Anex

MSI MPG A650GF

Lab ID#: MS65001959
Receipt Date: Dec 22, 2021
Test Date: Jan 7, 2022

Report: 21PS1959A
Report Date: Jan 7, 2022

DUT INFORMATION

Brand	MSI
Manufacturer (OEM)	CWT
Series	MPG
Model Number	
Serial Number	3067ZP0A17CE010048000478
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
Rated Frequency (Hz)	47-63
Rated Power (W)	650
Type	ATX12V
Cooling	140mm Double Ball Bearing Fan (HA1425M12B-Z)
Semi-Passive Operation	✗
Cable Design	Fully Modular

TEST EQUIPMENT

Electronic Loads	Chroma 63601-5 x4 Chroma 63600-2 x2 63640-80-80 x20 63610-80-20 x2
AC Sources	Chroma 6530, Keysight AC6804B
Power Analyzers	N4L PPA1530 x2
Sound Analyzer	Bruel & Kjaer 2270 G4
Microphone	Bruel & Kjaer Type 4955-A
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2
Tachometer	UNI-T UT372 x2
Digital Multimeter	Keysight U1273AX, Fluke 289, Keithley 2015 - THD
UPS	CyberPower OLS3000E 3kVA x2
Transformer	3kVA x2

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RESULTS

Temperature Range (°C /°F)	30-32 / 86-89.6
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓

115V

Average Efficiency	89.303%
Efficiency With 10W (≤500W) or 2% (>500W)	62.293
Average Efficiency 5VSB	78.065%
Standby Power Consumption (W)	0.0466658
Average PF	0.977
Avg Noise Output	24.93 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	A

230V

Average Efficiency	90.841%
Average Efficiency 5VSB	77.057%
Standby Power Consumption (W)	0.0667467
Average PF	0.924
Avg Noise Output	26.37 dB(A)
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	A-

POWER SPECIFICATIONS

Rail		3.3V	5V	12V(1)	12V(2)	12V(3)	12V(4)	5VSB	-12V
Max. Power	Amps	20	20	25	25	30	30	2.5	0.3
	Watts	100		650				12.5	3.6
Total Max. Power (W)		650							

HOLD-UP TIME & POWER OK SIGNAL (230V)

Hold-Up Time (ms)	14.2
AC Loss to PWR_OK Hold Up Time (ms)	13.8
PWR_OK Inactive to DC Loss Delay (ms)	0.4

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CABLES AND CONNECTORS

Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (600mm)	1	1	18AWG	No
4+4 pin EPS12V (700mm)	2	2	18AWG	No
6+2 pin PCIe (500mm+150mm)	2	4	18AWG	No
SATA (500mm+150mm+150mm+150mm)	2	8	18AWG	No
4 pin Molex (500mm+150mm+150mm+150mm) / FDD (+150mm)	1	4 / 1	18-20AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	18AWG	-

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General Data	-
Manufacturer (OEM)	CWT
PCB Type	Double Sided
Primary Side	**-**
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV, 1x Power Integrations CAP004DG (Discharge IC)
Inrush Protection	NTC Thermistor SCK-055 (5 Ohm) & Relay
Bridge Rectifier(s)	2x GBU1006 (600V, 10A @ 100°C)
APFC MOSFETs	2x Infineon IPA60R190P6 (600V, 12.7A @ 100°C, Rds(on): 0.19Ohm)
APFC Boost Diode	1x STMicroelectronics STTH8S06D (600V, 8A)
Bulk Cap(s)	1x Nippon Chemi-Con (420V, 470uF, 2,000h @ 105°C, KMQ)
Main Switchers	2x ON Semiconductor FCPF125N65S3 (650V, 15A @ 100°C, Rds(on): 0.125Ohm)
APFC Controller	Champion CM6502UHH & CM03X
Resonant Controller	Champion CM6901X
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	**-**
+12V MOSFETs	4x Infineon BSC014N06NS (60V, 152A @ 100°C, Rds(on): 1.45mOhm)
5V & 3.3V	DC-DC Converters: 2x UBIQ QM3006D (30V, 57A @ 100°C, Rds(on): 5.5mOhm) 2x UBIQ QM3016D (30V, 68A @ 100°C, Rds(on): 4mOhm) PWM Controller(s): ANPEC APW7159C
Filtering Capacitors	Electrolytic: 6x Nippon Chemi-Con (2-5,000h @ 105°C, KZE), 2x Nippon Chemi-Con (5-6,000h @ 105°C, KZH), 1x Rubycon (4-10,000h @ 105°C, YXJ), 8x Nichicon (4-10,000h @ 105°C, KY), 3x Nichicon (4-10,000h @ 105°C, KYA) Polymer: 11x FPCAP, 7x Nippon Chemi-Con
Supervisor IC	Sitronix ST9S429-PG14 (OCP, OVP, UVP, SCP, PG) & EST EST7618 (OCP, SC)
Fan Model	Hong Hua HA1425M12B-Z (140mm, 12V, 0.36A, Ball Bearing Fan)
5VSB Circuit	**-**
Standby PWM Controller	Power Integrations TNY177PN

