

Pilot

Automotive ATX Power Supply Installation Guide

<http://Pilotpowersupply.com>

ATTENTION

Please take a moment and read this manual before you install this power supply in your vehicle. Often times, rushing into installing the unit can result in serious damage to your power supply, computer and probably your car's electrical system.

When installing, always double check the polarity of your wires with a voltmeter. Avoid using the cigarette plug as a power source, often times the contacts are not capable of delivering high current to your PC. It's strongly recommended to connect this PSU directly to the battery (or power distributor, if it could provide enough current and power) **BY USING TWO HIGH-CURRENT WIRES AND SPECIAL FUSE.** It's not recommended to use vehicle chassis as "Ground Wire".

General Information

This PSU is FULLY ISOLATED TYPE - no more "ground loops" and speaker buzzing when using PC, if you has connected it right. It's designed to work with a wide variety of main boards such as AMD, Pentium-M, Celeron or full power P4 systems. Main boards must be ATX and ACPI compliant. The PSU is compatible with 12 volt battery system. The computer power-up and power-down sequence is determined by the state of ignition(ON/OFF switch input). When it's in off state- it doesn't take any power from battery.

The PSU has a simplest startup/shutdown controller, which provides: 5 seconds startup and 15 seconds shutdown delays, battery voltage monitor- to prevent deep discharge of battery, "Relay output" which you can use to drive your amplifier or another device –it takes "on state" after 2 seconds of PC startup , and "off state" before PC shutdown, this function prevents "buzzing and pops" of speakers during startup/shutdown PC. Output voltages are monitors by special supervisor, which provides over/under voltage and short circuit protection.

PSU DOESN'T SUPPORT "STAND-BY" MODE – TO PREVENT DEEP DISCHARGE OF YOUR CAR'S BATTERY .(No matter how big your battery is, "STAND-BY" will eventually drain your battery in a matter of days.)
SIMPLY USE "ON/OFF" OR HIBERNATE MODE OF PC'S OS.

Main power wires connection

Please follow Fig. 1 "General wiring diagram" on next page.

Use **two** dedicated #6(best way-#5) AWG or thicker wires for the power leads to the battery. It's not recommended to share power cable with other equipment. **Always check the polarity before connect main power wires .** As you can see, there is a "Main Fuse" in Fig. 1. **YOU MUST INSTALL IT NEAR THE BATTERY(LIKE IN CAR AUDIO APPLICTIONS)**, it prevents burning of wires , if they shorts together. Value of this fuse must be "50 A". This fuse is not included – you can buy it in your local car audio or radio parts shop.

