



Corsair RM650x

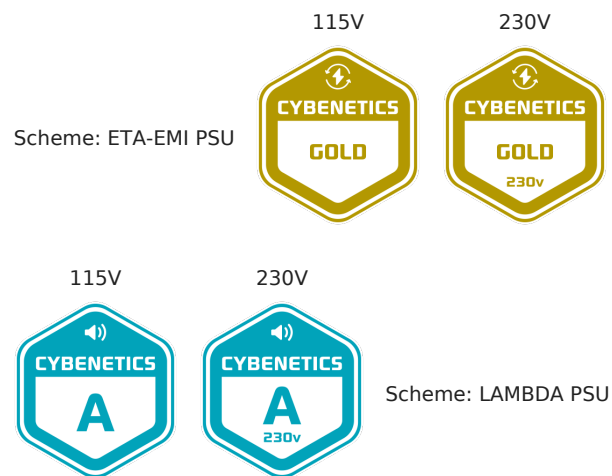
Serial Number 20277134000038960010

Lab ID CR65001734

Certification ID 251734

Test Result Report ID: 20PS1734A

Certificate Issue Date: Oct 17, 2020



A handwritten signature in blue ink, appearing to read "A. Bitziopoulos", enclosed within a circular stamp.

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	Corsair
Model	RM650x
OEM/ODM	Channel Well Technology
Serial Number	20277134000038960010
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10-5
Rated Frequency (Hz)	47-63

Rated Power (W)	650
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	140mm Magnetic Levitation Fan (NR140ML)
Semi-Passive Operation	✓
Cybenetics Testing Information	
Lab ID	CR65001734
Date of receipt	Oct 5, 2020
Testing Date	Oct 15, 2020
Report Issued Date	Oct 17, 2020
DUT Notes	CP-9020198
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	18-20AWG	Yes
4+4 pin EPS12V (650mm)	2	2	18AWG	Yes
6+2 pin PCIe (600mm+150mm)	2	4	16-18AWG	Yes
SATA (500mm+110mm+110mm+110mm)	1	4	18AWG	No
SATA (520mm+110mm+110mm)	1	3	18AWG	No
4 pin Molex (450mm+100mm+100mm+100mm)	1	4	18AWG	No
AC Power Cord (1380mm) - C13 coupler	1	1	18AWG	-

Power Specifications

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	54	3	0.3
	Watts	130		648	15	3.6
Total Max. Power (W)		650				

Parts Description

General Data	-
Manufacturer (OEM)	CWT
PCB Type	Double Sided
Primary Side	-
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor SCK-037 (3 Ohm) & Relay
Bridge Rectifier(s)	2x GBU806 (600V, 8A @ 100°C)
APFC MOSFETs	2x On Semiconductor FCPF190N60E (600V, 13.1A @ 100°C, Rds(on): 0.19Ohm)
APFC Boost Diode	1x Power Integrations QH08TZ600 (600V, 8A @ 95°C)
Bulk Cap(s)	2x Nippon Chemi-Con (400V, 330uF each or 660uF combined, 2,000h @ 105°C, KMR)
Main Switchers	2x Infineon IPA60R190P6 (650V, 12.7A @ 100°C, Rds(on): 0.19Ohm)
APFC Controller	Champion CM6500UNX & Champion CM03X
Resonant Controller	Champion CU6901VAC
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	4x On Semiconductor NTMFS5C430N (40V, 131A @ 100°C, Rds(on): 1.7mOhm)
5V & 3.3V	DC-DC Converters: 2x UBIQ QM3054M6 (30V, 61A @ 100°C, Rds(on): 4.8mOhm) & 3x UBIQ QN3107M6N (30V, 70A @ 100°C, Rds(on): 2.6mOhm) PWM Controllers: UPI Semi uP3861P
Filtering Capacitors	Electrolytic: 6x Nippon Chemi-Con (1-5,000h @ 105°C, KZE), 4x Nippon Chemi-Con (4-10,000h @ 105°C, KY), 1x Rubycon (4-10,000h @ @ 105°C, YXJ) Polymer: 23x FPCAP
Supervisor IC	Weltrend WT7502R (OVP, UVP, SCP, PG)
Fan Controller	Microchip PIC16F1503
Fan Model	Corsair NR140ML (140mm, 12V, 0.27A, Magnetic Levitation Bearing Fan)

5VSB Circuit	-
Rectifier	1x PS1045L SBR (45V, 10A) & IPS ISD04N65A (650V, 2.5A @ 100°C, Rds(on): 2.2 Ohm)
Standby PWM Controller	On-Bright OB5282

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	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	88.530%
Average Noise Output (>1450 Load Combinations)	20.01dBA
Average PF (>1450 Load Combinations)	0.991
Efficiency With 10W (≤500W) or 2% (>500W) Load	74.498%
Standby Power Consumption	0.0318W
Non-Accredited	
12V Ripple (Full Load)	9.20mV
5V Ripple (Full Load)	6.06mV
3.3V Ripple (Full Load)	7.97mV
5VSB Ripple (Full Load)	6.82mV
12V Load Regulation	1.05%
5V Load Regulation	0.40%
3.3V Load Regulation	0.52%
5VSB Load Regulation	1.54%
Inrush Current	25.110A

