



ML605 Power Bus Monitoring

April 2009

Overview

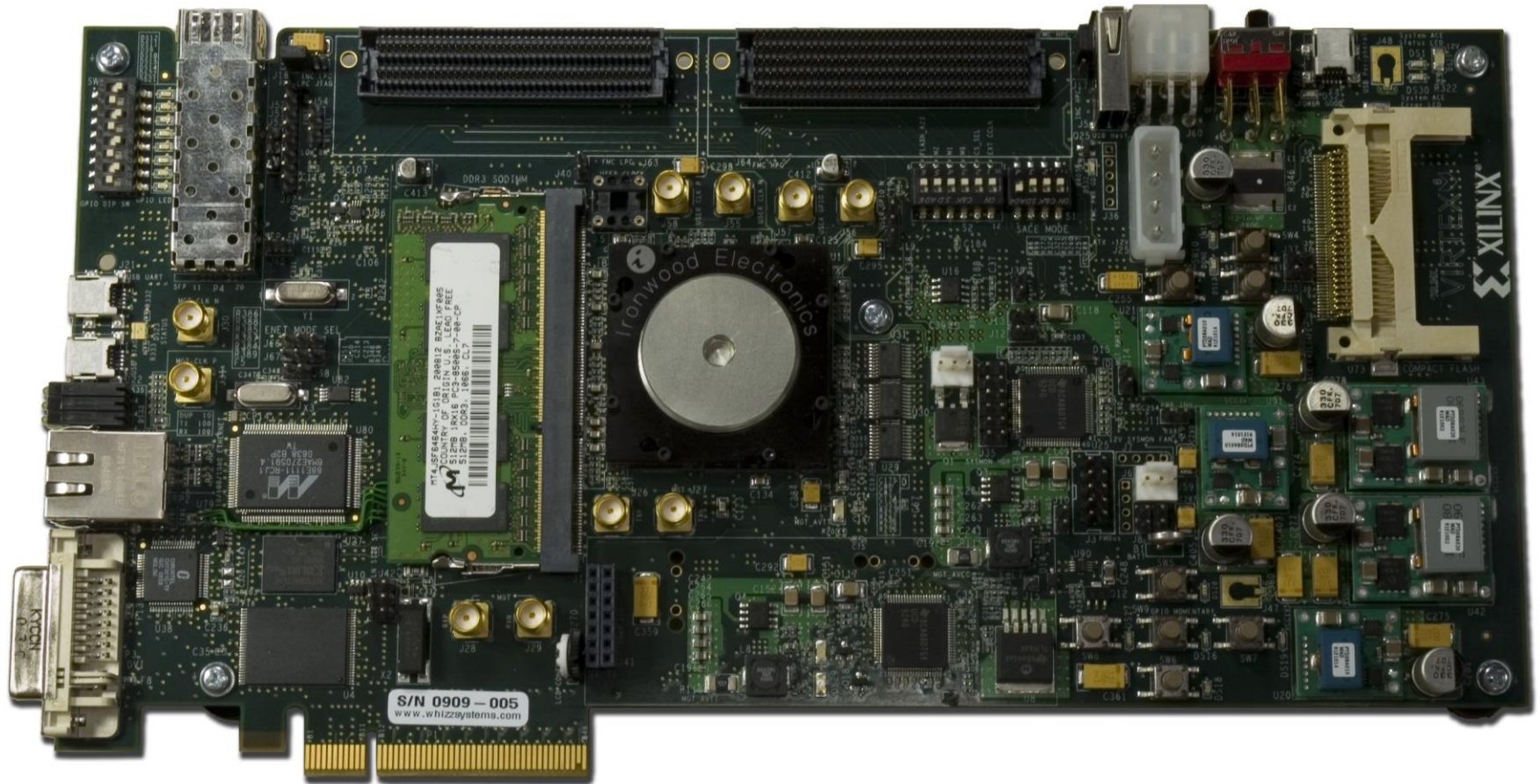
- **Caution!**
- **Xilinx ML605 Board**
- **Hardware & Software Requirements**
- **Setup**
 - ML605
 - Software Requirements
 - Connect TI USB Interface Adapter
- **TI Fusion Digital Power Designer Tutorial**
- **TI Fusion Digital Power Manufacturing Tool Tutorial**

Caution!

- The TI Software used in this presentation can adjust the power supply outputs on the ML605
- If used improperly, it may seriously damage your ML605
- Before making any adjustments not specifically covered in this presentation,
 - **Understand** the power requirements for Virtex-6 Devices
 - **Understand** the consequences of the change you are making
- **NOTE:** This presentation uses an ML605 as an example. These instructions may be followed for an SP605 as well.



Xilinx ML605 Board



Note: Presentation applies to the ML605

Hardware Requirements

- **TI USB Interface Adapter EVM**
 - TI Part number: [USB-TO-GPIO](#)



Software Requirements

▪ TI Digital Power Software

- TI Part Number: [FUSION DIGITAL POWER DESIGNER](#)
- Download: <http://www.ti.com/lit/zip/slvc118>



Software Requirements

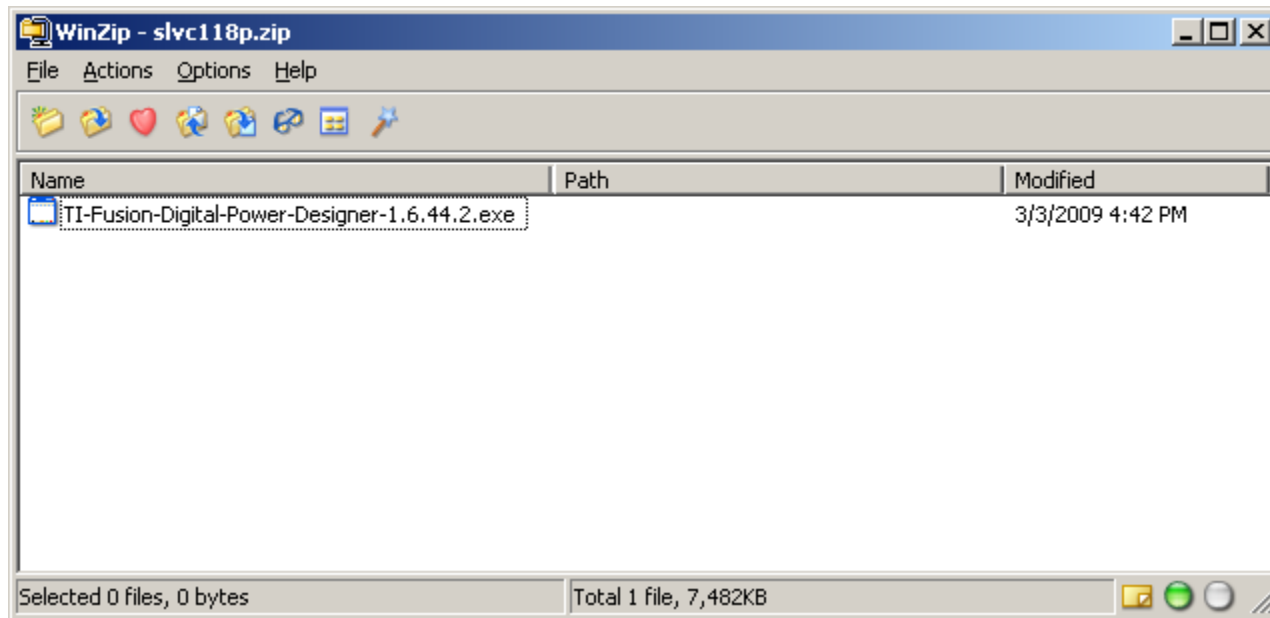
▪ TI Digital Power Software

- TI Part Number: [FUSION_MFR_GUI](#)
- Download: <http://www.ti.com/lit/exe/sldc005>



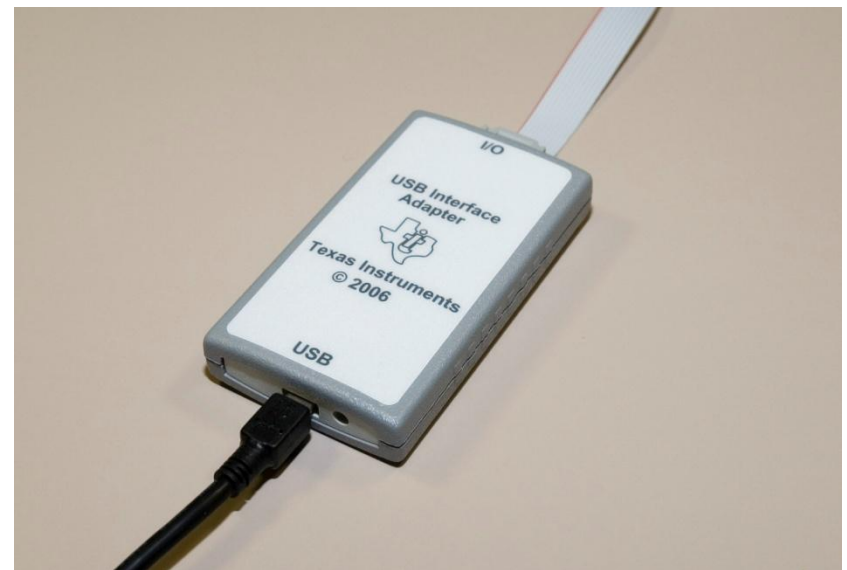
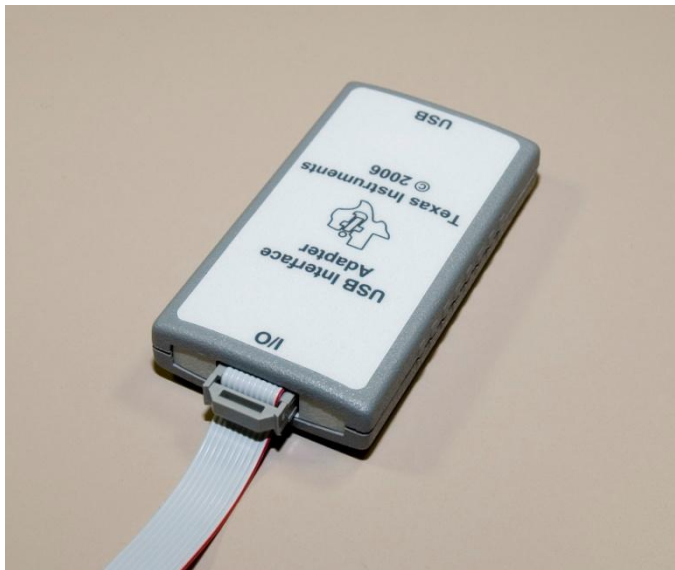
Software Setup

