



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

## STRIDER ESSENTIAL SERIES

The essential gold standard

SST-ST70F-ESG

SST-ST60F-ESG

SST-ST50F-ESG

High efficiency with 80 PLUS Gold certification

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

Class-leading single +12V rail

Strict  $\pm 3\%$  voltage regulation and low ripple & noise

Multiple protection circuitry

PCI-E 8pin and PCI-E 6pin connectors support

Silent running 120mm fan with 18dBA minimum

Active PFC

# **SPECIFICATION**

## **SilverStone Strider Essential**

**ST70F-ESG**

**ST60F-ESG**

**ST50F-ESG**

ATX12V / EPS 12V Switching

Power Supply

With Active PFC

80Plus Gold

PS/2

### **1.0 GENERAL REQUIREMENTS**

This specification describes a 700 / 600 / 500 watts power supply. With 5 output remote ON/OFF control for ATX-12V system and a “Power factor correction (active PFC)” circuit at 100V-240Vac.

## 2.0 INPUT REQUIREMENTS

The AC mains steady-state input voltage shall be 100 to 240 Vrms  
 The power supply shall operate from 90 to 264 Vrms.  
 The power supply shall operate from an AC mains frequency of 47-63Hz.  
 The AC mains steady-state RMS input current shall be:

SST-ST70F-ESG:  
 10Amp (maximum) at 100-127Vrms/60 Hz  
 5Amp (maximum) at 200-240Vrms/50 Hz.

SST-ST60F-ESG:  
 8Amp (maximum) at 100-127Vrms/60 Hz  
 4Amp (maximum) at 200-240Vrms/50 Hz.

SST-ST50F-ESG:  
 8Amp (maximum) at 100-127Vrms/60 Hz  
 4Amp (maximum) at 200-240Vrms/50 Hz.

## 3.0 OUTPUT REQUIREMENTS

### 3.1 OUTPUT VOLTAGE AND CURRENT

#### SST-ST70F-ESG:

	MINIMUM LOAD	NORMAL LOAD	MAXIMUM LOAD	LOAD REG	LINE REG	RIPPLE & NOISE
+3.3V	0.2A	10A	25A	±5%	±1%	50mV P-P
+5V	1A	10A	25A	±5%	±1%	50mV P-P
+12V	1A	24A	56A	±5%	±1%	120mV P-P
-12V	0A	0.25A	0.3A	±10%	±2%	120mV P-P
+5Vsb	0A	1A	3A	±5%	±1%	50mV P-P

+5Vsb peak current is 4A(less then 0.5S)

- (1) +3.3V & +5V total output not exceed 160W.  
 When +5V is load to 25A, the +3.3V maximum load is 10.6A.  
 When +3.3V is load to 25A, the +5V maximum load is 15.5A.
- (2) All outputs shall be safety-isolated from the AC mains and share a common return.  
 This common return must be connected to supply chassis.
- (3) Voltages and ripple are measured at the load side of mating connectors with a 0.1uF monolithic ceramic capacitor paralleled by a 10uF electrolytic capacitor across the measuring terminals.

## LOAD REGULATION CHARACTERISTICS

NO	LOAD CONDITION	OUTPUT LOAD				
		+3.3V	+5V	+12V	-12V	+5Vsb
1	COND.1	X	X	X	X	3.5A
2	COND.2	X	X	X	X	3A
3	COND.3	1.5A	1A	1A	0A	0.1A
4	COND.4	25A	1A	8A	0A	0.1A
5	COND.5	1.5A	25A	8A	0A	0.1A
6	COND.6	1A	5A	56A	0A	0.1A
7	COND.7	3.6A	3.6A	2.6A	0.3A	3A
8	COND.8	10A	10A	24A	0.25A	1A
9	COND.9	15.86A	15.86A	46.09A	0.25A	2.47A
10	COND.10	14A	14A	52A	0.3A	3A

