



Make It Yours.

Cooler Master XG 650

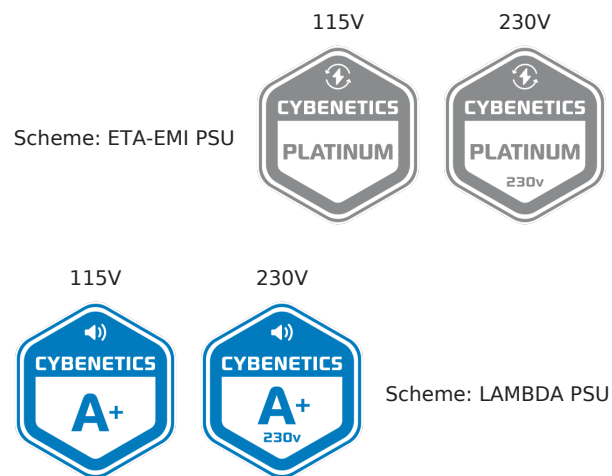
Serial Number

Lab ID CM65001890

Certification ID 251890

Test Result Report ID: 21PS1890A

Certificate Issue Date: Aug 31, 2021



A handwritten signature in blue ink, appearing to read "A. Bitziopoulos", is positioned above the name of the Certification Body General Manager.

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	Cooler Master
Model	XG 650
OEM/ODM	Huizhou Xin Hui Yuan Tech (Fusion Power)
Serial Number	
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	8-4
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 Fluid Dynamic Bearing Fan (DWPH EFC-14E12D)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	CM65001890
Date of receipt	Aug 3, 2021
Testing Date	Aug 30, 2021
Report Issued Date	Aug 31, 2021
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	18AWG	No
4+4 pin EPS12V (650mm)	1	1	18AWG	No
8 pin EPS12V (650mm)	1	1	18AWG	No
6+2 pin PCIe (550mm+125mm)	2	4	16-18AWG	No
SATA (500mm+125mm+125mm+125mm)	2	8	18AWG	No
4 pin Molex (500mm+125mm+125mm+125mm)	1	4	18AWG	No

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	54.1	3	0.3
	Watts	100		649.2	15	3.6
Total Max. Power (W)		650				

Parts Description

General Data	
Manufacturer (OEM)	Huizhou Xin Hui Yuan Tech (Fusion Power)
PCB Type	Double Sided
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	1x NTC Thermistor MF72-5D15 (5 Ohm) & Relay
Bridge Rectifier(s)	2x MCC GBU15KL (800V, 15A @ 100°C)
APFC MOSFETs	2x NCE Power NCE65TF130 (650V, 18A @ 100°C, Rds(on): 0.130Ohm)
APFC Boost Diode	1x CDP0865G1
Bulk Cap(s)	1x TK (450V, 470uF, 2,000h @ 105°C, LGW)
Main Switchers	4x NCE Power NCE65T180F (650V, 13.2A @ 100°C, Rds(on): 0.180Ohm)
Digital Controllers	Champion CM6500UNX
MCU	Champion CM6901T6X
Topology	Primary side: APFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETs	4x Excelliance MOS EMP16N04HS (40V, 100A @ 100°C, Rds(on): 1.6mOhm)
5V & 3.3V	DC-DC Converters: 2x Excelliance MOS EMB04N03A (30V, 55A @ 100°C, Rds(on): 4mOhm) & 2x Excelliance MOS EMB07N03 (30V, 17A @ 100°C, Rds(on): 7mOhm) PWM Controller(s): ANPEC APW7159C
Filtering Capacitors	Electrolytic: 2x Nippon Chemi-Con (105°C, W), 4x Nippon Chemi-Con (2-5,000h @ 105°C, KZE), 5x Nippon Chemi-Con (4-10,000h @ 105°C, KY), 2x Nippon Chemi-Con (5-6,000h @ 105°C, KZH) Polymer: 21x FPCAP
Supervisor IC	IN1S313I-SAG
Fan Model	DWPH EFC-14E12D (140mm, 12V, 0.80A, Fluid Dynamic Bearing Fan)
5VSB Circuit	

Rectifier	1x 45R10C SBR
Standby PWM Controller	Excelliance MOS EM8569C

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	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	89.745%
Average Noise Output (>1450 Load Combinations)	17.49dBA
Average PF (>1450 Load Combinations)	0.986
Efficiency With 10W ($\leq$ 500W) or 2% (>500W) Load	64.732%
Standby Power Consumption	0.0476W
Non-Accredited	
12V Ripple (Full Load)	23.28mV
5V Ripple (Full Load)	8.25mV
3.3V Ripple (Full Load)	13.70mV
5VSB Ripple (Full Load)	8.78mV
12V Load Regulation	0.05%
5V Load Regulation	0.26%
3.3V Load Regulation	0.42%
5VSB Load Regulation	2.55%
Inrush Current	65.800A

230V

Accredited		
Average Efficiency (>1450 load combinations)	91.657%	
Average Noise Output (>1450 Load Combinations)	16.68dBA	
Average PF (>1450 Load Combinations)	0.943	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.0908W	
Non-Accredited		
12V Ripple (Full Load)	23.72mV	
5V Ripple (Full Load)	8.88mV	
3.3V Ripple (Full Load)	13.45mV	
5VSB Ripple (Full Load)	7.21mV	
12V Load Regulation	0.04%	
5V Load Regulation	0.26%	
3.3V Load Regulation	0.39%	
5VSB Load Regulation	2.53%	
Inrush Current	81.350A	
Hold-Up Time & PWR_OK Signal	24.20ms	
AC Loss to PWR_OK Hold Up Time	20.20ms	
PWR_OK Inactive to DC Loss Delay	4.00ms	
PSU Timings: T1 (20% / 100%)	52.0ms	68.0ms
PSU Timings: T3 (20% / 100%)	124.0ms	124.0ms
OPP (32.80°C / 40.08°C)	150.19%	145.88%

