Cybenetics

Anex

SilverStone SX650-G

Lab ID#: 178
Receipt Date: -
Test Date: -

Report:
Report Date: Sep 21, 2018

DUT INFORMATION

Brand	SilverStone
Manufacturer (OEM)	High Power
Series	SFX
Model Number	SX650-G
Serial Number	DE17301005SX650G00
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
Rated Frequency (Hz)	50-60
Rated Power (W)	650
Type	SFX
Cooling	92mm Fluid Dynamic Bearing Fan (S0921512HB)
Semi-Passive Operation	✗
Cable Design	Fully Modular

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	22	22	54.2	2.5	0.3
	Watts	110		650	12.5	3.6
Total Max. Power (W)		650				

CABLES AND CONNECTORS

Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge	In Cable Capacitors
ATX connector 20+4 pin (300mm)	1	1	16-22AWG	No
4+4 pin EPS12V (410mm)	1	1	18AWG	No
6+2 pin PCIe (560mm+150mm)	2	4	18AWG	No
SATA (310mm+200mm+100mm)	2	6	18AWG	No
4 pin Molex (300mm+200mm+200mm)	1	3	18AWG	No
FDD Adapter (+105mm)	1	1	22AWG	No
AC Power Cord (1400mm) - C13 coupler	1	1	18AWG	-

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General Data	
Manufacturer (OEM)	High Power
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 3x CM chokes, 1x MOV, 1x CMD02X
Inrush Protection	NTC Thermistor & Diode
Bridge Rectifier(s)	2x GBU1506L (600V, 15A @ 100°C)
APFC MOSFETS	2x Toshiba TK16A60W (600V, 15.8A @ 150°C, 0.19Ohm)
APFC Boost Diode	1x Power Integrations D0665C5 (600V, 8A @ 150°C)
Hold-up Cap(s)	1x Rubycon (420V, 470uF, 3000h @ 85°C, USH)
Main Switchers	2x Toshiba TK16A60W (600V, 15.8A @ 150°C, 0.19Ohm)
High-side/Low-Side Driver	Silicon Labs Si8233BD
APFC Controller	Infineon ICE3PCS01G
Resonant Controller	Champion CM6901X
Topology	Primary side: Half-Bridge & LLC Resonant Controller Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	6x Toshiba TPHR85 04PL (SOP Advance Series, 40V, 150A @ 25C, 0.85mOhm)
5V & 3.3V	DC-DC Converters: 6x Infineon BSC0906NS (30V, 40A @ 100°C, 4.5mOhm) PWM Controller: APW7159C
Filtering Capacitors	Electrolytics:Nippon Chemi-Con (1-5,000 @ 105°C, KZE), Nippon Chemi-Con (4-10,000 @ 105°C, KY) Polymers: Nippon Chemi-Con
Supervisor IC	SITI PS224 (OVP, UVP, OCP,SCP, PG)
Micro Controller	STC 15W408AS
Fan Model	Globe Fan S0921512HB (92mm, 12V, 0.45A, Fluid Dynamic Bearing)
5VSB Circuit	
Rectifier	1x P10V45 SBR (45V, 10A)
Standby PWM Controller	Sanken STR-A6069H
-12V Circuit	
Rectifier	KEC KIA7912PI (-12V, 1A)

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RESULTS	
Temperature Range (°C /°F)	30-32 / 86-89.6
Average Efficiency	88.304
Efficiency With 10W (≤500W) or 2% (>500W) Load -115V	0.000
Average Efficiency 5VSB	79.096
Standby Power Consumption (W) -115V	0.0834153
Standby Power Consumption (W) -230V	0.1400210
Average PF	0.990
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓
Avg Noise Output	37.07
Efficiency Rating (ETA)	PLATINUM
Noise Rating (LAMBDA)	Standard+

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 4955-A, Bruel & Kjaer Type 4189	
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2	

