



EVGA 650 BQ (#2)

Serial Number 1703560615801533

Lab ID 164

Certification ID 25164

Test Result Report ID:

Certificate Issue Date: Aug 23, 2018

115V

230V

Scheme: ETA-EMI PSU



115V

230V



Scheme: LAMBDA PSU

A handwritten signature in blue ink, appearing to read 'A. Bitziopoulos'.

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	EVGA
Model	650 BQ (#2)
OEM/ODM	HEC
Serial Number	1703560615801533
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	Semi Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	140mm Teflon Nano-Steel Fan (RL4Z T1352512H)
Semi-Passive Operation	X
Cybenetics Testing Information	
Lab ID	164
Date of receipt	Aug 15, 2018
Testing Date	Aug 21, 2018
Report Issued Date	Aug 23, 2018
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

Cables and Connectors(Non-accredited measurements)

Captive Cables			
Description	Cable Count	Connector Count (Total)	Gauge
ATX connector 20+4 pin (570mm)	1	1	18-22AWG
4+4 pin EPS12V (620mm)	1	1	18AWG
6+2 pin PCIe (580mm+150mm)	1	2	18AWG
Modular Cables			
6+2 pin PCIe (550mm+150mm)	1	2	18AWG
SATA (500mm+150mm+150mm+150mm)	1	4	18AWG
SATA (500mm+150mm+150mm)	1	3	18AWG
4 pin Molex (550mm+150mm+150mm)+FDD (+150mm)	1	3 / 1	18-20AWG

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	24	20	54	3	0.3
	Watts	130		648	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)	84.573%
Average Noise Output (>1450 Load Combinations)	38.98dBA
Average PF (>1450 Load Combinations)	0.987
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.0518W
Non-Accredited	
12V Ripple (Full Load)	20.11mV
5V Ripple (Full Load)	16.52mV
3.3V Ripple (Full Load)	40.94mV
5VSB Ripple (Full Load)	27.01mV
12V Load Regulation	1.73%
5V Load Regulation	3.04%
3.3V Load Regulation	3.72%
5VSB Load Regulation	3.43%
Inrush Current	64.203A

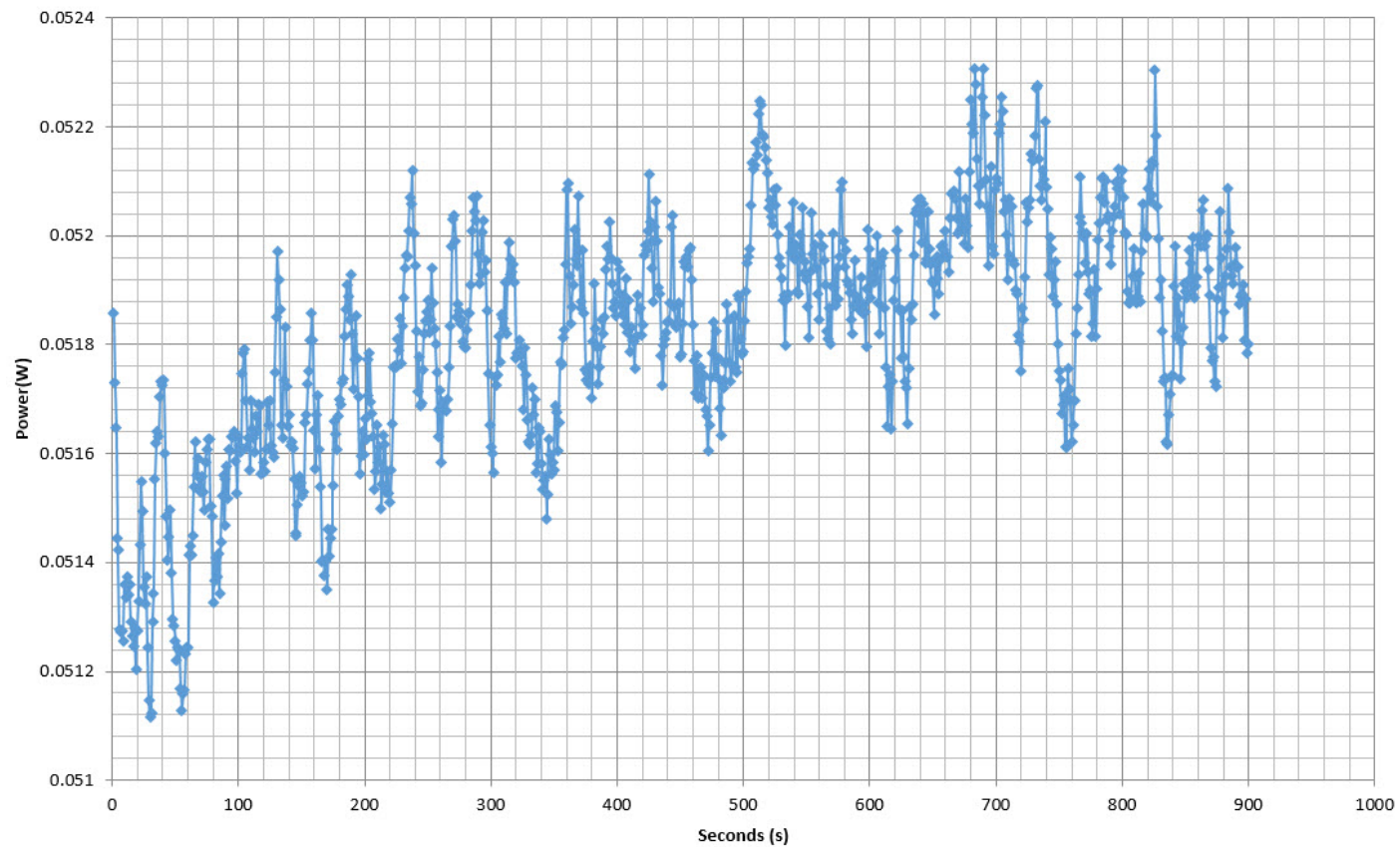
Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	17.60
AC Loss to PWR_OK Hold Up Time (ms)	15.32
PWR_OK Inactive to DC Loss Delay (ms)	2.28

