EFFICIENCY AND NOISE REPORT IN ACCORDANCE WITH
CYBENETICS ETA AND CYBENETICS LAMBDA PROCEDURE

Seasonic Prime PX-1600

Lab ID#: SS16002169
Receipt Date: Mar 28, 2023
Test Date: Apr 11, 2023

Report: 23PS2169A
Report Date: Apr 11, 2023

DUT INFORMATION

Brand	Seasonic
Manufacturer (OEM)	Seasonic
Series	Prime Platinum
Model Number	
Serial Number	
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	15-10
Rated Frequency (Hz)	50-60
Rated Power (W)	1600
Type	ATX12V
Cooling	135mm Fluid Dynamic Bearing Fan (HA13525H12SF-Z)
Semi-Passive Operation	✓ (selectable)
Cable Design	Fully Modular

TEST EQUIPMENT

Electronic Loads	Chroma 63601-5 x2 Chroma 63600-2 63640-80-80 x10 63610-80-20
AC Sources	Chroma 6530, APM SP300VAC4000W-P
Power Analyzers	RS HMC8015, N4L PPA1530, N4L PPA5530
Oscilloscopes	Picoscope 4444, Rigol DS7014, 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, Keithley 2015 - THD
UPS	FSP Champ Tower 3kVA, CyberPower OLS3000E 3kVA
Isolation Transformer	4kVA

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Seasonic Prime PX-1600

RESULTS

Temperature Range (°C /°F)	30-32 / 86-89.6 (+-2°C / +- 3.6°F)
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
ALPM (Alternative Low Power Mode) compatible	✓
ATX v3.0 PSU Power Excursion	✓

115V

Average Efficiency	91.491%
Efficiency With 10W (≤500W) or 2% (>500W)	76.512
Average Efficiency 5VSB	83.824%
Standby Power Consumption (W)	0.0218000
Average PF	0.988
Avg Noise Output	29.52 dB(A)
Efficiency Rating (ETA)	TITANIUM
Noise Rating (LAMBDA)	A-

230V

Average Efficiency	93.656%
Average Efficiency 5VSB	83.550%
Standby Power Consumption (W)	0.1489000
Average PF	0.947
Avg Noise Output	29.59 dB(A)
Efficiency Rating (ETA)	TITANIUM
Noise Rating (LAMBDA)	A-

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	25	25	133.3	3	0.5
	Watts	125		1600	15	6
Total Max. Power (W)		1600				

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CABLES AND CONNECTORS

Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (610mm)	1	1	16-18AWG	No
4+4 pin EPS12V (700mm)	3	3	16AWG	No
6+2 pin PCIe (750mm)	6	6	16AWG	No
12+4 pin PCIe (750mm) (600W)	2	2	16-28AWG	No
SATA (510mm+155mm+155mm+155mm)	4	16	18AWG	No
4 pin Molex to SATA 3.3 Adapter (410mm+155mm)	1	2	18AWG	No
4-pin Molex (460mm+130mm+130mm)	1	3	18AWG	No
AC Power Cord (1340mm) - C13 coupler	1	1	16AWG	-