230V

Accredited		
Average Efficiency (>1450 load combinations)	90.521%	
Average Noise Output (>1450 Load Combinations)	20.02dBA	
Average PF (>1450 Load Combinations)	0.959	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.0443W	
Non-Accredited		
12V Ripple (Full Load)	9.41mV	
5V Ripple (Full Load)	6.32mV	
3.3V Ripple (Full Load)	8.07mV	
5VSB Ripple (Full Load)	6.53mV	
12V Load Regulation	1.05%	
5V Load Regulation	0.38%	
3.3V Load Regulation	0.48%	
5VSB Load Regulation	1.50%	
Inrush Current	91.670A	
Hold-Up Time & PWR_OK Signal	21.40ms	
AC Loss to PWR_OK Hold Up Time	20.30ms	
PWR_OK Inactive to DC Loss Delay	1.10ms	
PSU Timings: T1 (20% / 100%)	52.0ms	52.0ms
PSU Timings: T3 (20% / 100%)	139.0ms	139.0ms
OPP (21.00°C / 41.00°C)	128.30%	128.16%

Hold-Up Time & PWR_OK Signal

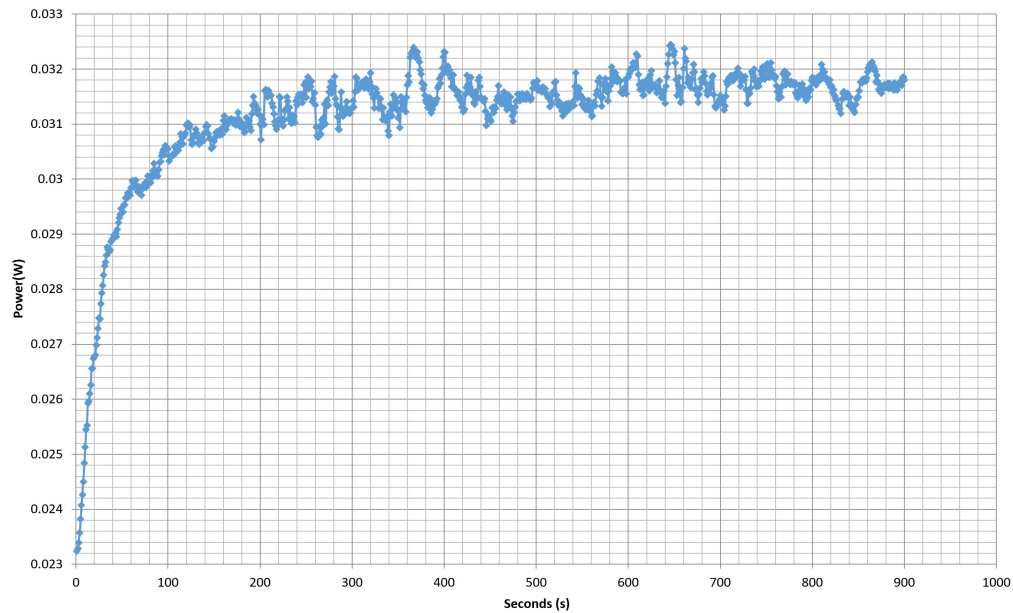
Hold-Up Time (ms)	21.4
AC Loss to PWR_OK Hold Up Time (ms)	20.3
PWR_OK Inactive to DC Loss Delay (ms)	1.1

