

Anex

Fractal Design ION+ 560P

Lab ID#: FD56001536
Receipt Date: Jul 11, 2019
Test Date: Jul 23, 2019

Report:

Report Date: Jul 24, 2019

DUT INFORMATION

Brand	Fractal Design
Manufacturer (OEM)	High Power
Series	ION+
Model Number	
Serial Number	1918FD19580100392
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10-5
Rated Frequency (Hz)	50-60
Rated Power (W)	560
Type	ATX12V
Cooling	140mm Fluid Dynamic Bearing Fan (DYNAMIC X2 GP-14)
Semi-Passive Operation	✓ (selectable)
Cable Design	Fully Modular

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				

CABLES AND CONNECTORS

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	-

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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)

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RESULTS

Temperature Range (°C /°F)	30-32 / 86-89.6
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	

115V

Average Efficiency	89.795%
Efficiency With 10W ($\leq 500W$) or 2% ($> 500W$)	48.216
Average Efficiency 5VSB	76.515%
Standby Power Consumption (W)	0.1058750
Average PF	0.989
Avg Noise Output	11.90 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	A++

230V

Average Efficiency	91.329%
Average Efficiency 5VSB	76.152%
Standby Power Consumption (W)	0.1412110
Average PF	0.941
Avg Noise Output	10.35 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	A++

TEST EQUIPMENT

Electronic Loads	Chroma 63601-5 x4 Chroma 63600-2 x2 63640-80-80 x20 63610-80-20 x2
AC Sources	Chroma 6530, Keysight AC6804B
Power Analyzers	N4L PPA1530 x2
Sound Analyzer	Bruel & Kjaer 2270 G4
Microphone	Bruel & Kjaer Type 4955-A
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2
Tachometer	UNI-T UT372 x2
Digital Multimeter	Keysight U1273AX, Fluke 289, Keithley 2015 - THD
UPS	CyberPower OLS3000E 3kVA x2

HOLD-UP TIME & POWER OK SIGNAL (230V)

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

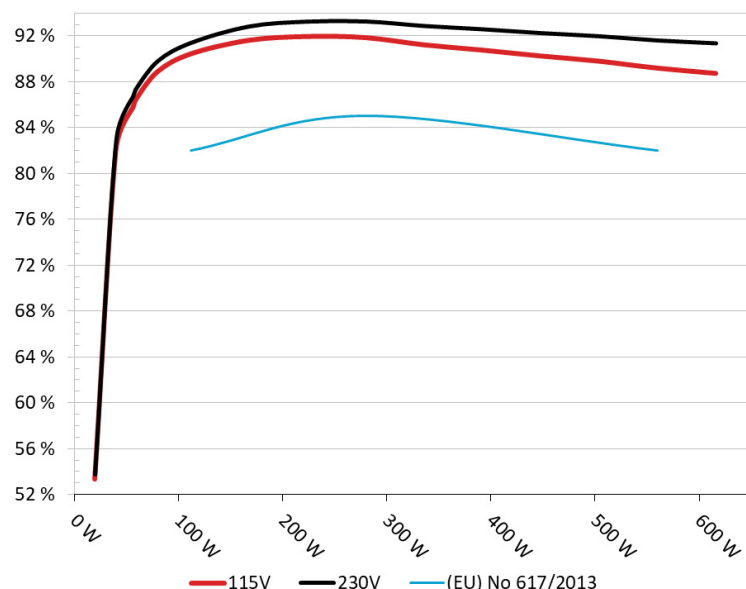
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EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