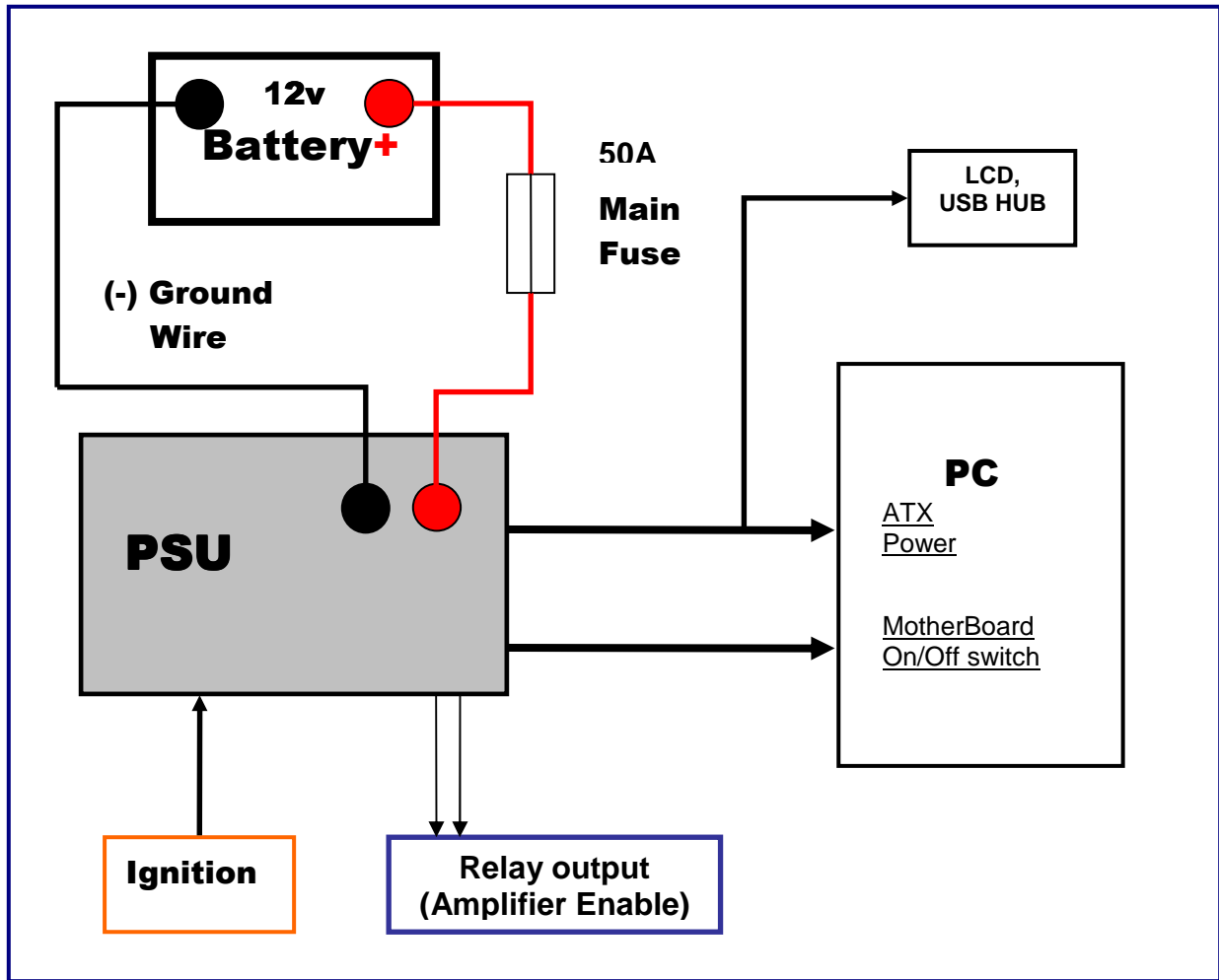


Fig. 1 "General wiring diagram"

ATX wires connection

If you a newbie just follow your main board's installation guide for right connection. There are standard ATX connectors at output of the PSU(see Fig. 2).

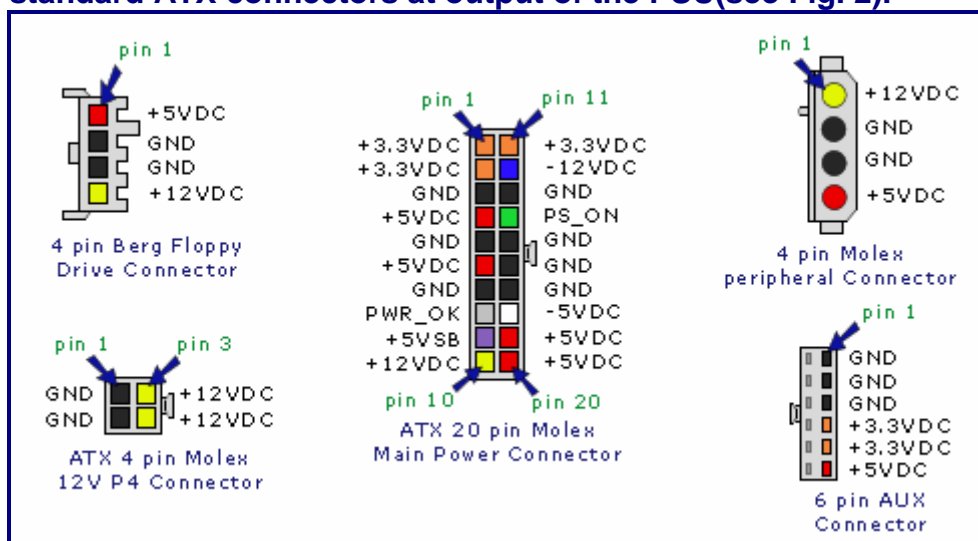


Fig. 2 "ATX 1 Power Supply connectors"

Note: This diagrams with facing forward pins. The pinouts above relate to the connectors not the sockets.

ATX 2.XX main boards has a new Molex 24 pins socket and needs a 24- pin power supply connector, but many of them could work great with standard Molex 20-pin connector, only some times it could be needed a special “20 to 24 pin adapter ”(not included). Now let’s look at Fig.3 and understand why it’s could be possible.