Stromverbrauch im Ruhezustand

Graphs

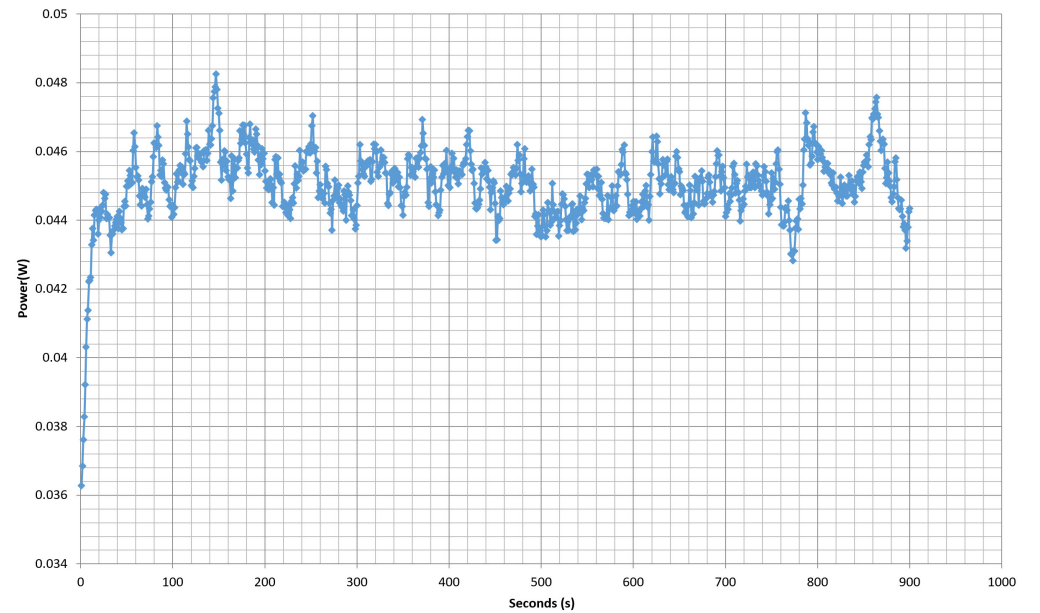
115V

Power - 20277134000038960010 - 09/10/2020 - 10:07



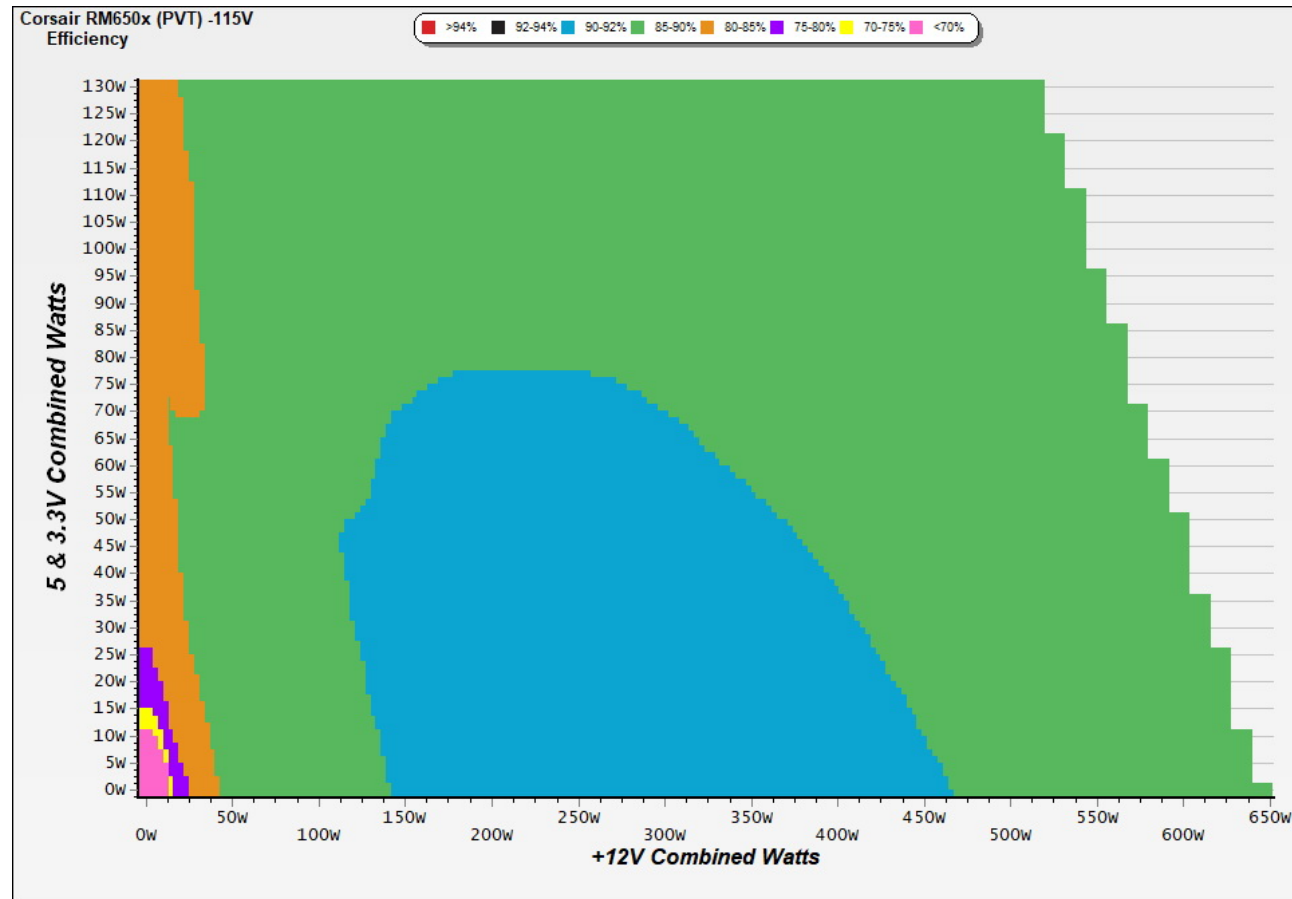
230V

Power - 20277134000038960010 - 09/10/2020 - 10:07



