## Anex

MSI MAG A650GL

Lab ID#: MS65002422
Receipt Date: Apr 4, 2024
Test Date: Apr 19, 2024

Report: 24PS2422A
Report Date: Apr 23, 2024

## DUT INFORMATION

| | |
|---|---|
| Brand | MSI |
| Manufacturer (OEM) | CWT |
| Series | MAG |
| Model Number | MAG A650GL |
| Serial Number | |
| DUT Notes | CWT GPX PLATFORM |

## DUT SPECIFICATIONS

| | |
|---|---|
| Rated Voltage (Vrms) | 100-240 |
| Rated Current (Arms) | 10 |
| Rated Frequency (Hz) | 47-63 |
| Rated Power (W) | 650 |
| Type | ATX12V |
| Cooling | 120mm Fluid Dynamic Bearing Fan (DF1202512FDHN) |
| Semi-Passive Operation | ✗ |
| Cable Design | Fully Modular |

## TEST EQUIPMENT

| | |
|---|---|
| Electronic Loads | Chroma 63601-5 x2<br>Chroma 63600-2<br>63640-80-80 x10<br>63610-80-20 |
| AC Sources | Chroma 6530, APM SP300VAC4000W-P |
| Power Analyzers | RS HMC8015, N4L PPA1530, N4L PPA5530 |
| Oscilloscopes | Picoscope 4444, Rigol DS7014, 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, Keithley 2015 - THD |
| UPS | FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA |
| Isolation Transformer | 4kVA |







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## RESULTS

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

## 115V

| | |
|---|---|
| Average Efficiency | 88.124% |
| Efficiency With 10W (≤500W) or 2% (>500W) | 61.711 |
| Average Efficiency 5VSB | 78.909% |
| Standby Power Consumption (W) | 0.0434000 |
| Average PF | 0.979 |
| Avg Noise Output | 37.10 dB(A) |
| Efficiency Rating (ETA) | GOLD |
| Noise Rating (LAMBDA) | Standard+ |

## POWER SPECIFICATIONS

| Rail | | 3.3V | 5V | 12V | 5VSB | -12V |
|---|---|---|---|---|---|---|
| Max. Power | Amps | 20 | 20 | 54 | 2.5 | 0.3 |
| | Watts | 100 | | 648 | 12.5 | 3.6 |
| Total Max. Power (W) | | 650 | | | | |

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

| | |
|---|---|
| Hold-Up Time (ms) | 14.5 |
| AC Loss to PWR_OK Hold Up Time (ms) | 13.3 |
| PWR_OK Inactive to DC Loss Delay (ms) | 1.2 |







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### CABLES AND CONNECTORS

Modular Cables

| Description | Cable Count | Connector Count (Total) | Gauge | In Cable Capacitors |
|---|---|---|---|---|
| ATX connector 20+4 pin (600mm) | 1 | 1 | 18AWG | No |
| 4+4 pin EPS12V (750mm) | 2 | 2 | 18AWG | No |
| 6+2 pin PCIe (600mm+150mm) | 2 | 4 | 18AWG | No |
| SATA (500mm+150mm+150mm) | 2 | 6 | 18AWG | No |
| 4-pin Molex (500mm+150mm+150mm) / FDD (+155mm) | 1 | 3 / 1 | 18-20AWG | No |







