



Cougar GX-F650 (#2)

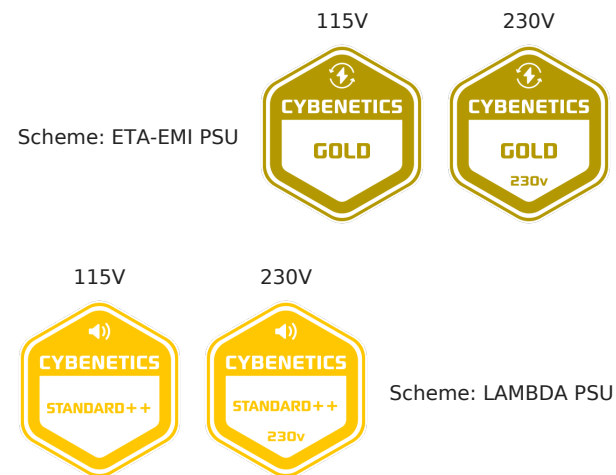
Serial Number H1801006851

Lab ID 293

Certification ID 25293

Test Result Report ID:

Certificate Issue Date: Feb 21, 2018



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	Cybernetics PSU Test Protocol

DUT Information(Non-accredited measurements)

Product Identification Details	
Brand	Cougar
Model	GX-F650 (#2)
OEM/ODM	HEC
Serial Number	H1801006851
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10-5
Rated Frequency (Hz)	47-63

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	135mm Hydro Dynamic Bearing Fan (RL4Z S1352512H)
Semi-Passive Operation	X
Cybenetics Testing Information	
Lab ID	293
Date of receipt	Feb 6, 2018
Testing Date	Feb 18, 2018
Report Issued Date	Feb 21, 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 (580mm)	1	1	16-18AWG	No
4+4 pin EPS12V (700mm)	1	1	16AWG	No
6+2 pin PCIe (600mm+120mm)	2	4	18AWG	No
SATA (450mm+120mm+120mm)	2	6	18AWG	No
SATA (450mm+120mm)	1	2	18AWG	No
4 pin Molex (400mm+120mm+120mm)	1	3	18AWG	No
AC Power Cord (1700mm) - C13 coupler	1	1	18AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	24	24	54	3	0.5
	Watts	130		648	15	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)	88.500%
Average Noise Output (>1450 Load Combinations)	33.42dBA
Average PF (>1450 Load Combinations)	0.983
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.0489W
Non-Accredited	
12V Ripple (Full Load)	12.53mV
5V Ripple (Full Load)	21.55mV
3.3V Ripple (Full Load)	24.35mV
5VSB Ripple (Full Load)	22.77mV
12V Load Regulation	0.67%
5V Load Regulation	1.48%
3.3V Load Regulation	2.07%

5VSB Load Regulation	2.33%
Inrush Current	65.592A

230V

Accredited		
Average Efficiency (>1450 load combinations)	90.166%	
Average Noise Output (>1450 Load Combinations)	33.28dBA	
Average PF (>1450 Load Combinations)	0.941	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.0956W	
Non-Accredited		
12V Ripple (Full Load)	12.03mV	
5V Ripple (Full Load)	20.24mV	
3.3V Ripple (Full Load)	24.18mV	
5VSB Ripple (Full Load)	21.22mV	
12V Load Regulation	1.05%	
5V Load Regulation	1.44%	
3.3V Load Regulation	2.04%	
5VSB Load Regulation	2.33%	
Inrush Current	56.632A	
Hold-Up Time & PWR_OK Signal	20.20ms	
AC Loss to PWR_OK Hold Up Time	17.30ms	
PWR_OK Inactive to DC Loss Delay	2.90ms	
OPP (0.00°C / 0.00°C)	-	-

Hold-Up Time & PWR_OK Signal

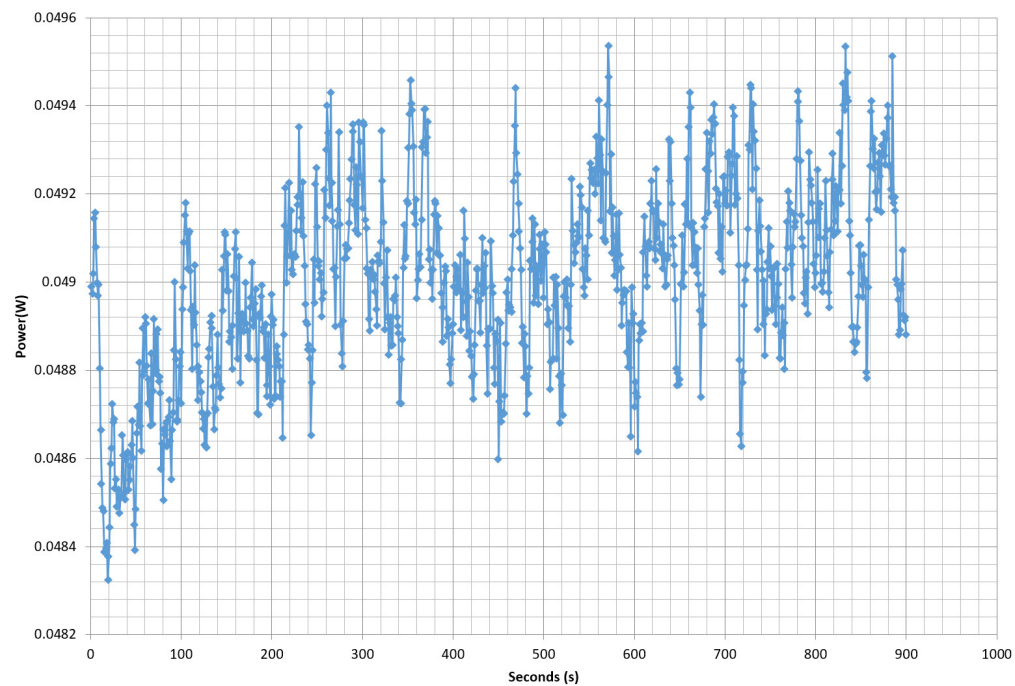
Hold-Up Time (ms)	20.2
AC Loss to PWR_OK Hold Up Time (ms)	17.3
PWR_OK Inactive to DC Loss Delay (ms)	2.9



