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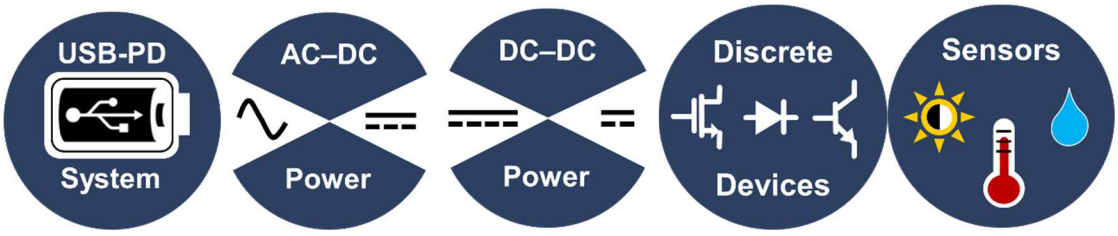
ON Semiconductor®

Universal Offline 200W 4-Port Type-C USB-PD Source

User Guide



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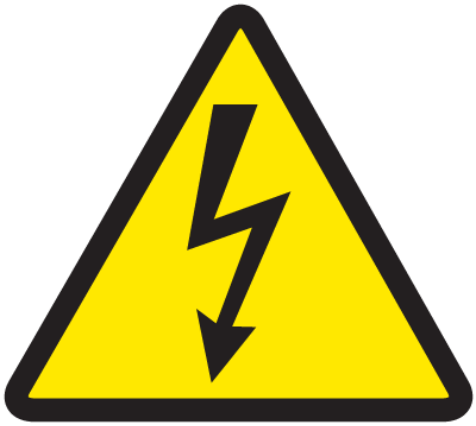
Warnings

- High voltage exists on the AC/DC supply. Exercise extreme caution when evaluating this system.
- The connectors between these two boards is not compatible with any other system. Connecting these boards to any other system risks damage to both device.



Installation

Go to www.onsemi.com/strata to download the most recent version of Strata and follow the installation prompts.

