ASUS TUF-650B-GAMING

L7YEMT000207W5Y

Lab ID AS65001708

Certification ID 251708

Test Result Report ID: 20PS1708A

Certificate Issue Date: Sep 7, 2020

Scheme: ETA-EMI PSU

115V



230V



Scheme: LAMBDA PSU

115V



230V





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	ASUS
Model	TUF-650B-GAMING
OEM/ODM	Great Wall
Serial Number	L7YEMT000207W5Y
Product Specifications	
Manufacturer-Provided Information	
□□□□ (Vrms)	100-240
□□□□ (Arms)	10-5
□□□□ (Hz)	47-63

□□□□ (W)	650
Operating Temperature (Continuous Full Load) (°C)	
□□	ATX12V
□□□□	Fixed cables
Warranty	-
Cybenetics Measurements	
Dimensions (W x H x D)	
Weight	
□□	135mm Double Ball-Bearing Fan (CF1325H12D)
□□□□□	✓
Cybenetics Testing Information	
Lab ID	AS65001708
Date of receipt	Aug 20, 2020
Testing Date	Sep 3, 2020
Report Issued Date	Sep 7, 2020
Engineer Name	-
Authorized By the Laboratory Technical Manager	Aristeidis Bitziopoulos
Signature	

□□□□ (Non-accredited measurements)

Native Cables				
□□	□□□	□□□□□	Gauge	In Cable Caps
ATX □□ 20+4 pin (610mm)	1	1	18-20AWG	□
4+4 pin EPS 12V □□ (820mm)	2	2	18AWG	□
6+2pin PCIe□□ (610mm+100mm)	2	4	18AWG	□
SATA□□ (400mm+120mm+120mm)	1	3	18AWG	□
SATA□□ (400mm+120mm)	1	2	18AWG	□
4-pin Molex (400mm+150mm+150mm+150mm)	1	4	18AWG	□

□□□□

□		3.3V	5V	12V	5VSB	-12V
□□□□	□□	25	25	51	3	0.8
	□	130		612	15	9.6
□□□□□ (W)		650				

Parts Description

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 SCK201R0
Bridge Rectifier(s)	2x GBU1508 (800V, 15A @ 100°C)
APFC MOSFETs	2x Advanced Power AP30SL60WL (650V, 16.5A @ 100°C, Rds(on): 0.13Ohm)
APFC Boost Diode	1x STMicroelectronics STPSC6H065D (650V, 6A @ 135°C)
Bulk Cap(s)	2x Teapo (450V, 270uF each or 540uF combined, 2,000h @ 105°C, LG)
Main Switchers	2x Advanced Power AP65SL190D (650V, 12.3A @ 100°C, Rds(on): 0.19Ohm)
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	4x Advanced Power AP9990GP (60V, 80A @ 100°C, Rds(on): 6mOhm)
5V & 3.3V	DC-DC Converters: 4x Infineon IPD040N03L (30V, 76A @ 100°C, Rds(on): 4mOhm) PWM Controllers: ANPEC APW7159C
Filtering Capacitors	Electrolytic: 2x Elite (3-5,000h @ 105°C, EJ), 2x Elite (2-5,000h @ 105°C, ED), 1x Teapo (6-10,000h @ 105°C, TC), 1x Teapo (3-5,000h @ 105°C, TX), 2x Lelon (4-10,000h @ 105°C, RZW), 1x Lelon (4-7,000h @ 105°C, RXW) Polymer: 4x Elite, 3x 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

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)	87.131%
Average Noise Output (>1450 Load Combinations)	32.23dBA
PF□□□ (>1450 Load Combinations)	0.978
Efficiency With 10W (≤500W) or 2% (>500W) Load	67.284%
□□□□□□	0.0556W
Non-Accredited	
12V Ripple (Full Load)	37.90mV
5V Ripple (Full Load)	24.43mV
3.3V Ripple (Full Load)	21.92mV
5VSB Ripple (Full Load)	31.35mV
12V Load Regulation	0.89%
5V Load Regulation	1.04%
3.3V Load Regulation	0.81%
5VSB Load Regulation	1.50%