Graphs

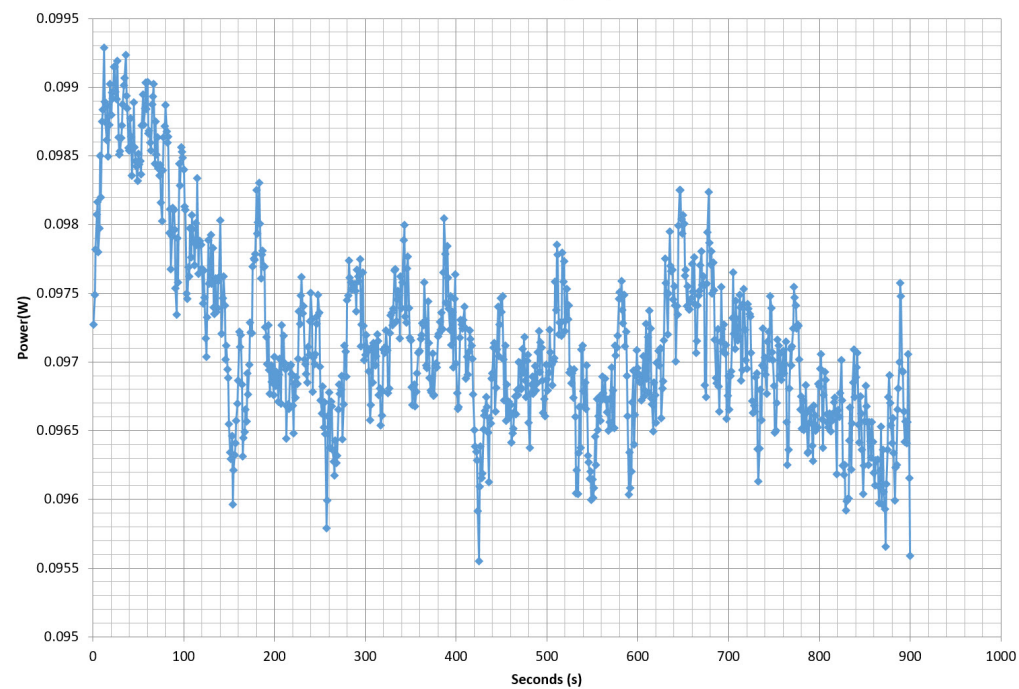
115V

Power - H1801006851 - 15/02/2018 - 10:11



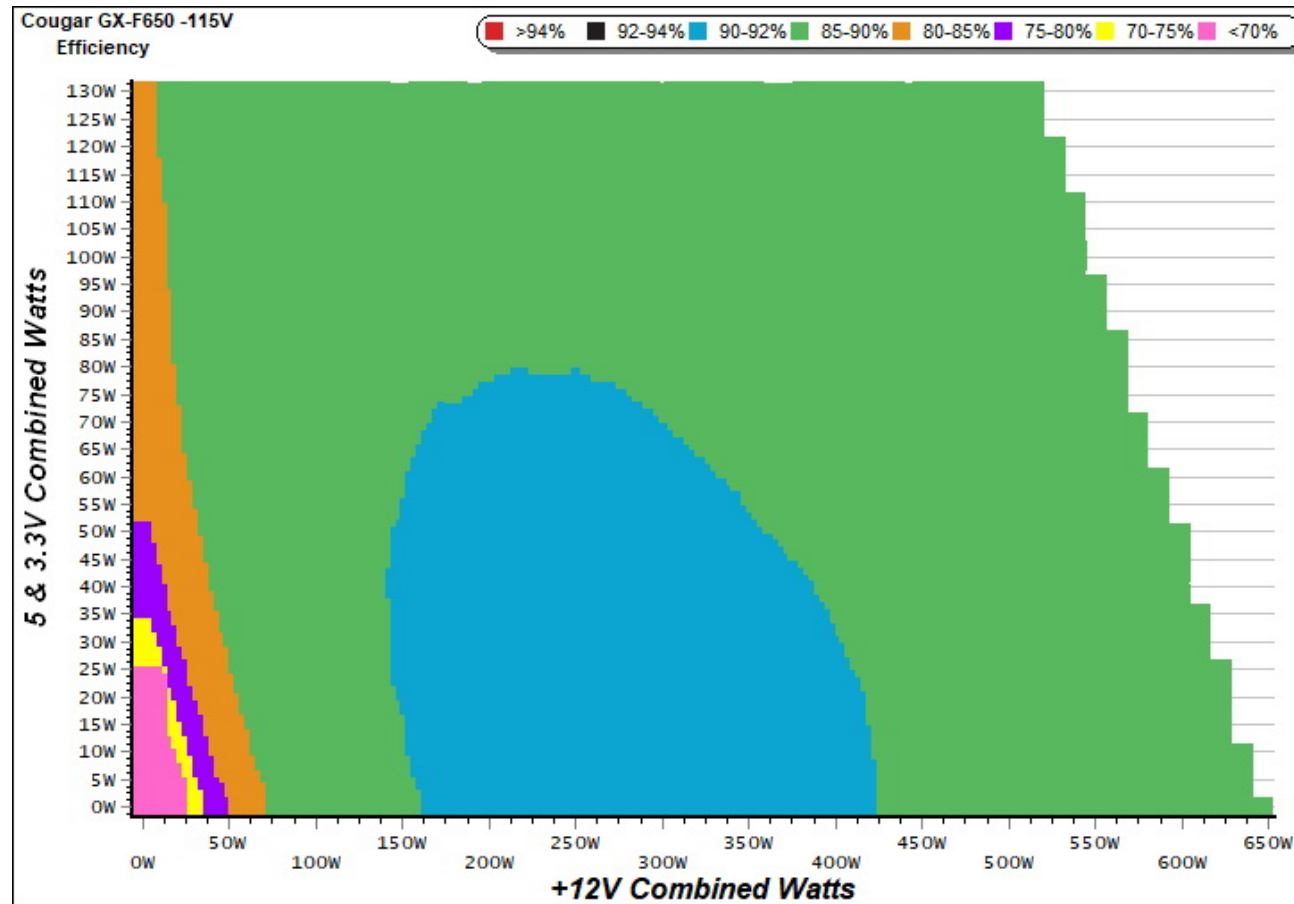
230V

Power - H1801006851 - 15/02/2018 - 10:11



