GIGABYTE™

Gigabyte P850GM (#2)

Serial Number 21103G012163

Lab ID GB85001915

Certification ID 251915

Test Result Report ID: 21PS1915A

Certificate Issue Date: Oct 7, 2021

Scheme: ETA-EMI PSU

115V

230V

115V

230V

Scheme: LAMBDA PSU

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	Gigabyte
Model	P850GM (#2)
OEM/ODM	MEIC
Serial Number	21103G012163
Product Specifications	
Manufacturer-Provided Information	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	12-6
Rated Frequency (Hz)	50-60

Rated Power (W)	850
Operating Temperature (Continuous Full Load) (°C)	
Type	ATX12V
Cable Design	Fully Modular
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
Cooling	120mm Rifle Bearing Fan (D12SH-12)
Semi-Passive Operation	✓
Cybenetics Testing Information	
Lab ID	GB85001915
Date of receipt	Sep 7, 2021
Testing Date	Oct 4, 2021
Report Issued Date	Oct 7, 2021
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	18AWG	No
4+4 pin EPS12V (600mm)	2	2	18AWG	No
6+2 pin PCIe (600mm+150mm)	2	4	18AWG	No
SATA (600mm+150mm+150mm+150mm)	2	8	18AWG	No
4-pin Molex (500mm+110mm+110mm) / FDD (+150mm)	1	3 / 1	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	70.8	3	0.3
	Watts	105		849.6	15	3.6
Total Max. Power (W)		850				

Parts Description

General Data	-
Manufacturer (OEM)	MEIC
PCB Type	Double Sided
Primary Side	-
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV, 1x Chipown PN8200 (Discharge IC)
Inrush Protection	NTC Thermistor 5D-15 (5 Ohm) & Relay
Bridge Rectifier(s)	2x GBU1006 (600V, 10A @ 100°C)
APFC MOSFETs	2x NCE Power NCE65T180F (650V, 13.2A @ 100°C, Rds(on): 0.18Ohm)
APFC Boost Diode	1x CREE C3D08060A (600V, 8A @ 152°C)
Bulk Cap(s)	1x Nippon Chemi-Con (400V, 820uF, 2,000h @ 105°C, KMW)
Main Switchers	2x NCE Power NCE65T180F (650V, 13.2A @ 100°C, Rds(on): 0.18Ohm)
APFC Controller	Champion CM6500UNX
Resonant Controller	Champion CM6901X
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	4x Nexperia PSMN1R4-40YLD (40V, 214A @ 100°C, Rds(on): 2.65mOhm)
5V & 3.3V	DC-DC Converters: 4x Alpha & Omega AON6354 (30V, 52A @ 100°C, Rds(on): 4.4mOhm) PWM Controllers: 2x uPI-Semi uP9303B
Filtering Capacitors	Electrolytic: 10x Lelon (4-7,000h @ 105°C, RXW), 1x Lelon (4-10,000h @ 105°C, RZW), 3x Lelon (2-5,000h @ 105°C, RXK) Polymer: 10x Lelon, 4x no info
Supervisor IC	Grenergy GR8313 (OVP, UVP, SCP, PG)
Fan Model	Yate Loon D12SH-12 (120mm, 12V, 0.30A, Rifle Bearing Fan)
5VSB Circuit	-

Rectifier	1x JF Semiconductor SP10U45L SBR (45V, 10A)
Standby PWM Controller	PR8109T

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	✓

Performance Summary

115V

Accredited	
Average Efficiency (>1450 load combinations)	89.598%
Average Noise Output (>1450 Load Combinations)	36.75dBA
Average PF (>1450 Load Combinations)	0.986
Efficiency With 10W (≤500W) or 2% (>500W) Load	68.970%
Standby Power Consumption	0.0538W
Non-Accredited	
12V Ripple (Full Load)	23.25mV
5V Ripple (Full Load)	18.35mV
3.3V Ripple (Full Load)	21.40mV
5VSB Ripple (Full Load)	25.20mV
12V Load Regulation	0.55%
5V Load Regulation	1.61%
3.3V Load Regulation	2.62%
5VSB Load Regulation	2.12%
Inrush Current	55.040A

