



**SILVERSTONE**<sup>®</sup>  
Designing Inspiration

STRIDER ESSENTIAL SERIES

ST50F-ESB

ST40F-ESB

Power for everything you need

High efficiency with 80 PLUS Bronze certification

24/7 continuous power output with 40°C operating temperature

Class-leading single +12V rail

Multiple protection circuitry

Silent running 120mm fan with 18dBA

PCI-E connectors support

Active PFC



## Installation and system optimization guide:

The following manual and guides were carefully prepared by the SilverStone engineering team to help you maximize the potential of your SilverStone product. Please keep this manual for future reference when upgrading or performing maintenance on your system. A copy of this manual can also be downloaded from our website at:

<http://www.silverstonetek.com>

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# SPECIFICATION

## SilverStone Strider Essential

### ST50F-ESB ST40F-ESB

ATX12V Switching Power Supply  
With Active PFC  
80Plus Bronze  
PS/2

This specification describes the requirements of 500W/400W with active P.F.C Switching Power Supply with an ATX form-factor, +5V standby voltage, fan control, ATX 12V Power supply version 2.3, remote on/off control, dual line input capability and forced air cooling characteristics.

#### 1. AC INPUT requirements

The input voltage, current, and frequency requirements for continuous operation are stated below.

Parameter	Min	Nom	Max	Unit
Vin	90	100-240	264	VACrm
VinFrequency	47	60---50	63	Hz
lin(500W)	--	8-----4	--	Arms
lin(400W)	--	6-----3	--	Arms

##### 1.1 Inrush current limiting

50 A @ 115Vrms

100 A @ 230Vrms (at 25oC ambient cold start)

## 2. DC OUTPUT

### 2.1 DC voltage regulation

Parameter	Range	Min	Nom	Max	Unit
+3.3V	+/-5%	+3.14	+3.3	+3.47	Volts
+5V	+/-5%	+4.75	+5.0	+5.25	Volts
+12V	+/-5%	+11.40	+12.0	+12.6	Volts
-12V	+/-10%	-10.80	-12.0	-13.2	Volts
+5VSB	+/-5%	+4.75	+5.0	+5.25	Volts

### 2.2 Load Ranges

#### 2.2.1 Typical Power Distribution for 500W ATX12V Configuration

Parameter	Min	Nom	Max	Peak	Unit
+3.3V	0.1	-	18	-	Amps
+5V	0.2	-	16	-	Amps
+12V	0.5	-	38	-	Amps
-12V	0.0	-	0.3	-	Amps
+5VSB	0.0	-	2.5	-	Amps

Note:

( 1 )Total combined output load of +3.3V and +5V is  $\leq 110W$ .

( 2 )+12V Maximum output power should not exceed 456W.

( 3 )When +5V load is over 15A,+12V min load is 2A.

( 4 )When +12V load is over 30A,+5V min load is 4A.

( 5 )Maximum continuous total DC output power should not exceed 500W.

( 6 )Peak DC output power should not exceed 520W for 12 second.

#### 2.2.2 Typical Power Distribution for a 400W ATX12V Configuration

Parameter	Min	Nom	Max	Peak	Unit
+3.3V	0.1	-	16	-	Amps
+5V	0.2	-	16	-	Amps
+12V	0.5	-	38	-	Amps
-12V	0.0	-	0.3	-	Amps
+5VSB	0.0	-	2.5	-	Amps

Note:

- ( 1 )Total combined output load of +3.3V and +5V is  $\leq 100W$ .
- ( 2 )+12V Maximum output power should not exceed 360W.
- ( 3 )When +5V load is over 15A,+12V min load is 2A.
- ( 4 )When +12V load is over 25A,+5V min load is 4A.
- ( 5 )Maximum continuous total DC output power should not exceed 400W.
- ( 6 )Peak DC output power should not exceed 420W for 12 second.

## 2.3 DC Output Ripple/Noise.

### 2.3.1 Ripple regulation

Parameter	Ripple&Noise	Unit
+3.3V	50	mVp-p
+5V	50	mVp-p
+12V	120	mVp-p
-12V	120	mVp-p
+5VSB	50	mVp-p

### 2.3.2 Definition

The ripple voltage of the outputs shall be measured at the pins of the output connector. The ripple voltage of the outputs shall be measured at the pins of the output connector at the connectors with a 0.1 $\mu$ F ceramic capacitor and a 10 $\mu$ F electrolytic capacitor to simulate system loading. Ripple shall be measured under any condition of line voltage, output load, line frequency, operation temperature.

