

Neosys Technology Inc.

PB-2500J

User Manual

Revision 1.0

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Declaration of Conformity

FCC This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

CE The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

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Safety Precautions

- Read these instructions carefully before you install, operate, or transport the system.
- Install the system or DIN rail associated with, at a sturdy location
- Install the power socket outlet near the system where it is easily accessible
- Secure each system module(s) using its retaining screws
- Place power cords and other connection cables away from foot traffic. Do not place items over power cords and make sure they do not rest against data cables
- Shutdown, disconnect all cables from the system and ground yourself before touching internal modules
- Ensure that the correct power range is being used before powering the device
- Should a module fail, arrange for a replacement as soon as possible to minimize down-time
- If the system is not going to be used for a long time, disconnect it from mains (power socket) to avoid transient over-voltage

Service and Maintenance

- ONLY qualified personnel should service the system
- Shutdown the system, disconnect the power cord and all other connections before servicing the system
- When replacing/ installing additional components (expansion card, memory module, etc.), insert them as gently as possible while assuring proper connector engagement

ESD Precautions

- Handle add-on module, motherboard by their retention screws or the module's frame/ heat sink. Avoid touching the PCB circuit board or add-on module connector pins
- Use a grounded wrist strap and an anti-static work pad to discharge static electricity when installing or maintaining the system
- Avoid dust, debris, carpets, plastic, vinyl and styrofoam in your work area.
- Do not remove any module or component from its anti-static bag before installation

About This Manual

This manual introduces and demonstrates installation procedures of Neosys industrial-grade intelligent ultracapacitor-based power backup modules, PB-2500-PCIe and PB-2500-CSM.

Revision History

| Version | Date | Description |
|---------|-----------|-----------------|
| 1.0 | May. 2018 | Initial release |

1 Introduction

Neosys' PB-2500J series is an innovative power backup solution for demanding industrial applications. Utilizing ultracapacitor technology, it features -25°C to 65°C operating temperature range and extremely high durability. Compared to traditional battery-based UPS systems, PB-2500J series can sustain superb reliability in extreme temperature environments and eliminates the drawback of battery performance degradation over time.

PB-2500J series is composed of eight 100F ultracapacitors to provide 2500 watt-second stored energy to sustain your computer during power outage and depending on your system's power consumption, it could be from seconds to minutes.

But what makes PB-2500J novel is its patented CAP energy management technology, an on-board processor that constantly monitors power consumption and evolves with the system. During a power outage, it maximizes the system operation time by estimating the perfect time to initiate system shutdown to prevent data loss.

PB-2500J series is available in two form-factors. PB-2500J-PCIe is a plug-and-play PCIe card particularly designed for Neosys' Nuvo-6000 series, and PB- 2500J-CSM is a ready-to-use Cassette module for Neosys' Nuvo-5000/ 7000 series.

When it comes to industrial embedded controllers, stability and data loss prevention during power outages are just as important. Neosys' PB-2500J series aims to do the latter by redefining reliability and taking it to another level. With PB-2500J series, unexpected power loss and unstable power lines are a thing in the past!



1.1 Specification of PB-2500J-PCIe

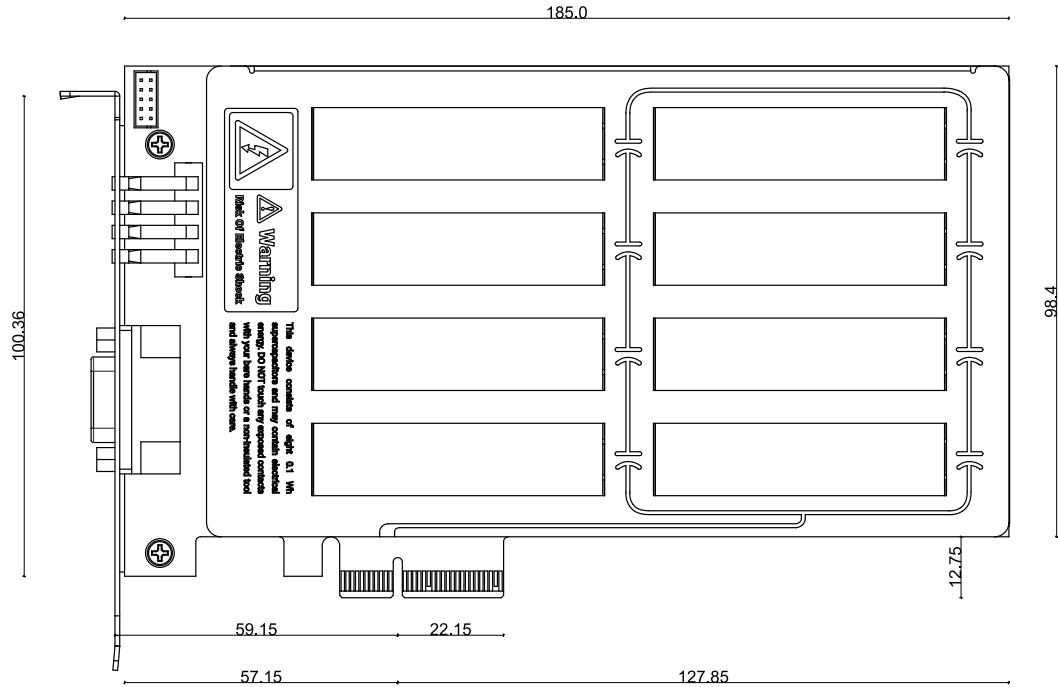
| | |
|------------------------------|---|
| Ultracapacitor configuration | 8x 100F, 3.0V ultracapacitor |
| capacity | 2500 watt-second |
| Expected lifespan | >10 years @ 25°C with 2500 w-s capacity 76,000 hours @ 35°C with 2500 w-s capacity 34,000 hours @ 45°C with 2500 w-s capacity 15,000 hours @ 55°C with 2500 w-s capacity 7,200 hours @ 65°C with 2500 w-s capacity Expected lifespan is 2.2x when configured as 2100 watt-second energy capacity, or 4.8x when configured as 1750 watt-second energy capacity. |
| Cycle life | 500,000 charging/discharging cycles* |
| Communication interface | 3-wire RS-232 |
| Dimension | Half-length PCIe card 167mm(W) x 111mm(H) |
| Operating temperature | -25°C ~ 65°C |
| Storage temperature | -40°C ~ 70°C |
| EMC | CE/FCC class A, according to EN 55022 & EN55024 |

1.2 Specification of PB-2500J-CSM

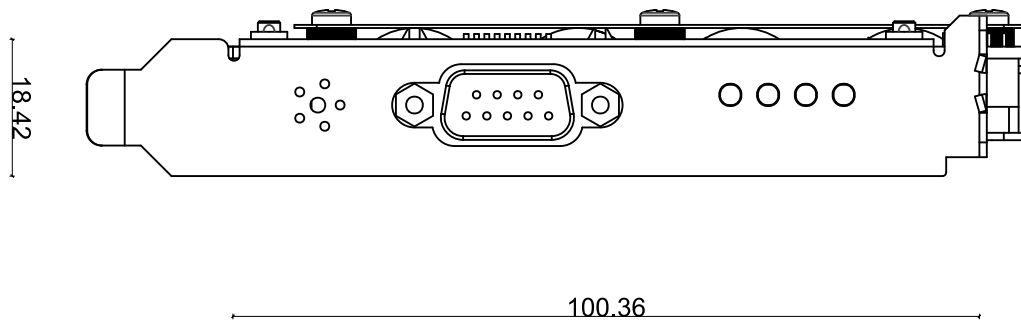
| | |
|------------------------------|---|
| Ultracapacitor configuration | 8x 100F, 3.0V ultracapacitor |
| capacity | 2500 watt-second |
| Expected lifespan | >10 years @ 25°C with 2500 w-s capacity 76,000 hours @ 35°C with 2500 w-s capacity 34,000 hours @ 45°C with 2500 w-s capacity 15,000 hours @ 55°C with 2500 w-s capacity 7,200 hours @ 65°C with 2500 w-s capacity Expected lifespan is 2.2x when configured as 2100 watt-second energy capacity, or 4.8x when configured as 1750 watt-second energy capacity. |
| Cycle life | 500,000 charging/discharging cycles* |
| Communication interface | 3-wire RS-232 |
| Dimension | 225mm(D) x 141mm(W) x 28.7mm(H) |
| Operating temperature | -25°C ~ 65°C |
| Storage temperature | -40°C ~ 70°C |
| EMC | CE/FCC class A, according to EN 55022 & EN55024 |

