



Thermaltake Toughpower Grand Gold 650W

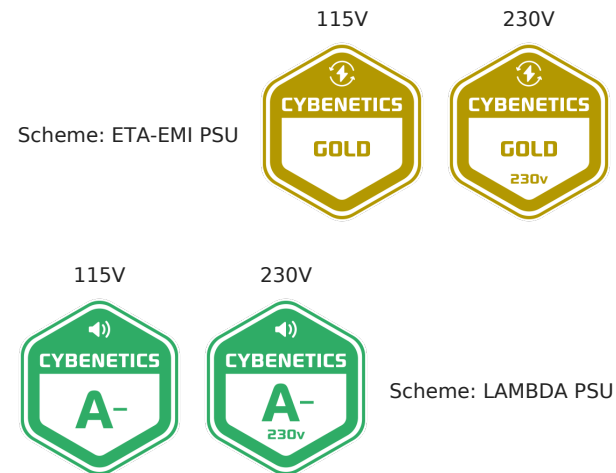
Serial Number PSTRG0650FPCGEUSLA000190

Lab ID 483

Certification ID 25483

Test Result Report ID:

Certificate Issue Date: Sep 26, 2018



A handwritten signature in blue ink, appearing to read 'A. Bitziopoulos', is written over a faint, circular blue stamp.

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 Grand Gold 650W
OEM/ODM	Sirfa
Serial Number	PSTRG0650FPCGEUSLA000190
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
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	140mm Hydro Dynamic Bearing Fan (TT-1425 (A1425L12S))
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	483
Date of receipt	Sep 10, 2018
Testing Date	Sep 23, 2018
Report Issued Date	Sep 26, 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	In Cable Capacitors
ATX connector 20+4 pin (600mm)	1	1	18AWG	No
4+4 pin EPS12V (660mm)	1	1	18AWG	No
6+2 pin PCIe (500mm+155mm)	2	4	18AWG	No
SATA (510mm+155mm+155mm)	3	9	18AWG	No
4-pin Molex (500mm+150mm+150mm+150mm)	1	4	18AWG	No
RGB Cable (580mm+80mm)	1	1	26AWG	No
FDD Adapter (+160mm)	1	1	22AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	18AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	22	22	54.2	3	0.3
	Watts	120		650	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)	88.838%
Average Noise Output (>1450 Load Combinations)	29.30dBA
Average PF (>1450 Load Combinations)	0.988
Efficiency With 10W (≤500W) or 2% (>500W) Load	62.497%
Standby Power Consumption	0.0901W
Non-Accredited	
12V Ripple (Full Load)	18.65mV
5V Ripple (Full Load)	18.68mV
3.3V Ripple (Full Load)	17.14mV
5VSB Ripple (Full Load)	11.29mV
12V Load Regulation	1.13%
5V Load Regulation	2.18%
3.3V Load Regulation	3.93%

5VSB Load Regulation	4.78%
Inrush Current	32.625A

230V

Accredited		
Average Efficiency (>1450 load combinations)	90.410%	
Average Noise Output (>1450 Load Combinations)	29.25dBA	
Average PF (>1450 Load Combinations)	0.940	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1676W	
Non-Accredited		
12V Ripple (Full Load)	16.91mV	
5V Ripple (Full Load)	18.27mV	
3.3V Ripple (Full Load)	17.00mV	
5VSB Ripple (Full Load)	11.52mV	
12V Load Regulation	1.07%	
5V Load Regulation	2.16%	
3.3V Load Regulation	3.87%	
5VSB Load Regulation	4.77%	
Inrush Current	67.251A	
Hold-Up Time & PWR_OK Signal	16.40ms	
AC Loss to PWR_OK Hold Up Time	15.00ms	
PWR_OK Inactive to DC Loss Delay	1.40ms	
OPP (0.00°C / 0.00°C)	-	-

Hold-Up Time & PWR_OK Signal

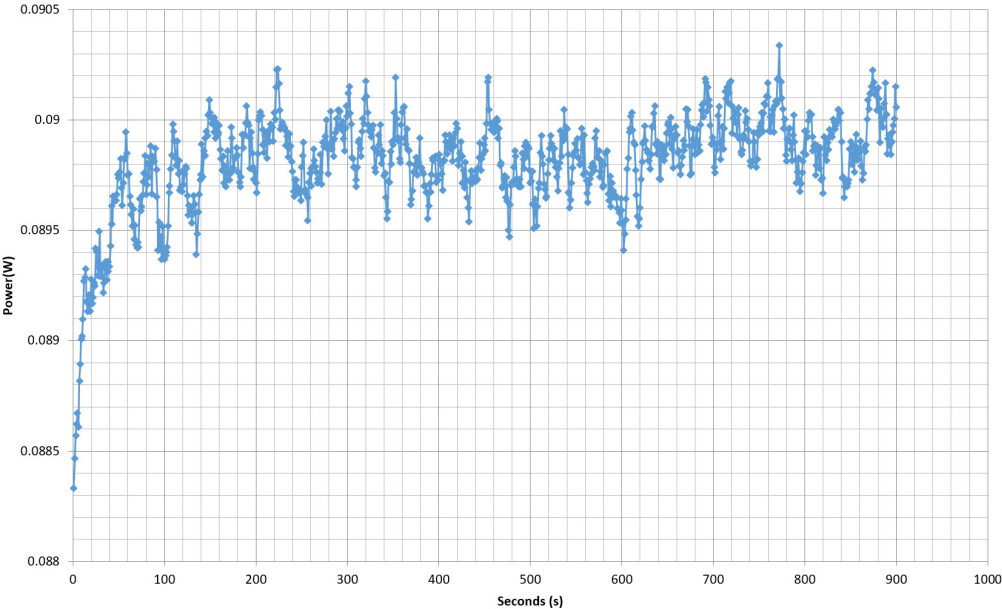
Hold-Up Time (ms)	16.4
AC Loss to PWR_OK Hold Up Time (ms)	15
PWR_OK Inactive to DC Loss Delay (ms)	1.4

