# Thermaltake Toughpower GF A3 650W (HKC)

PSTPD0650FNFAGEHPG000334

Lab ID TT65002261

Certification ID 252261

Test Result Report ID: 23PS2261A

Certificate Issue Date: Oct 16, 2023

Scheme: ETA-EMI PSU

115V




230V




Scheme: LAMBDA PSU

115V




230V







Outside Validation Scope



# 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 | Thermaltake |
| Model | Toughpower GF A3 650W (HKC) |
| OEM/ODM | HKC |
| Serial Number | PSTPD0650FNFAGEHPG000334 |
| Product Specifications | |
| Manufacturer-Provided Information | |
| □□□□ (Vrms) | 100-240 |
| □□□□ (Arms) | 10 |

| | |
|---|---|
| □□□□ (Hz) | 50-60 |
| □□□□ (W) | 650 |
| Operating Temperature (Continuous Full Load) (°C) | |
| □□ | ATX12V |
| □□□□ | Fully Modular |
| Warranty | - |
| Cybenetics Measurements | |
| Dimensions (W x H x D) | |
| Weight | |
| □□ | 120mm Fluid Dynamic Bearing Fan<br>[TT-1225 (AV-F12025HS)] |
| □□□□□ | ✓ (selectable) |
| Cybenetics Testing Information | |
| Lab ID | TT65002261 |
| Date of receipt | Aug 17, 2023 |
| Testing Date | Oct 12, 2023 |
| Report Issued Date | Oct 16, 2023 |
| Engineer Name | - |
| Authorized By the Laboratory Technical Manager | Aristeidis Bitziopoulos |
| Signature |  |

## □□□□ (Non-accredited measurements)

| □□□□□ | | | | |
|---|---|---|---|---|
| □□ | □□□□ | □□□□□□ | Gauge | In Cable Capacitors |
| ATX □□ 20+4 pin (600mm) | 1 | 1 | 18AWG | □ |
| 4+4 pin EPS 12V □□ (650mm+150mm) | 1 | 2 | 18AWG | □ |
| 6+2pin PCIe□□ (500mm+150mm) | 2 | 4 | 18AWG | □ |
| 12+4 pin PCIe (600mm) (300W) | 1 | 1 | 18-26AWG | □ |
| SATA□□ (500mm+145mm+145mm+145mm) | 2 | 8 | 18AWG | □ |
| 4-pin Molex (500mm+150+150mm+150mm) | 1 | 4 | 18AWG | □ |
| □ 4pin □□ (145mm) | 1 | 1 | 22AWG | □ |

| | | | | | |
|---|---|---|---|---|---|
| AC Power Cord (1380mm) - C13 coupler | 1 | 1 | 18AWG | - | |

□□□□

| □ | | 3.3V | 5V | 12V | 5VSB | -12V |
|---|---|---|---|---|---|---|
| □□□□ | □□ | 20 | 20 | 51.4 | 3 | 0.3 |
| | □ | 100 | | 649.2 | 15 | 3.6 |
| □□□□□ (W) | | 650 | | | | |

## Parts Description

| General Data | |
|---|---|
| Manufacturer (OEM) | HKC |
| PCB Type | Double-Sided |
| Primary Side | |
| Transient Filter | 6x Y caps, 2x X caps, 2x CM chokes, 1x MOV |
| Inrush Protection | 1x NTC Thermistor 2.5D-15 (2.5 Ohm @ 25°C) & Relay |
| Bridge Rectifier(s) | 2x Diodes GBU1506 (800V, 15A @ 125°C) |
| APFC MOSFETs | 2x LONTEN LSD65R180GT (650V, 20A @ 25°C, Rds(on): 0.018Ohm ) |
| APFC Boost Diode | 1x Global Power Tech. G3S06004J (600V, 11A @ 25°C) |
| Bulk Cap(s) | 2x Rubycon (420V, 330uF each or 660uF combined, 2-3000h @ 105°C, MXH) |
| Main Switchers | 2x MPVA20N50F (500V, 20A @ 25°C, Rds(on): 0.26Ohm ) |
| APFC Controller | Champion CM6500UNX |
| Resonant Controller | Champion CM6901X |
| Topology | Primary side: APFC, Half-Bridge & LLC converter<br>Secondary side: Synchronous Rectification & DC-DC converters |
| Secondary Side | |
| +12V MOSFETs | 4x Advanced Power Electronics AP4NA1R4CMT-A (45V, 39A @ 70°C, Rds(on): 1.4 mOhm) |
| 5V & 3.3V | DC-DC Converters:<br>2x Advanced Power Electronics AP4024GEMT-HF (30V, 20.9A @ 70°C, Rds(on): 4.5mOhm)<br>2x Wayon WMB040N03LG2 (30V, 38A @ 100°C, Rds(on): 4.0mOhm)<br><br>PWM Controller(s): 2x ANPEC APW7164 |

| | |
|---|---|
| Filtering Capacitors | Electrolytic:<br>6x CapXon (3,000h @ 105°C, KF)<br>3x Teapo (3,000h @ 105°C, SC)<br><br>Polymer:21x CapXon |
| Supervisor IC | IN1S3151 - SAG |
| Fan Model | TT-1225 (AV-F12025HS) (120mm, 12V, 0.3A, Sleeve Bearing Fan) |
| 5VSB Circuit | |
| Rectifier | SB1045L (45V, 10A) |
| Standby PWM Controller | PN8141 |

# Test Results

## Temperature & Compliance Info

| | |
|---|---|
| □□□□ (°C /°F) | 28-32 / 82.4-89.6 |
| □□ ErP Lot3/6□□ | ✓ |
| □□ (EU) No 617/2013□□ | ✓ |
| ALPM (Alternative Low Power Mode) compatible | ✓ |
| ATX v3.0 Compliance | ✓ |

## Performance Summary

### 115V

| | |
|---|---|
| Accredited | |
| □□□□ (>1450 load combinations) | 89.122% |
| Average Noise Output (>1450 Load Combinations) | 25.56dBA |
| PF□□□ (>1450 Load Combinations) | 0.987 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | 64.582% |
| □□□□□□ | 0.0573W |
| Non-Accredited | |
| 12V Ripple (Full Load) | 39.48mV |
| 5V Ripple (Full Load) | 16.37mV |

| | |
|---|---|
| 3.3V Ripple (Full Load) | 20.11mV |
| 5VSB Ripple (Full Load) | 11.02mV |
| 12V Load Regulation | 0.33% |
| 5V Load Regulation | 1.37% |
| 3.3V Load Regulation | 2.35% |
| 5VSB Load Regulation | 5.29% |
| Inrush Current | 63.720A |

