Fractal

Fractal Design ION+ 760P

1918FD19340101113

Lab ID FD76001534

Certification ID 251534

Test Result Report ID:

Certificate Issue Date: May 21, 2020

Scheme: ETA-EMI PSU

115V



230V



115V



230V



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	Fractal Design
Model	ION+ 760P
OEM/ODM	High Power
Serial Number	1918FD19340101113
Product Specifications	
Manufacturer-Provided Information	
□□□□ (Vrms)	100-240
□□□□ (Arms)	10-5

□□□□ (Hz)	50-60
□□□□ (W)	760
Operating Temperature (Continuous Full Load) (°C)	
□□	ATX12V
□□□□	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
□□	140mm Fluid Dynamic Bearing Fan (DYNAMIC X2 GP-14)
□□□□□	✓ (selectable)
Cybenetics Testing Information	
Lab ID	FD76001534
Date of receipt	Jul 11, 2019
Testing Date	May 20, 2020
Report Issued Date	May 21, 2020
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

□□□□□
(Non-accredited measurements)

□□□□□				
□□	□□□□	□□□□□□	Gauge	In Cable Capacitors
ATX □□ 20+4 pin (600mm)	1	1	18AWG	□
4+4 pin EPS 12V □□ (700mm)	2	2	16AWG	□
6+2pin PCIe□□ (550mm+120mm)	3	6	16-18AWG	□
SATA□□ (650mm+120mm)	1	2	18AWG	□
SATA□□ (400mm+120mm+120mm+120mm)	2	8	18AWG	□

□ 4pin Molex□□ (400mm+120mm+120mm+120mm)	1	4	18AWG	□
AC Power Cord (1400mm) - C13 coupler	1	1	16AWG	-

□□□□

□		3.3V	5V	12V	5VSB	-12V
□□□□	□□	22	22	63.3	3	3.6
	□	120		760	15	0.3
□□□□□ (W)		760				

Parts Description

General Data	
Manufacturer (OEM)	High Power
PCB Type	Double Sided
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 3x CM chokes, 1x MOV,1x Discharge IC
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	2x GBU1506 (600V, 15A @ 100°C)
APFC MOSFETS	2x Infineon IPA60R120P7 (650V, 16A @ 100°C, 0.120Ohm)
APFC Boost Diode	1x Infineon IDH08G65C5 (650V, 8A @ 145°C)
Hold-up Cap(s)	2x Rubycon (400V, 470uF each or 940uF combined, 2,000h @ 105°C, MXH)
Main Switchers	2x Infineon IPA60R120P7 (650V, 16A @ 100°C, 0.120Ohm)
APFC Controller	Infineon ICE3PCS01G
Resonant Controllers	Champion CM6901X
Topology	Primary side: Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	8x Infineon BSC027N04LS (40V, 88A @ 100°C, 2.7mOhm)
5V & 3.3V	DC-DC Converters:8x Infineon BSC0906NS (30V, 40A @ 100°C, 4.5mOhm) PWM Controllers: ANPEC APW7159C
Filtering Capacitors	Electrolytics: 4x Nippon Chemi-Con (4-10,000h @ 105°C, KY), 5x Rubycon (3-6,000h @ 105°C, YXG), 1x Rubycon (6-10,000h @ 105°C, ZLH) Polymers: 31x FPCAP, 6x NIC
Supervisor IC	SITI PS224 (OCP, OVP, UVP, SCP, PG)

Micro Controller	STC 15W408AS
Fan Model	Fractal Design DYNAMIC X2 GP-14 (140mm, 3-12V, 0.35A, 1700 rpm, Fluid Dynamic Bearing Fan)
Fan Power Transistor	STi 2SD882 (NPN)
5VSB Circuit	
Rectifier	1x PFC P10V45SP SBR (45V, 10A) & 2x Infineon BSC0906NS FET (30V, 40A @ 100°C, 4.5mΩ)
Standby PWM Controller	Excelliance MOS Corp EM8569
-12V Circuit	
Rectifier	KEC KIA7912PI (-12V, 1A)

Test Results

Temperature & Compliance Info

□□□□ (°C /°F)	28-32 / 82.4-89.6
□□ ErP Lot3/6□□	✓
□□ (EU) No 617/2013□□	✓

Performance Summary

115V

Accredited	
□□□□ (>1450 load combinations)	90.211%
Average Noise Output (>1450 Load Combinations)	15.87dBA
PF□□□ (>1450 Load Combinations)	0.992
Efficiency With 10W (≤500W) or 2% (>500W) Load	44.135%
□□□□□□	0.1021W
Non-Accredited	
12V Ripple (Full Load)	26.48mV
5V Ripple (Full Load)	13.84mV
3.3V Ripple (Full Load)	17.12mV
5VSB Ripple (Full Load)	23.29mV
12V Load Regulation	0.73%

5V Load Regulation	0.64%
3.3V Load Regulation	0.91%
5VSB Load Regulation	2.50%
Inrush Current	30.774A

230V

Accredited		
□□□□ (>1450 load combinations)		91.896%
Average Noise Output (>1450 Load Combinations)		15.90dBA
PF□□□ (>1450 Load Combinations)		0.955
Efficiency With 10W (≤500W) or 2% (>500W) Load		-
□□□□□□		0.1394W
Non-Accredited		
12V Ripple (Full Load)		23.32mV
5V Ripple (Full Load)		14.27mV
3.3V Ripple (Full Load)		16.43mV
5VSB Ripple (Full Load)		18.34mV
12V Load Regulation		0.69%
5V Load Regulation		0.52%
3.3V Load Regulation		0.88%
5VSB Load Regulation		2.27%
Inrush Current		81.766A
□□□□ & PG□□		21.40ms
AC Loss to PWR_OK Hold Up Time		17.40ms
PWR_OK Inactive to DC Loss Delay		4.00ms
OPP (0.00°C / 0.00°C)	134.78%	-

