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**sbRIO-9651**

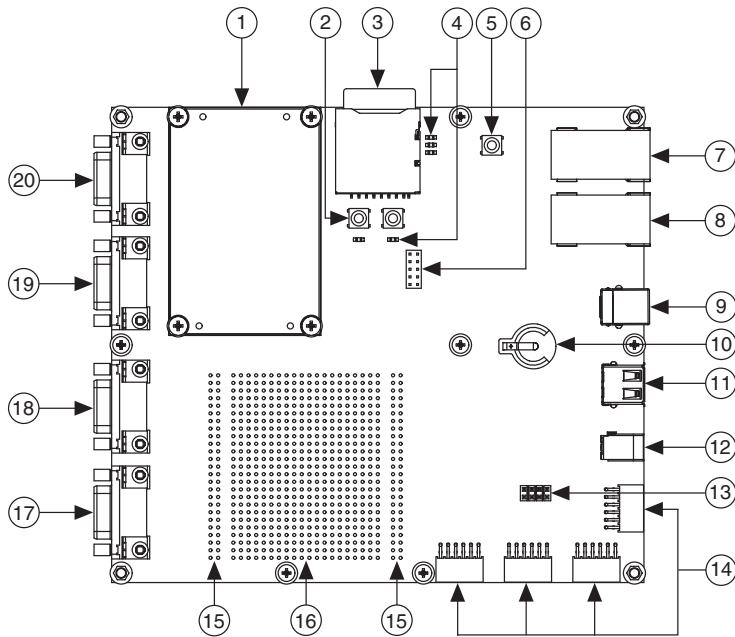
# QUICK START GUIDE

## NI sbRIO-9651

### System on Module Development Kit

The NI sbRIO-9651 System on Module (SOM) development kit includes the sbRIO-9651 SOM and a reference carrier board. Use this document to help you get started with setting up the system and reviewing an example LabVIEW project.

## Parts Locator Diagram



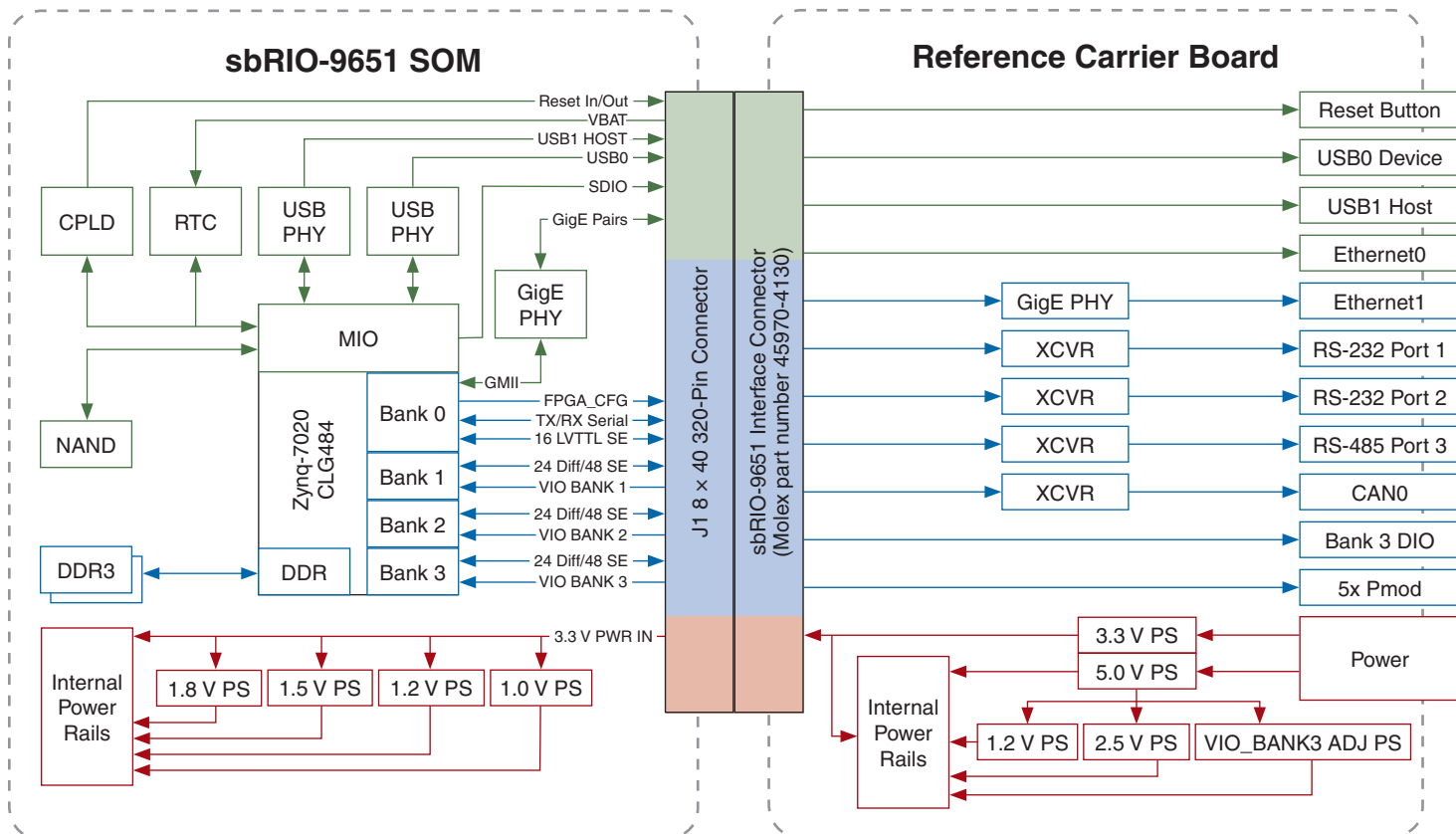
- 1 sbRIO-9651 SOM
- 2 User Buttons
- 3 SDHC Slot
- 4 LEDs
- 5 Reset Button
- 6 VIO\_BANK3 Voltage Selection Jumper
- 7 Ethernet0 Port
- 8 Ethernet1 Port
- 9 USB0 Device Port
- 10 RTC Battery
- 11 USB1 Host Port
- 12 Power Connector (9 V–16 V)
- 13 Pmod Connector 5 (I<sup>2</sup>C)
- 14 Pmod Connectors 1 through 4
- 15 Bank 3 FPGA I/O
- 16 Prototyping Area
- 17 RS-232 Port 1 (Console Out)
- 18 RS-232 Port 2
- 19 RS-485 Port 5
- 20 CAN0 Port

