

MODEL NO. ATX1500 (400W/450W/500W/550W/600W/650W/700W/750W)

This specification describes the requirements of **400,450,500,550,600,650,700,750 Watts** switching power supply with an stretch ATX form-factor and EPS 12V, +5V standby voltage, remote on/off control, full range line input capability and forced air cooling characteristics.

1. AC INPUT

1.1 AC input requirements

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

Table 1 AC Input Line Requirements

| Parameter | Min. | Nom. | Max. | Unit |
|-------------------|------|------------------|------|--------|
| Vin(Full range) | 90 | 100---240 | 264 | VACrms |
| Vin Frequency | 47 | 60----50 | 63 | Hz |
| Iin(400W,450W) | | 7-----3.5 | | Arms |
| Iin(500W,550W) | | 8-----4 | | Arms |
| Iin(600W,650W) | | 9-----4.5 | | Arms |
| Iin(700W,750W) | | 10-----5 | | Arms |

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

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 | Unit |
|-----------|--------|--------|--------|--------|-------|
| +3.3V | +/-5% | +3.14 | +3.30 | +3.47 | Volts |
| +5V | +/-5% | +4.75 | +5.00 | +5.25 | Volts |
| +12V | +/-5% | +11.40 | +12.00 | +12.60 | Volts |
| -12V | +/-10% | -13.20 | -12.00 | -10.80 | Volts |
| +5VSB | +/-5% | +4.75 | +5.00 | +5.25 | Volts |

Note:1>Voltage tolerance is required at main connector and S-ATA connector(if used)

2>Output transient response tested DC voltage regulation range +5V,+12V,+3.3V,-12V ±5%

2.2 Load ranges

2.2.1: (400 Watts Load Range,單組)

| Parameter | Range | Min | Nom. | Max | Unit |
|-----------|-------------|-----|------------|-----|------|
| +3.3V | 0.1 | - | 20 | | Amps |
| +5V | 0.2 | - | 18 | | Amps |
| +12V | 0.15 | - | 33 | | Amps |
| -12V | 0 | - | 0.3 | | Amps |
| +5VSB | 0 | - | 2.5 | | Amps |

1.Maximum continuous total DC output power should not exceed **400W**.

2.Maximum continuous combined load on +3.3V and +5V outputs shall not exceed **100W**.

3.Maximum combined current for the +12V outputs shall be **33A(396W)**.

2.2.2: (450 Watts Load Range,單組)

| Parameter | Min | Nom. | Max | Peak | Unit |
|-----------|-------------|------|------------|------|------|
| +3.3V | 0.1 | - | 20 | | Amps |
| +5V | 0.2 | - | 18 | | Amps |
| +12V | 0.15 | - | 36 | | Amps |
| -12V | 0 | - | 0.3 | | Amps |
| +5VSB | 0 | - | 2.5 | | Amps |

- 1.Maximum continuous total DC output power should not exceed **450W**.
- 2.Maximum continuous combined load on +3.3V and +5V outputs shall not exceed **100W**.
- 3.Maximum combined current for the +12V outputs shall be **36A(432W)**.

2.2.3: (500 Watts Load Range,單組)

| Parameter | Min | Nom. | Max | Peak | Unit |
|-----------|-------------|------|------------|------|------|
| +3.3V | 0.1 | - | 20 | | Amps |
| +5V | 0.2 | - | 18 | | Amps |
| +12V | 0.15 | - | 41 | | Amps |
| -12V | 0 | - | 0.3 | | Amps |
| +5VSB | 0 | - | 2.5 | | Amps |

- 1.Maximum continuous total DC output power should not exceed **500W**.
- 2.Maximum continuous combined load on +3.3V and +5V outputs shall not exceed **100W**.
- 3.Maximum combined current for the +12V outputs shall be **41A(492W)**.

