



Fractal Design ION+ 560P

Serial Number 1918FD19580100392

Lab ID FD56001536

Certification ID 251536

Test Result Report ID:

Certificate Issue Date: Jul 24, 2019

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+ 560P
OEM/ODM	High Power
Serial Number	1918FD19580100392
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10-5
Rated Frequency (Hz)	50-60

Rated Power (W)	560
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	140mm Fluid Dynamic Bearing Fan (DYNAMIC X2 GP-14)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	FD56001536
Date of receipt	Jul 11, 2019
Testing Date	Jul 23, 2019
Report Issued Date	Jul 24, 2019
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	18AWG	No
4+4 pin EPS12V (700mm)	1	1	16AWG	No
6+2 pin PCIe (550mm+120mm)	2	4	16-18AWG	No
SATA (650mm+120mm)	1	2	18AWG	No
SATA (400mm+120mm+120mm+120mm)	1	4	18AWG	No
4 pin Molex (400mm+120mm+120mm+120mm)	1	4	18AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	16AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	46.6	3	0.3
	Watts	110		560	15	3.6
Total Max. Power (W)		560				

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 IPA60R180P7S (650V, 11A @ 100°C, 0.180Ohm)
APFC Boost Diode	1x Infineon IDH06G65C5 (650V, 6A @ 145°C)
Hold-up Cap(s)	2x Rubycon (400V, 330uF each or 660uF combined, 2,000h @ 105°C, MXH)
Main Switchers	2x Infineon IPA60R180P7S (650V, 11A @ 100°C, 0.180Ohm)
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	6x 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, 0.30A, 1400rpm, 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

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)	89.795%
Average Noise Output (>1450 Load Combinations)	11.90dBA
Average PF (>1450 Load Combinations)	0.989
Efficiency With 10W (≤500W) or 2% (>500W) Load	48.216%
Standby Power Consumption	0.1059W
Non-Accredited	
12V Ripple (Full Load)	20.99mV
5V Ripple (Full Load)	13.40mV
3.3V Ripple (Full Load)	14.81mV
5VSB Ripple (Full Load)	15.47mV
12V Load Regulation	0.83%
5V Load Regulation	0.54%
3.3V Load Regulation	1.15%

5VSB Load Regulation	2.51%
Inrush Current	28.627A

230V

Accredited		
Average Efficiency (>1450 load combinations)	91.329%	
Average Noise Output (>1450 Load Combinations)	10.35dBA	
Average PF (>1450 Load Combinations)	0.941	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1412W	
Non-Accredited		
12V Ripple (Full Load)	18.57mV	
5V Ripple (Full Load)	12.90mV	
3.3V Ripple (Full Load)	14.25mV	
5VSB Ripple (Full Load)	14.26mV	
12V Load Regulation	0.82%	
5V Load Regulation	0.50%	
3.3V Load Regulation	1.09%	
5VSB Load Regulation	2.38%	
Inrush Current	74.431A	
Hold-Up Time & PWR_OK Signal	21.20ms	
AC Loss to PWR_OK Hold Up Time	17.20ms	
PWR_OK Inactive to DC Loss Delay	4.00ms	
OPP (0.00°C / 0.00°C)	132.56%	-

Hold-Up Time & PWR_OK Signal

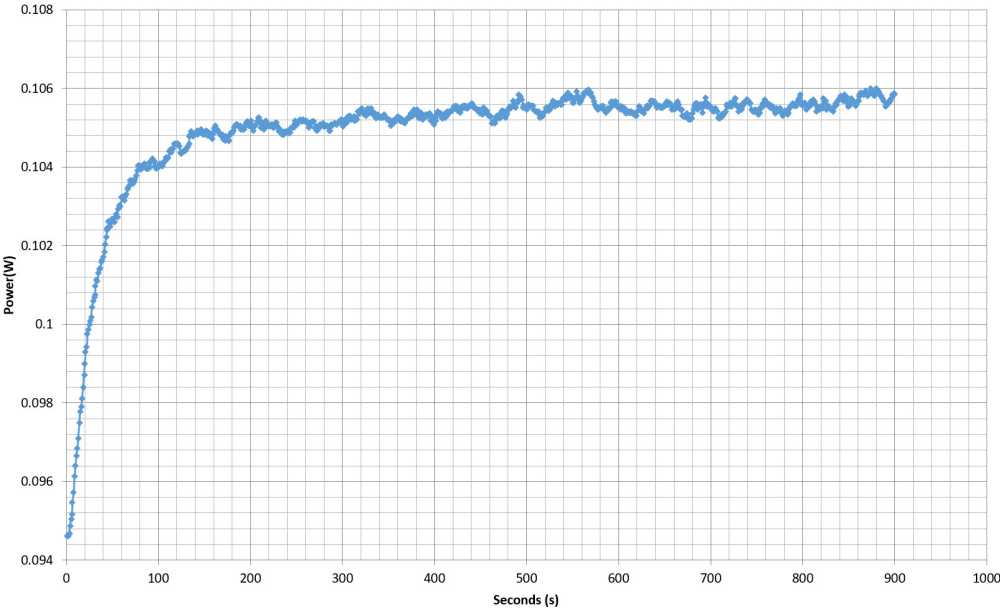
Hold-Up Time (ms)	21.2
AC Loss to PWR_OK Hold Up Time (ms)	17.2
PWR_OK Inactive to DC Loss Delay (ms)	4

