

# PowerNavigator

## Users Guide

Chance Dunlap

Sr. Marketing Manager, Infrastructure Power

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# Overview

- **This guide walks a user through the steps to setup and configure a digital power device using the new PowerNavigator GUI**
- **This guide assumes the user has followed the instructions on the website for downloading and installing PowerNavigator and is able to launch the program successfully.**

# Overview

- **The following sections are shown in this guide:**

- Hardware free mode
  - Selection of devices
  - Power architecture setup
  - Current sharing
- Sequencing
  - Time based sequencing
  - Event based sequencing
- Command Line Tool
  - Changing parameters
- File save/load
  - Project Files
  - Configuration Files
- Connecting to hardware
  - Monitoring
  - Writing to devices
  - Fault Status
  - Eval Board

# Hardware Free Mode (Offline Mode)



# Hardware Free Mode (Offline Mode)

Scan Devices

Build Offline System

Projects

Full system example  
ZL9101M 3-phase

Scan Again 01 to 70

Monitor Hardware

Build New System

Open Project

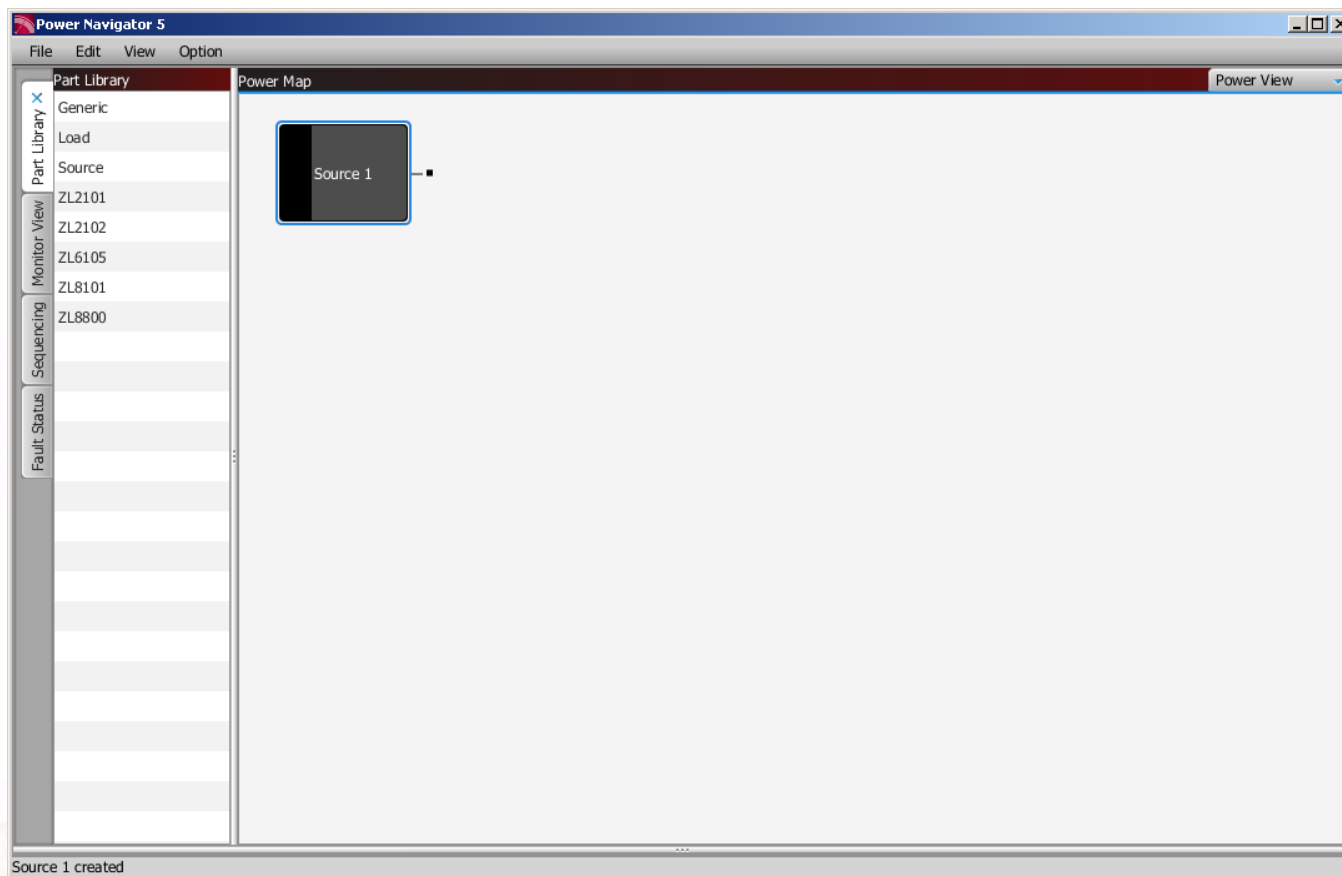
Design your power system from scratch using Intersil parts in the library. Once your system is designed, bring up the system by connecting to hardware.

Start Cancel

Click on “Build New System” and then “Start”

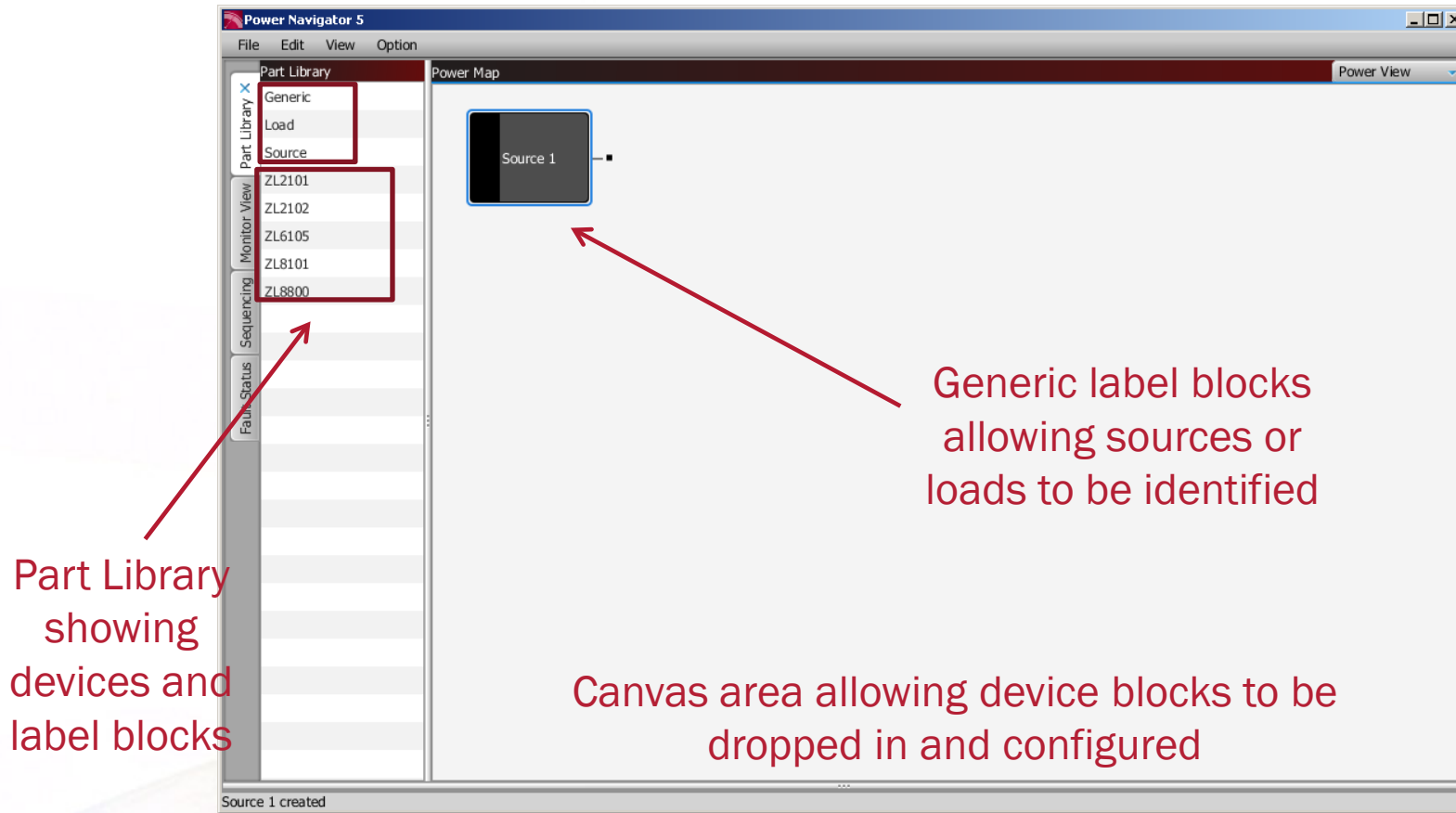
This section allows you to configure an entire power system without hardware. This is useful for preparing for initial system prototypes to arrive.

# System View



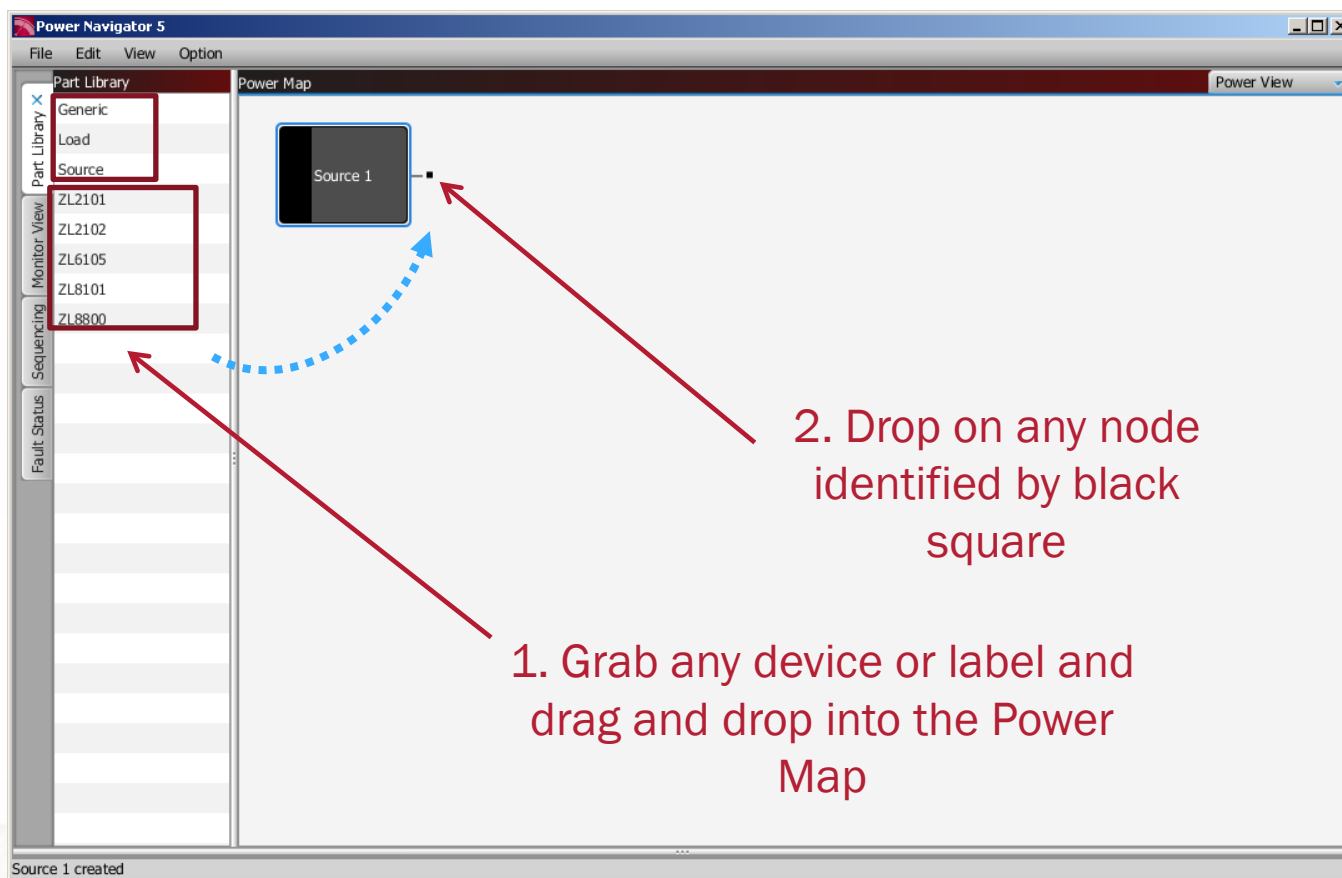
Initial screen is a blank canvas allowing the user to setup and configure an entire power system

# System View: Sections



Initial screen is a blank canvas allowing the user to setup and configure an entire power system

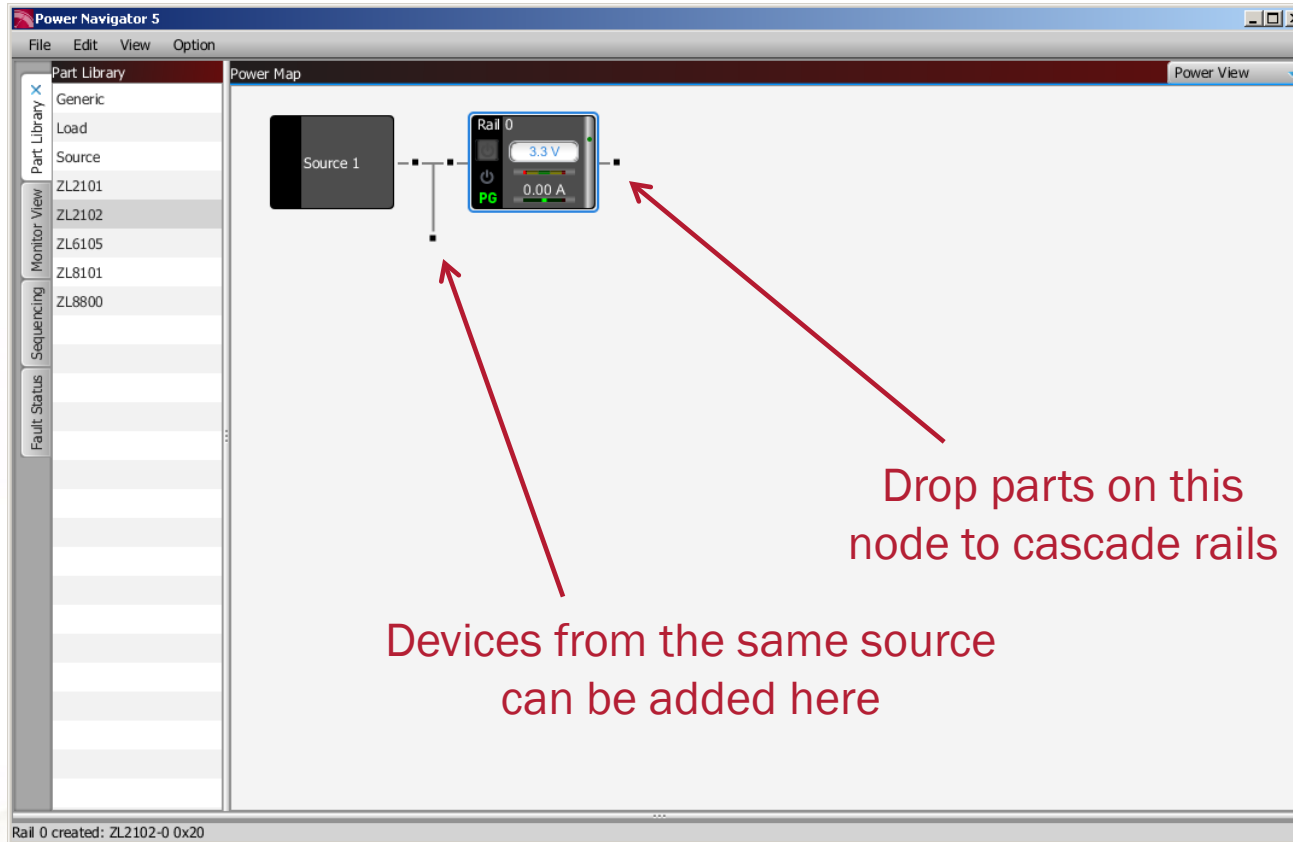
# System View: Setup of Power Map



Initial screen is a blank canvas allowing the user to setup and configure an entire power system

