Introduction

The PMBus-USB Adapter (I2C-ADAPTER-A00) enables communication with the PMBus® interface of Vicor power modules in a VIA package 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). A GUI, available for download on the Vicor website, provides a convenient means for monitoring and control of the power module.

The signal interface of a VIA™ is used for PMBus communication purposes with the provided GUI installed on the user's PC. 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.

Please note that this User Guide applies only to the operation of the I2C-ADAPTER-A00 PMBus-USB Adapter with Vicor converters in a VIA package. Support for all other Vicor products that include I²C™ or PMBus communication capabilities is provided by the I2C-ADAPTER-A02 PMBus-USB Adapter (see reference document UG:901).
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 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 the 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 a 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.
- Signal cables 43503-01 and 43503-02 are rated up to five insertions and extractions into the VIA™ signal cable receptacle. Insert and extract the VIA signal connector cables by firmly grasping the connector body housing. To avoid unnecessary stress on the connector, the cable should be appropriately strain relieved.
**Connector Information – PMBus-USB Adapter**

**Figure 1**

*Host PC to VIA™ power module array connection, PMBus communication interface accessories shown as a typical application set up*
**Application Details**

The PMBus-USB Adapter, along with the listed companion accessories and Vicor Digital Interface Demo GUI, provides a convenient means to demonstrate the PMBus® digital interface offered on Vicor VIA™ 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 in a VIA package
- Vicor Digital Interface Demo Board GUI for PMBus control interface (available on Vicor website HV BCM family page)
- USB connection to host PC
- Provides 5V external bias (VDD)
- Internal 10kΩ clock and data signal line (SCL and SDA) pull-up resistors to 5V VDD
- Isolated PMBus to Host interface \(4242V_{DC}\)
- Measurement of input and output parameters, including but not limited to:
  - Voltage
  - Current
  - Power
  - Temperature
- Fault monitoring, including but not limited to:
  - Overvoltage / Undervoltage
  - Overcurrent
  - Overtemperature
- Enable / Disable control

**Table 1**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB-ADAPTER-1V-B00</td>
<td>Adapter bridge board, for use with single chassis-mount VIA</td>
</tr>
<tr>
<td>USB-ADAPTER-4V-A00</td>
<td>Adapter bridge board, for use with up to four chassis-mount VIAs</td>
</tr>
<tr>
<td>43503-01</td>
<td>VIA Signal Connector cable with Molex® Micro-Lock™ connector (600mm length)</td>
</tr>
<tr>
<td>43503-02</td>
<td>VIA Signal Connector cable with Molex® Micro-Lock™ connector (200mm length)</td>
</tr>
<tr>
<td>I2C-ADAPTER-A00</td>
<td>PMBus-USB Adapter</td>
</tr>
<tr>
<td>Software Interface</td>
<td>Vicor digital interface demo board GUI</td>
</tr>
</tbody>
</table>
VIA™ to Adapter Bridge Board

The Typical Application diagram in Figure 1 shows the connections required to establish PMBus® communication between PMBus-enabled VIA modules and a host PC. The setup for this configuration includes directly connecting the VIA Signal Connector cable to the PMBus signal port on the VIA. The Adapter Bridge Board, as shown in Figure 2 and Figure 3, provides the necessary connections between the VIA Signal Connector Cable and the PMBus-USB Adapter. On Adapter Bridge Board USB-ADAPTER-1V-B00, the VIA PMBus address is programmed to 51h by a pre-installed resistor R02. On the Adapter Bridge Board USB-ADAPTER-4V-A00, the four VIA PMBus addresses are programmed to 51h, 53h, 54h, 55h by pre-installed resistors R02-R05. An LED provides visual indication that VDDB (5V) is present.

Lastly, the PMBus-USB Adapter connects to the user’s computer where the provided Vicor Digital Interface Demo GUI is installed.