- Install the TI Fusion Digital Power Designer (DPD) Software



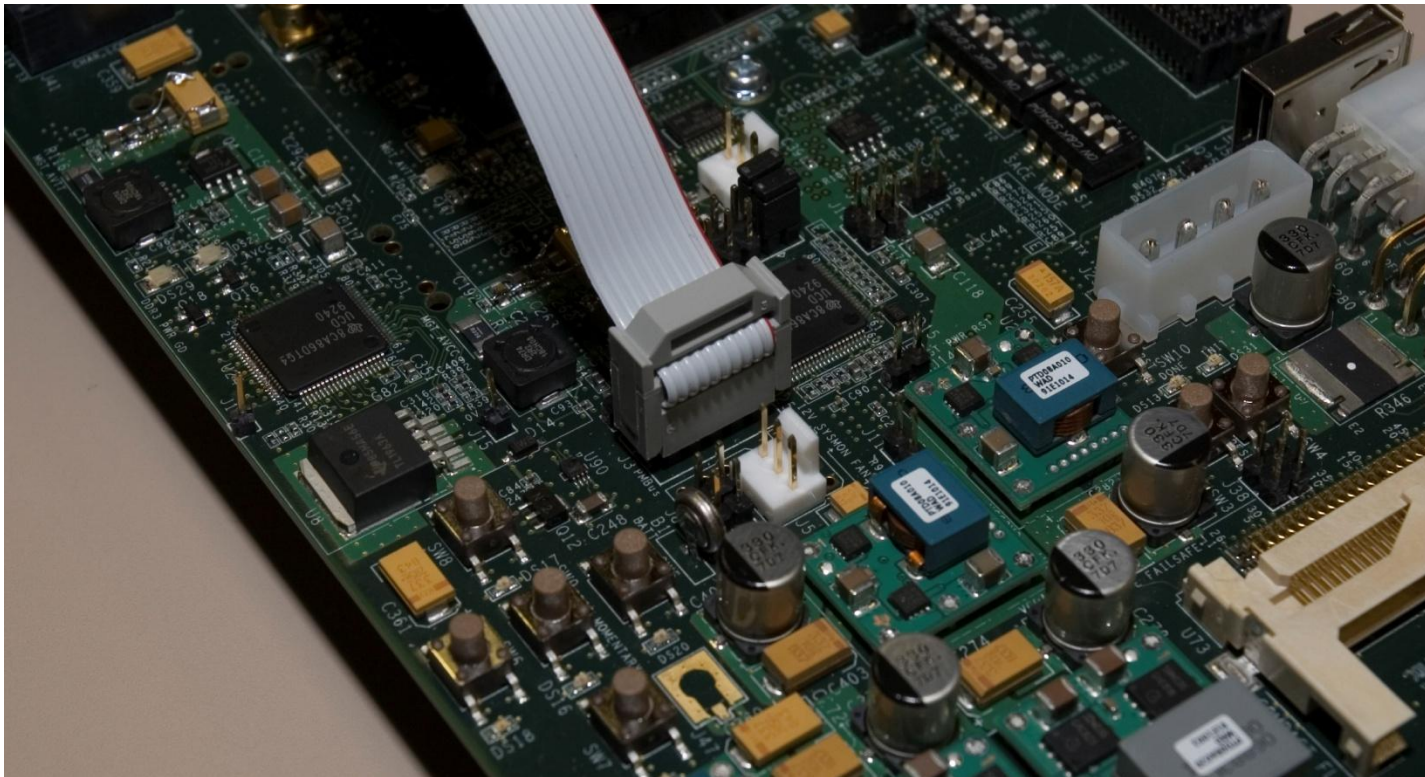
Connect TI USB Interface Adapter

- **On the TI USB Adapter**
 - Connect the Ribbon Cable
 - Connect the USB Cable



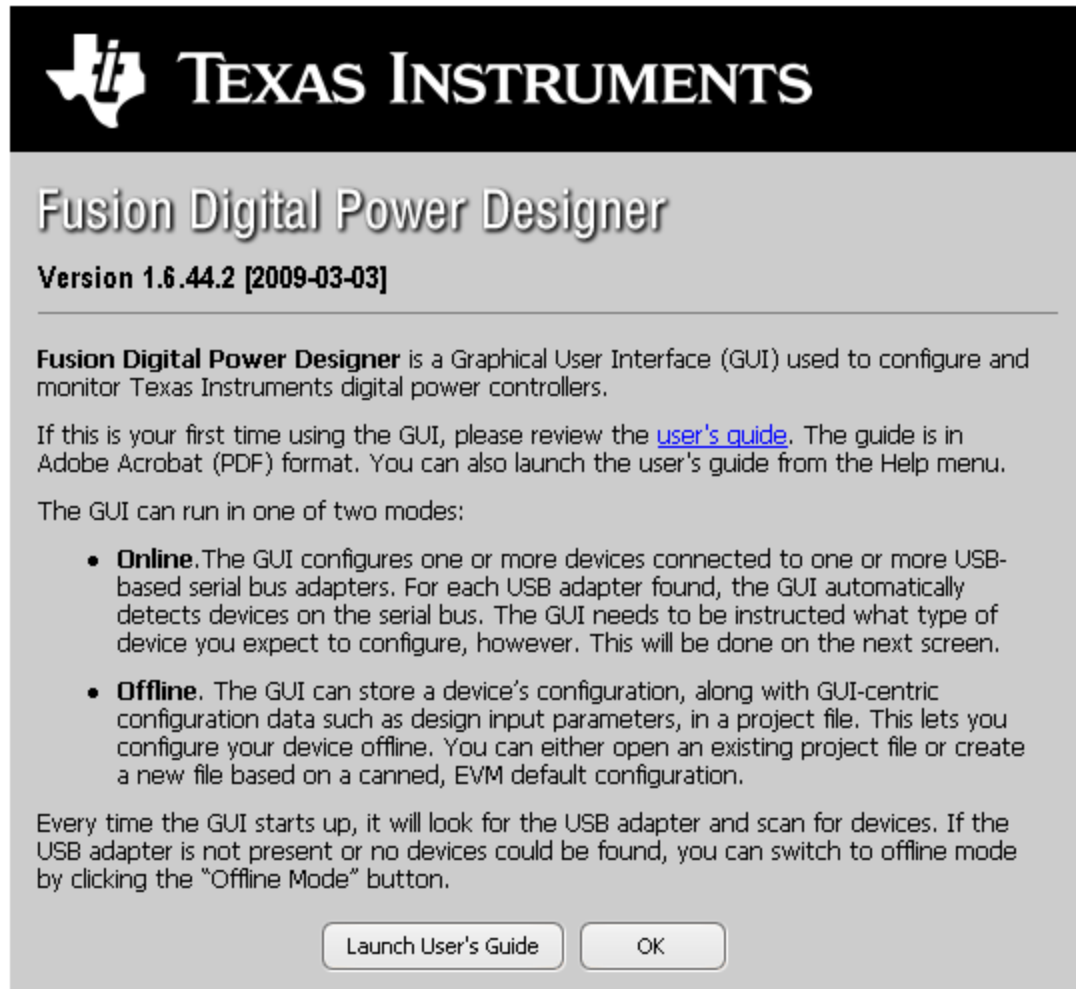
Connect TI USB Interface Adapter

- **Connect the Ribbon Cable to the ML605**
 - Red stripe towards pin 1



TI Fusion Digital Power Designer

▪ Open Digital Power Designer (DPD)



Note: Presentation applies to the ML605

TI Fusion Digital Power Designer

- Click on **UCDXXX and Similar**



TI Fusion Digital Power Designer

- The DPD opens; Click on Monitor

The screenshot displays the TI Fusion Digital Power Designer software interface. The window title is "Fusion Digital Power Designer - UCD9240 @ Address 2 Rail #1 - Texas Instruments". The menu bar includes "File", "Device", "Tools", and "Help". The main window is divided into several sections:

