Seasonic Prime TX-1600 (ATX v3.0)

Serial Number R2304AA132940001

Lab ID SS16002263

Certification ID 252263

Test Result Report ID: 23PS2263A

Certificate Issue Date: Oct 25, 2023

Scheme: ETA-EMI PSU

115V 230V

Scheme: LAMBDA PSU

115V 230V

Outside Validation Scope

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	Seasonic
Model	Prime TX-1600 (ATX v3.0)
OEM/ODM	Seasonic
Serial Number	R2304AA132940001
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	15-10

Rated Frequency (Hz)	50-60
Rated Power (W)	1600
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	135mm Fluid Dynamic Bearing Fan (HA13525H12SF-Z)
Semi-Passive Operation	✓ (selectable)
Cybenetics Testing Information	
Lab ID	SS16002263
Date of receipt	Sep 29, 2023
Testing Date	Oct 18, 2023
Report Issued Date	Oct 25, 2023
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 (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
SATA (410mm+150mm)	1	2	18AWG	No
4-pin Molex (460mm+125mm+125mm)	1	3	18AWG	No

AC Power Cord (1390mm) - C19 coupler	1	1	14AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	25	25	133.33	3	0.5
	Watts	125		1600	15	6
Total Max. Power (W)		1600				

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	✓
ALPM (Alternative Low Power Mode) compatible	✓
ATX v3.0 Compliance	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	92.092%
Average Noise Output (>1450 Load Combinations)	20.69dBA
Average PF (>1450 Load Combinations)	0.987
Efficiency With 10W (≤500W) or 2% (>500W) Load	71.426%
Standby Power Consumption	0.0169W
Non-Accredited	
12V Ripple (Full Load)	26.08mV
5V Ripple (Full Load)	11.18mV
3.3V Ripple (Full Load)	16.19mV

5VSB Ripple (Full Load)	29.98mV
12V Load Regulation	0.52%
5V Load Regulation	0.31%
3.3V Load Regulation	0.76%
5VSB Load Regulation	0.55%
Inrush Current	18.050A

230V

Accredited		
Average Efficiency (>1450 load combinations)		93.872%
Average Noise Output (>1450 Load Combinations)		21.12dBA
Average PF (>1450 Load Combinations)		0.947
Efficiency With 10W (≤500W) or 2% (>500W) Load		70.365%
Standby Power Consumption		0.1020W
Non-Accredited		
12V Ripple (Full Load)		25.58mV
5V Ripple (Full Load)		11.58mV
3.3V Ripple (Full Load)		15.89mV
5VSB Ripple (Full Load)		30.42mV
12V Load Regulation		0.56%
5V Load Regulation		0.33%
3.3V Load Regulation		0.76%
5VSB Load Regulation		0.55%
Inrush Current		34.980A
12V Transient Response (200%)		11.45V
5V Transient Response (200%)		4.954V
3.3V Transient Response (200%)		3.142V
5VSB Transient Response (200%)		4.873V
Hold-Up Time & PWR_OK Signal		20.90ms
AC Loss to PWR_OK Hold Up Time		17.60ms
PWR_OK Inactive to DC Loss Delay		3.30ms
PSU Timings: T1 (20% / 100%)	38.0ms	39.0ms

PSU Timings: T3 (20% / 100%)	127.0ms	125.0ms
OPP (27.64°C / 43.92°C)	138.08%	134.26%

Hold-Up Time & PWR_OK Signal

Hold-Up Time (ms)	20.9
AC Loss to PWR_OK Hold Up Time (ms)	17.6
PWR_OK Inactive to DC Loss Delay (ms)	3.3

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Tables

115V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	114.86 V	114.80 V	113.85 V	114.92 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.98 Hz	59.40 Hz	60.02 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.420	1.418	1.340	1.422	1.490	PASS
Mains Voltage THD:	0.15 %	0.10 %	N/A	0.27 %	2.00 %	PASS
Real Power:	0.017 W	0.005 W	N/A	0.032 W	N/A	N/A
Apparent Power:	11.910 W	11.881 W	N/A	11.948 W	N/A	N/A
Power Factor:	0.002	N/A	N/A	N/A	N/A	N/A