Inrush Current	42.800A

230V

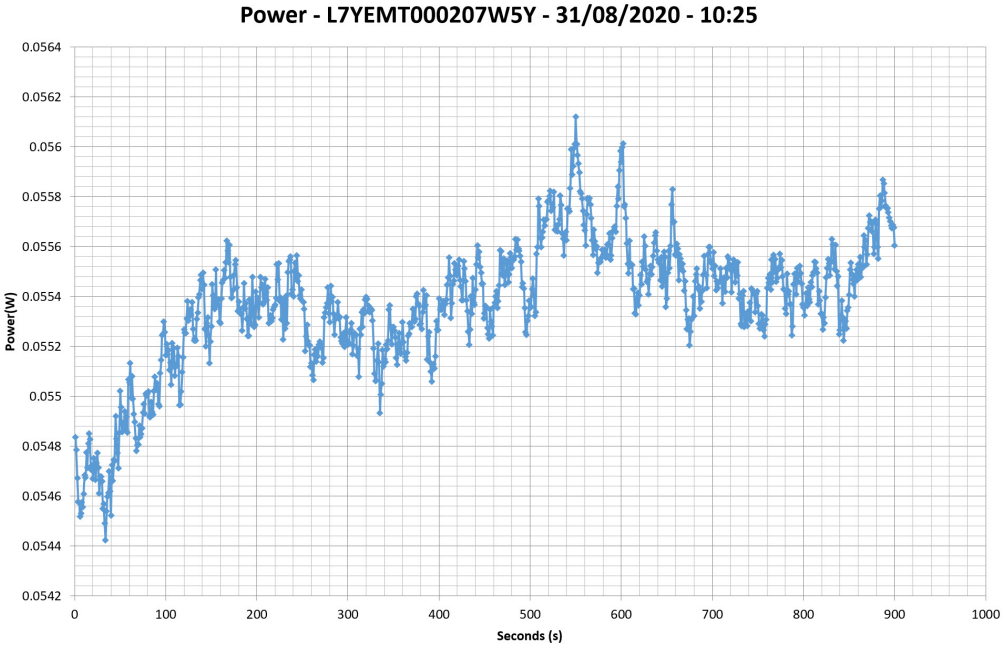
Accredited		
□□□□ (>1450 load combinations)		89.562%
Average Noise Output (>1450 Load Combinations)		31.87dBA
PF□□□ (>1450 Load Combinations)		0.941
Efficiency With 10W (≤500W) or 2% (>500W) Load		-
□□□□□□		0.0961W
Non-Accredited		
12V Ripple (Full Load)		38.61mV
5V Ripple (Full Load)		23.79mV
3.3V Ripple (Full Load)		22.35mV
5VSB Ripple (Full Load)		29.58mV
12V Load Regulation		0.92%
5V Load Regulation		1.04%
3.3V Load Regulation		0.81%
5VSB Load Regulation		1.43%
Inrush Current		98.100A
□□□□ & PG□□		12.40ms
AC Loss to PWR_OK Hold Up Time		10.10ms
PWR_OK Inactive to DC Loss Delay		2.30ms
PSU Timings: T1 (20% / 100%)	34.0ms	32.0ms
PSU Timings: T3 (20% / 100%)	120.0ms	122.0ms
OPP (28.00°C / 43.00°C)	126.36%	126.37%

□□□□ & PG□□

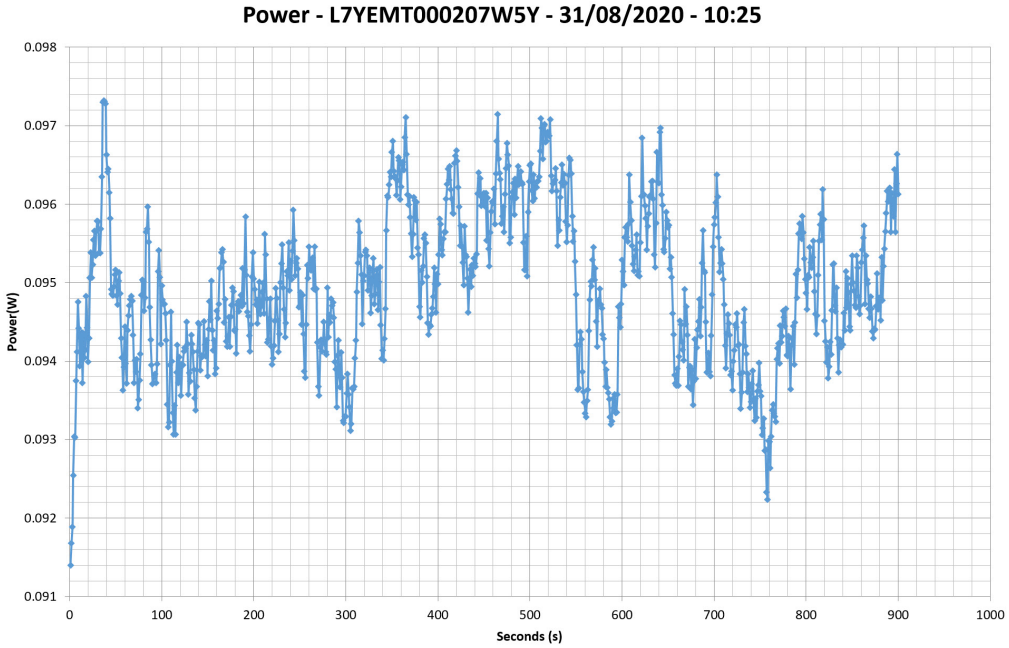
Hold-Up Time (ms)	12.4
AC Loss to PWR_OK Hold Up Time (ms)	10.1
PWR_OK Inactive to DC Loss Delay (ms)	2.3