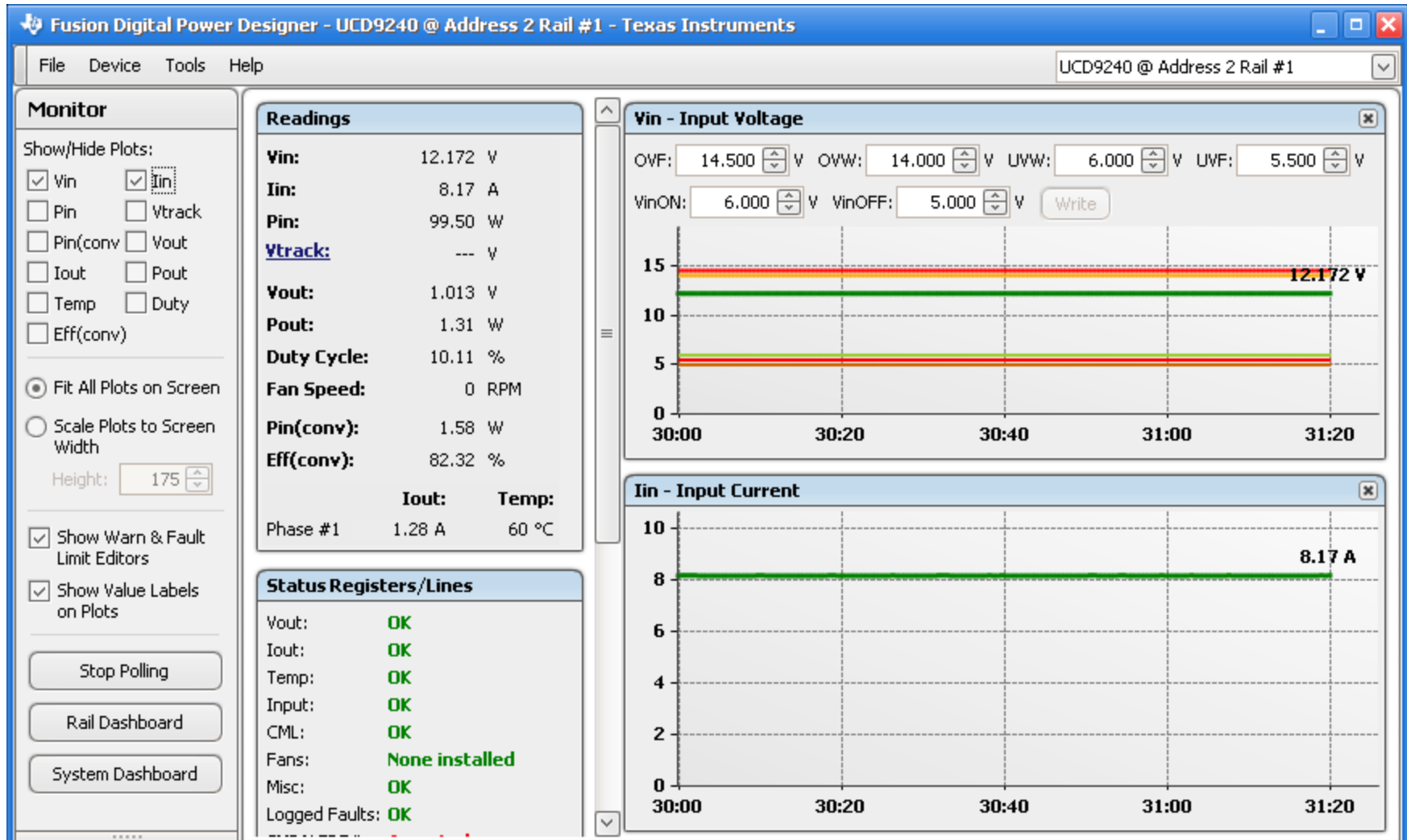
- Configure Panel (Left):** Contains buttons for "Write to Hardware", "Auto write on rail or device change" (checked), "Discard Changes", "Store RAM To Flash", "Restore Flash to RAM", "Clear Restore Notices", and a "Plot:" section.
- Navigation Panel (Left):** Includes "Configure", "Design", "Monitor" (highlighted with a red border), "Status", and "Security".
- Configuration Tabs (Top):** "Vout Config", "Other Config", "Advanced Config", "Phase/Rail Config", "GPIO Config", and "CLA Banks".
- Soft Start & Stop Timing Graph (Center):** A line graph showing Vout (0.00 to 2.75) vs Time (0 to 36). It features three traces: a yellow trace for "UCD9240 @ 2 Rail #3" with a "Delay 5.0 ms" and "Rise 10.0" annotation, a blue trace for "UCD9240 @ 2 Rail #1", and a green trace for "UCD9240 @ 2 Rail #2".
- Select Rail to Edit Table (Center):**

Device	Rail Name	Vout	...	Rise	
UCD924...	1	UCD9240 ...	1,000	5.0	1
UCD924...	2	UCD9240 ...	2,500	5.0	1
UCD924...	3	UCD9240 ...	2,500	...	1
- Voltage Setpoint, Margins, and Limits Panel (Right):** Configures parameters for "UCD9240 @ 2 Rail #1".
 - Vout Max: 1.600 V
 - Over Fault: 1.150 V, 15.0 %
 - Over Warn: 1.125 V, 12.5 %
 - Margin High: 1.100 V, 10.0 %
 - Vout: 1.000 V
 - Margin Low: 0.900 V, -10.0 %
 - Under Warn: 0.875 V, -12.5 %
 - Under Fault: 0.850 V, -15.0 %
 - Over Current LV: 0.900 V, -10.0 %
 - Power Good On: 0.900 V, -10.0 %
 - Power Good Off: 0.875 V, -12.5 %
- Transaction Log (Bottom Right):** Shows "VOUT_MARGIN_LOW [0x26,Rail #1]".

The footer contains version information: "Fusion Digital Power Designer v1.6.44.2 [2009-03-03]", "UCD9240 Firmware v3.24.0.8163 [2008-09-15]", "USB Adapter v1.0.10 [P]", and the Texas Instruments logo with "fusion digital power".

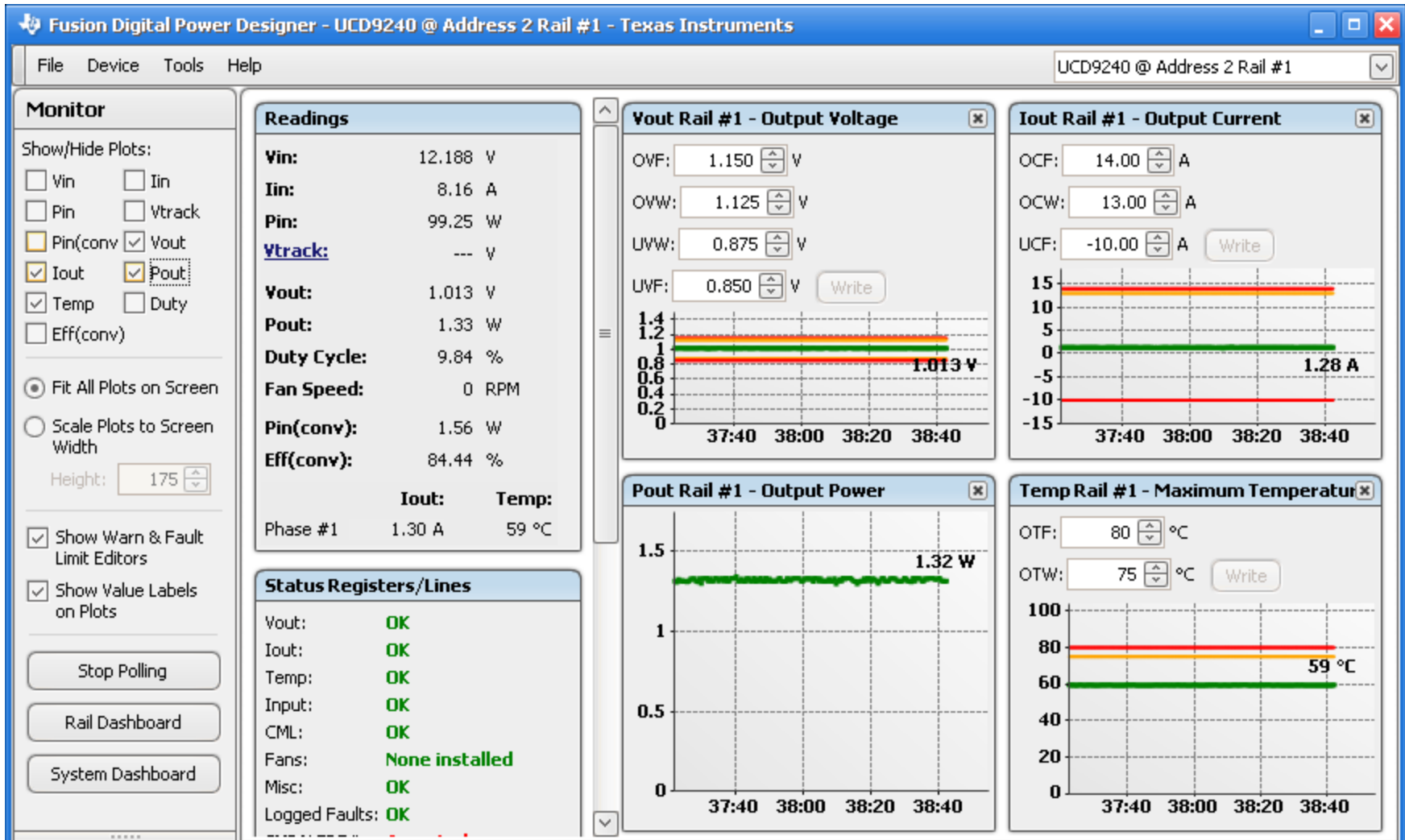
TI Fusion Digital Power Designer

- Select Vin and Iin – Input voltage and current from the Power Brick
 - 12 V Input, and 8 Amps current draw