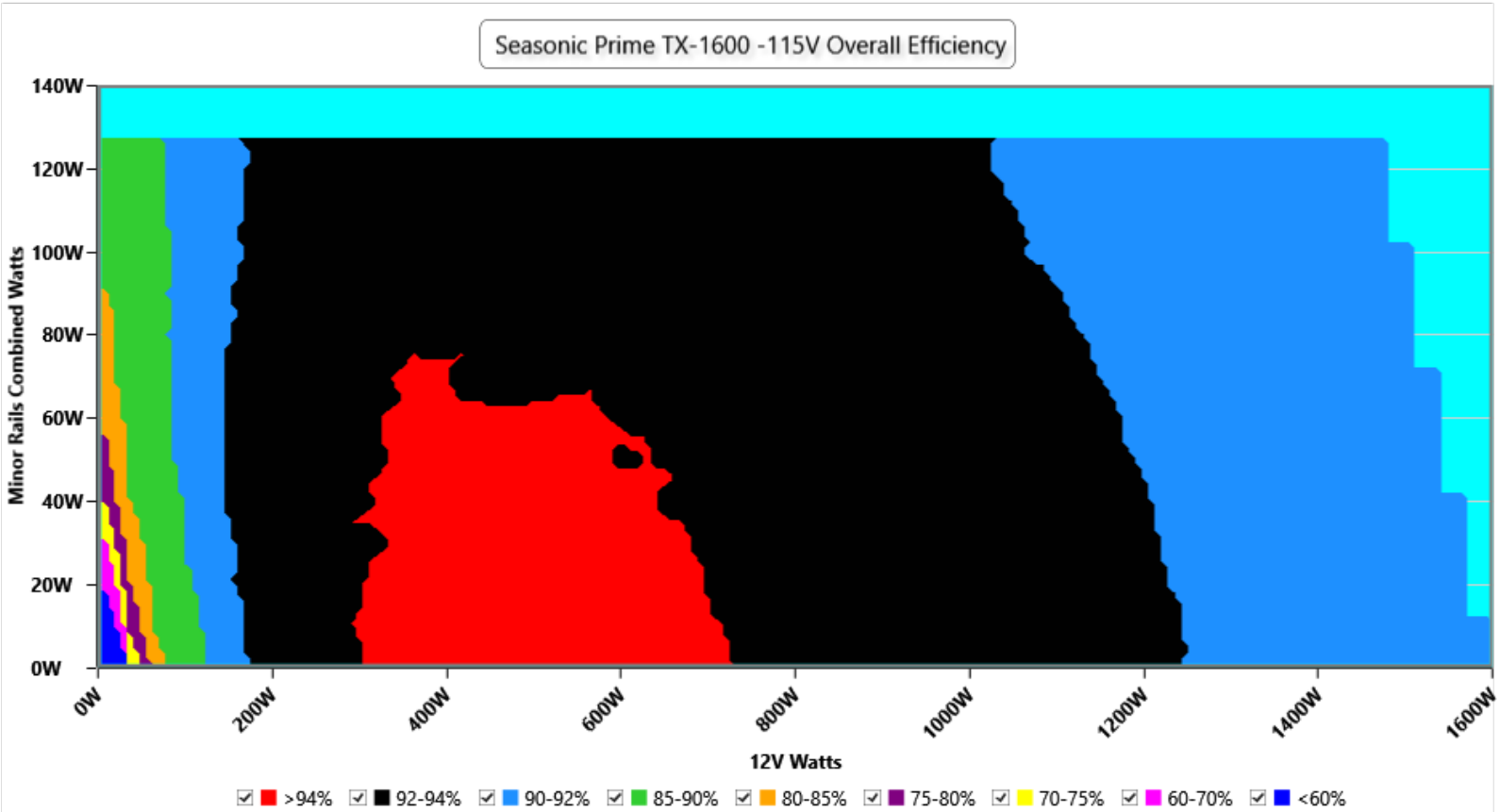
230V

Detailed Results						
	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	229.86 V	229.78 V	227.70 V	229.92 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:	1.418	1.417	1.340	1.420	1.490	PASS

Mains Voltage THD:	0.16 %	0.12 %	N/A	0.21 %	2.00 %	PASS
Real Power:	0.102 W	0.071 W	N/A	0.136 W	N/A	N/A
Apparent Power:	41.344 W	41.300 W	N/A	41.411 W	N/A	N/A
Power Factor:	0.002	N/A	N/A	N/A	N/A	N/A