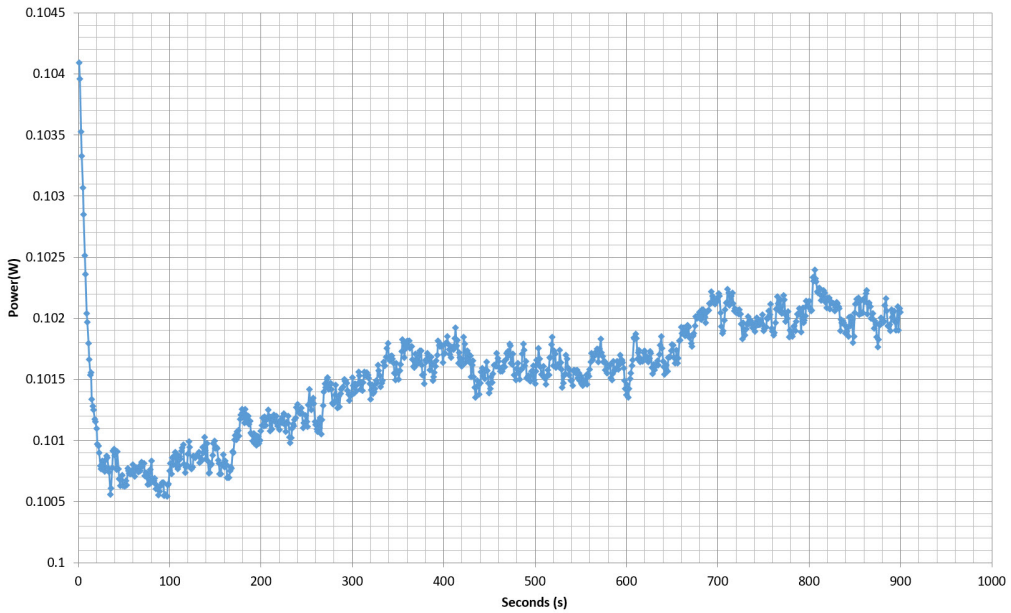
□□□□ & PG□□

Hold-Up Time (ms)	21.4
AC Loss to PWR_OK Hold Up Time (ms)	17.4

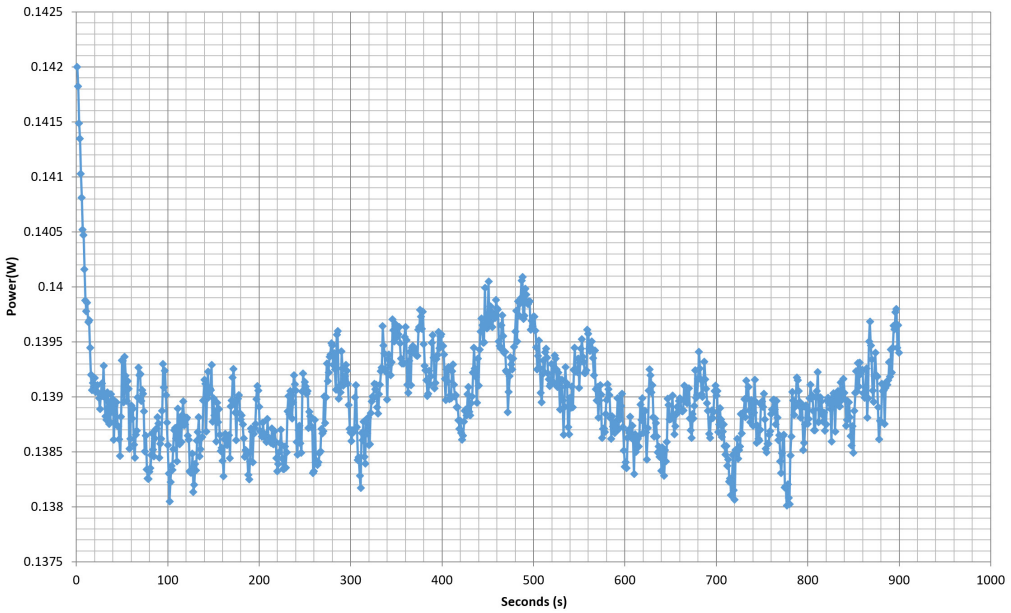
PWR_OK Inactive to DC Loss Delay (ms)	4

