



Corsair RM650x

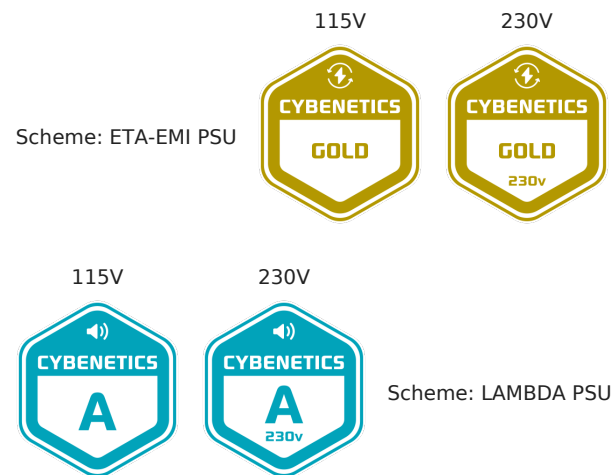
20277134000038960010

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	
□□□□ (Vrms)	100-240
□□□□ (Arms)	10-5
□□□□ (Hz)	47-63

Power (W)	650
Operating Temperature (Continuous Full Load) (°C)	
PSU	ATX12V
PSU Type	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Fan	140mm Magnetic Levitation Fan (NR140ML)
PSU Efficiency	✓
Cybenetics Testing Information	
Lab ID	CR65001734
Date of receipt	Oct 5, 2020
Testing Date	Oct 15, 2020
Report Issued Date	Oct 17, 2020
Report Number	CP-9020198
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

Non-accredited measurements

Non-accredited measurements				
Item	Quantity	Unit	Gauge	In Cable Capacitors
ATX 20+4 pin (600mm)	1	1	18-20AWG	□
4+4 pin EPS 12V (650mm)	2	2	18AWG	□
6+2pin PCIe (600mm+150mm)	2	4	16-18AWG	□
SATA (500mm+110mm+110mm+110mm)	1	4	18AWG	□
SATA (520mm+110mm+110mm)	1	3	18AWG	□
4 pin Molex (450mm+100mm+100mm+100mm)	1	4	18AWG	□
AC Power Cord (1380mm) - C13 coupler	1	1	18AWG	-



□		3.3V	5V	12V	5VSB	-12V
□□□□	□□	20	20	54	3	0.3
	□	130		648	15	3.6
□□□□ (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

□□□□ (°C / °F)	28-32 / 82.4-89.6
□□ ErP Lot3/6□□	✓
□□ (EU) No 617/2013□□	✓
ALPM (Alternative Low Power Mode) compatible	✓

Performance Summary

115V

Accredited	
□□□□ (>1450 load combinations)	88.530%
Average Noise Output (>1450 Load Combinations)	20.01dBA
PF□□□ (>1450 Load Combinations)	0.991
Efficiency With 10W (≤500W) or 2% (>500W) Load	74.498%
□□□□□	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		
☐☐☐☐ (>1450 load combinations)	90.521%	
Average Noise Output (>1450 Load Combinations)	20.02dBA	
PF☐☐☐ (>1450 Load Combinations)	0.959	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
☐☐☐☐☐☐	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	
☐☐☐☐ & PG☐☐	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%