Vampire Power

Graphs

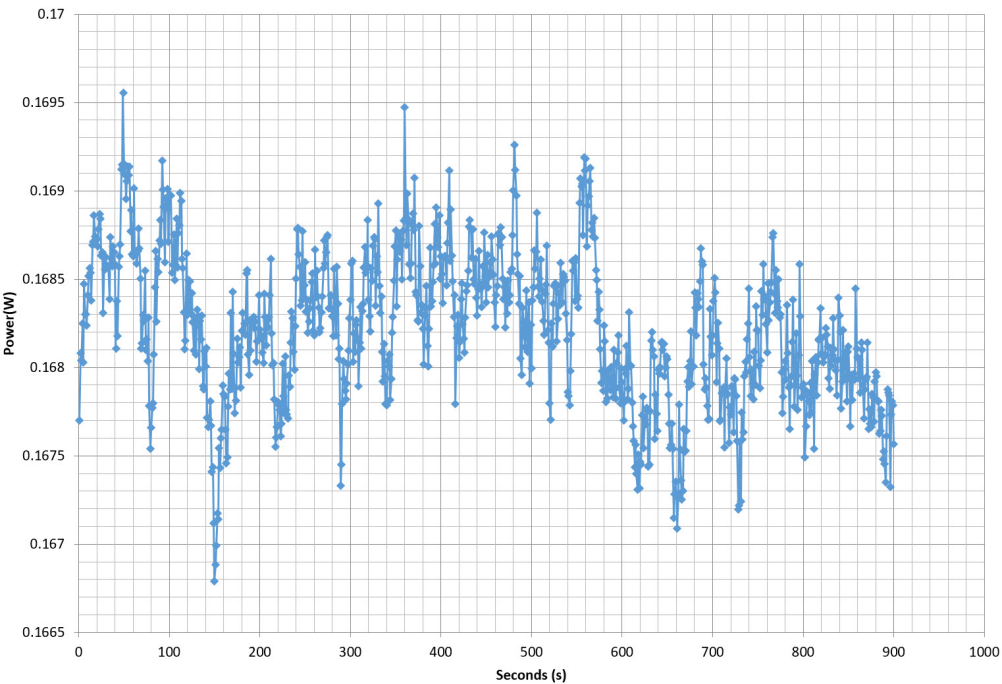
115V

Power - PSTRG0650FPCGEUSLA000190 - 20/09/2018 - 14:08



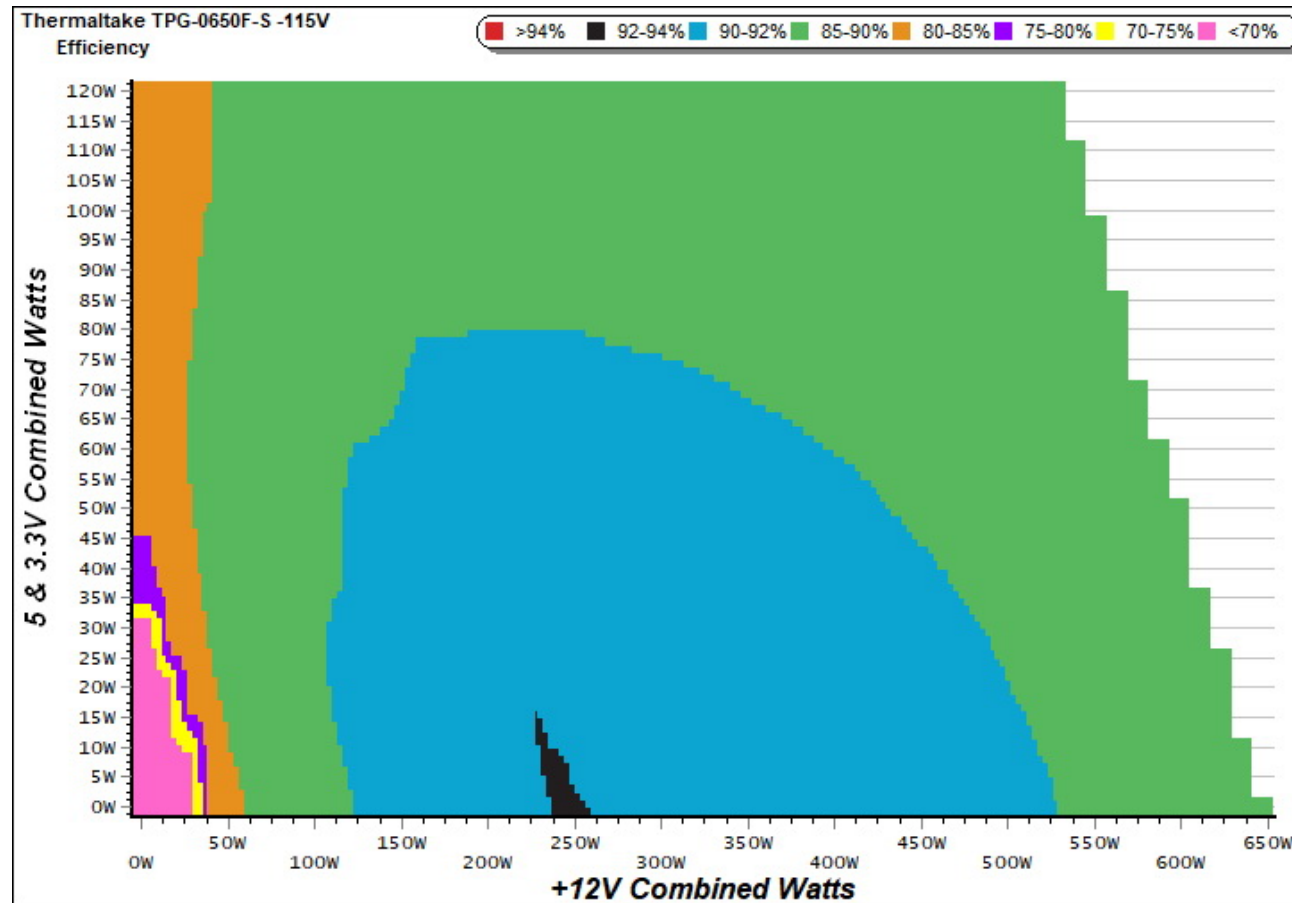
