ASUS TUF-650B-GAMING

序號 L7YEMT000207W5Y

Lab ID AS65001708

認證 ID 251708

測試結果報告 ID: 20PS1708A

證書簽發日期 : Sep 7, 2020

115V 230V

認證方案: ETA-EMI PSU

115V 230V

認證方案: LAMBDA PSU

Aristeidis Bitziopoulos, 認證機構總經理

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

額定頻率 (Hz)	47-63
額定功率 (W)	650
工作溫度 (持續滿載) (°C)	
類別	ATX12V
線材設計	Fixed cables
保固	-
Cybenetics Measurements	
Dimensions (W x H x D)	
重量	
散熱	135mm Double Ball-Bearing Fan (CF1325H12D)
半被動運轉	✓
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	

線材與接頭

(Non-accredited measurements)

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)	2	2	18AWG	No
6+2 pin PCIe (610mm+100mm)	2	4	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

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	25	25	51	3	0.8
	Watts	130		612	15	9.6
Total Max. Power (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

溫度範圍 (°C /°F)	28-32 / 82.4-89.6
符合 ErP Lot 3/6	✓
符合 (EU) No 617/2013規範	✓
相容 ALPM（Alternative Low Power Mode）	✓

Performance Summary

115V

Accredited	
平均效率 (>1450 load combinations)	87.131%
Average Noise Output (>1450 Load Combinations)	32.23dBA
PF平均值 (>1450 Load Combinations)	0.978
Efficiency With 10W (≤500W) or 2% (>500W) Load	67.284%
待機功耗	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
□□□□ & PWR_OK □□		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%

