Anex

Lian Li SP850

Lab ID#: LL85002081
Receipt Date: Jul 24, 2022
Test Date: Oct 27, 2022

Report: 22PS2081A
Report Date: Oct 27, 2022

DUT INFORMATION

Brand	Lian Li
Manufacturer (OEM)	Helly Technology
Series	SP
Model Number	SP850
Serial Number	G89SP850BY220700290
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
Rated Frequency (Hz)	60-50
Rated Power (W)	850
Type	SFX
Cooling	92mm Double Ball Bearing Fan (D92LH-12B)
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	89.825%
Efficiency With 10W (≤500W) or 2% (>500W)	72.506
Average Efficiency 5VSB	82.273%
Standby Power Consumption (W)	0.0551000
Average PF	0.992
Avg Noise Output	37.16 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	Standard+

230V

Average Efficiency	91.870%
Average Efficiency 5VSB	80.895%
Standby Power Consumption (W)	0.0995000
Average PF	0.970
Avg Noise Output	37.21 dB(A)
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	Standard+

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	70	2.5	0.3
	Watts	100		840	12.5	3.6
Total Max. Power (W)		850				

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

Hold-Up Time (ms)	16.5
AC Loss to PWR_OK Hold Up Time (ms)	14.9
PWR_OK Inactive to DC Loss Delay (ms)	1.6

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CABLES AND CONNECTORS

Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (300mm)	1	1	16-20AWG	No
4+4 pin EPS12V (600mm)	2	2	16AWG	No
6+2 pin PCIe (400mm+125mm)	1	2	18AWG	No
6+2 pin PCIe (400mm)	1	1	18AWG	No
12 pin PCIe (400mm)	1	1	16AWG	No
SATA (120mm+120mm+120mm+120mm)	2	8	18AWG	No
4-pin Molex (120mm+120mm+120mm+120mm)	1	4	18AWG	No
AC Power Cord (1390mm) - C13 coupler	1	1	18AWG	-

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General Data	-
Manufacturer (OEM)	Helly
PCB Type	Double Sided
Primary Side	**-**
Transient Filter	2x Y caps, 2x SMD-Y caps, 2x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor 10D-11 (10 Ohm) & 1x Sanrise Tech SRC60R075BS (600V, 21.5A @ 125°C, Rds(on): 0.075Ohm)
Bridge Rectifier(s)	2x
APFC MOSFETs	2x Oriental Semiconductor (600V, 22.8A @ 100°C, Rds(on): 0.099Ohm)
APFC Boost Diode	1x G3S06510A (650V, 10A)
Bulk Cap(s)	1x Rubycon (420V, 550uF, 3,000h @ 105°C, MXK)
Main Switchers	2x
APFC Controller	Champion CM6502UHHX
Resonant Controller	Champion CM6901T6X
Topology	Primary side: APFC, Half-Bridge & LLC converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	**-**
+12V MOSFETs	6x G013N04G
5V & 3.3V	DC-DC Converters: 4x 3NA3R4 PWM Controller(s): ANPEC APW7159C
Filtering Capacitors	Electrolytic: 2x Nippon Chemi-Con (4-10,000h @ 105°C, KY), 1x Rubycon (4-10,000h @ 105°C, YXJ) Polymer: 22x no info
Supervisor IC	Grenergy GR8313 (OVP, UVP, PG)
Fan Model	Yate Loon D92LH-12B (92mm, 12V, 0.60A, Double Ball Bearing Fan)
5VSB Circuit	**-**
Rectifier	1x 45R20S
Standby PWM Controller	Excelliance MOS EM8569C

