

Anex

Asus TUF-450B-GAMING

Lab ID#: AS45001712
Receipt Date: Aug 20, 2020
Test Date: Sep 9, 2020

Report: 20PS1712A

Report Date: Sep 9, 2020

DUT INFORMATION

Brand	Asus
Manufacturer (OEM)	Great Wall
Series	TUF Gaming
Model Number	
Serial Number	2K070017569
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	7-3
Rated Frequency (Hz)	47-63
Rated Power (W)	450
Type	ATX12V
Cooling	135mm Double Ball-Bearing Fan (CF1325H12D)
Semi-Passive Operation	✓
Cable Design	Fixed cables

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	✓
ALPM (Alternative Low Power Mode) compatible	✓

115V

Average Efficiency	85.959%
Efficiency With 10W (≤500W) or 2% (>500W)	63.422
Average Efficiency 5VSB	78.609%
Standby Power Consumption (W)	0.0534553
Average PF	0.986
Avg Noise Output	30.66 dB(A)
Efficiency Rating (ETA)	SILVER
Noise Rating (LAMBDA)	Standard++

230V

Average Efficiency	88.260%
Average Efficiency 5VSB	78.126%
Standby Power Consumption (W)	0.0945254
Average PF	0.940
Avg Noise Output	30.51 dB(A)
Efficiency Rating (ETA)	SILVER
Noise Rating (LAMBDA)	Standard++

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	37.4	3	0.8
	Watts	110		448.8	15	9.6
Total Max. Power (W)		450				

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

Hold-Up Time (ms)	13.4
AC Loss to PWR_OK Hold Up Time (ms)	9.4
PWR_OK Inactive to DC Loss Delay (ms)	4

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CABLES AND CONNECTORS

Native Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Caps
ATX connector 20+4 pin (610mm)	1	1	18-20AWG	No
4+4 pin EPS12V (820mm)	1	1	18AWG	No
6+2 pin PCIe (610mm+100mm)	1	2	18AWG	No
SATA (400mm+120mm+120mm)	1	3	18AWG	No
SATA (400mm+120mm)	1	2	18AWG	No
4-pin Molex (400mm+150mm+150mm+150mm)	1	4	18AWG	No

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General Data	-
Manufacturer (OEM)	Great Wall
PCB Type	Single Sided
Primary Side	-
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor SCK-1R58
Bridge Rectifier(s)	1x GBU1508 (800V, 15A @ 100°C)
APFC MOSFETs	1x Advanced Power AP30SL60WL (650V, 16.5A @ 100°C, Rds(on): 0.13Ohm)
APFC Boost Diode	1x STMicroelectronics STTH8S06 (600V, 8A @ 175°C)
Bulk Cap(s)	1x Lelon (450V, 270uF, 2,000h @ 105°C, LSG)
Main Switchers	2x STMicroelectronics STF13NM60N (600V, 6.93A @ 100°C, Rds(on): 0.36Ohm)
APFC Controller	Champion CM6500UNX & CM03X Phantom Power Remover
Resonant Controller	Champion CM6901X
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	-
+12V MOSFETs	2x STMicroelectronics STP100N6F7 (60V, 75A @ 100°C, Rds(on): 5.6mOhm)
5V & 3.3V	DC-DC Converters: 4x Infineon IPD040N03L (30V, 76A @ 100°C, Rds(on): 4mOhm) PWM Controllers: ANPEC APW7159C
Filtering Capacitors	Electrolytic: 1x Elite (2-5,000h @ 105°C, EK), 5x Teapo (6-10,000h @ 105°C, TC), 3x Teapo (3-5,000h @ 105°C, TX), 2x Teapo (5-6,000h @ 105°C, TB), 1x Lelon (4-10,000h @ 105°C, RZW) Polymer: 2x Elite, 2x Lelon
Step-Down DC-DC Converter	Texas Instruments TPS54231
Supervisor IC	IN1S429I-DCG
Fan Model	Champion CF1325H12D (135mm, 12V, 0.6A, Double Ball Bearing)
5VSB Circuit	-
Rectifier	1x PFC PFR30L45CT SBR (45V, 30A)
Standby PWM Controller	Power Intergrations TNY278PN