Efficiency Graph

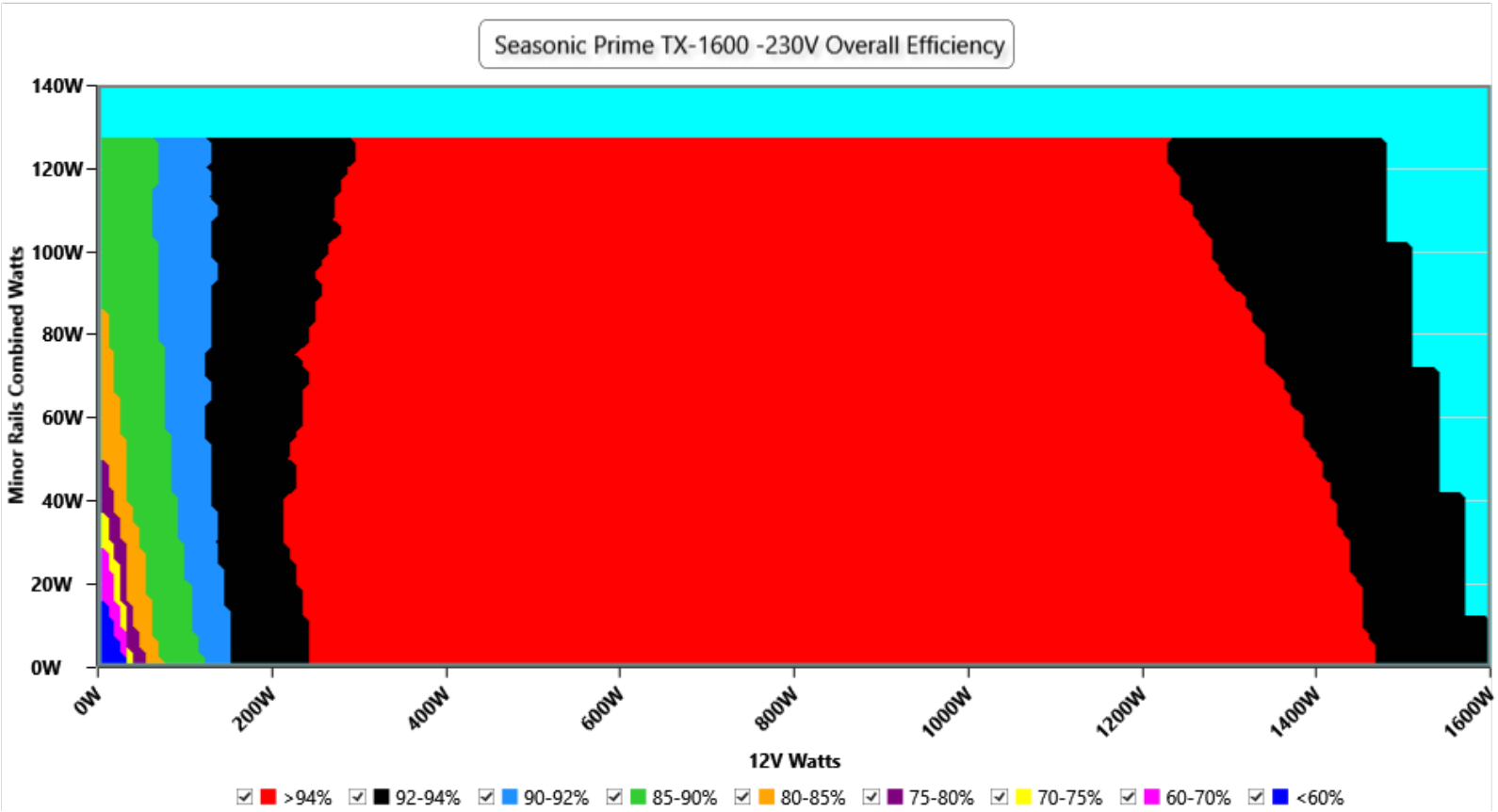
115V



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