Hold-Up Time & PWR_OK Signal

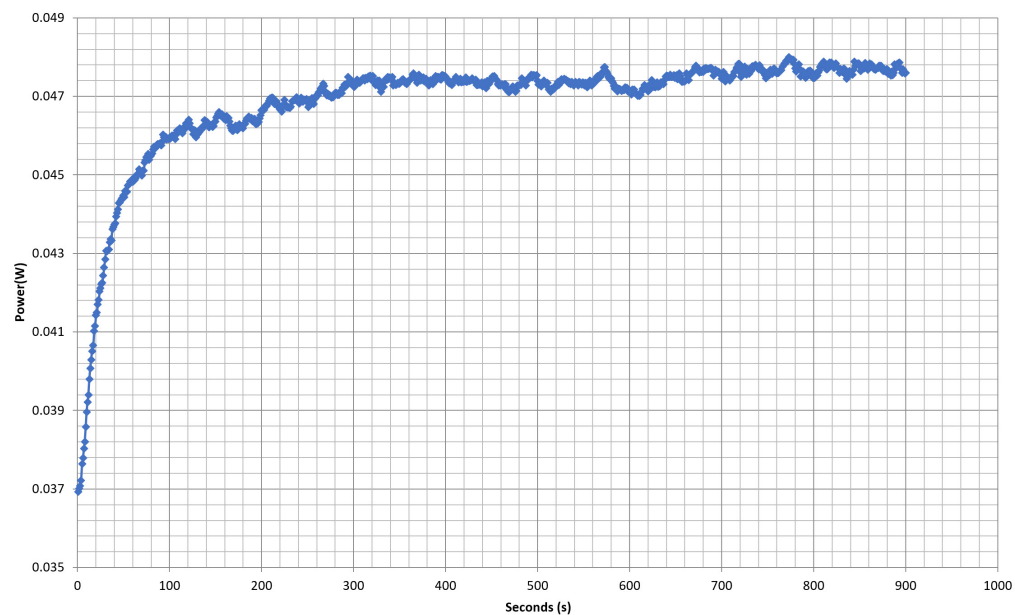
Hold-Up Time (ms)	24.2
AC Loss to PWR_OK Hold Up Time (ms)	20.2
PWR_OK Inactive to DC Loss Delay (ms)	4