1.3 Dimension

1.3.1 PB-2500J-PCIe Superior View



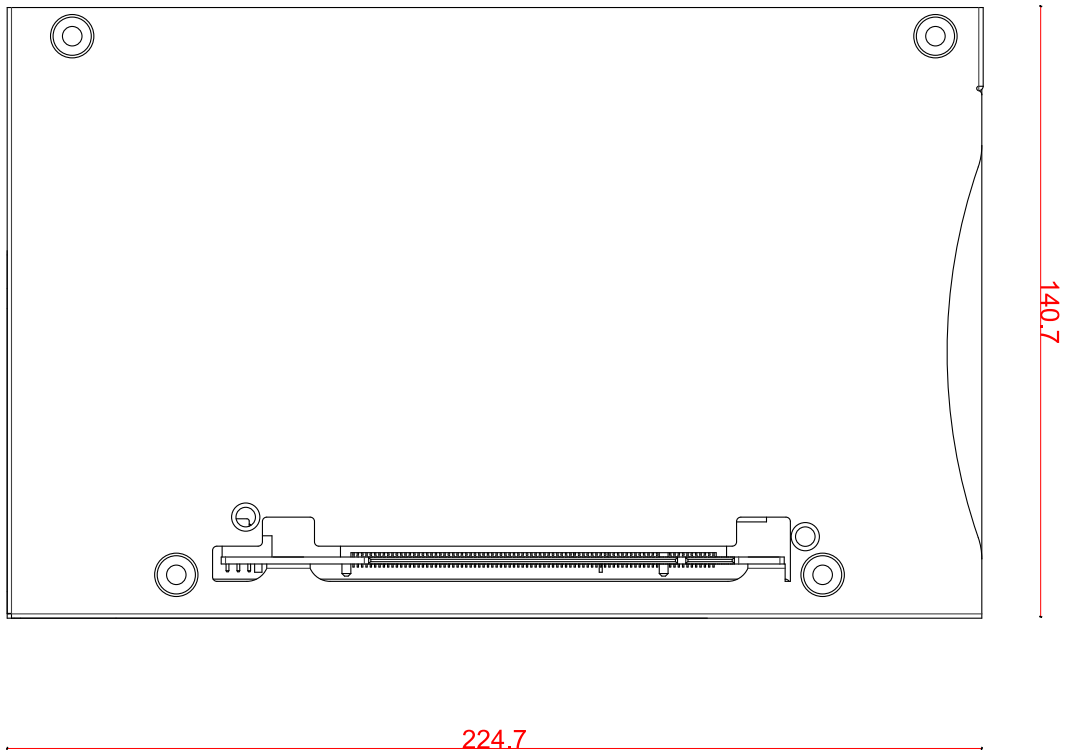
1.3.2 PB-2500J-PCIe Panel View



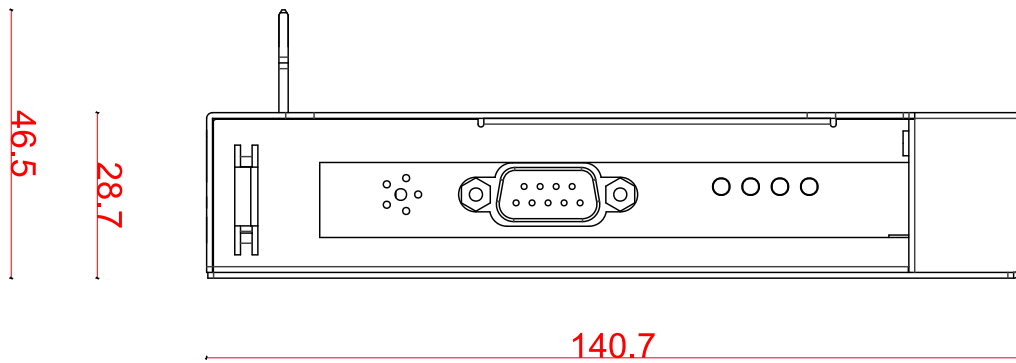
NOTE

All measurements are in millimeters (mm).

1.3.3 PB-2500J-CSM5 Superior view



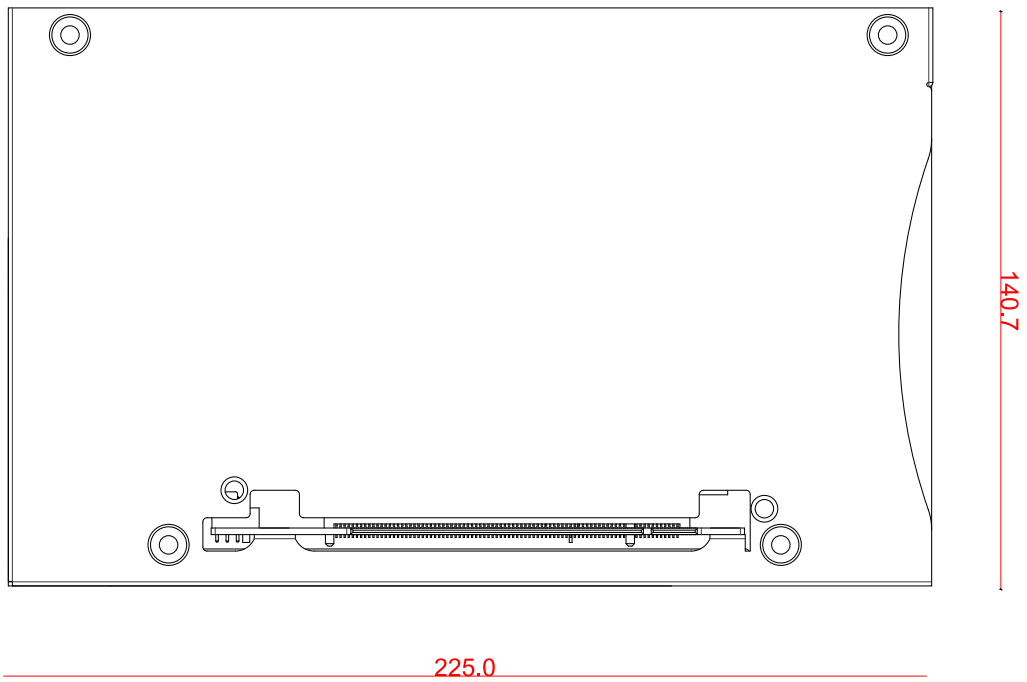
1.3.4 PB-2500J-CSM5 Panel View



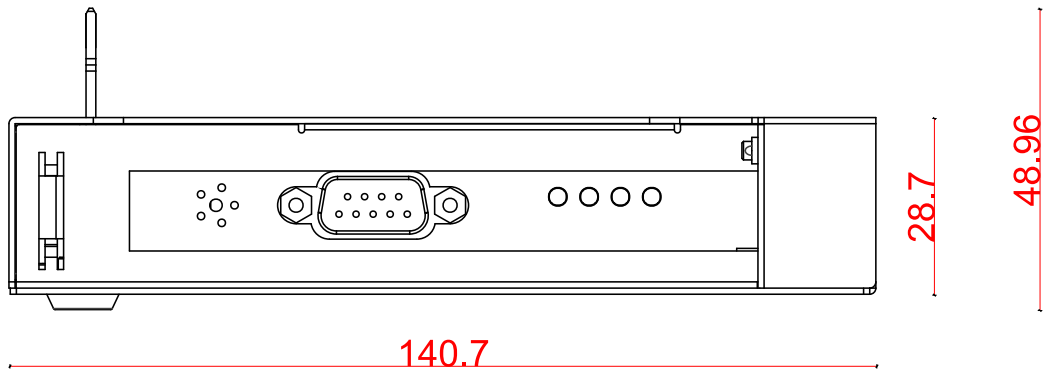
NOTE

All measurements are in millimeters (mm).

1.3.5 PB-2500J-CSM7 Superior View



1.3.6 PB-2500J-CSM7 Panel View



NOTE

All measurements are in millimeters (mm).

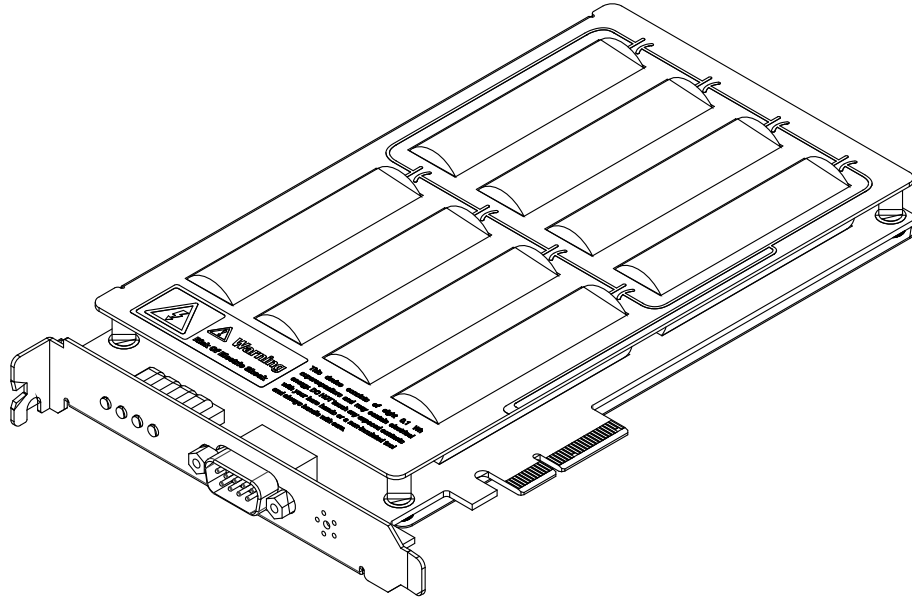
2 Unpacking the System

Upon receiving and unpacking your PB-2500J-PCIe/ CSM, please check immediately if the package contains all the items listed in the following table. If any item(s) are missing or damaged, please contact your local dealer or Neosys Technology.

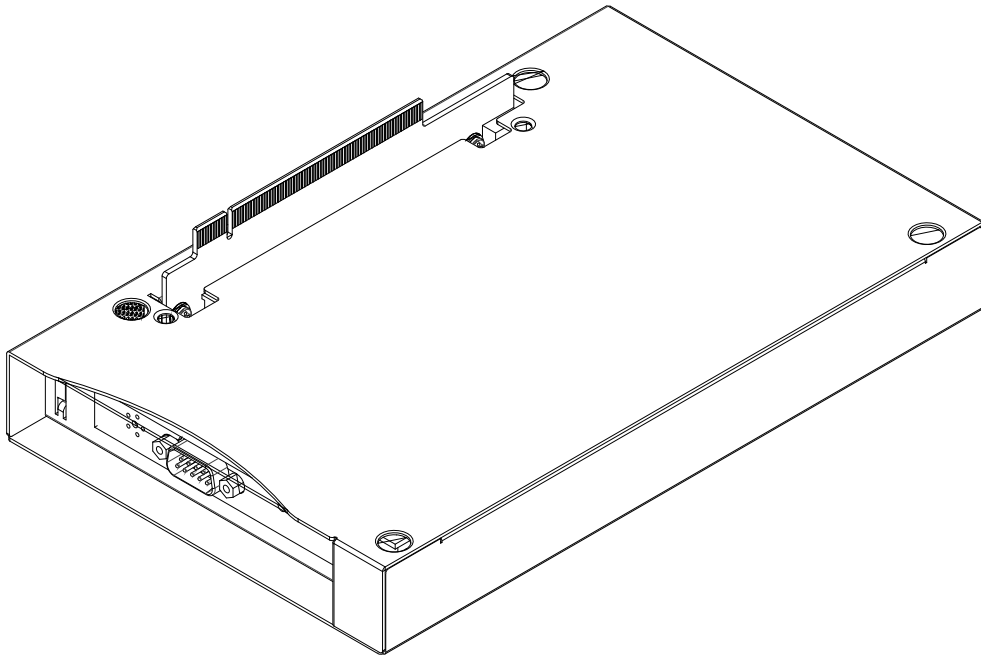
2.1 PB-2500J-PCIe/ CSM Packing List

| Item | Description | Qty |
|------|--|-----|
| 1 | PB-2500J-PCIe or PB-2500J-CSM (5 or 7) | 1 |
| 2 | Neosys Drivers & Utilities DVD | 1 |