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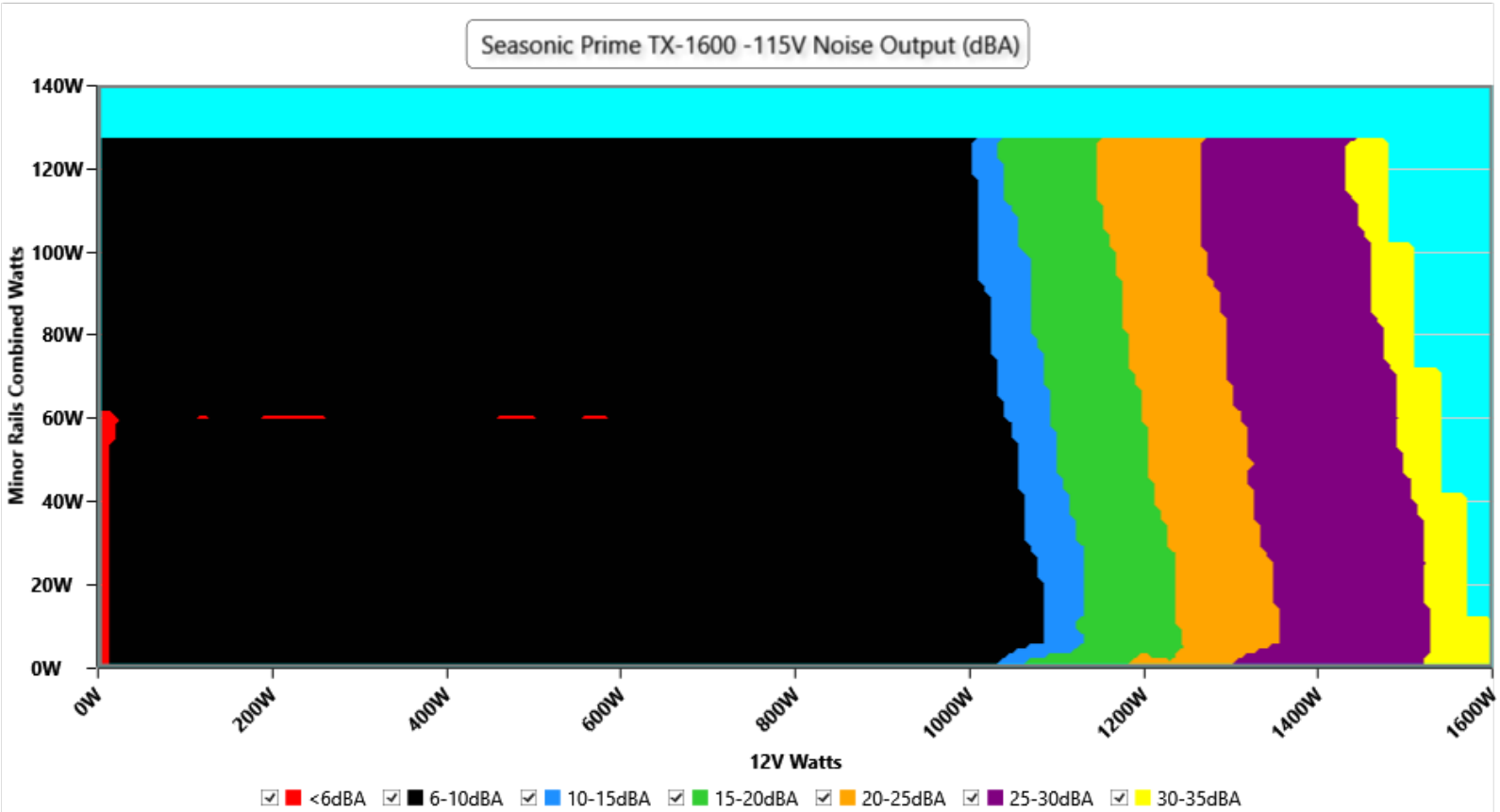
Noise Graph

