EVGA 650 B3

Serial Number 1703460605800323

Lab ID 146

Certification ID 25146

Test Result Report ID:

Certificate Issue Date: Jul 25, 2018

115V 230V

Scheme: ETA-EMI PSU

CYBENETICS SILVER

115V 230V

CYBENETICS STANDARD++

Scheme: LAMBDA PSU

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 B3
OEM/ODM	Super Flower
Serial Number	1703460605800323
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	130mm Sleeve Bearing Fan (S1282412H)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	146
Date of receipt	Jul 18, 2018
Testing Date	Jul 22, 2018
Report Issued Date	Jul 25, 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	18-22AWG	Yes
4+4 pin EPS12V (600mm)	1	1	18-22AWG	Yes
6+2 pin PCIe (550mm+150mm)	1	2	18-22AWG	Yes
6+2 pin PCIe (550mm)	1	1	18-22AWG	Yes
SATA (500mm+100mm+100mm)	2	6	18-20AWG	No
4 pin Molex (500mm+100mm+100mm)	1	3	18AWG	No
FDD Adapter (+105mm)	1	1	24AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	18AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	54.1	3	0.5
	Watts	110		649.2	15	6
Total Max. Power (W)		650				

Parts Description

General Data	
Manufacturer (OEM)	RSY / Super Flower
Platform Model	Leadex Bronze
Primary Side	
Transient Filter	5x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor
Bridge Rectifier(s)	GBU1506 (600V, 15A @ 100°C)
APFC MOSFETS	2x AOTF22N50 (500V, 15A @100°C, 0.26Ohm)
APFC Boost Diode	1x STTH8R06D (600V, 8A @ 100°C)
Hold-up Cap(s)	1x Nippon Chemi-Con (400V, 470uF, 95°C, CE)
Main Switchers	2x AOTF22N50 (500V, 15A @100°C, 0.26Ohm)
APFC Controller	SF29603 & S9602 & ICE3PCS02G
Resonant Controller	SF29605
Topology	Primary side: Half-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	4x A&O AOT240L (40V, 82A @ 100°C, 4.7mOhm @ 125°C)
5V & 3.3V	DC-DC Converters: 4x A&O AON6516 (30V, 25A @ 100°C, 8mOhm) PWM Controller: 2x On Semiconductor NCP1587A
Filtering Capacitors	Electrolytics: Teapo (3000-6000h @ 105°C, SY) Polymers: Teapo
Supervisor IC	SF29605 & LM339A
Fan Model	S1282412H (120mm, 12V, 0.35A, Sleeve Bearing)
5VSB Circuit	

Rectifier	Mospec S10C60C
Standby PWM Controller	29604

Test Results

Temperature & Compliance Info

Temperature Range (°C /°F)	28-32 / 82.4-89.6
ErP Lot 3/6 Ready	ErP Lot 3/6 2010: ✓ ErP Lot 3/6 2013: ✓ ErP Lot 3/6 2014, CEC: Partially
(EU) No 617/2013 Compliance	✓

