
SFX DC-DC Power Supply For ATX Mother Board

Introduction

Thank you, for purchasing an OPUS Solutions, Inc SFX DC-DC Power Supply.

OPUS Solutions SFX DC-DC smart power supply is designed specifically for ATX motherboards to be used in an automotive environment. This Product brings a new dimension to your PC's mobility. Just get in your vehicle and start the engine; your PC is ready to go. When you switch off the ignition the PC can go into shut down, standby or hibernate modes automatically, no switch to fiddle or fuss.

The SFX DC-DC Power supply has a micro-controller that controls and monitors various functions of the power supply operation. It monitors automobile battery voltage to protect against deep discharge. The Ignition lead is monitored to start the PC when the ignition is turned on and to implement a safe shutdown procedure. It controls and monitors motherboard signals to provide smooth power-up and power down sequences. In addition, it also responds to shut down, stand-by and hibernate modes. The power supply can be programmed to shut down the PC after a delay of up to one hour. The power supply outputs are monitored to assure proper PC operation. A green LED indicator in the power supply continually reports the power system status and health. It is also used for troubleshooting.

There are features that are built-in for trouble free and safe PC operation. The input power is protected against transients, Load dumps and double battery during jumpstarts. PC does not reboot during engine start or cranking.

It also uses state-of-the-art technologies and the most advanced techniques to maximize efficiency, performance and reliability. Simply put, there are no other PC power supply like it. (Patent Pending)

List of products supported by this guide

SFX-12-15	SFX DC-DC Power supply 12V input, 150W output
SFX-24-15	SFX DC-DC Power supply 24V input, 150W output

Contact Information:

For Technical support email or call

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Package Contents

If any of the items are missing from the package, please contact customer support at OPUS Solutions, Inc.

- 1 - SFX DC-DC Power supply
- 1 - 20 pin ATX power cable.
- 1 - Drive power cable assembly. An 8-pin connector to 3 HDD power and 1FDD power connectors.
- 1 - 2 pin power switch cable.
- 1 - 3 pin DC main power pigtail cable.
- 3 - #6-32 x .187" long Pan head Philips screws.

General Information

Power input

Powered by 12Volt or 24 Volt battery systems. The Computer on and off sequence is determined by the state of ignition/switch input. The SFX power supply is compatible with ATX/SFX power specification.

Normal operating condition

When the computer is properly assembled, cabled, configured and power applied to the DC-DC power supply it should function as described below.

Idle state (ignition off):

In an idle (ignition off) condition, the Status Green LED light in the power supply will blink for 100ms ON and OFF for approximately 2.5 sec. The PC is powered down. Only standby power is supplied to the motherboard. The power consumption should be at very minimum. (The idle state power consumption varies depending on the motherboard bios setup, amount of memory modules installed and other hardware installed).

PC ON State:

When the ignition switch is turned on the Status LED light will be ON constantly within 9 seconds. This indicates that proper handshakes and controls were completed between DC-DC power supply and motherboard and they are operating normally. The operating system should be booting, coming out of standby or hibernate mode. The PC is ready for your use.

Back to Idle state:

When the ignition switch is turned off, The DC-DC power supply will delay going into shut down, stand-by or hibernate modes. The delay time is set by a set of jumpers located inside the DC-DC power supply control board (Refer to the heading 'Setting the turn off delay'). Once the delay time has elapsed, the DC-DC power supply handshakes and controls with the motherboard to go into one of three states namely shut down, standby or hibernate mode.

If the ignition is turned on again, while shut down delay is in progress, the DC-DC power supply will turn off the delay function and the PC will continue operate normally.

If the PC is manually put into stand-by mode, tapping the keyboard or pointing device will start the PC as long as Ignition is on.

If the PC is manually put into power down mode, to restart the PC the ignition must be turned off wait 5 sec and turned on again.

Abnormal condition:

If the green LED light flashes at a faster rate, this indicates a problem condition. Count the number of flashes and refer to trouble shooting section to determine the nature of the fault.

Battery management

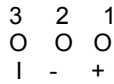
The normal full load operating voltage range of the power supply is between 7V to 18VDC. The micro controller monitors the battery voltage so the battery will not be deep discharged. When the ignition switch is in the aux position or delayed turn off enabled the computer can be powered up. Under this condition the engine is not running, so the battery is not being charged. When the battery voltage dips below 11V for more than 10 seconds continually the SFX- DC-DC power supply will enter automatically into a shutdown sequence. This will protect the battery from deep discharge, and the battery is saved for its main intended purpose, to start the vehicle.

General wiring guidelines

Connect the computer power input cables directly to the battery terminals.
 Use half loop to prevent cable/connector stress.
 Use a dedicated #12 AWG pair cable to connect the unit to the battery.
 Use an #18 AWG wire for ignition or on/off
 Note: Do not share power cable with other equipment. Connect directly to the battery.