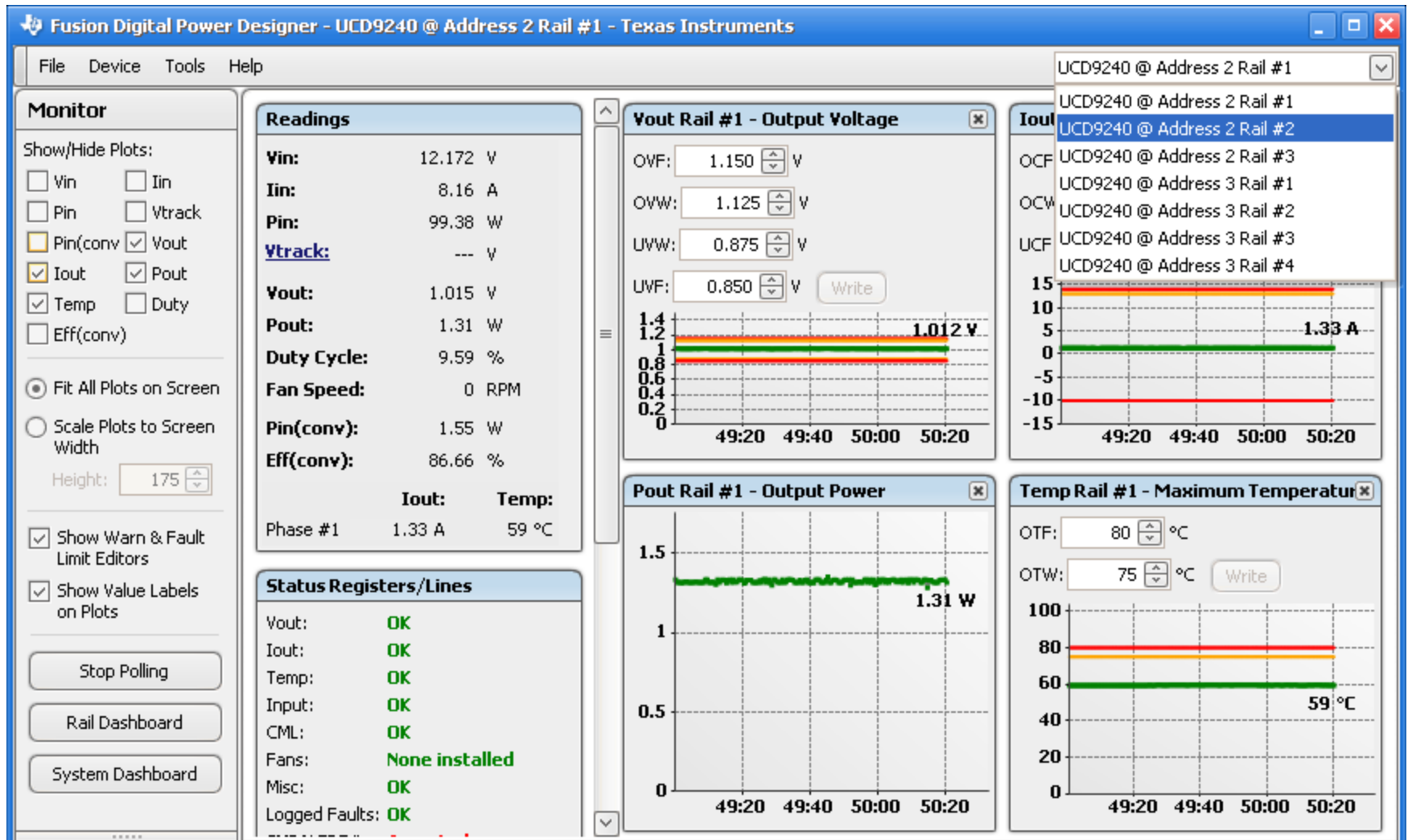
TI Fusion Digital Power Designer

- Select Vout Iout, Pout, and Temp – Measurements for VCCINT_FPGA (1.0 V)
 - TI [PTD08A020W](#) – 20A, 4.75V to 14V, Non-Isolated, Digital PowerTrain Module (U42)



TI Fusion Digital Power Designer

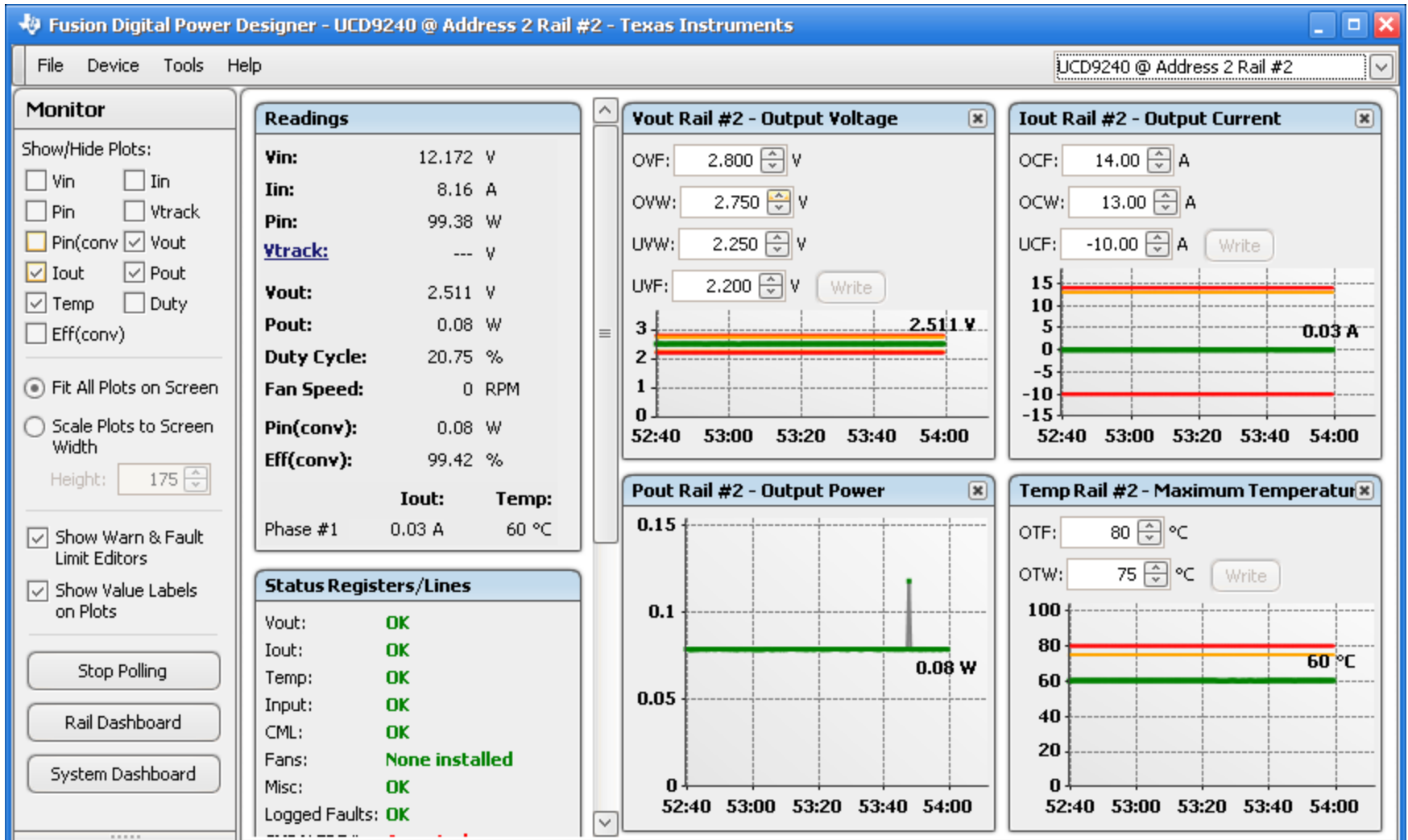
- Select Address 2, Rail #2



TI Fusion Digital Power Designer

View VCC2V5_FPGA (2.5 V)