Graphs

115V



230V



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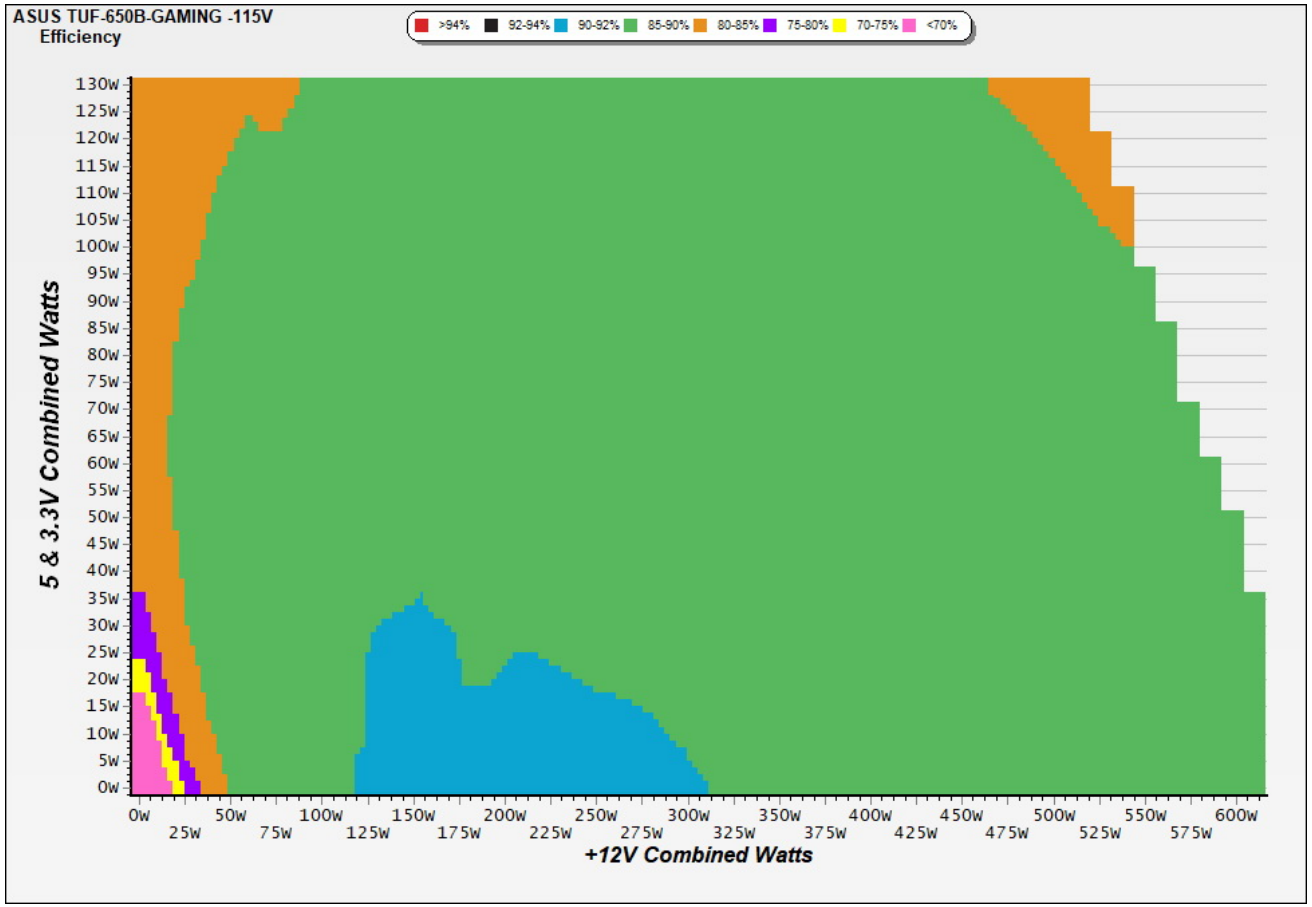
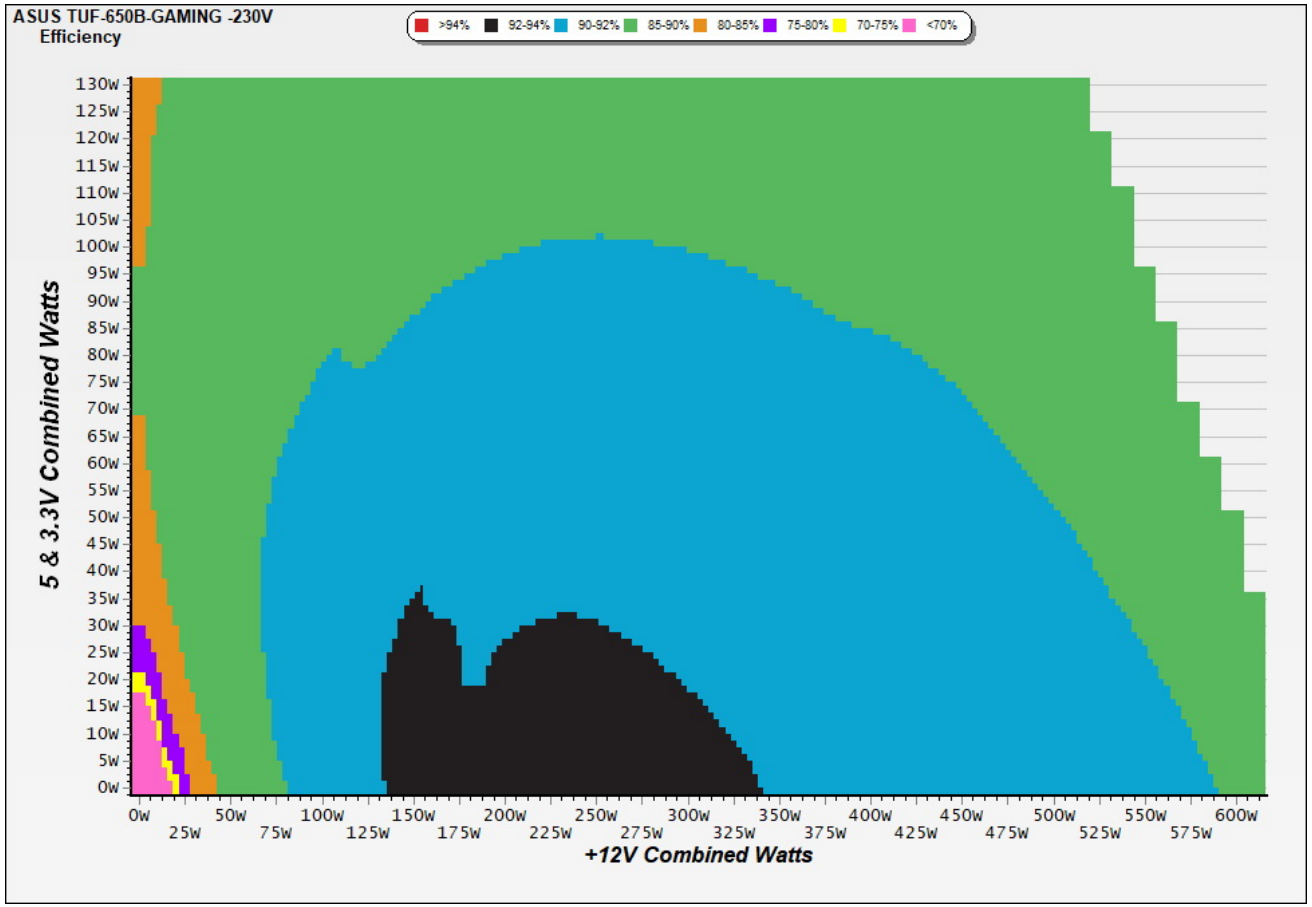
115V