□□□□ & PG□□

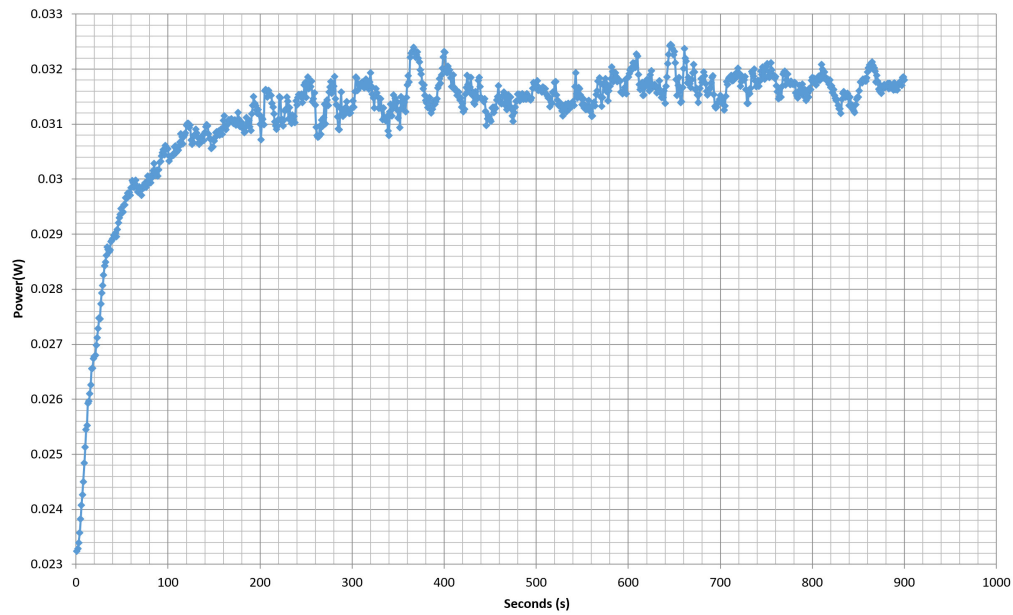
Hold-Up Time (ms)	21.4
AC Loss to PWR_OK Hold Up Time (ms)	20.3
PWR_OK Inactive to DC Loss Delay (ms)	1.1