### 2.3.3 Ripple/Noise voltage test circuit

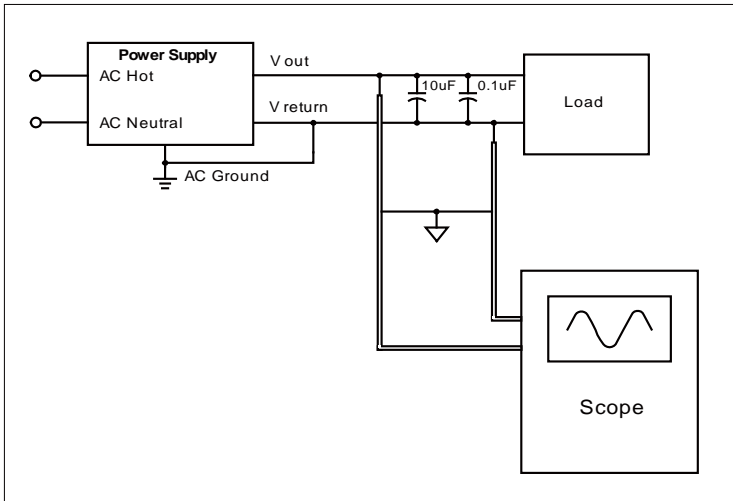


Figure 3. Ripple/Noise voltage test circuit

## 2.4 Overshoot

Any overshoot at turn on or turn off shall be less 10% of the nominal voltage value, all outputs shall be within the regulation limit of section 2.0 before issuing the power good signal of section 5.0.

## 2.5 Efficiency

Power supply typical efficiency is 82% under full Load at nominal input voltage of 115VAC or 230VAC.

## 2.6 Remote on/off control

When the logic level "PS-ON" is low, the DC outputs are to be enabled.

When the logic level is high or open collector, the DC outputs are to be disabled.

# 3. PROTECTION

## 3.1 Over-power protection

The power supply will be shutdown and latch off when output power is 110%~160%.

## 3.2 Over voltage protection

The over voltage sense circuitry and reference shall reside in packages that are separate and distinct from the regulator control circuitry and reference. No single point fault shall be able to cause a sustained over voltage condition on any or all outputs. The supply shall provide latch-mode over voltage protection as defined in Table.

Output	Minimum	Nominal	Maximum	Unit
+12 VDC	13.4	15.0	17	Volts
+5 VDC	5.74	6.3	7.5	Volts
+3.3 VDC	3.76	4.2	4.8	Volts

## 3.3 Over Current Protection

500W

Parameter	Min	Max	Unit
+12V	52	65	A

Parameter	Min	Max	Unit
+3.3V	24	40	A
+5V	24	40	A

400W

Parameter	Min	Max	Unit
+12V	33	45	A

Parameter	Min	Max	Unit
+3.3V	24	40	A
+5V	24	40	A

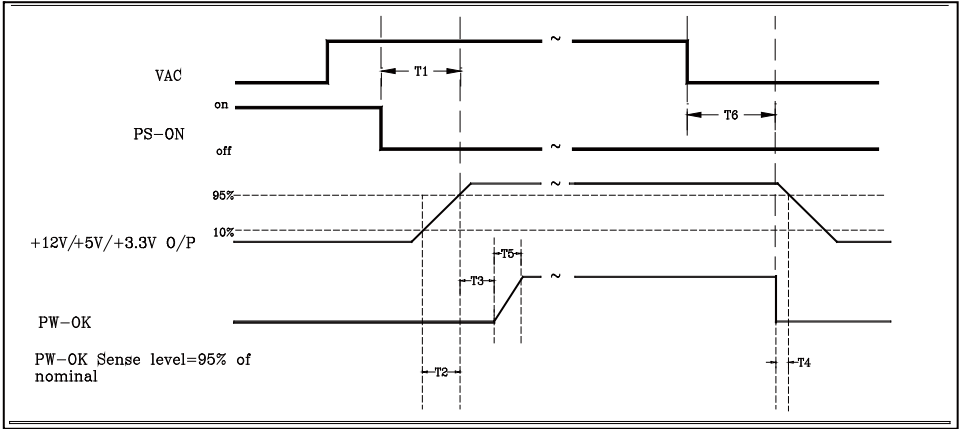
No damage or hazardous condition should occur with all the DC output connectors disconnected from the load. The power supply may latch into the shutdown state.

## 3.4 Over temperature protection

## 4. TIMING

### 4.1 Signal timing drawing

Figure 4 is a reference for signal timing for main power connector signals and rails.