## 230V

| | |
|---|---|
| Accredited | |
| □□□□ (>1450 load combinations) | 91.205% |
| Average Noise Output (>1450 Load Combinations) | 25.29dBA |
| PF□□□ (>1450 Load Combinations) | 0.938 |
| Efficiency With 10W (≤500W) or 2% (>500W) Load | 62.176% |
| □□□□□□ | 0.1137W |
| Non-Accredited | |
| 12V Ripple (Full Load) | 38.10mV |
| 5V Ripple (Full Load) | 16.14mV |
| 3.3V Ripple (Full Load) | 19.93mV |
| 5VSB Ripple (Full Load) | 11.19mV |
| 12V Load Regulation | 0.33% |
| 5V Load Regulation | 1.31% |
| 3.3V Load Regulation | 2.32% |
| 5VSB Load Regulation | 5.29% |
| Inrush Current | 133.200A |
| 12V Transient Response (200%) | 11.58V |
| 5V Transient Response (200%) | 4.967V |
| 3.3V Transient Response (200%) | 3.210V |
| 5VSB Transient Response (200%) | 4.940V |
| □□□□ & PG□□ | 25.90ms |
| AC Loss to PWR_OK Hold Up Time | 20.00ms |
| PWR_OK Inactive to DC Loss Delay | 5.90ms |

| | | |
|---|---|---|
| PSU Timings: T1 (20% / 100%) | 90.0ms | 90.0ms |
| PSU Timings: T3 (20% / 100%) | 122.0ms | 123.0ms |
| OPP (21.52°C / 38.00°C) | 150.13% | 135.00% |

## □□□□ & PG□□

| | |
|---|---|
| Hold-Up Time (ms) | 25.9 |
| AC Loss to PWR_OK Hold Up Time (ms) | 20 |
| PWR_OK Inactive to DC Loss Delay (ms) | 5.9 |

## □□□□

### Tables

#### 115V

| Detailed Results | | | | | | |
|---|---|---|---|---|---|---|
| | Average | Min | Limit Min | Max | Limit Max | Result |
| Mains Voltage RMS: | 114.88 V | 114.84 V | 113.85 V | 114.93 V | 116.15 V | PASS |
| Mains Frequency: | 60.00 Hz | 59.98 Hz | 59.40 Hz | 60.01 Hz | 60.60 Hz | PASS |
| Mains Voltage CF: | 1.416 | 1.415 | 1.340 | 1.419 | 1.490 | PASS |
| Mains Voltage THD: | 0.14 % | 0.11 % | N/A | 0.18 % | 2.00 % | PASS |
| Real Power: | 0.057 W | -0.002 W | N/A | 0.106 W | N/A | N/A |
| Apparent Power: | 10.947 W | 10.916 W | N/A | 10.979 W | N/A | N/A |
| Power Factor: | 0.007 | N/A | N/A | N/A | N/A | N/A |

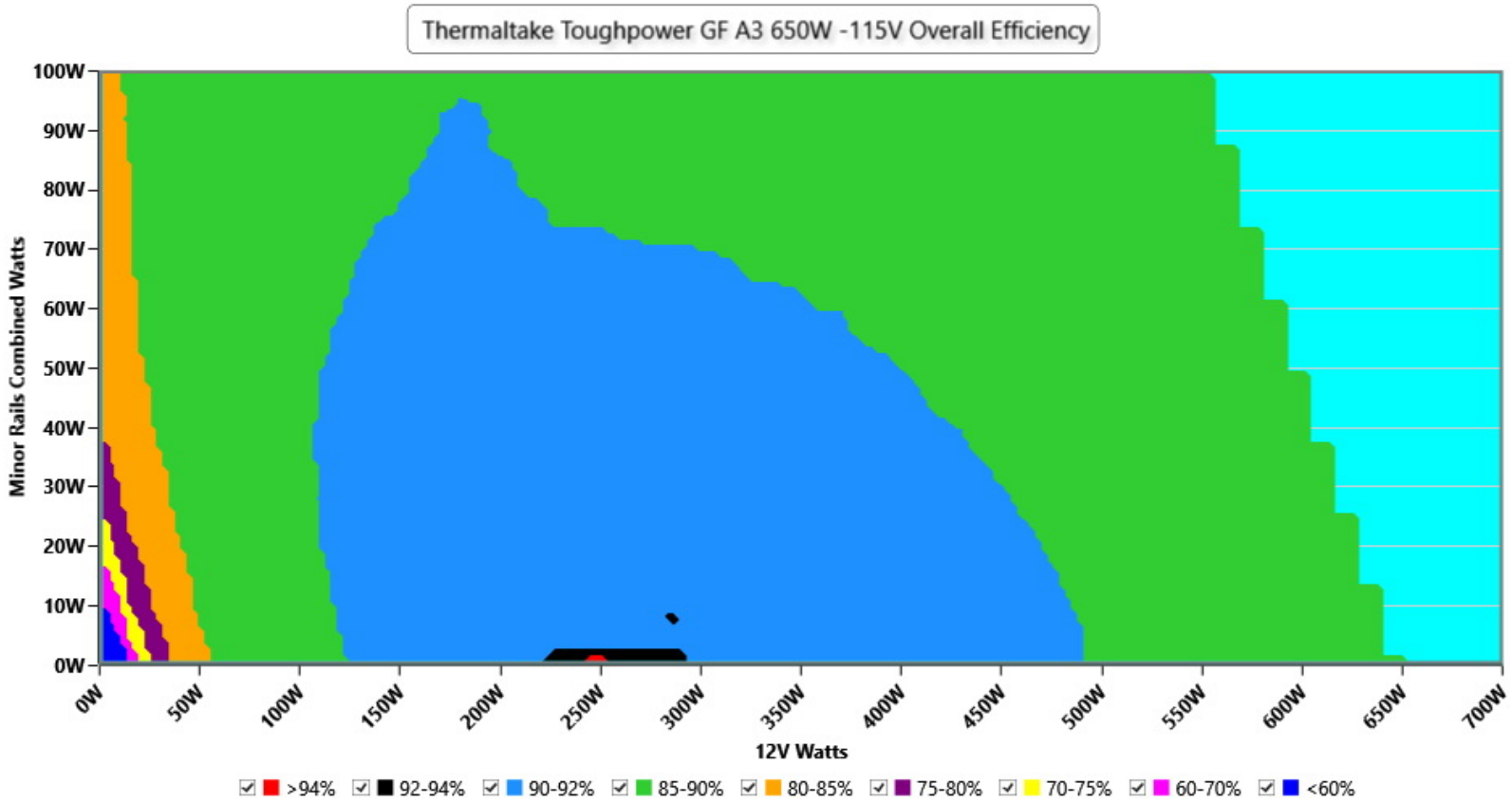
#### 230V

| Detailed Results | | | | | | |
|---|---|---|---|---|---|---|
| | Average | Min | Limit Min | Max | Limit Max | Result |
| Mains Voltage RMS: | 229.95 V | 229.90 V | 227.70 V | 229.99 V | 232.30 V | PASS |
| Mains Frequency: | 50.00 Hz | 50.00 Hz | 49.50 Hz | 50.00 Hz | 50.50 Hz | PASS |