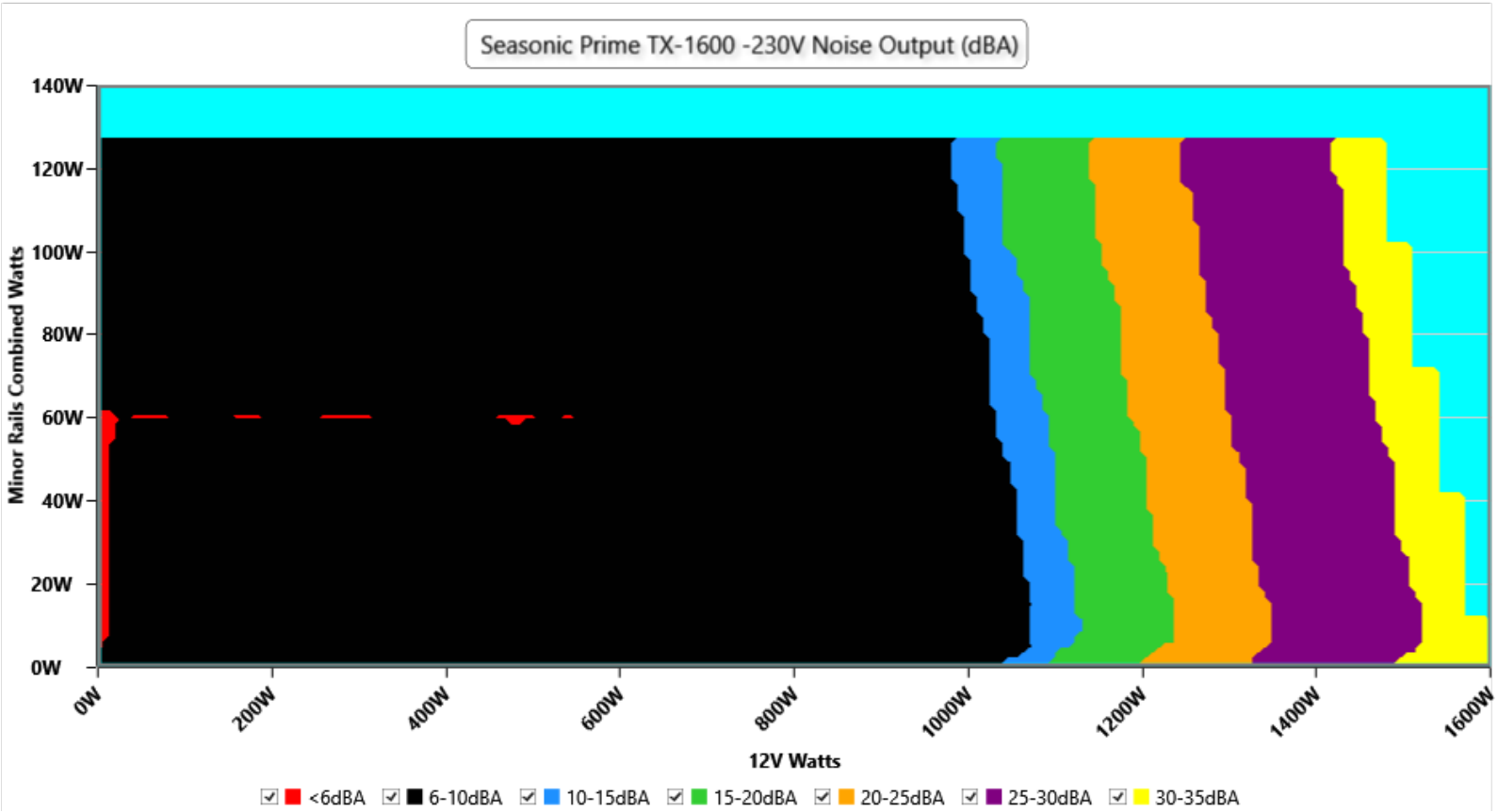
115V



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

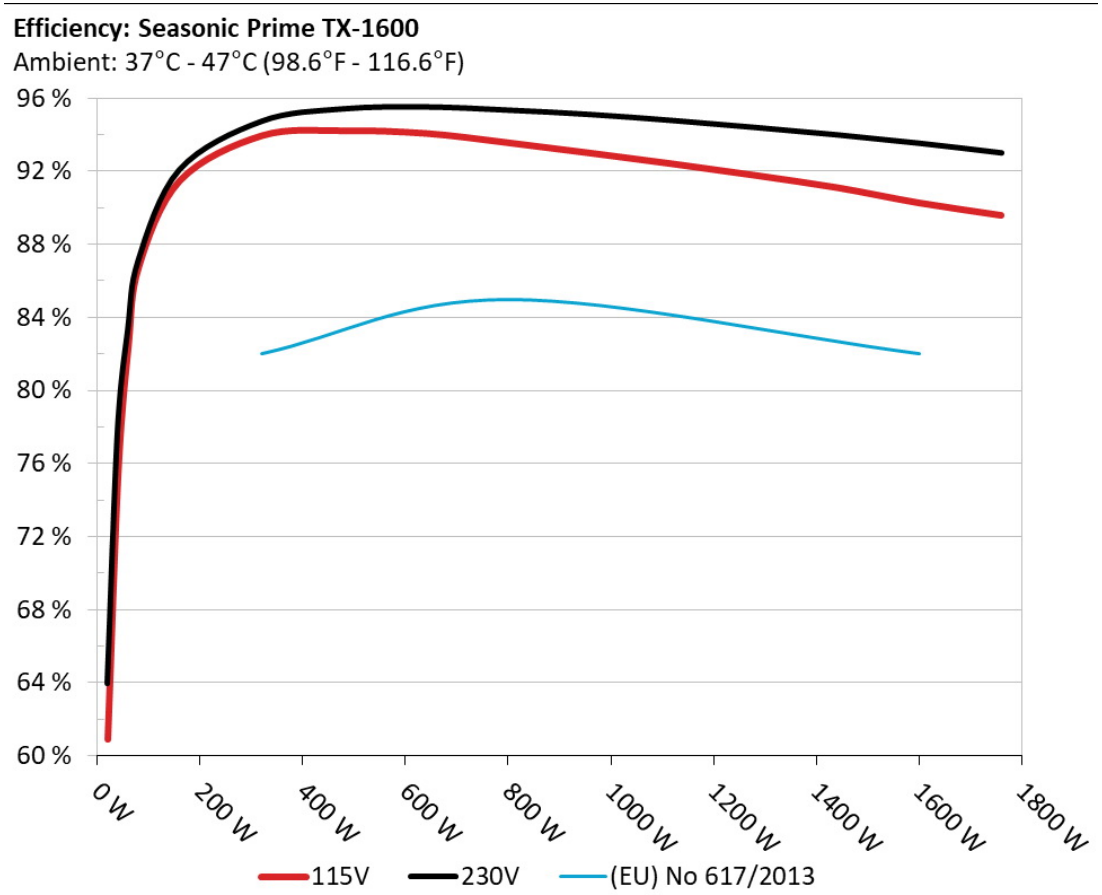


INFO

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

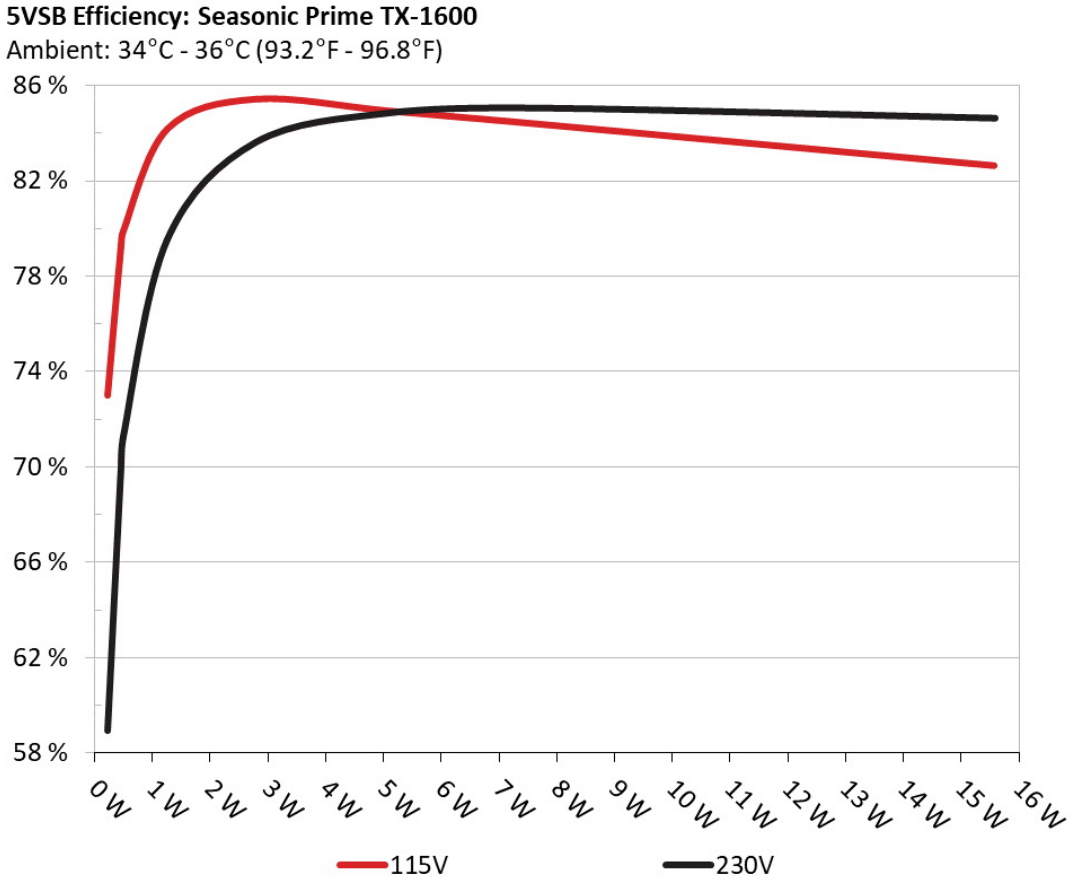
Efficiency under high ambient temperature



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)

115V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.228W	73.019%	0.029
	5.056V	0.312W		114.85V
2	0.09A	0.455W	79.15%	0.053
	5.055V	0.575W		114.84V
3	0.55A	2.788W	85.414%	0.253
	5.069V	3.265W		114.85V
4	1A	5.096W	84.92%	0.369
	5.096V	6.001W		114.85V
5	1.5A	7.69W	84.37%	0.426
	5.126V	9.115W		114.84V
6	3A	15.57W	82.632%	0.527
	5.19V	18.842W		114.84V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.228W	58.925%	0.011
	5.06V	0.387W		229.85V
2	0.09A	0.455W	69.712%	0.018
	5.055V	0.653W		229.85V
3	0.55A	2.788W	83.615%	0.09
	5.07V	3.334W		229.85V
4	1A	5.097W	84.854%	0.154
	5.097V	6.007W		229.85V
5	1.5A	7.689W	85.06%	0.216
	5.126V	9.039W		229.85V
6	3A	15.595W	84.636%	0.321
	5.198V	18.426W		229.85V

