Thermaltake Toughpower GF3 1650W

Serial Number PSTPD1650FNFAGE4SL000342

Lab ID TT16502080

Certification ID 252080

Test Result Report ID: 22PS2080A

Certificate Issue Date: Oct 21, 2022

Scheme: ETA-EMI PSU

115V: CYBENETICS PLATINUM

230V: CYBENETICS PLATINUM 230v

Scheme: LAMBDA PSU

115V	230V
No LAMBDA level	**No LAMBDA level**
Average noise output 45.58 dB(A), above the 45 dB(A) limit of the lowest LAMBDA level (Standard).	Average noise output 45.70 dB(A), above the 45 dB(A) limit of the lowest LAMBDA level (Standard).

CYBENETICS ATX 3.0 PASS

Outside Validation Scope



Aristeidis Bitziopoulos, Certification Body General Manager

General Information

Test Equipment

Electronic Loads	Chroma 63601-5 x2 Chroma 63600-2 Chroma 63640-80-80 x10 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 GF3 1650W
OEM/ODM	High Power
Serial Number	PSTPD1650FNFAGE4SL000342

Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	20-16
Rated Frequency (Hz)	50-60
Rated Power (W)	1650
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	140mm Hydraulic Bearing Fan [TT-1425 (A1425S12S-2)]
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	TT16502080
Date of receipt	Sep 22, 2022
Testing Date	Oct 21, 2022
Report Issued Date	Oct 21, 2022
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 (600mm)	1	1	16-22AWG	No
8 pin EPS12V (750mm)	1	1	16AWG	No
4+4 pin EPS12V (750mm)	1	1	16AWG	No

6+2 pin PCIe (600mm)	3	3	16AWG	No
6+2 pin PCIe (600mm+150mm)	3	6	16-18AWG	No
12+4 pin PCIe (600mm) (600W)	2	2	16-24AWG	No
SATA (600mm+150mm+150mm+150mm)	4	16	18AWG	No
4-pin Molex (600mm+150mm+150mm+150mm)	2	8	18AWG	No
FDD Adapter (150mm)	1	1	22AWG	No
AC Power Cord (1380mm) - C19 coupler	1	1	16AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	25	25	137.5	3	0.3
	Watts	130		1650	15	3.6
Total Max. Power (W)		1650				

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	✓
ALPM (Alternative Low Power Mode) compatible	✓
ATX v3.0 Compliance	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	89.763%
Average Noise Output (>1450 Load Combinations)	45.58dBA
Average PF (>1450 Load Combinations)	0.996

Efficiency With 10W (≤500W) or 2% (>500W) Load	71.010%
Standby Power Consumption	0.0099W
Non-Accredited	
12V Ripple (Full Load)	17.75mV
5V Ripple (Full Load)	16.02mV
3.3V Ripple (Full Load)	29.12mV
5VSB Ripple (Full Load)	20.97mV
12V Load Regulation	1.62%
5V Load Regulation	1.17%
3.3V Load Regulation	0.58%
5VSB Load Regulation	4.66%
Inrush Current	33.370A

230V

Accredited	
Average Efficiency (>1450 load combinations)	91.788%
Average Noise Output (>1450 Load Combinations)	45.70dBA
Average PF (>1450 Load Combinations)	0.981
Efficiency With 10W (≤500W) or 2% (>500W) Load	70.525%
Standby Power Consumption	0.1067W
Non-Accredited	
12V Ripple (Full Load)	15.86mV
5V Ripple (Full Load)	16.24mV
3.3V Ripple (Full Load)	28.42mV
5VSB Ripple (Full Load)	19.20mV
12V Load Regulation	1.60%
5V Load Regulation	1.33%
3.3V Load Regulation	0.55%
5VSB Load Regulation	4.64%
Inrush Current	66.190A
12V Transient Response (200%)	11.13V
5V Transient Response (200%)	4.882V

3.3V Transient Response (200%)		3.191V
5VSB Transient Response (200%)		4.837V
Hold-Up Time & PWR_OK Signal		11.30ms
AC Loss to PWR_OK Hold Up Time		8.40ms
PWR_OK Inactive to DC Loss Delay		2.90ms
PSU Timings: T1 (20% / 100%)	106.0ms	107.0ms
PSU Timings: T3 (20% / 100%)	124.0ms	124.0ms
OPP (33.21°C / 43.21°C)	131.11%	121.29%

Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	11.3
AC Loss to PWR_OK Hold Up Time (ms)	8.4
PWR_OK Inactive to DC Loss Delay (ms)	2.9