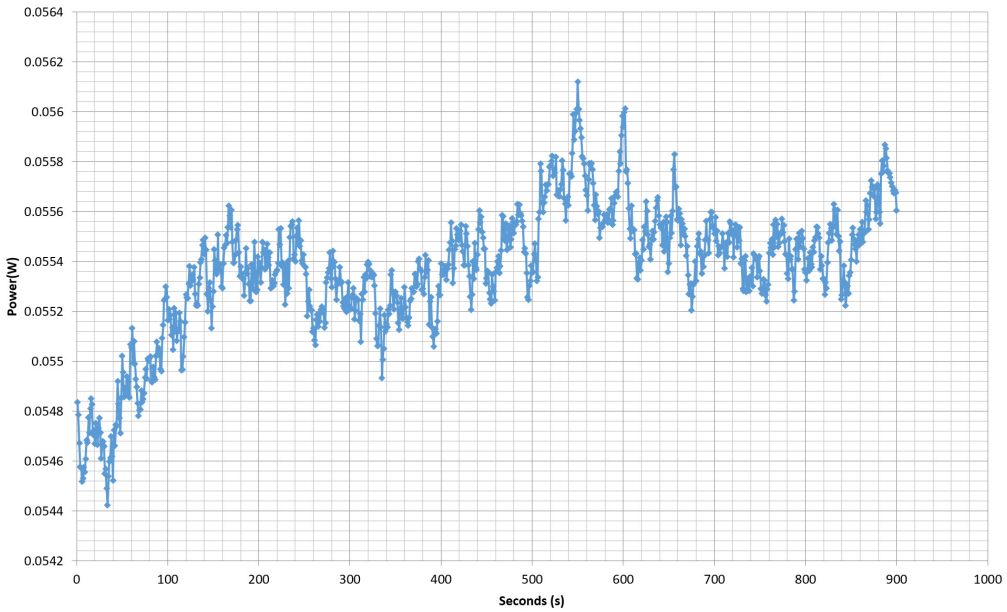
□□□□ & PWR_OK □□

Hold-Up Time (ms)	12.4
AC Loss to PWR_OK Hold Up Time (ms)	10.1

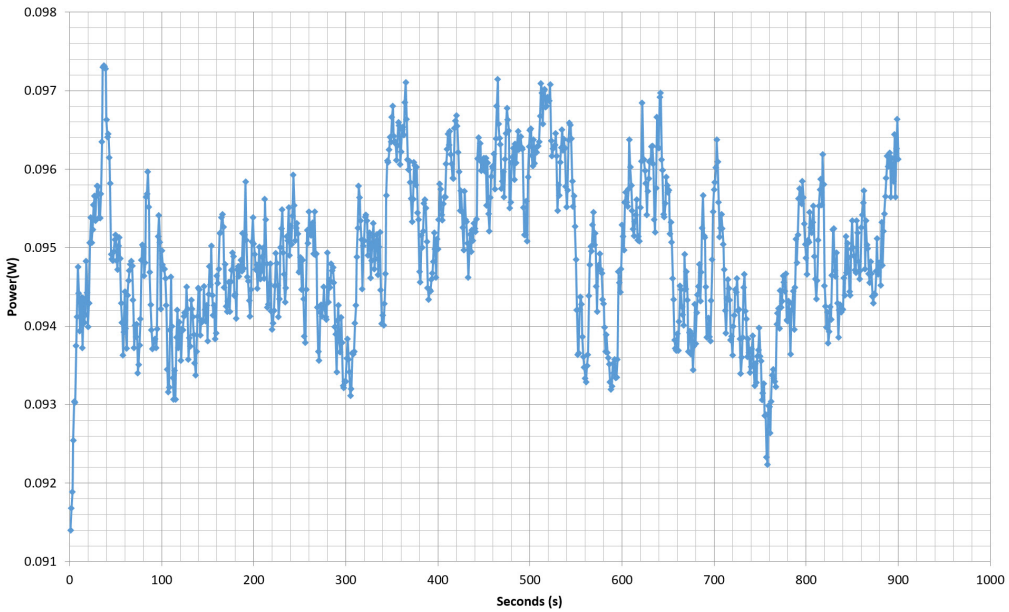
PWR_OK Inactive to DC Loss Delay (ms)	2.3

Graphs

115V



230V



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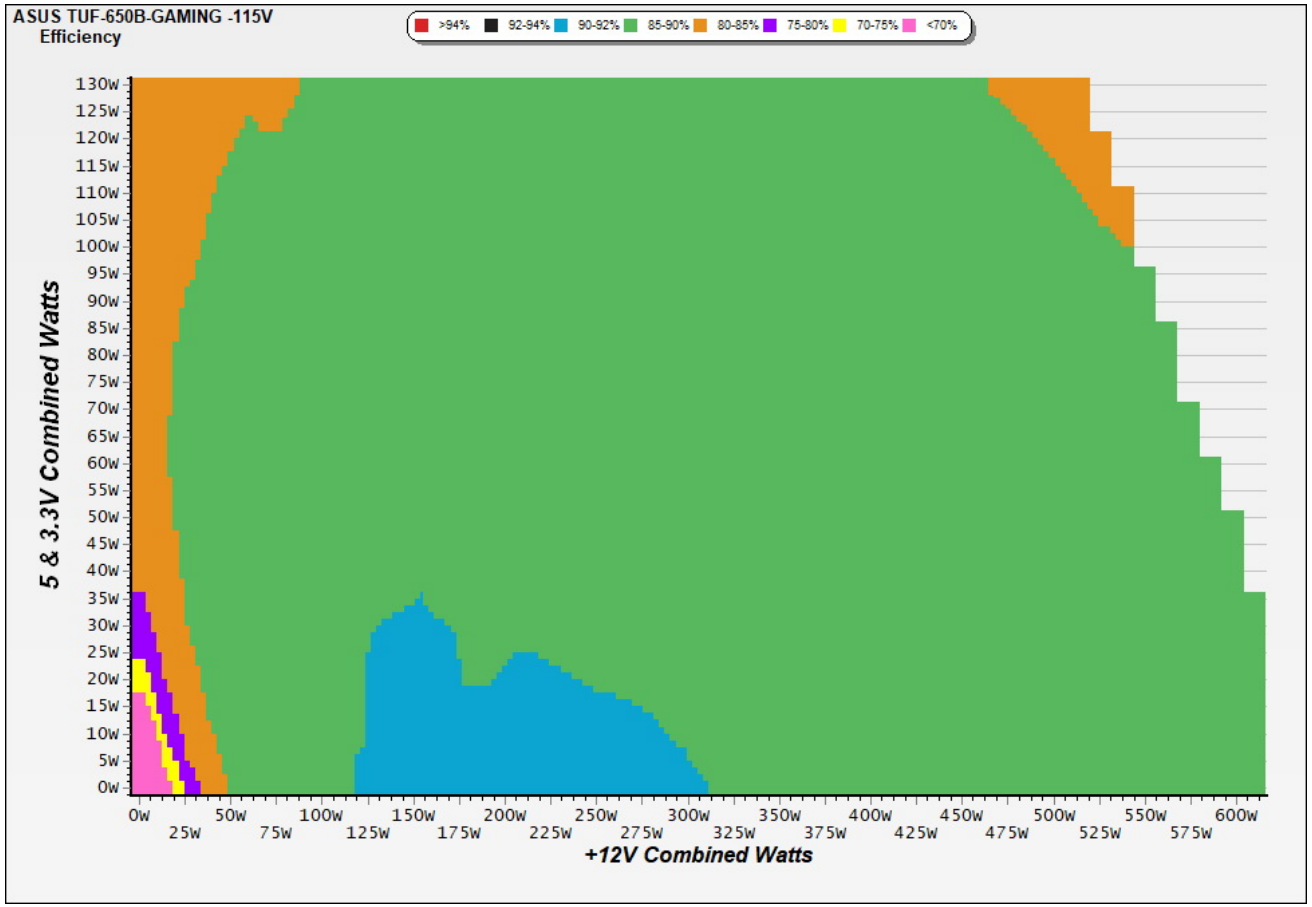
115V