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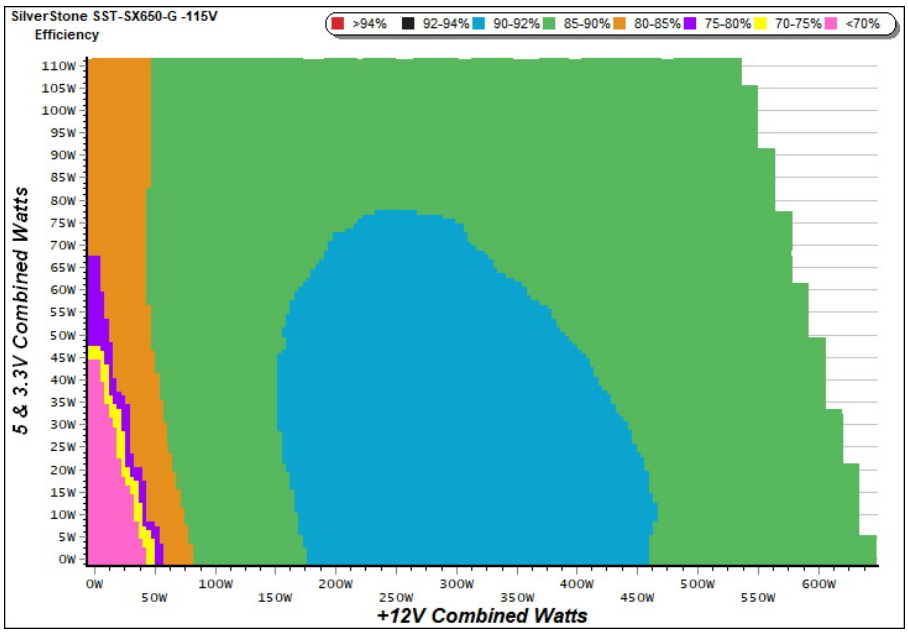
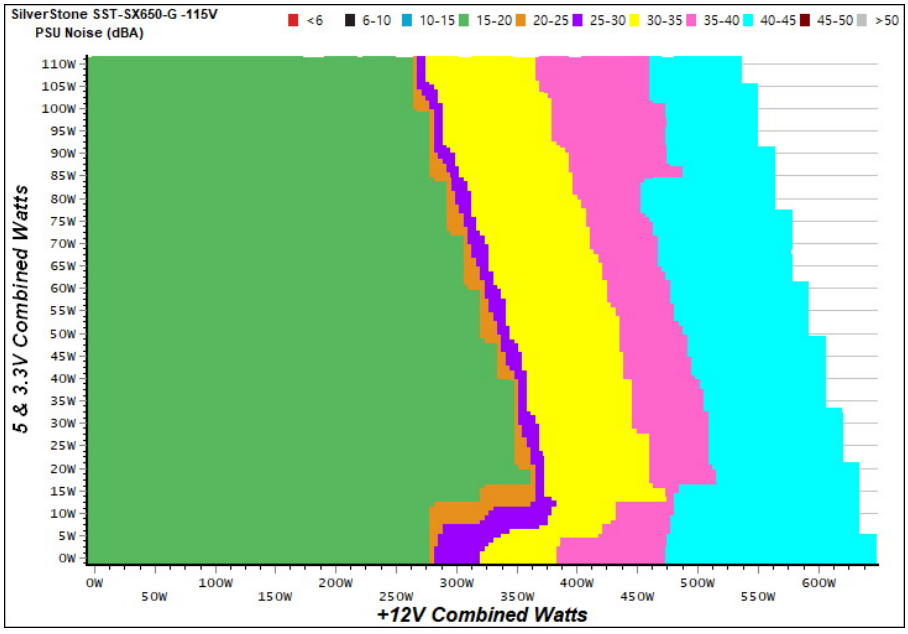
EFFICIENCY GRAPH