Efficiency Graph

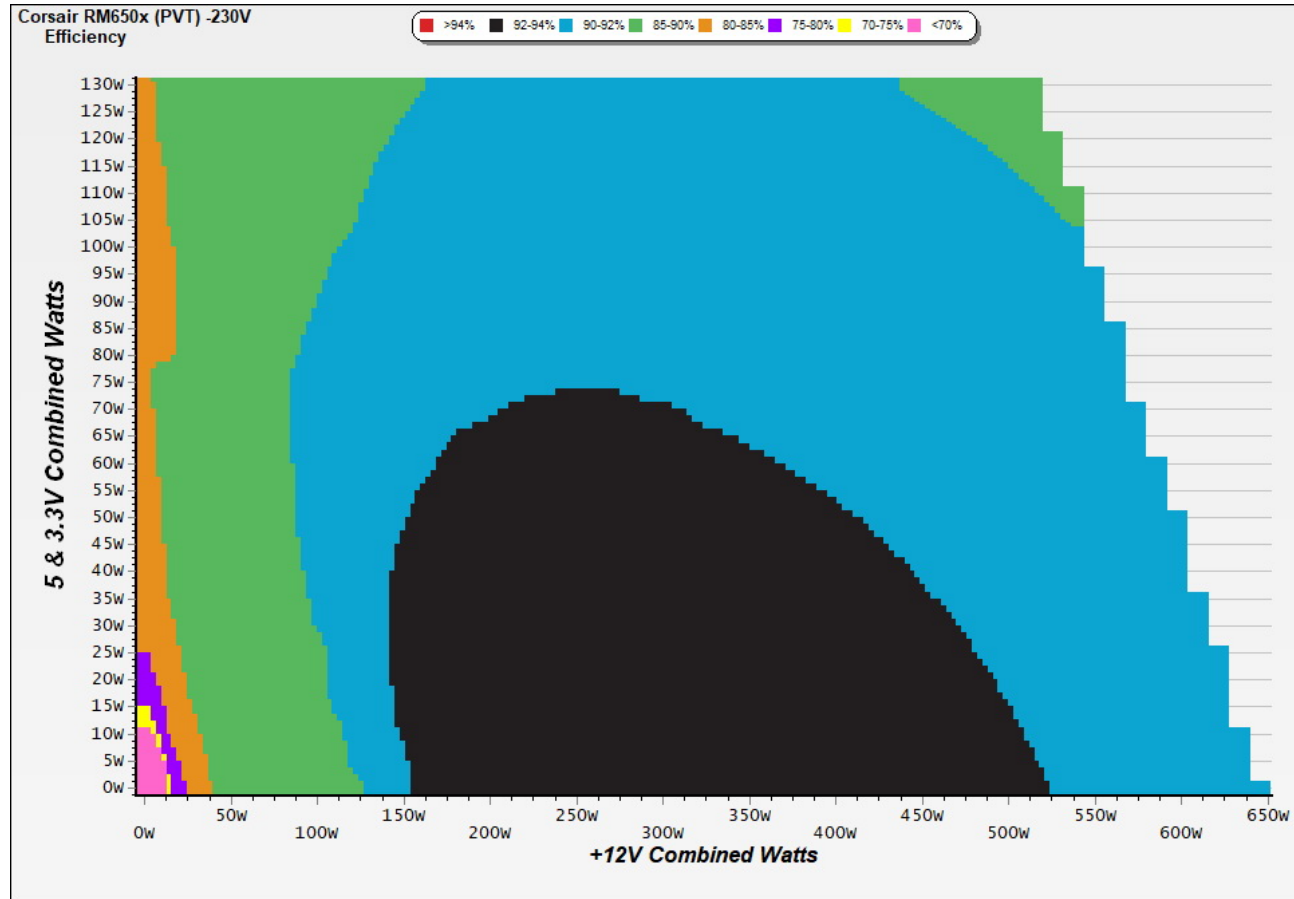
115V



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

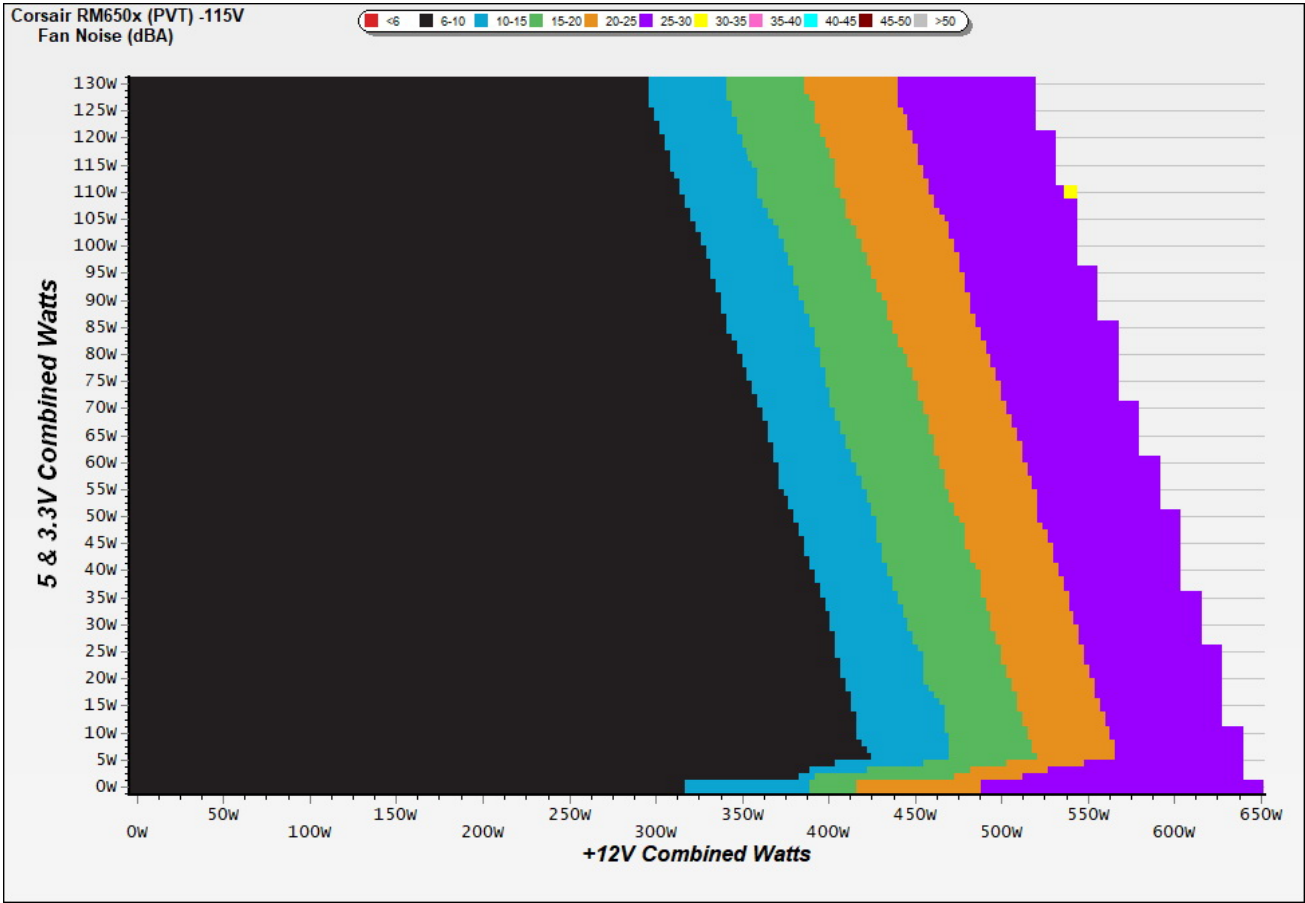


INFO

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