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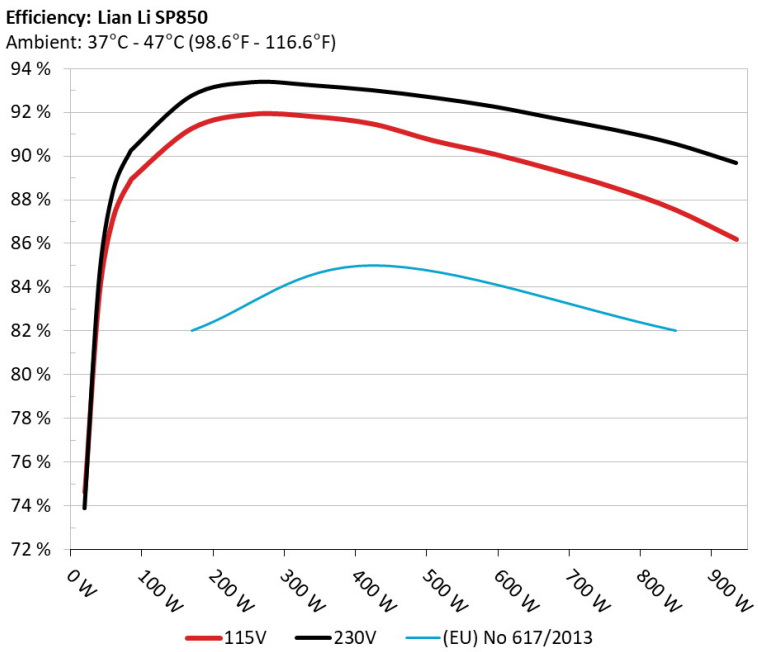
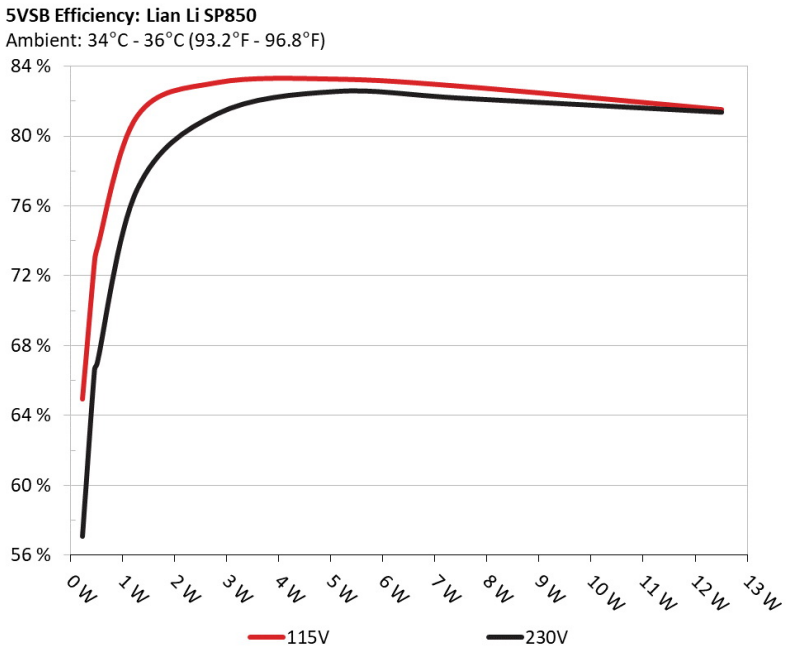
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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	0.041A	0.211	68.954%	0.030
	5.107V	0.306		115.20V
2	0.087A	0.442	75.685%	0.058
	5.107V	0.584		115.20V
3	0.541A	2.759	79.925%	0.265
	5.096V	3.452		115.18V
4	1.001A	5.091	77.892%	0.371
	5.085V	6.536		115.18V
5	1.501A	7.613	77.692%	0.427
	5.072V	9.799		115.18V
6	2.500A	12.617	75.370%	0.482
	5.046V	16.740		115.19V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.041A	0.212	63.473%	0.010
	5.108V	0.334		230.40V
2	0.087A	0.444	71.268%	0.019
	5.107V	0.623		230.40V
3	0.542A	2.760	76.731%	0.102
	5.096V	3.597		230.43V
4	1.002A	5.093	78.294%	0.172
	5.085V	6.505		230.43V
5	1.501A	7.614	78.301%	0.232
	5.071V	9.724		230.42V
6	2.501A	12.620	78.186%	0.314
	5.046V	16.141		230.41V