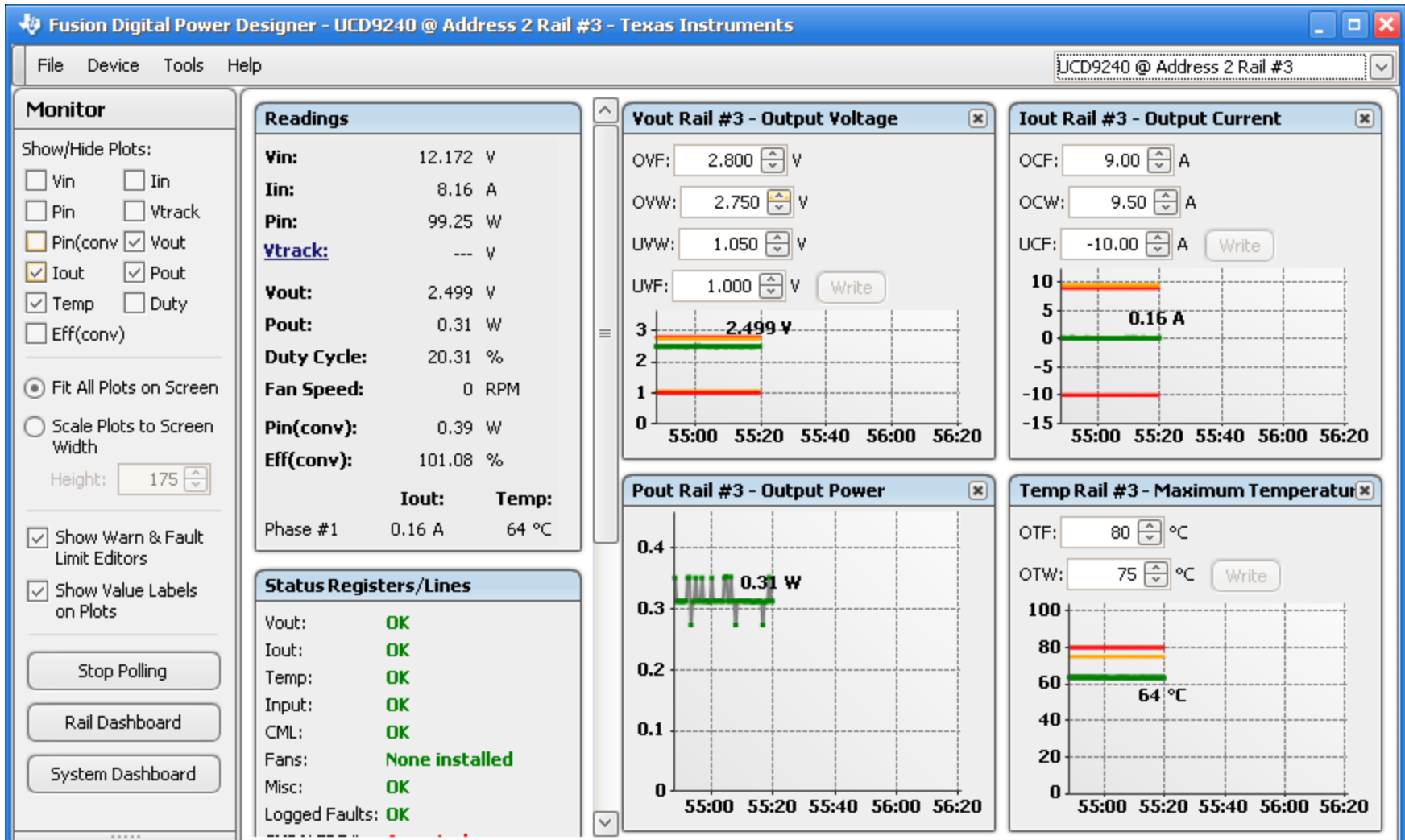
- TI [PTD08A020W](#) – 20A, 4.75V to 14V, Non-Isolated, Digital PowerTrain Module (U43)



TI Fusion Digital Power Designer

- At Address 2, Rail #3, view VCCAUX (2.5 V)

- TI [PTD08A010W](#) – 10A, 4.75V to 14V, Non-Isolated, Digital PowerTrain Module (U91)



TI Fusion Digital Power Designer

- Select Address 3, Rail #1
 - Click Monitor

The screenshot shows the TI Fusion Digital Power Designer interface for UCD9240 @ Address 3 Rail #1. The 'Monitor' tab is selected in the left sidebar. The main window displays a 'Soft Start & Stop Timing' graph and a 'Voltage Setpoint, Margins, and Limits' configuration panel.

Soft Start & Stop Timing

The graph shows Vout (V) vs Time (ms). Key parameters are highlighted:

- Delay: 5.0 ms
- Rise: 10.0 ms
- UCD9240 @ 3 Rail #4 (cyan line)
- UCD9240 @ 3 Rail #3 (purple line)
- UCD9240 @ 3 Rail #2 (brown line)

Select Rail to Edit

Device	Rail	Rail Name	Vout	Rise
UCD924...	1	UCD9240 ...	1.000	5.0
UCD924...	2	UCD9240 ...	1.250	5.0
UCD924...	3	UCD9240 ...	1.500	...
UCD924...	4	UCD9240 ...	3.300	5.0

UCD9240 @ 3 Rail #1

Voltage Setpoint, Margins, and Limits

Vout Max: 1.600 V (Edit Voltage Feedback Design)

Over Fault: 1.100 V 10.0 % OV Response

Over Warn: 1.075 V 7.5 %

Margin High: 1.050 V 5.0 %

Vout: 1.000 V

Margin Low: 0.950 V -5.0 % Synchronize margins/limits/PG to Vout

Under Warn: 0.925 V -7.5 %

Under Fault: 0.900 V -10.0 % UV Response

Over Current LV: 0.925 V -7.5 % OC LV Response

Power Good On: 0.925 V -7.5 %

Power Good Off: 0.900 V -10.0 %

VOUT_MARGIN_HIGH [0x25,Rail #1] Transaction Log

Fusion Digital Power Designer v1.6.44.2 [2009-03-03] UCD9240 Firmware v3.24.0.8163 [2008-09-15] USB Adapter v1.0.10 [P] TEXAS INSTRUMENTS | fusion digital power

TI Fusion Digital Power Designer

- At Address 3, Rail #1, view MGT_AVCC (1.0 V)
 - Discrete Components

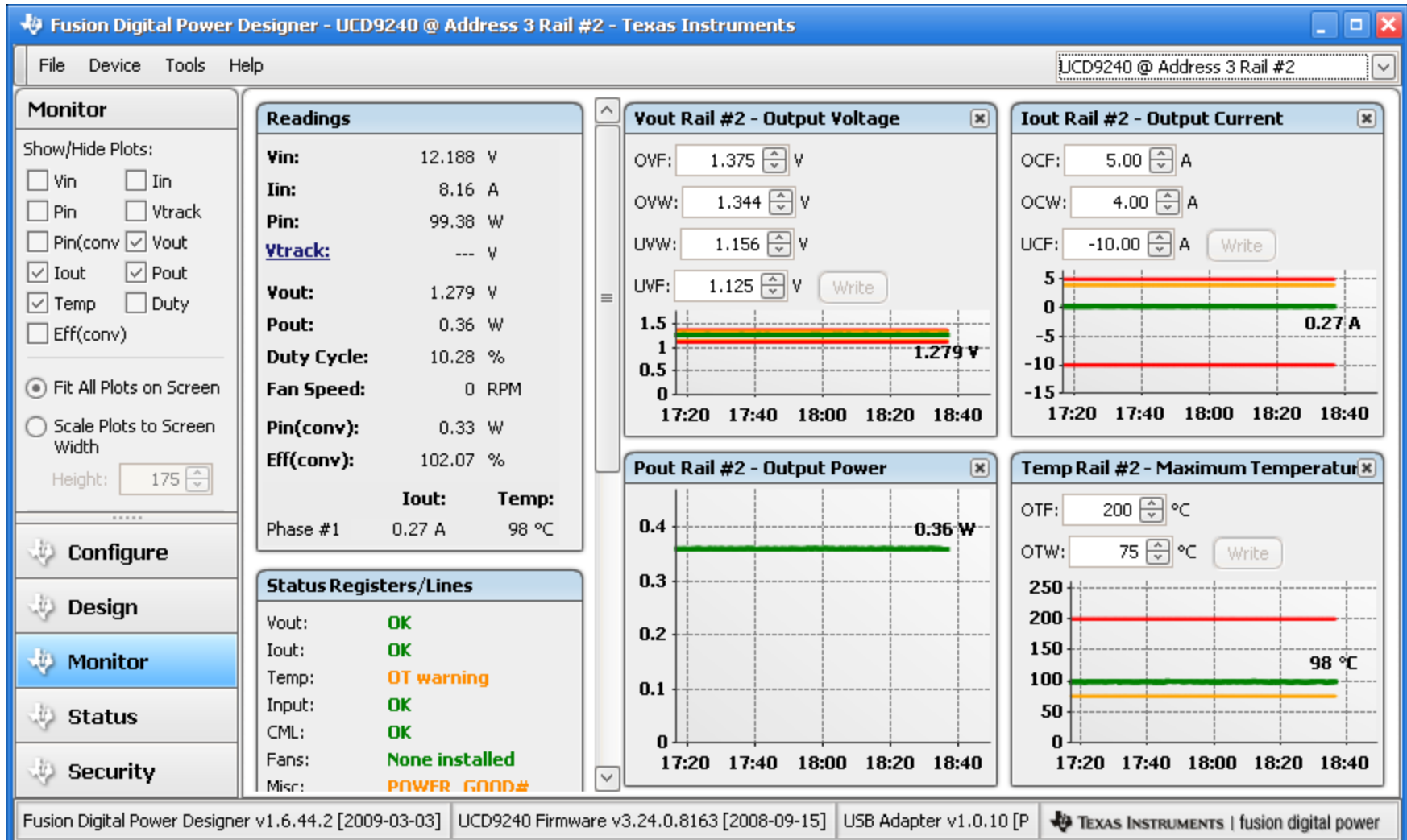
The screenshot displays the TI Fusion Digital Power Designer software interface for the UCD9240 @ Address 3 Rail #1. The interface is divided into several sections:

- Monitor Panel (Left):** Contains checkboxes for showing/hiding plots (Vin, Iin, Pin, Vtrack, Pin(conv), Vout, Iout, Pout, Temp, Duty, Eff(conv)) and options for fitting all plots on screen or scaling to screen width. The height is set to 175.
- Readings Panel (Top Middle):** Displays real-time measurements:
 - Vin: 12.203 V
 - Iin: 8.17 A
 - Pin: 99.75 W
 - Vtrack: --- V
 - Vout: 1.020 V
 - Pout: 0.54 W
 - Duty Cycle: 8.34 %
 - Fan Speed: 0 RPM
 - Pin(conv): 0.53 W
 - Eff(conv): 100.18 %
- Status Registers/Lines Panel (Bottom Middle):** Shows the status of various components:
 - Vout: OK
 - Iout: OK
 - Temp: OT warning
 - Input: OK
 - CML: OK
 - Fans: None installed
 - Misc: POWER GOOD#
- Vout Rail #1 - Output Voltage Panel (Top Right):** Shows a plot of output voltage over time (09:20 to 10:40). The voltage is stable at 1.020 V. Control limits are set: OVF: 1.100 V, OVW: 1.075 V, UVW: 0.925 V, UVF: 0.900 V.
- Iout Rail #1 - Output Current Panel (Middle Right):** Shows a plot of output current over time. The current is stable at 0.52 A. Control limits are set: OCF: 5.00 A, OCW: 4.00 A, UCF: -10.00 A.
- Pout Rail #1 - Output Power Panel (Bottom Middle):** Shows a plot of output power over time. The power is stable at 0.54 W.
- Temp Rail #1 - Maximum Temperature Panel (Bottom Right):** Shows a plot of maximum temperature over time. The temperature is stable at 99 °C. Control limits are set: OTF: 200 °C, OTW: 75 °C.

