



SILVERSTONE®
Designing Inspiration

SFX Form Factor **SX600-G**

The new SFX form factor milestone

- Intelligent semi-fanless operation
- Support standard SFX form factor and ATX via included bracket
- High efficiency with 80 PLUS Gold certification
- 100% modular cables
- All cables made with flexible flat arrays
- 600W continuous power output at 40°C operating temperature rated for 24/7 operation
- Class-leading single +12V rail with 50A
- Strict $\pm 3\%$ voltage regulation and low ripple & noise
- Support dual PCI-E 8/6pin connectors
- 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

SFX Form Factor

SX600-G

600W Switching Power Supply
With Active PFC
80 Plus Gold

This specification describes the requirements of 600Watts with full range voltage, switching power supply with a SFX form-factor and SFX 12V,+5V standby voltage, remote on/off .

1. AC INPUT

1.1 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 | VACrms |
| Vin Frequency | 47 | 60 | 50 | 63 | Hz |
| Iin | | 9 | 4.5 | | A |

Power factor correction (PF)>0.90 at full load.

1.2 Inrush current regulation

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

2. DC OUTPUT

2.1 DC voltage regulation

| Parameter | Range | Min | Nom. | Max | |
|-----------|-------|--------|-------|--------|-------|
| +3.3V | ±3% | +3.2 | +3.3 | +3.4 | Volts |
| +5V | ±3% | +4.85 | +5.0 | +5.15 | Volts |
| +12V | ±3% | +11.64 | +12.0 | +12.36 | Volts |
| -12V | ±10% | -10.8 | -12.0 | -13.2 | Volts |
| +5VSb | ±5% | +4.75 | +5.0 | +5.25 | Volts |

1. At no load, 3.3V output +/-5% regulation limits do not apply.

2.2 LOAD RANGE

| Parameter | Min | Nom. | Max | Peak | Unit |
|-----------|-----|------|-----|------|------|
| +3.3V | 0 | - | 20 | - | Amps |
| +5V | 0 | - | 15 | - | Amps |
| +12V | 0 | - | 50 | - | Amps |
| -12V | 0 | - | 0.3 | - | Amps |
| +5VSb | 0 | - | 2.5 | - | Amps |

(1) The maximum combined load on +5V and +3.3V outputs shall not exceed 90W.

(2) The maximum combined load on +12V outputs shall not exceed 600W(50A).

(3) The maximum continuous average DC outputs power shall not exceed 600W.

2.3 Output Ripple

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 when terminated in the load impedance specified in figure1. Ripple and noise are measured at the connectors with a 0.1uF ceramic capacitor and a 10uF 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 voltage test circuit

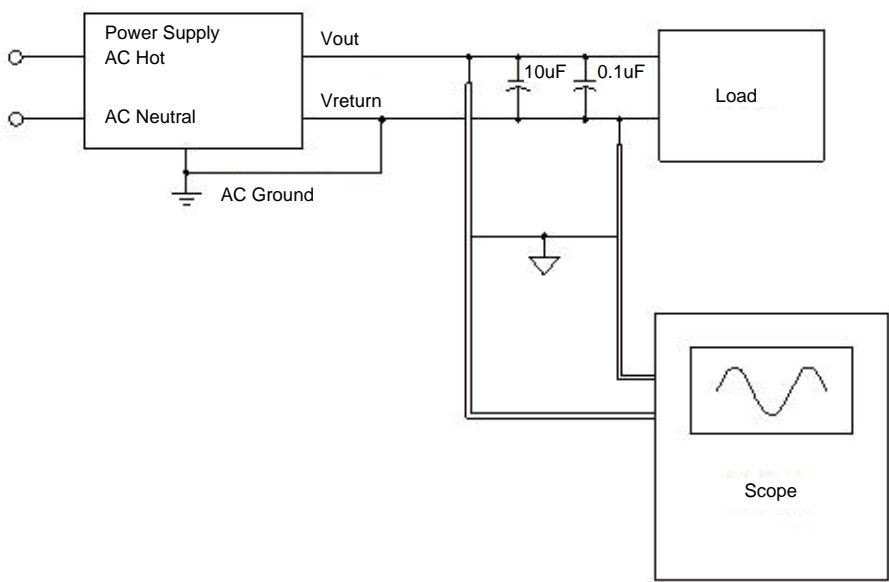


Figure 1. Ripple voltage test circuit

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 efficiency typical 87%/20% Loading, 90%/50% Loading, 87%/100% Loading, at normal AC main voltage.

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 over 110% ~ 160% of rated DC output.