Graphs

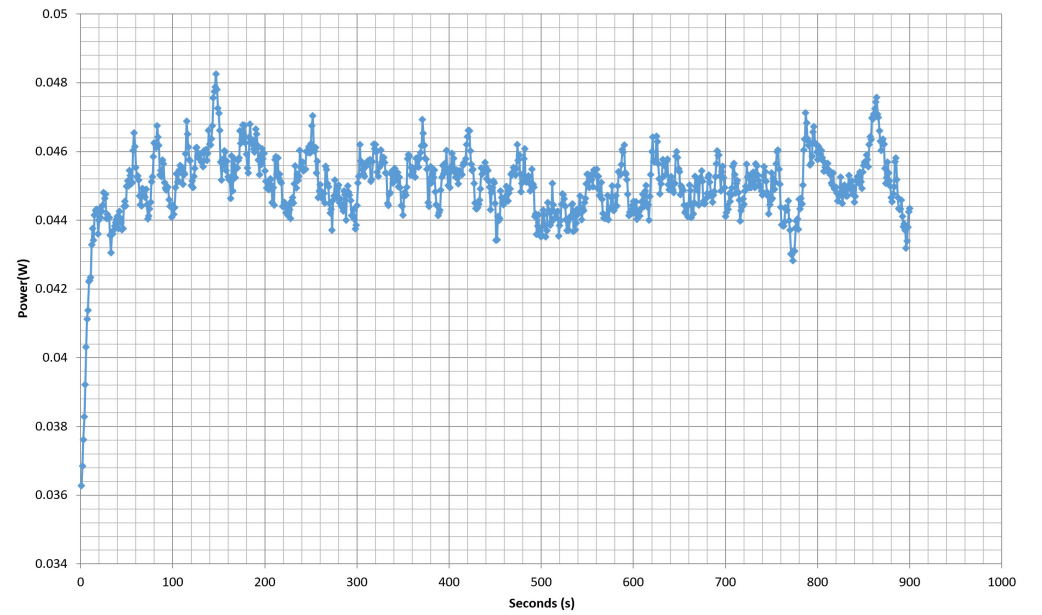
115V

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



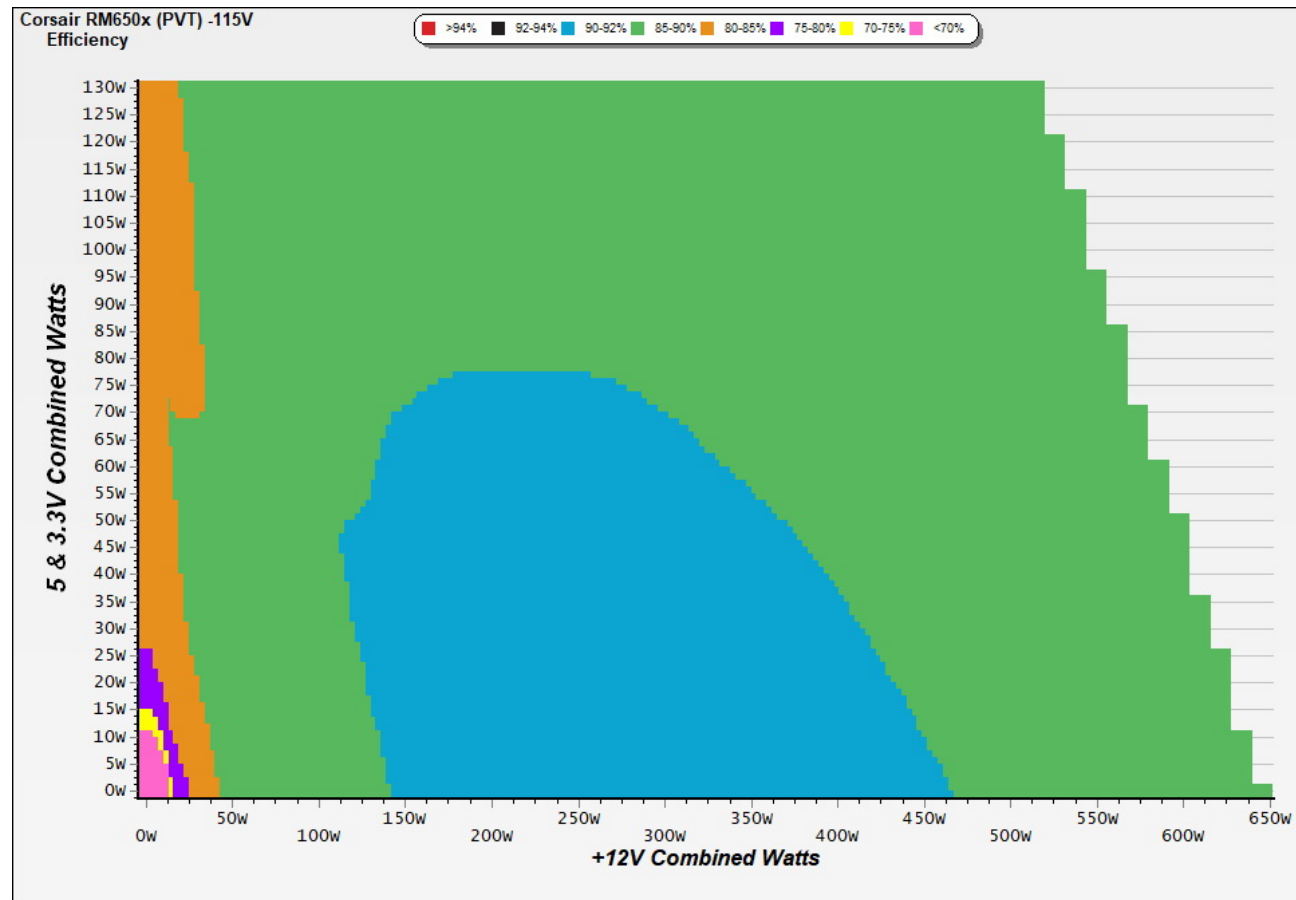
230V