Vampire Power

Graphs

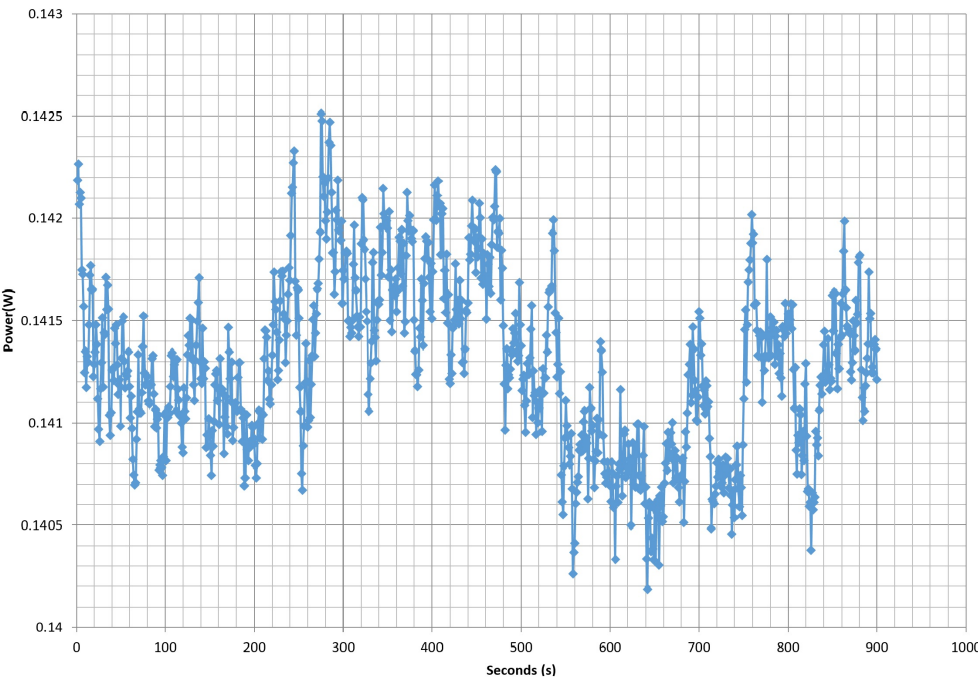
115V

Power - 1918FD19580100392 - 19/07/2019 - 20:31



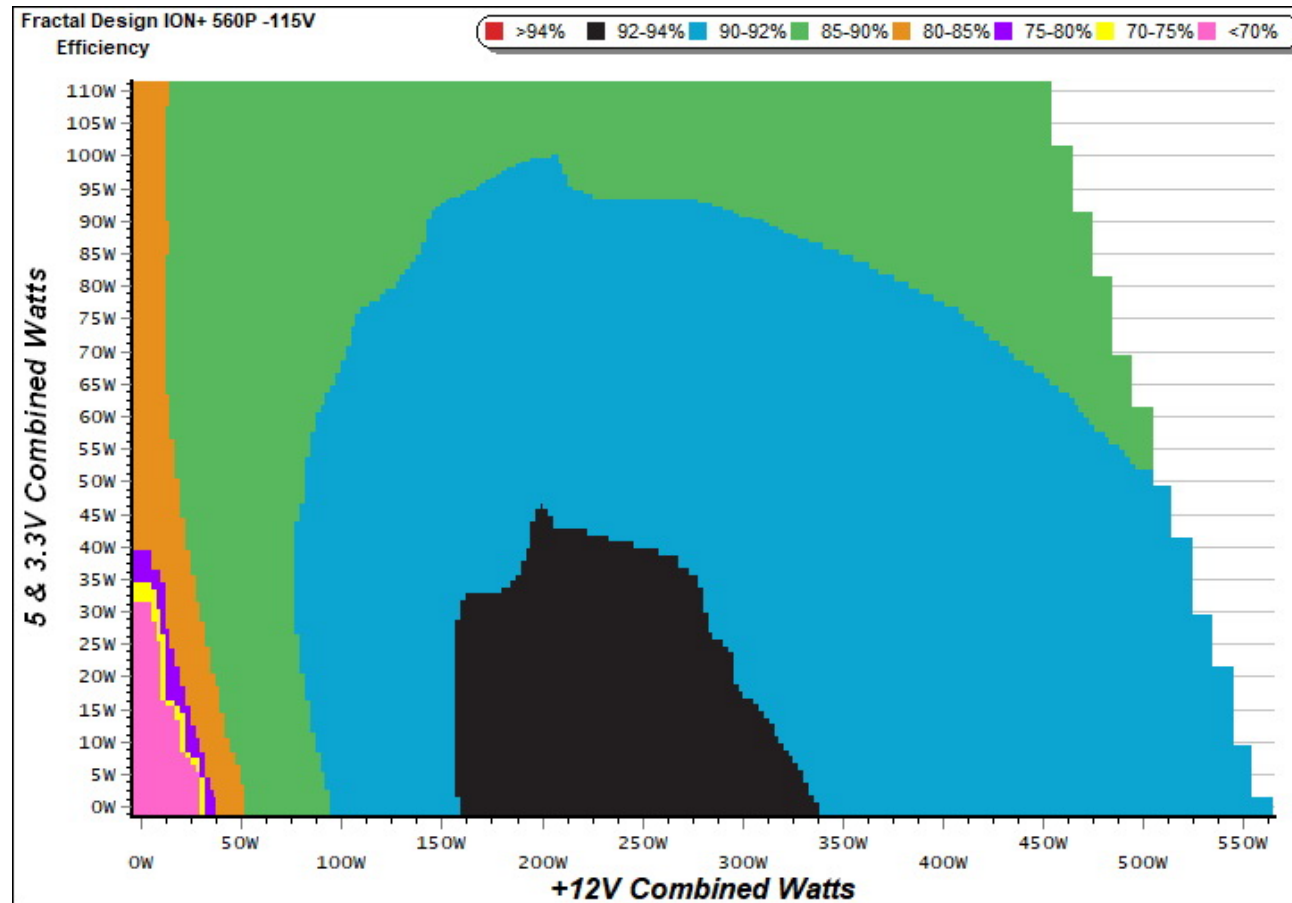
230V

Power - 1918FD19580100392 - 19/07/2019 - 20:31



Efficiency Graph

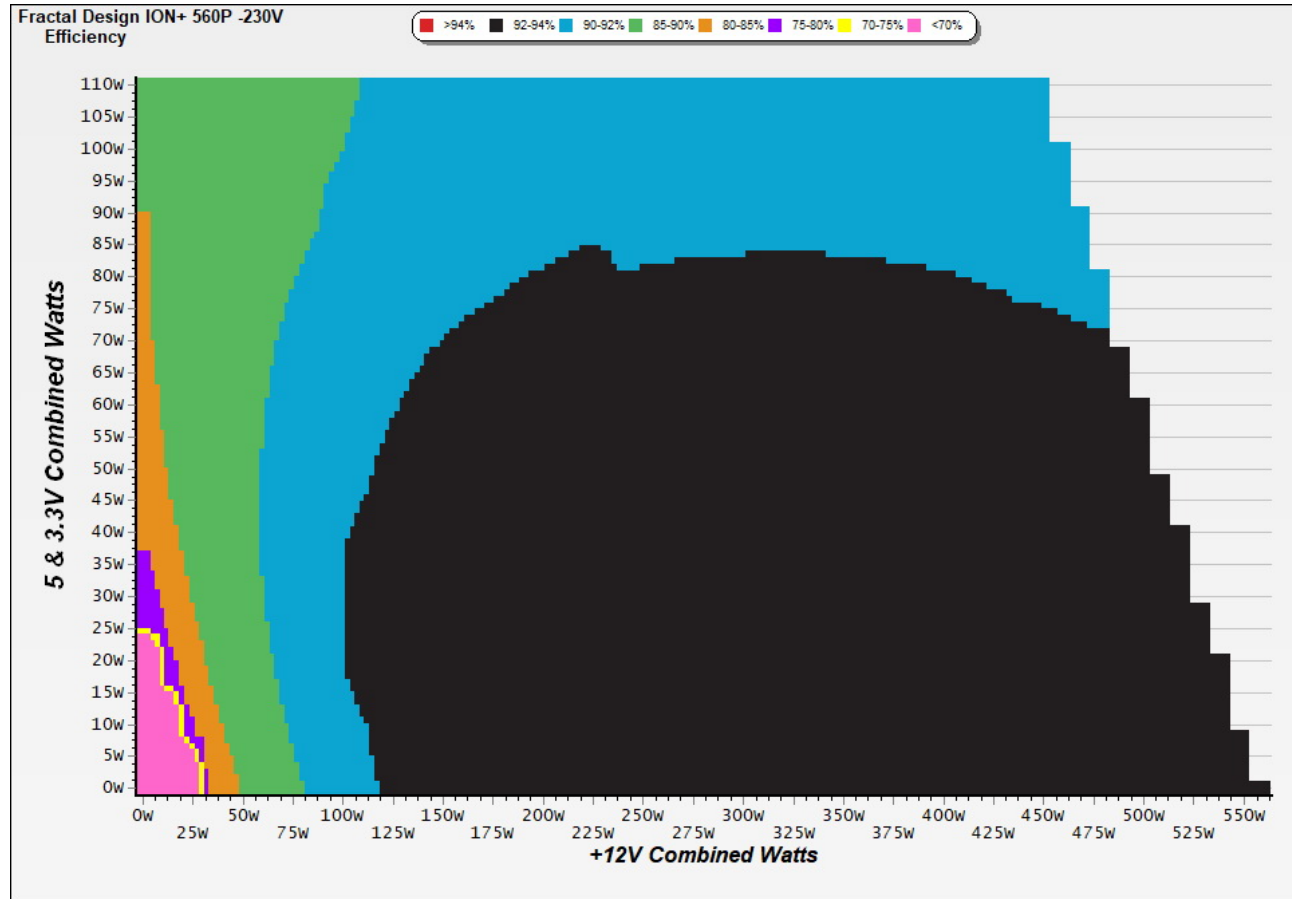
115V



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