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General Data	
Manufacturer (OEM)	Seasonic
PCB Type	Double Sided
Primary Side	
Transient Filter	6x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	2x NTC Thermistor MF72-20D20M (20 Ohm) & Relay
Rectifier FETs	4x
APFC MOSFETs	4x Infineon IPA60R099P6 (600V, 24A @ 100°C, Rds(on): 0.099Ohm)
APFC Boost Diode	2x ST STTH8S06 (600V, 8A @ 175°C)
Bulk Cap(s)	3x Nippon Chemi-Con (420V, 820uF each or 2460uF combined, 2,000h @ 105°C, KHE)
Main Switchers	4x Infineon IPA60R080P7 (600V, 23A @ 100°C, Rds(on): 0.08Ohm)
Drivers IC	2x Silicon Labs Si8233BD
APFC Controller	Texas Instruments UCD28070
Resonant Controller	Champion CM6901T2X
Topology	Primary side: Bridgeless, Interleaved PFC, Full-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETs	16x Nexperia PSMN2R6-40YS (40V, 100A @ 100°C, Rds(on): 3.7mOhm)
5V & 3.3V	DC-DC Converters
Filtering Capacitors	Electrolytic: 6x Nippon Chemi-Con (105°C, W) 1x Nippon Chemi-Con (5-6,000h @ 105°C, KZH) 2x Nippon Chemi-Con (2-5,000h @ 105°C, KZE) 3x Rubycon (6-10,000h @ 105°C, ZLH) 2x Rubycon (3-6,000h @ 105°C, YXG) Polymer: 12x Nippon Chemi-Con, 22x FPCAP, 4x
Supervisor IC	Weltrend WT7527RA (OCP, OVP, UVP, SCP, PG)
Fan Controller	Nuvoton M031
Fan Model	Hong Hua HA13525H12SF-Z (135mm, 12V, 0.5A, Fluid Dynamic Bearing Fan)
5VSB Circuit	
Rectifier	1x Infineon BSC100N06LS3 FET (60V, 36A @ 100°C, Rds(on): 10mOhm)
Standby PWM Controller	Power Integrations INN3164C

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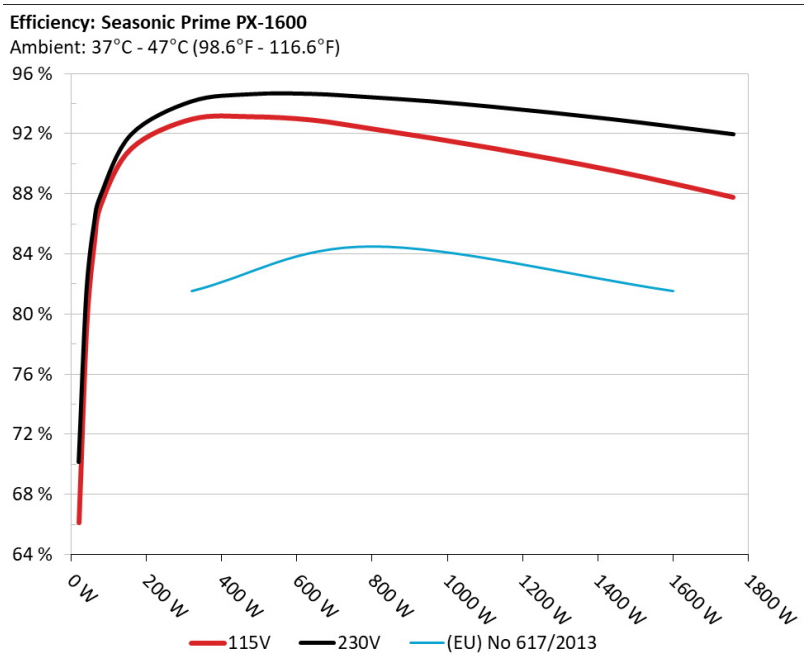
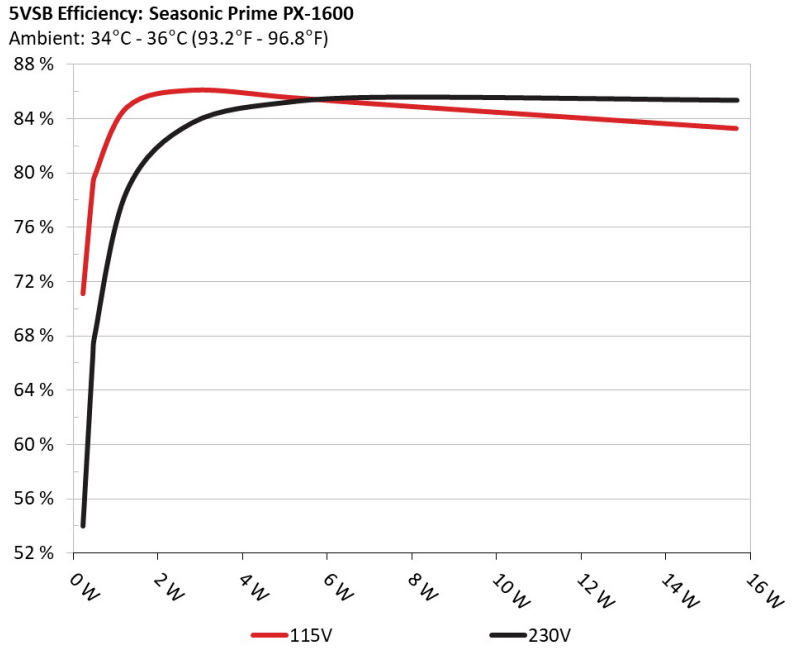
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.228W	70.597%	0.031
	5.074V	0.323W		114.87V
2	0.09A	0.457W	78.473%	0.055
	5.074V	0.582W		114.88V
3	0.55A	2.801W	85.585%	0.258
	5.094V	3.273W		114.87V
4	1A	5.123W	85.044%	0.375
	5.123V	6.024W		114.87V
5	1.5A	7.74W	84.438%	0.448
	5.159V	9.166W		114.87V
6	3A	15.663W	82.768%	0.532
	5.221V	18.924W		114.87V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229W	53.487%	0.012
	5.078V	0.429W		229.78V
2	0.09A	0.457W	65.79%	0.02
	5.077V	0.695W		229.78V
3	0.55A	2.802W	83.205%	0.092
	5.095V	3.368W		229.78V
4	1A	5.125W	84.753%	0.158
	5.124V	6.047W		229.78V
5	1.5A	7.737W	85.112%	0.22
	5.157V	9.089W		229.78V
6	3A	15.681W	84.876%	0.328
	5.228V	18.475W		229.77V