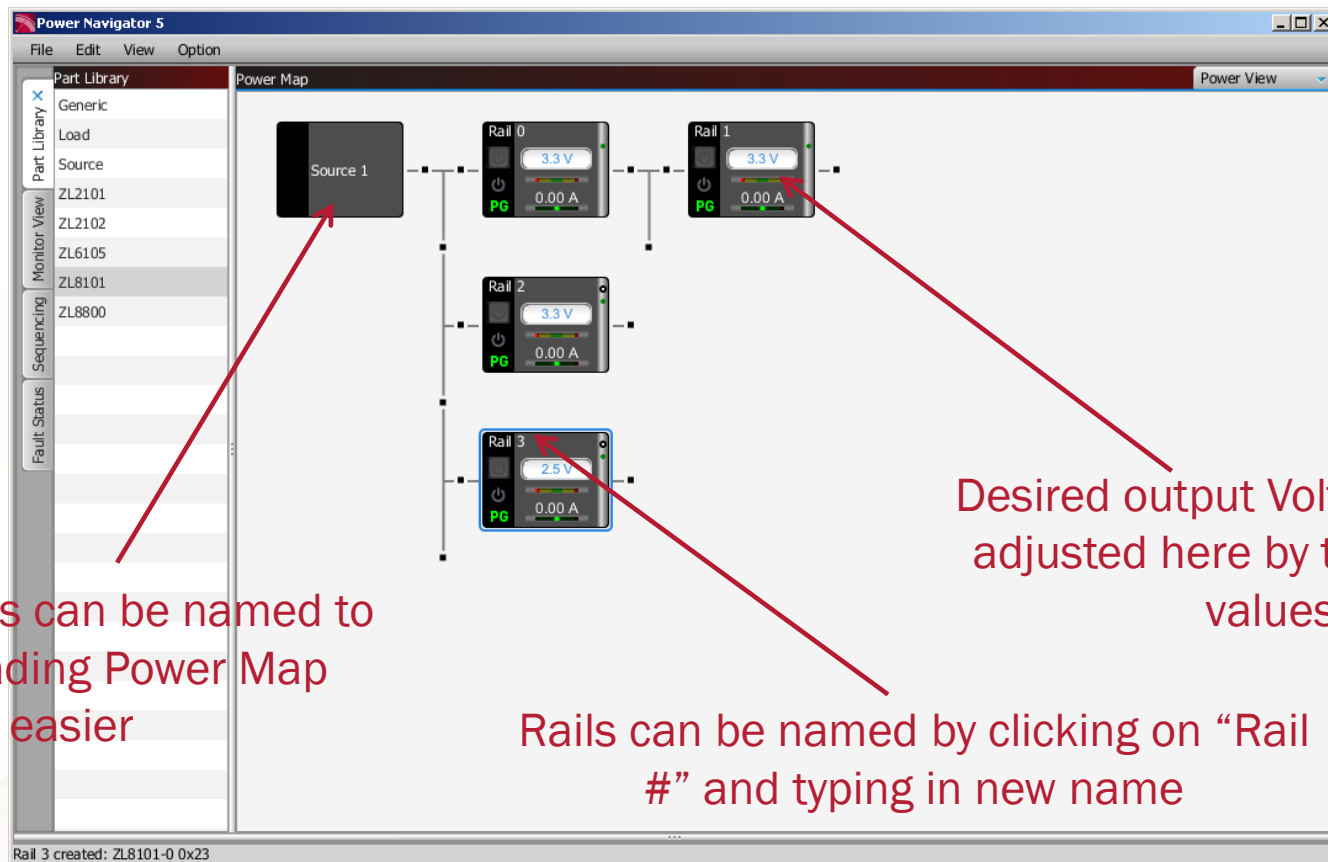


# System View: Single Output



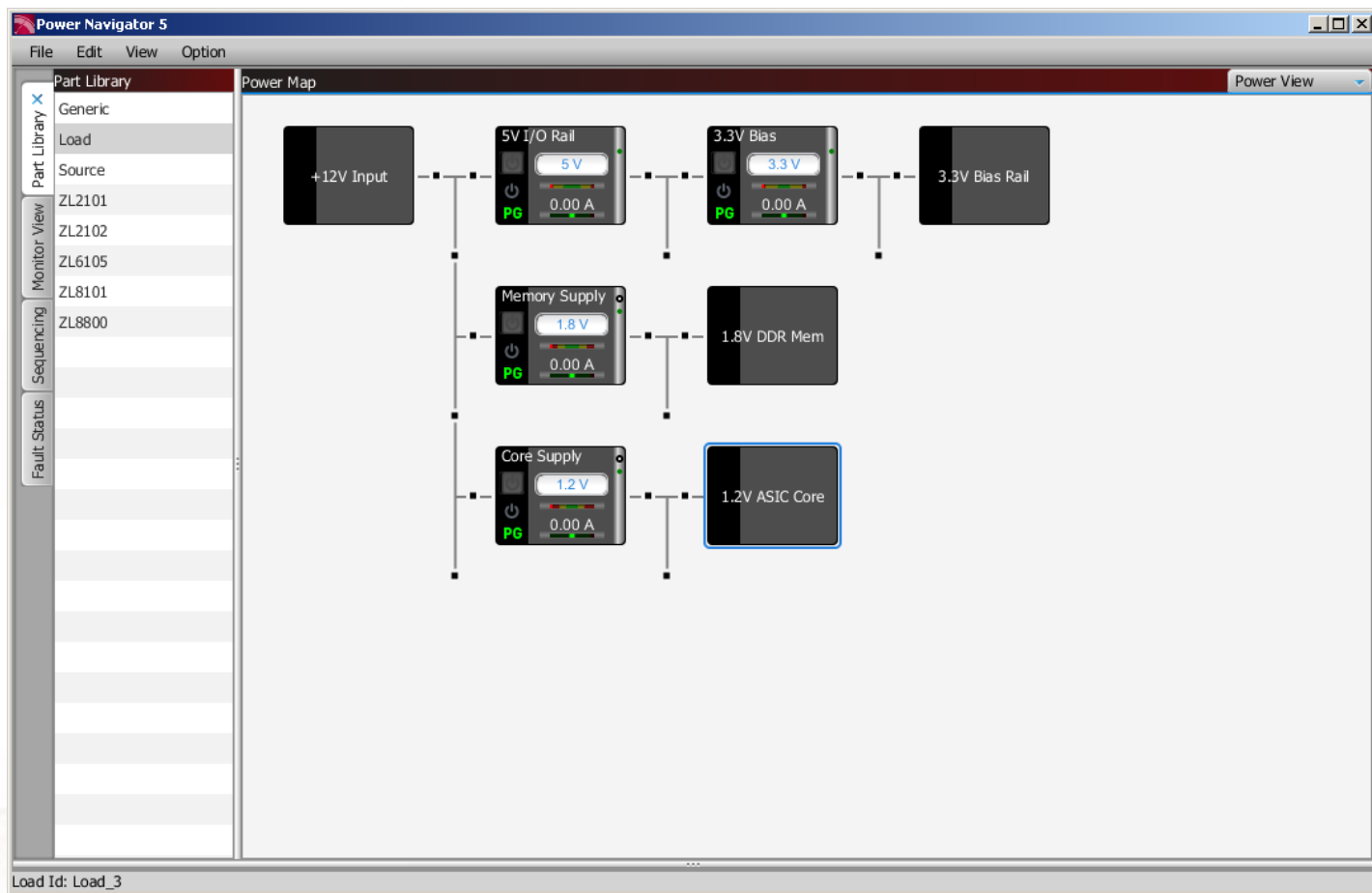
A single device has now been placed in the Power Map allowing it to be configured. Additional devices can be added to match the system

# System View: Multiple Rails



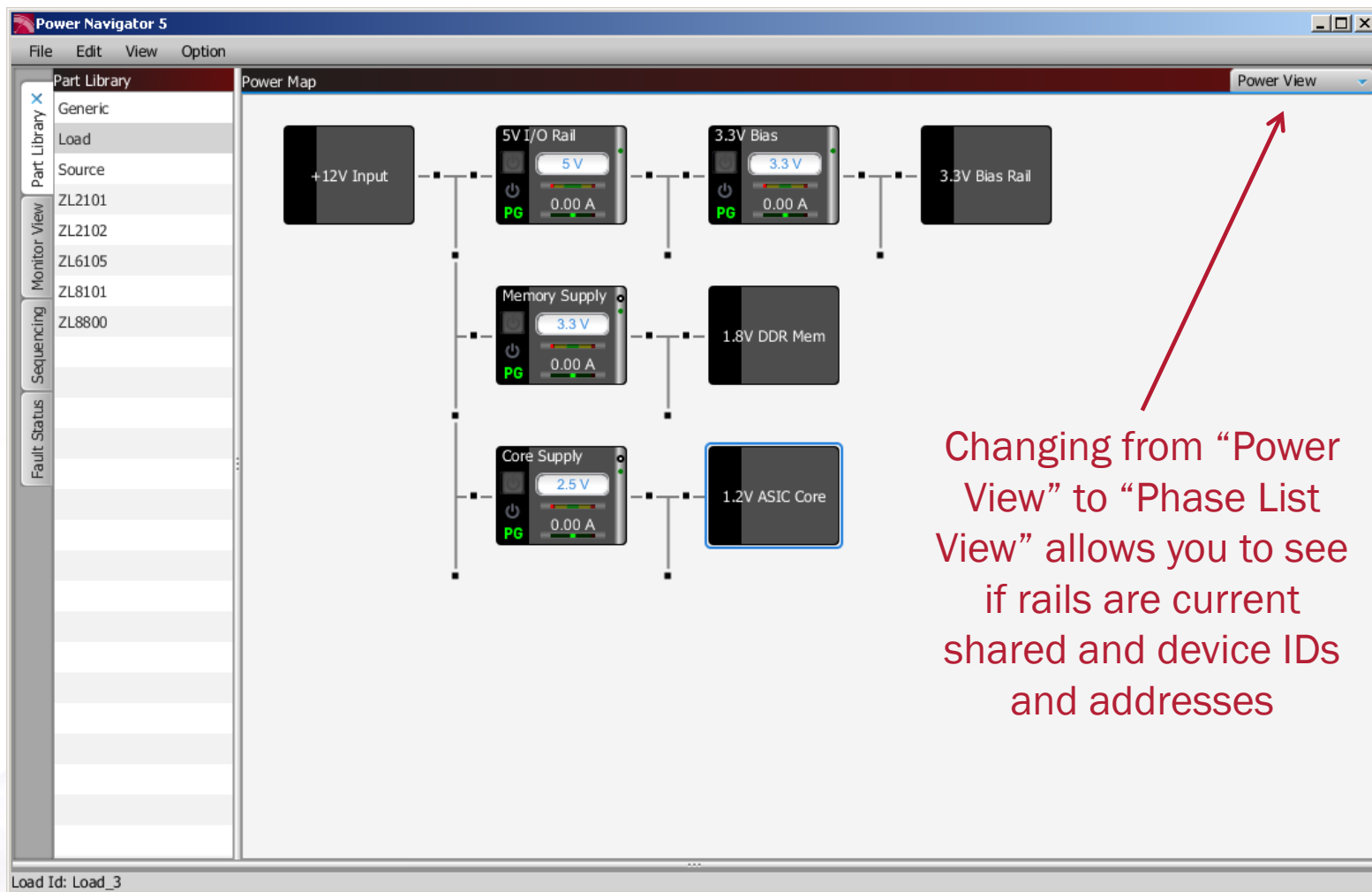
Now that complete architecture with power devices is complete, readability can be improved by naming devices and adding label blocks if desired

# System View: Labels Applied

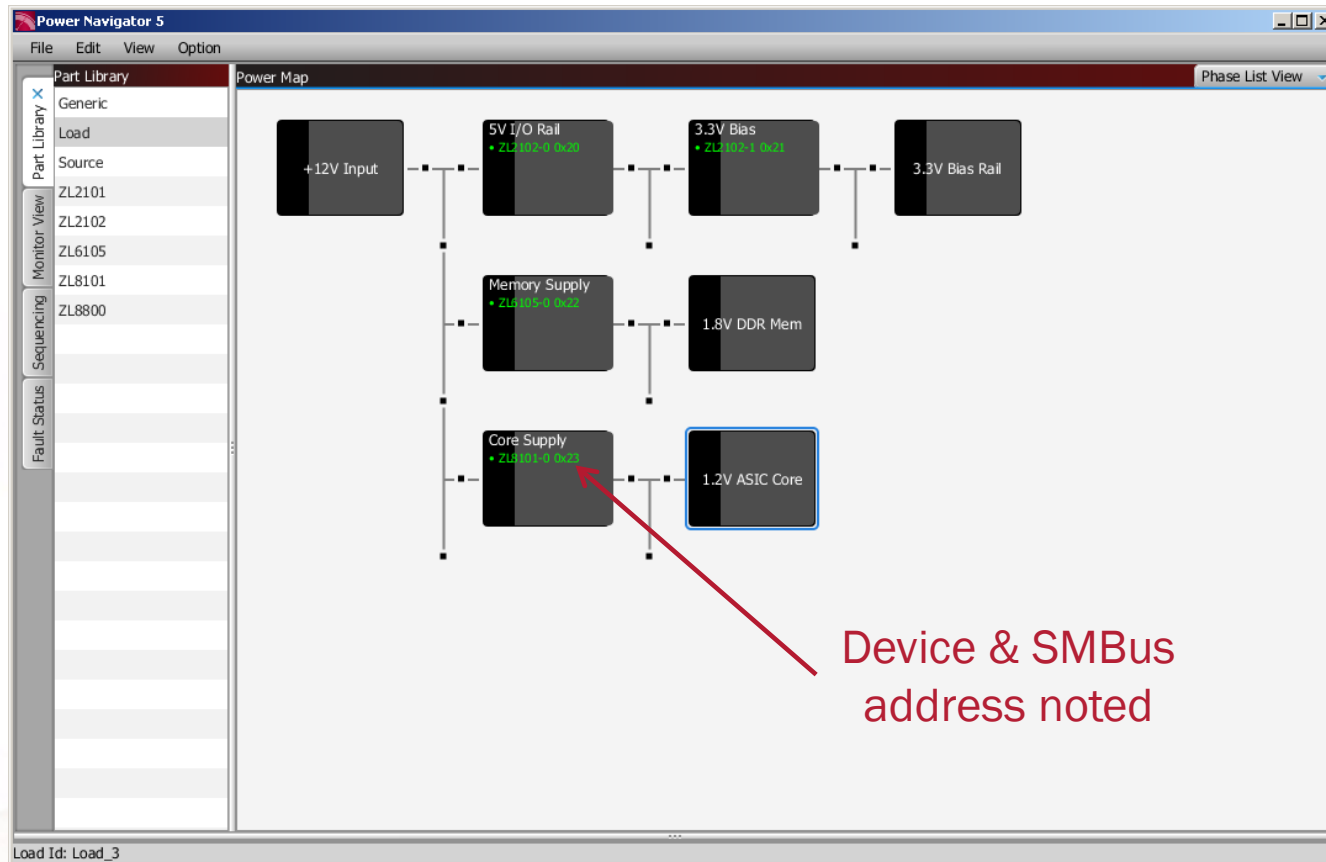


Example system with all rails labeled and output voltages defined

# System View: Reviewing Devices & Phases



# System View: Phase List View



All device IDs are displayed in this view along with SMBus address. The SMBus address is automatically assigned and can be changed to match hardware schematic

# System View: Changing SMBus Addresses

The screenshot shows the Power Navigator 5 interface. On the left, the 'Part Library' pane is visible with a red arrow pointing to the 'View' tab. The main area displays a 'Power Map' with components like '+12V Input', '5V I/O Rail', '3.3V Bias', '3.3V Bias Rail', 'Memory Supply', '1.8V DDR Mem', 'Core Supply', and '1.2V ASIC Core'. A red arrow points from the 'System Devices' window to the 'Core Supply' component. The 'System Devices' window is open, showing a table of devices and their SMBus addresses.

