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Automotive Dual 100W USB-PD User Guide



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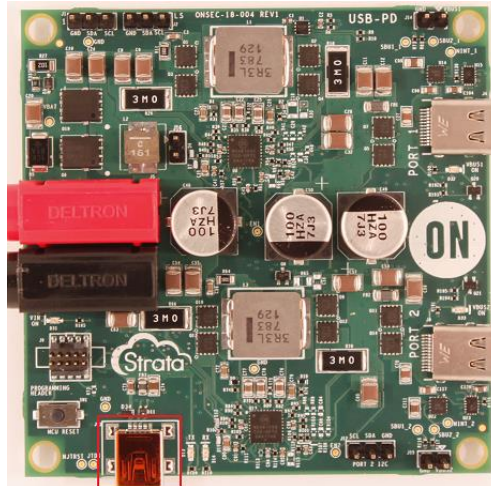
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Startup Procedure

Note: Must have 'Strata.exe' installed, as well as an active internet connection to download USB Serial Port drivers if necessary.

Step 1: Apply 5V to 32V to the input Banana Connectors.

- Recommend > 200W input capability for max output testing



Step 2: Open the 'Strata' application and press 'Continue'

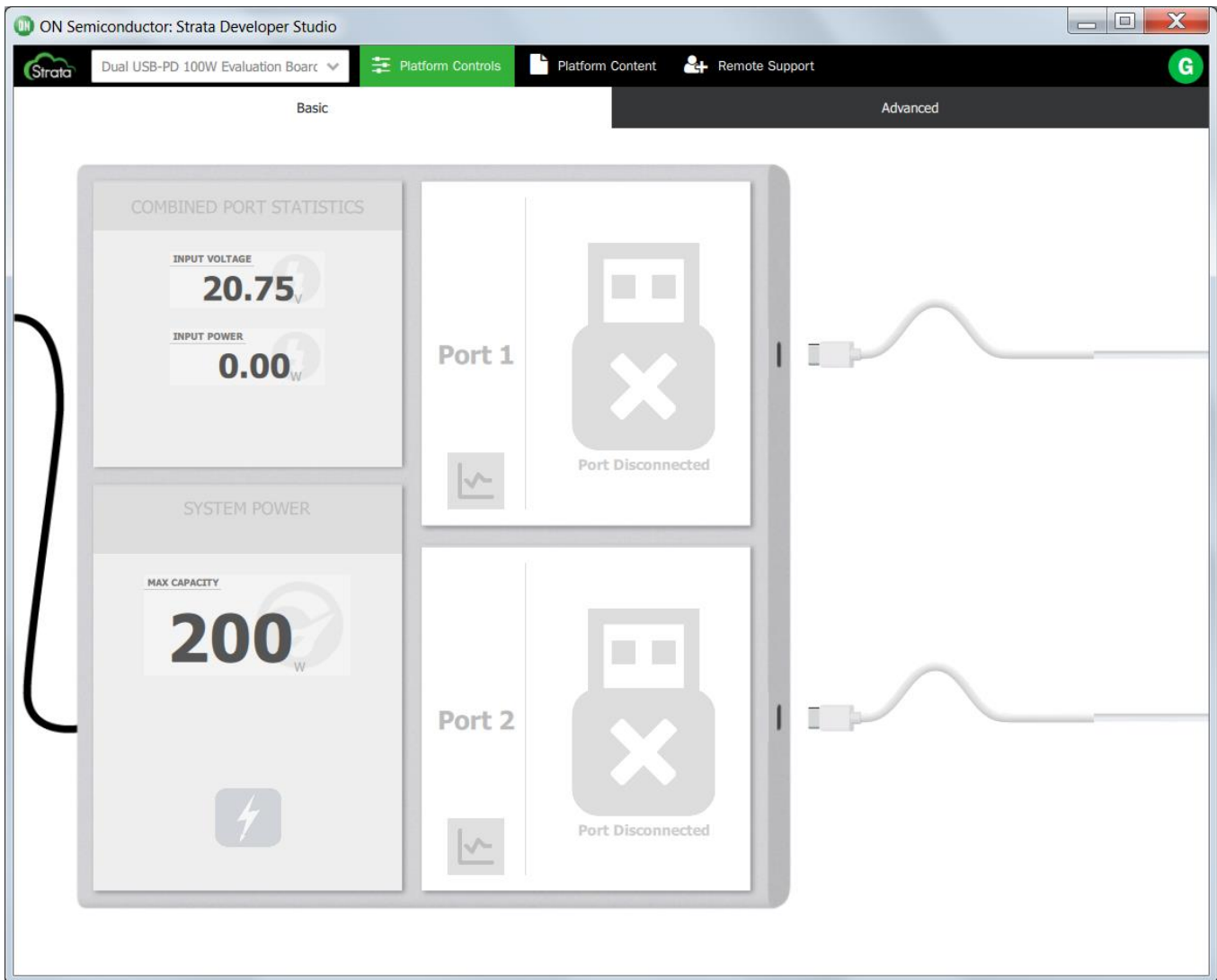


Step 3: Login to Strata as a Guest.



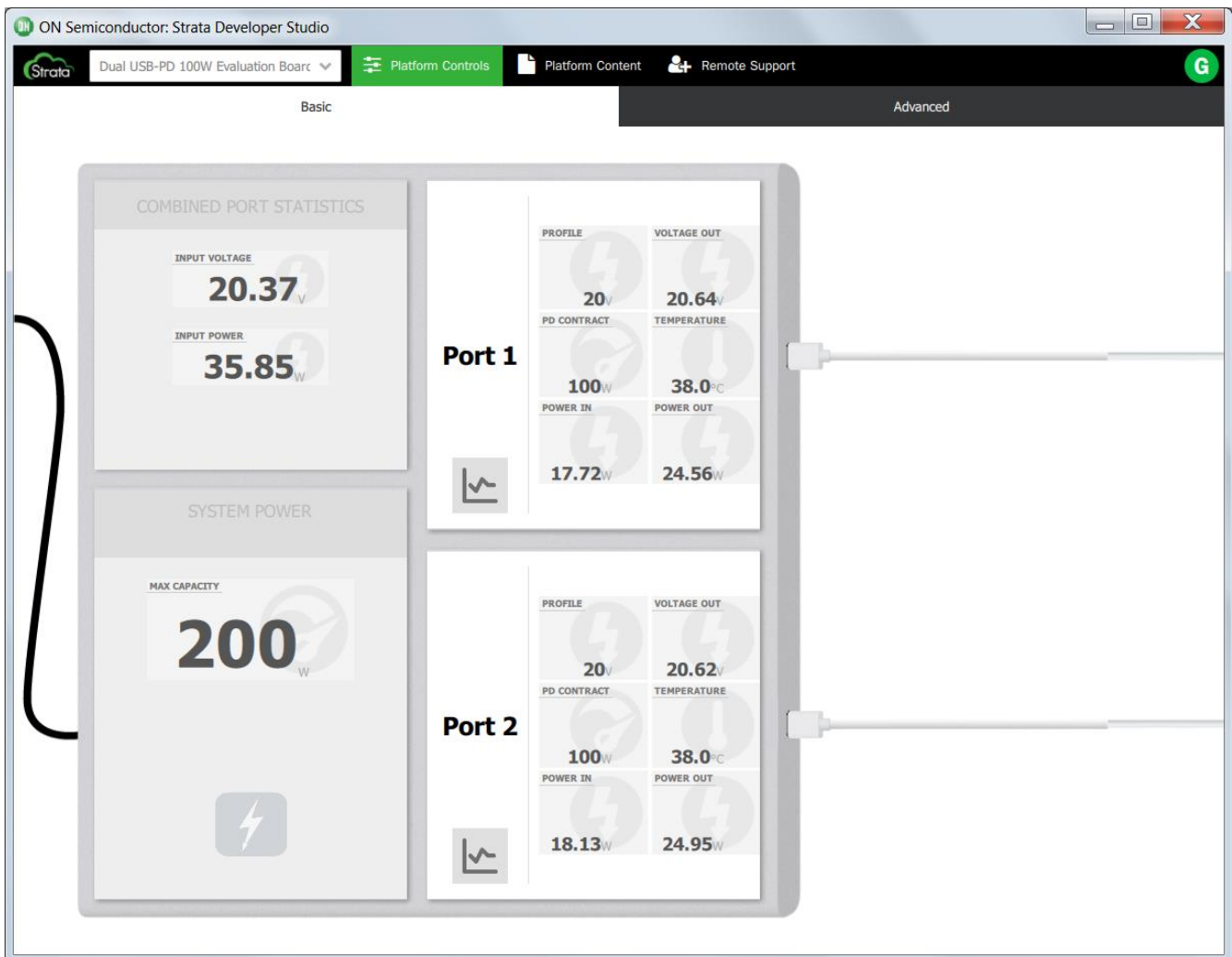
Step 4: Plug USB Mini-B into the EVK and PC.