2.2 PC-2500J



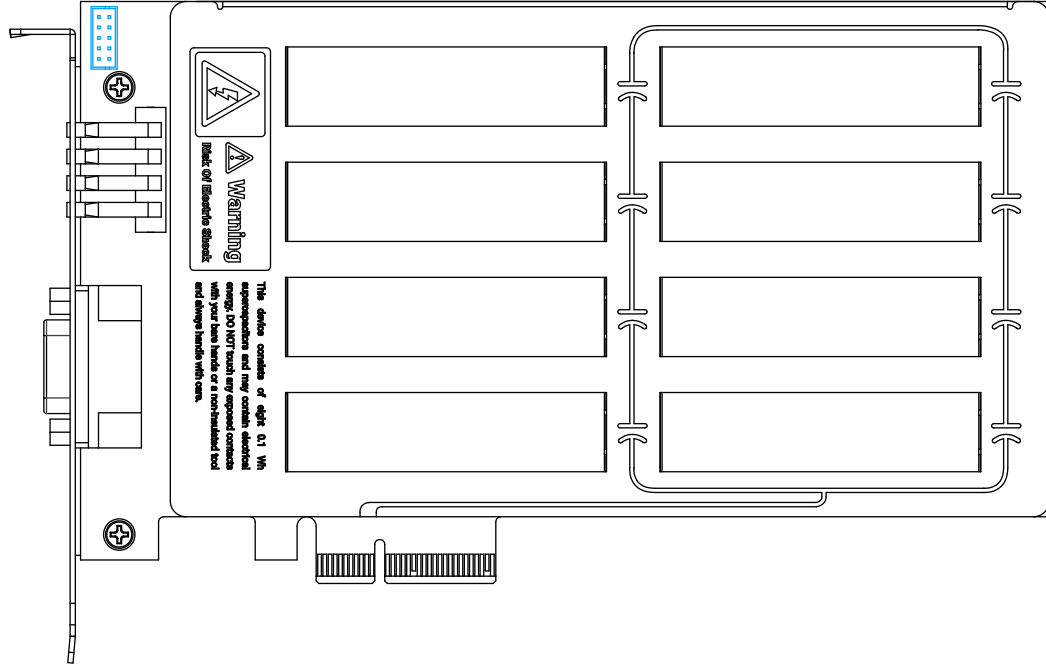
PB-2500J-PCIe



PB-2500J-CSM5/ 7

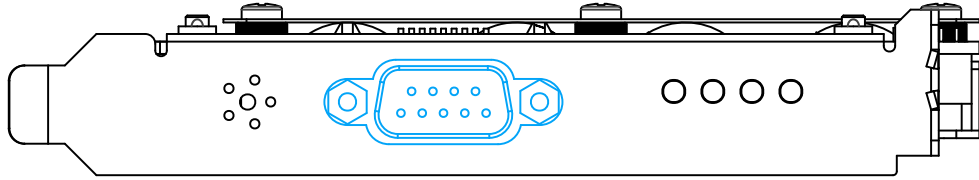
2.2.1 PB-2500J-PCIe 2x5 2.0mm Pitch Wafer Connector

PB-2500J-PCIe provides a 2x5 2.0mm pitch wafer cable connector for communicating with the host computer.

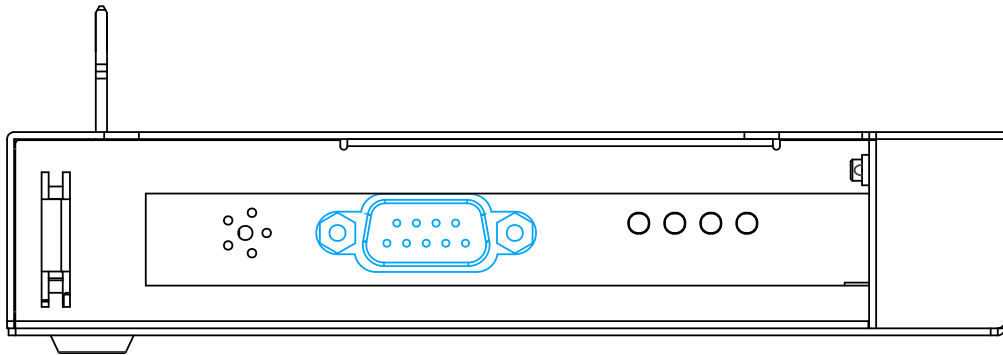


2.2.2 COM Port

The 9-pin D-sub COM port provides communication connection with the host computer to acquire input voltage of the host computer.



PB-2500J-PCIe



PB-2500J-CSM5/ 7

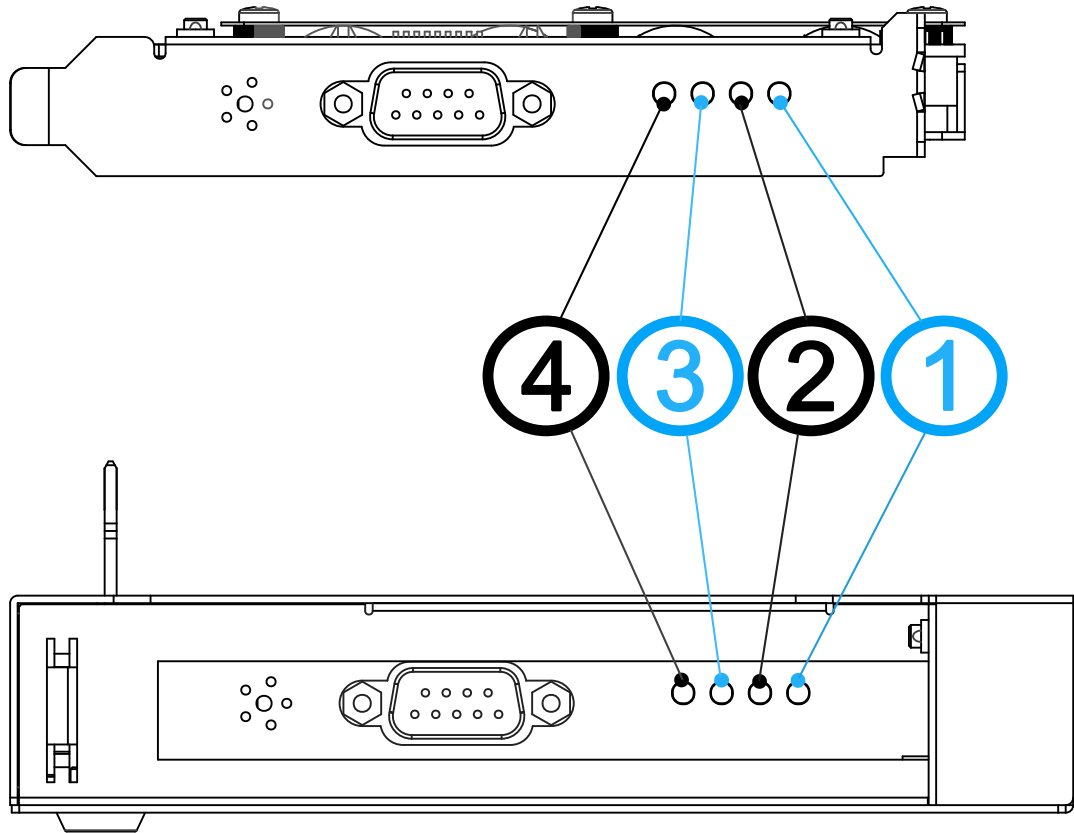


NOTE

The COM port must be configured in RS-232 mode to properly communicate with PB-2500J-PCIe or PB-2500J-CSM5/ 7 Cassette module.

2.2.3 LED Indicators

There are four LED indicators on the front panel and their status descriptions are listed in the following table.



| LED | Color | Status | Description |
|-----|--------|------------|--|
| 1 | Green | Off | Energy of the SuperCAP is below 1736J |
| | | Steady-lid | Energy of the SuperCAP reached 2500J |
| | | Flashing | Energy of the SuperCAP reach 1736J |
| 2 | Green | Off | Energy of the SuperCAP is below 625J |
| | | Steady-lid | Energy of the SuperCAP reached 1111J |
| | | Flashing | Energy of the SuperCAP reach 625J |
| 3 | Orange | | When lid, it indicates PB-2500J-PCIe is being charged. |
| 4 | Red | | When Lid, it indicates a brownout status. |

3 PB-2500J-PCIe/ CSM Installation

Before disassembling the system enclosure and installing components and modules, please make sure you have done the following:

- It is recommended that only qualified service personnel should install and service this product to avoid injury or damage to the system.
- Please observe all ESD procedures at all times to avoid damaging the equipment.
- Before disassembling your system, please make sure the system has powered off, all cables and antennae (power, video, data, etc.) are disconnected.
- Place the system on a flat and sturdy surface (remove from mounts or out of server cabinets) before proceeding with the installation/ replacement procedure.
- Acquire a DB9 COM (female) to COM (female) cable for PB2500J-PCIe/ CSM installation.



NOTE

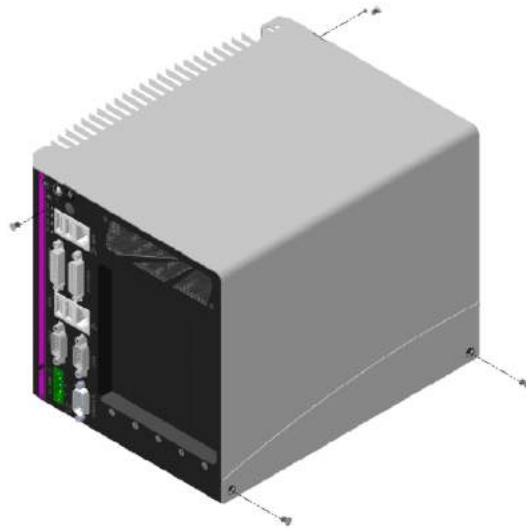
The installation process of PB-2500J-PCIe or PB-2500J-CSM5/ 7 Cassette module does not require a driver installation process. However, you need to download the software “PB-2500J Parameter Configurer” to access and manage the ultracapacitor-based power backup solution.

