
| 30% Load | 8.7 mV | 12.7 mV | 18.0 mV | 9.6 mV | Pass |
| 40% Load | 10.7 mV | 9.7 mV | 18.7 mV | 10.7 mV | Pass |
| 50% Load | 20.0 mV | 10.6 mV | 19.0 mV | 12.2 mV | Pass |
| 60% Load | 15.0 mV | 12.1 mV | 20.4 mV | 13.5 mV | Pass |
| 70% Load | 18.4 mV | 13.0 mV | 23.0 mV | 14.4 mV | Pass |
| 80% Load | 21.4 mV | 15.1 mV | 24.1 mV | 17.0 mV | Pass |
| 90% Load | 24.5 mV | 14.8 mV | 27.5 mV | 17.3 mV | Pass |
| 100% Load | 36.7 mV | 16.2 mV | 29.8 mV | 20.8 mV | Pass |
| 110% Load | 32.5 mV | 15.6 mV | 28.2 mV | 20.0 mV | Pass |
| Crossload 1 | 12.1 mV | 14.8 mV | 20.2 mV | 12.5 mV | Pass |
| Crossload 2 | 33.6 mV | 15.2 mV | 27.0 mV | 18.2 mV | Pass |

The results above are not used in the certification process

### 230V

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 7.0 mV | 7.1 mV | 13.7 mV | 7.6 mV | Pass |
| 20% Load | 6.8 mV | 9.1 mV | 15.2 mV | 8.8 mV | Pass |
| 30% Load | 8.1 mV | 12.7 mV | 17.9 mV | 9.6 mV | Pass |
| 40% Load | 9.4 mV | 10.1 mV | 18.0 mV | 10.5 mV | Pass |
| 50% Load | 17.0 mV | 10.6 mV | 19.0 mV | 11.4 mV | Pass |
| 60% Load | 13.8 mV | 12.0 mV | 20.7 mV | 12.4 mV | Pass |
| 70% Load | 16.4 mV | 12.8 mV | 22.3 mV | 14.4 mV | Pass |
| 80% Load | 17.6 mV | 14.8 mV | 23.4 mV | 19.3 mV | Pass |

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 90% Load | 24.6 mV | 15.4 mV | 25.7 mV | 19.0 mV | Pass |
| 100% Load | 30.0 mV | 16.8 mV | 27.9 mV | 26.1 mV | Pass |
| 110% Load | 32.4 mV | 16.2 mV | 28.8 mV | 25.7 mV | Pass |
| Crossload 1 | 11.3 mV | 14.8 mV | 20.1 mV | 12.7 mV | Pass |
| Crossload 2 | 31.2 mV | 15.5 mV | 25.6 mV | 18.7 mV | Pass |

The results above are not used in the certification process

## Cooler Master V650 Gold

Top side

Power specifications label

Cybenetics 提供自願性認證方案: 電源供應器方面有 ETA (效率)、 LAMBDA (噪音) 與 SAFE (安全與正確運作)；散熱產品方面有 DELTA (機殼隔音) 與 PHI (風扇風量與靜壓)

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