Einarex Apex L1 650W

Serial Number

Lab ID EX65002549

Certification ID 252549

Test Result Report ID: 24PS2549A

Certificate Issue Date: Aug 27, 2024

230V

Scheme: ETA-EMI PSU



230V

No LAMBDA level

Average noise output 45.78 dB(A), above the 45 dB(A) limit of the lowest LAMBDA level (Standard).

Scheme: LAMBDA PSU



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	Einarex
Model	Apex L1 650W
OEM/ODM	Tecnomall Technology
Serial Number	
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	200-240

Rated Current (Arms)	6
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	120mm Hydro Dynamic Bearing Fan
Semi-Passive Operation	✗
Cybenetics Testing Information	
Lab ID	EX65002549
Date of receipt	Aug 13, 2024
Testing Date	Aug 26, 2024
Report Issued Date	Aug 27, 2024
DUT Notes	Protections are not properly set. Not smooth voltage waveform and voltage spikes during turn on tests. Improper DC Power Sequencing.
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**	In Cable Capacitors
ATX connector 20+4 pin (520mm)	1	1	18-22AWG	No
8 pin EPS12V (610mm) / 4 + 4 pin EPS12V (+150mm)	1	2	18AWG	No
Modular Cables				
6+2 pin PCIe (530mm)	1	1	18AWG	No

6+2 pin PCIe (550mm+145mm)	1	2	18AWG	No
SATA (450mm+155mm+155mm)	2	6	18AWG	No
4-pin Molex (450mm+150mm)	1	1	18AWG	No
AC Power Cord (1410mm) - C13 coupler	1	1	18AWG	-

Protection Features

Over Power Protection	✓
Over Current (+12V) Protection	-
Over Temperature Protection	✓
Short Circuit Protection	✓
Surge Protection	✓
Inrush Current Protection	✓
Fan Failure Protection	✗

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	18	18	53	3	0.3
	Watts	120		636	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 230V

Accredited	
Average Efficiency (>1450 load combinations)	85.555%

Average Noise Output (>1450 Load Combinations)		45.78dBA
Average PF (>1450 Load Combinations)		0.931
Efficiency With 10W (≤500W) or 2% (>500W) Load		-
Standby Power Consumption		0.1062W
Non-Accredited		
12V Ripple (Full Load)		52.99mV
5V Ripple (Full Load)		29.78mV
3.3V Ripple (Full Load)		40.36mV
5VSB Ripple (Full Load)		19.34mV
12V Load Regulation		2.75%
5V Load Regulation		2.73%
3.3V Load Regulation		3.33%
5VSB Load Regulation		4.80%
Inrush Current		133.600A
Hold-Up Time & PWR_OK Signal		12.20ms
AC Loss to PWR_OK Hold Up Time		9.70ms
PWR_OK Inactive to DC Loss Delay		2.50ms
PSU Timings: T1 (20% / 100%)	61.0ms	60.0ms
PSU Timings: T3 (20% / 100%)	309.0ms	320.0ms
12V OCP (28.2°C / 40.8°C)	56.00A (105.66%), 11.418V	56.00A (105.66%), 11.418V
5V OCP (28.2°C / 40.8°C)	Starts < 4.75V	Starts < 4.75V
3.3V OCP (28.2°C / 40.8°C)	27.3A (151.67%), 3.157V	21.2A (117.78%), 3.16V
5VSB OCP (28.2°C / 40.8°C)	4.7A (156.67%), 4.942V	4.4A (146.67%), 4.92V
OPP (28.72°C / 45.74°C)	125.39%	123.18%

Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	12.2
AC Loss to PWR_OK Hold Up Time (ms)	9.7
PWR_OK Inactive to DC Loss Delay (ms)	2.5