3.1 PB-2500J-PCIe Installation in Nuvo-6000 Series

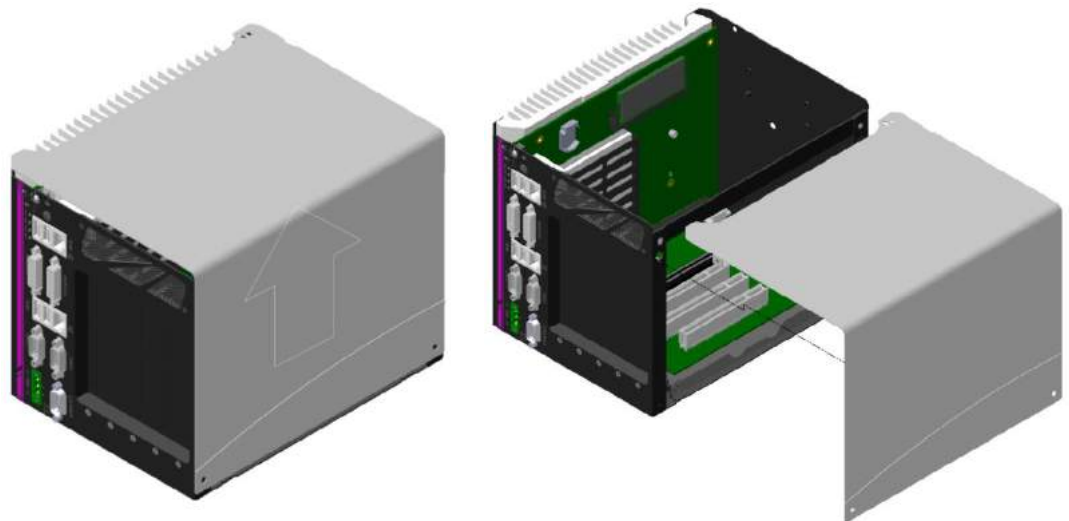
Prior to installing PB-2500J-PCIe into your Nuvo-6000 controller, please make sure at least one PCIe slot is vacant for installation. Please follow the instruction below to remove the enclosure for installation:

3.1.1 Removing Nuvo-6000 Chassis Cover

1. Loose four M3, F-head screws on the front, back and right side of the chassis.



2. Gently push the L-shape chassis cover toward top, then move it toward right to remove the cover.



3.1.2 Installing PB-2500J-PCIe into Nuvo-6000 Controller

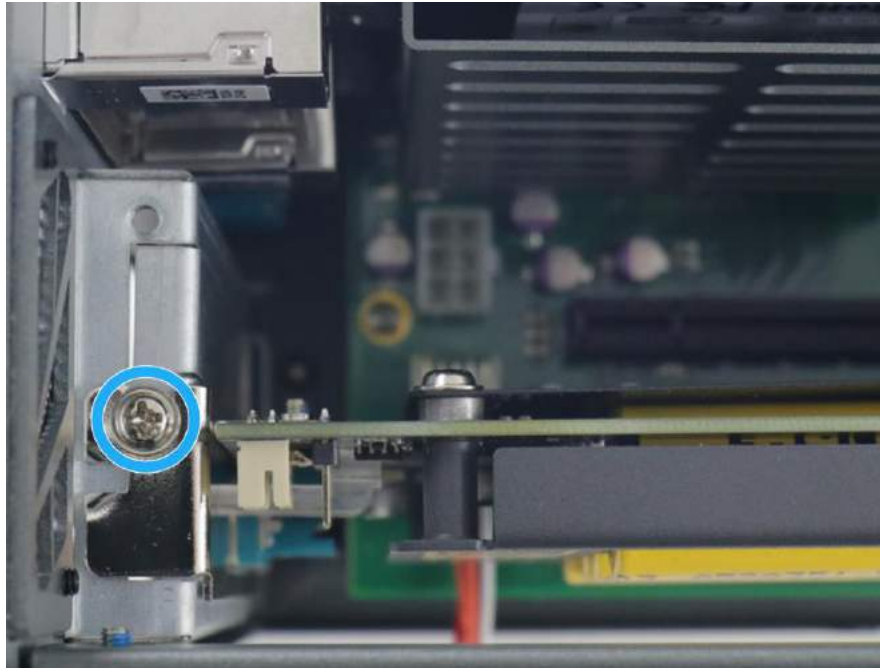
1. Once the chassis has been removed, the 2x5 pin 2.0mm pitch wafer connector (indicated in orange), x4 PCI Express slot (indicated in blue) and the x16 PCI Express slot (indicated in red) can be accessed.
2. Connect the provided 2x5 pin 2.0mm pitch cable to the PCBA board of the Nuvo-6000 controller.



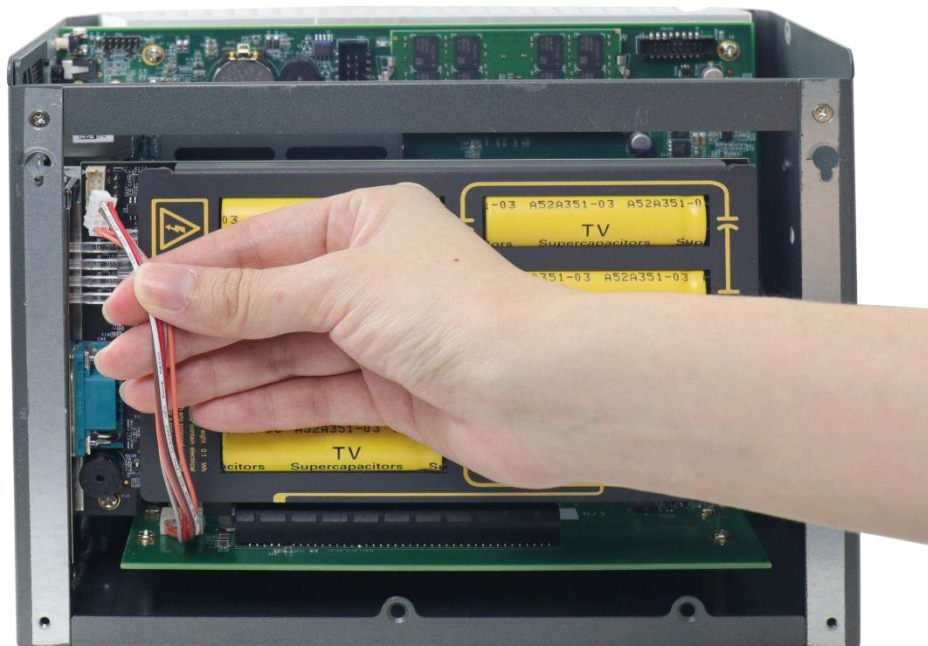
3. Align and insert the golden-finger connector of PB-2500J-PCIe into the PCI Express slot until it's firmly seated.



- Secure PB-2500J-PCIe with a screw.



- Insert the other end of the 2x5 pin, 2.0mm pitch cable into the 2x5 pin, 2.0mm pitch wafer connector on the PB-2500J-PCIe.



6. Use a COM-to-COM cable (user-provided item) to connect the COM port on PB-2500J-PCIe to COM port on Nuvo-6000 controller. Please make sure the COM port is configured in RS-232 mode on the host controller.



7. Reinstall the controller chassis and re-connect all cables to complete the installation.

3.2 PB-2500J-PCIe Installation in Nuvo-5000/ 7000 Series

PB-2500J-PCIe can be installed into Nuvo-5000 with A3 version PCBA daughter board (please contact your distributor or Neosys Technology for details) and 7000 Series with NVBP-5000E PCBA daughter board by following the steps listed below. For demonstration purposes, we will use Nuvo-5000 series as an example.

1. Place the controller up-side-down on a flat surface and unfastening the four screws indicated below.

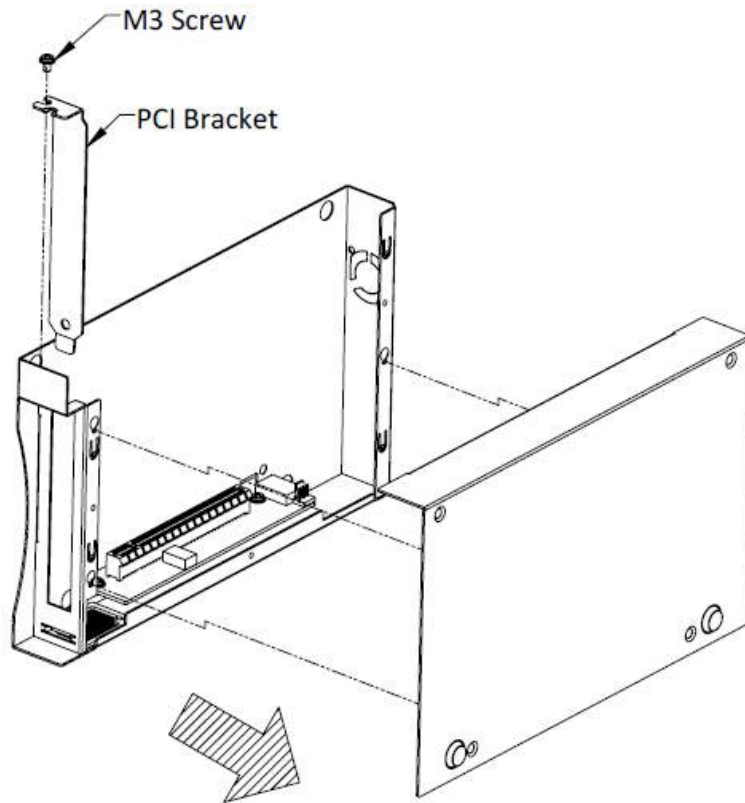


2. Lift the Cassette module gently to separate it from the controller.



3.2.1 Installing PB-2500J-PCIe into Cassette Module of Nuvo-5000/ 7000 Series

1. Separate the cover of the Cassette module and remove the blank faceplate installed in Cassette by unfastening the M3 screw.



2. Insert one end of the 2x5 pin 2.0mm pitch cable into the 2x5 pin 2.0mm pitch wafer connector on the PCBA board in the Cassette module.



- Align and insert the golden-finger connector of PB-2500J-PCIe into the PCI Express slot until it's firmly seated.



- Connect the 2x5 pin 2.0mm pitch cable onto the 2x5 pin 2.0mm pitch wafer connector on PB-2500J-PCIe and secure the faceplate with a screw.



- Place the Cassette module's cover back on and reinstall the Cassette module onto the controller.
- Use a COM-to-COM cable to connect the COM port of PB-2500J-PCIe to the COM port of your controller. Secure both COM ports. Please make sure the COM port is configured in RS-232 mode on the host controller.



3.3 PB-2500J-CSM Installation

PB-2500J-CSM consists of a PB-2500J-PCIe already installed in a Cassette module.

Please refer to the following instructions on how to install PB-2500J-CSM5 onto a

Nuvo-5000E/P systems or PB-25800J-CSM7 onto a Nuvo-7000E/P system.