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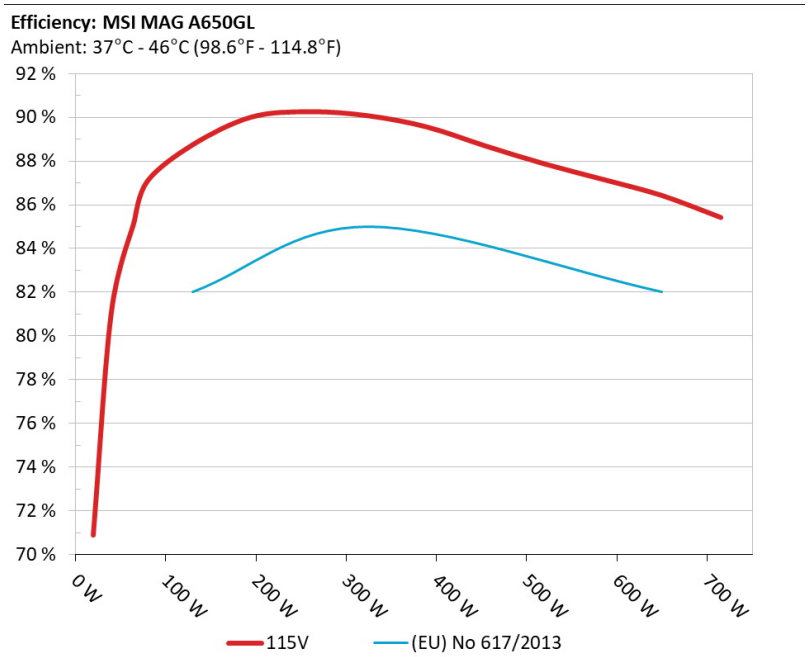
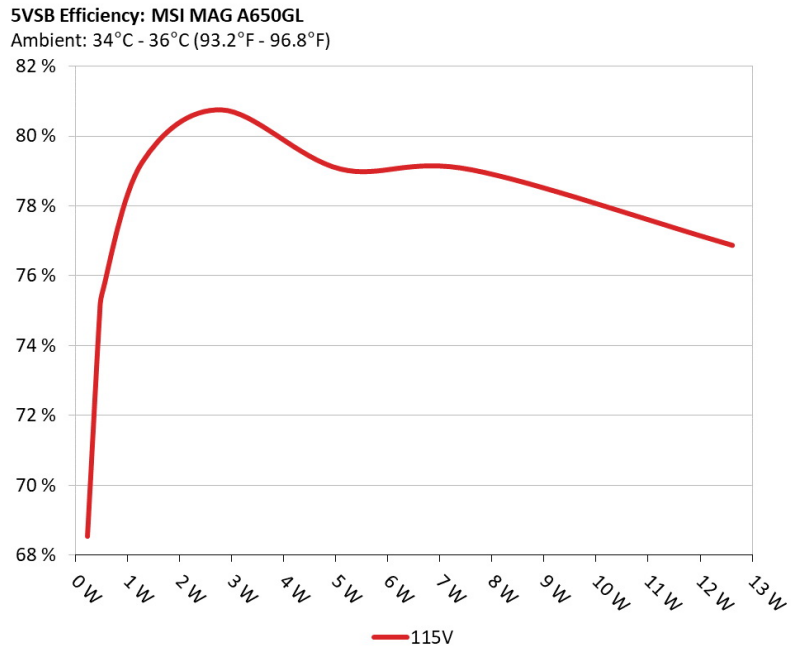
## EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE




**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)

| Test # | 5VSB | DC/AC (Watts) | Efficiency | PF/AC Volts |
|---|---|---|---|---|
| 1 | 0.045A | 0.23W | 68.55% | 0.033 |
| | 5.113V | 0.335W | | 114.94V |
| 2 | 0.09A | 0.46W | 74.842% | 0.06 |
| | 5.111V | 0.614W | | 114.94V |
| 3 | 0.55A | 2.804W | 80.762% | 0.263 |
| | 5.099V | 3.472W | | 114.92V |
| 4 | 1A | 5.087W | 79.068% | 0.352 |
| | 5.087V | 6.434W | | 114.91V |
| 5 | 1.5A | 7.61W | 79.045% | 0.407 |
| | 5.073V | 9.627W | | 114.91V |
| 6 | 2.5A | 12.613W | 76.884% | 0.462 |
| | 5.046V | 16.406W | | 114.9V |

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

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# 115V







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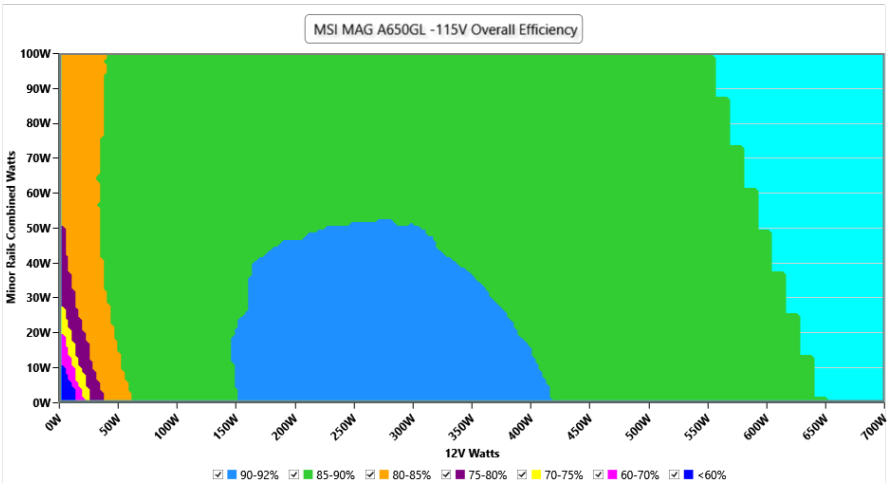
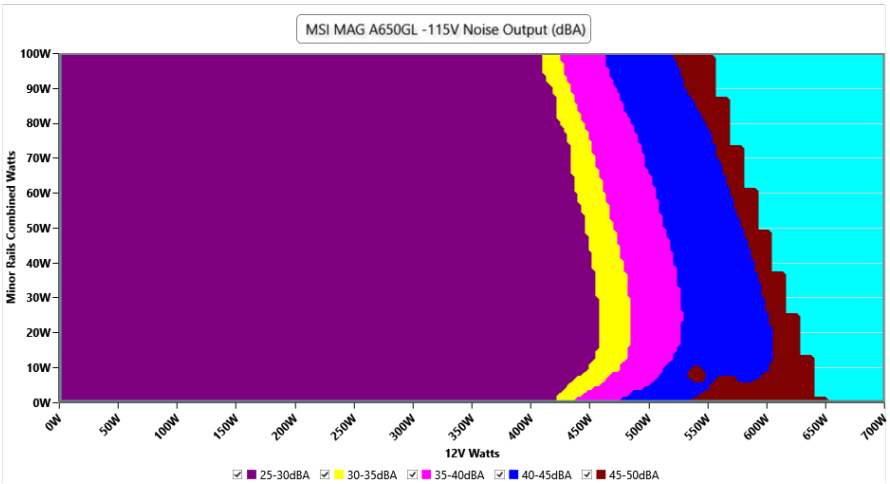
## EFFICIENCY GRAPH 115V