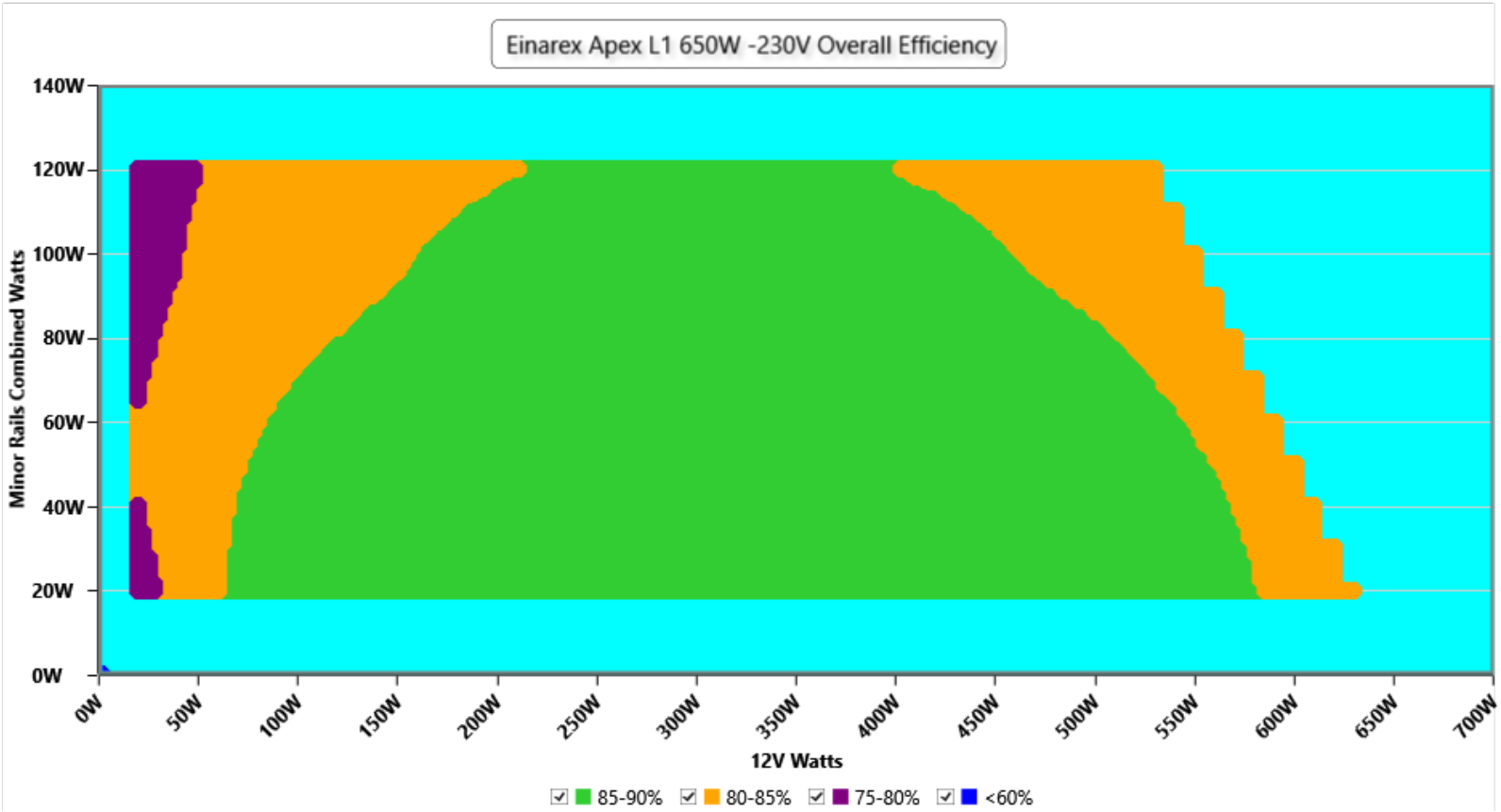
Stromverbrauch im Ruhezustand

Tables 230V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	231.08 V	230.95 V	227.70 V	231.12 V	232.30 V	PASS
Mains Frequency:	50.00 Hz	49.99 Hz	49.50 Hz	50.01 Hz	50.50 Hz	PASS
Mains Voltage CF:	1.417	1.416	1.340	1.419	1.490	PASS
Mains Voltage THD:	0.17 %	0.14 %	N/A	0.28 %	2.00 %	PASS
Real Power:	0.106 W	0.071 W	N/A	0.167 W	N/A	N/A
Apparent Power:	22.741 W	22.395 W	N/A	23.134 W	N/A	N/A
Power Factor:	0.004	N/A	N/A	N/A	N/A	N/A