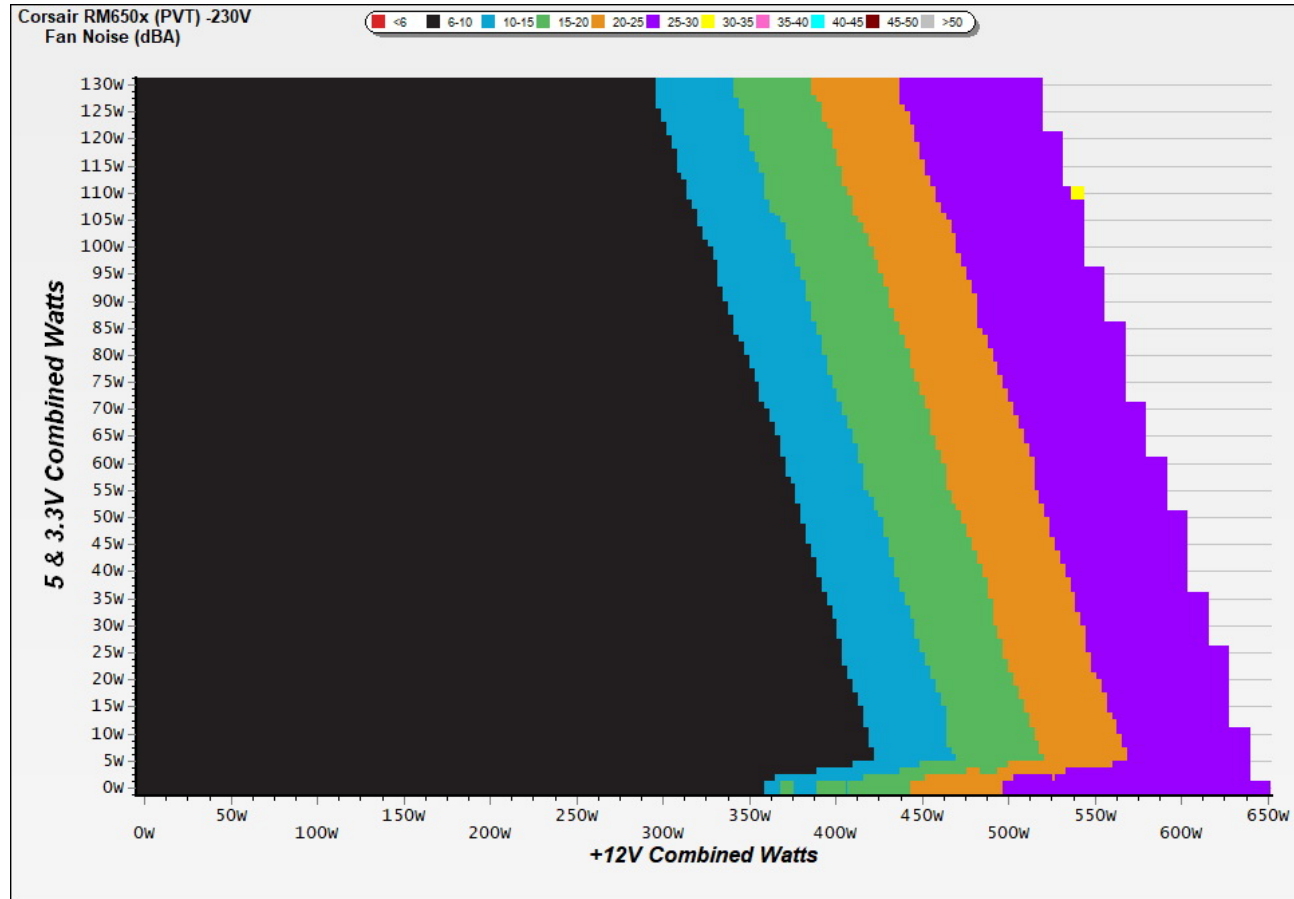
115V



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

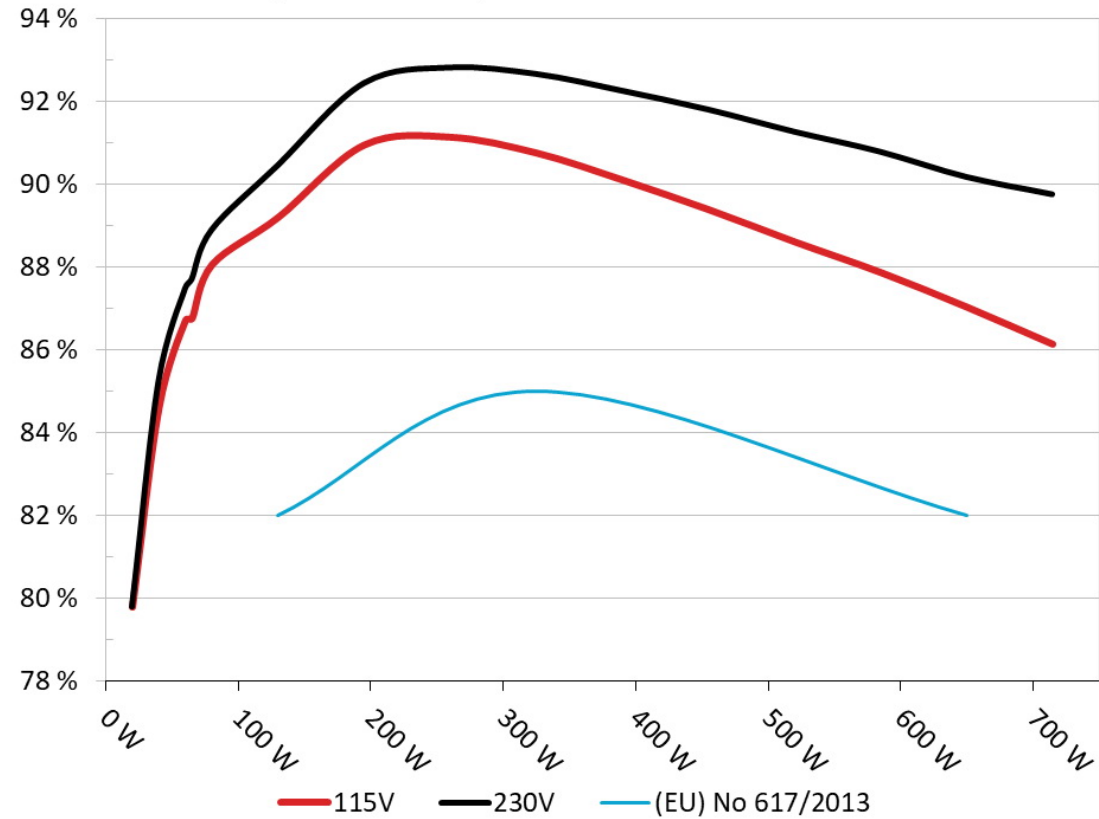
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

Indicative Performance