230V

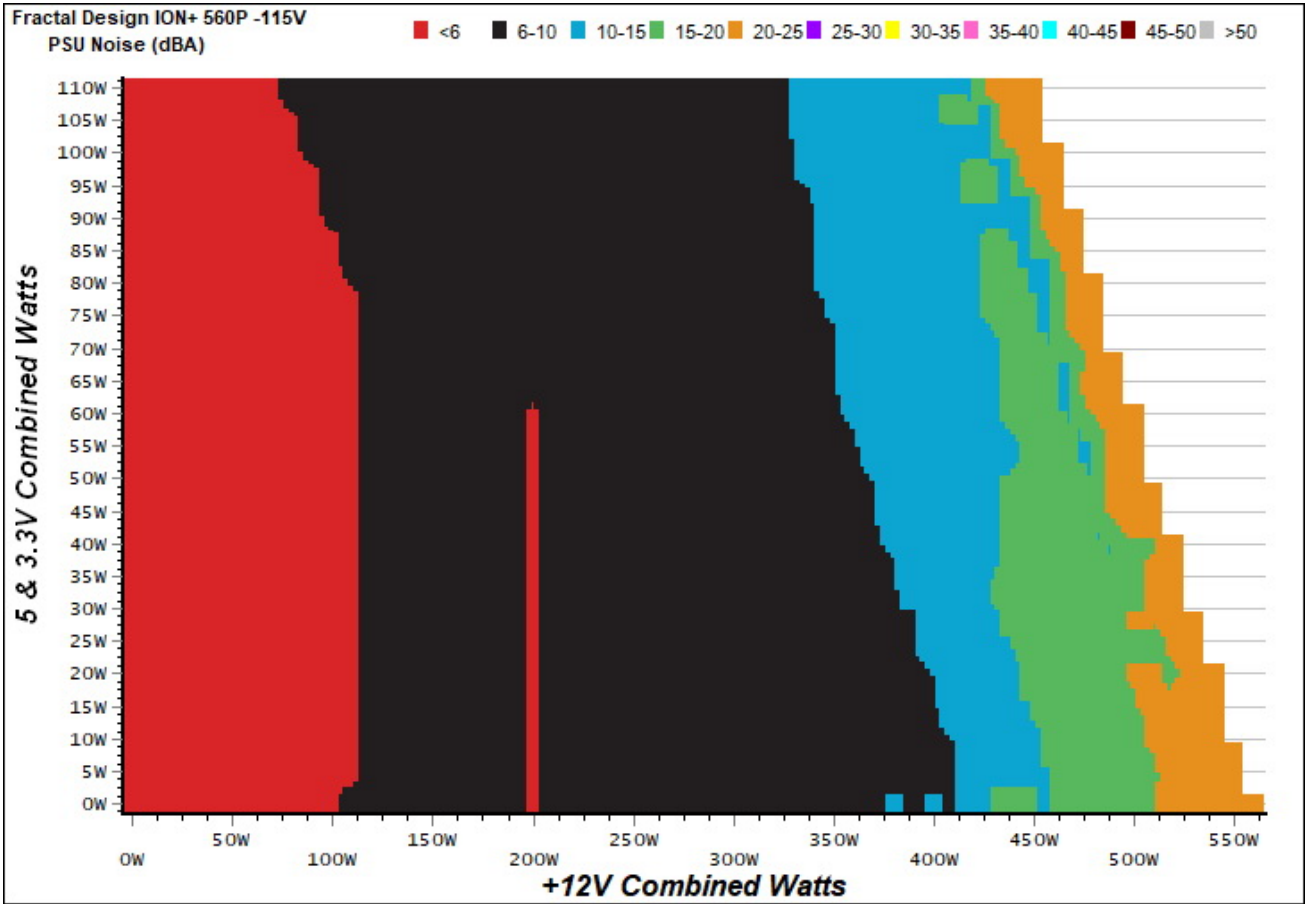


INFO

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

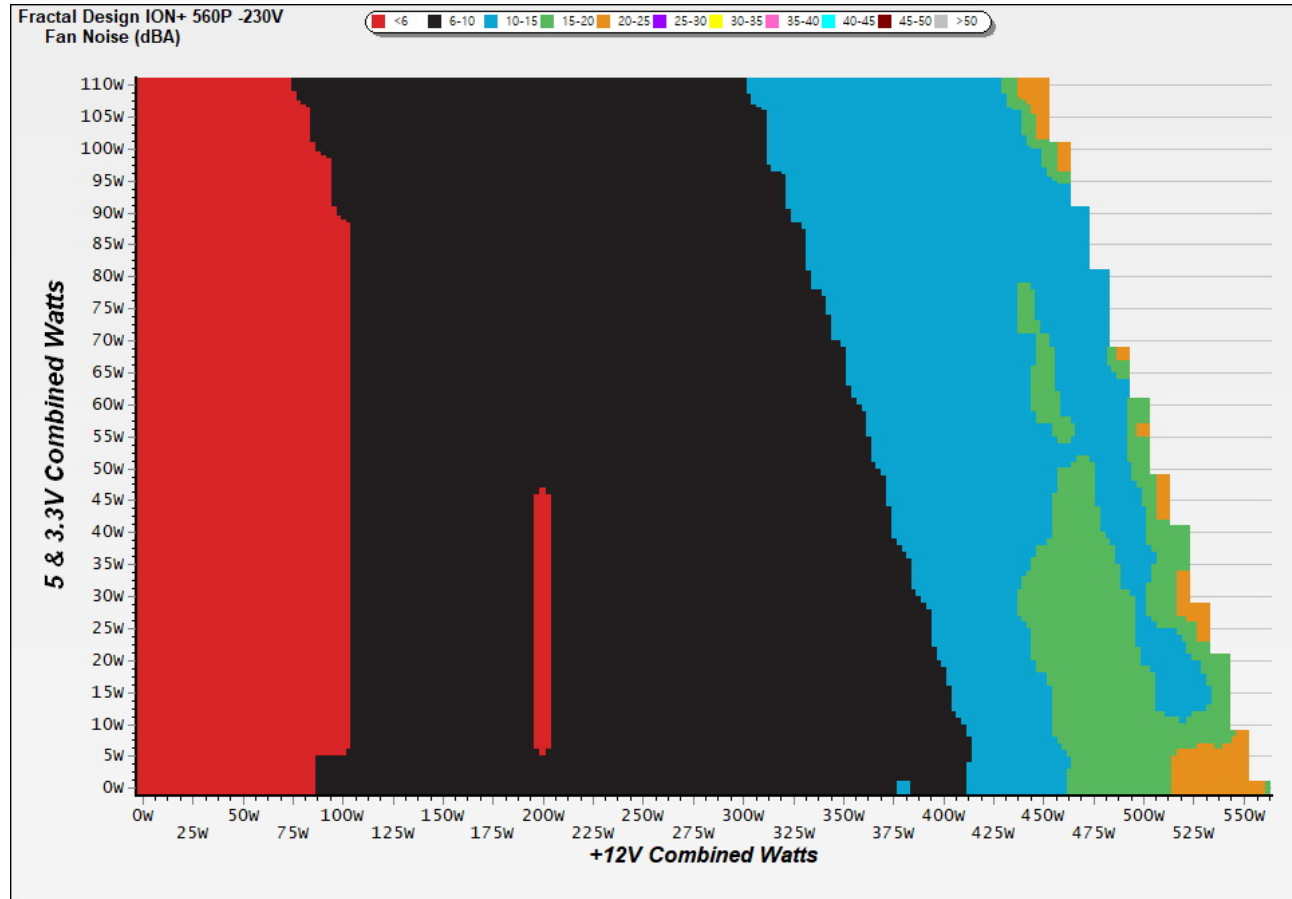
115V



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

230V



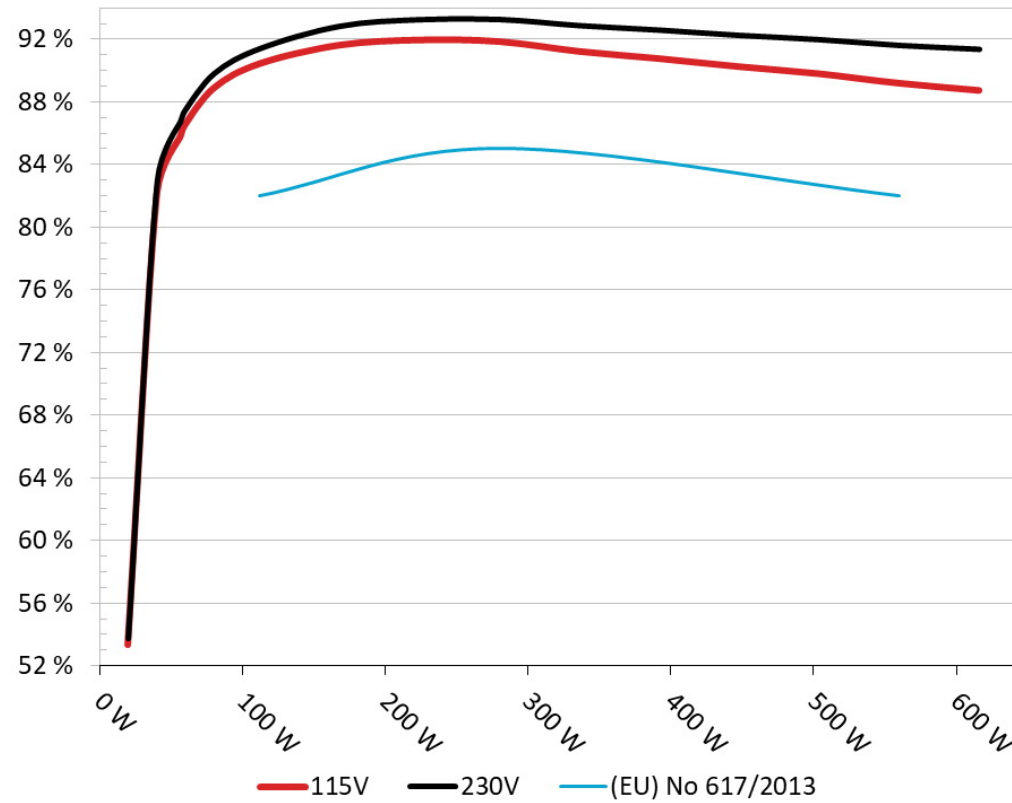
INFO

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

