

*SilverStone Technology Co., Ltd.*

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STRIDER PLUS SERIES  
**SST-ST60F-PS**  
Smallest and most powerful modular ATX PSUs  
with 80 PLUS Silver

Compact design with a depth of 140mm for easy integration  
80 PLUS Silver certification with 80 PLUS Gold level efficiency at 230Vac  
100% modular cables

24/7 continuous power output with 40°C operating temperature  
Class-leading single +12V rail

Strict ±3% voltage regulation and low ripple & noise

Silent running 120mm fan with 18dBA minimum

# SPECIFICATION

## SilverStone Strider Plus ST60F-PS

### ATX12V / EPS 12V Switching Power Supply With Active PFC 80Plus Silver PS/2

#### 1. General

##### 1.1 Scope

This specification defines the performance characteristics of a single phase 600watts, 5 output power supply. This specification also defines worldwide safety and electromagnetic compatibility requirements for the power supply which is intended for use in computer products.

#### 2. Input Characteristics

##### 2.1 Input Voltage

Nominal Voltage

-----  
100-240 Vrms

Voltage Variation Range

-----  
90 - 264 Vrms

##### 2.2 Input Frequency

Nominal Frequency

-----  
50-60 Hz

Frequency Variation Range

-----  
47 Hz to 63 Hz

\* The power supply must operate at above frequency with 90-264 VACrms input voltage range.

#### 2.3 Max. Input AC Current

Max. Input Current

-----  
8A

Measuring Range

-----  
90 - 264 Vrms

#### 2.4 Inrush Current

The power supply must meet inrush requirements for any rated AC voltage, during turn on at any phase of AC voltage, during a single cycle AC dropout condition, during repetitive ON/OFF cycling of AC, and over the specified temperature range.

The peak inrush current shall be less than the ratings of its critical components (including input fuse, bulk rectifiers, and surge limiting device).

#### 2.5 Efficiency

SST-ST60F-PS provides an efficiency of 85% minimum when measured at full load under 115V/60Hz condition.

### 3. Output characteristics

#### 3.1 Normal Operation Output

Output Voltage	Load MIN	Range MAX	Regulation	Ripple P-P Max.
1. +5V	0.2A	20A	±3%	50mV
2. +12V	0.6A	49.0A	±3%	120mV
4. -12V	0.0A	0.5A	±10%	120mV
5. +5Vs	0.0A	3.0A	±5%	50mV
6. +3.3V	0.1A	20.0A	±3%	50mV

- Maximum continuous total DC output power should not exceed 600W.
  - Maximum continuous combined load on +3.3VDC and +5VDC outputs shall not exceed 130W.
  - Maximum combined load on +12V outputs shall not exceed 588W.
- NOTE: Noise test should be measured with 20 MHz bandwidth frequency oscilloscope. The output terminal shall add a tantalum capacitor of 10uF in parallel with a ceramic capacitor of 0.1uF.

### 3.2 Remote On/Off Controlled mode

The PSON# signal is required to remotely turn on/off the power supply, PSON# is an active low signal that turns on the output power rails. When this is not pulled low by the system, or left open, the outputs (except the +5VSB) turn off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply.

TTL level	"H" 2.0 V - 5.25 V
	"L" 0.0 V - 1.0 V

### 3.3 Regulation

The cross regulation defined as follows, the output regulation should be within the specified range.

Load	+5V	+3.3V	+12V	-12V	+5Vsb
Light Load.	2.54A	2.54A	7.96A	0.08A	0.49A
Typical Load	6.36A	6.36A	19.96A	0.2A	1.22A
Full Load	12.72A	12.72A	39.78A	0.41A	2.44A

### 3.4 Rise Time

DC output rise time is less than 20 mS at nominal line and full load.

### 3.5 Hold-up Time

DC +5V output maintains at least 12mS after power off which hold within para 3.1 under 230V/50Hz condition.

### 3.6 5VSB

5VSB is required for the implementation of PS-ON described above. 5VSB is a standby voltage that may be used to power circuits that require power input during the powered-down state of all power rails. The 5 VSB pin should deliver  $5V \pm 5\%$  at a minimum of 3.0 A for PC board circuits to operate. Conversely, PC board should draw no more than 3.0A maximum from this pin. This power may be used to operate circuits such as soft power control.

### 3.7 PG-OK

PG-OK is a power good signal and should be asserted high by power supply to indicate that the +5 VDC and +3.3 VDC outputs are above the under-voltage thresholds of the power supply. When this signal is asserted high, there should be sufficient mains energy stored by the converter to guarantee continuous power operation within specification. Conversely, when either the +5VDC or the +3.3VDC output voltage falls below the under-voltage threshold, or when mains power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PG-OK should be deasserted to a low state. See Figure 1 for a representation of the timing characteristics of the PG-OK,PS-ON, and germane power rail signals.

### 3.8 3.3V Sense

A default 3.3V sense line should be implemented pin 13 of the connector.