Vampire Power

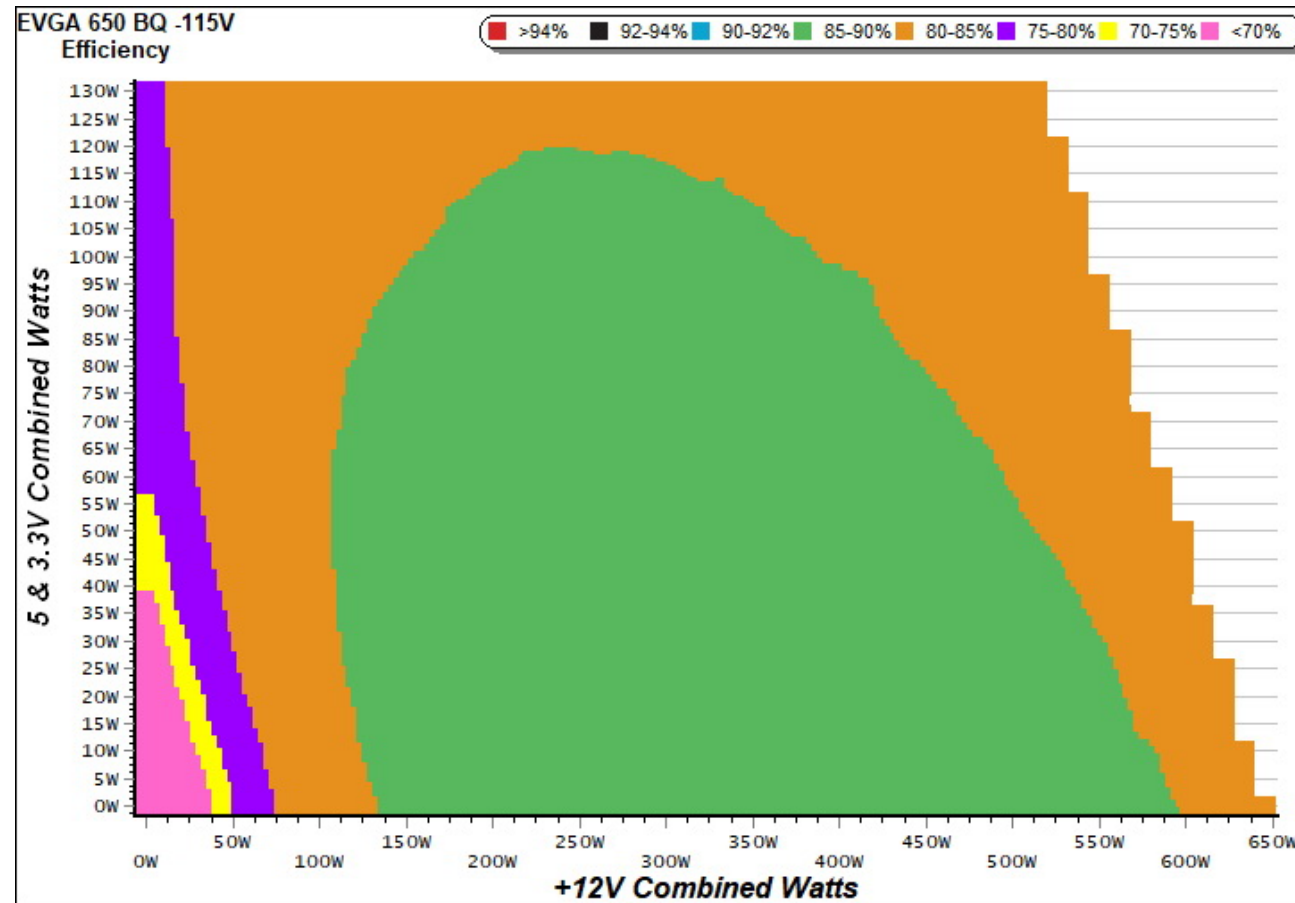
Graphs 115V

Power - 1703560615801533 - 21/08/2017 - 15:50