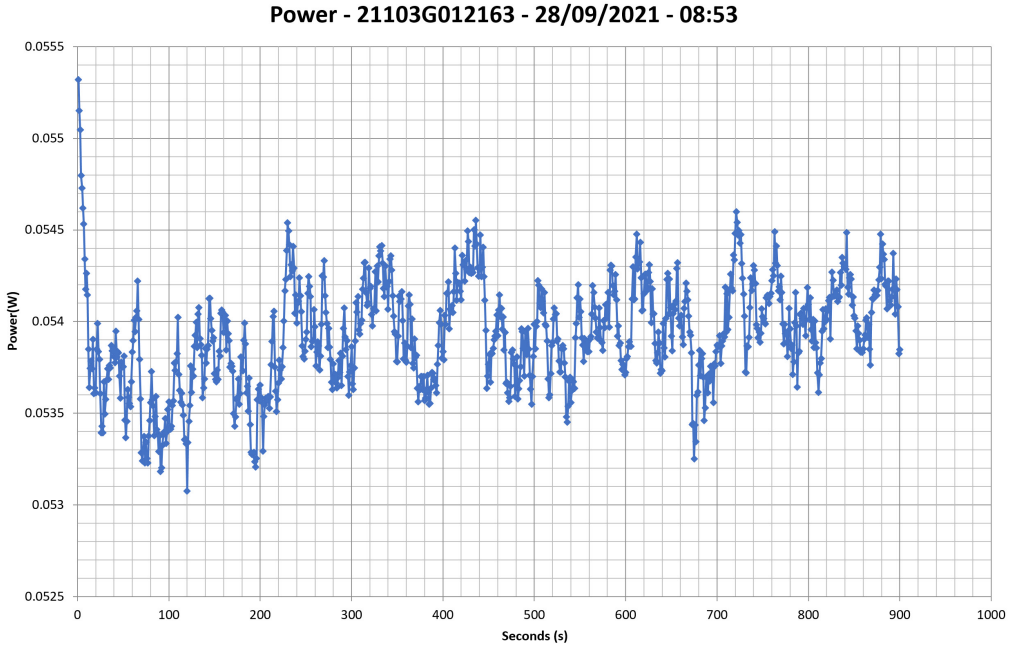
230V		
Accredited		
Average Efficiency (>1450 load combinations)	91.815%	
Average Noise Output (>1450 Load Combinations)	34.98dBA	
Average PF (>1450 Load Combinations)	0.961	
Efficiency With 10W (≤500W) or 2% (>500W) Load	-	
Standby Power Consumption	0.1517W	
Non-Accredited		
12V Ripple (Full Load)	23.02mV	
5V Ripple (Full Load)	16.76mV	
3.3V Ripple (Full Load)	21.15mV	
5VSB Ripple (Full Load)	23.55mV	
12V Load Regulation	0.77%	
5V Load Regulation	1.68%	
3.3V Load Regulation	2.65%	
5VSB Load Regulation	2.10%	
Inrush Current	79.920A	
Hold-Up Time & PWR_OK Signal	15.10ms	
AC Loss to PWR_OK Hold Up Time	15.80ms	
PWR_OK Inactive to DC Loss Delay	-0.70ms	
PSU Timings: T1 (20% / 100%)	85.0ms	83.0ms
PSU Timings: T3 (20% / 100%)	270.0ms	276.0ms
OPP (27.60°C / 0.00°C)	117.40%	117.40%

Hold-Up Time & PWR_OK Signal

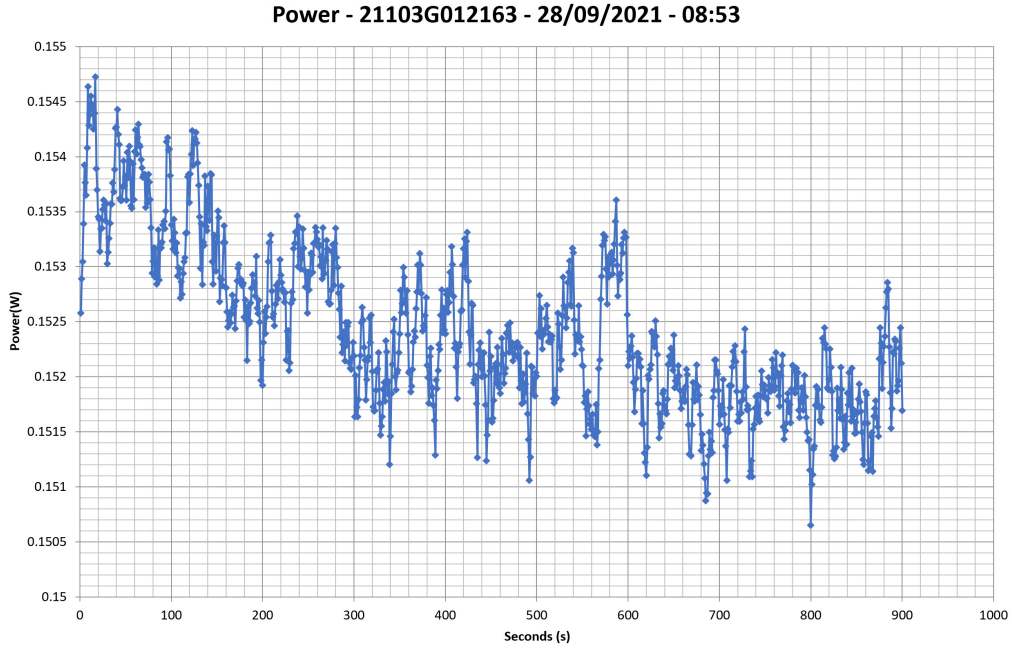
Hold-Up Time (ms)	15.1
AC Loss to PWR_OK Hold Up Time (ms)	15.8
PWR_OK Inactive to DC Loss Delay (ms)	-0.7