Performance Summary 115V

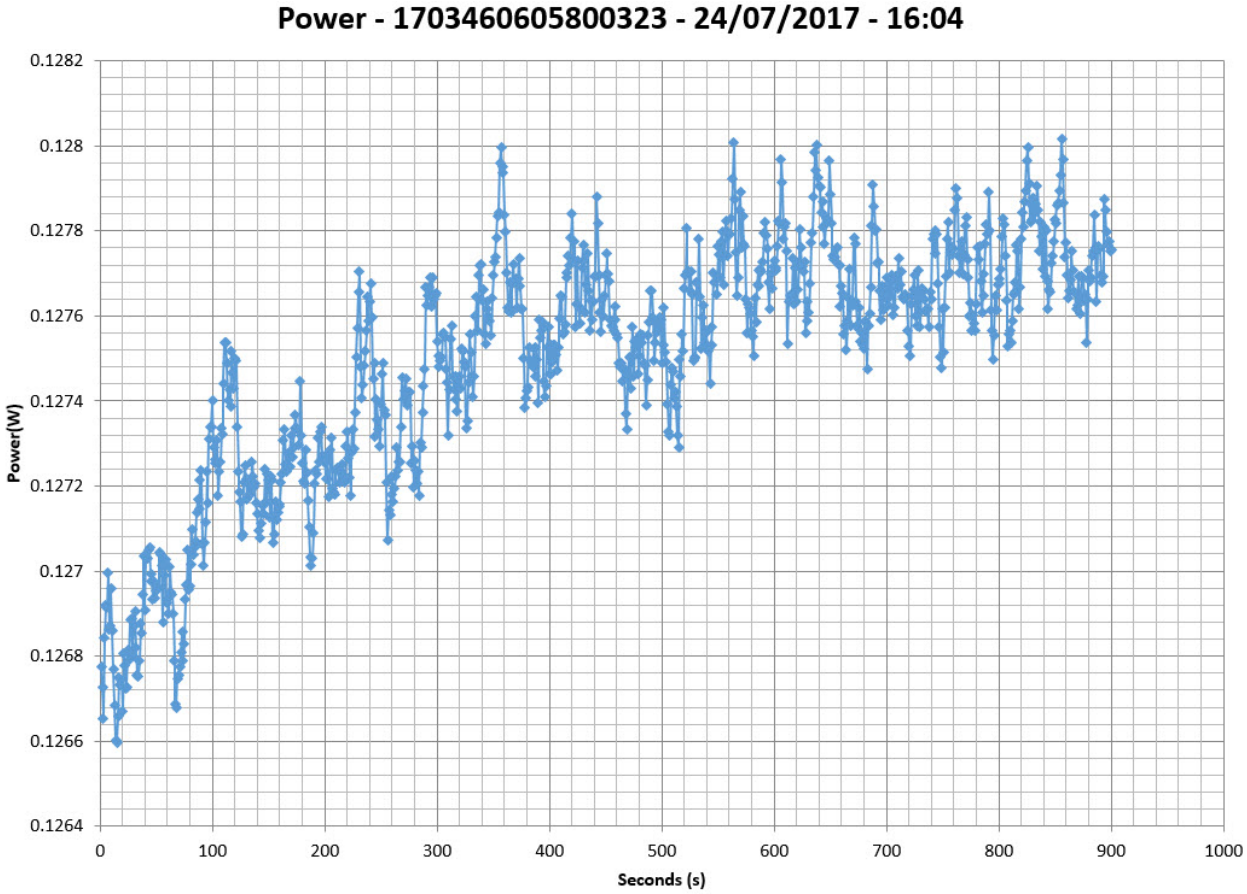
Accredited	
Average Efficiency (>1450 load combinations)	86.113%
Average Noise Output (>1450 Load Combinations)	31.98dBA
Average PF (>1450 Load Combinations)	0.990
Efficiency With 10W (≤500W) or 2% (>500W) Load	-
Standby Power Consumption	0.1278W
Non-Accredited	
12V Ripple (Full Load)	14.99mV
5V Ripple (Full Load)	11.21mV
3.3V Ripple (Full Load)	15.59mV
5VSB Ripple (Full Load)	10.35mV
12V Load Regulation	0.76%
5V Load Regulation	0.97%
3.3V Load Regulation	0.84%
5VSB Load Regulation	3.88%
Inrush Current	64.915A

Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	17.96
AC Loss to PWR_OK Hold Up Time (ms)	14.58
PWR_OK Inactive to DC Loss Delay (ms)	3.38