Cond. 10 only at 115Vac/60Hz and less than 1 S

Cond. 1 only at 115Vac/60Hz and less than 100 mS

### SST-ST60F-ESG:

	MINIMUM LOAD	NORMAL LOAD	MAXIMUM LOAD	LOAD REG	LINE REG	RIPPLE & NOISE
+3.3V	0.2A	10A	24A	±5%	±1%	50mV P-P
+5V	1A	10A	24A	±5%	±1%	50mV P-P
+12V	1A	22A	46A	±5%	±1%	120mV P-P
-12V	0A	0.25A	0.3A	±10%	±2%	120mV P-P
+5Vsb	0A	1A	3A	±5%	±1%	50mV P-P

+5Vsb peak current is 3.5A(less than 0.5S)

(1) +3.3V & +5V total output not exceed 130W.

When +5V is load to 24A, the +3.3V maximum load is 3A.

When +3.3V is load to 24A, the +5V maximum load is 10A.

(2) All outputs shall be safety-isolated from the AC mains and share a

common return. This common return must be connected to supply chassis.

- (3) Voltages and ripple are measured at the load side of mating connectors with a 0.1uF monolithic ceramic capacitor paralleled by a 10uF electrolytic capacitor across the measuring terminals.

### LOAD REGULATION CHARACTERISTICS

NO	LOAD CONDITION	OUTPUT LOAD				
		+3.3V	+5V	+12V	-12V	+5Vsb
1	COND.1	X	X	X	X	3.5A
2	COND.2	X	X	X	X	3A
3	COND.3	1.5A	1A	1A	0A	0.1A
4	COND.4	24A	1A	8A	0A	0.1A
5	COND.5	1.5A	24A	8A	0A	0.1A
6	COND.6	3A	6A	46A	0A	0.1A
7	COND.7	3.6A	3.6A	2.6A	0.3A	3A
8	COND.8	10A	10A	22A	0.25A	1A
9	COND.9	13.41A	13.41A	39.39A	0.26A	2.57A
10	COND.10	14A	14A	44A	0.3A	3A

Cond. 10 only at 115Vac/60Hz and less then 1 S

Cond. 1 only at 115Vac/60Hz and less then 100 mS

### SST-ST50F-ESG:

	MINIMUM LOAD	NORMAL LOAD	MAXIMUM LOAD	LOAD REG	LINE REG	RIPPLE & NOISE
+3.3V	0.2A	10A	24A	±5%	±1%	50mV P-P
+5V	1A	9A	20A	±5%	±1%	50mV P-P
+12V	1A	22A	39A	±5%	±1%	120mV P-P
-12V	0A	0.25A	0.3A	±10%	±2%	120mV P-P
+5Vsb	0A	1A	3A	±5%	±1%	50mV P-P

+5Vsb peak current is 3.5A(less then 0.5S)

(1) +3.3V & +5V total output not exceed 120W.

When +5V is load to 20A, the +3.3V maximum load is 7.5A.

When +3.3V is load to 24A, the +5V maximum load is 9A..

(2) All outputs shall be safety-isolated from the AC mains and share a common return. This common return must be connected to supply chassis.

(3) Voltages and ripple are measured at the load side of mating connectors with a 0.1uF monolithic ceramic capacitor paralleled by a 10uF electrolytic capacitor across the measuring terminals.

## LOAD REGULATION CHARACTERISTICS

NO	LOAD CONDITION	OUTPUT LOAD				
		+3.3V	+5V	+12V	-12V	+5Vsb
1	COND.1	X	X	X	X	3.5A
2	COND.2	X	X	X	X	3A
3	COND.3	1.5A	1A	1A	0A	0.1A
4	COND.4	24A	1A	7A	0A	0.1A
5	COND.5	1.5A	20A	7A	0A	0.1A
6	COND.6	3A	6A	39A	0A	0.1A
7	COND.7	3.6A	3.6A	2.6A	0.3A	3A
8	COND.8	10A	9A	20A	0.25A	1A
9	COND.9	13.25A	11.04A	32.15A	0.26A	2.47A
10	COND.10	12A	12A	36A	0.3A	3A

Cond. 10 only at 115Vac/60Hz and less than 1 S

Cond. 1 only at 115Vac/60Hz and less than 100 mS

## 3.2 REMOTE ON/OFF CONTROL

The power supply shall accept a logic open collector level which will disable/ enable all the output voltage (exclude + 5V standby).