The bottom status bar shows: Fusion Digital Power Designer v1.6.44.2 [2009-03-03] | UCD9240 Firmware v3.24.0.8163 [2008-09-15] | USB Adapter v1.0.10 [P] | TEXAS INSTRUMENTS | fusion digital power

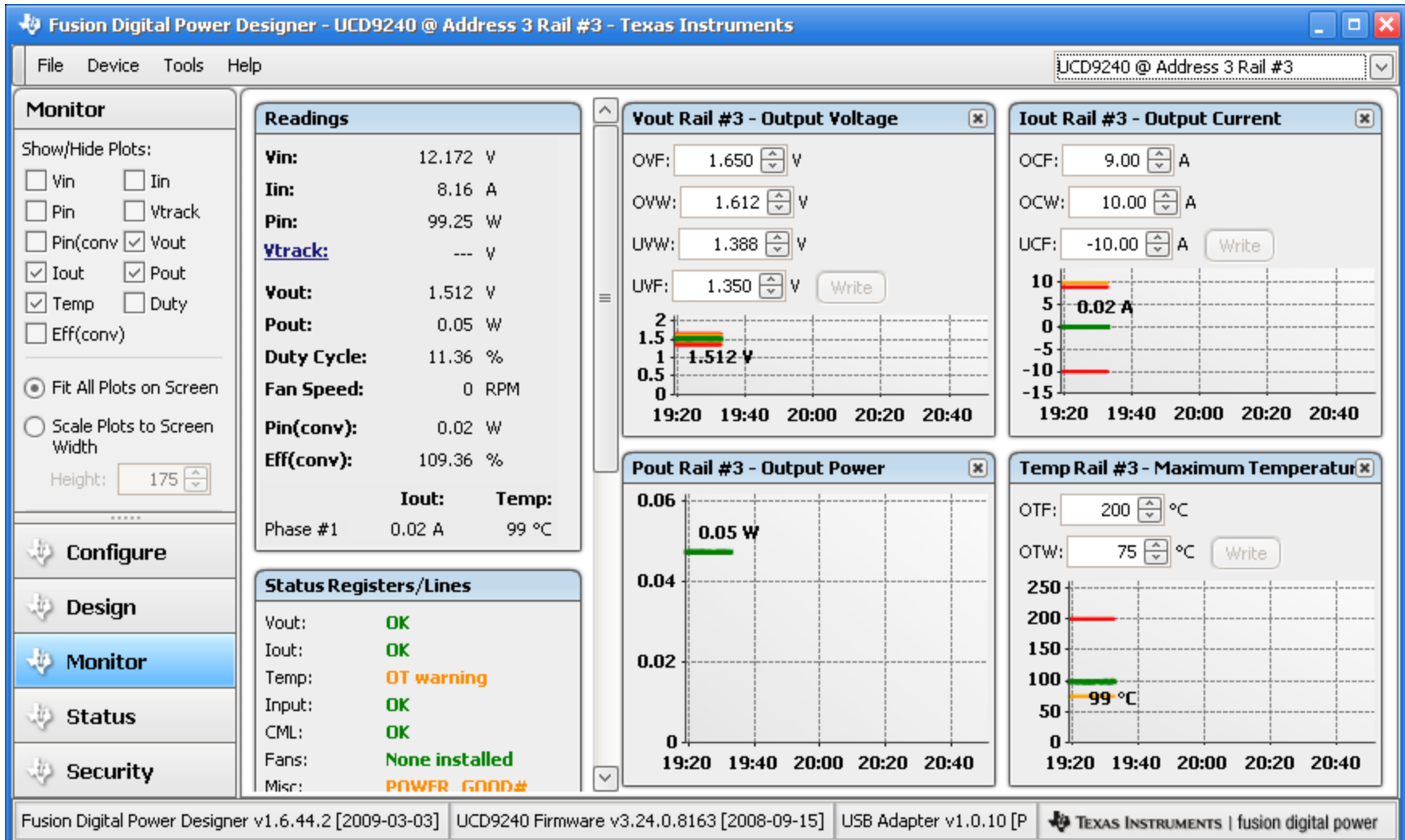
TI Fusion Digital Power Designer

- At Address 3, Rail #2, view MGT_AVTT (1.2 V)
 - Discrete Components



TI Fusion Digital Power Designer

- At Address 3, Rail #3, view VCC1V5_FPGA (1.5 V)
 - TI [PTD08A010W](#) – 10A, 4.75V to 14V, Non-Isolated, Digital PowerTrain Module (U20)



TI Fusion Digital Power Designer

- At Address 3, Rail #4, view VCC3V3 (3.3 V)
 - TI [PTD08A010W](#) – 10A, 4.75V to 14V, Non-Isolated, Digital PowerTrain Module (U21)

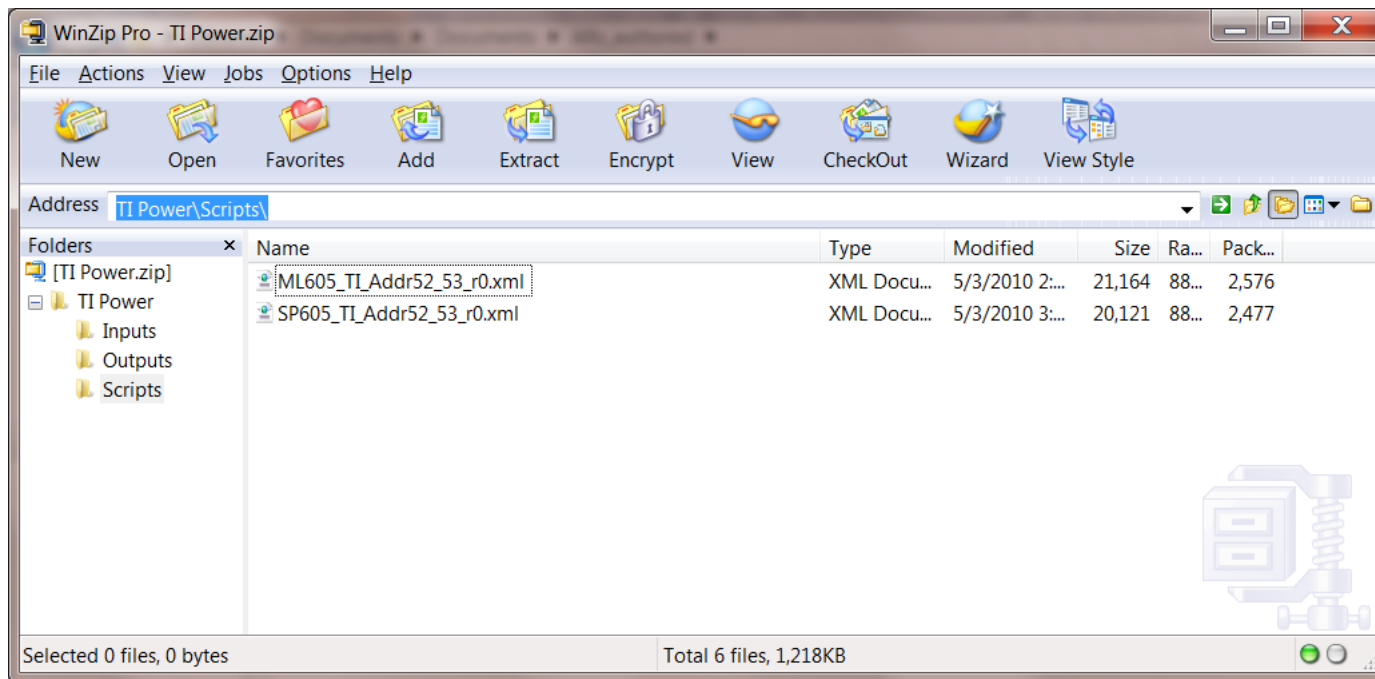
The screenshot displays the TI Fusion Digital Power Designer software interface for the UCD9240 @ Address 3 Rail #4. The interface is divided into several sections:

- Monitor Panel (Left):** Contains checkboxes for showing/hiding plots (Vin, Iin, Pin, Vtrack, Pin(conv), Vout, Iout, Pout, Temp, Duty, Eff(conv)) and options for fitting all plots on screen or scaling to screen width. The height is set to 175.
- Readings Panel (Top Middle):** Displays real-time measurements:
 - Vin: 12.188 V
 - Iin: 8.16 A
 - Pin: 99.25 W
 - Vtrack: --- V
 - Vout: 3.317 V
 - Pout: 0.00 W
 - Duty Cycle: 26.91 %
 - Fan Speed: 0 RPM
 - Pin(conv): 0.00 W
 - Eff(conv): 101.15 %
- Status Registers/Lines Panel (Bottom Middle):** Shows the status of various components:
 - Vout: OK
 - Iout: OK
 - Temp: OT warning
 - Input: OK
 - CML: OK
 - Fans: None installed
 - Misc: POWER GOOD#
- Vout Rail #4 - Output Voltage Plot (Top Right):** A line graph showing the output voltage over time. The current value is 3.317 V. Control limits are set: OVF: 3.630 V, OVW: 3.548 V, UVW: 3.052 V, UVF: 2.970 V.
- Iout Rail #4 - Output Current Plot (Middle Right):** A line graph showing the output current over time. The current value is 0.00 A. Control limits are set: OCF: 9.00 A, OCW: 10.00 A, UCF: -9.09 A.
- Pout Rail #4 - Output Power Plot (Bottom Middle):** A line graph showing the output power over time. The current value is 0.00 W.
- Temp Rail #4 - Maximum Temperature Plot (Bottom Right):** A line graph showing the maximum temperature over time. The current value is 0 °C. Control limits are set: OTF: 200 °C, OTW: 0 °C.

The bottom status bar shows: Fusion Digital Power Designer v1.6.44.2 [2009-03-03] | UCD9240 Firmware v3.24.0.8163 [2008-09-15] | USB Adapter v1.0.10 [P] | TEXAS INSTRUMENTS | fusion digital power