### 3.9 Capacitive Load

The power supply should be able to power up and operate normally with the following capacitances simultaneously present on the DC outputs.

Output	Capacitive load (uF)
+5V	6,000
+12V	8,000
+3.3V	6,000
-12V	350
+5VS	350

## 4. Protection

### 4.1 Input Protection

In primary circuit of the power supply, a protected fuse is inserted. Only internal fault of the power supply will cause the fuse blown. Any overload or short circuit at DC output will keep from fuse brown or fire hazard.

## 4.2 Output Protection

### 4.2.1 Under voltage protection

The +5V/+12V/+3.3V DC output are protected against the under voltage condition . range value can't be exceed 3.3~3.7V at 5V terminal and 8.5~9.5V at 12V, 2.0~2.4V at 3.3V.

### 4.2.2 Over Voltage Protection

The +12V/ DC output are protected against the over voltage condition . Maximum value can't be over 15.5V at 12V.

### 4.2.3 Over Power Protection

The power supply can be used electronic circuit to limit the output current against exceeding 60% of surge output power or protected against excessive power delivery since short circuit of any output or over total power at high line.

### 4.2.4 Short Circuit Protection

Short circuit placed on +5V,+12V,+3.3V,-12V will latch off. +5VSB will auto-recovery.

### 4.2.5 Over-Current Protection

Current protection should be designed to limit the current to operate within safe operating conditions. Over current protection schemes where only the voltage output that experiences the over current event is shut off may be adequate to maintain safe operation of the power supply and the system; however, damage to the motherboard or other system components may occur. The recommended over current protection scheme is for the power supply to latch into the shutdown state. The setting of over current protection for each output rail is as following.

### 4.2.6 Over-Temperature Protection

This power supply includes an over-temperature protection sensor, which can trip and shut down the power supply at 110°C

## 5.Start Stability

### 5.1 No Load Start

When power is applied to SST-ST60F-PS with no load connected or under minimum load connected, neither damage to power supply nor hazards to users will occur.

### 5.2 Cold Start

The power supply shall operate properly when first applied at normal input voltage and or so maximum load after 4 hours storage in 0°C environment.

## 6.Environment

### 6.1 Temperature and Humidity

#### 6.1.1 Operating

Temperature	0 to 40 °C
Relative Humidity	20 to 90 %

#### 6.1.2 Storage

Temperature	-40 to 70 °C
Relative Humidity	20 to 95 % noncondensing

### 6.2 Altitude

The power supply can operate normally at any altitude between 0 to 10000 feet.

### 6.3 Vibration and Shock

Sweep and resonance search for each of X,Y,Z, axis at the sweep. RATE of 1/OCTAVE/Min.

Frequency	Duration	Amplitude
5-55-10 Hz	30 minutes	0.35 mm

## 7. Conducted EMI

## 8. Product Safety

### 8.1 Safety Requirement

### 8.2 Leakage Current

The AC leakage current is less than 3.5mA when the power supply connect to 264Vac/50Hz .

### 8.3 Insulation Resistance

The insulation resistance should be not less than 30M ohm after applying of 500VDC for 1 minute.

### 8.4 Dielectric Voltage Withstand

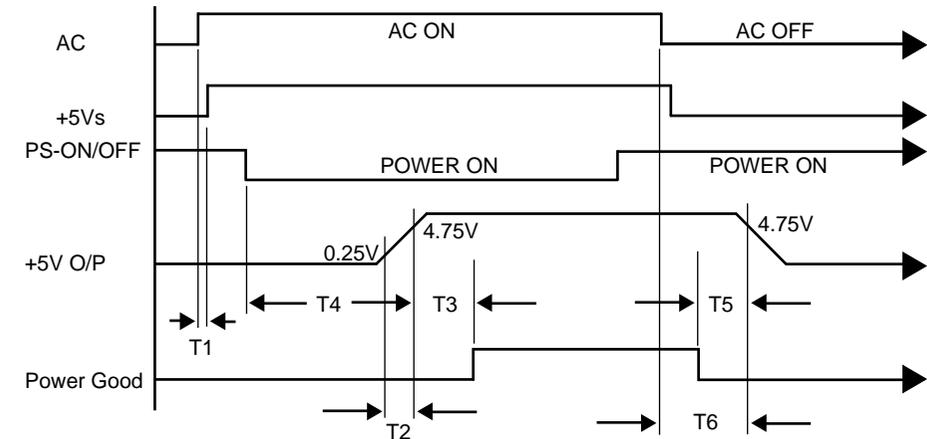
The power supply shall withstand for 1 minute without breakdown the application of a V AC voltage applied between both input line and chassis (20mA DC cut-off current). Main transformer shall similarly withstand 3000Vac applied between both primary and secondary windings for a minimum of one minute.