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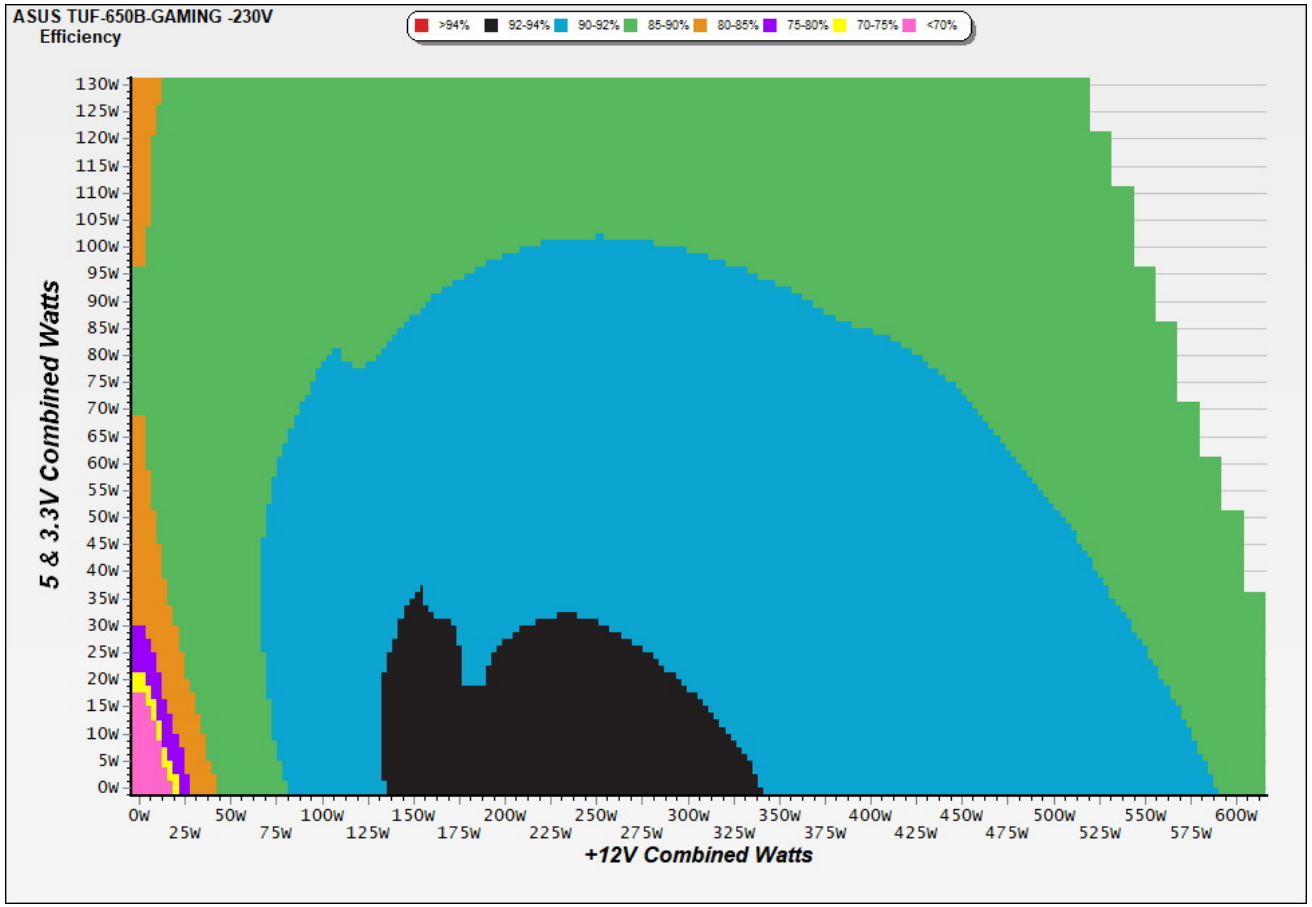
This graph depicts the PSU`s efficiency throughout its entire operational range. For the generation of the efficiency and noise graphs we set our loaders to auto mode through our custom-made software before trying thousands of possible load combinations