1. Access System Devices by ensuring its in view, by pulling up on the window

2. If "System Devices" can not be seen, access it by "View" tab and click on "System Devices"

3. Edit addresses in the "System Devices" window

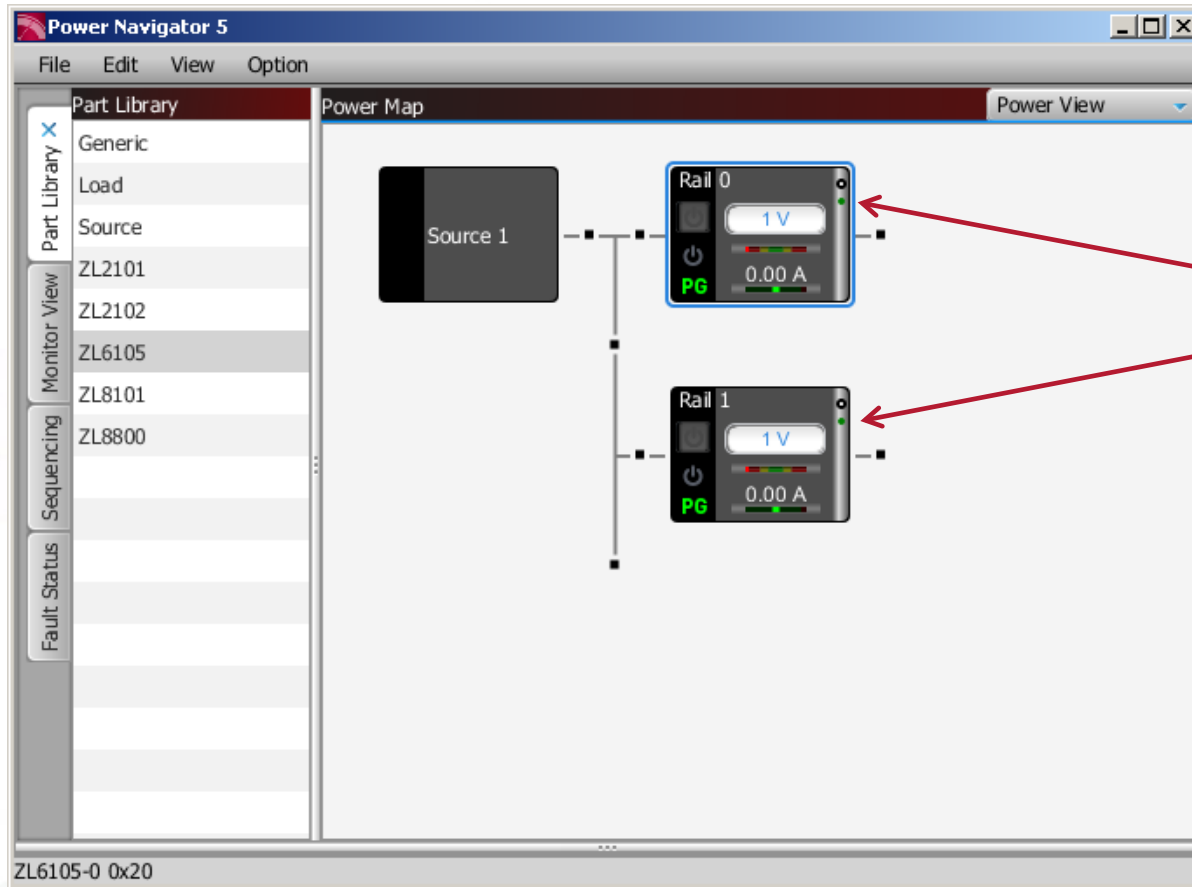
Device	Address	Connected
ZL2102	0x20	Offline
ZL2102	0x21	Offline
ZL6105	0x22	Offline
ZL8101	0x23	Offline

In order to connect the system to hardware the SMBus address must match hardware otherwise the wrong configuration could be sent to devices

# Current Sharing

- **This section covers current sharing and setting up the ZL8800 in the Power Map**
- **Several of Intersil Digital devices are enabled to current share between devices using the DDC bus. This is easily supported in the GUI**

# Current Sharing



The green dot represents one phase used in the power supply.

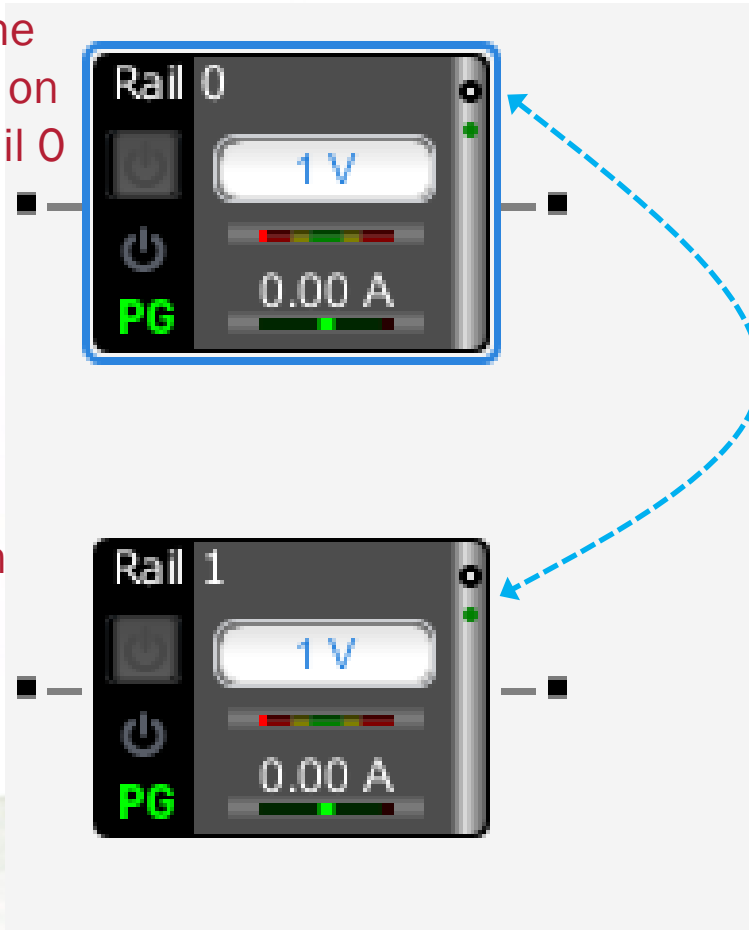
Two ZL6105 devices are placed on the Power Map. The intent is to create a two phase solution by current sharing the devices



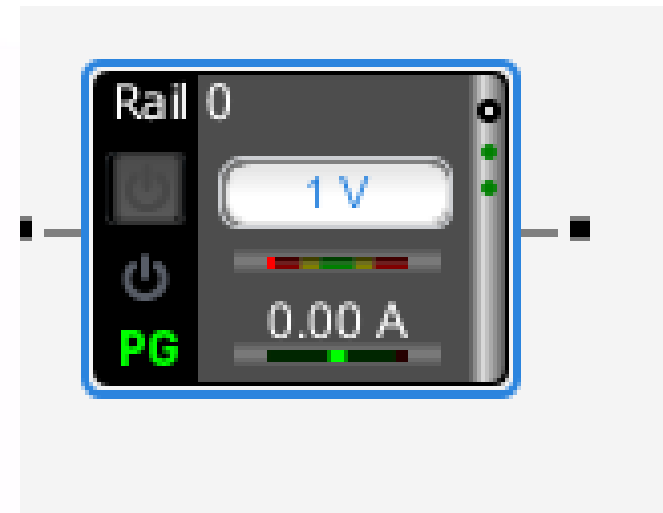
# Current Sharing

2. Drag it onto the white & black dot on the top right of Rail 0

1. Grab the green dot on Rail 1

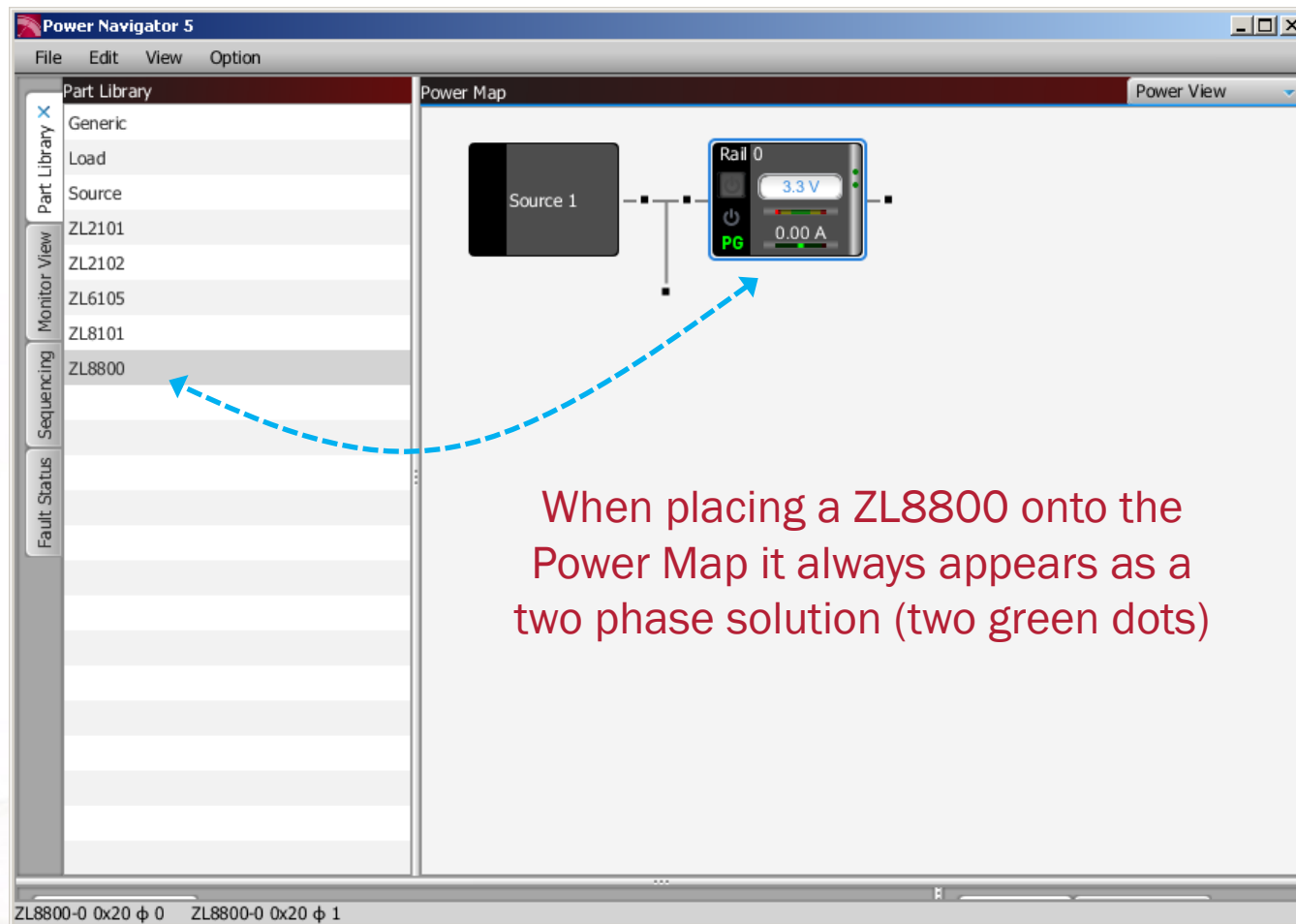


End result is a two phase power supply shown below (indicated by 2 green phase dots)



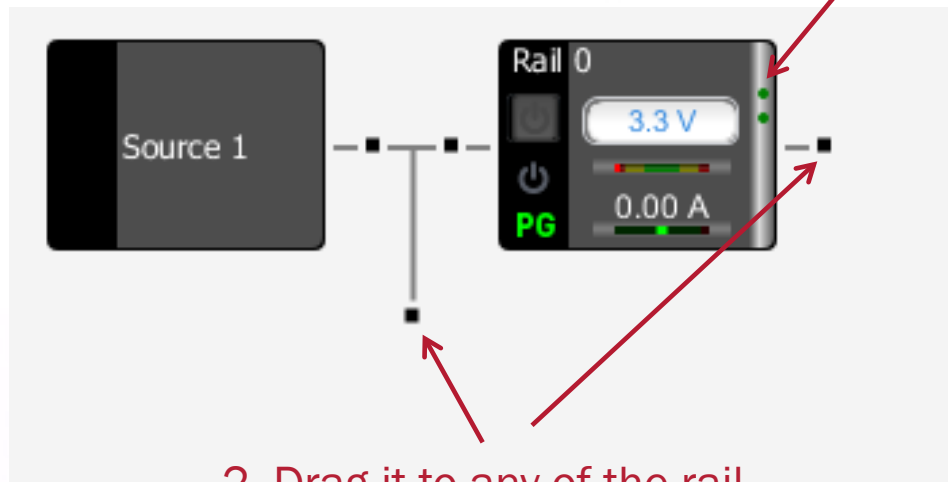
To current share the rails, move one of the devices by dragging and dropping the green dot onto the other rail (into the circle above the green dot)