As logic level is low, outputs voltage were enabled.

As logic level is high, outputs voltage were disabled.

Note: 1. Logic high level: 2.0-5.25V while sourcing 0.2mA maximum.

2. Logic low level: 0-0.5V while sinking 1.6mA maximum.

3. Rise Time: 15ms maximum (10%-90%).

### 3.3 OUTPUT VOLTAGE HOLD-UP TIME

16.0 mS minimum : at 115V / 60 Hz. (80%LOAD)

### 3.4 OPERATION AT NO LOAD

The power supply shall be capable of being operated with no load on any or all outputs without damage. For no load on +3.3V & +5V, the output shall not exceed +4.3V & +6.5Vdc and the power supply may shutdown and require by remote-control or remove AC power restart.

### 3.5 PROTECTION

#### 3.5.1 OVER-VOLTAGE PROTECTION

In the event of an over-voltage condition on +3.3 & +5Vdc & +12V the power supply shall shutdown and require remote control or remove the AC mains input to reset the system.

+5V : 6.5V (maximum)

+3.3V : 4.3V (maximum)

+12V : 15.5V (maximum)

#### 3.5.2 OVER- CURRENT PROTECTION

There shall be protection from an output over-current event. The PSU may shutdown form such an event and require power-on restart. The overload currents should be ramped at a minimum rate of 10 A/s starting from full load.

#### OVER-CURRENT TEST VALUES:

##### SST-ST70F-ESG:

Output Voltage	3.3V	5V	12V
Protecting trigger condition	< 60A	< 45A	< 62A

##### SST-ST60F-ESG:

Output Voltage	3.3V	5V	12V
Protecting trigger condition	< 60A	< 45A	< 52A

##### SST-ST50F-ESG:

Output Voltage	3.3V	5V	12V
Protecting trigger condition	< 60A	< 45A	< 46A

### 3.5.3 SHORT-CIRCUIT PROTECTION

An O/P short circuit is defined as any O/P impedance of less than 0.1 ohms. The power supply shall shutdown and latch off for shorting +3.3V, +5V or +12V rail to return or any other rail. and +5VSB shall not cause any damage to the power supply. The power supply shall either shutdown and latch off or fold back for shorting negative rail. +5VSB must be capable of being shorted indefinitely, but when the short is removed, the power supply shall recover automatically or by cycling PS\_ON#. The power supply shall be capable withstanding a continuous short-circuit to the O/P without damage or overstress to the unit (for example to components, PCB traces, connectors) under the I/P conditions specified.

### 3.6 OUTPUT RISE TIME

The cold-start enable main output voltage rise-time of all outputs shall be measured with maximum load on all outputs. (with COND.9)

Rise time: +3.3V 20mS (maximum)  
(10-90%) +5V 20mS (maximum)  
+12 V 20mS (maximum)  
-12 V 20mS (maximum)

The test condition: 115Vac/60Hz

### 3.7 OUTPUT OVERSHOOT/UNDERSHOOT

No output voltage shall overshoot / undershoot or generate spikes at turn-on or turn-off, during momentary power loss, output short, or realistic input voltage or output load changes, Overshoot/undershoot is defined as any output that exceeds the voltage tolerance plus or minus an additional 5%. All outputs shall be measured with minimum load (COND.3)

	Overshoot	Undershoot
+3.3V	3.63V	2.97V
+5V	5.5V	4.5V
+12V	13.2V	10.8V
-12V	-13.8V	-10.2V
+5Vsb	5.5V	4.5V

### 3.8 EFFICIENCY REQUIREMENT OF MAIN OUTPUT

The PSU should be at 87% efficiency with 100% of full load, at 90% efficiency with 50% of full load and at 87% efficiency with 20% of full load in a "light" load or ideal condition. That should be tested at nominal Input voltage is 115V/60Hz and load conditions defined in below Table.