## 9. Power Good Signal

A TTL compatible signal for the purpose of initiating an orderly start-up procedure under normal input operating conditions. During power up, this signal is asserted ( low ) until +5V is under regulation and AC reaches min. line specification range. After all voltage are going appropriate level, the system may have a turn on delay of 100mS, but no greater than 500mS. During power off the signal should go to low level before +5V is out of regulation. The low level is 0 to 0.8V and high level is 4.75 to 5.25V. The " Power Good "signal can drive up to 6 standard TTL loads.

Time Diagram

Figure 1



- \* T1 : Turn on time ( 2 sec. Max.)
- \* T2 : Rise time (  $\cong$  20mS Max.)
- \* T3 : Power good turn on delay time (  $100 < T3 < 500$  mS )
- \* T4 : Switch on time (0.5 sec. Max.)
- \* T5 : Power good turn off delay time ( 1.0 mS Min.) PS-ON/OFF
- \* T6 : Power hold-on time ( 12 mS Min.)
- \* Power on-off cycle :

When the power supply is turned off for a minimum of 2.0 sec. and turn on again, the power good signal will be asserted.

## 10. MTBF

The MTBF of the power should be 100,000 hours min.

## 11. Burn-In

### 11.1 Input Voltage

Applying 220Vac for 230V model.

### 11.2 Test Condition

Applying 75% loads for the power supply in 45 (+/-5) oC chamber for 4 hours.

## 12. Harmonics

The product shall meet requirement for EN61000-3-2 & EN61000-3-3 :1995 standard of class D, test at 230Vac 50Hz.

## 13. Power Factor

The power supply with active power factor correction, and meet the EN61000-3-2 standards, The power factor is greater than 0.9 at 230V/50Hz, Max. load.

## 14. Mechanical Requirements

### 14.1 Physical Dimension

150 mm (W) × 86 mm (H) × 140mm (D)

### 14.2 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
GND	1	3	+12V
GND	2	4	+12V

#### 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

*Warranty Information*

This product has a limited 3 year warranty in North America, Europe, and Australia.

For information on warranty periods in other regions, please contact your reseller or SilverStone authorized distributor.

*Warranty terms & conditions*

- Product component defects or damages resulted from defective production is covered under warranty. Defects or damages with the following conditions will be fixed or replaced under SilverStone Technology's jurisdiction.
  - Usage in accordance with instructions provided in this manual, with no misuse, overuse, or other inappropriate actions.
  - Damage not caused by natural disaster (thunder, fire, earthquake, flood, salt, wind, insect, animals, etc...)
  - Product is not disassembled, modified, or fixed. Components not disassembled or replaced.
  - Warranty mark/stickers are not removed or broken.
 Loss or damages resulted from conditions other than ones listed above are not covered under warranty.
- Under warranty, SilverStone Technology's maximum liability is limited to the current market value for the product (depreciated value, excluding shipping, handling, and other fees). SilverStone Technology is not responsible for other damages or loss associated with the use of product.
- Under warranty, SilverStone Technology is obligated to repair or replace its defective products. Under no circumstances will SilverStone Technology be liable for damages in connection with the sale, purchase, or use including but not limited to loss of data, loss of business, loss of profits, loss of use of the product or incidental or consequential damage whether or not foreseeable and whether or not based on breach of warranty, contract or negligence, even if SilverStone Technology has been advised of the possibility of such damages.
- Warranty covers only the original purchaser through authorized SilverStone distributors and resellers and is not transferable to a second-hand purchaser.
- You must provide sales receipt or invoice with clear indication of purchase date to determine warranty eligibility.
- If a problem develops during the warranty period, please contact your retailer/reseller/SilverStone authorized distributors or SilverStone <http://www.silverstonetek.com>. Please note that: (i) You must provide proof of original purchase of the product by a dated itemized receipt; (ii) You shall bear the cost of shipping (or otherwise transporting) the product to SilverStone authorized distributors. SilverStone authorized distributors will bear the cost of shipping (or otherwise transporting) the product back to you after completing the warranty service; (iii) Before you send the product, you must be issued a Return Merchandise Authorization ("RMA") number from SilverStone. Updated warranty information will be posted on SilverStone's official website. Please visit <http://www.silverstonetek.com> for the latest updates.

*Additional info & contacts*

**For North America** ([usasupport@silverstonetek.com](mailto:usasupport@silverstonetek.com))

SilverStone Technology in North America may repair or replace defective product with refurbished product that is not new but has been functionally tested. Replacement product will be warranted for remainder of the warranty period or thirty days, whichever is longer. All power supplies should be sent back to the place of purchase if it is within 30 days of purchase, after 30 days, customers need to initiate RMA procedure with SilverStone Technology in USA by first downloading the "USA RMA form for end-users" form from the below link and follow its instructions.  
<http://silverstonetek.com/contactus.php>

**For Australia only** ([support@silverstonetek.com](mailto:support@silverstonetek.com))

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. Please refer to above "Warranty terms & conditions" for further warranty details.

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