

Anex

be quiet! L10-CM-600

Lab ID#: 112

Receipt Date: -

Test Date: -

Report: 20PS112A

Report Date: May 20, 2000

DUT INFORMATION	
Brand	be quiet!
Manufacturer (OEM)	FSP
Series	Pure Power 10
Model Number	L10-CM-600
Serial Number	278S7031000446
DUT Notes	BN274

DUT SPECIFICATIONS	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	8-5
Rated Frequency (Hz)	50-60
Rated Power (W)	600
Type	ATX12V
Cooling	120mm Rifle Bearing Fan (BQ QF1-12025-MS)
Semi-Passive Operation	x
Cable Design	Semi Modular

POWER SPECIFICATIONS							
Rail		3.3V	5V	12V1	12V2	5VSB	-12V
Max. Power	Amps	25	18	32	28	3	0.3
	Watts	140		576		15	3.6
Total Max. Power (W)		600					

CABLES AND CONNECTORS			
Native Cables			
Description	Cable Count	Connector Count (Total)	Gauge
ATX connector 20+4 pin (560mm)	1	1	18-24AWG
4+4 pin EPS12V (620mm)	1	1	18AWG
Modular Cables			
6+2 pin PCIe (500mm+150mm)	2	4	18AWG
SATA (500mm+150mm+150mm)	1	3	18AWG
SATA (500mm) / 4 pin Molex (+150mm+150mm)	1	1 / 2	18AWG
SATA (500mm+150mm) / 4 pin Molex (+150mm) / FDD (+150mm)	1	2 / 1 / 1	18-22AWG

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PAGE 1/9

Anex

be quiet! L10-CM-600

General Data	
Manufacturer (OEM)	FSP
Platform Model	Raider
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x DM choke
Inrush Protection	NTC Thermistor & Diode
Bridge Rectifier(s)	1x
APFC MOSFETS	2x JCS18N50FH (500V, 11A @ 100°C, 0.27Ohm)
APFC Boost Diode	1x STMicroelectronics STTH8R06FP (600V, 8A @ 130°C)
Hold-up Cap(s)	1x Teapo (420V, 330uF, 2000h @ 85 °C, LH)
Main Switch	1x Infineon IPA80R460CE (800V, 6.8A @ 100°C, 0.46Ohm)
Reset Switch	1x CET CEF03N8 (800V, 2A @ 100°C, 4.8 ohm)
Combo APFC/Switching Controller	FSP 6600 IC
Topology	Primary side: Active Clamp Reset Forward Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	2x
5V & 3.3V	DC-DC Converters: 4x Infineon IPD060N03L G (30V, 50A @ 100°C, 6mOhm) PWM Controller: 2x FSP6601
Filtering Capacitors	Electrolytics: Teapo (1-3,000 @ 105°C, SC) Polymers: Teapo, 5x CapXon (modular board)
Supervisor IC	Weltrend WT7527 (OVP, UVP, OCP, SCP, PG)
Fan Model	BQ QF1-12025-MS (120mm, 12V, 0.30A, 52 CFM, 1800 RPM, Sleeve Bearing)
5VSB Circuit	
Switching FET	CET CEF02N7G (700V, 1.3A @ 100°C, 6.75Ohm)
Rectifier	1x PS30U60CTR

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PAGE 2/9

Anex

be quiet! L10-CM-600

RESULTS

Temperature Range (°C /°F)	30-32 / 86-89.6
Average Efficiency	86.954
Efficiency With 10W (≤500W) or 2% (>500W) Load -115V	0.000
Average Efficiency 5VSB	79.129
Standby Power Consumption (W) -115V	0.0977968
Standby Power Consumption (W) -230V	0.1617640
Average PF	0.988
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
Avg Noise Output	19.64
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	A+