- This should bring up the 'Basic' view within Strata



Step 5: Connect a USB-C device

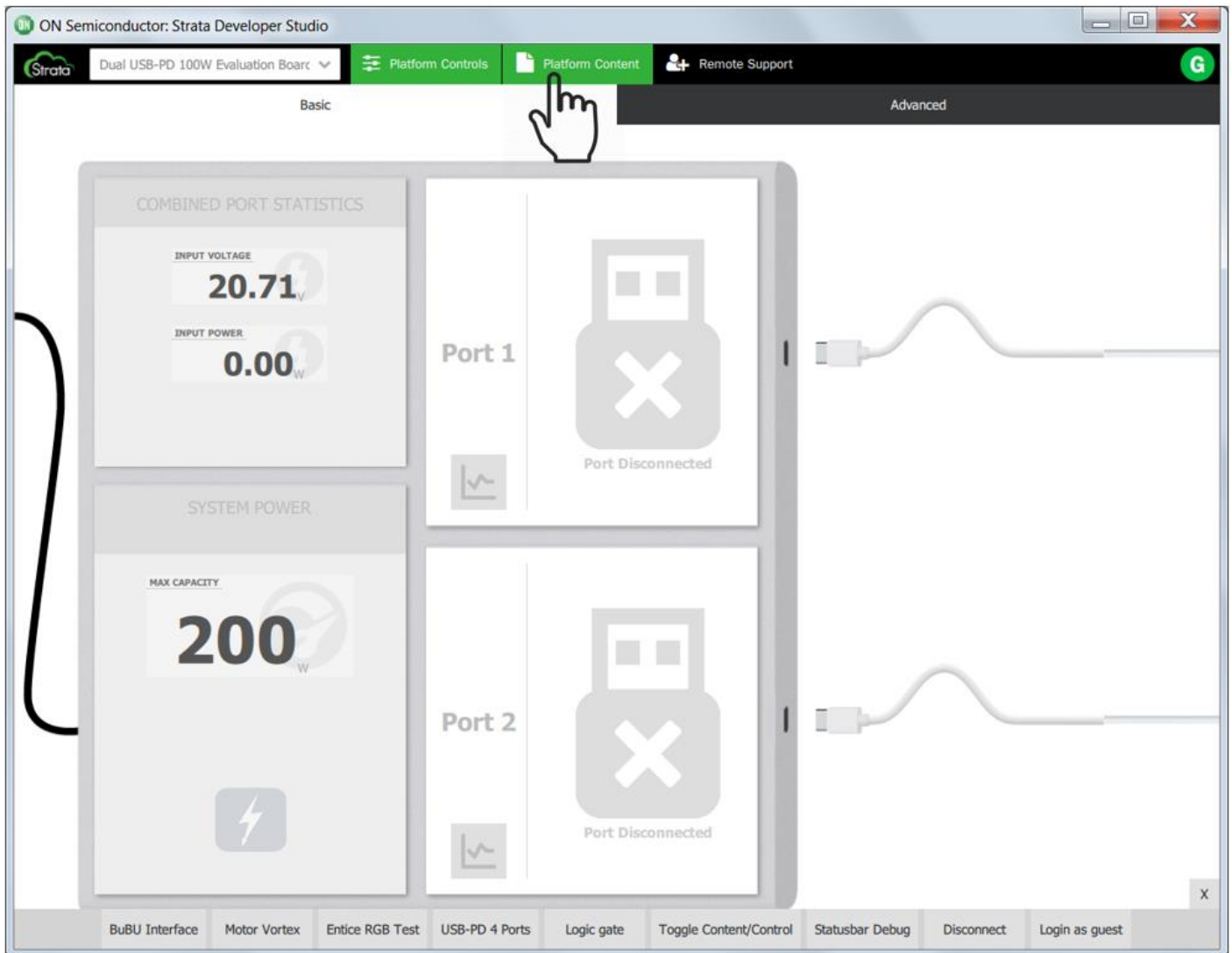
- There should be a connection within Strata on the corresponding port
- Strata will show the PD contract, voltage profile and actual output value, temperature, and input and output powers for each port.