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



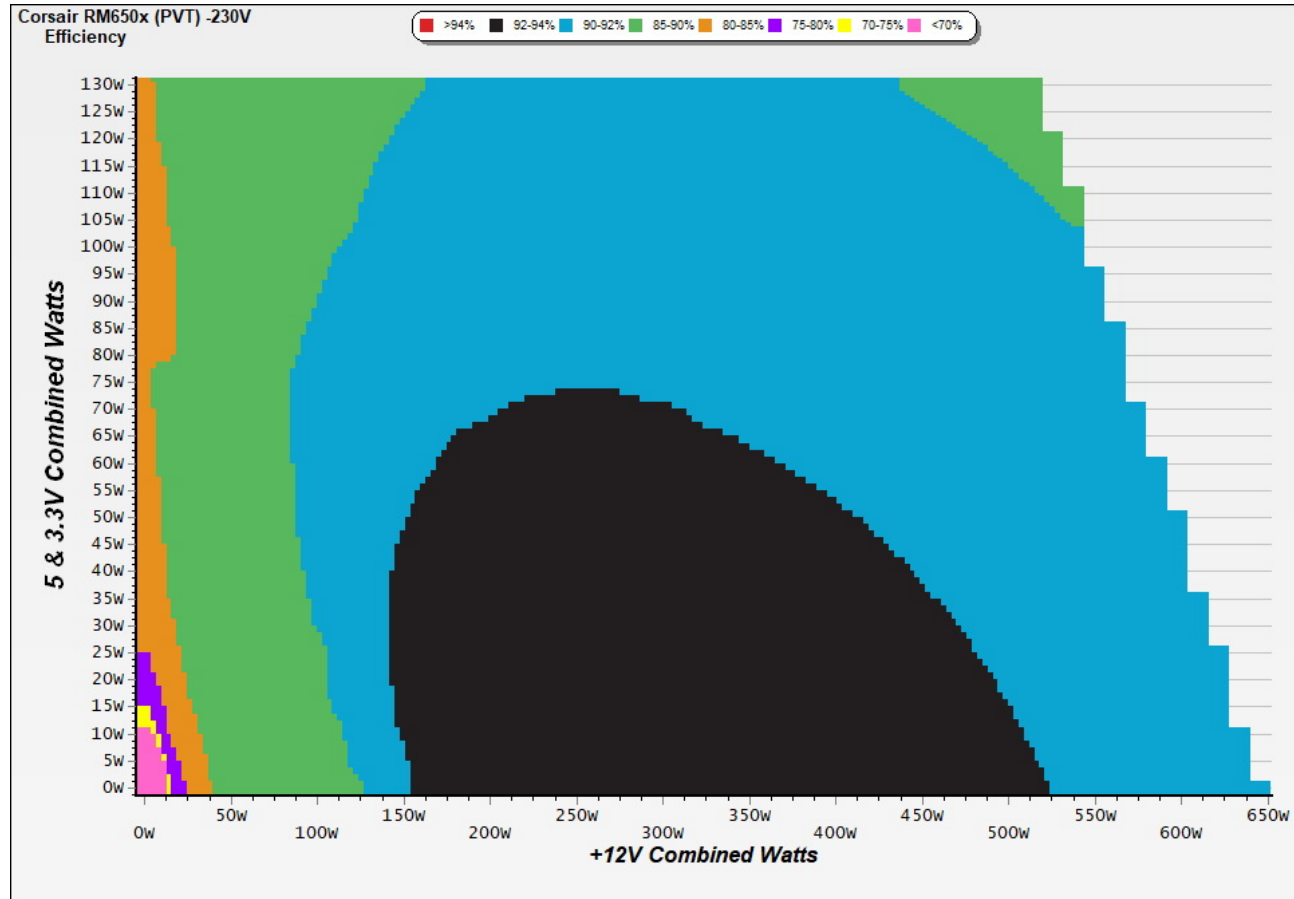


115V



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