Efficiency Graph

230V

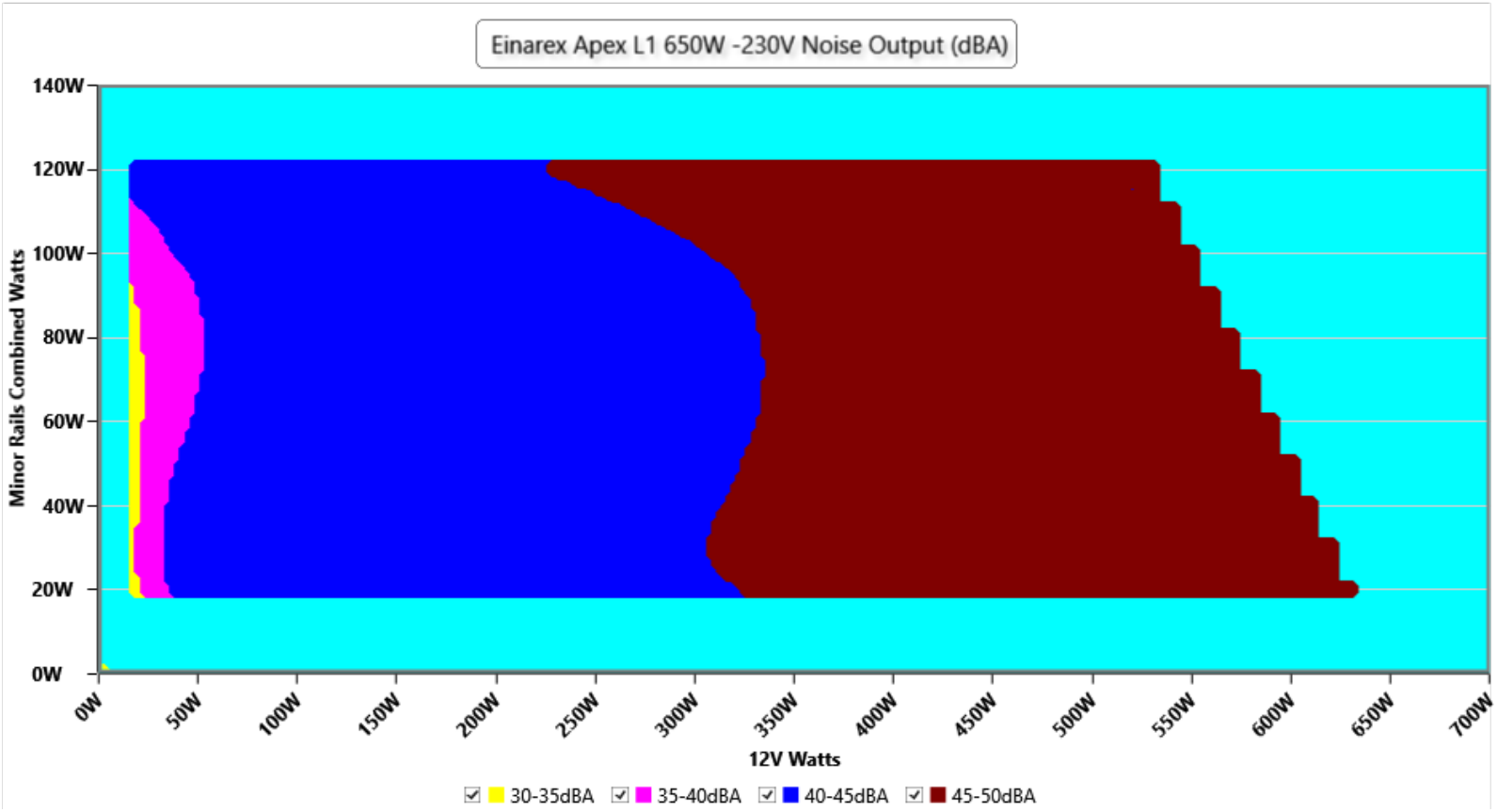


INFO

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

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

Noise under high ambient temperature (indicative)