3.2 Over current protection

The power supply shall have current limit to prevent the +3.3V,+5V,and +12V outputs from exceeding the values shown in the following Table. If the current limits are exceeded the power supply shall shutdown and latch off.

| Voltage | Over Current Limit (Iout limit) |
|---------|---------------------------------|
| +12V | 55A minimum; 75A maximum |
| +5V | 17A minimum; 45A maximum |
| +3.3V | 22A minimum; 45A maximum |

3.3 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 | 16.5 | Volts |
| +5 VDC | 5.74 | 6.3 | 7.0 | Volts |
| +3.3 VDC | 3.76 | 4.2 | 5.1 | Volts |

3.4 Short circuit

An output short circuit is defined as any output impedance of less than 0.1 ohms.The power supply shall shut down and latch off for shorting the +3.3 VDC,+5 VDC,or+12 VDC rails to return or any other rail. Shorts between main output rails and +5VSB shall not cause any damage to the power supply. The power supply shall either shut down and latch off or fold back for shorting the negative rails.+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 of withstanding a continuous short-circuit to the output without damage or overstress to the unit.

3.5 No load operation

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.

4. TIMING

4.1 Signal timing drawing

Figure 2 is a reference for signal timing for main power connector signals and rails.

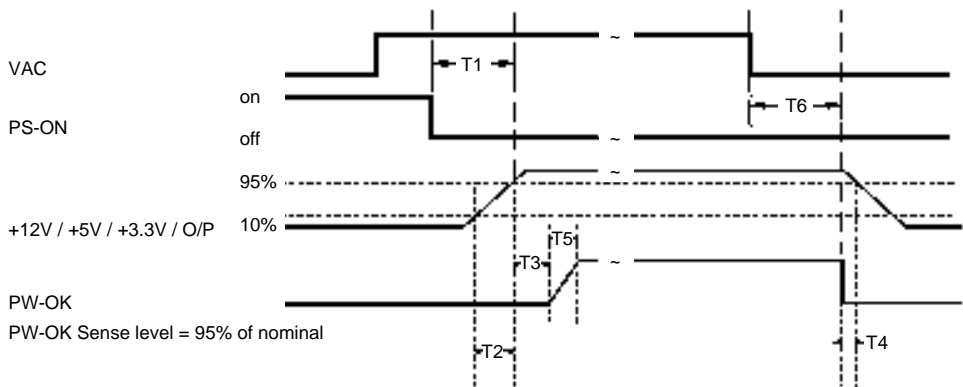


Figure 2. PS-OK Timing Sequence

- (1)T2: Rise time (0.2ms~20ms)
- (2)T3: Power good signal turn on delay time (100ms~500ms)
- (3)T4: Power good signal 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.

| Max.step size | | Max.step size |
|---------------|---|---------------|
| Output | (% of rated output amps per Sec 3.2.3)(1) | (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 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

4.3 Hold up time

When the power loss its input power, it shall maintain 12ms at 75% load in regulation limit at nominal input voltage. (AC:115V/60Hz or 230V/50Hz)

4.4 Test conditions

| Test | Start Voltage [Vac] | End Voltage [Vac] | Duration [cycles / ms] | Load | Frequency [Hz] |
|------|------------------------|-------------------------|---------------------------|----------|-------------------|
| 1 | 230 | 0 | 0.5 / 10ms | 75% Load | 50 |
| 3 | 100 | 0 | 0.5 / 8.33ms | 75%Load | 60 |

5. ENVIRONMENT

5.1 Operation

| | |
|-------------------|----------------------|
| Temperature | 0 to 40 °C |
| Relative Humidity | to 85%,on-condensing |

5.2 Shipping and Storage

| | |
|-------------------|-----------------------|
| Temperature | -20 to 60 °C |
| Relative Humidity | to 95%,non-condensing |

5.3 Altitude

| | |
|-----------|---------------|
| Operating | 10,000FT max. |
| Storage | 50,000FT max. |

6. SAFETY

6.1 Underwriters Laboratory (UL) recognition.

The power supply designed to meet UL 1950.

6.2 The power supply must bear the German Bauart Mark from TUV .

7. ELECTROMAGNETIC COMPATIBILITY (EMC)

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

7.2 ELECTRICAL FAST TRANSIENT / BURST (EFT/B) – EN 61000 – 4 - 4 : 2010

7.3 SURGE – EN 61000 – 4 - 5 : 2005

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

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

7.6 RADIATED SUSCEPTIBILITY – EN 61000 – 4 – 3 : 2006

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

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

7.9 EN61000-3-2 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 Class B Radio interference (CISPR 22).

7.11 FCC Part 15, Subpart J 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 25°C of full load and 120V AC input. The MTBF of the power supply shall be calculated in accordance with MIL-HDBK-217F. The DC FAN is not included.

9. MECHANICAL

125 mm (W) × 63.5 mm (H) × 100 mm (D)

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