Graphs

115V



230V



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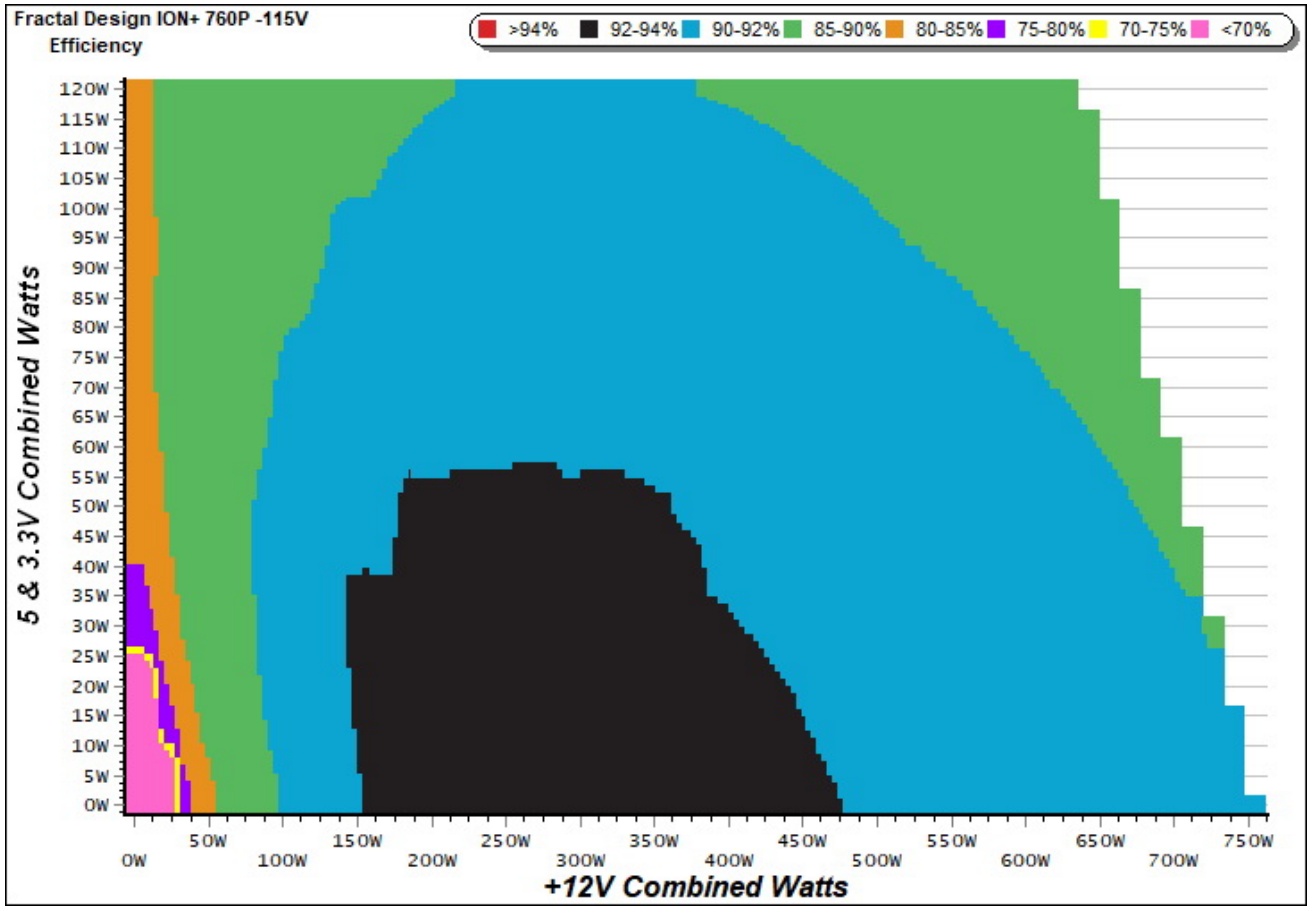
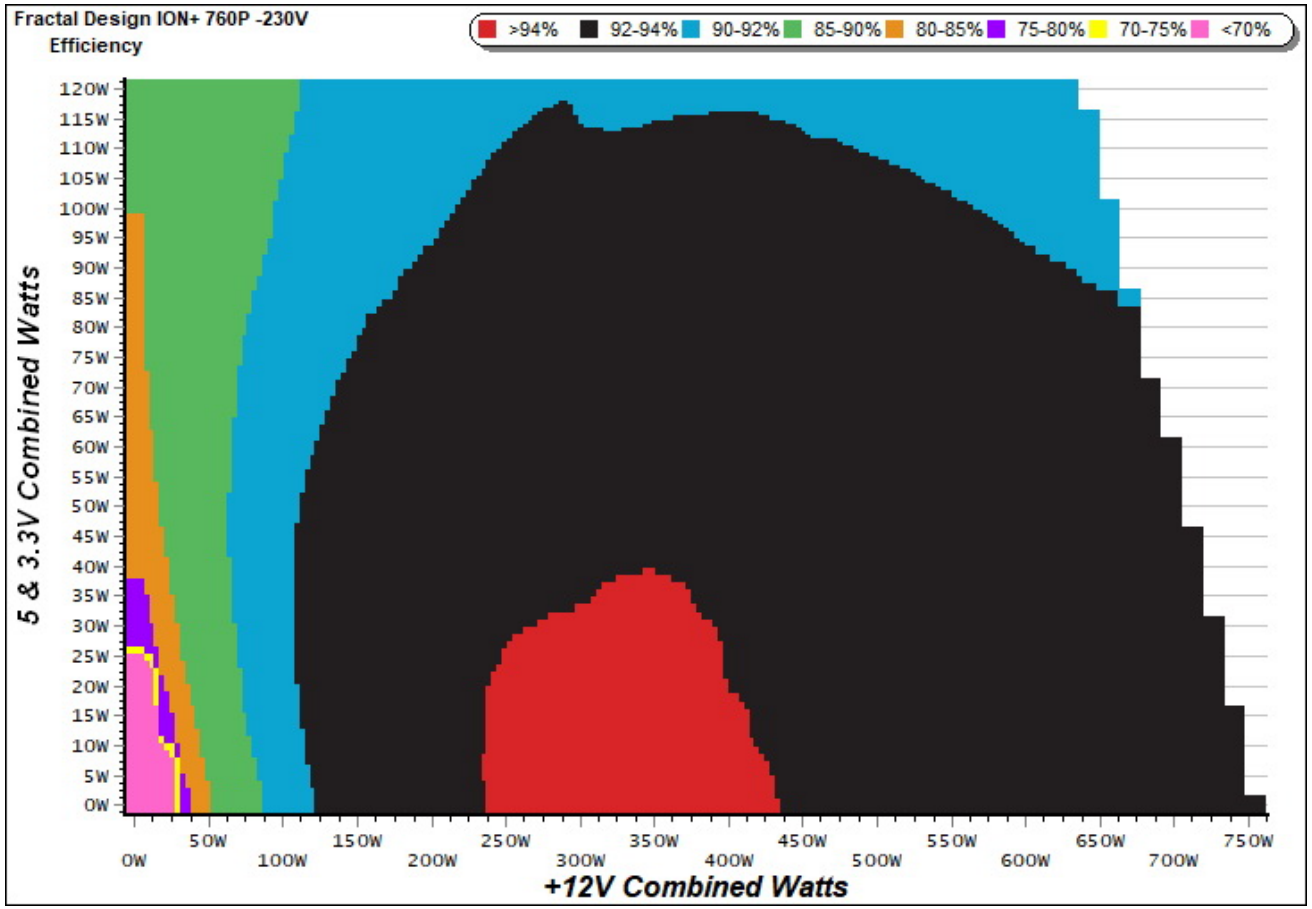
115V