2.2.4: (550 Watts Load Range,單組)

| Parameter | Min | Nom. | Max | Peak | Unit |
|-----------|-------------|------|------------|------|------|
| +3.3V | 0.1 | - | 20 | | Amps |
| +5V | 0.2 | - | 18 | | Amps |
| +12V | 0.15 | - | 45 | | Amps |
| -12V | 0 | - | 0.3 | | Amps |
| +5VSB | 0 | - | 2.5 | | Amps |

- 1.Maximum continuous total DC output power should not exceed **550W**.
- 2.Maximum continuous combined load on +3.3V and +5V outputs shall not exceed **100W**.
- 3.Maximum combined current for the +12V outputs shall be **45A(540W)**.

2.2.5: (600 Watts Load Range,單組)

| Parameter | Min | Nom. | Max | Peak | Unit |
|-----------|-------------|------|------------|------|------|
| +3.3V | 0.1 | - | 20 | | Amps |
| +5V | 0.2 | - | 18 | | Amps |
| +12V | 0.15 | - | 49 | | Amps |
| -12V | 0 | - | 0.3 | | Amps |
| +5VSB | 0 | - | 2.5 | | Amps |

- 1.Maximum continuous total DC output power should not exceed **600W**.
- 2.Maximum continuous combined load on +3.3V and +5V outputs shall not exceed **120W**.
- 3.Maximum combined current for the +12V outputs shall be **49A(588W)**.

2.2.6: (650 Watts Load Range,單組)

| Parameter | Min | Nom. | Max | Peak | Unit |
|-----------|-------------|------|------------|------|------|
| +3.3V | 0.1 | - | 20 | | Amps |
| +5V | 0.2 | - | 18 | | Amps |
| +12V | 0.15 | - | 54 | | Amps |
| -12V | 0 | - | 0.3 | | Amps |
| +5VSB | 0 | - | 2.5 | | Amps |

- 1.Maximum continuous total DC output power should not exceed **650W**.
- 2.Maximum continuous combined load on +3.3V and +5V outputs shall not exceed **120W**.
- 3.Maximum combined current for the +12V outputs shall be **54A(648W)**.

2.2.7: (700 Watts Load Range,單組)

| Parameter | Min | Nom. | Max | Peak | Unit |
|-----------|-------------|------|------------|------|------|
| +3.3V | 0.1 | - | 20 | | Amps |
| +5V | 0.2 | - | 18 | | Amps |
| +12V | 0.15 | - | 58 | | Amps |
| -12V | 0 | - | 0.3 | | Amps |
| +5VSB | 0 | - | 2.5 | | Amps |

- 1.Maximum continuous total DC output power should not exceed **700W**.
- 2.Maximum continuous combined load on +3.3V and +5V outputs shall not exceed **120W**.
- 3.Maximum combined current for the +12V outputs shall be **58A(696W)**.

2.2.8: (750 Watts Load Range,單組)

| Parameter | Min | Nom. | Max | Peak | Unit |
|-----------|-------------|------|------------|------|------|
| +3.3V | 0.1 | - | 20 | | Amps |
| +5V | 0.2 | - | 18 | | Amps |
| +12V | 0.15 | - | 62 | | Amps |
| -12V | 0 | - | 0.3 | | Amps |
| +5VSB | 0 | - | 2.5 | | Amps |

- 1.Maximum continuous total DC output power should not exceed **750W**.
- 2.Maximum continuous combined load on +3.3V and +5V outputs shall not exceed **120W**.
- 3.Maximum combined current for the +12V outputs shall be **62A(744W)**.

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 figure 1. 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