Efficiency Graph

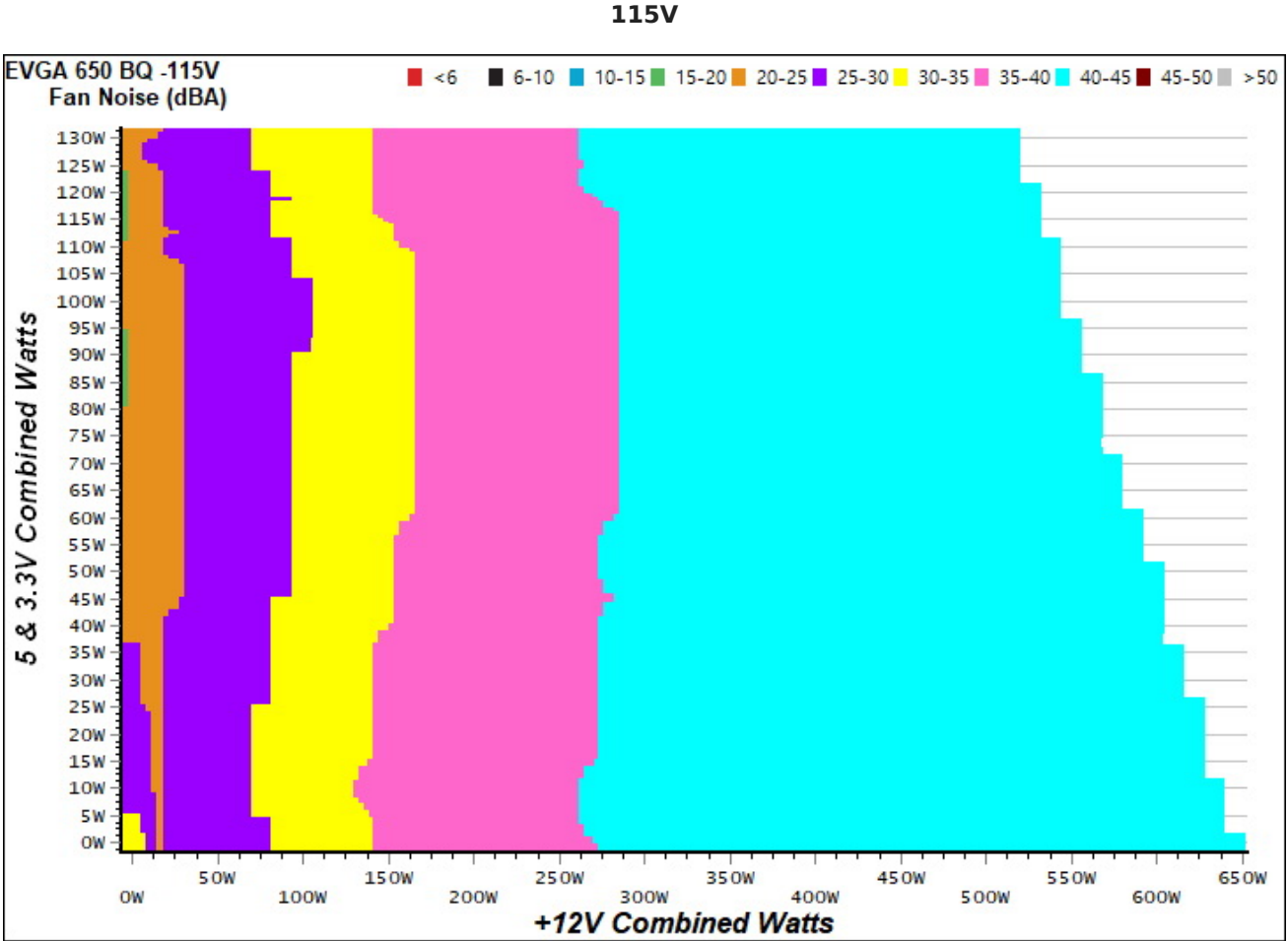
115V



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.

Noise Graph