Figure 2
USB-ADAPTER-1V-B00
Assembly Drawing and Schematic

TOP VIEW
Figure 3
USB-ADAPTER-4V-A00
assembly drawing and schematic
The following is a list of all connectors and components present on the USB-ADAPTER-1V-B00 and USB-ADAPTER-4V-A00 Adapter Bridge Boards.

### Table 2
**USB-ADAPTER-1V-B00 components**

<table>
<thead>
<tr>
<th>Reference Designator</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Manufacturer Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>R04, R05, R08</td>
<td>RES 0Ω 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73Z1ETTP</td>
</tr>
<tr>
<td>R06</td>
<td>RES 1kΩ 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73H1ETTP1001F</td>
</tr>
<tr>
<td>R01</td>
<td>RES 10kΩ 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73H1ETTP1002F</td>
</tr>
<tr>
<td>R02</td>
<td>RES 1.05kΩ 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73H1ETTP1051F</td>
</tr>
<tr>
<td>C01</td>
<td>CAP X7R 0.1µF 10% 16V 0402</td>
<td>Murata</td>
<td>GRM155R71C104KA88D</td>
</tr>
<tr>
<td>D01</td>
<td>DLED RED SMD 0402</td>
<td>Panasonic</td>
<td>LNJ247W82RA</td>
</tr>
<tr>
<td>J01</td>
<td>CONN MICRO-B USB SMD</td>
<td>TE Connectivity</td>
<td>2174507-2</td>
</tr>
<tr>
<td>J02</td>
<td>CONN MICRO HDR 5POS 1.25mm SINGLE ROW RA</td>
<td>Molex</td>
<td>504195-0570</td>
</tr>
</tbody>
</table>

### Table 3
**USB-ADAPTER-4V-A00 components**

<table>
<thead>
<tr>
<th>Reference Designator</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Manufacturer Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>R01</td>
<td>RES 0Ω JUMPER 1A 0603</td>
<td>KOA Speer</td>
<td>RK73Z1JTTD</td>
</tr>
<tr>
<td>R06, R09</td>
<td>RES 0Ω 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73Z1ETTP</td>
</tr>
<tr>
<td>R08</td>
<td>RES 1kΩ 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73H1ETTP1001F</td>
</tr>
<tr>
<td>R07</td>
<td>RES 10kΩ 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73H1ETTP1002F</td>
</tr>
<tr>
<td>R02</td>
<td>RES 1.05kΩ 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73H1ETTP1051F</td>
</tr>
<tr>
<td>R03</td>
<td>RES 2.8kΩ 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73H1ETTP2801F</td>
</tr>
<tr>
<td>R04</td>
<td>RES 3.92kΩ 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73H1ETTP3921F</td>
</tr>
<tr>
<td>R05</td>
<td>RES 5.23kΩ 1/16W 1% 0402</td>
<td>KOA Speer</td>
<td>RK73H1ETTP5231F</td>
</tr>
<tr>
<td>C01</td>
<td>CAP X7R 0.1µF 10% 16V 0402</td>
<td>Murata</td>
<td>GRM155R71C104KA88D</td>
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<td>D01</td>
<td>DLED RED SMD 0402</td>
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<td>J01</td>
<td>CONN MICRO-B USB SMD</td>
<td>TE Connectivity</td>
<td>2174507-2</td>
</tr>
<tr>
<td>J02, J03, J04, J05</td>
<td>CONN MICRO HDR 5POS 1.25mm SINGLE ROW RA</td>
<td>Molex</td>
<td>504195-0570</td>
</tr>
</tbody>
</table>
GUI Configuration

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. Confirm illumination of the LED on the Adapter Bridge Board as a visual indication that VDDB bias is present.
2. Power up module within the input voltage continuous operating range specified by the device data sheet.
3. Open the Vicor Digital Interface Demo Board software installed on the connected host PC.
4. Go to Tools -> Scan for Digital Supervisor to detect Digital Supervisor as shown in Figure 4.1.
5. Go to Tools -> Scan for Devices and select desired power module device as shown in Figure 4.2.
6. Verify the desired power module device is selected (highlighted in green) for communication through the GUI.
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