Efficiency Graph

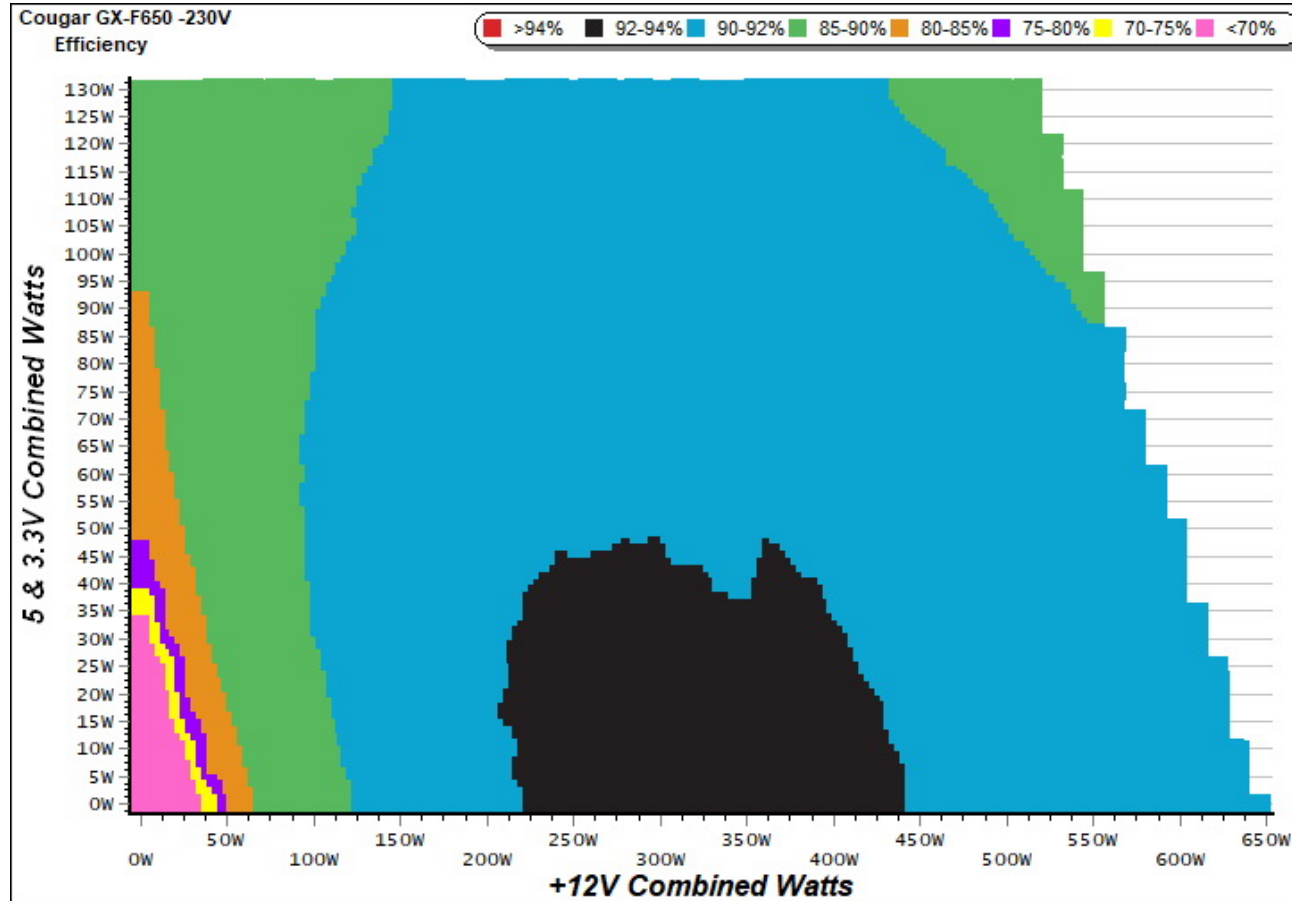
115V



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

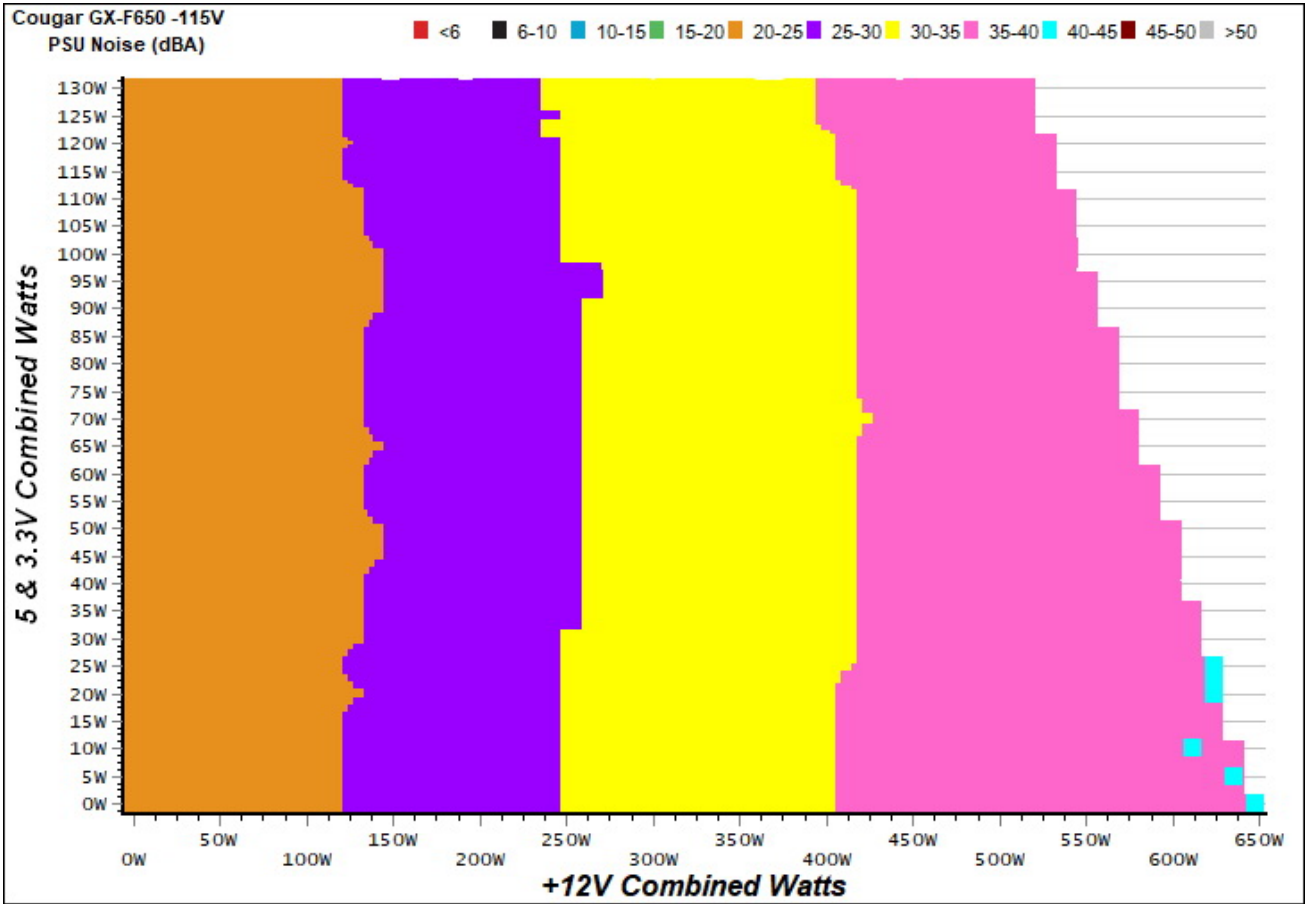


INFO