1. To install PB-2500J-CSM, turn your system upside-down and remove the existing Cassette module.



Nuvo-5000E/ P Cassette module removal

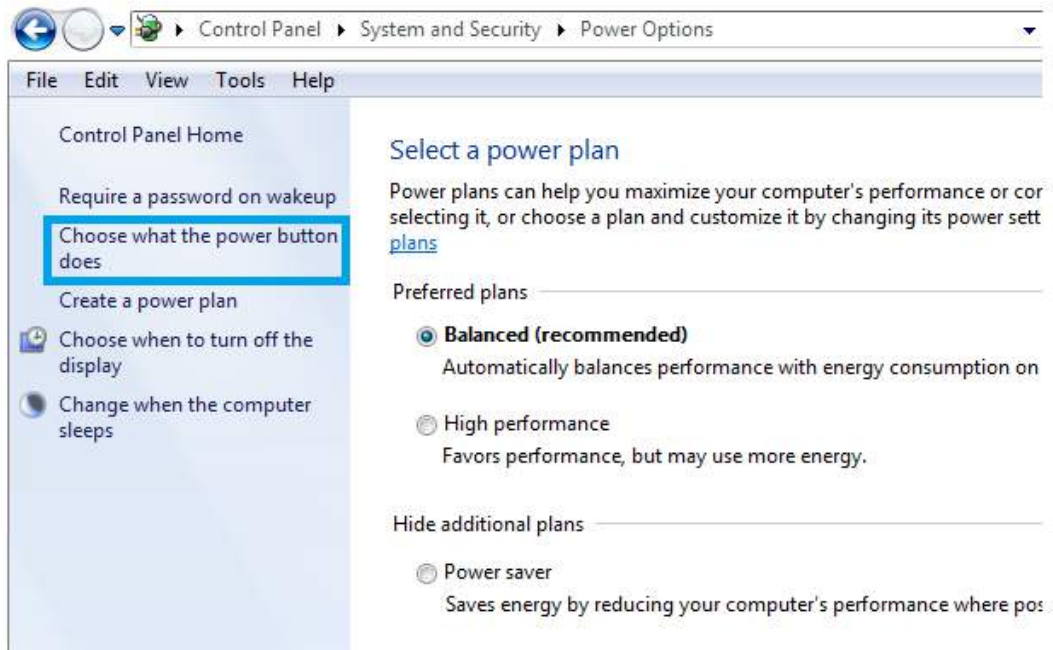


Nuvo-7000E/ P Cassette module removal

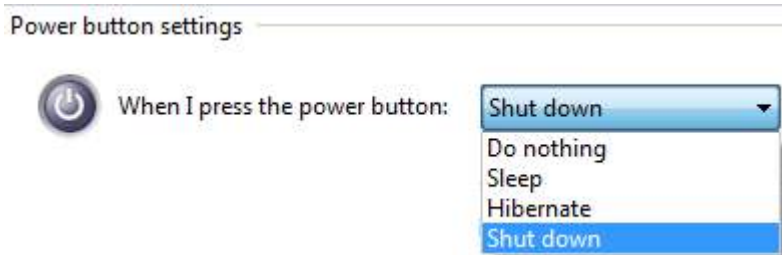
2. Gently lower the PB-2500J-CSM onto the system, matching the four (4) Cassette module positioning poles and secure with four (4) screws.
3. Connect using a DB9 female/ female COM-to-COM cable to connect the COM port of PB-2500J-PCIe to the COM port of your controller. Secure both COM ports. Please make sure the COM port is configured in RS-232 mode on the host controller.

3.4 Configuring Windows System

Please make sure you've configured your Windows system to initiate a shutdown process when pressing the power button. By default, Windows 7/ 8/ 10 goes to sleep (S3) mode when the power button is pressed. As sleep (S3) is not a complete shutdown behavior, PB-2500J will not recognize this command. To configure the setting in your Windows system, go to "Control Panel > System and Security > Power Options".

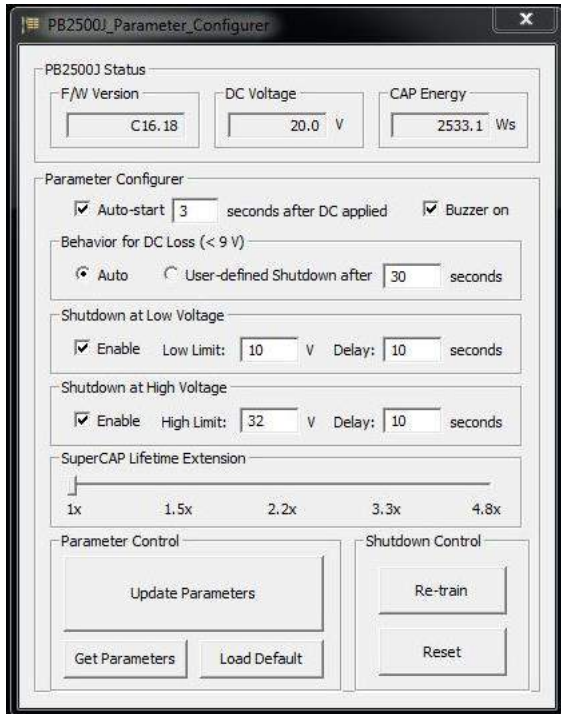


Set the "When I press the power button" configuration to "Shut down"

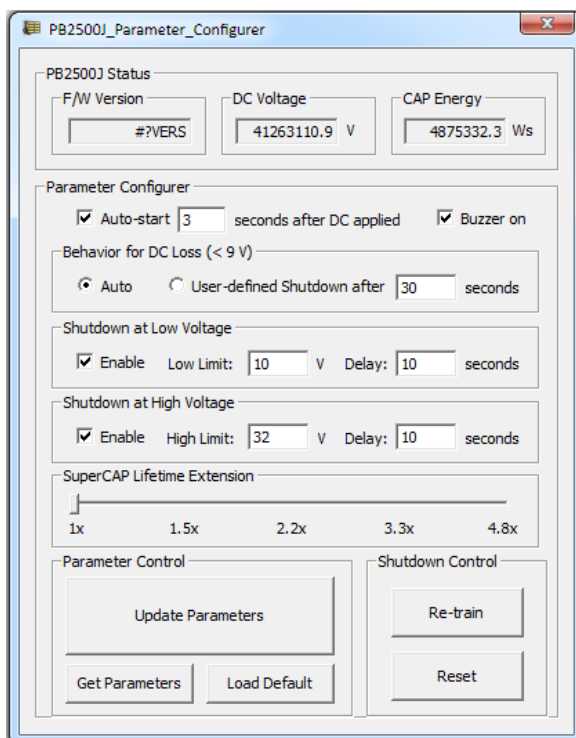


3.5 Changing COM Port Connection

When PB-2500J is connected to host computer’s COM1 and is configured in RS-232 mode, the configurator should look similar to the following illustration.

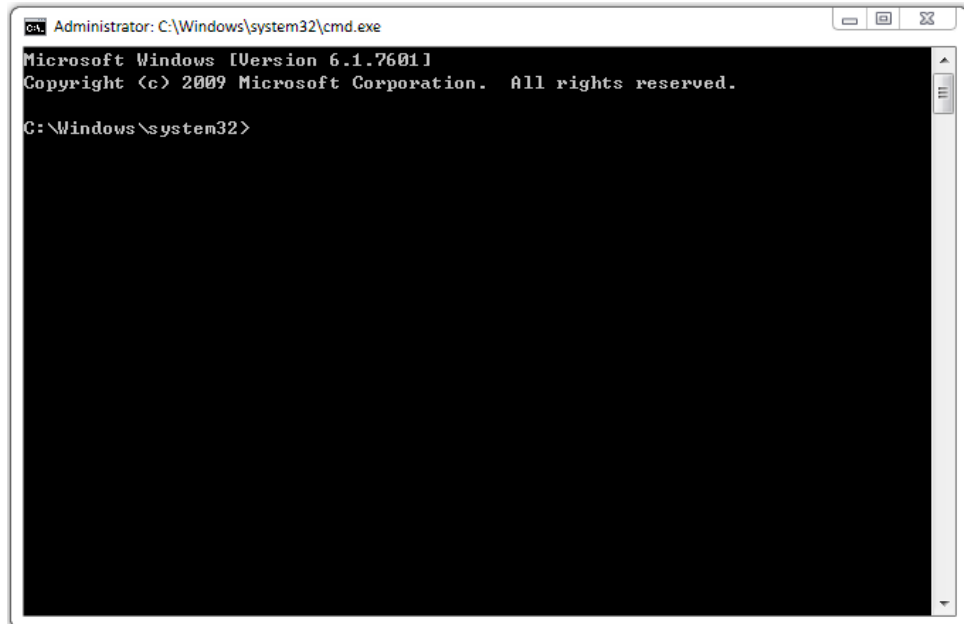


If for whatever reason, the COM port connection needs to be connected to another COM port (COM2, 3 or 4), the configurator will read false readings (F/W Version, DC Voltage, CAP Energy) upon initial connection change.



To complete the connection switch to the new COM port, the following steps must be performed in order for the system to read PB-2500J parameters.

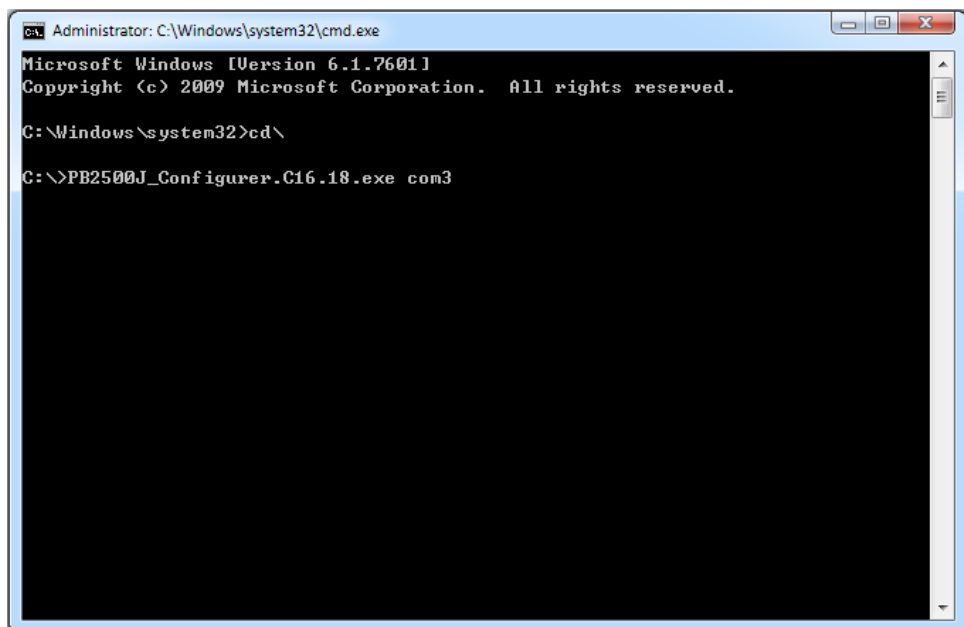
1. Press Windows key
2. In the “Search programs and files” column, type in “cmd” and press Ctrl+Shift+Enter to run the “command line dialogue” with administrative rights



```
Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Windows\system32>
```

