Anex

SilverStone ST60F-TI

Lab ID#: 128
Receipt Date: -
Test Date: -

Report:

Report Date: Jun 20, 2018

DUT INFORMATION

Brand	SilverStone
Manufacturer (OEM)	Enhance Electronics
Series	Strider Titanium
Model Number	ST60F-TI
Serial Number	155200448
DUT Notes	

DUT SPECIFICATIONS

Rated Voltage (Vrms)	100-240
Rated Current (Arms)	9-4.5
Rated Frequency (Hz)	50-60
Rated Power (W)	600
Type	ATX12V
Cooling	120mm Fluid Dymanic Bearing Fan (HA1225H12F-Z)
Semi-Passive Operation	✗
Cable Design	Fully Modular

POWER SPECIFICATIONS

Rail		3.3V	5V	12V	5VSB	-12V
Max. Power	Amps	20	20	49	2.5	0.3
	Watts	100		588	12.5	3.6
Total Max. Power (W)		600				

CABLES AND CONNECTORS

Modular Cables

Description	Cable Count	Connector Count (Total)	Gauge
ATX connector 20+4 pin (560mm)	1	1	18-22AWG
4+4 pin EPS12V (755mm)	1	1	18AWG
6 pin PCIe (560mm)	2	2	18AWG
6+2 pin PCIe (560mm)	2	2	18AWG
SATA (600mm+140mm+140mm+140mm)	2	8	18AWG
4 pin Molex (610mm+150mm+150mm)	1	3	18AWG
FDD Adapter (+105mm)	1	1	22AWG

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Primary Side	
Transient Filter	4x Y caps, 4x X caps, 2x CM chokes, 1x MOV
Inrush Protection	NTC Thermistor
Bridge Rectifier(s)	2x Vishay BU1506 (600V, 15A @ 150°C)
APFC MOSFETS	2x Infineon IPP50R140CP (550V, 15A @ 100°C, 0.14 Ohm)
APFC Boost Diode	1x CREE C3D08060A (600V, 8A @ 152°C)
Hold-up Cap(s)	1x Nippon Chemi-Con (450V, 470uF, 2000h @ 105°C, KMQ)
Main Switchers	2x Infineon IPP50R140CP (550V, 15A @ 100°C, 0.14 Ohm) Driver IC: 1x Silicon Labs Si8230BD
APFC Controller	Champion CM6502S & CM03X Green PFC controller
Switching Controller	Champion CM6901
Topology	Primary side: Half-Bridge & LLC Resonant Converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	8x Infineon BSC014N04LS (40V, 100A @ 100°C, 1.4 mOhm)
5V & 3.3V	DC-DC Converters: 2x BSC050NE2LS FETs (25V, 37A @ 100°C, 5.0mΩ) 2x BSC018NE2LS FETs (25V, 97A @ 100°C, 1.8mΩ) PWM Controller: 2x APW7073
Filtering Capacitors	Electrolytics: Nippon Chemi-Con (105°C, KY 4,000-10,000h, KZH 5,000-6,000h), Rubycon (105°C, ZLH 6,000-10,000h, YXG 3,000-6,000h) Polymers: Unicon (TW)
Supervisor IC	SITI PS223 (OVP, UVP, OCP, SCP, OTP)
Fan Model	Hong Hua HA1225H12F-Z (120mm, 12V, 0.58A, 2200RPM, Fluid Dynamic Bearing)
5VSB Circuit	
Rectifier	1x PFR10V45CT & 1x SG30N04D
Standby PWM Controller	Sanken STR-A6069H