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

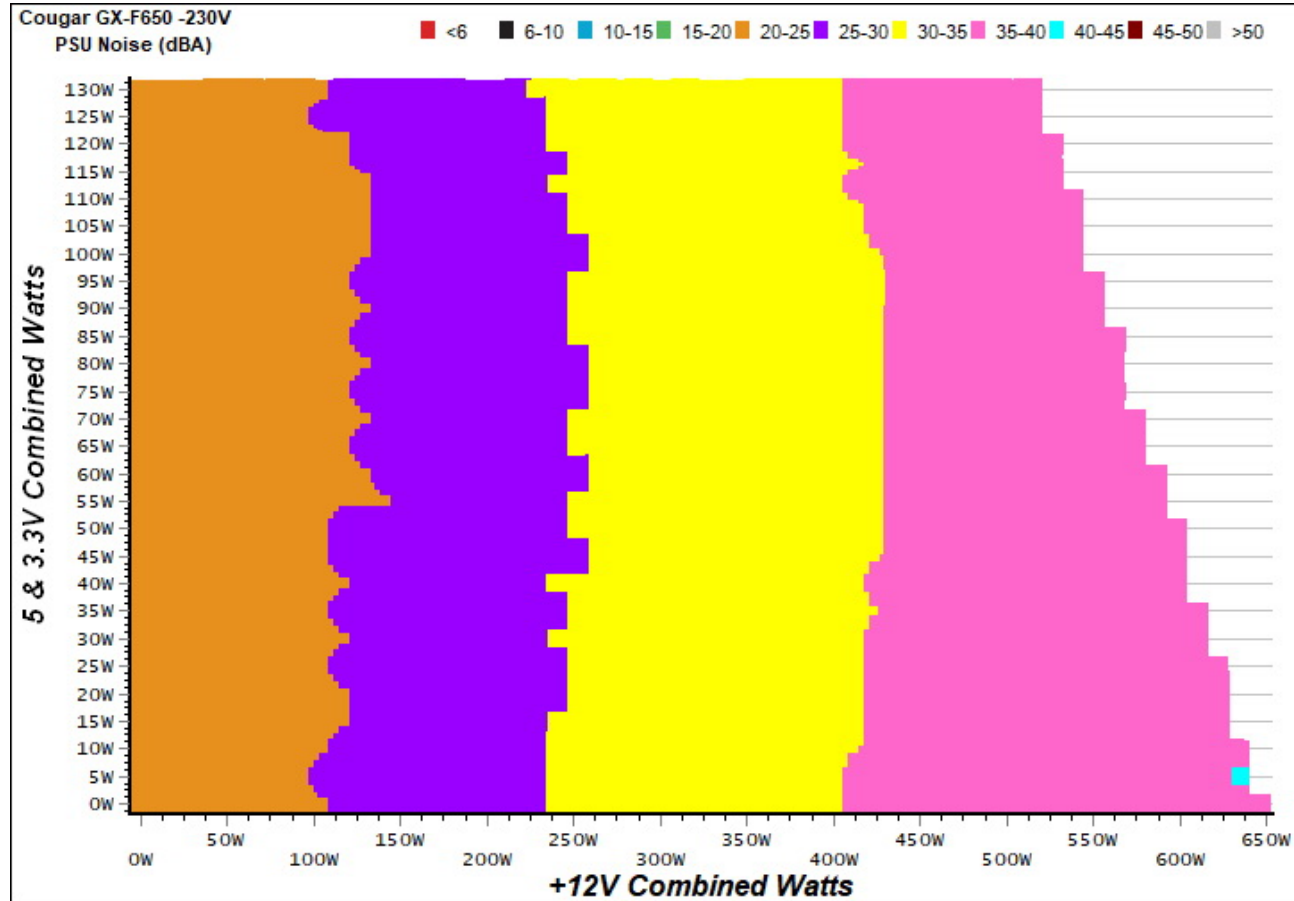
115V



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

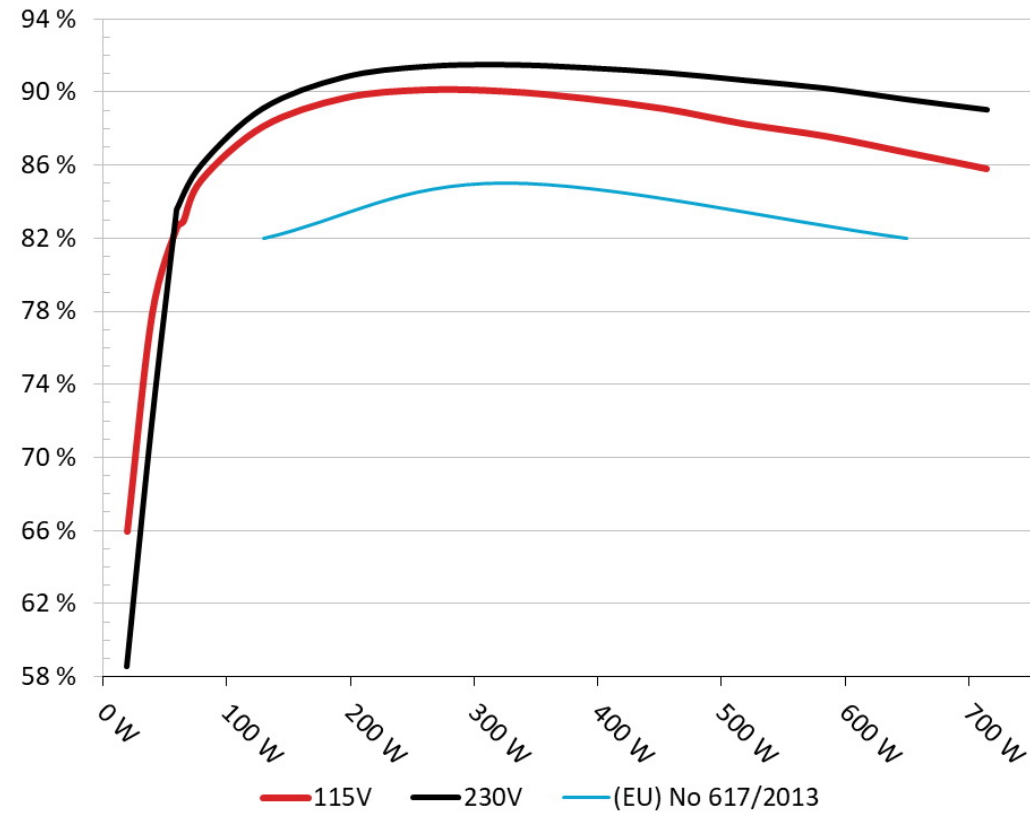
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails.

Indicative Performance

Efficiency under high ambient temperature

Efficiency: Cougar GX-F650

Ambient: 30°C - 40°C (86°F - 104°F)