Stromverbrauch im Ruhezustand

Tables

115V

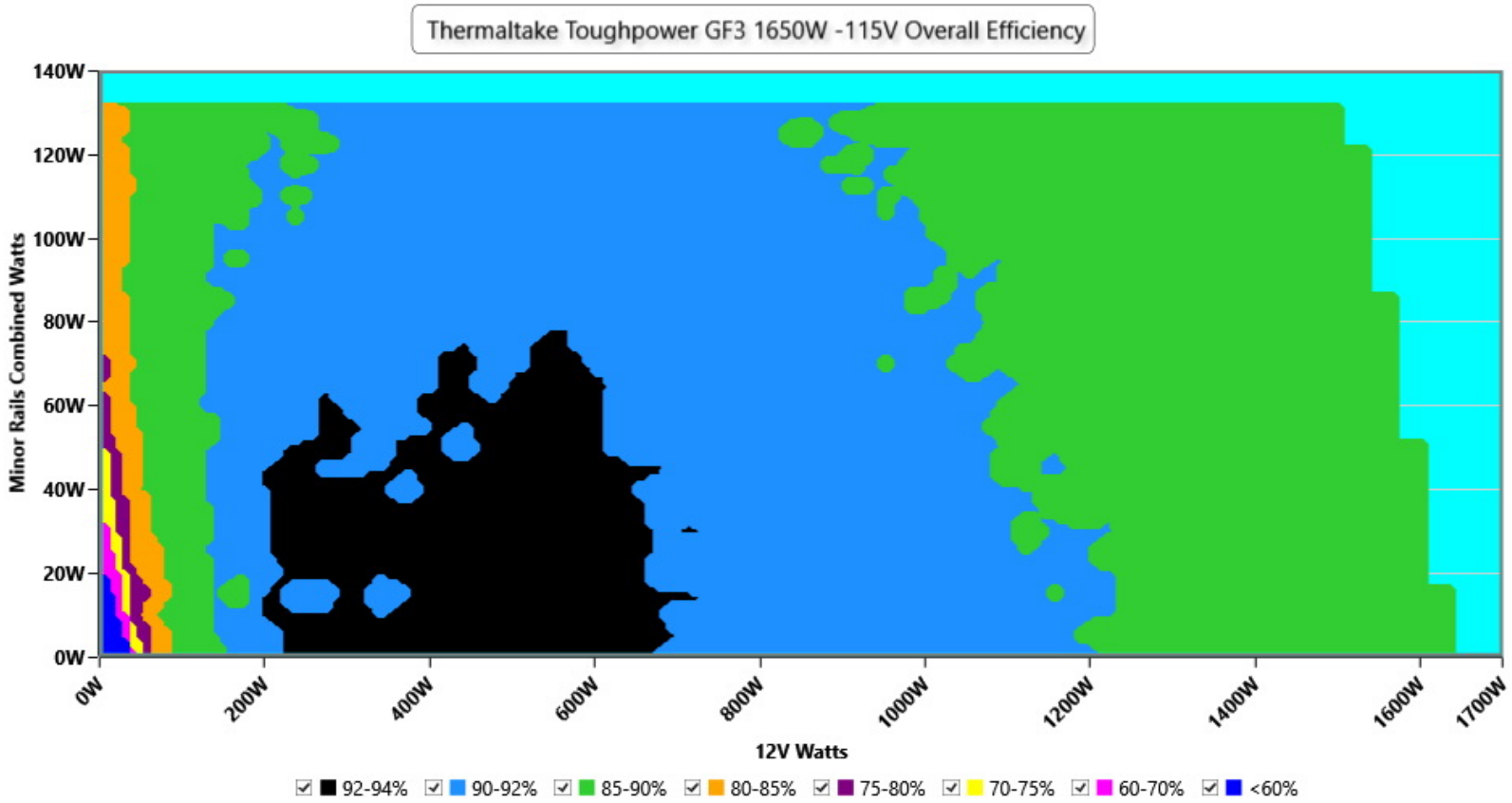
Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	115.16 V	115.15 V	113.85 V	115.18 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.91 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.415	1.415	1.340	1.416	1.490	PASS
Mains Voltage THD:	0.13 %	0.11 %	N/A	0.15 %	2.00 %	PASS
Real Power:	0.010 W	0.003 W	N/A	0.017 W	N/A	N/A
Apparent Power:	6.900 W	6.891 W	N/A	6.917 W	N/A	N/A
Power Factor:	0.001	N/A	N/A	N/A	N/A	N/A

230V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	230.38 V	230.37 V	227.70 V	230.41 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:	1.415	1.415	1.340	1.416	1.490	PASS
Mains Voltage THD:	0.14 %	0.13 %	N/A	0.16 %	2.00 %	PASS
Real Power:	0.107 W	0.082 W	N/A	0.162 W	N/A	N/A
Apparent Power:	23.116 W	23.090 W	N/A	23.139 W	N/A	N/A
Power Factor:	0.004	N/A	N/A	N/A	N/A	N/A