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

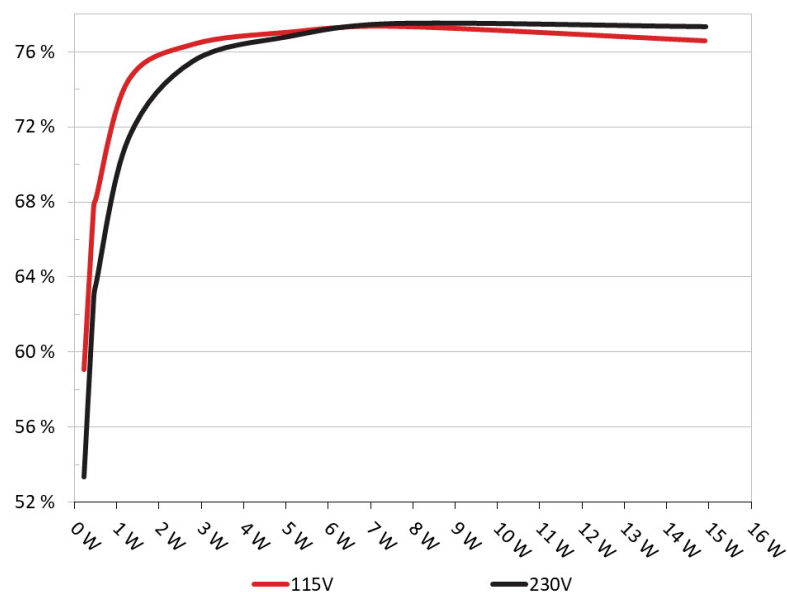


INFO

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

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Fractal Design ION+ 560P

5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

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

5VSB EFFICIENCY -230V (ERP LOT 3/6 & CEC)

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

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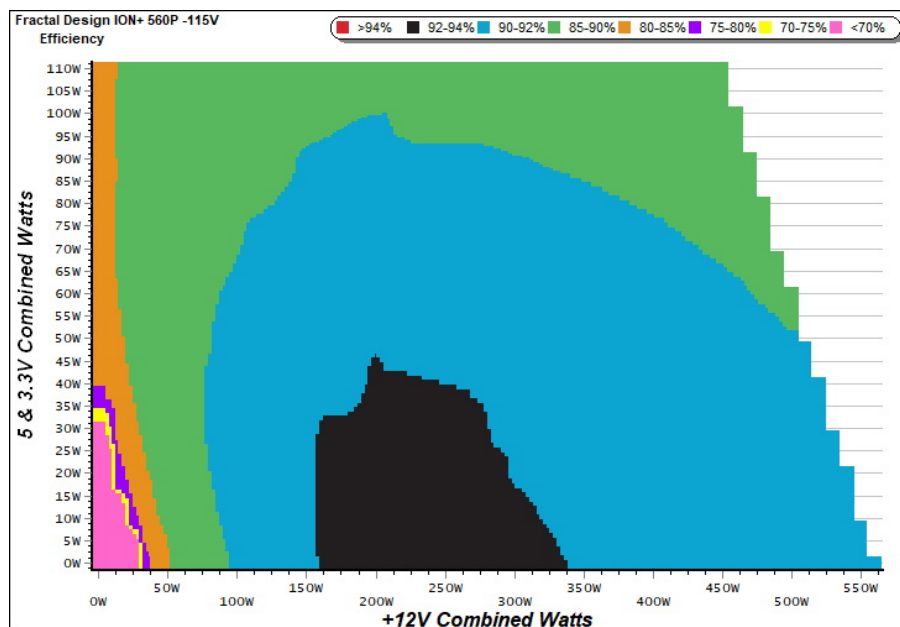
115V

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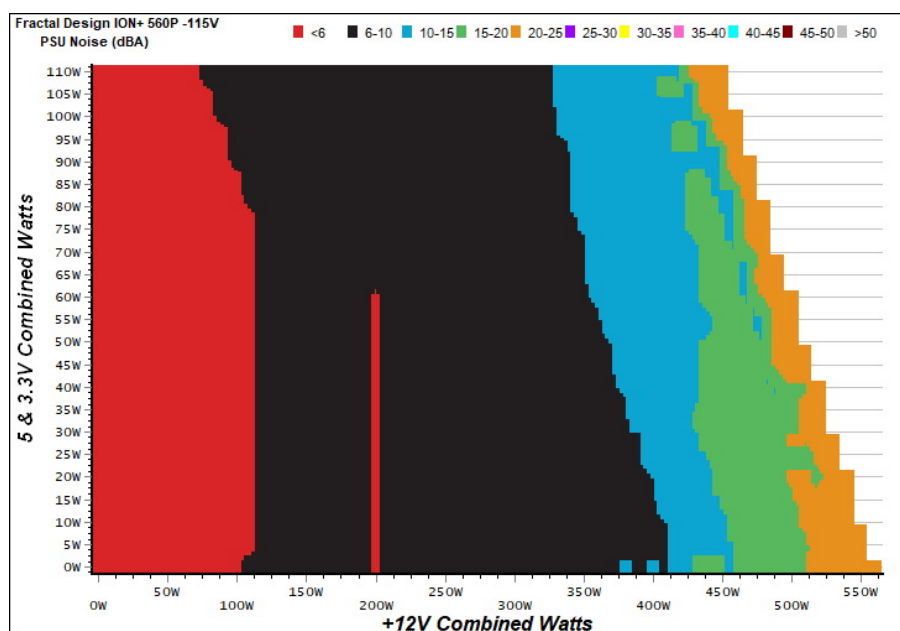
EFFICIENCY GRAPH 115V