230V

Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	774 RPM · 21.7 dB(A) · 30.4 °C	1429 RPM · 40.2 dB(A) · 40.0 °C	**+18.5 dB(A)**
20%	1008 RPM · 30.6 dB(A) · 30.4 °C	1548 RPM · 42.7 dB(A) · 40.9 °C	**+12.1 dB(A)**
50%	1458 RPM · 42.2 dB(A) · 30.6 °C	1790 RPM · 47.4 dB(A) · 42.5 °C	**+5.2 dB(A)**
100%	1848 RPM · 49.7 dB(A) · 30.9 °C	1892 RPM · 49.3 dB(A) · 45.4 °C	**-0.4 dB(A)**

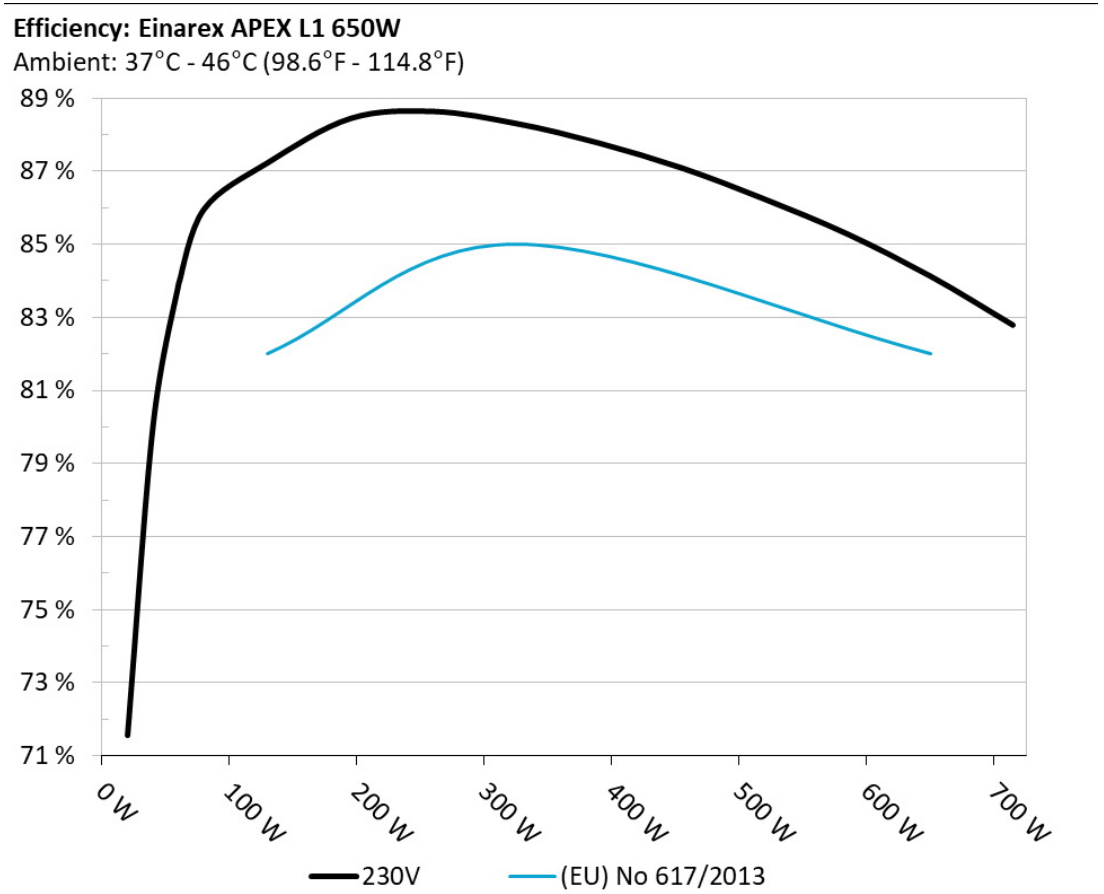
INFO

Fan speed, noise and the measured intake temperature at 10, 20, 50 and 100 % load, from the two load regulation tests: at normal