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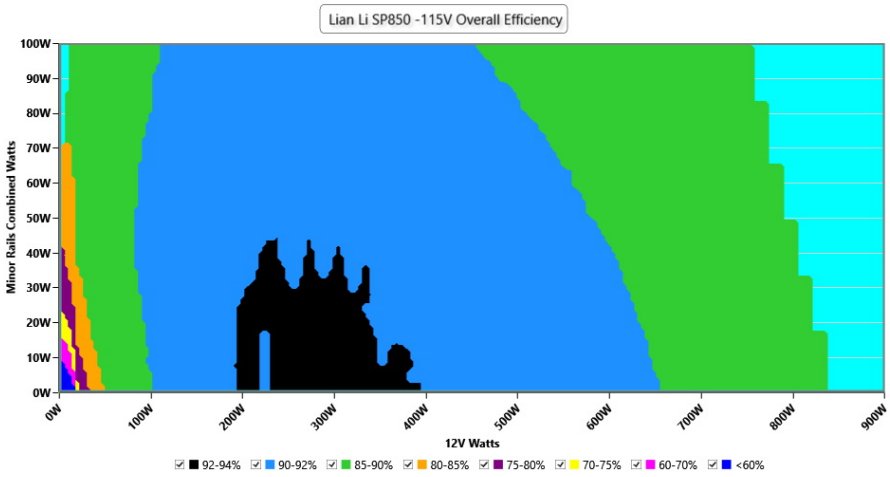
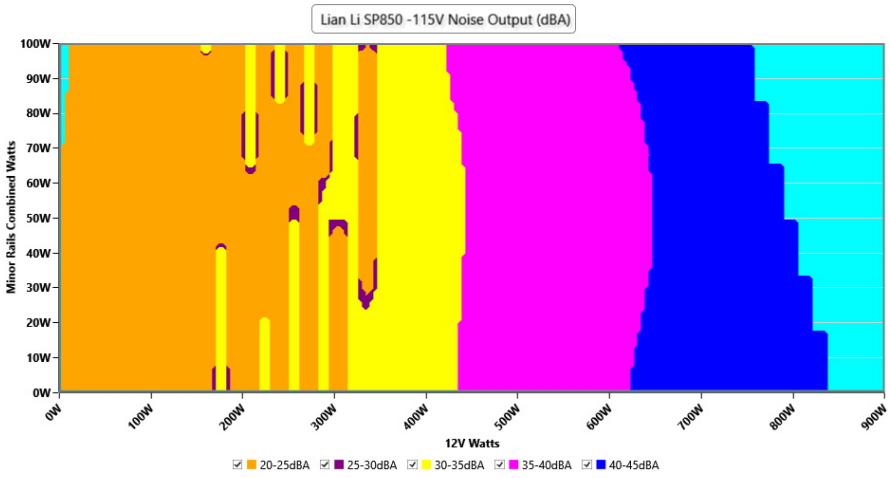
EFFICIENCY GRAPH 115V



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

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	115.14 V	115.12 V	113.85 V	115.19 V	116.15 V	PASS
Mains Frequency:	60.00 Hz	59.96 Hz	59.40 Hz	60.03 Hz	60.60 Hz	PASS
Mains Voltage CF:	1.416	1.415	1.340	1.418	1.490	PASS
Mains Voltage THD:	0.13 %	0.10 %	N/A	0.19 %	2.00 %	PASS
Real Power:	0.055 W	-0.003 W	N/A	0.088 W	N/A	N/A
Apparent Power:	6.355 W	6.205 W	N/A	6.507 W	N/A	N/A
Power Factor:	0.013	N/A	N/A	N/A	N/A	N/A