□□

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



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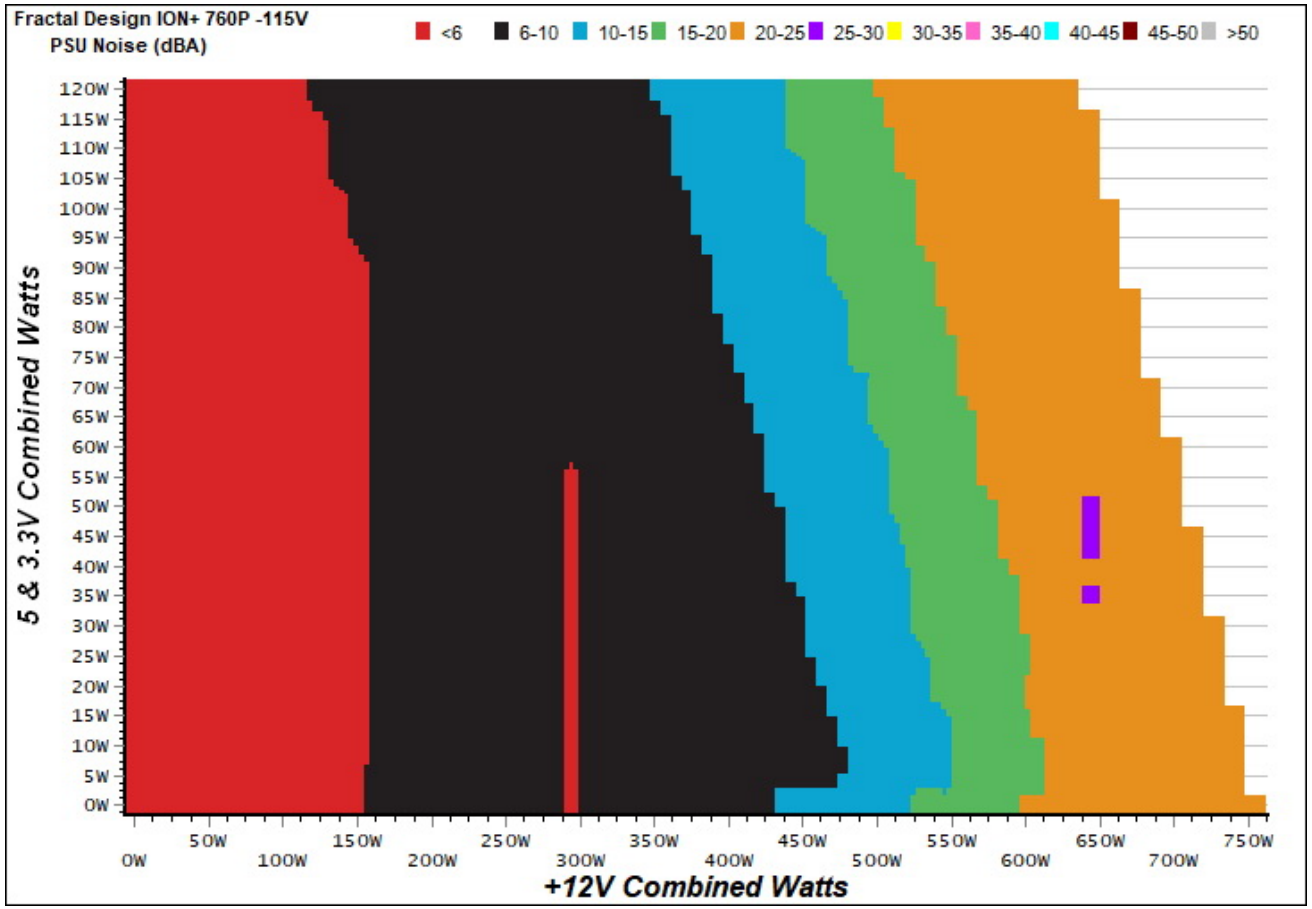
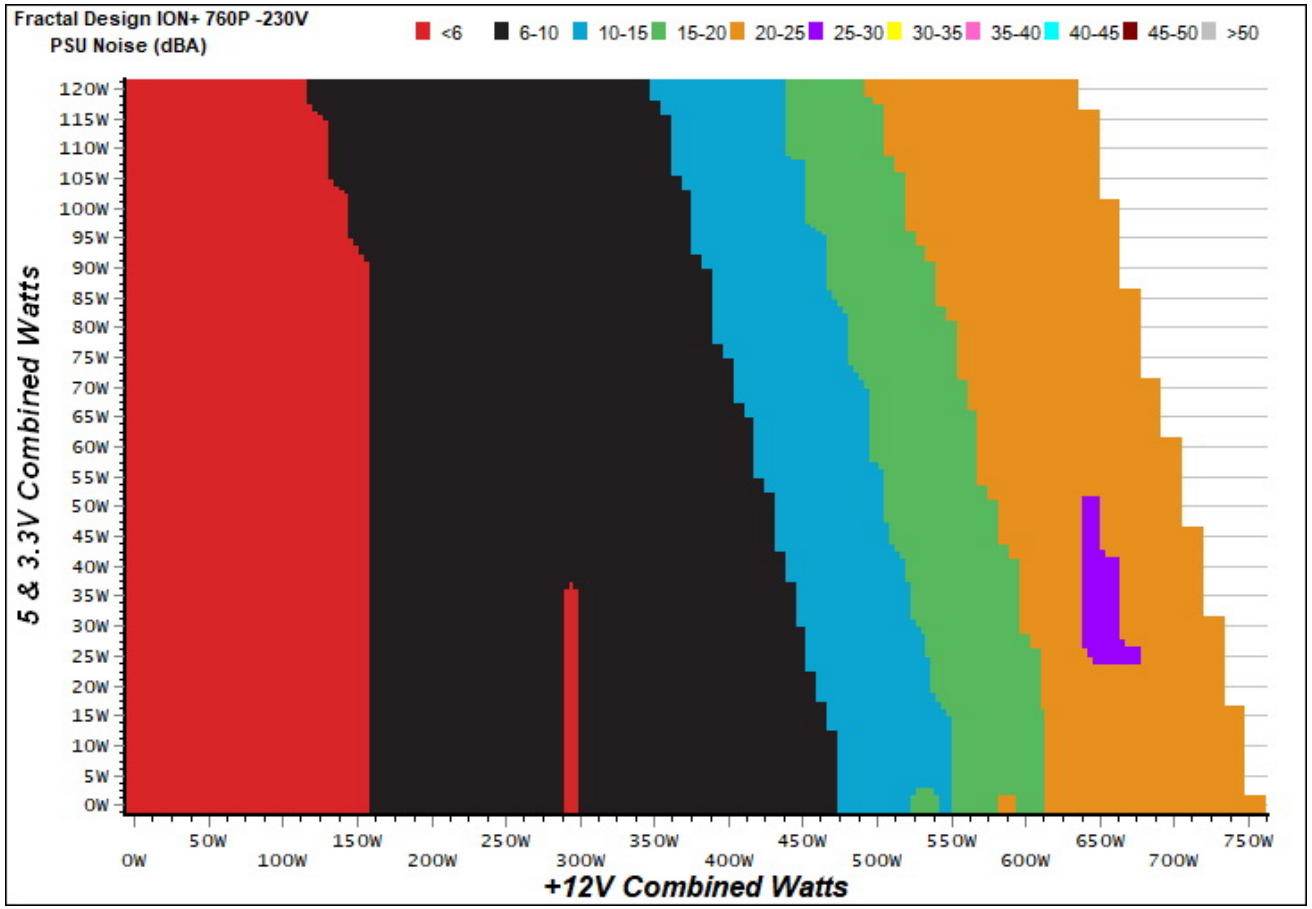
115V