ambient (about 30-32 °C) and at high ambient (about 40-47 °C). These are stabilized readings at fixed loads, not averages over the certification sweep, so they are indicative of how the fan behaves when it is hot. "<6.0" is the floor of our sound meter: the fan is stopped or too quiet to measure (the fan speed column says which); with the fan stopped, the intake sensor can read higher than the chamber air.

Informational. Not part of the ETA or LAMBDA rating.

Indicative Performance

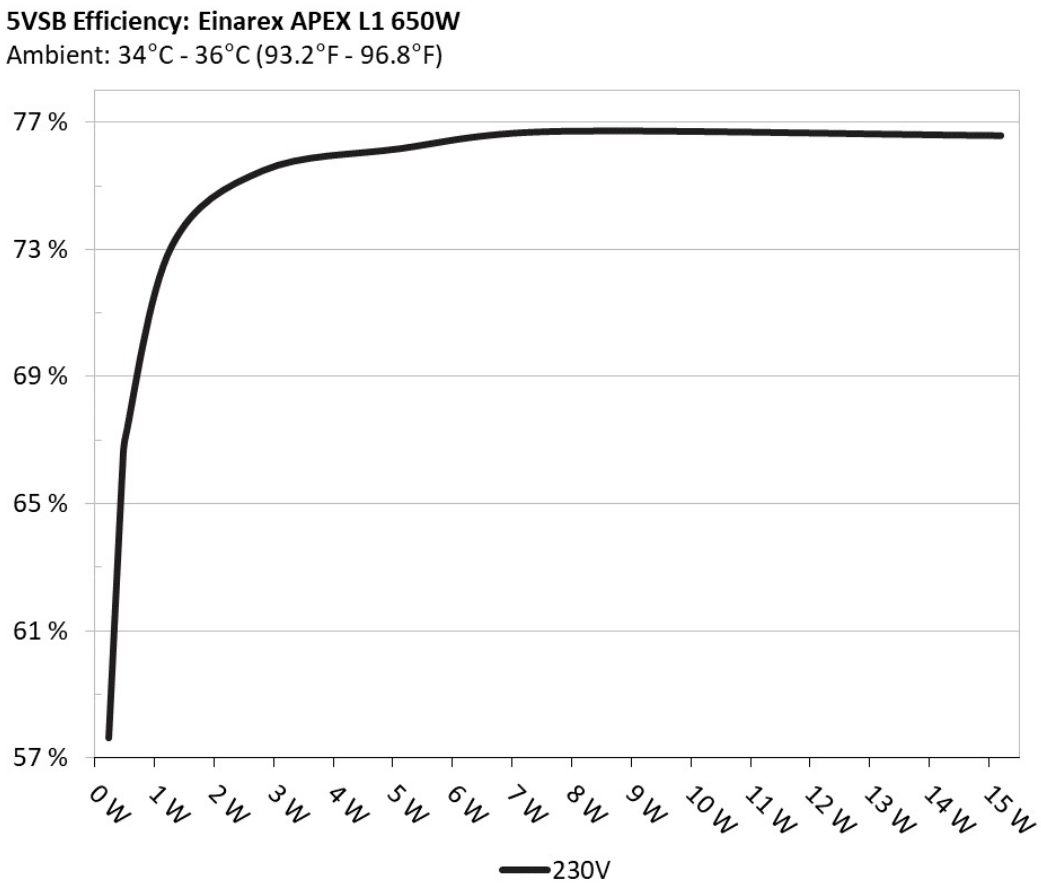
Efficiency under high ambient temperature