Efficiency under high ambient temperature

Efficiency: Corsair RM650x (PVT)

Ambient: 37°C - 47°C (98.6°F - 116.6°F)



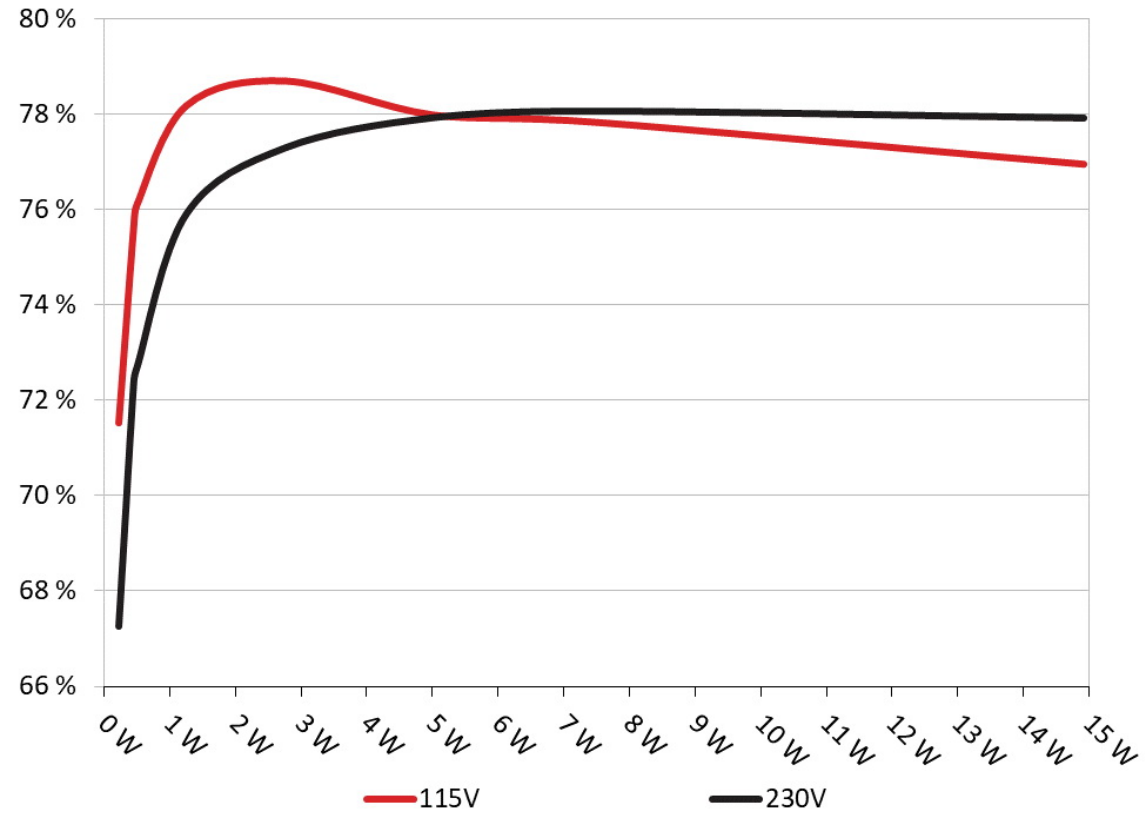
INFO

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: Corsair RM650x (PVT)