# ZL8800 Setup



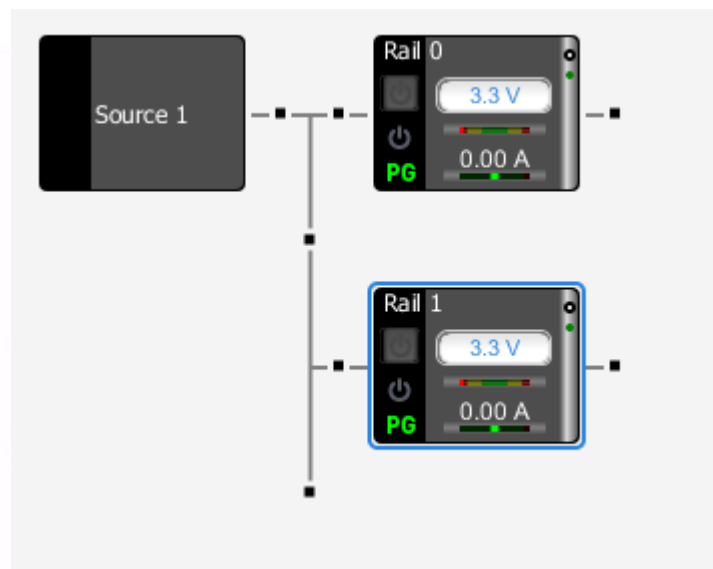
# ZL8800 Setup

1. Grab a green dot on Rail 0



2. Drag it to any of the rail nodes

End solution with two outputs shown below

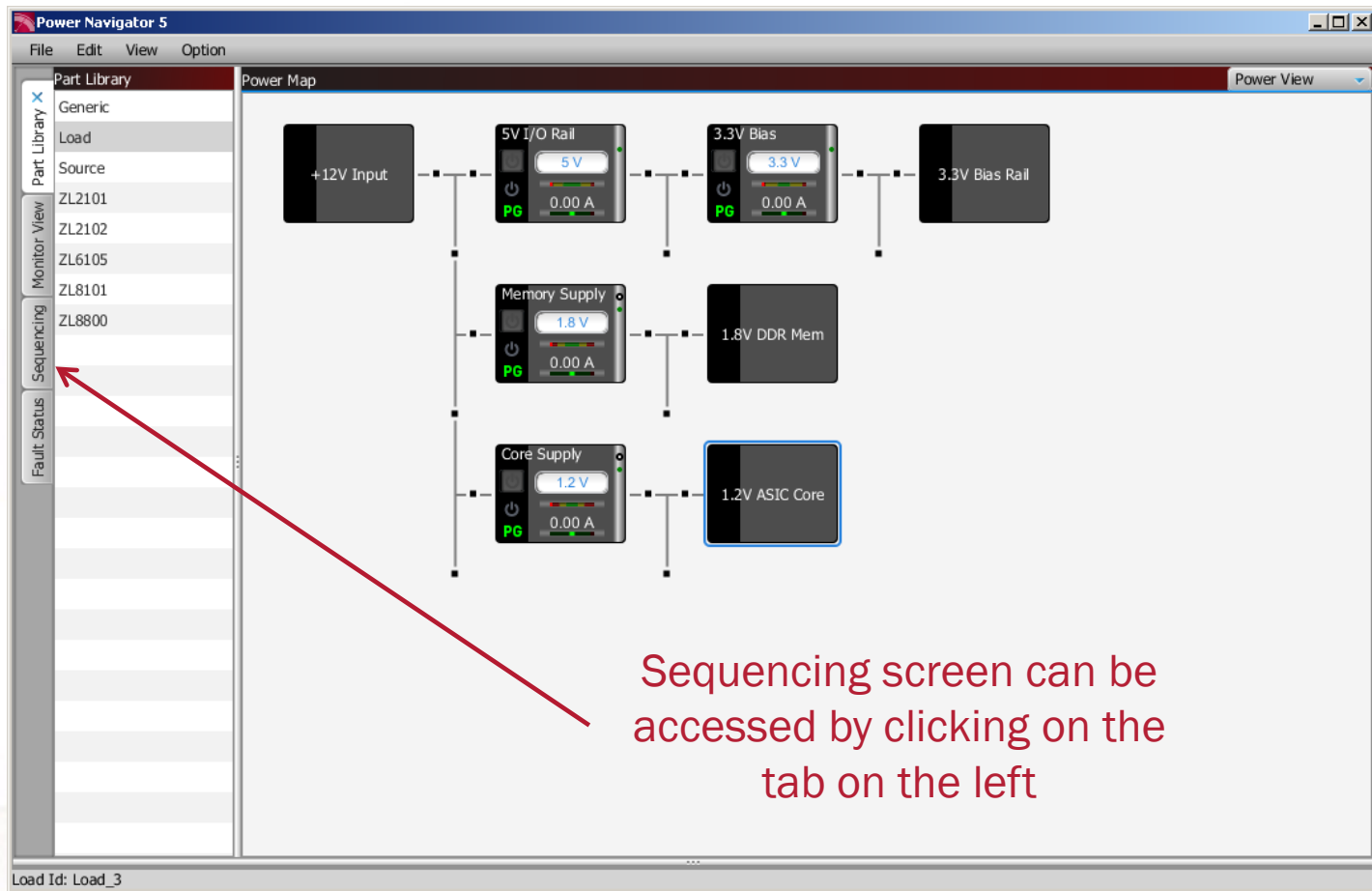


To create a 2 output solution with the ZL8800 the opposite approach from current sharing is applied. The phase dots need to be separated into two distinct outputs

# Sequencing



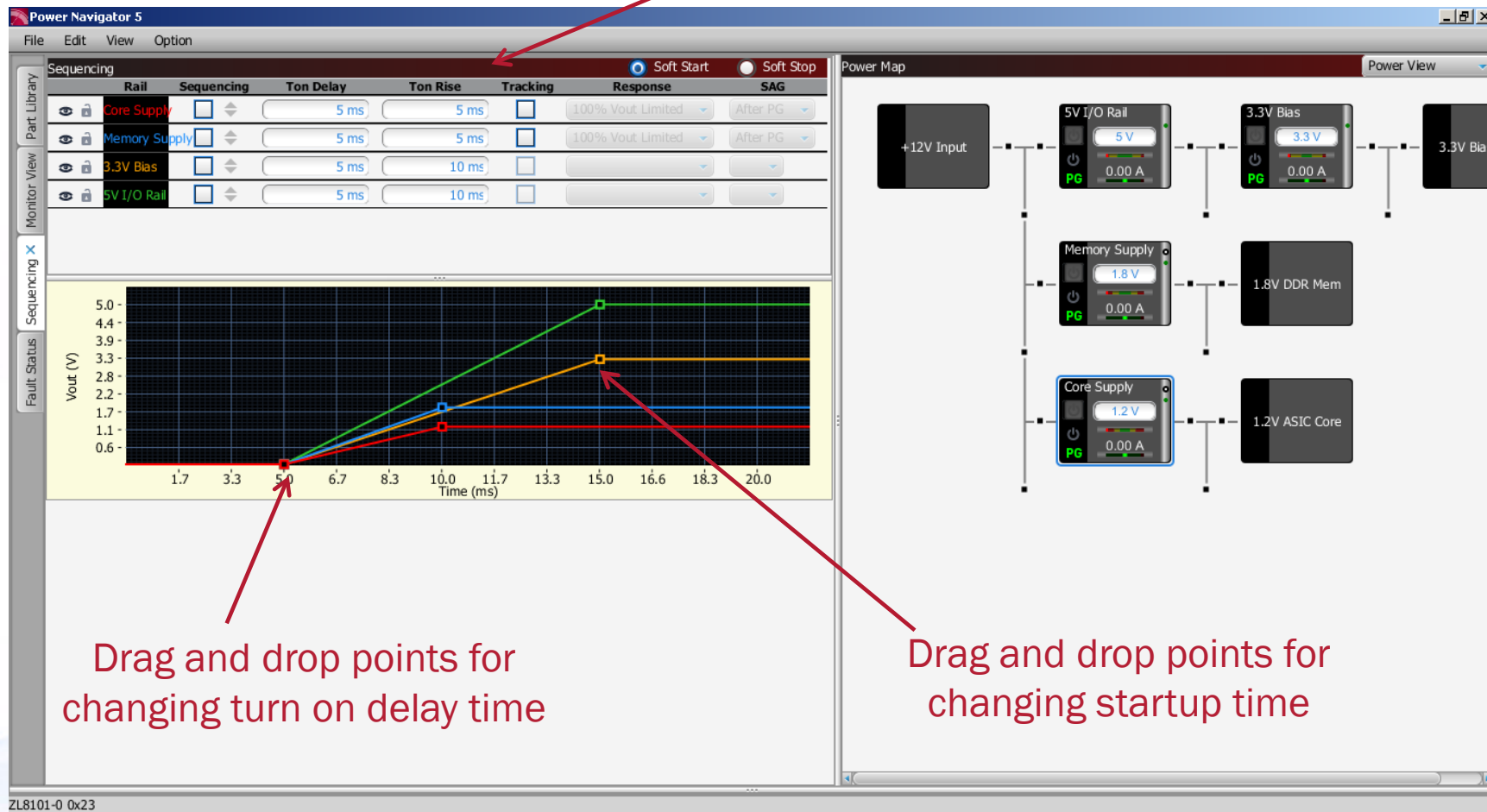
# Sequencing Setup



Based on the power architecture defined, the devices can now be configured for sequencing during power up or power down

# Sequencing Overview

Sequencing control window



# Sequencing View Expanded

Lockout of rail to turn off drag and drop capability (stops rails from accidentally being adjusted)

Selects response to tracking

Sequencing							<input checked="" type="radio"/> Soft Start	<input type="radio"/> Soft Stop
	Rail	Sequencing	Ton Delay	Ton Rise	Tracking	Response	SAG	
		Core Supply	<input type="checkbox"/>	<input type="text" value="5 ms"/>	<input type="text" value="5 ms"/>	<input type="checkbox"/>	100% Vout Limited	After PG
		Memory Supply	<input type="checkbox"/>	<input type="text" value="5 ms"/>	<input type="text" value="5 ms"/>	<input type="checkbox"/>	100% Vout Limited	After PG
		3.3V Bias	<input type="checkbox"/>	<input type="text" value="5 ms"/>	<input type="text" value="10 ms"/>	<input type="checkbox"/>		
		5V I/O Rail	<input type="checkbox"/>	<input type="text" value="5 ms"/>	<input type="text" value="10 ms"/>	<input type="checkbox"/>		

Select if rails are to be used for tracking

Select if rails are to be used for tracking

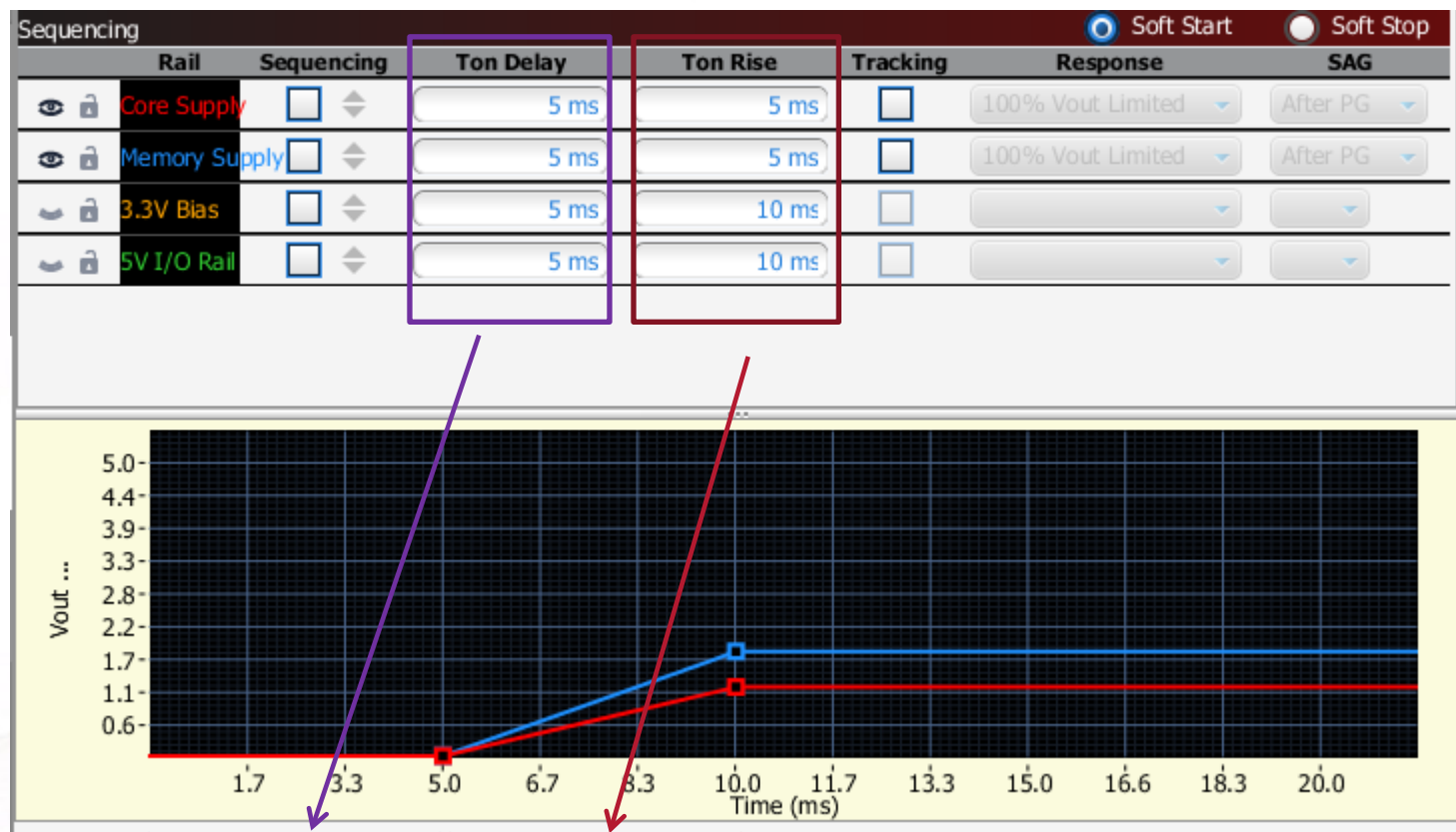
Rail name

Turn on/off visibility of power rail on sequencing (improves readability if multiple rails are being sequenced)

Adjustment of Ton delay and softstart times. Same as using drag and drop functionality

# Sequencing Example

Sequencing example with two rails (only ones selected with visibility icon)