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) 230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	**0.045A**	0.232W	57.621%	0.017
	5.144V	0.404W		229.84V

2	**0.09A**	0.463W	66.143%	0.029
	5.142V	0.7W		229.83V
3	**0.55A**	2.822W	75.498%	0.138
	5.129V	3.739W		229.83V
4	**1A**	5.118W	76.187%	0.214
	5.118V	6.717W		229.83V
5	**1.5A**	7.658W	76.727%	0.249
	5.105V	9.982W		229.83V
6	**3A**	15.196W	76.599%	0.335
	5.065V	19.838W		229.84V

Protection Features

OCP (Normal @ 28.2°C)	12V: 56A (105.66%), 11.418V 5V: Starts < 4.75V 3.3V: 27.3A (151.67%), 3.157V 5VSB: 4.7A (156.67%), 4.942V
OCP (Hot) @ 40.8°C)	12V: 56A (105.66%), 11.418V 5V: Starts < 4.75V 3.3V: 21.2A (117.78%), 3.16V 5VSB: 4.4A (146.67%), 4.92V
OPP (Normal @ 28.7°C)	815.05W (125.39%)
OPP (Hot @ 45.7°C)	800.65W (123.18%)
OTP	✓ (150°C @ Heat Sink)
SCP	12V to Earth: ✓ 5V to Earth: ✓ 3.3V to Earth: ✓ 5VSB to Earth: ✓ -12V to Earth: ✓
PWR_OK	Accurate but lower than 16.0ms
NLO	✓
Fan Failure Protection	✗
SIP	Surge: None Inrush: NTC

Supplementary Tests (For Reference)

Typical Load Tests 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%	**3.567A**	**1.944A**	**1.941A**	**0.98A**	65.006	82.695%	1429	40.2	40.04°C	0.805
	12.168V	5.143V	3.401V	5.102V	78.609				42.12°C	229.82V
20%	**8.150A**	**2.928A**	**2.92A**	**1.181A**	129.94	87.235%	1548	42.7	40.93°C	0.862
	12.152V	5.123V	3.39V	5.082V	148.955				43.22°C	229.81V
30%	**13.119A**	**3.418A**	**3.416A**	**1.383A**	194.943	88.45%	1640	43.4	41.13°C	0.89
	12.112V	5.12V	3.381V	5.062V	220.398				44.14°C	229.8V
40%	**18.127A**	**3.908A**	**3.915A**	**1.587A**	260.028	88.64%	1713	44.1	41.72°C	0.91
	12.072V	5.118V	3.371V	5.042V	293.353				45.34°C	229.79V
50%	**22.789A**	**4.901A**	**4.911A**	**1.793A**	325.025	88.308%	1790	47.4	42.48°C	0.93
	12.046V	5.102V	3.36V	5.021V	368.058				46.8°C	229.77V
60%	**27.420A**	**5.901A**	**5.914A**	**2A**	389.367	87.776%	1863	49.3	42.83°C	0.946
	12.019V	5.084V	3.349V	4.999V	443.59				48.34°C	229.77V
70%	**32.153A**	**6.907A**	**6.923A**	**2.211A**	454.677	87.092%	1887	49.5	43.3°C	0.956
	11.991V	5.068V	3.337V	4.976V	522.067				50.02°C	229.76V
80%	**36.915A**	**7.915A**	**7.939A**	**2.321A**	519.463	86.24%	1891	49.4	43.91°C	0.965
	11.962V	5.053V	3.325V	4.956V	602.344				52.07°C	229.74V
90%	**42.193A**	**8.409A**	**8.447A**	**2.432A**	584.879	85.277%	1890	49.5	44.57°C	0.971
	11.907V	5.054V	3.314V	4.935V	685.86				54.3°C	229.73V
100%	**47.277A**	**8.904A**	**8.993A**	**3.062A**	649.705	84.125%	1892	49.3	45.4°C	0.974
	11.845V	5.053V	3.302V	4.9V	772.314				58.24°C	229.72V
110%	**52.234A**	**9.919A**	**10.122A**	**3.075A**	714.333	82.787%	1887	49.5	46.39°C	0.977
	11.794V	5.04V	3.29V	4.878V	862.861				61.07°C	229.7V
CL1	**1.904A**	**15.183A**	**14.231A**	**0.493A**	146.416	77.066%	1940	50.7	40.22°C	0.865
	12.613V	4.756V	3.352V	5.067V	189.989				47.99°C	229.81V
CL2	**1.898A**	**18.319A**	**0.977A**	**0.491A**	116.486	79.198%	1889	49.5	40°C	0.854
	12.649V	4.732V	3.377V	5.09V	147.081				44.49°C	229.82V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
CL3	**1.974A**	**0.974A**	**16.124A**	**0.491A**	85.902	74.531%	1825	49.5	41.33°C	0.837
	12.163V	5.134V	3.374V	5.092V	115.256				44.25°C	229.82V
CL4	**56.010A**	**0.935A**	**0.991A**	**0.501A**	649.936	84.096%	1848	49.7	45.49°C	0.975
	11.411V	5.348V	3.329V	4.987V	772.869				54.99°C	229.72V