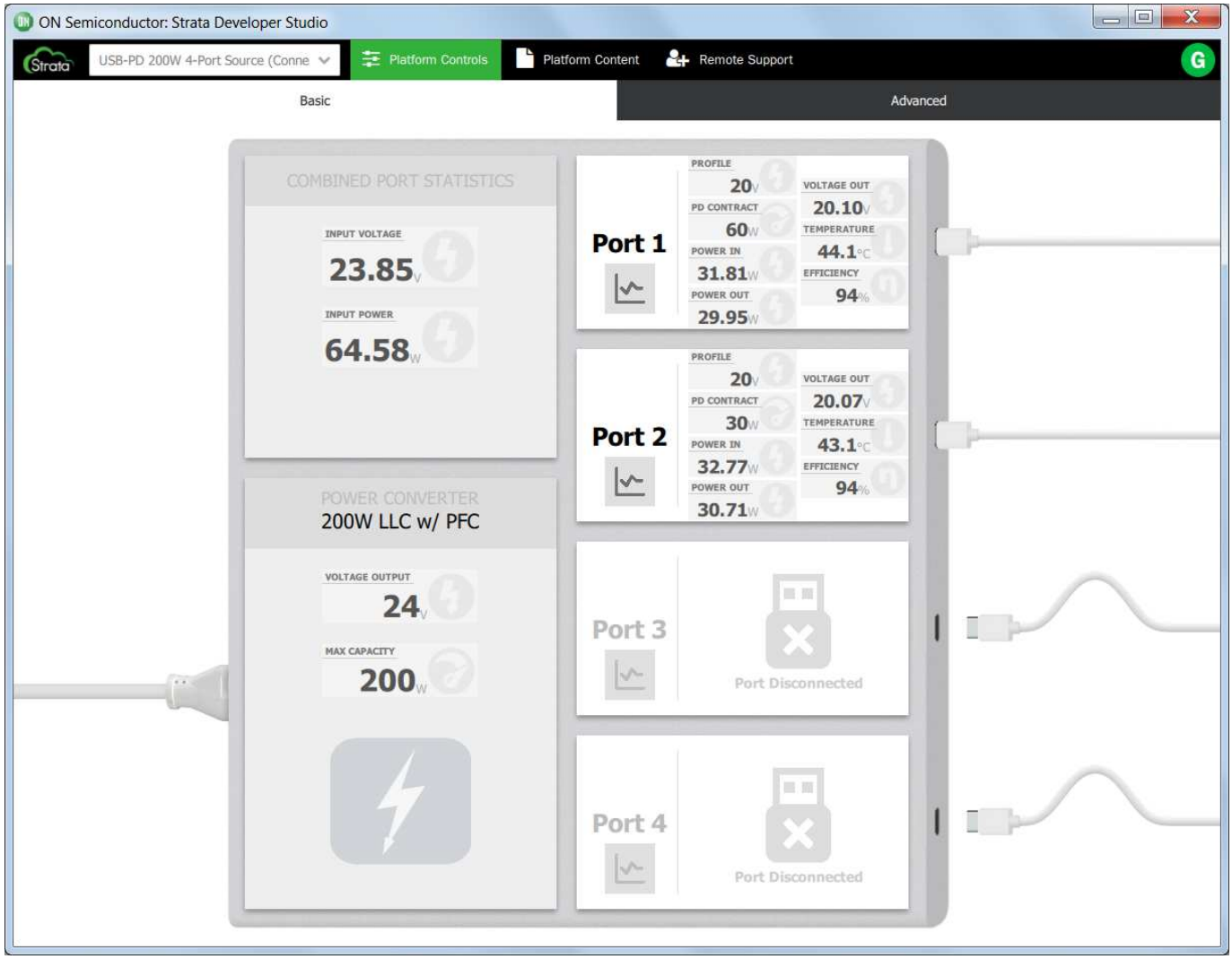
Startup Procedure

1. Apply AC voltage to the input of the board
2. Connect your computer to the board using a USB Mini-B cable.
3. Login with your credentials or click “Login” with empty fields to login as guest
4. Your board will be detected and relevant content will be downloaded to your computer.

Basic View

The basic view is comprised of two main sections…

1. Input
    a. Bottom left is the voltage output and max power capability from the AC supply
    b. Top left is the input voltage and instantaneous power to the USB type-C ports
2. Output
    a. Telemetry from ports 1 through 4
        i. **Profile** – PD Contract voltage
        ii. **Voltage Out** - Measured voltage at type-C connector
        iii. **PD Contract** – Negotiated power contract
        iv. **Temperature –** Measured temperature next to high side MOSFET
        v. **Power In** – Measured port input voltage multiplied by measured port input current
        vi. **Power Out** – Measured output voltage multiplied by measured output current
        vii. **Efficiency** – Power out / Power in * 100
    b. Graphs are available by clicking the button beneath the **Port #** title