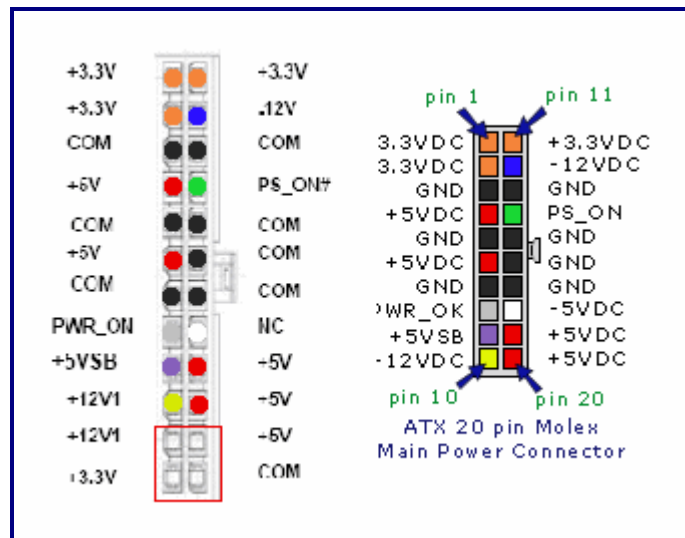


Fig. 3 “Comparison of 24 and 20 pins connectors”

As you can see at Fig. 3 , 24-pin connector has a 4 extra contacts, typically they uses if system takes very much power, but if not – we can simply use 20 pin connector, because it’s fully identical to part of 24 pin connector. Be careful and attentively when connecting 20- Pin connector to 24 pin socket – double check the direction and place of it.

To power SATA HDD use special adapter(not included), like at Fig. 4

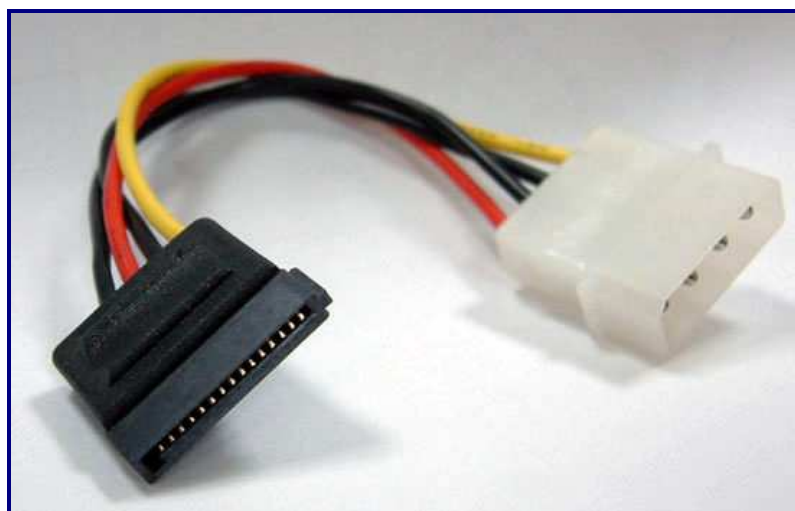


Fig. 4 “4-pin Molex to SATA power connector adapter”

Note: The different Molex adapters, which is not included in package, you can buy at your local computer shop or computer service.

Main board on/off switch connection

From the power switch in the front of the PC's case runs two wires (usually twisted) that ends in a plastic header labeled « Power SW” or a similar label. The PSU “power switch” wires connects in parallel with power switch wires (See Fig. 5).