## Block Diagram

The following figure shows the connections and interfaces between the sbRIO-9651 SOM and the reference carrier board.

**Legend**

- Fixed behavior signals
- User-defined FPGA signals
- Power signals



# Getting Started with the sbRIO-9651 SOM Development Kit

Complete the following steps to get started with the sbRIO-9651 SOM and the reference carrier board, including setting up your hardware and reviewing an example LabVIEW project that includes an sbRIO-9651 SOM target.

 **Note** Refer to the documentation listed in the *Where to Go Next* section of this document for additional sbRIO-9651 SOM resources.

## 1 Installing Required Software

Install or verify that you have installed the following software:

- LabVIEW 2014 or later
- LabVIEW Real-Time Module 2014 or later
- LabVIEW FPGA Module 2014 or later
- NI-RIO Device Drivers August 2014 or later

## 2 Connecting Power

- a. Ensure that your included 12 V power supply is disconnected from an AC power source.
- b. Connect the power supply to the **Power (9 V–16 V)** terminal on the reference carrier board.
- c. Plug in the power supply to the AC power source.

## 3 Connecting to a Computer

To connect with USB:

- a. Connect one end of the included USB cable to the **USB0 Device** port on the reference carrier board.
- b. Connect the other end of the USB cable to a computer.

To connect with Ethernet:


- a. Connect a standard Category 5 (CAT-5) or better Ethernet cable to the **Ethernet0** port on the reference carrier board.
- b. Connect the other end of the Ethernet cable to an Ethernet hub or to a computer.

When you power up the device, it attempts to initiate a DHCP network connection. If the device cannot initiate a DHCP connection, it connects to the network with a link-local IP address with the form `169.254.x.x`.


- c. In Measurement & Automation Explorer (MAX), configure network settings for the device. Refer to the *MAX Help for CompactRIO and Single-Board RIO* for more information about configuring network settings in MAX.

## 4 Reviewing Example Software

- a. In LabVIEW, open the sbRIO-9651 SOM reference carrier board example project, located at `\labview\examples\CompactRIO\Chassis Specific\sbrIO-9651 CRB Getting Started\sbrIO-9651 CRB Getting Started.lvproj`.
- b. Expand the **sbRIO-9651 Socket (DevKit)** item and review the LabVIEW FPGA I/O items defined for the sbRIO-9651 SOM development kit.


 **Note** The socketed component-level IP (CLIP) for the reference carrier board, located at `<National Instruments>\shared\CompactRIO\CLIPs\sbrIO-9651\DevKit\DevKit.cfg`, defines the I/O configuration used in this application. When you are ready to create a carrier board for your own application, you can use the development kit CLIP definition as a starting point for a new CLIP.


- c. Open the `sbrIO-9651 CRB Getting Started.vi` file in the project and review the block diagram.
- d. Compile the VI and download it to the flash memory of the sbRIO-9651 SOM. Refer to the *Downloading an FPGA VI to the Flash Memory of an FPGA Target* topic in the *LabVIEW Help (FPGA Module)* for more information.


 **Note** When you create your own CLIP and define processor peripherals (such as secondary Ethernet, CAN, or additional serial ports), you must compile your FPGA VI and download it to the flash of the sbRIO-9651 SOM. This ensures that the driver for the peripheral can load properly at boot time.

## Where to Go Next


Refer to the following additional resources as you design, prototype, and implement your sbRIO-9651 SOM application.


 *NI sbRIO-9651 System on Module OEM Device Specifications*—Device and peripheral requirements for the sbRIO-9651 SOM.


 *NI sbRIO-9651 System on Module Carrier Board Design Guide*—Recommendations and constraints for designing a custom carrier board.

 *LabVIEW Help*—Information about configuring sbRIO-9651 SOM targets in LabVIEW and compiling, downloading, and running FPGA VIs.




 *NI Single-Board RIO CLIP Generator Help*—Reference for the sbRIO CLIP Generator application.

 [ni.com/singleboard/setup](http://ni.com/singleboard/setup)—Tutorials, demos, and videos for getting started with NI sbRIO devices.

 [ni.com/training](http://ni.com/training)—Online or classroom training and certifications.

 [ni.com/support](http://ni.com/support)—Discussion forums, example code, and other helpful resources.

### Legend

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