Efficiency Graph

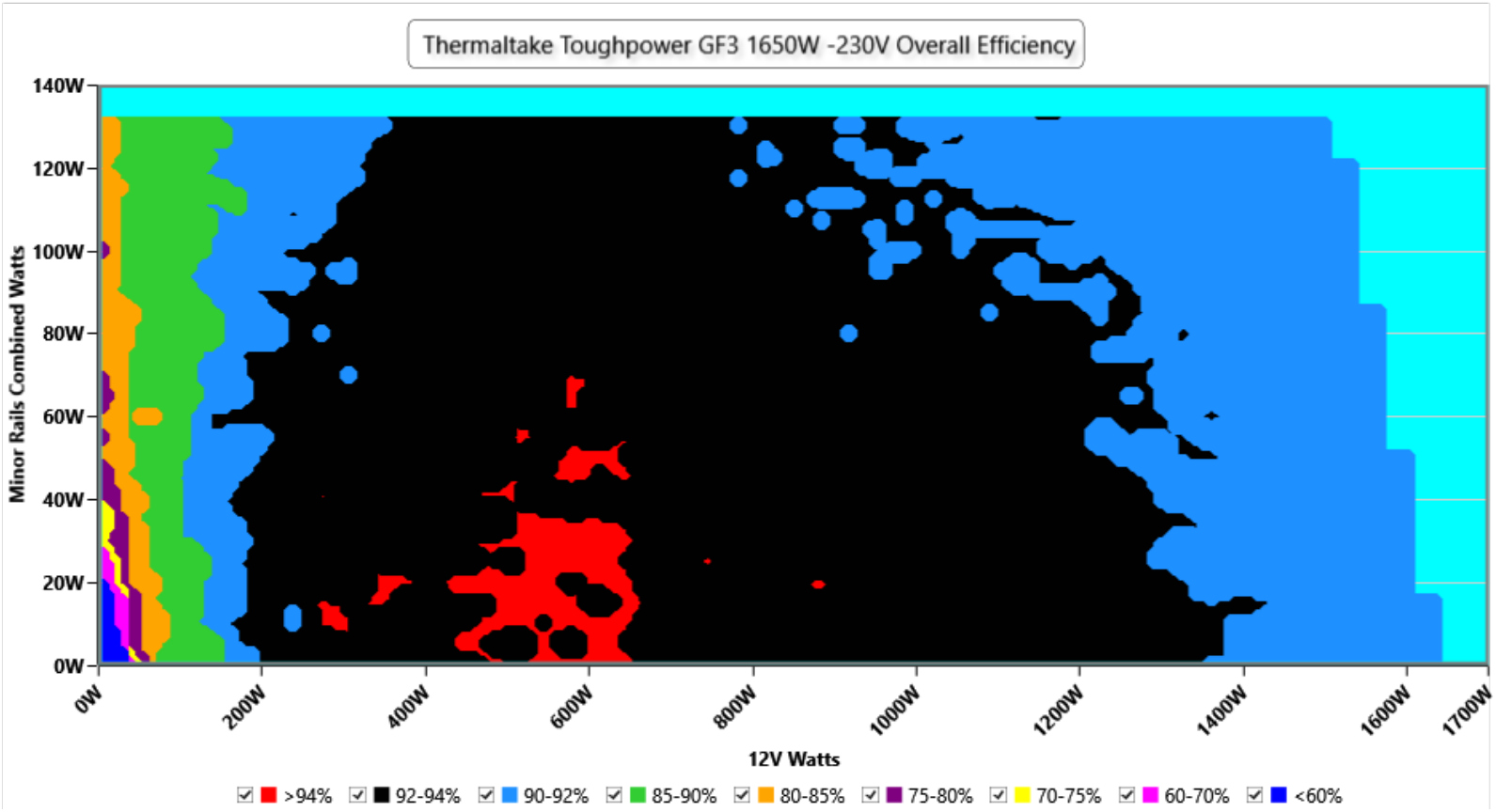
115V



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

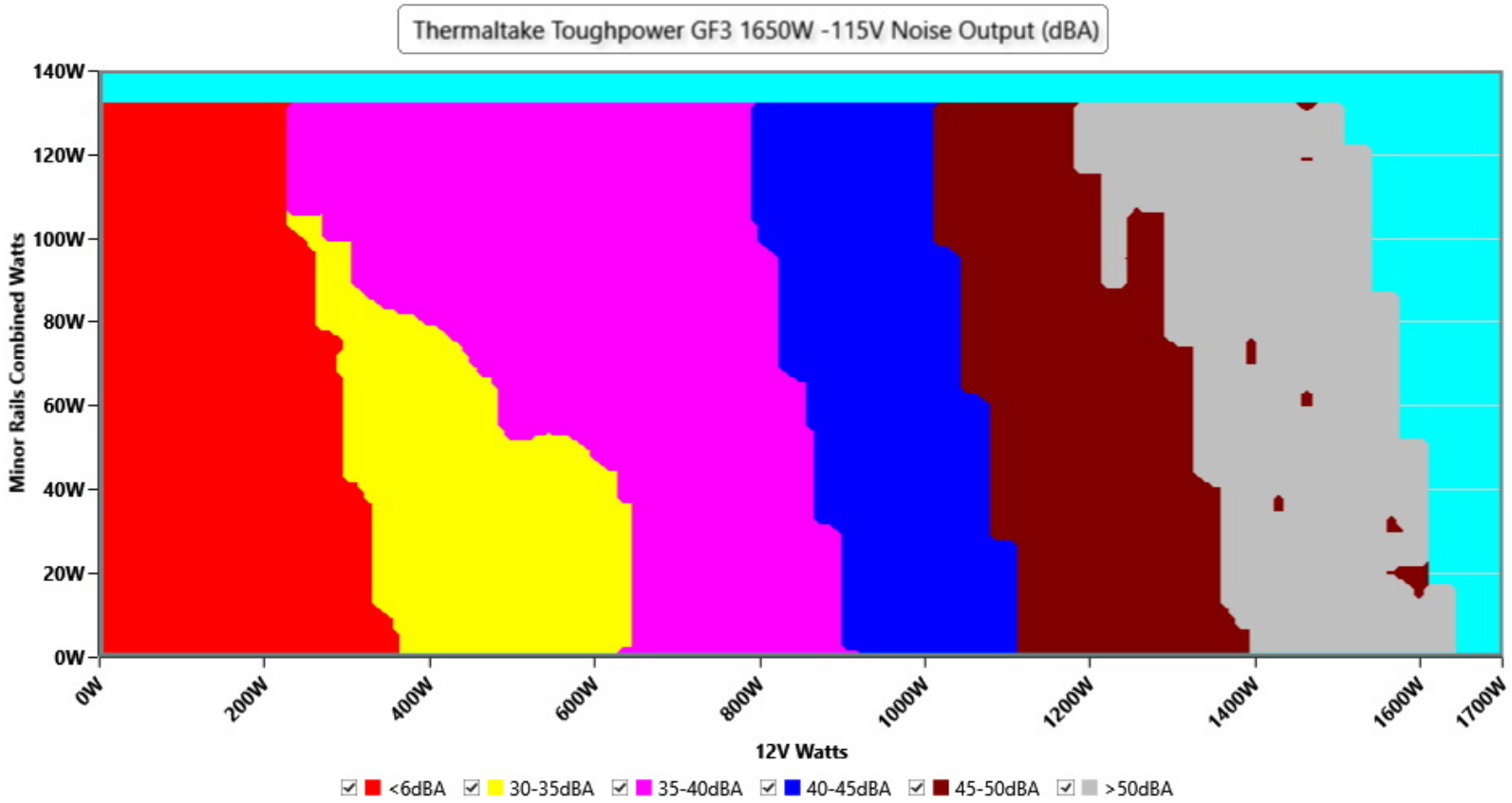


INFO

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

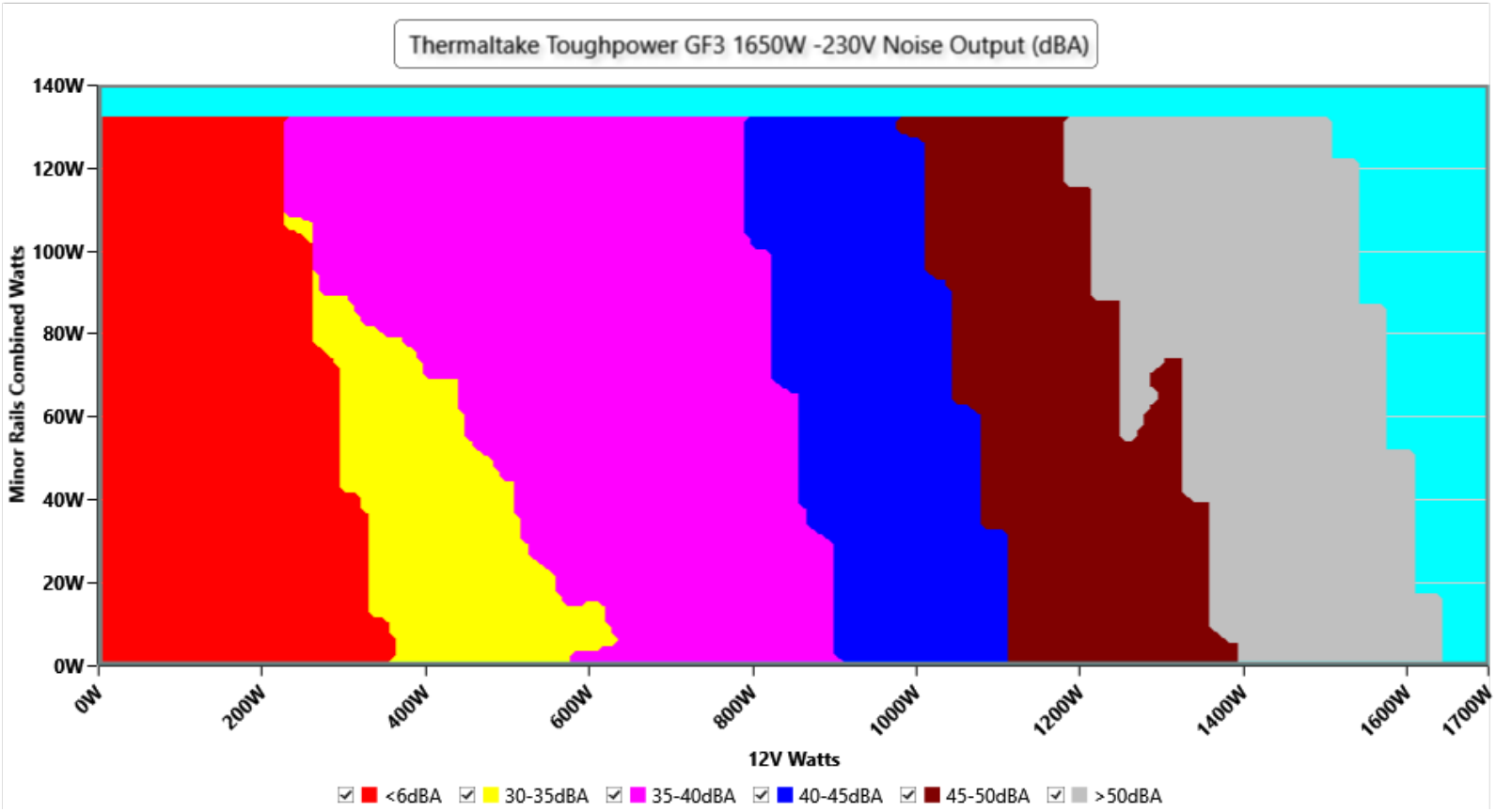
115V



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