Graphs

115V

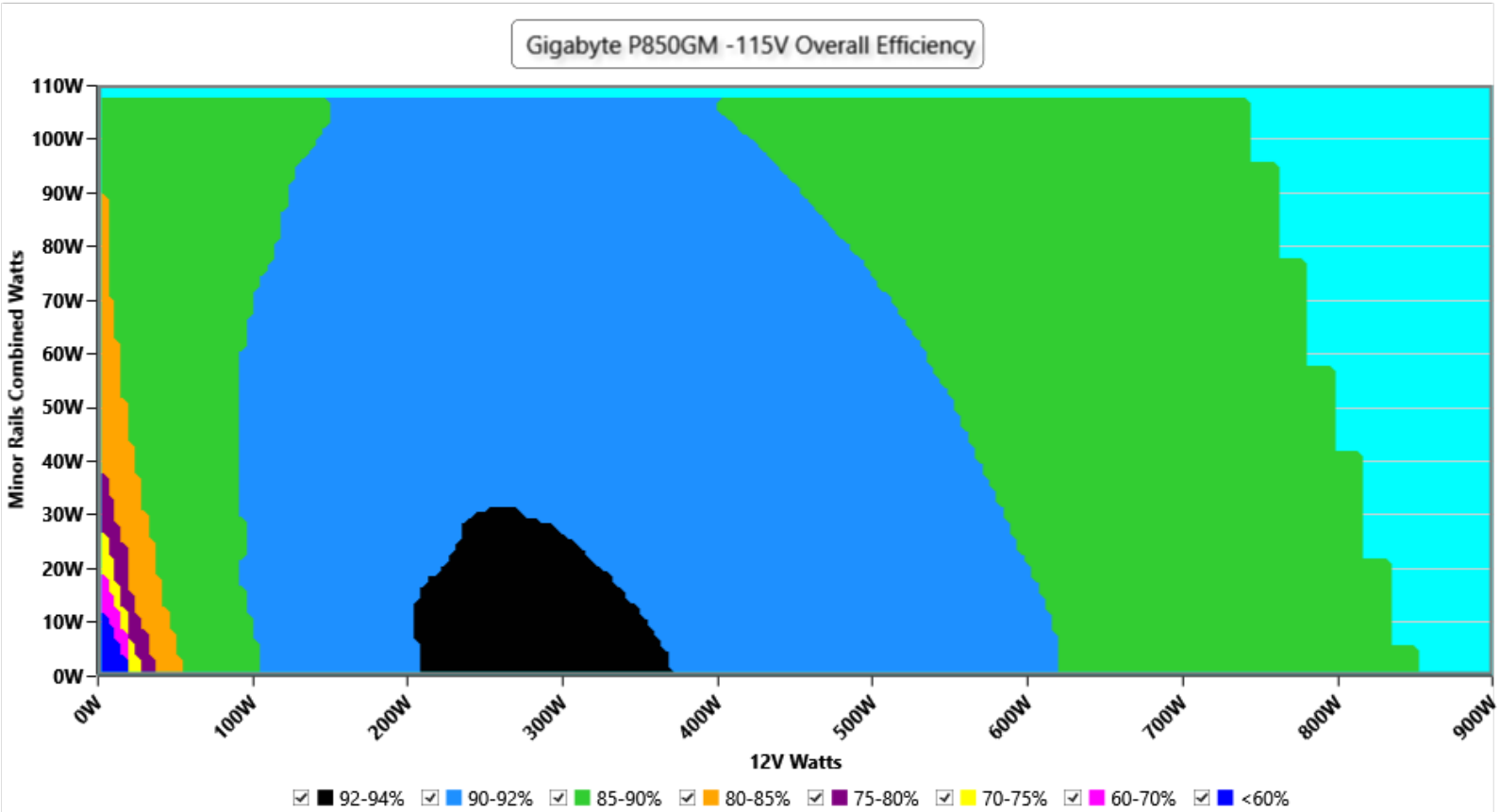


230V



Efficiency Graph

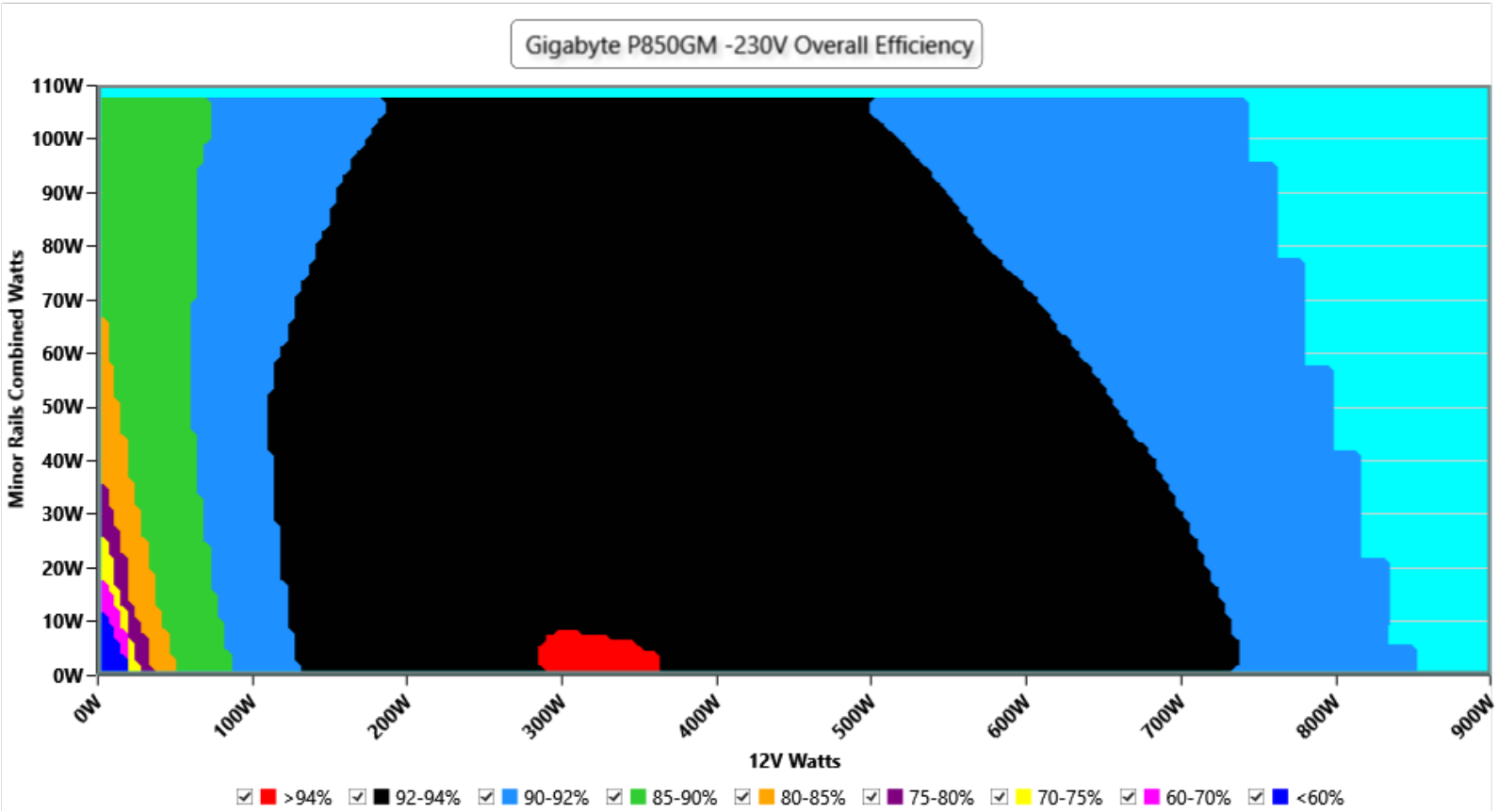
115V



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

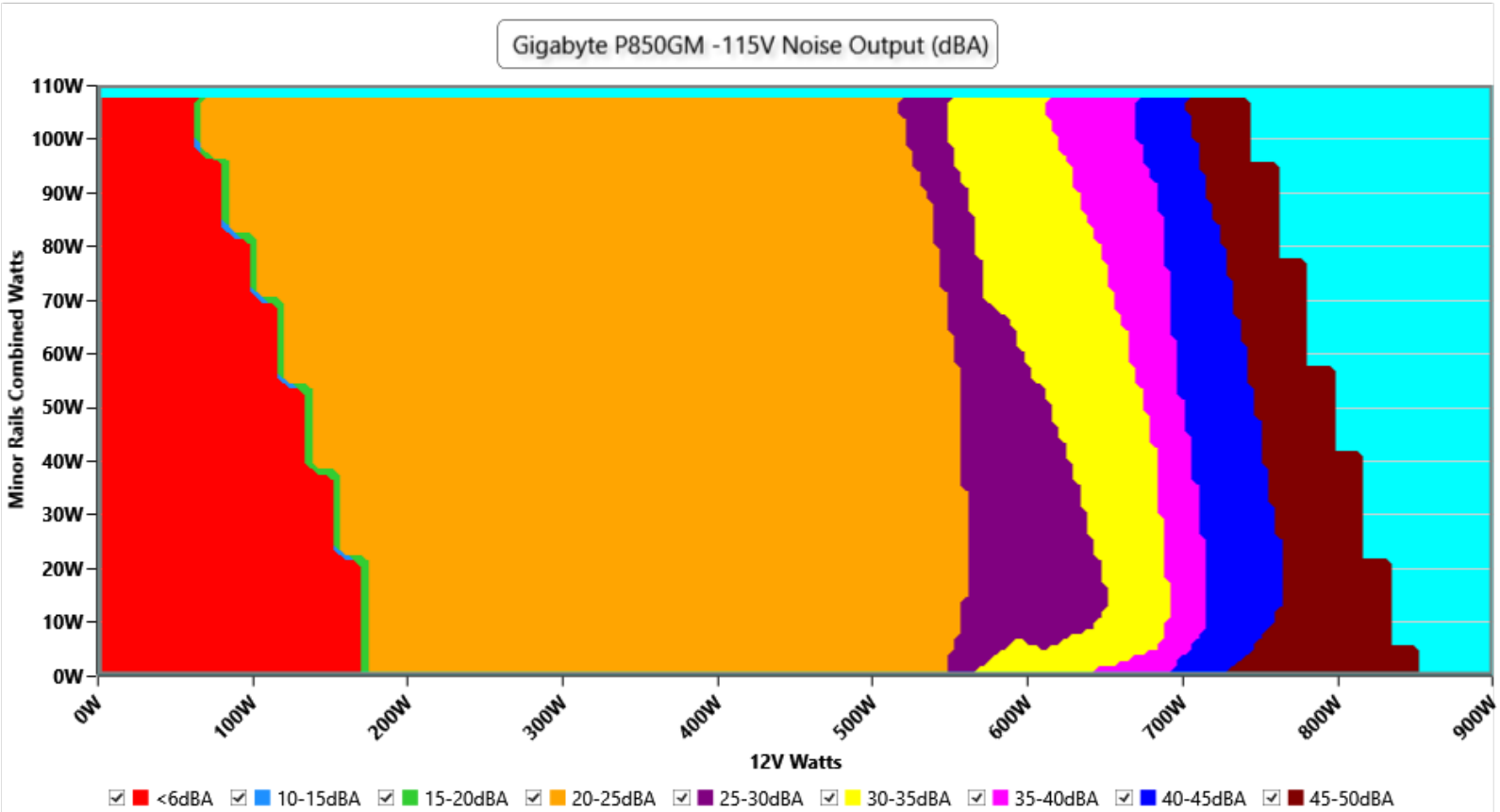


INFO

