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	✓

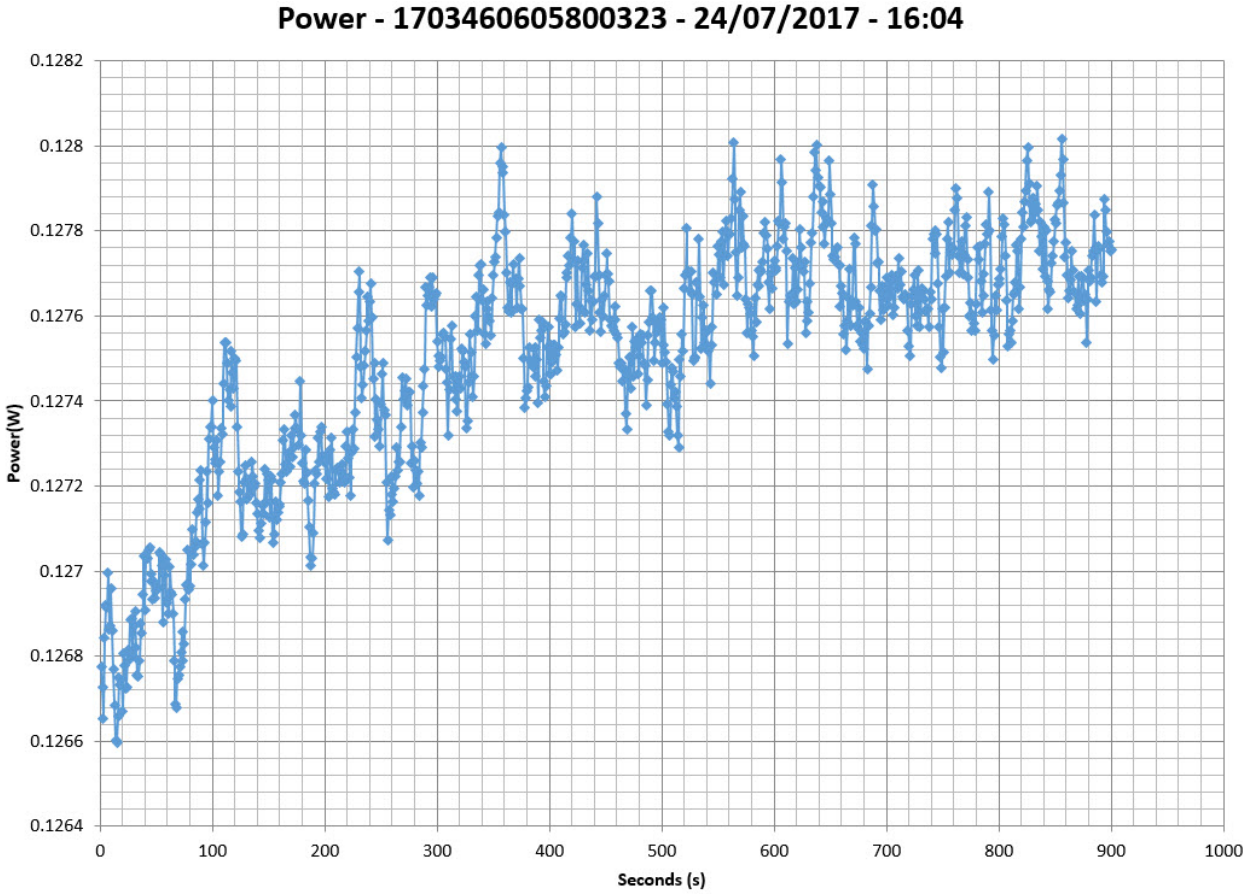
Performance Summary 115V

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