Noise under high ambient temperature (indicative)

230V

Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 44.7 °C	0 RPM · <6.0 dB(A) · 44.7 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 45.6 °C	0 RPM · <6.0 dB(A) · 45.6 °C	fan off in both
50%	1199 RPM · 38.6 dB(A) · 42.3 °C	1199 RPM · 38.6 dB(A) · 42.3 °C	**+0.0 dB(A)**
100%	1989 RPM · 51.7 dB(A) · 45.9 °C	1989 RPM · 51.7 dB(A) · 45.9 °C	**+0.0 dB(A)**

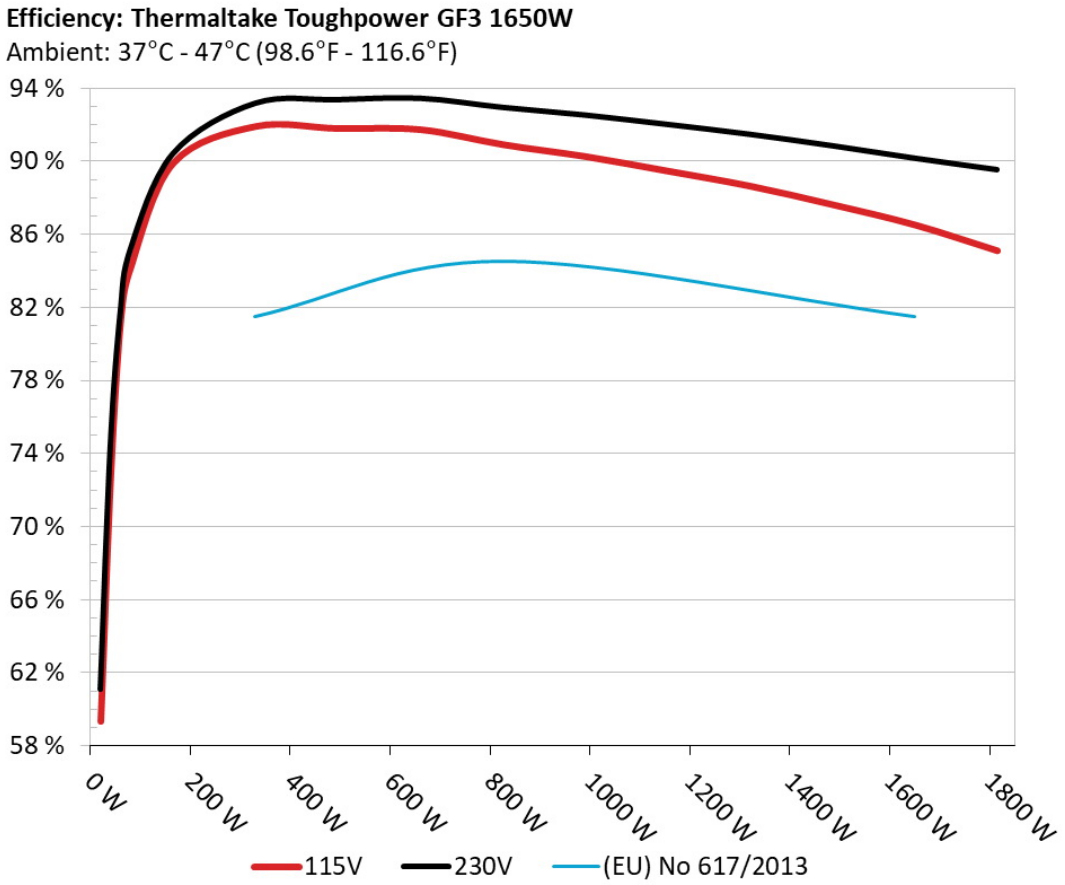
INFO

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, with the fan stopped; 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