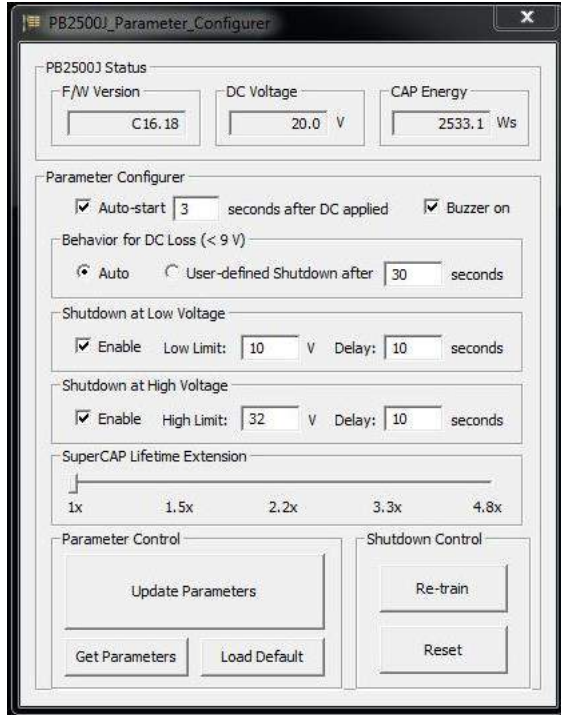
3. Change directory to where PB-2500J_Configurer can be located. For example, PB-2500J_Configurer has been placed in C directory and the newly connected port on the host computer is COM3.
4. Type in “PB2500J_Configurer.C16.18.exe com3” (.exe file name + COM port number connected) and press Enter.



```
Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Windows\system32>cd\
C:\>PB2500J_Configurer.C16.18.exe com3
```


- Once the command has been issued, press “Get Parameters” on the configurer and all parameters should be acquired.



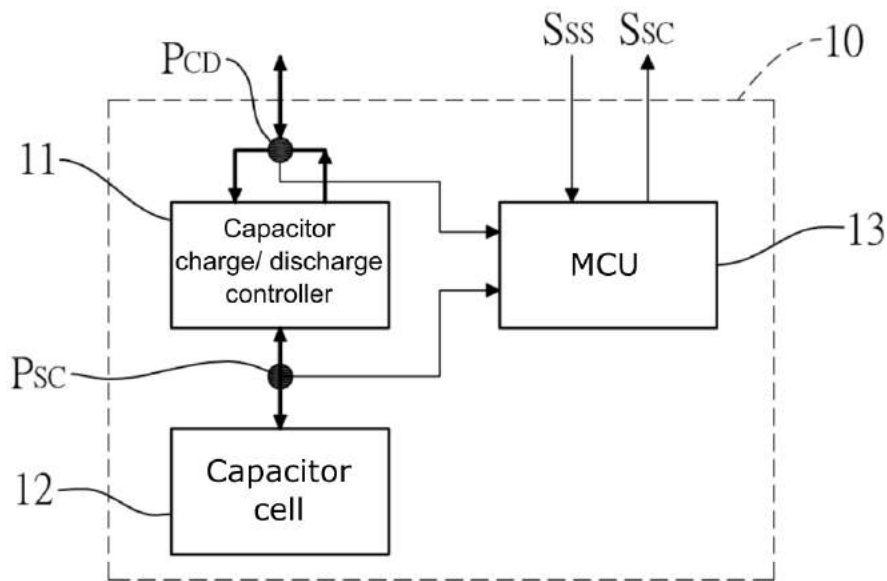
4 CAP Energy Management Technology

~ PB2500J Parameter Configurer

By controlling fundamental techniques such as charge/ discharge control, active load balance and DC/ DC regulation, Neosys is able to design and create a reliable ultracapacitor-based power backup system. However, the real challenge is how to get the most out of the capacitor energy while ensuring the system shuts down safely during a power blackout.

4.1 CAP Energy Management Technology

The patented architecture (R.O.C. patent I598820) incorporates a microprocessor along with ultracapacitors and charge/ discharge controller. The proprietary firmware embedded in the MCU not only monitors energy level continuously, it also automatically initiates soft-shutdown to prevent data loss/ corruption.

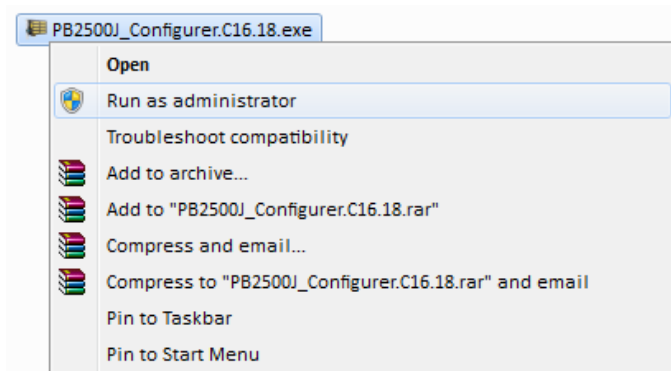


By providing sophisticated real-time energy monitoring, high/ low voltage protection and auto/ manual shutdown control, the dedicated interface help users better manage and efficiently utilize their PB-2500J. The software can also extend the lifespan of ultracapacitors up to 4.8x by controlling charge/ discharge cycles.

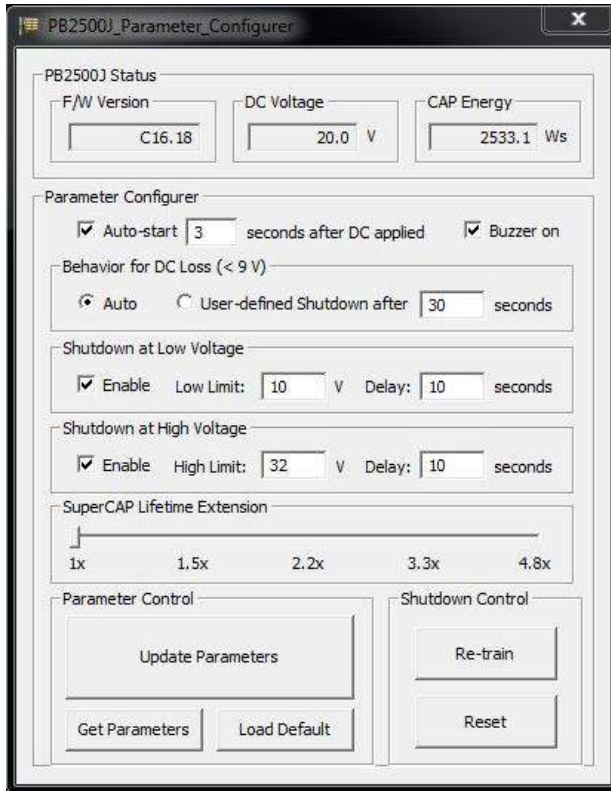
4.1.1 Executing PB2500J Parameter Configurer

The PB2500J Parameter Configurer is an application that allows the user to monitor and manage the connected PB2500J-PCIe/ CSM.

Once you have installed PB2500J-PCIe/ CSM and have connected it to the host controller COM port (configured in RS-232 mode). You may copy the “PB2500J_Configurer” executable (.exe) file on the Utility DVD to your computer desktop and run it by right-clicking on the exe file and select to “Run as administrator” from your desktop (installation not required).

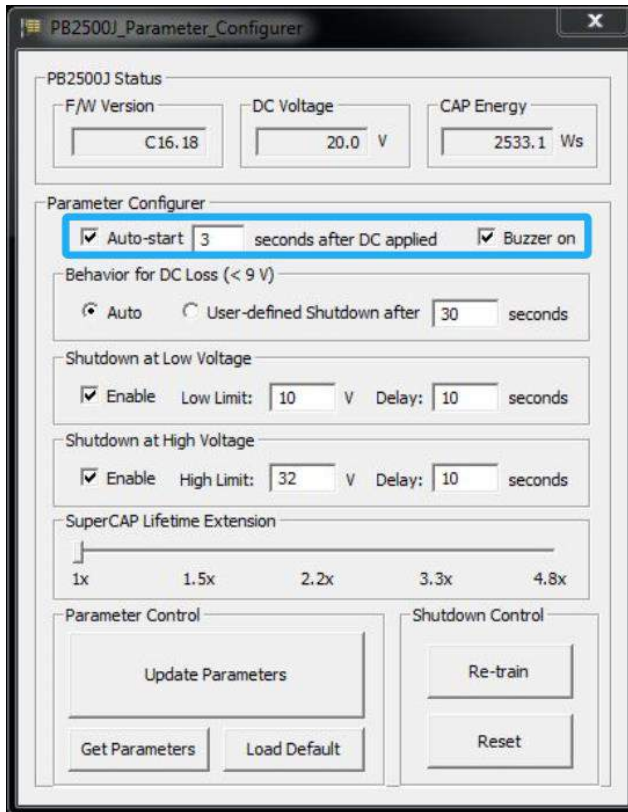


4.2 PB-2500J Parameter Configurer



| Item | Description | |
|----------------------|---|---|
| F/W Version | Shows the firmware version of your PB-2500J | |
| DC Voltage | Shows the current input voltage of your PB-2500J | |
| CAP Energy | Shows the current charged energy status (rated 2500Ws Max.) | |
| Parameter Configurer | Auto-start _ seconds after DC applied | The time delay (in seconds) to start PB-2500J once your computer has been powered on. |
| | Behavior for DC Loss (<9V) | This allows you to set the delay time (in seconds) to shutdown when DC voltage drops below 9V. |
| | Shutdown at Low Voltage | This allows you set the low voltage limit and delay time (in seconds) to shutdown (Note: DO NOT set voltage lower than 10V) |
| | Shutdown at High Voltage | This allows you set the high voltage limit and delay time (in seconds) to shutdown (Note: DO NOT set voltage higher than 32V) |
| | SuperCAP Lifetime Extension | This setting allows you to extend the lifespan of the Supercapacitors on your PB-2500J. Lifespan extension settings are approximate figures and may not exactly reflect real world applications. |
| | Parameter Control | Update Parameters: Click on this button for new parameters to take effect. Get Parameters: Click on this button to acquire current parameters. Load Default: Clicking on this button to load default parameters. |
| | Shutdown Control | Re-train: This button will re-train PB-2500J to be customized to the system's required shutdown time. Reset: This button will reset (erase) previous Re-train shutdown settings. |