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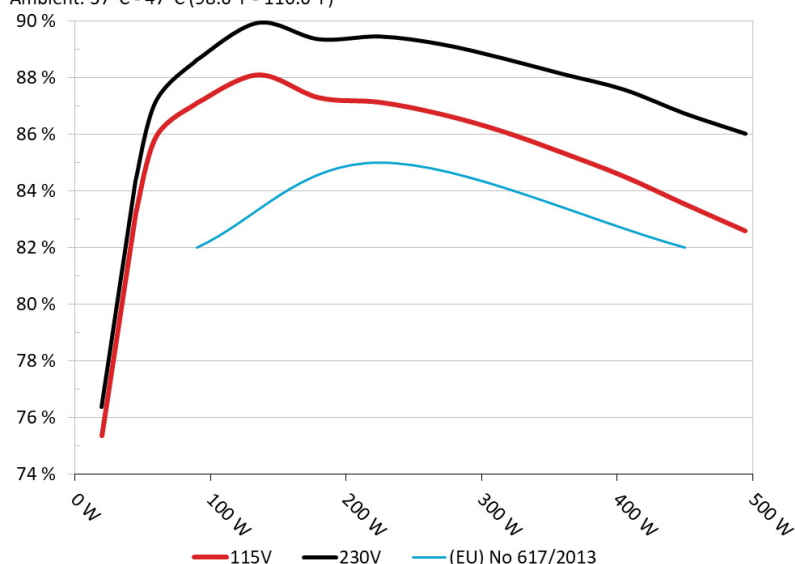
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EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

Efficiency: ASUS TUF-450B-GAMING

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



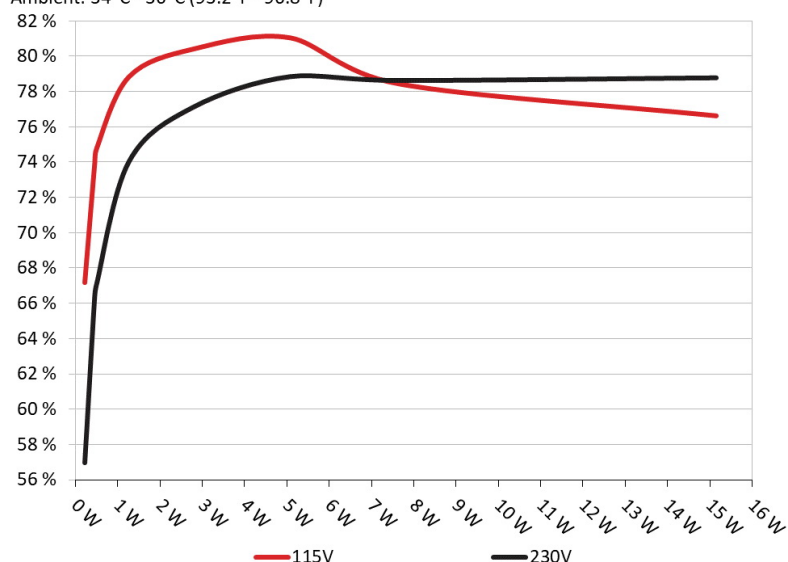
INFO

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: ASUS TUF-450B-GAMING

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

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Asus TUF-450B-GAMING

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	67.155%	0.031
	5.098V	0.341		115.17V
2	0.090A	0.459	73.794%	0.056
	5.098V	0.622		115.17V
3	0.550A	2.800	80.414%	0.238
	5.091V	3.482		115.18V
4	1.000A	5.084	81.046%	0.318
	5.084V	6.273		115.17V
5	1.500A	7.618	78.447%	0.367
	5.079V	9.711		115.17V
6	3.000A	15.143	76.619%	0.429
	5.048V	19.764		115.17V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.045A	0.229	56.965%	0.011
	5.099V	0.402		230.32V
2	0.090A	0.459	66.234%	0.019
	5.098V	0.693		230.32V
3	0.550A	2.800	77.114%	0.094
	5.092V	3.631		230.32V
4	1.000A	5.085	78.837%	0.153
	5.085V	6.450		230.32V
5	1.500A	7.619	78.619%	0.206
	5.079V	9.691		230.32V
6	2.999A	15.158	78.767%	0.296
	5.054V	19.244		230.31V