### 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*

## 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*







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### VAMPIRE POWER -115V

**Detailed Results**

| | Average | Min | Limit Min | Max | Limit Max | Result |
|---|---|---|---|---|---|---|
| Mains Voltage RMS: | 115.06 V | 115.03 V | 113.85 V | 115.11 V | 116.15 V | PASS |
| Mains Frequency: | 60.00 Hz | 59.99 Hz | 59.40 Hz | 60.01 Hz | 60.60 Hz | PASS |
| Mains Voltage CF: | 1.416 | 1.415 | 1.340 | 1.418 | 1.490 | PASS |
| Mains Voltage THD: | 0.13 % | 0.09 % | N/A | 0.19 % | 2.00 % | PASS |
| Real Power: | 0.043 W | 0.012 W | N/A | 0.062 W | N/A | N/A |
| Apparent Power: | 10.235 W | 10.148 W | N/A | 10.336 W | N/A | N/A |
| Power Factor: | 0.006 | N/A | N/A | N/A | N/A | N/A |

***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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### 10-110% 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% | 3.612A | 1.994A | 1.981A | 0.985A | 64.997 | 85.059% | 1139 | 29.5 | 40.05°C | 0.955 |
| | 12.016V | 5.015V | 3.331V | 5.075V | 76.417 | | | | 44.33°C | 114.88V |
| 20% | 8.248A | 2.992A | 2.974A | 1.185A | 129.926 | 88.73% | 1144 | 29.6 | 40.9°C | 0.973 |
| | 12.007V | 5.012V | 3.328V | 5.062V | 146.428 | | | | 45.58°C | 114.86V |
| 30% | 13.240A | 3.493A | 3.472A | 1.387A | 194.925 | 89.999% | 1146 | 29.7 | 41.33°C | 0.978 |
| | 11.999V | 5.01V | 3.326V | 5.048V | 216.587 | | | | 46.33°C | 114.84V |
| 40% | 18.247A | 3.993A | 3.971A | 1.589A | 260.007 | 90.248% | 1145 | 29.7 | 41.65°C | 0.981 |
| | 11.991V | 5.009V | 3.325V | 5.035V | 288.104 | | | | 47.27°C | 114.82V |
| 50% | 22.908A | 4.994A | 4.967A | 1.793A | 324.998 | 90.057% | 1154 | 29.9 | 42.36°C | 0.984 |
| | 11.982V | 5.006V | 3.322V | 5.021V | 360.878 | | | | 48.45°C | 114.8V |
| 60% | 27.520A | 5.995A | 5.966A | 1.997A | 389.308 | 89.551% | 1156 | 29.9 | 42.87°C | 0.983 |
| | 11.973V | 5.004V | 3.319V | 5.007V | 434.733 | | | | 49.39°C | 114.77V |
| 70% | 32.221A | 6.999A | 6.966A | 2.203A | 454.611 | 88.678% | 1706 | 40.8 | 43.24°C | 0.982 |
| | 11.965V | 5.002V | 3.316V | 4.992V | 512.653 | | | | 50.3°C | 114.74V |
| 80% | 36.930A | 8.001A | 7.968A | 2.308A | 519.44 | 87.862% | 2200 | 46.2 | 43.65°C | 0.982 |
| | 11.956V | 4.998V | 3.313V | 4.981V | 591.203 | | | | 51.68°C | 114.72V |
| 90% | 42.045A | 8.505A | 8.456A | 2.414A | 584.846 | 87.146% | 2407 | 48.5 | 44.35°C | 0.985 |
| | 11.948V | 4.996V | 3.311V | 4.971V | 671.109 | | | | 53.4°C | 114.69V |
| 100% | 47.102A | 9.009A | 8.975A | 2.52A | 649.578 | 86.417% | 2409 | 48.5 | 44.63°C | 0.987 |
| | 11.940V | 4.994V | 3.309V | 4.959V | 751.672 | | | | 54.79°C | 114.67V |
| 110% | 51.899A | 10.016A | 10.073A | 2.525A | 715.009 | 85.41% | 2411 | 48.6 | 42.81°C | 0.987 |
| | 11.931V | 4.991V | 3.306V | 4.951V | 837.152 | | | | 53.72°C | 114.65V |
| CL1 | 0.115A | 12.044A | 11.985A | 0A | 101.288 | 83.25% | 1153 | 29.9 | 40.46°C | 0.968 |
| | 12.001V | 4.998V | 3.313V | 5.085V | 121.669 | | | | 49.93°C | 114.86V |
| CL2 | 0.115A | 19.998A | 0A | 0A | 101.338 | 80.738% | 1152 | 29.9 | 41.14°C | 0.969 |
| | 12.004V | 4.998V | 3.326V | 5.09V | 125.515 | | | | 50.57°C | 114.87V |
| CL3 | 0.115A | 0A | 19.943A | 0A | 67.394 | 75.329% | 1127 | 29.1 | 40.12°C | 0.959 |
| | 12.003V | 5.01V | 3.31V | 5.091V | 89.466 | | | | 50.2°C | 114.89V |
| CL4 | 54.354A | 0A | 0A | 0A | 649.495 | 87.568% | 2400 | 48.4 | 42.85°C | 0.987 |
| | 11.949V | 5.014V | 3.328V | 5.037V | 741.707 | | | | 52.11°C | 114.68V |