□□

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



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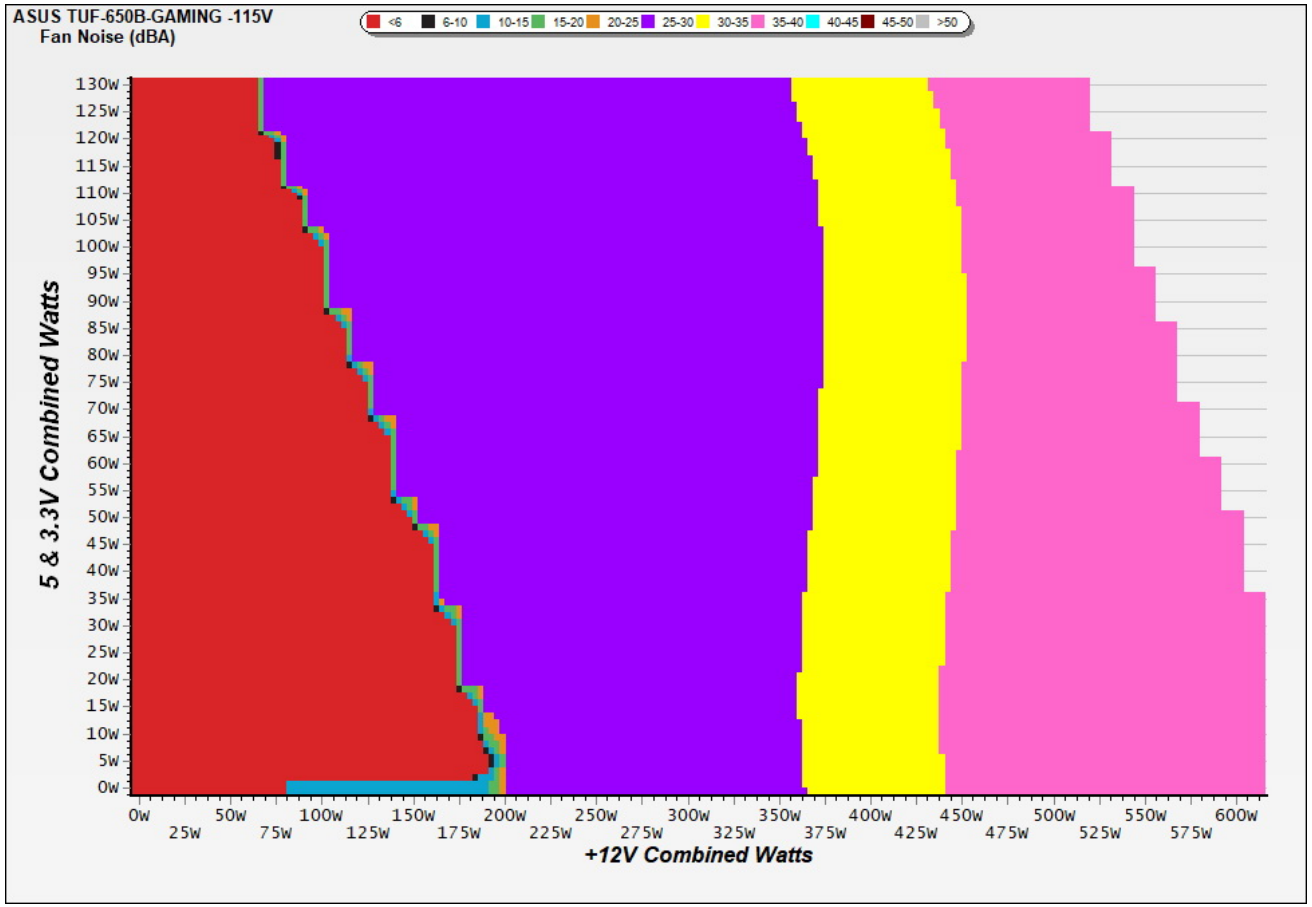
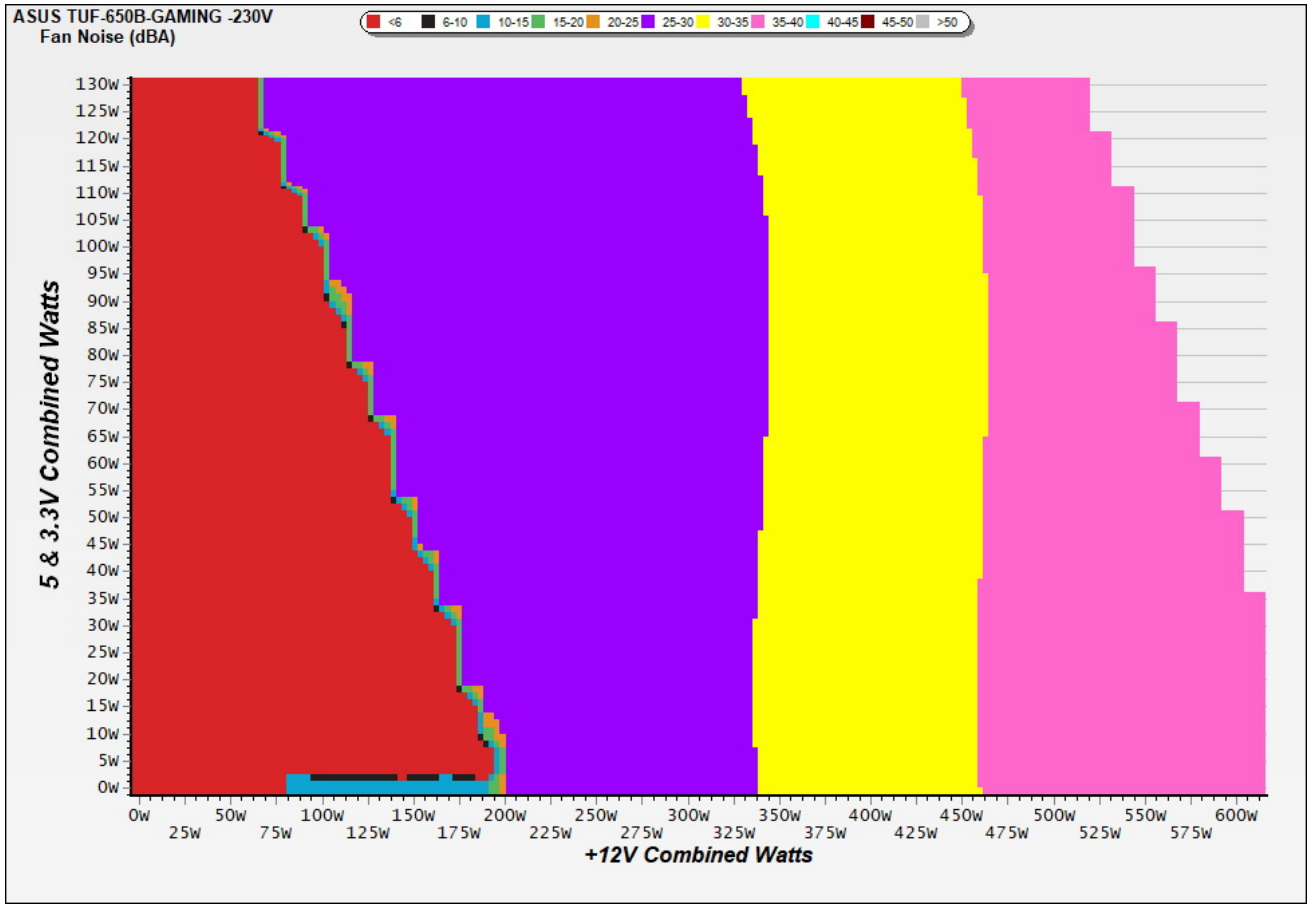
115V