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RESULTS	
Temperature Range (°C /°F)	30-32 / 86-89.6
Average Efficiency	91.801
Efficiency With 10W (≤500W) or 2% (>500W) Load -115V	0.000
Average Efficiency 5VSB	81.263
Standby Power Consumption (W) -115V	0.0586622
Standby Power Consumption (W) -230V	0.0943343
Average PF	0.975
ErP Lot 3/6 Ready	ErP Lot 6 2010: ✓ ErP Lot 6 2013: ✓ ErP Lot 3 2014: Partially
(EU) No 617/2013 Compliance	✓
Avg Noise Output	21.10
Efficiency Rating (ETA)	PLATINUM
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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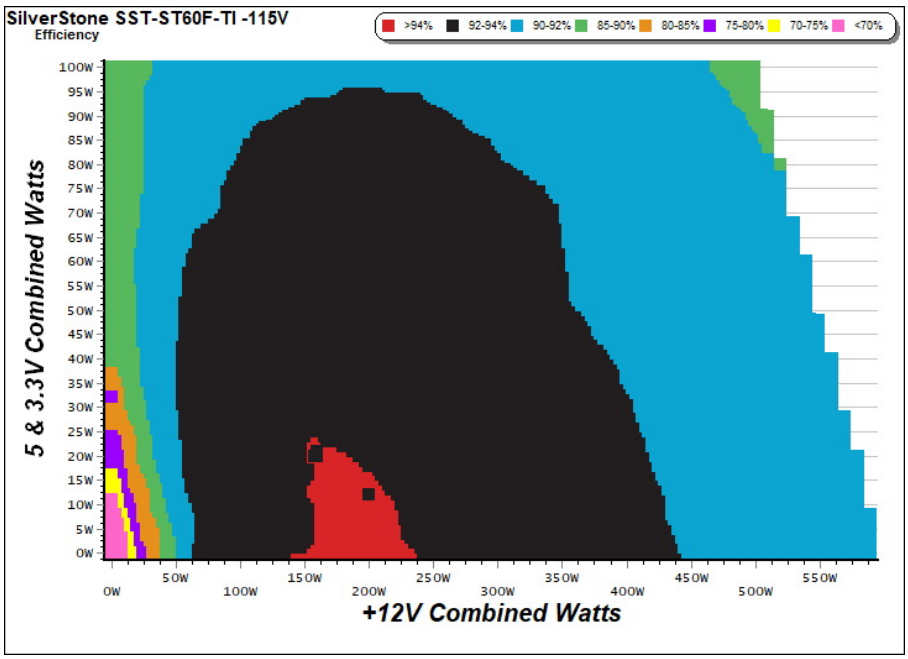
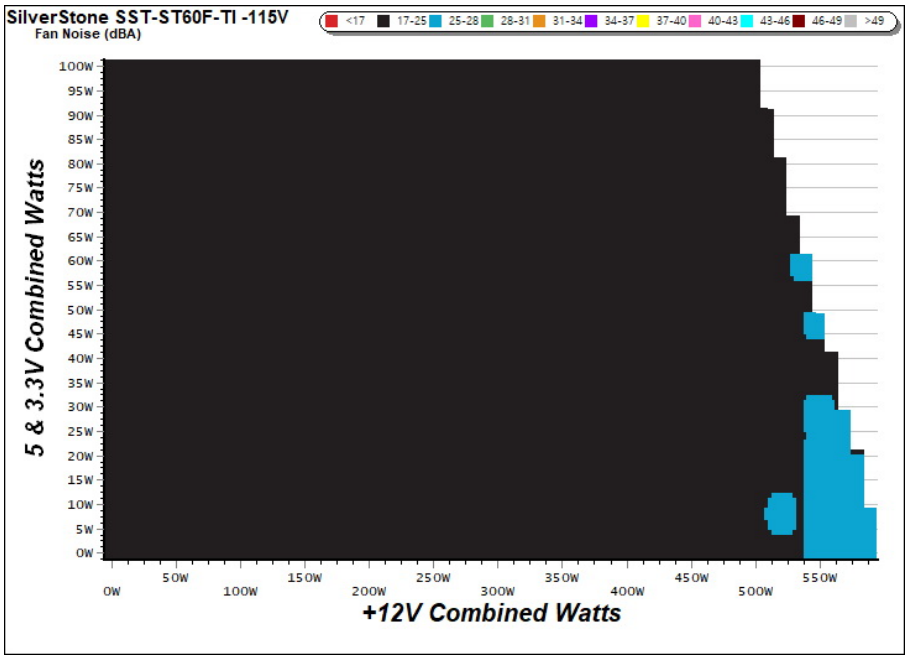
EFFICIENCY GRAPH