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

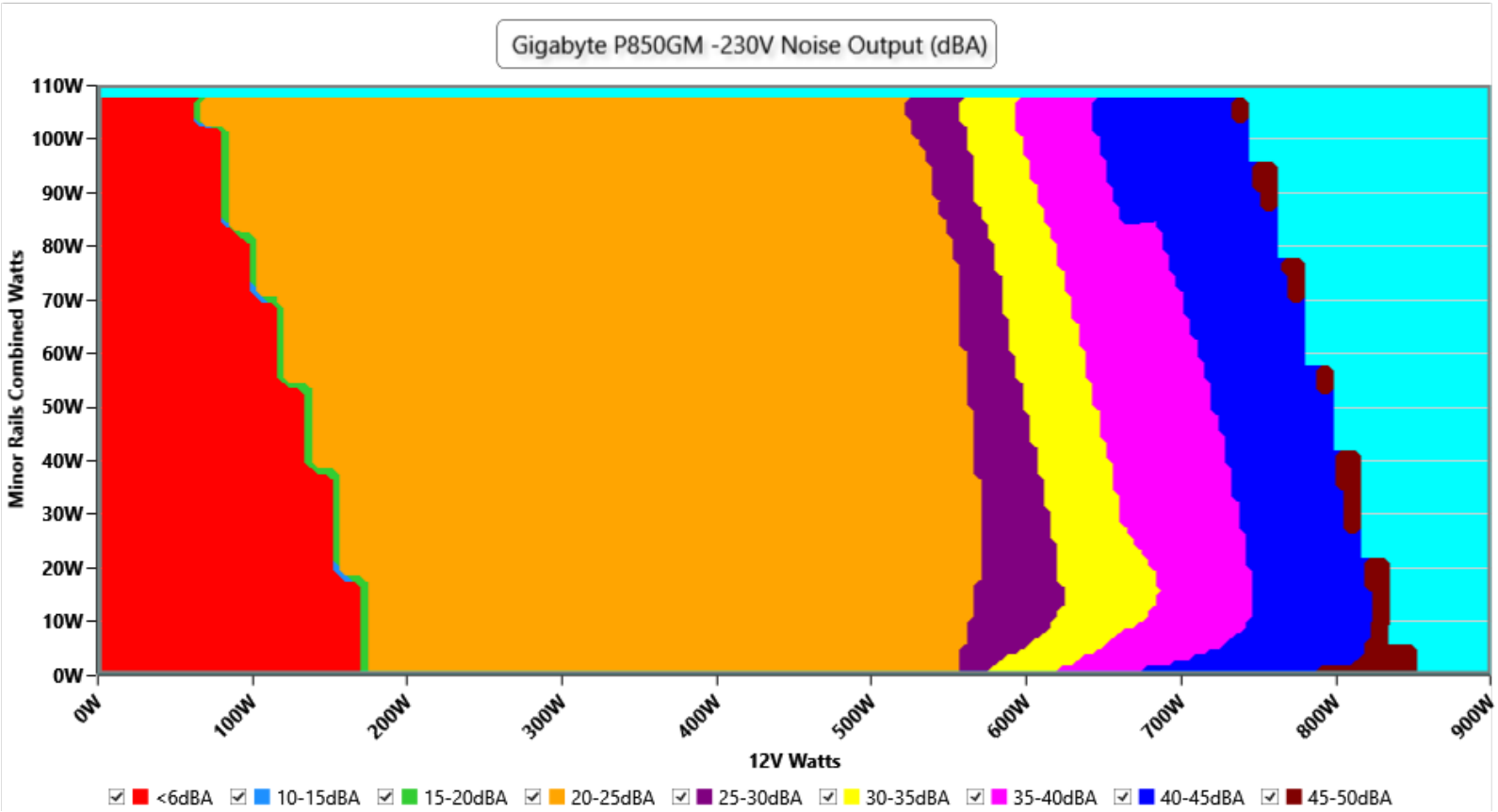
115V



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

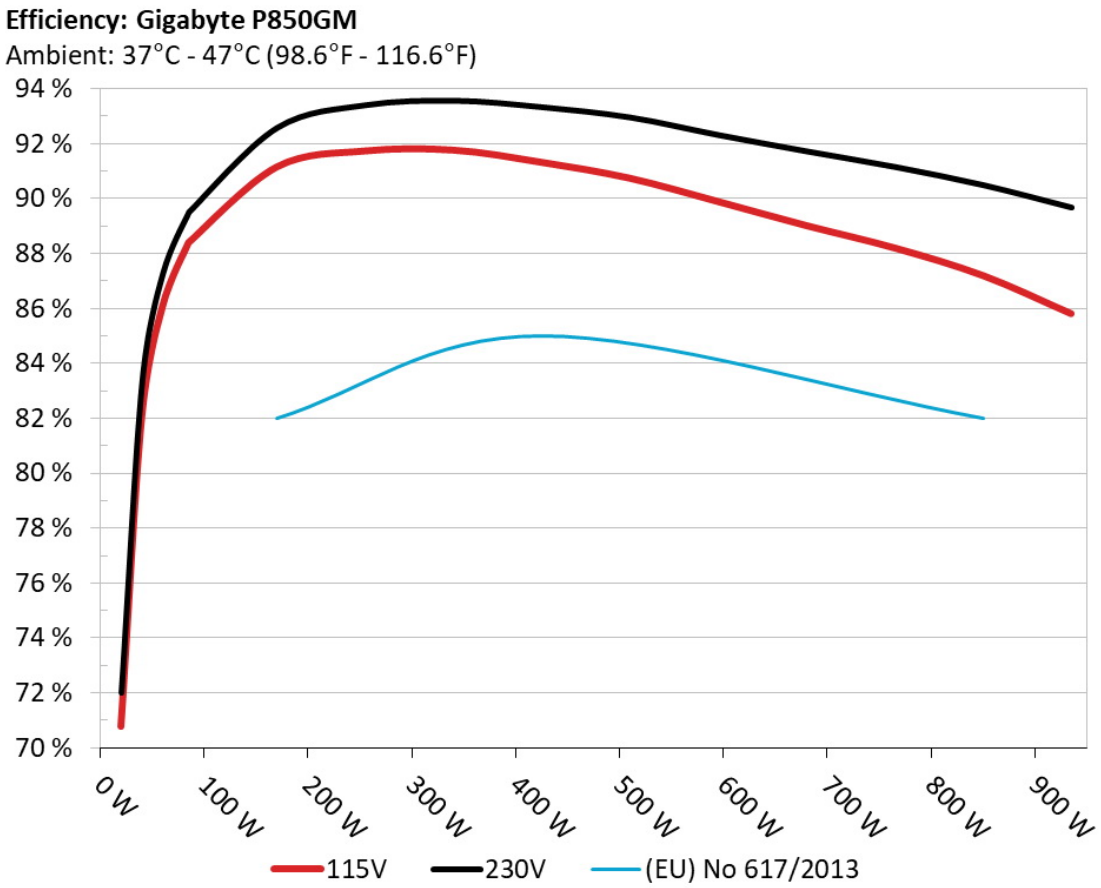


INFO