INFO

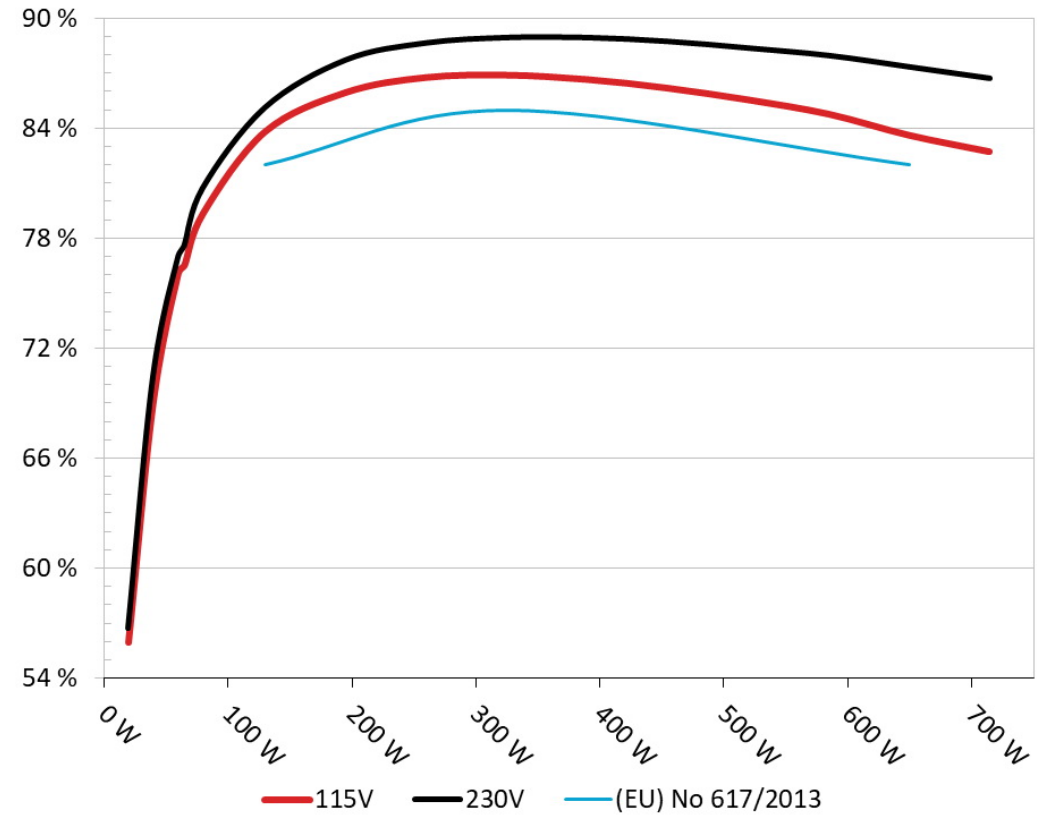
The PSU`s noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails.

