

PMBus Interface and Accessories User Guide



| Contents | Page |
|---------------------------------------|------|
| Introduction | 1 |
| Connector Information | 3 |
| Configuration Details | 4 |
| Application Details | 5 |
| GUI Configuration | 5 |



Introduction

The PMBus-USB Adapter enables communication with the PMBus® interface of Vicor power modules using a Host PC. The PMBus control interface provides digital management capabilities and access to the telemetry monitoring and status reporting offered by the product.

The PMBus-USB Adapter converts the PMBus interface to a USB communication protocol using an internal isolated controller, allowing users to easily connect to a Host PC (no driver installation is required with Windows operating systems). The Power System Configurator GUI, available from Vicor, provides a convenient means for monitoring and control of the power module.

All PMBus capabilities and features of the connected power module are available through the GUI, allowing users to read and write into the status configuration registers of the module, observe input and output telemetry, monitor faults and obtain other additional device information. The PMBus-USB Adapter enables easy evaluation of the PMBus digital interface offered on select Vicor products in a test environment. Contact Vicor Applications for a complete list of compatible products.

Please note that this User Guide applies only to the operation of the PMBus-USB Adapter listed below with Vicor converters and the Power System Configurator GUI.

| Compatible Adapter Part Number | VDDB Bias Voltage |
|--------------------------------|-------------------|
| I2C-ADAPTER-A04 | 5V supply output |



IMPORTANT NOTICE:

Hazardous voltages may be present on the interfaced Vicor power module.

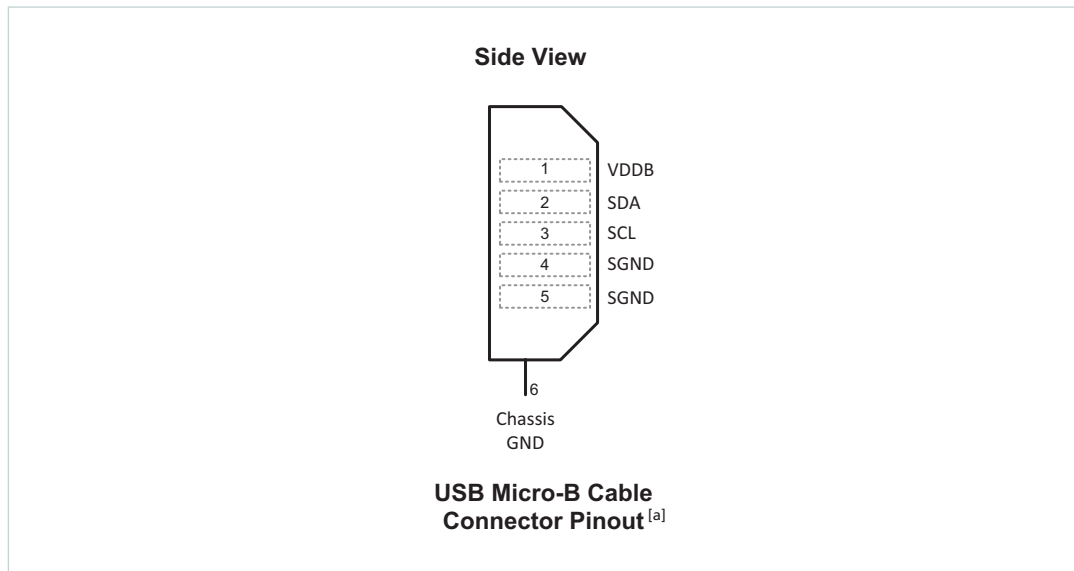
PERSONAL CONTACT WITH LINE VOLTAGE MAY RESULT IN SEVERE INJURY, DISABILITY, OR DEATH. IMPROPER OR UNSAFE HANDLING OF THIS ACCESSORY AND RELATED POWER MODULE(S) MAY RESULT IN SERIOUS INJURY OR DEATH

Read the precautions below entirely BEFORE using the PMBus®-USB Adapter. Do not operate the PMBus-USB Adapter unless you have the appropriate safety precautions in place on your bench to guarantee safety.

The list below is not comprehensive and is not a substitute for common sense and good practice.

- During operation, the power devices and surrounding structures can be operated safely at high temperatures.
- Remove power from converter and use caution when connecting and disconnecting test probes and interface lines to avoid inadvertent short circuits and contact with hot surfaces.
- Never use a jumper in place of the fuse.
- Always use approved safety glasses when testing electronic products. Follow good laboratory practice and procedures.
- Avoid creating ground loops when making measurements of the isolated input or output voltage and signals.
- Care should be taken to protect the user from accidental contact with electrical terminals when operating under power.
- Care should be taken to avoid reversing polarities if connecting to the opposite (solder) side of the board.
- The PMBus-USB Adapter described in this document is designed for general laboratory evaluation, and is not suitable for installation in end user equipment or applications.
- Refer to the specific Vicor power module data sheet of the interfaced product(s) for electrical, thermal, and mechanical product details.