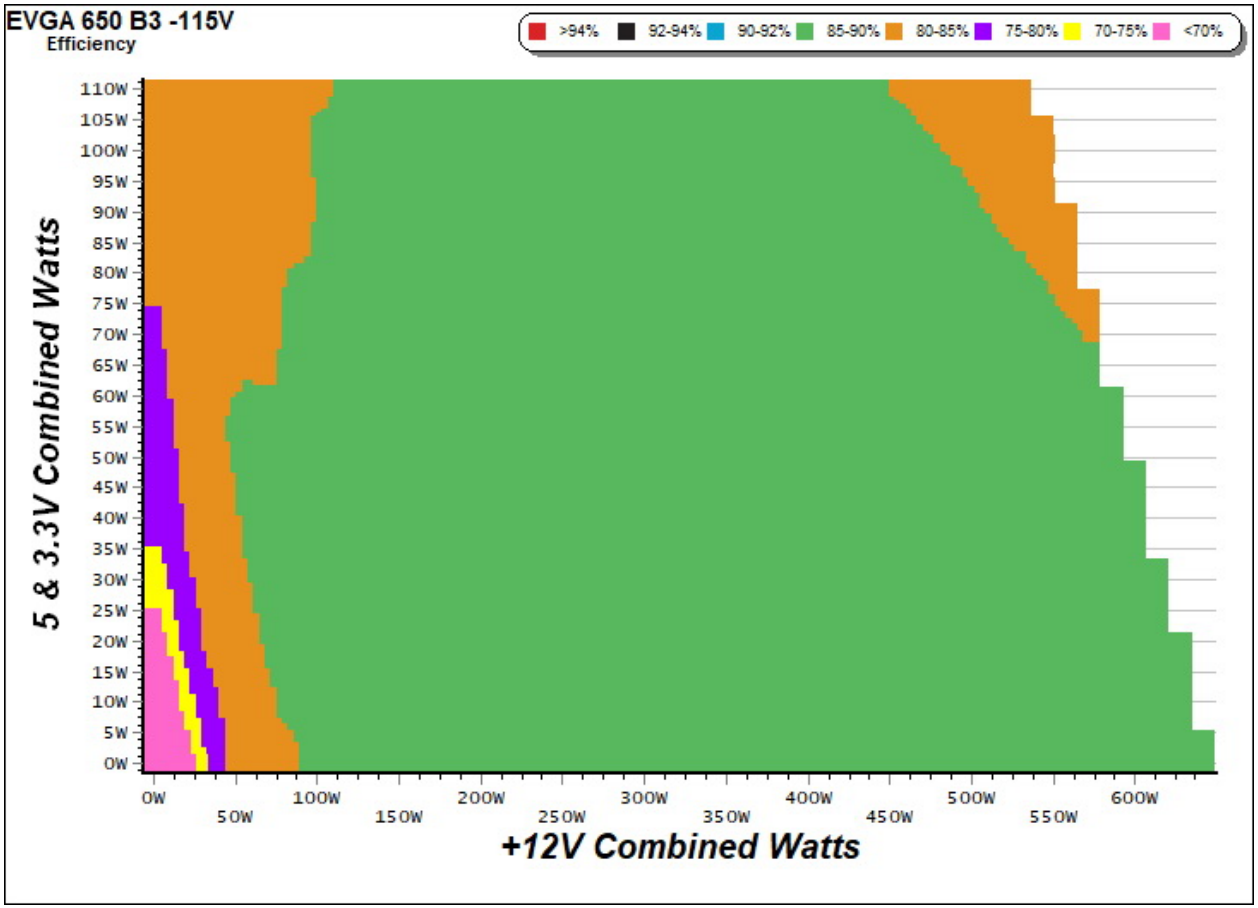
Vampire Power

Graphs 115V



Efficiency Graph

115V

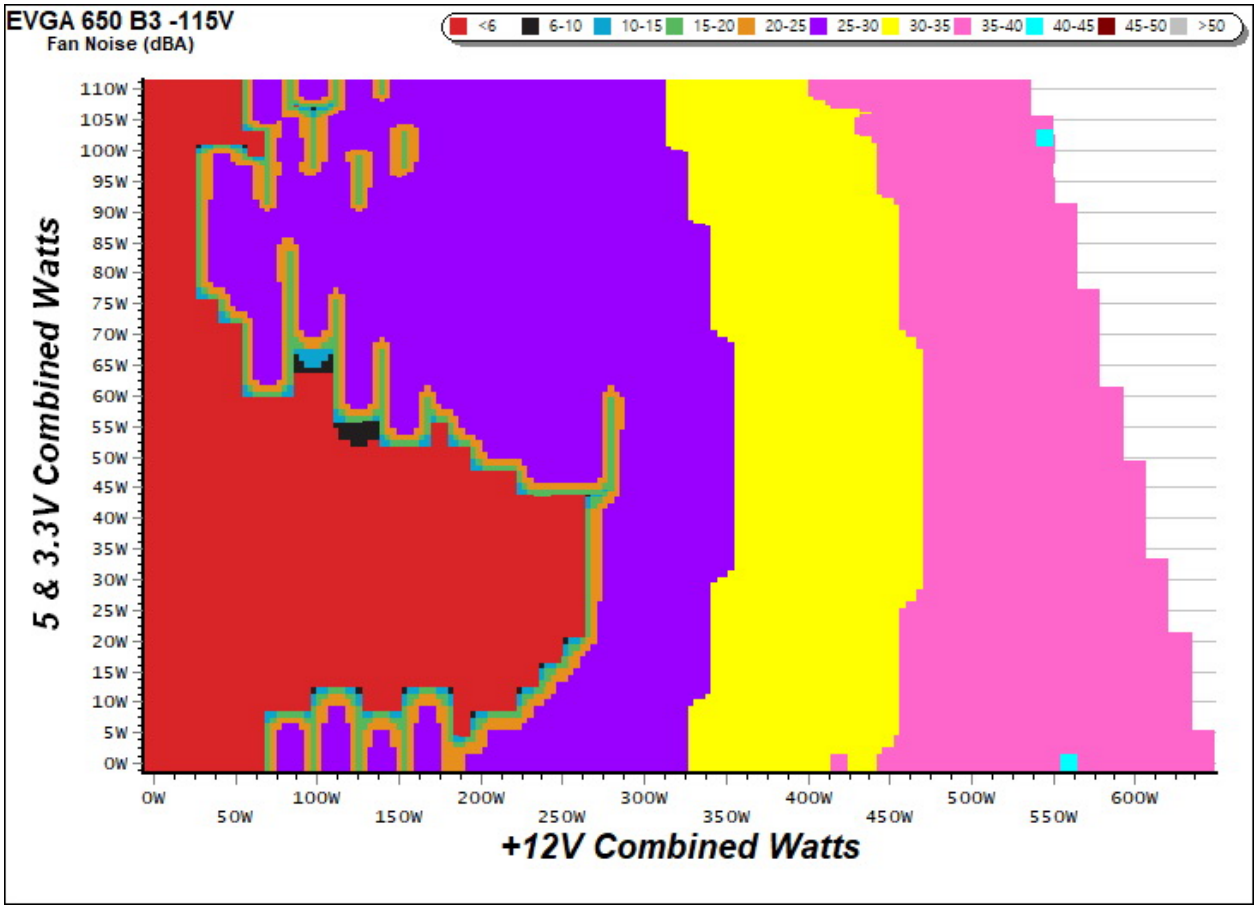


INFO