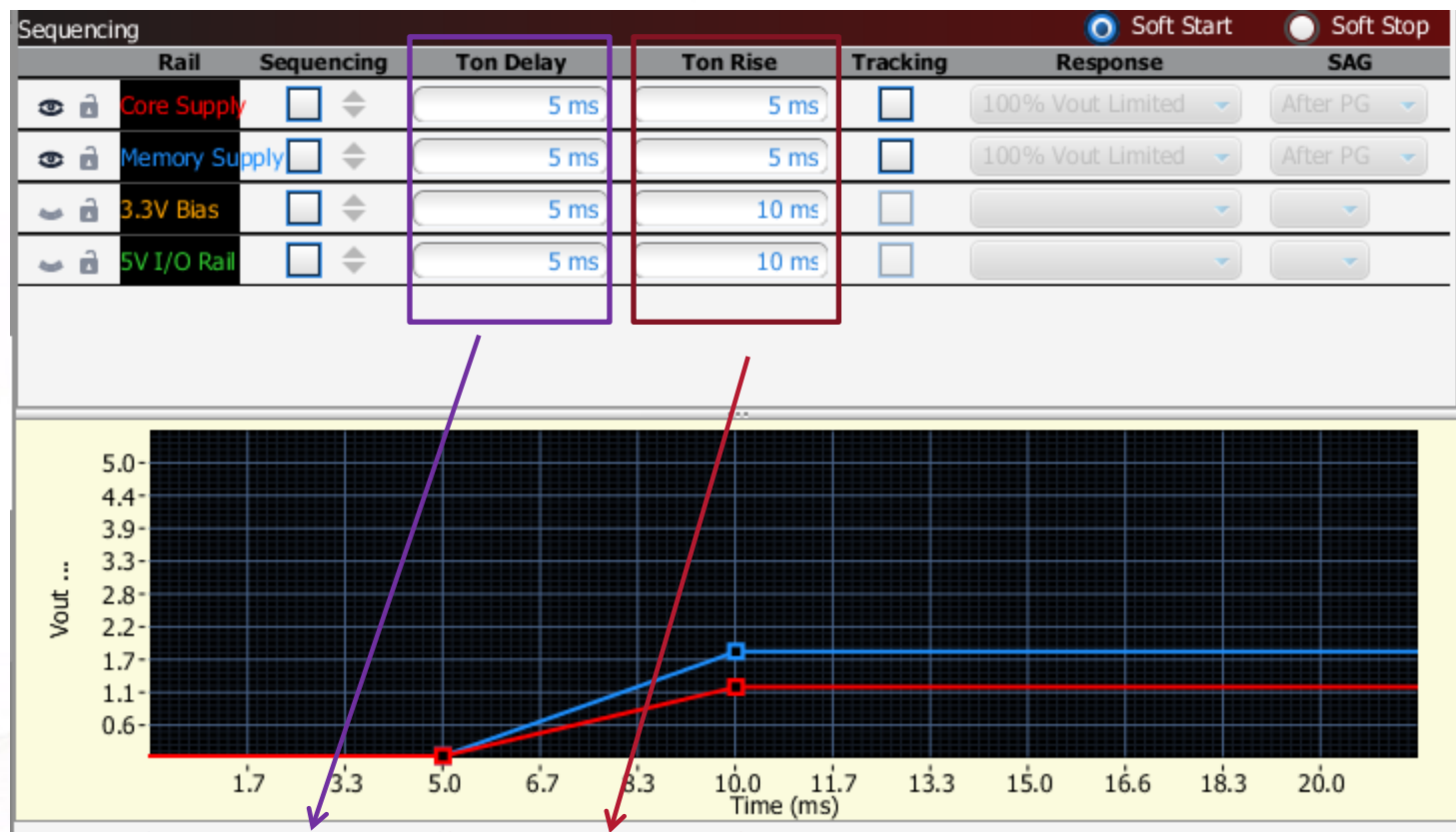
5ms delay after EN  
(defined as 0ms event)

5ms softstart ramp  
after Ton Delay expires



# Sequencing Example

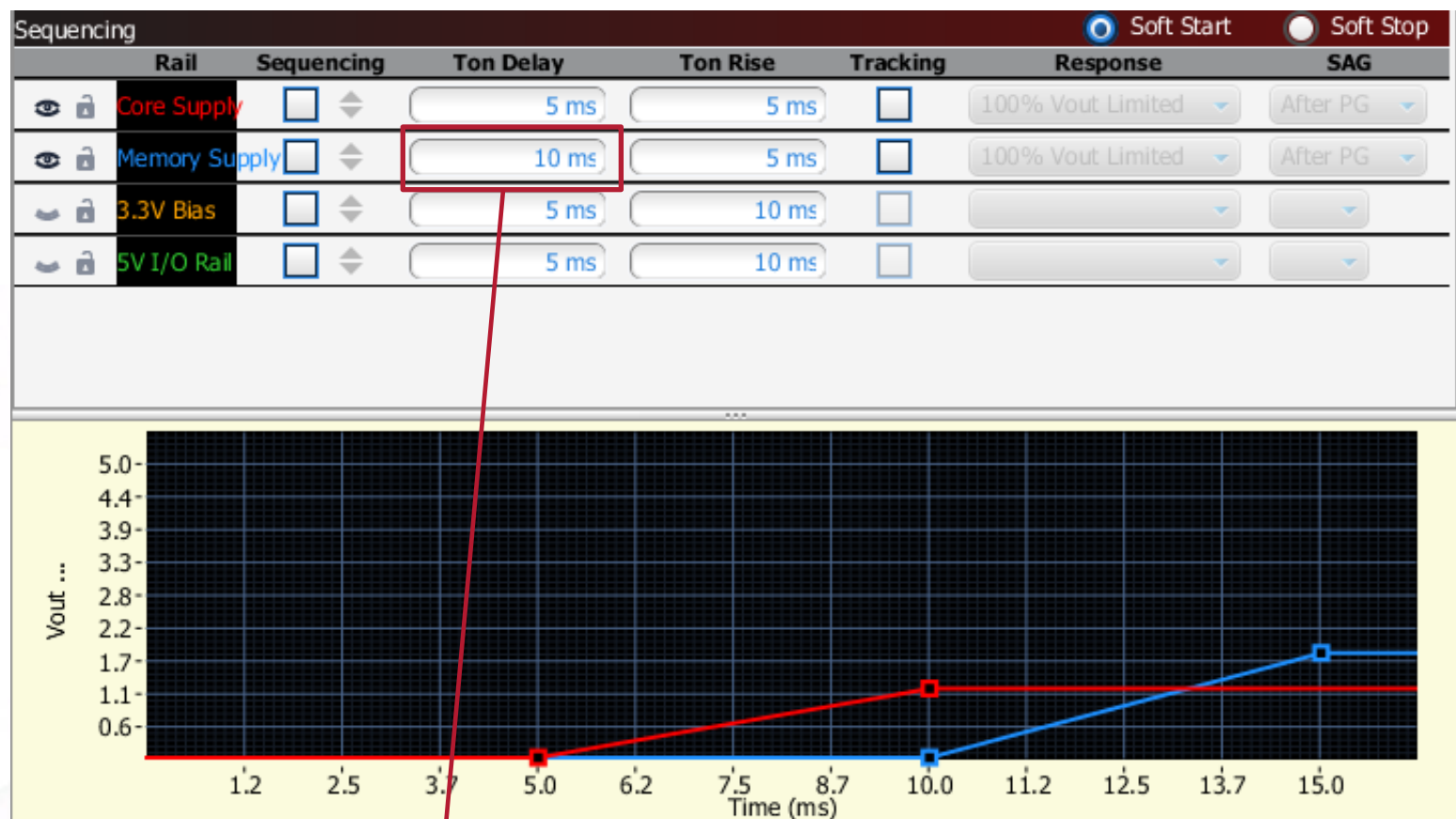
Sequencing example with two rails (only ones selected with visibility icon)



5ms delay after EN  
(defined as 0ms event)

5ms softstart ramp  
after Ton Delay expires

# Sequencing Example



A change of Ton Delay to 10ms extends the delay time from the 0ms point (EN event).

# Sequencing: Time based or Event based

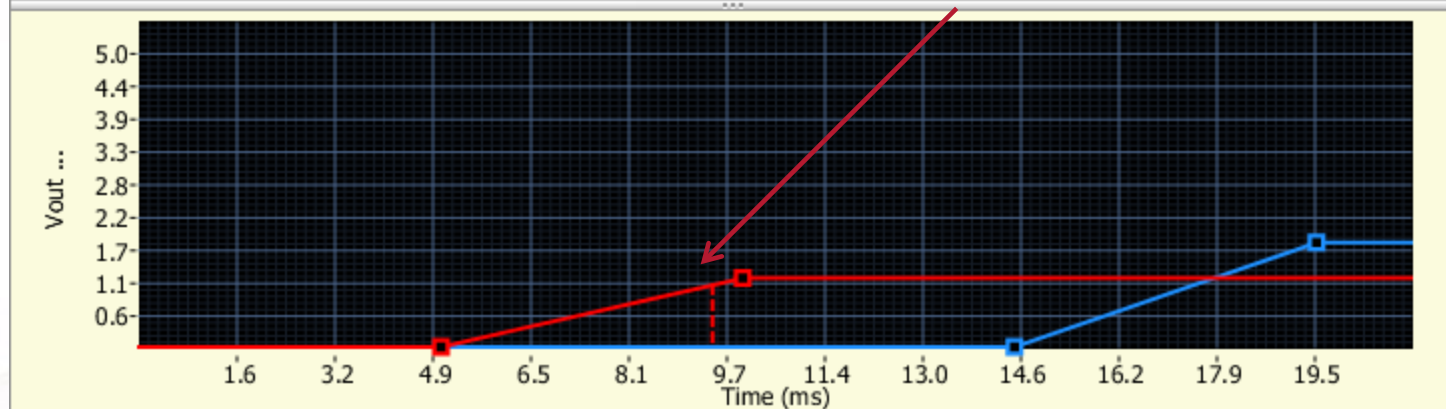
- **The previous example showed how sequencing can be setup as a time based sequence**
  - Every device ramps at its exact point based on timing from an Enable signal
  - Downside is that any fault on one rail is not signaled to the others
- **Event based sequencing can be used on the Digital Power devices if they have their DDC Bus pins connected to each other**
  - Sequencing now occurs in a defined priority order
  - Sequencing is now dependent on the timing pattern and that the prior rail in the sequencing has a valid PGOOD

# Event Based Sequencing

Sequencing order defined by position, use up/down arrows to adjust

Sequencing							
						Soft Start	Soft Stop
Rail	Sequencing	Ton Delay	Ton Rise	Tracking	Response		
Core Supply	<input checked="" type="checkbox"/>	5 ms	5 ms	<input type="checkbox"/>	100% Vout Limited		
Memory Supply	<input checked="" type="checkbox"/>	5 ms	5 ms	<input type="checkbox"/>	100% Vout Limited		
3.3V Bias	<input type="checkbox"/>	5 ms	10 ms	<input type="checkbox"/>			
5V I/O Rail	<input type="checkbox"/>	5 ms	10 ms	<input type="checkbox"/>			

Line denotes PG threshold, which will be crossed before end of soft-start

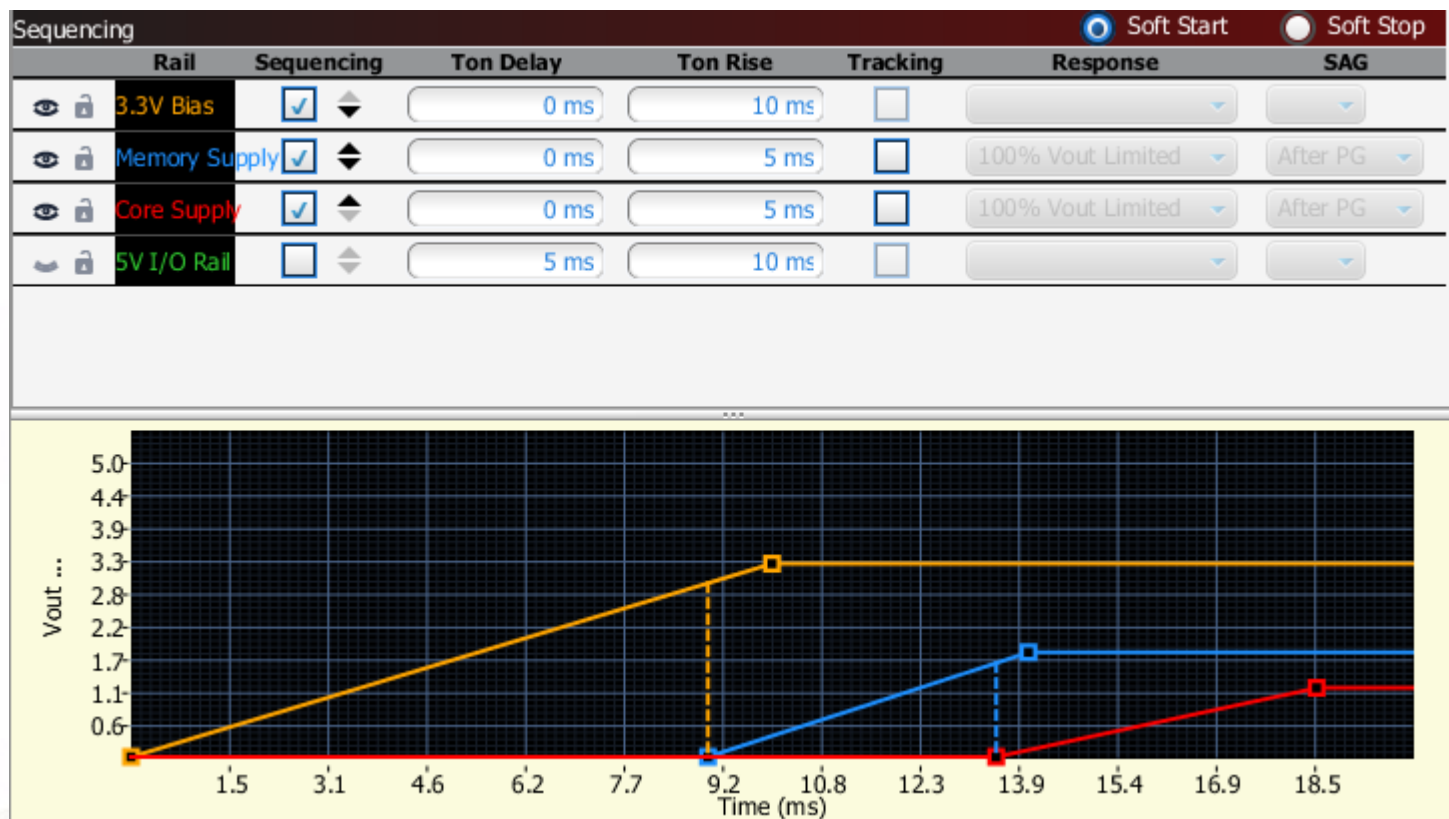


Ton Delay of 1<sup>st</sup> rail of 5ms

Soft-start time of 5ms

Second device Ton Delay will begin from PGOOD of earlier device

# Event Based Sequencing: 3 Rail Example



Three rails sequenced in order. Ton Delays are set to 0ms to show how the start of each rail begins once the PGOOD signal occurs from the prior rail