Connector Information – PMBus-USB Adapter

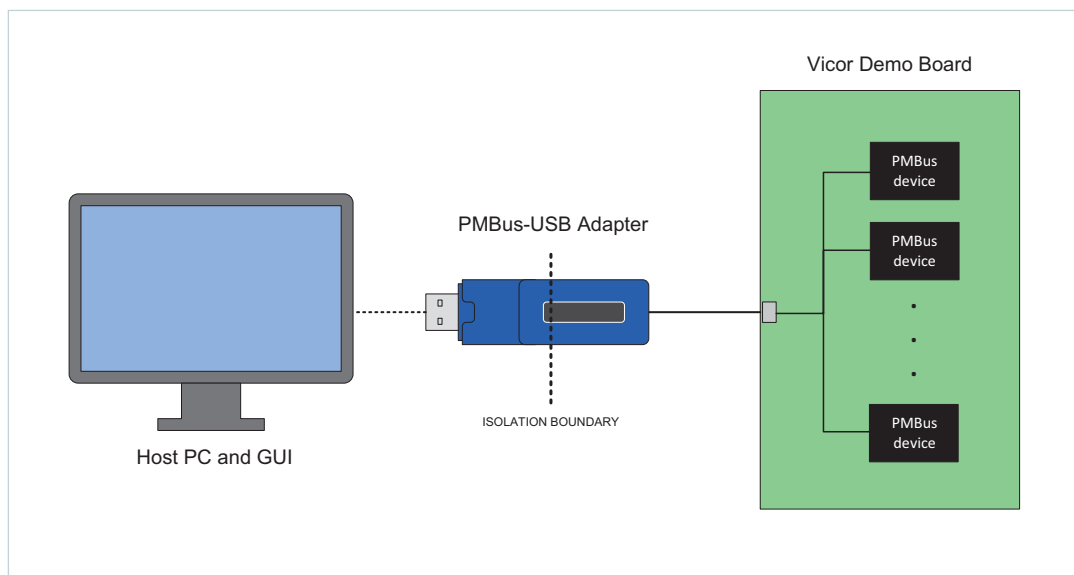


| Pin Number | Signal Name | Type | Function |
|------------|-------------|---------------|--|
| 1 | VDDB | OUTPUT | 5V supply output |
| 2 | SDA | INPUT/OUTPUT | I ² C Data PMBus [®] compatible ^[b] |
| 3 | SCL | OUTPUT | I ² C Clock PMBus compatible ^[b] |
| 4 | SGND | SIGNAL RETURN | Signal ground |
| 5 | SGND | SIGNAL RETURN | Signal ground |
| 6 | Chassis GND | SHIELD | Connector housing ground |

^[a] The USB Micro-B cable connector represents the pinout of the PMBus-USB Adapter. It does not represent the USB Micro-B PCB receptacle.

^[b] The PMBus-USB Adapter does not include internal pull-up resistors on the SDA and SCL lines. This allows the user to select the internal 5V bus (VDDB) for pull up or an external VDD bus. See Figure 2 for further details.

Figure 1
Host PC to Vicor power module array connection, PMBus[®] communication interface shown as a typical application set up



Configuration Details

The SDA and SCL lines are not pulled up to VDDDB within the adapter to enable flexibility of the compatible adapters and I²C bus voltages. The user must include the pull-up resistors R1 and R2 as shown in either of the diagrams below in Figure 2 for the adapter to function properly. C1 is recommended for I²C bus bypassing. R3 and C2 are recommended to provide a path to GND for high-frequency noise.

- I2C-ADAPTER-A04 is compatible with either 5V or 3.3V I²C bus voltages when using external VDD.
- VDDDB current supply maximum is 50mA.