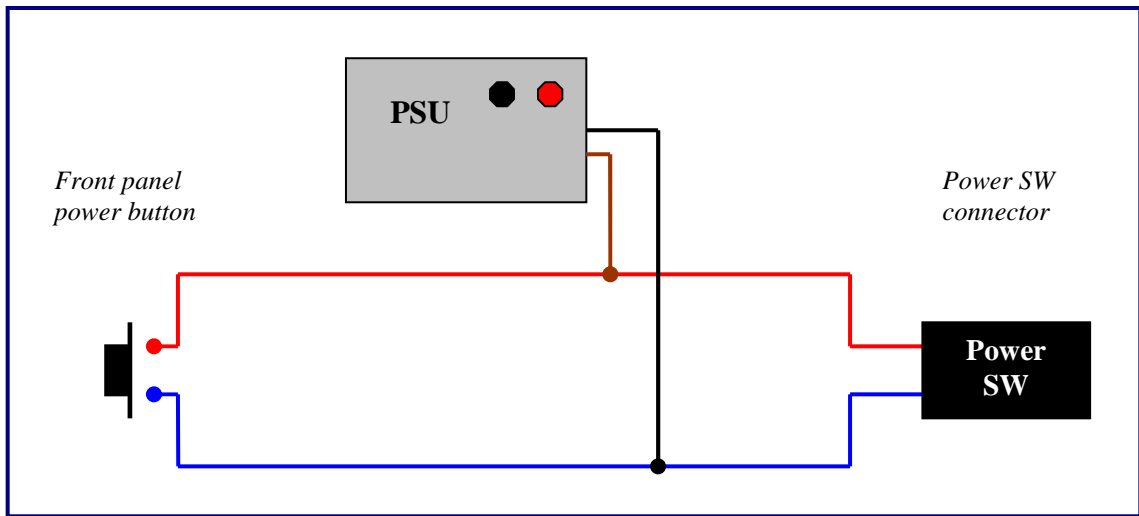


Fig. 5 “Power switch wires connection”

To connect PSU's switch wires to power button wires, delete in one place of them insulation and connect them together by twisting manually (follow Fig. 5, no matter colors and polarity), also, if you want, you can solder it using soldering iron. After that, you must insulate this connections by using PVC electric insulation tape. Now you can connect “Power SW” header to the two corresponding pins on the main board. Unfortunately, the location of these pins varies by main board, and they may not be clearly labeled. You may have to consult the diagram found in your main board manual, or elsewhere, to determine the proper place to connect this header. The polarity of this connection is very important because power switch inside the PSU is transistor based. The wrong polarity of Power SW header connection isn't dangerous, simply main board will not startup. How to check it? – If main power and ATX wires already connected, simply power up PSU's “ignition” wire (connect it to “+” of battery, or red contact on front panel of PSU), after 5 secs system must startup, if not, then change polarity of Power SW connection by turning header at 180 degrees like at Fig. 6 and check it again- if ok, disable “ignition”, if not – check again all connections if you find some mistake there- fix it and try again.

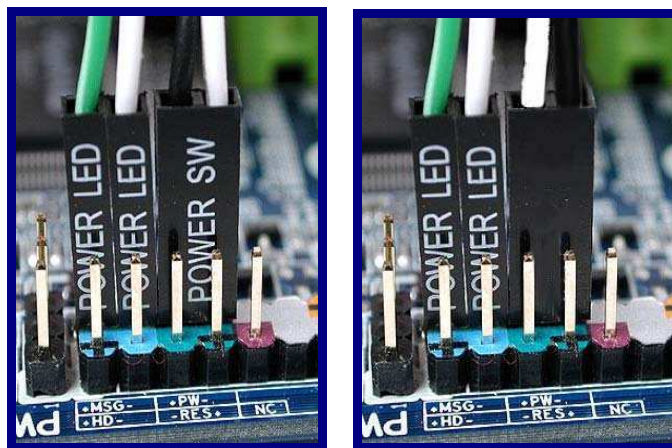


Fig. 6 “Power SW header, changing polarity by turning it at 180 deg”

“Ignition” wire connection

The “ignition” wire of PSU typically uses to power up and power down the PC. This wire also uses by voltage monitoring system(inside the PSU), when voltage of “ignition” is lower than 11 Volts , the PSU shutdowns the PC and disables itself. This wire must be connected to ignition wire(where presents a voltage during engine work , and not presents when it’s off) of the car. It’s strongly recommended to use car-type fuse with special holder near the connection point of this wires , it’s value must be 3A . Connection like that provides automatic startup and shutdown the PC with engine of your car. There could be another ways to connect it, by using 3 position switch or external startup/shutdown controller, they described in “startup/shutdown controller” section.

Relay output

There is a relay inside of the PSU, which drives by startup/shutdown controller. This relay shorts two contacts together after 2-15 seconds after PC startup, and disables contacts before PC shutdown. By using “Relay output” you can organize remote driving of your amplifier(the logic of relay’s work provides no buzzing and pops in speaker during starting up the PC) or another device.