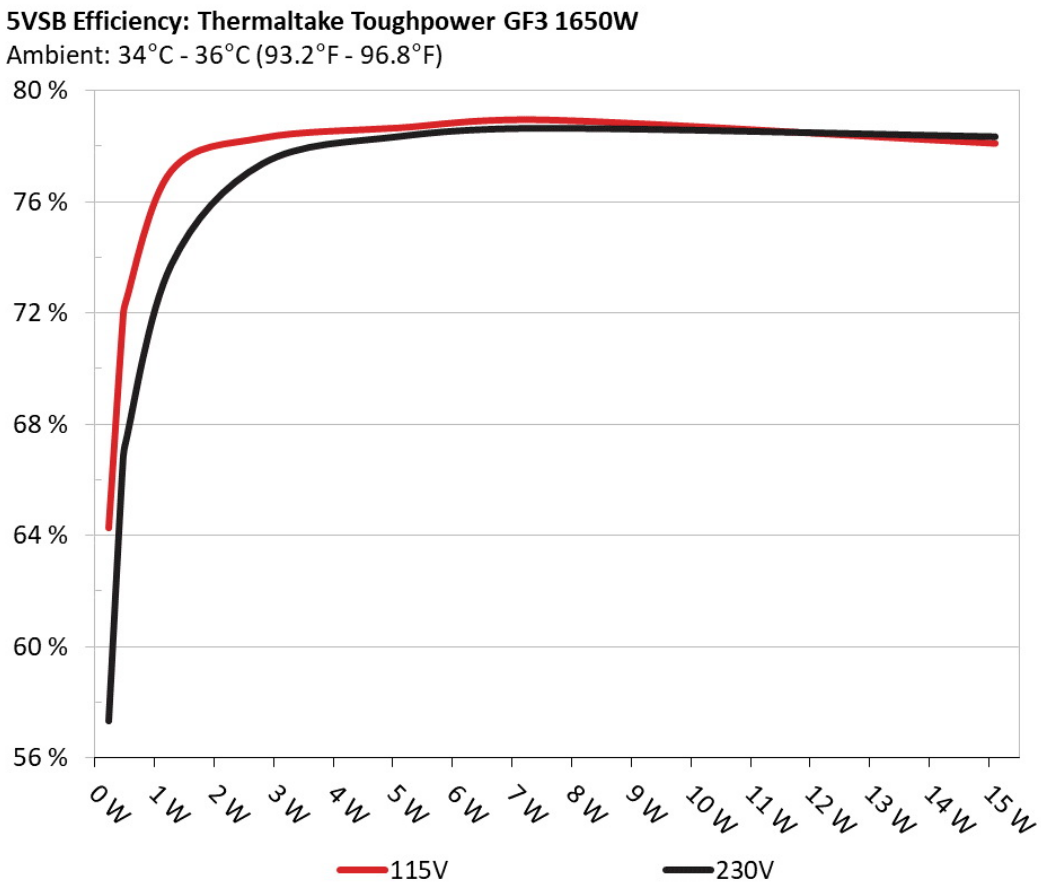
Efficiency under high ambient temperature



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	0.231W	64.282%	0.052
	5.125V	0.359W		115.17V
2	0.09A	0.461W	71.56%	0.09
	5.123V	0.645W		115.16V
3	0.55A	2.811W	78.284%	0.324
	5.11V	3.591W		115.15V
4	1A	5.098W	78.644%	0.405
	5.096V	6.483W		115.16V
5	1.5A	7.624W	78.924%	0.44
	5.081V	9.659W		115.16V
6	3A	15.098W	78.086%	0.491
	5.032V	19.334W		115.15V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231W	57.345%	0.018
	5.125V	0.403W		230.38V
2	0.09A	0.461W	66.422%	0.03
	5.123V	0.695W		230.38V
3	0.55A	2.811W	77.385%	0.143
	5.11V	3.632W		230.37V
4	1A	5.097W	78.36%	0.223
	5.096V	6.504W		230.37V
5	1.5A	7.623W	78.658%	0.283
	5.081V	9.691W		230.37V
6	3A	15.106W	78.352%	0.369
	5.035V	19.278W		230.37V