**ST70F-ESG :**

loading	+12V	+5V	+3.3V	-12V	+5Vsb
100%	46.09A	15.86A	15.86A	0.25A	2.47A
50%	23.04A	7.93A	7.93A	0.12A	1.23A
20%	9.22A	3.17A	3.17A	0.05A	0.49A

**ST60F-ESG :**

loading	+12V	+5V	+3.3V	-12V	+5Vsb
100%	39.39A	13.41A	13.41A	0.26A	2.57A
50%	19.7A	6.71A	6.71A	0.13A	1.28A
20%	7.88A	2.68A	2.68A	0.05A	0.51A

**ST50F-ESG :**

loading	+12V	+5V	+3.3V	-12V	+5Vsb
100%	32.15A	11.04A	13.25A	0.25A	2.47A
50%	16.07A	5.52A	6.62A	0.12A	1.24A
20%	6.43A	2.21A	2.65A	0.05A	0.49A

**3.9 EFFICIENCY REQUIREMENT OF STANDBY OUTPUT(230V/50Hz)**

The +5Vsb supply efficiency should be greater than 50% with a minimum loading of 50mA and input voltage is set up at 230Vac/50HZ when main O/P off ( PS\_ON# high state).Meet Erp2013.

### 3.10 POWER GOOD SIGNAL TIME SEQUENCE

Measure condition :115V (FULL LOAD)