230V

Power - PSTRG0650FPCGEUSLA000190 - 20/09/2018 - 14:08



Efficiency Graph

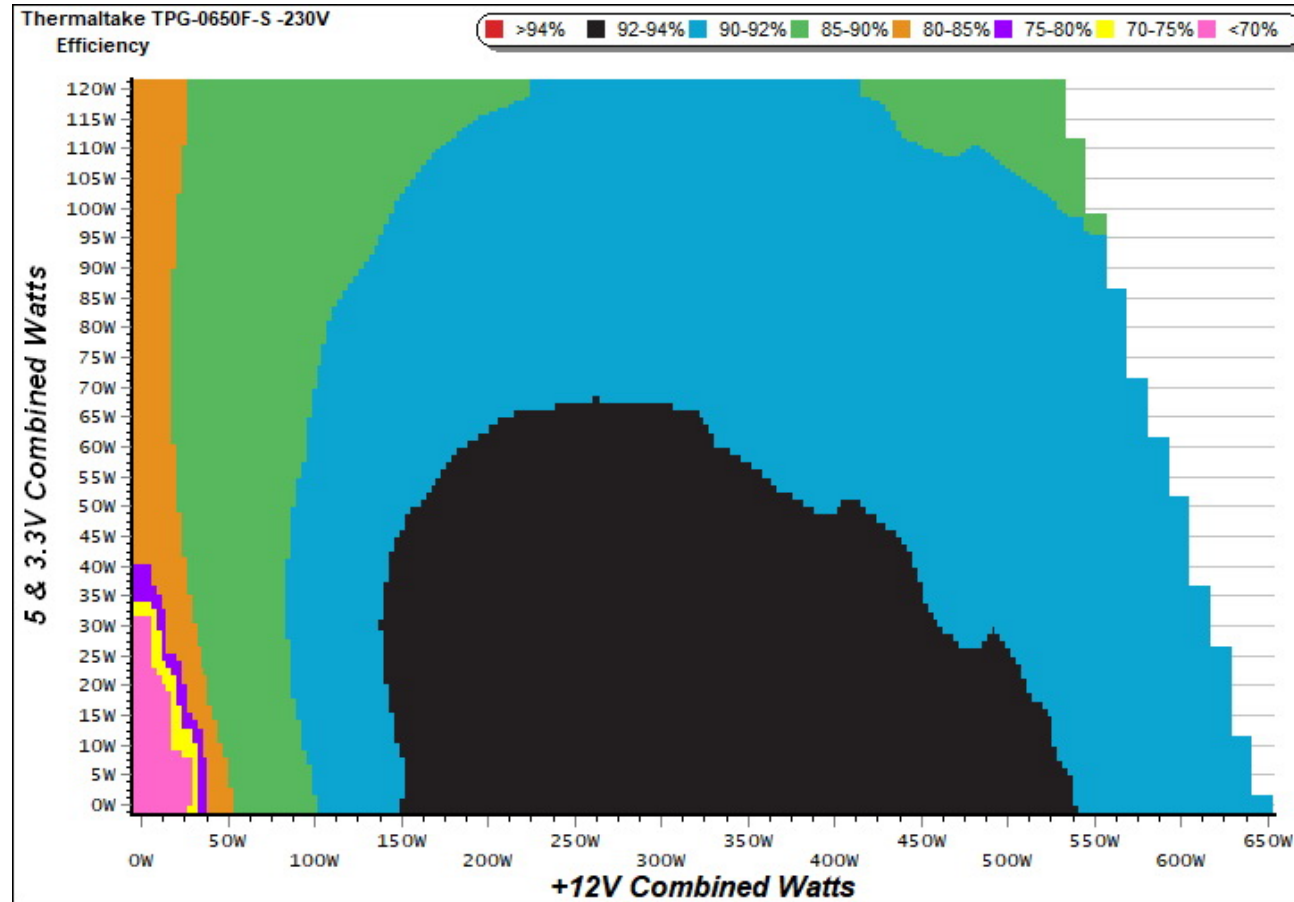
115V



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