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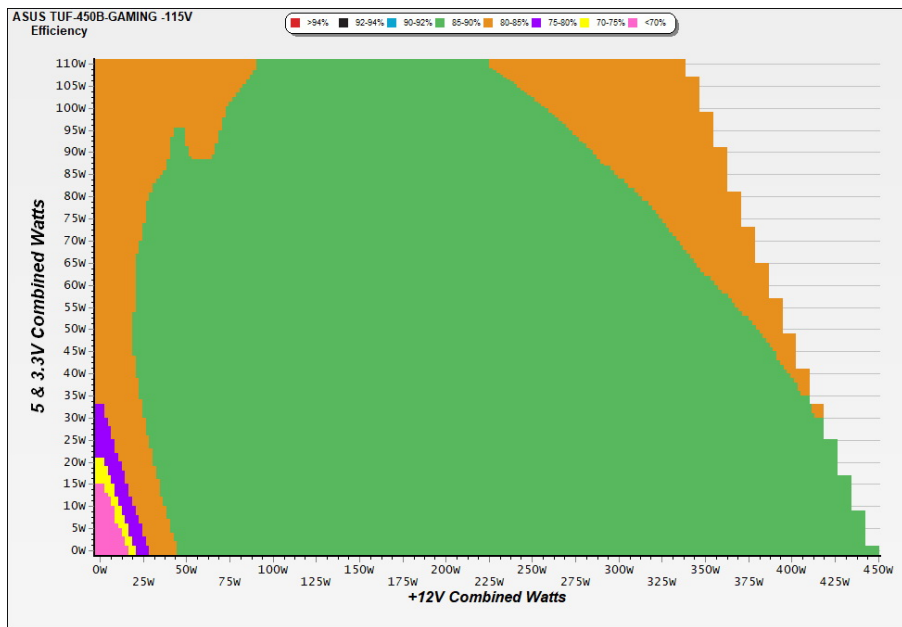
115V

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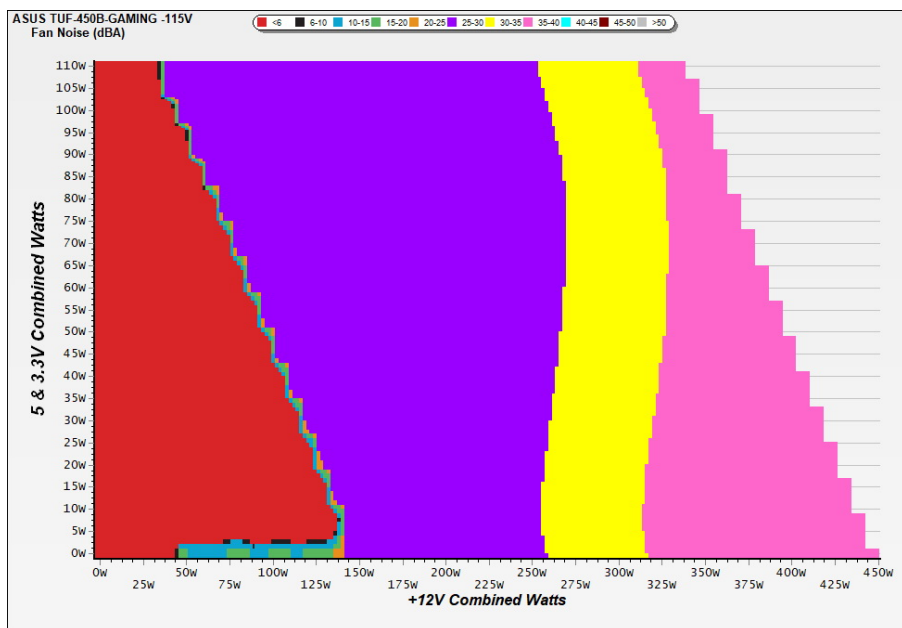
EFFICIENCY GRAPH 115V