# Command Line Tool

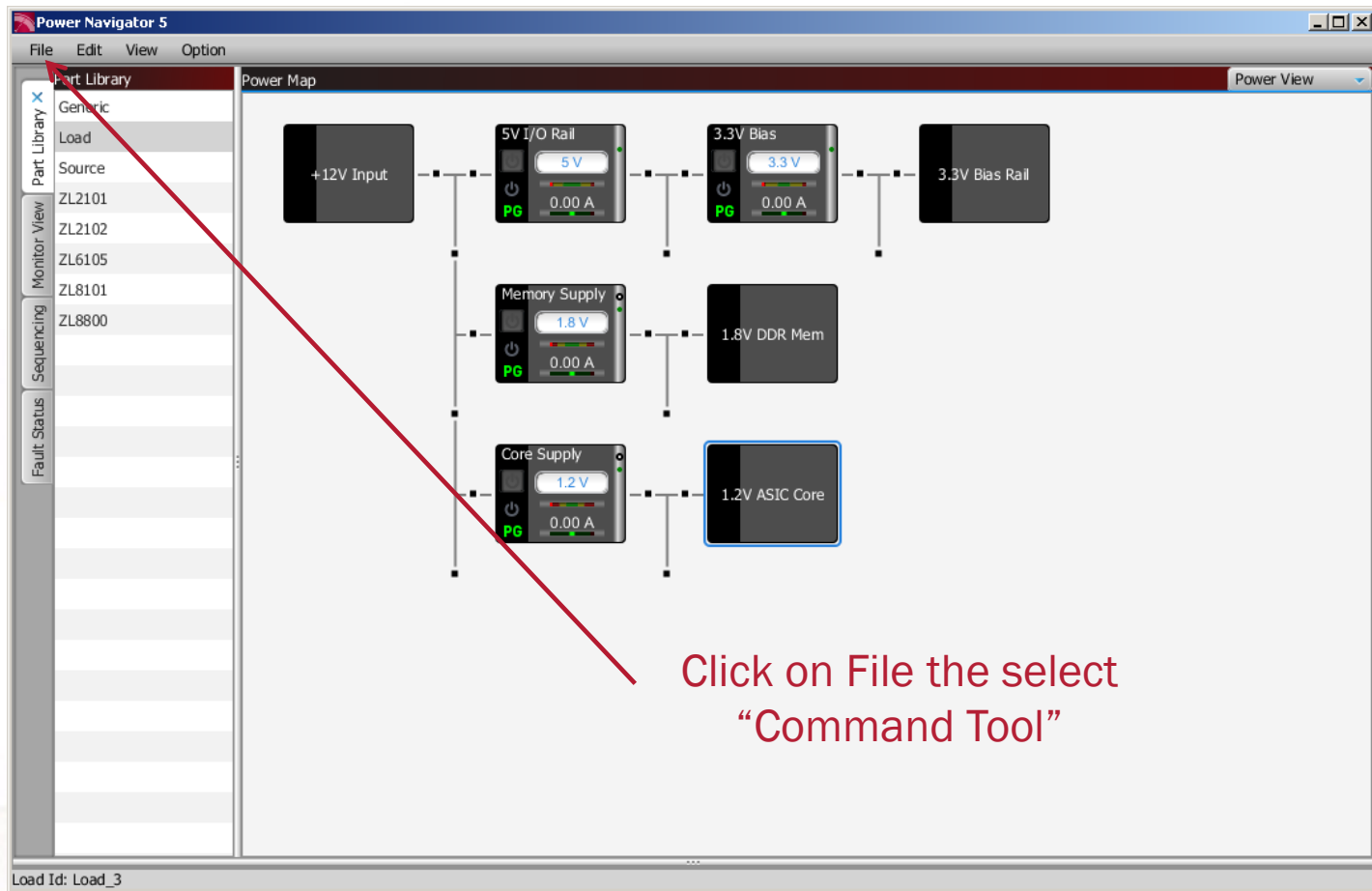




# Command Line Tool Overview

- **The command line tool is a powerful tool that can be used in any mode (with or without hardware) to adjust every parameter**
- **The command line tool is used to read/write any PMBus command that the device supports**

# Accessing the Command Line Tool

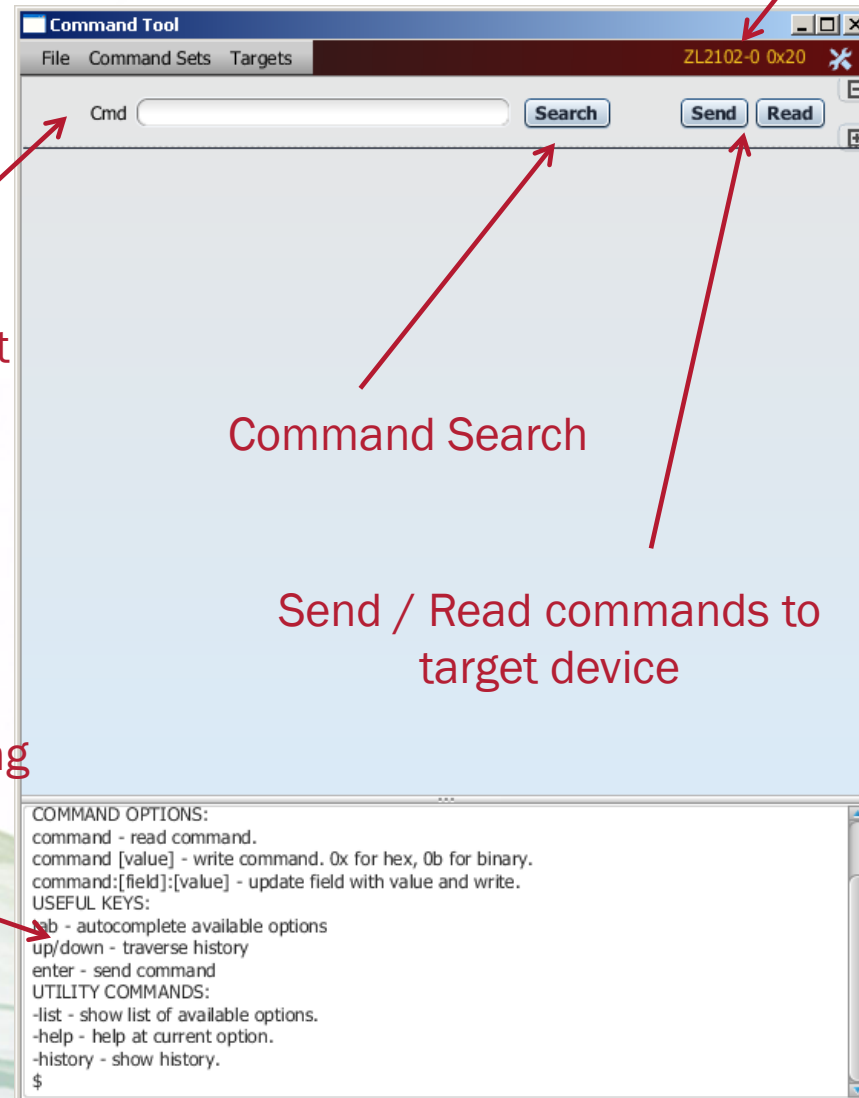


The Command Line tool can be accessed in a variety of manners, this shows how it can be accessed from the file menu



# Command Line Tool

Device selected for reading/writing commands



Command Line to select PMBus command

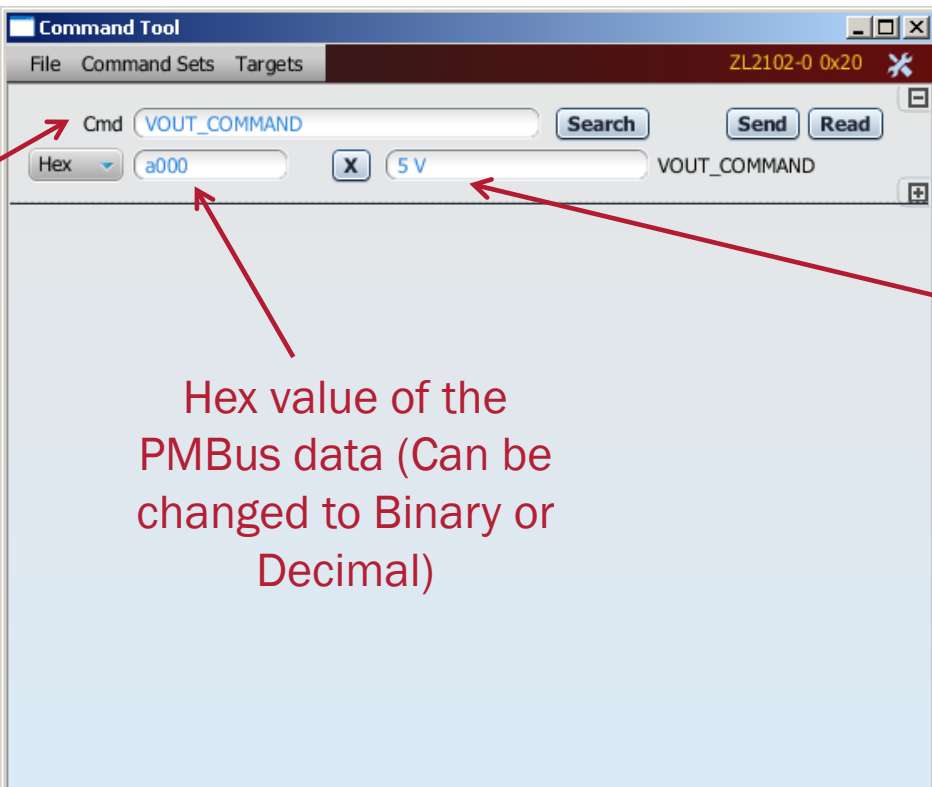
Command Search

Send / Read commands to target device

Add/Remove command lines in the window

Command window logging all changes

# Command Line: Changing Vout



The screenshot shows the 'Command Tool' window with the 'Targets' tab selected. The target is 'ZL2102-0 0x20'. The 'Cmd' field contains 'VOUT\_COMMAND'. Below it, the 'Hex' dropdown is set to 'Hex', and the value 'a000' is entered. To the right of the hex value is a button with an 'X' icon. Further right, the value '5 V' is displayed. The 'VOUT\_COMMAND' label is also present on the right side of the interface. Three red arrows point from text annotations to these specific elements: the 'VOUT\_COMMAND' text, the 'a000' hex value, and the '5 V' value.

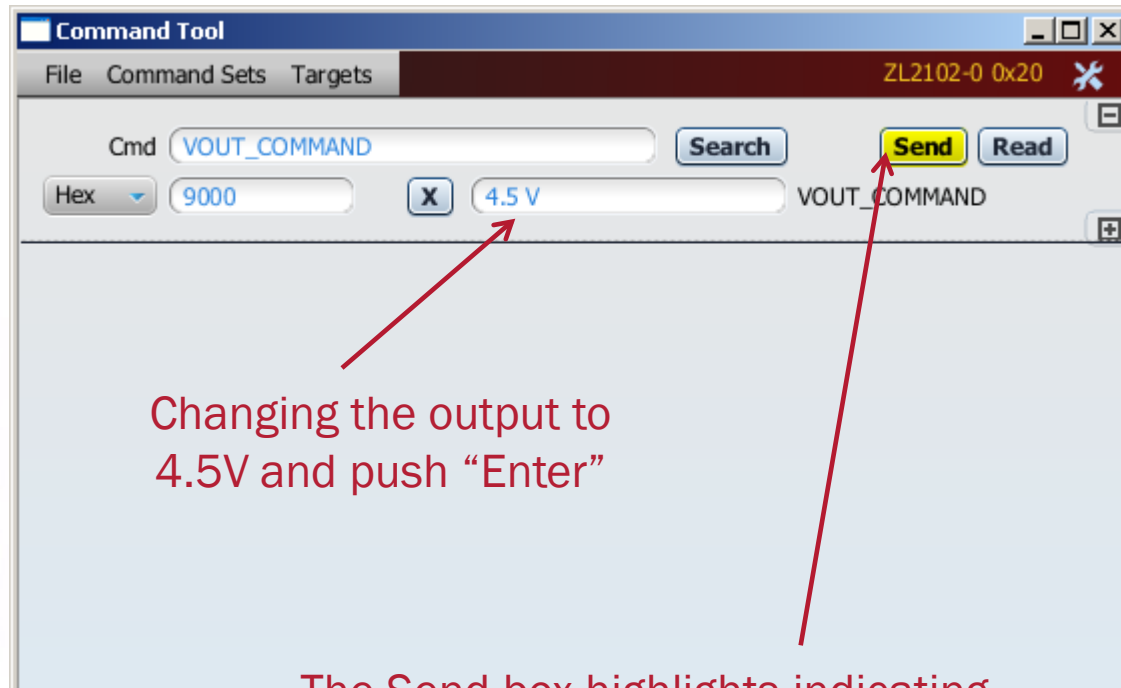
Type in “Vout\_Command” for the appropriate PMBus Command. The field will auto fill providing possible selections

Hex value of the PMBus data (Can be changed to Binary or Decimal)

Interpretation of the PMBus data

Typing in the VOUT\_COMMAND into the cmd line brings up the current configuration of that PMBus command, showing the device selected is a 5V output. Changes can then be made

# Command Line: Changing Vout



Changing the output to 4.5V and push "Enter"

The Send box highlights indicating confirmation is needed before making change to the hardware connected, or configuration if no hardware is connected

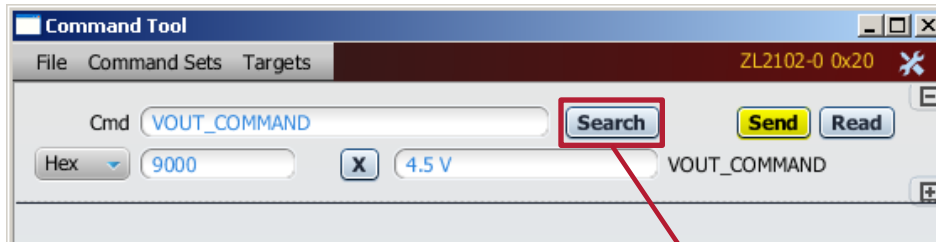
# Command Line: MISC\_CONFIG



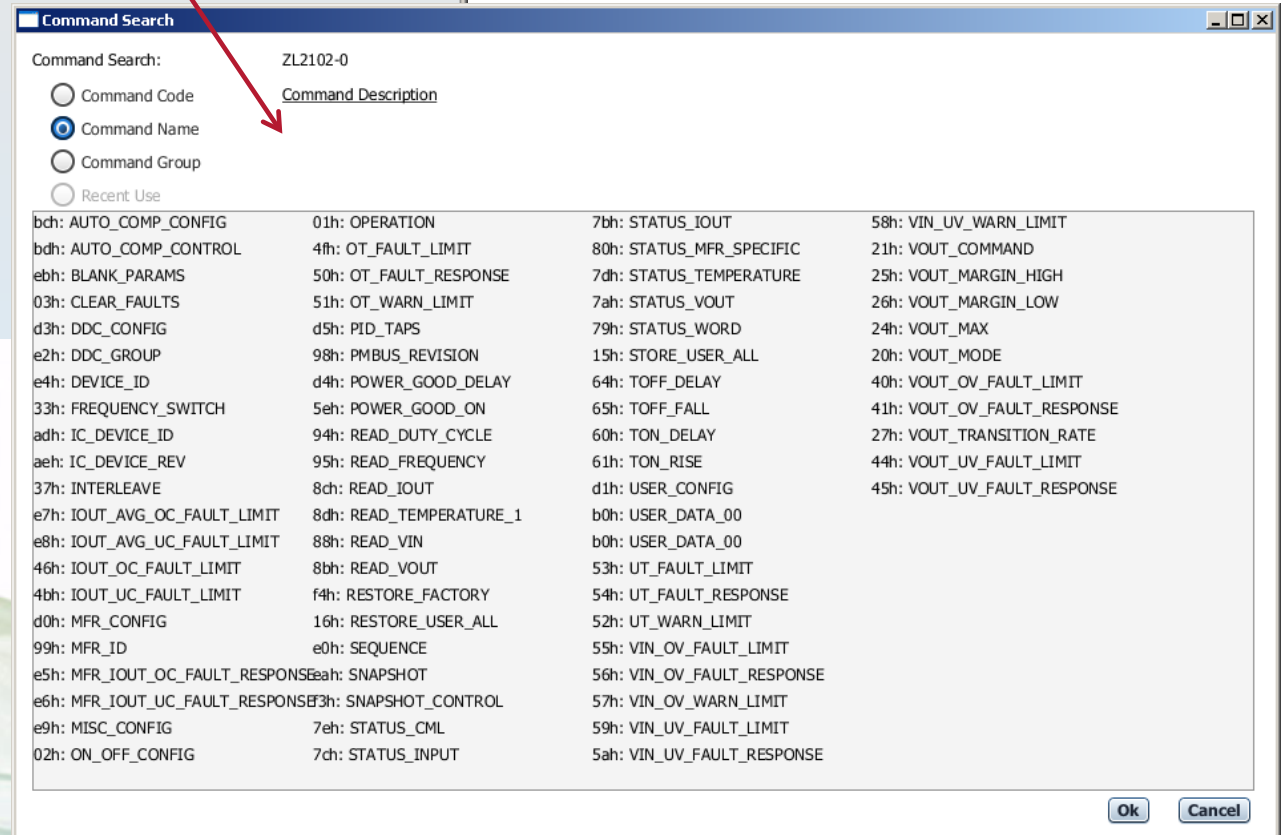
Change to  
MISC\_CONFIG  
PMBus command