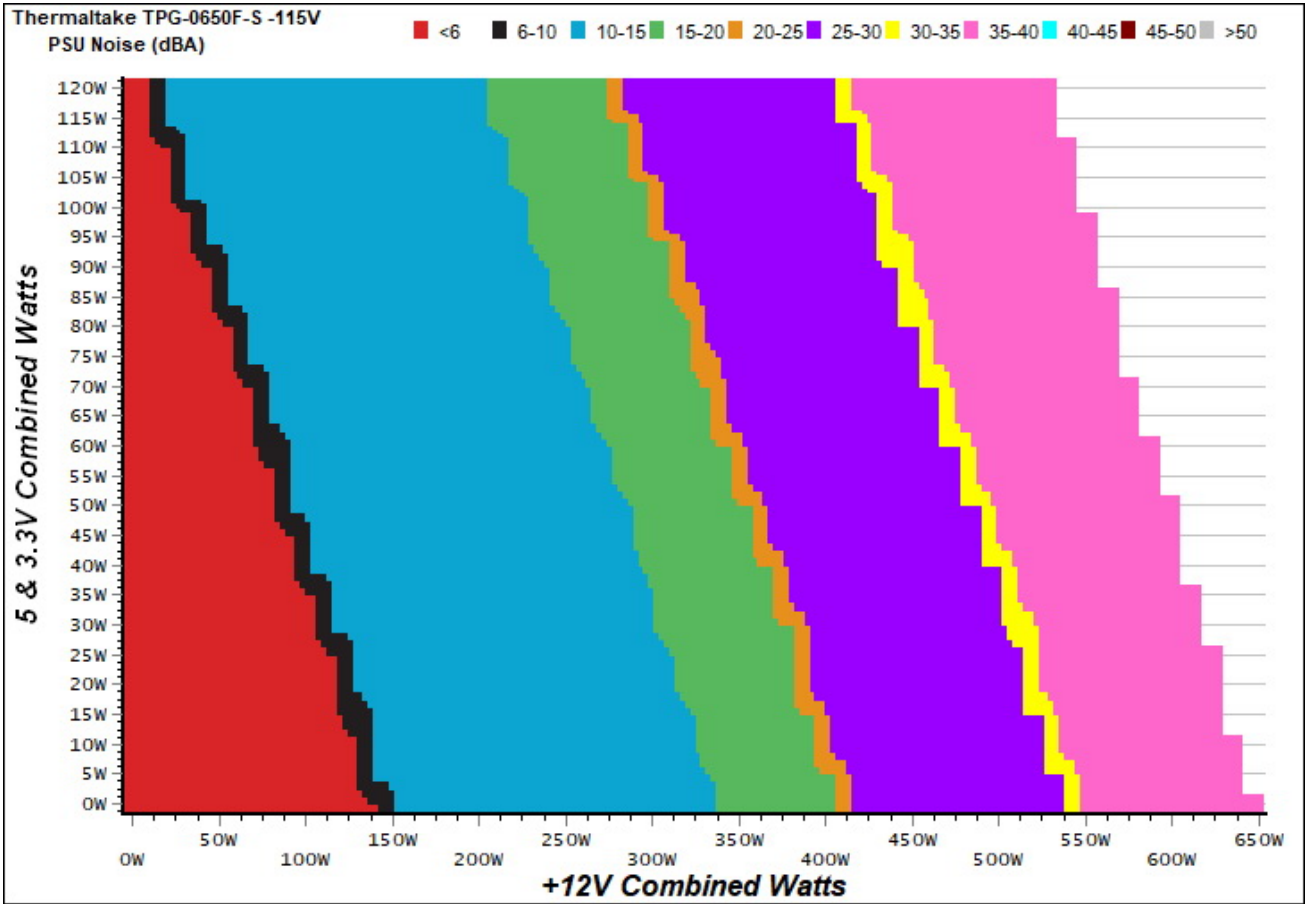


INFO

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

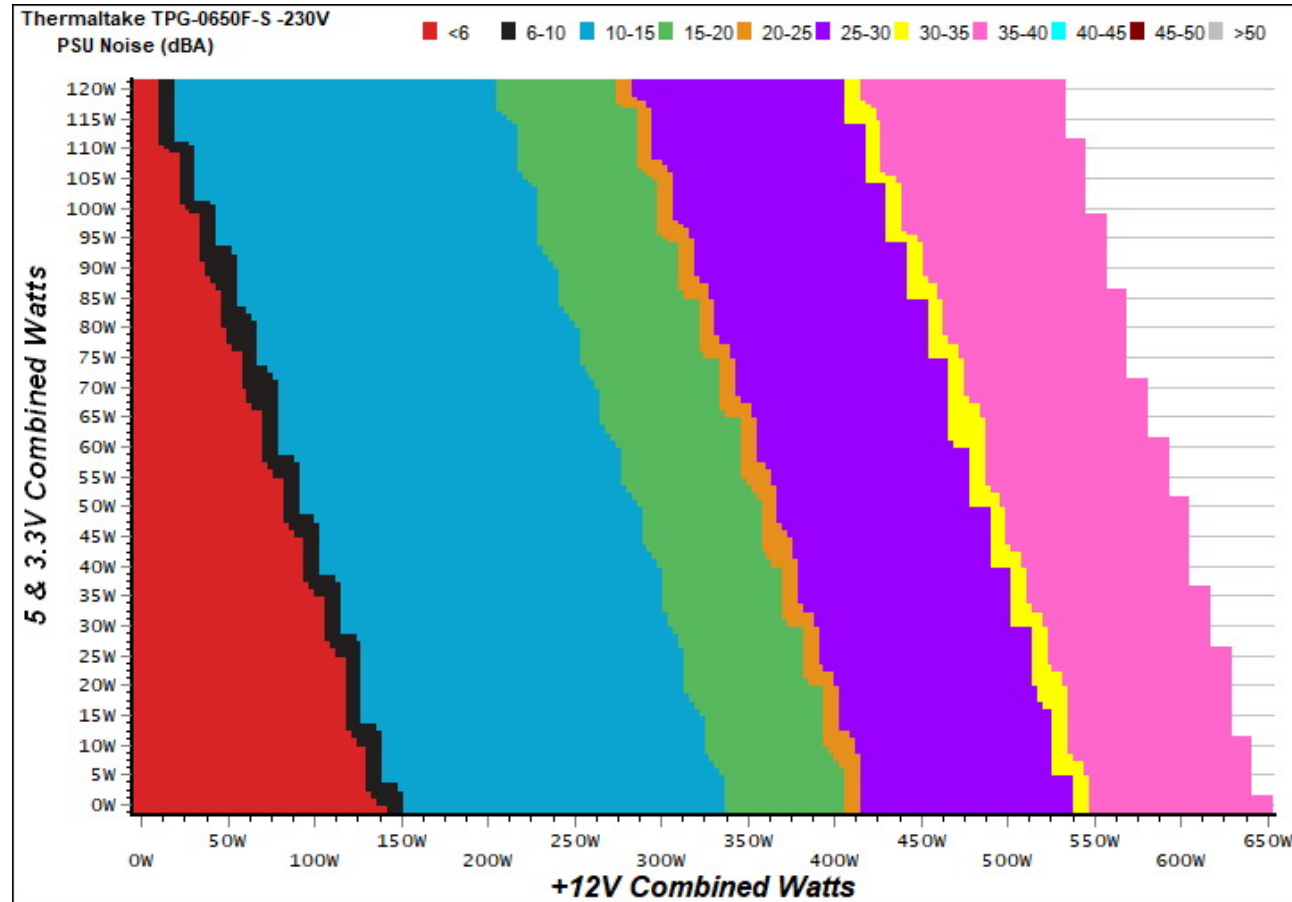