Graphs

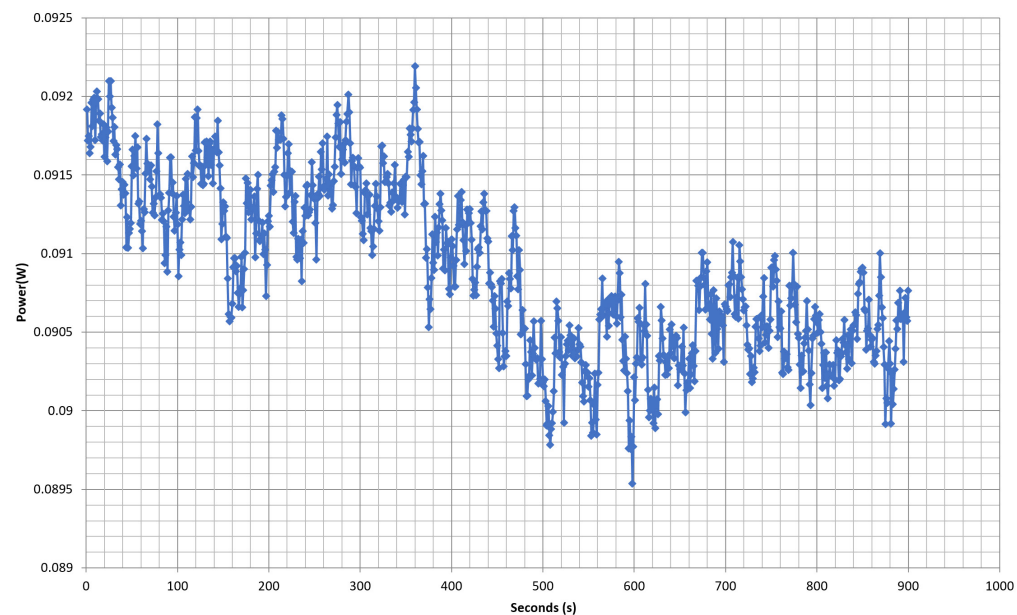
115V

Power - 25/08/2021 - 09:14



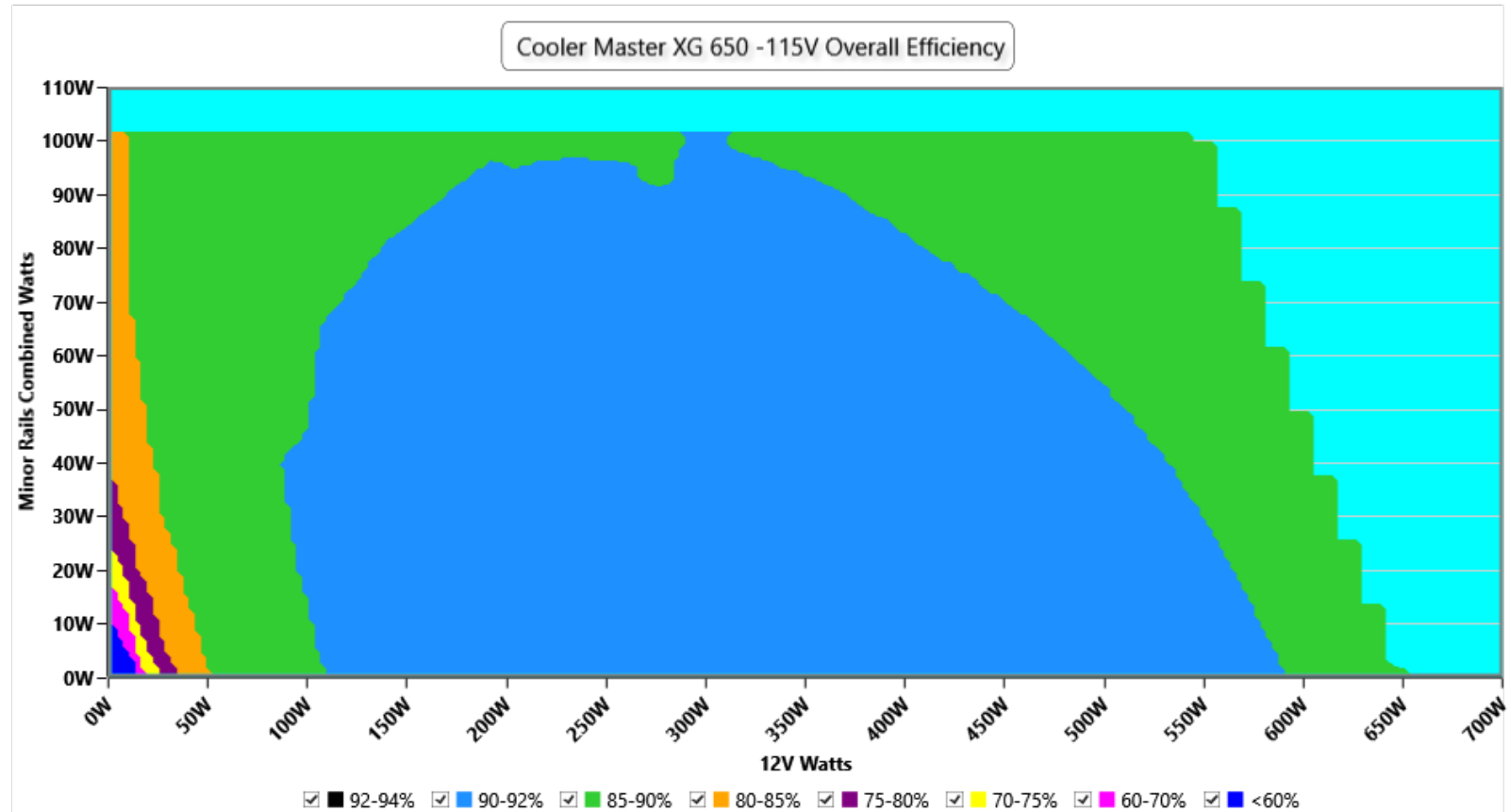
230V

Power - 25/08/2021 - 09:14



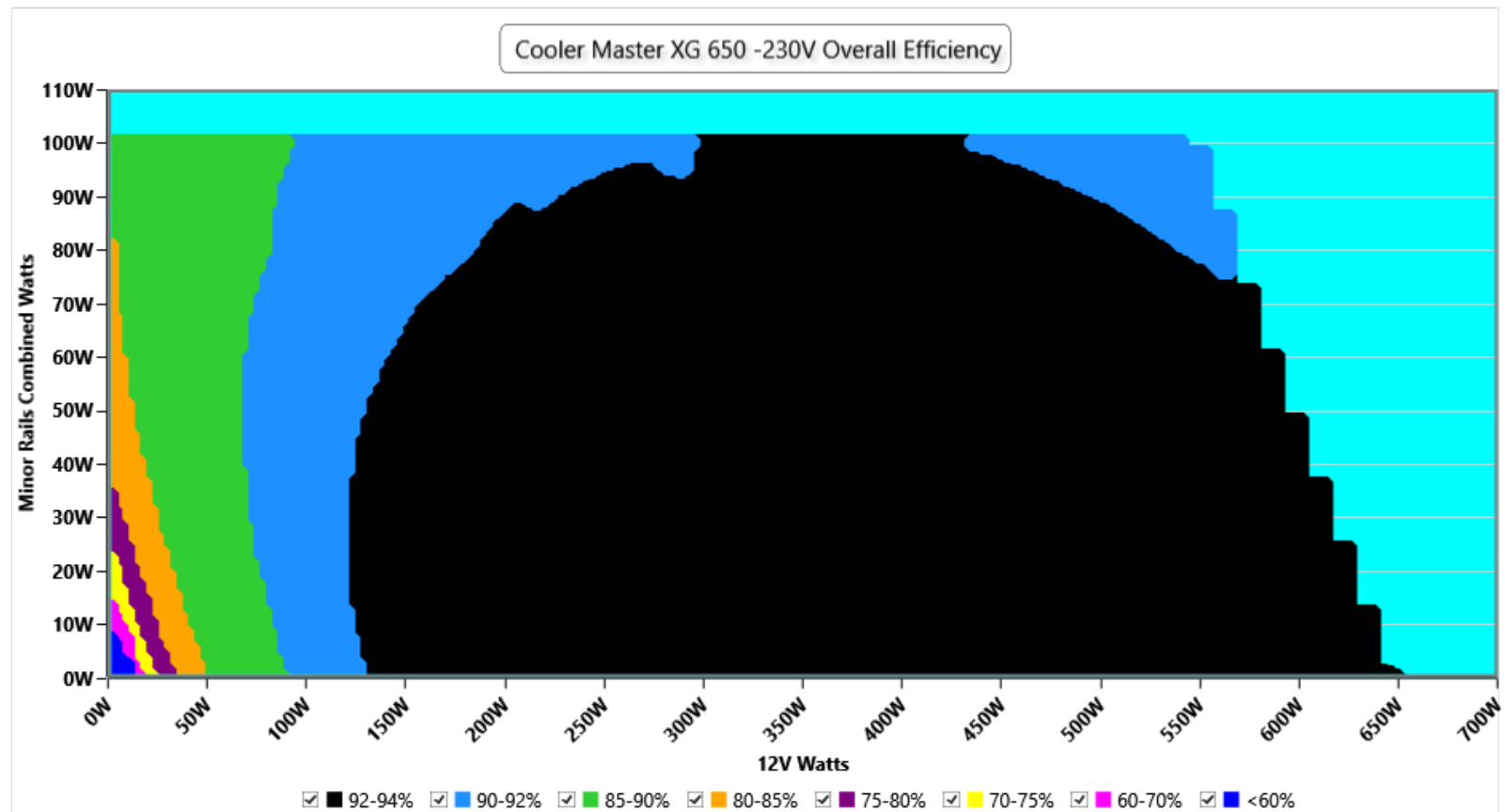