All you need is to connect one wire of relay output to +12V, second wire to “Remote” or a similar labeled contact of your amplifier. The best way is protect this circuit by 3A car-type fuse at input(where it takes +12v).

Note: Delay variables by special resistor on front panel of the PSU, be careful - don’t brake it, when turning.

Startup/shutdown controller

The startup/shutdown controller provides voltage monitoring, automatic turn on and turn off of the system and drives “relay output”.

To prevent voltage monitoring scheme errors you must provide good connection of “PSU’s ignition wire”, because it uses not only to turn on and turn off the PSU but also for monitoring input voltage.

This controller takes actions as follows:

- 1) Ignition=OFF. Nothing happens. PSU is off state and waiting for ignition signal.
- 2) Ignition=ON. The PSU turns on the 5Vsb rail, than it waits for 5seconds.
- 3) Now it’s “Ignition voltage checking” state. If voltage of ignition no lower than 11 volts, it sends an “ON” signal to the main board via the “Power Switch” wires connected to the main board’s “Power SW” pins, the main board will turn ON and your system should start booting, else it takes “Power error state” and nothing happens.
- 4) Ignition=ON during driving. Your computer will remain ON. The controller constantly monitors Ignition for low voltage(which also mean OFF) or system shutdown(by user, or abnormal condition, or by output voltage supervisor)
- 5) if system shutdowns by user, or abnormal condition, or by output voltage supervisor- it takes “Power error state”, to prevent startup system again when you turn off ignition.

6) Ignition=OFF or low voltage. The controller waits for 15 seconds if after that ignition is still off (if ignition on again, it goes to 4) , then it turns the main board OFF by sending a signal to the main board 's ON/OFF switch. Your computer should turn off gracefully (shutdown procedure). During 40 seconds, power will still be available for your PC to perform shutdown. If your PC doesn't shutdown during 40 seconds, the controller shutdown it hardly by turning off the PSU.

After that , if there was a "low voltage ignition's state" the controller takes " power error state", else-the controller disables itself too.

7) PSU will go to step 1, if ignition is tuned ON again.

NOTE: "Power error state" means that controller shutdowns Main board and PSU but doesn't shutdown itself, it is staying in this condition and nothing happens. In most times this state prevents fast discharging of your car's battery. To exit this state all you need is to turn off the "ignition".

So the minimum startup delay is 5sec, and minimum shutdown delay is 15sec. To provide more delays you can use any external startup/shutdown controller, which will drive the PSU's "Ignition " wire, but you must remember – that this wire also using for voltage monitoring- be careful with connections and schematic or use any relay to drive it directly to the battery.

Another way to drive PSU's ignition wire, is to use 3 position "on-off-on" switcher, like in Fig.7. Using 3-position switch provides to you to choose when PC is working- "Always", "Never" or "By ignition", so using this switch you can also turn off the PC when you want. This switch could be very helpful, when you stop your car's engine at small time ,like at gas station, all you need to prevent shutdown your PC during this time is to switch it to "Always" position during 15 seconds since shutdown engine of your car- don't forget to switch it to "By ignition" or "Never" state when you leave your car for a long time.