Figure 2
Recommended
pull-up resistor configurations

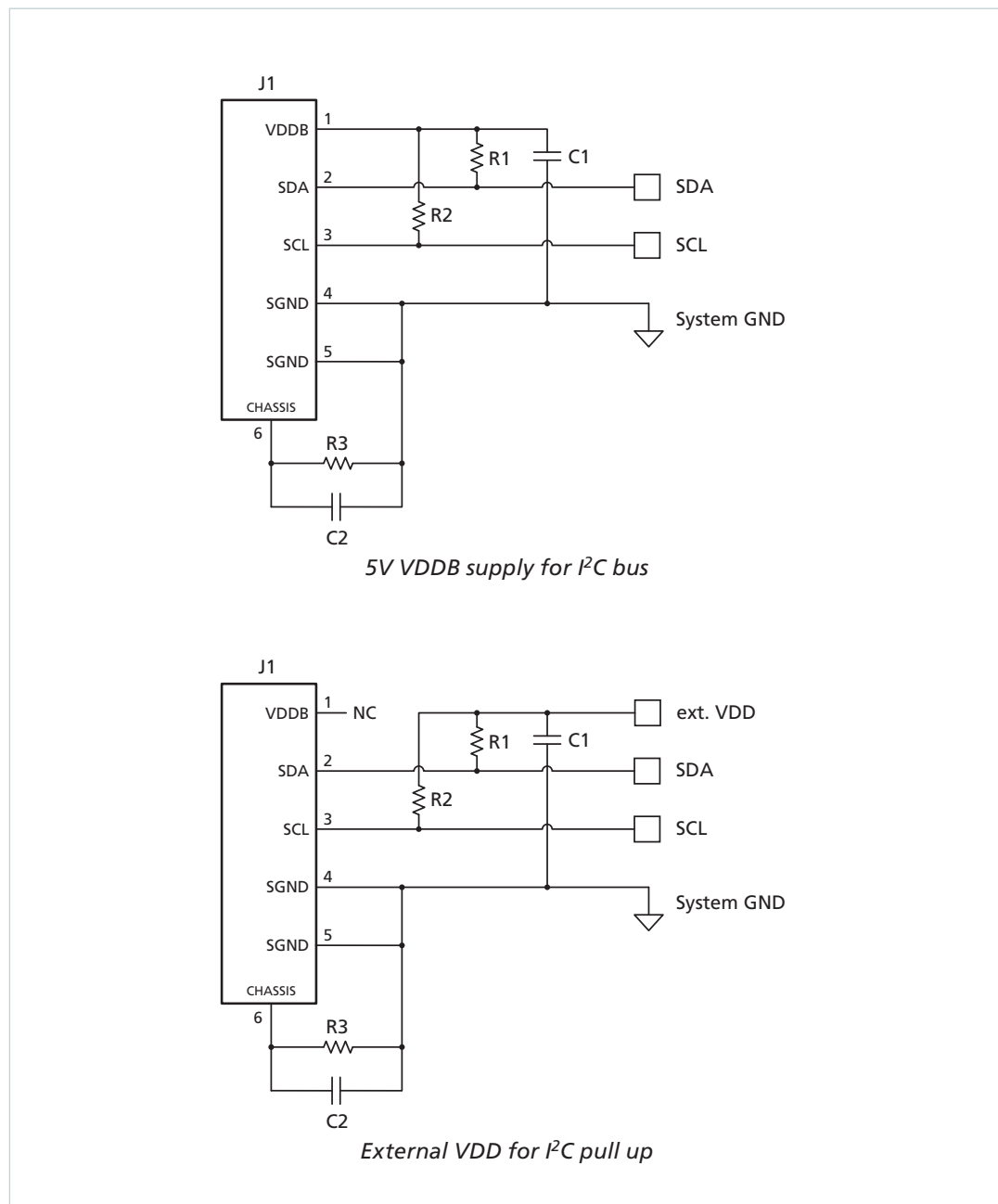


Table 1
Component information
for Figure 2

| Reference Designator | Description |
|----------------------|-----------------------|
| R1, R2 | RES 2kΩ 1/20W 1% |
| R3 | RES 10kΩ 1/16W 1% |
| C1, C2 | CAP X7R 0.1μF 10% 16V |
| J1 | CONN MICRO-B USB SMD |

Application Details

The PMBus-USB Adapter, along with the listed companion accessories and Power System Configurator GUI, provides a convenient means to demonstrate the PMBus® digital interface offered on Vicor power modules in an evaluation environment. With these tools, the user can quickly get started with evaluating the features offered by the PMBus interface and determining the needs of a final production power system.

Features

- Easily configure and monitor PMBus enabled Vicor power modules
 - Power System Configurator GUI for PMBus control interface; contact Vicor Applications for details
- USB connection to host PC
- Provides external bias (VDDDB)
- Isolated PMBus to host interface (4242V_{DC})
- Measurement of input and output parameters such as voltage, current and temperature
- Fault monitoring and reporting
- Enable / Disable control with compatible products

Safety and Regulatory Compliance

- CE Marked for Low Voltage Directive, EMC Directive, and RoHS Recast Directive
- UKCA, electrical equipment (safety) regulation
- The PMBus-USB Adapter complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
 - This device may not cause harmful interference;
 - This device must accept any interference received, including interference that may cause undesired operation.