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

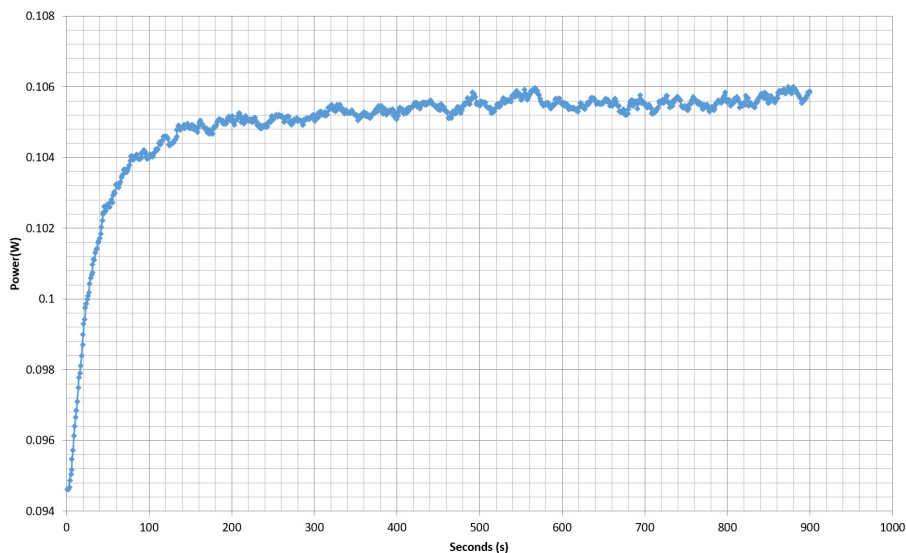
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

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VAMPIRE POWER -115V

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



INFO

This graph is generated by the PPA Standby Power Analysis software which takes full control of the power analyzer during the whole procedure. This application features all of the EN50564 & IEC62301 test limits for standby power software testing

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10-110% 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

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20-80W 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

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

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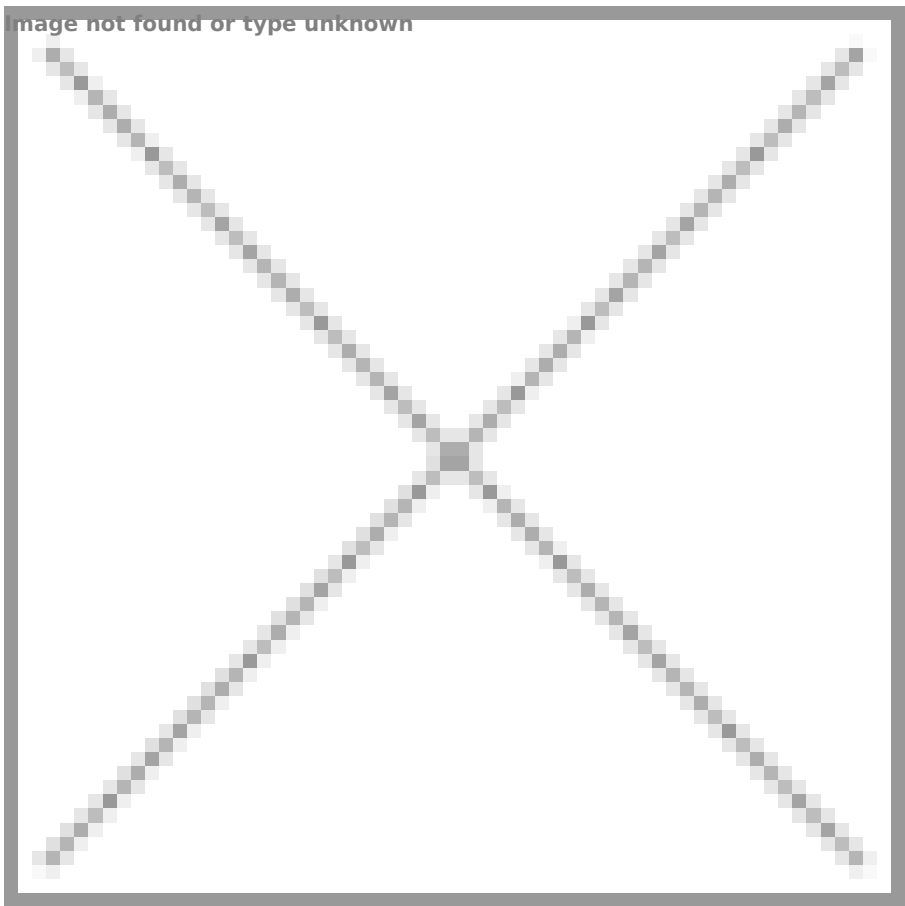
230V