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### 20-80W 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 | 1.236A | 0.498A | 0.495A | 0.196A | 19.995 | 70.878% | 1089 | 28.0 | 36°C | 0.842 |
| | 12.014V | 5.02V | 3.336V | 5.104V | 28.21 | | | | 39.05°C | 114.9V |
| 40W | 2.720A | 0.697A | 0.693A | 0.294A | 39.995 | 81.057% | 1124 | 29.0 | 37.88°C | 0.924 |
| | 12.016V | 5.018V | 3.335V | 5.099V | 49.342 | | | | 41.19°C | 114.89V |
| 60W | 4.204A | 0.897A | 0.891A | 0.393A | 59.995 | 85.178% | 1128 | 29.1 | 38.19°C | 0.953 |
| | 12.018V | 5.018V | 3.334V | 5.094V | 70.434 | | | | 41.74°C | 114.88V |
| 80W | 5.685A | 1.096A | 1.089A | 0.491A | 79.937 | 87.07% | 1134 | 29.4 | 39.59°C | 0.959 |
| | 12.015V | 5.017V | 3.333V | 5.088V | 91.808 | | | | 43.44°C | 114.88V |

### RIPPLE MEASUREMENTS 115V

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 30.01mV | 17.11mV | 17.14mV | 18.11mV | Pass |
| 20% Load | 35.95mV | 17.01mV | 16.88mV | 18.52mV | Pass |
| 30% Load | 34.93mV | 17.11mV | 17.24mV | 20.82mV | Pass |
| 40% Load | 25.31mV | 12.92mV | 12.23mV | 17.03mV | Pass |
| 50% Load | 17.48mV | 13.39mV | 12.58mV | 16.88mV | Pass |
| 60% Load | 16.61mV | 13.23mV | 13.35mV | 18.82mV | Pass |
| 70% Load | 19.63mV | 13.74mV | 13.50mV | 16.88mV | Pass |
| 80% Load | 20.24mV | 14.61mV | 14.99mV | 17.08mV | Pass |
| 90% Load | 21.16mV | 16.40mV | 15.09mV | 18.21mV | Pass |
| 100% Load | 33.10mV | 16.67mV | 15.37mV | 18.06mV | Pass |
| 110% Load | 34.67mV | 17.56mV | 16.06mV | 19.82mV | Pass |
| Crossload1 | 44.66mV | 15.65mV | 17.56mV | 15.19mV | Pass |
| Crossload2 | 38.41mV | 21.76mV | 12.74mV | 15.14mV | Pass |
| Crossload3 | 35.39mV | 12.82mV | 17.60mV | 14.37mV | Pass |
| Crossload4 | 32.97mV | 15.80mV | 14.20mV | 18.44mV | Pass |







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*Top side*


*Power specifications label*

## CERTIFICATIONS 115V

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CYBENETICS STANDARD+

**Aristeidis Bitziopoulos**
Lab Director