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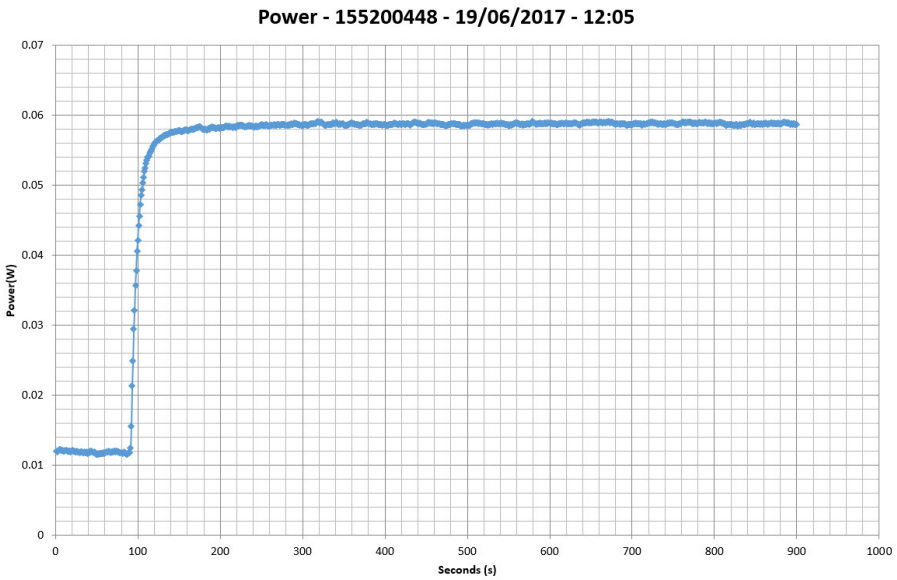
5VSB EFFICIENCY (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.205	64.465%	0.021
	4.935V	0.318		115.14V
2	0.086A	0.426	71.838%	0.040
	4.933V	0.593		115.13V
3	0.542A	2.663	82.651%	0.185
	4.913V	3.222		115.12V
4	1.002A	4.903	83.740%	0.274
	4.894V	5.855		115.12V
5	1.502A	7.317	83.167%	0.330
	4.873V	8.798		115.13V
6	2.502A	12.088	81.808%	0.387
	4.832V	14.776		115.13V

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

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.042A	0.206	56.284%	0.007
	4.935V	0.366		230.35V
2	0.087A	0.430	65.250%	0.013
	4.933V	0.659		230.36V
3	0.542A	2.664	73.795%	0.071
	4.914V	3.610		230.35V
4	1.002A	4.905	79.977%	0.115
	4.895V	6.133		230.35V
5	1.502A	7.321	82.102%	0.159
	4.875V	8.917		230.35V
6	2.501A	12.093	82.260%	0.229
	4.835V	14.701		230.35V