Indicative Performance

Efficiency under high ambient temperature

Efficiency: EVGA 650 BQ

Ambient: 38°C - 46°C (100.4°F - 114.8°F)



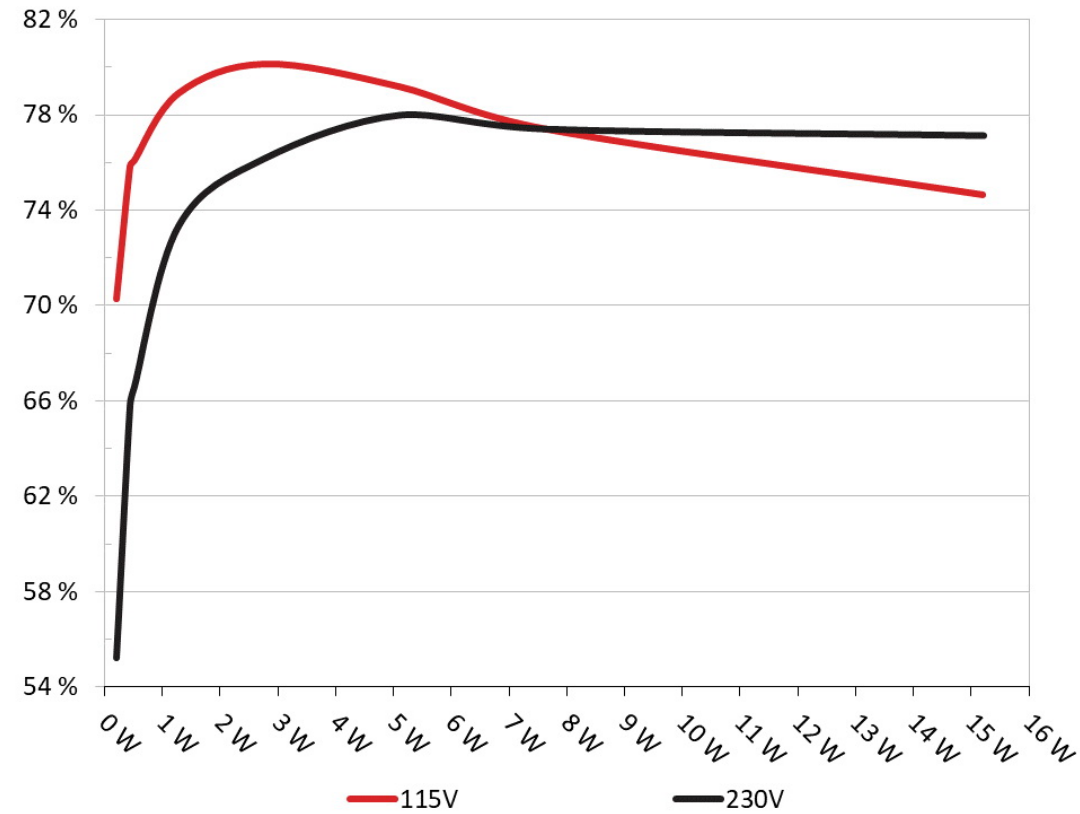
INFO

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: EVGA 650 BQ

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	0.213	70.297%	0.043
	5.131V	0.303		115.17V

2	0.087A	0.446	75.850%	0.082
	5.130V	0.588		115.19V
3	0.542A	2.776	80.162%	0.288
	5.122V	3.463		115.17V
4	1.002A	5.119	79.205%	0.350
	5.110V	6.463		115.18V
5	1.501A	7.657	77.422%	0.384
	5.100V	9.890		115.18V
6	3.001A	15.204	74.669%	0.431
	5.066V	20.362		115.18V