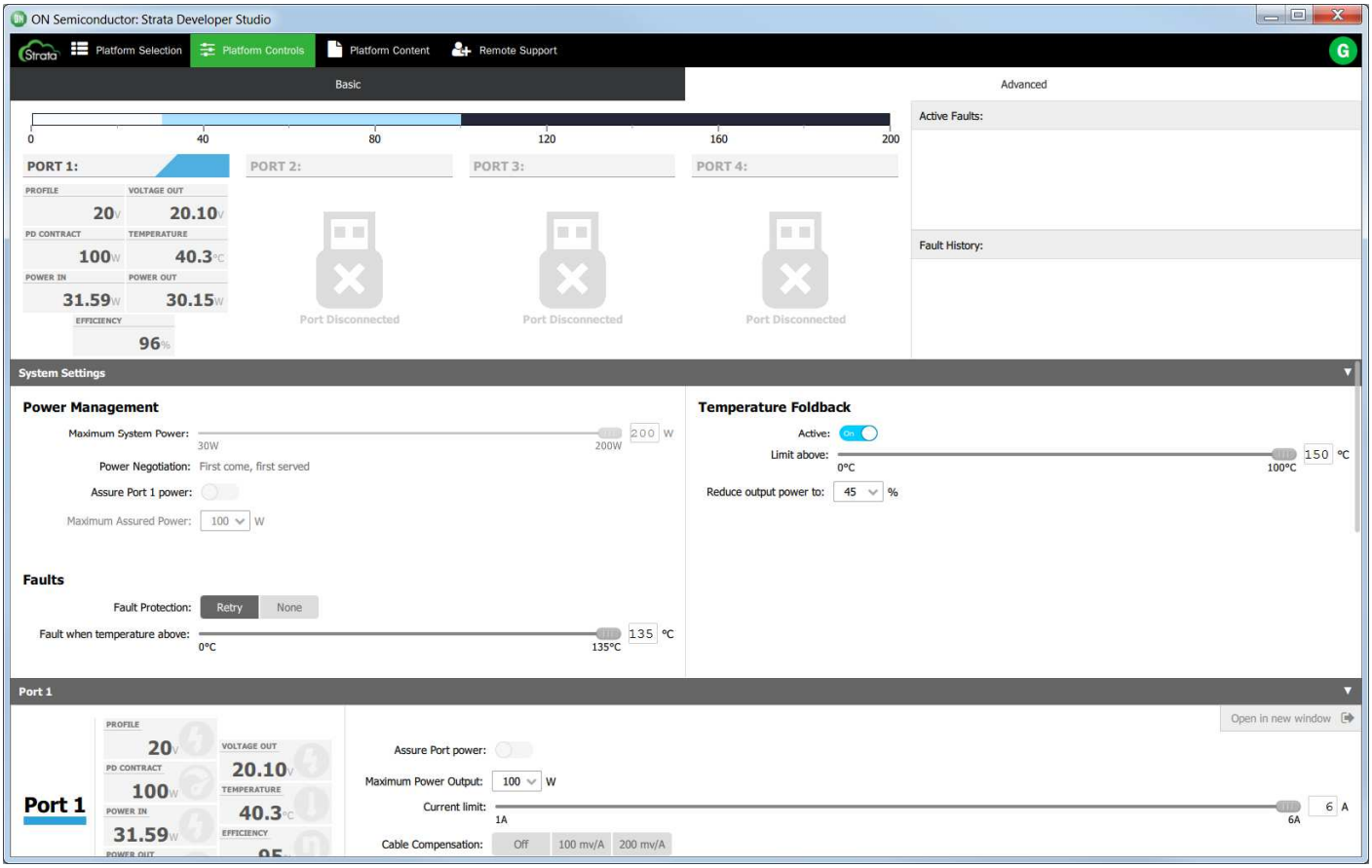


Advanced View

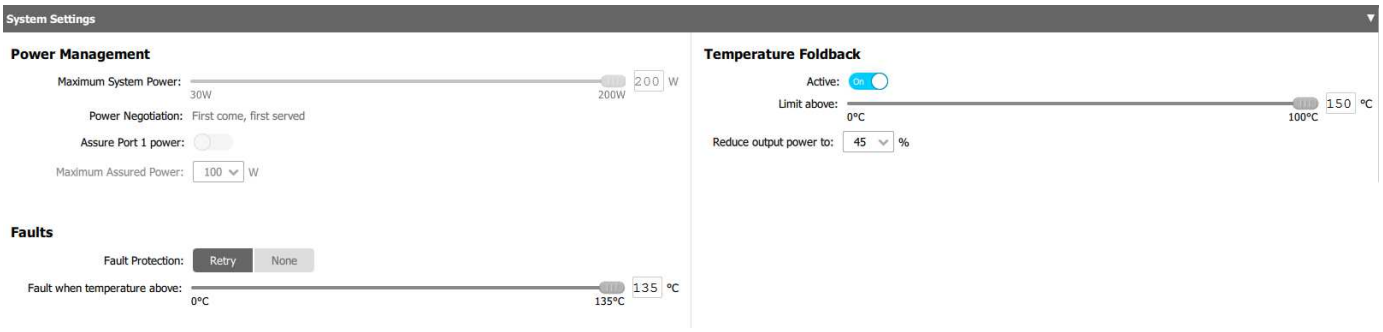
The advanced view is broken up into 3 main sections:

1. Telemetry
    a. Port Telemetry – Described in “Basic View”
        i. Additional power bar at top showing PD Contract of each port and instantaneous power consumed
            1. E.g. 100W PD Contract with approximately 30W consumed as seen below
    b. Fault Display – prints out fault information
2. System Settings – Controls regarding system behavior
    a. Power Management
    b. Fault
3. Port Settings – Controls relevant to an individual port