TEST EQUIPMENT

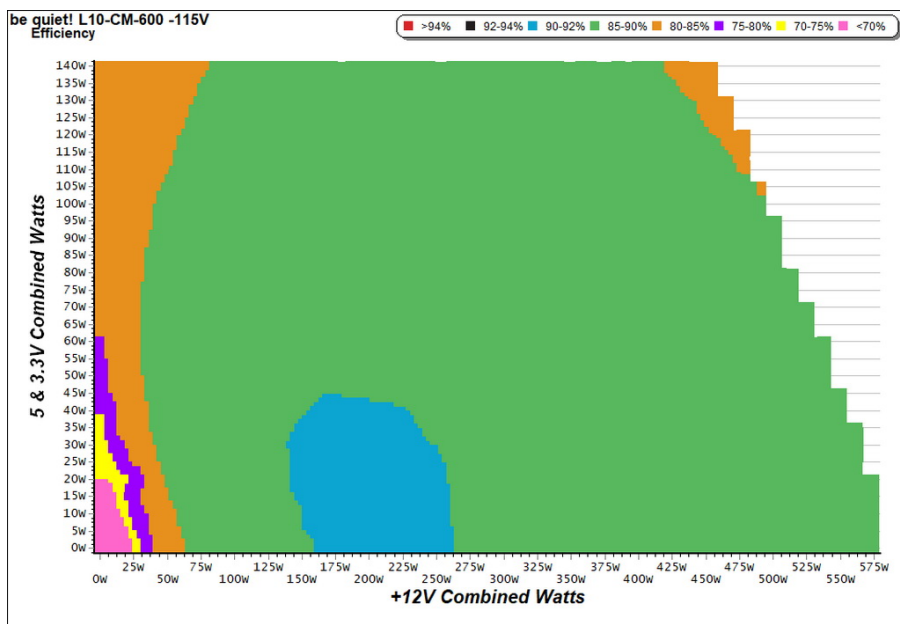
Electronic Loads	Chroma 6314A x2 63123A x6 63102A 63101A	Chroma 63601-5 x2 Chroma 63600-2 63640-80-80 x10 63610-80-20
AC Sources	Chroma 6530, Chroma 61604	
Power Analyzers	N4L PPA1530, N4L PPA5530	
Oscilloscopes	Picoscope 4444 & 3424, Keysight DSOX3024A, Rigol DS2072A	
Voltmeter	Keithley 2015 THD 6.5 Digit	
Sound Analyzer	Bruel & Kjaer 2250-L G4	
Microphone	Bruel & Kjaer Type 4189	
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2	