Efficiency Graph

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

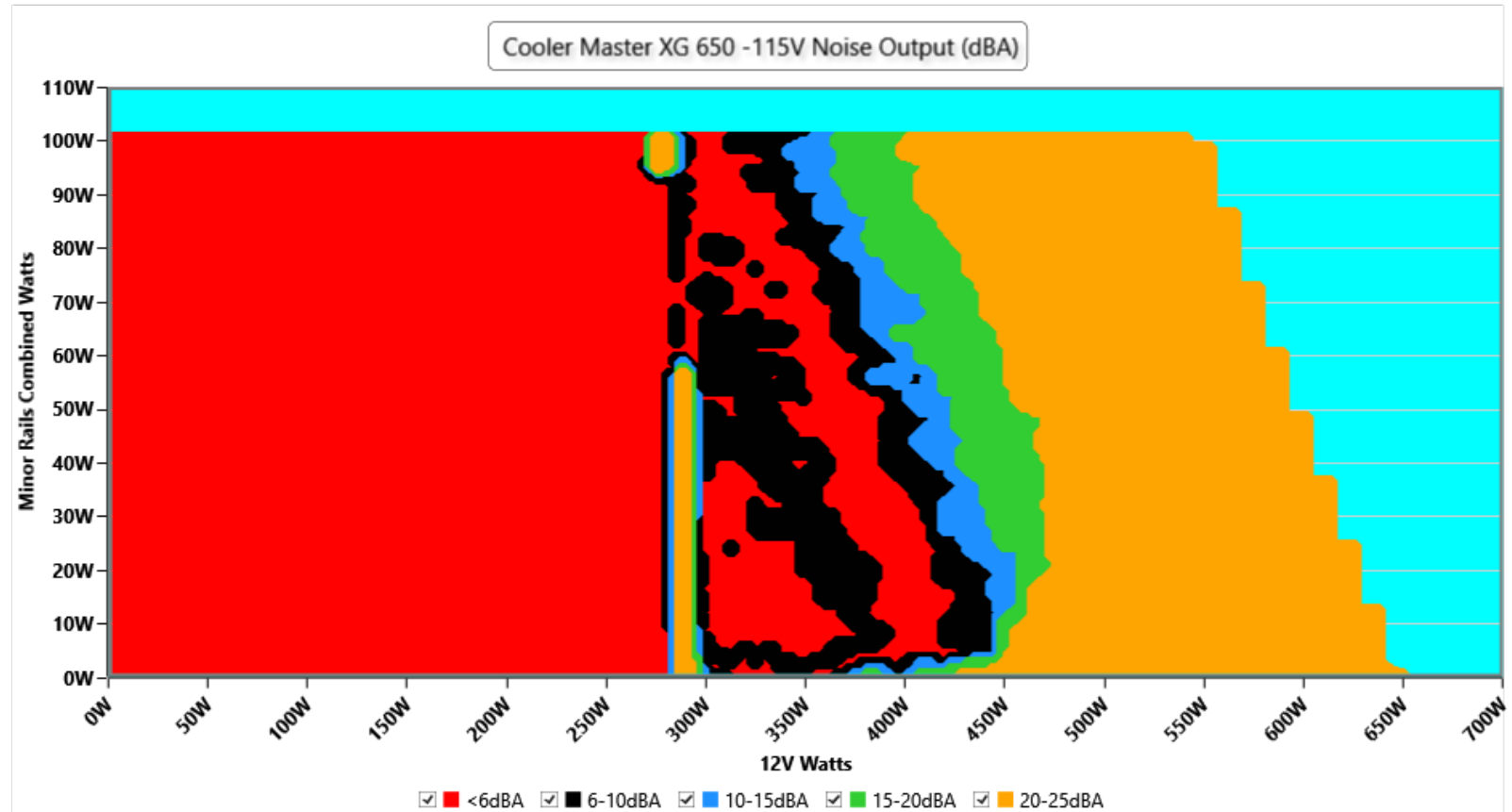


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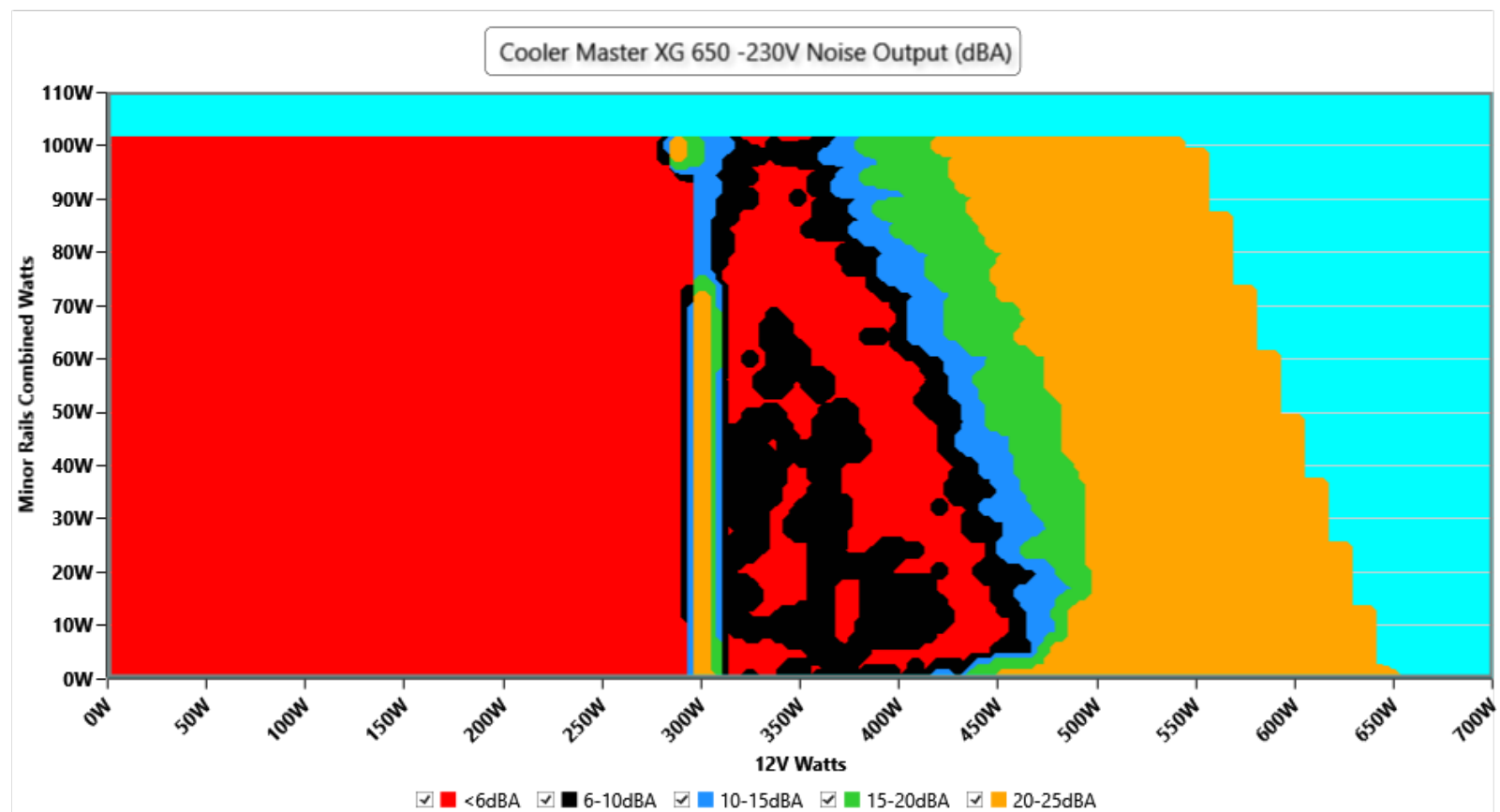