| | | | | | | |
|---|---|---|---|---|---|---|
| Mains Voltage CF: | 1.416 | 1.415 | 1.340 | 1.416 | 1.490 | PASS |
| Mains Voltage THD: | 0.13 % | 0.11 % | N/A | 0.16 % | 2.00 % | PASS |
| Real Power: | 0.114 W | 0.064 W | N/A | 0.170 W | N/A | N/A |
| Apparent Power: | 37.395 W | 37.354 W | N/A | 37.441 W | N/A | N/A |
| Power Factor: | 0.003 | N/A | N/A | N/A | N/A | N/A |

## □□□□□□

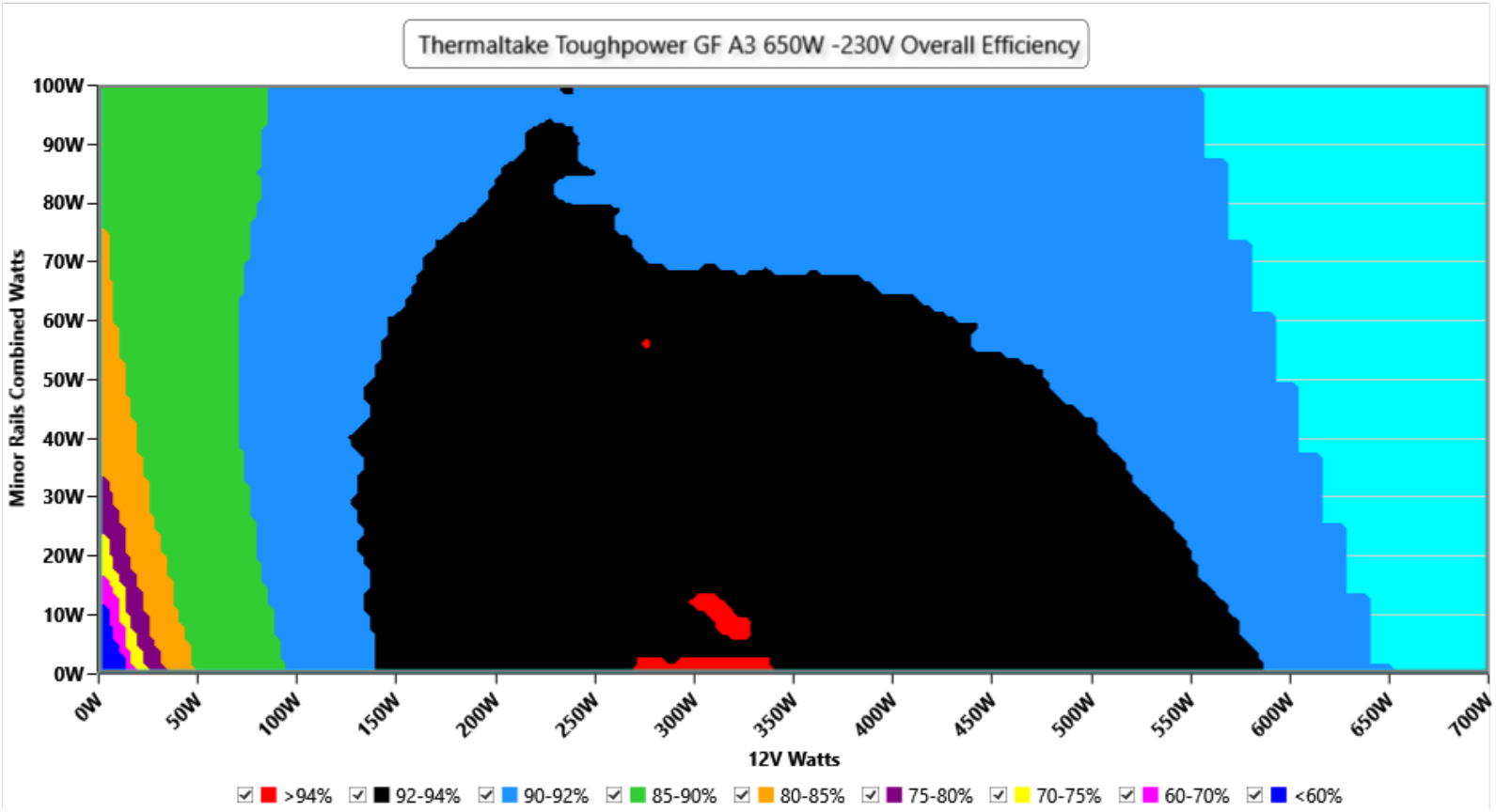
**115V**




□□

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

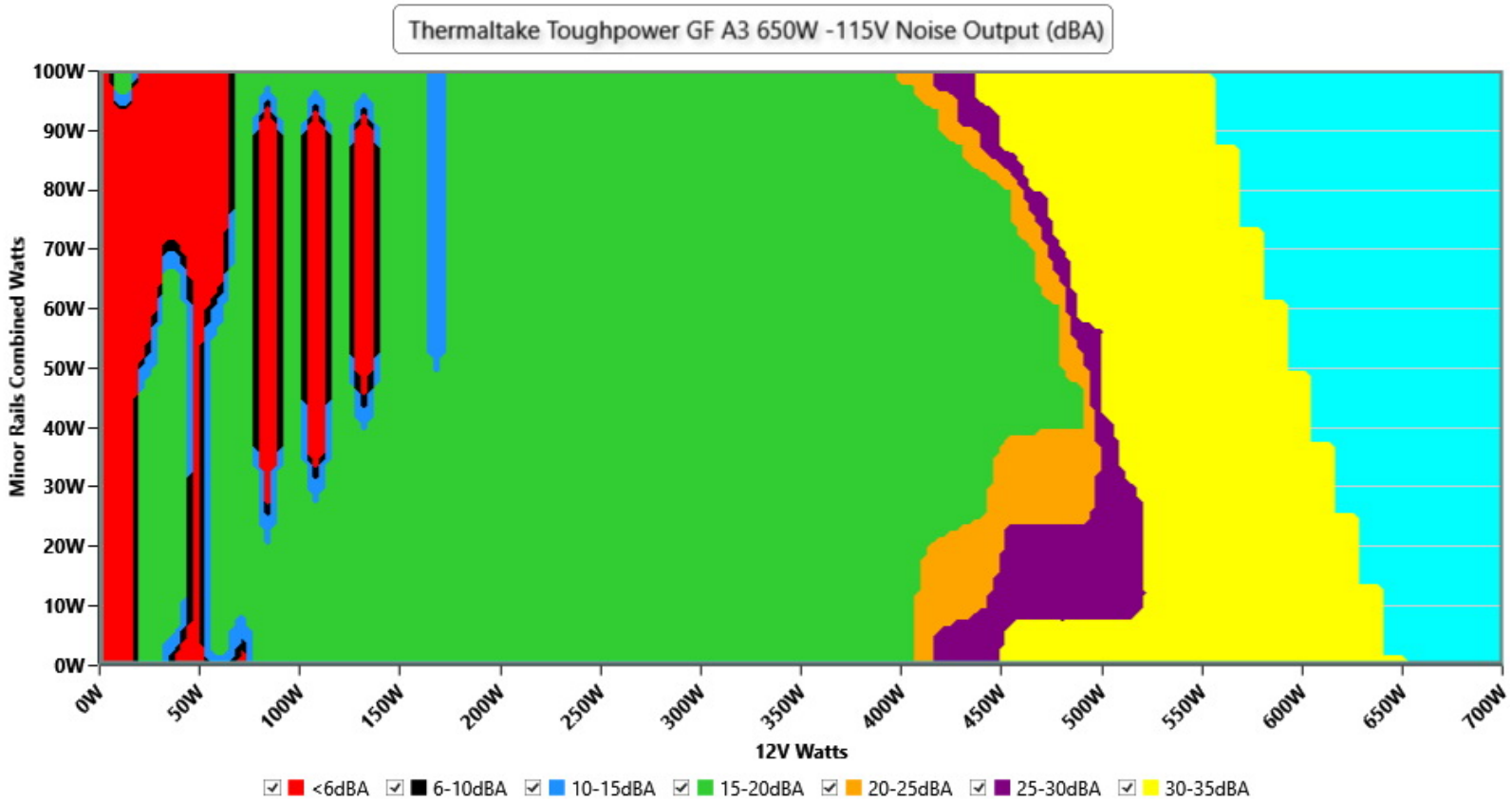
## 230V




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

## □□□□□

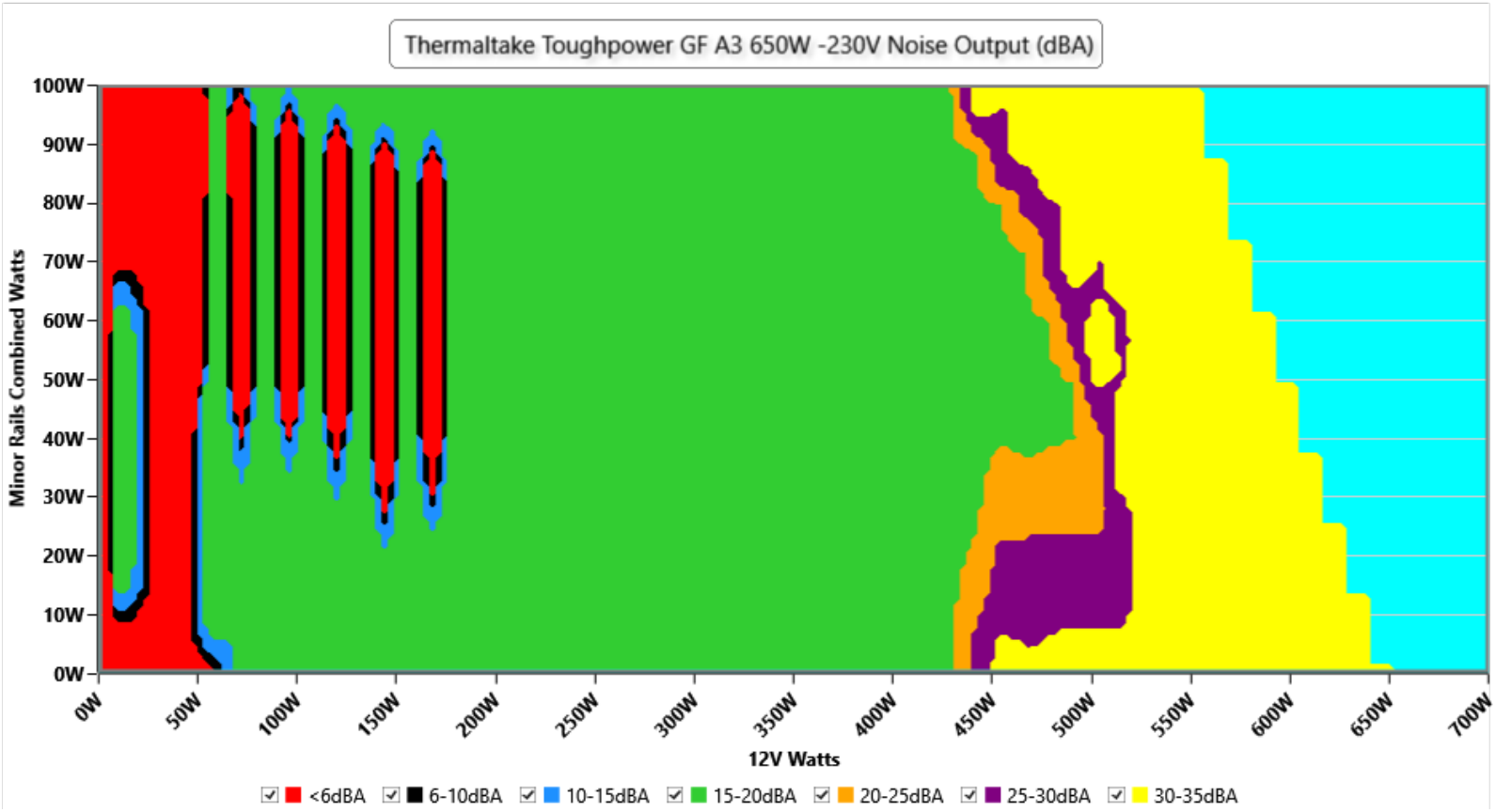
**115V**




□□

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




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