GUI Configuration

Table 2
PMBus companion accessories

| Part Number | Description |
|--------------------|-------------------------------|
| I2C-ADAPTER-A04 | PMBus-USB Adapter |
| Software Interface | Power System Configurator GUI |

After making the necessary connections, follow the guidelines for configuring the GUI and to ensure establishment of communication between the power module and the host PC.

1. Verify I²C bus voltage is available for external SCL and SDA pull-up resistors, whether from VDDDB or external source.
2. Power up module within the input voltage continuous operating range specified by the device data sheet.
3. Open the Power System Configurator software installed on the connected host PC.
4. The Power System Configurator GUI will connect with and display any compatible Vicor products on the Devices side panel.
5. Verify the desired power module device is selected (highlighted in orange) for communication through the GUI.

Revision History

| Revision | Date | Description | Page Number(s) |
|----------|----------|--|----------------------|
| 1.0 | 05/20/19 | Initial release | n/a |
| 1.1 | 08/24/20 | Updated nomenclature and third-party trademarks | all |
| 1.2 | 09/17/20 | Added support for part number I2C-ADAPTER-A03 | 1, 3, 4, 5, 6 |
| 1.3 | 02/12/21 | Clarified connector pinout | 3 |
| 1.4 | 05/08/24 | I2C-ADAPTER-A04 replaces I2C-ADAPTER-A02, I2C-ADAPTER-A03 Added agency approvals Updated configuration details | 1, 3, 5 1, 5 4 |

Limitation of Warranties

Information in this document is believed to be accurate and reliable. HOWEVER, THIS INFORMATION IS PROVIDED "AS IS" AND WITHOUT ANY WARRANTIES, EXPRESSED OR IMPLIED, AS TO THE ACCURACY OR COMPLETENESS OF SUCH INFORMATION. VICOR SHALL HAVE NO LIABILITY FOR THE CONSEQUENCES OF USE OF SUCH INFORMATION. IN NO EVENT SHALL VICOR BE LIABLE FOR ANY INDIRECT, INCIDENTAL, PUNITIVE, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR SAVINGS, BUSINESS INTERRUPTION, COSTS RELATED TO THE REMOVAL OR REPLACEMENT OF ANY PRODUCTS OR REWORK CHARGES).

Vicor reserves the right to make changes to information published in this document, at any time and without notice. You should verify that this document and information is current. This document supersedes and replaces all prior versions of this publication.

All guidance and content herein are for illustrative purposes only. Vicor makes no representation or warranty that the products and/or services described herein will be suitable for the specified use without further testing or modification. You are responsible for the design and operation of your applications and products using Vicor products, and Vicor accepts no liability for any assistance with applications or customer product design. It is your sole responsibility to determine whether the Vicor product is suitable and fit for your applications and products, and to implement adequate design, testing and operating safeguards for your planned application(s) and use(s).

VICOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED OR WARRANTED FOR USE IN LIFE SUPPORT, LIFE-CRITICAL OR SAFETY-CRITICAL SYSTEMS OR EQUIPMENT. VICOR PRODUCTS ARE NOT CERTIFIED TO MEET ISO 13485 FOR USE IN MEDICAL EQUIPMENT NOR ISO/TS16949 FOR USE IN AUTOMOTIVE APPLICATIONS OR OTHER SIMILAR MEDICAL AND AUTOMOTIVE STANDARDS. VICOR DISCLAIMS ANY AND ALL LIABILITY FOR INCLUSION AND/OR USE OF VICOR PRODUCTS IN SUCH EQUIPMENT OR APPLICATIONS AND THEREFORE SUCH INCLUSION AND/OR USE IS AT YOUR OWN RISK.

Terms of Sale

The purchase and sale of Vicor products is subject to the Vicor Corporation Terms and Conditions of Sale which are available at: (<https://www.vicorpower.com/termsconditionswarranty>)

Export Control

This document as well as the item(s) described herein may be subject to export control regulations. Export may require a prior authorization from U.S. export authorities.

Contact Us: <https://www.vicorpower.com/contact-us>

Vicor Corporation

25 Frontage Road
Andover, MA, USA 01810

Tel: 800-735-6200

Fax: 978-475-6715

www.vicorpower.com

email

Customer Service: custserv@vicorpower.com

Technical Support: apps@vicorpower.com

©2019 – 2024 Vicor Corporation. All rights reserved. The Vicor name is a registered trademark of Vicor Corporation.
Molex is a registered trademark of Molex, LLC. Micro-Lock is a trademark of Molex, LLC.

PMBus® is a registered trademark of SMIF, Inc.

Windows is a trademark of Microsoft Corporation

All other trademarks, product names, logos and brands are property of their respective owners.