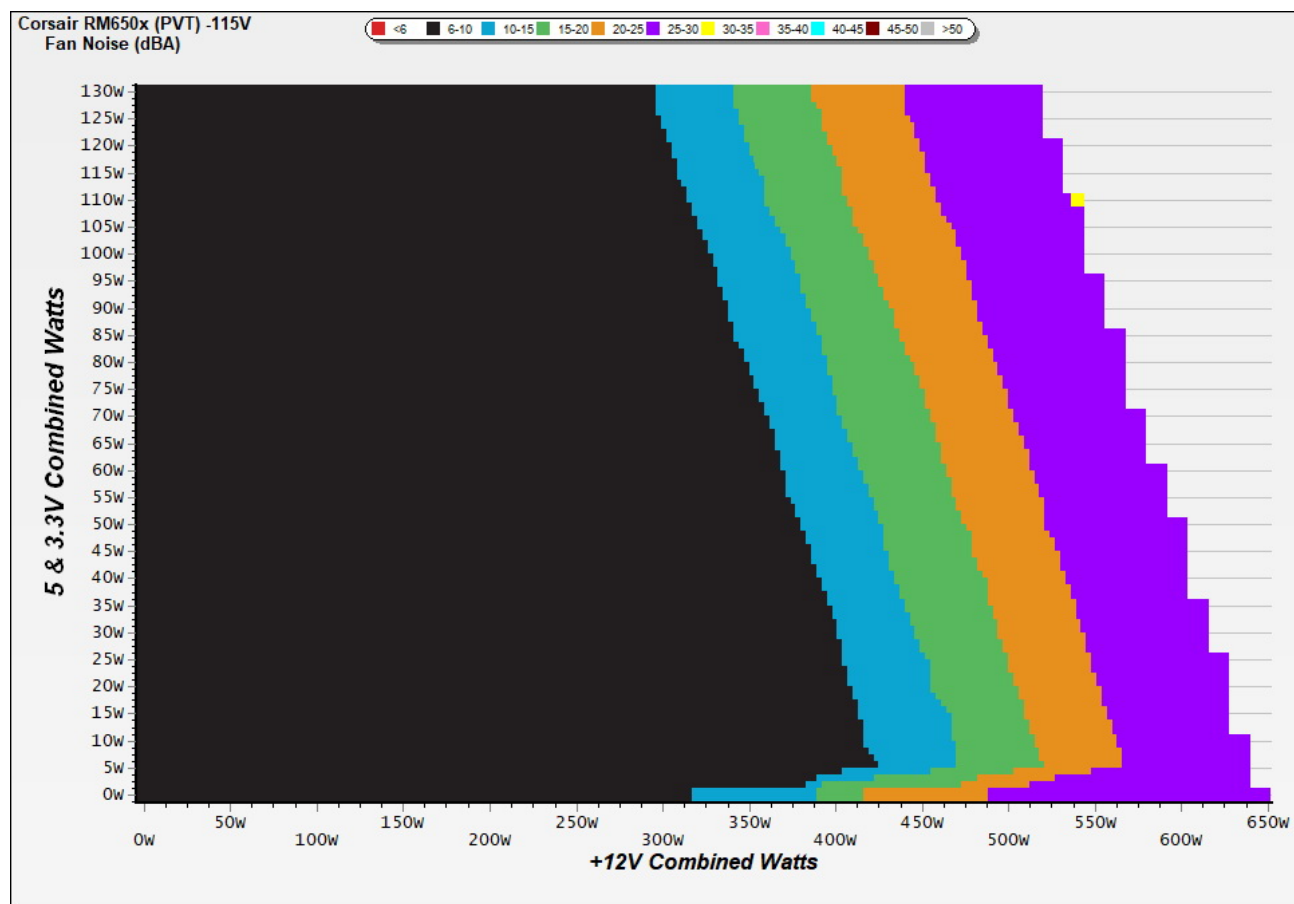
230V



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

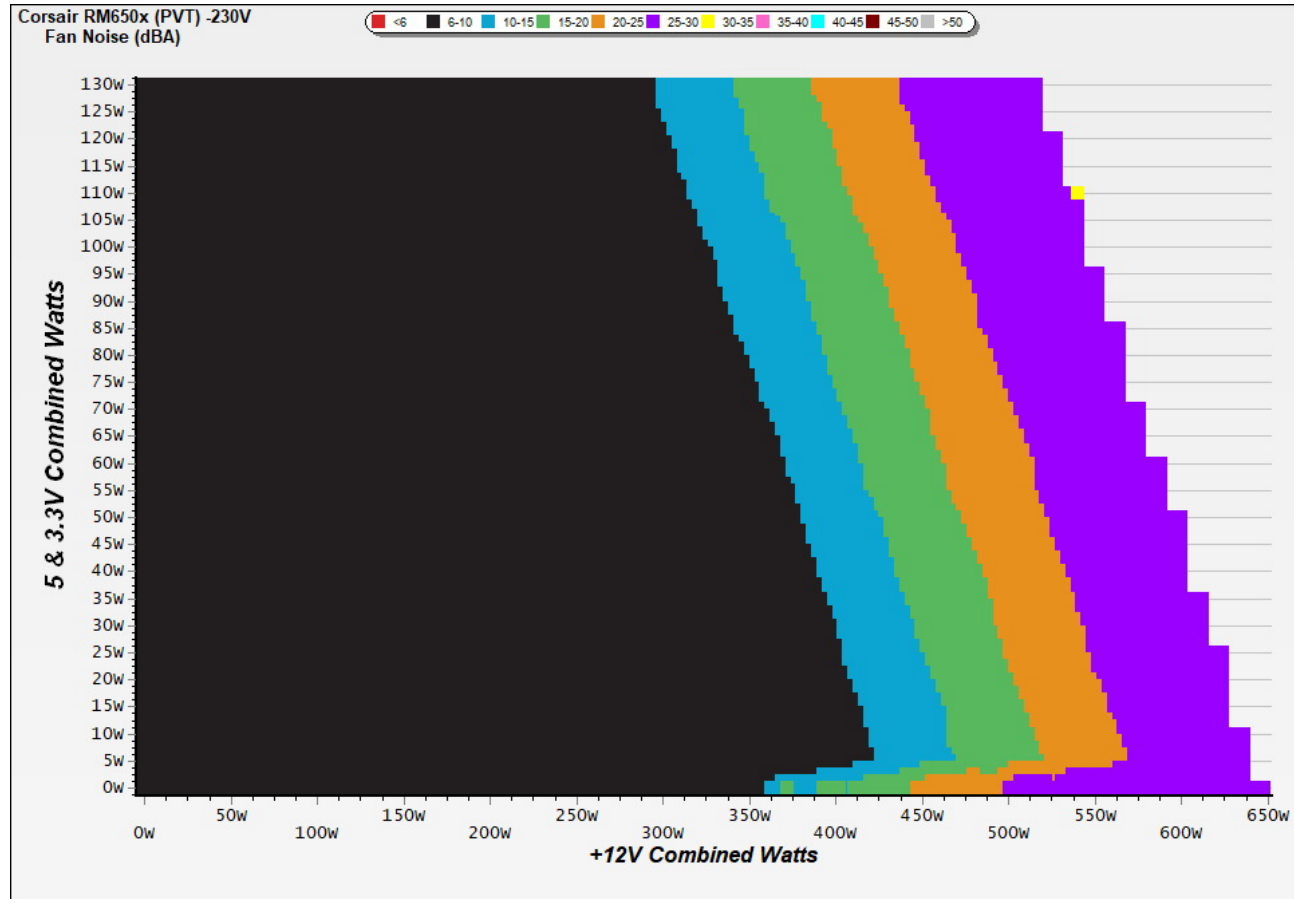


115V



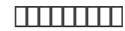