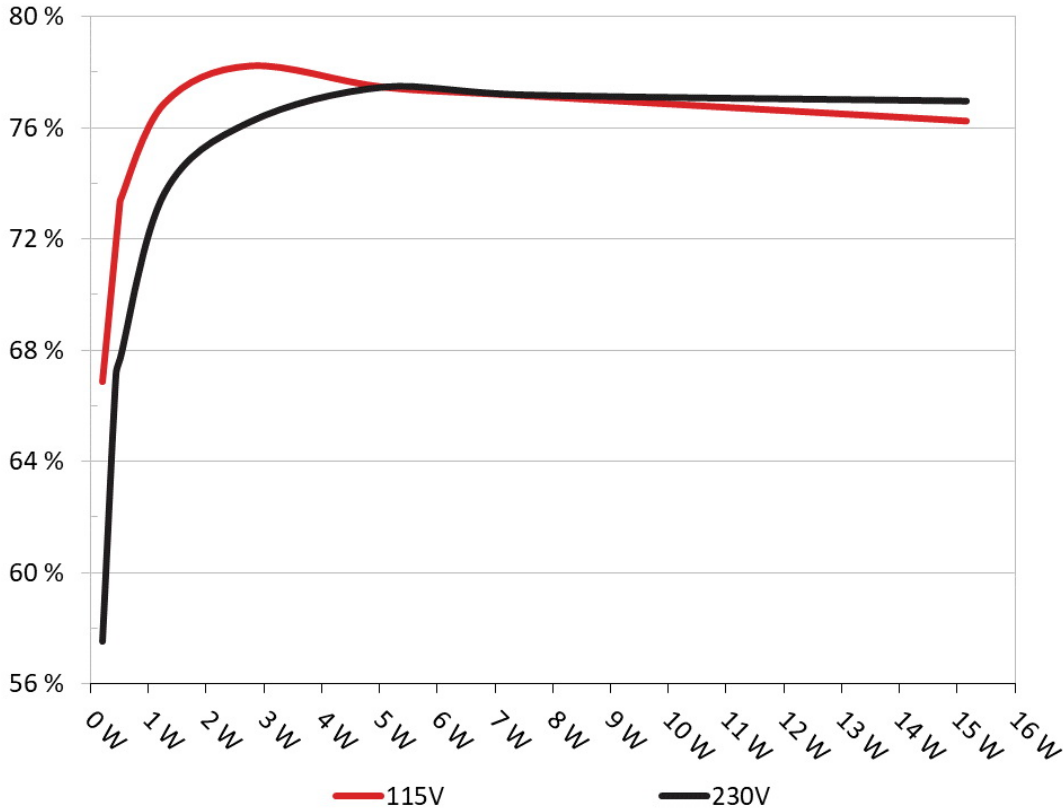


INFO

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: Cougar GX-F650
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	0.042A	0.214	66.875%	0.032
	5.112V	0.320		115.03V
2	0.087A	0.447	73.399%	0.060
	5.111V	0.609		115.03V
3	0.542A	2.766	78.246%	0.255
	5.100V	3.535		115.03V
4	1.002A	5.104	77.474%	0.338
	5.093V	6.588		115.04V
5	1.502A	7.632	77.161%	0.386
	5.082V	9.891		115.03V
6	3.002A	15.164	76.262%	0.444
	5.052V	19.884		115.03V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.214	57.527%	0.011
	5.112V	0.372		230.15V
2	0.087A	0.447	67.117%	0.020
	5.111V	0.666		230.18V
3	0.543A	2.768	76.232%	0.102
	5.101V	3.631		230.15V
4	1.002A	5.105	77.489%	0.168
	5.093V	6.588		230.16V
5	1.502A	7.634	77.197%	0.224
	5.083V	9.889		230.16V
6	3.002A	15.168	76.979%	0.316
	5.053V	19.704		230.16V

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	3.581A	1.995A	1.978A	0.981A	64.798	82.904%	860	24.7	32.56°C	0.978
	12.072V	5.007V	3.333V	5.083V	78.160				35.81°C	115.07V
2	8.206A	2.995A	2.975A	1.181A	129.800	88.134%	885	26.3	33.12°C	0.982
	12.058V	4.999V	3.324V	5.073V	147.276				36.87°C	115.06V
3	13.184A	3.508A	3.494A	1.381A	194.918	89.676%	945	28.6	34.26°C	0.976
	12.047V	4.990V	3.318V	5.064V	217.359				38.47°C	115.06V
4	18.161A	4.014A	3.984A	1.581A	259.813	90.124%	1020	30.2	34.87°C	0.978
	12.038V	4.984V	3.312V	5.054V	288.283				39.79°C	115.05V
5	22.803A	5.023A	4.992A	1.783A	324.765	90.045%	1100	32.5	35.88°C	0.983
	12.029V	4.975V	3.303V	5.042V	360.669				41.51°C	115.05V
6	27.451A	6.039A	6.005A	1.986A	389.768	89.657%	1210	35.3	36.13°C	0.986
	12.021V	4.968V	3.295V	5.031V	434.732				42.26°C	115.04V
7	32.098A	7.050A	7.023A	2.191A	454.620	89.080%	1282	37.0	36.75°C	0.989
	12.012V	4.960V	3.288V	5.020V	510.350				44.33°C	115.05V
8	36.736A	8.075A	8.046A	2.395A	519.690	88.248%	1390	38.5	37.60°C	0.990
	12.013V	4.953V	3.280V	5.008V	588.898				47.05°C	115.05V
9	41.833A	8.597A	8.583A	2.397A	584.798	87.582%	1470	40.4	38.88°C	0.991
	12.005V	4.945V	3.273V	5.001V	667.712				48.64°C	115.04V