## Noise under high ambient temperature (indicative)

### 115V

| Load | Normal ambient<br>fan · noise · intake | High ambient<br>fan · noise · intake | Noise change |
|---|---|---|---|
| 10% | 737 RPM · 12.2 dB(A) · 40.2 °C | 737 RPM · 12.2 dB(A) · 40.2 °C | **+0.0 dB(A)** |
| 20% | 908 RPM · 20.2 dB(A) · 40.7 °C | 908 RPM · 20.2 dB(A) · 40.7 °C | **+0.0 dB(A)** |
| 50% | 919 RPM · 20.5 dB(A) · 42.2 °C | 919 RPM · 20.5 dB(A) · 42.2 °C | **+0.0 dB(A)** |
| 100% | 1734 RPM · 39.0 dB(A) · 45.0 °C | 1734 RPM · 39.0 dB(A) · 45.0 °C | **+0.0 dB(A)** |

### 230V

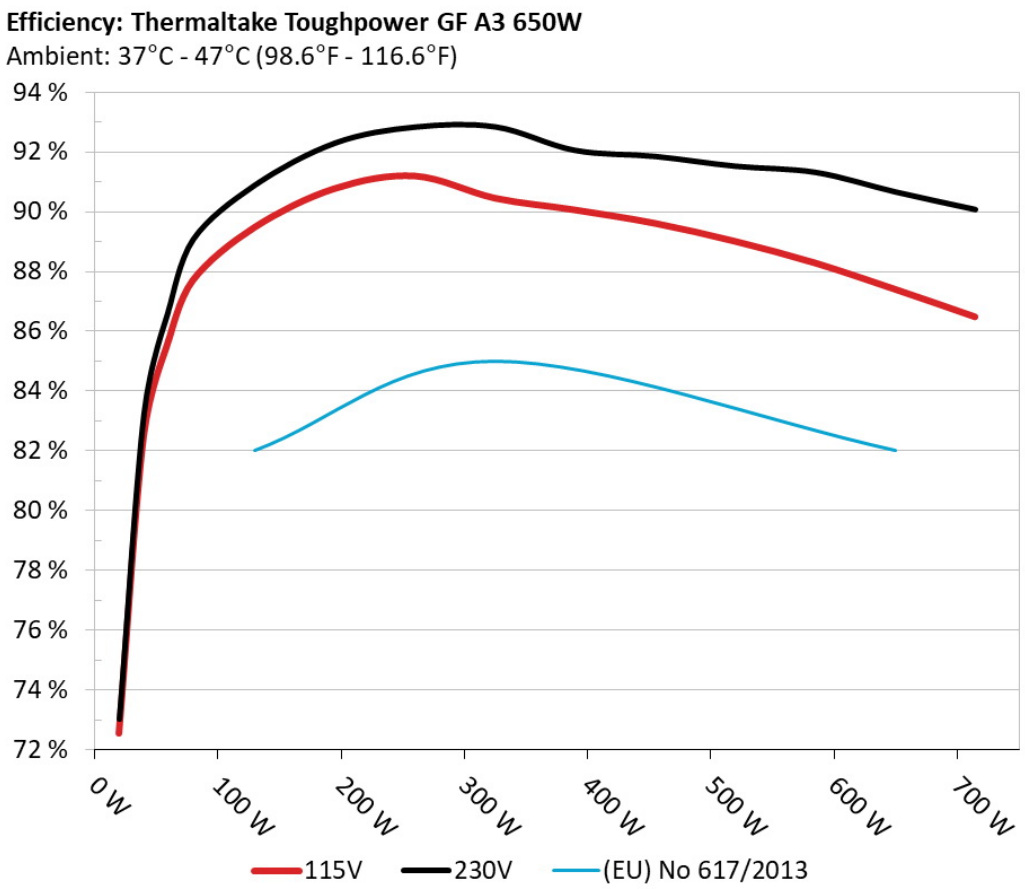
| Load | Normal ambient<br>fan · noise · intake | High ambient<br>fan · noise · intake | Noise change |
|---|---|---|---|
| 10% | 759 RPM · 13.5 dB(A) · 40.2 °C | 759 RPM · 13.5 dB(A) · 40.2 °C | **+0.0 dB(A)** |
| 20% | 913 RPM · 20.3 dB(A) · 40.9 °C | 913 RPM · 20.3 dB(A) · 40.9 °C | **+0.0 dB(A)** |
| 50% | 922 RPM · 20.6 dB(A) · 42.3 °C | 922 RPM · 20.6 dB(A) · 42.3 °C | **+0.0 dB(A)** |
| 100% | 1715 RPM · 38.9 dB(A) · 45.3 °C | 1715 RPM · 38.9 dB(A) · 45.3 °C | **+0.0 dB(A)** |

### INFO

Fan speed, noise and the measured intake temperature at 10, 20, 50 and 100 % load, from the two load regulation tests: at normal ambient (about 30-32 °C) and at high ambient (about 40-47 °C). These are stabilized readings at fixed loads, not averages over the certification sweep, so they are indicative of how the fan behaves when it is hot. "<6.0" is the floor of our sound meter: the fan is stopped or too quiet to measure (the fan speed column says which); with the fan stopped, the intake sensor can read higher than the chamber air.