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

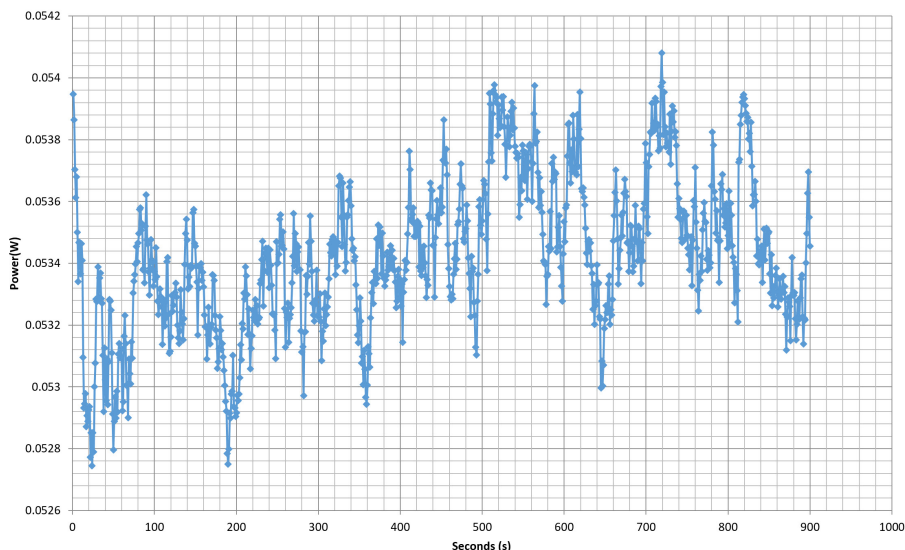
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

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VAMPIRE POWER -115V

Power - 2K070017569 - 04/09/2020 - 13:19



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
1	1.936A	1.950A	1.986A	0.984A	44.954	82.828%	0	<6.0	45.89°C	0.950
	12.064V	5.126V	3.324V	5.082V	54.274				40.15°C	115.17V
2	4.904A	2.928A	2.980A	1.182A	90.019	87.061%	0	<6.0	46.86°C	0.977
	12.055V	5.124V	3.322V	5.076V	103.398				40.50°C	115.17V
3	8.214A	3.416A	3.478A	1.380A	135.002	88.111%	0	<6.0	48.53°C	0.984
	12.047V	5.123V	3.321V	5.071V	153.218				41.63°C	115.17V
4	11.530A	3.909A	3.978A	1.579A	179.997	87.304%	1364	32.4	41.83°C	0.989
	12.037V	5.119V	3.318V	5.067V	206.173				49.58°C	115.17V
5	14.507A	4.888A	4.981A	1.778A	224.985	87.141%	1397	33.2	42.14°C	0.991
	12.027V	5.115V	3.314V	5.062V	258.186				50.67°C	115.17V
6	17.487A	5.869A	5.979A	1.978A	269.971	86.724%	1473	34.7	42.93°C	0.992
	12.018V	5.113V	3.312V	5.057V	311.300				51.99°C	115.16V
7	20.481A	6.850A	6.979A	2.177A	315.036	86.121%	1571	36.3	43.33°C	0.993
	12.008V	5.111V	3.309V	5.051V	365.808				53.05°C	115.16V
8	23.470A	7.831A	7.982A	2.377A	360.016	85.355%	1667	38.1	43.43°C	0.993
	11.999V	5.109V	3.307V	5.046V	421.785				54.18°C	115.16V
9	26.885A	8.323A	8.469A	2.378A	404.868	84.526%	1774	39.7	44.86°C	0.994
	11.991V	5.107V	3.305V	5.044V	478.985				56.42°C	115.16V
10	30.043A	8.815A	8.988A	2.980A	449.701	83.548%	1877	41.3	45.81°C	0.994
	11.983V	5.105V	3.304V	5.033V	538.254				57.86°C	115.16V
11	33.802A	8.817A	8.991A	2.981A	494.509	82.597%	1965	42.5	47.10°C	0.994
	11.976V	5.104V	3.303V	5.031V	598.701				59.79°C	115.16V
CL1	0.100A	13.000A	12.999A	0.000A	110.842	82.588%	0	<6.0	50.81°C	0.983
	12.038V	5.119V	3.315V	5.082V	134.211				42.46°C	115.18V
CL2	37.421A	1.000A	1.002A	1.000A	462.590	84.331%	1918	41.9	45.25°C	0.994
	12.001V	5.115V	3.313V	5.066V	548.544				57.38°C	115.16V