230V



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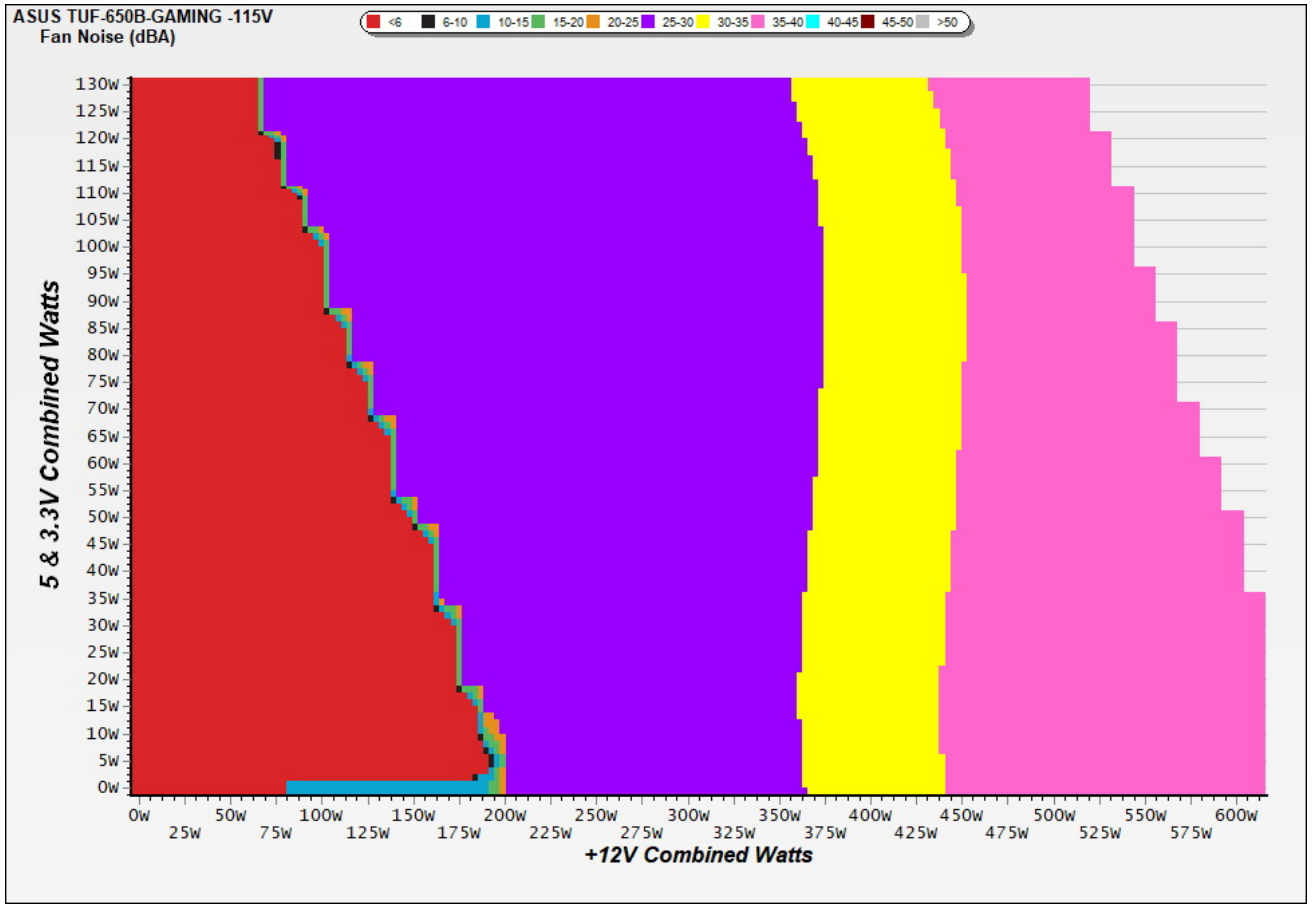
115V