Collateral Viewing

Click the “Platform Content” Button at the top of Strata to view system content.

Note: An internet connection is required to download platform content



Advanced Control

Provides advanced systems controls, telemetry and operation modes for in-depth evaluation of the system capabilities.

Click the ‘Advanced’ button to bring up the Advanced Control Interface. See explanation of ‘Protection’ features, below.

The screenshot displays the ON Semiconductor Strata Developer Studio interface for a Dual USB-PD 100W Evaluation Board. The interface is split into 'Basic' and 'Advanced' tabs, with the 'Advanced' tab selected. The main content is organized into three horizontal sections: System Settings, Port 1, and Port 2.

System Settings:

- Faults:** Fault Protection is set to 'Shutdown'. Fault when input below is 0V. Fault when temperature above is 135°C.
- Input Foldback:** Enabled. Limit below is 5V. Limit output power is 45W.
- Temperature Foldback:** Enabled. Limit above is 150°C. Limit output power is 45W.
- Active Faults:** Empty list.
- Fault History:** Empty list.

Port 1:

- Telemetry:** Profile: 20V, Voltage Out: 20.62V, PD Contract: 100W, Temperature: 30.0°C, Power In: 23.83W, Power Out: 23.30W.
- Advertised Voltages:** 5V/5A, 7V/5A, 8V/5A, 9V/5A, 12V/5A, 15V/5A, 20V/5A.
- Show Graphs:** Vout, Iout, Iin, Pout, Pin.
- Max Power Output:** 100W.
- Current Limit:** 6A.
- Cable Compensation:** For every increment of: 0.3. Bias output by: 50mV.

Port 2:

- Telemetry:** Profile: 20V, Voltage Out: 20.62V, PD Contract: 100W, Temperature: 30.0°C, Power In: 16.95W, Power Out: 23.51W.
- Advertised Voltages:** 5V/3A, 7V/3A, 8V/3A, 9V/3A, 12V/3A, 15V/3A, 20V/3A.
- Show Graphs:** Vout, Iout, Iin, Pout, Pin.
- Max Power Output:** 100W.
- Current Limit:** 6A.
- Cable Compensation:** For every increment of: 0.3. Bias output by: 50mV (DEBUB).

USB-PD Dual Port 100W Power Management

Available Power Levels

- 100W if a 5A capable cable is attached
- 60W if a standard type-C cable is attached (3A max)
- May be limited by user adjustable thresholds/limits
 - Host/user power limit setting
 - Over temperature
 - Input under voltage
 - Output over current conditions (foldback)

Available Voltages for each Power Level

These voltages and currents are offered to the sink device via the *Source Capabilities* message.

100W = 5V, 7V, 8V, 9V, 12V, 15V or 20V @ 5A

60W = 5V, 7V, 8V, 9V, 12V, 15V or 20V @ 3A

45W = 5V, 7V, 8V, 9V, 12V or 15V @ 3A

36W = 5V, 7V, 8V, 9V or 12V @ 3A

27W = 5V, 7V, 8V or 9V @ 3A

15W = 5V @ 3A

Protection Features

- Temperature foldback
 - If PCB temp > user set limit, the board will limit its output capability to the user set value.
- Temperature fault
 - If PCB temp > user set limit, the board will perform the user set protection action = Shutdown, Retry, or No Action.
- Input voltage foldback
 - If input voltage drops < set limit, the board will limit its output capability to the user set value.
- Input voltage fault
 - If input voltage < user set limit, the board will perform the user set protection action = Shutdown, Retry, or No Action.

Power Variables (Fusb302 class)

- *m_commanded_max_power* – the maximum power set by the host
 - configured via ‘Pmax’ on the Advanced Controls tab
- *m_default_max_power* – the maximum power setting unconstrained by foldback settings
 - Default Limited to 60W if a 3 amp cable is attached, or 100W if a 5 amp cable is attached.
- *m_current_max_power* – the current maximum power setting constrained by cable-type, foldback, or overcurrent settings.
- *m_cable_max_current* – the maximum current in amps allowed by the cable type

Power Rules

$m_commanded_max_power \geq m_default_max_power \geq m_current_max_power$

When ‘*m_current_max_power*’ changes, a USB-PD negotiation is performed between the USB-PD-100W board and the attached sink device.

References

1. Universal Serial Bus Power Delivery Specification, Revision 3.0
2. Universal Serial Bus 3.2 Specification

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