Input Power connector

Connector pin description



View of connector used on the power supply.

Mating Plug: AMP; P/N: 350766-1
 Crimps: Amp P/N: AMP; 640310-3 qty 2 and 350919-3 qty 1

Pin#	Label	Function
1	Batt (+)	+12V Battery power feed - Red
2	GND (-)	Battery return (GND) - Blk
3	IGN/SW	Ignition or power switch input - Yel

Shut Down Delay Timer Setup

A four-pin jumper block (JU1) is located on the DC-DC power supply controller board, (top right side). The fan cover assembly must be disassembled to access the jumper block.

4 3 2 1 JU1

o o o o	No jumpers installed:	10 sec turn off delay (jumpers are inserted in vertical park position- Factory default)
o o o-o	Pins 1 & 2 shorted:	20 minutes turn off delay
o-o o o	Pins 3 & 4 shorted:	40 minutes turn off delay
o-o o-o	Pins 1 & 2, 3 & 4 shorted:	60 minutes turn off delay

System requirements

Computer case must be SFX power supply form factor compatible. Most micro ATX cases use this size power supply. Motherboards must be ATX 2.01 compliant. The motherboards must be able to support ACPI function under power management in BIOS setup. If the motherboard does not support ACPI function, then the computer can go only into power down mode and not into shutdown, stand-by or hibernate modes.

Installation Steps

- Step 1. Configure your ATX motherboard BIOS
- Step 2. Configure your operating system
- Step 3. Test the PC for proper operation.
- Step 4. Install SFX DC-DC power supply and the wiring
- Step 5. Test the PC with DC-DC for proper operation, if all passes then, enjoy it.

Configuring your ATX, micro ATX or Flex ATX motherboard BIOS

Here is an example of how to configure a typical motherboard. For this example we used Intel D815EEA2 motherboard. Your motherboard may vary where certain options are located. This example provides general knowledge how to configure the motherboard.

1. Power-up the computer and press the 'Del' key to go into the 'BIOS SETUP UTILITY'
2. Go to the 'Power' tab. Use arrow keys to navigate.
3. Go to 'APM' option. (Advanced Power Management)
4. Select 'Enabled' for Power Management, Choose time for Inactivity Timer, Select 'Enabled' for Hard Drive.
5. Type 'Esc' key to go back into the 'Power' tab.
6. Go to 'ACPI' option (Advanced Configuration and Power Interface).
7. Select 'S3 State' for ACPI Suspend State, Select 'Enabled' for Video Repost and select 'Stay off' for Wake on LAN from S5.
8. Type 'Esc' key to go back into the 'Power' tab.
9. Select 'Stay Off' for After Power Failure.
10. Go to 'Exit' tab and select Exit Saving Changes.
ATX motherboard configuration is complete.

Note: If an application or motherboard does not support standby mode then select 'S1 state' in step 6 above.

Configuring your operating system (Windows 98 SE)

Caution: ACPI is not a plug and play function. If ACPI is not enabled at the time Windows is installed, you should install as shown below.

Click **Start >> Settings >> Control Panel**, then double click **Add/Remove Hardware** icon. Let windows automatically detect. Windows should automatically detect ACPI component (if it was enabled as described in configuring your ATX mother board section) and install the proper drivers. You may need the original Windows CD

Re-boot the computer to detect the newly installed ACPI component.

Now follow the steps outlined below to configure Shutdown or Stand-by mode of operation.

1. Go to Display Properties: Click **Start >> Settings >> Control Panel**>> – double click **Display** for accessing Display properties window.
2. Click the **Screen Saver** tab >> **Settings** on the Display Properties window to access Power Management Properties window.
3. Select **Portable/Laptop** under Power schemes.
4. Click the **Advanced** tab. In Power buttons box, under the statement 'When I press the power button on my computer:' select **Standby** or **Shutdown**. See **note** below
5. Click **Apply**>> **OK** to apply and close the power management Properties window.
6. Click 'OK' on the Display properties window.
Windows 98 SE configuration is complete.

7. Shut down the computer. Click **Start >> Shut Down >> Shut Down** under Shut Down Windows.

Note: Some applications do not support standby mode. In that case select Shutdown in step 4 above. Try it.

Configuring your operating system (Windows 2000 Pro)

TBD

Testing the PC for proper operation before installing the DC-DC power supply

1. Power-up the computer by pushing the soft Power ON/OFF switch on the front panel of the computer. The computer should power up normally.
2. Open any application and test for normal operation, then close the application.
3. Push the soft Power On/OFF switch for less than 1 second. The computer should go into Standby or shut down mode, as it was set in step 4 of configuring your operating system (Windows 98 SE).
4. Wait about 10 seconds and push the soft Power ON/OFF switch again. The computer should power up normally.
5. Open an application for Standby mode testing. Use the application as you would normally.
6. Push the soft Power On/OFF switch for less than 1 second. The computer should go into Standby or shut down mode, as it was set in step 4 of configuring your operating system (Windows 98 SE). See note below
7. Repeat steps 4 to 6 for all applications that are used in your computer.