Indicative Performance

Efficiency under high ambient temperature

Efficiency: Fractal Design ION+ 560P
Ambient: 37°C - 47°C (98.6°F - 116.6°F)



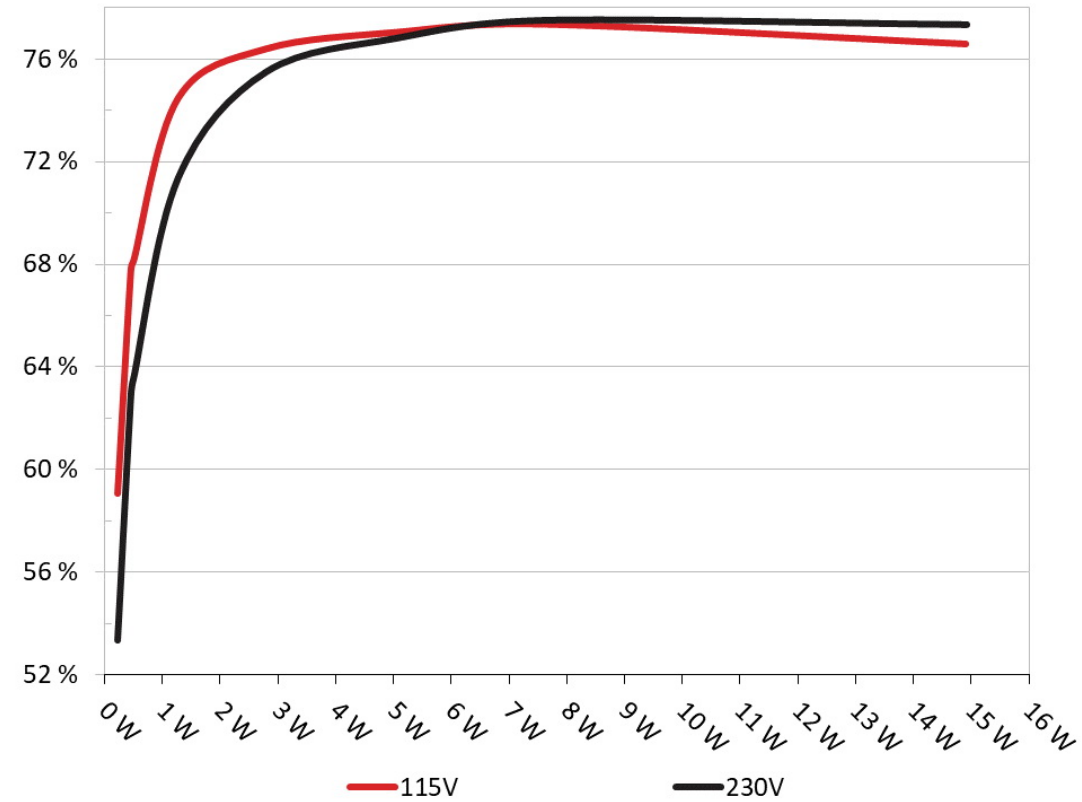
INFO

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: Fractal Design ION+ 560P

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	0.045A	0.231	59.079%	0.053
	5.118V	0.391		115.10V
2	0.090A	0.461	67.794%	0.090
	5.114V	0.680		115.10V
3	0.550A	2.801	76.384%	0.317
	5.092V	3.667		115.10V
4	1.000A	5.072	77.035%	0.397
	5.072V	6.584		115.10V
5	1.500A	7.573	77.347%	0.438
	5.048V	9.791		115.10V
6	3.000A	14.915	76.578%	0.485
	4.971V	19.477		115.11V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.231	53.349%	0.019
	5.117V	0.433		230.23V
2	0.090A	0.461	62.892%	0.031
	5.114V	0.733		230.23V
3	0.550A	2.801	75.478%	0.142
	5.092V	3.711		230.22V
4	1.000A	5.071	76.798%	0.220
	5.071V	6.603		230.22V
5	1.500A	7.572	77.487%	0.278
	5.047V	9.772		230.22V
6	3.001A	14.923	77.321%	0.367
	4.973V	19.300		230.22V