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
10%	11.974A	1.997A	2A	0.985A	164.977	90.411%	0	<6.0	44.59°C	0.989
	11.973V	5.01V	3.3V	5.078V	182.431				40.25°C	115.12V
20%	25.017A	2.998A	3.002A	1.186A	329.997	92.42%	0	<6.0	45.61°C	0.996
	11.955V	5.004V	3.298V	5.059V	357.088				40.71°C	115.08V
30%	38.408A	3.503A	3.5A	1.389A	494.636	92.31%	1033	34.9	41.06°C	0.998
	11.940V	4.996V	3.301V	5.042V	535.838				46.32°C	115.04V
40%	51.890A	4.008A	3.995A	1.593A	659.856	92.248%	1038	35.0	42.87°C	0.998
	11.922V	4.992V	3.305V	5.023V	715.306				48.94°C	115V
50%	65.080A	5.017A	5.002A	1.8A	825.226	91.426%	1197	38.5	43.57°C	0.999
	11.904V	4.984V	3.299V	5.003V	902.653				50.21°C	114.96V
60%	78.240A	6.016A	6.009A	2.001A	989.732	90.778%	1377	42.1	43.69°C	0.999
	11.886V	4.989V	3.296V	4.983V	1090.276				50.79°C	114.91V
70%	91.510A	7.041A	7.015A	2.217A	1155.134	89.979%	1625	46.3	43.78°C	0.999
	11.868V	4.973V	3.294V	4.962V	1283.744				51.52°C	114.86V
80%	104.820A	8.003A	7.999A	2.326A	1319.745	89.155%	1807	49.2	44.17°C	0.999
	11.849V	4.976V	3.3V	4.945V	1480.286				52.52°C	114.83V
90%	118.596A	8.567A	8.486A	2.436A	1485.397	88.134%	1990	51.7	44.65°C	0.999
	11.829V	4.962V	3.299V	4.928V	1685.546				53.76°C	114.76V
100%	132.153A	9.081A	9.009A	3.068A	1650.282	87.025%	1987	51.7	46.1°C	0.999
	11.809V	4.957V	3.297V	4.889V	1896.279				56.19°C	114.71V
110%	145.622A	10.102A	10.109A	3.078A	1814.918	85.613%	1995	51.8	47.22°C	0.999
	11.788V	4.95V	3.294V	4.874V	2119.78				58.12°C	114.67V
CL1	0.119A	15.626A	15.604A	0A	131.326	82.901%	0	<6.0	48.25°C	0.98
	11.962V	5.011V	3.307V	5.095V	158.418				42.8°C	115.15V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
CL2	0.117A	25.077A	0A	0A	126.408	79.404%	0	<6.0	50.07°C	0.986
	11.967V	4.985V	3.295V	5.109V	159.195				43.69°C	115.14V
CL3	0.117A	0A	24.997A	0A	83.898	75.09%	0	<6.0	52.26°C	0.978
	11.974V	4.994V	3.3V	5.092V	111.721				44.18°C	115.15V
CL4	139.621A	0A	0A	0.002A	1649.756	87.497%	1982	51.6	45.51°C	0.999
	11.816V	4.967V	3.293V	5.018V	1885.489				55.41°C	114.72V

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
10%	11.973A	1.998A	2A	0.985A	164.986	90.882%	0	<6.0	44.66°C	0.933
	11.975V	5.007V	3.3V	5.077V	181.495				40.28°C	230.39V
20%	25.015A	3A	3.002A	1.186A	330.011	93.649%	0	<6.0	45.59°C	0.97
	11.957V	5.001V	3.299V	5.058V	352.436				40.85°C	230.39V
30%	38.404A	3.506A	3.504A	1.389A	494.625	93.842%	1037	35.0	41.63°C	0.986
	11.941V	4.993V	3.296V	5.041V	527.011				46.77°C	230.37V
40%	51.881A	4.011A	3.994A	1.593A	659.831	93.92%	1042	35.1	41.82°C	0.992
	11.924V	4.988V	3.305V	5.022V	702.538				47.43°C	230.35V
50%	65.066A	5.023A	5.002A	1.8A	825.226	93.421%	1199	38.6	42.26°C	0.995
	11.906V	4.978V	3.299V	5.002V	883.329				48.32°C	230.33V
60%	78.224A	6.035A	6.006A	2.001A	989.703	93.003%	1381	42.2	42.6°C	0.997
	11.888V	4.972V	3.297V	4.982V	1064.322				49.69°C	230.3V
70%	91.488A	7.052A	7.014A	2.217A	1155.107	92.493%	1621	46.2	42.83°C	0.998
	11.870V	4.965V	3.294V	4.962V	1249.087				50.35°C	230.28V
80%	104.796A	8.003A	7.996A	2.326A	1319.621	91.951%	1765	48.6	43.14°C	0.998
	11.852V	4.961V	3.302V	4.945V	1435.222				51.21°C	230.26V
90%	118.558A	8.581A	8.485A	2.435A	1485.369	91.323%	1991	51.7	45.21°C	0.998
	11.832V	4.953V	3.3V	4.928V	1626.418				54.28°C	230.24V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
100%	132.105A	9.098A	9.013A	3.068A	1650.217	90.641%	1989	51.7	45.85°C	0.999
	11.813V	4.947V	3.295V	4.89V	1820.457				55.9°C	230.22V
110%	145.500A	10.119A	10.102A	3.075A	1814.621	90.016%	1996	51.8	46.94°C	0.999
	11.796V	4.941V	3.296V	4.878V	2015.874				57.85°C	230.2V
CL1	0.117A	15.684A	15.604A	0A	131.312	83.494%	0	<6.0	48.76°C	0.918
	11.965V	4.992V	3.307V	5.096V	157.303				42.31°C	230.41V
CL2	0.117A	25.204A	0A	0A	126.403	79.757%	0	<6.0	50.45°C	0.921
	11.971V	4.959V	3.296V	5.109V	158.486				43.4°C	230.4V
CL3	0.117A	0A	24.989A	0A	83.895	75.986%	0	<6.0	52.6°C	0.878
	11.973V	4.997V	3.301V	5.094V	110.416				44.49°C	230.4V
CL4	139.616A	0A	0A	0.002A	1649.784	91.002%	1993	51.7	45.55°C	0.999
	11.816V	4.966V	3.293V	5.017V	1812.957				55.53°C	230.22V