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
10%	11.430A	1.964A	1.984A	0.981A	159.994	91.493%	0	<6.0	44.51°C	0.975
	12.108V	5.091V	3.327V	5.095V	174.867				40.24°C	114.8V
20%	23.884A	2.946A	2.978A	1.178A	319.996	93.963%	0	<6.0	45.37°C	0.983
	12.104V	5.092V	3.325V	5.096V	340.558				40.79°C	114.75V
30%	36.621A	3.438A	3.476A	1.374A	479.216	94.234%	0	<6.0	46.49°C	0.983
	12.101V	5.09V	3.323V	5.094V	508.539				41.39°C	114.7V
40%	49.459A	3.929A	3.974A	1.571A	639.584	94.09%	0	<6.0	47.27°C	0.987
	12.098V	5.09V	3.322V	5.093V	679.762				41.7°C	114.64V
50%	61.912A	4.915A	4.971A	1.765A	799.324	93.579%	497	9.7	42.38°C	0.991
	12.095V	5.087V	3.319V	5.098V	854.171				48.45°C	114.59V
60%	74.435A	5.9A	5.97A	1.962A	959.805	93.011%	499	9.8	42.96°C	0.993
	12.092V	5.085V	3.317V	5.097V	1031.926				49.47°C	114.53V
70%	86.895A	6.885A	6.97A	2.16A	1119.551	92.426%	524	11.2	43.27°C	0.994
	12.088V	5.084V	3.315V	5.094V	1211.3				50.32°C	114.48V
80%	99.434A	7.869A	7.969A	2.261A	1279.595	91.798%	676	19.7	43.85°C	0.995
	12.085V	5.083V	3.312V	5.087V	1393.921				52.01°C	114.41V
90%	112.314A	8.362A	8.456A	2.361A	1439.413	91.127%	820	26.1	44.68°C	0.995
	12.081V	5.082V	3.311V	5.082V	1579.562				53.71°C	114.34V
100%	125.017A	8.857A	8.974A	2.945A	1599.461	90.289%	1545	44.3	45.71°C	0.995
	12.076V	5.081V	3.309V	5.094V	1771.483				55.76°C	114.28V
110%	137.616A	9.846A	10.068A	2.949A	1760.026	89.605%	1843	49.7	46.87°C	0.995
	12.075V	5.078V	3.307V	5.087V	1964.205				57.79°C	114.21V
CL1	0.116A	14.804A	14.981A	0A	126.307	86.38%	499	9.8	40.87°C	0.97
	12.105V	5.087V	3.311V	5.053V	146.224				46.35°C	114.79V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
CL2	0.114A	24.528A	0A	0A	126.228	85.112%	498	9.7	40.46°C	0.97
	12.105V	5.09V	3.325V	5.055V	148.316				47.51°C	114.81V
CL3	0.114A	0A	24.94A	0A	83.884	79.071%	497	9.7	40.77°C	0.96
	12.105V	5.099V	3.308V	5.056V	106.1				49.87°C	114.82V
CL4	132.483A	0A	0A	0A	1599.969	90.723%	974	31.3	45.7°C	0.995
	12.077V	5.1V	3.327V	4.985V	1763.582				56.64°C	114.29V

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
10%	11.428A	1.963A	1.983A	0.982A	159.986	92.051%	0	<6.0	44.27°C	0.871
	12.109V	5.093V	3.327V	5.094V	173.802				40.01°C	229.83V
20%	23.876A	2.946A	2.978A	1.177A	319.942	94.708%	0	<6.0	45.57°C	0.929
	12.106V	5.09V	3.324V	5.097V	337.819				40.95°C	229.81V
30%	36.611A	3.438A	3.476A	1.374A	479.145	95.389%	0	<6.0	46.16°C	0.947
	12.103V	5.09V	3.323V	5.094V	502.307				41.04°C	229.78V
40%	49.453A	3.93A	3.974A	1.571A	639.554	95.496%	0	<6.0	47.27°C	0.955
	12.099V	5.089V	3.321V	5.094V	669.722				41.6°C	229.76V
50%	61.914A	4.916A	4.972A	1.765A	799.343	95.323%	497	9.7	42.21°C	0.961
	12.095V	5.086V	3.319V	5.099V	838.56				48.22°C	229.73V
60%	74.445A	5.9A	5.971A	1.963A	959.871	95.083%	498	9.7	42.81°C	0.967
	12.091V	5.085V	3.316V	5.096V	1009.519				49.37°C	229.71V
70%	86.906A	6.886A	6.971A	2.16A	1119.611	94.755%	544	12.4	43°C	0.971
	12.088V	5.084V	3.314V	5.093V	1181.592				50.05°C	229.67V
80%	99.444A	7.869A	7.971A	2.261A	1279.625	94.376%	696	20.7	43.71°C	0.975
	12.084V	5.083V	3.312V	5.087V	1355.883				51.76°C	229.64V
90%	112.322A	8.363A	8.458A	2.361A	1439.426	93.97%	840	26.8	44.85°C	0.979
	12.080V	5.082V	3.31V	5.082V	1531.796				54.01°C	229.63V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
100%	125.011A	8.856A	8.976A	2.944A	1599.446	93.511%	976	31.4	45.46°C	0.982
	12.077V	5.081V	3.309V	5.095V	1710.428				55.47°C	229.6V
110%	137.649A	9.846A	10.07A	2.949A	1760.06	92.983%	1902	50.1	46.99°C	0.985
	12.072V	5.078V	3.306V	5.086V	1892.892				57.92°C	229.57V
CL1	0.116A	14.807A	14.983A	0A	126.31	86.621%	498	9.7	40.44°C	0.852
	12.105V	5.086V	3.31V	5.054V	145.827				45.93°C	229.83V
CL2	0.115A	24.53A	0A	0A	126.227	85.352%	498	9.7	40.43°C	0.853
	12.105V	5.089V	3.325V	5.056V	147.888				47.52°C	229.83V
CL3	0.114A	0A	24.941A	0A	83.885	79.381%	497	9.7	41.27°C	0.799
	12.106V	5.099V	3.308V	5.056V	105.675				50.33°C	229.84V
CL4	132.489A	0A	0A	0A	1599.97	93.803%	974	31.3	45.03°C	0.982
	12.076V	5.1V	3.327V	4.985V	1705.674				56.01°C	229.59V