□□

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



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)

115V

Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 45.8 °C	0 RPM · <6.0 dB(A) · 45.8 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 46.8 °C	0 RPM · <6.0 dB(A) · 46.8 °C	fan off in both
50%	489 RPM · 8.1 dB(A) · 42.3 °C	489 RPM · 8.1 dB(A) · 42.3 °C	**+0.0 dB(A)**
100%	1046 RPM · 29.0 dB(A) · 45.1 °C	1046 RPM · 29.0 dB(A) · 45.1 °C	**+0.0 dB(A)**

230V

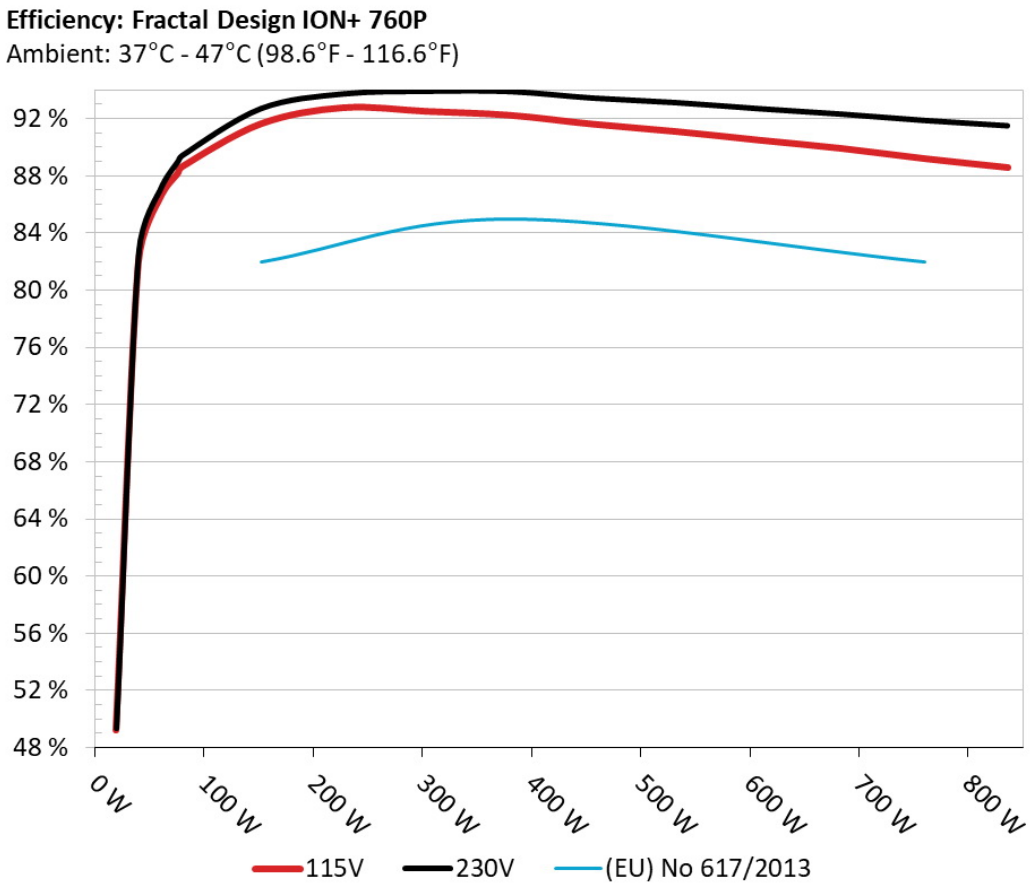
Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 45.3 °C	0 RPM · <6.0 dB(A) · 45.3 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 45.8 °C	0 RPM · <6.0 dB(A) · 45.8 °C	fan off in both
50%	487 RPM · 8.1 dB(A) · 42.3 °C	487 RPM · 8.1 dB(A) · 42.3 °C	**+0.0 dB(A)**
100%	1198 RPM · 33.1 dB(A) · 45.1 °C	1198 RPM · 33.1 dB(A) · 45.1 °C	**+0.0 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.

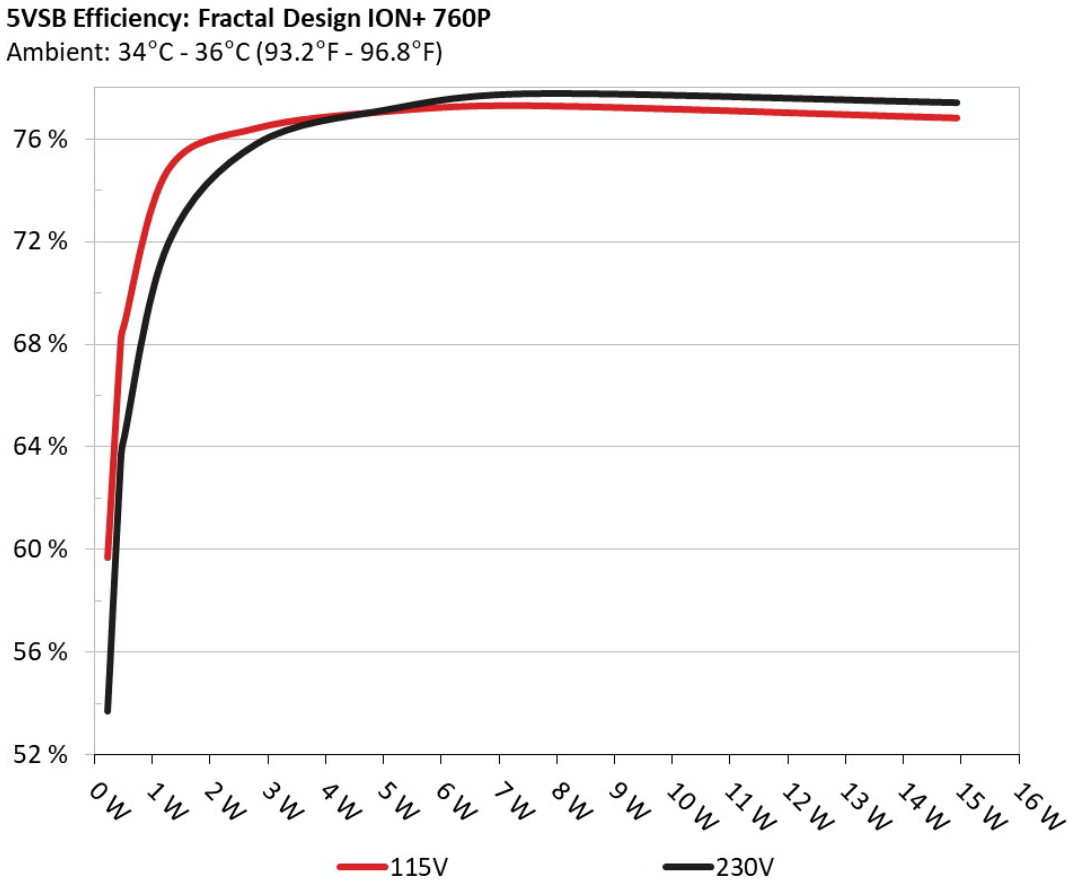
Informational. Not part of the ETA or LAMBDA rating.