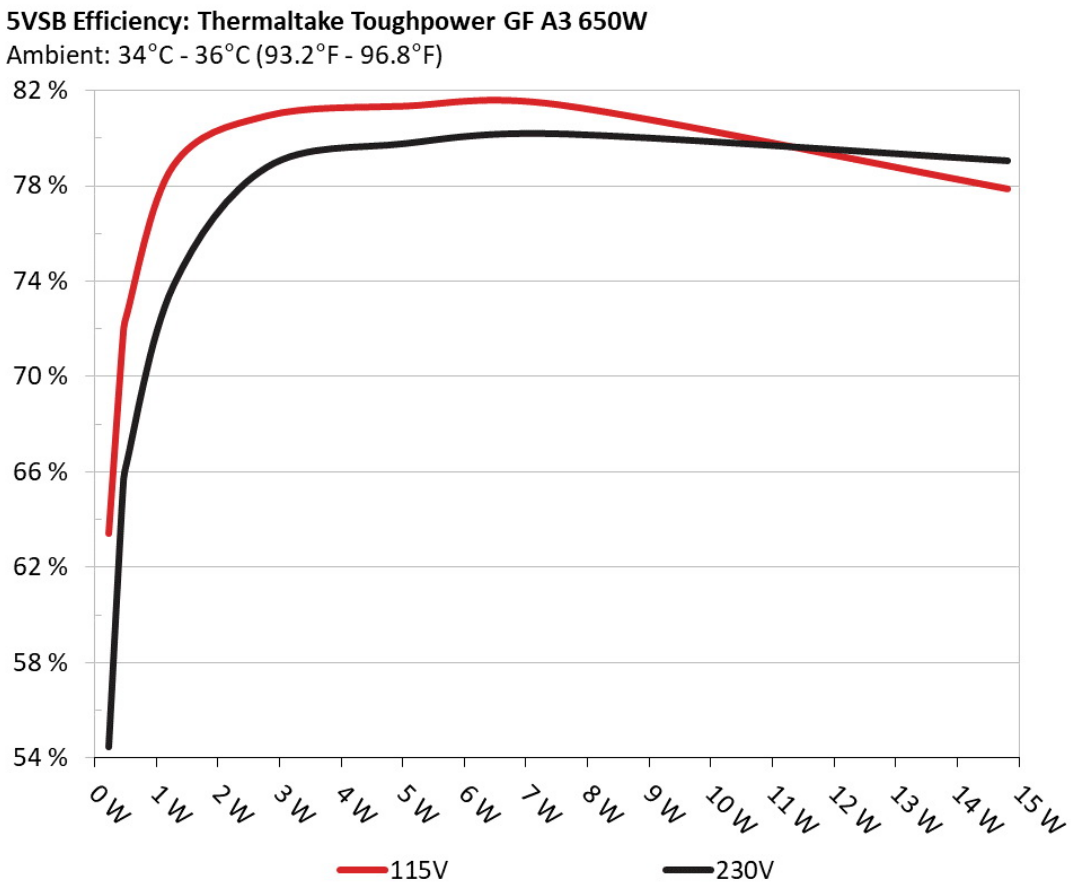
*Informational. Not part of the ETA or LAMBDA rating.*

## Indicative Performance




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□□□□




□□

This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input

## □□□□ □□ 5Vsb □□ (ErP Lot3/6 & CEC)

### 115V

| □□ # | 5VSB | DC/AC (□ ) | □□ | PF/AC □□ |
|---|---|---|---|---|
| 1 | 0.045A | 0.23W | 63.68% | 0.034 |
| | 5.106V | 0.361W | | 114.87V |
| 2 | 0.09A | 0.459W | 71.89% | 0.06 |
| | 5.103V | 0.639W | | 114.87V |
| 3 | 0.55A | 2.793W | 81.186% | 0.249 |
| | 5.078V | 3.44W | | 114.87V |
| 4 | 1A | 5.053W | 81.596% | 0.327 |
| | 5.053V | 6.193W | | 114.87V |
| 5 | 1.5A | 7.538W | 81.65% | 0.378 |
| | 5.025V | 9.232W | | 114.87V |
| 6 | 3A | 14.818W | 78.127% | 0.446 |
| | 4.939V | 18.967W | | 114.86V |

### 230V

| □□ # | 5VSB | DC/AC (□ ) | □□ | PF/AC □□ |
|---|---|---|---|---|
| 1 | 0.045A | 0.23W | 54.71% | 0.012 |
| | 5.106V | 0.421W | | 229.95V |
| 2 | 0.09A | 0.459W | 65.528% | 0.02 |
| | 5.104V | 0.701W | | 229.94V |
| 3 | 0.55A | 2.793W | 79.042% | 0.096 |
| | 5.079V | 3.534W | | 229.94V |
| 4 | 1A | 5.054W | 80.044% | 0.159 |
| | 5.054V | 6.315W | | 229.94V |
| 5 | 1.5A | 7.538W | 80.449% | 0.205 |
| | 5.025V | 9.37W | | 229.94V |
| 6 | 3A | 14.819W | 79.318% | 0.308 |
| | 4.939V | 18.683W | | 229.94V |

## Supplementary Tests (For Reference)

### 10-110%□□□□

#### 115V

| □□ | 12V | 5V | 3.3V | 5VSB | DC/AC (□ ) | □□ | □□□□ (RPM) | □□□□□□□ (dB[A]) | □□ (□□ /□□ ) | PF/AC □□ |
|---|---|---|---|---|---|---|---|---|---|---|
| 10% | 3.608A | 1.967A | 1.971A | 0.993A | 64.999 | 85.67% | 737 | 12.2 | 40.22°C | 0.956 |
| | 12.031V | 5.084V | 3.349V | 5.038V | 75.872 | | | | 44.23°C | 114.84V |
| 20% | 8.236A | 2.955A | 2.964A | 1.196A | 129.932 | 89.473% | 908 | 20.2 | 40.71°C | 0.979 |
| | 12.025V | 5.077V | 3.34V | 5.018V | 145.219 | | | | 45.03°C | 114.82V |
| 30% | 13.218A | 3.452A | 3.466A | 1.401A | 194.936 | 90.77% | 913 | 20.3 | 41.28°C | 0.984 |
| | 12.020V | 5.07V | 3.332V | 4.998V | 214.758 | | | | 46.02°C | 114.8V |
| 40% | 18.211A | 3.95A | 3.969A | 1.607A | 260.015 | 91.189% | 916 | 20.4 | 41.6°C | 0.989 |
| | 12.015V | 5.064V | 3.326V | 4.978V | 285.14 | | | | 46.65°C | 114.78V |
| 50% | 22.845A | 4.944A | 4.973A | 1.816A | 325.002 | 90.449% | 919 | 20.5 | 42.23°C | 0.992 |
| | 12.015V | 5.057V | 3.318V | 4.957V | 359.321 | | | | 47.74°C | 114.75V |
| 60% | 27.431A | 5.94A | 5.982A | 2A | 389.206 | 90.06% | 922 | 20.6 | 42.84°C | 0.993 |
| | 12.013V | 5.051V | 3.31V | 4.937V | 432.162 | | | | 48.86°C | 114.73V |
| 70% | 32.106A | 6.941A | 6.996A | 2.239A | 454.643 | 89.61% | 1128 | 27.4 | 43.08°C | 0.995 |
| | 12.008V | 5.044V | 3.302V | 4.913V | 507.358 | | | | 50.13°C | 114.71V |
| 80% | 36.785A | 7.944A | 8.014A | 2.348A | 519.452 | 89.009% | 1130 | 27.4 | 43.64°C | 0.995 |
| | 12.004V | 5.036V | 3.294V | 4.898V | 583.598 | | | | 51.72°C | 114.68V |
| 90% | 41.863A | 8.45A | 8.52A | 2.458A | 584.839 | 88.28% | 1548 | 36.1 | 44.02°C | 0.996 |
| | 12.000V | 5.029V | 3.286V | 4.882V | 662.483 | | | | 53.12°C | 114.66V |
| 100% | 46.686A | 8.961A | 9.06A | 3.102A | 649.672 | 87.401% | 1734 | 39.0 | 45.01°C | 0.996 |
| | 11.994V | 5.021V | 3.278V | 4.835V | 743.322 | | | | 55.09°C | 114.63V |
| 110% | 51.381A | 9.974A | 10.186A | 3.108A | 714.295 | 86.483% | 2069 | 43.8 | 46.71°C | 0.997 |
| | 11.988V | 5.013V | 3.269V | 4.826V | 825.935 | | | | 57.63°C | 114.6V |
| CL1 | 0.115A | 11.882A | 11.932A | 0A | 101.273 | 84.512% | 915 | 20.4 | 41.15°C | 0.979 |
| | 12.026V | 5.066V | 3.327V | 5.076V | 119.834 | | | | 46.61°C | 114.83V |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CL2 | 0.115A | 19.703A | 0A | 0A | 101.364 | 83.054% | 913 | 20.3 | 40.15°C | 0.98 |
| | 12.029V | 5.074V | 3.345V | 5.083V | 122.046 | | | | 47.24°C | 114.83V |
| CL3 | 0.115A | 0A | 19.832A | 0A | 67.376 | 77.916% | 913 | 20.3 | 41.59°C | 0.963 |
| | 12.026V | 5.081V | 3.328V | 5.079V | 86.472 | | | | 50.69°C | 114.84V |
| CL4 | 54.120A | 0A | 0A | 0A | 649.478 | 88.727% | 1340 | 32.3 | 45.54°C | 0.996 |
| | 12.001V | 5.042V | 3.301V | 5.035V | 732.008 | | | | 56.51°C | 114.63V |