This command uses several  
bit field options to setup the  
device. Logical interpretation  
is provided to quickly setup  
the device

# Command Line Tool: Search

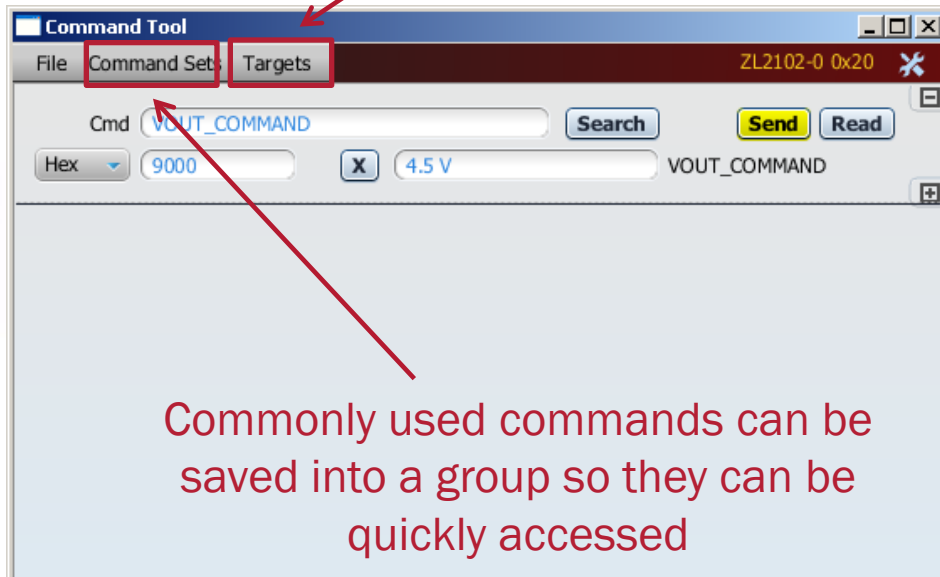


Clicking “Search” allows the user to find any PMBus command the device supports



# Command Line Tool: Tips

Change target device through “Targets”  
tab in top menu



Multiple commands can be  
displayed at once



# Project & Config files

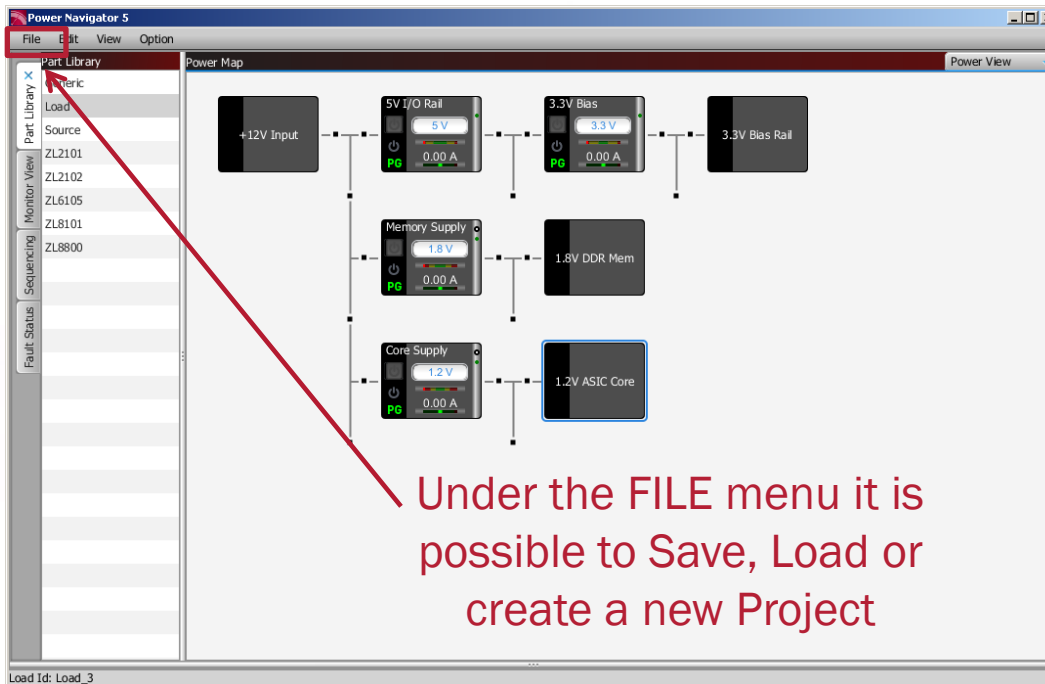


# File Formats

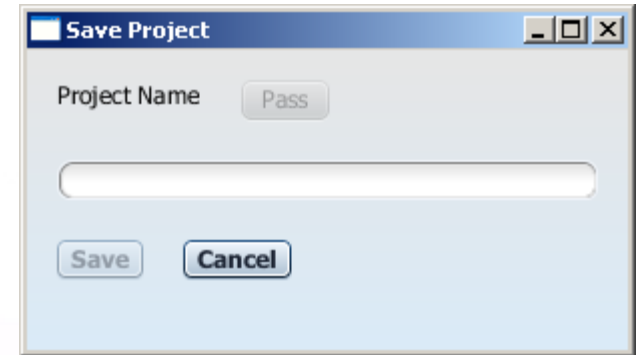
- **The Power Map can be saved as a project file that saves every attribute including configurations:**
  - This is called a “Project File”
  - Project files can be saved/loaded and shared to pass along setups
- **Individual part configurations can be saved in a text file format:**
  - This is called a “Config File”
  - Configuration files list every PMBus command that is configured and its data
  - These files can be saved/loaded for individual parts
  - These are used for other Intersil tools for programming devices at 3<sup>rd</sup> party programming houses



# Project Files



Under the FILE menu it is possible to Save, Load or create a new Project



Project file name must be at least 4 characters and must be unique (can not save the same name twice)

Project files are saved in folders under the following directory on your PC:

C:\Documents and Settings\User\My Documents\Intersil\PowerNavigator\Projects

# Config Files

Individual device  
configuration files are stored  
in the Project file directory

```
# ZL2102-0 0x20
# connected: false
# DEVICE_ID
# IC_DEVICE_ID
# IC_DEVICE_REV
# 5.0.2
# 2013/10/04 13:51:26
```

0x49A01200  
0x00

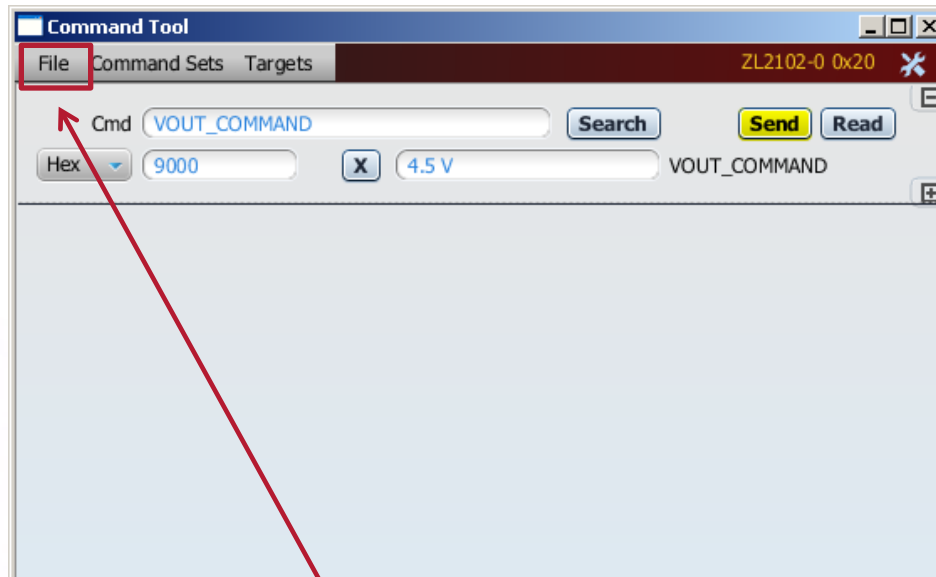
Revision history including  
time/date stamps are saved.  
Using the # sign will allow  
comments in the file

```
### Begin User Store
RESTORE_USER_ALL
VOUT_COMMAND          0x9000      # 4.5 V
VOUT_MARGIN_HIGH      0xa800      # 5.25 V
VOUT_MARGIN_LOW       0x9800      # 4.75 V
VOUT_OV_FAULT_LIMIT   0xb0cd      # 5.525 V
VOUT_UV_FAULT_LIMIT   0x8f33      # 4.475 V
POWER_GOOD_ON         0x9000      # 4.5 V
```

```
STORE_USER_ALL
### End User Store
```

Configuration files only save  
command changes that are  
different from the device  
default

# Config File: Load / Save

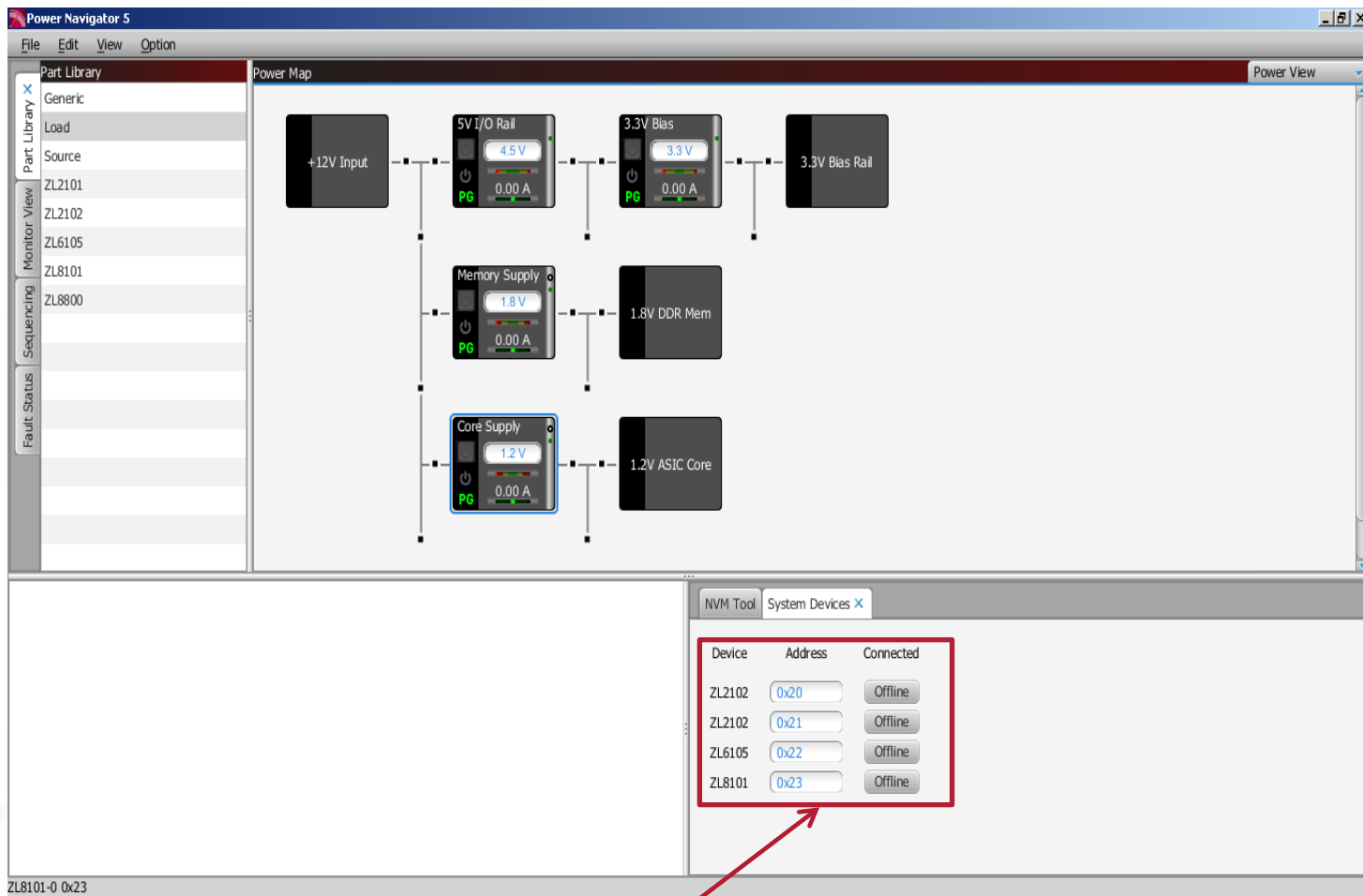


Config files can be saved separately (outside of project files) through the FILE menu on the command line tool