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115V

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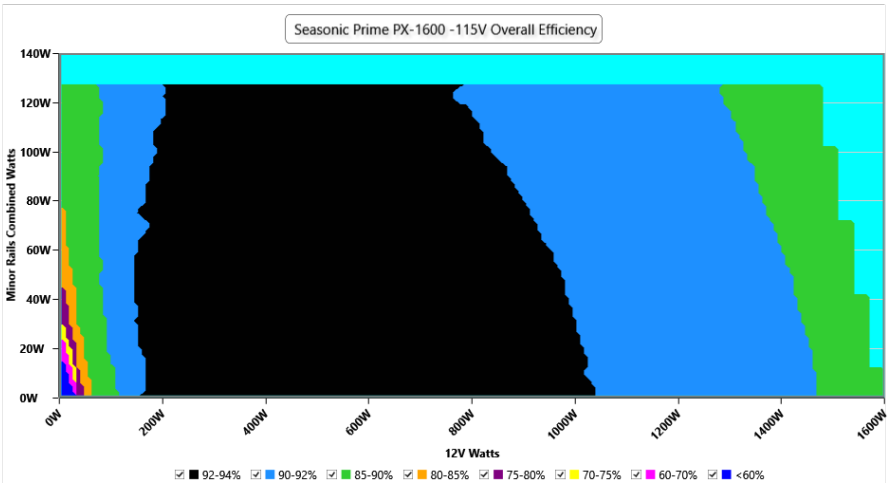
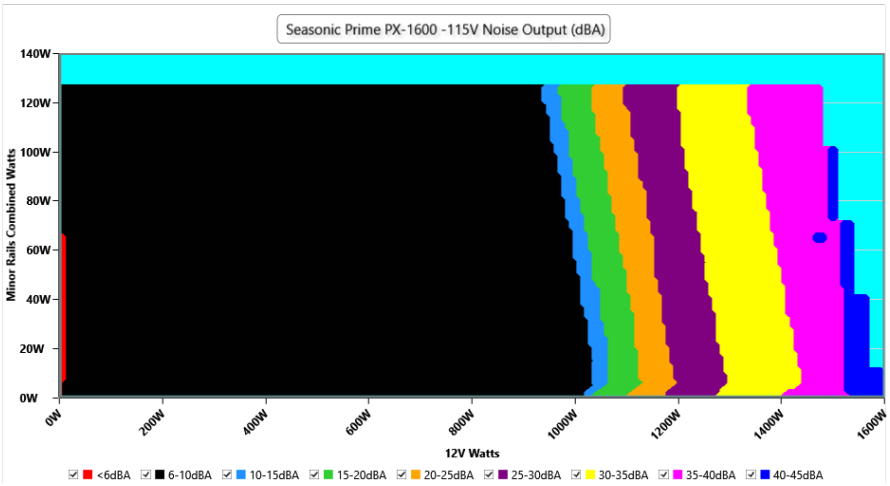
EFFICIENCY GRAPH 115V