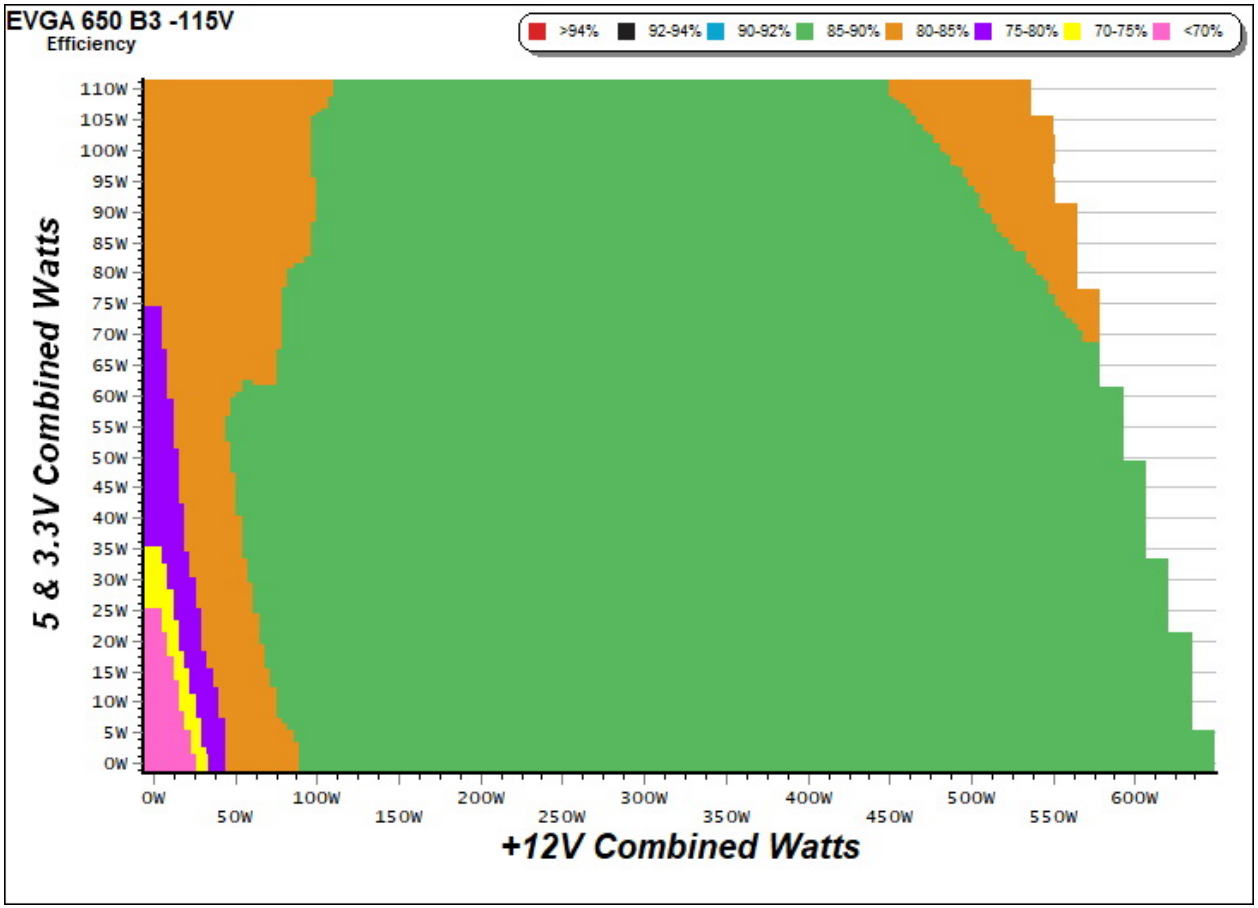
Hold-Up Time (ms)	17.96
AC Loss to PWR_OK Hold Up Time (ms)	14.58
PWR_OK Inactive to DC Loss Delay (ms)	3.38