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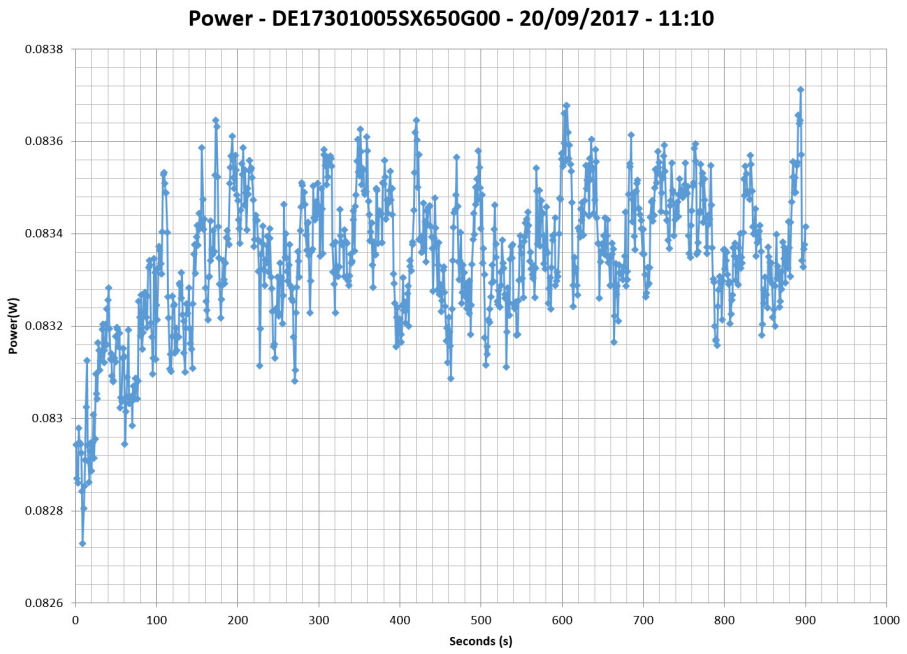
5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.214	63.314%	0.056
	5.131V	0.338		115.18V
2	0.087A	0.447	71.406%	0.100
	5.130V	0.626		115.18V
3	0.542A	2.773	79.776%	0.314
	5.114V	3.476		115.16V
4	1.002A	5.112	80.593%	0.376
	5.101V	6.343		115.16V
5	1.502A	7.637	80.670%	0.408
	5.086V	9.467		115.17V
6	2.501A	12.611	79.290%	0.442
	5.042V	15.905		115.17V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.213	55.469%	0.019
	5.131V	0.384		230.42V
2	0.087A	0.446	64.638%	0.035
	5.129V	0.690		230.44V
3	0.542A	2.767	75.850%	0.158
	5.107V	3.648		230.42V
4	1.002A	5.103	78.750%	0.232
	5.093V	6.480		230.43V
5	1.501A	7.624	79.466%	0.282
	5.078V	9.594		230.43V
6	2.501A	12.622	79.820%	0.335
	5.047V	15.813		230.43V