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%	5.264A	1.971A	1.953A	0.982A	84.988	88.809%	0	<6.0	44.66°C	0.985
	12.042V	5.074V	3.379V	5.091V	95.697				40.44°C	115.16V
20%	11.552A	2.961A	2.936A	1.182A	169.906	91.248%	0	<6.0	45.62°C	0.991
	12.034V	5.065V	3.371V	5.074V	186.2				41.01°C	115.14V
30%	18.198A	3.459A	3.432A	1.384A	254.895	91.901%	0	<6.0	46.35°C	0.992
	12.026V	5.059V	3.365V	5.057V	277.356				41.28°C	115.11V
40%	24.865A	3.964A	3.935A	1.588A	339.986	91.795%	1889	32.0	41.52°C	0.994
	12.016V	5.045V	3.354V	5.038V	370.368				47.23°C	115.08V
50%	31.164A	4.963A	4.929A	1.793A	424.692	91.453%	2054	34.0	42.88°C	0.995
	12.007V	5.038V	3.347V	5.02V	464.377				49.27°C	115.06V
60%	37.454A	5.964A	5.928A	1.999A	509.211	90.694%	2305	37.8	43.05°C	0.996
	11.999V	5.031V	3.34V	5.002V	561.458				49.86°C	115.03V
70%	43.821A	6.969A	6.933A	2.206A	594.525	90.08%	2526	40.8	43.39°C	0.996
	11.990V	5.022V	3.332V	4.983V	659.997				50.54°C	115V
80%	50.201A	7.979A	7.938A	2.312A	679.333	89.347%	2783	42.4	43.67°C	0.997
	11.981V	5.014V	3.324V	4.971V	760.335				51.73°C	114.97V
90%	56.986A	8.483A	8.434A	2.419A	764.732	88.528%	2913	44.1	44.23°C	0.997
	11.972V	5.009V	3.318V	4.958V	863.835				53.33°C	114.93V
100%	63.715A	8.994A	8.965A	2.527A	849.467	87.53%	2919	44.2	45.05°C	0.998
	11.964V	5.002V	3.311V	4.945V	970.494				55.14°C	114.9V
110%	70.188A	10.008A	10.075A	2.53A	934.851	86.183%	2921	44.2	46.92°C	0.998
	11.955V	4.995V	3.304V	4.939V	1084.738				57.84°C	114.87V
CL1	0.115A	11.911A	11.812A	0A	101.26	84.766%	2485	40.7	42.33°C	0.985
	12.042V	5.053V	3.36V	5.144V	119.46				48.78°C	115.16V
CL2	0.114A	19.759A	0A	0A	101.378	84.525%	2135	35.5	43.29°C	0.988
	12.041V	5.061V	3.367V	5.148V	119.94				50.38°C	115.15V
CL3	0.114A	0A	19.595A	0A	67.362	80.303%	1972	33.3	44.52°C	0.981
	12.039V	5.061V	3.367V	5.144V	83.883				52.58°C	115.17V
CL4	70.967A	0A	0A	0.001A	849.346	88.318%	2927	44.3	45.62°C	0.997
	11.969V	5.028V	3.333V	5.114V	961.7				55.59°C	114.91V

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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	1.232A	0.491A	0.487A	0.194A	19.984	74.638%	0	<6.0	40.25°C	0.88
	12.048V	5.086V	3.389V	5.143V	26.773				37.15°C	115.18V
40W	2.712A	0.688A	0.682A	0.292A	39.986	83.607%	0	<6.0	40.73°C	0.953
	12.046V	5.085V	3.388V	5.136V	47.826				37.42°C	115.17V
60W	4.194A	0.885A	0.877A	0.39A	59.985	87.198%	0	<6.0	42.63°C	0.975
	12.044V	5.08V	3.384V	5.129V	68.793				38.85°C	115.17V
80W	5.672A	1.083A	1.073A	0.488A	79.925	88.931%	0	<6.0	44.13°C	0.982
	12.043V	5.077V	3.382V	5.122V	89.873				40.17°C	115.16V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	34.98mV	9.66mV	9.30mV	45.74mV	Pass
20% Load	35.90mV	10.37mV	9.96mV	48.68mV	Pass
30% Load	36.81mV	11.13mV	9.10mV	46.75mV	Pass
40% Load	9.77mV	10.52mV	7.58mV	10.78mV	Pass
50% Load	12.15mV	11.69mV	8.95mV	11.64mV	Pass
60% Load	39.09mV	13.16mV	9.81mV	44.43mV	Pass
70% Load	15.29mV	13.82mV	9.50mV	13.71mV	Pass
80% Load	32.96mV	14.48mV	10.42mV	37.14mV	Pass
90% Load	38.22mV	15.25mV	11.32mV	45.94mV	Pass
100% Load	23.88mV	17.57mV	12.19mV	19.99mV	Pass
110% Load	26.38mV	18.29mV	12.05mV	20.38mV	Pass
Crossload1	10.96mV	15.51mV	10.47mV	37.42mV	Pass
Crossload2	11.41mV	17.64mV	8.70mV	39.07mV	Pass
Crossload3	10.55mV	12.82mV	11.08mV	37.12mV	Pass
Crossload4	24.51mV	14.54mV	10.25mV	42.45mV	Pass