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	3.529A	1.975A	1.965A	0.980A	64.769	76.505%	1677	40.8	38.45°C	0.980
	12.242V	5.056V	3.353V	5.094V	84.660				40.82°C	115.19V
2	8.091A	2.973A	2.957A	1.181A	129.754	83.798%	1685	40.9	38.70°C	0.987
	12.222V	5.038V	3.344V	5.080V	154.842				41.27°C	115.19V
3	13.012A	3.489A	3.474A	1.380A	194.886	85.941%	1692	41.0	39.02°C	0.980
	12.202V	5.025V	3.336V	5.066V	226.767				41.74°C	115.18V
4	17.943A	3.992A	3.966A	1.580A	259.751	86.759%	1692	41.0	39.51°C	0.983
	12.181V	5.013V	3.327V	5.051V	299.395				42.40°C	115.18V
5	22.553A	5.000A	4.971A	1.786A	324.699	86.886%	1692	41.0	40.11°C	0.986
	12.160V	4.994V	3.318V	5.034V	373.705				43.44°C	115.18V
6	27.186A	6.034A	6.013A	1.991A	389.709	86.652%	1692	41.0	40.87°C	0.989
	12.137V	4.975V	3.283V	5.019V	449.738				44.79°C	115.17V
7	31.826A	7.058A	7.052A	2.196A	454.581	86.180%	1692	41.0	42.14°C	0.990
	12.113V	4.958V	3.275V	5.002V	527.476				46.38°C	115.17V
8	36.500A	8.098A	8.103A	2.405A	519.615	85.542%	1692	41.0	42.89°C	0.993
	12.088V	4.942V	3.257V	4.986V	607.440				47.88°C	115.17V

9	41.619A	8.631A	8.658A	2.410A	584.659	84.761%	1692	41.0	44.37°C	0.995
	12.063V	4.928V	3.244V	4.975V	689.776				50.13°C	115.18V
10	46.500A	9.163A	9.190A	3.029A	649.512	83.612%	1692	41.0	45.56°C	0.996
	12.039V	4.913V	3.231V	4.948V	776.817				51.91°C	115.18V
11	51.982A	9.182A	9.218A	3.035A	714.385	82.714%	1692	41.0	46.28°C	0.996
	12.017V	4.904V	3.222V	4.939V	863.678				53.33°C	115.18V
CL1	0.094A	16.028A	16.002A	0.004A	132.463	78.754%	1692	41.0	43.46°C	0.984
	12.189V	4.929V	3.268V	5.072V	168.199				49.16°C	115.19V
CL2	54.112A	1.004A	1.003A	1.002A	665.402	84.138%	1692	41.0	45.94°C	0.996
	12.051V	4.980V	3.267V	5.011V	790.843				51.62°C	115.18V

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	0.494A	0.475A	0.195A	19.645	55.945%	1638	40.0	0.947
	12.262V	5.075V	3.361V	5.124V	35.115				115.20V
2	2.406A	0.981A	0.981A	0.390A	39.733	69.108%	1650	40.2	0.970
	12.251V	5.067V	3.356V	5.115V	57.494				115.19V
3	3.627A	1.474A	1.489A	0.586A	59.853	76.093%	1658	40.5	0.983
	12.244V	5.060V	3.354V	5.105V	78.658				115.19V
4	4.837A	1.975A	1.967A	0.780A	79.739	79.338%	1677	40.8	0.977
	12.237V	5.054V	3.351V	5.098V	100.505				115.19V

The results above are not used in the certification process

Ripple Measurements 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.7 mV	10.1 mV	21.0 mV	11.2 mV	Pass
20% Load	7.1 mV	11.7 mV	23.3 mV	10.4 mV	Pass
30% Load	8.3 mV	10.1 mV	23.8 mV	11.6 mV	Pass
40% Load	9.2 mV	10.1 mV	25.4 mV	17.0 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
50% Load	10.4 mV	11.5 mV	27.3 mV	12.8 mV	Pass
60% Load	12.4 mV	11.9 mV	28.8 mV	13.6 mV	Pass
70% Load	14.5 mV	11.7 mV	30.6 mV	14.1 mV	Pass
80% Load	15.8 mV	13.9 mV	33.6 mV	16.6 mV	Pass
90% Load	17.3 mV	15.8 mV	36.3 mV	19.2 mV	Pass
100% Load	20.1 mV	16.5 mV	40.9 mV	27.0 mV	Pass
110% Load	22.5 mV	16.2 mV	38.8 mV	26.7 mV	Pass
Crossload 1	16.1 mV	17.8 mV	48.6 mV	16.6 mV	Pass
Crossload 2	20.0 mV	12.6 mV	25.0 mV	15.8 mV	Pass

The results above are not used in the certification process

EVGA 650 BQ (#2)



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

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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

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