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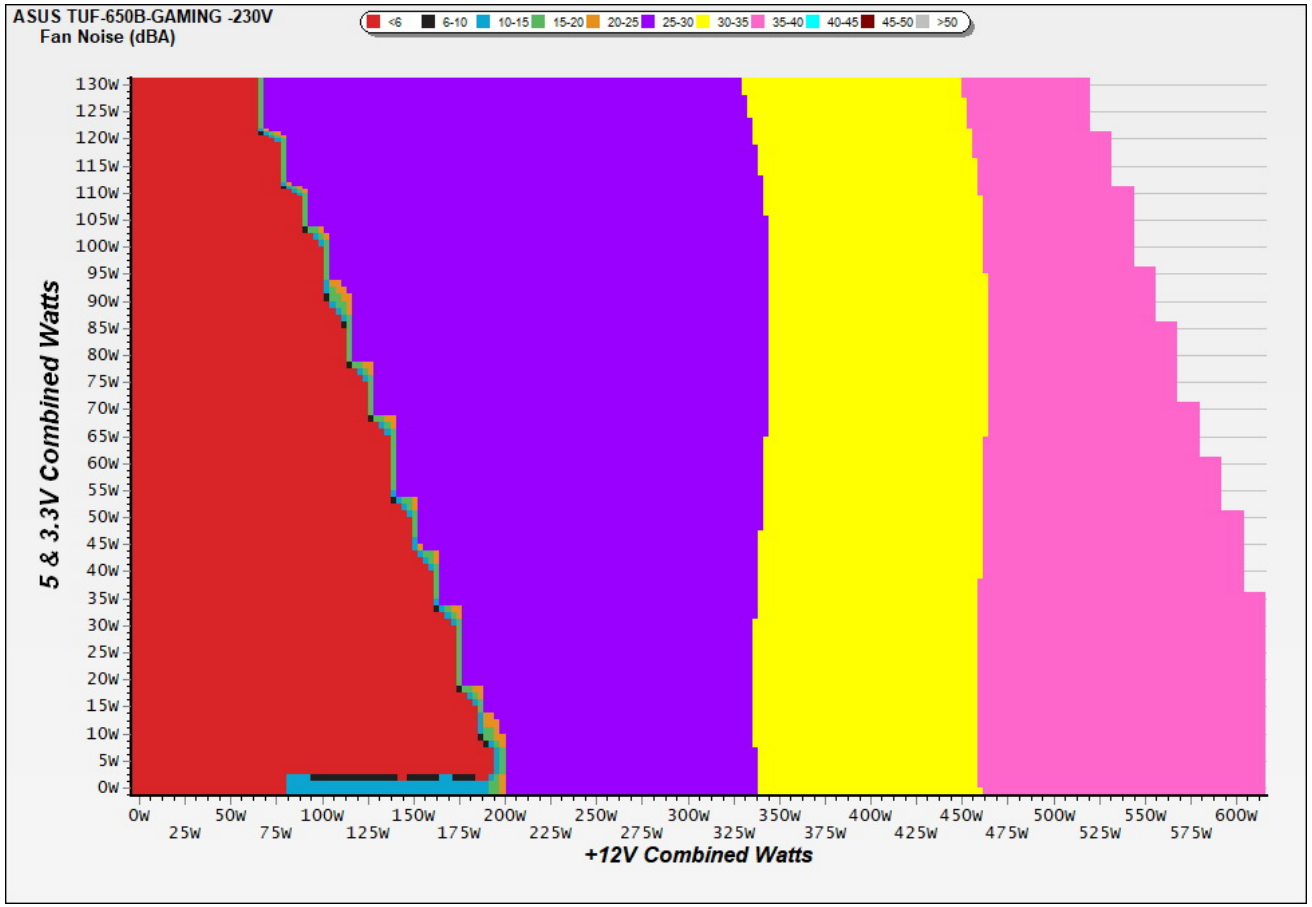
The PSU`s noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