The results above are not used in the certification process

**230V**

| □□ | 12V | 5V | 3.3V | 5VSB | DC/AC (□ ) | □□ | □□□□ (RPM) | □□□□□□□ (dB[A]) | □□ (□□ /□□ ) | PF/AC □□ |
|---|---|---|---|---|---|---|---|---|---|---|
| 10% | 3.608A | 1.967A | 1.971A | 0.993A | 65.006 | 86.734% | 759 | 13.5 | 40.2°C | 0.729 |
| | 12.030V | 5.085V | 3.349V | 5.037V | 74.948 | | | | 44.47°C | 229.93V |
| 20% | 8.236A | 2.955A | 2.964A | 1.196A | 129.937 | 90.886% | 913 | 20.3 | 40.93°C | 0.878 |
| | 12.025V | 5.078V | 3.341V | 5.018V | 142.967 | | | | 45.45°C | 229.92V |
| 30% | 13.217A | 3.451A | 3.465A | 1.4A | 194.93 | 92.294% | 915 | 20.4 | 41.21°C | 0.928 |
| | 12.020V | 5.071V | 3.333V | 4.998V | 211.204 | | | | 46.37°C | 229.91V |
| 40% | 18.209A | 3.949A | 3.968A | 1.607A | 260.007 | 92.828% | 918 | 20.5 | 41.94°C | 0.951 |
| | 12.016V | 5.066V | 3.327V | 4.978V | 280.094 | | | | 47.49°C | 229.9V |
| 50% | 22.849A | 4.943A | 4.972A | 1.816A | 324.997 | 92.832% | 922 | 20.6 | 42.32°C | 0.965 |
| | 12.013V | 5.059V | 3.319V | 4.957V | 350.098 | | | | 48.32°C | 229.89V |
| 60% | 27.430A | 5.939A | 5.98A | 2A | 389.208 | 92.05% | 924 | 20.6 | 42.7°C | 0.973 |
| | 12.014V | 5.052V | 3.311V | 4.937V | 422.824 | | | | 49.24°C | 229.88V |
| 70% | 32.106A | 6.939A | 6.994A | 2.239A | 454.647 | 91.845% | 1132 | 27.5 | 43.24°C | 0.978 |
| | 12.009V | 5.045V | 3.303V | 4.913V | 495.016 | | | | 50.3°C | 229.87V |
| 80% | 36.782A | 7.942A | 8.012A | 2.348A | 519.456 | 91.519% | 1133 | 27.5 | 43.79°C | 0.982 |
| | 12.004V | 5.038V | 3.295V | 4.897V | 567.588 | | | | 51.85°C | 229.85V |
| 90% | 41.883A | 8.455A | 8.523A | 2.455A | 584.767 | 91.312% | 1331 | 32.3 | 44.13°C | 0.984 |
| | 11.992V | 5.026V | 3.285V | 4.888V | 640.406 | | | | 53.19°C | 229.85V |
| 100% | 46.686A | 8.959A | 9.057A | 3.102A | 649.647 | 90.657% | 1715 | 38.9 | 45.29°C | 0.986 |
| | 11.994V | 5.023V | 3.279V | 4.836V | 716.603 | | | | 55.34°C | 229.83V |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 110% | 51.378A | 9.97A | 10.182A | 3.109A | 714.282 | 90.072% | 2073 | 43.8 | 46.72°C | 0.987 |
| | 11.989V | 5.015V | 3.27V | 4.825V | 793.013 | | | | 57.64°C | 229.83V |
| CL1 | 0.115A | 11.875A | 11.925A | 0A | 101.282 | 85.785% | 926 | 20.7 | 41.42°C | 0.843 |
| | 12.031V | 5.069V | 3.329V | 5.074V | 118.062 | | | | 46.93°C | 229.93V |
| CL2 | 0.115A | 19.696A | 0A | 0A | 101.373 | 84.356% | 918 | 20.5 | 40.9°C | 0.846 |
| | 12.033V | 5.076V | 3.346V | 5.081V | 120.174 | | | | 48.05°C | 229.93V |
| CL3 | 0.115A | 0A | 19.824A | 0A | 67.38 | 79.086% | 915 | 20.4 | 40.58°C | 0.767 |
| | 12.029V | 5.083V | 3.329V | 5.078V | 85.199 | | | | 49.64°C | 229.94V |
| CL4 | 54.118A | 0A | 0A | 0A | 649.523 | 91.772% | 1343 | 32.4 | 45.12°C | 0.985 |
| | 12.002V | 5.043V | 3.301V | 5.035V | 707.76 | | | | 56.06°C | 229.83V |