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PAGE 3/9

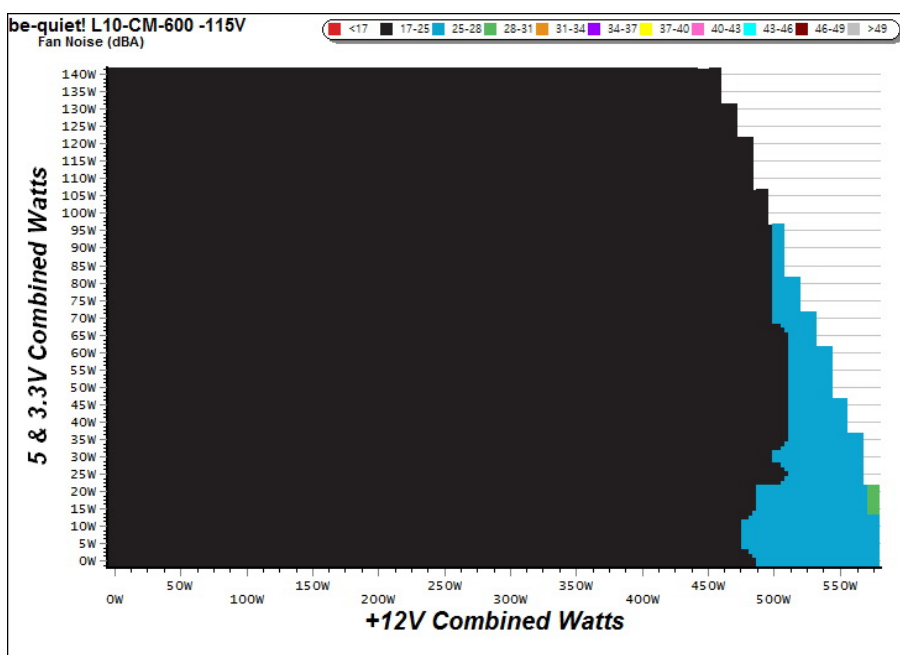
EFFICIENCY GRAPH



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



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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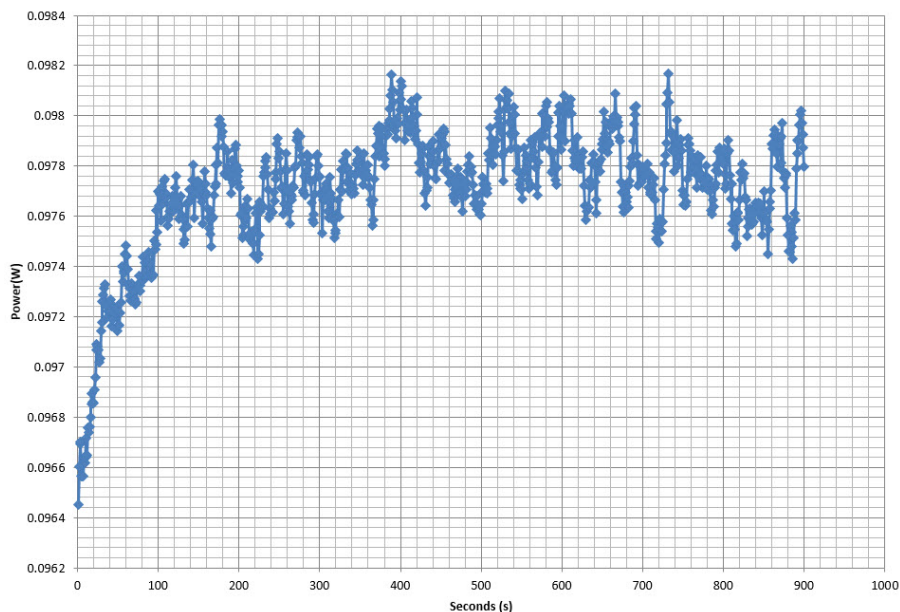
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5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)				
Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.212	61.628%	0.064
	5.090V	0.344		115.11V
2	0.087A	0.443	72.150%	0.111
	5.089V	0.614		115.11V
3	0.532A	2.702	79.752%	0.324
	5.080V	3.388		115.10V
4	1.002A	5.080	80.956%	0.378
	5.069V	6.275		115.10V
5	1.502A	7.597	80.862%	0.406
	5.059V	9.395		115.10V
6	3.001A	15.084	79.111%	0.449
	5.026V	19.067		115.10V

5VSB EFFICIENCY -230V (ERP LOT 3/6 & CEC)				
Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.212	49.882%	0.024
	5.090V	0.425		230.30V
2	0.087A	0.443	64.017%	0.039
	5.089V	0.692		230.29V
3	0.532A	2.701	78.403%	0.167
	5.080V	3.445		230.28V
4	1.002A	5.080	79.091%	0.247
	5.069V	6.423		230.28V
5	1.502A	7.596	79.506%	0.295
	5.058V	9.554		230.28V
6	3.002A	15.083	79.678%	0.358
	5.025V	18.930		230.28V