VAMPIRE POWER -115V



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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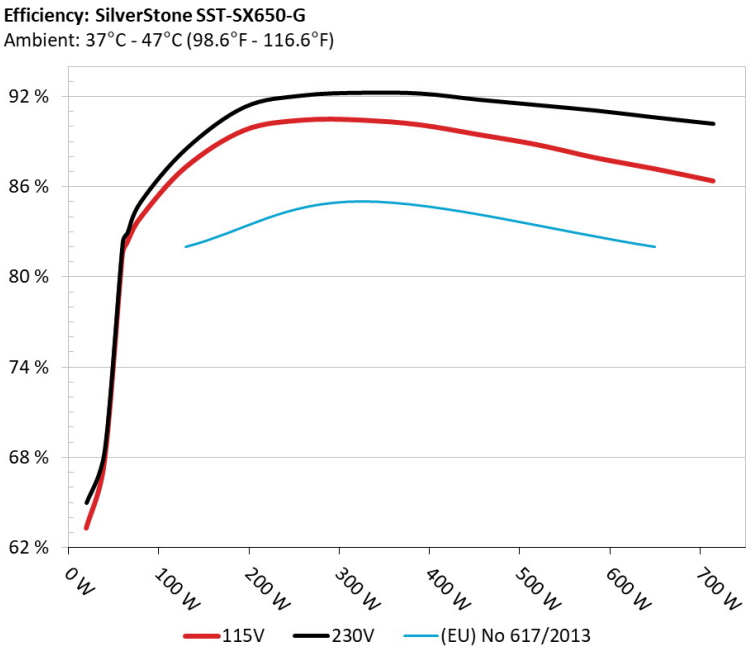
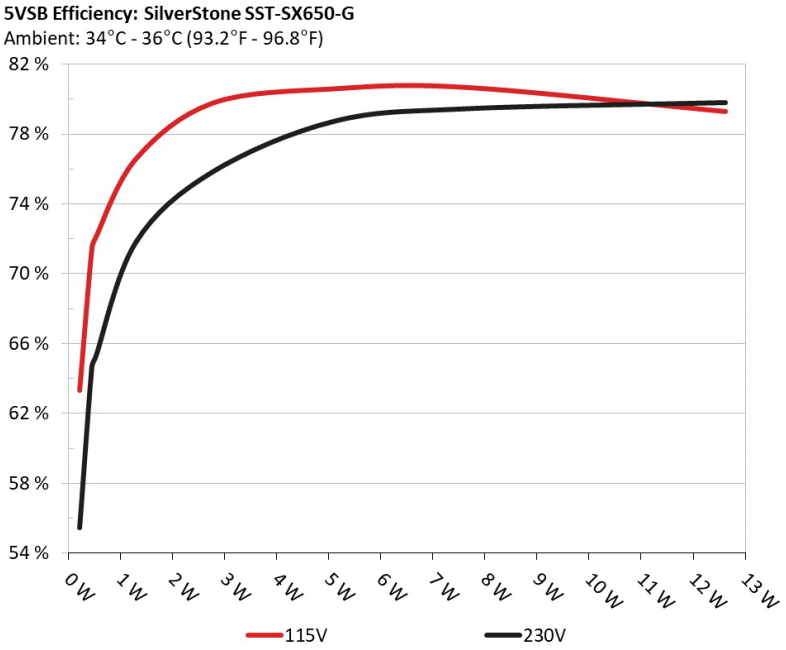
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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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10-110% LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.576A	1.976A	1.973A	0.981A	64.838	82.269%	1117	19.4	38.04°C	0.983
	12.095V	5.066V	3.341V	5.080V	78.812				46.87°C	115.17V
2	8.189A	2.955A	2.965A	1.181A	129.760	87.294%	1117	19.4	38.52°C	0.993
	12.082V	5.060V	3.334V	5.066V	148.647				47.99°C	115.16V
3	13.156A	3.464A	3.483A	1.381A	194.902	89.754%	1117	19.4	38.70°C	0.994
	12.072V	5.054V	3.328V	5.057V	217.151				50.84°C	115.16V
4	18.128A	3.964A	3.970A	1.583A	259.795	90.430%	1117	19.4	39.16°C	0.996
	12.059V	5.049V	3.321V	5.048V	287.289				54.21°C	115.16V
5	22.775A	4.961A	4.976A	1.786A	324.763	90.430%	1117	19.4	39.75°C	0.997
	12.043V	5.042V	3.313V	5.031V	359.133				57.74°C	115.15V
6	27.436A	5.951A	5.987A	1.991A	389.724	90.114%	1117	19.4	40.35°C	0.998
	12.027V	5.036V	3.306V	5.017V	432.479				59.31°C	115.15V
7	32.109A	6.964A	7.003A	2.196A	454.685	89.461%	1997	34.1	41.89°C	0.998
	12.009V	5.028V	3.296V	5.005V	508.248				61.20°C	115.15V
8	36.796A	7.966A	8.020A	2.401A	519.667	88.794%	2265	36.8	43.22°C	0.998
	11.993V	5.021V	3.290V	4.994V	585.248				62.77°C	115.15V
9	41.934A	8.476A	8.558A	2.404A	584.728	87.917%	2491	41.0	44.42°C	0.998
	11.974V	5.017V	3.283V	4.988V	665.092				65.51°C	115.14V
10	47.041A	8.987A	9.063A	2.508A	649.626	87.191%	2790	44.7	45.93°C	0.998
	11.956V	5.010V	3.276V	4.979V	745.061				68.71°C	115.14V
11	52.553A	8.994A	9.075A	2.510A	714.580	86.381%	2755	44.6	46.55°C	0.998
	11.938V	5.007V	3.271V	4.974V	827.246				72.33°C	115.14V
CL1	0.099A	13.019A	13.006A	0.005A	109.914	81.634%	1117	19.4	43.82°C	0.992
	12.082V	5.047V	3.305V	5.096V	134.642				65.68°C	115.16V
CL2	54.123A	1.003A	1.003A	1.002A	660.507	87.522%	2790	44.7	45.63°C	0.998
	11.956V	5.034V	3.305V	5.039V	754.678				68.88°C	115.15V