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	0.226	71.519%	0.017
	5.035V	0.316		115.18V
2	0.090A	0.453	75.626%	0.058
	5.032V	0.599		115.19V
3	0.550A	2.762	78.689%	0.253
	5.022V	3.510		115.17V
4	1.000A	5.013	77.975%	0.341
	5.013V	6.429		115.17V
5	1.500A	7.505	77.820%	0.390
	5.003V	9.644		115.17V
6	3.000A	14.917	76.943%	0.453
	4.973V	19.387		115.17V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.226	67.262%	0.010
	5.034V	0.336		230.32V
2	0.090A	0.453	72.364%	0.018
	5.032V	0.626		230.32V
3	0.550A	2.763	77.287%	0.098
	5.024V	3.575		230.32V
4	1.000A	5.014	77.918%	0.162
	5.015V	6.435		230.32V
5	1.500A	7.508	78.054%	0.217
	5.005V	9.619		230.30V
6	3.000A	14.923	77.911%	0.315
	4.974V	19.154		230.30V

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	3.611A	1.981A	2.000A	0.994A	64.956	86.751%	0	<6.0	43.90°C	0.969
	12.007V	5.048V	3.299V	5.032V	74.876				38.30°C	115.17V
2	8.181A	2.972A	3.004A	1.193A	130.016	89.195%	0	<6.0	45.21°C	0.989
	12.115V	5.047V	3.297V	5.029V	145.766				39.12°C	115.17V
3	13.147A	3.470A	3.505A	1.393A	195.014	90.945%	0	<6.0	46.80°C	0.993
	12.091V	5.045V	3.295V	5.024V	214.430				40.30°C	115.17V
4	18.122A	3.967A	4.009A	1.594A	260.016	91.132%	0	<6.0	48.59°C	0.995
	12.074V	5.043V	3.294V	5.019V	285.319				41.41°C	115.16V
5	22.766A	4.961A	5.013A	1.795A	325.048	90.751%	0	<6.0	50.62°C	0.996
	12.059V	5.041V	3.292V	5.015V	358.174				42.99°C	115.16V
6	27.381A	5.955A	6.018A	1.996A	389.408	90.103%	532	10.7	43.15°C	0.995
	12.037V	5.040V	3.291V	5.012V	432.179				51.77°C	115.16V
7	32.090A	6.951A	7.024A	2.196A	454.744	89.384%	725	20.4	44.01°C	0.995
	12.017V	5.038V	3.289V	5.008V	508.751				52.87°C	115.16V
8	36.803A	7.948A	8.031A	2.398A	520.053	88.602%	992	30.3	44.31°C	0.995
	12.000V	5.035V	3.287V	5.004V	586.952				53.49°C	115.16V
9	41.891A	8.445A	8.523A	2.399A	584.942	87.862%	1251	36.3	45.15°C	0.996
	11.994V	5.033V	3.285V	5.002V	665.750				55.92°C	115.15V
10	46.720A	8.946A	9.046A	3.007A	649.775	87.027%	1433	39.7	45.45°C	0.996
	11.988V	5.030V	3.283V	4.988V	746.636				57.03°C	115.15V
11	52.140A	8.951A	9.051A	3.009A	714.601	86.131%	1745	44.9	46.65°C	0.997
	11.985V	5.028V	3.281V	4.985V	829.668				59.50°C	115.15V
CL1	0.099A	16.001A	15.999A	0.000A	134.560	83.388%	411	8.4	43.63°C	0.990
	12.103V	5.040V	3.295V	5.082V	161.366				50.75°C	115.18V

CL2	53.995A	0.999A	1.001A	1.000A	661.104	87.818%	1144	34.0	45.17°C	0.996
	11.997V	5.032V	3.284V	5.012V	752.810				57.67°C	115.15V

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	3.611A	1.980A	2.002A	0.993A	64.953	87.702%	0	<6.0	45.29°C	0.791
	12.007V	5.049V	3.297V	5.033V	74.061				40.02°C	230.33V
2	8.182A	2.971A	3.003A	1.193A	130.004	90.460%	0	<6.0	46.30°C	0.920
	12.113V	5.048V	3.296V	5.030V	143.715				40.30°C	230.33V
3	13.150A	3.468A	3.507A	1.393A	194.998	92.446%	0	<6.0	47.22°C	0.955
	12.087V	5.046V	3.294V	5.026V	210.931				40.73°C	230.33V
4	18.126A	3.965A	4.007A	1.593A	259.992	92.823%	0	<6.0	48.81°C	0.970
	12.071V	5.044V	3.293V	5.021V	280.093				41.77°C	230.33V
5	22.772A	4.957A	5.014A	1.794A	325.023	92.668%	0	<6.0	49.61°C	0.979
	12.055V	5.043V	3.292V	5.018V	350.738				42.09°C	230.32V
6	27.375A	5.950A	6.019A	1.994A	389.286	92.265%	427	8.5	42.90°C	0.984
	12.036V	5.042V	3.290V	5.014V	421.920				50.99°C	230.32V
7	32.082A	6.947A	7.026A	2.195A	454.608	91.809%	671	18.0	43.86°C	0.987
	12.016V	5.040V	3.288V	5.010V	495.165				52.51°C	230.32V
8	36.797A	7.942A	8.031A	2.397A	519.928	91.271%	901	27.1	44.30°C	0.988
	11.999V	5.037V	3.287V	5.006V	569.655				53.51°C	230.32V
9	41.890A	8.437A	8.523A	2.397A	584.820	90.786%	1146	34.1	44.37°C	0.990
	11.992V	5.035V	3.285V	5.005V	644.175				54.53°C	230.32V
10	46.714A	8.942A	9.045A	3.005A	649.651	90.179%	1432	39.6	45.08°C	0.991
	11.987V	5.032V	3.283V	4.991V	720.400				56.30°C	230.32V
11	52.145A	8.944A	9.049A	3.006A	714.432	89.759%	1517	41.3	46.72°C	0.992
	11.981V	5.031V	3.281V	4.989V	795.947				59.37°C	230.31V
CL1	0.098A	16.000A	15.999A	0.000A	134.543	84.455%	639	16.4	42.41°C	0.934
	12.103V	5.041V	3.294V	5.083V	159.308				49.45°C	230.32V