Noise Graph

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



INFO

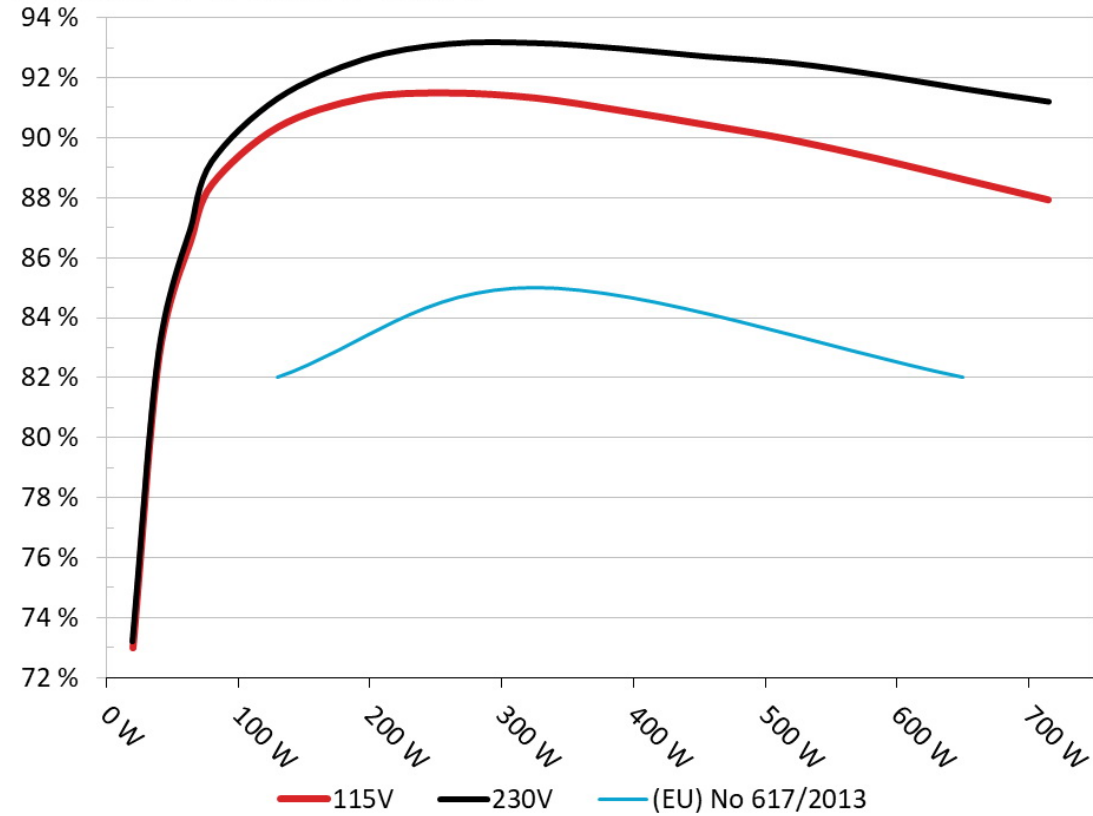
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