The results above are not used in the certification process

Light Load Tests 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	**1.220A**	**0.483A**	**0.484A**	**0.195A**	20.002	71.545%	882	26.4	36.86°C	0.628
	12.171V	5.171V	3.412V	5.135V	27.957				38.28°C	229.84V
40W	**2.698A**	**0.674A**	**0.678A**	**0.293A**	40.001	80.036%	1066	31.5	37.3°C	0.72
	12.114V	5.191V	3.409V	5.128V	49.978				39.21°C	229.83V
60W	**4.172A**	**0.868A**	**0.872A**	**0.391A**	60.002	83.917%	1221	35.5	38.31°C	0.795
	12.112V	5.184V	3.406V	5.121V	71.502				40.14°C	229.82V
80W	**5.643A**	**1.062A**	**1.067A**	**0.489A**	79.954	85.962%	1339	38.5	39.4°C	0.826
	12.108V	5.179V	3.402V	5.114V	93.011				41.29°C	229.83V

The results above are not used in the certification process

Ripple Measurements 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	22.04mV	15.09mV	15.80mV	16.72mV	Pass
20% Load	20.20mV	15.14mV	15.55mV	17.60mV	Pass
30% Load	22.50mV	17.04mV	18.63mV	17.44mV	Pass
40% Load	24.30mV	15.81mV	21.29mV	16.98mV	Pass
50% Load	27.16mV	16.37mV	23.65mV	17.29mV	Pass
60% Load	31.46mV	17.60mV	26.93mV	17.96mV	Pass
70% Load	33.30mV	18.78mV	29.04mV	18.16mV	Pass
80% Load	34.57mV	20.58mV	32.01mV	18.11mV	Pass
90% Load	37.03mV	21.50mV	34.22mV	18.57mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
100% Load	52.99mV	29.78mV	40.36mV	19.34mV	Pass
110% Load	61.43mV	33.22mV	44.18mV	21.31mV	Pass
Crossload1	26.34mV	35.93mV	24.90mV	17.18mV	Pass
Crossload2	24.70mV	23.71mV	15.39mV	13.44mV	Pass
Crossload3	22.40mV	16.01mV	23.44mV	16.47mV	Pass
Crossload4	62.51mV	27.34mV	42.59mV	19.81mV	Pass

The results above are not used in the certification process

Einarex Apex L1 650W



Top side



Power specifications label

Cybenetics bietet freiwillige Zertifizierungsprogramme für Netzteile – ETA für Effizienz, LAMBDA für Lautstärke und SAFE für Sicherheit und korrekten Betrieb – sowie für Kühlprodukte mit DELTA für die Schalldämmung von Gehäusen und PHI für Luftstrom und statischen Druck von Lüftern

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