115V



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

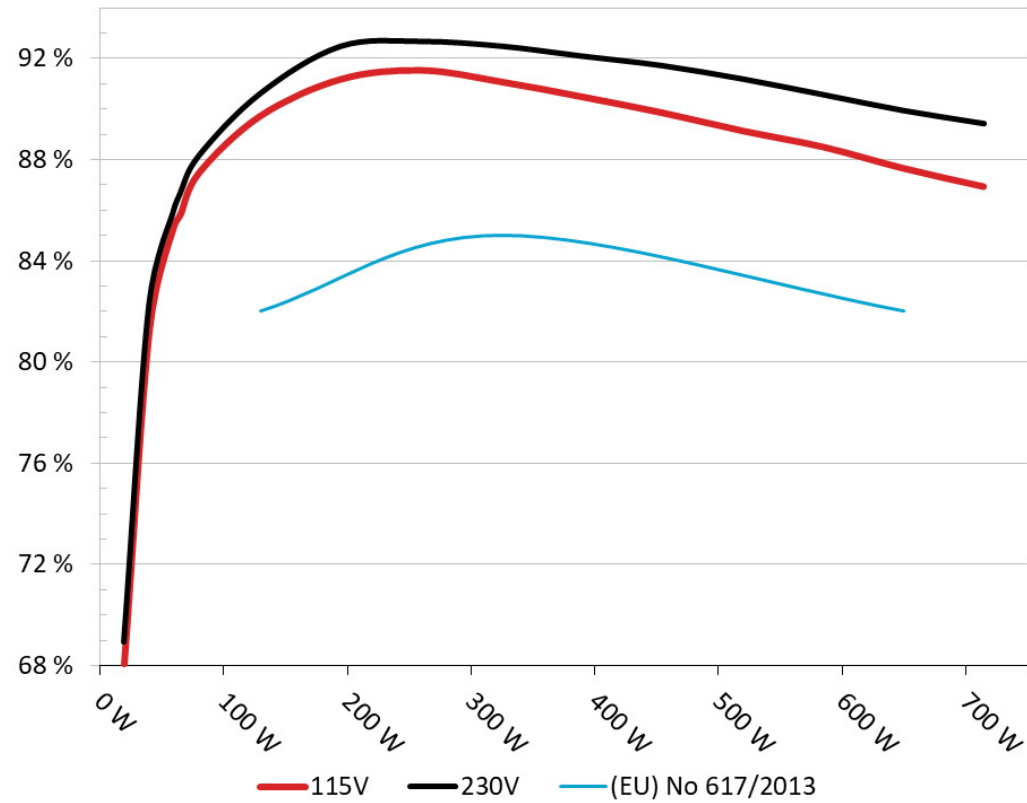
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails.