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	2.877A	1.993A	2.003A	1.004A	56.165	85.753%	0	<6.0	45.13°C	0.945
	12.016V	5.015V	3.295V	4.980V	65.496				40.30°C	115.12V
2	6.745A	2.995A	2.999A	1.207A	111.872	90.454%	0	<6.0	45.76°C	0.976
	12.004V	5.011V	3.300V	4.971V	123.679				40.53°C	115.12V
3	10.986A	3.494A	3.489A	1.411A	167.772	91.642%	0	<6.0	46.87°C	0.987
	11.994V	5.009V	3.297V	4.962V	183.074				41.32°C	115.12V
4	15.235A	3.997A	4.007A	1.616A	223.792	91.971%	390	7.0	41.82°C	0.992
	11.984V	5.007V	3.294V	4.953V	243.330				48.06°C	115.12V
5	19.161A	4.999A	5.019A	1.821A	279.902	91.871%	393	7.1	42.05°C	0.996
	11.972V	5.002V	3.288V	4.942V	304.670				49.24°C	115.12V
6	23.089A	6.006A	6.033A	2.028A	335.988	91.241%	431	7.7	42.92°C	0.996
	11.961V	4.998V	3.282V	4.932V	368.242				50.86°C	115.12V
7	26.998A	7.011A	7.033A	2.236A	391.739	90.784%	626	13.5	43.07°C	0.996
	11.950V	4.993V	3.285V	4.921V	431.505				51.53°C	115.12V
8	30.976A	8.022A	8.053A	2.445A	448.241	90.265%	730	18.4	43.46°C	0.996
	11.939V	4.988V	3.278V	4.911V	496.582				52.52°C	115.12V
9	35.294A	8.519A	8.550A	2.443A	503.548	89.817%	882	21.4	44.08°C	0.997
	11.929V	4.991V	3.275V	4.915V	560.638				53.46°C	115.11V
10	39.459A	9.026A	9.086A	3.071A	559.961	89.210%	1034	28.6	45.34°C	0.997
	11.917V	4.988V	3.269V	4.886V	627.688				55.10°C	115.11V
11	44.193A	9.028A	9.085A	3.072A	615.988	88.748%	1036	28.7	46.98°C	0.997
	11.908V	4.988V	3.269V	4.885V	694.089				57.41°C	115.11V
CL1	0.146A	13.004A	12.999A	0.000A	109.406	84.229%	0	<6.0	49.71°C	0.976
	11.986V	5.003V	3.277V	5.046V	129.891				42.65°C	115.12V

CL2	46.682A	1.003A	1.003A	1.000A	570.317	90.160%	1027	28.4	45.02°C	0.997
	11.933V	4.997V	3.284V	4.955V	632.558				55.20°C	115.11V

The results above are not used in the certification process

230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	2.877A	1.995A	1.997A	1.004A	56.166	86.742%	0	<6.0	44.80°C	0.732
	12.015V	5.014V	3.304V	4.979V	64.751				39.83°C	230.24V
2	6.745A	2.996A	3.001A	1.208A	111.869	91.418%	0	<6.0	46.48°C	0.867
	12.003V	5.010V	3.298V	4.969V	122.371				40.94°C	230.24V
3	10.986A	3.496A	3.488A	1.411A	167.756	92.846%	0	<6.0	47.48°C	0.923
	11.993V	5.008V	3.295V	4.961V	180.682				41.37°C	230.24V
4	15.236A	3.998A	4.008A	1.616A	223.777	93.270%	390	7.0	41.75°C	0.948
	11.983V	5.005V	3.292V	4.951V	239.924				48.20°C	230.23V
5	19.159A	5.002A	5.019A	1.822A	279.882	93.279%	393	7.1	42.06°C	0.962
	11.972V	5.000V	3.287V	4.941V	300.049				49.38°C	230.24V
6	23.089A	6.007A	6.034A	2.029A	335.975	92.885%	431	7.7	42.52°C	0.971
	11.961V	4.996V	3.280V	4.931V	361.711				50.56°C	230.24V
7	26.992A	6.999A	7.035A	2.232A	391.672	92.602%	627	13.5	43.00°C	0.974
	11.950V	5.002V	3.284V	4.931V	422.962				51.44°C	230.23V
8	30.975A	8.008A	8.058A	2.440A	448.197	92.265%	733	18.4	44.24°C	0.978
	11.938V	4.997V	3.276V	4.920V	485.772				53.24°C	230.24V
9	35.294A	8.521A	8.553A	2.443A	503.502	91.994%	882	23.7	44.87°C	0.982
	11.928V	4.989V	3.274V	4.913V	547.318				54.51°C	230.23V
10	39.455A	9.020A	9.087A	3.069A	559.905	91.625%	1036	28.7	45.90°C	0.986
	11.917V	4.991V	3.268V	4.889V	611.086				56.19°C	230.23V
11	44.189A	9.029A	9.086A	3.073A	615.932	91.378%	1038	28.7	46.62°C	0.989
	11.908V	4.986V	3.269V	4.884V	674.045				57.42°C	230.24V
CL1	0.148A	13.004A	13.002A	0.000A	109.428	85.143%	398	7.2	41.90°C	0.879
	11.985V	5.001V	3.278V	5.045V	128.523				49.16°C	230.24V