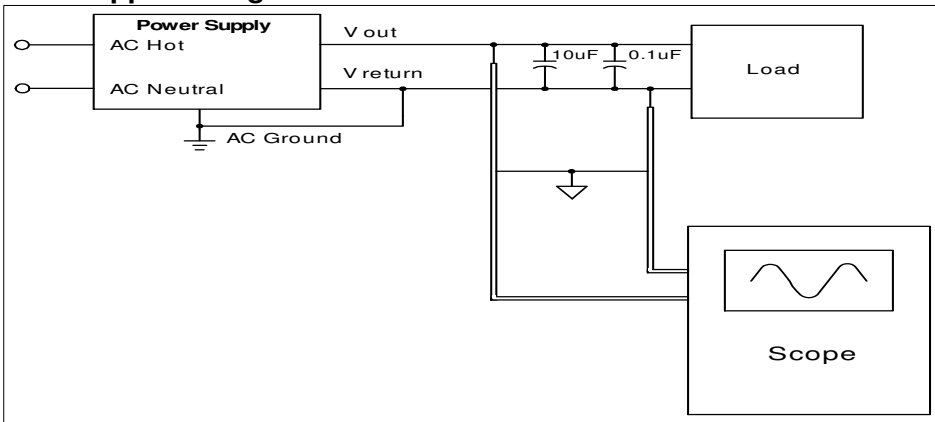


Figure 1. Ripple voltage test circuit

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%** at normal voltage and full load on all outputs.

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.

3.0 PROTECTION

3.1 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.

400W (單組)

| Voltage | Over Current Limit (Iout limit) |
|---------|---------------------------------|
| +12V | 35A minimum; 55A maximum |
| +5V | 22A minimum; 40A maximum |
| +3.3V | 22A minimum; 40A maximum |

450W (單組)

| Voltage | Over Current Limit (Iout limit) |
|---------|---------------------------------|
|---------|---------------------------------|

| | |
|-------|--------------------------|
| +12V | 38A minimum; 57A maximum |
| +5V | 22A minimum; 40A maximum |
| +3.3V | 22A minimum; 40A maximum |

500W (單組)

| | |
|---------|---------------------------------|
| Voltage | Over Current Limit (lout limit) |
| +12V | 43A minimum; 65A maximum |
| +5V | 22A minimum; 40A maximum |
| +3.3V | 22A minimum; 40A maximum |

550W (單組)

| | |
|---------|---------------------------------|
| Voltage | Over Current Limit (lout limit) |
| +12V | 47A minimum; 70A maximum |
| +5V | 22A minimum; 40A maximum |
| +3.3V | 22A minimum; 40A maximum |

600W (單組)

| | |
|---------|---------------------------------|
| Voltage | Over Current Limit (lout limit) |
| +12V | 52A minimum; 75A maximum |
| +5V | 24A minimum; 45A maximum |
| +3.3V | 25A minimum; 45A maximum |

650W (單組)

| | |
|---------|---------------------------------|
| Voltage | Over Current Limit (lout limit) |
| +12V | 55A minimum; 80A maximum |
| +5V | 24A minimum; 45A maximum |
| +3.3V | 25A minimum; 45A maximum |

700W (單組)

| | |
|---------|---------------------------------|
| Voltage | Over Current Limit (lout limit) |
| +12V | 60A minimum; 80A maximum |
| +5V | 24A minimum; 45A maximum |
| +3.3V | 25A minimum; 45A maximum |

750W (單組)

| | |
|---------|---------------------------------|
| Voltage | Over Current Limit (lout limit) |
| +12V | 63A minimum; 90A maximum |
| +5V | 24A minimum; 45A maximum |
| +3.3V | 25A minimum; 45A maximum |

3.2 Over Temperature Protection

The power supply will be protected against over temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an OTP condition the PSU will shutdown. When the power supply temperature drops

to within specified limits, the power supply shall restore power automatically. The OTP circuit must have built in hysteresis such that the power supply will not oscillate on and off due to temperature recovering condition.

3.3 Over-power protection

The power supply will be shutdown and latch off when output power within 120~160% of rated DC output.

Note: Assurance machine can work at low voltage, full load won't damage machine.

3.4 Under voltage protection.

In an under voltage fault occurs, the supply will latch all DC outputs into a shutdown state when +12V,+5V & +3.3V outputs under 85% of it's maximum value.

3.5 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 | 15 | 17 | Volts |
| +5 VDC | 5.5 | 6 | 7 | Volts |
| +3.3 VDC | 3.6 | 4 | 5 | Volts |

3.6 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

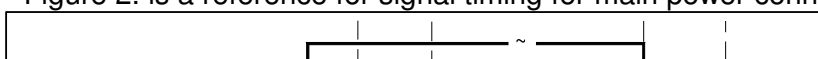
3.7 No load operation

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.