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

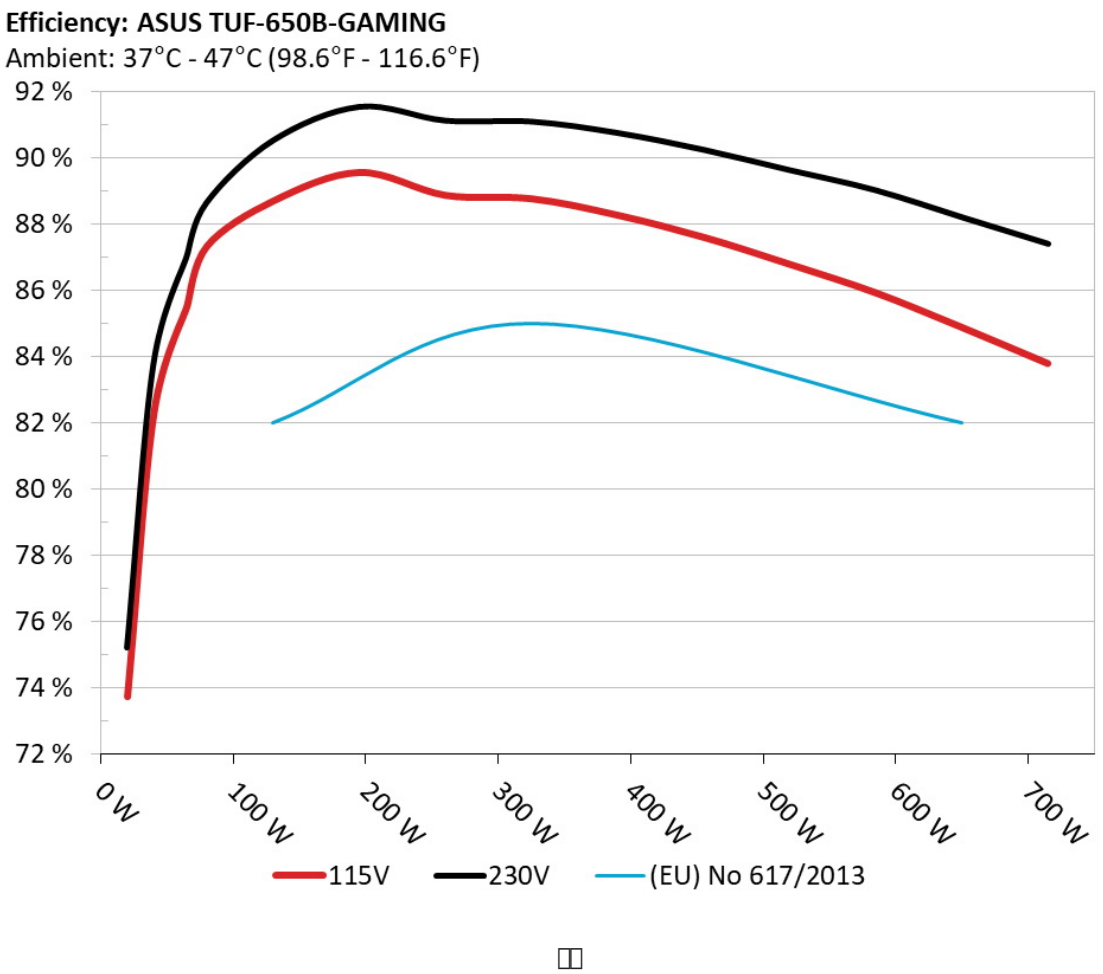
Load	Normal ambient fan · noise · intake	High ambient fan · noise · intake	Noise change
10%	0 RPM · <6.0 dB(A) · 46.9 °C	0 RPM · <6.0 dB(A) · 46.9 °C	fan off in both
20%	0 RPM · <6.0 dB(A) · 48.0 °C	0 RPM · <6.0 dB(A) · 48.0 °C	fan off in both
50%	1297 RPM · 31.0 dB(A) · 42.8 °C	1297 RPM · 31.0 dB(A) · 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: the fan is stopped or too quiet to measure (the fan speed column says which); with the fan stopped, the intake sensor can read higher than the chamber air.