4.2.1 Auto-start



Auto-start Settings

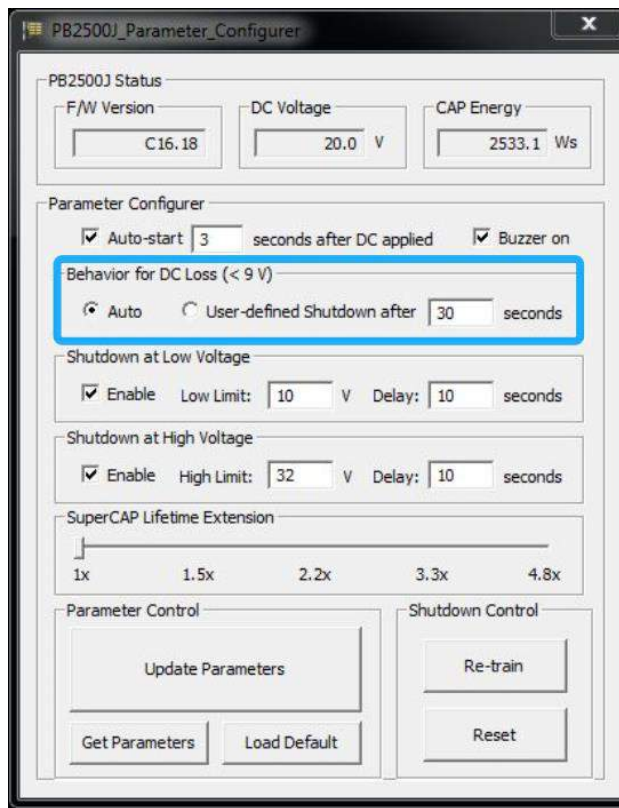
| | |
|---|--|
| <p>Auto-start _ seconds after DC applied</p> | <p>If the “Auto-start” box is checked, the system will start __ seconds after the 3-pin pluggable terminal block is plugged into the system (DC applied).</p> <p>If the “Auto-start” box is not checked, once you have plugged in the 3-pin pluggable terminal block, you will need to press the power button to turn the system on.</p> |
| <p>Buzzer on</p> | <p>If the “Buzzer on” box is checked, a buzzer sound will sound as soon as the supercapacitors start to discharge (supplying power to the system).</p> <p>If the “Buzzer on” box is not checked, no buzzer sound will be made when the supercapacitors start to discharge.</p> |



NOTE

For new parameters to take effect, you must click on “[Update Parameters](#)” and follow procedure instructions. Please refer to the relevant section for details.

4.2.2 Behavior for DC Loss (<9V)



Behavior for DC Loss (<9V) Settings

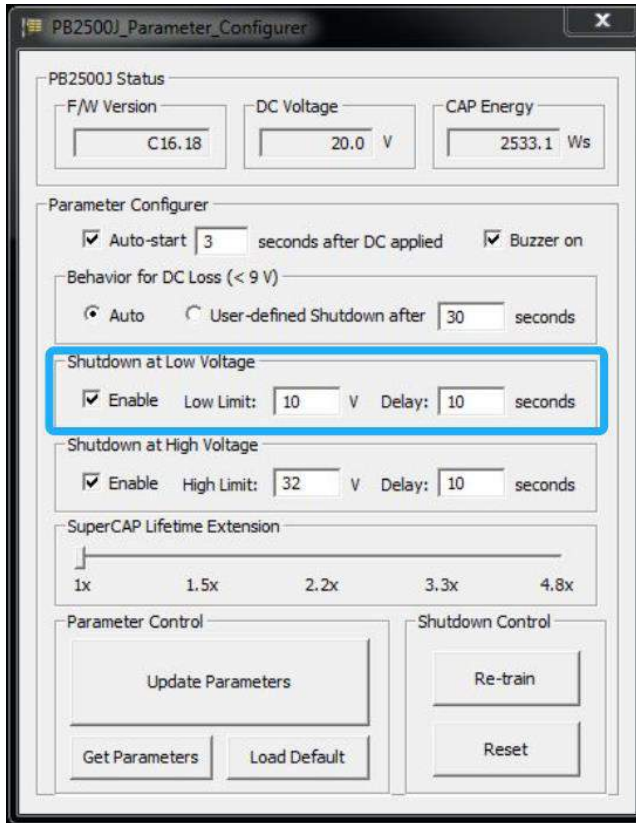
| | |
|--|---|
| Auto | If the “ Auto ” box is selected, the delay shutdown time will be pre-determined by the MCU when you “Re-train” PB-2500J. |
| User-defined Shutdown after _ seconds | If the “ User-defined Shutdown after _ seconds ” is selected, when the input voltage drops below 9V, the shutdown process will be initiated by the user defined time in seconds. |



NOTE

For new parameters to take effect, you must click on “[Update Parameters](#)” and follow procedure instructions. Please refer to the relevant section for details.

4.2.3 Shutdown at Low Voltage



Shutdown at low voltage settings

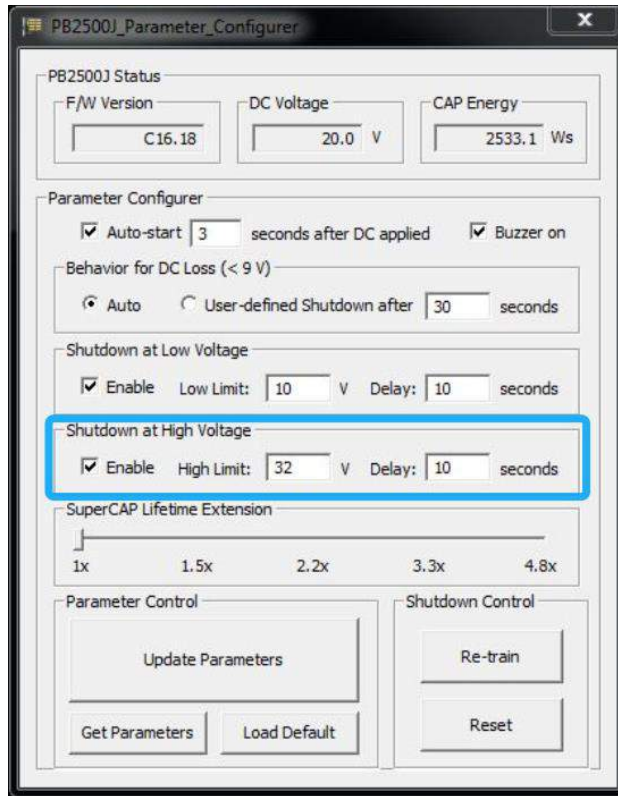
| | |
|-------------------------|---|
| Enable | If the “ Enable ” box is checked, the shutdown process will be determined by the Low Limit: _ V and Delay: _ seconds settings. |
| Low Limit: _ V | If the “ Enable ” box is checked, the shutdown process will be initiated by low voltage limit setting (Low Limit: _ V) and the Delay: _ seconds. |
| Delay: _ seconds | If the “ Enable ” box is checked, the shutdown process will be initiated in _ seconds (Delay: _ seconds) when the low voltage limit setting (Low Limit: _ V) is reached. |



NOTE

For new parameters to take effect, you must click on “[Update Parameters](#)” and follow procedure instructions. Please refer to the relevant section for details.

4.2.4 Shutdown at High Voltage



Shutdown at high voltage settings

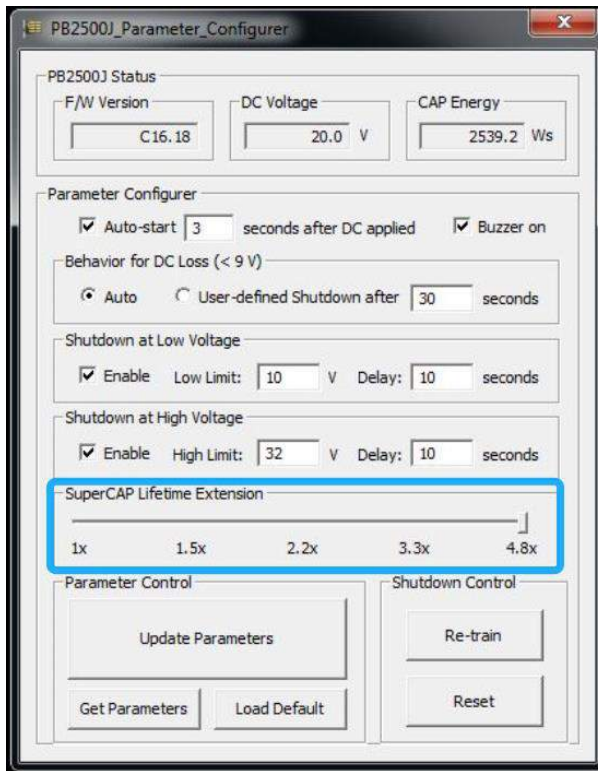
| | |
|-------------------------|---|
| Enable | If the “ Enable ” box is checked, the shutdown process will be determined by the High Limit: _ V and Delay: _ seconds settings. |
| High Limit: _ V | If the “ Enable ” box is checked, the shutdown process will be initiated by high voltage limit setting (High Limit: _ V) and the Delay: _ seconds. |
| Delay: _ seconds | If the “ Enable ” box is checked, the shutdown process will be initiated in _ seconds (Delay: _ seconds) when the high voltage limit setting (High Limit: _ V) is reached. |



NOTE

For new parameters to take effect, you must click on “[Update Parameters](#)” and follow procedure instructions. Please refer to the relevant section for details.