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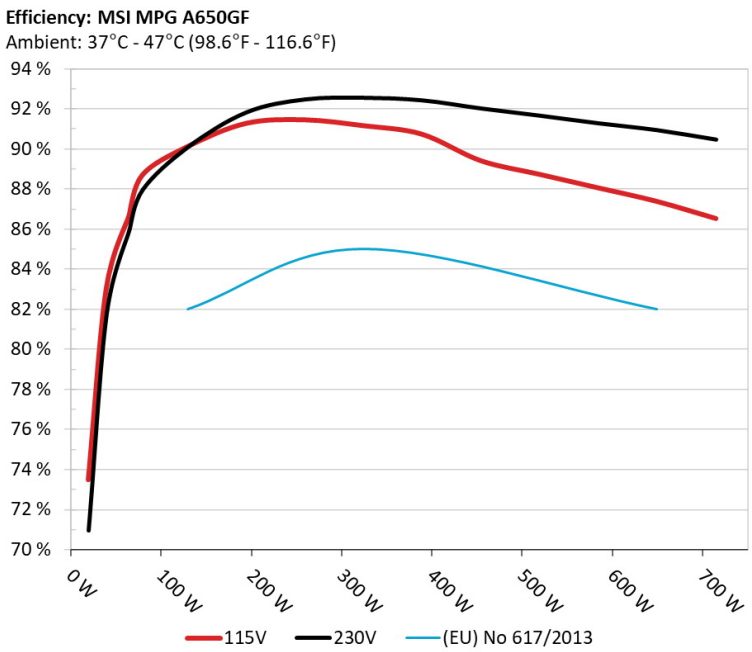
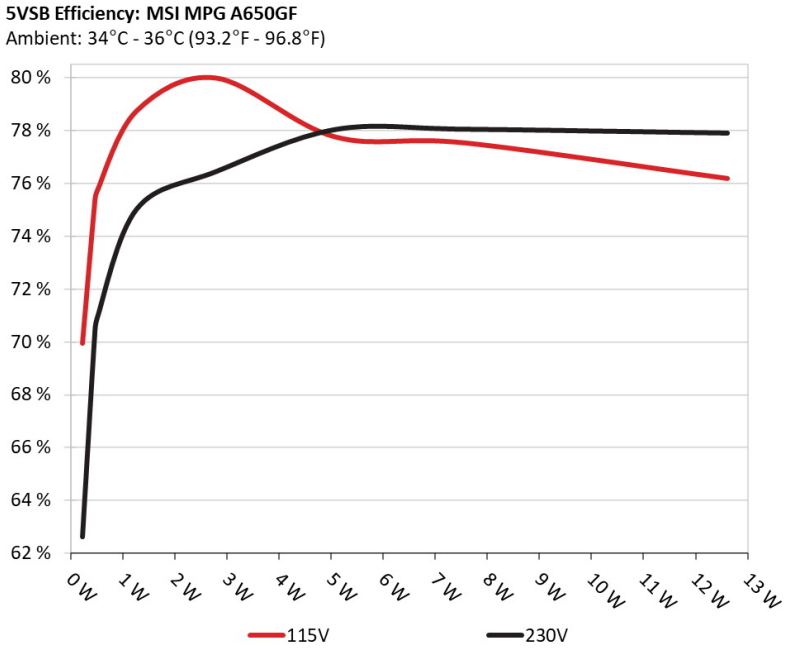
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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