Indicative Performance



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□□□□



□□

This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input

□□□□ □□ 5Vsb □□ (ErP Lot3/6 & CEC)

115V

□□ #	5VSB	DC/AC (□)	□□	PF/AC □□
1	0.045A	0.231	59.690%	0.054
	5.114V	0.387		115.10V
2	0.090A	0.461	68.195%	0.091
	5.112V	0.676		115.10V
3	0.550A	2.801	76.426%	0.316
	5.091V	3.665		115.10V
4	1.000A	5.072	77.082%	0.392
	5.071V	6.580		115.10V
5	1.500A	7.573	77.307%	0.432
	5.048V	9.796		115.10V
6	3.000A	14.927	76.828%	0.481
	4.975V	19.429		115.10V

230V

□□ #	5VSB	DC/AC (□)	□□	PF/AC □□
1	0.046A	0.231	53.721%	0.115
	5.046V	0.430		230.24V
2	0.090A	0.461	63.586%	0.031
	5.112V	0.725		230.24V
3	0.550A	2.801	75.785%	0.143
	5.091V	3.696		230.24V
4	1.000A	5.072	77.129%	0.220
	5.071V	6.576		230.24V
5	1.500A	7.573	77.752%	0.277
	5.048V	9.740		230.25V
6	3.001A	14.934	77.402%	0.365
	4.976V	19.294		230.25V

Supplementary Tests (For Reference)

10-110%□□□□

115V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
1	4.490A	1.991A	1.993A	1.002A	76.156	88.142%	0	<6.0	45.81°C	0.959
	12.148V	5.026V	3.312V	4.993V	86.401				40.24°C	115.12V
2	9.964A	2.985A	2.993A	1.204A	151.854	91.588%	0	<6.0	46.82°C	0.984
	12.139V	5.024V	3.308V	4.986V	165.802				40.62°C	115.12V
3	15.807A	3.486A	3.479A	1.406A	227.752	92.725%	0	<6.0	47.74°C	0.994
	12.130V	5.023V	3.306V	4.979V	245.621				41.35°C	115.11V
4	21.663A	3.985A	3.993A	1.610A	303.762	92.467%	478	7.8	41.65°C	0.996
	12.120V	5.022V	3.304V	4.970V	328.507				48.52°C	115.11V
5	27.230A	4.907A	5.001A	1.815A	379.887	92.200%	489	8.1	42.30°C	0.997
	12.110V	5.018V	3.300V	4.961V	412.027				49.45°C	115.11V
6	32.741A	5.984A	6.006A	2.020A	456.015	91.574%	555	9.9	42.54°C	0.998
	12.101V	5.016V	3.296V	4.953V	497.976				50.27°C	115.11V
7	38.255A	6.985A	7.018A	2.226A	531.742	91.064%	600	11.9	43.36°C	0.998
	12.093V	5.013V	3.292V	4.944V	583.922				51.40°C	115.11V
8	43.849A	7.990A	8.032A	2.433A	608.258	90.457%	756	18.5	43.92°C	0.998
	12.083V	5.009V	3.287V	4.935V	672.427				52.90°C	115.10V
9	49.777A	8.491A	8.523A	2.433A	683.585	89.878%	933	25.3	44.15°C	0.999
	12.075V	5.008V	3.285V	4.935V	760.574				53.51°C	115.10V
10	55.551A	8.999A	9.051A	3.058A	760.010	89.165%	1046	29.0	45.08°C	0.999
	12.066V	5.003V	3.282V	4.907V	852.363				54.81°C	115.10V
11	61.897A	9.003A	9.064A	3.061A	836.037	88.541%	1336	36.2	46.52°C	0.999
	12.057V	5.001V	3.278V	4.903V	944.232				57.01°C	115.10V
CL1	0.154A	14.003A	14.000A	0.000A	118.180	84.237%	0	<6.0	49.53°C	0.981
	12.125V	5.018V	3.289V	5.064V	140.295				42.56°C	115.12V

CL2	63.354A	1.004A	1.001A	1.000A	778.434	89.727%	1321	35.8	45.35°C	0.999
	12.077V	5.014V	3.296V	4.974V	867.558				54.46°C	115.10V

The results above are not used in the certification process

230V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
1	4.491A	1.990A	1.991A	1.001A	76.148	89.054%	0	<6.0	45.25°C	0.801
	12.146V	5.028V	3.312V	4.995V	85.508				40.39°C	230.22V
2	9.964A	2.982A	2.994A	1.201A	151.850	92.731%	0	<6.0	45.84°C	0.909
	12.137V	5.035V	3.307V	4.997V	163.753				40.64°C	230.23V
3	15.808A	3.484A	3.476A	1.406A	227.740	93.761%	0	<6.0	46.61°C	0.947
	12.129V	5.025V	3.307V	4.980V	242.893				41.03°C	230.21V
4	21.663A	3.983A	3.992A	1.609A	303.738	93.947%	485	8.0	41.51°C	0.963
	12.119V	5.023V	3.306V	4.972V	323.308				47.75°C	230.22V
5	27.195A	4.984A	4.998A	1.814A	379.857	93.931%	487	8.1	42.26°C	0.976
	12.110V	5.020V	3.302V	4.963V	404.402				48.86°C	230.23V
6	32.738A	5.980A	6.005A	2.019A	455.979	93.469%	553	9.8	42.67°C	0.979
	12.101V	5.018V	3.298V	4.955V	487.839				49.82°C	230.23V
7	38.256A	6.981A	7.013A	2.224A	531.705	93.152%	597	11.9	43.01°C	0.984
	12.092V	5.016V	3.293V	4.947V	570.795				50.74°C	230.23V
8	43.847A	7.982A	8.030A	2.431A	608.218	92.727%	754	18.4	43.38°C	0.988
	12.083V	5.012V	3.288V	4.939V	655.925				51.75°C	230.23V
9	49.780A	8.484A	8.519A	2.431A	683.574	92.349%	1014	27.9	44.02°C	0.991
	12.074V	5.012V	3.287V	4.939V	740.209				52.68°C	230.23V
10	55.554A	8.987A	9.046A	3.055A	759.979	91.907%	1198	33.1	45.07°C	0.994
	12.065V	5.009V	3.283V	4.912V	826.901				54.60°C	230.23V
11	61.895A	9.005A	9.073A	3.061A	836.003	91.534%	1334	36.2	46.99°C	0.995
	12.057V	5.000V	3.274V	4.902V	913.327				56.86°C	230.23V
CL1	0.147A	14.004A	13.999A	0.000A	118.168	84.908%	0	<6.0	48.82°C	0.889
	12.124V	5.022V	3.290V	5.068V	139.171				42.46°C	230.24V