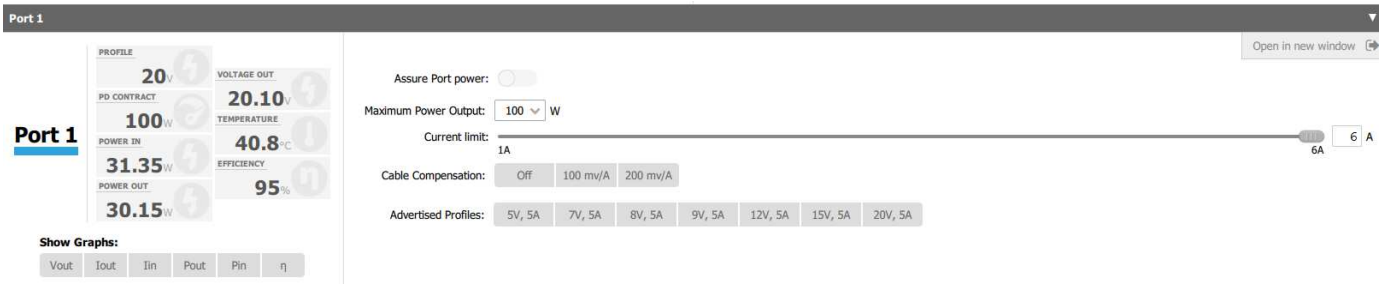
Default View



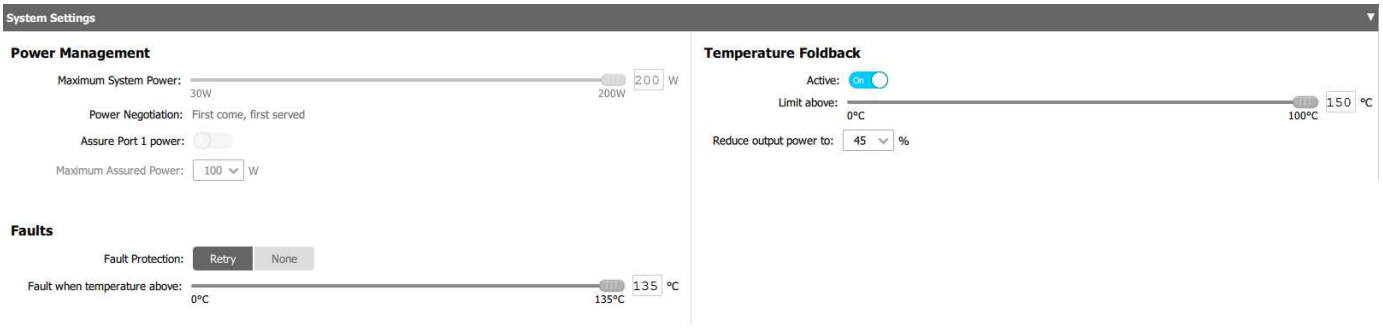
System Settings



Port Settings



System Settings



Power Management

Max System Power

This slider allows for artificially limiting the total power of the device anywhere from 30W to 200W.

First Come First Served Algorithm

The First Come First Served power management algorithm is an intelligent power management scheme ensuring that the total PD contracts requested from the type-C ports do not exceed the total power that the AC supply is able to source. Using this algorithm, 7.5W is reserved for each remaining open type-C port with the rest available for power contracts up to 100W.

Sleep State

This front end 200W AC/DC supply has a sleep state feature that must be tested outside the strata software.

1. Disconnect the AC board physically from the downstream DC/DC board
2. Populate the 100 mil header next to SW1 with an option plug
3. Make sure the switch is set to “Normal”
4. Apply AC power to the input of the board through a power monitor
5. Monitor the output voltage using the 24V pad or a test point (do not pull load)
6. Move the switch to “Sleep” and you will see the output waveform as indicated in the test report
    a. Vout will rise to 24V then slowly drop to 5V, then repeat
7. Integrating power use over a minute or two will show the ultra-low power consumption.

Assured Power

Multi-port type-C sources can have both assured and shared ports where assured ports will always have an allocated amount of power and shared ports will share a total maximum power between all of them. This system provides the option to include port 1 as a shared port (default operation) or assure port 1 to retain a certain amount of the total power reserve at all times.

These controls are both in the power management portion of system settings as well as the port 1 settings.

Please see “Individual Port Controls” for more info.

Faults

Fault Protection
Retry will cause the board to start back up once the fault is removed.
None will disable the fault and no action will occur when the temperature threshold is met.