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230V

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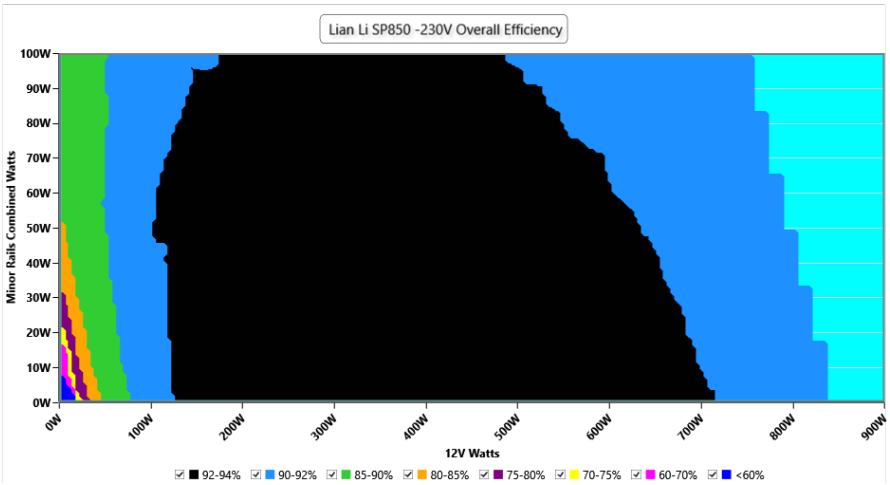
EFFICIENCY GRAPH 230V



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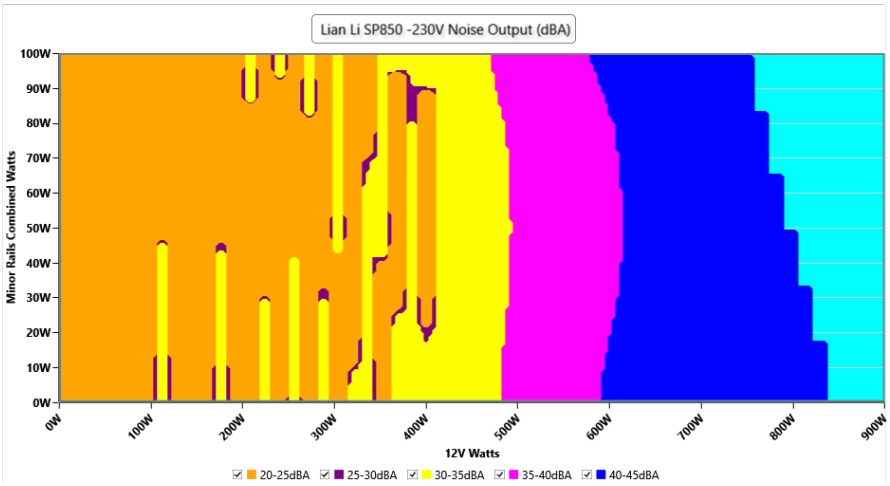
NOISE GRAPH 230V



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VAMPIRE POWER -230V

Detailed Results

	Average	Min	Limit Min	Max	Limit Max	Result
Mains Voltage RMS:	230.32 V	230.20 V	227.70 V	230.36 V	232.30 V	PASS
Mains Frequency:	50.00 Hz	49.99 Hz	49.50 Hz	50.01 Hz	50.50 Hz	PASS
Mains Voltage CF:	1.416	1.415	1.340	1.418	1.490	PASS
Mains Voltage THD:	0.12 %	0.10 %	N/A	0.21 %	2.00 %	PASS
Real Power:	0.100 W	0.072 W	N/A	0.135 W	N/A	N/A
Apparent Power:	21.077 W	20.819 W	N/A	21.319 W	N/A	N/A
Power Factor:	0.004	N/A	N/A	N/A	N/A	N/A