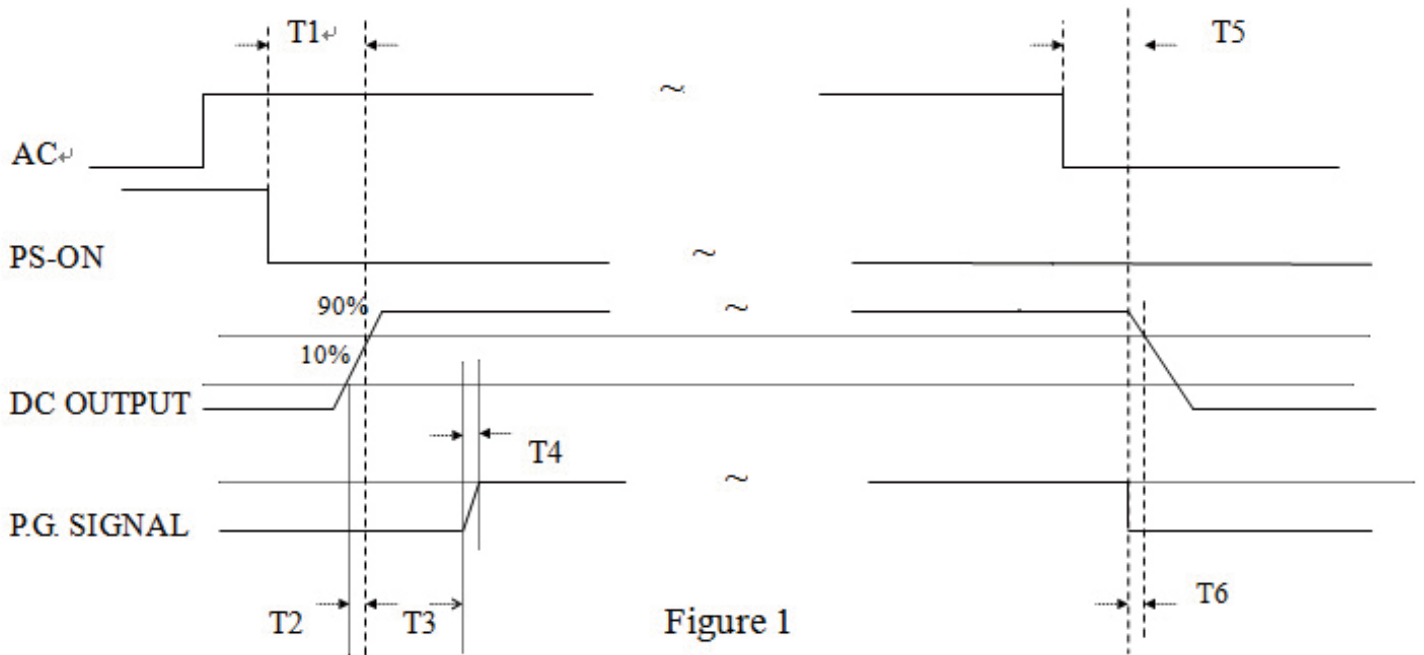


Figure 1

T1: PS\_ON -- DC O/P within Spec. < 500mS

T2: RISETIME < 20mS

T3: Power Good Delay Time 100mS-500mS

T4: Power Good Rise-time < 10mS

T5: AC fail hold-up time > 16mS

T6: Power Fail Delay Time > 1mS

### 3.11 OUTPUT TRANSIENT RESPONSE

Expected output transient step sizes for each output. The transient load slew rate is = 1.0 A/ $\mu$ s.

Table of DC Output Transient Step Sizes

#### ST70F-ESG :

Output	Max. step size (% of rated output amps per Sec 3.1)
+12V	10A (10000uF)
+5V	8A (6000uF)
+3.3V	8A (6000uF)
-12V	0.1A (350uF)
+5Vsb	0.3A (6000uF)

(Adding external capacitor)

**ST60F-ESG :**

Output	Max. step size (% of rated output amps per Sec 3.1)
+12V	9A (10000uF)
+5V	8A (6000uF)
+3.3V	8A (6000uF)
-12V	0.1A (350uF)
+5Vsb	0.3A (6000uF)

(Adding external capacitor)

**ST50F-ESG :**

Output	Max. step size (% of rated output amps per Sec 3.1)
+12V	8A (10000uF)
+5V	8A (6000uF)
+3.3V	8A (6000uF)
-12V	0.1A (350uF)
+5Vsb	0.3A (6000uF)

(Adding external capacitor)

Output voltages should remain within the regulation limits of Section 3.1, and the power supply should be stable when subjected to load transients per above table from any steady state load, including any or all of the following conditions:

- Load-changing repetition rate of 50 Hz to 10 kHz
- AC input range per Section 2.0

### 3.12 CAPACITIVE LOAD

The power supply should be able to power up and operate normally with the following capacitances simultaneously present on the DC outputs. This capacitive loading should be used to check all of function test, but without hold-up time.

Output	ATX12V Capacitive load (uF)
+12V	10000
+5V	6000
+3.3V	6000
-12V	350
+5Vsb	6000

### 3.13 CLOSED-LOOP STABILITY

The power supply shall be unconditionally stable under all line/load/transient load conditions including capacitive loads specified in Section 3.13. A minimum of 45 degrees phase margin and 10 dB gain margin is recommended at both the maximum and minimum loads.

## 4.0 PHYSICAL ENVIRONMENT

### 4.1 TEMPERATURE

4.1.1 Operating Ambient: +0 to 40°C

4.1.2 Non-Operating Ambient(Storage): -40°C to +70°C

### 4.2 HUMIDITY

4.2.1 Operating: To 85% relative humidity (non-condensing)

4.2.2 Non-Operating: To 95% relative humidity (non-condensing)

Note: 95%RH is achieved with a dry bulb temperature of 55°C and a wet bulb temperature of 54°C.