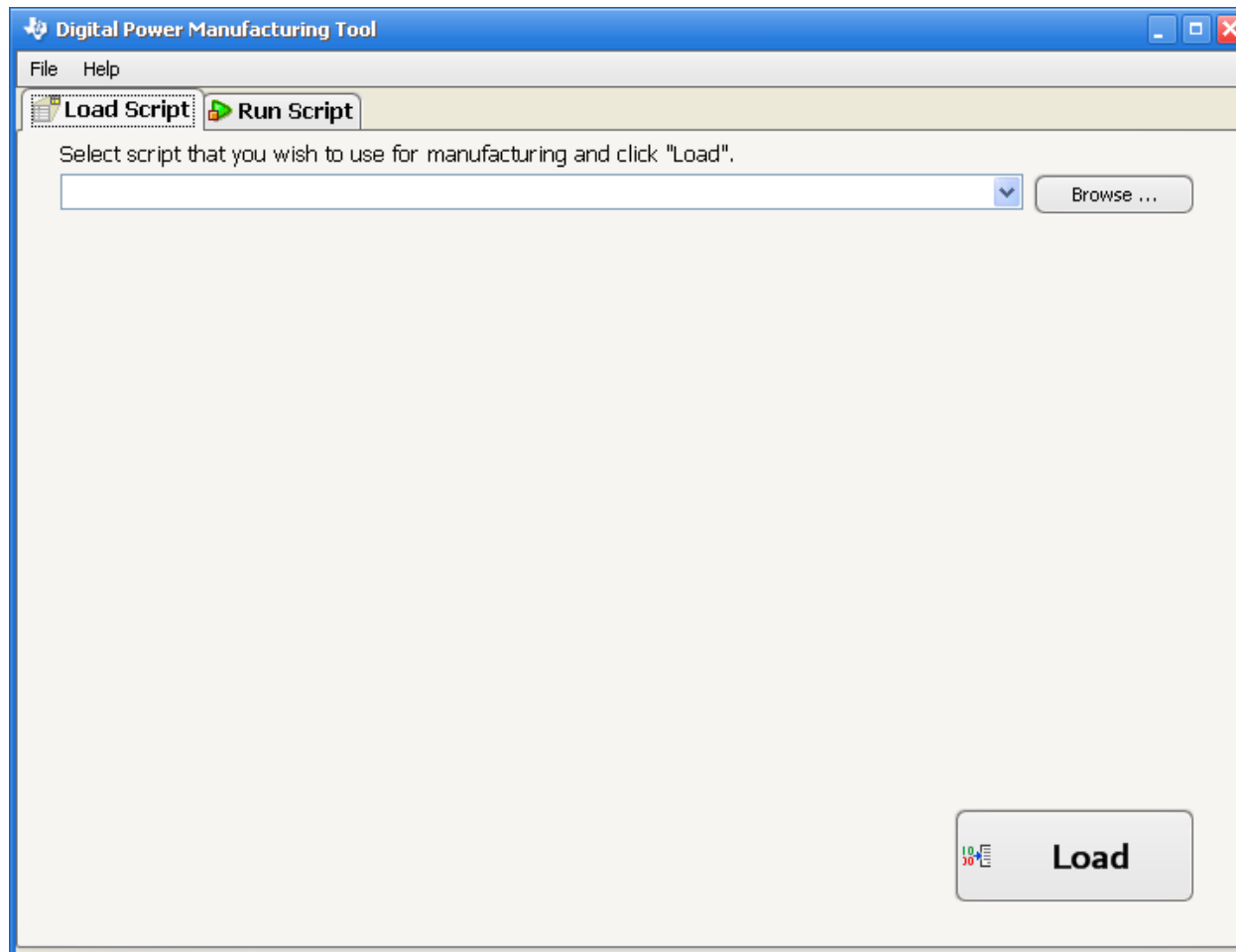
Restoring Power Levels

- Unzip included file: TI_Power.zip



TI Fusion Digital Power Manufacturing Tool

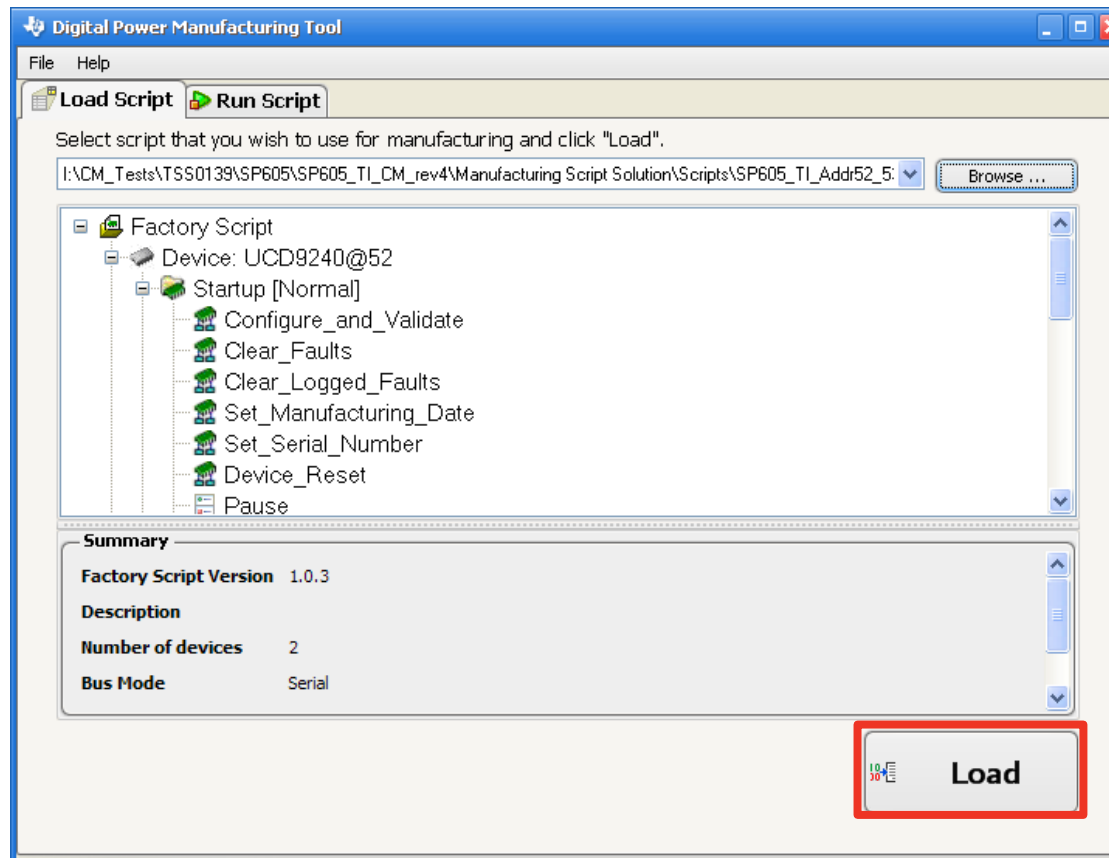
- Open Manufacturer's GUI



TI Fusion Digital Power Manufacturing Tool

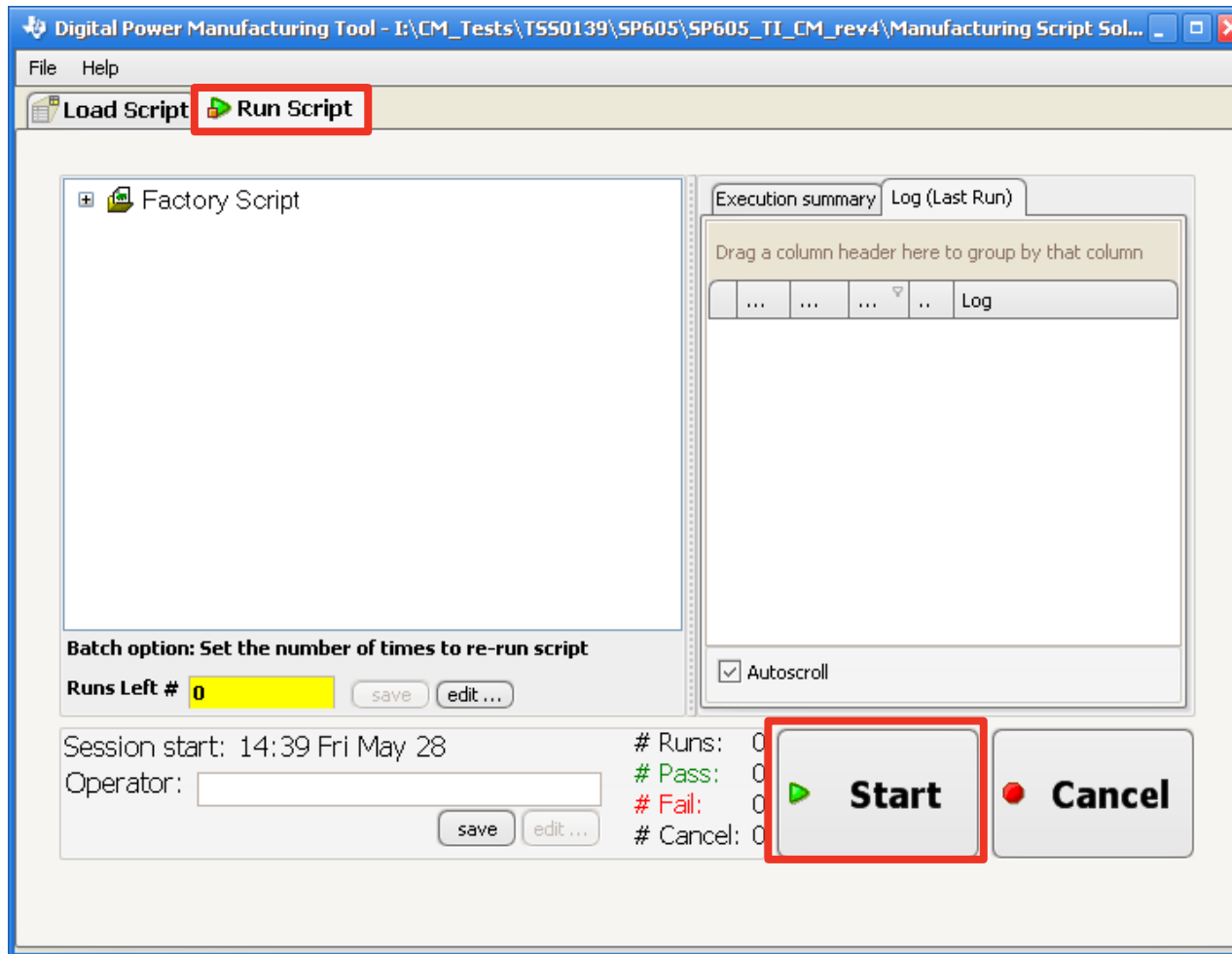
- Load xml script from TI_Power directory

- TI_Power/Scripts/SP605_TI_Addr52_53_r0.xml or
TI_Power/Scripts/ML605_TI_Addr52_53_r0.xml



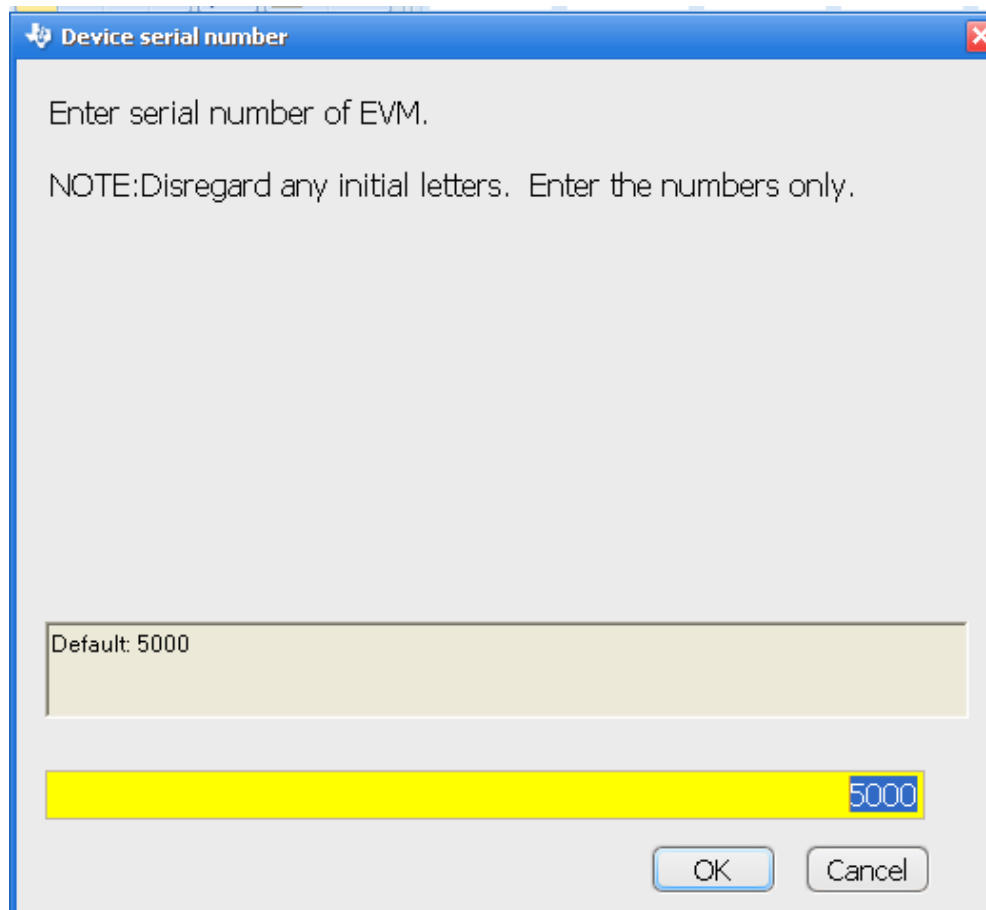
TI Fusion Digital Power Manufacturing Tool

- Click Run Script tab and then Start



TI Fusion Digital Power Manufacturing Tool

- Operator ID is irrelevant, click OK and wait for the board to finish programming
- Default Serial number is OK as well.



Device serial number

Enter serial number of EVM.

NOTE:Disregard any initial letters. Enter the numbers only.

Default: 5000

5000

OK Cancel

TI Fusion Digital Power Manufacturing Tool

Finished!

The screenshot displays the 'Digital Power Manufacturing Tool' interface. The main window title is 'Digital Power Manufacturing Tool - I:\CM_Tests\T550123_12v1\SP605\SP605_TI_CM_rev3\Manufacturing Scr...'. The interface includes a menu bar with 'File' and 'Help', and two tabs: 'Load Script' and 'Run Script'. The 'Run Script' tab is active, showing a tree view of the script steps, all of which are marked with green checkmarks, indicating successful completion. The steps include: Startup [Normal], Configure_and_Validate, Validation [Normal], Clear_Faults, Clear_Logged_Faults, Set_Manufacturing_Date, Device_Reset, Pause, Validate_Vout_Device_All_Rails, End [Normal], Clear_Faults, and Clear_Logged_Faults. Below the tree view, there is a 'Batch option: Set the number of times to re-run script' section with 'Runs Left # 0' and 'save' and 'edit...' buttons. To the right, there is an 'Execution summary' section with a 'Log (Last Run)' tab. The log table shows three entries, all with a status of 'PASS'. The bottom of the interface features session information: 'Session start: 14:39 Fri May 28', 'Operator: Amanda', and statistics: '# Runs: 5', '# Pass: 1', '# Fail: 4', and '# Cancel: 0'. There are 'save' and 'edit...' buttons for the operator name. At the bottom right, there are 'Start' and 'Cancel' buttons. A large green banner at the very bottom of the window reads 'Manufacturing Passed'.

File Help

Load Script Run Script

- ✓ Startup [Normal]
 - ✓ Configure_and_Validate
- ✓ Validation [Normal]
 - ✓ Clear_Faults
 - ✓ Clear_Logged_Faults
 - ✓ Set_Manufacturing_Date
 - ✓ Device_Reset
 - ✓ Pause
 - ✓ Validate_Vout_Device_All_Rails
- ✓ End [Normal]
 - ✓ Clear_Faults
 - ✓ Clear_Logged_Faults

Batch option: Set the number of times to re-run script

Runs Left # 0 save edit...

Session start: 14:39 Fri May 28 # Runs: 5
Operator: Amanda # Pass: 1
Fail: 4
Cancel: 0

save edit...

Start Cancel

Manufacturing Passed

..	Log
1...	GE...	IN...	n...	UCD9240@53.End END attempt: 0/0 (3484.4642ms) PASS
1...	GE...	IN...	n...	UCD9240@53 END attempt: 0/0 (15172.2634ms) PASS
▶ 1...	GE...	IN...	n...	Factory Script END attempt: 0/0 (34532.134ms) PASS