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5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.23W	69.942%	0.032
	5.107V	0.329W		115.12V
2	0.09A	0.46W	75.142%	0.059
	5.106V	0.612W		115.11V
3	0.55A	2.803W	79.965%	0.265
	5.095V	3.505W		115.12V
4	1A	5.085W	77.742%	0.367
	5.084V	6.541W		115.12V
5	1.5A	7.609W	77.51%	0.423
	5.072V	9.817W		115.11V
6	2.5A	12.624W	76.172%	0.472
	5.049V	16.572W		115.11V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.23W	62.606%	0.011
	5.105V	0.367W		230.24V
2	0.09A	0.46W	70.105%	0.019
	5.105V	0.656W		230.24V
3	0.55A	2.803W	76.454%	0.101
	5.095V	3.666W		230.24V
4	1A	5.085W	78.044%	0.167
	5.084V	6.516W		230.24V
5	1.5A	7.608W	78.055%	0.227
	5.071V	9.747W		230.24V
6	2.5A	12.624W	77.908%	0.307
	5.049V	16.204W		230.24V

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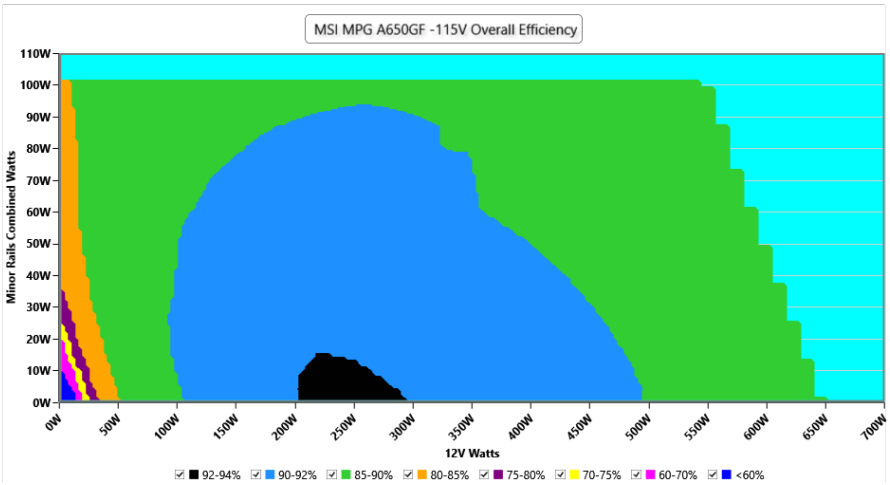
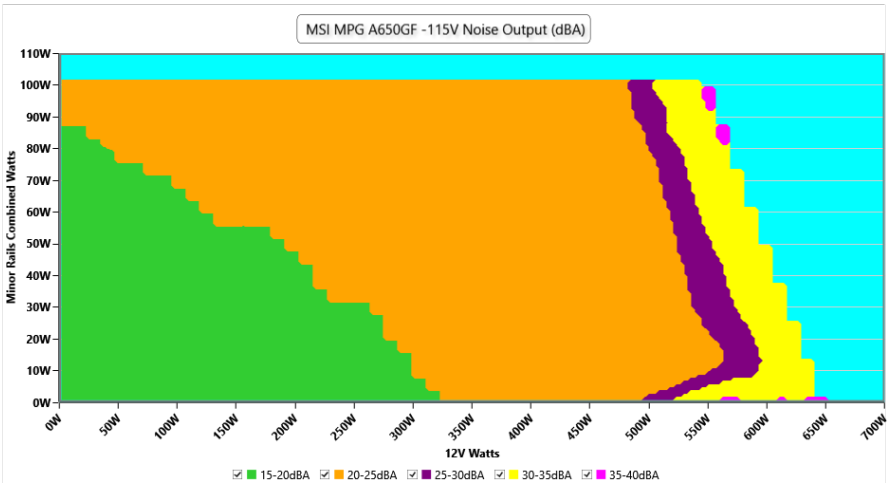
EFFICIENCY GRAPH 115V