VAMPIRE POWER -115V

Power - 278S7031000446 - 18/05/2017 - 10:49



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

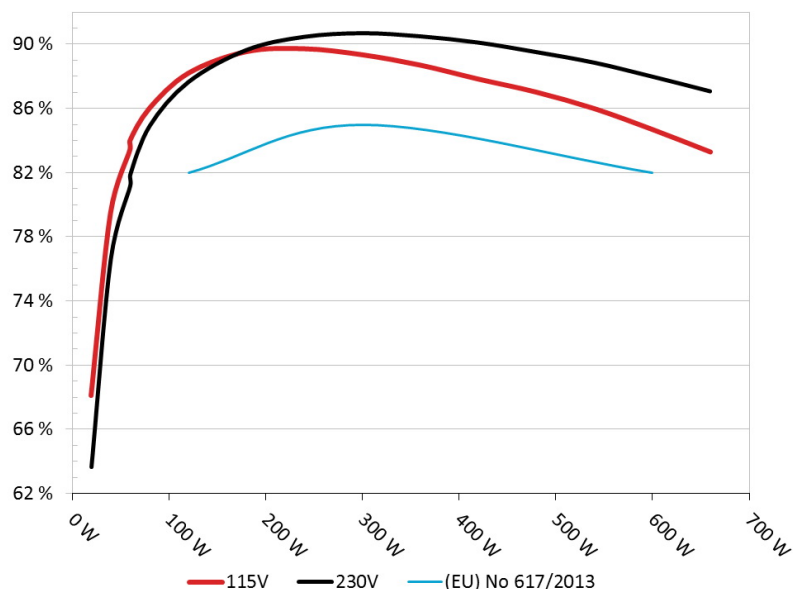
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PAGE 5/9

EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

Efficiency: be-quiet! L10-CM-600
Ambient: 37°C - 46°C (98.6°F - 114.8°F)

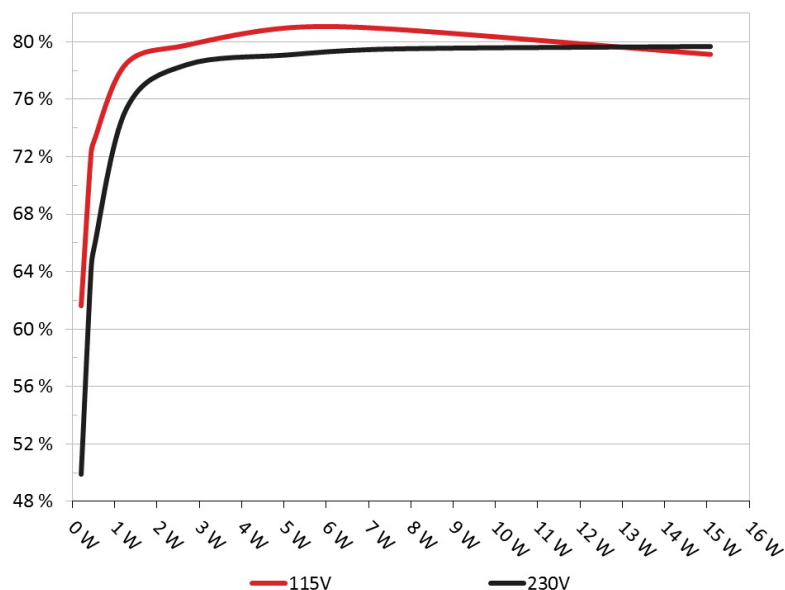


INFO

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: be-quiet! L10-CM-600
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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Anex