□□

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

Noise under high ambient temperature (indicative)

115V

Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 46.7 °C	0 RPM · <6.0 dB(A) · 46.7 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 47.8 °C	0 RPM · <6.0 dB(A) · 47.8 °C	fan off in both
50%	1346 RPM · 32.0 dB(A) · 42.3 °C	1346 RPM · 32.0 dB(A) · 42.3 °C	**+0.0 dB(A)**
100%	1950 RPM · 42.5 dB(A) · 45.9 °C	1950 RPM · 42.5 dB(A) · 45.9 °C	**+0.0 dB(A)**

230V

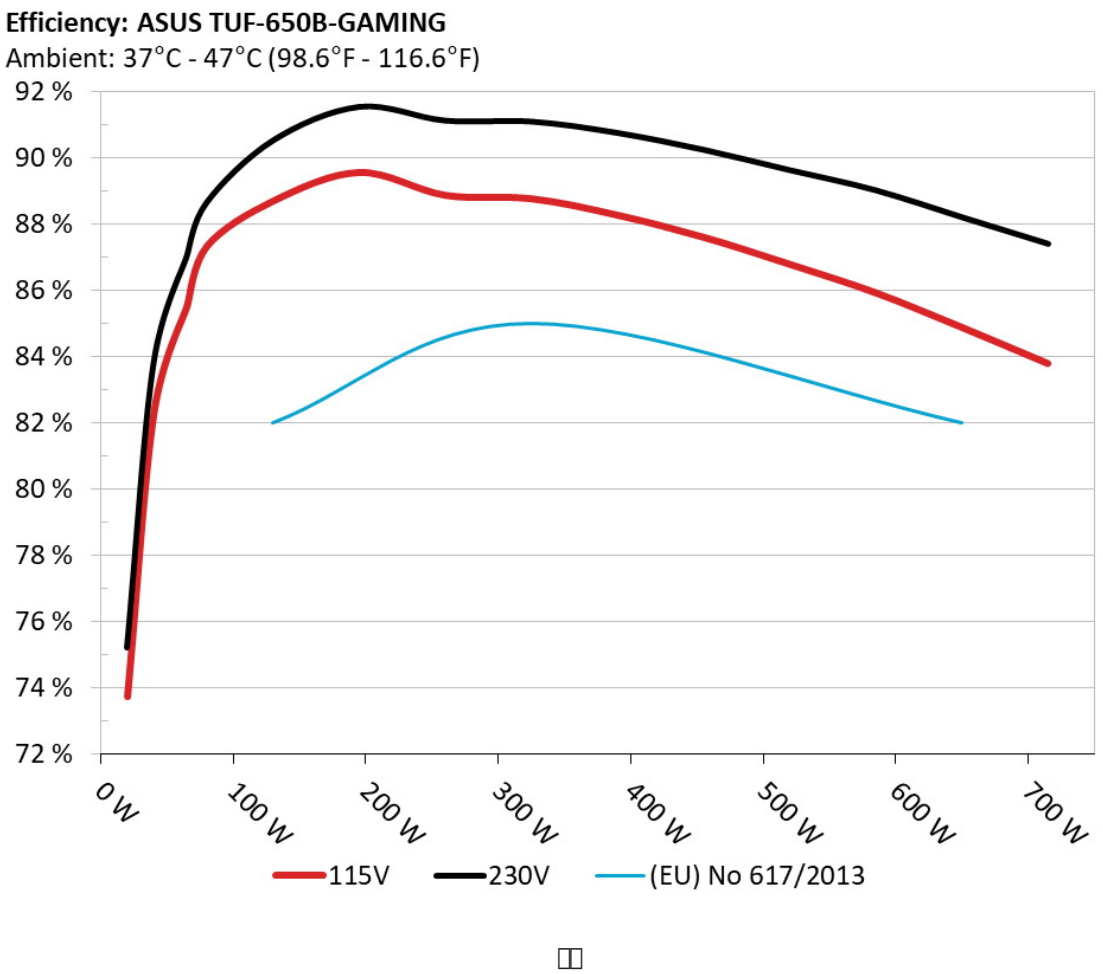
Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 46.9 °C	0 RPM · <6.0 dB(A) · 46.9 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 48.0 °C	0 RPM · <6.0 dB(A) · 48.0 °C	fan off in both
50%	1297 RPM · 31.0 dB(A) · 42.8 °C	1297 RPM · 31.0 dB(A) · 42.8 °C	**+0.0 dB(A)**
100%	1960 RPM · 42.5 dB(A) · 46.6 °C	1960 RPM · 42.5 dB(A) · 46.6 °C	**+0.0 dB(A)**