4.2.5 SuperCAP Lifetime Extension



SuperCAP lifetime extension settings

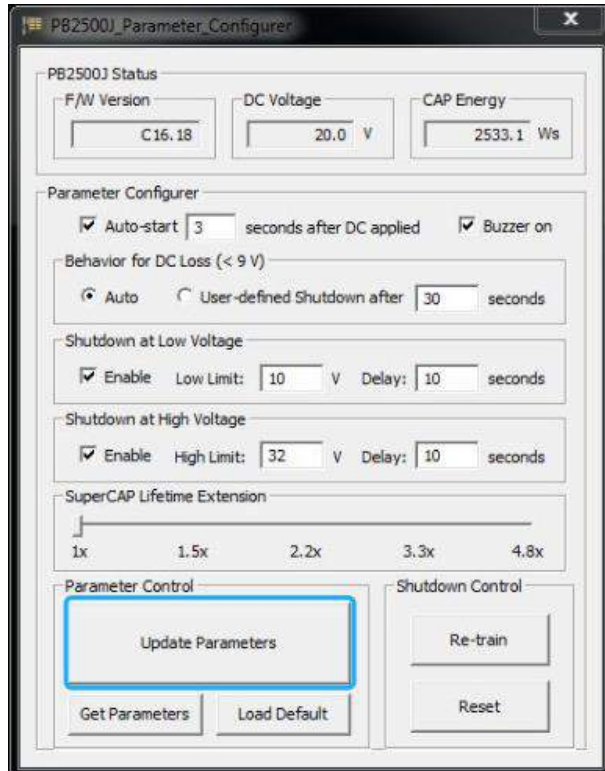
The SuperCAP lifetime extension setting is an automated setting when users only need to click on the bar, drag it to the desired lifetime extension setting, click on the “Update Parameters” and follow procedure instruction for settings to take effect.



NOTE

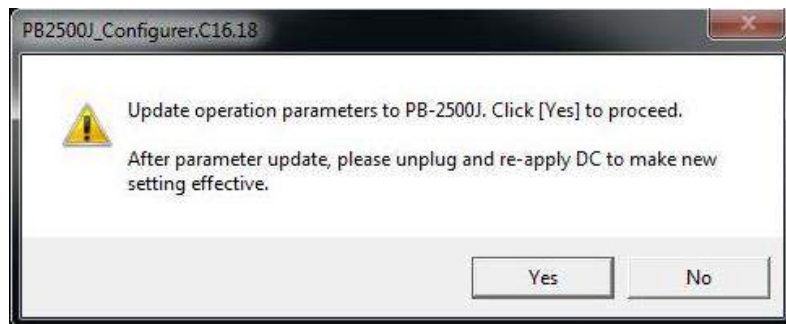
For new parameters to take effect, you must click on “[Update Parameters](#)” and follow procedure instructions. Please refer to the relevant section for details.

4.2.6 Update Parameters



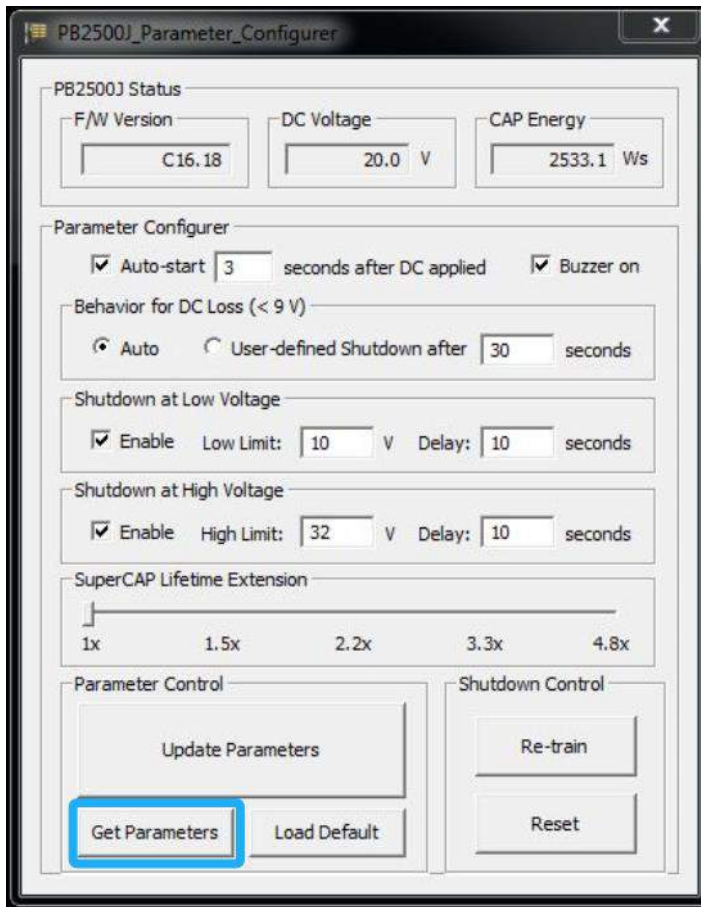
Whenever you enter/ adjust a new parameter or parameters, for the new settings to take effect, you must perform the following steps:

1. Click on the “Update Parameters” button and the following dialogue will appear.



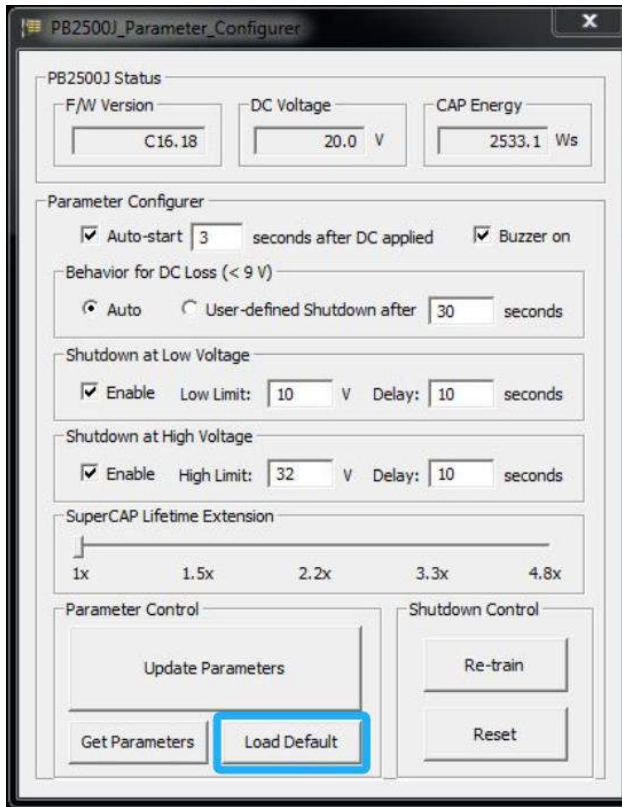
2. Click on yes, manually shutdown your system by going to “Start > Shut down”.
3. Once the system has shut down, unplug the 3-pin pluggable terminal block.
4. Wait for 5~10 seconds, plug in the 3-pin pluggable terminal block and start up your system for the new settings to take effect.

4.2.7 Get Parameters



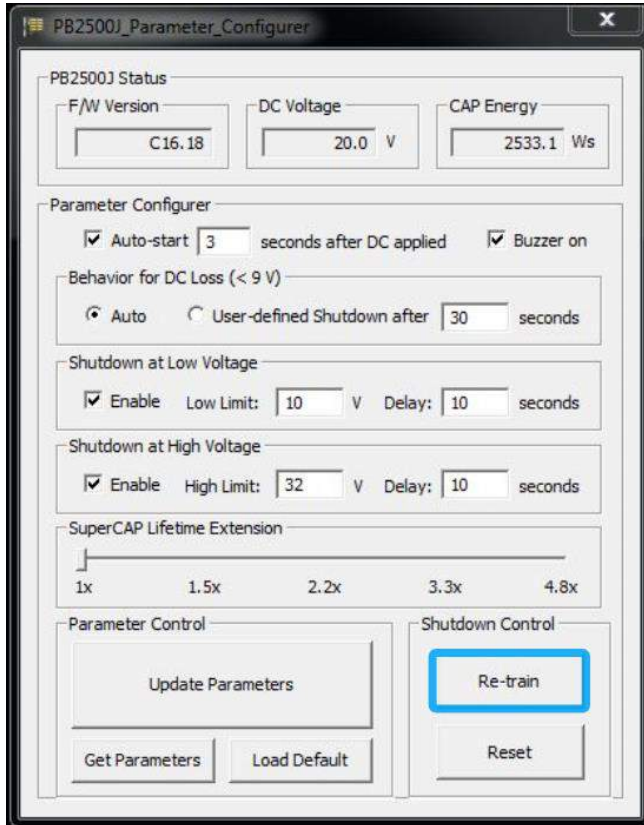
Click on “Get Parameters” to manually acquire the current PB-2500J status for F/W version, DC voltage and current stored CAP energy.

4.2.8 Load Default



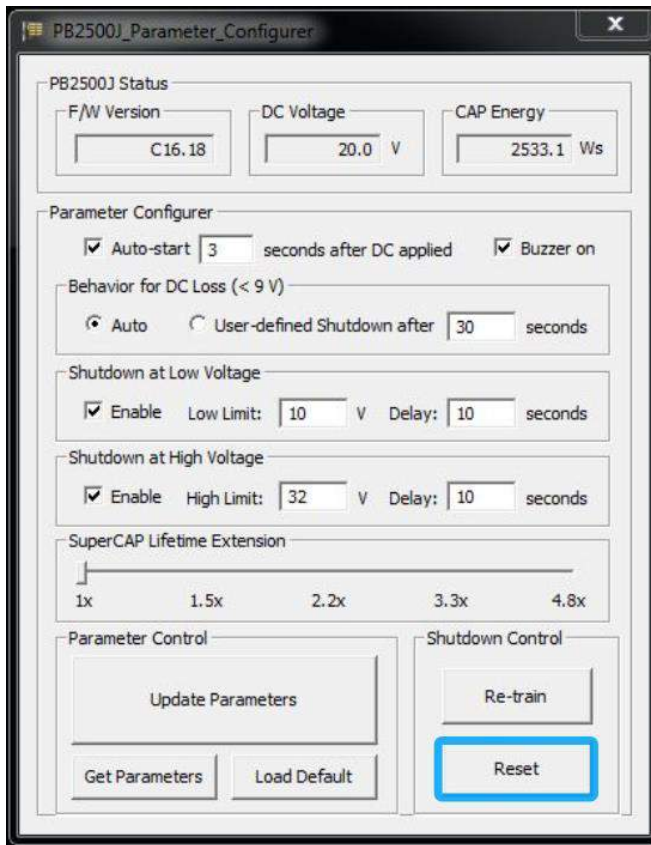
You may set PB-2500J back to the original settings by clicking on “Load Default” to reset all changes you have made previously.

4.2.9 Re-train



The Re-train function is to customize the PB-2500J to your system’s required shutdown time! By clicking on “Re-train”, a shutdown action will be initiated so the time required to shutdown can be memorized.

4.2.10 Reset



By clicking on Reset, it will erase all previous Re-train settings and hence result in immediate shutdown when a command is issued.