be quiet! L10-CM-600

10-110% LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	Fan Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.145A	1.980A	1.958A	0.985A	59.772	83.428%	568	17.4	38.23°C	0.964
	12.147V	5.050V	3.364V	5.061V	71.645				41.57°C	115.11V
2	7.327A	2.970A	2.946A	1.187A	119.772	88.196%	568	17.4	38.72°C	0.980
	12.136V	5.042V	3.355V	5.049V	135.802				42.21°C	115.11V
3	11.861A	3.481A	3.462A	1.385A	179.884	89.548%	568	17.4	39.17°C	0.987
	12.126V	5.029V	3.344V	5.036V	200.881				43.08°C	115.10V
4	16.392A	3.982A	3.949A	1.591A	239.782	89.733%	568	17.4	39.37°C	0.992
	12.117V	5.021V	3.336V	5.024V	267.216				44.21°C	115.10V
5	20.587A	4.985A	4.952A	1.796A	299.681	89.357%	568	17.4	40.19°C	0.995
	12.107V	5.010V	3.325V	5.008V	335.376				45.76°C	115.10V
6	24.800A	5.997A	5.960A	2.001A	359.724	88.708%	568	17.4	41.16°C	0.997
	12.096V	5.000V	3.316V	4.995V	405.514				47.89°C	115.11V
7	29.016A	7.014A	6.979A	2.204A	419.656	87.840%	910	19.7	41.90°C	0.998
	12.084V	4.988V	3.304V	4.983V	477.750				48.92°C	115.11V
8	33.234A	8.042A	8.003A	2.414A	479.596	87.025%	1165	22.3	42.98°C	0.998
	12.074V	4.973V	3.291V	4.970V	551.101				49.98°C	115.10V
9	37.898A	8.554A	8.544A	2.415A	539.660	85.991%	1380	26.6	43.63°C	0.998
	12.063V	4.965V	3.282V	4.963V	627.575				51.01°C	115.10V
10	42.307A	9.079A	9.056A	3.030A	599.494	84.694%	1600	31.6	44.44°C	0.998
	12.053V	4.954V	3.270V	4.943V	707.836				52.52°C	115.12V
11	47.325A	9.089A	9.074A	3.034A	659.457	83.289%	1685	32.6	45.55°C	0.998
	12.042V	4.948V	3.263V	4.940V	791.770				54.49°C	115.12V
CL1	0.101A	17.022A	17.004A	0.004A	142.348	79.857%	935	19.7	43.27°C	0.985
	12.115V	4.985V	3.308V	5.040V	178.253				49.27°C	115.10V
CL2	48.307A	1.003A	1.003A	1.002A	596.137	84.638%	1535	30.0	44.45°C	0.998
	12.065V	4.979V	3.295V	5.005V	704.340				51.71°C	115.11V

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PAGE 7/9

Anex

be quiet! L10-CM-600

20-80W LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	Fan Noise (dB[A])	PF/AC Volts
1	1.198A	0.491A	0.472A	0.196A	19.632	68.089%	568	17.4	0.580
	12.155V	5.057V	3.368V	5.083V	28.833				115.14V
2	2.428A	0.981A	0.978A	0.390A	39.731	79.481%	568	17.4	0.745
	12.152V	5.053V	3.364V	5.076V	49.988				115.14V
3	3.659A	1.477A	1.484A	0.590A	59.887	84.020%	568	17.4	0.964
	12.148V	5.050V	3.362V	5.069V	71.277				115.14V
4	4.876A	1.978A	1.959A	0.787A	79.765	86.006%	568	17.4	0.969
	12.141V	5.051V	3.363V	5.064V	92.743				115.12V

RIPPLE MEASUREMENTS

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	6.4 mV	13.9 mV	11.0 mV	11.8 mV	Pass
20% Load	10.6 mV	17.3 mV	15.3 mV	13.4 mV	Pass
30% Load	10.5 mV	19.4 mV	17.8 mV	15.4 mV	Pass
40% Load	11.5 mV	20.1 mV	20.5 mV	16.4 mV	Pass
50% Load	13.2 mV	21.6 mV	22.2 mV	17.3 mV	Pass
60% Load	15.9 mV	22.9 mV	24.7 mV	19.0 mV	Pass
70% Load	19.5 mV	24.2 mV	27.2 mV	20.2 mV	Pass
80% Load	23.0 mV	25.4 mV	29.9 mV	21.6 mV	Pass
90% Load	28.5 mV	28.7 mV	32.6 mV	22.9 mV	Pass
100% Load	35.1 mV	29.7 mV	35.4 mV	26.0 mV	Pass
110% Load	46.9 mV	31.6 mV	38.8 mV	27.9 mV	Pass
Crossload 1	18.3 mV	24.5 mV	18.7 mV	20.2 mV	Pass
Crossload 2	31.3 mV	31.2 mV	37.8 mV	24.4 mV	Pass

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PAGE 8/9

Anex

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

Hold-Up Time (ms)	22.30
AC Loss to PWR_OK Hold Up Time (ms)	24.04
PWR_OK Inactive to DC Loss Delay (ms)	-1.74



Top side



Power specifications label

CERTIFICATIONS



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PAGE 9/9