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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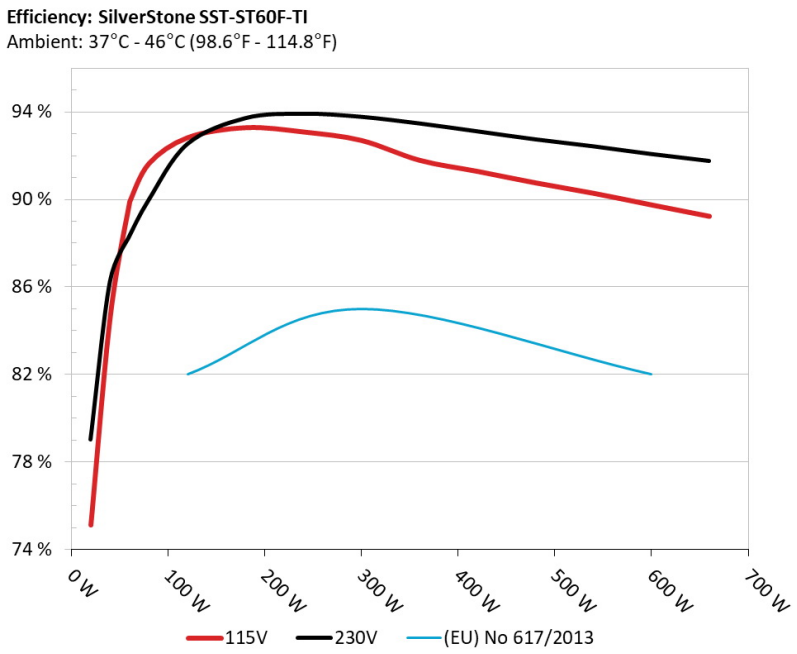
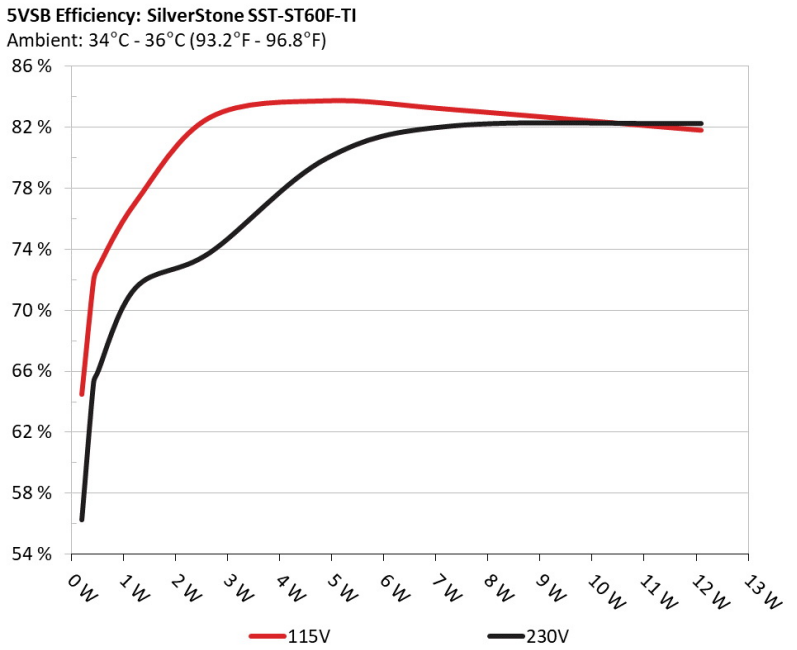
EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE