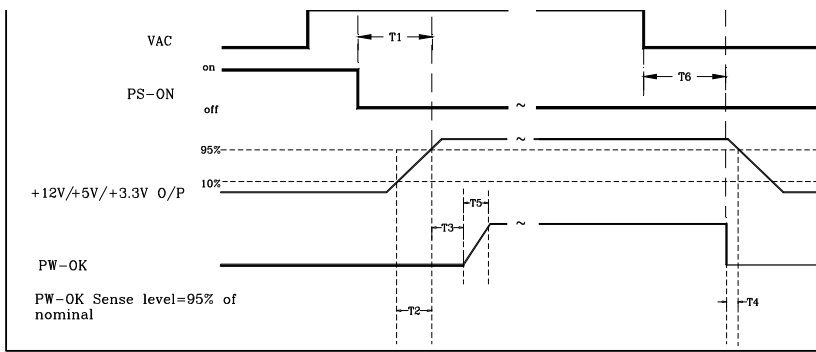


Figure 2. PS-OK Timing Sequence

- (1) T3: Power good signal turn on delay time (100ms~500ms)
- (2) T4: Power good signal turn off delay time (**75%**Load 1ms min)
- (3) T2: Rise time (0.1~20ms)
- (4) T6: Hold up time (**75%**Load 16ms)

4.2 Hold up time

When the power loss its input power, it shall maintain **16ms** in regulation limit at normal input voltage and **75%** full load (AC:115V/60Hz or 230V/50Hz)

5. ENVIRONMENT

5.1 Operation

| | |
|-------------------|---------------------------|
| Temperature | 0 to 40°C |
| Relative Humidity | 10 to 90%, non-condensing |

5.2 Shipping and Storage

| | |
|-------------------|--------------------------|
| Temperature | -20 to 90°C |
| Relative Humidity | 5 to 95%, non-condensing |

5.3 Altitude

| | |
|-----------|-------|
| Operating | 2000m |
| Storage | 3000m |

6. SAFETY

6.1 Underwriters Laboratory (UL) recognition.

The power supply designed to meet UL 60950

7. ELECTROMAGNETIC COMPATIBILITY (EMC)

- 7.1 ELECTROSTATIC DISCHARGE (ESD) – IEC 61000-4-2(EN 61000-4-2).
- 7.2 RADIATED SUSCEPTIBILITY – IEC 61000-4-3(EN 61000-4-3).
- 7.3 ELECTRICAL FAST TRANSIENT / BURST (EFT/B) – IEC 61000-4 -4(EN 61000-4-4).
- 7.4 SURGE – IEC 61000-4-5(EN 61000-4-5).
- 7.5 CONDUCTED SUSCEPTIBILITY – IEC 61000-4-6(EN 61000-4-6).
- 7.6 POWER FREQUENCY MAGNETIC FIELD – IEC 61000-4-8(EN 61000-4-8).
- 7.7 VOLTAGE DIPS – IEC 61000-4-11(EN 61000-4-11).
- 7.8 VOLTAGE FLUCTUATIONS – IEC 61000-3-3 (EN 61000-3-3).