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])	Temps (In/Out)	PF/AC Volts
20W	1.224A	0.49A	0.495A	0.197A	19.999	60.915%	0	<6.0	39.93°C	0.857
	12.139V	5.097V	3.334V	5.073V	32.83				36.86°C	114.84V
40W	2.702A	0.687A	0.693A	0.296A	39.997	75.411%	0	<6.0	41.01°C	0.922
	12.101V	5.097V	3.333V	5.07V	53.028				37.69°C	114.83V
60W	4.176A	0.883A	0.891A	0.394A	59.996	82.463%	0	<6.0	42.49°C	0.939
	12.100V	5.095V	3.331V	5.075V	72.755				38.73°C	114.83V
80W	5.641A	1.08A	1.09A	0.492A	79.936	86.759%	0	<6.0	42.99°C	0.955
	12.109V	5.093V	3.329V	5.077V	92.143				39.03°C	114.82V

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
20W	1.222A	0.49A	0.495A	0.197A	19.995	63.95%	0	<6.0	39.8°C	0.514
	12.144V	5.098V	3.334V	5.073V	31.341				36.73°C	229.85V
40W	2.700A	0.687A	0.693A	0.296A	39.995	77.87%	0	<6.0	40.62°C	0.632
	12.102V	5.098V	3.333V	5.071V	51.361				37.26°C	229.85V
60W	4.176A	0.883A	0.891A	0.394A	59.995	83.361%	0	<6.0	42.13°C	0.723
	12.100V	5.095V	3.331V	5.075V	71.976				38.61°C	229.84V
80W	5.640A	1.079A	1.09A	0.493A	79.934	87.085%	0	<6.0	43.09°C	0.773
	12.110V	5.094V	3.329V	5.076V	91.797				39.37°C	229.84V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	17.08mV	10.32mV	12.36mV	28.73mV	Pass
20% Load	15.65mV	10.57mV	12.57mV	26.73mV	Pass
30% Load	16.26mV	10.88mV	12.93mV	13.91mV	Pass
40% Load	16.26mV	10.93mV	13.49mV	25.24mV	Pass
50% Load	16.93mV	11.08mV	13.60mV	28.84mV	Pass
60% Load	16.47mV	11.44mV	13.34mV	15.19mV	Pass
70% Load	16.88mV	11.44mV	14.00mV	21.70mV	Pass
80% Load	16.98mV	11.80mV	14.88mV	25.50mV	Pass
90% Load	18.72mV	11.40mV	14.98mV	27.40mV	Pass
100% Load	26.08mV	11.18mV	16.19mV	29.98mV	Pass
110% Load	26.70mV	11.75mV	15.80mV	27.30mV	Pass
Crossload1	21.64mV	12.62mV	16.46mV	9.16mV	Pass
Crossload2	17.59mV	19.04mV	17.91mV	7.60mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
Crossload3	16.01mV	10.68mV	21.04mV	7.64mV	Pass
Crossload4	26.48mV	11.79mV	14.00mV	10.77mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	17.08mV	10.78mV	12.57mV	26.01mV	Pass
20% Load	17.13mV	11.45mV	12.31mV	26.58mV	Pass
30% Load	16.68mV	11.70mV	14.47mV	14.88mV	Pass
40% Load	16.01mV	10.78mV	13.13mV	25.81mV	Pass
50% Load	17.95mV	11.80mV	14.26mV	31.25mV	Pass
60% Load	17.90mV	12.57mV	14.73mV	16.16mV	Pass
70% Load	18.41mV	13.96mV	15.14mV	22.53mV	Pass
80% Load	18.11mV	12.67mV	15.55mV	24.73mV	Pass
90% Load	17.44mV	12.57mV	15.39mV	26.94mV	Pass
100% Load	25.58mV	11.58mV	15.89mV	30.42mV	Pass
110% Load	29.21mV	12.89mV	15.65mV	28.96mV	Pass
Crossload1	25.08mV	11.93mV	16.07mV	8.90mV	Pass
Crossload2	18.05mV	19.35mV	18.83mV	8.06mV	Pass
Crossload3	16.62mV	12.16mV	21.65mV	7.90mV	Pass
Crossload4	25.35mV	11.37mV	13.88mV	10.59mV	Pass

The results above are not used in the certification process

Seasonic Prime TX-1600 (ATX v3.0)

Top side

Power specifications label

Cybenetics 提供自願性認證方案: 電源供應器方面有 ETA (效率)、 LAMBDA (噪音) 與 SAFE (安全與正確運作)；散熱產品方面有 DELTA (機殼隔音) 與 PHI (風扇風量與靜壓)

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