Note: All applications software must be checked for proper Standby mode operation.

If any application has problem going into Standby mode then the operating system must be configured for Shutdown

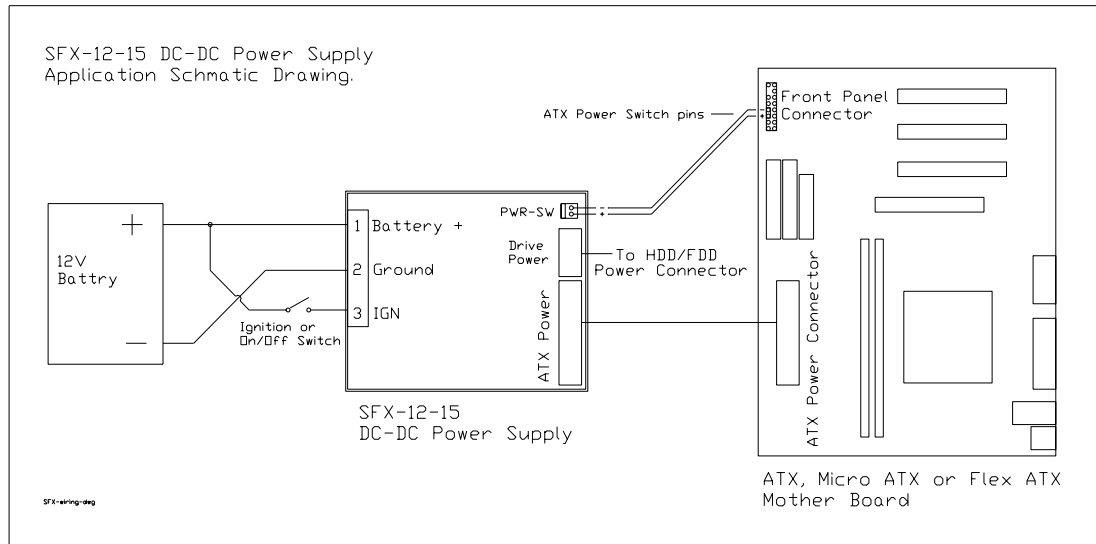
Installing the SFX DC-DC Power supply

!! Caution! Observe proper Static protection to prevent damage to your computer or the DC-DC power supply. Use wrist strap to prevent static damage.

Refer to application example drawing.

1. Power down and open the computer case.
2. Remove the AC- DC power supply if was installed.
3. Set shut down delay timer jumpers in the SFX DC-DC power supply for minimum time (Default factory setting)
4. Install the OPUS SFX DC-DC Power Supply in your computer.
5. Connect one end of 20-pin ATX power cable to OPUS SFX DC-DC power supply J6 -ATX Power Connector. Connect the other end to a Power connector on the ATX motherboard.
6. Connect the 8-pin side of the drive power cable to J8- Drive Power connector on the DC-DC power supply. Connect the other ends to the appropriate Drives.
7. Connect one end of 4-pin ATX 12V connector to J7 and the other end to P\$ mother board ATX12V connector. (This cable is not supplied with SFX-12-15 in the standard pack)
8. Connect the 2-pin cable (polarized side) to J9- (Power-switch) of DC-DC power supply. Connect the other end to the motherboard 2 pin ATX power switch/soft power switch pins on the front panel header.
Important: proper polarity is required to function accurately. The green wire side of the 2-pin connector must be connected to the +ve side and white wire side must be connected to the – ve side of pins.
Example: Pins 6 and 8 are the ATX power switch pins on an Intel D815EEA2 motherboard front panel connector.
Pin 6 is +ve(green wire side) and pin 8 is –ve (white wire side)
9. Wire the 3 pins DC input power connector.
Pin 1: Battery Positive. Use RED color # 12 AWG automotive grade wire.
Pin 2: Ground or Battery Negative. Use Black color # 12 AWG automotive grade wire.
Pin 3: Ignition or Switched Battery. Use Yellow #18 AWG automotive grade wire
10. Insert the 3 pin input power cable connector to the SFX-DC-DC power supply input power connector.
11. Double-check all wiring for proper connection, power feed and battery polarity to the power supply.
12. If the power feed to the power supply/ PC is connected properly, Status Green LED in the SFX-DC-DC power supply should blink at a rate of approximately .1 sec. ON and 2.5 sec OFF. This is the idle /standby state of power supply.