CL2	53.989A	1.000A	1.002A	1.000A	661.094	90.847%	1344	38.2	45.43°C	0.991
	11.998V	5.032V	3.283V	5.013V	727.697				56.93°C	230.32V

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	1.233A	0.494A	0.499A	0.197A	19.983	79.776%	0	<6.0	0.821
	12.026V	5.069V	3.312V	5.066V	25.049				115.18V
2	2.469A	0.989A	1.000A	0.397A	39.974	84.596%	0	<6.0	0.934
	12.020V	5.050V	3.300V	5.044V	47.253				115.17V
3	3.710A	1.485A	1.502A	0.595A	60.005	86.706%	0	<6.0	0.965
	12.010V	5.048V	3.298V	5.039V	69.205				115.17V
4	4.943A	1.981A	2.001A	0.794A	79.955	88.049%	0	<6.0	0.977
	12.009V	5.047V	3.298V	5.035V	90.807				115.17V

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	1.233A	0.494A	0.499A	0.197A	19.984	79.792%	0	<6.0	0.427
	12.026V	5.071V	3.310V	5.067V	25.045				230.35V
2	2.469A	0.990A	0.998A	0.397A	39.973	85.239%	0	<6.0	0.646
	12.020V	5.051V	3.299V	5.044V	46.895				230.35V
3	3.710A	1.486A	1.500A	0.595A	60.003	87.481%	0	<6.0	0.768
	12.010V	5.049V	3.297V	5.039V	68.590				230.35V
4	4.943A	1.980A	2.001A	0.794A	79.954	88.897%	0	<6.0	0.839
	12.009V	5.049V	3.297V	5.036V	89.940				230.34V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	4.10mV	3.40mV	4.20mV	5.40mV	Pass
20% Load	4.10mV	3.50mV	4.80mV	5.00mV	Pass
30% Load	8.10mV	4.20mV	5.30mV	5.40mV	Pass
40% Load	7.60mV	4.30mV	5.30mV	5.30mV	Pass
50% Load	6.60mV	3.90mV	5.60mV	5.30mV	Pass
60% Load	6.90mV	4.30mV	5.80mV	4.90mV	Pass
70% Load	6.40mV	4.40mV	9.10mV	5.30mV	Pass
80% Load	6.40mV	10.30mV	14.50mV	9.10mV	Pass
90% Load	6.10mV	5.10mV	9.80mV	5.50mV	Pass
100% Load	9.20mV	6.10mV	8.00mV	6.80mV	Pass
110% Load	9.60mV	6.30mV	8.40mV	6.70mV	Pass
Crossload1	4.80mV	5.00mV	7.00mV	5.60mV	Pass
Crossload2	8.60mV	5.40mV	6.80mV	5.90mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	4.00mV	3.50mV	4.00mV	5.50mV	Pass
20% Load	4.00mV	3.60mV	4.60mV	5.00mV	Pass
30% Load	9.00mV	4.70mV	5.30mV	5.80mV	Pass
40% Load	7.40mV	4.90mV	5.10mV	5.50mV	Pass
50% Load	6.90mV	4.30mV	5.60mV	5.50mV	Pass
60% Load	6.50mV	4.50mV	6.20mV	5.20mV	Pass
70% Load	6.30mV	4.50mV	10.80mV	5.50mV	Pass
80% Load	6.70mV	10.40mV	15.10mV	9.60mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	6.50mV	5.40mV	12.40mV	5.80mV	Pass
100% Load	9.40mV	6.30mV	8.10mV	6.50mV	Pass
110% Load	9.40mV	6.50mV	8.20mV	6.50mV	Pass
Crossload1	4.80mV	5.20mV	7.30mV	6.10mV	Pass
Crossload2	9.30mV	5.30mV	7.40mV	5.70mV	Pass

The results above are not used in the certification process

Corsair RM650x



Top side

MODEL / MODELO / 型号 / 型號 / 모델: RPS0122 POWER SUPPLY / FUENTE DE ALIMENTACIÓN / 전원 공급 장치						
PART NUMBER: CP-9020198 / 75-003896						
交流輸入 AC INPUT	AC INPUT AC 입력 Entrada de CA	100V – 240V • 10A – 5A • 47Hz – 63Hz				
直流輸出 DC OUTPUT	DC OUTPUT DC 출력 Salida de CC	+5V	+3.3V	+12V	-12V	+5Vsb
最大電流 MAX LOAD	MAX LOAD 최대 부하 Carga Máximo	20A	20A	54A	0.3A	3A
最大瓦特數 MAX POWER	MAX POWER 최대 결합 와트 Wataje Combinado Máximo	130W	648W	3.6W	15W	
TOTAL POWER: 650W PODER TOTAL / 总功率 / 總功率 / 총출력						
FC C E EAC TÜV Rheinland CCC						

Power specifications label

Cybenetics bietet freiwillige Zertifizierungsprogramme für Netzteile – ETA für Effizienz, LAMBDA für Lautstärke und SAFE für Sicherheit und korrekten Betrieb – sowie für Kühlprodukte mit DELTA für die Schalldämmung von Gehäusen und PHI für Luftstrom und statischen Druck von Lüftern

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