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])	Temps (In/Out)	PF/AC Volts
20W	1.238A	0.498A	0.498A	0.195A	20	59.83%	0	<6.0	40.11°C	0.888
	12.000V	5.015V	3.313V	5.117V	33.639				36.97°C	115.15V
40W	2.725A	0.698A	0.699A	0.294A	39.999	73.345%	0	<6.0	40.71°C	0.941
	11.995V	5.014V	3.305V	5.112V	54.569				37.26°C	115.15V
60W	4.216A	0.898A	0.897A	0.392A	59.998	81.854%	0	<6.0	42.05°C	0.963
	11.985V	5.012V	3.309V	5.107V	73.307				38.29°C	115.14V
80W	5.702A	1.098A	1.097A	0.49A	79.958	84.698%	0	<6.0	42.99°C	0.97
	11.983V	5.009V	3.308V	5.102V	94.409				39.03°C	115.15V

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
20W	1.238A	0.499A	0.498A	0.195A	20.005	61.579%	0	<6.0	40.14°C	0.53
	12.002V	5.013V	3.312V	5.117V	32.634				37.02°C	230.41V
40W	2.725A	0.698A	0.698A	0.294A	40.004	74.894%	0	<6.0	40.62°C	0.677
	11.998V	5.011V	3.311V	5.112V	53.617				37.35°C	230.41V
60W	4.215A	0.899A	0.897A	0.392A	60.002	82.231%	0	<6.0	41.45°C	0.763
	11.988V	5.009V	3.309V	5.107V	72.95				37.93°C	230.41V
80W	5.702A	1.099A	1.097A	0.49A	79.966	85.634%	0	<6.0	43.28°C	0.836
	11.986V	5.008V	3.309V	5.102V	93.649				39.53°C	230.4V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.80mV	3.73mV	4.61mV	5.40mV	Pass
20% Load	6.98mV	4.60mV	6.14mV	6.58mV	Pass
30% Load	7.29mV	6.60mV	7.88mV	7.75mV	Pass
40% Load	8.17mV	5.42mV	7.98mV	9.43mV	Pass
50% Load	7.97mV	8.03mV	11.00mV	11.17mV	Pass
60% Load	8.73mV	10.02mV	12.33mV	11.98mV	Pass
70% Load	12.97mV	8.29mV	12.44mV	16.57mV	Pass
80% Load	12.36mV	15.72mV	17.71mV	17.28mV	Pass
90% Load	14.15mV	15.82mV	23.08mV	17.49mV	Pass
100% Load	17.75mV	16.02mV	29.12mV	20.97mV	Pass
110% Load	18.16mV	10.53mV	22.68mV	20.89mV	Pass
Crossload1	10.27mV	7.85mV	15.95mV	6.28mV	Pass
Crossload2	6.88mV	7.62mV	7.07mV	5.15mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
Crossload3	7.25mV	3.99mV	17.86mV	5.00mV	Pass
Crossload4	16.44mV	13.92mV	17.38mV	19.44mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	7.85mV	3.78mV	4.97mV	5.30mV	Pass
20% Load	6.67mV	4.86mV	6.19mV	6.52mV	Pass
30% Load	7.14mV	6.09mV	7.73mV	7.75mV	Pass
40% Load	8.05mV	6.03mV	8.04mV	9.33mV	Pass
50% Load	6.78mV	6.70mV	9.98mV	10.45mV	Pass
60% Load	8.68mV	9.31mV	12.23mV	11.98mV	Pass
70% Load	9.34mV	7.31mV	11.62mV	13.41mV	Pass
80% Load	10.27mV	8.64mV	17.30mV	15.09mV	Pass
90% Load	11.69mV	15.77mV	22.21mV	16.46mV	Pass
100% Load	15.86mV	16.24mV	28.42mV	19.20mV	Pass
110% Load	16.67mV	10.58mV	25.97mV	21.03mV	Pass
Crossload1	11.01mV	7.72mV	15.50mV	6.22mV	Pass
Crossload2	6.93mV	9.44mV	7.52mV	5.00mV	Pass
Crossload3	6.44mV	7.95mV	16.74mV	5.00mV	Pass
Crossload4	14.50mV	13.34mV	17.00mV	18.98mV	Pass

The results above are not used in the certification process

Thermaltake Toughpower GF3 1650W



Top side



Power specifications label

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CYBENETICS LTD Syrou 6, Latsia, 2231, Nicosia Cyprus

www.cybenetics.com - info@cybenetics.com