Indicative Performance

Efficiency under high ambient temperature

Efficiency: Cooler Master XG 650W

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



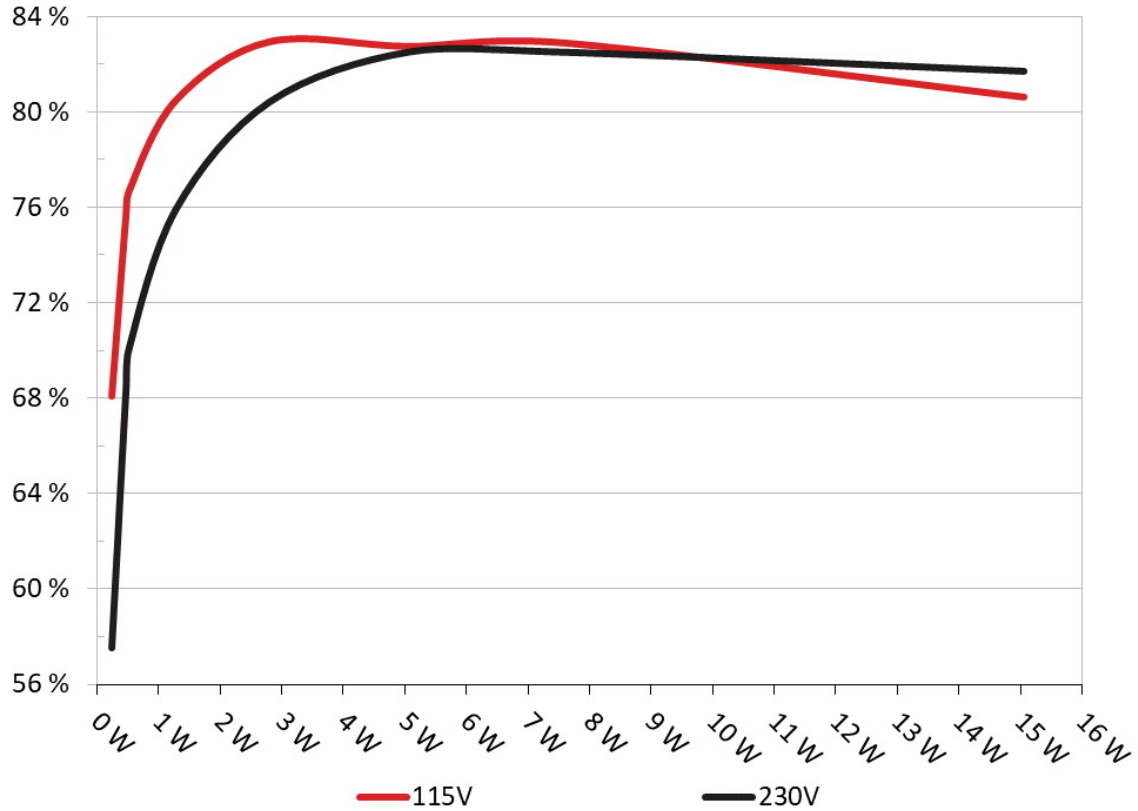
INFO

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: Cooler Master XG 650W

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

5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts	
1	0.045A	0.23W	68.099%	0.055
	5.099V	0.338W		115.14V
2	0.09A	0.459W	75.618%	0.096
	5.097V	0.607W		115.14V
3	0.55A	2.798W	82.937%	0.326
	5.085V	3.374W		115.14V
4	1A	5.074W	82.735%	0.4
	5.073V	6.133W		115.14V
5	1.5A	7.591W	82.882%	0.439
	5.059V	9.159W		115.14V
6	3.001A	15.059W	80.617%	0.491
	5.019V	18.68W		115.14V

230V

5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts	
1	0.045A	0.23W	57.535%	0.019
	5.099V	0.4W		230.28V
2	0.09A	0.459W	68.24%	0.033
	5.098V	0.673W		230.28V
3	0.55A	2.798W	80.412%	0.15
	5.085V	3.48W		230.28V
4	1A	5.074W	82.504%	0.228
	5.073V	6.15W		230.28V
5	1.5A	7.591W	82.49%	0.286
	5.06V	9.202W		230.28V
6	3.001A	15.061W	81.692%	0.372
	5.019V	18.436W		230.28V