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 (+-2 °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

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	114.87 V	114.79 V	113.85 V	114.94 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.98 Hz	59.40 Hz	60.01 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.419	1.418	1.340	1.422	1.490	PASS
Mains Voltage THD:	0.21 %	0.17 %	N/A	0.32 %	2.00 %	PASS
Real Power:	0.022 W	0.004 W	N/A	0.041 W	N/A	N/A
Apparent Power:	11.478 W	11.448 W	N/A	11.511 W	N/A	N/A
Power Factor:	0.002	N/A	N/A	N/A	N/A	N/A

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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COMMISSION REGULATION (EU) NO 617/2013 TESTING 115V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
10%	11.460A	1.982A	1.989A	0.975A	159.982	91.544%	0	<6.0	44.54°C	0.975
	12.076V	5.044V	3.317V	5.125V	174.766				40.29°C	114.82V
20%	23.943A	2.975A	2.987A	1.169A	319.941	93.477%	0	<6.0	45.29°C	0.983
	12.072V	5.041V	3.315V	5.133V	342.263				40.75°C	114.77V
50%	62.108A	4.965A	4.987A	1.751A	799.314	92.834%	472	9.0	42.32°C	0.992
	12.056V	5.035V	3.309V	5.14V	861.012				48.33°C	114.59V
100%	125.524A	8.957A	9.005A	2.916A	1599.427	89.202%	1385	41.5	45.53°C	0.996
	12.027V	5.023V	3.299V	5.143V	1793.038				55.61°C	114.26V

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230V

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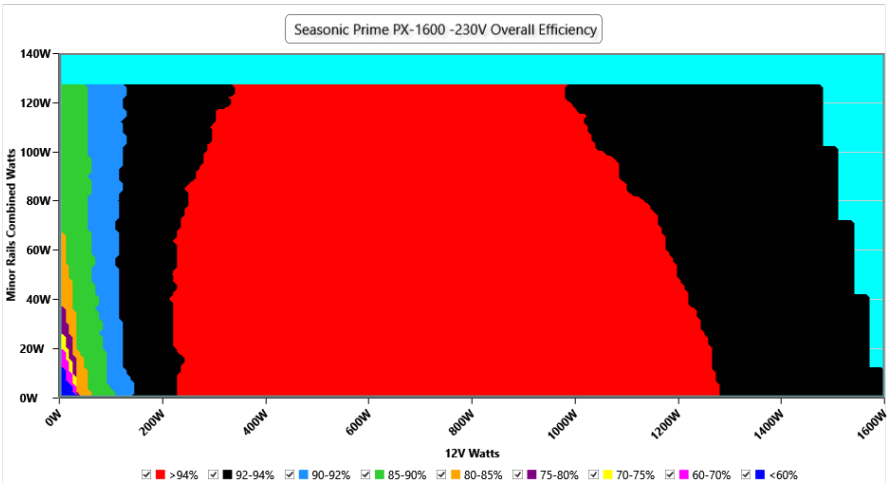
EFFICIENCY GRAPH 230V