### 4.3 ALTITUDE

4.3.1 Operating: To 10,000ft

4.3.2 Non-Operating: To 50,000ft

## 5.0 REGULATORY COMPLIANCE

### 5.1 SAFETY REQUIREMENTS

- IEC 950
- TUV EN 60950
- NEMKO + CB REPOR
- CUL

### 5.2 DIELECTRIC STRENGTH

Primary to Frame Ground: 1800 Vac for 1 sec.

Primary to Secondary: 1800 Vac for 1 sec.

### 5.3 INSULATION RESISTANCE

Primary to Secondary: 20 Meg. ohms minimum.

Primary to FRAME GROUND: 20 Meg. ohms minimum.

### 5.4 GROUND LEAKAGE CURRENT

The power supply ground leakage current shall be less than 3.5mA.

### 5.5 EMISSION REQUIREMENTS

The power supply shall comply with CISPR 22, Class B, for both conducted and radiated emissions with a 4dB margin..

## 6.0 OTHER REQUIREMENTS

### 6.1 INPUT CONNECTIONS

Refer to Mechanical Specifications for placement. The AC mains input are through a three-circuit IEC type connector mounted on the rear of the power supply chassis.

### 6.2 RELIABILITY

The power supply reliability, when calculated by "Bellcore" latest revision are exceed 100,000 hours with all output at maximum load and an ambient temperature of 25°C .

The special requirement is for cooling fan that MTTF be guarantee over 20,000 hours at 40°C ambient temperature.

## 7.0 MECHANICAL REQUIREMENTS

### 7.1 PHYSICAL DIMENSION

150 mm (W) × 86 mm (H) × 140mm (D)

### 7.2 CONNECTORS

#### M/B 24PIN connector

	Signal	Pin	Pin	Signal	
Orange	+3.3V	13	1	+3.3V	Orange
Blue	-12VDC	14	2	+3.3V	Orange
Black	COM	15	3	COM	Black
Green	PS-ON	16	4	+5VDC	Red
Black	COM	17	5	COM	Black
Black	COM	18	6	+5VDC	Red
Black	COM	19	7	COM	Black
White	N/C	20	8	PWRGOOD	Grey
Red	+5VDC	21	9	+5Vsb	Purple
Red	+5VDC	22	10	+12V	Yellow
Red	+5VDC	23	11	+12V	Yellow
Black	COM	24	12	+3.3V	Orange

#### EPS 12V 8PIN connector

	Signal	Pin	Pin	Signal	
Yellow	+12V	5	1	COM	Black
Yellow	+12V	6	2	COM	Black
Yellow	+12V	7	3	COM	Black
Yellow	+12V	8	4	COM	Black

#### ATX 12V 4PIN (4+4PIN EPS 12V in split mode)

	Signal	Pin	Pin	Signal	
Black	GND	1	3	+12V	Yellow
Black	GND	2	4	+12V	Yellow

**4PIN peripheral connector (HDD)****4PIN floppy connector (FDD)**

	Signal	Pin	Pin	Signal	
Yellow	+12V	1	1	+5VDC	Red
Black	COM	2	2	COM	Black
Black	COM	3	3	COM	Black
Red	+5VDC	4	4	+12V	Yellow

**SATA connector**

	Signal	Pin
Orange	+3.3V	5
Black	COM	4
Red	+5V	3
Black	COM	2
Yellow	+12V	1

**8PIN PCI Express connector**

	Signal	Pin	Pin	Signal	
Yellow	+12V	1	5	COM	Black
Yellow	+12V	2	6	COM	Black
Yellow	+12V	3	7	COM	Black
Black sense1	COM	4	8	COM	Black

**6PIN PCI Express connector**

	Signal	Pin	Pin	Signal	
Yellow	+12V	1	4	COM	Black
Yellow	+12V	2	5	COM	Black
Yellow	+12V	3	6	COM	Black

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*SilverStone Technology Co., Ltd.*

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**[www.silverstonetek.com](http://www.silverstonetek.com)**

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support@silverstonetek.com

NO.G11220310

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