INFO

Fan speed, noise and the measured intake temperature at 10, 20, 50 and 100 % load, from the two load regulation tests: at normal ambient (about 30-32 °C) and at high ambient (about 40-47 °C). These are stabilized readings at fixed loads, not averages over the certification sweep, so they are indicative of how the fan behaves when it is hot. "<6.0" is the floor of our sound meter, with the fan stopped; with the fan stopped, the intake sensor can read higher than the chamber air.

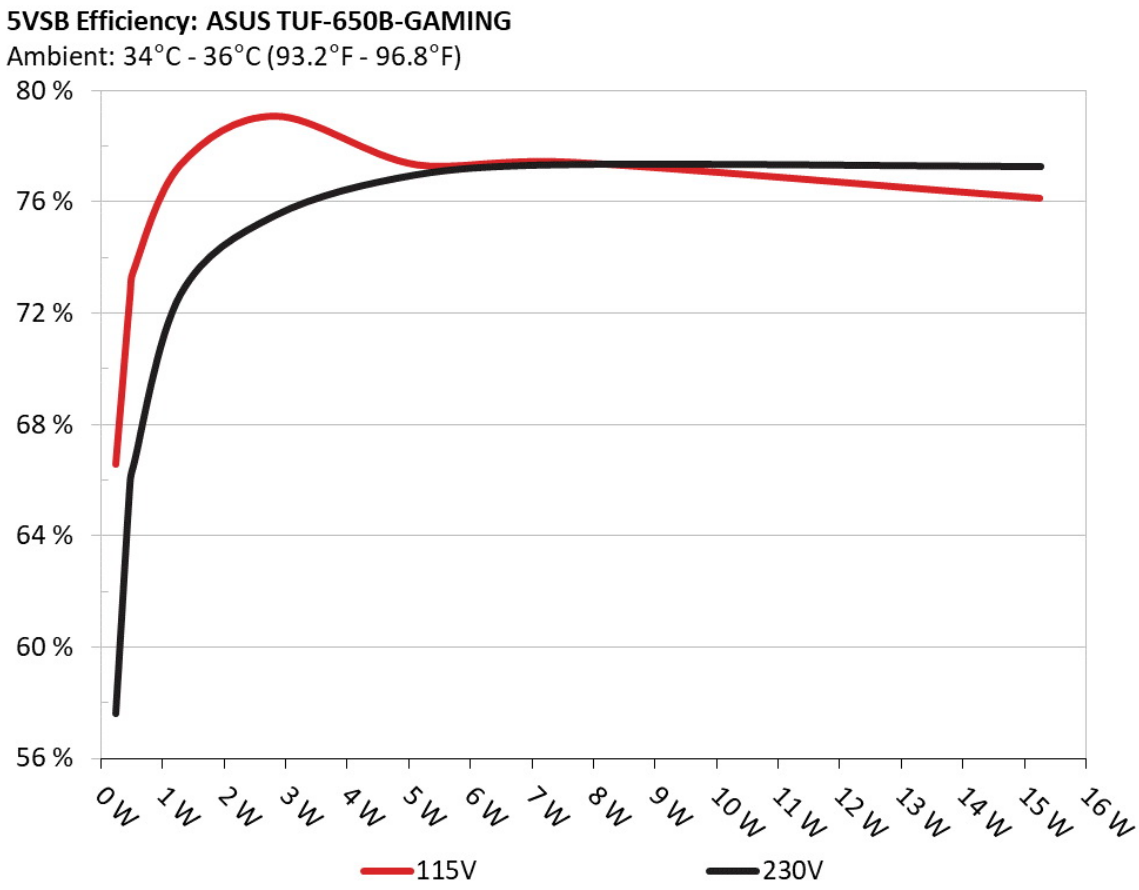
Informational. Not part of the ETA or LAMBDA rating.