Indicative Performance

Efficiency under high ambient temperature

Efficiency: Thermaltake TPG-0650F-S

Ambient: 37°C - 47°C (98.6°F - 116.6°F)



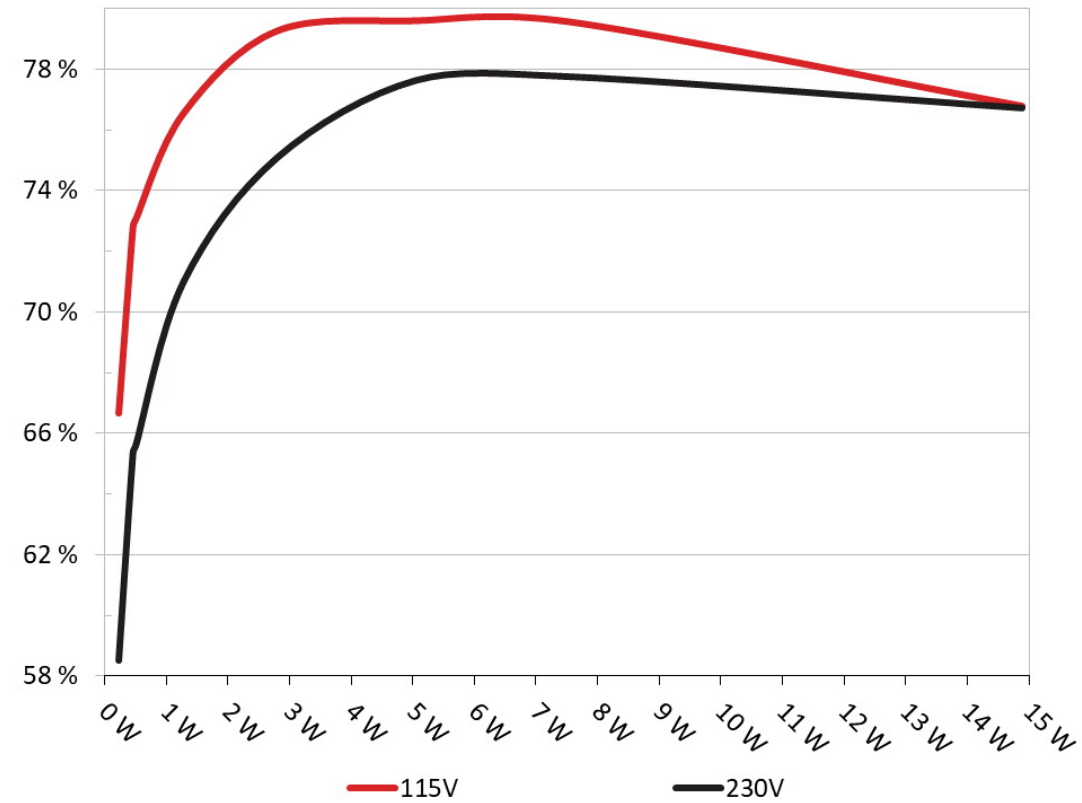
INFO

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

5VSB Efficiency: Thermaltake TPG-0650F-S

Ambient: 34°C - 36°C (93.2°F - 96.8°F)



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	0.230	66.667%	0.043
	5.104V	0.345		115.05V
2	0.090A	0.460	72.785%	0.077
	5.102V	0.632		115.05V
3	0.550A	2.795	79.246%	0.252
	5.080V	3.527		115.06V
4	1.000A	5.060	79.585%	0.299
	5.060V	6.358		115.05V
5	1.500A	7.556	79.545%	0.324
	5.037V	9.499		115.05V
6	3.000A	14.887	76.777%	0.360
	4.962V	19.390		115.04V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.230	58.524%	0.017
	5.104V	0.393		230.20V
2	0.090A	0.460	65.341%	0.029
	5.102V	0.704		230.02V
3	0.550A	2.794	75.087%	0.133
	5.080V	3.721		230.20V
4	1.000A	5.060	77.655%	0.192
	5.059V	6.516		230.20V
5	1.500A	7.555	77.774%	0.233
	5.036V	9.714		230.18V
6	3.000A	14.895	76.739%	0.286
	4.965V	19.410		230.20V