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 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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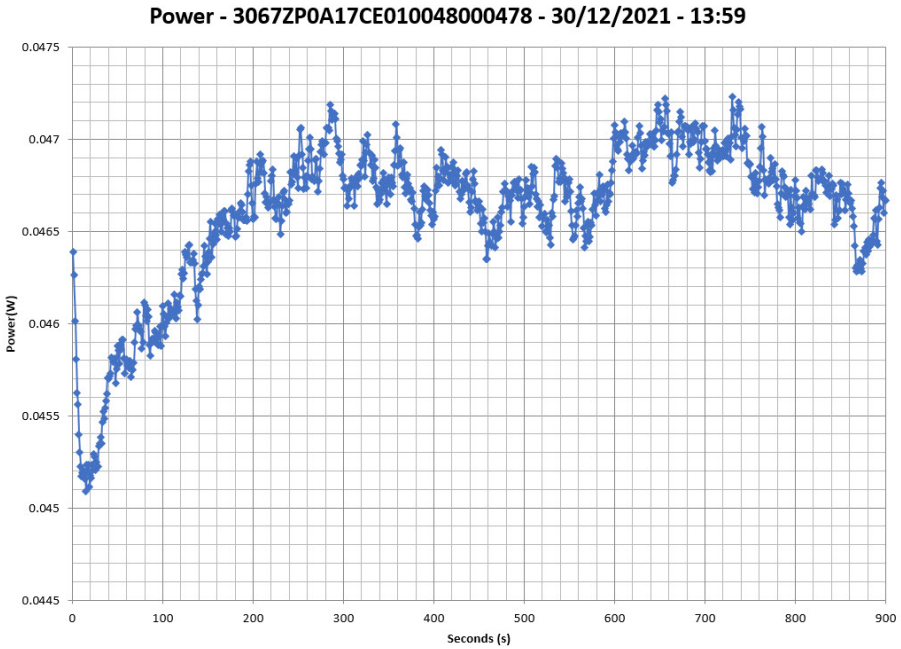
VAMPIRE POWER -115V



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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10-110% 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%	3.590A	1.988A	1.97A	0.985A	64.998	86.401%	738	21.3	40.67°C	0.955
	12.086V	5.03V	3.351V	5.078V	75.229				44.78°C	115.1V
20%	8.198A	2.983A	2.957A	1.184A	129.929	90.098%	739	21.4	40.81°C	0.973
	12.079V	5.028V	3.348V	5.07V	144.208				45.21°C	115.1V
30%	13.162A	3.482A	3.451A	1.383A	194.94	91.259%	741	21.5	41.44°C	0.979
	12.071V	5.026V	3.346V	5.062V	213.613				46.21°C	115.1V
40%	18.137A	3.98A	3.947A	1.583A	260.025	91.433%	742	21.5	41.61°C	0.981
	12.065V	5.024V	3.344V	5.053V	284.387				46.69°C	115.1V
50%	22.767A	4.978A	4.937A	1.784A	325.025	91.14%	744	21.6	42°C	0.982
	12.058V	5.022V	3.342V	5.045V	356.62				47.59°C	115.1V
60%	27.360A	5.976A	5.928A	1.986A	389.495	90.719%	747	21.8	42.61°C	0.981
	12.050V	5.02V	3.34V	5.036V	429.343				49.17°C	115.1V
70%	32.029A	6.976A	6.921A	2.188A	454.824	89.395%	1185	35.5	43.05°C	0.979
	12.042V	5.018V	3.338V	5.027V	508.78				50.36°C	115.1V
80%	36.715A	7.978A	7.915A	2.291A	519.633	88.717%	1517	42.2	43.85°C	0.98
	12.031V	5.015V	3.335V	5.022V	585.72				52.16°C	115.1V
90%	41.808A	8.48A	8.401A	2.393A	585.059	88.038%	1739	45.2	44°C	0.981
	12.020V	5.013V	3.333V	5.016V	664.554				53.42°C	115.1V
100%	46.834A	8.982A	8.917A	2.496A	649.813	87.364%	1740	45.3	45.96°C	0.982
	12.012V	5.011V	3.331V	5.009V	743.803				56.04°C	115.1V
110%	51.595A	9.985A	10.004A	2.499A	715.242	86.51%	1741	45.3	46.89°C	0.983
	12.005V	5.009V	3.328V	5.004V	826.78				58.2°C	115.1V
CL1	0.116A	11.999A	11.883A	0A	101.315	85.138%	750	21.9	43.42°C	0.968
	12.086V	5.018V	3.34V	5.09V	119.001				48.77°C	115.12V
CL2	0.116A	19.958A	0A	0A	101.423	83.217%	754	22.1	41.51°C	0.969
	12.090V	5.012V	3.352V	5.094V	121.878				48.94°C	115.12V
CL3	0.116A	0A	19.785A	0A	67.388	77.718%	739	21.4	40.54°C	0.958
	12.086V	5.034V	3.335V	5.091V	86.708				49.81°C	115.12V
CL4	54.045A	0A	0A	0A	649.703	88.287%	1742	45.3	45.75°C	0.982
	12.021V	5.026V	3.342V	5.075V	735.905				57.07°C	115.11V