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

115V

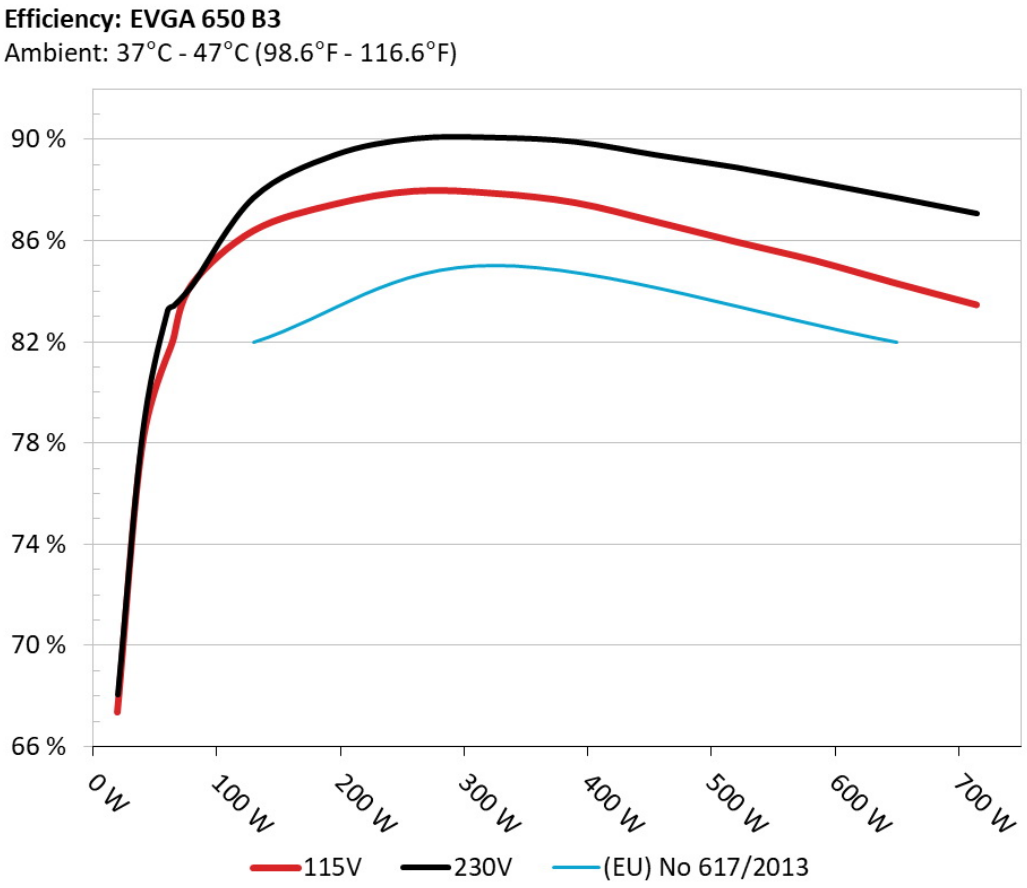


INFO

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.