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

230V



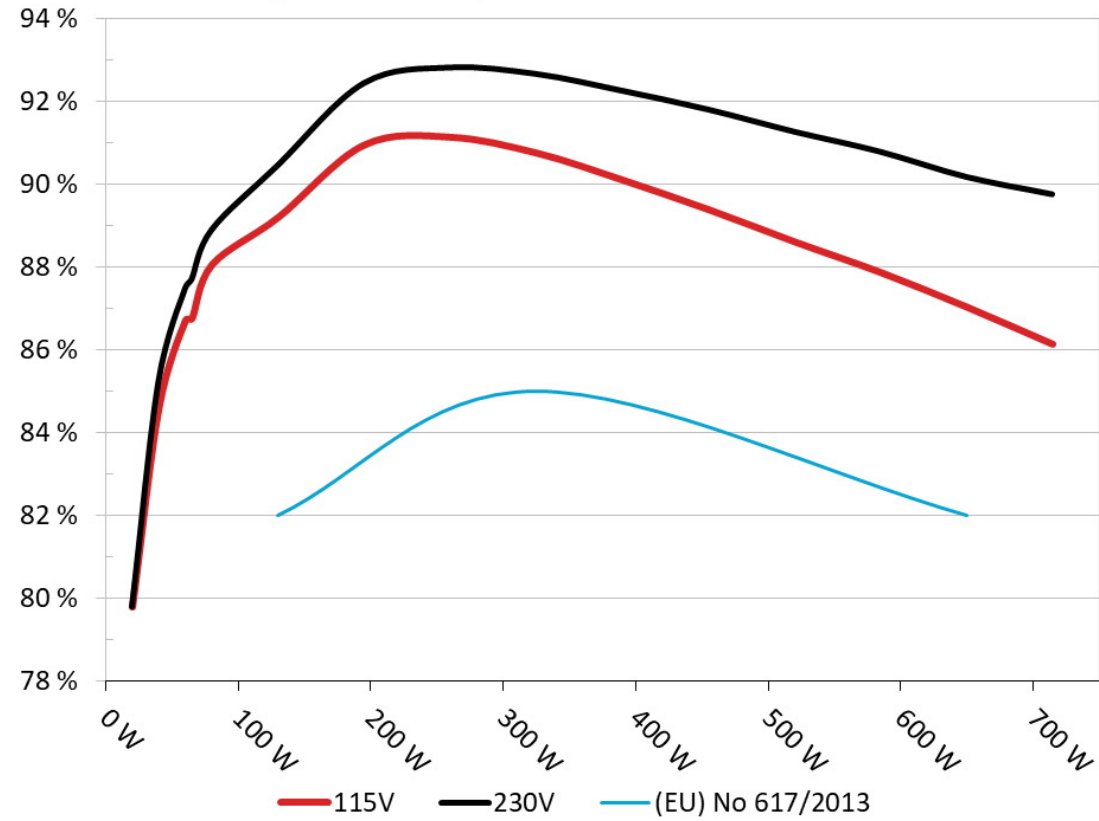
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