# Connecting to Hardware

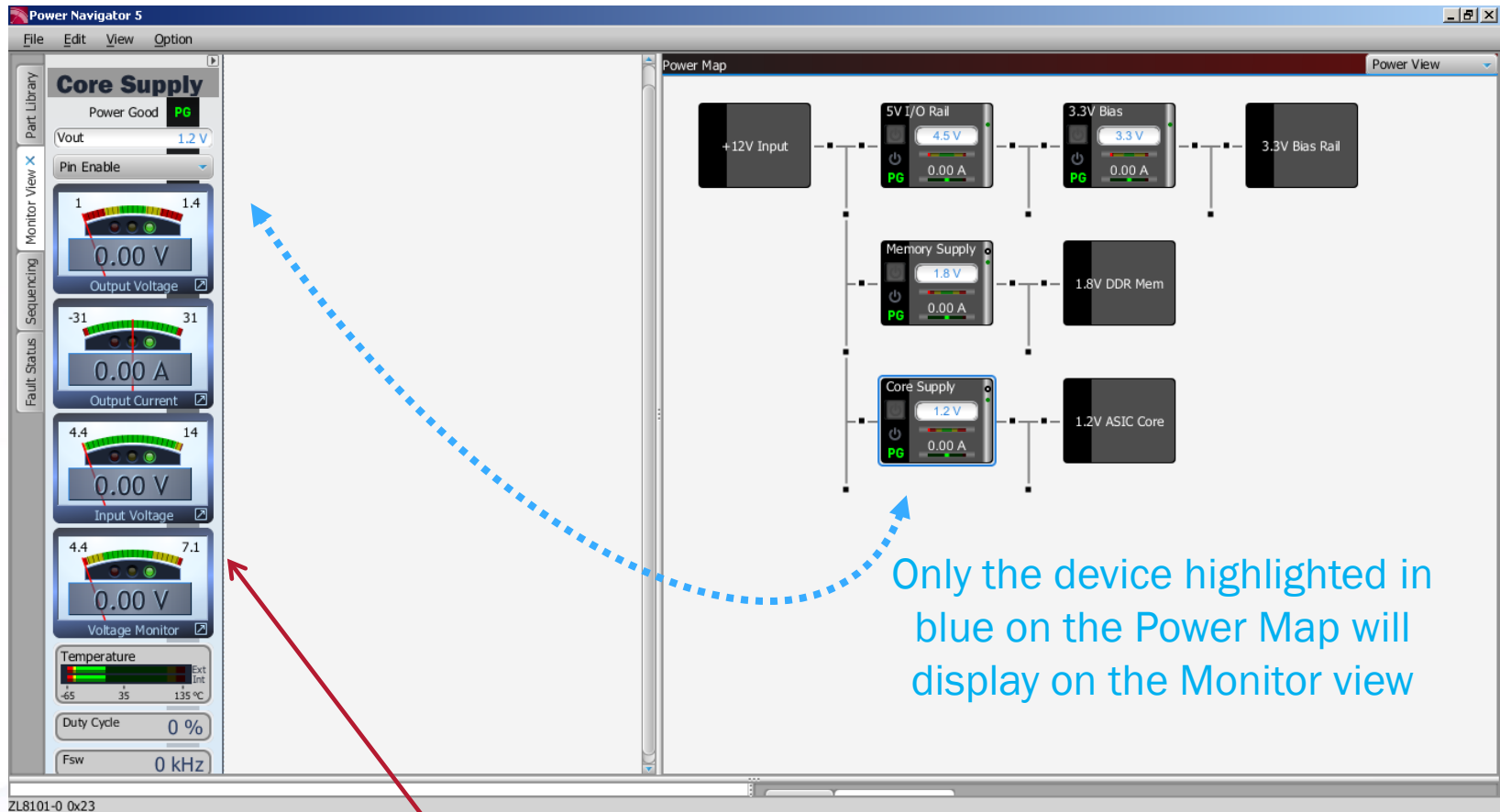


# Connecting to Hardware



Devices can be selected from the Power Map to be individually connected

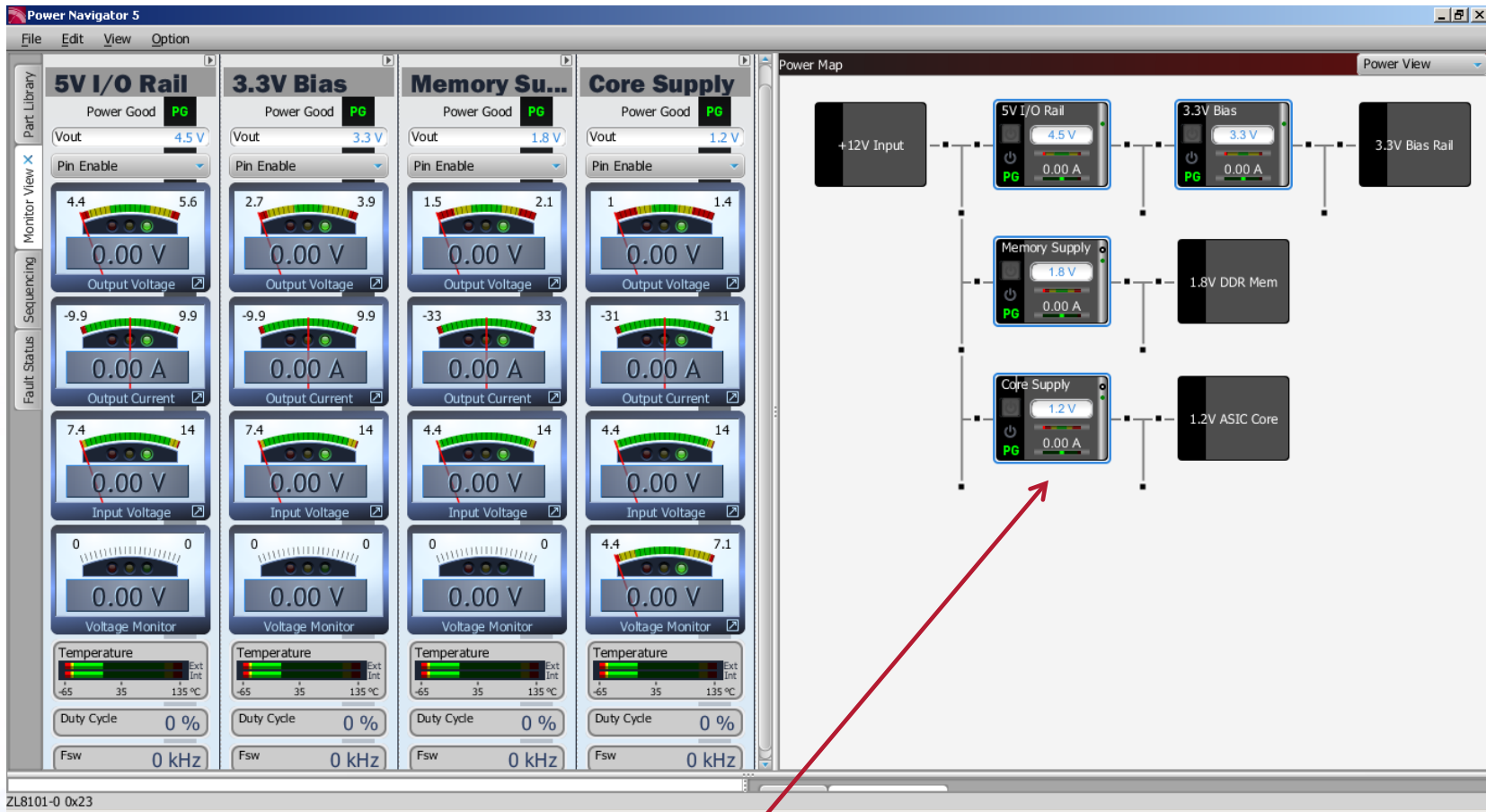
# Monitoring Status



Only the device highlighted in blue on the Power Map will display on the Monitor view

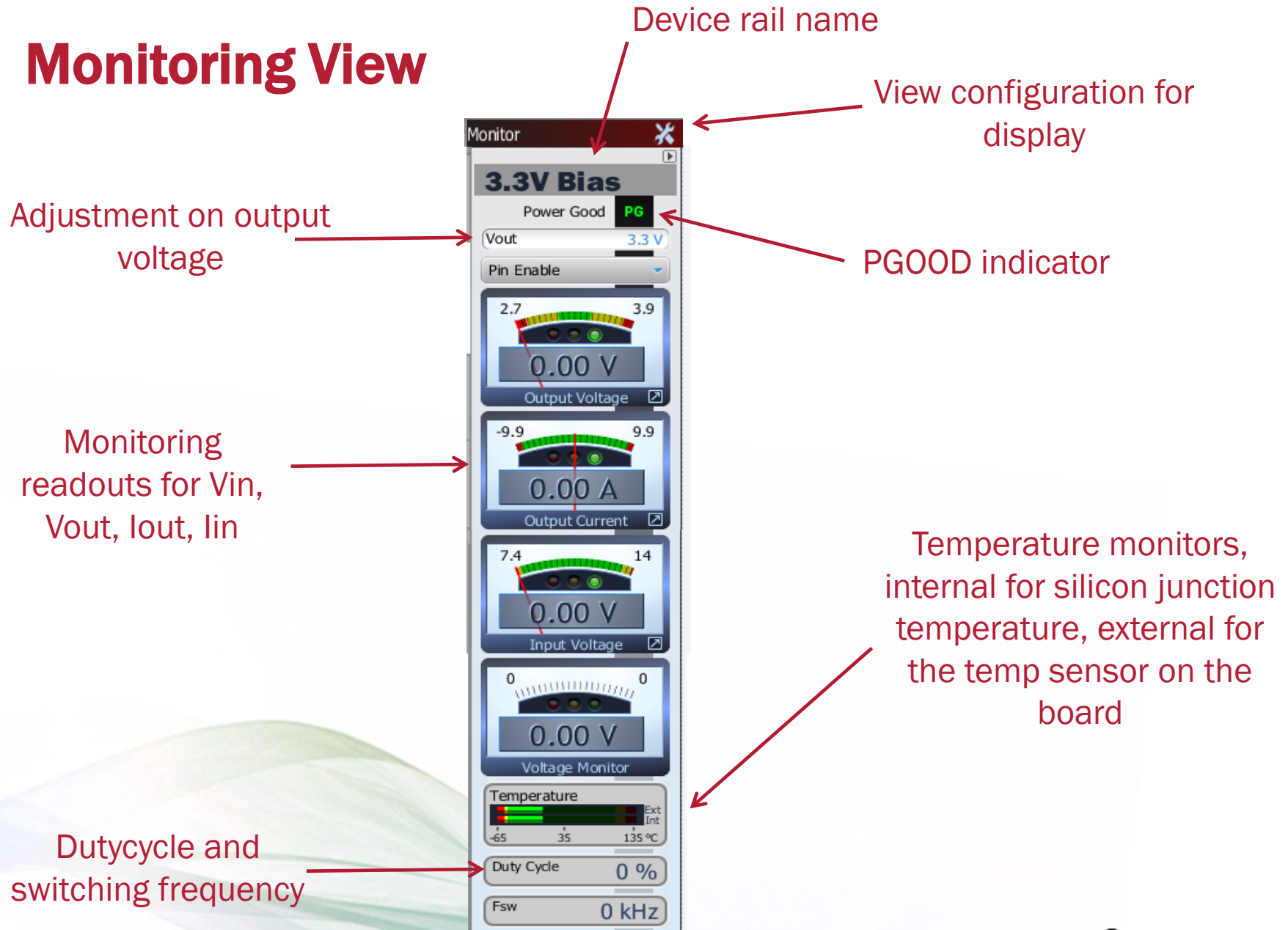
Monitoring view that displays all the telemetric data from the power supply

# Monitoring Status



Clicking in the lower half of the box will select it.  
Holding “CTRL” key while selecting boxes will  
highlight multiple devices

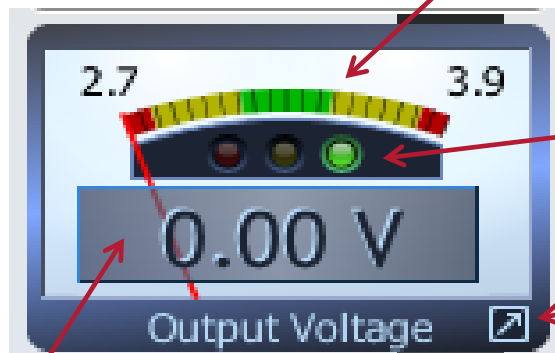
# Monitoring View





# Readouts

Analog readout with color indicators. Green is within normal limits, yellow in PMBus warning limits, red for exceeding OVP/UVF settings



Operation and fault lights

Clicking this button will open the window below allowing adjustment of limits

Digital readout of output voltage

**Vout Margins & Limits**

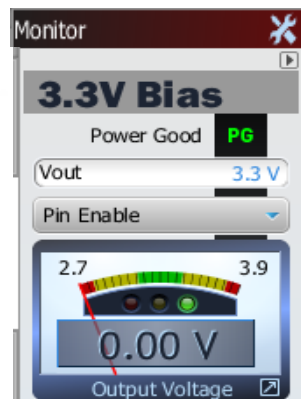
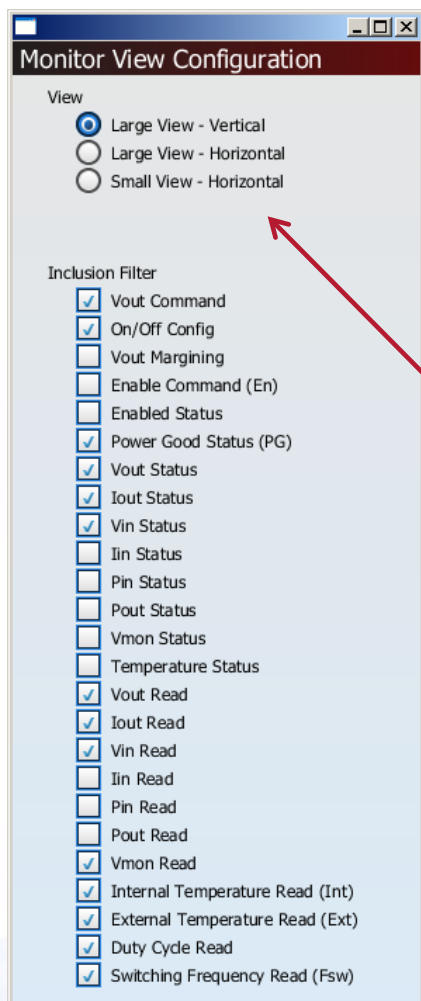
Vout Max	3.63 V	
Vout OV Fault Limit	3.79 V	10.5 %
Vout Margin High	3.46 V	5 %
Vout Margin Low	3.13 V	-5 %
Power Good Threshold	2.97 V	-10 %
Vout UV Fault Limit	2.8 V	-10.5 %
Margin/Limits Track Vout <input checked="" type="checkbox"/>		
Display Limit High	3.89 V	20 %
Display Limit Low	2.7 V	-20 %
Display Limits Track Vout <input checked="" type="checkbox"/>		
Vout Command	3.3 V	

2.7 3.9

0.00 V

Output Voltage

# Monitoring: Changing Views



1. Click on the config icon on the top right

2. Adjust the view properties to select horizontal or add/drop any filter selection

Φ	Rail	Vcmd	Mode	Status	Vout	Iout	Vin	Duty	Fsw
▶	5V I/O Rail	4.5 V	Pin	PG Vout Iout Vin	0.00 V	0.00 A	0.00 V	0 %	0 kHz
▶	3.3V Bias	3.3 V	Pin	PG Vout Iout Vin	0.00 V	0.00 A	0.00 V	0 %	0 kHz
▶	Memory Supply	1.8 V	Pin	PG Vout Iout Vin	0.00 V	0.00 A	0.00 V	0 %	0 kHz

For systems with a large number of rails, a different monitoring view can be selected.

# Fault Status

Select fault status on left side tab

The screenshot displays the Power Navigator 5 interface. On the left, the 'Fault Status' tab is selected, showing a list of fault categories for three power rails: 5V I/O Rail, Memory Supply, and 3.3V Bias. A red arrow points to the 'Fault Status' tab in the left sidebar. The 'Power Map' view on the right shows a block diagram of the power system with components like +12V Input, 5V I/O Rail, 3.3V Bias, Memory Supply, and Core Supply, each with its own status indicator (PG, Vout, Iout, etc.).

Fault status can be selected for rails of interest by selecting devices in the Power Map

Fault Status can be seen for every rail in the system alerting the user of the root cause of a fault (ie Over Current)

# Evaluation Board & Hardware Detection

Detected devices appear here

The screenshot displays the PowerNavigator software interface. On the left, the 'Scan Devices' panel is empty, with a red arrow pointing to it from the text 'Detected devices appear here'. Below this panel is a 'Scan Again' button with a range of '01' to '70' and a 'Monitor Hardware' button, with a red arrow pointing to it from the text 'SMBus address range can be adjusted'. The central 'Build Offline System' panel shows a 'Part Library' on the left, a 'Dashboard' with various system parameters, and a 'Monitor: Rail 12V' section. The main area of this panel displays a 'System: White Lightning' block diagram with components like 'Core', 'Rail L1V', 'Rail 0V', 'Rail 5.0V', and 'Rail 0V'. Below the diagram is a 'Build New System' button. On the right, the 'Projects' panel shows a 'Full system example' with 'ZL9101M 3-phase'. At the bottom, there are 'Start' and 'Cancel' buttons. A descriptive text block in the lower center reads: 'Design your power system from scratch using Intersil parts in the library. Once your system is designed, bring up the system by connecting to hardware.'

SMBus address range can be adjusted

Design your power system from scratch using Intersil parts in the library. Once your system is designed, bring up the system by connecting to hardware.

Digital Power devices can be instantly connected and monitored without setting up a project file simply by connecting the hardware and launching PowerNavigator. Any device detected will show up in the left window

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