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

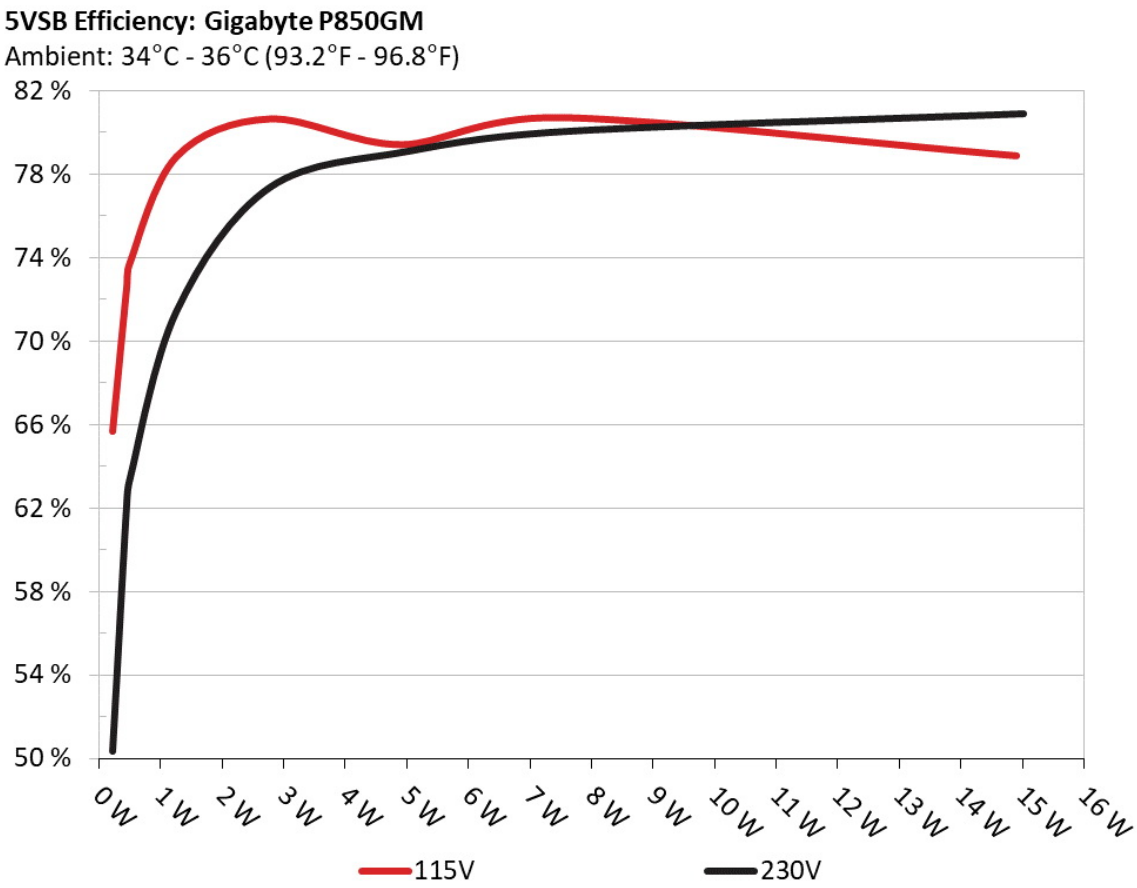
Efficiency under high ambient temperature



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	65.681%	0.05
	5.069V	0.347W		115.17V
2	0.09A	0.456W	72.58%	0.089
	5.068V	0.628W		115.17V
3	0.55A	2.775W	80.658%	0.314
	5.045V	3.44W		115.17V
4	1A	4.928W	79.422%	0.392
	4.927V	6.205W		115.17V
5	1.5A	7.499W	80.723%	0.433
	4.998V	9.29W		115.16V
6	3A	14.911W	78.891%	0.464
	4.97V	18.901W		115.16V