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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])	PF/AC Volts
1	1.229A	0.488A	0.496A	0.196A	19.983	75.354%	0	<6.0	0.869
	12.069V	5.127V	3.325V	5.096V	26.519				115.16V
2	2.460A	0.974A	0.992A	0.393A	39.973	83.227%	0	<6.0	0.939
	12.065V	5.127V	3.324V	5.093V	48.029				115.16V
3	3.694A	1.462A	1.491A	0.590A	60.006	85.932%	0	<6.0	0.962
	12.061V	5.126V	3.324V	5.089V	69.830				115.16V
4	4.923A	1.952A	1.985A	0.787A	79.957	87.118%	0	<6.0	0.973
	12.057V	5.125V	3.323V	5.084V	91.780				115.17V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	25.20mV	10.50mV	7.40mV	9.00mV	Pass
20% Load	23.50mV	11.50mV	8.60mV	11.50mV	Pass
30% Load	18.40mV	12.10mV	8.50mV	12.80mV	Pass
40% Load	17.10mV	14.10mV	9.20mV	19.60mV	Pass
50% Load	17.50mV	14.40mV	9.70mV	19.00mV	Pass
60% Load	14.00mV	15.20mV	10.20mV	24.10mV	Pass
70% Load	13.40mV	17.90mV	11.10mV	20.90mV	Pass
80% Load	15.20mV	17.60mV	13.80mV	24.50mV	Pass
90% Load	17.10mV	19.30mV	14.00mV	25.00mV	Pass
100% Load	29.20mV	22.20mV	16.00mV	38.20mV	Pass
110% Load	33.00mV	20.90mV	16.10mV	40.50mV	Pass
Crossload1	24.80mV	17.80mV	15.50mV	11.50mV	Pass
Crossload2	30.00mV	15.30mV	10.60mV	22.70mV	Pass

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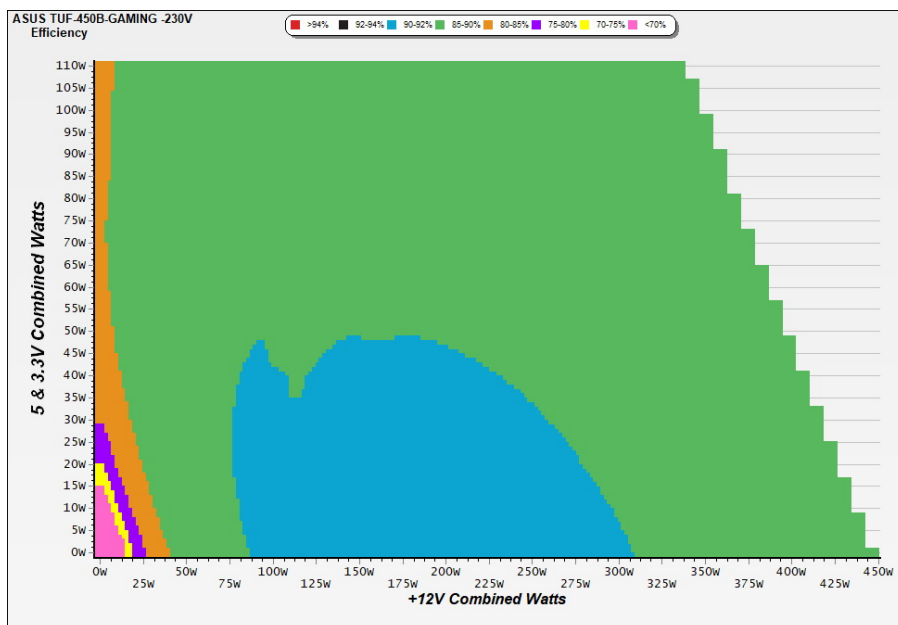
230V