Application Wiring Example



Testing the PC with SFX DC-DC Power supply installed for proper operation

1. Power-up the computer by Turning the Ignition switch on (starting the vehicle) or toggling the switch. The Green Status LED should light up constantly and the computer should power up normally.
2. Open any application and test for normal operation, then close the application.
3. Turn off the computer by turning the ignition switch off. Within 5 Sec. the PC should start to go into Standby or shut down mode and the Green status light should go back to the idle/standby blink rate.
4. Wait about 10 seconds and Turn on the Ignition switch again. The computer should power up normally.
5. Open an application for Standby mode testing. Use the application as you would normally.
6. Turn off the computer by turning the ignition switch off. The computer should go into Standby or shut down mode, as it was set in step 4 of configuring your operating system (Windows 98 SE). See note below.
7. Repeat steps 4 to 6 for all applications that are used in your computer.

Note: All applications software must be checked for proper Standby mode operation.

If any application has problem going into Standby mode then the operating system must be configured for Shutdown

Trouble shooting guide

Computer does not turn on?

Check to make sure that battery is connected to SFX Power supply connector.

Check to make sure that Ignition input to SFX power supply is connected to pin 3 of the power input connector. Make sure the 2-pin power switch pins are properly attached.

Computer does not turn off when the ignition is turned off!

Check the Green LED state

Interpreting the Green Status LED light flashing

0.1 sec ON and 2.5 Sec OFF:	DC-DC power supply is in Idle or stand-by state.
On constantly	The PC is powered and the PC should be operating.
Number of flashes	Reason for flashing
1 Flash	Battery voltage is below normal operating range. The normal range is 11.5 VDC to 18 VDC. During engine cranking the low battery voltage detection is ignored so the battery voltage can dip below 11.5V.
2 Flashes	The computer power up sequence failed Reasons: <ol style="list-style-type: none"> 1. Check the wiring of the two wire power-switch cable from power supply connector J9 to power switch pins on the ATX motherboard. If connected properly check the polarity of the power switch pins. May be reversed. 2. Check ATX mother board bios settings. 3. Locked up mother board or software crash of bug. 4. Faulty DC-DC power supply.
3 Flashes	Power supply output voltages are out of normal voltage range. Reasons: <ol style="list-style-type: none"> 1. Power supply output is over loaded or shorted. 2. Faulty DC-DC power supply.
4 Flashes	Power down, stand-by or hibernate sequence failed. Reasons: <ol style="list-style-type: none"> 1. Check the wiring of the two wire power-switch cable from power supply connector J9 to power switch pins on the ATX motherboard. If connected properly check the polarity of the power switch pins. May be reversed. 2. Check ATX mother board bios settings. 3. Check if ACPI function is enabled in the power management BIOS setup. 4. Make sure ACPI drivers are installed in the operating system. 5. Check if application is compatible with ACPI mode of operation. 6. Locked up mother board or software crash of bug. 7. Faulty DC-DC power supply

Technical Specifications

Input:	12V	24V	
Normal input voltage range:	7V to 18V DC	18V to 30V DC	
Low battery shutdown voltage:	11 Volts \pm 0.3V	22V \pm 0.3V	
Low battery de-bounce time:	10 Sec.		
Input current drain:			
Power down/ Standby mode:	0.025 A		
Ignition/ Power switch current drain:	<10 mA		
Ignition on/off de-bounce time:	5 Sec		
Turn off delay setting:	10 Sec.(Factory default), 20 Min., 40 Min or 60 Min.		
Output:	150W	Ripple	Regulation
+3.3V:	10A max, 13A pk,	50mV p-p max	2%
+5 V:	10 A max, 13A pk	50mV p-p max	2%
+12 V:	5 A max, 6.5 A pk	50mV p-p max	2%
-12 V:	0.2 A max, .4 A pk,	150mV p-p max	10%
5 V standby:	1 A max, 1.2 A pk	50mV p-p max	2%
Power supply efficiency	> 90% at optimum loads		
MTBF:	150,000 hrs		
Operating Temperature Range:	-25°C to 70°C		
Input Fuse:	15A ATO replaceable (Automotive blade fuse)		
Input Power Mating connector:	Plug: AMP P/N: 350766-1 Crimps: Amp P/N: 640310-3 and 350919-3		
Output Power Connectors:	20 pin ATX Mother power connector, cable length 240 mm long 8 pin Drive power connector to 3 HDD and 1 FDD power connectors 2 pin ATX power Switch connector, cable length 420mm		
Printed circuit Board Dimensions:	98mm (W) x 123mm(D) x 48mm (H)		
External Dimensions:	100mm(W) x 125mm (D) x 63.5mm (H) 3.94" (W) x 4.92" (D) x 2.5" (H)		
Warranty:	3 Years, Limited warranty		
Specifications Subject to change without notice			