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20-80W 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	1.228A	0.497A	0.492A	0.196A	19.994	73.477%	732	20.9	37.45°C	0.841
	12.082V	5.033V	3.354V	5.1V	27.211				40.53°C	115.08V
40W	2.705A	0.695A	0.689A	0.294A	39.996	83.039%	733	21.1	38.06°C	0.924
	12.084V	5.033V	3.353V	5.096V	48.165				41.41°C	115.09V
60W	4.182A	0.894A	0.886A	0.393A	59.995	86.637%	734	21.2	38.16°C	0.95
	12.083V	5.032V	3.352V	5.093V	69.249				41.9°C	115.09V
80W	5.654A	1.093A	1.083A	0.491A	79.942	88.683%	735	21.2	39.53°C	0.96
	12.082V	5.032V	3.352V	5.089V	90.143				43.59°C	115.09V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	13.15mV	14.71mV	18.26mV	6.24mV	Pass
20% Load	16.71mV	14.51mV	19.02mV	10.18mV	Pass
30% Load	18.09mV	14.81mV	19.43mV	7.73mV	Pass
40% Load	18.30mV	14.91mV	17.85mV	7.57mV	Pass
50% Load	19.37mV	14.66mV	20.86mV	9.26mV	Pass
60% Load	19.78mV	15.02mV	20.40mV	11.97mV	Pass
70% Load	17.53mV	14.81mV	19.94mV	11.62mV	Pass
80% Load	18.56mV	15.32mV	21.53mV	14.69mV	Pass
90% Load	17.69mV	16.29mV	17.85mV	17.76mV	Pass
100% Load	26.05mV	17.64mV	18.96mV	24.96mV	Pass
110% Load	26.25mV	18.42mV	20.06mV	22.86mV	Pass
Crossload1	23.77mV	15.66mV	19.17mV	5.54mV	Pass
Crossload2	15.50mV	18.23mV	15.60mV	5.12mV	Pass
Crossload3	14.74mV	14.71mV	18.92mV	5.12mV	Pass
Crossload4	25.63mV	17.70mV	19.63mV	11.23mV	Pass

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230V

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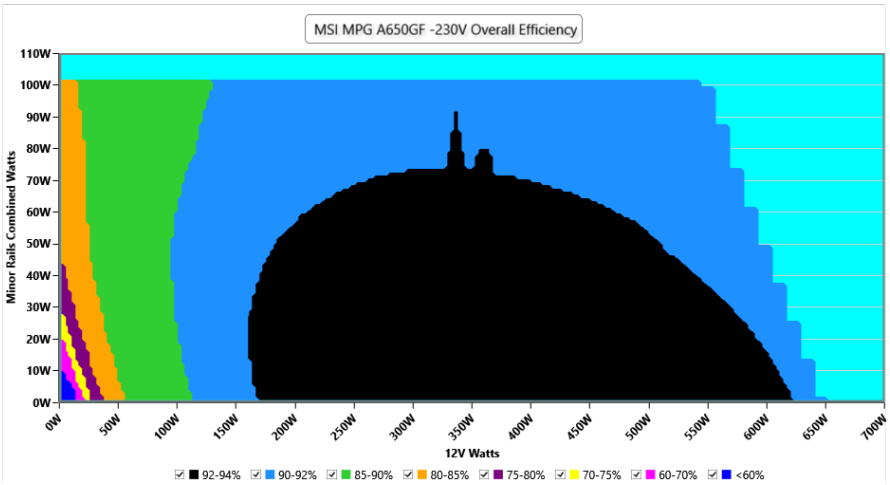
EFFICIENCY GRAPH 230V