The results above are not used in the certification process

### 20-80□□□□□

#### 115V

| □□ | 12V | 5V | 3.3V | 5VSB | DC/AC (□ ) | □□ | □□□□ (RPM) | □□□□□□□ (dB[A]) | □□ (□□ /□□ ) | PF/AC □□ |
|---|---|---|---|---|---|---|---|---|---|---|
| 20W | 1.234A | 0.491A | 0.492A | 0.196A | 19.993 | 72.56% | 0 | <6.0 | 39.91°C | 0.794 |
| | 12.033V | 5.09V | 3.355V | 5.091V | 27.556 | | | | 36.83°C | 114.85V |
| 40W | 2.716A | 0.688A | 0.689A | 0.295A | 39.993 | 82.482% | 0 | <6.0 | 40.99°C | 0.908 |
| | 12.033V | 5.089V | 3.354V | 5.083V | 48.486 | | | | 37.78°C | 114.85V |
| 60W | 4.198A | 0.884A | 0.886A | 0.394A | 59.992 | 85.986% | 0 | <6.0 | 42.57°C | 0.947 |
| | 12.033V | 5.087V | 3.352V | 5.075V | 69.77 | | | | 38.85°C | 114.85V |
| 80W | 5.677A | 1.082A | 1.083A | 0.493A | 79.933 | 87.704% | 0 | <6.0 | 36.34°C | 0.966 |
| | 12.031V | 5.085V | 3.35V | 5.067V | 91.139 | | | | 40.3°C | 114.84V |

The results above are not used in the certification process

## 230V

| □□ | 12V | 5V | 3.3V | 5VSB | DC/AC (□ ) | □□ | □□□□ (RPM) | □□□□□□□ (dB[A]) | □□ (□□ /□□ ) | PF/AC □□ |
|---|---|---|---|---|---|---|---|---|---|---|
| 20W | 1.234A | 0.491A | 0.492A | 0.196A | 19.997 | 73.035% | 0 | <6.0 | 39.67°C | 0.427 |
| | 12.030V | 5.089V | 3.355V | 5.092V | 27.384 | | | | 36.58°C | 229.94V |
| 40W | 2.718A | 0.688A | 0.689A | 0.295A | 39.999 | 83.26% | 0 | <6.0 | 41.01°C | 0.588 |
| | 12.030V | 5.089V | 3.353V | 5.083V | 48.04 | | | | 37.7°C | 229.94V |
| 60W | 4.200A | 0.885A | 0.886A | 0.394A | 60 | 87.174% | 0 | <6.0 | 41.78°C | 0.702 |
| | 12.030V | 5.088V | 3.352V | 5.075V | 68.825 | | | | 38.27°C | 229.93V |
| 80W | 5.678A | 1.081A | 1.083A | 0.494A | 79.948 | 89.079% | 756 | 13.4 | 39.37°C | 0.779 |
| | 12.031V | 5.086V | 3.35V | 5.066V | 89.75 | | | | 43.16°C | 229.93V |

The results above are not used in the certification process

□□□□

## 115V

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 9.11mV | 10.56mV | 10.03mV | 4.44mV | Pass |
| 20% Load | 12.42mV | 11.03mV | 10.24mV | 4.75mV | Pass |
| 30% Load | 13.51mV | 10.72mV | 11.22mV | 5.01mV | Pass |
| 40% Load | 15.83mV | 11.64mV | 11.27mV | 5.47mV | Pass |
| 50% Load | 19.95mV | 12.78mV | 13.44mV | 5.83mV | Pass |
| 60% Load | 20.62mV | 12.88mV | 14.01mV | 6.45mV | Pass |
| 70% Load | 22.84mV | 14.48mV | 15.93mV | 7.33mV | Pass |
| 80% Load | 26.91mV | 16.33mV | 17.53mV | 8.62mV | Pass |
| 90% Load | 31.09mV | 15.61mV | 18.15mV | 8.72mV | Pass |
| 100% Load | 39.48mV | 16.37mV | 20.11mV | 11.02mV | Pass |
| 110% Load | 41.84mV | 17.63mV | 21.31mV | 11.78mV | Pass |
| Crossload1 | 23.45mV | 15.22mV | 16.49mV | 7.80mV | Pass |
| Crossload2 | 17.32mV | 16.33mV | 19.55mV | 7.43mV | Pass |

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| Crossload3 | 15.00mV | 13.96mV | 12.05mV | 7.38mV | Pass |
| Crossload4 | 33.95mV | 14.42mV | 16.14mV | 12.02mV | Pass |

The results above are not used in the certification process

**230V**

| Test | 12V | 5V | 3.3V | 5VSB | Pass/Fail |
|---|---|---|---|---|---|
| 10% Load | 8.80mV | 10.67mV | 9.20mV | 4.34mV | Pass |
| 20% Load | 11.55mV | 11.18mV | 10.29mV | 4.80mV | Pass |
| 30% Load | 13.87mV | 11.33mV | 10.96mV | 5.06mV | Pass |
| 40% Load | 15.47mV | 11.85mV | 11.69mV | 5.73mV | Pass |
| 50% Load | 18.77mV | 12.52mV | 12.26mV | 6.30mV | Pass |
| 60% Load | 20.57mV | 12.52mV | 14.01mV | 6.87mV | Pass |
| 70% Load | 23.10mV | 14.32mV | 15.51mV | 7.85mV | Pass |
| 80% Load | 25.93mV | 15.40mV | 17.79mV | 8.51mV | Pass |
| 90% Load | 29.23mV | 16.49mV | 18.72mV | 8.83mV | Pass |
| 100% Load | 38.10mV | 16.14mV | 19.93mV | 11.19mV | Pass |
| 110% Load | 40.38mV | 17.22mV | 20.77mV | 12.23mV | Pass |
| Crossload1 | 23.45mV | 15.49mV | 16.44mV | 7.84mV | Pass |
| Crossload2 | 16.14mV | 14.42mV | 18.56mV | 7.28mV | Pass |
| Crossload3 | 13.82mV | 13.81mV | 12.26mV | 7.33mV | Pass |
| Crossload4 | 33.66mV | 14.78mV | 15.70mV | 11.62mV | Pass |

The results above are not used in the certification process

Thermaltake Toughpower GF A3 650W (HKC)





Top side Power specifications label

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