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



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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)	Fan Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.211A	1.994A	1.969A	1.006A	59.812	89.896%	964	24.4	38.43°C	0.919
	11.904V	5.010V	3.350V	4.972V	66.535				40.45°C	115.14V
2	7.475A	2.993A	2.959A	1.206A	119.776	92.816%	1133	25.5	38.68°C	0.952
	11.898V	5.002V	3.341V	4.960V	129.047				41.01°C	115.13V
3	12.093A	3.508A	3.472A	1.414A	179.911	93.272%	1268	27.2	38.95°C	0.970
	11.893V	4.993V	3.335V	4.946V	192.889				42.07°C	115.13V
4	16.706A	4.015A	3.964A	1.621A	239.806	93.075%	1488	32.4	39.49°C	0.975
	11.888V	4.985V	3.328V	4.934V	257.647				42.98°C	115.12V
5	20.976A	5.020A	4.971A	1.826A	299.737	92.687%	1712	37.9	39.90°C	0.980
	11.884V	4.976V	3.318V	4.921V	323.385				44.02°C	115.12V
6	25.251A	6.039A	5.978A	2.036A	359.739	91.782%	1979	40.4	40.21°C	0.984
	11.879V	4.968V	3.310V	4.908V	391.951				45.23°C	115.12V
7	29.528A	7.053A	6.996A	2.246A	419.679	91.275%	2124	43.5	41.19°C	0.986
	11.874V	4.960V	3.300V	4.895V	459.797				46.57°C	115.12V
8	33.808A	8.080A	8.016A	2.456A	479.699	90.753%	2156	44.1	42.41°C	0.988
	11.870V	4.951V	3.293V	4.885V	528.576				48.35°C	115.12V
9	38.529A	8.597A	8.551A	2.456A	539.781	90.276%	2156	44.1	43.40°C	0.989
	11.866V	4.945V	3.285V	4.883V	597.922				49.88°C	115.12V
10	43.200A	9.112A	9.060A	2.561A	599.624	89.744%	2156	44.1	44.81°C	0.990
	11.862V	4.939V	3.278V	4.874V	668.150				53.14°C	115.13V
11	48.273A	9.124A	9.073A	2.566A	659.613	89.223%	2226	43.9	45.96°C	0.991
	11.858V	4.932V	3.273V	4.870V	739.288				56.04°C	115.13V
CL1	0.099A	12.012A	12.006A	0.004A	100.865	86.502%	2156	44.1	42.81°C	0.950
	11.901V	4.980V	3.319V	5.049V	116.604				49.95°C	115.13V
CL2	48.963A	1.003A	1.002A	1.002A	594.172	90.417%	2226	43.9	43.76°C	0.990
	11.865V	4.964V	3.306V	4.926V	657.143				52.24°C	115.14V

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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	1.230A	0.491A	0.473A	0.196A	19.669	75.124%	765	19.8	0.807
	11.898V	5.019V	3.359V	5.009V	26.182				115.14V
2	2.478A	0.990A	0.982A	0.399A	39.758	84.667%	765	19.8	0.891
	11.906V	5.015V	3.356V	4.999V	46.958				115.14V
3	3.732A	1.487A	1.489A	0.601A	59.871	90.639%	788	20.2	0.919
	11.904V	5.012V	3.353V	4.990V	66.054				115.14V
4	4.974A	1.995A	1.969A	0.801A	79.776	91.634%	924	22.3	0.935
	11.902V	5.009V	3.349V	4.980V	87.059				115.13V

RIPPLE MEASUREMENTS

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	19.4 mV	7.5 mV	15.0 mV	6.1 mV	Pass
20% Load	20.0 mV	7.7 mV	16.5 mV	5.7 mV	Pass
30% Load	25.7 mV	8.6 mV	23.3 mV	6.8 mV	Pass
40% Load	31.5 mV	9.1 mV	20.2 mV	7.0 mV	Pass
50% Load	37.3 mV	10.2 mV	22.1 mV	8.8 mV	Pass
60% Load	43.8 mV	11.8 mV	25.6 mV	8.3 mV	Pass
70% Load	51.0 mV	21.5 mV	42.0 mV	17.7 mV	Pass
80% Load	55.4 mV	21.6 mV	45.7 mV	17.3 mV	Pass
90% Load	60.0 mV	15.5 mV	38.1 mV	11.2 mV	Pass
100% Load	66.2 mV	18.8 mV	36.7 mV	15.8 mV	Pass
110% Load	72.1 mV	20.6 mV	37.1 mV	15.3 mV	Pass
Crossload 1	21.2 mV	9.7 mV	18.1 mV	7.0 mV	Pass
Crossload 2	64.8 mV	18.8 mV	33.7 mV	13.3 mV	Pass

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HOLD-UP TIME & POWER OK SIGNAL (230V)	
Hold-Up Time (ms)	14.3
AC Loss to PWR_OK Hold Up Time (ms)	19.7
PWR_OK Inactive to DC Loss Delay (ms)	-5.4

Top side

Power specifications label

CERTIFICATIONS

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