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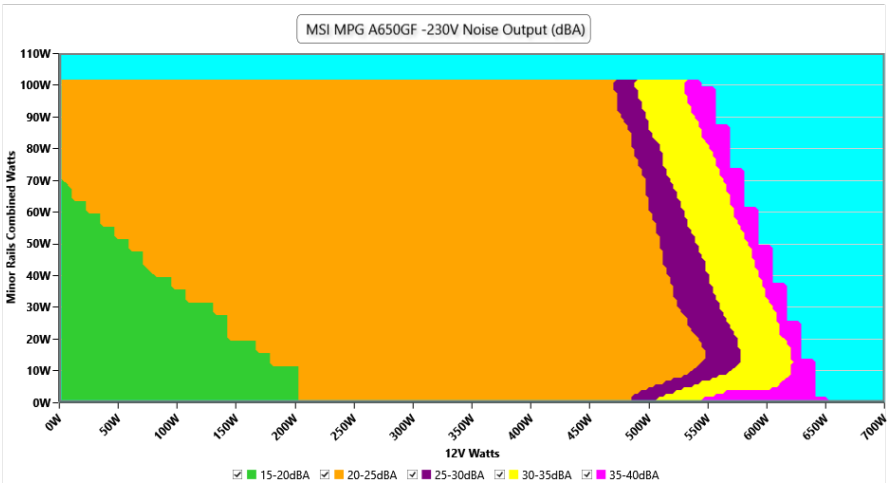
NOISE GRAPH 230V



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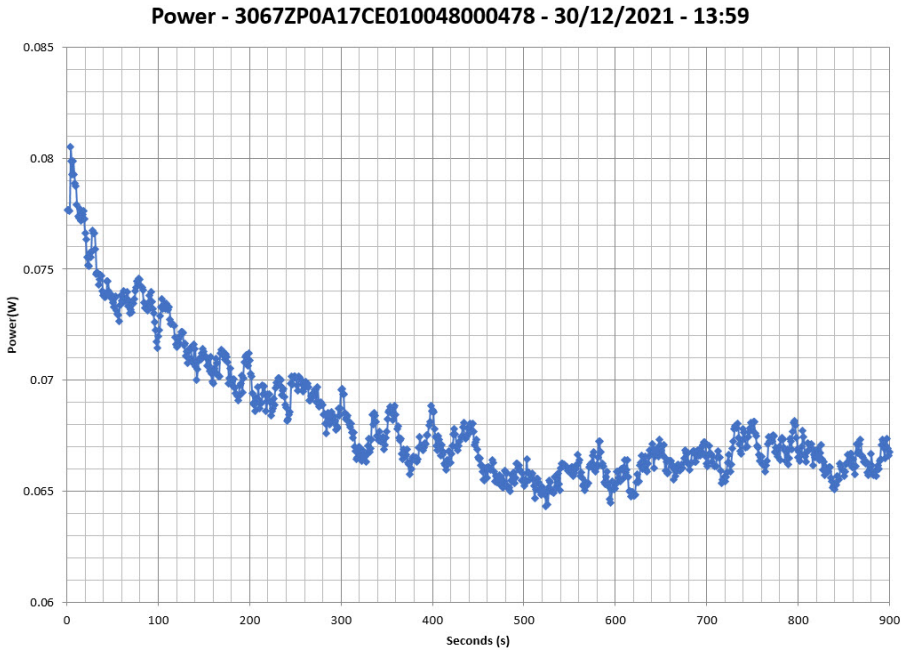
VAMPIRE POWER -230V