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%	3.622A	1.991A	1.987A	0.986A	65.024	86.386%	0	<6.0	44.8°C	0.959
	11.991V	5.023V	3.322V	5.074V	75.271				39.65°C	115.16V
20%	8.264A	2.988A	2.982A	1.185A	129.995	90.359%	0	<6.0	45.92°C	0.985
	11.990V	5.022V	3.32V	5.064V	143.865				40.04°C	115.15V
30%	13.258A	3.486A	3.481A	1.385A	195.013	91.326%	0	<6.0	46.76°C	0.991
	11.990V	5.021V	3.319V	5.054V	213.535				40.5°C	115.15V
40%	18.257A	3.985A	3.979A	1.587A	260.104	91.496%	0	<6.0	48.58°C	0.992
	11.990V	5.02V	3.318V	5.044V	284.279				41.63°C	115.14V
50%	22.905A	4.983A	4.976A	1.789A	325.124	91.332%	505	9.1	42.27°C	0.991
	11.989V	5.019V	3.317V	5.033V	355.981				49.69°C	115.14V
60%	27.527A	5.981A	5.974A	1.992A	389.799	90.916%	750	22.8	42.46°C	0.989
	11.987V	5.018V	3.315V	5.022V	428.748				50.22°C	115.14V
70%	32.200A	6.98A	6.972A	2.196A	455.107	90.436%	754	22.9	43.48°C	0.989
	11.987V	5.016V	3.314V	5.01V	503.235				51.77°C	115.14V
80%	36.877A	7.98A	7.971A	2.3A	519.918	89.935%	768	23.4	43.82°C	0.99
	11.986V	5.015V	3.313V	5.002V	578.107				52.76°C	115.14V
90%	41.952A	8.481A	8.457A	2.404A	585.339	89.306%	1010	31.6	44.56°C	0.99
	11.985V	5.014V	3.311V	4.994V	655.43				53.75°C	115.13V
100%	46.763A	8.982A	8.974A	3.018A	650.171	88.619%	1191	36.5	45.81°C	0.991
	11.985V	5.013V	3.31V	4.972V	733.673				55.91°C	115.12V
110%	51.440A	9.983A	10.065A	3.021A	714.785	87.938%	1389	40.6	46.79°C	0.992
	11.984V	5.011V	3.309V	4.966V	812.829				57.62°C	115.12V
CL1	0.117A	12.016A	11.984A	0A	101.346	84.074%	0	<6.0	49.45°C	0.98
	11.991V	5.012V	3.313V	5.09V	120.544				42.44°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
CL4	54.222A	0A	0A	0A	649.91	89.589%	1110	34.4	45.52°C	0.991
	11.986V	5.022V	3.317V	5.064V	725.44				55.41°C	115.12V

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%	3.622A	1.991A	1.987A	0.986A	65.019	87.129%	0	<6.0	45.09°C	0.75
	11.989V	5.024V	3.322V	5.074V	74.624				40.02°C	230.29V
20%	8.264A	2.987A	2.982A	1.185A	129.981	91.315%	0	<6.0	46.41°C	0.889
	11.989V	5.022V	3.32V	5.063V	142.343				40.56°C	230.29V
30%	13.257A	3.486A	3.48A	1.385A	194.994	92.619%	0	<6.0	47.26°C	0.937
	11.989V	5.022V	3.32V	5.054V	210.534				41.01°C	230.29V
40%	18.257A	3.984A	3.978A	1.587A	260.086	93.139%	0	<6.0	48.75°C	0.957
	11.989V	5.021V	3.319V	5.044V	279.245				41.94°C	230.29V
50%	22.904A	4.982A	4.975A	1.789A	325.094	93.166%	453	<6.0	42.13°C	0.969
	11.988V	5.019V	3.317V	5.033V	348.942				49.52°C	230.29V
60%	27.522A	5.98A	5.973A	1.992A	389.716	92.985%	746	22.8	42.59°C	0.974
	11.987V	5.018V	3.316V	5.022V	419.115				50.41°C	230.29V
70%	32.198A	6.979A	6.971A	2.196A	455.044	92.718%	751	22.8	43.19°C	0.978
	11.986V	5.017V	3.314V	5.011V	490.782				51.53°C	230.29V
80%	36.871A	7.978A	7.969A	2.3A	519.828	92.495%	756	22.9	43.46°C	0.98
	11.985V	5.016V	3.313V	5.003V	562.007				52.29°C	230.29V
90%	41.948A	8.48A	8.455A	2.403A	585.274	92.104%	986	31.0	44.53°C	0.982
	11.985V	5.014V	3.312V	4.995V	635.451				53.87°C	230.29V
100%	46.757A	8.981A	8.972A	3.017A	650.104	91.641%	1199	36.7	45.6°C	0.984
	11.985V	5.013V	3.311V	4.973V	709.405				55.6°C	230.29V
110%	51.437A	9.98A	10.063A	3.021A	714.717	91.213%	1350	39.6	46.68°C	0.985
	11.983V	5.012V	3.309V	4.967V	783.573				57.57°C	230.29V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
CL1	0.117A	12.015A	11.982A	0A	101.337	85.186%	0	<6.0	49.68°C	0.863
	11.990V	5.013V	3.313V	5.09V	118.961				42.65°C	230.29V
CL4	54.219A	0A	0A	0A	649.859	92.613%	1099	34.1	45.65°C	0.984
	11.986V	5.022V	3.317V	5.064V	701.691				55.86°C	230.29V