This button affects **Thermal Fault** and individual port **Current Limit**.

Thermal Fault Protection
Choose the temperature at which the over-temperature fault is initiated. The **Retry** or **None** buttons will determine how the board will respond to an over-temperature condition.

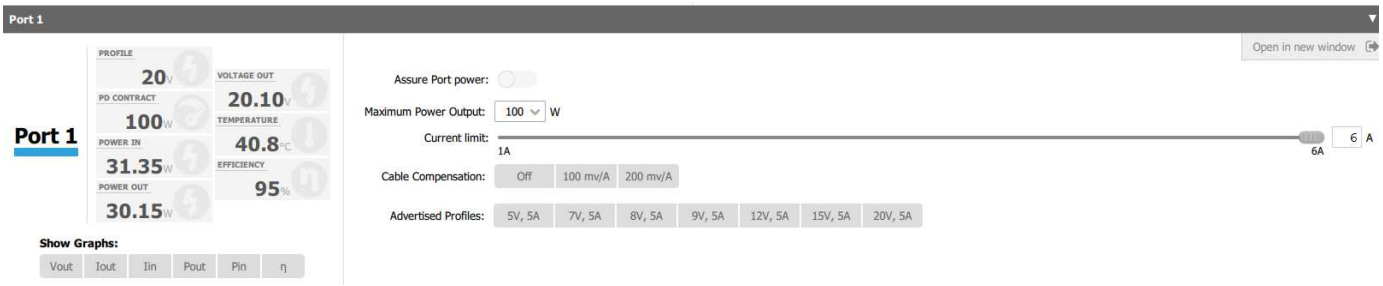
Note: The UI fault protection is a software control that is based on the readings from each port's temperature sensors. Individual parts may have their own over temperature protection. Hysteresis exists on this setting of 2°C.

Thermal Foldback Protection
Thermal Foldback Protection is used to force a port to renegotiate the PD contract the % power of that port's total available power when the temperature threshold is met. Hysteresis exists on this setting of 2°C.

Temperature foldback reduces power by observing the max current for a port (3A or 5A) and selecting voltages starting from the lowest available (5V) and working up through the available voltages until a the chosen % power of that port's contract is exceeded. Once that happens, the last value that did not exceed the % power is chosen. Since the lowest value is 5V @ 3A (15W) or 5V @ 5A (25W), it is possible the new contract will exceed the % power.

Input Voltage Fault
No controls are available to the user for this fault. If AC power is removed from the board (or 24V is no longer present on the main DC rail) the board will shut down until at least 22V is seen at the input of the DC board. Hysteresis exists on this setting of 0.5V that is unobservable to the user.

Individual Port Controls



Assured Port Power (Port 1 only)

This control allows you to switch port one between “Assured” and “Shared” power operation. Note that when the Assure Port 1 Power toggle is enabled and a device is plugged in, you will not be able to change the “Max Port Power” drop down.

Max Port Power

The port power of each port can be artificially limited by selecting an option in the drop down box. Once this is set, no contract will be offered on that port that exceeds the chosen max port power limit.

Current limit

The port current limit can be set in Strata to trigger from 0A to 6A. When triggered, the buck controller will be disabled and will hiccup in an attempt to restart until the current limit is increased or the requested current by the sink device decreases to an acceptable value. In addition to the software current limit, there is a fast hardware 6A current limit that exists due to the FPF2895 load switch.

Cable compensation

The cable compensation feature is intended to reduce voltage droop at the sink device when sourcing higher currents. Cable compensation is set on default to increase the output voltage by 100mV per increment of 1A.

Warning: It is possible to exceed the voltage of downstream devices by reducing the current slider and increasing the voltage slider. Care must be taken by the user to ensure the voltage does not violate the specifications of the downstream device.

Advertised Profiles

At the bottom of each port’s controls there are a number of boxes showing voltage and current. These default to 7.5W until a device is plugged in. Once a device is plugged in, a list of profiles that were offered to the sink device will be displayed. The maximum of these profiles will be the power contract the sink device accepted from our source. Non-PD devices will accept 7.5W contracts after waiting for the PD negotiations to time out.

Visual Controls

Show Graphs

Click on relevant button (e.g. **Vout, Pin,** etc) and graph will appear below port settings.

Open in new window

Control in top right to pop out control for customizable view.

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