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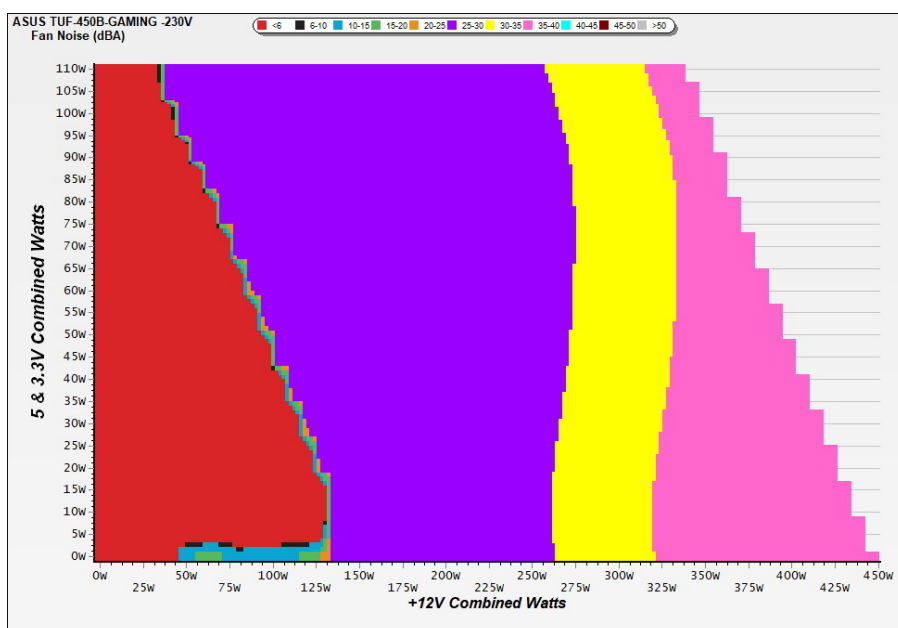
EFFICIENCY GRAPH 230V



INFO

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NOISE GRAPH 230V



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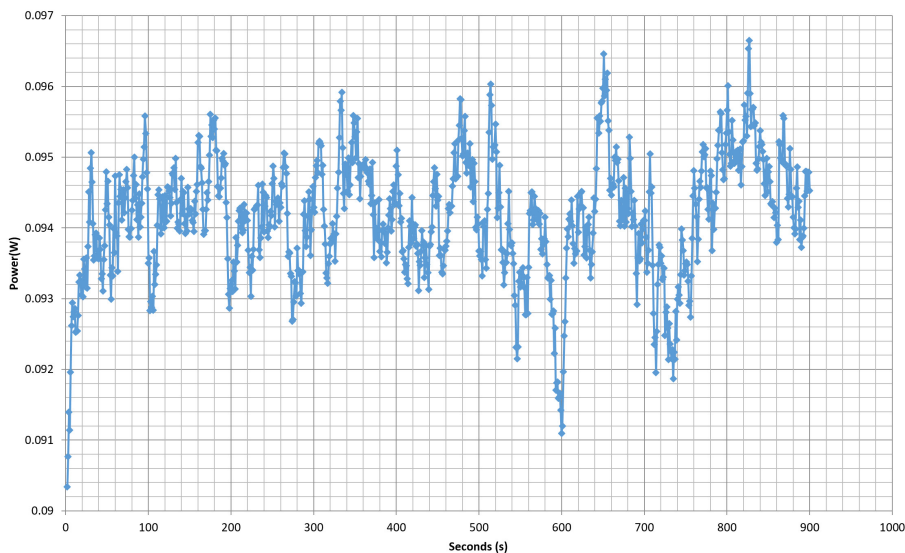
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10-110% LOAD TESTS 230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	1.936A	1.950A	1.986A	0.984A	44.958	83.979%	0	<6.0	45.33°C	0.727
	12.065V	5.127V	3.324V	5.082V	53.535				39.42°C	230.36V
2	4.904A	2.928A	2.978A	1.182A	90.019	88.611%	0	<6.0	47.50°C	0.872
	12.056V	5.124V	3.322V	5.076V	101.589				40.86°C	230.36V
3	8.213A	3.417A	3.478A	1.381A	135.009	89.929%	0	<6.0	48.22°C	0.923
	12.048V	5.123V	3.321V	5.071V	150.128				41.10°C	230.36V
4	11.534A	3.908A	3.980A	1.579A	180.008	89.350%	1365	32.5	41.38°C	0.947
	12.035V	5.117V	3.316V	5.067V	201.464				49.50°C	230.35V
5	14.508A	4.891A	4.981A	1.778A	224.993	89.447%	1367	32.5	41.85°C	0.960
	12.026V	5.115V	3.313V	5.062V	251.538				50.40°C	230.35V
6	17.489A	5.869A	5.983A	1.978A	269.986	89.176%	1446	34.0	43.04°C	0.968
	12.017V	5.113V	3.311V	5.057V	302.757				52.04°C	230.35V
7	20.480A	6.851A	6.983A	2.178A	315.048	88.684%	1575	36.4	43.78°C	0.973
	12.008V	5.111V	3.309V	5.051V	355.249				53.54°C	230.35V
8	23.472A	7.833A	7.981A	2.378A	360.029	88.117%	1655	37.9	43.91°C	0.977
	11.998V	5.109V	3.307V	5.046V	408.579				54.52°C	230.35V
9	26.885A	8.321A	8.468A	2.379A	404.832	87.574%	1745	39.3	44.06°C	0.980
	11.990V	5.107V	3.305V	5.044V	462.274				55.07°C	230.34V
10	30.040A	8.815A	8.989A	2.980A	449.676	86.727%	1874	41.3	46.13°C	0.982
	11.983V	5.106V	3.304V	5.033V	518.495				57.55°C	230.33V
11	33.800A	8.816A	8.991A	2.981A	494.480	86.014%	1954	42.5	46.84°C	0.984
	11.976V	5.104V	3.303V	5.031V	574.883				58.72°C	230.33V
CL1	0.100A	13.001A	12.999A	0.000A	110.835	84.196%	0	<6.0	50.20°C	0.908
	12.038V	5.118V	3.315V	5.082V	131.640				41.54°C	230.32V
CL2	37.420A	1.001A	1.000A	1.000A	462.574	87.622%	1891	41.4	45.82°C	0.983
	12.001V	5.114V	3.312V	5.066V	527.917				57.13°C	230.33V