- ( 1 )T2: Rise time (0.1ms~20ms)
- ( 2 )T3: Power good turn on delay time (100ms~500ms)
- ( 3 )T4: Power good turn off delay time (1ms min)
- ( 4 )T5: Rise time (10ms max)

### 4.2 Output Transient Response

Table 13. summarizes the expected output transient step sizes for each output. The transient load slew rate is =1.0A/us.

Table 13. DC Output Transient Step Sizes

Output	Max.step size	Max.step size
	(% of rated output amps per Sec 3.2.3)	(amps)
+12 VDC	40%	-
+5 VDC	30%	-
+3.3 VDC	30%	-
-12 VDC	-	0.1A
+5 VSB	-	0.5A

(1) For example, for a rated +5 VDC output of 18A, the transient step would be 30% x 18A=5.4A Output voltages should remain within the regulation limits of Section 2.1, and the power supply should be stable when subjected to load transients per Table 13. from any steady state load, including any or all of the following conditions:



- \* Simultaneous load steps on the +12 VDC,+5 VDC,and +3.3 VDC outputs (all steps occurring in the same direction)
- \* Load-changing repetition rate of 50 Hz to 10 kHz
- \* AC input range per Section 1.0
- \* +5Vsb Loading min 0.1A
- \* +12V loading min 0.6A

### 4.3 Hold up time (T6 of figure 4.)

When the power loss its input power, The output shall maintain 12ms in regulation ranges.  
 Tested at 80% of maximum load and AC:115V/60Hz or 230V/50Hz.

### 4.4 Capacitive Load-REQUIRED

The power supply should be able to power up and operate with the regulation limits defined in Table 15,With the following capacitances simultaneously present on the DC outputs.

Output Capacitive Loads

Output	Capacitive Load(uF)
+12VDC	10000
+5VDC	10000
+3.3VDC	10000
+5VSB	6000
-12VDC	330

## 5. ENVIRONMENT

### 5.1 Operation

Temperature	0°C to 40°C at AC 100V full Load
Relative Humidity	20 to 85%, non-condensing

### 5.2 Shipping and Storage

Temperature	-10°C to 50°C
Relative Humidity	5 to 90%, non-condensing

### 5.3 Altitude

Operating	3,000FT max.
Storage	15,000FT max.

## 6. SAFETY

6.1 Underwriters Laboratory (UL) recognition.

The power supply designed to meet UL 60950.

6.2 The power supply must bear the German Bauart Mark form Nemko.

6.3 NEMKO certified by any NORDIC .

## 7. ELECTROMAGNETIC COMPATIBILITY (EMC)

7.1 ELECTROSTATIC DISCHARGE (ESD) - IEC 61000 – 4 - 2 : 2008

7.2 ELECTRICAL FAST TRANSIENT / BURST ( EFT/B) – IEC 61000 – 4 - 4 : 2012

7.3 SURGE – IEC 61000 – 4 - 5 : 2005

7.4 POWER FREQUENCY MAGNETIC FIELD – IEC 61000 – 4 - 8 : 2009

7.5 VOLTAGE DIPS – IEC 61000 – 4 - 11 : 2004

7.6 RADIATED SUSCEPTIBILITY – IEC 61000 – 4 – 3 : 2006+A1 : 2007+A2 : 2010

7.7 CONDUCTED SUSCEPTIBILITY – IEC 61000 – 4 - 6 : 2008

7.8 VOLTAGE FLUCTUATION - EN 61000 – 3 – 3 : 2008

7.9 EN61000-3-2 : 2006+A2 : 2009 harmonic current emissions.

If applicable to sales in Europe, the power supply shall meet the requirements of EN 61000-3-2 Class D and the Guidelines for the Suppression of Harmonics in Appliances and General Use Equipment Class D for harmonic line current content at full-rated power.

7.10 EN55022 : 2010/AC : 2011 Class B Radio interference (CISPR 22).

7.11 ANSI C63.4-2009 / FCC Part 15 Subpart B / ICE-003 Issue 5 class B 115VAC operation.

## **8. MTBF**

### **8.1 MTBF (MEAN TIME BETWEEN FAILURES) CALCULATION**

The demonstrated MTBF shall be 100,000 hours of continuous operation at 25oC,full load, 80% confidence limit and nominal line. The MTBF of the power supply shall be calculated in accordance with MIL-STD-217D/E. The DC FAN is not included.

## **9. MECHANICAL REQUIREMENTS**

9.1 Physical Dimension : 150mm x 140mm x 86mm

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