Indicative Performance

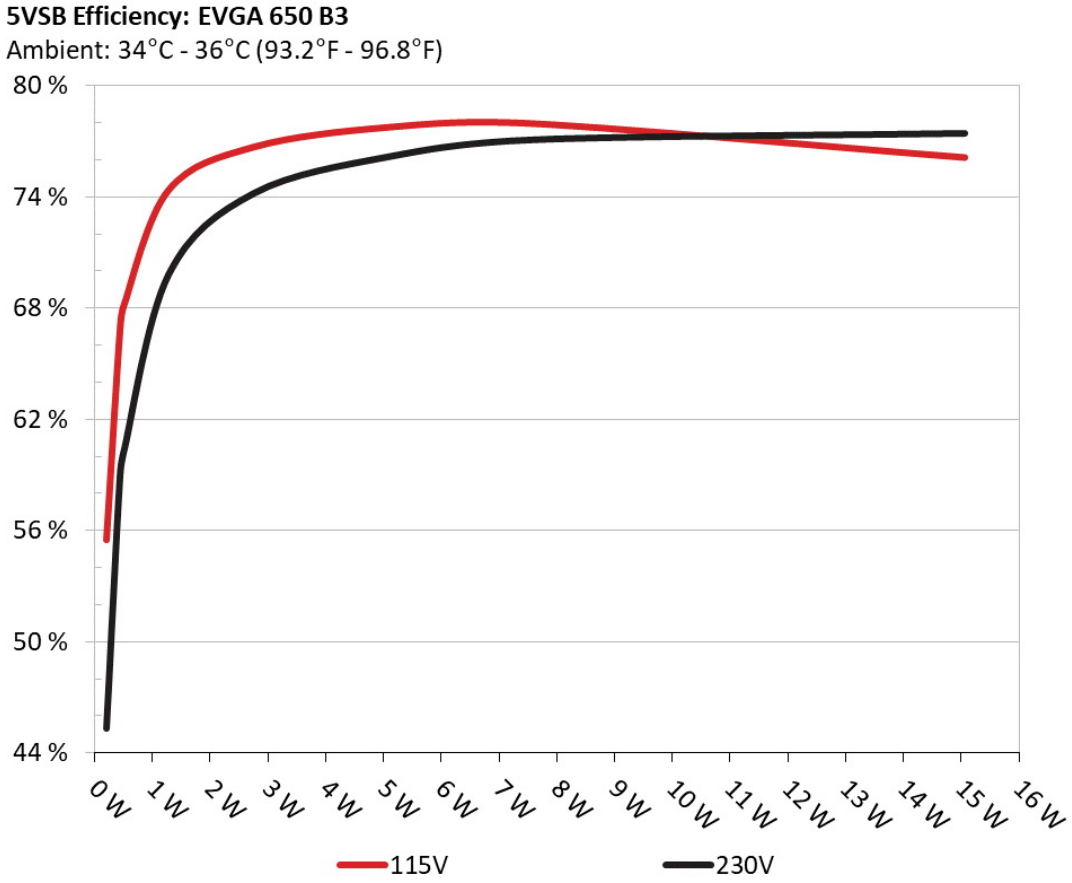
Efficiency under high ambient temperature



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	0.041A	0.212	55.497%	0.041
	5.135V	0.382		115.19V

2	0.087A	0.445	66.817%	0.071
	5.133V	0.666		115.19V
3	0.542A	2.770	76.689%	0.271
	5.115V	3.612		115.17V
4	1.002A	5.106	77.752%	0.349
	5.098V	6.567		115.17V
5	1.501A	7.624	77.939%	0.391
	5.079V	9.782		115.18V
6	3.001A	15.053	76.114%	0.447
	5.016V	19.777		115.18V

Supplementary Tests (For Reference)