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	3.560A	1.970A	1.968A	0.994A	64.889	85.816%	0	<6.0	48.34°C	0.946
	12.160V	5.078V	3.351V	5.032V	75.614				40.47°C	115.06V
2	8.109A	2.961A	2.966A	1.197A	129.390	89.713%	687	13.7	40.88°C	0.977
	12.145V	5.067V	3.338V	5.014V	144.226				49.23°C	115.06V
3	13.059A	3.462A	3.459A	1.402A	194.464	91.167%	585	9.6	41.09°C	0.985
	12.134V	5.056V	3.325V	4.994V	213.306				50.02°C	115.06V
4	18.029A	3.966A	3.983A	1.609A	259.687	91.524%	580	9.5	41.71°C	0.994
	12.118V	5.045V	3.314V	4.974V	283.738				51.23°C	115.05V
5	22.676A	4.969A	5.001A	1.817A	324.980	91.064%	575	9.5	42.30°C	0.994
	12.104V	5.033V	3.299V	4.954V	356.870				52.44°C	115.05V
6	27.270A	5.976A	6.028A	2.027A	389.503	90.481%	830	19.4	42.53°C	0.994
	12.090V	5.021V	3.285V	4.934V	430.481				53.45°C	115.05V
7	31.941A	6.990A	7.063A	2.239A	454.760	89.849%	1020	26.2	43.37°C	0.995
	12.074V	5.008V	3.270V	4.914V	506.139				54.81°C	115.05V
8	36.617A	8.007A	8.111A	2.453A	520.081	89.129%	1150	30.0	43.57°C	0.996
	12.062V	4.996V	3.255V	4.893V	583.514				55.46°C	115.04V
9	41.720A	8.530A	8.632A	2.457A	584.994	88.497%	1415	36.1	44.75°C	0.996
	12.044V	4.985V	3.243V	4.885V	661.033				56.80°C	115.04V
10	46.549A	9.051A	9.196A	3.102A	649.842	87.655%	1430	36.3	45.63°C	0.997
	12.033V	4.974V	3.229V	4.837V	741.364				58.22°C	115.04V
11	51.991A	9.066A	9.222A	3.108A	714.651	86.935%	1430	36.3	46.57°C	0.997
	12.020V	4.966V	3.220V	4.827V	822.051				59.73°C	115.04V
CL1	0.142A	14.002A	13.999A	0.000A	118.128	82.280%	695	13.8	42.39°C	0.978
	12.152V	5.033V	3.281V	5.092V	143.569				52.47°C	115.06V

CL2	54.172A	1.003A	0.999A	1.000A	665.100	88.437%	1430	36.3	45.34°C	0.997
	12.033V	5.007V	3.275V	4.954V	752.060				58.34°C	115.04V

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	3.557A	1.967A	1.968A	0.994A	64.854	86.629%	0	<6.0	46.76°C	0.790
	12.163V	5.079V	3.352V	5.033V	74.864				40.25°C	230.03V
2	8.108A	2.961A	2.965A	1.197A	129.350	90.583%	687	13.7	40.75°C	0.884
	12.143V	5.066V	3.337V	5.013V	142.797				47.78°C	230.21V
3	13.059A	3.461A	3.458A	1.402A	194.438	92.458%	585	9.6	41.34°C	0.911
	12.133V	5.055V	3.325V	4.993V	210.299				48.89°C	230.03V
4	18.027A	3.964A	3.982A	1.609A	259.648	92.656%	580	9.5	41.65°C	0.916
	12.118V	5.045V	3.314V	4.973V	280.227				49.80°C	230.20V
5	22.676A	4.968A	5.000A	1.817A	324.887	92.467%	575	9.5	42.31°C	0.955
	12.100V	5.033V	3.300V	4.955V	351.356				50.94°C	230.21V
6	27.270A	5.979A	6.028A	2.027A	389.479	92.076%	830	19.4	42.55°C	0.972
	12.089V	5.020V	3.284V	4.934V	422.997				51.67°C	230.20V
7	31.940A	6.991A	7.067A	2.240A	454.825	91.697%	1020	26.2	43.21°C	0.976
	12.076V	5.008V	3.269V	4.913V	496.010				52.68°C	230.02V
8	36.617A	8.009A	8.113A	2.453A	520.126	91.168%	1150	30.0	43.63°C	0.983
	12.063V	4.996V	3.254V	4.893V	570.514				53.67°C	230.02V
9	41.713A	8.528A	8.635A	2.458A	585.067	90.549%	1417	36.2	44.47°C	0.989
	12.048V	4.985V	3.242V	4.883V	646.133				55.20°C	230.03V
10	46.554A	9.051A	9.200A	3.103A	649.898	89.922%	1430	36.3	45.78°C	0.991
	12.033V	4.973V	3.228V	4.836V	722.733				57.16°C	230.19V
11	52.000A	9.067A	9.229A	3.109A	714.718	89.412%	1422	36.2	46.66°C	0.993
	12.019V	4.965V	3.219V	4.826V	799.352				58.63°C	230.19V
CL1	0.144A	14.003A	14.000A	0.000A	118.147	82.901%	695	13.8	42.85°C	0.880
	12.151V	5.032V	3.281V	5.092V	142.516				51.65°C	230.21V