CL2	63.354A	1.004A	1.000A	1.000A	778.436	92.540%	1257	34.4	45.11°C	0.994
	12.077V	5.016V	3.297V	4.976V	841.193				54.10°C	230.23V

The results above are not used in the certification process

20-80□□□□□

115V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	PF/AC □□
1	1.191A	0.496A	0.481A	0.199A	19.618	49.207%	0	<6.0	0.894
	12.194V	5.039V	3.315V	5.033V	39.868				115.11V
2	2.448A	0.993A	0.997A	0.399A	40.060	81.875%	0	<6.0	0.916
	12.155V	5.035V	3.311V	5.022V	48.928				115.12V
3	3.632A	1.491A	1.480A	0.599A	59.527	86.356%	0	<6.0	0.940
	12.151V	5.030V	3.306V	5.011V	68.932				115.12V
4	4.886A	1.991A	1.992A	0.800A	79.954	88.592%	0	<6.0	0.962
	12.147V	5.026V	3.312V	5.000V	90.250				115.12V

The results above are not used in the certification process

230V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	PF/AC □□
1	1.194A	0.497A	0.481A	0.199A	19.650	49.381%	0	<6.0	0.602
	12.190V	5.030V	3.317V	5.024V	39.793				230.23V
2	2.450A	0.996A	0.996A	0.399A	40.079	82.700%	0	<6.0	0.664
	12.152V	5.026V	3.313V	5.014V	48.463				230.23V
3	3.633A	1.494A	1.479A	0.600A	59.535	87.024%	0	<6.0	0.737
	12.149V	5.022V	3.308V	5.003V	68.412				230.23V
4	4.887A	1.989A	1.992A	0.800A	79.960	89.457%	0	<6.0	0.808
	12.146V	5.028V	3.313V	5.003V	89.384				230.23V

The results above are not used in the certification process

□□□□

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	12.80mV	9.30mV	11.50mV	11.90mV	Pass
20% Load	13.50mV	10.30mV	13.20mV	14.70mV	Pass
30% Load	15.20mV	11.40mV	13.20mV	14.70mV	Pass
40% Load	16.20mV	11.80mV	14.10mV	16.50mV	Pass
50% Load	16.30mV	12.50mV	15.00mV	17.80mV	Pass
60% Load	18.40mV	12.80mV	14.30mV	17.50mV	Pass
70% Load	18.20mV	12.80mV	15.10mV	19.20mV	Pass
80% Load	19.40mV	12.50mV	15.30mV	20.40mV	Pass
90% Load	20.80mV	13.40mV	14.90mV	20.80mV	Pass
100% Load	26.50mV	13.80mV	17.10mV	23.30mV	Pass
110% Load	27.70mV	15.20mV	17.80mV	24.00mV	Pass
Crossload1	16.00mV	11.20mV	14.30mV	14.40mV	Pass
Crossload2	25.60mV	13.80mV	17.00mV	22.10mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	11.20mV	8.70mV	11.30mV	11.90mV	Pass
20% Load	11.20mV	10.20mV	12.00mV	13.20mV	Pass
30% Load	11.90mV	10.80mV	12.40mV	13.20mV	Pass
40% Load	13.40mV	11.10mV	13.10mV	14.20mV	Pass
50% Load	13.60mV	11.60mV	13.70mV	15.70mV	Pass
60% Load	15.30mV	12.50mV	14.30mV	15.50mV	Pass
70% Load	15.10mV	12.60mV	14.60mV	17.00mV	Pass
80% Load	16.90mV	14.00mV	15.60mV	17.70mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	16.90mV	13.90mV	15.10mV	18.10mV	Pass
100% Load	23.30mV	14.30mV	16.40mV	18.30mV	Pass
110% Load	23.50mV	14.50mV	16.40mV	19.30mV	Pass
Crossload1	15.40mV	11.00mV	13.50mV	13.10mV	Pass
Crossload2	22.20mV	14.50mV	15.70mV	18.50mV	Pass

The results above are not used in the certification process

Fractal Design ION+ 760P

Top side

Power specifications label

本测试报告中包含的所有数据和图表均可在以下条件下由任何人使用：使用过程需提及测试结果由Cybenetics提供。
在任何情况下都应提供原始测试结果文档的网站链接

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