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20-80W LOAD TESTS 230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.229A	0.488A	0.497A	0.196A	19.988	76.363%	0	<6.0	0.500
	12.070V	5.128V	3.326V	5.095V	26.175				230.36V
2	2.459A	0.975A	0.993A	0.393A	39.977	84.341%	0	<6.0	0.692
	12.068V	5.128V	3.325V	5.091V	47.399				230.36V
3	3.694A	1.463A	1.488A	0.590A	60.008	87.165%	0	<6.0	0.794
	12.063V	5.126V	3.324V	5.087V	68.844				230.36V
4	4.922A	1.951A	1.988A	0.787A	79.959	88.616%	0	<6.0	0.851
	12.059V	5.125V	3.323V	5.083V	90.231				230.35V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	27.50mV	10.40mV	7.90mV	8.90mV	Pass
20% Load	24.20mV	10.90mV	8.50mV	10.40mV	Pass
30% Load	18.90mV	12.20mV	8.80mV	12.10mV	Pass
40% Load	16.70mV	13.10mV	8.90mV	16.40mV	Pass
50% Load	17.70mV	15.30mV	10.20mV	18.80mV	Pass
60% Load	13.60mV	15.00mV	10.60mV	22.70mV	Pass
70% Load	12.90mV	15.90mV	11.40mV	22.40mV	Pass
80% Load	15.00mV	17.60mV	13.60mV	24.90mV	Pass
90% Load	18.10mV	18.50mV	14.60mV	25.00mV	Pass
100% Load	29.80mV	20.90mV	16.10mV	40.50mV	Pass
110% Load	33.60mV	21.20mV	16.60mV	41.60mV	Pass
Crossload1	24.00mV	17.40mV	15.50mV	11.50mV	Pass
Crossload2	30.90mV	16.90mV	11.00mV	23.70mV	Pass

All data and graphs included in this test report can be used by any individual on the following conditions:

- > It should be mentioned that the test results are provided by Cybenetics
- > The link to the original test results document should be provided in any case

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Anex

Asus TUF-450B-GAMING



Top side

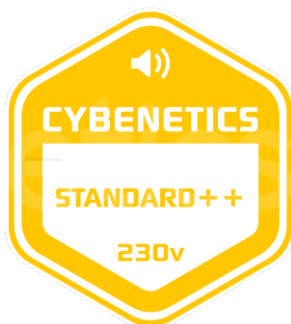


Power specifications label

CERTIFICATIONS 115V



CERTIFICATIONS 230V



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