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EFFICIENCY GRAPH 230V



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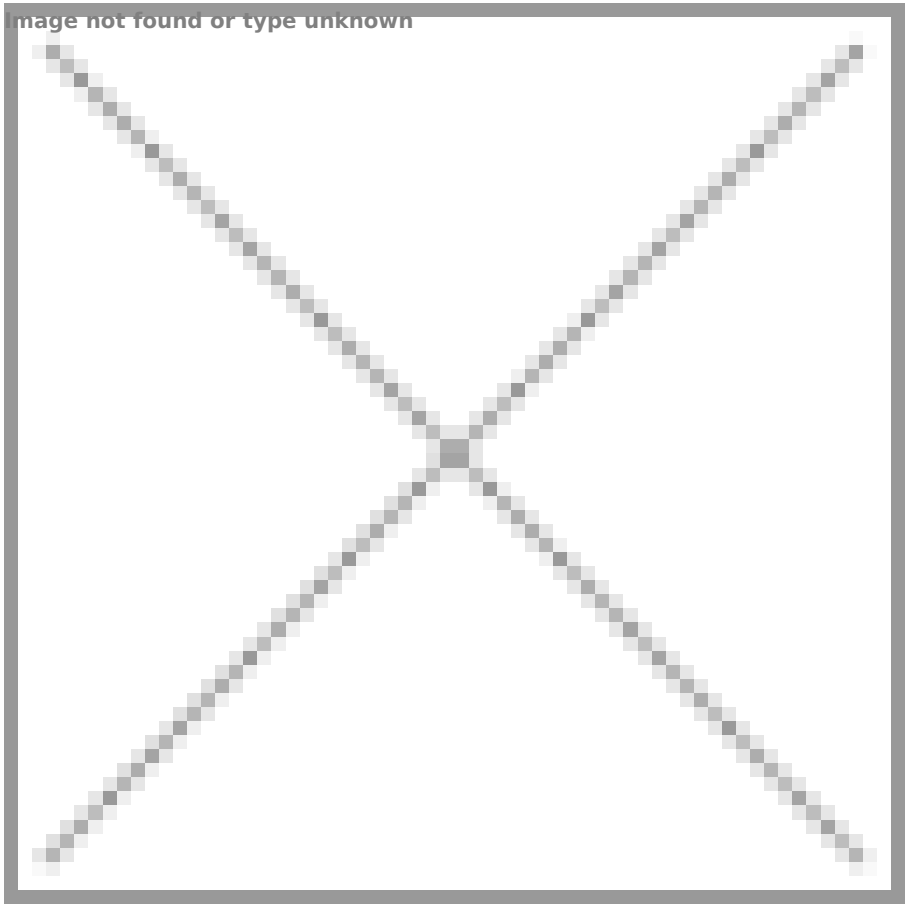
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VAMPIRE POWER -230V

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10-110% LOAD TESTS 230V

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RIPPLE MEASUREMENTS 230V

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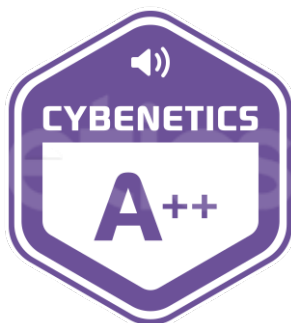


Top side

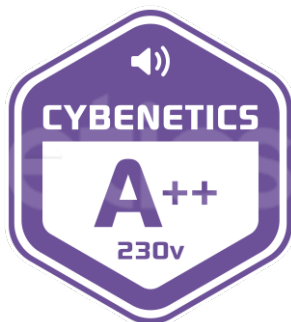
AC INPUT	交流電輸入	交流電輸入	AC 입력	100-240 VAC — 50-60 Hz — 10-5 A				
DC OUTPUT	直流輸出	直流輸出	DC 출력	3.3V	5V	12V	-12V	5V5B
MAX. A	最大輸出電流	最大輸出電流	최대 출력 전류	20A	20A	466A	0.3A	3A
COMBINED	最大功率	最大功率	최대 출력	110W	560W	36W	15W	
TOTAL	總輸出功率	總輸出功率	총 출력	560W				

Power specifications label

CERTIFICATIONS 115V



CERTIFICATIONS 230V



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