7.9 HARMONIC CURRENT EMISSION – IEC61000-3-2(EN 61000-3-2).

7.10 EN55032:Class B Radio interference (CISPR 22).

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

8. MTBF

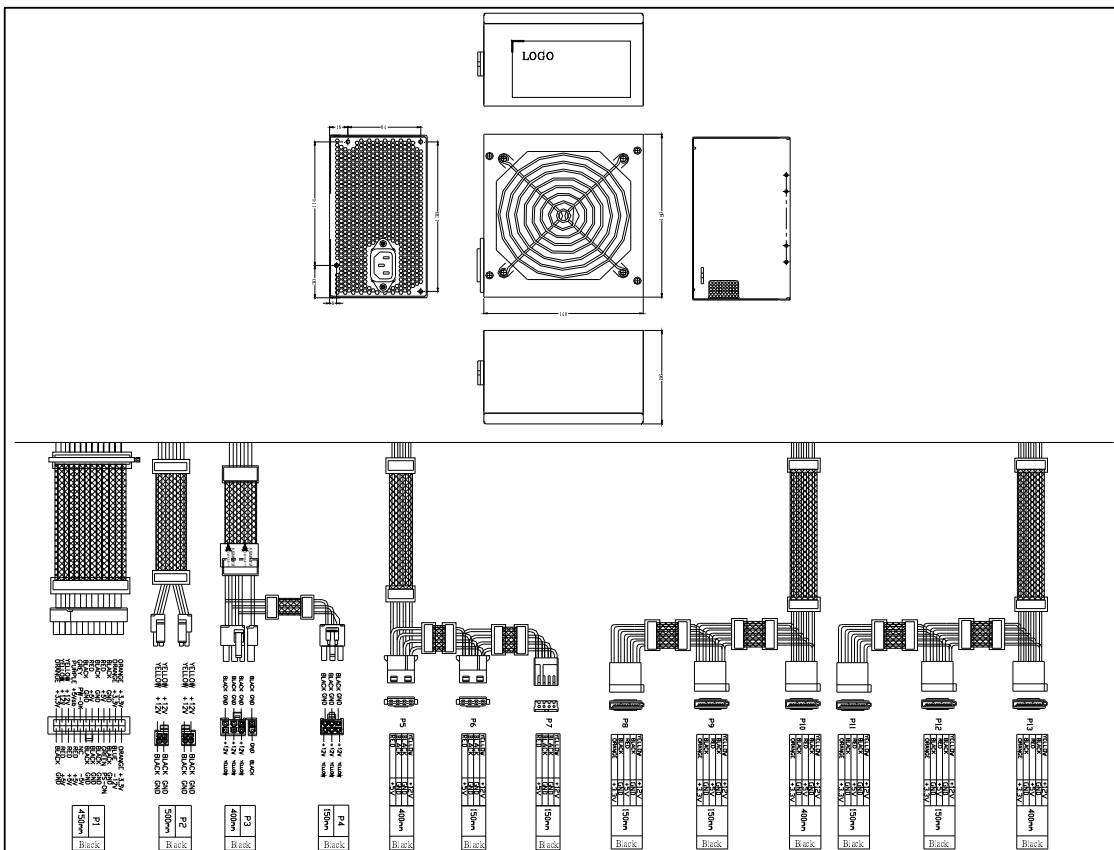
8.1 MTBF (mean time between failures) calculation

The demonstrated MTBF shall be 100,000 hours of continuous operation at 25°C, at 80% load, and nominal line. The MTBF of the power supply be calculated in accordance with MIL-HDBK-217F. The DC FAN is not included.

9. MECHANICAL REQUIREMENTS

9.1 Physical dimension (L150mm*W140mm*H86mm)

(線材組合 & 外露長度僅供參考，可根據客戶要求更改或新增。)



9.2 Connectors (INTEL approved or equivalent)

P1 Connector (24PIN:Molex 44476-1111 or equivalent)

| 18AWG wire | Signal | Pin | Pin | Signal | 18AWG wire |
|---------------|------------|-----|-----|--------|------------|
| Orange | +3.3V | 11 | 1 | +3.3V | Orange |
| Orange(22AWG) | +3.3Vsense | | | | |
| Blue (20AWG) | -12V | 12 | 2 | +3.3V | Orange |

| | | | | | |
|---------------|-------|----|----|----------|--------------|
| Black | GND | 13 | 3 | GND | Black |
| Green (20AWG) | PS-ON | 14 | 4 | +5V | Red |
| | | | | +5Vsense | Red (22AWG) |
| Black | GND | 15 | 5 | GND | Black |
| Black | GND | 16 | 6 | +5V | Red |
| Black | GND | 17 | 7 | GND | Black |
| NC | -5V | 18 | 8 | PW-OK | Gray (20AWG) |
| Red | +5V | 19 | 9 | +5Vsb | Purple |
| Red | +5V | 20 | 10 | +12V | Yellow |
| Red | +5V | T3 | T1 | +12V | Yellow |
| Black | GND | T4 | T2 | +3.3V | Orange |