Indicative Performance



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□□□□



□□

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	0.231	66.571%	0.031
	5.133V	0.347		115.13V
2	0.090A	0.462	72.642%	0.056
	5.133V	0.636		115.13V
3	0.550A	2.820	79.080%	0.231
	5.125V	3.566		115.13V
4	1.000A	5.120	77.330%	0.310
	5.119V	6.621		115.13V
5	1.500A	7.667	77.421%	0.352
	5.111V	9.903		115.13V
6	3.000A	15.238	76.133%	0.410
	5.079V	20.015		115.13V

230V

□□ #	5VSB	DC/AC (□)	□□	PF/AC □□
1	0.045A	0.231	57.606%	0.011
	5.133V	0.401		230.27V
2	0.090A	0.462	65.906%	0.019
	5.133V	0.701		230.27V
3	0.550A	2.820	75.522%	0.095
	5.126V	3.734		230.27V
4	1.000A	5.119	76.989%	0.154
	5.118V	6.649		230.27V
5	1.500A	7.669	77.355%	0.203
	5.112V	9.914		230.27V
6	3.000A	15.257	77.282%	0.288
	5.085V	19.742		230.27V

Supplementary Tests (For Reference)

10-110%□□□□

115V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
1	3.598A	1.961A	1.989A	0.979A	64.972	85.416%	0	<6.0	46.70°C	0.938
	12.053V	5.100V	3.320V	5.108V	76.065				40.84°C	115.13V
2	8.232A	2.945A	2.985A	1.177A	130.045	88.697%	0	<6.0	47.77°C	0.960
	12.043V	5.094V	3.317V	5.100V	146.617				40.91°C	115.13V
3	13.215A	3.438A	3.484A	1.374A	195.053	89.561%	0	<6.0	48.86°C	0.972
	12.032V	5.090V	3.315V	5.095V	217.787				41.19°C	115.13V
4	18.211A	3.934A	3.987A	1.572A	260.069	88.868%	1330	31.6	41.40°C	0.978
	12.018V	5.086V	3.311V	5.089V	292.648				49.86°C	115.13V
5	22.872A	4.924A	4.990A	1.771A	325.116	88.767%	1346	32.0	42.32°C	0.983
	12.006V	5.079V	3.307V	5.084V	366.257				51.54°C	115.13V
6	27.502A	5.916A	5.993A	1.970A	389.675	88.273%	1427	33.6	42.58°C	0.986
	11.994V	5.073V	3.304V	5.078V	441.442				52.50°C	115.12V
7	32.201A	6.911A	7.000A	2.170A	454.986	87.602%	1588	36.5	43.29°C	0.988
	11.983V	5.066V	3.301V	5.071V	519.377				53.74°C	115.12V
8	36.909A	7.908A	8.006A	2.370A	520.297	86.782%	1730	39.0	43.97°C	0.989
	11.972V	5.060V	3.298V	5.065V	599.542				54.83°C	115.12V
9	42.024A	8.410A	8.495A	2.372A	585.217	85.918%	1857	41.1	44.49°C	0.991
	11.962V	5.056V	3.296V	5.061V	681.132				56.41°C	115.12V
10	46.888A	8.912A	9.018A	2.973A	650.050	84.878%	1950	42.5	45.87°C	0.992
	11.950V	5.052V	3.294V	5.049V	765.863				58.16°C	115.12V
11	52.356A	8.915A	9.025A	2.974A	714.865	83.787%	2047	43.7	46.57°C	0.993
	11.940V	5.050V	3.292V	5.045V	853.197				59.38°C	115.11V
CL1	0.102A	16.006A	16.001A	0.000A	134.556	81.669%	0	<6.0	51.37°C	0.964
	12.030V	5.027V	3.304V	5.095V	164.758				42.67°C	115.13V

CL2	51.016A	0.999A	1.000A	1.000A	624.184	86.001%	1964	42.5	45.60°C	0.992
	11.971V	5.090V	3.306V	5.080V	725.790				58.53°C	115.12V

The results above are not used in the certification process

230V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	□□ (□□ /□□)	PF/AC □□
1	3.598A	1.962A	1.988A	0.979A	64.976	86.927%	0	<6.0	46.92°C	0.789
	12.054V	5.100V	3.320V	5.107V	74.748				40.63°C	230.28V
2	8.234A	2.943A	2.985A	1.177A	130.054	90.510%	0	<6.0	48.03°C	0.894
	12.042V	5.094V	3.318V	5.101V	143.690				40.74°C	230.27V
3	13.215A	3.438A	3.484A	1.374A	195.069	91.530%	0	<6.0	49.04°C	0.930
	12.033V	5.090V	3.316V	5.095V	213.120				41.37°C	230.27V
4	18.213A	3.934A	3.987A	1.572A	260.078	91.114%	1317	31.5	41.73°C	0.949
	12.017V	5.086V	3.311V	5.091V	285.443				50.44°C	230.28V
5	22.878A	4.923A	4.988A	1.770A	325.130	91.084%	1297	31.0	42.80°C	0.960
	12.004V	5.079V	3.307V	5.086V	356.955				52.16°C	230.28V
6	27.507A	5.916A	5.992A	1.969A	389.701	90.744%	1439	34.0	43.08°C	0.966
	11.993V	5.073V	3.304V	5.079V	429.451				53.14°C	230.28V
7	32.206A	6.911A	7.000A	2.170A	455.016	90.231%	1569	36.3	43.44°C	0.972
	11.982V	5.066V	3.301V	5.072V	504.281				54.08°C	230.28V
8	36.914A	7.909A	8.004A	2.370A	520.328	89.614%	1733	39.0	43.81°C	0.975
	11.971V	5.060V	3.299V	5.066V	580.631				55.38°C	230.27V
9	42.031A	8.410A	8.498A	2.372A	585.229	89.003%	1844	40.9	45.06°C	0.978
	11.960V	5.056V	3.296V	5.062V	657.536				57.03°C	230.28V
10	46.893A	8.915A	9.018A	2.972A	650.074	88.191%	1960	42.5	46.59°C	0.981
	11.949V	5.052V	3.294V	5.049V	737.118				58.89°C	230.28V
11	52.363A	8.916A	9.023A	2.975A	714.900	87.391%	2044	43.7	46.81°C	0.983
	11.939V	5.050V	3.292V	5.045V	818.049				59.59°C	230.28V
CL1	0.102A	16.006A	16.003A	0.000A	134.578	83.390%	0	<6.0	52.80°C	0.906
	12.029V	5.028V	3.304V	5.098V	161.383				42.20°C	230.28V