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 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%	5.264A	1.971A	1.953A	0.982A	84.989	90.024%	0	<6.0	45.31°C	0.897
	12.043V	5.074V	3.379V	5.09V	94.408				40.93°C	230.37V
20%	11.552A	2.961A	2.936A	1.183A	169.92	92.759%	0	<6.0	46.21°C	0.959
	12.034V	5.066V	3.372V	5.072V	183.184				41.57°C	230.36V
30%	18.199A	3.459A	3.432A	1.385A	254.914	93.381%	0	<6.0	47.05°C	0.974
	12.026V	5.06V	3.365V	5.055V	272.983				41.76°C	230.35V
40%	24.867A	3.962A	3.933A	1.588A	339.996	93.239%	1964	33.0	42.49°C	0.98
	12.016V	5.047V	3.356V	5.037V	364.65				48.28°C	230.34V
50%	31.170A	4.963A	4.93A	1.794A	424.73	93.012%	2065	34.3	42.73°C	0.983
	12.006V	5.038V	3.347V	5.018V	456.645				48.88°C	230.33V
60%	37.465A	5.966A	5.93A	2A	509.246	92.68%	2247	36.2	43.17°C	0.985
	11.996V	5.029V	3.339V	5V	549.474				49.69°C	230.31V
70%	43.835A	6.971A	6.934A	2.208A	594.552	92.267%	2515	40.8	43.43°C	0.987
	11.987V	5.022V	3.331V	4.981V	644.368				50.45°C	230.3V
80%	50.213A	7.979A	7.937A	2.314A	679.364	91.733%	2788	42.4	43.59°C	0.988
	11.979V	5.015V	3.324V	4.968V	740.584				51.66°C	230.29V
90%	57.007A	8.485A	8.436A	2.421A	764.759	91.197%	2915	44.2	44.78°C	0.988
	11.968V	5.007V	3.317V	4.956V	838.566				54.01°C	230.27V
100%	63.748A	8.995A	8.965A	2.528A	849.484	90.559%	2916	44.2	44.93°C	0.989
	11.958V	5.002V	3.311V	4.943V	938.048				54.981°C	230.26V
110%	70.224A	10.009A	10.076A	2.532A	934.856	89.689%	2921	44.2	46.76°C	0.99
	11.949V	4.994V	3.303V	4.936V	1042.344				57.61°C	230.25V
CL1	0.115A	11.923A	11.821A	0A	101.262	86.41%	2179	35.9	42.12°C	0.924
	12.038V	5.048V	3.357V	5.143V	117.187				48.61°C	230.37V
CL2	0.114A	19.775A	0A	0A	101.379	86.098%	1880	31.9	43.86°C	0.924
	12.036V	5.057V	3.365V	5.146V	117.747				51.08°C	230.37V
CL3	0.114A	0A	19.598A	0A	67.361	81.598%	1894	32.0	44.42°C	0.875
	12.037V	5.06V	3.367V	5.143V	82.552				52.48°C	230.37V
CL4	71.021A	0A	0A	0.001A	849.338	91.204%	2929	44.3	45.05°C	0.989
	11.959V	5.028V	3.333V	5.113V	931.274				55.03°C	230.26V

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Lian Li SP850

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	1.231A	0.491A	0.487A	0.194A	19.988	73.889%	0	<6.0	39.75°C	0.55
	12.057V	5.087V	3.39V	5.142V	27.054				36.67°C	230.37V
40W	2.715A	0.688A	0.682A	0.292A	39.988	84.229%	0	<6.0	41.29°C	0.737
	12.037V	5.085V	3.388V	5.135V	47.477				37.97°C	230.38V
60W	4.196A	0.885A	0.877A	0.39A	59.986	88.402%	0	<6.0	42.04°C	0.835
	12.041V	5.082V	3.385V	5.128V	67.856				38.51°C	230.37V
80W	5.672A	1.083A	1.073A	0.488A	79.934	90.257%	0	<6.0	43.35°C	0.887
	12.044V	5.078V	3.382V	5.121V	88.564				39.55°C	230.37V

RIPPLE MEASUREMENTS 230V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	36.10mV	11.33mV	7.23mV	45.04mV	Pass
20% Load	7.85mV	10.01mV	7.48mV	9.46mV	Pass
30% Load	9.97mV	10.77mV	7.79mV	10.63mV	Pass
40% Load	10.83mV	10.82mV	8.19mV	11.23mV	Pass
50% Load	32.30mV	12.35mV	8.44mV	39.47mV	Pass
60% Load	33.62mV	12.60mV	8.59mV	40.28mV	Pass
70% Load	36.66mV	13.47mV	9.15mV	44.02mV	Pass
80% Load	36.30mV	14.58mV	10.36mV	44.18mV	Pass
90% Load	17.11mV	15.65mV	11.02mV	15.49mV	Pass
100% Load	23.95mV	16.93mV	11.36mV	18.48mV	Pass
110% Load	25.68mV	17.85mV	12.98mV	19.86mV	Pass
Crossload1	13.63mV	15.50mV	10.60mV	37.90mV	Pass
Crossload2	13.75mV	17.93mV	8.45mV	39.15mV	Pass
Crossload3	8.25mV	11.08mV	10.46mV	37.39mV	Pass
Crossload4	23.71mV	16.51mV	13.01mV	42.80mV	Pass

Anex

Lian Li SP850

Top side

Power specifications label

CERTIFICATIONS 115V

CYBENETICS PLATINUM

CYBENETICS STANDARD+

CERTIFICATIONS 230V

CYBENETICS PLATINUM 230v

CYBENETICS STANDARD+ 230v

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