P2 (Motherboard 4+4Pin) Power Connector

| 18AWG wire | Signal | Pin | Pin | Signal | 18AWG wire |
|------------|--------|-----|-----|--------|------------|
| Black | GND | 1 | 1 | GND | Black |
| Black | GND | 2 | 2 | GND | Black |
| Yellow | +12V | 3 | 3 | +12V | Yellow |
| Yellow | +12V | 4 | 4 | +12V | Yellow |

P3,P4 (Motherboard 6+2Pin) Power Connector

| 18AWG wire | Signal | Pin | Pin | Signal | 18AWG wire |
|------------|--------|-----|-----|--------|------------|
| Black | GND | 4 | 1 | +12V | Yellow |
| Black | GND | 5 | 2 | +12V | Yellow |
| Black | GND | 6 | 3 | +12V | Yellow |
| Black | GND | 2 | 1 | GND | Black |

P5,P6 大4PIN Power Connector

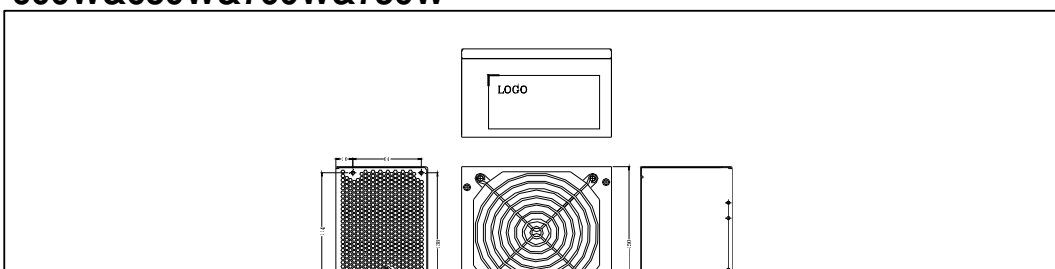
P7 小4PIN Power Connector

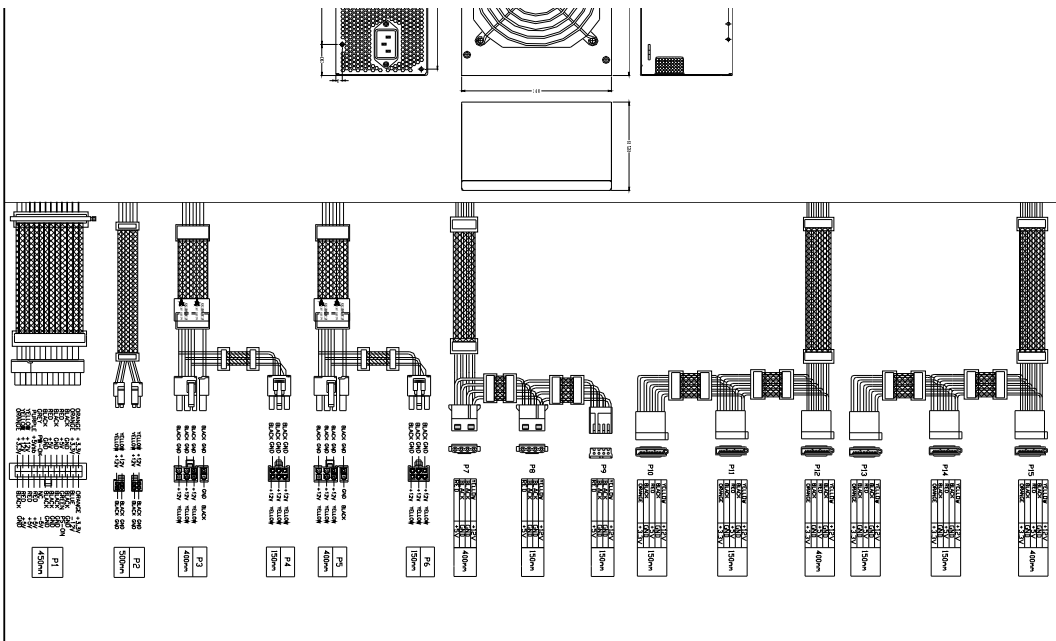
| 18 AWG wire | Signal | Pin | Pin | Signal | 22AWG wire |
|-------------|--------|-----|-----|--------|------------|
| Yellow | +12V | 1 | 1 | +12V | Yellow |
| Black | GND | 2 | 2 | GND | Black |
| Black | GND | 3 | 3 | GND | Black |
| Red | +5V | 4 | 4 | +5V | Red |