CL2	51.026A	1.000A	1.001A	1.000A	624.163	89.254%	1945	42.4	46.02°C	0.980
	11.968V	5.091V	3.305V	5.084V	699.314				58.74°C	230.28V

The results above are not used in the certification process

20-80□□□□□

115V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	PF/AC □□
1	1.231A	0.490A	0.497A	0.195A	20.000	73.714%	0	<6.0	0.847
	12.061V	5.108V	3.323V	5.126V	27.132				115.14V
2	2.462A	0.980A	0.994A	0.391A	39.990	82.304%	0	<6.0	0.911
	12.057V	5.105V	3.321V	5.121V	48.588				115.14V
3	3.698A	1.469A	1.491A	0.587A	60.021	85.521%	0	<6.0	0.934
	12.053V	5.102V	3.320V	5.117V	70.183				115.13V
4	4.927A	1.962A	1.987A	0.783A	79.972	87.330%	0	<6.0	0.945
	12.050V	5.099V	3.319V	5.112V	91.574				115.13V

The results above are not used in the certification process

230V

□□ #	12V	5V	3.3V	5VSB	DC/AC (□)	□□	□□□□ (RPM)	□□□□□□□ (dB[A])	PF/AC □□
1	1.231A	0.490A	0.497A	0.195A	20.002	75.195%	0	<6.0	0.495
	12.062V	5.108V	3.322V	5.127V	26.600				230.26V
2	2.462A	0.980A	0.994A	0.391A	39.993	83.769%	0	<6.0	0.676
	12.058V	5.106V	3.321V	5.122V	47.742				230.26V
3	3.698A	1.469A	1.490A	0.587A	60.025	87.010%	0	<6.0	0.771
	12.054V	5.103V	3.321V	5.117V	68.986				230.28V
4	4.927A	1.961A	1.987A	0.783A	79.976	88.636%	0	<6.0	0.825
	12.051V	5.100V	3.320V	5.113V	90.230				230.27V

The results above are not used in the certification process

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115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	16.90mV	13.20mV	12.90mV	9.50mV	Pass
20% Load	15.40mV	15.20mV	14.10mV	11.30mV	Pass
30% Load	15.20mV	17.10mV	15.30mV	16.60mV	Pass
40% Load	16.00mV	19.40mV	16.20mV	17.60mV	Pass
50% Load	18.10mV	19.70mV	17.80mV	20.00mV	Pass
60% Load	20.60mV	20.80mV	17.20mV	21.40mV	Pass
70% Load	21.60mV	20.80mV	17.80mV	21.70mV	Pass
80% Load	23.30mV	21.50mV	19.30mV	24.40mV	Pass
90% Load	25.90mV	22.60mV	19.80mV	25.40mV	Pass
100% Load	37.90mV	24.40mV	21.90mV	31.40mV	Pass
110% Load	40.00mV	24.80mV	22.10mV	32.10mV	Pass
Crossload1	21.20mV	20.00mV	19.70mV	11.20mV	Pass
Crossload2	33.40mV	22.10mV	19.90mV	21.50mV	Pass

The results above are not used in the certification process

230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	19.00mV	11.90mV	10.60mV	9.20mV	Pass
20% Load	16.20mV	13.10mV	11.90mV	10.80mV	Pass
30% Load	12.10mV	13.40mV	12.20mV	15.50mV	Pass
40% Load	14.20mV	15.90mV	13.00mV	16.70mV	Pass
50% Load	16.10mV	16.20mV	14.10mV	19.20mV	Pass
60% Load	18.70mV	17.50mV	15.90mV	20.30mV	Pass
70% Load	20.10mV	18.00mV	16.60mV	20.60mV	Pass
80% Load	22.00mV	19.60mV	18.20mV	23.00mV	Pass





Test	12V	5V	3.3V	5VSB	Pass/Fail
90% Load	27.00mV	21.40mV	19.50mV	25.30mV	Pass
100% Load	38.60mV	23.80mV	22.40mV	29.60mV	Pass
110% Load	40.10mV	24.10mV	22.40mV	31.30mV	Pass
Crossload1	20.40mV	17.10mV	18.70mV	10.50mV	Pass
Crossload2	35.70mV	21.00mV	20.90mV	21.60mV	Pass

The results above are not used in the certification process

ASUS TUF-650B-GAMING

Top side

Power specifications label

本测试报告中包含的所有数据和图表均可在以下条件下由任何人使用：使用过程需提及测试结果由 Cybenetics提供。
在任何情况下都应提供原始测试结果文档的网站链接

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