230V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.228W	50.367%	0.02
	5.066V	0.453W		230.35V
2	0.09A	0.456W	62.199%	0.032
	5.068V	0.733W		230.35V
3	0.55A	2.783W	77.361%	0.143
	5.06V	3.597W		230.35V
4	1A	5.052W	79.099%	0.221
	5.051V	6.387W		230.35V
5	1.5A	7.562W	80.033%	0.279
	5.04V	9.449W		230.35V
6	3A	15.016W	80.882%	0.364
	5.005V	18.566W		230.35V

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%	5.231A	1.953A	1.943A	0.992A	85.006	88.094%	0	<6.0	45.05°C	0.968
	12.120V	5.121V	3.397V	5.043V	96.495				39.94°C	115.18V
20%	11.472A	2.934A	2.922A	1.192A	169.965	91.164%	0	<6.0	46.52°C	0.982
	12.121V	5.114V	3.388V	5.034V	186.438				40.86°C	115.18V
30%	18.081A	3.429A	3.416A	1.393A	254.975	91.749%	960	24.7	41.5°C	0.987
	12.108V	5.105V	3.381V	5.026V	277.905				47.58°C	115.17V
40%	24.699A	3.925A	3.914A	1.595A	340.064	91.779%	963	24.7	41.98°C	0.988
	12.100V	5.097V	3.373V	5.017V	370.525				48.8°C	115.17V
50%	30.970A	4.914A	4.906A	1.798A	425.088	91.333%	968	24.9	42.84°C	0.989
	12.095V	5.088V	3.363V	5.008V	465.428				50.07°C	115.16V
60%	37.200A	5.907A	5.905A	2A	509.623	90.755%	986	25.6	43.06°C	0.99
	12.092V	5.08V	3.354V	4.999V	561.537				50.85°C	115.16V
70%	43.506A	6.903A	6.908A	2.205A	594.889	89.903%	1471	37.2	43.67°C	0.991
	12.085V	5.071V	3.344V	4.99V	661.698				51.95°C	115.16V
80%	49.830A	7.903A	7.915A	2.309A	679.766	89.029%	1785	42.5	44.15°C	0.991
	12.078V	5.063V	3.335V	4.982V	763.536				52.91°C	115.15V
90%	56.559A	8.411A	8.415A	2.412A	765.229	88.209%	2090	47.2	44.83°C	0.992
	12.071V	5.054V	3.327V	4.975V	867.516				54.5°C	115.15V
100%	63.017A	8.922A	8.952A	3.026A	850.052	87.206%	2094	47.2	45.64°C	0.993
	12.065V	5.045V	3.318V	4.958V	974.762				55.81°C	115.15V
110%	69.326A	9.931A	10.068A	3.029A	934.663	85.82%	2097	47.2	46.98°C	0.994
	12.064V	5.036V	3.307V	4.953V	1089.099				57.82°C	115.15V
CL1	0.115A	12.342A	12.358A	0A	106.315	85.465%	211	<6.0	42.37°C	0.978
	12.138V	5.121V	3.374V	5.045V	124.397				49.8°C	115.19V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
CL2	0.115A	19.502A	0A	0A	101.401	83.187%	992	25.5	43.33°C	0.977
	12.150V	5.128V	3.377V	5.055V	121.898				51.78°C	115.19V
CL3	0.115A	0A	19.61A	0A	67.397	79.713%	0	<6.0	54.19°C	0.967
	12.151V	5.108V	3.366V	5.042V	84.55				44.64°C	115.19V
CL4	70.353A	0A	0A	0.001A	849.752	87.799%	2089	47.2	45.74°C	0.993
	12.079V	5.047V	3.326V	5.023V	967.84				56.08°C	115.14V

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%	5.226A	1.952A	1.943A	0.992A	85.005	89.286%	0	<6.0	45.17°C	0.874
	12.131V	5.124V	3.397V	5.042V	95.205				40.03°C	230.39V
20%	11.462A	2.933A	2.923A	1.192A	169.966	92.576%	0	<6.0	46.56°C	0.937
	12.132V	5.116V	3.387V	5.033V	183.596				40.93°C	230.39V
30%	18.067A	3.427A	3.417A	1.393A	254.974	93.397%	965	24.8	41.25°C	0.96
	12.117V	5.108V	3.38V	5.025V	273.001				47.52°C	230.39V
40%	24.690A	3.924A	3.915A	1.595A	340.067	93.562%	967	24.8	41.45°C	0.97
	12.105V	5.099V	3.372V	5.016V	363.468				48.33°C	230.39V
50%	30.966A	4.913A	4.908A	1.798A	425.103	93.326%	970	24.9	42.38°C	0.975
	12.097V	5.09V	3.362V	5.007V	455.503				49.49°C	230.39V
60%	37.199A	5.906A	5.907A	2A	509.635	92.955%	990	25.4	42.8°C	0.979
	12.092V	5.081V	3.353V	4.998V	548.259				50.45°C	230.4V
70%	43.504A	6.902A	6.911A	2.206A	594.983	92.312%	1540	38.7	43.25°C	0.982
	12.088V	5.072V	3.343V	4.988V	644.538				51.33°C	230.4V
80%	49.831A	7.902A	7.919A	2.309A	679.826	91.718%	1901	44.4	43.53°C	0.984
	12.079V	5.064V	3.334V	4.98V	741.214				52.28°C	230.4V
90%	56.563A	8.41A	8.421A	2.413A	765.259	91.147%	2099	47.2	44.28°C	0.985
	12.070V	5.055V	3.325V	4.973V	839.586				53.5°C	230.4V