10	46.666A	9.112A	9.090A	3.008A	649.579	86.695%	1530	41.5	39.60°C	0.992
	11.998V	4.938V	3.267V	4.983V	749.269				50.48°C	115.04V
11	52.102A	9.124A	9.108A	3.011A	714.495	85.806%	1545	42.2	40.26°C	0.993
	11.992V	4.933V	3.260V	4.977V	832.683				52.39°C	115.04V
CL1	0.098A	16.026A	16.005A	0.005A	133.767	84.123%	1200	35.1	37.22°C	0.980
	12.044V	4.972V	3.304V	5.082V	159.014				45.14°C	115.05V

CL2	61.943A	1.003A	1.004A	1.002A	756.739	85.831%	1550	42.7	39.48°C	0.993
	11.999V	4.947V	3.274V	5.026V	881.666				49.45°C	115.05V

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	3.567A	1.993A	1.978A	0.981A	64.787	83.557%	860	24.7	31.85°C	0.792
	12.119V	5.007V	3.333V	5.083V	77.536				37.95°C	230.25V
2	8.185A	3.000A	2.976A	1.181A	129.769	89.106%	860	24.7	32.17°C	0.900
	12.082V	4.998V	3.324V	5.073V	145.635				38.85°C	230.25V
3	13.164A	3.509A	3.492A	1.381A	194.900	90.799%	945	28.6	33.02°C	0.935
	12.064V	4.990V	3.318V	5.064V	214.651				39.98°C	230.25V
4	18.138A	4.016A	3.983A	1.581A	259.779	91.381%	1000	29.8	33.52°C	0.950
	12.051V	4.984V	3.312V	5.054V	284.282				40.78°C	230.23V
5	22.784A	5.020A	4.993A	1.782A	324.748	91.483%	1090	32.2	34.47°C	0.957
	12.039V	4.975V	3.303V	5.042V	354.981				42.45°C	230.23V
6	27.420A	6.041A	6.007A	1.986A	389.660	91.321%	1170	33.9	35.09°C	0.963
	12.030V	4.968V	3.295V	5.031V	426.691				43.71°C	230.24V
7	32.079A	7.053A	7.024A	2.191A	454.667	91.040%	1255	36.7	35.62°C	0.965
	12.020V	4.960V	3.288V	5.020V	499.414				44.93°C	230.25V
8	36.736A	8.081A	8.047A	2.395A	519.678	90.625%	1340	37.8	36.54°C	0.968
	12.012V	4.952V	3.280V	5.008V	573.436				46.28°C	230.23V
9	41.825A	8.598A	8.583A	2.398A	584.710	90.193%	1450	40.2	37.67°C	0.971
	12.005V	4.945V	3.273V	5.001V	648.287				47.64°C	230.26V
10	46.667A	9.113A	9.091A	3.008A	649.553	89.582%	1525	41.3	39.06°C	0.973
	11.997V	4.938V	3.267V	4.983V	725.091				49.50°C	230.24V
11	52.126A	9.124A	9.108A	3.011A	714.512	89.023%	1545	42.2	39.20°C	0.974
	11.987V	4.932V	3.260V	4.977V	802.619				50.76°C	230.25V
CL1	0.098A	16.028A	16.002A	0.004A	133.749	85.300%	1190	34.7	36.58°C	0.911
	12.063V	4.972V	3.303V	5.082V	156.799				44.64°C	230.24V