Graphs 115V



Efficiency Graph

115V

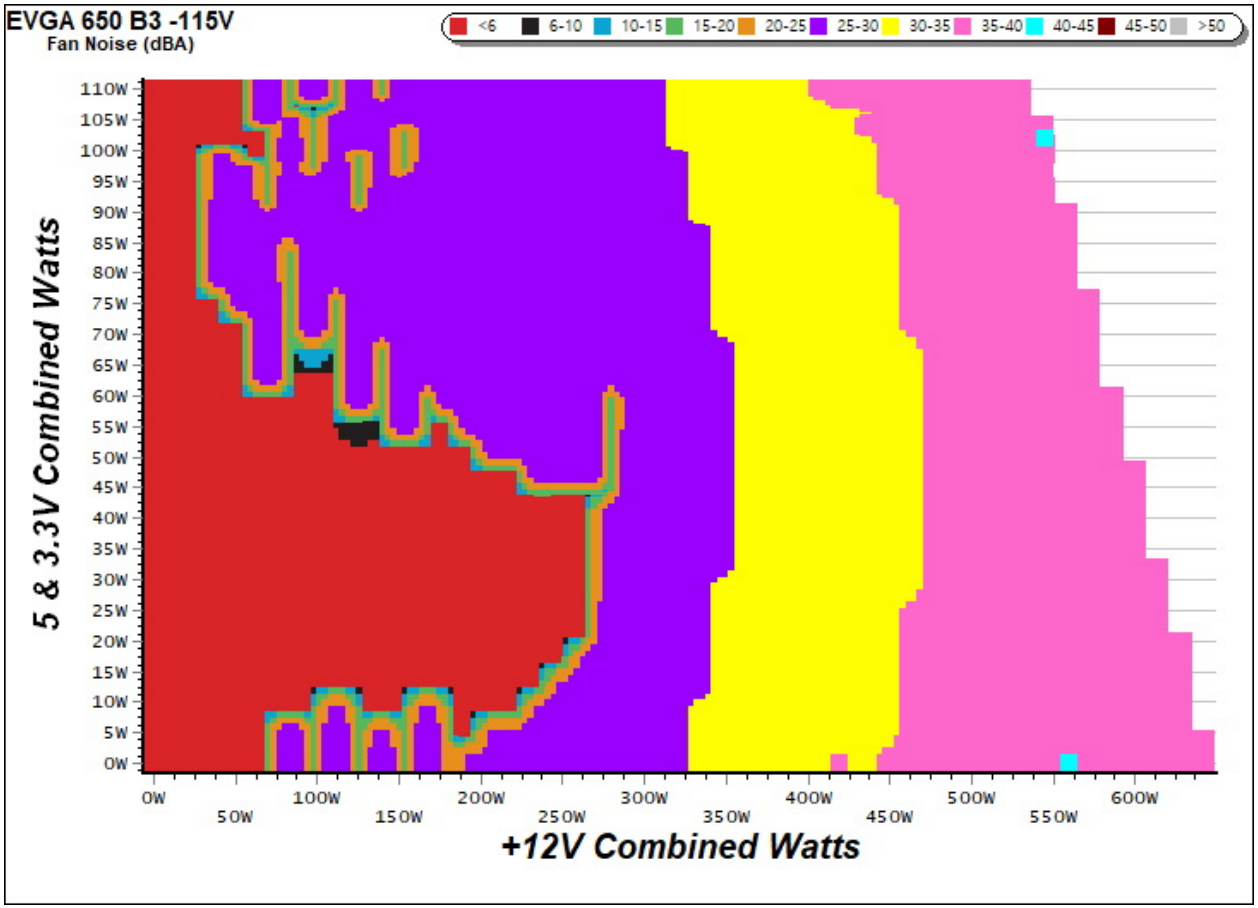


INFO

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

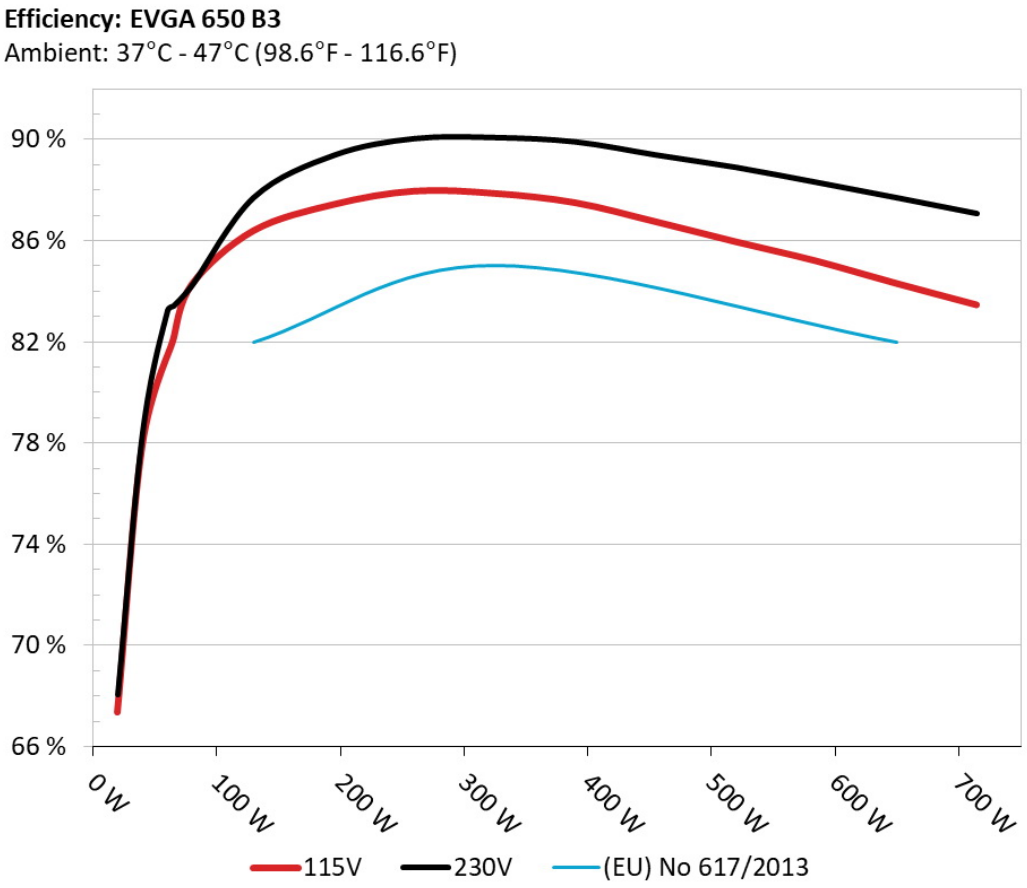


INFO

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