Test	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
100%	63.005A	8.923A	8.959A	3.027A	850.149	90.486%	2100	47.2	45.65°C	0.986
	12.069V	5.045V	3.315V	4.957V	939.533				55.65°C	230.41V
110%	69.318A	9.931A	10.076A	3.031A	934.717	89.674%	2104	47.2	47.2°C	0.987
	12.066V	5.036V	3.305V	4.951V	1042.356				58.11°C	230.41V
CL1	0.116A	12.336A	12.353A	0A	106.322	86.164%	295	<6.0	49.83°C	0.904
	12.137V	5.124V	3.376V	5.045V	123.397				42.81°C	230.42V
CL2	0.115A	19.502A	0A	0A	101.404	84.117%	228	<6.0	51.72°C	0.901
	12.151V	5.128V	3.377V	5.054V	120.552				43.76°C	230.41V
CL3	0.115A	0A	19.564A	0A	67.399	80.495%	0	<6.0	53.27°C	0.857
	12.152V	5.106V	3.373V	5.042V	83.732				44.99°C	230.4V
CL4	70.389A	0A	0A	0.001A	849.921	91.123%	2103	47.2	45.93°C	0.986
	12.075V	5.045V	3.332V	5.023V	932.723				56.15°C	230.4V

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	0.488A	0.485A	0.198A	20.006	70.781%	0	<6.0	40.2°C	0.894
	12.132V	5.126V	3.405V	5.063V	28.265				36.92°C	115.19V
40W	2.699A	0.683A	0.679A	0.297A	40.004	82.059%	0	<6.0	41.16°C	0.937
	12.114V	5.124V	3.403V	5.06V	48.75				37.41°C	115.19V
60W	4.171A	0.879A	0.873A	0.396A	60.002	86.084%	0	<6.0	42.25°C	0.956
	12.115V	5.122V	3.401V	5.057V	69.702				38.19°C	115.18V
80W	5.641A	1.074A	1.067A	0.495A	79.964	88.406%	0	<6.0	44.19°C	0.968
	12.114V	5.121V	3.401V	5.054V	90.451				39.64°C	115.18V

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	0.487A	0.485A	0.198A	20.005	72.017%	0	<6.0	40.29°C	0.618
	12.162V	5.13V	3.403V	5.061V	27.779				37.09°C	230.39V
40W	2.692A	0.683A	0.679A	0.297A	40.004	83.33%	0	<6.0	41.35°C	0.756
	12.143V	5.128V	3.401V	5.058V	48.007				37.57°C	230.39V
60W	4.163A	0.878A	0.874A	0.396A	60.004	87.275%	0	<6.0	42.52°C	0.826
	12.139V	5.126V	3.399V	5.055V	68.753				38.38°C	230.39V
80W	5.630A	1.074A	1.068A	0.495A	79.969	89.506%	0	<6.0	44.15°C	0.866
	12.136V	5.125V	3.399V	5.052V	89.344				39.4°C	230.39V

The results above are not used in the certification process

Ripple Measurements

115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	5.98mV	7.62mV	5.63mV	16.72mV	Pass
20% Load	24.12mV	9.31mV	6.91mV	17.54mV	Pass
30% Load	13.60mV	10.33mV	7.32mV	18.10mV	Pass
40% Load	12.17mV	13.25mV	7.93mV	18.35mV	Pass
50% Load	12.00mV	10.94mV	9.57mV	19.17mV	Pass
60% Load	12.82mV	13.81mV	11.00mV	18.51mV	Pass
70% Load	13.94mV	14.17mV	12.64mV	18.66mV	Pass
80% Load	14.86mV	15.24mV	18.53mV	19.37mV	Pass
90% Load	15.53mV	15.80mV	18.73mV	20.39mV	Pass
100% Load	23.25mV	18.35mV	21.40mV	25.20mV	Pass
110% Load	23.97mV	19.86mV	22.43mV	25.63mV	Pass
Crossload1	9.01mV	18.23mV	23.87mV	17.43mV	Pass
Crossload2	14.96mV	11.76mV	28.66mV	16.88mV	Pass

Test	12V	5V	3.3V	5VSB	Pass/Fail
Crossload3	5.41mV	14.98mV	16.58mV	16.72mV	Pass
Crossload4	22.13mV	12.21mV	7.24mV	21.73mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	5.72mV	8.28mV	5.84mV	16.46mV	Pass
20% Load	23.62mV	9.05mV	6.04mV	16.36mV	Pass
30% Load	14.17mV	9.77mV	7.37mV	18.00mV	Pass
40% Load	12.07mV	11.76mV	7.93mV	17.84mV	Pass
50% Load	11.20mV	10.79mV	9.31mV	17.69mV	Pass
60% Load	12.36mV	12.89mV	11.11mV	18.25mV	Pass
70% Load	12.72mV	13.55mV	12.08mV	18.71mV	Pass
80% Load	13.08mV	15.44mV	17.50mV	18.51mV	Pass
90% Load	15.02mV	15.85mV	18.73mV	19.32mV	Pass
100% Load	23.02mV	16.76mV	21.15mV	23.55mV	Pass
110% Load	23.00mV	18.13mV	21.86mV	24.20mV	Pass
Crossload1	21.22mV	16.53mV	21.86mV	17.41mV	Pass
Crossload2	19.31mV	11.61mV	28.30mV	16.62mV	Pass
Crossload3	6.23mV	26.49mV	16.53mV	16.72mV	Pass
Crossload4	22.17mV	11.64mV	7.27mV	21.56mV	Pass

The results above are not used in the certification process

Gigabyte P850GM (#2)

Top side

Power specifications label

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