CL2	61.953A	1.003A	1.003A	1.002A	756.656	89.193%	1550	42.7	37.56°C	0.974
	11.999V	4.947V	3.273V	5.026V	848.331				47.37°C	230.25V

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	1.208A	0.490A	0.477A	0.196A	19.648	65.937%	750	21.3	0.882
	12.086V	5.013V	3.338V	5.102V	29.798				115.07V
2	2.442A	0.989A	0.986A	0.391A	39.736	77.853%	810	23.3	0.953
	12.079V	5.012V	3.336V	5.097V	51.040				115.07V
3	3.674A	1.486A	1.498A	0.586A	59.780	82.602%	820	23.8	0.970
	12.074V	5.009V	3.334V	5.092V	72.371				115.07V
4	4.908A	1.995A	1.978A	0.786A	79.803	85.217%	830	24.4	0.973
	12.068V	5.005V	3.332V	5.086V	93.647				115.07V

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	1.194A	0.492A	0.476A	0.196A	19.622	58.584%	860	24.7	0.539
	12.200V	5.012V	3.339V	5.103V	33.494				230.25V
2	2.421A	0.990A	0.989A	0.391A	39.757	71.875%	910	26.9	0.701
	12.187V	5.010V	3.337V	5.097V	55.314				230.24V
3	3.664A	1.487A	1.498A	0.586A	59.843	83.353%	830	24.4	0.773
	12.123V	5.008V	3.334V	5.092V	71.795				230.24V
4	4.892A	1.995A	1.979A	0.786A	79.800	86.007%	860	24.7	0.834
	12.106V	5.005V	3.332V	5.086V	92.783				230.24V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	5.6 mV	10.0 mV	9.9 mV	7.5 mV	Pass
20% Load	7.5 mV	10.6 mV	11.4 mV	9.0 mV	Pass
30% Load	8.0 mV	12.3 mV	12.8 mV	11.0 mV	Pass
40% Load	9.3 mV	12.7 mV	13.5 mV	10.9 mV	Pass
50% Load	10.0 mV	13.6 mV	15.7 mV	14.0 mV	Pass
60% Load	11.6 mV	15.0 mV	16.9 mV	15.9 mV	Pass
70% Load	11.6 mV	15.5 mV	18.4 mV	18.8 mV	Pass
80% Load	10.4 mV	16.9 mV	19.1 mV	31.3 mV	Pass
90% Load	55.0 mV	25.8 mV	23.8 mV	31.5 mV	Pass
100% Load	12.5 mV	21.6 mV	24.4 mV	22.8 mV	Pass
110% Load	13.2 mV	21.9 mV	25.1 mV	23.3 mV	Pass
Crossload 1	7.9 mV	15.8 mV	17.8 mV	6.2 mV	Pass
Crossload 2	14.3 mV	19.0 mV	20.5 mV	20.2 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	11.6 mV	10.6 mV	10.6 mV	7.5 mV	Pass
20% Load	9.5 mV	11.0 mV	12.2 mV	8.7 mV	Pass
30% Load	9.2 mV	12.3 mV	13.9 mV	11.2 mV	Pass
40% Load	9.4 mV	13.5 mV	14.8 mV	11.7 mV	Pass
50% Load	9.5 mV	13.7 mV	16.7 mV	13.8 mV	Pass
60% Load	9.7 mV	15.0 mV	16.3 mV	15.4 mV	Pass
70% Load	10.1 mV	15.7 mV	18.1 mV	16.0 mV	Pass
80% Load	10.4 mV	16.8 mV	18.6 mV	26.3 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	11.0 mV	18.2 mV	20.3 mV	30.5 mV	Pass
100% Load	12.0 mV	20.2 mV	24.2 mV	21.2 mV	Pass
110% Load	13.4 mV	22.0 mV	23.7 mV	22.0 mV	Pass
Crossload 1	9.8 mV	15.5 mV	17.9 mV	5.9 mV	Pass
Crossload 2	14.1 mV	19.8 mV	20.4 mV	19.4 mV	Pass

The results above are not used in the certification process

Cougar GX-F650 (#2)



Top side



Power specifications label

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

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