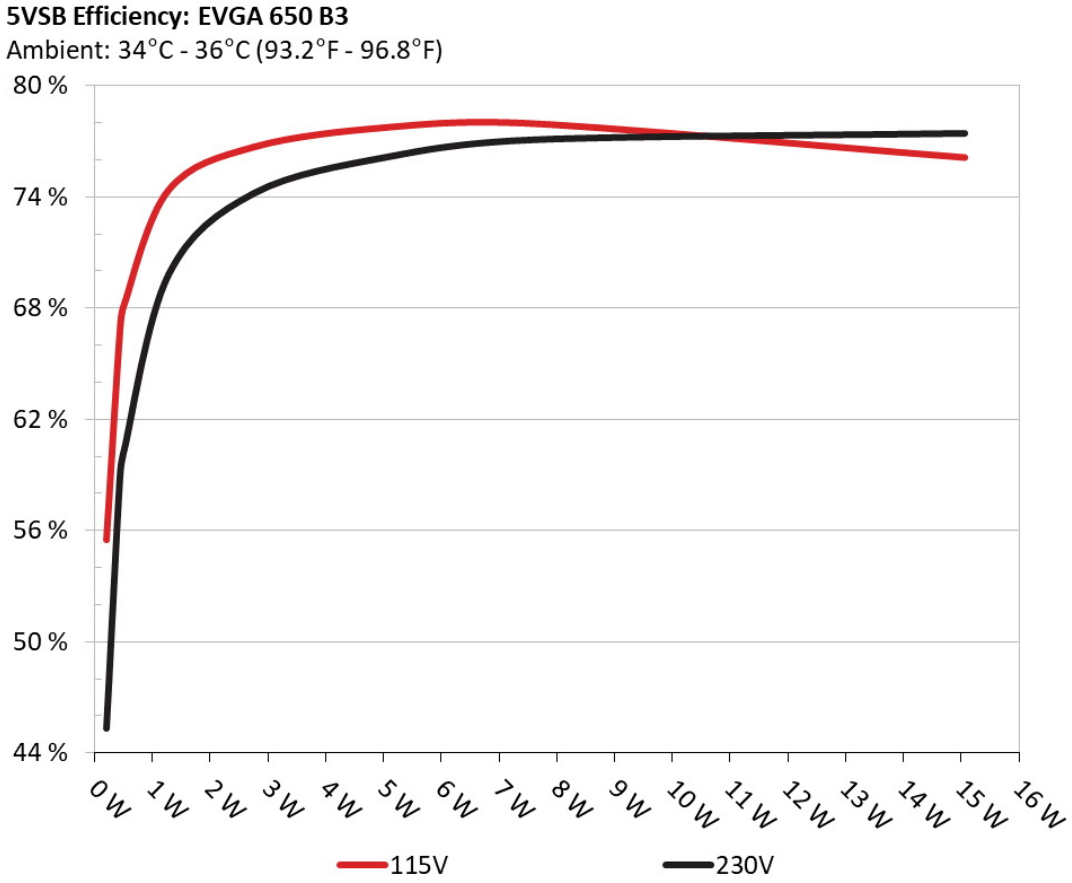
Efficiency under high ambient temperature



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

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