INFO

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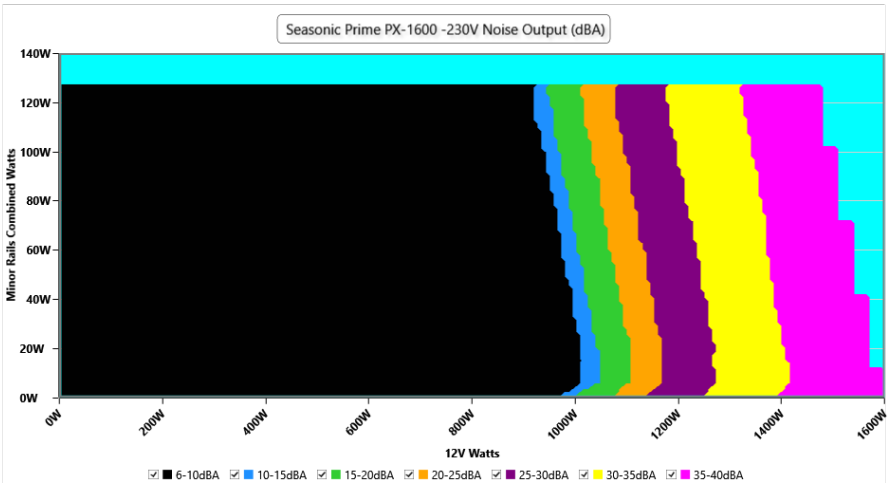
NOISE GRAPH 230V



INFO

The PSU's noise in its entire operational range and under 30-32 °C (+-2 °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

VAMPIRE POWER -230V

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	229.76 V	229.69 V	227.70 V	229.86 V	232.30 V	PASS
Mains Frequency:	50.00 Hz	49.98 Hz	49.50 Hz	50.02 Hz	50.50 Hz	PASS
Mains Voltage CF:	1.417	1.416	1.340	1.418	1.490	PASS
Mains Voltage THD:	0.18 %	0.14 %	N/A	0.23 %	2.00 %	PASS
Real Power:	0.149 W	0.103 W	N/A	0.200 W	N/A	N/A
Apparent Power:	39.698 W	39.648 W	N/A	39.756 W	N/A	N/A
Power Factor:	0.004	N/A	N/A	N/A	N/A	N/A

INFO

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COMMISSION REGULATION (EU) NO 617/2013 TESTING 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%	11.460A	1.983A	1.989A	0.976A	159.982	92.449%	0	<6.0	44.65°C	0.856
	12.075V	5.043V	3.317V	5.123V	173.057				40.41°C	229.75V
20%	23.945A	2.976A	2.987A	1.169A	319.94	94.634%	0	<6.0	45.59°C	0.914
	12.071V	5.04V	3.315V	5.131V	338.084				40.8°C	229.72V
50%	62.114A	4.966A	4.986A	1.751A	799.31	94.906%	473	9.0	42.24°C	0.951
	12.055V	5.034V	3.309V	5.14V	842.216				48.26°C	229.64V
100%	125.516A	8.957A	9.003A	2.916A	1599.409	92.959%	1373	41.3	45.21°C	0.976
	12.028V	5.024V	3.299V	5.145V	1720.545				55.29°C	229.49V

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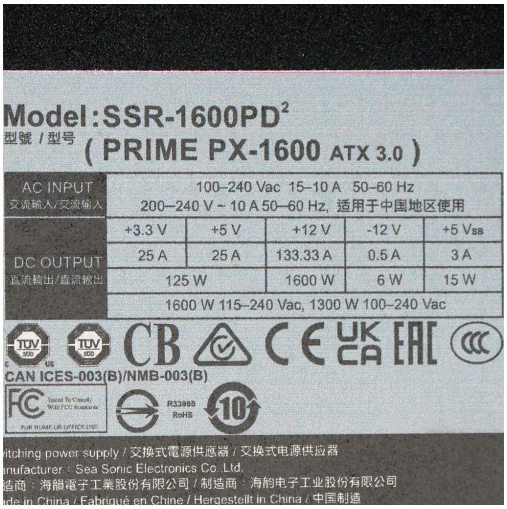
Seasonic Prime PX-1600

Top side



Power specifications label

CERTIFICATIONS 115V

Aristeidis Bitziopoulos
Lab Director

CERTIFICATIONS 230V