Typical Load Tests 115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	Fan Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.547A	1.975A	1.981A	0.980A	64.751	81.688%	893	16.6	38.51°C	0.957
	12.175V	5.063V	3.323V	5.085V	79.266				42.09°C	115.21V
2	8.123A	2.961A	2.977A	1.180A	129.714	86.379%	1005	20.9	39.36°C	0.980
	12.172V	5.058V	3.320V	5.068V	150.169				41.47°C	115.21V
3	13.050A	3.468A	3.494A	1.385A	194.854	87.417%	1218	27.3	39.82°C	0.989
	12.164V	5.054V	3.317V	5.052V	222.901				41.98°C	115.21V
4	17.976A	3.963A	3.979A	1.585A	259.729	87.940%	1240	27.8	40.14°C	0.992
	12.158V	5.049V	3.314V	5.036V	295.347				42.45°C	115.21V
5	22.574A	4.960A	4.980A	1.790A	324.716	87.850%	1315	30.4	40.69°C	0.994
	12.148V	5.043V	3.312V	5.017V	369.627				43.07°C	115.21V
6	27.182A	5.956A	5.983A	2.000A	389.696	87.485%	1425	32.3	41.41°C	0.995
	12.137V	5.036V	3.309V	4.998V	445.441				44.22°C	115.21V
7	31.794A	6.962A	6.984A	2.205A	454.628	86.738%	1550	35.5	42.76°C	0.996
	12.126V	5.031V	3.305V	4.982V	524.142				45.63°C	115.20V
8	36.417A	7.962A	7.994A	2.415A	519.596	85.944%	1645	37.4	43.25°C	0.996
	12.115V	5.026V	3.302V	4.965V	604.573				46.47°C	115.20V

9	41.481A	8.475A	8.517A	2.420A	584.680	85.186%	1817	42.0	44.86°C	0.996
	12.103V	5.021V	3.298V	4.956V	686.355				48.28°C	115.20V
10	46.296A	8.980A	9.012A	3.044A	649.504	84.300%	1910	42.1	45.46°C	0.996
	12.091V	5.017V	3.295V	4.925V	770.469				49.25°C	115.20V
11	51.723A	8.984A	9.019A	3.050A	714.480	83.454%	2003	43.0	46.63°C	0.996
	12.079V	5.013V	3.292V	4.915V	856.140				51.19°C	115.19V
CL1	0.097A	13.021A	13.003A	0.004A	110.061	80.138%	1447	33.5	44.16°C	0.980
	12.159V	5.043V	3.322V	5.098V	137.339				46.88°C	115.22V
CL2	54.018A	1.003A	1.003A	1.001A	666.716	84.894%	1910	42.1	46.44°C	0.996
	12.095V	5.029V	3.291V	5.019V	785.355				49.73°C	115.20V

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	1.195A	0.492A	0.480A	0.195A	19.656	67.380%	0	<6.0	0.838
	12.191V	5.068V	3.324V	5.124V	29.172				115.22V
2	2.418A	0.981A	0.990A	0.391A	39.717	77.905%	0	<6.0	0.909
	12.183V	5.066V	3.323V	5.113V	50.981				115.21V
3	3.645A	1.478A	1.500A	0.585A	59.843	82.078%	0	<6.0	0.953
	12.178V	5.064V	3.323V	5.101V	72.910				115.21V
4	4.862A	1.976A	1.985A	0.785A	79.773	84.254%	0	<6.0	0.965
	12.172V	5.062V	3.322V	5.091V	94.681				115.21V

The results above are not used in the certification process

Ripple Measurements 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.8 mV	4.8 mV	6.9 mV	5.0 mV	Pass
20% Load	8.7 mV	7.4 mV	6.7 mV	4.9 mV	Pass
30% Load	9.2 mV	7.0 mV	8.0 mV	4.9 mV	Pass
40% Load	10.7 mV	7.3 mV	8.8 mV	6.0 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
50% Load	12.9 mV	7.5 mV	10.1 mV	6.6 mV	Pass
60% Load	10.4 mV	7.3 mV	11.6 mV	6.3 mV	Pass
70% Load	12.0 mV	8.3 mV	12.0 mV	7.1 mV	Pass
80% Load	12.1 mV	9.1 mV	12.3 mV	7.1 mV	Pass
90% Load	12.8 mV	10.1 mV	13.5 mV	8.4 mV	Pass
100% Load	15.0 mV	11.2 mV	15.6 mV	10.4 mV	Pass
110% Load	14.6 mV	11.5 mV	15.5 mV	10.8 mV	Pass
Crossload 1	9.4 mV	6.7 mV	8.2 mV	8.1 mV	Pass
Crossload 2	14.6 mV	10.2 mV	14.3 mV	9.0 mV	Pass

The results above are not used in the certification process

EVGA 650 B3

Top side

Power specifications label

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 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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