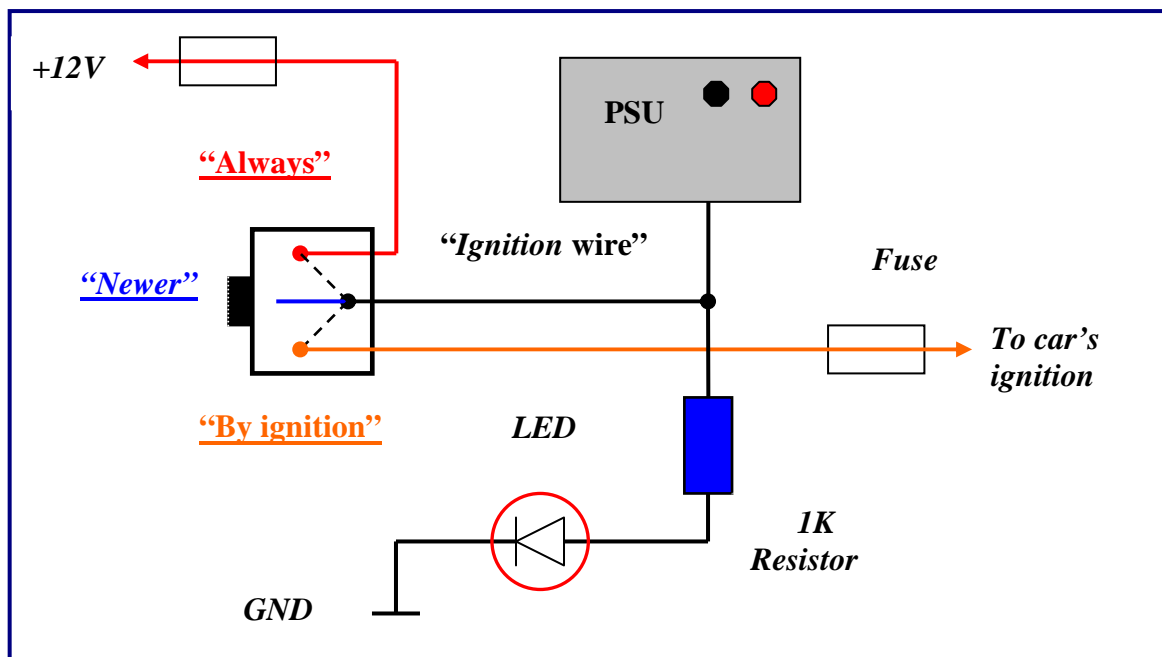


Fig. 7 "3-position switcher wiring diagram"

Protect wires by 3A fuses, like at Fig. 7. Also you can use a LED, which will point when PC is ON state, it could be helpful to you – it will remind you to turn off the PC when you stop engine, if switcher is in “ALWAYS” state. Simply connect an anode of LED through 1K resistor to PSU’s “Ignition wire”(Fig.7 Black wire), and cathode of LED to car’s ground wire.

Powering additional devices

If your system doesn’t take very much power, and one of most 4-pin Molex peripheral connectors (typically used to power HDD&CD drives) is free, you can use it for powering additional devices such as LCD screen, USB HUB and etc. As you know, PSU is isolated type, it means that ground of Car doesn’t connect to ground of PC, therefore you must use also ground wires of 4-pin Molex connector, one wire for 12v and one wire for 5v rails. Currents must not exceed 3 Amps for 5v rail and 1.5-3 Amps (depend on your system power taking) for 12V rail. **It’s strongly recommended to protect power wires for additional devices by fuses near the point of connection of them with Molex connector.** Value of these fuses must not exceed 3A.

Pinout of 4-pin Molex peripheral connector you can find at Fig. 2.

After installation testing

After all connections have been made and checked you must test quality of all connections and wires under load.

- 1) Startup your car’s engine
- 2) Your system must startup, after that you can run some 3d game or 3dmark to load system highly, if your system doesn’t support 3d graphics simply use programs which you will use constantly
- 3) Using voltmeter check voltage directly on the battery of your car and on the PSU power leads, difference of measurements must not exceed 0.5-0.7Volt, If it exceeds – check again connections of power wires or use thicker power wires. Battery’s voltage, when engine works, must be at 13,1-14,6Volts range. If less, then it’s a problem of car’s alternator – you must visit your local car service and consult with them.
- 4) ALL wires mustn’t become warm, check it directly after startup of system, then after 10, 20, 30 minutes of your system’s work.
- 5) Check logic of work of relay output(if used) and startup/shutdown controller.

If everything ok – enjoy your building, if not – check again problematic part of system’s connections again, if you can’t find and fix the bug, please describe your problem fully to our support service

support@pilotpowersupply.com

Specifications

<i>Input voltage (full load)</i>	<i>9-18 Volts Non-Regulated</i>
<i>Input Current (at Peak load)</i>	<i>45 Amps Max</i>
<i>Output Power</i>	<i>400 Watts Max</i>
<i>Sleep current (ALL Rails Off)</i>	<i>0 Amps</i>
<i>Efficiency</i>	<i>80%</i>
<i>Individual Supply Outputs</i>	<i>Max Output Current</i>
<i>5 Volts +/- 2%</i>	<i>30 Amps</i>
<i>3.3 Volts +/- 2%</i>	<i>20 Amps</i>
<i>12.0 Volts +/- 2%</i>	<i>17 Amps</i>
<i>5.0 Volts Standby +/- 2%</i>	<i>2 Amps</i>
<i>-12.0 Volts +/- 10%</i>	<i>150 mA</i>

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