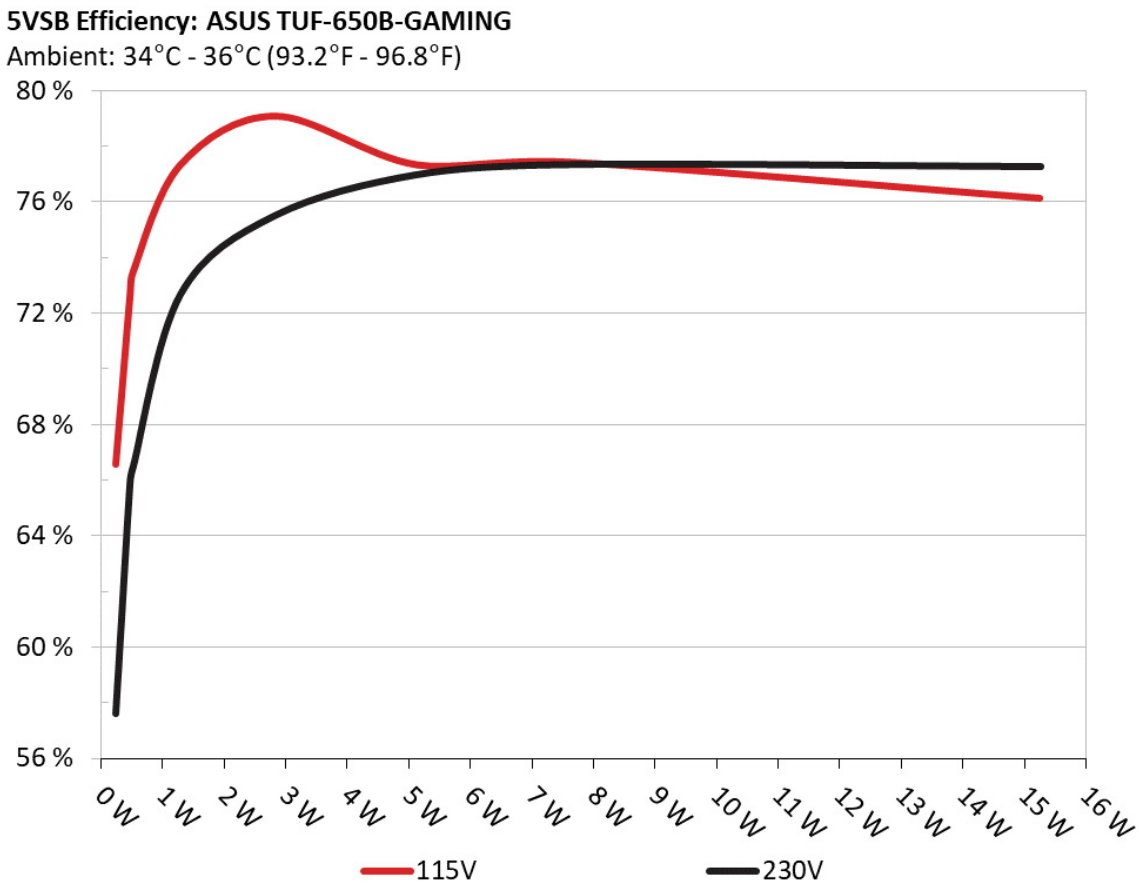
Informational. Not part of the ETA or LAMBDA rating.

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□□



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

5VSB□□□ ERP LOT 3/6□ CEC□

115V

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
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)

□□□□□□

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	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

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	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

[redacted]

[redacted]

115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
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

[redacted]

230V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
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

[redacted]

□□□□

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

□□□□□□□□□□

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

上述結果不用於認證過程

ASUS TUF-650B-GAMING

Top side

Power specifications label

本測試報告中包含的所有資料和圖表，任何個人在滿足以下條件時均可使用：

› 應註明測試結果由 Cybenetics 提供

› 在任何情況下均應提供原始測試結果文件的連結

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CYBENETICS LTD 塞普勒斯 尼科西亞 拉齊亞 2231 Syrou 6號

www.cybenetics.com - info@cybenetics.com