CL2	46.672A	1.001A	1.000A	1.000A	570.219	92.597%	1028	28.4	45.94°C	0.986
	11.934V	4.995V	3.282V	4.953V	615.805				56.30°C	230.24V

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	1.204A	0.498A	0.485A	0.200A	19.647	53.326%	0	<6.0	0.890
	12.079V	5.019V	3.303V	5.012V	36.843				115.12V
2	2.475A	0.999A	0.998A	0.400A	40.049	82.187%	0	<6.0	0.918
	12.017V	5.013V	3.307V	4.999V	48.729				115.12V
3	3.675A	1.499A	1.485A	0.602A	59.567	86.536%	0	<6.0	0.948
	12.016V	5.007V	3.300V	4.987V	68.835				115.12V
4	4.942A	1.996A	1.999A	0.803A	79.965	88.906%	0	<6.0	0.961
	12.011V	5.011V	3.303V	4.984V	89.943				115.12V

The results above are not used in the certification process

230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.206A	0.500A	0.484A	0.200A	19.669	53.760%	0	<6.0	0.576
	12.073V	5.018V	3.301V	5.011V	36.587				230.25V
2	2.477A	0.997A	1.000A	0.400A	40.063	82.998%	0	<6.0	0.657
	12.017V	5.012V	3.301V	4.998V	48.270				230.23V
3	3.676A	1.498A	1.485A	0.602A	59.576	87.487%	0	<6.0	0.738
	12.015V	5.011V	3.298V	4.991V	68.097				230.24V
4	4.942A	1.997A	2.000A	0.803A	79.967	89.831%	0	<6.0	0.801
	12.011V	5.010V	3.301V	4.983V	89.019				230.24V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	15.9 mV	8.4 mV	10.6 mV	11.4 mV	Pass
20% Load	10.9 mV	8.8 mV	11.4 mV	12.0 mV	Pass
30% Load	11.0 mV	9.7 mV	12.0 mV	12.8 mV	Pass
40% Load	12.7 mV	10.8 mV	12.4 mV	13.3 mV	Pass
50% Load	13.0 mV	11.0 mV	12.8 mV	13.6 mV	Pass
60% Load	14.0 mV	12.5 mV	14.5 mV	15.4 mV	Pass
70% Load	15.3 mV	12.2 mV	13.6 mV	15.2 mV	Pass
80% Load	14.5 mV	12.3 mV	14.8 mV	14.9 mV	Pass
90% Load	15.5 mV	16.3 mV	14.8 mV	18.9 mV	Pass
100% Load	21.0 mV	13.4 mV	14.8 mV	15.5 mV	Pass
110% Load	20.7 mV	14.2 mV	15.6 mV	16.0 mV	Pass
Crossload 1	15.8 mV	10.9 mV	13.3 mV	12.6 mV	Pass
Crossload 2	20.4 mV	12.7 mV	14.2 mV	25.6 mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	17.3 mV	8.1 mV	10.3 mV	11.8 mV	Pass
20% Load	9.8 mV	8.4 mV	10.6 mV	11.3 mV	Pass
30% Load	9.8 mV	9.3 mV	11.4 mV	11.5 mV	Pass
40% Load	10.3 mV	9.9 mV	11.7 mV	12.6 mV	Pass
50% Load	11.0 mV	10.5 mV	12.6 mV	13.0 mV	Pass
60% Load	11.7 mV	11.9 mV	12.8 mV	13.7 mV	Pass
70% Load	12.4 mV	11.5 mV	12.9 mV	13.6 mV	Pass
80% Load	13.0 mV	12.2 mV	13.5 mV	14.0 mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	13.7 mV	15.9 mV	14.3 mV	16.5 mV	Pass
100% Load	18.6 mV	12.9 mV	14.3 mV	14.3 mV	Pass
110% Load	19.4 mV	13.0 mV	15.2 mV	14.5 mV	Pass
Crossload 1	15.0 mV	10.3 mV	12.5 mV	12.4 mV	Pass
Crossload 2	18.5 mV	12.1 mV	14.1 mV	14.7 mV	Pass

The results above are not used in the certification process

Fractal Design ION+ 560P



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

CYBENETICS LTD Syrou 6, Latsia, 2231, Nicosia Cyprus



AC INPUT	交流電輸入	交流電輸入	AC 입력	100-240 VAC — 50-60 Hz — 10-5 A				
DC OUTPUT	直流輸出	直流輸出	DC 출력	3.3V	5V	12V	-12V	5VSB
MAX. A	最大輸出電流	最大輸出電流	최대 출력 전류	20A	20A	46.6A	0.3A	3A
COMBINED	最大功率	最大功率	최대 출력	110W	560W	3.6W	15W	
TOTAL	總輸出功率	總輸出功率	총 출력	560W				

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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