P8,P9,P10,P11,P12,P13 SATA Power Connector

| 18AWG wire | Signal | Pin |
|------------|--------|-----|
| Orange | +3.3V | 5 |
| Black | GND | 4 |
| Red | +5V | 3 |
| Black | GND | 2 |
| Yellow | +12V | 1 |

600W&650W&700W&750W





P1 Connector (24PIN:Molex 44476-1111 or equivalent)

| 18AWG wire | Signal | Pin | Pin | Signal | 18AWG wire |
|---------------|------------|-----|-----|----------|--------------|
| Orange | +3.3V | 11 | 1 | +3.3V | Orange |
| Orange(22AWG) | +3.3Vsense | | | | |
| Blue (20AWG) | -12V | 12 | 2 | +3.3V | Orange |
| Black | GND | 13 | 3 | GND | Black |
| Green (20AWG) | PS-ON | 14 | 4 | +5V | Red |
| | | | | +5Vsense | Red (22AWG) |
| Black | GND | 15 | 5 | GND | Black |
| Black | GND | 16 | 6 | +5V | Red |
| Black | GND | 17 | 7 | GND | Black |
| NC | -5V | 18 | 8 | PW-OK | Gray (20AWG) |
| Red | +5V | 19 | 9 | +5Vsb | Purple |
| Red | +5V | 20 | 10 | +12V | Yellow |
| Red | +5V | T3 | T1 | +12V | Yellow |
| Black | GND | T4 | T2 | +3.3V | Orange |

P2 (Motherboard 4+4Pin) Power Connector

| 18AWG wire | Signal | Pin | Pin | Signal | 18AWG wire |
|------------|--------|-----|-----|--------|------------|
| Black | GND | 1 | 1 | GND | Black |
| Black | GND | 2 | 2 | GND | Black |
| Yellow | +12V | 3 | 3 | +12V | Yellow |
| Yellow | +12V | 4 | 4 | +12V | Yellow |

P3,P5 (Motherboard 6+2Pin) Power Connector

| 18AWG wire | Signal | Pin | Pin | Signal | 18AWG wire |
|------------|--------|-----|-----|--------|------------|
| Black | GND | 4 | 1 | +12V | Yellow |
| Black | GND | 5 | 2 | +12V | Yellow |
| Black | GND | 6 | 3 | +12V | Yellow |
| Black | GND | 2 | 1 | GND | Black |

P4,P6 (Motherboard PCI 6Pin) Power Connector

| 18AWG wire | Signal | Pin | Pin | Signal | 18AWG wire |
|------------|--------|-----|-----|--------|------------|
| Black | GND | 4 | 1 | +12V | Yellow |
| Black | GND | 5 | 2 | +12V | Yellow |
| Black | GND | 6 | 3 | +12V | Yellow |

P5,P6 大4PIN Power Connector**P7 小4PIN Power Connector**

| 18 AWG wire | Signal | Pin | Pin | Signal | 22AWG wire |
|-------------|--------|-----|-----|--------|------------|
| Yellow | +12V | 1 | 1 | +5V | Red |
| Black | GND | 2 | 2 | GND | Black |
| Black | GND | 3 | 3 | GND | Black |
| Red | +5V | 4 | 4 | +12V | Yellow |

P8,P9,P10,P11,P12,P13 SATA Power Connector

| 18AWG wire | Signal | Pin |
|------------|--------|-----|
| Orange | +3.3V | 5 |
| Black | GND | 4 |
| Red | +5V | 3 |
| Black | GND | 2 |
| Yellow | +12V | 1 |

☞ 10. FAN SPEED CONTROL

Fan voltage varies with the ambient temperature or output power.