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	1.240A	0.498A	0.497A	0.196A	20.018	73.009%	0	<6.0	40.53°C	0.799
	11.991V	5.026V	3.324V	5.099V	27.418				37.36°C	115.16V
40W	2.728A	0.697A	0.695A	0.295A	40.019	82.787%	0	<6.0	41.71°C	0.915
	11.991V	5.025V	3.323V	5.095V	48.34				37.95°C	115.16V
60W	4.216A	0.896A	0.894A	0.393A	60.021	86.742%	0	<6.0	42.54°C	0.952
	11.991V	5.025V	3.323V	5.091V	69.195				38.17°C	115.16V
80W	5.702A	1.095A	1.093A	0.492A	79.997	88.456%	0	<6.0	44.08°C	0.966
	11.991V	5.024V	3.322V	5.087V	90.437				39.16°C	115.16V

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	1.240A	0.498A	0.496A	0.196A	20.012	73.227%	0	<6.0	39.99°C	0.491
	11.989V	5.026V	3.324V	5.099V	27.329				36.85°C	230.3V
40W	2.728A	0.697A	0.695A	0.295A	40.014	82.903%	0	<6.0	41.33°C	0.634
	11.989V	5.026V	3.323V	5.095V	48.266				37.64°C	230.3V
60W	4.216A	0.896A	0.894A	0.393A	60.015	87.146%	0	<6.0	42.28°C	0.728
	11.989V	5.025V	3.323V	5.091V	68.867				38.27°C	230.3V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
80W	5.702A	1.095A	1.093A	0.492A	79.984	89.212%	0	<6.0	43.66°C	0.799
	11.989V	5.025V	3.323V	5.087V	89.657				39.12°C	230.29V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	15.3 mV	5.8 mV	10.3 mV	5.4 mV	Pass
20% Load	17.4 mV	5.9 mV	10.1 mV	5.8 mV	Pass
30% Load	18.6 mV	6.0 mV	10.3 mV	5.6 mV	Pass
40% Load	14.6 mV	6.6 mV	11.6 mV	6.3 mV	Pass
50% Load	12.9 mV	6.4 mV	10.6 mV	6.1 mV	Pass
60% Load	12.4 mV	6.4 mV	10.3 mV	6.5 mV	Pass
70% Load	12.9 mV	7.1 mV	11.1 mV	6.5 mV	Pass
80% Load	13.9 mV	7.3 mV	12.4 mV	7.0 mV	Pass
90% Load	15.2 mV	8.0 mV	13.5 mV	6.7 mV	Pass
100% Load	23.3 mV	8.3 mV	13.7 mV	8.8 mV	Pass
110% Load	24.3 mV	8.5 mV	14.3 mV	8.9 mV	Pass
Crossload 1	24.2 mV	8.3 mV	13.7 mV	7.3 mV	Pass
Crossload 4	23.0 mV	6.7 mV	12.4 mV	6.9 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	14.3 mV	5.9 mV	10.8 mV	5.2 mV	Pass
20% Load	17.0 mV	6.0 mV	9.9 mV	5.8 mV	Pass
30% Load	17.4 mV	6.5 mV	11.0 mV	5.9 mV	Pass

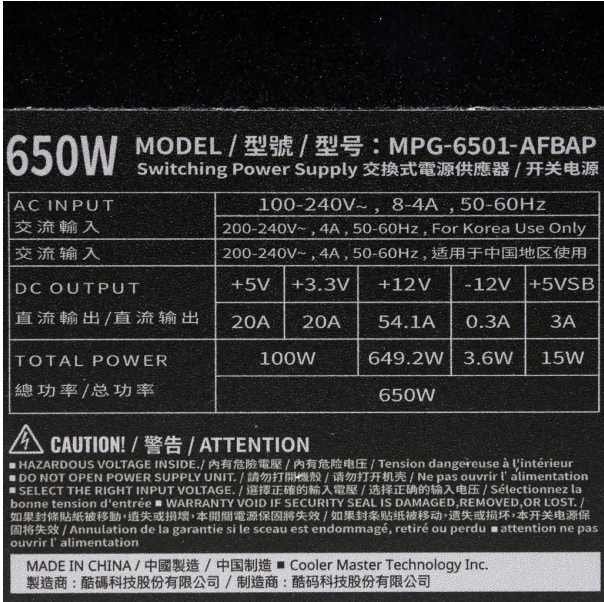
Test	12V	5V	3.3V	5VSB	Pass/Fail
40% Load	14.4 mV	6.6 mV	11.5 mV	5.9 mV	Pass
50% Load	12.1 mV	6.6 mV	15.9 mV	6.4 mV	Pass
60% Load	11.9 mV	6.6 mV	11.0 mV	6.4 mV	Pass
70% Load	12.4 mV	7.3 mV	12.0 mV	6.2 mV	Pass
80% Load	13.8 mV	7.3 mV	12.1 mV	6.7 mV	Pass
90% Load	13.7 mV	8.0 mV	13.1 mV	7.1 mV	Pass
100% Load	23.7 mV	8.9 mV	13.5 mV	7.2 mV	Pass
110% Load	25.8 mV	8.5 mV	14.0 mV	7.7 mV	Pass
Crossload 1	22.8 mV	8.5 mV	12.8 mV	7.1 mV	Pass
Crossload 4	24.3 mV	6.4 mV	12.4 mV	6.6 mV	Pass

The results above are not used in the certification process

Cooler Master XG 650



Top side



Power specifications label

Cybenetics [REDACTED] ETA[REDACTED] LAMBDA[REDACTED] SAFE[REDACTED] DELTA[REDACTED] PHI[REDACTED]

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