Indicative Performance



Efficiency: Corsair RM650x (PVT)

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

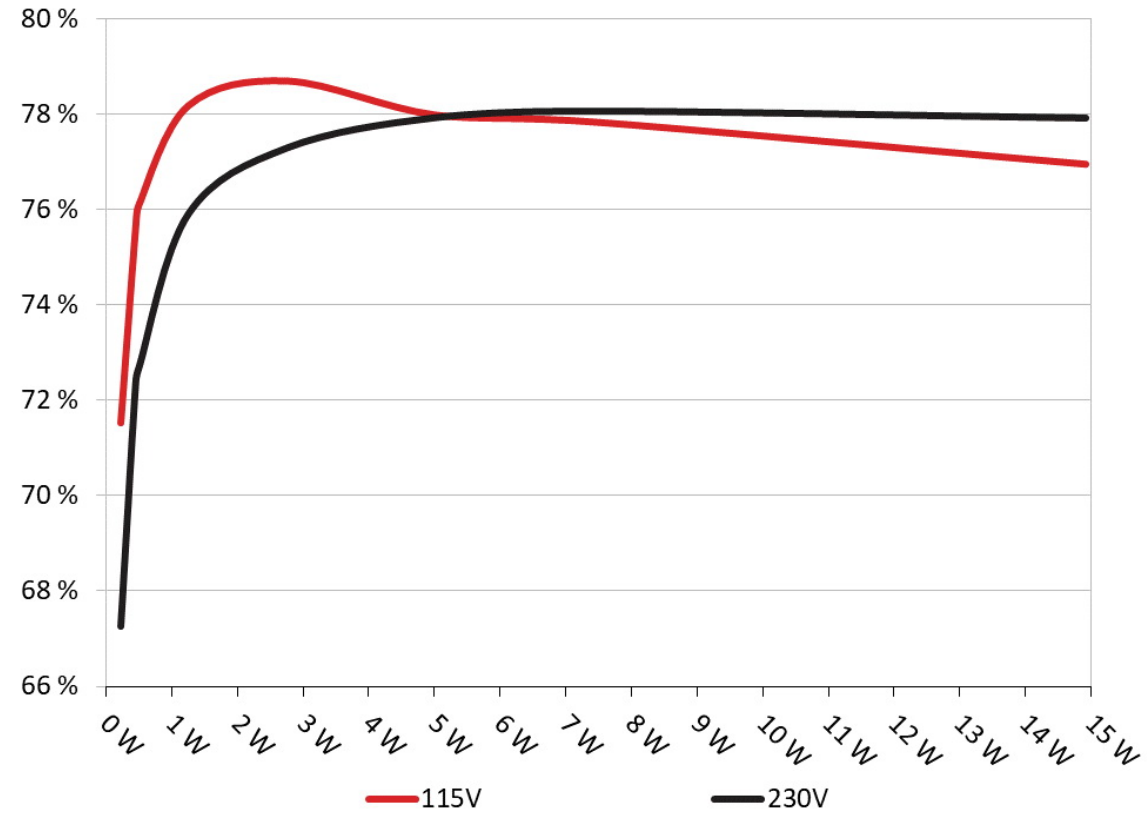


The PSU's efficiency under high ambient temperatures with 115V and 230V input. For this graph the results of the 10-110% load regulation table are used

5Vsb

5VSB Efficiency: Corsair RM650x (PVT)

Ambient: 34°C - 36°C (93.2°F - 96.8°F)



This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input

5Vsb (ErP Lot3/6 & CEC)

115V

#	5VSB	DC/AC (%)		PF/AC
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

#	5VSB	DC/AC (%)		PF/AC
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)

10-110%□□□

115V

□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□	□□□ (RPM)	□□□□□ (dB[A])	□ (□□ /□□)	PF/AC □
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

#	12V	5V	3.3V	5VSB	DC/AC ()		(RPM)	(dB[A])	(/)	PF/AC
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

20-80mm

115V

#	12V	5V	3.3V	5VSB	DC/AC (%)	Efficiency (%)	Speed (RPM)	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

#	12V	5V	3.3V	5VSB	DC/AC (%)	Efficiency (%)	Speed (RPM)	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



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