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10-110% LOAD TESTS 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%	3.594A	1.988A	1.97A	0.985A	64.999	85.838%	736	21.3	40.37°C	0.764
	12.076V	5.03V	3.35V	5.077V	75.722				44.58°C	230.21V
20%	8.206A	2.983A	2.957A	1.184A	129.933	90.073%	739	21.4	40.48°C	0.878
	12.069V	5.027V	3.348V	5.069V	144.253				44.87°C	230.21V
30%	13.163A	3.482A	3.452A	1.383A	194.936	91.81%	740	21.4	41.35°C	0.916
	12.071V	5.026V	3.346V	5.061V	212.325				46.12°C	230.22V
40%	18.138A	3.98A	3.947A	1.583A	260.024	92.454%	742	21.5	41.98°C	0.935
	12.064V	5.024V	3.344V	5.053V	281.247				47.02°C	230.22V
50%	22.769A	4.978A	4.937A	1.784A	325.025	92.534%	744	21.6	42.64°C	0.944
	12.057V	5.023V	3.342V	5.045V	351.248				48.14°C	230.22V
60%	27.357A	5.975A	5.928A	1.986A	389.481	92.405%	748	21.8	42.68°C	0.95
	12.051V	5.021V	3.34V	5.036V	421.496				49.1°C	230.22V
70%	32.030A	6.975A	6.922A	2.188A	454.823	92.002%	1153	34.6	43.39°C	0.954
	12.042V	5.019V	3.338V	5.028V	494.365				50.88°C	230.23V
80%	36.720A	7.978A	7.916A	2.29A	519.642	91.645%	1400	40.0	43.53°C	0.957
	12.030V	5.016V	3.335V	5.022V	567.02				52.08°C	230.23V
90%	41.810A	8.479A	8.401A	2.393A	585.119	91.262%	1737	45.2	44.66°C	0.959
	12.021V	5.013V	3.333V	5.016V	641.142				54.09°C	230.25V
100%	46.828A	8.982A	8.917A	2.496A	649.852	90.92%	1741	45.3	45.45°C	0.961
	12.015V	5.012V	3.331V	5.01V	714.755				55.86°C	230.25V
110%	51.584A	9.984A	10.005A	2.498A	715.266	90.45%	1741	45.3	46.59°C	0.963
	12.009V	5.01V	3.328V	5.005V	790.789				58.21°C	230.25V
CL1	0.116A	11.999A	11.884A	0A	101.311	84.554%	749	21.9	42.97°C	0.852
	12.076V	5.018V	3.34V	5.089V	119.819				48.31°C	230.25V
CL2	0.116A	19.955A	0A	0A	101.416	82.834%	753	22.0	41.7°C	0.855
	12.082V	5.012V	3.352V	5.093V	122.433				49.12°C	230.25V
CL3	0.116A	0A	19.784A	0A	67.385	77.138%	739	21.4	40.79°C	0.794
	12.078V	5.034V	3.335V	5.091V	87.356				50.44°C	230.25V
CL4	54.023A	0A	0A	0A	649.765	91.844%	1741	45.3	45.11°C	0.961
	12.027V	5.025V	3.341V	5.073V	707.467				56.55°C	230.25V

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› The link to the original test results document should be provided in any case

Anex

MSI MPG A650GF

20-80W LOAD TESTS 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	1.230A	0.497A	0.492A	0.196A	19.99	70.959%	729	20.9	36.58°C	0.48
	12.069V	5.033V	3.354V	5.1V	28.171				39.68°C	230.19V
40W	2.708A	0.695A	0.689A	0.294A	39.992	81.758%	731	20.9	37.26°C	0.644
	12.071V	5.032V	3.353V	5.096V	48.915				40.65°C	230.19V
60W	4.186A	0.894A	0.886A	0.393A	59.992	85.927%	733	21.1	38.27°C	0.745
	12.071V	5.032V	3.352V	5.093V	69.817				41.86°C	230.2V
80W	5.658A	1.093A	1.083A	0.491A	79.935	87.951%	734	21.2	39.15°C	0.804
	12.072V	5.031V	3.351V	5.089V	90.886				42.9°C	230.2V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	9.52mV	14.20mV	16.16mV	6.70mV	Pass
20% Load	21.96mV	14.15mV	16.67mV	7.11mV	Pass
30% Load	29.61mV	14.00mV	16.57mV	7.88mV	Pass
40% Load	25.92mV	15.32mV	18.05mV	8.85mV	Pass
50% Load	21.32mV	15.48mV	18.82mV	8.34mV	Pass
60% Load	18.86mV	14.76mV	18.46mV	10.03mV	Pass
70% Load	18.45mV	16.19mV	20.30mV	11.21mV	Pass
80% Load	18.96mV	15.94mV	21.84mV	13.77mV	Pass
90% Load	18.50mV	16.09mV	17.85mV	18.99mV	Pass
100% Load	26.51mV	17.53mV	18.14mV	23.22mV	Pass
110% Load	26.42mV	17.44mV	18.23mV	24.13mV	Pass
Crossload1	10.32mV	15.03mV	17.52mV	5.67mV	Pass
Crossload2	10.54mV	17.72mV	14.98mV	4.91mV	Pass
Crossload3	11.11mV	14.61mV	20.20mV	5.17mV	Pass
Crossload4	24.72mV	18.62mV	16.13mV	10.55mV	Pass

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Anex

MSI MPG A650GF

Top side

Power specifications label

CERTIFICATIONS 115V

CYBENETICS PLATINUM

CYBENETICS A

CERTIFICATIONS 230V

CYBENETICS GOLD 230v

CYBENETICS A- 230v

Aristeidis Bitziopoulos
Lab Director

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