CL2	54.178A	1.000A	1.001A	1.000A	665.109	90.773%	1425	36.3	45.35°C	0.992
	12.032V	5.007V	3.275V	4.954V	732.720				57.27°C	230.19V

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	1.186A	0.493A	0.475A	0.197A	19.568	68.093%	0	<6.0	0.870
	12.192V	5.089V	3.366V	5.080V	28.737				115.06V
2	2.439A	0.983A	0.981A	0.395A	39.982	81.302%	0	<6.0	0.916
	12.171V	5.085V	3.361V	5.067V	49.177				115.05V
3	3.625A	1.476A	1.461A	0.594A	59.505	85.335%	0	<6.0	0.943
	12.165V	5.082V	3.356V	5.055V	69.731				115.05V
4	4.876A	1.970A	1.969A	0.794A	79.905	87.469%	0	<6.0	0.957
	12.162V	5.078V	3.350V	5.042V	91.352				115.06V

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	1.184A	0.490A	0.476A	0.197A	19.542	68.939%	0	<6.0	0.547
	12.199V	5.092V	3.367V	5.083V	28.347				230.21V
2	2.434A	0.983A	0.982A	0.395A	39.936	82.281%	0	<6.0	0.696
	12.174V	5.087V	3.361V	5.070V	48.536				230.20V
3	3.622A	1.475A	1.458A	0.594A	59.453	85.936%	0	<6.0	0.776
	12.165V	5.082V	3.356V	5.056V	69.183				230.21V
4	4.871A	1.970A	1.969A	0.794A	79.822	88.120%	0	<6.0	0.825
	12.158V	5.077V	3.350V	5.042V	90.583				230.21V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	17.0 mV	9.6 mV	9.3 mV	16.0 mV	Pass
20% Load	23.7 mV	10.5 mV	10.3 mV	17.6 mV	Pass
30% Load	26.9 mV	11.5 mV	11.1 mV	19.7 mV	Pass
40% Load	27.9 mV	13.2 mV	15.8 mV	19.7 mV	Pass
50% Load	31.0 mV	15.0 mV	17.7 mV	20.1 mV	Pass
60% Load	37.7 mV	17.3 mV	34.0 mV	21.8 mV	Pass
70% Load	36.5 mV	19.7 mV	16.9 mV	32.1 mV	Pass
80% Load	39.2 mV	21.4 mV	17.9 mV	27.9 mV	Pass
90% Load	41.0 mV	23.9 mV	28.2 mV	30.1 mV	Pass
100% Load	45.1 mV	29.9 mV	33.9 mV	28.4 mV	Pass
110% Load	47.2 mV	31.7 mV	39.7 mV	30.2 mV	Pass
Crossload 1	36.2 mV	17.4 mV	11.9 mV	15.1 mV	Pass
Crossload 2	37.4 mV	26.8 mV	38.9 mV	33.9 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	28.0 mV	6.3 mV	6.8 mV	4.1 mV	Pass
20% Load	21.4 mV	7.3 mV	9.0 mV	4.7 mV	Pass
30% Load	11.3 mV	9.3 mV	10.6 mV	7.2 mV	Pass
40% Load	11.5 mV	9.3 mV	10.2 mV	6.2 mV	Pass
50% Load	12.0 mV	11.1 mV	11.2 mV	6.9 mV	Pass
60% Load	12.3 mV	15.1 mV	14.1 mV	10.2 mV	Pass
70% Load	13.2 mV	13.5 mV	13.4 mV	8.4 mV	Pass
80% Load	14.1 mV	15.1 mV	15.2 mV	9.2 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	15.6 mV	16.4 mV	16.6 mV	10.3 mV	Pass
100% Load	16.9 mV	18.3 mV	17.0 mV	11.5 mV	Pass
110% Load	19.0 mV	19.6 mV	17.8 mV	12.0 mV	Pass
Crossload 1	21.7 mV	13.4 mV	14.6 mV	6.9 mV	Pass
Crossload 2	17.6 mV	13.0 mV	12.1 mV	9.1 mV	Pass

The results above are not used in the certification process

Thermaltake Toughpower Grand Gold 650W



Top side

All data and graphs included in this test report can be used by any individual on the following conditions:

- › It should be mentioned that the test results are provided by Cybenetics
- › The link to the original test results document should be provided in any case

CYBENETICS LTD Syrou 6, Latsia, 2231, Nicosia Cyprus



Power specifications label

Cybenetics runs voluntary certification programs for power supplies - ETA for efficiency, LAMBDA for noise and SAFE for safety and correct operation - and for cooling products, with DELTA for chassis soundproofing and PHI for fan airflow and static pressure. THETA rates cooler performance on AMD AM5 and Intel LGA1851 outside ISO 17065 and accreditation scope

www.cybenetics.com - info@cybenetics.com