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20-80W LOAD TESTS

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	PSU Noise (dB[A])	PF/AC Volts
1	1.207A	0.491A	0.475A	0.196A	19.700	63.287%	1117	19.4	0.883
	12.109V	5.072V	3.349V	5.114V	31.128				115.17V
2	2.436A	0.980A	0.983A	0.391A	39.749	67.701%	1117	19.4	0.967
	12.109V	5.070V	3.345V	5.100V	58.713				115.17V
3	3.672A	1.475A	1.494A	0.586A	59.868	81.586%	1117	19.4	0.977
	12.095V	5.068V	3.344V	5.093V	73.380				115.17V
4	4.895A	1.975A	1.974A	0.786A	79.781	83.941%	1117	19.4	0.981
	12.091V	5.065V	3.340V	5.087V	95.044				115.17V

RIPPLE MEASUREMENTS

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	14.5 mV	12.0 mV	14.2 mV	13.1 mV	Pass
20% Load	58.7 mV	22.4 mV	14.3 mV	17.1 mV	Pass
30% Load	31.4 mV	26.1 mV	19.4 mV	25.0 mV	Pass
40% Load	29.3 mV	32.5 mV	20.0 mV	22.8 mV	Pass
50% Load	29.7 mV	29.1 mV	20.7 mV	24.6 mV	Pass
60% Load	29.8 mV	28.1 mV	25.3 mV	26.1 mV	Pass
70% Load	31.7 mV	31.3 mV	27.5 mV	33.0 mV	Pass
80% Load	34.1 mV	32.6 mV	28.5 mV	30.0 mV	Pass
90% Load	38.4 mV	32.2 mV	30.7 mV	32.6 mV	Pass
100% Load	44.4 mV	32.8 mV	33.0 mV	29.6 mV	Pass
110% Load	43.8 mV	28.7 mV	31.0 mV	28.8 mV	Pass
Crossload 1	60.2 mV	25.2 mV	24.6 mV	33.7 mV	Pass
Crossload 2	41.4 mV	27.9 mV	25.6 mV	25.1 mV	Pass

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HOLD-UP TIME & POWER OK SIGNAL (230V)	
Hold-Up Time (ms)	18.76
AC Loss to PWR_OK Hold Up Time (ms)	16.46
PWR_OK Inactive to DC Loss Delay (ms)	2.30

Top side

Power specifications label

CERTIFICATIONS

CYBENETICS PLATINUM

CYBENETICS STANDARD+

Cybenetics offers the ETA and Lambda voluntary certification programs, through which the efficient and silent power supplies are promoted

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